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

11-AMRC-0113

MAR 28 2011

Mr. D. A. Faulk, Program Manager
Office of Environmental Cleanup
Hanford Project Office
U.S. Environmental Protection Agency
309 Bradley Boulevard, Suite 115
Richland, Washington 99352

Dear Mr. Faulk:

TRANSMITTAL OF THE APPROVED WASTE SITE RECLASSIFICATION FORM AND SUPPORTING DOCUMENTATION FOR THE 600-120, WHITE BLUFFS SPARE PARTS BURN PIT AND 600-297, WHITE BLUFFS IMHOFF TANK, REVISION 0

Attached for your use is the approved Waste Site Reclassification Form No. 2004-063 and 2011-006 and supporting "Remaining Sites Verification Package for the 600-120, White Bluffs Spare Parts Burn Pit and 600-297, White Bluffs Imhoff Tank," Revision 0. If you have questions, please contact me or your staff may contact Jamie Zeisloft, of my staff, at (509) 372-0188.

Sincerely,

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

AMRC:JHZ

Attachment

cc w/attach:
C. J. Guzzetti, EPA
Administrative Record, H6-08

cc w/o attach:
S. L. Feaster, WCH
T. A. Foster, WCH
M. L. Proctor, WCH

Date Submitted: 02/02/2011 Originator: M. L. Proctor Phone: 372-9227	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-IU-2 Waste Site Code: 600-120 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2004-063

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

Description of current waste site condition:

The 600-120, White Bluffs Spare Parts Burn Pit waste site was used for disposal of industrial and commercial wastes including flammable wastes, solvents, and waste soils from 1943 to 1948. The depression measured approximately 110 by 65 m (360 by 215 ft). The 600-120 waste site is identified as a remaining site for remediation in 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 (EPA 1999).

Remedial action at the 600-120 waste site was performed from January to March 2010. The remediation resulted in approximately 1 m (3 ft) of material scraped from the surface and placed in staging piles adjacent to the waste site prior to being sent to the Environmental Restoration Disposal Facility. An additional small excavated area is also a part of the 600-120 waste site, and extended to a depth of 8 m (28 ft) as a part of the removal of the 600-297 White Bluffs Imhoff Tank. Per regulatory approval, the 600-120 waste site information is being used to reclassify the 600-297 waste site to Interim Closed Out, as described in the Waste Site Reclassification Form for the 600-297 Waste Site, Control Number 2011-006 (attached). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the Environmental Restoration Disposal Facility 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:

Following remediation, verification sampling was conducted in September 2010. The sample results were evaluated in comparison to the remedial action goals (RAGs). The results demonstrate that residual contaminant concentrations meet direct exposure cleanup criteria and are protective of groundwater and the Columbia River.

In accordance with this evaluation, the verification sampling results support a reclassification of the 600-120 waste site to Interim Closed Out. The current site conditions achieve the RAGs established by the Remaining Sites ROD (EPA 1999). The results of verification sampling 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 analytical results and rationale presented in the attached remaining sites verification package also demonstrate that the 600-120 waste site is protective of groundwater and the Columbia River. Institutional controls to prevent uncontrolled drilling or excavation into the deep-zone soil are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 600-120, White Bluffs Spare Parts Burn Pit* (attached).

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)	M S French Signature	3/2/11 Date
N/A Ecology Project Manager (printed)	Signature	Date
L Buelow for C. Guzzetti EPA Project Manager (printed)	Signature	3/16/11 Date

Date Submitted: 2/02/2011 Originator: M. L. Proctor Phone: 372-9227	**WASTE SITE RECLASSIFICATION FORM** Operable Unit(s): 100-IU-2 Waste Site Code: 600-297 Type of Reclassification Action: Closed Out ☐ Interim Closed Out ☒ No Action ☐ RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	Control Number: 2011-006

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

Description of current waste site condition:

The 600-297, White Bluffs Imhoff Tank waste site was thought to have supported a sanitary sewer system based on the historic drawing for the White Bluffs shop area (GE, 1948, "White Bluffs Central Shops Plot Plan," H-11-3709, General Electric Company, Richland, Washington). However, this tank was actually used to facilitate the separation of solids before discharge of liquids to the filter and leaching bed where spent pickling acid waste was disposed. During remediation of the 600-120 waste site, the 600-297 tank was removed. The 600-297 waste site was included in the *Explanation of Significant Differences for the 100 Area Remaining Sites Interim Remedial Action Record of Decision, Hanford Site, Benton County, Washington*, U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 2009) as a candidate site for further evaluation. Per regulatory agreement, the 600-297 tank was removed during remediation of the 600-120 waste site (see the Waste Site Reclassification Form for the 600-120 Waste Site, Control Number 2004-063 [attached]). Cleanup verification sampling of the 600-297 waste site was included with the cleanup verification sampling for the 600-120 waste site. All work was done in accordance with remedial action objectives and remedial action goals (RAGs) established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington (EPA 1999). The selected remedy involved (1) excavating the site to the extent required to meet specified soil cleanup levels, (2) disposing of contaminated excavation materials at the Environmental Restoration Disposal Facility 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:

Following remediation of the 600-120 waste site, verification sampling was performed that included the area where the 600-297 Imhoff tank had been located. In accordance with this evaluation, the verification sampling results support a reclassification of the 600-297 waste site to Interim Closed Out. The current site conditions achieve the RAGs established by the Remaining Sites ROD (EPA 1999). The results of verification sampling 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 analytical results and rationale presented in the attached remaining sites verification package also demonstrate that the 600-297 waste site is protective of groundwater and the Columbia River. Institutional controls to prevent uncontrolled drilling or excavation into the deep-zone soil are not required. The basis for reclassification of the 600-297 waste site is described in detail along with the basis for reclassification of the 600-120 waste site in the *Remaining Sites Verification Package for the 600-120, White Bluffs Spare Parts Burn Pit* (attached).

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)	M S French Signature	3/12/11 Date
N/A Ecology Project Manager (printed)	Signature	Date
L Buelow for C. Guzzetti EPA Project Manager (printed)	Signature	3/16/11 Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 600-120, WHITE BLUFFS SPARE PARTS BURN PIT AND 600-297, WHITE BLUFFS IMHOFF TANK

Attachment to Waste Site Reclassification Forms 2004-063 and 2011-006

March 2011

REMAINING SITES VERIFICATION PACKAGE FOR THE 600-120, WHITE BLUFFS SPARE PARTS BURN PIT AND 600-297, WHITE BLUFFS IMHOFF TANK

EXECUTIVE SUMMARY

The 600-120, White Bluffs Spare Parts Burn Pit waste site, located in the 100-IU-2 Operable Unit, was believed to have been a burn pit that was used for disposal of industrial and commercial wastes, including flammable wastes, solvents, and waste soils. However, no evidence of burning was found on the site surface. The 600-297, White Bluffs Imhoff Tank waste site, was believed to have been a septic tank associated with the White Bluffs sanitary sewer system. However, during remediation, this tank was determined to resemble an old boiler.

A focused confirmatory sampling approach was chosen for the 600-120 waste site (BHI 2004b). The 600-120 waste site was divided into three areas for confirmatory sampling, based on historical information, results of the geophysical survey, walkdown observations, anticipated sources of contamination, and the potential for different remedial actions in the three areas (BHI 2004b). Confirmatory sampling was conducted in March 2004, and it was determined that remedial action was necessary in areas 1 and 3.

Area 1 was a large depression that appeared to be an abandoned burn pit, backfilled with coal ash. Two test trenches were excavated for confirmatory sampling in area 1. Evidence of vitrified clay pipe, rubber, burned wood, and coal were found. Confirmatory samples collected from the coal ash and native soil locations in area 1 found that direct exposure remedial action goals (RAGs) were exceeded for benzo(a)pyrene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene, indicating that site remediation was required. Barium, copper, and selenium were also present in concentrations exceeding soil cleanup criteria for groundwater or river protection.

Area 2 was identified during the geophysical survey as a trench-like feature, southeast of area 1, trending from southwest to northeast. Two confirmatory sampling test trenches were excavated in area 2. Remedial action was determined to be unnecessary at area 2, because the sample results did not exceed the RAGs, and no suspected hazardous material was found.

Area 3 was indentified during the geophysical survey as a depression northeast of area 1 where buried debris was suspected to be present. One test trench was excavated in area 3 for confirmatory sampling. Concrete walls, debris, coal ash, apparent rust, and oil stained soil were all observed in this test trench. Three of the concrete walls extended to a depth greater than 4 m (13 ft), and were thought to be associated with the pipes that led to the Pickling Acid Crib that were uncovered in area 2. The ash found in the area 3 test trench was similar to that of area 1, and no sample was collected. Confirmatory samples of stained soils showed lead and silver concentrations in excess of direct exposure cleanup RAGs. Herbicides, pesticides, and polychlorinated biphenyls (PCBs) were also present in concentrations exceeding soil cleanup criteria for groundwater or river protection.

Based on the confirmatory sampling results and the site history, area 1 and area 3 of the 600-120 waste site were recommended for remove, treat, and dispose (RTD). Area 2 was determined not to need remediation.

Remediation occurred from January 7 to March 15, 2010. Materials that were excavated as a part of this remediation included coal ash and a concrete structure determined to be from the 600-297 White Bluffs Imhoff Tank waste site. The concrete was fully removed and the bottom of the structure was at approximately 8 m (28 ft) below ground surface. Groundwater was encountered at this location after the 600-297 waste site tank removal. Cleanup verification sampling of the 600-120 waste site included the area of the 600-297 waste site.

Following remediation, verification sampling was conducted in September 2010. The results indicated that the waste removal action achieved compliance with the remedial action objectives (RAOs) and RAGs for the 600-120 and 600-297 waste sites. A summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table ES-1. The results of the verification sampling are used to make reclassification decisions for the 600-120 and 600-297 waste sites in accordance with the TPA-MP-14 procedure in the *Tri-Party Agreement Handbook Management Procedures* (DOE-RL 2007).

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. 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). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow-zone soil (i.e., surface to 4.6 m [15 ft]), and contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The 600-120 and 600-297 waste sites do not have a deep zone; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Those constituents exceeding the ecological screening level in the *Washington Administrative Code* Chapter 173-340, Table 749-3 were boron, vanadium, and zinc. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for manganese, vanadium, and zinc. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum detected levels of manganese, vanadium, and zinc are below Hanford Site background levels, 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.

Table ES-1. Summary of Remedial Action Goals for the 600-120 and 600-297 Waste Sites.

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	Radionuclides were not COPCs for the 600-120 and 600-297 waste site.	Yes
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COC and COPC concentrations are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	The hazard quotients for individual nonradionuclide COCs/COPCs are <1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient for all sampling areas (1.4×10^{-3}) is <1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	Excess cancer risk values for individual nonradionuclide COCs/COPCs are $<1 \times 10^{-6}$.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess carcinogenic risk for all sampling areas (2.2×10^{-7}) is $<1 \times 10^{-5}$.	
Groundwater/River Protection – Radionuclides	Attain single COC groundwater and river RAGs.	Radionuclides were not COPCs for the 600-120 and 600-297 waste site.	Yes
	Attain National Primary Drinking Water Regulations: 4 mrem/yr (beta/gamma) dose standard to target receptor/organ [a].		
	Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25th of the derived concentration guide for DOE Order 5400.5 [b].		
	Meet total uranium standard of 21.2 pCi/L [c].		
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and Columbia River cleanup requirements.	All individual nonradionuclide groundwater and Columbia River cleanup requirements have been met.	Yes

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

COC = contaminant of concern
COPC = contaminant of potential concern
MCL = maximum contaminant level
RAG = remedial action goal

REMAINING SITES VERIFICATION PACKAGE FOR THE 600-120, WHITE BLUFFS SPARE PARTS BURN PIT AND 600-297, WHITE BLUFFS IMHOFF TANK

STATEMENT OF PROTECTIVENESS

The 600-120, White Bluffs Spare Parts Burn Pit waste site verification sampling data, site evaluations, and supporting documentation demonstrate that this site and the 600-297 waste site meet the objectives established in the *Remedial Design Report/Remedial Action Work Plan for the 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). These results show that residual soil concentrations support future land uses that can be represented (or bounded) by a rural-residential scenario. The results also demonstrate that residual contaminant concentrations support unrestricted future use of shallow-zone soil (i.e., surface to 4.6 m [15 ft]) and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. These sites do not have a deep zone; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based in part on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Those constituents exceeding the ecological screening level in the *Washington Administrative Code* Chapter 173-340, Table 749-3 were boron, vanadium, and zinc. U.S. Environmental Protection Agency ecological soil screening levels were exceeded for manganese, vanadium, and zinc. Exceedance of screening values is intended to trigger additional evaluation and does not necessarily indicate the existence of risk to ecological receptors. Because the maximum detected levels of manganese, vanadium, and zinc are below Hanford Site background levels, 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.

GENERAL SITE INFORMATION AND BACKGROUND

The 600-120, White Bluffs Spare Parts Burn Pit waste site, located in the 100-IU-2 Operable Unit, was thought to have been used for disposal of industrial and commercial wastes, including flammable wastes, solvents, and waste soils. Coal ash appears to have served as backfill at the site. The *White Bluffs, 100-IU-2 Operable Unit Technical Baseline Report* (BHI 1995) refers to the waste site as a burn pit known to have been in operation from 1943 to 1948; however, no evidence of burning was found on the site surface. The 600-120 waste site is located west of

Route 2 North, approximately 400 m (1,320 ft) southeast of Federal Avenue, and north of the White Bluffs Pickling Acid Cribs. The center of the waste site is at approximate Washington State Plane (WSP) coordinates N 147624.9, E 577867.7.

The 600-297, White Bluffs Imhoff Tank waste site, located in the 100-IU-2 Operable Unit, was thought to have consisted of a septic tank associated with the White Bluffs sanitary sewer system. However, during remediation of this waste site, it was determined that the structure was actually an old boiler, and was likely not associated with the sanitary sewer system. Both waste sites are shown in Figure 1.

Geophysical Survey

A geophysical survey was performed on the 600-120 waste site and surrounding area in 2004 (BHI 2004b). An anomalous zone of buried debris was identified, which appeared to be a sort of trench containing possible buried debris. An additional area of buried metallic debris was identified as correlating with a visible surface depression. Other features identified in the geophysical survey had the character of imported materials or debris that is commonly associated with roads and parking areas, such as basalt-rich bedding gravel (Figure 2).

A geophysical survey was performed on the 600-297 waste site in 2007 (WCH 2007). A feature that was suspected to be the buried White Bluffs Imhoff Tank was identified (Figure 3).

Site Walkdown

A site walkdown for the 600-120 waste site was performed in February 2004 to verify the waste site location, evaluate field conditions and sampling strategies, and locate any anomalies (BHI 2004a). During the walkdown, the site was identified as a previous burn area. It was noted that coal ash piles were present on the surface. Photographs of the walkdown are provided in Appendix A.

CONFIRMATORY SAMPLING ACTIVITIES

The 600-120 waste site was divided into three areas for confirmatory sampling, based on historical information, results of the geophysical survey, walkdown observations, anticipated sources of contamination, and the potential for different remedial actions in the three areas (BHI 2004b). Area 1 was a large depression that appeared to be an abandoned burn pit, backfilled with coal ash, and measured approximately 65 by 110 m (213 by 360 ft). Area 2 was identified during the geophysical survey as a trench-like feature, southeast of area 1, trending from southwest to northeast. Area 2 measured approximately 15 by 110 m (50 by 360 ft). Area 3 was indentified during the geophysical survey as a depressed area northeast of the burn pit where buried debris was suspected to be present, and measured approximately 2 by 6 m (6 by 20 ft). Confirmatory sampling was conducted in March 2004, and it was determined that remedial action was necessary in areas 1 and 3.

Figure 1. The 600-120 Waste Site Location Map.

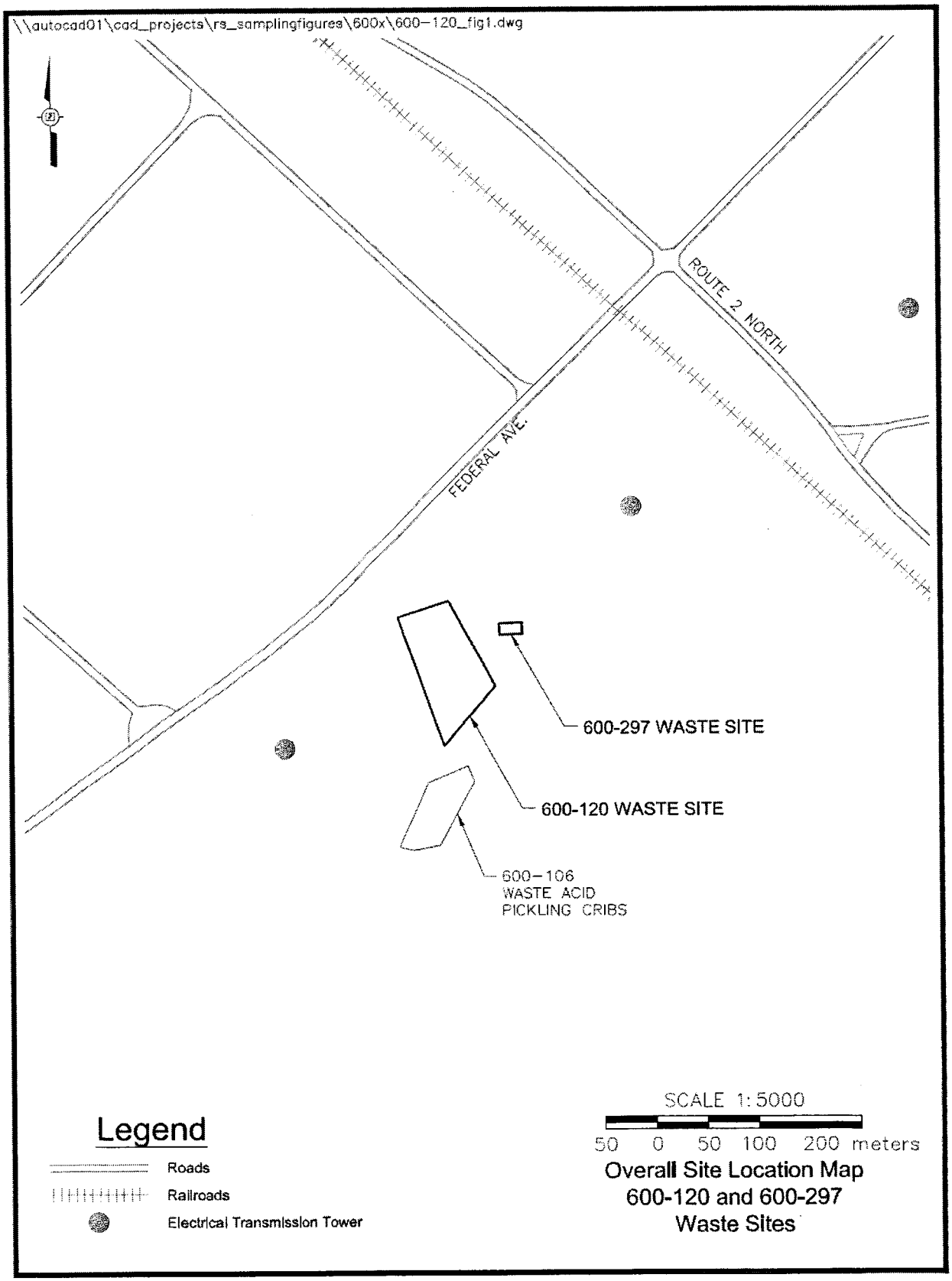


Figure 2. The 600-120 Waste Site Geophysical Interpretation.

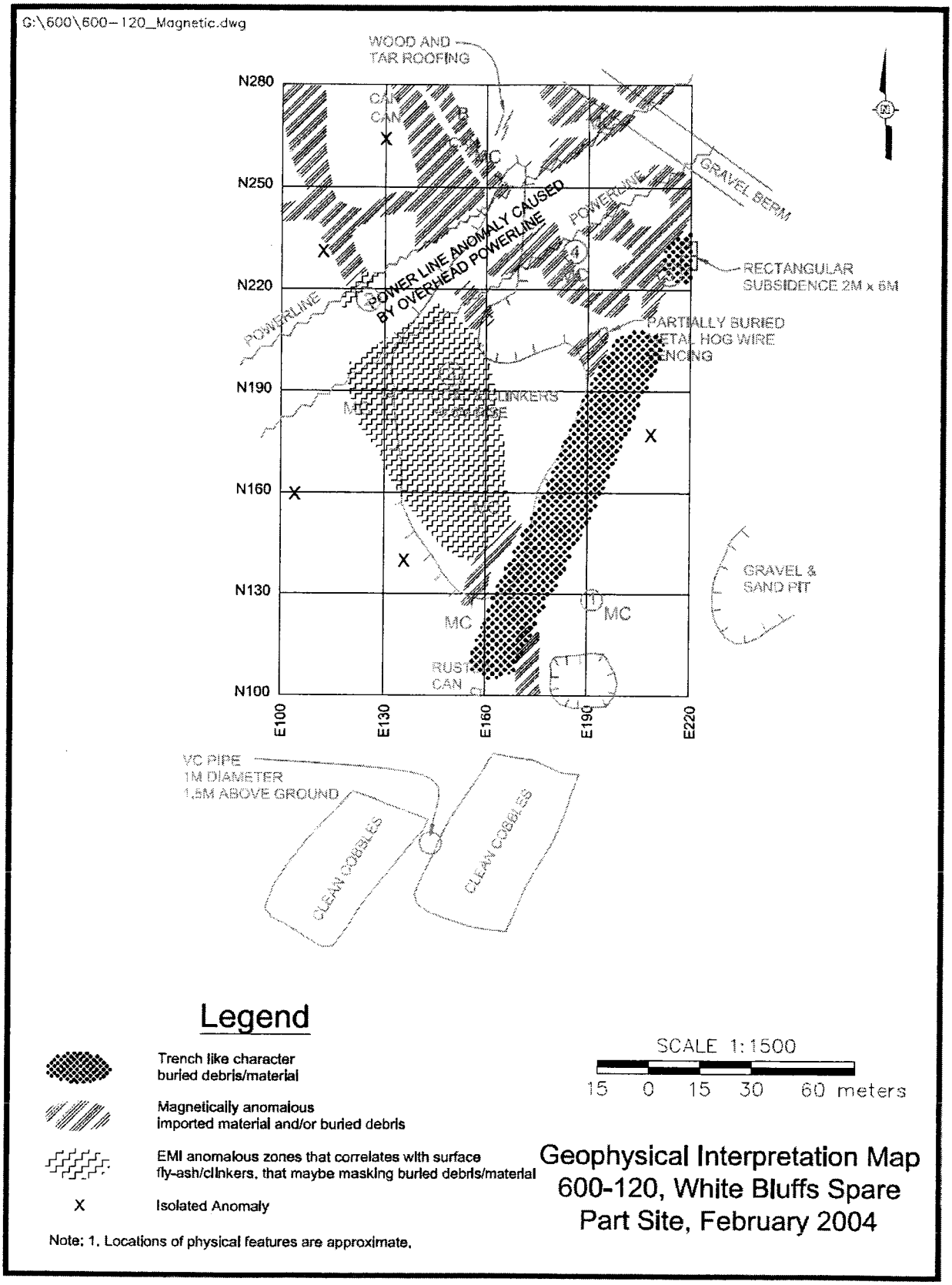
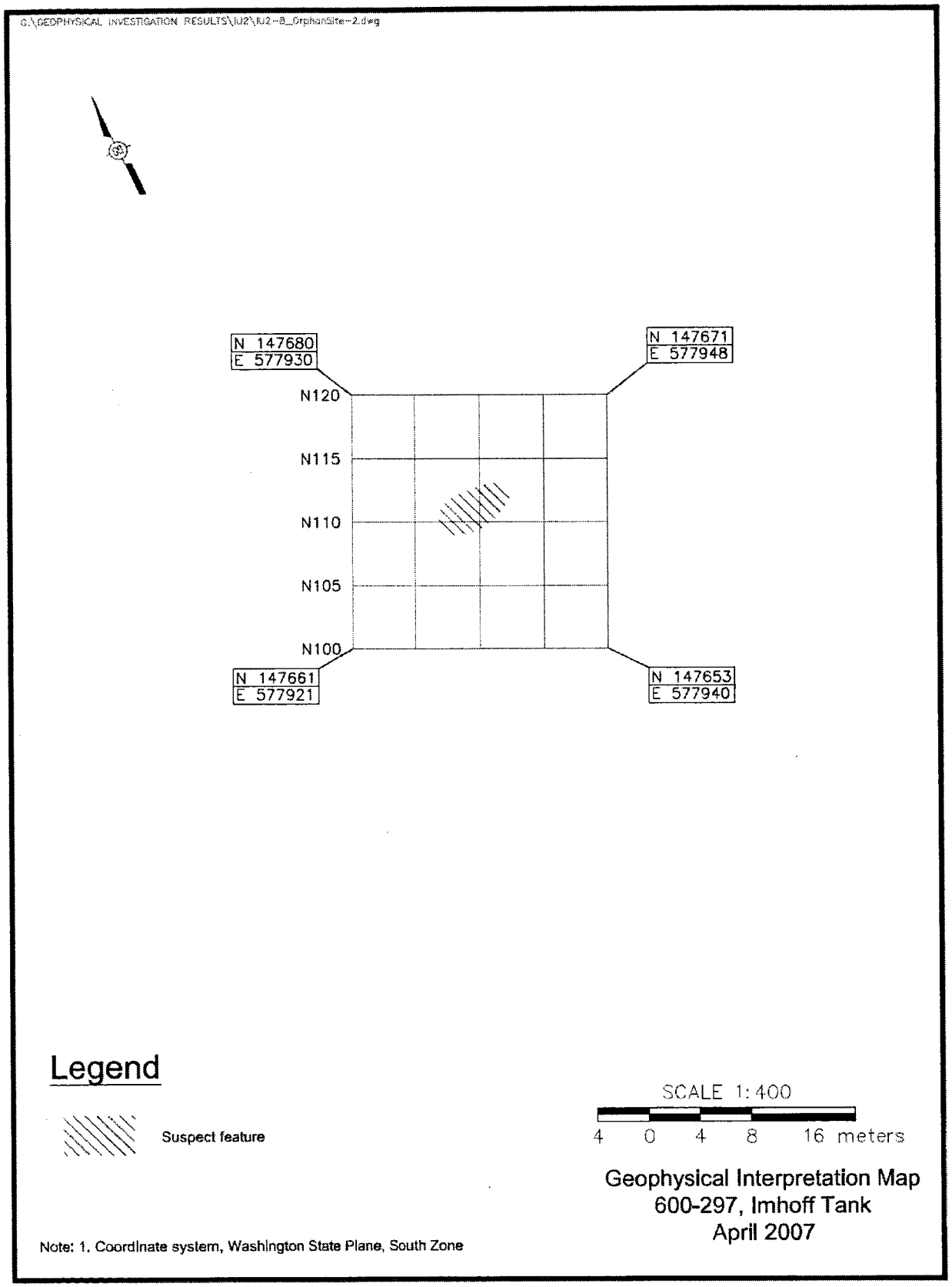


