Date Submitted:	**WASTE SITE RECLASSIFICATION FORM**	Control Number: 2008-028
Originator: J. M. Capron	Operable Unit(s): 100-FR-~~1~~ 2 PEK	
Phone: 372-9227	Waste Site Code: 120-F-1 10/8/08	
	Type of Reclassification Action:	
	Closed Out ☐ Interim Closed Out ☒ No Action ☐	
	RCRA Postclosure ☐ Rejected ☐ Consolidated ☐	

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

Description of current waste site condition:

The 120-F-1 waste site consisted of two dumping areas located 660 m (2,170 ft) southeast of the 105-F Reactor containing laboratory equipment and bottles, demolition debris, light bulbs and tubes, small batteries, small drums, and pesticide contaminated soil. It is probable that 108-F was the source of the debris but the material may have come from other locations within the 100-F Area. The site has been remediated and, with regulatory agency concurrence, backfilled. Remediation and verification sampling of this site have been performed in accordance with remedial action objectives and goals established by the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100 DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD), U.S. Environmental Protection Agency, Region 10, Seattle, Washington. The selected action involved: (1) evaluating the site using available process information, (2) remediating the site, (3) demonstrating through verification sampling that cleanup goals have been achieved, and (4) proposing the site for reclassification to Interim Closed Out.

Basis for reclassification:

In accordance with this evaluation, the verification sampling results support a reclassification of this site to Interim Closed Out. The current site conditions achieve the remedial action objectives and the corresponding remedial action goals established in the Remaining Sites ROD. The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow-zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. The 120-F-1 excavation has a maximum depth of approximately 6.5 m (21 ft), which includes a shallow zone and a deep zone. However, the entire excavation area is considered one decision unit, and is closed out using the more restrictive shallow-zone cleanup criteria; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 120-F-1, Glass Dump Waste Site* (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.

R. F. Guercia DOE Federal Project Director (printed)	Signature	6/6/08 Date
N/A Ecology Project Manager (printed)	Signature	Date
R. A. Lobos EPA Project Manager (printed)	Signature	6-27-08 Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 120-F-1 GLASS DUMP WASTE SITE

Attachment to Waste Site Reclassification Form 2008-028

May 2008

REMAINING SITES VERIFICATION PACKAGE FOR THE 120-F-1 GLASS DUMP WASTE SITE

EXECUTIVE SUMMARY

The 120-F-1 waste site is located within the 100-FR-2 Operable Unit on the Hanford Site, approximately 660 m (2,170 ft) southeast of the 105-F Reactor. The 120-F-1 waste site includes two distinct dumping areas.

The 120-F-1 waste site was originally described as a single, open trench filled with fluorescent tubes, incandescent light bulbs, instrument vacuum tubes, small alkaline batteries, chemical bottles and laboratory apparatus with a second area of disturbed soil with surficial plastic debris approximately 46 m (150 ft) to the southeast (BHI 1994). Due to its proximity, the probable source of the debris found at the 120-F-1 waste site is believed to be the 108-F Building, but the site may have contained debris from other locations within the 100-F Area. Prior to remediation, the original access road was overgrown with 0.9 m (3-ft-) high sagebrush, indicating that the site had not been used for many years. The exact dates of site operation are unknown.

The 120-F-1 waste site was interim stabilized March 23, 1998 (BHI 1998a). The trench was covered with 30 sheets of plywood to provide a demarcation layer to aid in future remediation. A protective layer of soil, from material mounded to the side of the trench during the original excavation, was placed over the plywood in a layer approximately 0.2 to 0.6 m (0.6 to 2 ft) deep. The site was further protected by a barrier attached to metal posts and warning signs. Samples collected during the 1998 interim stabilization detected contamination of lead and mercury but no radiological contamination (BHI 1998a).

In preparation for remedial action at the site, a standard geophysical investigation was conducted in the vicinity of the glass dump. The second area of debris to the southeast was identified as a waste dumping area in the geophysical interpretation (BHI 2004). The southeastern dumping area proved to be larger than the aforementioned glass dump and contained concrete, wire debris, small drums with heavy oil-type petroleum hydrocarbons, and some stained soil with pesticides (dichlorodiphenyldichloroethylene [DDE] and dichlorodiphenyltrichloroethane [DDT]). The second area was remediated as part of the 120-F-1 Glass Dump Waste Site.

Confirmatory sampling was not performed because the presence of contamination was already documented during interim stabilization. On January 21, 2006, an industrial hygiene investigation of the 120-F-1 waste site was conducted to determine whether beryllium was present in the phosphor material used in the fluorescent tubes dumped at the 120-F-1 waste site (BHI 2006). Beryllium was used in the manufacture of fluorescent light bulbs prior to 1949. The previously interim-stabilized waste site was opened using a front-end loader. At this juncture, it was discovered that the plywood barrier had failed and the fluorescent tubes were crushed. Pieces of the fluorescent tubes and accompanying soils were sampled. The samples were analyzed for metals, including mercury and beryllium. Beryllium was detected in one of three samples at a concentration below its average background concentration. It was determined

that the fluorescent tubes were not manufactured with beryllium and that beryllium would not be a health concern during remove, treat, and dispose (RTD) activities at the 120-F-1 waste site. However, mercury and, to a much lesser extent, metals such as manganese, nickel, and cadmium were detected and determined to be possible airborne inhalation hazards. Therefore, wetting methods for dust suppression were indicated for the pending RTD of the site.

Remedial action at the 120-F-1 waste site began in September 2007 and was completed in March 2008. Two distinct areas were excavated resulting in disposal of approximately 1,505 bank cubic meters of contaminated materials to the Environmental Restoration Disposal Facility.

A summary of the cleanup evaluation for the soil sample results against the applicable criteria is presented in Table ES-1. The results of the verification sampling are used to make reclassification decisions for the 120-F-1 waste site in accordance with the *Tri-Party Agreement Handbook Management Procedures,* TPA-MP-14 (DOE-RL 2007).

Table ES-1. Summary of Remedial Action Goals for the 120-F-1 Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Direct Exposure – Radionuclides	Attain 15-mrem/yr dose rate above background over 1,000 years.	Radionuclides are not site COPCs.	Yes
Direct Exposure – Nonradionuclides	Attain individual COPC RAGs.	All individual COPC concentrations are below the direct exposure criteria.	Yes
Risk Requirements – Nonradionuclides	Attain a hazard quotient of <1 for all individual noncarcinogens.	All individual hazard quotients are less than 1.	Yes
	Attain a cumulative hazard quotient of <1 for noncarcinogens.	The cumulative hazard quotient (4.2×10^{-2}) is less than 1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The individual excess cancer risk for carcinogens are less than 1×10^{-6}.	
	Attain a cumulative excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk (1.1×10^{-6}) is less than 1×10^{-5}.	
Groundwater/River Protection – Radionuclides	Attain single-COPC groundwater and river protection RAGs.	Radionuclides are not site COPCs.	Yes
	Attain national primary drinking water standards:[a] 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the most stringent of 15 pCi/L MCL or 1/25th of the derived concentration guides from DOE Order 5400.5.[b]		
	Meet total uranium standard of 30 µg/L (21.2 pCi/L).		

Table ES-1. Summary of Remedial Action Goals for the 120-F-1 Site. (2 Pages)

Regulatory Requirement	Remedial Action Goals	Results	Remedial Action Objectives Attained?
Groundwater/River Protection – Nonradionuclides	Attain individual nonradionuclide groundwater and river cleanup requirements.	Residual concentrations of selenium, diesel range TPH, and motor oil range TPH are above the groundwater and river protection soil RAGs. However, RESRAD modeling predicts these constituents will not reach groundwater (and, therefore, the Columbia River) within 1,000 years.[d]	Yes

[a] "National Primary Drinking Water Regulations" (40 *Code of Federal Regulations* 141).
[b] *Radiation Protection of the Public and the Environment* (DOE Order 5400.5).
[c] *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2005b).
[d] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005), these constituents are not predicted to migrate more than 2 m (6.6 ft) vertically in 1,000 years (based on the lowest soil-partitioning coefficient distribution [for TPH] of 50 mL/g).

COPC = contaminant of potential concern
MCL = maximum contaminant level (drinking water standard)
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose model)
TPH = total petroleum hydrocarbons

Verification sampling for both the northwest and the southeast excavations within the 120-F-1 waste site was performed in December 2007 (WCH 2007b) to determine if the remedial action goals had been met. The contaminants of potential concern (COPCs) for verification sampling included inductively coupled plasma metals, hexavalent chromium, mercury, semivolatile organic compounds, and polychlorinated biphenyls (PCBs) (WCH 2007a). In the southeast excavation, total petroleum hydrocarbons were also COPCs.

Several iterations of material removal and sampling for limited analytes were conducted in the northwest excavation after the initial verification sampling results showed elevated contaminant levels. The verification sample results from the northwest excavation showed elevated levels of several pesticides and metals. Additional material was removed and the boundary of the waste site was increased. A second sample design was prepared for the northwest portion, and this area was sampled for PCBs and pesticides on February 4, 2008. The second set of samples also showed elevated levels of pesticides. Again, material was removed and the site boundary was increased. The northwest excavation was then sampled for pesticide analytes only on February 19, 2008, using a third, revised sample design. Slightly elevated pesticide levels were still present and additional material was removed from the area, which again changed the remediation boundary. Sampling for pesticide analytes was performed on March 5, 2008 in the northwest excavation using a fourth sample design. The fourth set of sampling results showed detectable levels of pesticides at a single sample site. A final remediation was performed at this specific area after which the same location was resampled. Pesticides were undetected in the sample. The full set of verification samples for the northwest excavation was then taken on March 18, 2008, using the sampling coordinates from the fourth sample design.

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 remedial action

objectives and the corresponding remedial action goals established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (DOE-RL 2005b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (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. Although a portion of the excavation extends into the deep zone, the site is being closed out using shallow zone criteria; therefore, no deep zone institutional controls are required.

A comparison against ecological risk screening levels has been made for the site contaminants of potential concern (COPCs) and other constituents. Screening levels were not exceeded for the site constituents, with the exception of antimony, boron, manganese, mercury, and vanadium. Exceedance of screening values does not necessarily indicate the existence of risk to ecological receptors. It is believed that the presence of these constituents does not pose a risk to ecological receptors because concentrations of antimony, manganese, and vanadium are below site background levels, and boron concentrations are consistent with those seen elsewhere at the Hanford Site (no established background value is available for boron). A single verification sample contained a concentration of mercury approximately two times above Hanford Site background. All other samples of mercury are below the ecological screening levels.

REMAINING SITES VERIFICATION PACKAGE FOR THE 120-F-1 GLASS DUMP WASTE SITE

STATEMENT OF PROTECTIVENESS

This report demonstrates that the 120-F-1 glass dump waste site meets the objectives for interim closure as established in the *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP) (DOE-RL 2005b) and the *Interim Action Record of Decision for the 100-BC-1, 100-BC-2, 100-DR-1, 100-DR-2, 100-FR-1, 100-FR-2, 100-HR-1, 100-HR-2, 100-KR-1, 100-KR-2, 100-IU-2, 100-IU-6, and 200-CW-3 Operable Units, Hanford Site, Benton County, Washington* (Remaining Sites ROD) (EPA 1999). 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. Although a portion of the excavation extends into the deep zone, the site is being closed out using shallow zone criteria; therefore, no deep zone institutional controls are required.

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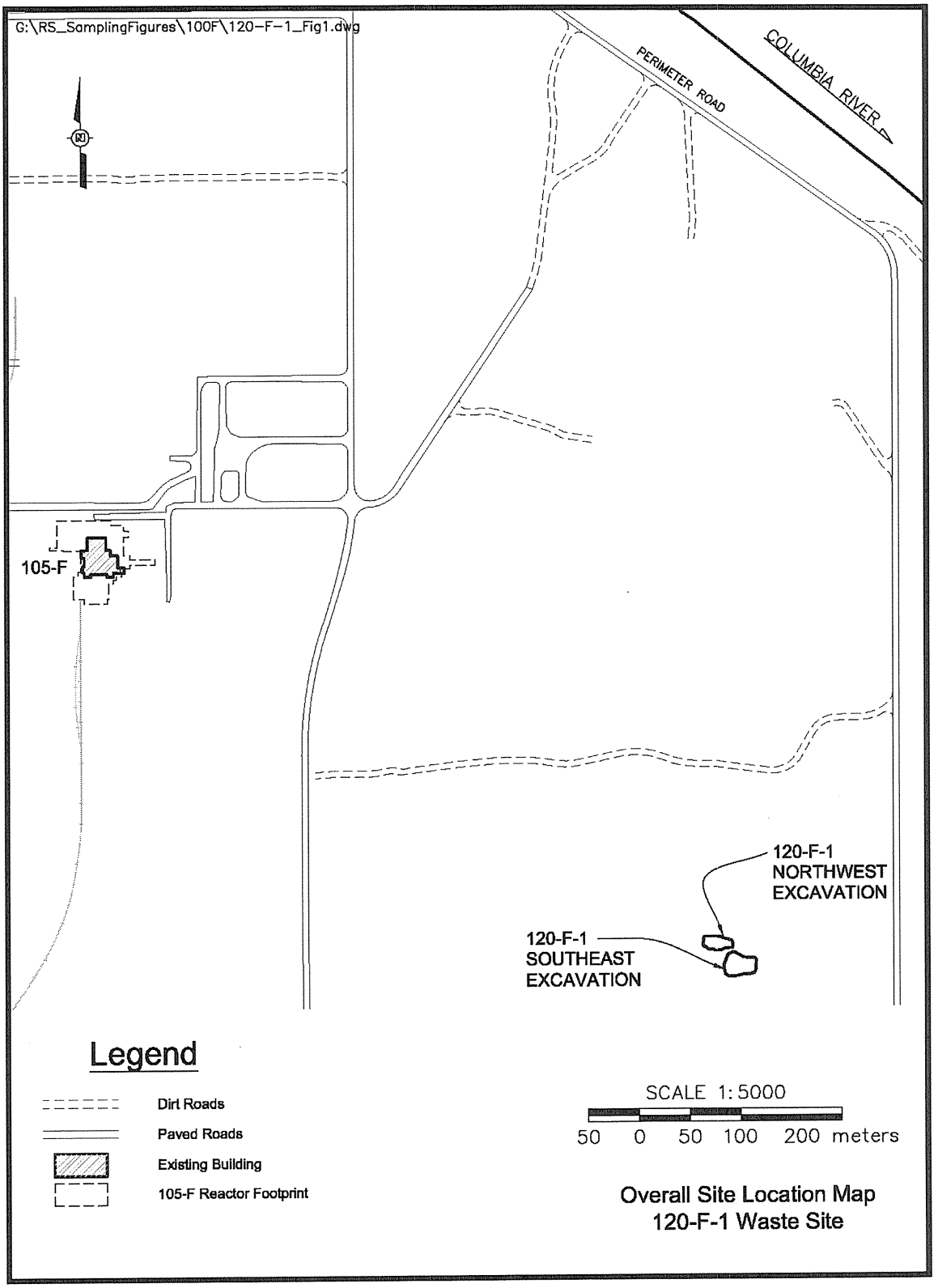
GENERAL SITE INFORMATION AND BACKGROUND

The 120-F-1 glass dump waste site, part of the 100-FR-2 Operable Unit, was located approximately 660 m (2,165 ft) southeast of the 105-F Reactor (Figure 1). The site originally consisted of an uncovered trench filled with waste (northwest excavation), but a second dumping area (southeast excavation) was later added as described below.

The 120-F-1 waste site was designated in the RDR/RAWP (DOE-RL 2005b) and the Remaining Sites ROD (EPA 1999) as an area for remove/treat/dispose (RTD) due to reports of fluorescent tubes, vacuum tubes, small batteries, and empty chemical bottles in an open trench. In accordance with the *Sampling and Analysis Instruction for the 120-F-1 Glass Dump Site* (BHI 1998b), the site was surveyed for volatile organic compounds and mercury vapors. No

Figure 1. 120-F-1 Waste Site Location Map.



organic vapors were detected, but mercury vapors were detected in the immediate vicinity of the broken fluorescent tubes.

Interim stabilization and limited sampling was performed on March 23, 1998. Interim stabilization was conducted as a housekeeping activity to reduce and stabilize hazards and to deter accidental or inadvertent entry. Evaluation of the data from samples collected during interim stabilization is provided in the *120-F-1 Glass Dump Interim Stabilization Final Report* (BHI 1998a). The data evaluation concluded that no radiological contamination was present and the lead and mercury results associated with the fluorescent bulbs reaffirmed that RTD was required at the 120-F-1 waste site.

PRE-REMEDIATION ACTIVITIES

On January 21, 2006, an industrial hygiene investigation of the 120-F-1 waste site was conducted to determine whether beryllium was present in the phosphor material used in the fluorescent tubes dumped at the 120-F-1 waste site (BHI 2006). Beryllium was used in the manufacture of fluorescent light bulbs prior to 1949. The previously interim-stabilized waste site was opened using a front-end loader. At this juncture, it was discovered that the plywood barrier had failed and the fluorescent tubes were crushed. Pieces of the fluorescent tubes and accompanying soils were sampled. The samples were analyzed for metals, including mercury and beryllium. Beryllium was detected in one of three samples at a concentration below its average background concentration. It was determined that the fluorescent tubes were not manufactured with beryllium and that beryllium would not be a health concern during RTD of the 120-F-1 waste site. However, mercury and, to a much lesser extent, metals such as manganese, nickel, and cadmium were detected and determined to be possible airborne inhalation hazards. Therefore, wetting methods for dust suppression were indicated for the pending RTD of the site.

Nonintrusive Investigation Results

In preparation for remedial action at the site, a standard geophysical investigation was conducted in the vicinity of the glass dump (BHI 2004). The second area of debris was identified in the geophysical interpretation, just southeast of the original glass dump. The second, southeast dumping area was larger than the original, northwest glass dump and contained concrete, wire debris, small drums with heavy oil-type petroleum hydrocarbons, and stained soil with pesticides (dichlorodiphenyldichloroethylene [DDE] and dichlorodiphenyltrichloroethane [DDT]).

Confirmatory Sample Design

The 120-F-1 site was sent directly to remediation without confirmatory sampling based on process knowledge and sampling results (BHI 1994, 1998a).

REMEDIAL ACTION SUMMARY

Remediation of the 120-F-1 waste site was performed during September 2007. Approximately 1,505 bank cubic meters (BCM) of debris from both of the 120-F-1 dump sites was excavated and disposed of at the Environmental Restoration Disposal Facility (ERDF). Eight in-process samples were collected prior to the initial verification sampling (Appendix A). From the northwest excavation, one sample of suspect asbestos-containing material (ACM) (J152H5), one sample of the soil beneath the ACM (J152H6), and two additional soil samples (J153H3 and J153H4). From the southeast excavation, in process samples were collected from an ERDF container with oil saturated soil (J152V6), the site of the excavated soil (J155N6), a site with yellow staining before excavation (J15JB0) and after excavation (J15P45). Remedial action continued in the northwest excavation even after verification sampling due to elevated levels of pesticides in the samples. A final post-excavation civil survey of the waste site is presented in Figure 2.

The northwest excavation contained fluorescent light bulbs and laboratory glassware, as well as most of the pesticide contaminated soil from the waste site. The southeast excavation contained a significant amount of demolition debris such as concrete, wire, and steel, as well as breached oil drums and pesticide contaminated soil. The southeast excavation is deeper than the northwest excavation because of the buried debris and stained soil. Selected photos of the material found at the 120-F-1 waste site are presented in Appendix B.

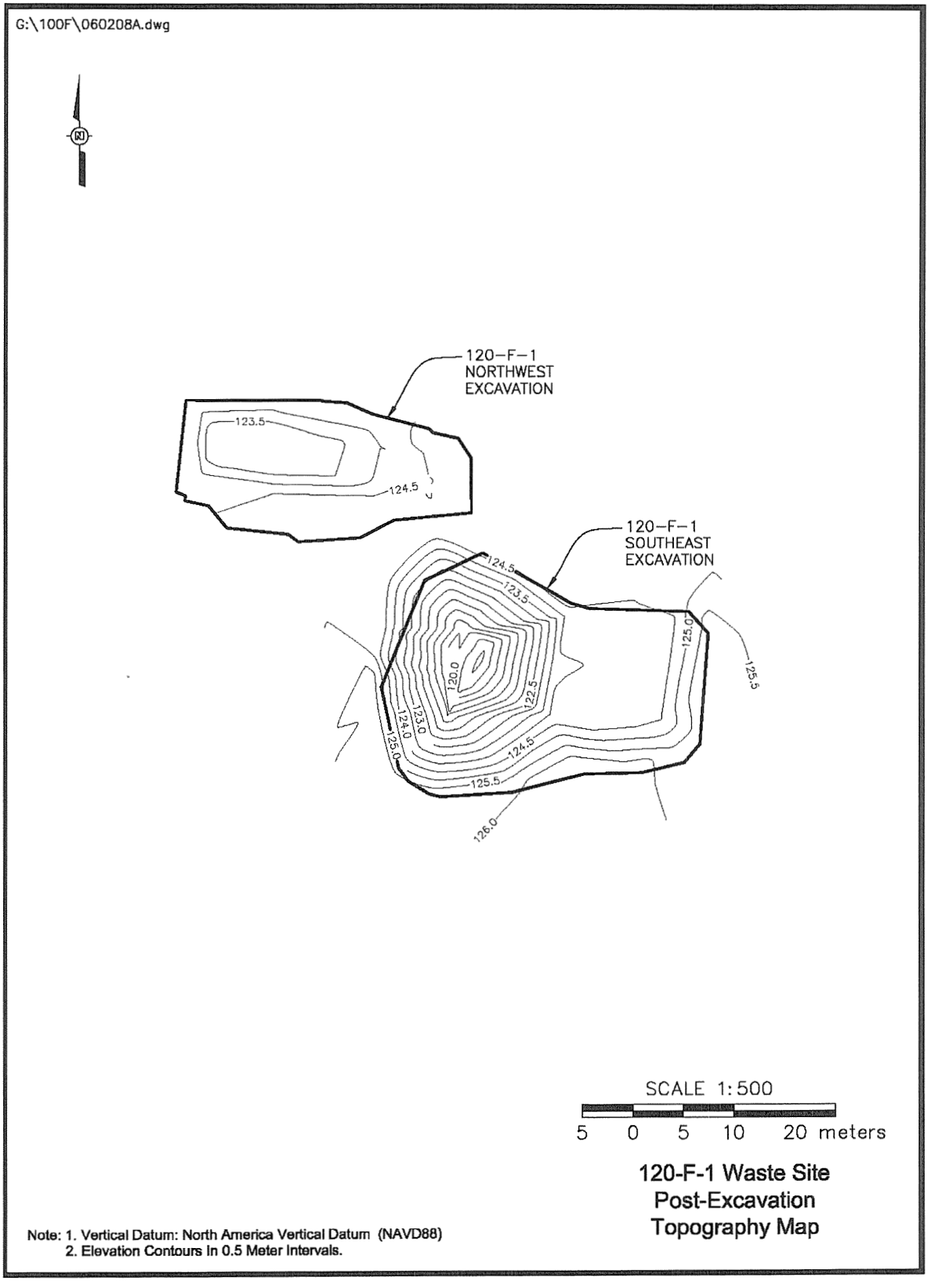
VERIFICATION SAMPLING ACTIVITIES

Remedial action goals (RAGs) are the specific numeric goals against which the cleanup verification data are evaluated to demonstrate attainment of the remedial action objectives for the site. Verification sampling for the 120-F-1 waste site was initially performed on December 3 and December 17, 2007 (WCH 2007b) to collect data from both excavations to determine if the RAGs had been met. Inadvertently, hexavalent chromium analysis for these samples was not requested while analyses for anions, cyanide, and sulfide were added. Several iterations of material removal and sampling for limited analytes were conducted in the northwest excavation after the initial verification sampling results showed elevated contaminant levels (Appendix A). The verification sample design for the northwest area was updated to account for changes in the excavation boundary. The final verification sampling for the northwest excavation was conducted on March 18, 2008. Hexavalent chromium sampling for the southeast excavation was performed on February 19, 2008. The following subsections provide additional discussion of the information used to develop the verification sampling design. The results of verification sampling are also summarized to support interim closure of the site.

Contaminants of Potential Concern

The waste site COPCs for the 120-F-1 waste site are described in the verification work instruction (WCH 2007a). COPCs for verification sampling in the northwestern excavation are inductively coupled plasma (ICP) metals, hexavalent chromium, mercury, semivolatile organic compounds by semivolatile organic analysis, pesticides, and polychlorinated biphenyls (PCBs).

Figure 2. Post-Excavation Civil Survey of the 120-F-1 Waste Site.



In the southeast excavation, the COPCs are the same as in the northwest excavation with the addition of total petroleum hydrocarbons. All analyses are discussed in the Data Evaluation portion of this remaining sites verification package.

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. The 120-F-1 waste site was divided into two decision units for the purpose of verification sampling. The first decision unit consisted of the southeast excavation and the second decision unit consisted of the northwest excavation.

Verification Sampling – Excavation Footprint

The decision rule for demonstrating compliance with the cleanup criteria requires comparison of the true population mean, as estimated by the 95% upper confidence limit (UCL) on the sample mean, with the cleanup level. Therefore, a statistical sampling design was the preferred verification sampling approach for this site because the distribution of potential residual soil contamination over the site was uncertain. The Washington State Department of Ecology publication, *Guidance on Sampling and Data Analysis Methods* (Ecology 1995), recommends that systematic sampling with sample locations distributed over the entire study area be used. This sampling approach is referred to by the Washington State Department of Ecology as "area-wide sampling."

Statistical parameters (i.e., standard deviation within the populations) for residual contaminant levels following remediation at the 120-F-1 waste site were unknown at the time of sample design development. Therefore, the standard deviation of the residual contaminant population was assumed to be less than 25% of the corresponding decision thresholds for the population. This assumption was verified later using the resulting verification sampling data in Appendix C. The assumption held true for all analytes with the exception of lead in the southeast excavation. This topic will be considered in the data quality assessment for the data set.

Each excavation footprint was delineated in Visual Sample Plan[1] and used as the basis for location of a random-start systematic grid for verification soil sample collection locations. A total of 10 verification soil samples were calculated to be collected on a random-start, triangular grid for each sampling area. Because the nature of the debris found at the two dumping areas within the 120-F-1 waste site was significantly different and because the COPCs for the two areas are different, each area will be separately evaluated with 10 samples collected within each area. A triangular grid was selected for this investigation based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Additional discussion of the development of the statistical verification design is available in the 120-F-1 verification work instruction (WCH 2007a).

Verification samples from both excavations were collected in December 2007 for all COPCs except for hexavalent chromium. In its place, IC anions, cyanide, and sulfide analyses were inadvertently requested. The sample results showed elevated levels of several pesticides

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

(chlordane, heptachlor, dieldrin, endrin, and DDD) and had a higher than acceptable practical quantitation limit for several PCB samples from the northwest excavation (Appendix A, Table A-2). Additional material was removed from the northwest excavation, and a second sample design for the northwest excavation only was developed due to an increase in the excavation boundary. Samples were collected on February 4, 2008, for PCB and pesticide analyses only. The results of these samples showed several elevated pesticide values (Appendix A, Table A-3), and additional material was removed from the northwest excavation. The excavation boundary was again expanded and an updated sample design was prepared. Samples were collected from these locations on February 19, 2008. Sample results for 3 of the 10 sample locations showed slightly elevated levels of one or more pesticides (Appendix A, Table A-4). Additional material was again removed and samples were collected at locations from a new sample design on March 5, 2008. Only one sample (NW-5) showed detection of pesticides (Appendix A, Table A-5). Additional material was removed from this location, but the excavation boundary did not change. This single sample location was resampled on March 11, 2008, with no detected pesticides (Appendix A, Table A-6). With regulatory agency concurrence (WCH 2008a), this final sampling design was then used to collect verification samples from all 10 locations in the northwest excavation for the full suite of analyses. The revised sample design for the northwest excavation, presented in Appendix D, differed from that in the original design (WCH 2007a) only in the specific sample locations due to the enlarged waste site boundary. The statistical assumptions and parameters were not altered in the design revision.