Figure 3. The 600-297 Waste Site Geophysical Interpretation.



Area 1 underwent confirmatory sampling by excavation of two test trenches, one in the southern portion of the burn pit area, and one in the northern portion. Both test trenches were approximately 10 m (32 ft) long, and native soil was reached at 1.2 to 1.5 m (4 to 5 ft) below ground surface (bgs). Both trenches were extended to 2 m (7 ft) bgs due to materials that were uncovered. In the southern trench, these buried materials included vitrified clay pipe, rubber, burned wood, and coal. No other evidence of burned material was found. Confirmatory samples were taken from the coal ash locations and native soil locations. The northern test trench consisted of gravel and sand. The contaminants of potential concern (COPCs) that did not meet the remedial action goals (RAGs) during confirmatory sampling included semivolatile organic compounds (SVOCs) and inductively coupled plasma (ICP) metals; therefore, area 1 was recommended for remedial action.

Area 2 also underwent confirmatory sampling by excavation of two test trenches, approximately 10 m (32 ft) in length. In the first test trench, a 7-cm (3-in.)-diameter carbon-steel pipe was found, and was determined to be associated with the 600-106, White Bluffs Pickling Acid Crib waste site. This pipe needed no remedial action based on this association. A sample was collected from the soil beneath the discovered pipe for informational purposes, but was not requested by the confirmatory sampling plan. The second test trench also uncovered two pipes trending to the pickling acid crib, and no sample was collected at this location. Remedial action was determined to be unnecessary at area 2, because the sample results did not exceed the RAGs, and no suspected hazardous material was found. The pipes found also do not require remedial action as described in the *Record of Decision for the 100-IU-1, 100-IU-3, 100-4, and 100-IU-5 Operable Units, Hanford Site, Benton County, Washington*, which states that no further action is required for the White Bluffs Pickling Acid Cribs operable unit (EPA 1996).

Area 3 underwent confirmatory sampling by excavation of one test trench approximately 24 m (80 ft) in length. Concrete walls, debris, coal ash, apparent rust, and oil stained soil were all observed in this test trench. Three of the concrete walls extended to a depth greater than 4 m (13 ft), and were thought to be associated with the pipes uncovered in area 2 that led to the pickling acid crib. The ash found in the area 3 test trench was similar to that of area 1, and no sample was collected. Confirmatory samples were collected of the stained soils. Area 3 was recommended for remedial action because the stained soil samples exceeded RAGs for ICP metals, herbicides, pesticides, and polychlorinated biphenyls (PCBs).

REMEDIAL ACTION SUMMARY

Based on the confirmatory sampling results and site history, the 600-120 waste site was recommended for remove, treat, and dispose (RTD). At this time, the 600-297 waste site had not been identified.

Remedial Action

Remediation occurred from January 7 to March 15, 2010, and only areas 1 and 3 of the 600-120 waste site were remediated, along with the structure associated with the 600-297 waste site. Dark soil that was observed in the sidewall during confirmatory sampling was determined to be

coal ash that extended into the excavation. Stained areas of soil observed during confirmatory sampling were fully removed.

On January 7, 2010, several concrete structures were encountered during initial remediation. A 10-cm (4-in.)-diameter vitrified clay pipe was found protruding from each of the concrete structures. It was later determined that the concrete structures were related to the 600-297, White Bluffs Imhoff Tank waste site. During demolition of the concrete structures, a 114-L (30-gal) tank was encountered on January 11, 2010. This tank, anomaly ID IU-2/6-120-10-001, resembled an old boiler, and contained a small amount of black, non-oily, non-viscous liquid. A sample (J19WT1) was taken of this liquid on April 14, 2010, and sample results are provided in the verification work instruction (WCH 2010b). The concrete was fully removed and the bottom of the structure was at approximately 8 m (28 ft) bgs. Groundwater was encountered at this location after the 600-297 waste site tank removal. The verification sampling data for the 600-120 waste site will be used for interim closure verification of the 600-297 waste site because of the proximity of the 600-120 waste site to the 600-297 waste site (Figure 4). Photographs of the remediation are provided in Appendix A.

Other waste characterization samples were also collected on January 11, 2010. Samples J19FB9 (main) and J19FC0 (duplicate) were collected from stockpiled soil and coal ash material removed from the ground at WSP coordinates N 147662.8, E 577921.4. On March 15, 2010, in-process samples were collected from random aliquots of soil distributed across the 600-120 waste site. Samples from the confirmatory, waste characterization, and in-process sampling are summarized in Table 1 and the data are provided in the verification work instruction (WCH 2010b).

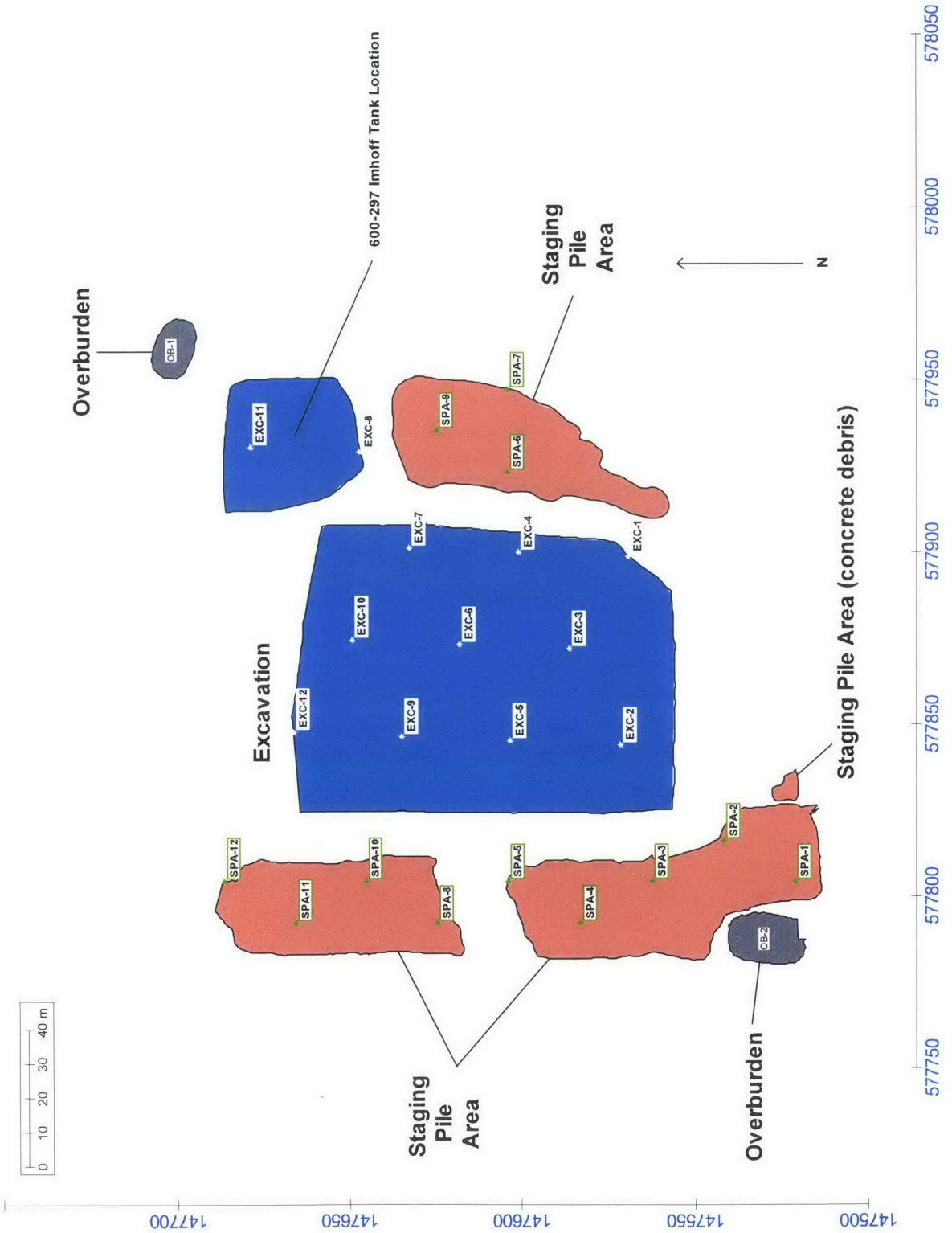
VERIFICATION SAMPLING ACTIVITIES

Verification sampling for the 600-120 and 600-297 waste sites was conducted in August 2010 to support a determination that residual contaminant concentrations at this site meet the cleanup criteria specified in the RDR/RAWP (DOE-RL 2009b) and the Remaining Sites ROD (EPA 1999). The verification sample results are provided in Appendix B and indicate that the waste removal action achieved compliance with the remedial action objectives (RAOs) for the 600-120 and 600-297 waste sites. The following subsections provide additional discussion of the information used to develop the verification sampling design. A more detailed discussion of the verification sampling can be found in the *Work Instruction for Verification Sampling of the 600-120, White Bluffs Spare Parts Burn Pit* (WCH 2010b).

Contaminants of Potential Concern

The COPCs for the 600-120 and 600-297 waste sites were preliminarily identified in the 100 Area RDR/RAWP (DOE-RL 2009b) as PCBs, pesticides, SVOCs, total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), asbestos, silver, cadmium, barium, chromium (total), hexavalent chromium, mercury, lead, selenium, and sulfate. Confirmatory sampling results for the 600-120 waste site, field observations during remediation, waste characterization sampling results, and in-process sampling results (WCH 2010b) were then used to refine the list of COPCs for verification sampling.

Figure 4. The 600-120 and 600-297 Waste Sites Verification Sample Locations.



Asbestos-containing material was not encountered during remedial activities; therefore, asbestos was eliminated as a COPC. Hexavalent chromium was not analyzed for, but was not anticipated in the waste stream based on process knowledge; therefore, it was not included as a COPC. Mercury was detected at less than background in all samples, and was excluded as a COPC. Confirmatory, waste characterization, and in-process samples were not analyzed for sulfate; however, process knowledge indicated that this constituent was not of concern because the soil cleanup criteria for protection of groundwater is 25,000 mg/kg (DOE-RL 2009b). Although herbicides were detected during confirmatory sampling, the detections were much less than the applicable RAGs, and herbicides were not detected in subsequent waste characterization and in-process samples; therefore, they were excluded as COPCs. PCBs were detected above groundwater or river protection RAGs during confirmatory and waste characterization sampling, and although they were undetected during subsequent in-process sampling, they were included as COPCs due to the previous detections and the nature of waste at the site. Pesticides were detected during confirmatory and waste characterization sampling, and were undetected during subsequent in-process sampling; however, they were included as COPCs due to the initial detections.

Semivolatile organic compounds (SVOCs) were detected at less than the practical quantitation limit during confirmatory sampling, and were all undetected during in-process sampling; therefore, they were excluded as COPCs. VOCs were not detected in the field during confirmatory sampling or remediation, and were undetected during waste characterization sampling; therefore, they were excluded as COPCs.

Barium, cadmium, copper, lead, selenium, and silver were included as COPCs based on sample results greater than the applicable RAGs during confirmatory sampling and detection in subsequent samples. TPH and PAH were included as COPCs because of detection during in-process sampling. Although not considered COPCs, analyses for the remaining constituents of the expanded ICP metals list included antimony, arsenic, beryllium, boron, chromium, cobalt, manganese, molybdenum, nickel, vanadium, and zinc.

Cleanup verification samples were analyzed using EPA-approved analytical methods. Table 1 identifies the analyses for verification sampling.

Table 1. 600-120 and 600-297 Laboratory Analytical Methods.

Analytical Method	Contaminant of Potential Concern
ICP metals [a] – EPA Method 6010	Barium, cadmium, lead, silver
PAH – EPA Method 8310	Polycyclic aromatic hydrocarbons
Pesticides – EPA Method 8081	Pesticides
PCB – EPA Method 8082	Polychlorinated biphenyls
TPH – NWTPH-Dx [b]	Total petroleum hydrocarbons

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

[b] NWTPH-Dx analyzes for both diesel and heavy oil range organics.

EPA = U.S. Environmental Protection Agency
ICP = inductively coupled plasma
NWTPH-Dx = Northwest total petroleum hydrocarbons – diesel range organics
PCB = polychlorinated biphenyls
TPH = total petroleum hydrocarbons

Verification Sample Design

This section describes the basis for selection of an appropriate sample design and determination of the number of verification samples that were collected. All sampling was performed in accordance with the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2009a). Professional knowledge and the laboratory results of confirmatory, waste characterization and in-process sampling were used to develop the verification sampling design for the 600-120 and 600-297 waste sites. A statistical sampling design was used to collect samples from the excavation and staging pile areas, at the coordinates provided in Table 2. A composite sampling design was used for the two overburden piles. Figure 4 shows the waste site footprint and the sampling locations.

The waste site was excavated to a depth of approximately 1 m (3 ft) bgs, with the exception of the center of the Imhoff tank location, which was excavated to approximately 8 m (28 ft) where groundwater was encountered.

Table 2. 600-120 and 600-297 Verification Sampling Summary Table. (2 Pages)

Sample Location	HEIS Number	Northing (m)	Easting (m)	Sample Analysis
EX-1	J1BYN4	147569.1	577898.2	ICP metals [a], PAH, PCBs, TPH, pesticides
EX-2	J1BYN5	147571.4	577843.5	
EX-3	J1BYN6	147586.0	577871.5	
EX-4	J1BYN7	147600.7	577899.5	
EX-5	J1BYN8	147602.9	577844.8	
EX-6	J1BYN9	147617.6	577872.8	
EX-7	J1BYP0	147632.3	577900.8	
EX-8	J1BYP1	147646.9	577928.8	
EX-9	J1BYP2	147634.5	577846.1	
EX-10	J1BYP3	147649.2	577874.1	
EX-11	J1BYP4	147678.5	577930.1	
EX-12	J1BYP5	147666.1	577847.4	
Duplicate of EX-4	J1BYP6	147600.7	577899.5	
SPA-1	J1BYP7	147521.0	577803.8	
SPA-2	J1BYP8	147541.7	577815.7	
SPA-3	J1BYP9	147562.3	577803.8	
SPA-4	J1BYR0	147583.0	577791.9	
SPA-5	J1BYR1	147603.6	577803.8	
SPA-6	J1BYR2	147603.6	577923.0	
SPA-7	J1BYR3	147603.6	577946.8	
SPA-8	J1BYR4	147624.2	577791.9	
SPA-9	J1BYR5	147624.2	577934.9	
SPA-10	J1BYR6	147644.9	577803.8	
SPA-11	J1BYR7	147665.5	577791.9	
SPA-12	J1BYR8	147686.1	577803.8	
Duplicate of SPA-7	J1BYR9	147603.6	577946.8	
OB-1 (NE end)	J1BYT0	NA	NA	

Table 2. 600-120 and 600-297 Verification Sampling Summary Table. (2 Pages)

Sample Location	HEIS Number	Northing (m)	Easting (m)	Sample Analysis
OB-2 (SW end)	J1BYT1	NA	NA	
Duplicate of OB-2	J1BYT2	NA	NA	
Equipment blank	J1BYT3	NA	NA	ICP metals [a]

[a] Analyses were 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.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PAH = polycyclic aromatic hydrocarbons
PCB = polychlorinated biphenyl
TPH = total petroleum hydrocarbons

Verification Sample Results

The 95% upper confidence limits (UCLs) on the true population means for residual concentrations of COPCs were calculated for the excavation and staging pile area decision units as specified by the RDR/RAWP (DOE-RL 2009b), with calculations provided in Appendix B. When a nonradionuclide COPC was detected in fewer than 50% of the verification samples collected for the area, 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 evaluation or calculations were performed for that COPC. Comparisons of the statistical results for COPCs and the site RAGs for the excavation, staging pile area, and overburden stockpile are presented in Tables 3, 4, and 5, respectively.

Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium are not presented in the RDR/RAWP (DOE-RL 2009b). Parameters to calculate cleanup levels for these constituents are not presented in the Cleanup Levels and Risk Calculations (CLARC) Database (Ecology 2009) under WAC 173-340-740(3) or other reference databases; therefore, these constituents are not considered COPCs and are not included in the tables. The laboratory-reported data results for all constituents are stored in the Environmental Restoration (ENRE) project-specific database prior to provision to the Hanford Environmental Information System (HEIS) and are presented as an attachment to the 95% UCL calculation in Appendix B.

Table 3. Comparison of Statistical Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Excavation Verification Sampling Data. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	2.87 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	64.7 (<BG)	5,600	200	400	No	--
Beryllium	0.243 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	4.14	7,200	320	-- [f]	No	--
Cadmium [g]	0.107 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium (total)	10.9 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	5.62 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	12.2 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	4.46 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	265 (<BG)	3,760	512 [c]	512 [c]	No	--
Molybdenum [e]	0.282	400	8	-- [f]	No	--
Nickel	10.6 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	44.4 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	33.5 (<BG)	24,000	480	67.8 [c]	No	--
TPH – motor oil	10.9	200	200	200	No	--
Acenaphthene	0.00272	4,800	96	129	No	--
Anthracene	0.00173	24,000	240	1,920	No	--
Benzo(a)anthracene	0.000856	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(a)pyrene	0.00225	0.137	0.015 [h]	0.015 [h]	No	--
Benzo(b)fluoranthene	0.00148	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(ghi)perylene [i]	0.00448	2,400	48	192	No	--
Benzo(k)fluoranthene	0.000906	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.00215	13.7	0.12	0.1 [h]	No	--
Dibenz(a,h)anthracene	0.000940	1.37	0.03 [h]	0.03 [h]	No	--
Fluoranthene	0.00282	3,200	64	18.0	No	--
Indeno(1,2,3-cd)pyrene	0.00262	1.37	0.33 [h]	0.33 [h]	No	--
Phenanthrene [i]	0.00185	24,000	240	1,920	No	--

Table 3. Comparison of Statistical Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Excavation Verification Sampling Data. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.00428	2,400	48	192	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009b) unless otherwise noted.
[b] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 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] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3) (1996) (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.
[f] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2009) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii] [Ecology 1996] [Method B for surface waters]).
[g] 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).
[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).
[i] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: Contaminant: benzo(ghi)perylene, surrogate: pyrene; phenanthrene, surrogate: anthracene.

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

Table 4. Comparison of Statistical Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Staging Pile Area Verification Sampling Data. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	2.68 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	64.8 (<BG)	5,600	200	400	No	--
Beryllium	0.238 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	2.66	7,200	320	-- [f]	No	--
Cadmium [g]	0.106 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium (total)	9.56 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	5.76 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	11.5 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	3.27 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	272 (<BG)	3,760	512 [c]	512 [c]	No	--
Molybdenum [e]	0.264	400	8	-- [f]	No	--
Nickel	9.57 (<BG)	1,600	19.1 [c]	27.4	No	--

Table 4. Comparison of Statistical Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Staging Pile Area Verification Sampling Data. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Vanadium	46.8 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	34.8 (<BG)	24,000	480	67.8 [c]	No	--
TPH – motor oil	19.2	200	200	200	No	--
Acenaphthene	0.0183	4,800	96	129	No	--
Acenaphthylene [i]	0.0872	4,800	96	129	No	--
Anthracene	0.000862	24,000	240	1,920	No	--
Benzo(a)anthracene	0.00267	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(a)pyrene	0.00803	0.137	0.015 [h]	0.015 [h]	No	--
Benzo(b)fluoranthene	0.00818	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(ghi)perylene [i]	0.0318	2,400	48	192	No	--
Benzo(k)fluoranthene	0.00365	1.37	0.015 [h]	0.015 [h]	No	--
Beta-BHC	0.00150	0.556	0.00486	0.00554	No	--
Chrysene	0.000997	13.7	0.12	0.1 [h]	No	--
Dibenz(a,h)anthracene	0.00701	1.37	0.03 [h]	0.03 [h]	No	--
4,4'-DDE	0.00171	2.94	0.0257	0.0033 [h]	No	--
Fluoranthene	0.0265	3,200	64	18.0	No	--
Fluorene	0.00816	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.190	1.37	0.33 [h]	0.33 [h]	No	--
Napthalene	0.0122	1,600	16.0	988	No	--
Phenanthrene [i]	0.00725	24,000	240	1,920	No	--
Pyrene	0.00629	2,400	48	192	No	--

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

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

[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 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] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3) (1996) (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).

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

[f] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2009) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii] [Ecology 1996] [Method B for surface waters]).

[g] 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).

[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).

[i] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: Contaminant: acenapthylene, surrogate: acenaphthene; benzo(ghi)perylene, surrogate: pyrene; phenanthrene, surrogate: anthracene.

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

Table 5. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Overburden Verification Sampling Data. (2 Pages)

COPC	Statistical Result [b] (mg/kg)	Remedial Action Goals [a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	2.48 (<BG)	20 [c]	20 [c]	20 [c]	No	--
Barium	67.3 (<BG)	5,600	200	400	No	--
Beryllium	0.241 (<BG)	10.4 [d]	1.51 [c]	1.51 [c]	No	--
Boron [e]	2.10	7,200	320	-- [f]	No	--
Cadmium [g]	0.146 (<BG)	13.9 [d]	0.81 [c]	0.81 [c]	No	--
Chromium (total)	9.17 (<BG)	80,000	18.5 [c]	18.5 [c]	No	--
Cobalt	5.97 (<BG)	24	15.7 [c]	-- [f]	No	--
Copper	10.9 (<BG)	2,960	59.2	22.0 [c]	No	--
Lead	4.60 (<BG)	353	10.2 [c]	10.2 [c]	No	--
Manganese	289 (<BG)	3,760	512 [c]	512 [c]	No	--
Molybdenum [e]	0.272	400	8	-- [f]	No	--
Nickel	8.75 (<BG)	1,600	19.1 [c]	27.4	No	--
Vanadium	50.6 (<BG)	560	85.1 [c]	-- [f]	No	--
Zinc	67.6 (<BG)	24,000	480	67.8 [c]	No	--
TPH – motor oil	55.4	200	200	200	No	--
Acenaphthene	0.0158	4,800	96	129	No	--
Acenaphthylene [i]	0.000961	4,800	96	129	No	--
Benzo(a)anthracene	0.00207	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(a)pyrene	0.00542	0.137	0.015 [h]	0.015 [h]	No	--
Benzo(b)fluoranthene	0.00776	1.37	0.015 [h]	0.015 [h]	No	--
Benzo(ghi)perylene [i]	0.0220	2,400	48	192	No	--
Benzo(k)fluoranthene	0.00322	1.37	0.015 [h]	0.015 [h]	No	--
Chrysene	0.00138	13.7	0.12	0.1 [h]	No	--
Dibenz(a,h)anthracene	0.00112	1.37	0.03 [h]	0.03 [h]	No	--
Fluoranthene	0.0618	3,200	64	18.0	No	--
Fluorene	0.0178	3,200	64	260	No	--
Indeno(1,2,3-cd)pyrene	0.0244	1.37	0.33 [h]	0.33 [h]	No	--
Napthalene	0.0894	1,600	16.0	988	No	--
Phenanthrene [i]	0.0114	24,000	240	1,920	No	--

Table 5. Comparison of Maximum Contaminant Concentrations to Remedial Action Goals for the 600-120 and 600-297 Overburden Verification Sampling Data. (2 Pages)

COPC	Statistical Result[b] (mg/kg)	Remedial Action Goals[a] (mg/kg)			Does the Statistical Data Set Exceed RAGs?	Do the Results Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Pyrene	0.00923	2,400	48	192	No	--

[a] RAGs obtained from the RDR/RAWP (DOE-RL 2009b) unless otherwise noted.
[b] 95% upper confidence level or maximum value, depending on data censorship, as described in Appendix B.
[c] Where cleanup levels are less than background, cleanup levels default to background per WAC 173-340-700(4)(d) (Ecology 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] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750(3) (1996) (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (*Hanford Guidance for Radiological Cleanup* [WDOH 1997]).
[e] No Hanford Site-specific or Washington State background value available.
[f] No parameters (bioconcentration factors or AWQC values) are available from the Cleanup Levels and Risk Calculations Database (Ecology 2009) or other databases to calculate cleanup levels (WAC 173-340-730[3][a][iii] [Ecology 1996] [Method B for surface waters]).
[g] 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).
[h] Where cleanup levels are less than RDLs, cleanup levels default to RDLs per WAC 173-340-707(2) (Ecology 1996).
[i] Toxicity data for this chemical are not available. Cleanup levels are based on surrogate chemicals: Contaminant: acenaphthylene, surrogate: acenaphthene; benzo(ghi)perylene, surrogate: pyrene; phenanthrene, surrogate: anthracene.

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

DATA EVALUATION

Nonradionuclides

Tables 3 through 5 compare the cleanup verification sample values to the applicable soil RAGs for direct exposure, protection of groundwater, and protection of the Columbia River. All cleanup verification data values pass in comparison to the applicable RAGs.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the *Washington Administrative Code* (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 WAC 173-340 three-part test for the 600-120 and 600-297 waste sites statistical data is included in the 95% UCL calculation (Appendix B). The results of this evaluation indicate that all residual COC/COPC concentrations pass the three-part test in comparison to applicable RAGs.

Nonradionuclide risk requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. For the 600-120 and 600-297 waste sites, these risk values were not calculated for constituents that were either not detected or were detected at concentrations below Hanford Site or Washington State background levels. All individual hazard quotients for noncarcinogenic constituents were less than 1.0. The cumulative hazard quotient for those noncarcinogenic constituents above background or detected levels is 1.4×10^{-3}. The carcinogenic risk value for the carcinogenic constituents above background or detected levels is 2.2×10^{-7}, which is less than the criteria of 1×10^{-5}. Based on the nonradionuclide groundwater and river protection RAGs shown in Tables 3 through 5, the residual concentrations of the nonradionuclide contaminants are protective of groundwater and the Columbia River.

DATA QUALITY ASSESSMENT

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

The DQA for the 600-120 and 600-297 waste sites 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 archival in the HEIS and are provided as an attachment to the 95% UCL calculation in Appendix B. The detailed DQA is presented in Appendix C.

SUMMARY FOR INTERIM CLOSURE

The 600-120 waste site and associated 600-297 waste site have been evaluated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2009b). Verification sampling was performed, and the analytical results indicate that the residual concentrations of COPCs at this site meet the RAGs and corresponding RAOs for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the verification sampling results support a reclassification of the 600-120 and 600-297 waste sites to Interim Closed Out. Cleanup verification sampling demonstrates that residual concentrations of all COPCs in shallow and deep zone soils are below applicable RAGs. Therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone of the sites are not required.

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

WCH, 2007, *Geophysical Site Investigation for White Bluffs Fire Station Septic,* dated April 2007, GI-0578536 Washington Closure Hanford, Richland, Washington.

WCH, 2010a, *IU-2/6 Remaining Sites Sampling and Field Activities*, Logbook EL-1643-02, pp. 84-85, Washington Closure Hanford, Richland, Washington.

WCH, 2010b, *Work Instruction for Verification Sampling of the 600-120, White Bluffs Spare Parts Burn Pit,* Work Instruction No. 0600X-WI-G0046, Rev. 0, Washington Closure Hanford, Richland, Washington.

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APPENDIX A

PHOTOGRAPHS

Figure 1. The 600-120 Waste Site Prior to Remediation (May 12, 1999).

Figure 2. 600-297 White Bluffs Imhoff Tank Encountered During Remediation of the 600-120 Waste Site (January 12, 2010).

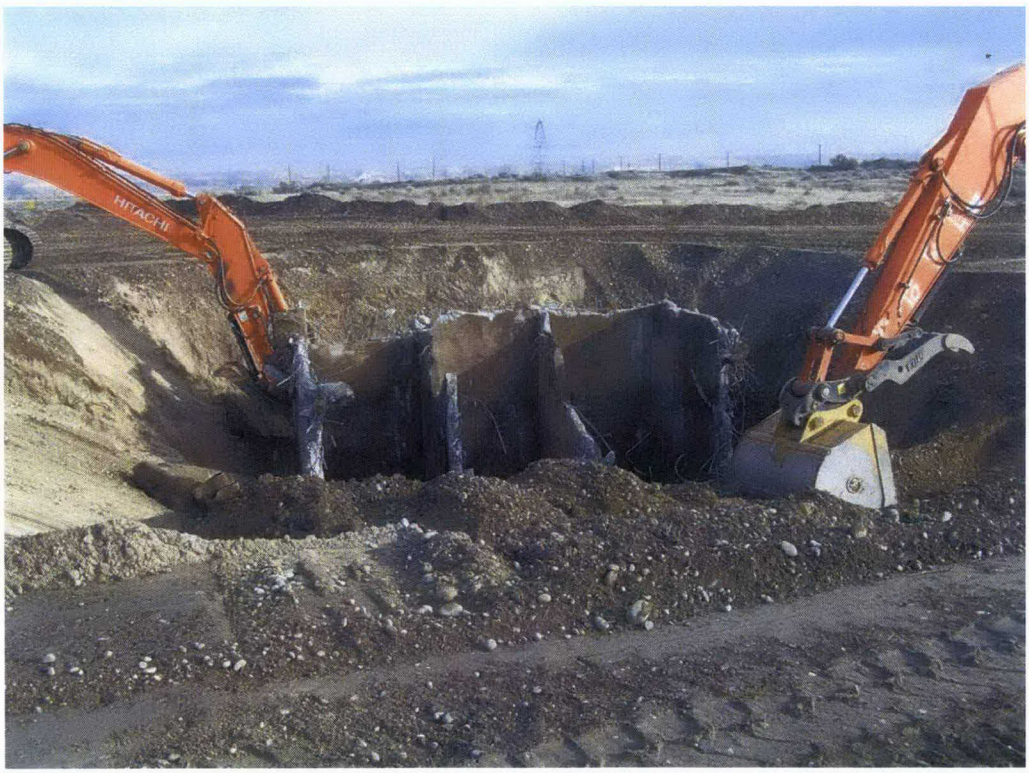

Figure 3. The 600-120 and 600-297 Waste Site Debris Pile after Remediation (March 10, 2010).

APPENDIX B

95% UPPER CONFIDENCE LIMIT, RELATIVE PERCENT DIFFERENCE (RPD), DIRECT CONTACT HAZARD QUOTIENT, AND CARCINOGENIC RISK CALCULATIONS

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-IU-2

Discipline: Environmental *Calculation No: 0600X-CA-V0096

Subject: 600-120 Waste Site Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 15 Attm. 1 = 15 Total = 31	T. E. Queen	J. D. Sloglie	B. L. Vedder	D. F. Obenauer	1/12/11

SUMMARY OF REVISION

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

Washington Closure Hanford **CALCULATION SHEET**

Originator T. E. Queen Date 12/29/10 Calc. No. 0600X-CA-V0096 Rev. No. 0
Project 100-IU-2/6 Field Remediation Job No. 14655 Checked J. D. Skoglie Date 12/29/10
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 1 of 15

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 4 - Calculation Sheet Summary
Sheet 5 to 6 - Calculation Sheet Verification Data - Excavation
Sheet 7 to 8 - Calculation Sheet Verification Data - Staging Pile Area
Sheet 9 to 12 - Ecology Software (MTCAStat) Results
Sheet 13 to 15 - Calculation Sheet Duplicate Analysis
Attachment 1 - 600-124, Verification Sampling Results (15 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), 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, 2005, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
10) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," *Washington Administrative Code.*

Solution:
Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2005b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for each 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 600-120 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 600-120 waste site consisted of 3 decision units for verification sampling: the excavation area, the staging pile area, and the overburden stockpile.

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

Washington Closure Hanford **CALCULATION SHEET**

Originator T. E. Queen TQ Date 12/29/10 Calc. No. 0600X-CA-V0096 Rev. No. 0
Project 100-IU-2/6 Field Remediation Job No. 14655 Checked J. D. Skoglie JDS Date 12/29/10
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations Sheet No. 2 of 15

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 (2005) under WAC 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium; therefore, these constituents are not considered site COCs/COPCs and are also not included in these calculations.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets ($n < 10$), 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 WAC 173-340-740(7)(e) 3-part test is not performed for COPCs where the statistical value defaults to the maximum value in the data set. Instead, direct comparison of the maximum value against site remedial action goals (RAGs) (within the RSVP) is used as the compliance basis.

The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method 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.

Washington Closure Hanford **CALCULATION SHEET**

Originator T. E. Queen **Date** 12/29/10 **Calc. No.** 0600X-CA-V0096 **Rev. No.** 0
Project 100-IU-2/6 Field Remediation **Job No.** 14655 **Checked** J. D. Skoglie **Date** 12/29/10
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 3 of 15

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile areas, overburden stockpile, 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 - Excavation [a]

Analyte	95% UCL Result	Maximum Result	Units
Arsenic	2.87	--	mg/kg
Barium	64.7	--	mg/kg
Beryllium	0.243	--	mg/kg
Boron	4.14	--	mg/kg
Cadmium	0.107	--	mg/kg
Chromium	10.9	--	mg/kg
Cobalt	5.62	--	mg/kg
Copper	12.2	--	mg/kg
Lead	4.46	--	mg/kg
Manganese	265	--	mg/kg
Molybdenum	0.282	--	mg/kg
Nickel	10.6	--	mg/kg
Vanadium	44.4	--	mg/kg
Zinc	33.5	--	mg/kg
TPH - motor oil	10.9	--	mg/kg
Acenaphthene	0.00272	--	mg/kg
Anthracene	0.00173	--	mg/kg
Benzo(a)anthracene	--	0.000856	mg/kg
Benzo(a)pyrene	--	0.00225	mg/kg
Benzo(b)fluoranthene	--	0.00148	mg/kg
Benzo(ghi)perylene	--	0.00448	mg/kg
Benzo(k)fluoranthene	--	0.000906	mg/kg
Chrysene	--	0.00215	mg/kg
Dibenz(a,h)anthracene	--	0.000940	mg/kg
Fluoranthene	--	0.00282	mg/kg
Indeno(1,2,3-cd)pyrene	--	0.00262	mg/kg
Phenanthrene	--	0.00185	mg/kg
Pyrene	--	0.00428	mg/kg

WAC 173-340-740(7)(e) Evaluation:

WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	NO
Any sample > 2x Cleanup Limit?	NO

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

Results Summary - Staging Pile Area [a]

Analyte	95% UCL Result	Maximum Result	Units
Arsenic	2.68	--	mg/kg
Barium	64.8	--	mg/kg
Beryllium	0.238	--	mg/kg
Boron	2.66	--	mg/kg
Cadmium	0.106	--	mg/kg
Chromium	9.56	--	mg/kg
Cobalt	5.76	--	mg/kg
Copper	11.5	--	mg/kg
Lead	3.27	--	mg/kg
Manganese	272	--	mg/kg
Molybdenum	0.264	--	mg/kg
Nickel	9.57	--	mg/kg
Vanadium	46.8	--	mg/kg
Zinc	34.8	--	mg/kg
TPH - motor oil	19.2	--	mg/kg
Acenapthene	--	0.0183	mg/kg
Acenaphthylene	--	0.0872	mg/kg
Anthracene	--	0.000862	mg/kg
Benzo(a)anthracene	--	0.00267	mg/kg
Benzo(a)pyrene	--	0.00803	mg/kg
Benzo(b)fluoranthene	--	0.00818	mg/kg
Benzo(ghi)perylene	--	0.0318	mg/kg
Benzo(k)fluoranthene	--	0.00365	mg/kg
Beta-BHC	--	0.00150	mg/kg
Chrysene	--	0.000997	mg/kg
Dibenz[a,h]anthracene	--	0.00701	mg/kg
4,4'-DDE	--	0.00171	mg/kg
Fluoranthene	--	0.0265	mg/kg
Fluorene	--	0.00816	mg/kg
Indeno(1,2,3-cd)pyrene	--	0.190	mg/kg
Napthalene	--	0.0122	mg/kg
Phenanthrene	--	0.00725	mg/kg
Pyrene	--	0.00629	mg/kg

WAC 173-340-740(7)(e) Evaluation:

WAC 173-340 3-Part Test for most stringent RAG:

95% UCL > Cleanup Limit?	NO
> 10% above Cleanup Limit?	NO
Any sample > 2x Cleanup Limit?	NO

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

-- = not applicable
B = blank contamination (inorganic constituents)
C = Sample was </= 5X the blank concentration
DE = direct exposure
GW = groundwater
J = estimate
L = dilution
M = sample duplicate precision not met
MTCA = *Model Toxics Control Act*
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)
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = sampling and analysis plan
TDL = target detection limit
U = undetected
UCL = upper confidence limit
WAC = Washington Administrative Code

Washington Closure Hanford **CALCULATION SHEET**

Originator T. E. Queen TQ **Date** 12/29/10 **Calc. No.** 0600X-CA-V0096 **Rev. No.** 0
Project 100-IU-2/6 Field Remediation **Job No.** 14655 **Checked** J. D. Skoglie **Date** 12/29/10
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations **Sheet No.** 4 of 15

Summary (continued)

Results:
The results presented in the tables that follow include the summary of the results of the 95% UCL calculations for the excavation, staging pile areas, overburden stockpile, 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 - Overbuden [a]

Analyte	Maximum Result	Units
Arsenic	2.48	mg/kg
Barium	67.3	mg/kg
Beryllium	0.241	mg/kg
Boron	2.10	mg/kg
Cadmium	0.146	mg/kg
Chromium	9.17	mg/kg
Cobalt	5.97	mg/kg
Copper	10.9	mg/kg
Lead	4.60	mg/kg
Manganese	289	mg/kg
Molybdenum	0.272	mg/kg
Nickel	8.75	mg/kg
Vanadium	50.6	mg/kg
Zinc	67.6	mg/kg
TPH - motor oil	55.4	mg/kg
Acenaphthene	0.0158	mg/kg
Acenapthylene	0.000961	mg/kg
Benzo(a)anthracene	0.00207	mg/kg
Benzo(a)pyrene	0.00542	mg/kg
Benzo(b)fluoranthene	0.00776	mg/kg
Benzo(ghi)perylene	0.0220	mg/kg
Benzo(k)fluoranthene	0.00322	mg/kg
Chrysene	0.00138	mg/kg
Dibenz[a,h]anthracene	0.00112	mg/kg
Fluoranthene	0.0618	mg/kg
Fluorene	0.0178	mg/kg
Indeno(1,2,3-cd)pyrene	0.0244	mg/kg
Napthalene	0.0894	mg/kg
Phenanthrene	0.0114	mg/kg
Pyrene	0.00923	mg/kg

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

Analyte	Excavation	Staging Pile Area	Overburden
	Duplicate Analysis		
Aluminum	1.8%	2.6%	20.5%
Barium	4.5%	5.1%	15.5%
Calcium	7.8%	4.9%	16.0%
Chromium	15.1%	3.5%	26.8%
Copper	13.1%	6.5%	17.9%
Iron	2.5%	2.7%	16.3%
Magnesium	12.2%	1.1%	11.9%
Manganese	3.0%	0.0%	14.9%
Silicon	5.3%	11.7%	26.9%
Vanadium	2.9%	2.8%	17.6%
Zinc	2.3%	8.0%	17.1%
TPH - motor oil			***50.7%***

[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

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 5 of 15

600-120 Statistical Calculations
Verification Data - 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
EX-4	J1BYN7	9/27/2010	2.80		0.871	61.5		0.436	0.213		0.174	1.87		1.74	0.104	B	0.174	10.9		0.174	5.27		1.74	12.2		0.871
Duplicate of EX-4	J1BYP6	9/27/2010	2.57		0.793	58.8		0.396	0.204		0.159	1.88		1.59	0.0936	B	0.159	9.37		0.159	5.01		1.59	10.7		0.793
EX-1	J1BYN4	9/27/2010	2.69		0.835	59.4		0.417	0.225		0.167	2.16		1.67	0.120	B	0.167	9.54		0.167	6.00		1.67	11.3		0.835
EX-2	J1BYN5	9/27/2010	2.57		0.694	57.4		0.347	0.214		0.139	1.39		1.39	0.0983	B	0.139	8.82		0.139	5.32		1.39	10.5		0.694
EX-3	J1BYN6	9/27/2010	2.88		0.737	67.2		0.369	0.259		0.147	8.98		1.47	0.0986	B	0.147	10.6		0.147	5.59		1.47	10.8		0.737
EX-5	J1BYN8	9/27/2010	2.83		0.899	62.6		0.450	0.236		0.180	3.78		1.80	0.0977	B	0.180	9.44		0.180	5.29		1.80	10.4		0.899
EX-6	J1BYN9	9/27/2010	2.79		0.882	67.5		0.441	0.250		0.176	2.82		1.76	0.0851	B	0.176	9.85		0.176	5.35		1.76	10.2		0.882
EX-7	J1BYP0	9/27/2010	3.26		0.952	64.9		0.476	0.224		0.190	3.17		1.90	0.120	B	0.190	10.5		0.190	5.54		1.90	11.3		0.952
EX-8	J1BYP1	9/27/2010	2.41		0.943	49.2		0.471	0.180	B	0.189	1.81	B	1.89	0.0825	B	0.189	8.41		0.189	4.89		1.89	8.23		0.943
EX-9	J1BYP2	9/27/2010	2.52		0.764	58.2		0.382	0.211		0.153	3.88		1.53	0.100	B	0.153	10.1		0.153	5.07		1.53	9.33		0.764
EX-10	J1BYP3	9/27/2010	2.78		0.744	64.2		0.372	0.245		0.149	1.91		1.49	0.0976	B	0.149	9.95		0.149	5.20		1.49	10.6		0.744
EX-11	J1BYP4	9/27/2010	2.80		0.752	51.2		0.376	0.229		0.150	1.20	B	1.50	0.0888	B	0.150	13.4		0.150	5.89		1.50	16.6		0.752
EX-12	J1BYP5	9/27/2010	2.83		0.940	70.3		0.470	0.269		0.188	1.58	B	1.88	0.112	B	0.188	11.5		0.188	5.87		1.88	13.3		0.940

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		
EX-4	J1BYN7/ J1BYP6	9/27/2010	2.69			60.2			0.209			1.88			0.0988			10.1			5.14			11.5		
EX-1	J1BYN4	9/27/2010	2.69			59.4			0.225			2.16			0.120			9.54			6.00			11.3		
EX-2	J1BYN5	9/27/2010	2.57			57.4			0.214			1.39			0.0983			8.82			5.32			10.5		
EX-3	J1BYN6	9/27/2010	2.88			67.2			0.259			8.98			0.0986			10.6			5.59			10.8		
EX-5	J1BYN8	9/27/2010	2.83			62.6			0.236			3.78			0.0977			9.44			5.29			10.4		
EX-6	J1BYN9	9/27/2010	2.79			67.5			0.250			2.82			0.0851			9.85			5.35			10.2		
EX-7	J1BYP0	9/27/2010	3.26			64.9			0.224			3.17			0.120			10.5			5.54			11.3		
EX-8	J1BYP1	9/27/2010	2.41			49.2			0.180			1.81			0.0825			8.41			4.89			8.23		
EX-9	J1BYP2	9/27/2010	2.52			58.2			0.211			3.88			0.100			10.1			5.07			9.33		
EX-10	J1BYP3	9/27/2010	2.78			64.2			0.245			1.91			0.0976			9.95			5.20			10.6		
EX-11	J1BYP4	9/27/2010	2.80			51.2			0.229			1.20			0.0888			13.4			5.89			16.6		
EX-12	J1BYP5	9/27/2010	2.83			70.3			0.269			1.58			0.112			11.5			5.87			13.3		

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
Mean	2.75	61.0	0.229	2.88	0.100	10.2	5.43	11.2
Standard deviation	0.214	6.43	0.0246	2.12	0.0121	1.30	0.352	2.10
95% UCL on mean	2.87	64.7	0.243	4.14	0.107	10.9	5.62	12.2
Maximum value	3.26	70.3	0.269	8.98	0.120	13.4	6.00	16.6
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
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NA
WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the 3-part test is not required.	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.	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.