Summaries of the samples collected and the analyses performed for the verification sampling event are presented in Table 1 and the locations are shown in Figure 3. All sampling was performed in accordance with ENV-1, *Environmental Monitoring & Management*, to fulfill the requirements of the *100 Area Remedial Action Sampling and Analysis Plan* (DOE-RL 2005a).

Table 1. Verification Sample Summary for the 120-F-1 Waste Site.[a] (3 Pages)

Sample Location	Sample Media	Actual Coordinates[b] Northing Easting	HEIS Number	Sample Analysis[c]
SE-1	Soil	N 147190.5 E 581051.3	J16332	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-2	Soil	N 147185.4 E 581057.7	J16333	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-3	Soil	N 147198.5 E 581052.6	J16335	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-4	Soil	N 147193.4 E 581058.9	J16336	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-5	Soil	N 147188.4 E 581065.2	J16337	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-6	Soil	N 147201.5 E 581060.1	J16338	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides

Table 1. Verification Sample Summary for the 120-F-1 Waste Site.[a] (3 Pages)

Sample Location	Sample Media	Actual Coordinates[b] Northing Easting	HEIS Number	Sample Analysis[c]
SE-7	Soil	N 147196.4 E 581066.5	J16339	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-8	Soil	N 147191.3 E 581072.8	J16340	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-9	Soil	N 147199.4 E 581074.0	J16341	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-10	Soil	N 147194.3 E 581080.4	J16342	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
SE-1	Soil	N 147190.5 E 581051.3	J16B36	Hexavalent chromium
SE-2	Soil	N 147185.4 E 581057.7	J16B37	Hexavalent chromium
SE-3	Soil	N 147198.5 E 581052.6	J16B38	Hexavalent chromium
SE-4	Soil	N 147193.4 E 581058.9	J16B39	Hexavalent chromium
SE-5	Soil	N 147188.4 E 581065.2	J16B40	Hexavalent chromium
SE-6	Soil	N 147201.5 E 581060.1	J16B41	Hexavalent chromium
SE-7	Soil	N 147196.4 E 581066.5	J16B42	Hexavalent chromium
SE-8	Soil	N 147191.3 E 581072.8	J16B43	Hexavalent chromium
SE-9	Soil	N 147199.4 E 581074.0	J16B44	Hexavalent chromium
SE-10	Soil	N 147194.3 E 581080.4	J16B45	Hexavalent chromium
NW-1	Soil	N 147211.5 E 581035.4	J16DT7	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-2	Soil	N 147210.0 E 581041.3	J16DT8	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-3	Soil	N 147217.4 E 581033.8	J16DT9	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-4	Soil	N 147215.9 E 581039.7	J16DV0	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-5	Soil	N 147214.3 E 581045.6	J16DV1	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions

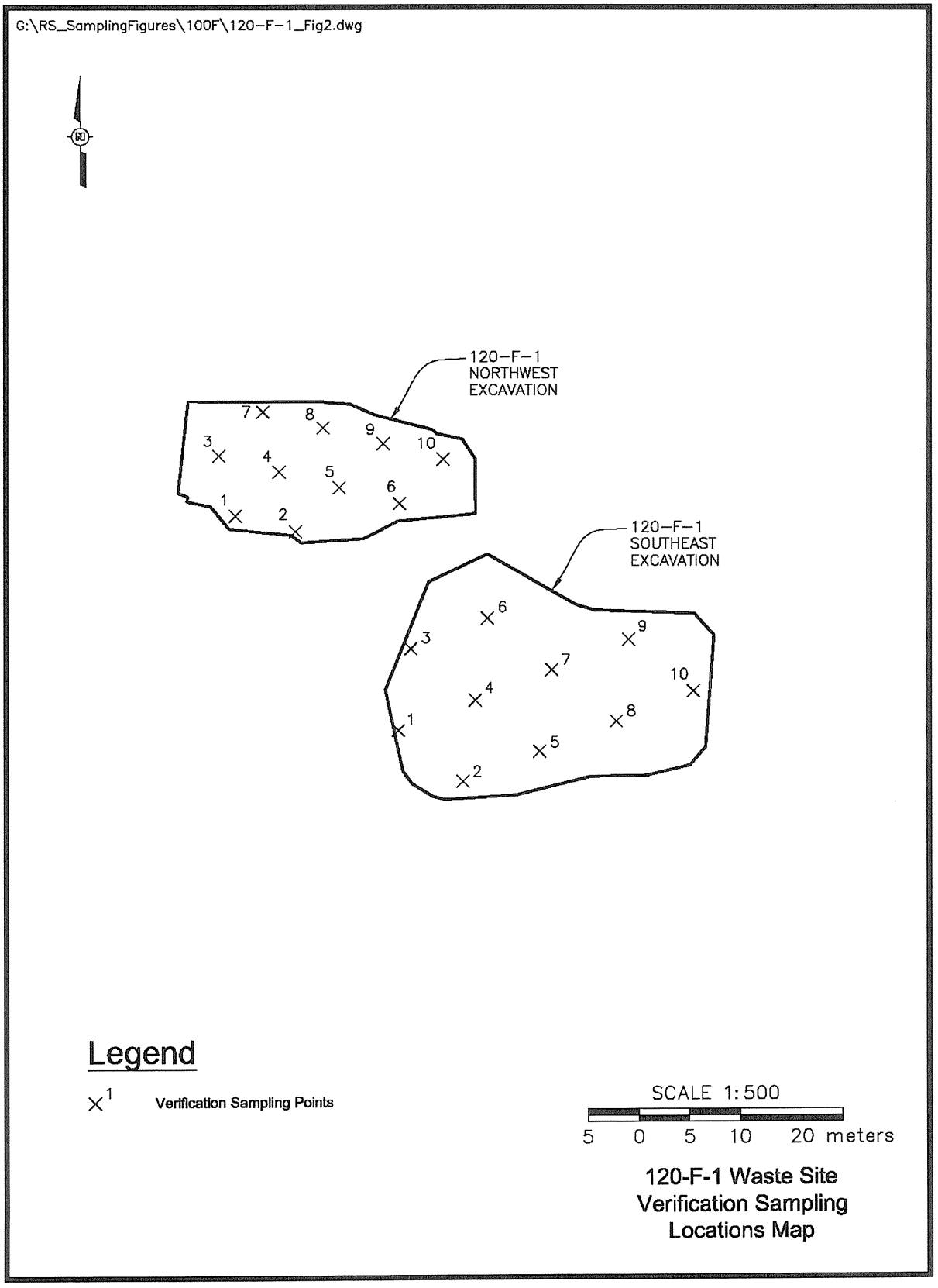
Table 1. Verification Sample Summary for the 120-F-1 Waste Site.[a] (3 Pages)

Sample Location	Sample Media	Actual Coordinates[b] Northing Easting	HEIS Number	Sample Analysis[c]
NW-6	Soil	N 147212.7 E 581051.5	J16DV2	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-7	Soil	N 147221.8 E 581038.1	J16DV3	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-8	Soil	N 147220.2 E 581044.0	J16DV4	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-9	Soil	N 147218.6 E 581049.9	J16DV5	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
NW-10	Soil	N 147217.1 E 581055.8	J16DV6	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
Duplicate of J16333	Soil	N 147185.4 E 581057.7	J16334	ICP metals, mercury, SVOA, PCBs, pesticides, TPH, IC anions, total cyanide, sulfides
Duplicate of J16B46	Soil	N 147194.3 E 581080.4	J16B46	Hexavalent chromium
Duplicate of J16DV7	Soil	N 147217.1 E 581055.8	J16DV6	ICP metals, mercury, hexavalent chromium, pesticides, SVOA, PCBs, IC anions
Equipment Blank	Silica sand	NA	J16354	ICP metals, IC anions
Equipment Blank	Silica sand	NA	J16DT6	ICP metals, IC anions

[a] Source: Field logbook EFL-1174-4, pp. 27-29 (WCH 2007b) and 88-89 (WCH 2008b).
[b] Washington State Plane (meters).
[c] Analyses of IC anions, total cyanide, sulfides were inadvertently requested for the southeast excavation samples instead of hexavalent chromium. These analyses were not required for the verification sampling. Due to detections of some anions, this analysis was added to the northwest excavation samples for consistency. Hexavalent chromium samples for the southeast excavation were collected at a later time.

HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
IC = ion chromatography
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semi-volatile organic analysis
TPH = total petroleum hydrocarbons

Figure 3. 120-F-1 Verification Sample Locations.



Verification Sampling Results

Verification samples were analyzed using U.S. Environmental Protection Agency-approved analytical methods. The laboratory-reported data results for all constituents are stored in the Environmental Restoration project-specific database prior to archival in the Hanford Environmental Information System and are presented in Attachment 1 of the 95% UCL calculation in Appendix C.

As noted earlier, the 120-F-1 waste site was divided into two sampling areas for verification sampling: the northwest excavation and the southeast excavation. Evaluation of the verification data from the excavation footprint was calculated using the 95% UCL on the true population mean for residual concentrations of COPCs as specified by the RDR/RAWP (DOE-RL 2005b). These calculations are provided in Appendix C. When a COPC was detected in fewer than 50% of the verification samples collected, the maximum detected value was used for comparison against the 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 and maximum results for COPCs with the shallow zone RAGs for the southeast and northwest excavation footprints are summarized in Tables 2a and 2b, respectively. Both sampling areas are evaluated using the more restrictive shallow zone cleanup criteria, even though a portion of the southeast excavation exceeded 4.6 m (15 ft) in depth. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not presented in the *Cleanup Levels and Risk Calculations Database* (Ecology 2005) under *Washington Administrative Code* (WAC) 173-340-740(3) for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium; therefore, these constituents are not considered site COPCs.

Table 2a. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 120-F-1 Southeast Verification Sampling Event. (2 Pages)

COPC	Statistical or Maximum Result (mg/kg)	Soil Cleanup Levels, (mg/kg)[a]			Does the Maximum Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Protective of Groundwater	Protective of the River		
Arsenic	2.9 (<BG)	20	20	20	No	--
Barium	58.2 (<BG)	5,600	132[b]	224	No	--
Beryllium	0.73 (<BG)	10.4[c]	1.51[b]	1.51[b]	No	--
Boron[d]	4.6	16,000	320	NA	No	--
Chromium, total	7.4 (<BG)	80,000	18.5[b]	18.5[b]	No	--
Cobalt	5.3 (<BG)	1,600	32	NA	No	--
Copper	12.6 (<BG)	2,960	59.2	22.0[b]	No	--
Hexavalent chromium[d]	1.8	2.1[c]	4.8	2	No	--
Lead	6.1 (<BG)	353	10.2[b]	10.2[b]	No	--
Manganese	259 (<BG)	11,200	512[b]	512[b]	No	--
Mercury	0.65	24	0.33[b]	0.33[b]	Yes	Yes[e]
Molybdenum[d]	0.85	400	8	NA	No	--
Nickel	9.3 (<BG)	1,600	19.1[b]	27.4	No	--

Table 2a. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 120-F-1 Southeast Verification Sampling Event. (2 Pages)

COPC	Statistical or Maximum Result (mg/kg)	Soil Cleanup Levels, (mg/kg)[a]			Does the Maximum Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Protective of Groundwater	Protective of the River		
Vanadium	38.5 (<BG)	560	85.1[b]	NA	No	--
Zinc	37.5 (<BG)	24,000	480	67.8[b]	No	--
Fluoride	3.9	4,800	96	NA	No	--
Nitrate (as Nitrogen)	4.2 (<BG)	128,000	1,000	2,000	No	--
Sulfate	8,410[f]	NA	25,000	50,000	No	--
Bis(2-ethylhexyl) phthalate	0.11	71.4	0.625	0.36	No	--
Aroclor-1254	0.023	0.5	0.017[g]	0.017[g]	No	--
Aroclor-1260	0.010	0.5	0.017[g]	0.017[g]	No	--
Dibenz(a,h)anthracene	0.025	0.33[g]	0.33[g]	0.33[g]	No	--
alpha-Chlordane	0.010	0.769	0.0165[g]	0.0165[g]	No	--
gamma-Chlordane	0.013	0.769	0.0165[g]	0.0165[g]	No	--
DDE	0.0018	2.94	0.0257	0.0033[g]	No	--
DDT	0.0021	2.94	0.0257	0.0033[g]	No	--
Endosulfan I	0.0018	480	9.6	0.0112	No	--

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

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

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) (Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (WDOH 1997).

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

[e] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005), residual concentrations of mercury are not expected to migrate more than 2 m (6.6 ft) vertically in 1,000 years based on the soil-partitioning distribution coefficient for mercury of 30 mL/g. The vadose zone underlying the remediation footprint is approximately 6.6 m (21.7 ft) thick. Therefore, residual concentrations of mercury are predicted to be protective of groundwater and the Columbia River.

[f] See sulfate data discussion in following section.

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

-- = not applicable
BG = background
COPC = contaminant of potential concern
NA = not available
RAG = remedial action goal
RDL = required detection limit
RESRAD = RESidual RADioactivity (dose assessment model)
WAC = *Washington Administrative Code*

Table 2b. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 120-F-1 Northwest Verification Sampling Event. (2 Pages)

COPC	Statistical or Maximum Result (mg/kg)	Soil Cleanup Levels, (mg/kg)[a]			Does the Maximum Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Protective of Groundwater	Protective of the River		
Antimony	0.91 (<BG)	32	5[b]	5[b]	No	
Arsenic	2.5 (<BG)	20	20	20	No	--
Barium	65.8 (<BG)	5,600	132[b]	224	No	--
Beryllium	0.26 (<BG)	10.4[c]	1.51[b]	1.51[b]	No	--

Table 2b. Comparison of Maximum or Statistical Contaminant Concentrations to Action Levels for the 120-F-1 Northwest Verification Sampling Event. (2 Pages)

COPC	Statistical or Maximum Result (mg/kg)	Soil Cleanup Levels, (mg/kg)[a]			Does the Maximum Exceed RAGs?	Does the Result Pass RESRAD Modeling?
		Direct Exposure	Protective of Groundwater	Protective of the River		
Boron[d]	1.6	16,000	320	NA	No	--
Chromium, total	11.7 (<BG)	80,000	18.5[b]	18.5[b]	No	--
Cobalt	7.1 (<BG)	1,600	32	NA	No	--
Copper	12.2 (<BG)	2,960	59.2	22.0[b]	No	--
Hexavalent chromium[d]	0.30	2.1[c]	4.8	2	No	--
Lead	2.9 (<BG)	353	10.2[b]	10.2[b]	No	--
Manganese	318 (<BG)	11,200	512[b]	512[b]	No	--
Nickel	11.8 (<BG)	1,600	19.1[b]	27.4	No	--
Selenium	1.8	400	5	1	Yes	Yes[e]
Vanadium	53.9 (<BG)	560	85.1	NA	No	--
Zinc	37.3 (<BG)	24,000	480	67.8[b]	No	--
Nitrate (as Nitrogen)	5.7 (<BG)	128,000	1,000	2,000	No	--
Sulfate	6.4 (<BG)	NA	25,000	50,000	No	--
Bis(2-ethylhexyl) phthalate	0.12	71.4	0.625	0.36	No	--
Di-n-butylphthalate	0.027	8,000	160	540	No	--
alpha-Chlordane	0.0021	0.769	0.02[f]	0.02[f]	No	--
gamma-Chlordane	0.0022	0.769	0.02[f]	0.02[f]	No	--

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

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

[c] Carcinogenic cleanup level calculated based on the inhalation exposure pathway (WAC 173-340-750[3]) (Ecology 1996) using an airborne particulate mass-loading rate of 0.0001 g/m^3 (WDOH 1997).

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

[e] Based on the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005), residual concentrations of selenium are not expected to migrate more than 1 m (3.3 ft) vertically in 1,000 years based on the soil-partitioning distribution coefficient for selenium of 150 mL/g. The vadose zone underlying the remediation footprint is approximately 6.6 m (21.7 ft) thick. Therefore, residual concentrations of selenium are predicted to be protective of groundwater and the Columbia River.

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

-- = not applicable
BG = background
COPC = contaminant of potential concern
NA = not available
RAG = remedial action goal
RDL = required detection limit
RESRAD = RESidual RADioactivity (dose assessment model)
WAC = *Washington Administrative Code*

VERIFICATION SAMPLE DATA EVALUATION

Evaluation of the verification sampling results in Tables 2a and 2b show that all direct exposure cleanup levels are met for the two sampling areas within the 120-F-1 waste site.

In the southeast excavation (Table 2a), groundwater and Columbia River protection RAGs were exceeded for mercury based on a single sample result. Analysis of the remaining nine samples did not detect mercury. Data were not collected on the vertical extent of residual contamination, but RESidual RADioactivity (RESRAD) modeling predicts that compounds having a soil-

partitioning coefficient (K_d) greater than 12 mL/g will not migrate through the 6.6 m (21.7-ft-) thick vadose zone between the shallow zone and groundwater at the deeper southeast portion of the waste site (BHI 2005). The K_d for mercury is 50 mL/g and, as discussed above, is not expected to migrate through the vadose zone. Therefore, the remediation performed in the southeast excavation of the 120-F-1 waste site is protective of groundwater and the Columbia River.

In the northwest excavation (Table 2b), the Columbia River protection RAG was exceeded for selenium based on a single sample result. Analyses of the remaining nine samples did not detect selenium. Data were not collected on the vertical extent of residual contamination, but RESRAD modeling predicts that compounds having a soil-partitioning coefficient (K_d) greater than 8 mL/g will not migrate through the 10.5 m (34.4-ft-) thick vadose zone between the shallow zone and groundwater at the shallower, northwest excavation of the site (BHI 2005). The K_d for selenium is 150 mL/g and, as discussed above, selenium is not predicted to migrate through the vadose zone within 1,000 years. Therefore, the remediation performed in the northwest excavation of the 120-F-1 waste site is protective of groundwater and the Columbia River.

All other COPCs for the 120-F-1 waste site were either not detected or were quantified below RAGs.

When using a statistical sampling approach, a RAG requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The application of the three-part test for the 120-F-1 waste site is included in the statistical calculations (Appendix C). All residual COPC concentrations for both excavations within the 120-F-1 waste site pass the three-part test.

Assessment of the risk requirements for the 120-F-1 waste site is determined by calculation of the hazard quotient and carcinogenic (excess cancer) risk values for nonradionuclides. These calculations are located in Appendix C. The requirements include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative excess carcinogenic risk of less than 1×10^{-5}. These risk values were conservatively calculated for the entire waste site using the highest values from each of the sampling areas. Risk values were not calculated for constituents that were not detected or were detected at concentrations below Hanford Site or Washington State background values. The calculations indicated that all individual hazard quotients for noncarcinogenic constituents are less than 1.0. The cumulative hazard quotient for the 120-F-1 waste site is 4.2×10^{-2}. All individual cumulative carcinogenic risk values are less than 1×10^{-6}. The cumulative carcinogenic risk value is 1.1×10^{-6}. Therefore, nonradionuclide risk requirements are met.

Sulfate Data Discussion

The sulfate data analysis in the southeast excavation was problematic due to a spread of three orders of magnitude in the sample results and the use of a lognormal distribution to calculate the 95% UCL. A 95% UCL value of 1,740,000 mg/kg was obtained from the 10 sample results (censored) using Ecology MTCAStat software and a lognormal distribution (Figure 4). MTCAStat software uses Land's method of statistical calculation and a H-statistic when the data

is determined to be lognormal. However, the maximum sulfate result from these 10 samples was 8,410 mg/kg with a mean of 5,202 mg/kg and a standard deviation of 2,660 mg/kg (Figure 4).

The 95% UCL result from MTCAStat software using a lognormal distribution and a H-statistic does not provide a realistic upper value for sulfate. Significant sample heterogeneity is apparent in the primary and duplicate samples for these samples where a 92% relative percent difference was calculated for sulfate (Appendix C). While 80% of the sulfate data were above the detection limit indicating a lognormal MTCAStat analysis is suitable, the maximum sulfate result is the appropriate value to use for comparison against the RAGs in this case.

The sulfate data were analyzed using ProUCL version 4.0 (EPA 2007) to determine if a better statistical test was appropriate. Results from this analysis indicated the data was gamma distributed and suggested using an adjusted gamma UCL (Figure 5). The 95% UCL value for sulfate using this test was 7,396 mg/kg.

The groundwater protection RAG for sulfate is based on a secondary maximum contaminant level (MCL) value. This RAG (25,000 mg/kg) is nearly three times the maximum value from the sample set (8,410 mg/kg). There is no direct exposure value for sulfate. There is a health based, drinking water advisory level for sulfate of 500 mg/L from EPA (EPA 2003). This equates to a soil concentration value of 50,000 mg/kg using the 100X rule as prescribed in the RDR/RAWP (DOE-RL 2005b).

For the sulfate results in the 120-F-1 southeast excavation, the MTCAStat 95% UCL value does not provide a realistic upper bound of concentration. Furthermore, the source of the sulfate RAG is a secondary MCL, which is driven by aesthetic concerns, not health risks. Therefore, it is appropriate to use the maximum sample result for comparison against the groundwater and Columbia River protection RAGs.

VERIFICATION SAMPLING DATA QUALITY ASSESSMENT

A data quality assessment (DQA) is performed to compare the verification sampling approach, the field logbook (WCH 2008b), and resulting analytical data with the sampling and data quality requirements specified by the project objectives and performance specifications.

Figure 4. MTCAStat calculation for sulfate results from 120-F-1 southeast excavation.

mg/kg	Sample
338	J16333/J16334
1.2	J16332
1.25	J16335
8410	J16336
153	J16337
2410	J16338
32.8	J16339
11.4	J16340
51.3	J16341
3.2	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	1141.22
Censored		Lognormal mean	5202.02
Detection limit or PQL		Std. devn.	2659.44829
Method detection limit		Median	42.05
TOTAL	10	Min.	1.2
		Max.	8410

Lognormal distribution?		Normal distribution?	
r-squared is:	0.965	r-squared is:	0.486

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 17371219.6435668

Figure 5. Results of 95% UCL Analysis of Sulfate Results for Southeast Excavation Using ProUCL 4.0.

1				General UCL Statistics for Full Data Sets								
2			User Selected Options									
3			From File	WorkSheet.wst								
4			Full Precision	OFF								
5			Confidence Coefficient	95%								
6			Number of Bootstrap Operations	2000								
7												
8												
9	C0											
10												
11						General Statistics						
12					Number of Valid Observations	10				Number of Distinct Observations	10	
13												
14					Raw Statistics					Log-transformed Statistics		
15					Minimum	1.2				Minimum of Log Data	0.182	
16					Maximum	8410				Maximum of Log Data	9.037	
17					Mean	1141				Mean of log Data	3.911	
18					Median	42.05				SD of log Data	3.048	
19					SD	2659						
20					Coefficient of Variation	2.33						
21					Skewness	2.777						
22												
23						Relevant UCL Statistics						
24					Normal Distribution Test					Lognormal Distribution Test		
25					Shapiro Wilk Test Statistic	0.512				Shapiro Wilk Test Statistic	0.948	
26					Shapiro Wilk Critical Value	0.842				Shapiro Wilk Critical Value	0.842	
27					Data not Normal at 5% Significance Level					Data appear Lognormal at 5% Significance Level		
28												
29					Assuming Normal Distribution					Assuming Lognormal Distribution		
30					95% Student's-t UCL	2683				95% H-UCL	17362755	
31					95% UCLs (Adjusted for Skewness)					95% Chebyshev (MVUE) UCL	6239	
32					95% Adjusted-CLT UCL	3314				97.5% Chebyshev (MVUE) UCL	8369	
33					95% Modified-t UCL	2806				99% Chebyshev (MVUE) UCL	12555	
34												
35					Gamma Distribution Test					Data Distribution		
36					k star (bias corrected)	0.228				Data appear Gamma Distributed at 5% Significance Level		
37					Theta Star	5012						
38					nu star	4.554						
39					Approximate Chi Square Value (.05)	0.952				Nonparametric Statistics		
40					Adjusted Level of Significance	0.0267				95% CLT UCL	2525	
41					Adjusted Chi Square Value	0.703				95% Jackknife UCL	2683	
42										95% Standard Bootstrap UCL	2484	
43					Anderson-Darling Test Statistic	0.649				95% Bootstrap-t UCL	27842	
44					Anderson-Darling 5% Critical Value	0.842				95% Hall's Bootstrap UCL	24331	
45					Kolmogorov-Smirnov Test Statistic	0.217				95% Percentile Bootstrap UCL	2769	
46					Kolmogorov-Smirnov 5% Critical Value	0.292				95% BCA Bootstrap UCL	3622	
47					Data appear Gamma Distributed at 5% Significance Level					95% Chebyshev(Mean, Sd) UCL	4807	
48										97.5% Chebyshev(Mean, Sd) UCL	6393	
49					Assuming Gamma Distribution					99% Chebyshev(Mean, Sd) UCL	9509	
50					95% Approximate Gamma UCL	5459						
51					95% Adjusted Gamma UCL	7396						
52												
53					Potential UCL to Use					Use 95% Adjusted Gamma UCL	7396	

The DQA for the 120-F-1 waste site established that the data are of the right type, quality, and quantity to support site verification decisions within specified error tolerances. All analytical data were found to be acceptable for decision-making purposes. The evaluation verified that the sample design was sufficient for the purpose of clean site verification. The cleanup verification sample analytical data are stored in the ENRE project-specific database for data evaluation prior to its archival in the HEIS and are summarized in Appendix C. The detailed DQA is presented in Appendix E.

SUMMARY FOR INTERIM CLOSURE

The 120-F-1 glass dump waste site has been remediated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2005b). The site was remediated by removing approximately 1,505 BCM of material for disposal at the ERDF. Statistical sampling to verify the completeness of remediation was performed, and analytical results for the two decision units were shown to meet the cleanup objectives for direct exposure, groundwater protection, and river protection. Accordingly, an interim closure reclassification is supported for the 120-F-1 waste site. The 120-F-1 waste site excavation area has a maximum depth of approximately 6.5 m (21 ft), which includes a shallow zone and a deep zone. However, the entire excavation area is considered one decision unit, and will be closed out using the more restrictive shallow zone cleanup criteria; therefore, institutional controls to prevent uncontrolled drilling or excavation into the deep zone are not required.