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655
Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 6 of 15

600-120 Statistical Calculations
Verification Data - Excavation

Sample Area	Sample Number	Sample Date	Lead			Manganese			Molybdenum			Nickel			Vanadium			Zinc			TPH - motor oil			Acenaphthene			Anthracene		
			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
EX-4	J1BYN7	9/27/2010	2.80		0.436	240		4.36	0.250	B	1.74	12.7		3.48	42.6		2.18	31.3		8.71	10.6	U	10.6	0.00348	U	0.00348	0.00348	U	0.00348
Duplicate of EX-4	J1BYP6	9/27/2010	2.55		0.396	233		3.96	0.237	B	1.59	9.71		3.17	41.4		1.98	30.6		7.93	10.4	U	10.4	0.00349	U	0.00349	0.00349	U	0.00349
EX-1	J1BYN4	9/27/2010	3.04		0.417	280		4.17	0.288	B	1.67	8.95		3.34	49.3		2.09	35.1		8.35	10.5	U	10.5	0.00349	U	0.00349	0.00349	U	0.00349
EX-2	J1BYN5	9/27/2010	2.89		0.347	250		3.47	0.318	B	1.39	8.74		2.78	44.9		1.73	32.2		6.94	10.2	U	10.2	0.00346	U	0.00346	0.00173	J	0.00346
EX-3	J1BYN6	9/27/2010	3.27		0.369	280		3.69	0.280	B	1.47	9.84		2.95	41.6		1.84	33.9		7.37	10.5	U	10.5	0.00381		0.00346	0.00121	J	0.00346
EX-5	J1BYN8	9/27/2010	3.89		0.450	247		4.50	0.288	B	1.80	9.32		3.60	40.4		2.25	31.7		8.99	8.39	J	10.4	0.00352		0.00352	0.00352	U	0.00352
EX-6	J1BYN9	9/27/2010	3.25		0.441	253		4.41	0.272	B	1.76	9.19		3.53	36.7		2.20	29.3		8.82	10.4	U	10.4	0.00303	J	0.00356	0.00214	J	0.00356
EX-7	J1BYP0	9/27/2010	4.96		0.476	259		4.76	0.292	B	1.90	10.5		3.81	43.8		2.38	35.0		9.52	10.8		9.74	0.000839	J	0.00335	0.00201	J	0.00335
EX-8	J1BYP1	9/27/2010	2.99		0.471	235		4.71	0.237	B	1.89	7.73		3.77	42.4		2.36	29.5		9.43	6.43	J	9.79	0.00103	J	0.00342	0.00103	J	0.00342
EX-9	J1BYP2	9/27/2010	4.26		0.382	245		3.82	0.247	B	1.53	8.80		3.06	38.2		1.91	31.3		7.64	15.6		10.2	0.000856	J	0.00342	0.000856	J	0.00342
EX-10	J1BYP3	9/27/2010	7.72		0.372	265		3.72	0.239	B	1.49	8.78		2.98	41.8		1.86	32.4		7.44	18.5		10.4	0.00346	U	0.00346	0.00121	J	0.00346
EX-11	J1BYP4	9/27/2010	3.18		0.376	236		3.76	0.269	B	1.50	13.3		3.01	45.7		1.88	33.1		7.52	12.9		10.2	0.00338	U	0.00338	0.00338	U	0.00338
EX-12	J1BYP5	9/27/2010	3.51		0.470	279		4.70	0.226	B	1.88	11.0		3.76	44.0		2.35	34.3		9.40	5.99	J	10.0	0.00337	U	0.00337	0.000844	J	0.00337

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Manganese mg/kg	Molybdenum mg/kg	Nickel mg/kg	Vanadium mg/kg	Zinc mg/kg	TPH - motor oil mg/kg	Acenaphthene mg/kg	Anthracene mg/kg
EX-4	J1BYN7/ J1BYP6	9/27/2010	2.68	237	0.244	11.2	42.0	31.0	5.25	0.00174	0.00174
EX-1	J1BYN4	9/27/2010	3.04	280	0.288	8.95	49.3	35.1	5.25	0.00175	0.00175
EX-2	J1BYN5	9/27/2010	2.89	250	0.318	8.74	44.9	32.2	5.10	0.00173	0.00173
EX-3	J1BYN6	9/27/2010	3.27	280	0.280	9.84	41.6	33.9	5.25	0.00381	0.00121
EX-5	J1BYN8	9/27/2010	3.89	247	0.288	9.32	40.4	31.7	8.39	0.00352	0.00176
EX-6	J1BYN9	9/27/2010	3.25	253	0.272	9.19	36.7	29.3	5.20	0.00303	0.00214
EX-7	J1BYP0	9/27/2010	4.96	259	0.292	10.5	43.8	35.0	10.8	0.000839	0.00201
EX-8	J1BYP1	9/27/2010	2.99	235	0.237	7.73	42.4	29.5	6.43	0.00103	0.00103
EX-9	J1BYP2	9/27/2010	4.26	245	0.247	8.80	38.2	31.3	15.6	0.000856	0.000856
EX-10	J1BYP3	9/27/2010	7.72	265	0.239	8.78	41.8	32.4	18.5	0.00173	0.00121
EX-11	J1BYP4	9/27/2010	3.18	236	0.269	13.3	45.7	33.1	12.9	0.00169	0.00169
EX-12	J1BYP5	9/27/2010	3.51	279	0.226	11.0	44.0	34.3	5.99	0.00169	0.00084

Statistical Computations

	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc	TPH - motor oil	Acenaphthene	Anthracene
95% UCL based on	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), 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.
N	12	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	42%	50%	33%
Mean	3.80	255	0.267	9.78	42.6	32.4	8.72	0.00195	0.00150
Standard deviation	1.39	17.2	0.0280	1.51	3.36	1.96	4.66	0.000986	0.000445
95% UCL on mean	4.46	265	0.282	10.6	44.4	33.5	10.9	0.00272	0.00173
Maximum value	7.72	280	0.318	13.3	49.3	35.1	18.5	0.00381	0.00214
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	10.2 GW & River Protection	512 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	200 DE, GW, & River Protection	96 GW Protection	240 GW Protection
WAC 173-340 3-PART TEST									
95% UCL > Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NO
> 10% above Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NO
Any sample > 2X Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO	NO	NO
WAC 173-340 Compliance?	Because all values are below background (10.2 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (512 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent RAG.	Because all values are below background (19.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg) the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg) the WAC 173-340 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent 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 T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 7 of 15

600-120 Statistical Calculations
Verification Data - Staging Pile Area

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
SPA-7	J1BYR3	9/27/2010	2.44		0.730	72.1		0.365	0.250		0.146	1.86		1.46	0.122	B	0.146	8.32		0.146	6.48		1.46	10.7		0.730
Duplicate of SPA-7	J1BYR9	9/27/2010	2.26		0.814	58.6		0.407	0.208		0.163	1.16	B	1.63	0.108	B	0.163	7.25		0.163	6.19		1.63	11.2		0.814
SPA-1	J1BYP7	9/27/2010	2.33		0.918	55.7		0.459	0.197		0.184	1.06	B	1.84	0.105	B	0.184	7.00		0.184	5.90		1.84	10.5		0.918
SPA-2	J1BYP8	9/27/2010	3.04		0.804	75.0		0.402	0.279		0.161	1.75		1.61	0.109	B	0.161	11.0		0.161	6.29		1.61	12.5		0.804
SPA-3	J1BYP9	9/27/2010	2.61		0.924	67.0		0.462	0.239		0.185	2.53		1.85	0.116	B	0.185	9.27		0.185	5.54		1.85	10.9		0.924
SPA-4	J1BYR0	9/27/2010	2.38		0.647	54.4		0.323	0.214		0.129	1.32		1.29	0.0845	B	0.129	8.16		0.129	4.71		1.29	10.1		0.647
SPA-5	J1BYR1	9/27/2010	2.50		0.980	62.2		0.490	0.252		0.196	2.10		1.96	0.0961	B	0.196	10.5		0.196	5.34		1.96	11.0		0.980
SPA-6	J1BYR2	9/27/2010	2.52		0.762	57.1		0.381	0.216		0.152	1.52	B	1.52	0.0943	B	0.152	7.94		0.152	5.69		1.52	11.0		0.762
SPA-8	J1BYR4	9/27/2010	2.53		0.809	68.4		0.405	0.246		0.162	1.60	B	1.62	0.110	B	0.162	8.82	J	0.162	5.24		1.62	9.51		0.809
SPA-9	J1BYR5	9/27/2010	2.94		0.655	50.6		0.328	0.210		0.131	1.30	B	1.31	0.0984	B	0.131	10.8	J	0.131	5.30		1.31	12.8		0.655
SPA-10	J1BYR6	9/27/2010	2.47		0.779	64.1		0.390	0.213		0.156	4.33		1.56	0.0926	B	0.156	8.37	J	0.156	4.55		1.56	8.97		0.779
SPA-11	J1BYR7	9/27/2010	2.69		0.693	54.7		0.347	0.189		0.139	1.67		1.39	0.0985	B	0.139	8.73	J	0.139	4.66		1.39	11.5		0.693
SPA-12	J1BYR8	9/27/2010	2.16		0.696	47.7		0.348	0.166		0.139	3.79		1.39	0.0849	B	0.139	7.37	J	0.139	3.55		1.39	7.73		0.696

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
SPA-7	J1BYR3/ J1BYR9	9/27/2010	2.35	65.4	0.229	1.51	0.115	7.79	6.34	11.0
SPA-1	J1BYP7	9/27/2010	2.33	55.7	0.197	1.06	0.105	7.00	5.90	10.5
SPA-2	J1BYP8	9/27/2010	3.04	75.0	0.279	1.75	0.109	11.0	6.29	12.5
SPA-3	J1BYP9	9/27/2010	2.61	67.0	0.239	2.53	0.116	9.27	5.54	10.9
SPA-4	J1BYR0	9/27/2010	2.38	54.4	0.214	1.32	0.0845	8.16	4.71	10.1
SPA-5	J1BYR1	9/27/2010	2.50	62.2	0.252	2.10	0.0961	10.5	5.34	11.0
SPA-6	J1BYR2	9/27/2010	2.52	57.1	0.216	1.52	0.0943	7.94	5.69	11.0
SPA-8	J1BYR4	9/27/2010	2.53	68.4	0.246	1.60	0.110	8.82	5.24	9.51
SPA-9	J1BYR5	9/27/2010	2.94	50.6	0.210	1.30	0.0984	10.8	5.30	12.8
SPA-10	J1BYR6	9/27/2010	2.47	64.1	0.213	4.33	0.0926	8.37	4.55	8.97
SPA-11	J1BYR7	9/27/2010	2.69	54.7	0.189	1.67	0.0985	8.73	4.66	11.5
SPA-12	J1BYR8	9/27/2010	2.16	47.7	0.166	3.79	0.0849	7.37	3.55	7.73

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium	Cobalt	Copper
95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.
N	12	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	0%	0%
Mean	2.54	60.2	0.221	2.04	0.100	8.81	5.26	10.6
Standard deviation	0.251	8.09	0.0305	1.02	0.0107	1.33	0.797	1.42
95% UCL on mean	2.68	64.8	0.238	2.66	0.106	9.56	5.76	11.5
Maximum value	3.04	75.0	0.279	4.33	0.122	11.0	6.48	12.8
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
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NO
> 10% above Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NO
Any sample > 2X Cleanup Limit?	NA	NA	NA	NO	NA	NA	NA	NO
WAC 173-340 Compliance?	Because all values are below background (6.5 mg/kg) the 3-part test is not required.	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.	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.	The data set meets the 3-part test criteria when compared to the most stringent RAG.

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655
Calc. No. 0600X-CA-V0090
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 8 of 15

600-120 Statistical Calculations

Verification Data - Staging Pile Area

Sample Area	Sample Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL	TPH - motor oil mg/kg	TPH - motor oil Q	TPH - motor oil PQL
SPA-7	J1BYR3	9/27/2010	2.81		0.365	320		3.65	0.317	B	1.46	8.81		2.92	57.4		1.83	40.4		7.30	10.0	U	10.0
Duplicate of SPA-7	J1BYR9	9/27/2010	2.62		0.407	268		4.07	0.287	B	1.63	8.94		3.26	54.9		2.03	37.9		8.14	18.5	J	10.3
SPA-1	J1BYP7	9/27/2010	2.43		0.459	268		4.59	0.228	B	1.84	8.92		3.67	53.4		2.29	35.0		9.18	10.0	U	10.0
SPA-2	J1BYP8	9/27/2010	3.37		0.402	306		4.02	0.279	B	1.61	11.3		3.21	47.6		2.01	38.9		8.04	10.1	U	10.1
SPA-3	J1BYP9	9/27/2010	3.81		0.462	272		4.62	0.299	B	1.85	9.14		3.70	42.9		2.31	34.7		9.24	9.62	J	10.2
SPA-4	J1BYR0	9/27/2010	2.55		0.323	222		3.23	0.222	B	1.29	8.42		2.59	36.3		1.62	28.3		6.47	3.49	J	10.2
SPA-5	J1BYR1	9/27/2010	2.98		0.490	258		4.90	0.238	B	1.96	9.60		3.92	39.4		2.45	31.6		9.80	9.92	U	9.92
SPA-6	J1BYR2	9/27/2010	2.70		0.381	242		3.81	0.239	B	1.52	8.73		3.05	44.9		1.91	34.2		7.62	15.7		9.95
SPA-8	J1BYR4	9/27/2010	3.08		0.405	278		4.05	0.204	B	1.62	8.40		3.24	39.8	J	2.02	31.6		8.09	10.3	UJ	10.3
SPA-9	J1BYR5	9/27/2010	3.03		0.328	239		3.28	0.240	B	1.31	9.84		2.62	42.1	J	1.64	31.2		6.55	16.2	J	10.1
SPA-10	J1BYR6	9/27/2010	3.03		0.390	222		3.90	0.257	B	1.56	7.77		3.12	34.3	J	1.95	29.1		7.79	19.0	J	10.2
SPA-11	J1BYR7	9/27/2010	2.47		0.347	211		3.47	0.194	B	1.39	9.28		2.77	38.5	J	1.73	28.4		6.93	10.2	UJ	10.2
SPA-12	J1BYR8	9/27/2010	3.85		0.348	172		3.48	0.166	B	1.39	6.59		2.78	27.2	J	1.74	24.2		6.96	52.4	J	10.1

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Lead mg/kg	Lead Q	Lead PQL	Manganese mg/kg	Manganese Q	Manganese PQL	Molybdenum mg/kg	Molybdenum Q	Molybdenum PQL	Nickel mg/kg	Nickel Q	Nickel PQL	Vanadium mg/kg	Vanadium Q	Vanadium PQL	Zinc mg/kg	Zinc Q	Zinc PQL	TPH - motor oil mg/kg	TPH - motor oil Q	TPH - motor oil PQL
SPA-7	J1BYR3/ J1BYR9	9/27/2010	2.72			294			0.302			8.88			56.2			39.2			11.8		
SPA-1	J1BYP7	9/27/2010	2.43			268			0.228			8.92			53.4			35.0			5.00		
SPA-2	J1BYP8	9/27/2010	3.37			306			0.279			11.3			47.6			38.9			5.05		
SPA-3	J1BYP9	9/27/2010	3.81			272			0.299			9.14			42.9			34.7			9.62		
SPA-4	J1BYR0	9/27/2010	2.55			222			0.222			8.42			36.3			28.3			3.49		
SPA-5	J1BYR1	9/27/2010	2.98			258			0.238			9.60			39.4			31.6			4.96		
SPA-6	J1BYR2	9/27/2010	2.70			242			0.239			8.73			44.9			34.2			15.7		
SPA-8	J1BYR4	9/27/2010	3.08			278			0.204			8.40			39.8			31.6			5.15		
SPA-9	J1BYR5	9/27/2010	3.03			239			0.240			9.84			42.1			31.2			16.2		
SPA-10	J1BYR6	9/27/2010	3.03			222			0.257			7.77			34.3			29.1			19.0		
SPA-11	J1BYR7	9/27/2010	2.47			211			0.194			9.28			38.5			28.4			5.10		
SPA-12	J1BYR8	9/27/2010	3.85			172			0.166			6.59			27.2			24.2			52.4		

Statistical Computations

	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc	TPH - motor oil
95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.
N	12	12	12	12	12	12	12
% < Detection limit	0%	0%	0%	0%	0%	0%	42%
Mean	3.00	249	0.239	8.91	41.9	32.2	12.8
Standard deviation	0.48	38.2	0.0410	1.15	8.01	4.43	13.6
95% UCL on mean	3.27	272	0.264	9.57	46.8	34.8	19.2
Maximum value	3.85	320	0.317	11.3	57.4	40.4	52.4
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg) unless noted otherwise	10.2 GW & River Protection	512 GW & River Protection	8 GW Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	200 DE, GW & River Protection
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO
> 10% above Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO
Any sample > 2X Cleanup Limit?	NA	NA	NO	NA	NA	NA	NO
WAC 173-340 Compliance?	Because all values are below background (10.2 mg/kg) the 3-part test is not required.	Because all values are below background (512 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 (19.1 mg/kg) the 3-part test is not required.	Because all values are below background (85.1 mg/kg) the 3-part test is not required.	Because all values are below background (67.8 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.

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 9 of 15

Ecology Software (MTCAStat) Results, 600-120 Waste Site Excavation

DATA	ID	Arsenic 95% UCL Calculation			
	J1BYN7/				
2.69	J1BYP6				
2.69	J1BYN4				
2.57	J1BYN5	Number of samples		Uncensored values	
2.88	J1BYN6	Uncensored	12	Mean	2.75
2.83	J1BYN8	Censored		Lognormal mean	2.75
2.79	J1BYN9	Detection limit or PQL		Std. devn.	0.214
3.26	J1BYP0	Method detection limit		Median	2.79
2.41	J1BYP1	TOTAL	12	Min.	2.41
2.52	J1BYP2			Max.	3.26
2.78	J1BYP3				
2.80	J1BYP4				
2.83	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.914		r-squared is: 0.896	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		2.87	

DATA	ID	Barium 95% UCL Calculation			
	J1BYN7/				
60.2	J1BYP6				
59.4	J1BYN4				
57.4	J1BYN5	Number of samples		Uncensored values	
67.2	J1BYN6	Uncensored	12	Mean	61.0
62.6	J1BYN8	Censored		Lognormal mean	61.1
67.5	J1BYN9	Detection limit or PQL		Std. devn.	6.43
64.9	J1BYP0	Method detection limit		Median	61.4
49.2	J1BYP1	TOTAL	12	Min.	49.2
58.2	J1BYP2			Max.	70.3
64.2	J1BYP3				
51.2	J1BYP4				
70.3	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.946		r-squared is: 0.964	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		64.7	

DATA	ID	Beryllium 95% UCL Calculation			
	J1BYN7/				
0.209	J1BYP6				
0.225	J1BYN4				
0.214	J1BYN5	Number of samples		Uncensored values	
0.259	J1BYN6	Uncensored	12	Mean	0.229
0.236	J1BYN8	Censored		Lognormal mean	0.229
0.250	J1BYN9	Detection limit or PQL		Std. devn.	0.0246
0.224	J1BYP0	Method detection limit		Median	0.227
0.180	J1BYP1	TOTAL	12	Min.	0.180
0.211	J1BYP2			Max.	0.269
0.245	J1BYP3				
0.229	J1BYP4				
0.269	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.962		r-squared is: 0.977	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		0.243	

DATA	ID	Boron 95% UCL Calculation			
	J1BYN7/				
1.88	J1BYP6				
2.16	J1BYN4				
1.39	J1BYN5	Number of samples		Uncensored values	
8.98	J1BYN6	Uncensored	12	Mean	2.88
3.78	J1BYN8	Censored		Lognormal mean	2.85
2.82	J1BYN9	Detection limit or PQL		Std. devn.	2.12
3.17	J1BYP0	Method detection limit		Median	2.04
1.81	J1BYP1	TOTAL	12	Min.	1.20
3.88	J1BYP2			Max.	8.98
1.91	J1BYP3				
1.20	J1BYP4				
1.58	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.913		r-squared is: 0.685	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		4.14	

DATA	ID	Cadmium 95% UCL Calculation			
	J1BYN7/				
0.0988	J1BYP6				
0.120	J1BYN4				
0.0983	J1BYN5	Number of samples		Uncensored values	
0.0986	J1BYN6	Uncensored	12	Mean	0.100
0.0977	J1BYN8	Censored		Lognormal mean	0.100
0.0851	J1BYN9	Detection limit or PQL		Std. devn.	0.0121
0.120	J1BYP0	Method detection limit		Median	0.0985
0.0825	J1BYP1	TOTAL	12	Min.	0.0825
0.100	J1BYP2			Max.	0.120
0.0976	J1BYP3				
0.0888	J1BYP4				
0.112	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.919		r-squared is: 0.906	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		0.107	

DATA	ID	Chromium 95% UCL Calculation			
	J1BYN7/				
10.1	J1BYP6				
9.54	J1BYN4				
8.82	J1BYN5	Number of samples		Uncensored values	
10.6	J1BYN6	Uncensored	12	Mean	10.2
9.44	J1BYN8	Censored		Lognormal mean	10.2
9.85	J1BYN9	Detection limit or PQL		Std. devn.	1.30
10.5	J1BYP0	Method detection limit		Median	10.0
8.41	J1BYP1	TOTAL	12	Min.	8.41
10.1	J1BYP2			Max.	13.4
9.95	J1BYP3				
13.4	J1BYP4				
11.5	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.921		r-squared is: 0.881	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		10.9	

DATA	ID	Cobalt 95% UCL Calculation			
	J1BYN7/				
5.14	J1BYP6				
6.00	J1BYN4				
5.32	J1BYN5	Number of samples		Uncensored values	
5.59	J1BYN6	Uncensored	12	Mean	5.43
5.29	J1BYN8	Censored		Lognormal mean	5.43
5.35	J1BYN9	Detection limit or PQL		Std. devn.	0.352
5.54	J1BYP0	Method detection limit		Median	5.34
4.89	J1BYP1	TOTAL	12	Min.	4.89
5.07	J1BYP2			Max.	6.00
5.20	J1BYP3				
5.89	J1BYP4				
5.87	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.966		r-squared is: 0.960	
		Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		5.62	

DATA	ID	Copper 95% UCL Calculation			
	J1BYN7/				
11.5	J1BYP6				
11.3	J1BYN4				
10.5	J1BYN5	Number of samples		Uncensored values	
10.8	J1BYN6	Uncensored	12	Mean	11.2
10.4	J1BYN8	Censored		Lognormal mean	11.2
10.2	J1BYN9	Detection limit or PQL		Std. devn.	2.10
11.3	J1BYP0	Method detection limit		Median	10.7
8.23	J1BYP1	TOTAL	12	Min.	8.23
9.33	J1BYP2			Max.	16.6
10.6	J1BYP3				
16.6	J1BYP4				
13.3	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.884		r-squared is: 0.821	
		Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is		12.2	

DATA	ID	Lead 95% UCL Calculation			
	J1BYN7/				
2.68	J1BYP6				
3.04	J1BYN4				
2.89	J1BYN5	Number of samples		Uncensored values	
3.27	J1BYN6	Uncensored	12	Mean	3.80
3.89	J1BYN8	Censored		Lognormal mean	3.79
3.25	J1BYN9	Detection limit or PQL		Std. devn.	1.39
4.96	J1BYP0	Method detection limit		Median	3.26
2.99	J1BYP1	TOTAL	12	Min.	2.68
4.26	J1BYP2			Max.	7.72
7.72	J1BYP3				
3.18	J1BYP4				
3.51	J1BYP5				
		Lognormal distribution?		Normal distribution?	
		r-squared is: 0.820		r-squared is: 0.698	
		Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is		4.46	

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 10 of 15

Ecology Software (MTCAStat) Results, 600-120 Waste Site Excavation

Manganese 95% UCL Calculation

DATA	ID
	J1BYN7/
237	J1BYP6
280	J1BYN4
250	J1BYN5
280	J1BYN6
247	J1BYN8
253	J1BYN9
259	J1BYP0
235	J1BYP1
245	J1BYP2
265	J1BYP3
236	J1BYP4
279	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	255
Censored		Lognormal mean	256
Detection limit or PQL		Std. devn.	17.2
Method detection limit		Median	252
TOTAL	12	Min.	235
		Max.	280

Lognormal distribution? Normal distribution?
r-squared is: 0.922 r-squared is: 0.915
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 265

Molybdenum 95% UCL Calculation

DATA	ID
	J1BYN7/
0.244	J1BYP6
0.288	J1BYN4
0.318	J1BYN5
0.280	J1BYN6
0.288	J1BYN8
0.272	J1BYN9
0.292	J1BYP0
0.237	J1BYP1
0.247	J1BYP2
0.239	J1BYP3
0.269	J1BYP4
0.226	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.267
Censored		Lognormal mean	0.267
Detection limit or PQL		Std. devn.	0.0280
Method detection limit		Median	0.271
TOTAL	12	Min.	0.226
		Max.	0.318

Lognormal distribution? Normal distribution?
r-squared is: 0.956 r-squared is: 0.954
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.282

Nickel 95% UCL Calculation

DATA	ID
	J1BYN7/
11.2	J1BYP6
8.95	J1BYN4
8.74	J1BYN5
9.84	J1BYN6
9.32	J1BYN8
9.19	J1BYN9
10.5	J1BYP0
7.73	J1BYP1
8.80	J1BYP2
8.78	J1BYP3
13.3	J1BYP4
11.0	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	9.78
Censored		Lognormal mean	9.79
Detection limit or PQL		Std. devn.	1.51
Method detection limit		Median	9.26
TOTAL	12	Min.	7.73
		Max.	13.3

Lognormal distribution? Normal distribution?
r-squared is: 0.927 r-squared is: 0.892
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 10.6

Vanadium 95% UCL Calculation

DATA	ID
	J1BYN7/
42.0	J1BYP6
49.3	J1BYN4
44.9	J1BYN5
41.6	J1BYN6
40.4	J1BYN8
36.7	J1BYN9
43.8	J1BYP0
42.4	J1BYP1
38.2	J1BYP2
41.8	J1BYP3
45.7	J1BYP4
44.0	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	42.6
Censored		Lognormal mean	42.6
Detection limit or PQL		Std. devn.	3.36
Method detection limit		Median	42.2
TOTAL	12	Min.	36.7
		Max.	49.3

Lognormal distribution? Normal distribution?
r-squared is: 0.970 r-squared is: 0.969
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 44.4

Zinc 95% UCL Calculation

DATA	ID
	J1BYN7/
31.0	J1BYP6
35.1	J1BYN4
32.2	J1BYN5
33.9	J1BYN6
31.7	J1BYN8
29.3	J1BYN9
35.0	J1BYP0
29.5	J1BYP1
31.3	J1BYP2
32.4	J1BYP3
33.1	J1BYP4
34.3	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	32.4
Censored		Lognormal mean	32.4
Detection limit or PQL		Std. devn.	1.96
Method detection limit		Median	32.3
TOTAL	12	Min.	29.3
		Max.	35.1

Lognormal distribution? Normal distribution?
r-squared is: 0.967 r-squared is: 0.970
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 33.5

TPH - motor oil 95% UCL Calculation

DATA	ID
	J1BYN7/
5.25	J1BYP6
5.25	J1BYN4
5.10	J1BYN5
5.25	J1BYN6
8.39	J1BYN8
5.20	J1BYN9
10.8	J1BYP0
6.43	J1BYP1
15.6	J1BYP2
18.5	J1BYP3
12.9	J1BYP4
5.99	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	8.72
Censored		Lognormal mean	8.73
Detection limit or PQL		Std. devn.	4.66
Method detection limit		Median	6.21
TOTAL	12	Min.	5.10
		Max.	18.5

Lognormal distribution? Normal distribut 0.803
r-squared is: 0.847 r-squared is:
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 10.9

Acenaphthene 95% UCL Calculation

DATA	ID
	J1BYN7/
0.001743	J1BYP6
0.001745	J1BYN4
0.00173	J1BYN5
0.00381	J1BYN6
0.00352	J1BYN8
0.00303	J1BYN9
0.000839	J1BYP0
0.00103	J1BYP1
0.000856	J1BYP2
0.00173	J1BYP3
0.00169	J1BYP4
0.001685	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.00195
Censored		Lognormal mean	0.00197
Detection limit or PQL		Std. devn.	0.000986
Method detection limit		Median	0.00173
TOTAL	12	Min.	0.000839
		Max.	0.00381

Lognormal distribution? Normal distribution?
r-squared is: 0.902 r-squared is: 0.848
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.00272

Anthracene 95% UCL Calculation

DATA	ID
	J1BYN7/
0.00174	J1BYP6
0.00175	J1BYN4
0.00173	J1BYN5
0.00121	J1BYN6
0.00176	J1BYN8
0.00214	J1BYN9
0.00201	J1BYP0
0.00103	J1BYP1
0.000856	J1BYP2
0.00121	J1BYP3
0.00169	J1BYP4
0.000844	J1BYP5

Number of samples		Uncensored values	
Uncensored	12	Mean	0.00150
Censored		Lognormal mean	0.00151
Detection limit or PQL		Std. devn.	0.000445
Method detection limit		Median	0.00171
TOTAL	12	Min.	0.000844
		Max.	0.00214

Lognormal distribution? Normal distribution?
r-squared is: 0.892 r-squared is: 0.916
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.00173

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 11 of 15

Ecology Software (MTCAStat) Results, 600-120 Waste Site Staging Pile Area

Arsenic 95% UCL Calculation

DATA	ID
	J1BYR3/
2.35	J1BYR9
2.33	J1BYP7
3.04	J1BYP8
2.61	J1BYP9
2.38	J1BYR0
2.50	J1BYR1
2.52	J1BYR2
2.53	J1BYR4
2.94	J1BYR5
2.47	J1BYR6
2.69	J1BYR7
2.16	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	2.54
Censored		Lognormal mean	2.54
Detection limit or PQL		Std. devn.	0.251
Method detection limit		Median	2.51
TOTAL	12	Min.	2.16
		Max.	3.04

Lognormal distribution? Normal distribution?
r-squared is: 0.952 r-squared is: 0.935
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.68

Barium 95% UCL Calculation

DATA	ID
	J1BYR3/
65.4	J1BYR9
55.7	J1BYP7
75.0	J1BYP8
67.0	J1BYP9
54.4	J1BYR0
62.2	J1BYR1
57.1	J1BYR2
68.4	J1BYR4
50.6	J1BYR5
64.1	J1BYR6
54.7	J1BYR7
47.7	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	60.2
Censored		Lognormal mean	60.2
Detection limit or PQL		Std. devn.	8.09
Method detection limit		Median	59.7
TOTAL	12	Min.	47.7
		Max.	75.0

Lognormal distribution? Normal distribution?
r-squared is: 0.979 r-squared is: 0.975
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 64.8

Beryllium 95% UCL Calculation

DATA	ID
	J1BYR3/
0.229	J1BYR9
0.197	J1BYP7
0.279	J1BYP8
0.239	J1BYP9
0.214	J1BYR0
0.252	J1BYR1
0.216	J1BYR2
0.246	J1BYR4
0.210	J1BYR5
0.213	J1BYR6
0.189	J1BYR7
0.166	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	0.221
Censored		Lognormal mean	0.221
Detection limit or PQL		Std. devn.	0.0305
Method detection limit		Median	0.215
TOTAL	12	Min.	0.166
		Max.	0.279

Lognormal distribution? Normal distribution?
r-squared is: 0.977 r-squared is: 0.980
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.238

Boron 95% UCL Calculation

DATA	ID
	J1BYR3/
1.51	J1BYR9
1.06	J1BYP7
1.75	J1BYP8
2.53	J1BYP9
1.32	J1BYR0
2.10	J1BYR1
1.52	J1BYR2
1.60	J1BYR4
1.30	J1BYR5
4.33	J1BYR6
1.67	J1BYR7
3.79	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	2.04
Censored		Lognormal mean	2.04
Detection limit or PQL		Std. devn.	1.02
Method detection limit		Median	1.64
TOTAL	12	Min.	1.06
		Max.	4.33

Lognormal distribution? Normal distribution?
r-squared is: 0.901 r-squared is: 0.788
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.66

Cadmium 95% UCL Calculation

DATA	ID
	J1BYR3/
0.115	J1BYR9
0.105	J1BYP7
0.109	J1BYP8
0.116	J1BYP9
0.0845	J1BYR0
0.0961	J1BYR1
0.0943	J1BYR2
0.110	J1BYR4
0.0984	J1BYR5
0.0926	J1BYR6
0.0985	J1BYR7
0.0849	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	0.100
Censored		Lognormal mean	0.100
Detection limit or PQL		Std. devn.	0.0107
Method detection limit		Median	0.0985
TOTAL	12	Min.	0.0845
		Max.	0.116

Lognormal distribution? Normal distribution?
r-squared is: 0.961 r-squared is: 0.963
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.106

Chromium 95% UCL Calculation

DATA	ID
	J1BYR3/
7.79	J1BYR9
7.00	J1BYP7
11.0	J1BYP8
9.27	J1BYP9
8.16	J1BYR0
10.5	J1BYR1
7.94	J1BYR2
8.82	J1BYR4
10.8	J1BYR5
8.37	J1BYR6
8.73	J1BYR7
7.37	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	8.81
Censored		Lognormal mean	8.82
Detection limit or PQL		Std. devn.	1.33
Method detection limit		Median	8.55
TOTAL	12	Min.	7.00
		Max.	11.0

Lognormal distribution? Normal distribution?
r-squared is: 0.957 r-squared is: 0.937
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.56

Cobalt 95% UCL Calculation

DATA	ID
	J1BYR3/
6.34	J1BYR9
5.90	J1BYP7
6.29	J1BYP8
5.54	J1BYP9
4.71	J1BYR0
5.34	J1BYR1
5.69	J1BYR2
5.24	J1BYR4
5.30	J1BYR5
4.55	J1BYR6
4.66	J1BYR7
3.55	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	5.26
Censored		Lognormal mean	5.27
Detection limit or PQL		Std. devn.	0.797
Method detection limit		Median	5.32
TOTAL	12	Min.	3.55
		Max.	6.34

Lognormal distribution? Normal distribution?
r-squared is: 0.911 r-squared is: 0.950
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.76

Copper 95% UCL Calculation

DATA	ID
	J1BYR3/
11.0	J1BYR9
10.5	J1BYP7
12.5	J1BYP8
10.9	J1BYP9
10.1	J1BYR0
11.0	J1BYR1
11.0	J1BYR2
9.51	J1BYR4
12.8	J1BYR5
8.97	J1BYR6
11.5	J1BYR7
7.73	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	10.6
Censored		Lognormal mean	10.6
Detection limit or PQL		Std. devn.	1.42
Method detection limit		Median	10.9
TOTAL	12	Min.	7.73
		Max.	12.8

Lognormal distribution? Normal distribution?
r-squared is: 0.930 r-squared is: 0.955
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.5

Lead 95% UCL Calculation

DATA	ID
	J1BYR3/
2.72	J1BYR9
2.43	J1BYP7
3.37	J1BYP8
3.81	J1BYP9
2.55	J1BYR0
2.98	J1BYR1
2.70	J1BYR2
3.08	J1BYR4
3.03	J1BYR5
3.03	J1BYR6
2.47	J1BYR7
3.85	J1BYR8

Number of samples		Uncensored values	
Uncensored	12	Mean	3.00
Censored		Lognormal mean	3.00
Detection limit or PQL		Std. devn.	0.477
Method detection limit		Median	3.01
TOTAL	12	Min.	2.43
		Max.	3.85

Lognormal distribution? Normal distribution?
r-squared is: 0.943 r-squared is: 0.921
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 3.27

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
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Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 12 of 15

Ecology Software (MTCAStat) Results, 600-120 Waste Site Staging Pile Area

DATA	ID
	J1BYR3/
294	J1BYR9
268	J1BYP7
306	J1BYP8
272	J1BYP9
222	J1BYR0
258	J1BYR1
242	J1BYR2
278	J1BYR4
239	J1BYR5
222	J1BYR6
211	J1BYR7
172	J1BYR8

Manganese 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	249
Censored		Lognormal mean	249
Detection limit or PQL		Std. devn.	38.2
Method detection limit		Median	250
TOTAL	12	Min.	172
		Max.	306

Lognormal distribution? Normal distribution?
r-squared is: 0.947 r-squared is: 0.976
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 272

DATA	ID
	J1BYR3/
0.302	J1BYR9
0.228	J1BYP7
0.279	J1BYP8
0.299	J1BYP9
0.222	J1BYR0
0.238	J1BYR1
0.239	J1BYR2
0.204	J1BYR4
0.240	J1BYR5
0.257	J1BYR6
0.194	J1BYR7
0.166	J1BYR8

Molybdenum 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	0.239
Censored		Lognormal mean	0.239
Detection limit or PQL		Std. devn.	0.0410
Method detection limit		Median	0.239
TOTAL	12	Min.	0.166
		Max.	0.302

Lognormal distribution? Normal distribution?
r-squared is: 0.966 r-squared is: 0.973
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.264

DATA	ID
	J1BYR3/
8.88	J1BYR9
8.92	J1BYP7
11.3	J1BYP8
9.14	J1BYP9
8.42	J1BYR0
9.60	J1BYR1
8.73	J1BYR2
8.40	J1BYR4
9.84	J1BYR5
7.77	J1BYR6
9.28	J1BYR7
6.59	J1BYR8

Nickel 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	8.91
Censored		Lognormal mean	8.91
Detection limit or PQL		Std. devn.	1.15
Method detection limit		Median	8.90
TOTAL	12	Min.	6.59
		Max.	11.3

Lognormal distribution? Normal distribution?
r-squared is: 0.924 r-squared is: 0.935
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.57

DATA	ID
	J1BYR3/
56.2	J1BYR9
53.4	J1BYP7
47.6	J1BYP8
42.9	J1BYP9
36.3	J1BYR0
39.4	J1BYR1
44.9	J1BYR2
39.8	J1BYR4
42.1	J1BYR5
34.3	J1BYR6
38.5	J1BYR7
27.2	J1BYR8

Vanadium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	41.9
Censored		Lognormal mean	42.0
Detection limit or PQL		Std. devn.	8.01
Method detection limit		Median	41.0
TOTAL	12	Min.	27.2
		Max.	56.2

Lognormal distribution? Normal distribution?
r-squared is: 0.964 r-squared is: 0.973
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 46.8

DATA	ID
	J1BYR3/
39.2	J1BYR9
35.0	J1BYP7
38.9	J1BYP8
34.7	J1BYP9
28.3	J1BYR0
31.6	J1BYR1
34.2	J1BYR2
31.6	J1BYR4
31.2	J1BYR5
29.1	J1BYR6
28.4	J1BYR7
24.2	J1BYR8

Zinc 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	32.2
Censored		Lognormal mean	32.2
Detection limit or PQL		Std. devn.	4.43
Method detection limit		Median	31.6
TOTAL	12	Min.	24.2
		Max.	39.2

Lognormal distribution? Normal distribution?
r-squared is: 0.962 r-squared is: 0.966
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 34.8

DATA	ID
	J1BYR3/
11.8	J1BYR9
5.00	J1BYP7
5.05	J1BYP8
9.62	J1BYP9
3.49	J1BYR0
4.96	J1BYR1
15.7	J1BYR2
5.15	J1BYR4
16.2	J1BYR5
19.0	J1BYR6
5.10	J1BYR7
52.4	J1BYR8

TPH - motor oil 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	12	Mean	12.8
Censored		Lognormal mean	12.5
Detection limit or PQL		Std. devn.	13.6
Method detection limit		Median	7.39
TOTAL	12	Min.	3.49
		Max.	52.4

Lognormal distribution? Normal distribution?
r-squared is: 0.883 r-squared is: 0.636
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 19.2

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
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Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 13 of 15

Duplicate Analysis - 600-120 Excavation

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	6280		4.36	2.80		0.871	61.5		0.436	0.213		0.174	1.87		1.74	0.104	B	0.174	5890		87.1	10.9		0.174
Duplicate of EX-4	J1BYP6	9/27/2010	6170		3.96	2.57		0.793	58.8		0.396	0.204		0.159	1.88		1.59	0.0936	B	0.159	5450		79.3	9.37		0.159

Analysis:

	TDL	Aluminum: 5	Arsenic: 10	Barium: 2	Beryllium: 0.2	Boron: 2	Cadmium: 0.2	Calcium: 100	Chromium: 1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)		Yes (calc RPD)	Yes (calc RPD)
	RPD	1.8%		4.5%				7.8%	15.1%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis - 600-120 Excavation

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel		
			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
EX-4	J1BYN7	9/27/2010	5.27		1.74	12.2		0.871	16200		17.4	2.80		0.436	4430		65.3	240		4.36	0.250	B	1.74	12.7		3.48
Duplicate of EX-4	J1BYP6	9/27/2010	5.01		1.59	10.7		0.793	15800		15.9	2.55		0.396	3920		59.5	233		3.96	0.237	B	1.59	9.71		3.17

Analysis:

	TDL	Cobalt: 2	Copper: 1	Iron: 5	Lead: 5	Magnesium: 75	Manganese: 5	Molybdenum: 2	Nickel: 4
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)
	RPD		13.1%	2.5%		12.2%	3.0%		
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Duplicate Analysis - 600-120 Excavation

Sampling Area	HEIS Number	Sample Date	Potassium			Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	1110		348	154		1.74	246		43.6	42.6		2.18	31.3		8.71
Duplicate of EX-4	J1BYP6	9/27/2010	1050		317	146		1.59	267		39.6	41.4		1.98	30.6		7.93

Analysis:

	TDL	Potassium: 400	Silicon: 2	Sodium: 50	Vanadium: 2.5	Zinc: 1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		5.3%		2.9%	2.3%
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 14 of 15

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-7	J1BYR3	9/27/2010	5900		4.07	2.26		0.814	58.6		0.407	0.208		0.163	1.16	B	1.63	0.108	B	0.163	3980		81.4	7.25		0.163
Duplicate of SPA-7	J1BYR9	9/27/2010	5750	J	4.59	2.33		0.918	55.7		0.459	0.197		0.184	1.06	B	1.84	0.105	B	0.184	3790	J	91.8	7.00	J	0.184

Analysis:

	TDL	Aluminum	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium
Duplicate Analysis	Both > PQL?	5 Yes (continue)	10 Yes (continue)	2 Yes (continue)	0.2 Yes (continue)	2 No-Stop (acceptable)	0.2 No-Stop (acceptable)	100 Yes (continue)	1 Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)			Yes (calc RPD)	Yes (calc RPD)
	RPD	2.6%		5.1%				4.9%	3.5%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel		
			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
SPA-7	J1BYR3	9/27/2010	6.19		1.63	11.2		0.814	19000		16.3	2.62		0.407	3610		61.0	268		4.07	0.287	B	1.63	8.94		3.26
Duplicate of SPA-7	J1BYR9	9/27/2010	5.90		1.84	10.5		0.918	18500		18.4	2.43		0.459	3650	J	68.8	268		4.59	0.228	B	1.84	8.92		3.67

Analysis:

	TDL	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel
Duplicate Analysis	Both > PQL?	2 Yes (continue)	1 Yes (continue)	5 Yes (continue)	5 Yes (continue)	75 Yes (continue)	5 Yes (continue)	2 No-Stop (acceptable)	4 Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)
	RPD		6.5%	2.7%		1.1%	0.0%		
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	HEIS Number	Sample Date	Potassium			Silicon			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SPA-7	J1BYR3	9/27/2010	1050		326	129		1.63	239		40.7	54.9		2.03	37.9		8.14
Duplicate of SPA-7	J1BYR9	9/27/2010	1030		367	145	J	1.84	209		45.9	53.4	J	2.29	35.0		9.18

Analysis:

	TDL	Potassium	Silicon	Sodium	Vanadium	Zinc
Duplicate Analysis	Both > PQL?	400 Yes (continue)	2 Yes (continue)	50 Yes (continue)	2.5 Yes (continue)	1 Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)
	RPD		11.7%		2.8%	8.0%
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable

CALCULATION SHEET

Washington Closure Hanford
Originator T. E. Queen
Project 100-IU-2/6 Field Remediation
Subject 600-120 Waste Site Cleanup Verification 95% UCL Calculations

Date 12/29/10
Job No. 14655

Calc. No. 0600X-CA-V0096
Checked J. D. Skoglie

Rev. No. 0
Date 12/29/10
Sheet No. 15 of 15

Duplicate Analysis - 600-120 Overburden

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
OB-2 (SW end)	J1BYT1	9/27/2010	7260	J	4.16	2.48		0.832	67.3		0.416	0.241		0.166	2.10		1.66	0.146	B	0.166	3500	J	83.2	9.17	J	0.166
Duplicate of OB-2	J1BYT2	9/27/2010	5910	J	4.36	1.96		0.871	57.6		0.436	0.198		0.174	1.66	B	1.74	0.119	B	0.174	2980	J	87.1	7.00	J	0.174

Analysis:

	TDL	5	10	2	0.2	2	0.2	100	1
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)			Yes (calc RPD)	Yes (calc RPD)
	RPD	20.5%		15.5%				16.0%	26.8%
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	HEIS Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Molybdenum			Nickel		
			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
OB-2 (SW end)	J1BYT1	9/27/2010	5.97		1.66	10.9		0.832	18600		16.6	4.60		0.416	3470	J	62.4	289		4.16	0.272	B	1.66	8.75		3.33
Duplicate of OB-2	J1BYT2	9/27/2010	5.07		1.74	9.11		0.871	15800		17.4	3.54		0.436	3080	J	65.4	249		4.36	0.227	B	1.74	8.19		3.49

Analysis:

	TDL	2	1	5	5	75	5	2	4
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	Yes (continue)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)		No-Stop (acceptable)
	RPD		17.9%	16.3%		11.9%	14.9%		
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	HEIS Number	Sample Date	Potassium			Silicon			Sodium			Vanadium			Zinc			TPH - motor oil			Benzo(a)anthracene			Benzo(a)pyrene		
			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
OB-2 (SW end)	J1BYT1	9/27/2010	1630		333	211	J	1.66	203		41.6	50.6	J	2.08	39.3		8.32	46.0	J	10.0	0.000989	J	0.00329	0.00394		0.00329
Duplicate of OB-2	J1BYT2	9/27/2010	1330		349	161	J	1.74	175		43.6	42.4	J	2.18	33.1		8.71	27.4	J	10.2	0.00109	J	0.00326	0.00290	J	0.00326

Analysis:

	TDL	400	2	50	2.5	1	5	0.015	0.015
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)		
	RPD		26.9%		17.6%	17.1%	*50.7%*		
	Difference > 2 TDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable

Duplicate Analysis - 600-120 Staging Pile Area

Sampling Area	HEIS Number	Sample Date	Benzo(b)fluoranthene			Benzo(ghi)perylene			Benzo(k)fluoranthene			Fluoranthene			Indeno(1,2,3-cd) pyrene			Phenanthrene			Pyrene		
			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
OB-2 (SW end)	J1BYT1	9/27/2010	0.00363		0.00329	0.0131		0.00329	0.00158	J	0.00329	0.0111		0.00329	0.0209		0.00329	0.00272	J	0.00329	0.00201	J	0.00329
Duplicate of OB-2	J1BYT2	9/27/2010	0.00430		0.00326	0.0115		0.00326	0.00165	J	0.00326	0.0271		0.00326	0.0131		0.00326	0.00267	J	0.00326	0.00228	J	0.00326

Analysis:

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

Attachment 1. 600-120 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
EX-4	J1BYN7	9/27/2010	6280		4.36	0.523	U	0.523	2.80		0.871	61.5		0.436	0.213		0.174
Duplicate of EX-4	J1BYP6	9/27/2010	6170		3.96	0.476	U	0.476	2.57		0.793	58.8		0.396	0.204		0.159
EX-1	J1BYN4	9/27/2010	7220		4.17	0.501	U	0.501	2.69		0.835	59.4		0.417	0.225		0.167
EX-2	J1BYN5	9/27/2010	6360		3.47	0.416	U	0.416	2.57		0.694	57.4		0.347	0.214		0.139
EX-3	J1BYN6	9/27/2010	7750		3.69	0.442	U	0.442	2.88		0.737	67.2		0.369	0.259		0.147
EX-5	J1BYN8	9/27/2010	7300		4.50	0.539	U	0.539	2.83		0.899	62.6		0.450	0.236		0.180
EX-6	J1BYN9	9/27/2010	7620		4.41	0.529	U	0.529	2.79		0.882	67.5		0.441	0.250		0.176
EX-7	J1BYP0	9/27/2010	6420		4.76	0.571	U	0.571	3.26		0.952	64.9		0.476	0.224		0.190
EX-8	J1BYP1	9/27/2010	5470		4.71	0.566	U	0.566	2.41		0.943	49.2		0.471	0.180	B	0.189
EX-9	J1BYP2	9/27/2010	6430		3.82	0.459	U	0.459	2.52		0.764	58.2		0.382	0.211		0.153
EX-10	J1BYP3	9/27/2010	7330		3.72	0.446	U	0.446	2.78		0.744	64.2		0.372	0.245		0.149
EX-11	J1BYP4	9/27/2010	6790		3.76	0.451	U	0.451	2.80		0.752	51.2		0.376	0.229		0.150
EX-12	J1BYP5	9/27/2010	7710		4.70	0.564	U	0.564	2.83		0.940	70.3		0.470	0.269		0.188
SPA-7	J1BYR3	9/27/2010	5900		4.07	0.488	U	0.488	2.26		0.814	58.6		0.407	0.208		0.163
Duplicate of SPA-7	J1BYR9	9/27/2010	5750	J	4.59	0.551	UJ	0.551	2.33		0.918	55.7		0.459	0.197		0.184
SPA-1	J1BYP7	9/27/2010	7050		3.65	0.438	U	0.438	2.44		0.730	72.1		0.365	0.250		0.146
SPA-2	J1BYP8	9/27/2010	8000		4.02	0.482	U	0.482	3.04		0.804	75.0		0.402	0.279		0.161
SPA-3	J1BYP9	9/27/2010	6910		4.62	0.554	U	0.554	2.61		0.924	67.0		0.462	0.239		0.185
SPA-4	J1BYR0	9/27/2010	6430		3.23	0.388	U	0.388	2.38		0.647	54.4		0.323	0.214		0.129
SPA-5	J1BYR1	9/27/2010	7670		4.90	0.588	U	0.588	2.50		0.980	62.2		0.490	0.252		0.196
SPA-6	J1BYR2	9/27/2010	6210		3.81	0.457	U	0.457	2.52		0.762	57.1		0.381	0.216		0.152
SPA-8	J1BYR4	9/27/2010	7690	J	4.05	0.486	UJ	0.486	2.53		0.809	68.4		0.405	0.246		0.162
SPA-9	J1BYR5	9/27/2010	6710	J	3.28	0.393	UJ	0.393	2.94		0.655	50.6		0.328	0.210		0.131
SPA-10	J1BYR6	9/27/2010	6580	J	3.90	0.468	UJ	0.468	2.47		0.779	64.1		0.390	0.213		0.156
SPA-11	J1BYR7	9/27/2010	6330	J	3.47	0.416	UJ	0.416	2.69		0.693	54.7		0.347	0.189		0.139
SPA-12	J1BYR8	9/27/2010	5000	J	3.48	0.417	UJ	0.417	2.16		0.696	47.7		0.348	0.166		0.139
OB-2 (SW end)	J1BYT1	9/27/2010	7260	J	4.16	0.499	UJ	0.499	2.48		0.832	67.3		0.416	0.241		0.166
Duplicate of OB-2	J1BYT2	9/27/2010	5910	J	4.36	0.523	UJ	0.523	1.96		0.871	57.6		0.436	0.198		0.174
OB-1 (NE end)	J1BYT0	9/27/2010	5470	J	3.44	0.413	UJ	0.413	2.12		0.688	49.7		0.344	0.178		0.138
Equipment Blank	J1BYT3	9/27/2010	177	J	3.21	0.386	UJ	0.386	0.643	U	0.643	1.76		0.321	0.129	U	0.129

Note: Gray cells indicate not applicable.

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

D = analyte reported from a dilution

HEIS = Hanford Environmental Information System

J = estimated result

PQL = practical quantitation limit

Q = qualifier

U = undetected

Attachment	1	Sheet No.	1 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 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
EX-4	J1BYN7	9/27/2010	1.87		1.74	0.104	B	0.174	5890		87.1	10.9		0.174	5.27		1.74
Duplicate of EX-4	J1BYP6	9/27/2010	1.88		1.59	0.0936	B	0.159	5450		79.3	9.37		0.159	5.01		1.59
EX-1	J1BYN4	9/27/2010	2.16		1.67	0.120	B	0.167	4850		83.5	9.54		0.167	6.00		1.67
EX-2	J1BYN5	9/27/2010	1.39		1.39	0.0983	B	0.139	3720		69.4	8.82		0.139	5.32		1.39
EX-3	J1BYN6	9/27/2010	8.98		1.47	0.0986	B	0.147	3480		73.7	10.6		0.147	5.59		1.47
EX-5	J1BYN8	9/27/2010	3.78		1.80	0.0977	B	0.180	3460		89.9	9.44		0.180	5.29		1.80
EX-6	J1BYN9	9/27/2010	2.82		1.76	0.0851	B	0.176	3160		88.2	9.85		0.176	5.35		1.76
EX-7	J1BYP0	9/27/2010	3.17		1.90	0.120	B	0.190	4350		95.2	10.5		0.190	5.54		1.90
EX-8	J1BYP1	9/27/2010	1.81	B	1.89	0.0825	B	0.189	3060		94.3	8.41		0.189	4.89		1.89
EX-9	J1BYP2	9/27/2010	3.88		1.53	0.100	B	0.153	3360		76.4	10.1		0.153	5.07		1.53
EX-10	J1BYP3	9/27/2010	1.91		1.49	0.0976	B	0.149	3390		74.4	9.95		0.149	5.20		1.49
EX-11	J1BYP4	9/27/2010	1.20	B	1.50	0.0888	B	0.150	3700		75.2	13.4		0.150	5.89		1.50
EX-12	J1BYP5	9/27/2010	1.58	B	1.88	0.112	B	0.188	3500		94.0	11.5		0.188	5.87		1.88
SPA-7	J1BYR3	9/27/2010	1.16	B	1.63	0.108	B	0.163	3980		81.4	7.25		0.163	6.19		1.63
Duplicate of SPA-7	J1BYR9	9/27/2010	1.06	B	1.84	0.105	B	0.184	3790	J	91.8	7.00	J	0.184	5.90		1.84
SPA-1	J1BYP7	9/27/2010	1.86		1.46	0.122	B	0.146	3350		73.0	8.32		0.146	6.48		1.46
SPA-2	J1BYP8	9/27/2010	1.75		1.61	0.109	B	0.161	3510		80.4	11.0		0.161	6.29		1.61
SPA-3	J1BYP9	9/27/2010	2.53		1.85	0.116	B	0.185	3600		92.4	9.27		0.185	5.54		1.85
SPA-4	J1BYR0	9/27/2010	1.32		1.29	0.0845	B	0.129	2830		64.7	8.16		0.129	4.71		1.29
SPA-5	J1BYR1	9/27/2010	2.10		1.96	0.0961	B	0.196	2990		98.0	10.5		0.196	5.34		1.96
SPA-6	J1BYR2	9/27/2010	1.52	B	1.52	0.0943	B	0.152	4630		76.2	7.94		0.152	5.69		1.52
SPA-8	J1BYR4	9/27/2010	1.60	B	1.62	0.110	B	0.162	2830	J	80.9	8.82	J	0.162	5.24		1.62
SPA-9	J1BYR5	9/27/2010	1.30	B	1.31	0.0984	B	0.131	6310	J	65.5	10.8	J	0.131	5.30		1.31
SPA-10	J1BYR6	9/27/2010	4.33		1.56	0.0926	B	0.156	3190	J	77.9	8.37	J	0.156	4.55		1.56
SPA-11	J1BYR7	9/27/2010	1.67		1.39	0.0985	B	0.139	11300	J	69.3	8.73	J	0.139	4.66		1.39
SPA-12	J1BYR8	9/27/2010	3.79		1.39	0.0849	B	0.139	2650	J	69.6	7.37	J	0.139	3.55		1.39
OB-2 (SW end)	J1BYT1	9/27/2010	2.10		1.66	0.146	B	0.166	3500	J	83.2	9.17	J	0.166	5.97		1.66
Duplicate of OB-2	J1BYT2	9/27/2010	1.66	B	1.74	0.119	B	0.174	2980	J	87.1	7.00	J	0.174	5.07		1.74
OB-1 (NE end)	J1BYT0	9/27/2010	1.72		1.38	0.101	B	0.138	2880	J	68.8	8.13	J	0.138	4.14		1.38
Equipment Blank	J1BYT3	9/27/2010	1.29	U	1.29	0.129	U	0.129	34.0	JB	64.3	0.129	UJ	0.129	1.29	U	1.29

Attachment	1	Sheet No.	2 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	12.2		0.871	16200		17.4	2.80		0.436	4430		65.3	240		4.36
Duplicate of EX-4	J1BYP6	9/27/2010	10.7		0.793	15800		15.9	2.55		0.396	3920		59.5	233		3.96
EX-1	J1BYN4	9/27/2010	11.3		0.835	17900		16.7	3.04		0.417	4290		62.6	280		4.17
EX-2	J1BYN5	9/27/2010	10.5		0.694	16800		13.9	2.89		0.347	3550		52.0	250		3.47
EX-3	J1BYN6	9/27/2010	10.8		0.737	17400		14.7	3.27		0.369	3960		55.3	280		3.69
EX-5	J1BYN8	9/27/2010	10.4		0.899	16700		18.0	3.89		0.450	3620		67.4	247		4.50
EX-6	J1BYN9	9/27/2010	10.2		0.882	16000		17.6	3.25		0.441	3390		66.1	253		4.41
EX-7	J1BYP0	9/27/2010	11.3		0.952	16700		19.0	4.96		0.476	3770		71.4	259		4.76
EX-8	J1BYP1	9/27/2010	8.23		0.943	15400		18.9	2.99		0.471	3230		70.7	235		4.71
EX-9	J1BYP2	9/27/2010	9.33		0.764	15300		15.3	4.26		0.382	3330		57.3	245		3.82
EX-10	J1BYP3	9/27/2010	10.6		0.744	16500		14.9	7.72		0.372	3430		55.8	265		3.72
EX-11	J1BYP4	9/27/2010	16.6		0.752	17000		15.0	3.18		0.376	4320		56.4	236		3.76
EX-12	J1BYP5	9/27/2010	13.3		0.940	18000		18.8	3.51		0.470	4020		70.5	279		4.70
SPA-7	J1BYR3	9/27/2010	11.2		0.814	19000		16.3	2.62		0.407	3610		61.0	268		4.07
Duplicate of SPA-7	J1BYR9	9/27/2010	10.5		0.918	18500		18.4	2.43		0.459	3650	J	68.8	268		4.59
SPA-1	J1BYP7	9/27/2010	10.7		0.730	20700		14.6	2.81		0.365	3440		54.8	320		3.65
SPA-2	J1BYP8	9/27/2010	12.5		0.804	19400		16.1	3.37		0.402	4140		60.3	306		4.02
SPA-3	J1BYP9	9/27/2010	10.9		0.924	16900		18.5	3.81		0.462	3420		69.3	272		4.62
SPA-4	J1BYR0	9/27/2010	10.1		0.647	14500		12.9	2.55		0.323	2890		48.5	222		3.23
SPA-5	J1BYR1	9/27/2010	11.0		0.980	16600		19.6	2.98		0.490	3190		73.5	258		4.90
SPA-6	J1BYR2	9/27/2010	11.0		0.762	16700		15.2	2.70		0.381	3610		57.2	242		3.81
SPA-8	J1BYR4	9/27/2010	9.51		0.809	16500		16.2	3.08		0.405	3220	J	60.7	278		4.05
SPA-9	J1BYR5	9/27/2010	12.8		0.655	15700		13.1	3.03		0.328	4080	J	49.2	239		3.28
SPA-10	J1BYR6	9/27/2010	8.97		0.779	14200		15.6	3.03		0.390	2920	J	58.5	222		3.90
SPA-11	J1BYR7	9/27/2010	11.5		0.693	14400		13.9	2.47		0.347	3890	J	52.0	211		3.47
SPA-12	J1BYR8	9/27/2010	7.73		0.696	10800		13.9	3.85		0.348	2390	J	52.2	172		3.48
OB-2 (SW end)	J1BYT1	9/27/2010	10.9		0.832	18600		16.6	4.60		0.416	3470	J	62.4	289		4.16
Duplicate of OB-2	J1BYT2	9/27/2010	9.11		0.871	15800		17.4	3.54		0.436	3080	J	65.4	249		4.36
OB-1 (NE end)	J1BYT0	9/27/2010	9.10		0.688	12600		13.8	4.26		0.344	2720	J	51.6	200		3.44
Equipment Blank	J1BYT3	9/27/2010	0.643	U	0.643	245		12.9	0.354		0.321	18.9	JB	48.2	4.54		3.21

Attachment	1	Sheet No.	3 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Molybdenum			Nickel			Potassium			Selenium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	0.250	B	1.74	12.7		3.48	1110		348	0.261	U	0.261	154		1.74
Duplicate of EX-4	J1BYP6	9/27/2010	0.237	B	1.59	9.71		3.17	1050		317	0.238	U	0.238	146		1.59
EX-1	J1BYN4	9/27/2010	0.288	B	1.67	8.95		3.34	1440		334	0.250	U	0.250	146		1.67
EX-2	J1BYN5	9/27/2010	0.318	B	1.39	8.74		2.78	1280		278	0.208	U	0.208	132		1.39
EX-3	J1BYN6	9/27/2010	0.280	B	1.47	9.84		2.95	1510		295	0.221	U	0.221	158		1.47
EX-5	J1BYN8	9/27/2010	0.288	B	1.80	9.32		3.60	1350		360	0.270	U	0.270	183		1.80
EX-6	J1BYN9	9/27/2010	0.272	B	1.76	9.19		3.53	1470		353	0.265	U	0.265	168		1.76
EX-7	J1BYP0	9/27/2010	0.292	B	1.90	10.5		3.81	1130		381	0.286	U	0.286	204		1.90
EX-8	J1BYP1	9/27/2010	0.237	B	1.89	7.73		3.77	1030		377	0.283	U	0.283	136		1.89
EX-9	J1BYP2	9/27/2010	0.247	B	1.53	8.80		3.06	1090		306	0.229	U	0.229	123		1.53
EX-10	J1BYP3	9/27/2010	0.239	B	1.49	8.78		2.98	1320		298	0.223	U	0.223	144		1.49
EX-11	J1BYP4	9/27/2010	0.269	B	1.50	13.3		3.01	1000		301	0.226	U	0.226	144		1.50
EX-12	J1BYP5	9/27/2010	0.226	B	1.88	11.0		3.76	1560		376	0.282	U	0.282	196		1.88
SPA-7	J1BYR3	9/27/2010	0.287	B	1.63	8.94		3.26	1050		326	0.244	U	0.244	129		1.63
Duplicate of SPA-7	J1BYR9	9/27/2010	0.228	B	1.84	8.92		3.67	1030		367	0.275	U	0.275	145	J	1.84
SPA-1	J1BYP7	9/27/2010	0.317	B	1.46	8.81		2.92	1560		292	0.219	U	0.219	156		1.46
SPA-2	J1BYP8	9/27/2010	0.279	B	1.61	11.3		3.21	1550		321	0.241	U	0.241	255		1.61
SPA-3	J1BYP9	9/27/2010	0.299	B	1.85	9.14		3.70	1550		370	0.277	U	0.277	171		1.85
SPA-4	J1BYR0	9/27/2010	0.222	B	1.29	8.42		2.59	1320		259	0.194	U	0.194	135		1.29
SPA-5	J1BYR1	9/27/2010	0.238	B	1.96	9.60		3.92	1930		392	0.294	U	0.294	201		1.96
SPA-6	J1BYR2	9/27/2010	0.239	B	1.52	8.73		3.05	1170		305	0.229	U	0.229	177		1.52
SPA-8	J1BYR4	9/27/2010	0.204	B	1.62	8.40		3.24	1540		324	0.243	U	0.243	135	J	1.62
SPA-9	J1BYR5	9/27/2010	0.240	B	1.31	9.84		2.62	1100		262	0.197	U	0.197	122	J	1.31
SPA-10	J1BYR6	9/27/2010	0.257	B	1.56	7.77		3.12	1300		312	0.234	U	0.234	135	J	1.56
SPA-11	J1BYR7	9/27/2010	0.194	B	1.39	9.28		2.77	968		277	0.208	U	0.208	130	J	1.39
SPA-12	J1BYR8	9/27/2010	0.166	B	1.39	6.59		2.78	949		278	0.209	U	0.209	112	J	1.39
OB-2 (SW end)	J1BYT1	9/27/2010	0.272	B	1.66	8.75		3.33	1630		333	0.250	U	0.250	211	J	1.66
Duplicate of OB-2	J1BYT2	9/27/2010	0.227	B	1.74	8.19		3.49	1330		349	0.261	U	0.261	161	J	1.74
OB-1 (NE end)	J1BYT0	9/27/2010	0.180	B	1.38	7.32		2.75	1140		275	0.206	U	0.206	143	J	1.38
Equipment Blank	J1BYT3	9/27/2010	1.29	U	1.29	2.57	U	2.57	39.9	B	257	0.193	U	0.193	80.2	J	1.29

Attachment	1	Sheet No.	4 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Metals).