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APPENDIX A

IN-PROCESS AND VERIFICATION SAMPLING RESULTS

Table A-1 In-Process Samples. (7 pages)

Sample	HEIS Number	Sample Date	Americium-241 GEA			Barium-133			Cesium-137			Cobalt-60			Europium-152			Europium-154		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
soil	J152H3	5/3/2007	0.088	U	0.088				0.06	U	0.06	0.069	U	0.069	0.14	U	0.14	0.2	U	0.2
soil	J152H4	5/3/2007	0.11	U	0.11				0.113		0.038	0.035	U	0.035	0.091	U	0.091	0.12	U	0.12
container	J152V6	6/6/2007	0.22	U	0.22				0.1	U	0.1	0.088	U	0.088	0.18	U	0.18	0.28	U	0.28
stockpile	J155N6	6/6/2007	0.27	U	0.27				0.08	U	0.08	0.079	U	0.079	0.22	U	0.22	0.25	U	0.25
yellow stain	J15JB0	9/11/2007	0.065	U	0.065	0.059	U	0.059	0.07	U	0.07	0.067	U	0.067	0.165	U	0.165	0.249	U	0.249

Sample	HEIS Number	Sample Date	Europium-155			Potassium-40			Radium-226			Radium-228			Silver-108 Metastable			Thorium-228 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
soil	J152H3	5/3/2007	0.13	U	0.13	12.4		0.38	0.414		0.099	0.621		0.28	0.621		0.28	0.578		0.08
soil	J152H4	5/3/2007	0.09	U	0.09	12		0.36	0.43		0.063	0.758		0.12	0.758		0.12	0.764		0.056
container	J152V6	6/6/2007	0.18	U	0.18	10.3		0.84	0.379		0.11	0.672		0.3	0.672		0.3	0.46		0.11
stockpile	J155N6	6/6/2007	0.19	U	0.19	11.3		0.9	0.441		0.13	0.575		0.39	0.575		0.39	0.588		0.12
yellow stain	J15JB0	9/11/2007	0.142	U	0.142	13.2		0.807	0.306		0.128	0.406		0.278	0.406		0.278	0.292		0.081

Sample	HEIS Number	Sample Date	Thorium-232 GEA			Uranium-235 GEA			Uranium-238 GEA		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
soil	J152H3	5/3/2007	0.621		0.28	0.25	U	0.25	6.7	U	6.7
soil	J152H4	5/3/2007	0.758		0.12	0.15	U	0.15	3.8	U	3.8
container	J152V6	6/6/2007	0.672		0.3	0.27	U	0.27	9.5	U	9.5
stockpile	J155N6	6/6/2007	0.575		0.39	0.31	U	0.31	8.7	U	8.7
yellow stain	J15JB0	9/11/2007	0.406		0.278	0.246	U	0.246	8.19	U	8.19

Asbestos

Sample	HEIS Number	Sample Date	Total Asbestos	Notes
suspect ACM	J152H5	5/3/2007	non-detected	60 - 70 % fiberglass
soil	J152H6	5/3/2007	non-detected	3 - 5 % fiberglass

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

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

C = blank contamination (inorganic compounds)

D = diluted

J = estimate value

PQL = Practical Quantitation Limit

R = rejected

Q = qualifier

U = undetected

X = tentatively identified compound

Table A-1. 120-F-1 In-Process samples. (7 pages)

Sample	Sample Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
soil	J152H3	5/3/2007	8910		6.2	1.4	U	1.4	1.8		1.8	97.4	C	0.09	0.53		0.04
soil	J152H4	5/3/2007	5670		4.6	1	U	1	2.8		1.3	102	C	0.06	0.36		0.03
container	J152V6	6/6/2007	3450	C	5.1	0.68	U	0.68	1.3	U	1.3	140	C	0.06	0.07		0.03
stockpile	J155N6	6/6/2007	5760	C	5.2	0.69	U	0.69	2.2		1.3	96.5	C	0.06	0.03	U	0.03
yellow stain initial	J15JB0	9/11/2007	1280	C	5	0.67	U	0.67	1.2	U	1.2	48.8	C	0.06	0.03	U	0.03
Yellow stain after RTD	J15P45	9/19/2007	5350		5.8	0.77	U	0.77	3.5		1.4	46.4	C	0.07	0.04	U	0.04

Sample	Sample Number	Sample Date	Boron			Cadmium			Calcium			Chromium (Total)			Cobalt		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
soil	J152H3	5/3/2007	3.8		1.6	0.13	U	0.13	10100	C	3.2	12.1	C	0.34	9		0.28
soil	J152H4	5/3/2007	4.8		1.2	0.65		0.09	4770	C	2.4	8.8	C	0.25	7		0.28
container	J152V6	6/6/2007	20.4		1.1	0.23		0.15	6950	C	2.2	3.1		0.32	2.9		0.25
stockpile	J155N6	6/6/2007	3		1.1	0.33		0.16	6180	C	2.2	8.1		0.31	7.1		0.25
yellow stain initial	J15JB0	9/11/2007	3	C	1.1	0.15	U	0.15	7080	C	2.2	3.4		0.3	0.59		0.24
Yellow stain after RTD	J15P45	9/19/2007	1.3	U	1.3	0.18	U	0.18	7450	C	2.5	15.9	C	0.35	2.8		0.28

Sample	Sample Number	Sample Date	Copper			Hexavalent Chromium			Iron			Lead			Magnesium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
soil	J152H3	5/3/2007	15.1		0.51				25300	C	12.6	5.6		1.2	6560		3.1
soil	J152H4	5/3/2007	13.8		0.38				18900	C	9.3	14		0.88	3710		2.3
container	J152V6	6/6/2007	7.2		0.28				7570		7.4	21.4		1	1950	C	2.5
stockpile	J155N6	6/6/2007	12.8		0.28				18200		7.5	14.9		1	3740	C	2.5
yellow stain initial	J15JB0	9/11/2007	4.2		0.27	0.21	U	0.21	8980	C	7.2	2.8		1	482	C	2.5
Yellow stain after RTD	J15P45	9/19/2007	13.5		0.32	2.3		0.24	22400	C	8.4	3		1.2	2780	C	2.8

Table A-1. 120-F-1 In-Process samples. (7 pages)

Sample	Sample Number	Sample Date	Manganese			Mercury			Molybdenum			Nickel			Potassium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
soil	J152H3	5/3/2007	513	C	0.09	1.3		0.02	1		0.55	13.2		0.81	1480		20.8
soil	J152H4	5/3/2007	297	C	0.06	0.36		0.02	5.5		0.41	19.6		0.6	1330		15.4
container	J152V6	6/6/2007	163		0.22	0.26		0.01	1.2		0.49	5.6		0.83	639		9.8
stockpile	J155N6	6/6/2007	312		0.22	0.04		0.02	0.5	U	0.5	9.9		0.85	1210		10
yellow stain initial	J15JB0	9/11/2007	29.1	C	0.21	0.67		0.02	0.48	U	0.48	0.82		0.82	788	C	9.7
Yellow stain after RTD	J15P45	9/19/2007	118		0.25	0.05		0.02	0.56	U	0.56	7.4		0.95	1190	C	11.2

Sample	Sample Number	Sample Date	Selenium			Silicon			Silver			Sodium			Vanadium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
soil	J152H3	5/3/2007	1.6	U	1.6	1620	C	1.8	0.38	U	0.38	305	C	1.9	63.9		0.43
soil	J152H4	5/3/2007	1.2	U	1.2	541	C	1.3	0.51		0.28	503	C	1.4	46.6		0.32
container	J152V6	6/6/2007	1.3	U	1.3	1200		2.6	0.28	U	0.28	269	C	2.2	16.3		0.25
stockpile	J155N6	6/6/2007	1.3	U	1.3	1400		2.7	0.28	U	0.28	136	C	2.2	41.2		0.25
yellow stain initial	J15JB0	9/11/2007	1.3	U	1.3	959	C	2.6	0.27	U	0.27	678	C	2.1	10.2		0.24
Yellow stain after RTD	J15P45	9/19/2007	1.5	U	1.5	2650	C	3	0.32	U	0.32	1040	C	2.5	59.4		0.28

Sample	Sample Number	Sample Date	Zinc		
			mg/kg	Q	PQL
soil	J152H3	5/3/2007	61.9	C	0.13
soil	J152H4	5/3/2007	83.2	C	0.09
container	J152V6	6/6/2007	86	C	0.12
stockpile	J155N6	6/6/2007	63.5	C	0.13
yellow stain initial	J15JB0	9/11/2007	10	C	0.12
Yellow stain after RTD	J15P45	9/19/2007	24	C	0.14

Table A-1. 120-F-1 In-Process Samples. (7 Pages)

Constituents	Sample J152H3 soil 5/3/2007			Sample J152H4 soil 5/3/2007			Sample J152V6 container 6/6/2007			Sample J155N6 waste designation 9/11/07			Sample J15JB0 yellow stain 9/11/2007			Sample J15P45 yellow stain @ 20 ft 9/19/2007		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls																		
Aroclor-1016	20	U	20	220	UD	220	14	U	14	14	U	14						
Aroclor-1221	20	U	20	220	UD	220	14	U	14	14	U	14						
Aroclor-1232	20	U	20	220	UD	220	14	U	14	14	U	14						
Aroclor-1242	20	U	20	220	UD	220	14	U	14	14	U	14						
Aroclor-1248	20	U	20	220	UD	220	14	U	14	14	U	14						
Aroclor-1254	20	U	20	640	D	220	38		14	8.3	J	14						
Aroclor-1260	20	U	20	220	UD	220	14	U	14	14	U	14						
Pesticides																		
Aldrin													1.4	UD	1.4	1.6	UD	1.6
alpha-BHC													1.4	UD	1.4	1.6	UD	1.6
alpha-Chlordane													1.4	UD	1.4	1.6	JD	1.6
beta-1,2,3,4,5,6-Hexachlorocyclohexane													1.4	UD	1.4	1.6	UD	1.6
delta-BHC													1.4	UD	1.4	1.6	UD	1.6
Dichlorodiphenyldichloroethane													1.4	UD	1.4	1.6	UD	1.6
Dichlorodiphenyldichloroethylene													22	D	1.4	1.6	UD	1.6
Dichlorodiphenyltrichloroethane													21	D	1.4	1.6	UD	1.6
Dieldrin													4.9	JXD	1.4	1.6	UD	1.6
Endosulfan I													2.4	JD	1.4	1.6	UD	1.6
Endosulfan II													3.7	JXD	1.4	1.6	UD	1.6
Endosulfan sulfate													1.4	UD	1.4	1.6	UD	1.6
Endrin													1.7	JD	1.4	1.6	UD	1.6
Endrin aldehyde													4.2	JXD	1.4	1.6	UD	1.6
Endrin ketone													7	XD	1.4	1.6	UD	1.6
gamma-BHC (Lindane)													1.4	UD	1.4	1.6	UD	1.6
gamma-Chlordane													1.4	UD	1.4	1.6	UD	1.6
Heptachlor													1.4	UD	1.4	1.6	UD	1.6
Heptachlor epoxide													1.4	UD	1.4	1.6	UD	1.6
Methoxychlor													1.4	UD	1.4	1.6	UD	1.6
Toxaphene													14	UD	14	16	UD	16

Table A-1. 120-F-1 In-Process Samples. (7 Pages)

Constituent	Sample J152H3 soil 5/3/2007			Sample J152H4 soil 5/3/2007			Sample J152V6 container 6/6/2007			Sample J155N6 waste designation 9/11/07			Sample J15JB0 yellow stain 9/11/2007			Sample J15P45 yellow stain @ 20 ft 9/19/2007		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
SVOAs																		
1,2,4-Trichlorobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
1,2-Dichlorobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
1,3-Dichlorobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
1,4-Dichlorobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
2,4,5-Trichlorophenol	1300	U	1300	930	U	930	900	U	900	890	U	890						
2,4,6-Trichlorophenol	500	U	500	370	U	370	360	U	360	360	U	360						
2,4-Dichlorophenol	500	U	500	370	U	370	360	U	360	360	U	360						
2,4-Dimethylphenol	500	U	500	370	U	370	360	U	360	360	U	360						
2,4-Dinitrophenol	1300	U	1300	930	U	930	900	U	900	890	U	890						
2,4-Dinitrotoluene	500	U	500	370	U	370	360	U	360	360	U	360						
2,6-Dinitrotoluene	500	U	500	370	U	370	360	U	360	360	U	360						
2-Chloronaphthalene	500	U	500	370	U	370	360	U	360	360	U	360						
2-Chlorophenol	500	U	500	370	U	370	360	U	360	360	U	360						
2-Methylnaphthalene	500	U	500	65	J	370	360	U	360	360	U	360						
2-Methylphenol (cresol, o-)	500	U	500	370	U	370	360	U	360	360	U	360						
2-Nitroaniline	1300	U	1300	930	U	930	900	U	900	890	U	890						
2-Nitrophenol	500	U	500	370	U	370	360	U	360	360	U	360						
3,3'-Dichlorobenzidine	500	U	500	370	U	370	360	U	360	360	U	360						
3-Nitroaniline	500	U	500	370	U	370	360	U	360	360	U	360						
4,6-Dinitro-2-methylphenol	1300	U	1300	930	U	930	900	U	900	890	U	890						
4-Bromophenylphenyl ether	1300	U	1300	930	U	930	900	U	900	890	U	890						
4-Chloro-3-methylphenol	500	U	500	370	U	370	360	U	360	360	U	360						
4-Chloroaniline	500	U	500	370	U	370	360	U	360	360	U	360						
4-Chlorophenylphenyl ether	500	U	500	370	U	370	360	U	360	360	U	360						
4-Methylphenol (cresol, p-)	500	U	500	370	U	370	360	U	360	360	U	360						
4-Nitroaniline	1300	U	1300	930	U	930	900	U	900	890	U	890						
4-Nitrophenol	1300	U	1300	930	U	930	900	U	900	890	U	890						
Acenaphthene	500	U	500	370	U	370	360	U	360	360	U	360						
Acenaphthylene	500	U	500	370	U	370	360	U	360	360	U	360						
Anthracene	500	U	500	580		370	360	U	360	360	U	360						
Benzo(a)anthracene	500	U	500	42	J	370	41	J	360	360	U	360						
Benzo(a)pyrene	500	U	500	370	U	370	65	J	360	30	J	360						
Benzo(b)fluoranthene	500	U	500	370	U	370	63	J	360	31	J	360						
Benzo(ghi)perylene	500	U	500	370	U	370	47	J	360	39	J	360						
Benzo(k)fluoranthene	500	U	500	370	U	370	69	J	360	35	J	360						
Bis(2-chloro-1-methylethyl)ether	500	U	500	370	U	370	360	U	360	360	U	360						
Bis(2-Chloroethoxy)methane	500	U	500	370	U	370	360	U	360	360	U	360						

Table A-1. 120-F-1 In-Process Samples. (7 Pages)

Constituent	Sample J152H3 soil 5/3/2007			Sample J152H4 soil 5/3/2007			Sample J152V6 container 6/6/2007			Sample J155N6 waste designation 9/11/07			Sample J15JB0 yellow stain 9/11/2007			Sample J15P45 yellow stain @ 20 ft 9/19/2007		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
SVOAs (continued)																		
Bis(2-chloroethyl) ether	500	U	500	370	U	370	360	U	360	360	U	360						
Bis(2-ethylhexyl) phthalate	110	J	500	140	J	370	180	JB	360	72	JB	360						
Butylbenzylphthalate	500	U	500	370	U	370	360	U	360	360	U	360						
Carbazole	500	U	500	370	U	370	360	U	360	360	U	360						
Chrysene	500	U	500	99	J	370	86	J	360	24	J	360						
Di-n-butylphthalate	45	J	500	370	U	370	27	JB	360	48	JB	360						
Di-n-octylphthalate	500	U	500	370	U	370	360	U	360	360	U	360						
Dibenz[a,h]anthracene	500	U	500	370	U	370	360	U	360	360	U	360						
Dibenzofuran	500	U	500	370	U	370	360	U	360	360	U	360						
Diethylphthalate	500	U	500	370	U	370	360	U	360	360	U	360						
Dimethyl phthalate	500	U	500	370	U	370	360	U	360	360	U	360						
Fluoranthene	500	U	500	71	J	370	63	J	360	28	J	360						
Fluorene	500	U	500	370	U	370	360	U	360	360	U	360						
Hexachlorobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
Hexachlorobutadiene	500	U	500	370	U	370	360	U	360	360	U	360						
Hexachlorocyclopentadiene	500	U	500	370	U	370	360	U	360	360	U	360						
Hexachloroethane	500	U	500	370	U	370	360	U	360	360	U	360						
Indeno(1,2,3-cd)pyrene	500	U	500	370	U	370	43	J	360	35	J	360						
Isophorone	500	U	500	370	U	370	360	U	360	360	U	360						
N-Nitroso-di-n-dipropylamine	500	U	500	370	U	370	360	U	360	360	U	360						
N-Nitrosodiphenylamine	500	U	500	370	U	370	360	U	360	360	U	360						
Naphthalene	500	U	500	59	J	370	360	U	360	360	U	360						
Nitrobenzene	500	U	500	370	U	370	360	U	360	360	U	360						
Pentachlorophenol	1300	U	1300	20000	D	9300	34	J	900	890	U	890						
Phenanthrene	500	U	500	370	U	370	33	J	360	18	J	360						
Phenol	500	U	500	370	U	370	48	J	360	360	U	360						
Pyrene	500	U	500	170	J	170	100.255	J	360	40	J	360						
Total Petroleum Hydrocarbon (TPH)																		
Total Petroleum Hydrocarbon (TPH)	201	U	201	18,000		3,700	244		144	142	U	142						

Table A-1. 120-F-1 In-Process Samples. (7 Pages)

Constituent	Sample J152H3 soil 5/3/2007			Sample J152H4 soil 5/3/2007			Sample J152V6 container 6/6/2007			Sample J155N6 waste designation 9/11/07			Sample J15JB0 yellow stain 9/11/2007			Sample J15P45 yellow stain @ 20 ft 9/19/2007		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
VOAs																		
1,1,1-Trichloroethane							6	U	6	6	U	6						
1,1,2,2-Tetrachloroethane							6	U	6	6	U	6						
1,1,2-Trichloroethane							6	U	6	6	U	6						
1,1-Dichloroethane							6	U	6	6	U	6						
1,1-Dichloroethene							6	U	6	6	U	6						
1,2-Dichloroethane							6	U	6	6	U	6						
1,2-Dichloroethene(Total)							6	U	6	6	U	6						
1,2-Dichloropropane							6	U	6	6	U	6						
2-Butanone							11	U	11	11	U	11						
2-Hexanone							11	U	11	11	U	11						
4-Methyl-2-Pentanone							11	U	11	11	U	11						
Acetone							11	U	11	2	J	11						
Benzene							6	U	6	6	U	6						
Bromodichloromethane							6	U	6	6	U	6						
Bromoform							6	U	6	6	U	6						
Bromomethane							11	U	11	11	U	11						
Carbon disulfide							6	U	6	6	U	6						
Carbon tetrachloride							6	U	6	6	U	6						
Chlorobenzene							6	U	6	6	U	6						
Chloroethane							11	U	11	11	U	11						
Chloroform							6	U	6	6	U	6						
Chloromethane							11	U	11	11	U	6						
cis-1,2-Dichloroethylene							6	U	6	6	U	6						
cis-1,3-Dichloropropene							6	U	6	6	U	6						
Dibromochloromethane							6	U	6	6	U	6						
Ethylbenzene							6	U	6	6	U	6						
Methylenechloride							11	B	6	9	B	6						
Styrene							6	U	6	6	U	6						
Tetrachloroethene							6	U	6	6	U	6						
Toluene							6	U	6	6	U	6						
trans-1,2-Dichloroethylene							6	U	6	6	U	6						
trans-1,3-Dichloropropene							6	U	6	6	U	6						
Trichloroethene							6	U	6	6	U	6						
Vinyl chloride							11	U	11	11	U	11						
Xylenes (total)							6	U	6	6	U	6						

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
NW-1	J16343	12/3/2007	5490		11.2	0.84	U	0.84	2.1		1.4	49.8		0.28	0.39		0.14	1.4	U	1.4	0.14	U	0.14
NW-2	J16344	12/3/2007	6500		12.4	0.93	U	0.93	2.2		1.5	77		0.31	0.44		0.15	4.7		1.5	0.15	U	0.15
NW-3	J16345	12/3/2007	5000		11.5	0.87	U	0.87	2.6		1.4	65.7		0.29	0.36		0.14	2.3		1.4	0.14	U	0.14
NW-4	J16346	12/3/2007	5780		12.5	0.94	U	0.94	2.6		1.6	79.5		0.31	0.4		0.16	2.7		1.6	0.16	U	0.16
NW-5	J16347	12/3/2007	5500		12.8	0.96	U	0.96	2.1		1.6	65.8		0.32	0.37		0.16	1.9		1.6	0.16	U	0.16
NW-6	J16348	12/3/2007	5790		11.7	0.88	U	0.88	2.3		1.5	64.1		0.29	0.33		0.15	2		1.5	0.55		0.15
NW-7	J16349	12/3/2007	4600		11.7	0.88	U	0.88	2.3		1.5	81.3		0.29	0.3		0.15	2.3		1.5	1.0		0.15
Dup of J16349	J16350	12/3/2007	5340		12.2	0.92	U	0.92	2.4		1.5	72.3		0.31	0.31		0.15	1.9		1.5	0.49		0.15
NW-8	J16351	12/3/2007	4780		12.4	0.93	U	0.93	2.6		1.5	48.1		0.31	0.29		0.15	1.7		1.5	0.71		0.15
NW-9	J16352	12/3/2007	5090		12.3	0.92	U	0.92	3		1.5	67.2		0.31	0.33		0.15	1.6		1.5	0.15	U	0.15
NW-10	J16353	12/3/2007	4930		12.2	0.92	U	0.92	2.3		1.5	59.8		0.31	0.33		0.15	1.5	U	1.5	0.15	U	0.15
Equip blank	J16354	12/17/2007	80.7		3.7	0.28	U	0.28	0.46	U	0.46	1.7		0.09	0.05	U	0.05	0.46	U	0.46	0.05	U	0.05
anomaly	J163T2	12/11/2007	114		3.6	1.6	U	0.27	2.8	U	0.45	1.8		0.09	0.04		0.04	0.36	C	0.45	0.50	U	0.04

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
			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
NW-1	J16343	12/3/2007	4230	C	11.2	8.8		0.56	5.8		0.56	12.8	C	0.56	18900		12.6	3.3		0.84	4090		7
NW-2	J16344	12/3/2007	3440	C	12.4	7.9		0.62	6.6		0.62	12.2	C	0.62	19300		13.9	4.4		0.93	3960		7.7
NW-3	J16345	12/3/2007	3350	C	11.5	6.2		0.58	6		0.58	11.9	C	0.58	17700		13	3.6		0.87	3780		7.2
NW-4	J16346	12/3/2007	3350	C	12.5	7.6		0.63	6		0.63	10.2	C	0.63	17800		14.1	4.8		0.94	3560		7.8
NW-5	J16347	12/3/2007	3560	C	12.8	7.7		0.64	6.1		0.64	11.9	C	0.64	17500		14.4	6.8		0.96	3790		8
NW-6	J16348	12/3/2007	3760	C	11.7	8.4		0.59	6.4		0.59	14.2	C	0.59	18300		13.2	5.3		0.88	3840		7.3
NW-7	J16349	12/3/2007	3470	C	11.7	15.3		0.59	5.2		0.59	14.2	C	0.59	14100		13.2	5.3		0.88	3160		7.3
Dup of J16349	J16350	12/3/2007	3460	C	12.2	10.4		0.61	6		0.61	13.7	C	0.61	16900		13.7	9.1		0.92	3620		7.6
NW-8	J16351	12/3/2007	3720	C	12.4	7.1		0.62	4.9		0.62	16.5	C	0.62	13900		13.9	6.8		0.93	3310		7.7
NW-9	J16352	12/3/2007	3050	C	12.3	6.6		0.61	5.6		0.61	10.6	C	0.61	13800		13.8	3.8		0.92	3190		7.7
NW-10	J16353	12/3/2007	3030	C	12.2	6.2		0.61	5.5		0.61	10.6	C	0.61	16900		13.7	3.7		0.92	3470		7.6
Equip blank	J16354	12/17/2007	23.9	C	3.7	0.19	U	0.19	0.19	U	0.19	0.25		0.19	156		4.2	0.34		0.28	10.3		2.3
anomaly	J163T2	12/11/2007	88.6	C	3.6	0.41	U	0.18	0.36	U	0.18	0.57		0.18	261	C	4	3.1	U	0.27	47.7		3.3

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			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	mg/kg	Q	PQL	mg/kg	Q	PQL
NW-1	J16343	12/3/2007	260	C	0.11	0.009	U	0.009	0.84	U	0.84	10.9		0.56	847		11.2	1.7	U	1.7	1560		11.2
NW-2	J16344	12/3/2007	308	C	0.12	0.01	U	0.01	1.3		0.93	10.2		0.62	1300		12.4	1.9	U	1.9	2670		12.4
NW-3	J16345	12/3/2007	266	C	0.12	0.009	U	0.009	0.87		0.87	10.3		0.58	1010		11.5	1.7	U	1.7	2100		11.5
NW-4	J16346	12/3/2007	318	C	0.13	0.01	U	0.01	0.94	U	0.94	9		0.63	1270		12.5	1.9	U	1.9	2560		12.5
NW-5	J16347	12/3/2007	288	C	0.13	0.23		0.01	2.3		0.96	11.4		0.64	1130		12.8	1.9	U	1.9	1500		12.8
NW-6	J16348	12/3/2007	288	C	0.12	0.56		0.009	1.7		0.88	10.4		0.59	1170		11.7	1.8	U	1.8	1890		11.7
NW-7	J16349	12/3/2007	267	C	0.12	0.37		0.01	3.3		0.88	9.1		0.59	1160		11.7	1.8	U	1.8	3040		11.7
Dup of J16349	J16350	12/3/2007	282	C	0.12	0.25		0.008	2.2		0.92	10.1		0.61	1230		12.2	1.8	U	1.8	2390		12.2
NW-8	J16351	12/3/2007	235	C	0.12	1.5		0.02	1.9		0.93	10.5		0.62	932		12.4	1.9	U	1.9	1710		12.4
NW-9	J16352	12/3/2007	282	C	0.12	0.02		0.01	0.92	U	0.92	8.8		0.61	1230		12.3	1.8	U	1.8	3180		12.3
NW-10	J16353	12/3/2007	265	C	0.12	0.01	U	0.01	0.92	U	0.92	8.6		0.61	884		12.2	1.8	U	1.8	2570		12.2
Equip blank	J16354	12/17/2007	4.2		0.04	0.009	U	0.009	0.28	U	0.28	0.19	U	0.19	37.3		3.7	0.56	U	0.56	0.56	U	0.56
anomaly	J163T2	12/11/2007	4.6		0.04	0.02		0.009	0.58	U	0.27	1.1	U	0.18	56.6		44	3.7	U	0.54	3.7	U	0.54

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Sample Location	HEIS Number	Sample Date	Silver			Sodium			Vanadium			Zinc			Total petroleum hydrocarbons			Bromide			Chloride		
			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
NW-1	J16343	12/3/2007	0.28	U	0.28	204	C	5.6	50.1		0.39	36.6	C	1.7	139	U	139	2.3	U	2.3	2.3	U	2.3
NW-2	J16344	12/3/2007	0.31	U	0.31	190	C	6.2	45.7		0.43	38.7	C	1.9	148	U	148	2.6	U	2.6	2.6	U	2.6
NW-3	J16345	12/3/2007	0.29	U	0.29	156	C	5.8	41.9		0.4	34	C	1.7	146	U	146	2.4	U	2.4	2.4	U	2.4
NW-4	J16346	12/3/2007	0.31	U	0.31	163	C	6.3	41.4		0.44	44.6	C	1.9	148	U	148	2.3	U	2.3	2.3	U	2.3
NW-5	J16347	12/3/2007	0.38		0.32	153	C	6.4	41.8		0.45	44.1	C	1.9	148	U	148	2.4	U	2.4	2.4	U	2.4
NW-6	J16348	12/3/2007	0.72		0.29	179	C	5.9	44.6		0.41	43.7	C	1.8	148	U	148	2.6	U	2.6	2.6	U	2.6
NW-7	J16349	12/3/2007	0.46		0.29	129	C	5.9	32.8		0.41	38.9	C	1.8	147	U	147	2.6	U	2.6	2.6	U	2.6
Dup of J16349	J16350	12/3/2007	0.31	U	0.31	147	C	6.1	39.9		0.43	37.8	C	1.8	147	U	147	2.4	U	2.4	2.4	U	2.4
NW-8	J16351	12/3/2007	0.31	U	0.31	135	C	6.2	34		0.43	43.9	C	1.9	140	U	140	2.3	U	2.3	2.3	U	2.3
NW-9	J16352	12/3/2007	0.31	U	0.31	123	C	6.1	30.9		0.43	34.5	C	1.8	150	U	150	2.7	U	2.7	2.7	U	2.7
NW-10	J16353	12/3/2007	0.31	U	0.31	154	C	6.1	40.9		0.43	32.3	C	1.8	149	U	149	2.2	U	2.2	2.2	U	2.2