Sample Location	HEIS Number	Sample Date	Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	0.174	U	0.174	246		43.6	42.6		2.18	31.3		8.71
Duplicate of EX-4	J1BYP6	9/27/2010	0.159	U	0.159	267		39.6	41.4		1.98	30.6		7.93
EX-1	J1BYN4	9/27/2010	0.167	U	0.167	291		41.7	49.3		2.09	35.1		8.35
EX-2	J1BYN5	9/27/2010	0.139	U	0.139	211		34.7	44.9		1.73	32.2		6.94
EX-3	J1BYN6	9/27/2010	0.147	U	0.147	313		36.9	41.6		1.84	33.9		7.37
EX-5	J1BYN8	9/27/2010	0.180	U	0.180	320		45.0	40.4		2.25	31.7		8.99
EX-6	J1BYN9	9/27/2010	0.176	U	0.176	260		44.1	36.7		2.20	29.3		8.82
EX-7	J1BYP0	9/27/2010	0.190	U	0.190	210		47.6	43.8		2.38	35.0		9.52
EX-8	J1BYP1	9/27/2010	0.189	U	0.189	182		47.1	42.4		2.36	29.5		9.43
EX-9	J1BYP2	9/27/2010	0.153	U	0.153	213		38.2	38.2		1.91	31.3		7.64
EX-10	J1BYP3	9/27/2010	0.149	U	0.149	198		37.2	41.8		1.86	32.4		7.44
EX-11	J1BYP4	9/27/2010	0.150	U	0.150	229		37.6	45.7		1.88	33.1		7.52
EX-12	J1BYP5	9/27/2010	0.188	U	0.188	184		47.0	44.0		2.35	34.3		9.40
SPA-7	J1BYR3	9/27/2010	0.163	U	0.163	239		40.7	54.9		2.03	37.9		8.14
Duplicate of SPA-7	J1BYR9	9/27/2010	0.184	U	0.184	209		45.9	53.4	J	2.29	35.0		9.18
SPA-1	J1BYP7	9/27/2010	0.146	U	0.146	206		36.5	57.4		1.83	40.4		7.30
SPA-2	J1BYP8	9/27/2010	0.161	U	0.161	223		40.2	47.6		2.01	38.9		8.04
SPA-3	J1BYP9	9/27/2010	0.185	U	0.185	214		46.2	42.9		2.31	34.7		9.24
SPA-4	J1BYR0	9/27/2010	0.129	U	0.129	199		32.3	36.3		1.62	28.3		6.47
SPA-5	J1BYR1	9/27/2010	0.196	U	0.196	226		49.0	39.4		2.45	31.6		9.80
SPA-6	J1BYR2	9/27/2010	0.152	U	0.152	247		38.1	44.9		1.91	34.2		7.62
SPA-8	J1BYR4	9/27/2010	0.162	U	0.162	175		40.5	39.8	J	2.02	31.6		8.09
SPA-9	J1BYR5	9/27/2010	0.131	U	0.131	224		32.8	42.1	J	1.64	31.2		6.55
SPA-10	J1BYR6	9/27/2010	0.156	U	0.156	197		39.0	34.3	J	1.95	29.1		7.79
SPA-11	J1BYR7	9/27/2010	0.139	U	0.139	281		34.7	38.5	J	1.73	28.4		6.93
SPA-12	J1BYR8	9/27/2010	0.139	U	0.139	146		34.8	27.2	J	1.74	24.2		6.96
OB-2 (SW end)	J1BYT1	9/27/2010	0.166	U	0.166	203		41.6	50.6	J	2.08	39.3		8.32
Duplicate of OB-2	J1BYT2	9/27/2010	0.174	U	0.174	175		43.6	42.4	J	2.18	33.1		8.71
OB-1 (NE end)	J1BYT0	9/27/2010	0.138	U	0.138	161		34.4	31.6	J	1.72	67.6		6.88
Equipment Blank	J1BYT3	9/27/2010	0.129	U	0.129	32.1	U	32.1	0.268	JB	1.61	0.95	B	6.43

Attachment	1	Sheet No.	5 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYN7			J1BYP6			J1BYN4			J1BYN5			J1BYN6		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		EX-4			Duplicate of EX-4			EX-1			EX-2			EX-3		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.81		3.46
Acenaphthylene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Anthracene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	1.73	J	3.46	1.21	J	3.46
Benzo(a)anthracene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Benzo(a)pyrene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Benzo(b)fluoranthene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Benzo(ghi)perylene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Benzo(k)fluoranthene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Chrysene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Dibenz[a,h]anthracene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Fluoranthene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Fluorene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Indeno(1,2,3-cd)pyrene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Naphthalene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Phenanthrene	PAH	3.48	U	3.48	1.22	J	3.49	0.872	J	3.49	3.46	U	3.46	3.46	U	3.46
Pyrene	PAH	3.48	U	3.48	3.49	U	3.49	3.49	U	3.49	3.46	U	3.46	3.46	U	3.46
Aroclor-1016	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1221	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1232	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1242	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1248	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1254	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aroclor-1260	PCB	14.1	U	14.1	13.9	U	13.9	13.9	U	13.9	14.0	U	14.0	13.8	U	13.8
Aldrin	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Alpha-BHC	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
alpha-Chlordane	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Beta-BHC	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Delta-BHC	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
4,4'-DDD	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
4,4'-DDE	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
4,4'-DDT	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Dieldrin	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endosulfan I	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endosulfan II	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endosulfan sulfate	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endrin	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endrin aldehyde	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Endrin ketone	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Gamma-BHC (Lindane)	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
gamma-Chlordane	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Heptachlor	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Heptachlor epoxide	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Methoxychlor	PEST	1.39	UD	1.39	1.38	UD	1.38	1.38	UD	1.38	1.39	UD	1.39	1.37	UD	1.37
Toxaphene	PEST	13.9	UD	13.9	13.8	UD	13.8	13.8	UD	13.8	13.9	UD	13.9	13.7	UD	13.7

Attachment	1	Sheet No.	6 of 15
Originator	T. E. Queen	Date	12/29/09
Checked	J. D. Skoglie	Date	12/29/09
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYN8			J1BYN9			J1BYP0			J1BYP1			J1BYP2		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		EX-5			EX-6			EX-7			EX-8			EX-9		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	3.52		3.52	3.03	J	3.56	0.839	J	3.35	1.03	J	3.42	0.856	J	3.42
Acenaphthylene	PAH	3.52	U	3.52	3.56	U	3.56	3.35	U	3.35	3.42	U	3.42	3.42	U	3.42
Anthracene	PAH	3.52	U	3.52	2.14	J	3.56	2.01	J	3.35	1.03	J	3.42	0.856	J	3.42
Benzo(a)anthracene	PAH	3.52	U	3.52	3.56	U	3.56	3.35	U	3.35	3.42	U	3.42	0.856	J	3.42
Benzo(a)pyrene	PAH	3.52	U	3.52	3.56	U	3.56	2.25	J	3.35	3.42	U	3.42	1.47	J	3.42
Benzo(b)fluoranthene	PAH	1.48	J	3.52	3.56	U	3.56	1.01	J	3.35	3.42	U	3.42	0.992	J	3.42
Benzo(ghi)perylene	PAH	3.52	U	3.52	3.56	U	3.56	4.48		3.35	0.992	J	3.42	2.12	J	3.42
Benzo(k)fluoranthene	PAH	3.52	U	3.52	3.56	U	3.56	0.906	J	3.35	3.42	U	3.42	3.42	U	3.42
Chrysene	PAH	2.15	J	3.52	3.56	U	3.56	3.35	U	3.35	3.42	U	3.42	3.42	U	3.42
Dibenz[a,h]anthracene	PAH	3.52	U	3.52	3.56	U	3.56	0.94	J	3.35	3.42	U	3.42	3.42	U	3.42
Fluoranthene	PAH	2.82	J	3.52	3.56	U	3.56	2.35	J	3.35	3.42	U	3.42	2.05	J	3.42
Fluorene	PAH	3.52	U	3.52	3.56	U	3.56	3.35	U	3.35	3.42	U	3.42	3.42	U	3.42
Indeno(1,2,3-cd)pyrene	PAH	3.52	U	3.52	3.56	U	3.56	3.35	U	3.35	2.62	J	3.42	3.42	U	3.42
Naphthalene	PAH	3.52	U	3.52	3.56	U	3.56	3.35	U	3.35	3.42	U	3.42	3.42	U	3.42
Phenanthrene	PAH	3.52	U	3.52	3.56	U	3.56	1.85	J	3.35	3.42	U	3.42	3.42	U	3.42
Pyrene	PAH	3.52	U	3.52	3.56	U	3.56	1.14	J	3.35	3.42	U	3.42	4.28		3.42
Aroclor-1016	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1221	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1232	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1242	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1248	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1254	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aroclor-1260	PCB	13.8	U	13.8	14.2	U	14.2	13.1	U	13.1	13.5	U	13.5	13.8	U	13.8
Aldrin	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Alpha-BHC	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
alpha-Chlordane	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Beta-BHC	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Delta-BHC	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
4,4'-DDD	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
4,4'-DDE	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
4,4'-DDT	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Dieldrin	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endosulfan I	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endosulfan II	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endosulfan sulfate	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endrin	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endrin aldehyde	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Endrin ketone	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Gamma-BHC (Lindane)	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
gamma-Chlordane	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Heptachlor	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Heptachlor epoxide	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Methoxychlor	PEST	1.37	UD	1.37	1.41	UD	1.41	1.30	UD	1.30	1.34	UD	1.34	1.37	UD	1.37
Toxaphene	PEST	13.7	UD	13.7	14.1	UD	14.1	13.0	UD	13.0	13.4	UD	13.4	13.7	UD	13.7

Attachment 1 Sheet No. 7 of 15
Originator T. E. Queen Date 12/29/09
Checked J. D. Skoglie Date 12/29/09
Calc. No. 0600X-CA-V0096 Rev. No. 0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYP3			J1BYP4			J1BYP5			J1BYR3			J1BYR9		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		EX-10			EX-11			EX-12			SPA-7			Duplicate of SPA-7		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Acenaphthylene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Anthracene	PAH	1.21	J	3.46	3.38	U	3.38	0.844	J	3.37	3.38	U	3.38	15.0	U	3.23
Benzo(a)anthracene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Benzo(a)pyrene	PAH	0.934	J	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Benzo(b)fluoranthene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Benzo(ghi)perylene	PAH	0.899	J	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Benzo(k)fluoranthene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Chrysene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Dibenz[a,h]anthracene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Fluoranthene	PAH	3.46	U	3.46	0.846	J	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Fluorene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Indeno(1,2,3-cd)pyrene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Naphthalene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Phenanthrene	PAH	3.46	U	3.46	1.02	J	3.38	3.37	U	3.37	3.38	U	3.38	3.23	U	3.23
Pyrene	PAH	3.46	U	3.46	3.38	U	3.38	3.37	U	3.37	3.38	U	3.38	0.873	J	3.23
Aroclor-1016	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1221	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1232	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1242	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1248	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1254	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aroclor-1260	PCB	13.7	U	13.7	13.2	U	13.2	13.6	U	13.6	13.5	U	13.5	13.3	U	13.3
Aldrin	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Alpha-BHC	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
alpha-Chlordane	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Beta-BHC	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Delta-BHC	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
4,4'-DDD	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
4,4'-DDE	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
4,4'-DDT	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Dieldrin	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endosulfan I	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endosulfan II	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endosulfan sulfate	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endrin	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endrin aldehyde	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Endrin ketone	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Gamma-BHC (Lindane)	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
gamma-Chlordane	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Heptachlor	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Heptachlor epoxide	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Methoxychlor	PEST	1.36	UD	1.36	1.31	UD	1.31	1.35	UD	1.35	1.34	UD	1.34	1.32	UD	1.32
Toxaphene	PEST	13.6	UD	13.6	13.1	UD	13.1	13.5	UD	13.5	13.4	UD	13.4	13.2	UDJ	13.2

Attachment	1	Sheet No.	8 of 15
Originator	T. E. Queen	Date	12/29/09
Checked	J. D. Skoglie	Date	12/29/09
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYP7			J1BYP8			J1BYP9			J1BYR0			J1BYR1		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		SPA-1			SPA-2			SPA-3			SPA-4			SPA-5		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	3.37	U	3.37	3.33	U	3.33	7.05		3.43	3.44	U	3.44	1.55	J	3.45
Acenaphthylene	PAH	3.37	U	3.37	3.33	U	3.33	19.1		3.43	3.44	U	3.44	3.45	U	3.45
Anthracene	PAH	3.37	U	3.37	0.833	J	3.33	0.859	J	3.43	0.862	J	3.44	3.45	U	3.45
Benzo(a)anthracene	PAH	3.37	U	3.37	3.33	U	3.33	1.75	J	3.43	3.44	U	3.44	3.45	U	3.45
Benzo(a)pyrene	PAH	3.37	U	3.37	3.33	U	3.33	5.24		3.43	3.44	U	3.44	3.45	U	3.45
Benzo(b)fluoranthene	PAH	3.37	U	3.37	3.33	U	3.33	6.24		3.43	3.44	U	3.44	3.45	U	3.45
Benzo(ghi)perylene	PAH	3.37	U	3.37	3.33	U	3.33	19.4		3.43	3.44	U	3.44	3.45	U	3.45
Benzo(k)fluoranthene	PAH	3.37	U	3.37	3.33	U	3.33	2.51	J	3.43	3.44	U	3.44	3.45	U	3.45
Chrysene	PAH	3.37	U	3.37	3.33	U	3.33	0.997	J	3.43	3.44	U	3.44	3.45	U	3.45
Dibenz[a,h]anthracene	PAH	3.37	U	3.37	3.33	U	3.33	1.31	J	3.43	3.44	U	3.44	3.45	U	3.45
Fluoranthene	PAH	3.37	U	3.37	3.33	U	3.33	14.4		3.43	3.44	U	3.44	3.45	U	3.45
Fluorene	PAH	3.37	U	3.37	8.16		3.33	3.43	U	3.43	3.44	U	3.44	3.45	U	3.45
Indeno(1,2,3-cd)pyrene	PAH	3.37	U	3.37	3.33	U	3.33	31.8		3.43	3.44	U	3.44	3.45	U	3.45
Naphthalene	PAH	5.90		3.37	3.33	U	3.33	3.43	U	3.43	3.44	U	3.44	3.45	U	3.45
Phenanthrene	PAH	3.37	U	3.37	3.33	U	3.33	4.30		3.43	3.44	U	3.44	3.45	U	3.45
Pyrene	PAH	3.37	U	3.37	3.33	U	3.33	2.32	J	3.43	3.44	U	3.44	3.45	U	3.45
Aroclor-1016	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1221	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1232	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1242	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1248	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1254	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aroclor-1260	PCB	13.7	U	13.7	13.3	U	13.3	13.4	U	13.4	13.7	U	13.7	13.5	U	13.5
Aldrin	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Alpha-BHC	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
alpha-Chlordane	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Beta-BHC	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Delta-BHC	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
4,4'-DDD	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
4,4'-DDE	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
4,4'-DDT	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Dieldrin	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endosulfan I	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endosulfan II	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endosulfan sulfate	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endrin	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endrin aldehyde	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Endrin ketone	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Gamma-BHC (Lindane)	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
gamma-Chlordane	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Heptachlor	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Heptachlor epoxide	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Methoxychlor	PEST	1.36	UD	1.36	1.32	UD	1.32	1.33	UD	1.33	1.36	UD	1.36	1.34	UD	1.34
Toxaphene	PEST	13.6	UD	13.6	13.2	UD	13.2	13.3	UD	13.3	13.6	UD	13.6	13.4	UD	13.4

Attachment	1	Sheet No.	9 of 15
Originator	T. E. Queen	Date	12/29/09
Checked	J. D. Skoglie	Date	12/29/09
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYR2			J1BYR4			J1BYR5			J1BYR6			J1BYR7		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		SPA-6			SPA-8			SPA-9			SPA-10			SPA-11		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	13.6		3.35	3.30	U	3.30
Acenaphthylene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	87.2		3.35	3.30	U	3.30
Anthracene	PAH	0.851	J	3.40	3.39	U	3.39	15.0	U	3.33	15.0	U	3.35	3.30	U	3.30
Benzo(a)anthracene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	1.66	J	3.35	3.30	U	3.30
Benzo(a)pyrene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	7.43		3.35	3.30	U	3.30
Benzo(b)fluoranthene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	5.03		3.35	3.30	U	3.30
Benzo(ghi)perylene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	27.8		3.35	3.30	U	3.30
Benzo(k)fluoranthene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	3.04	J	3.35	3.30	U	3.30
Chrysene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	3.35	U	3.35	3.30	U	3.30
Dibenz[a,h]anthracene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	7.01		3.35	3.30	U	3.30
Fluoranthene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	10.7		3.35	3.30	U	3.30
Fluorene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	3.35	U	3.35	3.30	U	3.30
Indeno(1,2,3-cd)pyrene	PAH	1.24	J	3.40	3.39	U	3.39	3.33	U	3.33	190		3.35	3.30	U	3.30
Naphthalene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	12.2		3.35	3.30	U	3.30
Phenanthrene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	5.55		3.35	3.30	U	3.30
Pyrene	PAH	3.40	U	3.40	3.39	U	3.39	3.33	U	3.33	1.98	J	3.35	3.30	U	3.30
Aroclor-1016	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1221	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1232	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1242	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1248	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1254	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aroclor-1260	PCB	13.1	U	13.1	13.5	U	13.5	13.4	U	13.4	13.6	U	13.6	13.8	U	13.8
Aldrin	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Alpha-BHC	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
alpha-Chlordane	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Beta-BHC	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Delta-BHC	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
4,4'-DDD	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
4,4'-DDE	PEST	1.71	JD	1.3	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
4,4'-DDT	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Dieldrin	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endosulfan I	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endosulfan II	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endosulfan sulfate	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endrin	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endrin aldehyde	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Endrin ketone	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Gamma-BHC (Lindane)	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
gamma-Chlordane	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Heptachlor	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Heptachlor epoxide	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Methoxychlor	PEST	1.30	UD	1.30	1.34	UD	1.34	1.33	UD	1.33	1.35	UD	1.35	1.37	UD	1.37
Toxaphene	PEST	13.0	UD	13.0	13.4	UDJ	13.4	13.3	UDJ	13.3	13.5	UDJ	13.5	13.7	UDJ	13.7

Attachment	1	Sheet No.	10 of 15
Originator	T. E. Queen	Date	12/29/09
Checked	J. D. Skoglie	Date	12/29/09
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (TPH).

Sample Location	HEIS Number	Sample Date	TPH - diesel range			TPH - motor oil (high boiling)		
			mg/kg	Q	PQL	mg/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	3.52	U	3.52	10.6	U	10.6
Duplicate of EX-4	J1BYP6	9/27/2010	3.47	U	3.47	10.4	U	10.4
EX-1	J1BYN4	9/27/2010	3.49	U	3.49	10.5	U	10.5
EX-2	J1BYN5	9/27/2010	3.40	U	3.40	10.2	U	10.2
EX-3	J1BYN6	9/27/2010	3.50	U	3.50	10.5	U	10.5
EX-5	J1BYN8	9/27/2010	3.48	U	3.48	8.39	J	10.4
EX-6	J1BYN9	9/27/2010	3.46	U	3.46	10.4	U	10.4
EX-7	J1BYP0	9/27/2010	3.25	U	3.25	10.8		9.74
EX-8	J1BYP1	9/27/2010	3.26	U	3.26	6.43	J	9.79
EX-9	J1BYP2	9/27/2010	3.40	U	3.40	15.6		10.2
EX-10	J1BYP3	9/27/2010	3.47	U	3.47	18.5		10.4
EX-11	J1BYP4	9/27/2010	3.39	U	3.39	12.9		10.2
EX-12	J1BYP5	9/27/2010	3.33	U	3.33	5.99	J	10.0
SPA-7	J1BYR3	9/27/2010	3.34	U	3.34	10.0	U	10.0
Duplicate of SPA-7	J1BYR9	9/27/2010	3.42	UJ	3.42	18.5	J	10.3
SPA-1	J1BYP7	9/27/2010	3.34	U	3.34	10.0	U	10.0
SPA-2	J1BYP8	9/27/2010	3.36	U	3.36	10.1	U	10.1
SPA-3	J1BYP9	9/27/2010	3.39	U	3.39	9.62	J	10.2
SPA-4	J1BYR0	9/27/2010	3.39	U	3.39	3.49	J	10.2
SPA-5	J1BYR1	9/27/2010	3.31	U	3.31	9.92	U	9.92
SPA-6	J1BYR2	9/27/2010	3.32	U	3.32	15.7		9.95
SPA-8	J1BYR4	9/27/2010	3.44	UJ	3.44	10.3	UJ	10.3
SPA-9	J1BYR5	9/27/2010	3.38	UJ	3.38	16.2	J	10.1
SPA-10	J1BYR6	9/27/2010	3.41	UJ	3.41	19.0	J	10.2
SPA-11	J1BYR7	9/27/2010	3.39	UJ	3.39	10.2	UJ	10.2
SPA-12	J1BYR8	9/27/2010	3.36	UJ	3.36	52.4	J	10.1
OB-2 (SW end)	J1BYT1	9/27/2010	3.34	UJ	3.34	46.0	J	10.0
Duplicate of OB-2	J1BYT2	9/27/2010	3.40	UJ	3.40	27.4	J	10.2
OB-1 (NE end)	J1BYT0	9/27/2010	3.31	UJ	3.31	55.4	J	9.94

Attachment	1	Sheet No.	12 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

CONSTITUENT	CLASS	J1BYR8			J1BYT1			J1BYT2			J1BYT0		
		9/27/2010			9/27/2010			9/27/2010			9/27/2010		
		SPA-12			OB-2 (SW end)			Duplicate of OB-2			OB-1 (NE end)		
		ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
Acenaphthene	PAH	18.3		3.26	1.98	J	3.29	7.67		3.26	15.8		3.25
Acenaphthylene	PAH	3.26	U	3.26	3.29	U	3.29	0.961	J	3.26	3.25	U	3.25
Anthracene	PAH	3.26	U	3.26	15.0	U	3.29	3.26	U	3.26	3.25	U	3.25
Benzo(a)anthracene	PAH	2.67	J	3.26	0.989	J	3.29	1.09	J	3.26	2.07	J	3.25
Benzo(a)pyrene	PAH	8.03		3.26	3.94		3.29	2.90	J	3.26	5.42		3.25
Benzo(b)fluoranthene	PAH	8.18		3.26	3.63		3.29	4.30		3.26	7.76		3.25
Benzo(ghi)perylene	PAH	31.8		3.26	13.1		3.29	11.5		3.26	22.0		3.25
Benzo(k)fluoranthene	PAH	3.65		3.26	1.58	J	3.29	1.65	J	3.26	3.22	J	3.25
Chrysene	PAH	3.26	U	3.26	3.29	U	3.29	3.26	U	3.26	1.38	J	3.25
Dibenz[a,h]anthracene	PAH	2.43	J	3.26	3.29	U	3.29	3.26	U	3.26	1.12	J	3.25
Fluoranthene	PAH	26.5		3.26	11.1		3.29	27.1		3.26	61.8		3.25
Fluorene	PAH	3.26	U	3.26	3.29	U	3.29	17.8		3.26	3.25	U	3.25
Indeno(1,2,3-cd)pyrene	PAH	44.7		3.26	20.9		3.29	13.1		3.26	24.4		3.25
Naphthalene	PAH	1.11	J	3.26	3.29	U	3.29	3.26	U	3.26	89.4		3.25
Phenanthrene	PAH	7.25		3.26	2.72	J	3.29	2.67	J	3.26	11.4		3.25
Pyrene	PAH	6.29		3.26	2.01	J	3.29	2.28	J	3.26	9.23		3.25
Aroclor-1016	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1221	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1232	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1242	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1248	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1254	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aroclor-1260	PCB	13.6	U	13.6	13.4	U	13.4	13.7	U	13.7	13.4	U	13.4
Aldrin	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Alpha-BHC	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
alpha-Chlordane	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Beta-BHC	PEST	1.50	JD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Delta-BHC	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
4,4'-DDD	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
4,4'-DDE	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
4,4'-DDT	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Dieldrin	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endosulfan I	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endosulfan II	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endosulfan sulfate	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endrin	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endrin aldehyde	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Endrin ketone	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Gamma-BHC (Lindane)	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
gamma-Chlordane	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Heptachlor	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Heptachlor epoxide	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Methoxychlor	PEST	1.35	UD	1.35	1.33	UD	1.33	1.36	UD	1.36	1.33	UD	1.33
Toxaphene	PEST	13.5	UDJ	13.5	13.3	UDJ	13.3	13.6	UDJ	13.6	13.3	UDJ	13.3

Attachment 1 Sheet No. 11 of 15
Originator T. E. Queen Date 12/29/09
Checked J. D. Skoglie Date 12/29/09
Calc. No. 0600X-CA-V0096 Rev. No. 0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48
Duplicate of EX-4	J1BYP6	9/27/2010	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49
EX-1	J1BYN4	9/27/2010	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49
EX-2	J1BYN5	9/27/2010	3.46	U	3.46	3.46	U	3.46	1.73	J	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46
EX-3	J1BYN6	9/27/2010	3.81		3.46	3.46	U	3.46	1.21	J	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46
EX-5	J1BYN8	9/27/2010	3.52		3.52	3.52	U	3.52	3.52	U	3.52	3.52	U	3.52	3.52	U	3.52	1.48	J	3.52
EX-6	J1BYN9	9/27/2010	3.03	J	3.56	3.56	U	3.56	2.14	J	3.56	3.56	U	3.56	3.56	U	3.56	3.56	U	3.56
EX-7	J1BYP0	9/27/2010	0.839	J	3.35	3.35	U	3.35	2.01	J	3.35	3.35	U	3.35	2.25	J	3.35	1.01	J	3.35
EX-8	J1BYP1	9/27/2010	1.03	J	3.42	3.42	U	3.42	1.03	J	3.42	3.42	U	3.42	3.42	U	3.42	3.42	U	3.42
EX-9	J1BYP2	9/27/2010	0.856	J	3.42	3.42	U	3.42	0.856	J	3.42	0.856	J	3.42	1.47	J	3.42	0.992	J	3.42
EX-10	J1BYP3	9/27/2010	3.46	U	3.46	3.46	U	3.46	1.21	J	3.46	3.46	U	3.46	0.934	J	3.46	3.46	U	3.46
EX-11	J1BYP4	9/27/2010	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38
EX-12	J1BYP5	9/27/2010	3.37	U	3.37	3.37	U	3.37	0.844	J	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37
SPA-7	J1BYR3	9/27/2010	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38
Duplicate of SPA-7	J1BYR9	9/27/2010	3.23	U	3.23	3.23	U	3.23	15.0	U	3.23	3.23	U	3.23	3.23	U	3.23	3.23	U	3.23
SPA-1	J1BYP7	9/27/2010	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37
SPA-2	J1BYP8	9/27/2010	3.33	U	3.33	3.33	U	3.33	0.833	J	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33
SPA-3	J1BYP9	9/27/2010	7.05		3.43	19.1		3.43	0.859	J	3.43	1.75	J	3.43	5.24		3.43	6.24		3.43
SPA-4	J1BYR0	9/27/2010	3.44	U	3.44	3.44	U	3.44	0.862	J	3.44	3.44	U	3.44	3.44	U	3.44	3.44	U	3.44
SPA-5	J1BYR1	9/27/2010	1.55	J	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45
SPA-6	J1BYR2	9/27/2010	3.40	U	3.40	3.40	U	3.40	0.851	J	3.40	3.40	U	3.40	3.40	U	3.40	3.40	U	3.40
SPA-8	J1BYR4	9/27/2010	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39
SPA-9	J1BYR5	9/27/2010	3.33	U	3.33	3.33	U	3.33	15.0	U	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33
SPA-10	J1BYR6	9/27/2010	13.6		3.35	87.2		3.35	15.0	U	3.35	1.66	J	3.35	7.43		3.35	5.03		3.35
SPA-11	J1BYR7	9/27/2010	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30
SPA-12	J1BYR8	9/27/2010	18.3		3.26	3.26	U	3.26	3.26	U	3.26	2.67	J	3.26	8.03		3.26	8.18		3.26
OB-2 (SW end)	J1BYT1	9/27/2010	1.98	J	3.29	3.29	U	3.29	15.0	U	3.29	0.989	J	3.29	3.94		3.29	3.63		3.29
Duplicate of OB-2	J1BYT2	9/27/2010	7.67		3.26	0.961	J	3.26	3.26	U	3.26	1.09	J	3.26	2.90	J	3.26	4.30		3.26
OB-1 (NE end)	J1BYT0	9/27/2010	15.8		3.25	3.25	U	3.25	3.25	U	3.25	2.07	J	3.25	5.42		3.25	7.76		3.25

Attachment	1	Sheet No.	13 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

Sample Location	HEIS Number	Sample Date	Benzo(ghi)perylene			Benzo(k)fluoranthene			Beta-BHC			Chrysene			Dibenz(a,h)anthracene			4,4'-DDE		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	3.48	U	3.48	3.48	U	3.48	1.39	UD	1.39	3.48	U	3.48	3.48	U	3.48	1.39	UD	1.39
Duplicate of EX-4	J1BYP6	9/27/2010	3.49	U	3.49	3.49	U	3.49	1.38	UD	1.38	3.49	U	3.49	3.49	U	3.49	1.38	UD	1.38
EX-1	J1BYN4	9/27/2010	3.49	U	3.49	3.49	U	3.49	1.38	UD	1.38	3.49	U	3.49	3.49	U	3.49	1.38	UD	1.38
EX-2	J1BYN5	9/27/2010	3.46	U	3.46	3.46	U	3.46	1.39	UD	1.39	3.46	U	3.46	3.46	U	3.46	1.39	UD	1.39
EX-3	J1BYN6	9/27/2010	3.46	U	3.46	3.46	U	3.46	1.37	UD	1.37	3.46	U	3.46	3.46	U	3.46	1.37	UD	1.37
EX-5	J1BYN8	9/27/2010	3.52	U	3.52	3.52	U	3.52	1.37	UD	1.37	2.15	J	3.52	3.52	U	3.52	1.37	UD	1.37
EX-6	J1BYN9	9/27/2010	3.56	U	3.56	3.56	U	3.56	1.41	UD	1.41	3.56	U	3.56	3.56	U	3.56	1.41	UD	1.41
EX-7	J1BYP0	9/27/2010	4.48		3.35	0.906	J	3.35	1.30	UD	1.30	3.35	U	3.35	0.940	J	3.35	1.30	UD	1.30
EX-8	J1BYP1	9/27/2010	0.992	J	3.42	3.42	U	3.42	1.34	UD	1.34	3.42	U	3.42	3.42	U	3.42	1.34	UD	1.34
EX-9	J1BYP2	9/27/2010	2.12	J	3.42	3.42	U	3.42	1.37	UD	1.37	3.42	U	3.42	3.42	U	3.42	1.37	UD	1.37
EX-10	J1BYP3	9/27/2010	0.899	J	3.46	3.46	U	3.46	1.36	UD	1.36	3.46	U	3.46	3.46	U	3.46	1.36	UD	1.36
EX-11	J1BYP4	9/27/2010	3.38	U	3.38	3.38	U	3.38	1.31	UD	1.31	3.38	U	3.38	3.38	U	3.38	1.31	UD	1.31
EX-12	J1BYP5	9/27/2010	3.37	U	3.37	3.37	U	3.37	1.35	UD	1.35	3.37	U	3.37	3.37	U	3.37	1.35	UD	1.35
SPA-7	J1BYR3	9/27/2010	3.38	U	3.38	3.38	U	3.38	1.34	UD	1.34	3.38	U	3.38	3.38	U	3.38	1.34	UD	1.34
Duplicate of SPA-7	J1BYR9	9/27/2010	3.23	U	3.23	3.23	U	3.23	1.32	UD	1.32	3.23	U	3.23	3.23	U	3.23	1.32	UD	1.32
SPA-1	J1BYP7	9/27/2010	3.37	U	3.37	3.37	U	3.37	1.36	UD	1.36	3.37	U	3.37	3.37	U	3.37	1.36	UD	1.36
SPA-2	J1BYP8	9/27/2010	3.33	U	3.33	3.33	U	3.33	1.32	UD	1.32	3.33	U	3.33	3.33	U	3.33	1.32	UD	1.32
SPA-3	J1BYP9	9/27/2010	19.4		3.43	2.51	J	3.43	1.33	UD	1.33	0.997	J	3.43	1.31	J	3.43	1.33	UD	1.33
SPA-4	J1BYR0	9/27/2010	3.44	U	3.44	3.44	U	3.44	1.36	UD	1.36	3.44	U	3.44	3.44	U	3.44	1.36	UD	1.36
SPA-5	J1BYR1	9/27/2010	3.45	U	3.45	3.45	U	3.45	1.34	UD	1.34	3.45	U	3.45	3.45	U	3.45	1.34	UD	1.34
SPA-6	J1BYR2	9/27/2010	3.40	U	3.40	3.40	U	3.40	1.30	UD	1.30	3.40	U	3.40	3.40	U	3.40	1.71	JD	1.30
SPA-8	J1BYR4	9/27/2010	3.39	U	3.39	3.39	U	3.39	1.34	UD	1.34	3.39	U	3.39	3.39	U	3.39	1.34	UD	1.34
SPA-9	J1BYR5	9/27/2010	3.33	U	3.33	3.33	U	3.33	1.33	UD	1.33	3.33	U	3.33	3.33	U	3.33	1.33	UD	1.33
SPA-10	J1BYR6	9/27/2010	27.8		3.35	3.04	J	3.35	1.35	UD	1.35	3.35	U	3.35	7.01		3.35	1.35	UD	1.35
SPA-11	J1BYR7	9/27/2010	3.30	U	3.30	3.30	U	3.30	1.37	UD	1.37	3.30	U	3.30	3.30	U	3.30	1.37	UD	1.37
SPA-12	J1BYR8	9/27/2010	31.8		3.26	3.65		3.26	1.50	JD	1.35	3.26	U	3.26	2.43	J	3.26	1.35	UD	1.35
OB-2 (SW end)	J1BYT1	9/27/2010	13.1		3.29	1.58	J	3.29	1.33	UD	1.33	3.29	U	3.29	3.29	U	3.29	1.33	UD	1.33
Duplicate of OB-2	J1BYT2	9/27/2010	11.5		3.26	1.65	J	3.26	1.36	UD	1.36	3.26	U	3.26	3.26	U	3.26	1.36	UD	1.36
OB-1 (NE end)	J1BYT0	9/27/2010	22.0		3.25	3.22	J	3.25	1.33	UD	1.33	1.38	J	3.25	1.12	J	3.25	1.33	UD	1.33

Attachment	1	Sheet No.	14 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Attachment 1. 600-120 Waste Site Verification Sample Results (Organics).

Sample Location	HEIS Number	Sample Date	Fluoranthene			Fluorene			Indeno(1,2,3-cd)			Naphthalene			Phenanthrene			Pyrene		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
EX-4	J1BYN7	9/27/2010	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48	3.48	U	3.48
Duplicate of EX-4	J1BYP6	9/27/2010	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	1.22	J	3.49	3.49	U	3.49
EX-1	J1BYN4	9/27/2010	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	3.49	U	3.49	0.872	J	3.49	3.49	U	3.49
EX-2	J1BYN5	9/27/2010	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46
EX-3	J1BYN6	9/27/2010	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46
EX-5	J1BYN8	9/27/2010	2.82	J	3.52	3.52	U	3.52	3.52	U	3.52	3.52	U	3.52	3.52	U	3.52	3.52	U	3.52
EX-6	J1BYN9	9/27/2010	3.56	U	3.56	3.56	U	3.56	3.56	U	3.56	3.56	U	3.56	3.56	U	3.56	3.56	U	3.56
EX-7	J1BYP0	9/27/2010	2.35	J	3.35	3.35	U	3.35	3.35	U	3.35	3.35	U	3.35	1.85	J	3.35	1.14	J	3.35
EX-8	J1BYP1	9/27/2010	3.42	U	3.42	3.42	U	3.42	2.62	J	3.42	3.42	U	3.42	3.42	U	3.42	3.42	U	3.42
EX-9	J1BYP2	9/27/2010	2.05	J	3.42	3.42	U	3.42	3.42	U	3.42	3.42	U	3.42	3.42	U	3.42	4.28		3.42
EX-10	J1BYP3	9/27/2010	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46	3.46	U	3.46
EX-11	J1BYP4	9/27/2010	0.846	J	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	1.02	J	3.38	3.38	U	3.38
EX-12	J1BYP5	9/27/2010	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37
SPA-7	J1BYR3	9/27/2010	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38	3.38	U	3.38
Duplicate of SPA-7	J1BYR9	9/27/2010	3.23	U	3.23	3.23	U	3.23	3.23	U	3.23	3.23	U	3.23	3.23	U	3.23	0.873	J	3.23
SPA-1	J1BYP7	9/27/2010	3.37	U	3.37	3.37	U	3.37	3.37	U	3.37	5.90		3.37	3.37	U	3.37	3.37	U	3.37
SPA-2	J1BYP8	9/27/2010	3.33	U	3.33	8.16		3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33
SPA-3	J1BYP9	9/27/2010	14.4		3.43	3.43	U	3.43	31.8		3.43	3.43	U	3.43	4.30		3.43	2.32	J	3.43
SPA-4	J1BYR0	9/27/2010	3.44	U	3.44	3.44	U	3.44	3.44	U	3.44	3.44	U	3.44	3.44	U	3.44	3.44	U	3.44
SPA-5	J1BYR1	9/27/2010	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45	3.45	U	3.45
SPA-6	J1BYR2	9/27/2010	3.40	U	3.40	3.40	U	3.40	1.24	J	3.40	3.40	U	3.40	3.40	U	3.40	3.40	U	3.40
SPA-8	J1BYR4	9/27/2010	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39	3.39	U	3.39
SPA-9	J1BYR5	9/27/2010	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33	3.33	U	3.33
SPA-10	J1BYR6	9/27/2010	10.7		3.35	3.35	U	3.35	190		3.35	12.2		3.35	5.55		3.35	1.98	J	3.35
SPA-11	J1BYR7	9/27/2010	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30	3.30	U	3.30
SPA-12	J1BYR8	9/27/2010	26.5		3.26	3.26	U	3.26	44.7		3.26	1.11	J	3.26	7.25		3.26	6.29		3.26
OB-2 (SW end)	J1BYT1	9/27/2010	11.1		3.29	3.29	U	3.29	20.9		3.29	3.29	U	3.29	2.72	J	3.29	2.01	J	3.29
Duplicate of OB-2	J1BYT2	9/27/2010	27.1		3.26	17.8		3.26	13.1		3.26	3.26	U	3.26	2.67	J	3.26	2.28	J	3.26
OB-1 (NE end)	J1BYT0	9/27/2010	61.8		3.25	3.25	U	3.25	24.4		3.25	89.4		3.25	11.4		3.25	9.23		3.25

Attachment	1	Sheet No.	15 of 15
Originator	T. E. Queen	Date	12/29/10
Checked	J. D. Skoglie	Date	12/29/10
Calc. No.	0600X-CA-V0096	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-IU-2

Discipline: Environmental Calculation No: 0600X-CA-V0097

Subject: 600-120 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 = 3 Total = 4	T. E. Queen	I. D. Skoglie	B. L. Vedder	D. F. Obenauer	1/12/11

SUMMARY OF REVISION

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

DE01-437.03

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	T. E. Queen	Date:	1/10/2011	Calc. No.:	0600X-CA-V0097	Rev.:	0
Project:	100-IU-2 Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	1/10/2011
Subject:	600-120 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	1 of 3

PURPOSE:

Provide documentation to support the calculation of the direct contact hazard quotient (HQ) and excess carcinogenic risk for the 600-120 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 600-120 White Bluffs Spare Parts Burn Pit*, Attachment to Waste Site Reclassification Form 2004-063, 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:	T. E. Queen	Date:	1/10/2011	Calc. No.:	0600X-CA-V0097	Rev.:	0
Project:	100-IU-2 Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	1/10/2011
Subject:	600-120 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	2 of 3

METHODOLOGY:

The 600-120 waste site is comprised of three decision units for verification sampling, consisting of the excavation, staging pile area footprint, and the overburden stockpile. The direct contact hazard quotient and carcinogenic risk calculations for the 600-120 waste site were conservatively calculated for the entire waste site using the greater of the statistical and composite verification soil sample results (WCH 2011). Of the contaminants of potential concern (COPCs) for this site, boron, molybdenum, the detected polycyclic aromatic hyrdrocarbons, 4,4'-DDE, and beta-BHC require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Although total petroleum hydrocarbons (motor oil) were detected and no background value is available, the risk associated with total petroleum hydrocarbons do not contribute to the cumulative toxicity calculation. 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 4.14 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 5.8×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ 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 1.4×10^{-3}. Comparing this value to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, then multiplied by 1.0×10^{-6}. For example, the maximum value for benzo(a)pyrene is 0.00803 mg/kg, divided by 0.137 mg/kg, and multiplied as indicated, is 5.9×10^{-8}. Comparing this value, and all other individual values, to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk can be obtained by summing the individual values. To avoid errors due to intermediate rounding, the individual cancer risk values prior to rounding are used for this calculation. The sum of the excess cancer risk values is 2.2×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
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

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

Washington Closure Hanford, Inc.		CALCULATION SHEET					
Originator:	T. E. Queen	Date:	1/11/2011	Calc. No.:	0600X-CA-V0097	Rev.:	0
Project:	100-IU-2 Field Remediation	Job No:	14655	Checked:	J. D. Skoglie	Date:	1/11/2011
Subject:	600-120 Waste Site Direct Contact Hazard Quotient and Carcinogenic Risk Calculations					Sheet No.	3 of 3

Table 1. Direct Contact Hazard Quotient and Excess Cancer Risk Results for the 600-120 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	4.14	7,200	5.8E-04	--	--
Molybdenum	0.282	400	7.1E-04	--	--
Polycyclic Aromatic Hydrocarbons					
Acenaphthene	0.0183	4,800	3.8E-06	--	--
Acenaphthylene[c]	0.0872	4,800	--	--	--
Anthracene	0.00173	24,000	7.2E-08	--	--
Benzo(a)anthracene	0.00267	--	--	1.37	1.9E-09
Benzo(a)pyrene	0.00803	--	--	0.137	5.9E-08
Benzo(b)fluoranthene	0.00818	--	--	1.37	6.0E-09
Benzo(ghi)perylene[c]	0.0318	2,400	1.3E-05	--	--
Benzo(k)fluoranthene	0.00365	--	--	1.37	2.7E-09
Chrysene	0.00215	--	--	13.7	1.6E-10
Dibenz(a,h)anthracene	0.00701	--	--	1.37	5.1E-09
Fluoranthene	0.0618	3,200	1.9E-05	--	--
Fluorene	0.01780	3,200	5.6E-06	--	--
Indeno(1,2,3-cd)pyrene	0.190	--	--	1.37	1.4E-07
Naphthalene	0.0894	1,600	5.6E-05	--	--
Phenanthrene[c]	0.0114	24,000	4.8E-07	--	--
Pyrene	0.00923	2,400	3.8E-06	--	--
Pesticides					
BHC, beta (Hexachlorocyclohexane)	0.00150	--	--	0.556	2.7E-09
DDE, 4,4'-	0.00171	--	--	2.94	5.8E-10
Total Petroleum Hydrocarbons					
Diesel range and motor oil [d]	55.4	200	--	--	--
Totals					
Cumulative Hazard Quotient:			**1.4E-03**		
Cumulative Excess Cancer Risk:					**2.2E-07**

[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] = Toxicity data for these chemicals are not available. RAGs fare based on surrogate chemicals.
Contaminant: acenapthylene; surrogate: acenapthene
Contaminant: benzo(ghi)perylene, surrogate: pyrene
Contaminant: phenanthrene; surrogate: anthracene

[d] = 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 600-120 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.

APPENDIX C

DATA QUALITY ASSESSMENT

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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 (WHC 2010b). This DQA was performed in accordance with site-specific data quality objectives found in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2009).

A review of the sample design (WCH 2010b), the field logbook (WCH 2010a), and applicable analytical data packages has been performed as part of this DQA. All samples were collected and analyzed per the sample design, with one exception. The original Washington State Plane (WSP) coordinates for sample SPA-12 (N 147686.1, E 577803.8) were located in a haul road. The sample was collected form the WSP coordinate location N 147684.1, E 577793.0.

To ensure quality data, the SAP data assurance requirements and the *Data Validation Procedure for Chemical Analysis* (BHI 2000) are used as appropriate. This review involves evaluation of the data to determine if they are of the right type, quality, and quantity to support the intended use (i.e., closeout decisions). The DQA completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data quality objectives process (EPA 2006).

Verification sample data collected at the 600-120 and 600-297 waste sites were provided by the laboratories in two sample delivery groups (SDGs): SDG K2416 and SDG K2417. SDG K2417 was submitted for third-party validation. No major deficiencies were identified in the analytical data set. Minor deficiencies are discussed as follows below. If no comments are made about a specific analysis, it should be assumed that no deficiencies affecting the quality of the data were found.

SDG K2417

This SDG comprises six verification soil samples (J1BYR4 through J1BYR9) from the 600-120 and 600-297 staging pile area and three verification soil samples (J1BYT0 through J1BYT2) from the overburden. A field duplicate pair (J1BYT1/J1BYT2) and the duplicate for sample J1BYR3 from SDG K2416 are included in this SDG. These samples were analyzed for inductively coupled plasma (ICP) metals, polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), pesticides, and total petroleum hydrocarbons (TPH). In addition, one equipment blank (J1BYT3) was collected and analyzed for ICP metals. SDG K2417 was submitted for third-party validation. Minor deficiencies are as follows:

In the TPH analysis, all of the motor oil data in SDG K2417 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 TPH analysis, the relative percent difference (RPD) for diesel range organics is above the quality control (QC) limit of 30% at 48%. The diesel range organics results were considered estimated and flagged "J" by third party validation. The data are usable for decision-making purposes.

In the pesticides analysis, all of the toxaphene data in SDG K2417 were qualified by third-party validation as estimated with "J" flags, due to lack of an MS, MSD, and LCS analysis. Estimated, or "J"-flagged, data are acceptable for decision-making purposes.

In the PAH analysis, the anthracene result may be considered estimated due to method blank contamination. All detected anthracene results in SDG K2417 were qualified as undetected, raised to the required quantitation limit (RQL) of 0.015 mg/kg, and flagged "U" by third-party validation. The data are usable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for seven analytes (aluminum, calcium, iron, magnesium, manganese, antimony, and vanadium). 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, calcium, magnesium, and vanadium did not have mismatched spike and native concentrations in the original MS. The original MS recovery for antimony, calcium, magnesium, and vanadium were 30%, 221%, 152%, and 133%, respectively. All antimony, calcium, magnesium, and vanadium data for SDG K2417 were considered estimated and flagged "J" by third-party validation due to the MS recoveries outside the QC limits. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recoveries for aluminum, antimony, and silicon are outside the QC limit at 133%, 66%, and 31%, respectively. The aluminum, antimony, and silicon results were considered estimated and flagged "J" by third party validation. The data are usable for decision-making purposes.

In the ICP metals analysis, the RPD for chromium is above the QC limit of 30% at 43%. The chromium results were considered estimated and flagged "J" by third party validation. The data are usable for decision-making purposes.

SDG K2416

This SDG comprises 13 verification soil samples (J1BYN4 through J1BYN9, J1BYP0 through J1BYP6) from the 600-120 and 600-297 excavation, and 7 verification soil samples (J1BYP7through J1BYP9, J1BYR0 through J1BYR3) from the 600-120 and 600-297 staging pile area. A field duplicate pair (J1BYN7/J1BYP6) is included in this SDG. These samples were analyzed for ICP metals, PAH, PCBs, pesticides, and TPH. Minor deficiencies are as follows:

In the TPH analysis, all of the motor oil data in SDG K2416 may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated data are acceptable for decision-making purposes.

In the ICP metals analysis, the MS recoveries were out of project acceptance criteria for three analytes (aluminum, iron, and antimony). 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 did not have mismatched spike and native concentrations in the original MS. The original MS recovery for antimony was 35%. All antimony data for SDG K2416 may be considered estimated. Estimated data are usable for decision-making purposes.

In the ICP metals analysis, the LCS recovery for aluminum, antimony, and silicon are outside the QC limits at 132%, 62%, and 31%, respectively. The aluminum, antimony, and silicon results may be considered estimated. The data are usable for decision-making purposes.

In the PCB analysis, a surrogate recovery was below QC limits, at 38%, for sample J1BYP2. The PCB results for sample J1BYP2 may be considered estimated. Estimated data are acceptable for decision-making purposes.

In the pesticides analysis, all of the toxaphene data in SDG K2416 may be considered estimated due to lack of an MS, MSD, and LCS analysis. Estimated 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/quality control (QA/QC) measures are used to assess potential sources of error and cross contamination of samples that could bias results. Field QA/QC samples, listed in the field logbook (WCH 2010a), are summarized in Table C-1. The main and QA/QC sample results are presented in Appendix B.

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

Sample Area	Main Sample	Duplicate Sample
Excavation	J1BYN7	J1BYP6
Staging Pile Area	J1BYR3	J1BYR9
Overburden	J1BYT1	J1BYT2

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. 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 upper confidence level (UCL) calculation brief in Appendix B provides details on duplicate pair evaluation and RPD calculation.

The RPD calculated for motor oil in the overburden duplicate sample (J1BYT2) is above the acceptance criteria of 30% at 50.7%. 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 target detection limit (TDL), including undetected analytes. In these cases, a control limit of ±2 times the TDL is used (Appendix B) to indicate that a visual check of the data is required by the reviewer. No data required this check. A visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are usable 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 600-120 and 600-297 waste sites 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 600-120 and 600-297 waste sites 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 B.

REFERENCES

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WCH, 2010a, *IU-2/6 Remaining Sites Sampling and Field Activities*, Logbook EL-1643-02, pp. 84-85, Washington Closure Hanford, Richland, Washington.

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