Sample Location	HEIS Number	Sample Date	Cyanide			Fluoride			Nitrate			Nitrate			Phosphate			Sulfate			Sulfide		
			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
NW-1	J16343	12/3/2007	0.49	U	0.49	2.3	U	2.3	2.26	U	2.3	2.26	U	2.3	2.3	U	2.3	2.3	U	2.3	0.22	U	0.22
NW-2	J16344	12/3/2007	0.56	U	0.56	2.6	U	2.6	4.94		2.6	2.58	U	2.6	2.6	U	2.6	104		2.6	27.6	U	27.6
NW-3	J16345	12/3/2007	0.54	U	0.54	2.4	U	2.4	3.05		2.4	2.43	U	2.4	2.4	U	2.4	10.1		2.4	24	U	24
NW-4	J16346	12/3/2007	0.55	U	0.55	2.3	U	2.3	2.33	U	2.3	2.33	U	2.3	2.3	U	2.3	2.3	U	2.3	29.6	U	29.6
NW-5	J16347	12/3/2007	0.55	U	0.55	2.4	U	2.4	2.45	U	2.4	2.45	U	2.4	2.4	U	2.4	2.4	U	2.4	27.3	U	27.3
NW-6	J16348	12/3/2007	0.55	U	0.55	2.6	U	2.6	2.56	U	2.6	2.56	U	2.6	3.3		2.6	2.6	U	2.6	21.8	U	21.8
NW-7	J16349	12/3/2007	0.53	U	0.53	2.6	U	2.6	2.55	U	2.6	2.55	U	2.6	2.6	U	2.6	2.6	U	2.6	22.5	U	22.5
Dup of J16349	J16350	12/3/2007	0.48	U	0.48	2.4	U	2.4	2.38	U	2.4	2.38	U	2.4	2.7		2.4	2.4	U	2.4	22.8	U	22.8
NW-8	J16351	12/3/2007	0.45	U	0.45	2.3	U	2.3	2.3	U	2.3	2.3	U	2.3	2.3	U	2.3	2.3	U	2.3	23.2	U	23.2
NW-9	J16352	12/3/2007	0.49	U	0.49	2.7	U	2.7	2.68	U	2.7	2.68	U	2.7	2.7	U	2.7	2.7	U	2.7	23.4	U	23.4
NW-10	J16353	12/3/2007	0.56	U	0.56	2.2	U	2.2	2.93		2.2	2.24	U	2.2	4.9		2.2	3.1		2.2	24.5	U	24.5

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16343 Sample Location NW-1 Sample Date 12/3/08			J16344 Sample Location NW-2 Sample Date 12/3/08			J16345 Sample Location NW-3 Sample Date 12/3/08			J16346 Sample Location NW-4 Sample Date 12/3/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1221	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1232	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1242	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1248	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1254	14	U	14	15	U	15	15	U	15	15	U	15
Aroclor-1260	14	U	14	15	U	15	15	U	15	15	U	15
Pesticides												
Aldrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Alpha-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Alpha-Chlordane	1.8	JD	1.4	1.5	UD	1.5	9.7	D	1.5	29	D	1.5
Beta-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Delta-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dichlorodiphenyldichloroethane	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dichlorodiphenyldichloroethylene	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dichlorodiphenyltrichloroethane	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dieldrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Endosulfan I	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Endosulfan II	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Endosulfan sulfate	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Endrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.6	JD	1.6
Endrin aldehyde	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Endrin ketone	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Gamma-BHC (Lindane)	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
gamma-Chlordane	2	JD	1.4	1.5	UD	1.5	9.5	D	1.5	32	D	1.5
Heptachlor	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	11	D	11
Heptachlor epoxide	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Methoxychlor	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Toxaphene	14	UD	14	15	UD	15	15	UD	15	15	UD	15
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	350	U	350	370	U	370	370	U	370	370	U	370
1,2-Dichlorobenzene	350	U	350	370	U	370	370	U	370	370	U	370
1,3-Dichlorobenzene	350	U	350	370	U	370	370	U	370	370	U	370
1,4-Dichlorobenzene	350	U	350	370	U	370	370	U	370	370	U	370
2,4,5-Trichlorophenol	870	U	870	940	U	940	870	U	870	930	U	930
2,4,6-Trichlorophenol	350	U	350	370	U	370	370	U	370	370	U	370
2,4-Dichlorophenol	350	U	350	370	U	370	370	U	370	370	U	370
2,4-Dimethylphenol	350	U	350	370	U	370	370	U	370	370	U	370
2,4-Dinitrophenol	870	U	870	940	U	940	910	U	910	930	U	930
2,4-Dinitrotoluene	350	U	350	370	U	370	370	U	370	370	U	370
2,6-Dinitrotoluene	350	U	350	370	U	370	370	U	370	370	U	370
2-Chloronaphthalene	350	U	350	370	U	370	370	U	370	370	U	370
2-Chlorophenol	350	U	350	370	U	370	370	U	370	370	U	370
2-Methylnaphthalene	350	U	350	370	U	370	370	U	370	370	U	370
2-Methylphenol (cresol, o-)	350	U	350	370	U	370	370	U	370	370	U	370
2-Nitroaniline	870	U	870	940	U	940	910	U	910	930	U	930
2-Nitrophenol	350	U	350	370	U	370	370	U	370	370	U	370

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16343 Sample Location NW-1 Sample Date 12/3/08			J16344 Sample Location NW-2 Sample Date 12/3/08			J16345 Sample Location NW-3 Sample Date 12/3/08			J16346 Sample Location NW-4 Sample Date 12/3/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	350	U	350	370	U	370	370	U	370	370	U	370
4-Methylphenol (p-cresol)	350	U	350	370	U	370	370	U	370	370	U	370
3-Nitroaniline	870	U	870	940	U	940	910	U	910	930	U	930
4,6-Dinitro-2-methylphenol	870	U	870	940	U	940	910	U	910	930	U	930
4-Bromophenyl-phenylether	350	U	350	370	U	370	370	U	370	370	U	370
4-Chloro-3-methylphenol	350	U	350	370	U	370	370	U	370	370	U	370
4-Chloroaniline	350	U	350	370	U	370	370	U	370	370	U	370
4-Chlorophenyl-phenylether	350	U	350	370	U	370	370	U	370	370	U	370
4-Nitroaniline	870	U	870	940	U	940	910	U	910	930	U	930
4-Nitrophenol	870	U	870	940	U	940	910	U	910	930	U	930
Acenaphthene	350	U	350	370	U	370	370	U	370	370	U	370
Acenaphthylene	350	U	350	370	U	370	370	U	370	370	U	370
Anthracene	350	U	350	370	U	370	370	U	370	370	U	370
Benzo(a)anthracene	350	U	350	370	U	370	370	U	370	370	U	370
Benzo(a)pyrene	350	U	350	370	U	370	370	U	370	370	U	370
Benzo(b)fluoranthene	350	U	350	370	U	370	370	U	370	370	U	370
Benzo(g,h,i)perylene	350	U	350	370	U	370	370	U	370	370	U	370
Benzo(k)fluoranthene	350	U	350	370	U	370	370	U	370	370	U	370
Bis(2-chloro-1-methylethyl)ether	350	U	350	370	U	370	370	U	370	370	U	370
Bis(2-chloroethoxy)methane	350	U	350	370	U	370	370	U	370	370	U	370
Bis(2-chloroethyl) ether	350	U	350	370	U	370	370	U	370	370	U	370
Bis(2-ethylhexyl) phthalate	23	JB	350	34	JB	370	41	JB	370	56	JB	370
Butylbenzylphthalate	350	U	350	370	U	370	370	U	370	370	U	370
Carbazole	350	U	350	370	U	370	370	U	370	370	U	370
Chrysene	350	U	350	370	U	370	370	U	370	370	U	370
Dibenz(a,h)anthracene	350	U	350	370	U	370	370	U	370	370	U	370
Dibenzofuran	350	U	350	370	U	370	370	U	370	370	U	370
Diethylphthalate	350	U	350	370	U	370	370	U	370	370	U	370
Dimethylphthalate	350	U	350	370	U	370	370	U	370	370	U	370
Di-n-butylphthalate	350	U	350	370	U	370	370	U	370	370	U	370
Di-n-octylphthalate	350	U	350	370	U	370	370	U	370	370	U	370
Fluoranthene	350	U	350	370	U	370	370	U	370	370	U	370
Fluorene	350	U	350	370	U	370	370	U	370	370	U	370
Hexachlorobenzene	350	U	350	370	U	370	370	U	370	370	U	370
Hexachlorobutadiene	350	U	350	370	U	370	370	U	370	370	U	370
Hexachlorocyclopentadiene	350	U	350	370	U	370	370	U	370	370	U	370
Hexachloroethane	350	U	350	370	U	370	370	U	370	370	U	370
Indeno(1,2,3-cd)pyrene	350	U	350	370	U	370	370	U	370	370	U	370
Isophorone	350	U	350	370	U	370	370	U	370	370	U	370
Naphthalene	350	U	350	370	U	370	370	U	370	370	U	370
Nitrobenzene	350	U	350	370	U	370	370	U	370	370	U	370
N-Nitroso-di-n-dipropylamine	350	U	350	370	U	370	370	U	370	370	U	370
N-Nitrosodiphenylamine	350	U	350	370	U	370	370	U	370	370	U	370
Pentachlorophenol	870	U	870	940	U	940	910	U	910	930	U	930
Phenanthrene	350	U	350	370	U	370	370	U	370	370	U	370
Phenol	350	U	350	370	U	370	370	U	370	370	U	370
Pyrene	350	U	350	370	U	370	370	U	370	370	U	370

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16347 Sample Location NW-5 Sample Date 12/3/08			J16348 Sample Location NW-6 Sample Date 12/3/08			J16349 Sample Location NW-7 Sample Date 12/3/08			J16350 Dup of J16349 Sample Date 12/3/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1221	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1232	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1242	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1248	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1254	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Aroclor-1260	15	U	15	7400	UD	7400	7400	UD	7400	7000	UD	7000
Pesticides												
Aldrin	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Alpha-BHC	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Alpha-Chlordane	250	D	3	2100	D	18	4900	D	74	12000	D	70
Beta-BHC	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Delta-BHC	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Dichlorodiphenyldichloroethane	12	JXD	3	18	UD	18	74	UD	74	530	XD	70
Dichlorodiphenyldichloroethylene	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Dichlorodiphenyltrichloroethane	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Dieldrin	3	UD	3	72	JD	18	180	JX	74	440	XD	70
Endosulfan I	3	UD	3	18	UD	18	74	UD	74	88	JD	70
Endosulfan II	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Endosulfan sulfate	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Endrin	13	JD	3	100	D	18	240	JD	74	70	UD	70
Endrin aldehyde	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Endrin ketone	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Gamma-BHC (Lindane)	3	UD	3	18	UD	18	74	UD	74	70	UD	70
gamma-Chlordane	230	D	3	2000	D	18	4600	D	74	12000	D	70
Heptachlor	56	D	3	820	D	18	2000	D	74	5700	D	70
Heptachlor epoxide	9.1	JD	3	18	UD	18	74	UD	74	70	UD	70
Methoxychlor	3	UD	3	18	UD	18	74	UD	74	70	UD	70
Toxaphene	30	UD	30	180	UD	180	740	UD	740	700	UD	700
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	370	U	370	370	U	370	370	U	370	350	U	350
1,2-Dichlorobenzene	370	U	370	370	U	370	370	U	370	350	U	350
1,3-Dichlorobenzene	370	U	370	370	U	370	370	U	370	350	U	350
1,4-Dichlorobenzene	370	U	370	370	U	370	370	U	370	350	U	350
2,4,5-Trichlorophenol	930	U	930	920	U	920	920	U	920	880	U	880
2,4,6-Trichlorophenol	370	U	370	370	U	370	370	U	370	350	U	350
2,4-Dichlorophenol	370	U	370	370	U	370	370	U	370	350	U	350
2,4-Dimethylphenol	370	U	370	370	U	370	370	U	370	350	U	350
2,4-Dinitrophenol	930	U	930	920	U	920	920	U	920	880	U	880
2,4-Dinitrotoluene	370	U	370	370	U	370	370	U	370	350	U	350
2,6-Dinitrotoluene	370	U	370	370	U	370	370	U	370	350	U	350
2-Chloronaphthalene	370	U	370	370	U	370	370	U	370	350	U	350
2-Chlorophenol	370	U	370	370	U	370	370	U	370	350	U	350
2-Methylnaphthalene	370	U	370	370	U	370	370	U	370	350	U	350
2-Methylphenol (cresol, o-)	370	U	370	370	U	370	370	U	370	350	U	350
2-Nitroaniline	930	U	930	920	U	920	920	U	920	880	U	880
2-Nitrophenol	370	U	370	370	U	370	370	U	370	350	U	350

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16347 Sample Location NW-5 Sample Date 12/3/08			J16348 Sample Location NW-6 Sample Date 12/3/08			J16349 Sample Location NW-7 Sample Date 12/3/08			J16350 Dup of J16349 Sample Date 12/3/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	370	U	370	370	U	370	370	U	370	370	U	370
4-Methylphenol (p-cresol)	370	U	370	370	U	370	370	U	370	370	U	370
3-Nitroaniline	930	U	930	930	U	930	920	U	920	920	U	920
4,6-Dinitro-2-methylphenol	930	U	930	930	U	930	920	U	920	920	U	920
4-Bromophenyl-phenylether	370	U	370	370	U	370	370	U	370	370	U	370
4-Chloro-3-methylphenol	370	U	370	370	U	370	370	U	370	370	U	370
4-Chloroaniline	370	U	370	370	U	370	370	U	370	370	U	370
4-Chlorophenyl-phenylether	370	U	370	370	U	370	370	U	370	370	U	370
4-Nitroaniline	930	U	930	930	U	930	920	U	920	920	U	920
4-Nitrophenol	930	U	930	930	U	930	920	U	920	920	U	920
Acenaphthene	370	U	370	370	U	370	370	U	370	370	U	370
Acenaphthylene	370	U	370	370	U	370	370	U	370	370	U	370
Anthracene	370	U	370	370	U	370	370	U	370	370	U	370
Benzo(a)anthracene	370	U	370	370	U	370	370	U	370	370	U	370
Benzo(a)pyrene	370	U	370	370	U	370	370	U	370	370	U	370
Benzo(b)fluoranthene	370	U	370	370	U	370	370	U	370	370	U	370
Benzo(g,h,i)perylene	370	U	370	370	U	370	370	U	370	370	U	370
Benzo(k)fluoranthene	370	U	370	370	U	370	370	U	370	370	U	370
Bis(2-chloro-1-methylethyl)ether	370	U	370	370	U	370	370	U	370	370	U	370
Bis(2-chloroethoxy)methane	370	U	370	370	U	370	370	U	370	370	U	370
Bis(2-chloroethyl) ether	370	U	370	370	U	370	370	U	370	370	U	370
Bis(2-ethylhexyl) phthalate	31	JB	370	120	JB	370	170	JB	370	69	JB	370
Butylbenzylphthalate	370	U	370	370	U	370	370	U	370	370	U	370
Carbazole	370	U	370	370	U	370	370	U	370	370	U	370
Chrysene	370	U	370	370	U	370	370	U	370	370	U	370
Dibenz(a,h)anthracene	370	U	370	75	J	370	110	J	370	370	U	370
Dibenzofuran	370	U	370	370	U	370	370	U	370	370	U	370
Diethylphthalate	370	U	370	370	U	370	370	U	370	370	U	370
Dimethylphthalate	370	U	370	370	U	370	370	U	370	370	U	370
Di-n-butylphthalate	370	U	370	370	U	370	370	U	370	370	U	370
Di-n-octylphthalate	370	U	370	370	U	370	370	U	370	370	U	370
Fluoranthene	370	U	370	47	J	370	370	U	370	370	U	370
Fluorene	370	U	370	370	U	370	370	U	370	370	U	370
Hexachlorobenzene	370	U	370	370	U	370	370	U	370	370	U	370
Hexachlorobutadiene	370	U	370	370	U	370	370	U	370	370	U	370
Hexachlorocyclopentadiene	370	U	370	370	U	370	370	U	370	370	U	370
Hexachloroethane	370	U	370	370	U	370	370	U	370	370	U	370
Indeno(1,2,3-cd)pyrene	370	U	370	370	U	370	370	U	370	370	U	370
Isophorone	370	U	370	370	U	370	370	U	370	370	U	370
Naphthalene	370	U	370	370	U	370	370	U	370	370	U	370
Nitrobenzene	370	U	370	370	U	370	370	U	370	370	U	370
N-Nitroso-di-n-dipropylamine	370	U	370	370	U	370	370	U	370	370	U	370
N-Nitrosodiphenylamine	370	U	370	370	U	370	370	U	370	370	U	370
Pentachlorophenol	930	U	930	930	U	930	920	U	920	920	U	920
Phenanthrene	370	U	370	370	U	370	370	U	370	370	U	370
Phenol	370	U	370	370	U	370	370	U	370	370	U	370
Pyrene	370	U	370	370	U	370	370	U	370	370	U	370

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16351 Sample Location NW-8 Sample Date 12/3/08			J16352 Sample Location NW-9 Sample Date 12/3/08			J16353 Sample Location NW-10 Sample Date 12/3/08			
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	
Polychlorinated Biphenyls										
Aroclor-1016	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1221	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1232	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1242	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1248	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1254	7000	U	7000	7600	U	7600	15	U	15	
Aroclor-1260	7000	U	7000	7600	U	7600	15	U	15	
Pesticides										
Aldrin	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Alpha-BHC	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Alpha-Chlordane	12000	D	70	1100	D	9.5	43	D	1.5	
Beta-BHC	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Delta-BHC	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Dichlorodiphenyldichloroethane	530	X	70	420	X	9.5	1.5	UD	1.5	
Dichlorodiphenyldichloroethylene	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Dichlorodiphenyltrichloroethane	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Dieldrin	440	X	70	34	JX	9.5	1.5	UD	1.5	
Endosulfan I	88	JD	70	9.5	U	9.5	1.5	UD	1.5	
Endosulfan II	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Endosulfan sulfate	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Endrin	70	U	70	47	D	9.5	2.5	JD	1.5	
Endrin aldehyde	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Endrin ketone	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Gamma-BHC (Lindane)	70	U	70	9.5	U	9.5	1.5	UD	1.5	
gamma-Chlordane	12000	D	70	880	D	9.5	40	D	1.5	
Heptachlor	5700	D	70	370	D	9.5	20	D	1.5	
Heptachlor epoxide	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Methoxychlor	70	U	70	9.5	U	9.5	1.5	UD	1.5	
Toxaphene	700	U	700	95	U	95	15	UD	15	
Semivolatile Organic Analytes										
1,2,4-Trichlorobenzene	350	U	350	380	U	380	370	U	370	
1,2-Dichlorobenzene	350	U	350	380	U	380	370	U	370	
1,3-Dichlorobenzene	350	U	350	380	U	380	370	U	370	
1,4-Dichlorobenzene	350	U	350	380	U	380	370	U	370	
2,4,5-Trichlorophenol	880	U	880	950	U	950	930	U	930	
2,4,6-Trichlorophenol	350	U	350	380	U	380	370	U	370	
2,4-Dichlorophenol	350	U	350	380	U	380	370	U	370	
2,4-Dimethylphenol	350	U	350	380	U	380	370	U	370	
2,4-Dinitrophenol	880	U	880	950	U	950	930	U	930	
2,4-Dinitrotoluene	350	U	350	380	U	380	370	U	370	
2,6-Dinitrotoluene	350	U	350	380	U	380	370	U	370	
2-Chloronaphthalene	350	U	350	380	U	380	370	U	370	
2-Chlorophenol	350	U	350	380	U	380	370	U	370	
2-Methylnaphthalene	350	U	350	380	U	380	370	U	370	
2-Methylphenol (cresol, o-)	350	U	350	380	U	380	370	U	370	
2-Nitroaniline	880	U	880	950	U	950	930	U	930	
2-Nitrophenol	350	U	350	380	U	380	370	U	370	

Table A-2. 120-F-1 Northwest Excavation Sampling Results from Initial Verification Samples. (8 Pages)

Constituent	J16351 Sample Location NW-8 Sample Date 12/3/08			J16352 Sample Location NW-9 Sample Date 12/3/08			J16353 Sample Location NW-10 Sample Date 12/3/08			
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	
Semivolatile Organic Analytes (continued)										
3,3'-Dichlorobenzidine	350	U	350	380	U	380	370	U	370	
4-Methylphenol (p-cresol)	350	U	350	380	U	380	370	U	370	
3-Nitroaniline	880	U	880	950	U	950	930	U	930	
4,6-Dinitro-2-methylphenol	880	U	880	950	U	950	930	U	930	
4-Bromophenyl-phenylether	350	U	350	380	U	380	370	U	370	
4-Chloro-3-methylphenol	350	U	350	380	U	380	370	U	370	
4-Chloroaniline	350	U	350	380	U	380	370	U	370	
4-Chlorophenyl-phenylether	350	U	350	380	U	380	370	U	370	
4-Nitroaniline	880	U	880	950	U	950	930	U	930	
4-Nitrophenol	880	U	880	950	U	950	930	U	930	
Acenaphthene	350	U	350	380	U	380	370	U	370	
Acenaphthylene	350	U	350	380	U	380	370	U	370	
Anthracene	350	U	350	380	U	380	370	U	370	
Benzo(a)anthracene	350	U	350	380	U	380	370	U	370	
Benzo(a)pyrene	350	U	350	380	U	380	370	U	370	
Benzo(b)fluoranthene	350	U	350	380	U	380	370	U	370	
Benzo(g,h,i)perylene	350	U	350	380	U	380	370	U	370	
Benzo(k)fluoranthene	350	U	350	380	U	380	370	U	370	
Bis(2-chloro-1-methylethyl)ether	350	U	350	380	U	380	370	U	370	
Bis(2-chloroethoxy)methane	350	U	350	380	U	380	370	U	370	
Bis(2-chloroethyl) ether	350	U	350	380	U	380	370	U	370	
Bis(2-ethylhexyl) phthalate	78	JB	350	73	JB	380	74	JB	370	
Butylbenzylphthalate	350	U	350	380	U	380	370	U	370	
Carbazole	350	U	350	380	U	380	370	U	370	
Chrysene	350	U	350	380	U	380	370	U	370	
Dibenz(a,h)anthracene	350	U	350	380	U	380	38	J	370	
Dibenzofuran	350	U	350	380	U	380	370	U	370	
Diethylphthalate	350	U	350	380	U	380	370	U	370	
Dimethylphthalate	350	U	350	380	U	380	370	U	370	
Di-n-butylphthalate	350	U	350	380	U	380	370	U	370	
Di-n-octylphthalate	350	U	350	380	U	380	370	U	370	
Fluoranthene	350	U	350	380	U	380	370	U	370	
Fluorene	350	U	350	380	U	380	370	U	370	
Hexachlorobenzene	350	U	350	380	U	380	370	U	370	
Hexachlorobutadiene	350	U	350	380	U	380	370	U	370	
Hexachlorocyclopentadiene	350	U	350	380	U	380	370	U	370	
Hexachloroethane	350	U	350	380	U	380	370	U	370	
Indeno(1,2,3-cd)pyrene	350	U	350	380	U	380	370	U	370	
Isophorone	350	U	350	380	U	380	370	U	370	
Naphthalene	350	U	350	380	U	380	370	U	370	
Nitrobenzene	350	U	350	380	U	380	370	U	370	
N-Nitroso-di-n-dipropylamine	350	U	350	380	U	380	370	U	370	
N-Nitrosodiphenylamine	350	U	350	380	U	380	370	U	370	
Pentachlorophenol	880	U	880	950	U	950	930	U	930	
Phenanthrene	350	U	350	380	U	380	370	U	370	
Phenol	350	U	350	380	U	380	370	U	370	
Pyrene	350	U	350	380	U	380	370	U	370	

Table A-3. 120-F-1 Northwest Excavtion Pre-Verification Sampling Results. (2 Pages)

Constituent	J169K6 Sample Location NW-1 Sample Date 2/4/08			J169K7 Sample Location NW-2 Sample Date 2/4/08			J169K8 Sample Location NW-3 Sample Date 2/4/08			J169K9 Sample Location NW-4 Sample Date 2/4/08			J169L0 Sample Location NW-5 Sample Date 2/4/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls															
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
Pesticides															
Aldrin	1.5	U	1.5	2.3	J	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Alpha-BHC	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Alpha-Chlordane	12		1.5	260		1.6	6.1	J	1.4	190		1.6	50		1.4
Beta-BHC	1.5	U	1.5	1.8	J,I	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Delta-BHC	1.5	U	1.5	1.4	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.5	U	1.5	16	I	1.6	1.4	U	1.4	9.3	I	1.6	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.5	U	1.5	20		1.6	1.4	U	1.4	2.6	J	1.6	1.4	U	1.4
Dieldrin	1.4	U	1.5	13		1.6	1.4	U	1.4	7.8		1.6	2.2	J	1.4
Endosulfan I	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Endosulfan II	1.4	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Endosulfan sulfate	1.4	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Endrin	1.5	U	1.5	20		1.6	1.4	U	1.4	12		1.6	3.6	J	1.4
Endrin aldehyde	1.5	U	1.5	3.0	J,I	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Endrin ketone	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Gamma-BHC (Lindane)	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
gamma-Chlordane	13		1.5	280		1.6	5.4	J	1.4	190		1.6	42		1.4
Heptachlor	1.6	J	1.5	110		1.6	1.4	U	1.4	87		1.6	11		1.4
Heptachlor epoxide	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	2.0	J,I	1.4
Methoxychlor	1.5	U	1.5	1.6	U	1.6	1.4	U	1.4	1.6	U	1.6	1.4	U	1.4
Toxaphene	15	U	15	16	U	16	14	U	14	16	U	16	14	U	14

Table A-3. 120-F-1 Northwest Excavtion Pre-Verification Sampling Results. (2 Pages)

Constituent	J169L1 Sample Location NW-6 Sample Date 2/4/08			J169L2 Sample Location NW-7 Sample Date 2/4/08			J169L3 Sample Location NW-8 Sample Date 2/4/08			J169L4 Sample Location NW-9 Sample Date 2/4/08			J169L5 Sample Location NW-10 Sample Date 2/4/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls															
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14	15	U	15
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14	15	U	15
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14	15	U	15
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14	15	U	15
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14	15	U	15
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14	23		15
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14	9.8	J	15
Pesticides															
Aldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Alpha-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Alpha-Chlordane	2.7	J	1.4	1.4	U	1.4	4.7	J	1.4	1.4	U	1.4	1.4	U	1.5
Beta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Delta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Dieldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endosulfan I	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endosulfan II	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Endrin ketone	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
gamma-Chlordane	2.6	J	1.4	1.4	U	1.4	4.9	J	1.4	1.4	U	1.4	1.4	U	1.5
Heptachlor	1.4	U	1.4	1.4	U	1.4	2.6	J	1.4	1.4	U	1.4	1.4	U	1.5
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Methoxychlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.5
Toxaphene	14	U	14	14	U	14	14	U	14	14	U	14	14	U	15

Table A-4. 120-F-1 Northwest Excavation Pre-Verification Sampling Results. (2 Pages)

Constituent	J16B47 Sample Location NW-1 Sample Date 2/19/08			J16B48 Sample Location NW-2 Sample Date 2/19/08			J16B49 Sample Location NW-3 Sample Date 2/19/08			J16B50 Sample Location NW-4 Sample Date 2/19/08			J16B51 Sample Location NW-5 Sample Date 2/19/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Pesticides															
Aldrin	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Alpha-BHC	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Alpha-Chlordane	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	81		2.1	2.0	U	2.0
Beta-BHC	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Delta-BHC	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Dichlorodiphenyldichloroethane	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Dichlorodiphenyldichloroethylene	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Dichlorodiphenyltrichloroethane	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Dieldrin	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	3.1	J	2.1	2.0	U	2.0
Endosulfan I	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Endosulfan II	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Endosulfan sulfate	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Endrin	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Endrin aldehyde	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Endrin ketone	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Gamma-BHC (Lindane)	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
gamma-Chlordane	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	89		2.1	2.0	U	2.0
Heptachlor	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	25		2.1	2.0	U	2.0
Heptachlor epoxide	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Methoxychlor	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1	2.1	U	2.1	2.0	U	2.0
Toxaphene	20	U	20	21	U	21	21	U	21	21	U	21	20	U	20

Table A-4. 120-F-1 Northwest Excavation Pre-Verification Sampling Results. (2 Pages)

Constituent	J16B52 Sample Location NW-6 Sample Date 2/19/08			J16B53 Sample Location NW-7 Sample Date 2/19/08			J16B54 Sample Location NW-8 Sample Date 2/19/08			J16B55 Sample Location NW-9 Sample Date 2/19/08			J16B56 Sample Location NW-10 Sample Date 2/19/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Pesticides															
Aldrin	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Alpha-BHC	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Alpha-Chlordane	33		2.0	2.2	U	2.2	2.0	U	2.0	8.4	J	2.1	2.1	U	2.1
Beta-BHC	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Delta-BHC	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Dichlorodiphenyldichloroethane	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Dichlorodiphenyldichloroethylene	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Dichlorodiphenyltrichloroethane	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Dieldrin	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endosulfan I	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endosulfan II	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endosulfan sulfate	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endrin	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endrin aldehyde	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Endrin ketone	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Gamma-BHC (Lindane)	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
gamma-Chlordane	39		2.0	2.2	U	2.2	2.0	U	2.0	7.4	J	2.1	2.1	U	2.1
Heptachlor	16		2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Heptachlor epoxide	17		2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Methoxychlor	2.0	U	2.0	2.2	U	2.2	2.0	U	2.0	2.1	U	2.1	2.1	U	2.1
Toxaphene	20	U	20	22	U	22	20	U	20	21	U	21	21	U	21

Table A-5. 120-F-1 Northwest Excavation Pre-Verification Sampling Results. (2 Pages)

Constituent	J16DD4 Sample Location NW-1 Sample Date 3/5/08			J16DD5 Sample Location NW-2 Sample Date 3/5/08			J16DD6 Sample Location NW-3 Sample Date 3/5/08			J16DD7 Sample Location NW-4 Sample Date 3/5/08			J16DD8 Sample Location NW-5 Sample Date 3/5/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Pesticides															
Aldrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Alpha-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Alpha-Chlordane	1.3	U	1.3	4.2	J	1.3	1.3	U	1.3	1.3	U	1.3	160		1.3
Beta-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Delta-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyldichloroethane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyldichloroethylene	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyltrichloroethane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dieldrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	11		1.3
Endosulfan I	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.7	J	1.3
Endosulfan II	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endosulfan sulfate	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin aldehyde	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin ketone	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Gamma-BHC (Lindane)	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
gamma-Chlordane	1.3	U	1.3	4.6	J	1.3	1.3	U	1.3	1.3	U	1.3	180		1.3
Heptachlor	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	65		1.3
Heptachlor epoxide	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Methoxychlor	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Toxaphene	13	U	13	13	U	13	13	U	13	13	U	13	13	U	13

Table A-5. 120-F-1 Northwest Excavation Pre-Verification Sampling Results. (2 Pages)

Constituent	J16DD9 Sample Location NW-6 Sample Date 3/5/08			J16DF0 Sample Location NW-7 Sample Date 3/5/08			J16DF1 Sample Location NW-8 Sample Date 3/5/08			J16DF2 Sample Location NW-9 Sample Date 3/5/08			J16DF3 Sample Location NW-10 Sample Date 3/5/08		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Pesticides															
Aldrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Alpha-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Alpha-Chlordane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Beta-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Delta-BHC	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyldichloroethane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyldichloroethylene	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dichlorodiphenyltrichloroethane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Dieldrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endosulfan I	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endosulfan II	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endosulfan sulfate	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin aldehyde	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Endrin ketone	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Gamma-BHC (Lindane)	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
gamma-Chlordane	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Heptachlor	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Heptachlor epoxide	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Methoxychlor	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3	1.3	U	1.3
Toxaphene	13	U	13	13	U	13	13	U	13	13	U	13	13	U	13

Table A-6. 120-F-1 Northwest Excavation Pre-Verification Sampling Results.

Constituent	J16DJ2 Sample Location NW-5 Sample Date 3/11/08			
	µg/kg	Q	PQL	
Pesticides				
Aldrin	1.3	U	1.3	
Alpha-BHC	1.3	U	1.3	
Alpha-Chlordane	1.3	U	1.3	
Beta-BHC	1.3	U	1.3	
Delta-BHC	1.3	U	1.3	
Dichlorodiphenyldichloroethane	1.3	U	1.3	
Dichlorodiphenyldichloroethylene	1.3	U	1.3	
Dichlorodiphenyltrichloroethane	1.3	U	1.3	
Dieldrin	1.3	U	1.3	
Endosulfan I	1.3	U	1.3	
Endosulfan II	1.3	U	1.3	
Endosulfan sulfate	1.3	U	1.3	
Endrin	1.3	U	1.3	
Endrin aldehyde	1.3	U	1.3	
Endrin ketone	1.3	U	1.3	
Gamma-BHC (Lindane)	1.3	U	1.3	
gamma-Chlordane	1.3	U	1.3	
Heptachlor	1.3	U	1.3	
Heptachlor epoxide	1.3	U	1.3	
Methoxychlor	1.3	U	1.3	
Toxaphene	13	U	13	

APPENDIX B

PHOTOS FROM 120-F-1 GLASS DUMP WASTE SITE

120-F-1 Waste Site Excavation.

Laboratory Bottles, Incandescent Bulbs, and Fluorescent Bulbs From 120-F-1.

Laboratory Bottles, Incandescent Bulbs, and Batteries From 120-F-1.

Metal Debris from 120-F-1.

Yellow Stained Soil from 120-F-1 Southwest Excavation.

Breached, Oily Drum from 120-F-1.

APPENDIX C

CALCULATION BRIEF

APPENDIX C

CALCULATIONS

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

DISCLAIMER FOR CALCULATIONS

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

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V03~~45~~ 50 4/2/08 thmk

Subject: 120-F-1 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 = 16 Attm. 1 = 18 Total = 35	H. M. Sulloway	L. D. Habel	NA	J. D. Fancher	4/2/08

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 H. M. Sulloway Date 04/03/08 Calc. No. 0100F-CA-V0350 Rev. No. 0
Project 100-F Field Remediation Job No. 14655 Checked L. D. Habel Date 4/3/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS Sheet No. 1 of 16

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:

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, 2005a, 100 Area Remedial Action Sampling and Analysis Plan (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, Remedial Design Report/Remedial Action Work Plan for the 100 Area (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) Ecology, 1992, *Statistical Guidance for Ecology Site Managers*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
7) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets),* Publication #92-54, Washington Department of Ecology, Olympia, Washington.
8) Ecology, 1996, *Model Toxic Control Act Cleanup Levels and Risk Calculations (CLARC II),* Publication #94-145, Washington State Department of Ecology, Olympia, Washington.
9) 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 2004b). 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 hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:
The subject calculations were performed on data from soil verification samples (Attachment 1) from the 120-F-1 waste site. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2005b) is documented by this calculation. In addition to the statistical soil samples collected at this site, nonstatistical data were collected, and the results are also included in Attachment 1. As the maximum detected values for these data sets are used instead of the 95% UCL (additional discussion is provided in the RSVP), calculations on these data sets are not included herein. Duplicate RPD results are used in evaluation of data quality within the RSVP for this site.

Washington Closure Hanford CALCULATION SHEET

Originator H. M. Sulloway Date 04/03/08 Calc. No. 0100F-CA-V0350 Rev. No. 0
Project 100-F Field Remediation Job No. 14655 Checked L. D. Habel Date 4/3/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS Sheet No. 2 of 16

Summary (continued)

Methodology:

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 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. The 95% UCL values were also not calculated for radium-226, radium-228, thorium-228, thorium-232, and potassium-40, as these isotopes are not related to the operational history of the site and thus not considered COCs/COPCs.

All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). For radionuclide data, calculation of the statistics was done on the reported value. In cases where the laboratory does not report a value below the minimal detectable activity (MDA), half of the MDA is used in the calculation. For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

For nonradionuclides, the WAC 173-340 statistical guidance suggests that a test for distributional form be performed on the data and the 95% UCL calculated on the appropriate distribution using Ecology software. For nonradionuclide small data sets (n < 10) the calculations are performed assuming nonparametric distribution, so no tests for distribution are performed. For nonradionuclide data sets of ten or greater, as for the subject site, distributional testing is done using Ecology's MTCAStat software (Ecology 1993). Due to differences in addressing censored data between the RDR/RAWP (DOE-RL 2005b) and MTCAStat coding and due to a limitation in the MTCAStat coding (no direct capability to address variable quantitation limits within a data set), substitutions for censored data are performed before software input and the resulting data set treated as uncensored.

The WAC 173-340-740(7)(e) 3-part test is performed for nonradionuclide analytes only and determines if:
1) the 95% UCL exceeds the most stringent cleanup limit for each COPC/COC,
2) greater than 10% of the raw data exceed the most stringent cleanup limit for each COPC/COC,
3) the maximum value of the raw data set exceeds two times the most stringent cleanup limit for each COPC/COC.

The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method and is listed in Table II-1 of the SAP (DOE-RL 2004a). Where direct evaluation of the attached sample data showed that a given analyte was not detected in the primary and/or duplicate sample, further evaluation of the RPD value was not performed. The RPD calculations use the following formula:

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

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

For quality assurance/quality control (QA/QC) split and duplicate RPD calculations, a value less than 30% indicates the data compare favorably. For regulatory splits, a threshold of 35% is used (EPA 1994). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. No split samples were collected for cleanup verification of the subject site. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

Washington Closure Hanford CALCULATION SHEET

Originator H. M. Sulloway Date 04/03/08 Calc. No. 0100F-CA-V0350 Rev. No. 1
Project 100-F Field Remediation Job No. 14655 Checked L. D. Habel Date 4/3/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS Sheet No. 8 of 16

Summary (continued)

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

Southeast Excavation Results Summary - Shallow Zone Excavation

Analyte	95% UCL Result[a]	Maximum Value[a]	Units
Arsenic	2.9		mg/kg
Barium	58.2		mg/kg
Beryllium	0.73		mg/kg
Boron	4.6		mg/kg
Chromium	7.4		mg/kg
Cobalt	5.3		mg/kg
Copper	12.6		mg/kg
Lead	6.1		mg/kg
Manganese	259		mg/kg
Nickel	9.3		mg/kg
Vanadium	38.5		mg/kg
Zinc	37.5		mg/kg
Bis(2-ethylhexyl)phthalate	0.11		mg/kg
Hexavalent chromium		1.8	mg/kg
Mercury		0.65	mg/kg
Molybdenum		0.85	mg/kg
Sulfate		8410	mg/kg
Chloride		34	mg/kg
Fluoride		3.9	mg/kg
Nitrate		18.6	mg/kg
Phosphate		46.5	mg/kg
Aroclor-1254		0.023	mg/kg
Aroclor-1260		0.010	mg/kg
alpha-Chlordane		0.010	mg/kg
gamma-Chlordane		0.013	mg/kg
Dibenz(a,h)anthracene		0.025	mg/kg
DDE		0.0018	mg/kg
DDT		0.0021	mg/kg
Endosulfan I		0.0018	mg/kg

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

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

Relative Percent Difference Results, J16333 and J16334 - QA/QC Analysis[b]

Analyte	Duplicate Analysis
Aluminum	8.6%
Barium	12.3%
Calcium	2.6%
Chromium	1.7%
Copper	5.9%
Iron	25.3%
Magnesium	10.8%
Manganese	15.8%
Silicon	7.9%
Vanadium	22.1%
Zinc	14.9%
Sulfate	91.7%

[b]Relative percent difference evaluation was not required for analytes not included in this table.

Abbreviations/Acronyms: The following abbreviations and/or acronyms are used in this calculation:

B = blank contamination (organics)
BG = background
C = blank contamination (inorganics)
COC = contaminant of concern
COPC = contaminant of potential concern
D = diluted
DE = direct exposure
GW = groundwater
J = estimate
MDA = minimal detectable activity
MTCA = *Model Toxics Control Act*
PQL = practical quantitation limit
QA/QC = quality assurance/quality control
RAG = remedial action goal
RDL = required detection limit
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

Washington Closure Hanford **CALCULATION SHEET**

Originator H. M. Sulloway **Date** 04/03/08 **Calc. No.** 0100F-CA-V0350 **Rev. No.** 1
Project 100-F Field Remediation **Job No.** 14655 **Checked** L. D. Habel **Date** 4/3/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS **Sheet No.** 4 of 16

Summary (continued)

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

Northwest Excavation Results Summary - Shallow Zone Excavation

Analyte	95% UCL Result[a]	Maximum Value[a]	Units
Arsenic	2.5		mg/kg
Barium	65.8		mg/kg
Beryllium	0.26		mg/kg
Boron	1.6		mg/kg
Chromium	11.7		mg/kg
Cobalt	7.1		mg/kg
Copper	12.2		mg/kg
Lead	2.9		mg/kg
Manganese	318		mg/kg
Nickel	11.8		mg/kg
Vanadium	53.9		mg/kg
Zinc	37.3		mg/kg
Sulfate	6.4		mg/kg
Bis(2-ethylhexyl)phthalate	0.12		mg/kg
Antimony		0.91	mg/kg
Hexavalent chromium		0.30	mg/kg
Selenium		1.8	mg/kg
Chloride		7.6	mg/kg
Nitrate		25.3	mg/kg
alpha-Chlordane		0.0021	mg/kg
gamma-Chlordane		0.0022	mg/kg
Di-n-butylphthalate		0.027	mg/kg

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

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

Relative Percent Difference Results, J16DV6 and J16DV7 - QA/QC Analysis[b]

Analyte	Duplicate Analysis
Aluminum	3.4%
Barium	4.5%
Calcium	2.8%
Chromium	9.0%
Copper	8.3%
Iron	3.9%
Magnesium	1.0%
Manganese	1.9%
Silicon	6.0%
Vanadium	2.2%
Zinc	1.4%
Nitrate	24.4%

[b]Relative percent difference evaluation was not required for analytes not included in this table.

Washington Closure Hanford

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

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Checked L. D. Haagel

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Date 7/3/08
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Southeast Excavation - Shallow Zone Verification Data

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-2	J16333	12/17/2007	1.8		1.3	49.9	C	0.26	0.56		0.13	1.7		1.3	6.0		0.53	4.7		0.53	12.3	C	0.53	11		0.79
Duplicate of J16333	J16334	12/17/2007	1.5		1.5	44.1	C	0.30	0.43		0.15	1.8		1.5	6.1		0.60	4.0		0.6	11.6	C	0.60	9.0		0.90
SE-1	J16332	12/17/2007	3.3		1.4	28.8	C	0.28	0.50		0.14	5.6		1.4	6.4		0.57	4.3		0.57	12.3	C	0.57	2.7		0.85
SE-3	J16335	12/17/2007	2.2		1.4	30.4	C	0.29	0.41		0.14	1.4	U	1.4	5.0		0.58	3.8		0.58	12.1	C	0.58	2.8		0.87
SE-4	J16336	12/17/2007	2.5		1.4	54.7	C	0.29	0.69		0.14	1.4		1.4	7.2		0.57	6.1		0.57	13.3	C	0.57	3.7		0.86
SE-5	J16337	12/17/2007	3.2		1.4	36.0		0.28	0.58		0.14	5.6		1.4	7.3		0.57	4.6		0.57	13.3		0.57	2.6		0.85
SE-6	J16338	12/17/2007	2.3		1.4	36.3		0.27	0.47		0.14	1.4	U	1.4	7.6		0.55	4.3		0.55	11.4		0.55	2.8		0.82
SE-7	J16339	12/17/2007	2.4		1.5	52.3		0.30	0.70		0.15	1.8		1.5	7.3		0.60	4.9		0.6	11.1		0.60	5.5		0.90
SE-8	J16340	12/17/2007	2.4		1.3	29.3		0.27	0.54		0.13	1.3	U	1.3	8.1		0.53	4.2		0.53	13.1		0.53	2.6		0.80
SE-9	J16341	12/17/2007	2.5		1.5	70.2		0.31	0.77		0.15	2.4		1.5	5.7		0.62	5.4		0.62	10.4		0.62	9.6		0.93
SE-10	J16342	12/17/2007	2.8		1.6	72.0		0.32	0.99		0.16	1.6	U	1.6	6.6		0.64	6.1		0.64	10.0		0.64	3.3		0.95

Statistical Computation Input Data

Sampling Area	HEIS Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Chromium			Cobalt			Copper			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-2	J16333/J16334	12/17/2007	1.7			47.0			0.50			1.8			6.1			4.4			12.0			10		
SE-1	J16332	12/17/2007	3.3			28.8			0.50			5.6			6.4			4.3			12.3			2.7		
SE-3	J16335	12/17/2007	2.2			30.4			0.41			0.7			5.0			3.8			12.1			2.8		
SE-4	J16336	12/17/2007	2.5			54.7			0.69			1.4			7.2			6.1			13.3			3.7		
SE-5	J16337	12/17/2007	3.2			36.0			0.58			5.6			7.3			4.6			13.3			2.6		
SE-6	J16338	12/17/2007	2.3			36.3			0.47			0.7			7.6			4.3			11.4			2.8		
SE-7	J16339	12/17/2007	2.4			52.3			0.70			1.8			7.3			4.9			11.1			5.5		
SE-8	J16340	12/17/2007	2.4			29.3			0.54			0.7			8.1			4.2			13.1			2.6		
SE-9	J16341	12/17/2007	2.5			70.2			0.77			2.4			5.7			5.4			10.4			9.6		
SE-10	J16342	12/17/2007	2.8			72.0			1.0			0.8			6.6			6.1			10.0			3.3		

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper	Lead
95% UCL value based on	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), lognormal and normal distribution rejected, use z-statistic.
N	10	10	10	10	10	10	10	10
% < Detection limit	0%	0%	0%	40%	0%	0%	0%	0%
Mean	2.5	45.7	0.61	2.7	6.7	4.8	11.9	4.6
Standard deviation	0.48	16.3	0.17	1.9	0.95	0.81	1.17	2.9
95% UCL on mean	2.9	58.2	0.73	4.6	7.4	5.3	12.6	6.1
Maximum detected value	3.3	72.0	1.0	5.6	8.1	6.1	13.3	11
Statistical value	2.9	58.2	0.73	4.6	7.4	5.3	12.6	6.1
Most Stringent Cleanup Limit for nonradionuclide and RAG type	20 DE/GW & River Protection	132 GW Protection	1.51 GW & River Protection	320 GW Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection	10.2 GW & River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
WAC 173-340 Compliance?	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

C = blank contamination
DE = direct exposure
GW = groundwater
HEIS = Hanford Environmental Information System
MDA = minimum detectable activity
MTCA = Model Toxics Control Act
PQL = practical quantitation limit
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Washington Closure Hanford

Originator H. M. Sulloway HMS
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel LDH

Rev. No. 0
Date 4/3/08
Sheet No. 6 of 16

1 Southeast Excavation - Shallow Zone Verification Data

2	Sampling	HEIS	Sample	Manganese			Nickel			Vanadium			Zinc			Bis(2-ethylhexyl)phthalate		
3	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
4	SE-2	J16333	12/17/2007	232		0.11	8.4		0.5	33.1		1.6	30.2	C	1.6	0.020	JB	0.35
5	Duplicate of J16333	J16334	12/17/2007	198		0.12	7.7		0.6	26.5		1.8	26.0	C	1.8	0.021	JB	0.35
6	SE-1	J16332	12/17/2007	191		0.11	8.4		0.6	28.0		1.7	24.8	C	1.7	0.033	JB	0.34
7	SE-3	J16335	12/17/2007	191		0.12	7.0		0.6	25.5		0.4	24.1	C	1.7	0.34	U	0.34
8	SE-4	J16336	12/17/2007	261		0.11	10.5		0.6	38.9		0.4	35.9	C	1.7	0.022	JB	0.36
9	SE-5	J16337	12/17/2007	229		0.11	8.8		0.6	33.3		0.4	28.1	C	1.7	0.35	U	0.35
10	SE-6	J16338	12/17/2007	206		0.11	9.9		0.6	25.7		0.4	28.4	C	1.6	0.028	J	0.35
11	SE-7	J16339	12/17/2007	247		0.12	8.4		0.6	38.3		0.4	39.0	C	1.8	0.020	J	0.35
12	SE-8	J16340	12/17/2007	216		0.11	9.1		0.5	31.4		0.4	30.9	C	1.6	0.20	J	0.35
13	SE-9	J16341	12/17/2007	270		0.12	7.7		0.6	36.4		0.4	47.1	C	1.9	0.027	J	0.36
14	SE-10	J16342	12/17/2007	314		0.13	8.9		0.6	49.7		0.4	39.4	C	1.9	0.025	J	0.37

15 Statistical Computation Input Data

16	Sampling	HEIS	Sample	Manganese			Nickel			Vanadium			Zinc			Bis(2-ethylhexyl)phthalate		
17	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
18	SE-2	J16333/J16334	12/17/2007	215			8.1			29.8			28.1			0.021		
19	SE-1	J15HP2	12/17/2007	191			8.4			28.0			24.8			0.033		
20	SE-3	J16335	12/17/2007	191			7.0			25.5			24.1			0.17		
21	SE-4	J16336	12/17/2007	261			10.5			38.9			35.9			0.022		
22	SE-5	J16337	12/17/2007	229			8.8			33.3			28.1			0.18		
23	SE-6	J16338	12/17/2007	206			9.9			25.7			28.4			0.028		
24	SE-7	J16339	12/17/2007	247			8.4			38.3			39.0			0.020		
25	SE-8	J16340	12/17/2007	216			9.1			31.4			30.9			0.20		
26	SE-9	J16341	12/17/2007	270			7.7			36.4			47.1			0.027		
27	SE-10	J16342	12/17/2007	314			8.9			49.7			39.4			0.025		

28 Statistical Computations

29		Manganese		Nickel		Vanadium		Zinc		Bis(2-ethylhexyl)phthalate	
30	95% UCL value based on	Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), lognormal and normal distribution rejected, use z-statistic.	
31	N	10		10		10		10		10	
32	% < Detection limit	0%		0%		0%		0%		20%	
33	Mean	234		8.7		33.7		32.6		0.072	
34	Standard deviation	39.1		1.0		7.42		7.47		0.076	
35	95% UCL on mean	259		9.3		38.5		37.5		0.11	
36	Maximum detected value	314		11		49.7		47.1		0.20	
37	Statistical value	259		9.3		38.5		37.5		0.11	
38	**Most Stringent Cleanup Limit for nonradionuclide and RAG type**	512	GW & River Protection	19.1	GW Protection	85.1	GW Protection	67.8	River Protection	0.36	River Protection
39	**WAC 173-340 3-PART TEST**										
40	95% UCL > Cleanup Limit?	NO		NO		NO		NO		NO	
41	> 10% above Cleanup Limit?	NO		NO		NO		NO		NO	
42	Any sample > 2X Cleanup Limit?	NO		NO		NO		NO		NO	
43	**WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	

44 C = blank contamination DE = direct exposure HEIS = Hanford Environmental Information System MDA = minimum detectable activity PQL = practical quantitation limit UCL = upper confidence limit
45 D = diluted GW = groundwater J = estimate MTCA = Model Toxcis Control Act U = undetected WAC = *Washington Administrative Code*

Washington Closure Hanford

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

Rev. No. 0
Date 4/3/08
Sheet No. 7 of 16

1 Northwest Excavation - Shallow Zone Verification Data

2/3 Sampling Area	HEIS Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Lead mg/kg	Q	PQL
4 NW-10	J16DV6	3/18/2008	2.7		1.4	77.4		0.3	0.34		0.14	1.9		1.4	11.6		0.6	8.2		0.6	11.6		0.6	3.9		0.87
5 Duplicate of J16DV6	J16DV7	3/18/2008	3.0		1.4	81.0		0.3	0.34		0.14	1.9		1.4	10.6		0.58	7.8		0.58	12.6		0.58	4.4		0.86
6 NW-1	J16DT7	3/18/2008	2.0		1.4	65.3		0.3	0.26		0.14	1.6		1.4	11.1		0.54	7.3		0.54	12.2		0.54	2.8		0.82
7 NW-2	J16DT8	3/18/2008	2.6		1.4	69.0		0.3	0.26		0.14	2.0		1.4	11.8		0.56	7.1		0.56	13.3		0.56	3.0		0.83
8 NW-3	J16DT9	3/18/2008	2.0		1.3	30.7		0.3	0.17		0.13	1.3	U	1.3	12.4		0.52	5.0		0.52	11.4		0.52	1.6		0.78
9 NW-4	J16DV0	3/18/2008	2.1		1.3	30.7		0.3	0.15		0.13	1.3	U	1.3	13		0.52	4.8		0.52	10.4		0.52	1.7		0.78
10 NW-5	J16DV1	3/18/2008	2.3		1.3	27.0		0.3	0.17		0.13	1.3	U	1.3	9.3		0.51	4.9		0.51	10.5		0.51	2.1		0.76
11 NW-6	J16DV2	3/18/2008	2.4		1.3	39.7		0.3	0.21		0.13	1.6		1.3	11.1		0.51	5.7		0.51	13.3		0.51	2.2		0.76
12 NW-7	J16DV3	3/18/2008	2.3		1.3	63.3		0.3	0.24		0.13	1.5		1.3	8.8		0.53	8.5		0.53	10.3		0.53	1.6		0.79
13 NW-8	J16DV4	3/18/2008	2.5		1.4	52.9		0.3	0.23		0.14	1.4		1.4	9.4		0.55	7.2		0.55	10.9		0.55	2.8		0.83
14 NW-9	J16DV5	3/18/2008	2.6		1.4	29.2		0.3	0.16		0.14	1.4	U	1.4	10.1		0.57	4.9		0.57	10.7		0.57	1.8		0.85

15 Statistical Computation Input Data

16/17 Sampling Area	HEIS Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Lead mg/kg	Q	PQL
18 NW-10	J16DV6/J16DV7	3/18/2008	2.9			79.2			0.34			1.9			11.1			8.0			12.1			4.2		
19 NW-1	J16DT7	3/18/2008	2.0			65.3			0.26			1.6			11.1			7.3			12.2			2.8		
20 NW-2	J16DT8	3/18/2008	2.6			69.0			0.26			2.0			11.8			7.1			13.3			3.0		
21 NW-3	J16DT9	3/18/2008	2.0			30.7			0.17			0.65			12.4			5.0			11.4			1.6		
22 NW-4	J16DV0	3/18/2008	2.1			30.7			0.15			0.65			13.0			4.8			10.4			1.7		
23 NW-5	J16DV1	3/18/2008	2.3			27.0			0.17			0.65			9.3			4.9			10.5			2.1		
24 NW-6	J16DV2	3/18/2008	2.4			39.7			0.21			1.6			11.1			5.7			13.3			2.2		
25 NW-7	J16DV3	3/18/2008	2.3			63.3			0.24			1.5			8.8			8.5			10.3			1.6		
26 NW-8	J16DV4	3/18/2008	2.5			52.9			0.23			1.4			9.4			7.2			10.9			2.8		
27 NW-9	J16DV5	3/18/2008	2.6			29.2			0.16			0.70			10.1			4.9			10.7			1.8		

28 Statistical Computations

29/30	Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper	Lead
95% UCL value based on	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n >10), use MTCAStat lognormal distribution.	Large data set (n >10), use MTCAStat lognormal distribution.
31 N	10	10	10	10	10	10	10	10
32 % < Detection limit	0%	0%	0%	40%	0%	0%	0%	0%
33 Mean	2.4	48.7	0.22	1.3	10.8	6.3	11.5	2.4
34 Standard deviation	0.28	19.5	0.059	0.55	1.39	1.4	1.15	0.82
35 95% UCL on mean	2.5	65.8	0.26	1.6	11.7	7.1	12.2	2.9
36 Maximum detected value	3.0	81.0	0.34	2.0	13.0	8.5	13.3	4.4
37 Statistical value	2.5	65.8	0.26	1.6	11.7	7.1	12.2	2.9
38 **Most Stringent Cleanup Limit for nonradionuclide and RAG type**	20 DE/GW & River Protection	132 GW Protection	1.51 GW & River Protection	320 GW Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection	10.2 GW & River Protection
39 **WAC 173-340 3-PART TEST**								
40 95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
41 > 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
42 Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
43 **WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

44 C = blank contamination GW = groundwater MDA = minimum detectable activity PQL = practical quantitation limit UCL = upper confidence limit
45 DE = direct exposure HEIS = Hanford Environmental Information System MTCA = Model Toxcis Control Act U = undetected WAC = *Washington Administrative Code*

Washington Closure Hanford

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

Rev. No. 0
Date 4/3/08
Sheet No. 8 of 16

1 Northwest Excavation - Shallow Zone Verification Data

2 Sampling Area	HEIS Number	Sample Date	Manganese mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL	Bis(2-ethylhexyl)phthalate mg/kg	Q	PQL
4 NW-10	J16DV6	3/18/2008	378		0.12	11.9		0.6	54.0		0.40	42.5		1.7	5.5		2.7	0.018	J	0.36
5 Duplicate of J16DV6	J16DV7	3/18/2008	371		0.12	12.1		0.6	52.8		0.40	41.9		1.7	4.3		2.6	0.028	JB	0.36
6 NW-1	J16DT7	3/18/2008	305		0.11	11.6		0.5	53.7		0.38	37.7		1.6	3.9		2.4	0.025	JB	0.35
7 NW-2	J16DT8	3/18/2008	329		0.11	11.8		0.6	48.7		0.39	38.8		1.7	3.9		2.4	0.10	JB	0.35
8 NW-3	J16DT9	3/18/2008	239		0.10	11.0		0.5	35.6		0.36	28.7		1.6	2.2	U	2.2	0.084	JB	0.34
9 NW-4	J16DV0	3/18/2008	238		0.10	13.0		0.5	34.3		0.36	27.7		1.6	4.0		2.2	0.072	JB	0.34
10 NW-5	J16DV1	3/18/2008	229		0.10	11.1		0.5	34.6		0.36	28.1		1.5	5.4		2.5	0.031	JB	0.35
11 NW-6	J16DV2	3/18/2008	269		0.10	11.3		0.5	40.6		0.35	31.1		1.5	3.3		2.4	0.023	JB	0.34
12 NW-7	J16DV3	3/18/2008	324		0.11	11.3		0.5	67.7		0.37	40.9		1.6	2.5	U	2.5	0.34	U	0.34
13 NW-8	J16DV4	3/18/2008	307		0.11	11.0		0.6	55.2		0.39	38.1		1.7	13		2.6	0.064	JB	0.36
14 NW-9	J16DV5	3/18/2008	241		0.11	10.8		0.6	35.7		0.40	29.4		1.7	5.3		2.6	0.029	JB	0.34

15 Statistical Computation Input Data

16 Sampling Area	HEIS Number	Sample Date	Manganese mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL	Bis(2-ethylhexyl)phthalate mg/kg	Q	PQL
18 NW-10	J16333/J16334	3/18/2008	375			12.0			53.4			42.2			4.9			0.023		
19 NW-1	J15HP2	3/18/2008	305			11.6			53.7			37.7			3.9			0.025		
20 NW-2	J16DT8	3/18/2008	329			11.8			48.7			38.8			3.9			0.10		
21 NW-3	J16DT9	3/18/2008	239			11.0			35.6			28.7			1.1			0.084		
22 NW-4	J16DV0	3/18/2008	238			13.0			34.3			27.7			4.0			0.072		
23 NW-5	J16DV1	3/18/2008	229			11.1			34.6			28.1			5.4			0.031		
24 NW-6	J16DV2	3/18/2008	269			11.3			40.6			31.1			3.3			0.023		
25 NW-7	J16DV3	3/18/2008	324			11.3			67.7			40.9			1.3			0.17		
26 NW-8	J16DV4	3/18/2008	307			11.0			55.2			38.1			13			0.064		
27 NW-9	J16DV5	3/18/2008	241			10.8			35.7			29.4			5.3			0.029		

28 Statistical Computations

29	Manganese		Nickel		Vanadium		Zinc		Sulfate		Bis(2-ethylhexyl)phthalate	
30 95% UCL value based on	Large data set (n >10), use MTCAStat lognormal cistribution.		Large data set (n >10), lognormal and normal distribution rejected, use z-statistic.		Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), lognormal and normal distribut on rejected, use z-statistic.		Large data set (n >10), use MTCAStat lognormal distribution.		Large data set (n >10), use MTCAStat lognormal distribution.	
31 N	10		10		10		10		10		10	
32 % < Detection limit	0%		0%		0%		0%		20%		10%	
33 Mean	286		11.5		46.0		34.3		4.6		0.062	
34 Standard deviation	49.4		0.652		11.5		5.77		3.4		0.047	
35 95% UCL on mean	318		11.8		53.9		37.3		6.4		0.12	
36 Maximum detected value	378		13.0		67.7		42.5		13		0.10	
37 Statistical value	318		11.8		53.9		37.3		6.4		0.12	
38 **Most Stringent Cleanup Limit for nonradionuclide and RAG type**	512	GW & River Protection	19.1	GW Protection	85.1	GW Protection	67.8	River Protection	25,000	GW Protection	0.36	River Protection
39 **WAC 173-340 3-PART TEST**												
40 95% UCL > Cleanup Limit?	NO		NO		NO		NO		NO		NO	
41 > 10% above Cleanup Limit?	NO		NO		NO		NO		NO		NO	
42 Any sample > 2X Cleanup Limit?	NO		NO		NO		NO		NO		NO	
43 **WAC 173-340 Compliance?**	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.		The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	

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45 D = diluted GW = groundwater J = estimate MTCA = Model Toxcis Control Act U = undetected WAC = *Washington Administrative Code*

CALCULATION SHEET

Washington Closure Hanford

Originator H. M. Sulloway

Project 100-F Field Remediation

Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08

Job No. 14655

Calc. No. 0100F-CA-V0350

Checked L. D. Habel

Rev. No. 0

Date 4/3/08

Sheet No. 9 of 16

Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Aluminum			Arsenic			Barium			Beryllium			Boron			Calcium			Chromium			Cobalt		
			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
SE-2	J16333	12/17/2007	4960	C	10.5	1.8		1.3	49.9	C	0.26	0.56		0.13	1.7		1.3	4920	C	10.5	6.0		0.53	4.7		0.53
Duplicate of J16333	J16334	12/17/2007	4550	C	11.9	1.5		1.5	44.1	C	0.3	0.43		0.15	1.8		1.5	5050	C	11.9	6.1		0.60	4.0		0.60

Analysis:

TDL		Aluminum: 5	Arsenic: 10	Barium: 2	Beryllium: 0.5	Boron: 2	Calcium: 100	Chromium: 1	Cobalt: 2
Duplicate Analysis	Both > PQL?	Yes (continue)	No-Stop (acceptable)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)		Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	8.6%		12.3%			2.6%	1.7%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Copper			Iron			Lead			Magnesium			Manganese			Nickel			Potassium			Silicon		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-2	J16333	12/17/2007	12.3	C	0.53	13800	C	11.9	11.1		0.79	3610		6.6	232		0.11	8.4		0.53	757		10.5	1940		10.5
Duplicate of J16333	J16334	12/17/2007	11.6	C	0.60	10700	C	13.4	9.0		0.90	3240		7.5	198		0.12	7.7		0.60	675		11.9	2100		11.9

Analysis:

TDL		Copper: 1	Iron: 5	Lead: 5	Magnesium: 75	Manganese: 5	Nickel: 4	Potassium: 400	Silicon: 2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	5.9%	25.3%		10.8%	15.8%			7.9%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable

Sampling Area	HEIS Number	Sample Date	Sodium			Vanadium			Zinc			Chloride			Sulfate			Bis (2-ethylhexyl) phthalate		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-2	J16333	12/17/2007	200	C	5.3	33.1		0.37	30.2	C	1.6	3.1		2.4	493	D	24	0.021	JB	0.35
Duplicate of J16333	J16334	12/17/2007	200	C	6.0	26.5		0.42	26.0	C	1.8	3.4		2.3	183	D	23	0.34	U	0.34

Analysis:

TDL		Sodium: 50	Vanadium: 2.5	Zinc: 1	Chloride: 2	Sulfate: 5	Bis (2-ethylhexyl) phthalate: 0.33
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	
	RPD		22.1%	14.9%		91.7%	
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford
Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

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Date 4/3/08
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Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Aluminum mg/kg	Q	PQL	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL
NW-10	J16DV6	3/18/2008	7520		2.7	2.7		1.4	77.4		0.29	0.34		0.14	1.9		1.4	3820		11.6	11.6		0.58	8.2		0.58
Duplicate of J16DV6	J16DV7	3/18/2008	7270		11.5	3.0		1.4	81.0		0.3	0.34		0.14	1.9		1.4	3930		11.5	10.6		0.58	7.8		0.58

Analysis:

TDL		Aluminum 5	Arsenic 5	Barium 2	Beryllium 0.5	Boron 2	Calcium 100	Chromium 1	Cobalt 2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)
	RPD	3.4%		4.5%			2.8%	9.0%	
	Difference > 2 TDL?	Not applicable	No - acceptable	Not applicable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sampling Area	HEIS Number	Sample Date	Copper mg/kg	Q	PQL	Iron mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL
NW-10	J16DV6	3/18/2008	11.6		0.58	23500		13	3.9		0.87	4220		7.2	378		0.12	11.9		0.58	1400		11.6	466		11.6
Duplicate of J16DV6	J16DV7	3/18/2008	12.6		0.58	22600		12.9	4.4		0.86	4180		7.2	371		0.12	12.1		0.58	1390		11.5	495		11.5

Analysis:

TDL		Copper 1	Iron 5	Lead 5	Magnesium 75	Manganese 5	Nickel 4	Potassium 400	Silicon 2
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)
	Both >5xTDL?	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	No-Stop (acceptable)	Yes (calc RPD)
	RPD	8.3%	3.9%		1.0%	1.9%			6.0%
	Difference > 2 TDL?	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable

Sampling Area	HEIS Number	Sample Date	Sodium mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Nitrate mg/kg	Q	PQL	Sulfate mg/kg	Q	PQL	Bis (2-ethylhexyl) phthalate mg/kg	Q	PQL
NW-10	J16DV6	3/18/2008	123		5.8	54.0		0.4	42.5		1.7	25.3		2.68	5.5		2.7	0.018	J	0.36
Duplicate of J16DV6	J16DV7	3/18/2008	126		5.8	52.8		0.4	41.9		1.7	19.8		2.64	4.3		2.6	0.028	JB	0.36

Analysis:

TDL		Sodium 50	Vanadium 2.5	Zinc 1	Nitrate 2.5	Sulfate 5	Bis (2-ethylhexyl) phthalate 0.33
Duplicate Analysis	Both > PQL?	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	Yes (continue)	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	Yes (calc RPD)	Yes (calc RPD)	Yes (calc RPD)	No-Stop (acceptable)	
	RPD		2.2%	1.4%	24.4%		
	Difference > 2 TDL?	No - acceptable	Not applicable	Not applicable	Not applicable	No - acceptable	No - acceptable

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

Rev. No. 0
Date 4/3/08
Sheet No. 11 of 16

Southeast Excavation

Ecology Software (MTCAStat) Results

Arsenic 95% UCL Calculation

DATA	ID
1.7	J16333/J16334
3.3	J16332
2.2	J16335
2.5	J16336
3.2	J16337
2.3	J16338
2.4	J16339
2.4	J16340
2.5	J16341
2.8	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	2.5
Censored		Lognormal mean	2.5
Detection limit or PQL		Std. devn.	0.47
Method detection limit		Median	2.5
TOTAL	10	Min.	1.7
		Max.	3.3

Lognormal distribution?
r-squared is: 0.93
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.93

UCL (Land's method) is 2.9

Barium 95% UCL Calculation

DATA	ID
47.0	J16333/J16334
28.8	J16332
30.4	J16335
54.7	J16336
36.0	J16337
36.3	J16338
52.3	J16339
29.3	J16340
70.2	J16341
72.0	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	45.6
Censored		Lognormal mean	45.9
Detection limit or PQL		Std. devn.	16.3
Method detection limit		Median	41.5
TOTAL	10	Min.	29.0
		Max.	72.0

Lognormal distribution?
r-squared is: 0.923
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.901

UCL (Land's method) is 58.2

Beryllium 95% UCL Calculation

DATA	ID
0.50	J16333/J16334
0.50	J16332
0.41	J16335
0.69	J16336
0.58	J16337
0.47	J16338
0.70	J16339
0.54	J16340
0.77	J16341
0.99	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	0.61
Censored		Lognormal mean	0.62
Detection limit or PQL		Std. devn.	0.17
Method detection limit		Median	0.56
TOTAL	10	Min.	0.41
		Max.	1.0

Lognormal distribution?
r-squared is: 0.96
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.91

UCL (Land's method) is 0.73

Boron 95% UCL Calculation

DATA	ID
1.8	J16333/J16334
5.6	J16332
0.7	J16335
1.4	J16336
5.6	J16337
0.70	J16338
1.8	J16339
0.65	J16340
2.4	J16341
0.80	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	2.1
Censored		Lognormal mean	2.2
Detection limit or PQL		Std. devn.	1.9
Method detection limit		Median	1.58
TOTAL	10	Min.	0.65
		Max.	5.6

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

Normal distribution?
r-squared is: 0.76

UCL (Land's method) is 4.6

Chromium 95% UCL Calculation

DATA	ID
6.1	J16333/J16334
6.4	J16332
5.0	J16335
7.2	J16336
7.3	J16337
7.6	J16338
7.3	J16339
8.1	J16340
5.7	J16341
6.6	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	6.7
Censored		Lognormal mean	6.7
Detection limit or PQL		Std. devn.	0.95
Method detection limit		Median	6.9
TOTAL	10	Min.	5.0
		Max.	8.1

Lognormal distribution?
r-squared is: 0.95
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.97

UCL (Land's method) is 7.4

Cobalt 95% UCL Calculation

DATA	ID
4.4	J16333/J16334
4.3	J16332
3.8	J16335
6.1	J16336
4.6	J16337
4.3	J16338
4.9	J16339
4.2	J16340
5.4	J16341
6.1	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	4.8
Censored		Lognormal mean	4.8
Detection limit or PQL		Std. devn.	0.81
Method detection limit		Median	4.5
TOTAL	10	Min.	3.8
		Max.	6.1

Lognormal distribution?
r-squared is: 0.91
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.89

UCL (Land's method) is 5.3

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway **Date** 04/03/08 **Calc. No.** 0100F-CA-V0350 **Rev. No.** 0
Project 100-F Field Remediation **Job No.** 14655 **Checked** L. D. Habel **Date** 4/3/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS **Sheet No.** 12 of 16

Southeast Excavation

Ecology Software (MTCAStat) Results

Copper 95% UCL Calculation

DATA	ID
12.0	J16333/J16334
12.3	J16332
12.1	J16335
13.3	J16336
13.3	J16337
11.4	J16338
11.1	J16339
13.1	J16340
10.4	J16341
10.0	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	11.9
Censored		Lognormal mean	11.9
Detection limit or PQL		Std. devn.	1.17
Method detection limit		Median	12.0
TOTAL	10	Min.	10.0
		Max.	13.3
Lognormal distribution?		Normal distribution?	
r-squared is:	0.95	r-squared is:	0.96

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 12.6

Lead 95% UCL Calculation

DATA	ID
10	J16333/J16334
2.7	J16332
3	J16335
3.7	J16336
2.6	J16337
2.8	J16338
5.5	J16339
2.6	J16340
9.6	J16341
3.3	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	4.6
Censored		Lognormal mean	4.5
Detection limit or PQL		Std. devn.	2.9
Method detection limit		Median	3.1
TOTAL	10	Min.	2.6
		Max.	10
Lognormal distribution?		Normal distribution?	
r-squared is:	0.79	r-squared is:	0.71

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 6.1

Manganese 95% UCL Calculation

DATA	ID
215	J16333/J16334
191	J16332
191	J16335
261	J16336
229	J16337
206	J16338
247	J16339
216	J16340
270	J16341
314	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	234
Censored		Lognormal mean	234
Detection limit or PQL		Std. devn.	39.1
Method detection limit		Median	223
TOTAL	10	Min.	191
		Max.	314
Lognormal distribution?		Normal distribution?	
r-squared is:	0.95	r-squared is:	0.93

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 259

Nickel 95% UCL Calculation

DATA	ID
8.1	J16333/J16334
8.4	J16332
7.0	J16335
11	J16336
8.8	J16337
9.9	J16338
8.4	J16339
9.1	J16340
7.7	J16341
8.9	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	8.7
Censored		Lognormal mean	8.7
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	8.6
TOTAL	10	Min.	7.0
		Max.	11
Lognormal distribution?		Normal distribution?	
r-squared is:	0.98	r-squared is:	0.98

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.3

Vanadium 95% UCL Calculation

DATA	ID
29.8	J16333/J16334
28.0	J16332
25.5	J16335
38.9	J16336
33.3	J16337
25.7	J16338
38.3	J16339
31.4	J16340
36.4	J16341
49.7	J16342

Number of samples		Uncensored values	
Uncensorec	10	Mean	33.7
Censorec		Lognormal mean	33.8
Detection limit or PQL		Std. devn.	7.42
Method detection limit		Median	32.4
TOTAL	10	Min.	25.5
		Max.	49.7
Lognormal distribution?		Normal distribution?	
r-squared is:	0.96	r-squared is:	0.92

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 38.5

Zinc 95% UCL Calculation

DATA	ID
28.1	J16333/J16334
24.8	J16332
24.1	J16335
35.9	J16336
28.1	J16337
28.4	J16338
39.0	J16339
30.9	J16340
47.1	J16341
39.4	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	32.6
Censored		Lognormal mean	32.6
Detection limit or PQL		Std. devn.	7.47
Method detection limit		Median	29.7
TOTAL	10	Min.	24.1
		Max.	47.1
Lognormal distribution?		Normal distribution?	
r-squared is:	0.94	r-squared is:	0.92

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 37.5

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway **Date** 04/03/08 **Calc. No.** 0100F-CA-V0350 **Rev. No.** 0
Project 100-F Field Remediation **Job No.** 14655 **Checked** L. D. Habel **Date** 4/15/08
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS **Sheet No.** 13 of 16

1 *Southeast Excavation* **Ecology Software (MTCAStat) Results**

DATA	ID	Bis(2-ethylhexyl)phthalate 95% UCL Calculation			
0.021	J16333/J16334				
0.033	J16332				
0.17	J16335	Number of samples		Uncensored values	
0.022	J16336	Uncensored	10	Mean	0.072
0.18	J16337	Censored		Lognormal mean	0.072
0.028	J16338	Detection limit or PQL		Std. devn.	0.076
0.020	J16339	Method detection limit		Median	0.028
0.20	J16340	TOTAL	10	Min.	0.020
0.027	J16341			Max.	0.20
0.025	J16342				
		Lognormal distribution?		Normal distribution?	
		r-squared is:	0.75	r-squared is:	0.69
		Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is	0.11		

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

Rev. No. 0
Date 4/3/08
Sheet No. 14 of 16

Northwest Excavation

Ecology Software (MTCAStat) Results

Arsenic 95% UCL Calculation

DATA	ID
2.9	J16DV6/J16DV7
2.0	J16DT7
2.6	J16DT8
2.0	J16DT9
2.1	J16DV0
2.3	J16DV1
2.4	J16DV2
2.3	J16DV3
2.5	J16DV4
2.6	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	2.4
Censored		Lognormal mean	2.4
Detection limit or PQL		Std. devn.	0.28
Method detection limit		Median	2.4
TOTAL	10	Min.	2.0
		Max.	2.9

Lognormal distribution?		Normal distribution?	
r-squared is:	0.96	r-squared is:	0.96

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 2.5

Barium 95% UCL Calculation

DATA	ID
79.2	J16DV6/J16DV7
65.3	J16DT7
69.0	J16DT8
30.7	J16DT9
30.7	J16DV0
27.0	J16DV1
39.7	J16DV2
63.3	J16DV3
52.9	J16DV4
29.2	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	48.7
Censored		Lognormal mean	49.2
Detection limit or PQL		Std. devn.	19.5
Method detection limit		Median	46.3
TOTAL	10	Min.	27.0
		Max.	79.2

Lognormal distribution?		Normal distribution?	
r-squared is:	0.903	r-squared is:	0.904

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 65.8

Beryllium 95% UCL Calculation

DATA	ID
0.34	J16DV6/J16DV7
0.26	J16DT7
0.26	J16DT8
0.17	J16DT9
0.15	J16DV0
0.17	J16DV1
0.21	J16DV2
0.24	J16DV3
0.23	J16DV4
0.16	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	0.22
Censored		Lognormal mean	0.22
Detection limit or PQL		Std. devn.	0.059
Method detection limit		Median	0.22
TOTAL	10	Min.	0.15
		Max.	0.34

Lognormal distribution?		Normal distribution?	
r-squared is:	0.95	r-squared is:	0.92

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.26

Boron 95% UCL Calculation

DATA	ID
1.9	J16DV6/J16DV7
1.6	J16DT7
2.0	J16DT8
0.65	J16DT9
0.65	J16DV0
0.65	J16DV1
1.6	J16DV2
1.5	J16DV3
1.4	J16DV4
0.70	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	1.3
Censored		Lognormal mean	1.3
Detection limit or PQL		Std. devn.	0.55
Method detection limit		Median	1.5
TOTAL	10	Min.	0.65
		Max.	2.0

Lognormal distribution?		Normal distribution?	
r-squared is:	0.83	r-squared is:	0.87

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 1.6

Chromium 95% UCL Calculation

DATA	ID
11.1	J16DV6/J16DV7
11.1	J16DT7
11.8	J16DT8
12.4	J16DT9
13.0	J16DV0
9.30	J16DV1
11.1	J16DV2
8.80	J16DV3
9.40	J16DV4
10.1	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	10.8
Censored		Lognormal mean	10.8
Detection limit or PQL		Std. devn.	1.39
Method detection limit		Median	11.1
TOTAL	10	Min.	8.80
		Max.	13.0

Lognormal distribution?		Normal distribution?	
r-squared is:	0.96	r-squared is:	0.97

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 11.7

Cobalt 95% UCL Calculation

DATA	ID
8.0	J16DV6/J16DV7
7.3	J16DT7
7.1	J16DT8
5.0	J16DT9
4.8	J16DV0
4.9	J16DV1
5.7	J16DV2
8.5	J16DV3
7.2	J16DV4
4.9	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	6.3
Censored		Lognormal mean	6.4
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	6.4
TOTAL	10	Min.	4.8
		Max.	8.5

Lognormal distribution?		Normal distribution?	
r-squared is:	0.88	r-squared is:	0.89

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 7.1

Washington Closure Hanford **CALCULATION SHEET**

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

Rev. No. 0
Date 4/3/08
Sheet No. 15 of 16

Northwest Excavation

Ecology Software (MTCAStat) Results

Copper 95% UCL Calculation

DATA	ID
12.1	J16333/J16334
12.2	J16332
13.3	J16335
11.4	J16336
10.4	J16337
10.5	J16338
13.3	J16339
10.3	J16340
10.9	J16341
10.7	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	11.5
Censored		Lognormal mean	11.5
Detection limit or PQL		Std. devn.	1.15
Method detection limit		Median	11.2
TOTAL	10	Min.	10.3
		Max.	13.3

Lognormal distribution?		Normal distribution?	
r-squared is:	0.91	r-squared is:	0.90
Recommendations:			
Use lognormal distribution.			
UCL (Land's method) is	12.2		

Lead 95% UCL Calculation

DATA	ID
4.2	J16333/J16334
2.8	J16332
3.0	J16335
1.6	J16336
1.7	J16337
2.1	J16338
2.2	J16339
1.6	J16340
2.8	J16341
1.8	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	2.4
Censored		Lognormal mean	2.4
Detection limit or PQL		Std. devn.	0.82
Method detection limit		Median	2.2
TOTAL	10	Min.	1.6
		Max.	4.2

Lognormal distribution?		Normal distribution?	
r-squared is:	0.93	r-squared is:	0.87
Recommendations:			
Use lognormal distribution.			
UCL (Land's method) is	2.9		

Manganese 95% UCL Calculation

DATA	ID
375	J16333/J16334
305	J16332
329	J16335
239	J16336
238	J16337
229	J16338
269	J16339
324	J16340
307	J16341
241	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	286
Censored		Lognormal mean	286
Detection limit or PQL		Std. devn.	49.4
Method detection limit		Median	287
TOTAL	10	Min.	229
		Max.	375

Lognormal distribution?		Normal distribution?	
r-squared is:	0.92	r-squared is:	0.92
Recommendations:			
Use lognormal distribution.			
UCL (Land's method) is	318		

Nickel 95% UCL Calculation

DATA	ID
12.0	J16333/J16334
11.6	J16332
11.8	J16335
11.0	J16336
13.0	J16337
11.1	J16338
11.3	J16339
11.3	J16340
11.0	J16341
10.8	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	11.5
Censored		Lognormal mean	11.5
Detection limit or PQL		Std. devn.	0.65
Method detection limit		Median	11.3
TOTAL	10	Min.	10.8
		Max.	13.0

Lognormal distribution?		Normal distribution?	
r-squared is:	0.88	r-squared is:	0.86
Recommendations:			
Reject BOTH lognormal and normal distributions.			
UCL (based on Z-statistic) is	11.8		

Vanadium 95% UCL Calculation

DATA	ID
53.4	J16333/J16334
53.7	J15HP2
48.7	J16DT8
35.6	J16DT9
34.3	J16DV0
34.6	J16DV1
40.6	J16DV2
67.7	J16DV3
55.2	J16DV4
35.7	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	46.0
Censored		Lognormal mean	46.1
Detection limit or PQL		Std. devn.	11.5
Method detection limit		Median	44.7
TOTAL	10	Min.	34.3
		Max.	67.7

Lognormal distribution?		Normal distribution?	
r-squared is:	0.90	r-squared is:	0.89
Recommendations:			
Use lognormal distribution.			
UCL (Land's method) is	53.9		

Zinc 95% UCL Calculation

DATA	ID
42.2	J16333/J16334
37.7	J15HP2
38.8	J16DT8
28.7	J16DT9
27.7	J16DV0
28.1	J16DV1
31.1	J16DV2
40.9	J16DV3
38.1	J16DV4
29.4	J16DV5

Number of samples		Uncensored values	
Uncensored	10	Mean	34.3
Censored		Lognormal mean	34.3
Detection limit or PQL		Std. devn.	5.77
Method detection limit		Median	34.4
TOTAL	10	Min.	27.7
		Max.	42.2

Lognormal distribution?		Normal distribution?	
r-squared is:	0.88	r-squared is:	0.88
Recommendations:			
Reject BOTH lognormal and normal distributions.			
UCL (based on Z-statistic) is	37.3		

Washington Closure Hanford

CALCULATION SHEET

Originator H. M. Sulloway
Project 100-F Field Remediation
Subject 120-F-1 CLEANUP VERIFICATION 95% UCL CALCULATIONS

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0350
Checked L. D. Habel

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Date 4/3/08
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1 *Northwest Excavation*

Ecology Software (MTCAStat) Results

Sulfate 95% UCL Calculation

DATA	ID
4.9	J16333/J16334
3.9	J16332
3.9	J16335
1.1	J16336
4.0	J16337
5.4	J16338
3.3	J16339
1.3	J16340
13	J16341
5.3	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	4.7
Censored		Lognormal mean	4.8
Detection limit or PQL		Std. devn.	3.4
Method detection limit		Median	4.0
TOTAL	10	Min.	1.1
		Max.	13
Lognormal distribution?		Normal distribution?	
r-squared is:	0.88	r-squared is:	0.74

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 6.4

Bis(2-ethylhexyl)phthalate 95% UCL Calculation

DATA	ID
0.023	J16333/J16334
0.025	J16332
0.10	J16335
0.084	J16336
0.072	J16337
0.031	J16338
0.023	J16339
0.17	J16340
0.064	J16341
0.029	J16342

Number of samples		Uncensored values	
Uncensored	10	Mean	0.060
Censored		Lognormal mean	0.060
Detection limit or PQL		Std. devn.	0.047
Method detection limit		Median	0.048
TOTAL	10	Min.	0.023
		Max.	0.17
Lognormal distribution?		Normal distribution?	
r-squared is:	0.91	r-squared is:	0.82

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.12

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-1	J16332	12/17/2007	4310	C	11.4	0.85	U	0.85	3.3		1.4	28.8	C	0.28	0.50		0.14	5.6		1.4	0.14	U	0.14
SE-2	J16333	12/17/2007	4960	C	10.5	0.79	U	0.79	1.8		1.3	49.9	C	0.26	0.56		0.13	1.7		1.3	0.13	U	0.13
Duplicate of J16333	J16334	12/17/2007	4550	C	11.9	0.9	U	0.9	1.5		1.5	44.1	C	0.30	0.43		0.15	1.8		1.5	0.15	U	0.15
SE-3	J16335	12/17/2007	4290	C	11.6	0.87	U	0.87	2.2		1.4	30.4	C	0.29	0.41		0.14	1.4	U	1.4	0.14	U	0.14
SE-4	J16336	12/17/2007	6690	C	11.5	0.86	U	0.86	2.5		1.4	54.7	C	0.29	0.69		0.14	1.4		1.4	0.14	U	0.14
SE-5	J16337	12/17/2007	5070		11.4	0.85	U	0.85	3.2		1.4	36.0		0.28	0.58		0.14	5.6		1.4	0.14	U	0.14
SE-6	J16338	12/17/2007	5100		11.0	0.82	U	0.82	2.3		1.4	36.3		0.27	0.47		0.14	1.4	U	1.4	0.14	U	0.14
SE-7	J16339	12/17/2007	5430		12.0	0.9	U	0.9	2.4		1.5	52.3		0.30	0.70		0.15	1.8		1.5	0.15	U	0.15
SE-8	J16340	12/17/2007	4910		10.6	0.8	U	0.8	2.4		1.3	29.3		0.27	0.54		0.13	1.3	U	1.3	0.13	U	0.13
SE-9	J16341	12/17/2007	5130		12.4	0.93	U	0.93	2.5		1.5	70.2		0.31	0.77		0.15	2.4		1.5	0.15	U	0.15
SE-10	J16342	12/17/2007	6320		12.7	0.95	U	0.95	2.8		1.6	72.0		0.32	0.99		0.16	1.6	U	1.6	0.16	U	0.16
NW-1	J16DT7	3/18/2008	6530		10.9	0.82	U	0.82	2.0		1.4	65.3		0.27	0.26		0.14	1.6		1.4	0.14	U	0.14
NW-2	J16DT8	3/18/2008	7360		11.1	0.83	U	0.83	2.6		1.4	69.0		0.28	0.26		0.14	2.0		1.4	0.14	U	0.14
NW-3	J16DT9	3/18/2008	5120		10.4	0.78	U	0.78	2.0		1.3	30.7		0.26	0.17		0.13	1.3	U	1.3	0.13	U	0.13
NW-4	J16DV0	3/18/2008	5050		10.4	0.78	U	0.78	2.1		1.3	30.7		0.26	0.15		0.13	1.3	U	1.3	0.13	U	0.13
NW-5	J16DV1	3/18/2008	4860		10.2	0.91		0.76	2.3		1.3	27.0		0.26	0.17		0.13	1.3	U	1.3	0.13	U	0.13
NW-6	J16DV2	3/18/2008	5990		10.1	0.76	U	0.76	2.4		1.3	39.7		0.25	0.21		0.13	1.6		1.3	0.13	U	0.13
NW-7	J16DV3	3/18/2008	4660		10.6	0.79	U	0.79	2.3		1.3	63.3		0.26	0.24		0.13	1.5		1.3	0.13	U	0.13
NW-8	J16DV4	3/18/2008	5400		11.0	0.83	U	0.83	2.5		1.4	52.9		0.28	0.23		0.14	1.4		1.4	0.14	U	0.14
NW-9	J16DV5	3/18/2008	5030		11.4	0.85	U	0.85	2.6		1.4	29.2		0.28	0.16		0.14	1.4	U	1.4	0.14	U	0.14
Duplicate of J16DV6	J16DV7	3/18/2008	7270		11.5	0.86	U	0.86	3.0		1.4	81.0		0.29	0.34		0.14	1.9		1.4	0.14	U	0.14
NW-10	J16DV6	3/18/2008	7520		11.6	0.87	U	0.87	2.7		1.4	77.4		0.29	0.34		0.14	1.9		1.4	0.14	U	0.14
Equip blank	J16354	12/17/2007	80.7		3.7	0.28	U	0.28	0.46	U	0.46	1.7		0.09	0.05	U	0.05	0.46	U	0.46	0.05	U	0.05
Equip blank	J19DT6	3/18/2008	49.7		3	0.24	U	0.24	0.4	U	0.4	1		0.08	0.04	U	0.04	0.4	U	0.4	0.04	U	0.04

Attachment	1	Sheet No.	1 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Iron			Lead			Magnesium		
			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
SE-1	J16332	12/17/2007	2630	C	11.4	6.4		0.57	4.3		0.57	12.3	C	0.57	10700	C	12.8	2.7		0.85	3220		7.1
SE-2	J16333	12/17/2007	4920	C	10.5	6		0.53	4.7		0.53	12.3	C	0.53	13800	C	11.9	11.1		0.79	3610		6.6
Duplicate of J16333	J16334	12/17/2007	5050	C	11.9	6.1		0.6	4.0		0.60	11.6	C	0.6	10700	C	13.4	9.0		0.90	3240		7.5
SE-3	J16335	12/17/2007	2590	C	11.6	5		0.58	3.8		0.58	12.1	C	0.58	10300	C	13	2.8		0.87	2990		7.2
SE-4	J16336	12/17/2007	5550	C	11.5	7.2		0.57	6.1		0.57	13.3	C	0.57	16400	C	12.9	3.7		0.86	3800		7.2
SE-5	J16337	12/17/2007	3440	C	11.4	7.3		0.57	4.6		0.57	13.3		0.57	12900		12.8	2.6		0.85	4020		7.1
SE-6	J16338	12/17/2007	7250	C	11	7.6		0.55	4.3		0.55	11.4		0.55	11000		12.4	2.8		0.82	3610		6.9
SE-7	J16339	12/17/2007	3880	C	12	7.3		0.6	4.9		0.6	11.1		0.6	15000		13.5	5.5		0.90	3710		7.5
SE-8	J16340	12/17/2007	3100	C	10.6	8.1		0.53	4.2		0.53	13.1		0.53	12300		12	2.6		0.80	3580		6.6
SE-9	J16341	12/17/2007	4050	C	12.4	5.7		0.62	5.4		0.62	10.4		0.62	16300		13.9	9.6		0.93	3430		7.7
SE-10	J16342	12/17/2007	3650	C	12.7	6.6		0.64	6.1		0.64	10.0		0.64	19900		14.3	3.3		0.95	4100		7.9
NW-1	J16DT7	3/18/2008	3750		10.9	11.1		0.54	7.3		0.54	12.2		0.54	21400		12.2	2.8		0.82	4370		6.8
NW-2	J16DT8	3/18/2008	3910		11.1	11.8		0.56	7.1		0.56	13.3		0.56	21100		12.5	3.0		0.83	4360		6.9
NW-3	J16DT9	3/18/2008	4150		10.4	12.4		0.52	5.0		0.52	11.4		0.52	14800		11.7	1.6		0.78	3820		6.5
NW-4	J16DV0	3/18/2008	4860		10.4	13.0		0.52	4.8		0.52	10.4		0.52	14100		11.7	1.7		0.78	4020		6.5
NW-5	J16DV1	3/18/2008	4030		10.2	9.3		0.51	4.9		0.51	10.5		0.51	14100		11.5	2.1		0.76	3600		6.4
NW-6	J16DV2	3/18/2008	3850		10.1	11.1		0.51	5.7		0.51	13.3		0.51	16900		11.4	2.2		0.76	4000		6.3
NW-7	J16DV3	3/18/2008	5060		10.6	8.8		0.53	8.5		0.53	10.3		0.53	24600		11.9	1.6		0.79	4330		6.6
NW-8	J16DV4	3/18/2008	4020		11.0	9.4		0.55	7.2		0.55	10.9		0.55	21300		12.4	2.8		0.83	4140		6.9
NW-9	J16DV5	3/18/2008	4460		11.4	10.1		0.57	4.9		0.57	10.7		0.57	14900		12.8	1.8		0.85	3700		7.1
Duplicate of J16DV6	J16DV7	3/18/2008	3930		11.5	10.6		0.58	7.8		0.58	12.6		0.58	22600		12.9	4.4		0.86	4180		7.2
NW-10	J16DV6	3/18/2008	3820		11.6	11.6		0.58	8.2		0.58	11.6		0.58	23500		13.0	3.9		0.87	4220		7.2
Equip blank	J16354	12/17/2007	23.9	C	3.7	0.19	U	0.19	0.19	U	0.19	0.25		0.19	156		4.2	0.34		0.28	10.3		2.3
Equip blank	J19DT6	3/18/2008	20.6		3.2	0.16	U	0.16	0.16	U	0.16	0.16	U	0.16	124		3.6	0.24	U	0.24	10.1		2

Attachment	1	Sheet No.	2 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Manganese			Mercury			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	mg/kg	Q	PQL	mg/kg	Q	PQL
SE-1	J16332	12/17/2007	191		0.11	0.01	U	0.01	0.85	U	0.85	8.4		0.57	631		11.4	1.7	U	1.7	2090		11.4
SE-2	J16333	12/17/2007	232		0.11	0.009	U	0.009	0.79	U	0.79	8.4		0.53	757		10.5	1.6	U	1.6	1940		10.5
Duplicate of J16333	J16334	12/17/2007	198		0.12	0.009	U	0.009	0.90	U	0.90	7.7		0.6	675		11.9	1.8	U	1.8	2100		11.9
SE-3	J16335	12/17/2007	191		0.12	0.009	U	0.009	0.87	U	0.87	7.0		0.58	539		11.6	1.7	U	1.7	1720		11.6
SE-4	J16336	12/17/2007	261		0.11	0.65		0.008	0.86	U	0.86	10.5		0.57	1040		11.5	1.7	U	1.7	1650		11.5
SE-5	J16337	12/17/2007	229		0.11	0.009	U	0.009	0.85		0.85	8.8		0.57	678		11.4	1.7	U	1.7	2320		11.4
SE-6	J16338	12/17/2007	206		0.11	0.01		0.01	0.82	U	0.82	9.9		0.55	704		11.0	1.6	U	1.6	1650		11.0
SE-7	J16339	12/17/2007	247		0.12	0.02		0.01	0.90	U	0.90	8.4		0.6	954		12.0	1.8	U	1.8	2420		12.0
SE-8	J16340	12/17/2007	216		0.11	0.01	U	0.01	0.80	U	0.80	9.1		0.53	784		10.6	1.6	U	1.6	1860		10.5
SE-9	J16341	12/17/2007	270		0.12	0.06		0.009	0.93	U	0.93	7.7		0.62	1160		12.4	1.9	U	1.9	2900		12.4
SE-10	J16342	12/17/2007	314		0.13	0.01	U	0.01	0.95	U	0.95	8.9		0.64	1210		12.7	1.9	U	1.9	3200		12.7
NW-1	J16DT7	3/18/2008	305		0.11	0.008	U	0.008	0.82	U	0.82	11.6		0.54	1170		10.9	1.6	U	1.6	387		10.9
NW-2	J16DT8	3/18/2008	329		0.11	0.01	U	0.01	0.83	U	0.83	11.8		0.56	1230		11.1	1.8		1.7	423		11.1
NW-3	J16DT9	3/18/2008	239		0.10	0.01	U	0.01	0.78	U	0.78	11.0		0.52	654		10.4	1.6	U	1.6	364		10.4
NW-4	J16DV0	3/18/2008	238		0.10	0.01	U	0.01	0.78	U	0.78	13.0		0.52	617		10.4	1.6	U	1.6	342		10.4
NW-5	J16DV1	3/18/2008	229		0.10	0.009	U	0.009	0.76	U	0.76	11.1		0.51	584		10.2	1.5	U	1.5	341		10.2
NW-6	J16DV2	3/18/2008	269		0.10	0.009	U	0.009	0.76	U	0.76	11.3		0.51	730		10.1	1.5	U	1.5	412		10.1
NW-7	J16DV3	3/18/2008	324		0.11	0.007	U	0.007	0.79	U	0.79	11.3		0.53	733		10.6	1.6	U	1.6	434		10.6
NW-8	J16DV4	3/18/2008	307		0.11	0.009	U	0.009	0.83	U	0.83	11		0.55	826		11.0	1.7	U	1.7	543		11.0
NW-9	J16DV5	3/18/2008	241		0.11	0.008	U	0.008	0.85	U	0.85	10.8		0.57	653		11.4	1.7	U	1.7	381		11.4
Duplicate of J16DV6	J16DV7	3/18/2008	371		0.12	0.01	U	0.01	0.86	U	0.86	12.1		0.58	1390		11.5	1.7	U	1.7	495		11.5
NW-10	J16DV6	3/18/2008	378		0.12	0.01	U	0.01	0.87	U	0.87	11.9		0.58	1400		11.6	1.7	U	1.7	466		11.6
Equip blank	J16354	12/17/2007	4.2		0.04	0.009	U	0.009	0.28	U	0.28	0.19	U	0.19	37.3		3.7	0.56	U	0.56	102		3.7
Equip blank	J19DT6	3/18/2008	3.2		0.03	0.009	U	0.009	0.24	U	0.24	0.16	U	0.16	15.2		3.2	0.48	U	0.48	42.1		3.2

Attachment	1	Sheet No.	3 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Silver			Sodium			Vanadium			Zinc			Total petroleum hydrocarbons			Bromide			Chloride		
			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
SE-1	J16332	12/17/2007	0.28	U	0.28	117	C	5.7	28		0.4	24.8	C	1.7	137	U	137	2.4	U	2.4	2.4	U	2.4
SE-2	J16333	12/17/2007	0.26	U	0.26	200	C	5.3	33.1		0.37	30.2	C	1.6	138	U	138	2.4	U	2.4	3.1		2.4
Duplicate of J16333	J16334	12/17/2007	0.3	U	0.3	200	C	6	26.5		0.42	26	C	1.8	138	U	138	2.3	U	2.3	3.4		2.3
SE-3	J16335	12/17/2007	0.29	U	0.29	127	C	5.8	25.5		0.4	24.1	C	1.7	137	U	137	2.5	U	2.5	2.5	U	2.5
SE-4	J16336	12/17/2007	0.29	U	0.29	183	C	5.7	38.9		0.4	35.9	C	1.7	143	U	143	2.7	U	2.7	9.7		2.7
SE-5	J16337	12/17/2007	0.28	U	0.28	430	C	5.7	33.3		0.4	28.1	C	1.7	139	U	139	2.5	U	2.5	34		2.5
SE-6	J16338	12/17/2007	0.27	U	0.27	152	C	5.5	25.7		0.38	28.4	C	1.6	140	U	140	2.5	U	2.5	2.5	U	2.5
SE-7	J16339	12/17/2007	0.3	U	0.3	172	C	6	38.3		0.42	39	C	1.8	140	U	140	2.6	U	2.6	2.6	U	2.6
SE-8	J16340	12/17/2007	0.27	U	0.27	193	C	5.3	31.4		0.37	30.9	C	1.6	139	U	139	2.7	U	2.7	2.7	U	2.7
SE-9	J16341	12/17/2007	0.31	U	0.31	154	C	6.2	36.4		0.43	47.1	C	1.9	145	U	145	2.3	U	2.3	2.3	U	2.3
SE-10	J16342	12/17/2007	0.32	U	0.32	180	C	6.4	49.7		0.44	39.4	C	1.9	146	U	146	2.6	U	2.6	2.6	U	2.6
NW-1	J16DT7	3/18/2008	0.27	U	0.27	139		5.4	53.7		0.38	37.7		1.6	141	U	141	2.4	U	2.4	3.5		2.4
NW-2	J16DT8	3/18/2008	0.28	U	0.28	132		5.6	48.7		0.39	38.8		1.7	140	U	140	2.4	U	2.4	2.4	U	2.4
NW-3	J16DT9	3/18/2008	0.26	U	0.26	112		5.2	35.6		0.36	28.7		1.6	133	U	133	2.2	U	2.2	2.2	U	2.2
NW-4	J16DV0	3/18/2008	0.26	U	0.26	131		5.2	34.3		0.36	27.7		1.6	134	U	134	2.2	U	2.2	2.2	U	2.2
NW-5	J16DV1	3/18/2008	0.26	U	0.26	174		5.1	34.6		0.36	28.1		1.5	138	U	138	2.5	U	2.5	2.5	U	2.5
NW-6	J16DV2	3/18/2008	0.25	U	0.25	120		5.1	40.6		0.35	31.1		1.5	134	U	134	2.4	U	2.4	2.4	U	2.4
NW-7	J16DV3	3/18/2008	0.26	U	0.26	147		5.3	67.7		0.37	40.9		1.6	134	U	134	2.5	U	2.5	2.5	U	2.5
NW-8	J16DV4	3/18/2008	0.28	U	0.28	140		5.5	55.2		0.39	38.1		1.7	144	U	144	2.6	U	2.6	7.6		2.6
NW-9	J16DV5	3/18/2008	0.28	U	0.28	112		5.7	35.7		0.40	29.4		1.7	141	U	141	2.6	U	2.6	2.6	U	2.6
Duplicate of J16DV6	J16DV7	3/18/2008	0.29	U	0.29	126		5.8	52.8		0.40	41.9		1.7	141	U	141	2.6	U	2.6	2.6	U	2.6
NW-10	J16DV6	3/18/2008	0.29	U	0.29	123		5.8	54.0		0.40	42.5		1.7	143	U	143	2.7	U	2.7	2.7	U	2.7
Equip blank	J16354	12/17/2007	0.09	U	0.09	9.2	C	1.9	0.21		0.13	0.63	C	0.56									
Equip blank	J19DT6	3/18/2008	0.08	U	0.08	10.6		1.6	0.11	U	0.11	0.48	U	0.48				2.4	U	2.4	2.4	U	2.4

Attachment	1	Sheet No.	4 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Cyanide			Fluoride			Nitrate			Nitrite			Phosphate			Sulfate			Sulfide		
			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
SE-1	J16332	12/17/2007	0.48	U	0.48	2.4	U	2.4	2.37	U	2.4	2.37	U	2.4	2.4	U	2.4	2.4	U	2.4	15.4	U	15.4
SE-2	J16333	12/17/2007	0.48	U	0.48	2.4	U	2.4	2.44	U	2.4	2.44	U	2.4	2.4	U	2.4	493	D	24	21.7	U	21.7
Duplicate of J16333	J16334	12/17/2007	0.47	U	0.47	2.3	U	2.3	2.34	U	2.3	2.34	U	2.3	2.3	U	2.3	183	D	23	15.4	U	15.4
SE-3	J16335	12/17/2007	0.48	U	0.48	2.5	U	2.5	2.46	U	2.5	2.46	U	2.5	2.5	U	2.5	2.5	U	2.5	21.2	U	21.2
SE-4	J16336	12/17/2007	0.5	U	0.5	3.9		2.7	2.73	U	2.7	2.73	U	2.7	2.7	U	2.7	8410	D	270	23.7	U	23.7
SE-5	J16337	12/17/2007	0.51	U	0.51	3.4		2.5	2.49	U	2.5	2.49	U	2.5	2.5	U	2.5	153	D	2.5	21.5	U	21.5
SE-6	J16338	12/17/2007	0.5	U	0.5	2.5	U	2.5	2.54	U	2.5	2.54	U	2.5	2.5	U	2.5	2410	D	125	21.5	U	21.5
SE-7	J16339	12/17/2007	0.5	U	0.5	2.6	U	2.6	2.62	U	2.6	2.62	U	2.6	2.6	U	2.6	32.8		2.6	21.5	U	21.5
SE-8	J16340	12/17/2007	0.49	U	0.49	2.7	U	2.7	2.72	U	2.7	2.72	U	2.7	2.7	U	2.7	11.4		2.7	21.1	U	21.1
SE-9	J16341	12/17/2007	0.48	U	0.48	2.3	U	2.3	18.6		2.3	2.27	U	2.3	6.8		2.3	51.3		2.3	22.3	U	22.3
SE-10	J16342	12/17/2007	0.48	U	0.48	2.6	U	2.6	2.56	U	2.6	2.56	U	2.6	46.5		2.6	3.2		2.6	22.7	U	22.7
NW-1	J16DT7	3/18/2008				2.4	U	2.4	3.53		2.4	2.4	U	2.4	2.4	U	2.4	3.9		2.4			
NW-2	J16DT8	3/18/2008				2.4	U	2.4	12.2		2.36	2.36	U	2.36	2.4	U	2.4	3.9		2.4			
NW-3	J16DT9	3/18/2008				2.2	U	2.2	2.2	U	2.2	2.2	U	2.2	2.2	U	2.2	2.2	U	2.2			
NW-4	J16DV0	3/18/2008				2.2	U	2.2	2.24	U	2.24	2.24	U	2.24	2.2	U	2.2	4.0		2.2			
NW-5	J16DV1	3/18/2008				2.5	U	2.5	2.47	U	2.47	2.47	U	2.47	2.5	U	2.5	5.4		2.5			
NW-6	J16DV2	3/18/2008				2.4	U	2.4	2.36	U	2.36	2.36	U	2.36	2.4	U	2.4	3.3		2.4			
NW-7	J16DV3	3/18/2008				2.5	U	2.5	2.86		2.48	2.48	U	2.48	2.5	U	2.5	2.5	U	2.5			
NW-8	J16DV4	3/18/2008				2.6	U	2.6	2.71		2.57	2.57	U	2.57	2.6	U	2.6	13.4		2.6			
NW-9	J16DV5	3/18/2008				2.6	U	2.6	3.54		2.55	2.55	U	2.55	2.6	U	2.6	5.3		2.6			
Duplicate of J16DV6	J16DV7	3/18/2008				2.6	U	2.6	19.8		2.64	2.64	U	2.64	2.6	U	2.6	4.3		2.6			
NW-10	J16DV6	3/18/2008				2.7	U	2.7	25.3		2.68	2.68	U	2.68	2.7	U	2.7	5.5		2.7			
Equip blank	J16354	12/17/2007																					
Equip blank	J19DT6	3/18/2008				2.4	U	2.4	2.39	U	2.39	2.39	U	2.39	2.4	U	2.4	2.4	U	2.4			

Attachment	1	Sheet No.	5 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Hexavalent Chromium		
			mg/kg	Q	PQL
SE-1	J16B36	2/19/2008	0.21	U	0.21
SE-2	J16B37	2/19/2008	0.21	U	0.21
SE-3	J16B38	2/19/2008	0.21	U	0.21
SE-4	J16B39	2/19/2008	1.2		0.21
SE-5	J16B40	2/19/2008	0.21	U	0.21
SE-6	J16B41	2/19/2008	1.8		0.21
SE-7	J16B42	2/19/2008	0.20	U	0.20
SE-8	J16B43	2/19/2008	0.21	U	0.21
SE-9	J16B44	2/19/2008	0.21	U	0.21
SE-10	J16B45	2/19/2008	0.22	U	0.22
Duplicate of J16B45	J16B46	2/19/2008	0.21	U	0.21
NW-1	J16DT7	3/18/2008	0.21		0.2
NW-2	J16DT8	3/18/2008	0.21	U	0.21
NW-3	J16DT9	3/18/2008	0.30		0.2
NW-4	J16DV0	3/18/2008	0.2	U	0.2
NW-5	J16DV1	3/18/2008	0.21	U	0.21
NW-6	J16DV2	3/18/2008	0.2	U	0.2
NW-7	J16DV3	3/18/2008	0.2	U	0.2
NW-8	J16DV4	3/18/2008	0.22	U	0.22
NW-9	J16DV5	3/18/2008	0.24		0.21
Duplicate of J16DV6	J16DV7	3/18/2008	0.22	U	0.22
NW-10	J16DV6	3/18/2008	0.22	U	0.22

Attachment	1	Sheet No.	6 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16332 Sample Location SE-1 Sample Date 12/17/07			J16333 Sample Location SE-2 Sample Date 12/17/07			J16334 Dup of J16333 Sample Date 12/17/07			J16335 Sample Location SE-3 Sample Date 12/17/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14
Pesticides												
Aldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-Chlordane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Beta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Delta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4	2.1	J	1.4	1.4	U	1.4
Dieldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan I	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan II	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin ketone	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
gamma-Chlordane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Heptachlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Methoxychlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Toxaphene	14	U	14	14	U	14	14	U	14	14	U	14
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	340	U	340	350	U	350	350	U	350	340	U	340
1,2-Dichlorobenzene	340	U	340	350	U	350	350	U	350	340	U	340
1,3-Dichlorobenzene	340	U	340	350	U	350	350	U	350	340	U	340
1,4-Dichlorobenzene	340	U	340	350	U	350	350	U	350	340	U	340
2,4,5-Trichlorophenol	860	U	860	860	U	860	860	U	860	860	U	860
2,4,6-Trichlorophenol	340	U	340	350	U	350	350	U	350	340	U	340
2,4-Dichlorophenol	340	U	340	350	U	350	350	U	350	340	U	340
2,4-Dimethylphenol	340	U	340	350	U	350	350	U	350	340	U	340
2,4-Dinitrophenol	860	U	860	860	U	860	860	U	860	860	U	860
2,4-Dinitrotoluene	340	U	340	350	U	350	350	U	350	340	U	340
2,6-Dinitrotoluene	340	U	340	350	U	350	350	U	350	340	U	340
2-Chloronaphthalene	340	U	340	350	U	350	350	U	350	340	U	340
2-Chlorophenol	340	U	340	350	U	350	350	U	350	340	U	340
2-Methylnaphthalene	340	U	340	350	U	350	350	U	350	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	350	U	350	350	U	350	340	U	340
2-Nitroaniline	860	U	860	860	U	860	860	U	860	860	U	860
2-Nitrophenol	340	U	340	350	U	350	350	U	350	340	U	340

Attachment	1	Sheet No.	7 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16332 Sample Location SE-1 Sample Date 12/17/07			J16333 Sample Location SE-2 Sample Date 12/17/07			J16334 Dup of J16333 Sample Date 12/17/07			J16335 Sample Location SE-3 Sample Date 12/17/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	340	U	340	350	U	350	350	U	350	340	U	340
4-Methylphenol (p-cresol)	340	U	340	350	U	350	350	U	350	340	U	340
3-Nitroaniline	860	U	860	860	U	860	860	U	860	860	U	860
4,6-Dinitro-2-methylphenol	860	U	860	860	U	860	860	U	860	860	U	860
4-Bromophenyl-phenylether	340	U	340	350	U	350	350	U	350	340	U	340
4-Chloro-3-methylphenol	340	U	340	350	U	350	350	U	350	340	U	340
4-Chloroaniline	340	U	340	350	U	350	350	U	350	340	U	340
4-Chlorophenyl-phenylether	340	U	340	350	U	350	350	U	350	340	U	340
4-Nitroaniline	860	U	860	860	U	860	860	U	860	860	U	860
4-Nitrophenol	860	U	860	860	U	860	860	U	860	860	U	860
Acenaphthene	340	U	340	350	U	350	350	U	350	340	U	340
Acenaphthylene	340	U	340	350	U	350	350	U	350	340	U	340
Anthracene	340	U	340	350	U	350	350	U	350	340	U	340
Benzo(a)anthracene	340	U	340	350	U	350	350	U	350	340	U	340
Benzo(a)pyrene	340	U	340	350	U	350	350	U	350	340	U	340
Benzo(b)fluoranthene	340	U	340	350	U	350	350	U	350	340	U	340
Benzo(g,h,i)perylene	340	U	340	350	U	350	350	U	350	340	U	340
Benzo(k)fluoranthene	340	U	340	350	U	350	350	U	350	340	U	340
Bis(2-chloro-1-methylethyl)ether	340	U	340	350	U	350	350	U	350	340	U	340
Bis(2-chloroethoxy)methane	340	U	340	350	U	350	350	U	350	340	U	340
Bis(2-chloroethyl) ether	340	U	340	350	U	350	350	U	350	340	U	340
Bis(2-ethylhexyl) phthalate	33	JB	340	20	JB	350	21	JB	350	340	U	340
Butylbenzylphthalate	340	U	340	350	U	350	350	U	350	340	U	340
Carbazole	340	U	340	350	U	350	350	U	350	340	U	340
Chrysene	340	U	340	350	U	350	350	U	350	340	U	340
Dibenz(a,h)anthracene	25	J	340	350	U	350	350	U	350	340	U	340
Dibenzofuran	340	U	340	350	U	350	350	U	350	340	U	340
Diethylphthalate	340	U	340	350	U	350	350	U	350	340	U	340
Dimethylphthalate	340	U	340	350	U	350	350	U	350	340	U	340
Di-n-butylphthalate	340	U	340	350	U	350	350	U	350	340	U	340
Di-n-octylphthalate	340	U	340	350	U	350	350	U	350	340	U	340
Fluoranthene	340	U	340	350	U	350	350	U	350	340	U	340
Fluorene	340	U	340	350	U	350	350	U	350	340	U	340
Hexachlorobenzene	340	U	340	350	U	350	350	U	350	340	U	340
Hexachlorobutadiene	340	U	340	350	U	350	350	U	350	340	U	340
Hexachlorocyclopentadiene	340	U	340	350	U	350	350	U	350	340	U	340
Hexachloroethane	340	U	340	350	U	350	350	U	350	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	350	U	350	350	U	350	340	U	340
Isophorone	340	U	340	350	U	350	350	U	350	340	U	340
Naphthalene	340	U	340	350	U	350	350	U	350	340	U	340
Nitrobenzene	340	U	340	350	U	350	350	U	350	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	350	U	350	350	U	350	340	U	340
N-Nitrosodiphenylamine	340	U	340	350	U	350	350	U	350	340	U	340
Pentachlorophenol	860	U	860	860	U	860	860	U	860	860	U	860
Phenanthrene	340	U	340	350	U	350	350	U	350	340	U	340
Phenol	340	U	340	350	U	350	350	U	350	340	U	340
Pyrene	340	U	340	350	U	350	350	U	350	340	U	340

Attachment	1	Sheet No.	8 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16336 Sample Location SE-4 Sample Date 12/17/07			J16337 Sample Location SE-5 Sample Date 12/17/07			J16338 Sample Location SE-6 Sample Date 12/17/07			J16339 Sample Location SE-7 Sample Date 12/17/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14
Pesticides												
Aldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-Chlordane	10		1.4	1.4	U	1.4	8.6	D	1.4	1.4	U	1.4
Beta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Delta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dieldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan I	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan II	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin ketone	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
gamma-Chlordane	13		1.4	1.4	U	1.4	8.2	D	1.4	1.4	U	1.4
Heptachlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Methoxychlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Toxaphene	14	U	14	14	U	14	14	U	14	14	U	14
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	360	U	360	350	U	350	350	U	350	350	U	350
1,2-Dichlorobenzene	360	U	360	350	U	350	350	U	350	350	U	350
1,3-Dichlorobenzene	360	U	360	350	U	350	350	U	350	350	U	350
1,4-Dichlorobenzene	360	U	360	350	U	350	350	U	350	350	U	350
2,4,5-Trichlorophenol	890	U	890	870	U	870	880	U	880	870	U	870
2,4,6-Trichlorophenol	360	U	360	350	U	350	350	U	350	350	U	350
2,4-Dichlorophenol	360	U	360	350	U	350	350	U	350	350	U	350
2,4-Dimethylphenol	360	U	360	350	U	350	350	U	350	350	U	350
2,4-Dinitrophenol	890	U	890	870	U	870	880	U	880	870	U	870
2,4-Dinitrotoluene	360	U	360	350	U	350	350	U	350	350	U	350
2,6-Dinitrotoluene	360	U	360	350	U	350	350	U	350	350	U	350
2-Chloronaphthalene	360	U	360	350	U	350	350	U	350	350	U	350
2-Chlorophenol	360	U	360	350	U	350	350	U	350	350	U	350
2-Methylnaphthalene	360	U	360	350	U	350	350	U	350	350	U	350
2-Methylphenol (cresol, o-)	360	U	360	350	U	350	350	U	350	350	U	350
2-Nitroaniline	890	U	890	870	U	870	880	U	880	870	U	870
2-Nitrophenol	360	U	360	350	U	350	350	U	350	350	U	350

Attachment	1	Sheet No.	9 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16336 Sample Location SE-4 Sample Date 12/17/07			J16337 Sample Location SE-5 Sample Date 12/17/07			J16338 Sample Location SE-6 Sample Date 12/17/07			J16339 Sample Location SE-7 Sample Date 12/17/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	360	U	360	350	U	350	350	U	350	350	U	350
4-Methylphenol (p-cresol)	360	U	360	350	U	350	350	U	350	350	U	350
3-Nitroaniline	890	U	890	870	U	870	880	U	880	870	U	870
4,6-Dinitro-2-methylphenol	890	U	890	870	U	870	880	U	880	870	U	870
4-Bromophenyl-phenylether	360	U	360	350	U	350	350	U	350	350	U	350
4-Chloro-3-methylphenol	360	U	360	350	U	350	350	U	350	350	U	350
4-Chloroaniline	360	U	360	350	U	350	350	U	350	350	U	350
4-Chlorophenyl-phenylether	360	U	360	350	U	350	350	U	350	350	U	350
4-Nitroaniline	890	U	890	870	U	870	880	U	880	870	U	870
4-Nitrophenol	890	U	890	870	U	870	880	U	880	870	U	870
Acenaphthene	360	U	360	350	U	350	350	U	350	350	U	350
Acenaphthylene	360	U	360	350	U	350	350	U	350	350	U	350
Anthracene	360	U	360	350	U	350	350	U	350	350	U	350
Benzo(a)anthracene	360	U	360	350	U	350	350	U	350	350	U	350
Benzo(a)pyrene	360	U	360	350	U	350	350	U	350	350	U	350
Benzo(b)fluoranthene	360	U	360	350	U	350	350	U	350	350	U	350
Benzo(g,h,i)perylene	360	U	360	350	U	350	350	U	350	350	U	350
Benzo(k)fluoranthene	360	U	360	350	U	350	350	U	350	350	U	350
Bis(2-chloro-1-methylethyl)ether	360	U	360	350	U	350	350	U	350	350	U	350
Bis(2-chloroethoxy)methane	360	U	360	350	U	350	350	U	350	350	U	350
Bis(2-chloroethyl) ether	360	U	360	350	U	350	350	U	350	350	U	350
Bis(2-ethylhexyl) phthalate	22	JB	360	350	U	350	28	J	350	20	J	350
Butylbenzylphthalate	360	U	360	350	U	350	350	U	350	350	U	350
Carbazole	360	U	360	350	U	350	350	U	350	350	U	350
Chrysene	360	U	360	350	U	350	350	U	350	350	U	350
Dibenz(a,h)anthracene	360	U	360	350	U	350	350	U	350	350	U	350
Dibenzofuran	360	U	360	350	U	350	350	U	350	350	U	350
Diethylphthalate	360	U	360	350	U	350	350	U	350	350	U	350
Dimethylphthalate	360	U	360	350	U	350	350	U	350	350	U	350
Di-n-butylphthalate	360	U	360	350	U	350	350	U	350	350	U	350
Di-n-octylphthalate	360	U	360	350	U	350	350	U	350	350	U	350
Fluoranthene	360	U	360	350	U	350	350	U	350	350	U	350
Fluorene	360	U	360	350	U	350	350	U	350	350	U	350
Hexachlorobenzene	360	U	360	350	U	350	350	U	350	350	U	350
Hexachlorobutadiene	360	U	360	350	U	350	350	U	350	350	U	350
Hexachlorocyclopentadiene	360	U	360	350	U	350	350	U	350	350	U	350
Hexachloroethane	360	U	360	350	U	350	350	U	350	350	U	350
Indeno(1,2,3-cd)pyrene	360	U	360	350	U	350	350	U	350	350	U	350
Isophorone	360	U	360	350	U	350	350	U	350	350	U	350
Naphthalene	360	U	360	350	U	350	350	U	350	350	U	350
Nitrobenzene	360	U	360	350	U	350	350	U	350	350	U	350
N-Nitroso-di-n-dipropylamine	360	U	360	350	U	350	350	U	350	350	U	350
N-Nitrosodiphenylamine	360	U	360	350	U	350	350	U	350	350	U	350
Pentachlorophenol	890	U	890	870	U	870	880	U	880	870	U	870
Phenanthrene	360	U	360	350	U	350	350	U	350	350	U	350
Phenol	360	U	360	350	U	350	350	U	350	350	U	350
Pyrene	360	U	360	350	U	350	350	U	350	350	U	350

Attachment	1	Sheet No.	10 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16340 Sample Location SE-8 Sample Date 12/17/07			J16341 Sample Location SE-9 Sample Date 12/17/07			J16342 Sample Location SE-10 Sample Date 12/17/07			J16DT7 Sample Location NW-1 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	15	U	15	15	U	15	14	U	14
Aroclor-1221	14	U	14	15	U	15	15	U	15	14	U	14
Aroclor-1232	14	U	14	15	U	15	15	U	15	14	U	14
Aroclor-1242	14	U	14	15	U	15	15	U	15	14	U	14
Aroclor-1248	14	U	14	15	U	15	15	U	15	14	U	14
Aroclor-1254	14	U	14	23		15	15	U	15	14	U	14
Aroclor-1260	14	U	14	9.8	J	15	15	U	15	14	U	14
Pesticides												
Aldrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Alpha-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Alpha-Chlordane	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Beta-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Delta-BHC	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.4	UD	1.4	1.8	JD	1.5	1.5	UD	1.5	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.4	UD	1.4	1.7	JD	1.5	1.5	UD	1.5	1.4	U	1.4
Dieldrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Endosulfan I	1.4	UD	1.4	1.8	JD	1.5	1.5	UD	1.5	1.4	U	1.4
Endosulfan II	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Endosulfan sulfate	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Endrin	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Endrin aldehyde	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Endrin ketone	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Gamma-BHC (Lindane)	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
gamma-Chlordane	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Heptachlor	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Heptachlor epoxide	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Methoxychlor	1.4	UD	1.4	1.5	UD	1.5	1.5	UD	1.5	1.4	U	1.4
Toxaphene	14	UD	14	15	UD	15	15	UD	15	14	U	14
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	350	U	350	360	U	360	370	U	370	340	U	340
1,2-Dichlorobenzene	350	U	350	360	U	360	370	U	370	340	U	340
1,3-Dichlorobenzene	350	U	350	360	U	360	370	U	370	340	U	340
1,4-Dichlorobenzene	350	U	350	360	U	360	370	U	370	340	U	340
2,4,5-Trichlorophenol	870	U	870	910	U	910	920	U	920	850	U	850
2,4,6-Trichlorophenol	350	U	350	360	U	360	370	U	370	340	U	340
2,4-Dichlorophenol	350	U	350	360	U	360	370	U	370	340	U	340
2,4-Dimethylphenol	350	U	350	360	U	360	370	U	370	340	U	340
2,4-Dinitrophenol	870	U	870	910	U	910	920	U	920	850	U	850
2,4-Dinitrotoluene	350	U	350	360	U	360	370	U	370	350	U	350
2,6-Dinitrotoluene	350	U	350	360	U	360	370	U	370	340	U	340
2-Chloronaphthalene	350	U	350	360	U	360	370	U	370	340	U	340
2-Chlorophenol	350	U	350	360	U	360	370	U	370	340	U	340
2-Methylnaphthalene	350	U	350	360	U	360	370	U	370	340	U	340
2-Methylphenol (cresol, o-)	350	U	350	360	U	360	370	U	370	340	U	340
2-Nitroaniline	870	U	870	910	U	910	920	U	920	850	U	850
2-Nitrophenol	350	U	350	360	U	360	370	U	370	340	U	340

Attachment	1	Sheet No.	11 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16340 Sample Location SE-8 Sample Date 12/17/07			J16341 Sample Location SE-9 Sample Date 12/17/07			J16342 Sample Location SE-10 Sample Date 12/17/07			J16DT7 Sample Location NW-1 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	350	U	350	360	U	360	370	U	370	340	U	340
4-Methylphenol (p-cresol)	350	U	350	360	U	360	370	U	370	340	U	340
3-Nitroaniline	870	U	870	910	U	910	920	U	920	850	U	850
4,6-Dinitro-2-methylphenol	870	U	870	910	U	910	920	U	920	850	U	850
4-Bromophenyl-phenylether	350	U	350	360	U	360	370	U	370	340	U	340
4-Chloro-3-methylphenol	350	U	350	360	U	360	370	U	370	340	U	340
4-Chloroaniline	350	U	350	360	U	360	370	U	370	340	U	340
4-Chlorophenyl-phenylether	350	U	350	360	U	360	370	U	370	340	U	340
4-Nitroaniline	870	U	870	910	U	910	920	U	920	850	U	850
4-Nitrophenol	870	U	870	910	U	910	920	U	920	850	U	850
Acenaphthene	350	U	350	360	U	360	370	U	370	340	U	340
Acenaphthylene	350	U	350	360	U	360	370	U	370	340	U	340
Anthracene	350	U	350	360	U	360	370	U	370	340	U	340
Benzo(a)anthracene	350	U	350	360	U	360	370	U	370	340	U	340
Benzo(a)pyrene	350	U	350	360	U	360	370	U	370	340	U	340
Benzo(b)fluoranthene	350	U	350	360	U	360	370	U	370	340	U	340
Benzo(g,h,i)perylene	350	U	350	360	U	360	370	U	370	340	U	340
Benzo(k)fluoranthene	350	U	350	360	U	360	370	U	370	340	U	340
Bis(2-chloro-1-methylethyl)ether	350	U	350	360	U	360	370	U	370	340	U	340
Bis(2-chloroethoxy)methane	350	U	350	360	U	360	370	U	370	340	U	340
Bis(2-chloroethyl) ether	350	U	350	360	U	360	370	U	370	340	U	340
Bis(2-ethylhexyl) phthalate	200	J	350	27	J	360	25	J	370	25	JB	350
Butylbenzylphthalate	350	U	350	360	U	360	370	U	370	340	U	340
Carbazole	350	U	350	360	U	360	370	U	370	340	U	340
Chrysene	350	U	350	360	U	360	370	U	370	340	U	340
Dibenz(a,h)anthracene	350	U	350	360	U	360	370	U	370	340	U	340
Dibenzofuran	350	U	350	360	U	360	370	U	370	340	U	340
Diethylphthalate	350	U	350	360	U	360	370	U	370	340	U	340
Dimethylphthalate	350	U	350	360	U	360	370	U	370	340	U	340
Di-n-butylphthalate	350	U	350	360	U	360	370	U	370	340	U	340
Di-n-octylphthalate	350	U	350	360	U	360	370	U	370	340	U	340
Fluoranthene	350	U	350	360	U	360	370	U	370	340	U	340
Fluorene	350	U	350	360	U	360	370	U	370	340	U	340
Hexachlorobenzene	350	U	350	360	U	360	370	U	370	340	U	340
Hexachlorobutadiene	350	U	350	360	U	360	370	U	370	340	U	340
Hexachlorocyclopentadiene	350	U	350	360	U	360	370	U	370	340	U	340
Hexachloroethane	350	U	350	360	U	360	370	U	370	340	U	340
Indeno(1,2,3-cd)pyrene	350	U	350	360	U	360	370	U	370	340	U	340
Isophorone	350	U	350	360	U	360	370	U	370	340	U	340
Naphthalene	350	U	350	360	U	360	370	U	370	340	U	340
Nitrobenzene	350	U	350	360	U	360	370	U	370	340	U	340
N-Nitroso-di-n-dipropylamine	350	U	350	360	U	360	370	U	370	340	U	340
N-Nitrosodiphenylamine	350	U	350	360	U	360	370	U	370	340	U	340
Pentachlorophenol	870	U	870	910	U	910	920	U	920	850	U	850
Phenanthrene	350	U	350	360	U	360	370	U	370	340	U	340
Phenol	350	U	350	360	U	360	370	U	370	340	U	340
Pyrene	350	U	350	360	U	360	370	U	370	340	U	340

Attachment	1	Sheet No.	12 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DT8 Sample Location NW-2 Sample Date 3/18/07			J16DT9 Sample Location NW-3 Sample Date 3/18/07			J16DV0 Sample Location NW-4 Sample Date 3/18/07			J16DV1 Sample Location NW-5 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1221	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1232	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1242	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1248	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1254	14	U	14	14	U	14	13	U	13	14	U	14
Aroclor-1260	14	U	14	14	U	14	13	U	13	14	U	14
Pesticides												
Aldrin	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Alpha-BHC	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Alpha-Chlordane	1.6	J	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Beta-BHC	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Delta-BHC	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Dieldrin	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endosulfan I	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endosulfan II	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endrin	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Endrin ketone	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
gamma-Chlordane	1.8	J	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Heptachlor	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Methoxychlor	1.4	U	1.4	1.4	U	1.4	1.3	U	1.3	1.4	U	1.4
Toxaphene	14	U	14	14	U	14	13	U	13	14	U	14
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	350	U	350	340	U	340	340	U	340	350	U	350
1,2-Dichlorobenzene	350	U	350	340	U	340	340	U	340	350	U	350
1,3-Dichlorobenzene	350	U	350	340	U	340	340	U	340	350	U	350
1,4-Dichlorobenzene	350	U	350	340	U	340	340	U	340	350	U	350
2,4,5-Trichlorophenol	880	U	880	850	U	850	840	U	840	880	U	880
2,4,6-Trichlorophenol	350	U	350	340	U	340	340	U	340	350	U	350
2,4-Dichlorophenol	350	U	350	340	U	340	340	U	340	350	U	350
2,4-Dimethylphenol	350	U	350	340	U	340	340	U	340	350	U	350
2,4-Dinitrophenol	880	U	880	850	U	850	840	U	840	880	U	880
2,4-Dinitrotoluene	350	U	350	340	U	340	340	U	340	350	U	350
2,6-Dinitrotoluene	350	U	350	340	U	340	340	U	340	350	U	350
2-Chloronaphthalene	350	U	350	340	U	340	340	U	340	350	U	350
2-Chlorophenol	350	U	350	340	U	340	340	U	340	350	U	350
2-Methylnaphthalene	350	U	350	340	U	340	340	U	340	350	U	350
2-Methylphenol (cresol, o-)	350	U	350	340	U	340	340	U	340	350	U	350
2-Nitroaniline	880	U	880	850	U	850	840	U	840	880	U	880
2-Nitrophenol	350	U	350	340	U	340	340	U	340	350	U	350

Attachment	1	Sheet No.	13 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DT8 Sample Location NW-2 Sample Date 3/18/07			J16DT9 Sample Location NW-3 Sample Date 3/18/07			J16DV0 Sample Location NW-4 Sample Date 3/18/07			J16DV1 Sample Location NW-5 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	350	U	350	340	U	340	340	U	340	350	U	350
4-Methylphenol (p-cresol)	350	U	350	340	U	340	340	U	340	350	U	350
3-Nitroaniline	880	U	880	850	U	850	840	U	840	880	U	880
4,6-Dinitro-2-methylphenol	880	U	880	850	U	850	840	U	840	880	U	880
4-Bromophenyl-phenylether	350	U	350	340	U	340	340	U	340	350	U	350
4-Chloro-3-methylphenol	350	U	350	340	U	340	340	U	340	350	U	350
4-Chloroaniline	350	U	350	340	U	340	340	U	340	350	U	350
4-Chlorophenyl-phenylether	350	U	350	340	U	340	340	U	340	350	U	350
4-Nitroaniline	880	U	880	850	U	850	840	U	840	880	U	880
4-Nitrophenol	880	U	880	850	U	850	840	U	840	880	U	880
Acenaphthene	350	U	350	340	U	340	340	U	340	350	U	350
Acenaphthylene	350	U	350	340	U	340	340	U	340	350	U	350
Anthracene	350	U	350	340	U	340	340	U	340	350	U	350
Benzo(a)anthracene	350	U	350	340	U	340	340	U	340	350	U	350
Benzo(a)pyrene	350	U	350	340	U	340	340	U	340	350	U	350
Benzo(b)fluoranthene	350	U	350	340	U	340	340	U	340	350	U	350
Benzo(g,h,i)perylene	350	U	350	340	U	340	340	U	340	350	U	350
Benzo(k)fluoranthene	350	U	350	340	U	340	340	U	340	350	U	350
Bis(2-chloro-1-methylethyl)ether	350	U	350	340	U	340	340	U	340	350	U	350
Bis(2-chloroethoxy)methane	350	U	350	340	U	340	340	U	340	350	U	350
Bis(2-chloroethyl) ether	350	U	350	340	U	340	340	U	340	350	U	350
Bis(2-ethylhexyl) phthalate	100	JB	350	84	JB	340	72	JB	340	31	JB	350
Butylbenzylphthalate	350	U	350	340	U	340	340	U	340	350	U	350
Carbazole	350	U	350	340	U	340	340	U	340	350	U	350
Chrysene	350	U	350	340	U	340	340	U	340	350	U	350
Dibenz(a,h)anthracene	350	U	350	340	U	340	340	U	340	350	U	350
Dibenzofuran	350	U	350	340	U	340	340	U	340	350	U	350
Diethylphthalate	350	U	350	340	U	340	340	U	340	350	U	350
Dimethylphthalate	350	U	350	340	U	340	340	U	340	350	U	350
Di-n-butylphthalate	19	J	350	27	J	340	25	J	340	350	U	350
Di-n-octylphthalate	350	U	350	340	U	340	340	U	340	350	U	350
Fluoranthene	350	U	350	340	U	340	340	U	340	350	U	350
Fluorene	350	U	350	340	U	340	340	U	340	350	U	350
Hexachlorobenzene	350	U	350	340	U	340	340	U	340	350	U	350
Hexachlorobutadiene	350	U	350	340	U	340	340	U	340	350	U	350
Hexachlorocyclopentadiene	350	U	350	340	U	340	340	U	340	350	U	350
Hexachloroethane	350	U	350	340	U	340	340	U	340	350	U	350
Indeno(1,2,3-cd)pyrene	350	U	350	340	U	340	340	U	340	350	U	350
Isophorone	350	U	350	340	U	340	340	U	340	350	U	350
Naphthalene	350	U	350	340	U	340	340	U	340	350	U	350
Nitrobenzene	350	U	350	340	U	340	340	U	340	350	U	350
N-Nitroso-di-n-dipropylamine	350	U	350	340	U	340	340	U	340	350	U	350
N-Nitrosodiphenylamine	350	U	350	340	U	340	340	U	340	350	U	350
Pentachlorophenol	880	U	880	850	U	850	840	U	840	880	U	880
Phenanthrene	350	U	350	340	U	340	340	U	340	350	U	350
Phenol	350	U	350	340	U	340	340	U	340	350	U	350
Pyrene	350	U	350	340	U	340	340	U	340	350	U	350

Attachment	1	Sheet No.	14 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DV2 Sample Location NW-6 Sample Date 3/18/07			J16DV3 Sample Location NW-7 Sample Date 3/18/07			J16DV4 Sample Location NW-8 Sample Date 3/18/07			J16DV5 Sample Location NW-9 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1221	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1232	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1242	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1248	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1254	14	U	14	14	U	14	14	U	14	14	U	14
Aroclor-1260	14	U	14	14	U	14	14	U	14	14	U	14
Pesticides												
Aldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Alpha-Chlordane	1.4	U	1.4	1.4	U	1.4	2.1	J	1.4	1.4	U	1.4
Beta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Delta-BHC	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Dieldrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan I	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan II	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Endrin ketone	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
gamma-Chlordane	1.4	U	1.4	1.4	U	1.4	2.2	J	1.4	1.4	U	1.4
Heptachlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Methoxychlor	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4	1.4	U	1.4
Toxaphene	14	U	14	14	U	14	14	U	14	14	U	14
Semivolatile Organic Analytes												
1,2,4-Trichlorobenzene	340	U	340	340	U	340	360	U	360	340	U	340
1,2-Dichlorobenzene	340	U	340	340	U	340	360	U	360	340	U	340
1,3-Dichlorobenzene	340	U	340	340	U	340	360	U	360	340	U	340
1,4-Dichlorobenzene	340	U	340	340	U	340	360	U	360	340	U	340
2,4,5-Trichlorophenol	860	U	860	840	U	840	900	U	900	860	U	860
2,4,6-Trichlorophenol	340	U	340	340	U	340	360	U	360	340	U	340
2,4-Dichlorophenol	340	U	340	340	U	340	360	U	360	340	U	340
2,4-Dimethylphenol	340	U	340	340	U	340	360	U	360	340	U	340
2,4-Dinitrophenol	860	U	860	840	U	840	900	U	900	860	U	860
2,4-Dinitrotoluene	340	U	340	340	U	340	360	U	360	340	U	340
2,6-Dinitrotoluene	340	U	340	340	U	340	360	U	360	340	U	340
2-Chloronaphthalene	340	U	340	340	U	340	360	U	360	340	U	340
2-Chlorophenol	340	U	340	340	U	340	360	U	360	340	U	340
2-Methylnaphthalene	340	U	340	340	U	340	360	U	360	340	U	340
2-Methylphenol (cresol, o-)	340	U	340	340	U	340	360	U	360	340	U	340
2-Nitroaniline	860	U	860	840	U	840	900	U	900	860	U	860
2-Nitrophenol	340	U	340	340	U	340	360	U	360	340	U	340

Attachment	1	Sheet No.	15 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DV2 Sample Location NW-6 Sample Date 3/18/07			J16DV3 Sample Location NW-7 Sample Date 3/18/07			J16DV4 Sample Location NW-8 Sample Date 3/18/07			J16DV5 Sample Location NW-9 Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)												
3,3'-Dichlorobenzidine	340	U	340	340	U	340	360	U	360	340	U	340
4-Methylphenol (p-cresol)	340	U	340	340	U	340	360	U	360	340	U	340
3-Nitroaniline	860	U	860	840	U	840	900	U	900	860	U	860
4,6-Dinitro-2-methylphenol	860	U	860	840	U	840	900	U	900	860	U	860
4-Bromophenyl-phenylether	340	U	340	340	U	340	360	U	360	340	U	340
4-Chloro-3-methylphenol	340	U	340	340	U	340	360	U	360	340	U	340
4-Chloroaniline	340	U	340	340	U	340	360	U	360	340	U	340
4-Chlorophenyl-phenylether	340	U	340	340	U	340	360	U	360	340	U	340
4-Nitroaniline	860	U	860	840	U	840	900	U	900	860	U	860
4-Nitrophenol	860	U	860	840	U	840	900	U	900	860	U	860
Acenaphthene	340	U	340	340	U	340	360	U	360	340	U	340
Acenaphthylene	340	U	340	340	U	340	360	U	360	340	U	340
Anthracene	340	U	340	340	U	340	360	U	360	340	U	340
Benzo(a)anthracene	340	U	340	340	U	340	360	U	360	340	U	340
Benzo(a)pyrene	340	U	340	340	U	340	360	U	360	340	U	340
Benzo(b)fluoranthene	340	U	340	340	U	340	360	U	360	340	U	340
Benzo(g,h,i)perylene	340	U	340	340	U	340	360	U	360	340	U	340
Benzo(k)fluoranthene	340	U	340	340	U	340	360	U	360	340	U	340
Bis(2-chloro-1-methylethyl)ether	340	U	340	340	U	340	360	U	360	340	U	340
Bis(2-chloroethoxy)methane	340	U	340	340	U	340	360	U	360	340	U	340
Bis(2-chloroethyl) ether	340	U	340	340	U	340	360	U	360	340	U	340
Bis(2-ethylhexyl) phthalate	23	JB	340	340	U	340	64	JB	360	29	JB	340
Butylbenzylphthalate	340	U	340	340	U	340	360	U	360	340	U	340
Carbazole	340	U	340	340	U	340	360	U	360	340	U	340
Chrysene	340	U	340	340	U	340	360	U	360	340	U	340
Dibenz(a,h)anthracene	340	U	340	340	U	340	360	U	360	340	U	340
Dibenzofuran	340	U	340	340	U	340	360	U	360	340	U	340
Diethylphthalate	340	U	340	340	U	340	360	U	360	340	U	340
Dimethylphthalate	340	U	340	340	U	340	360	U	360	340	U	340
Di-n-butylphthalate	340	U	340	340	U	340	360	U	360	340	U	340
Di-n-octylphthalate	340	U	340	340	U	340	360	U	360	340	U	340
Fluoranthene	340	U	340	340	U	340	360	U	360	340	U	340
Fluorene	340	U	340	340	U	340	360	U	360	340	U	340
Hexachlorobenzene	340	U	340	340	U	340	360	U	360	340	U	340
Hexachlorobutadiene	340	U	340	340	U	340	360	U	360	340	U	340
Hexachlorocyclopentadiene	340	U	340	340	U	340	360	U	360	340	U	340
Hexachloroethane	340	U	340	340	U	340	360	U	360	340	U	340
Indeno(1,2,3-cd)pyrene	340	U	340	340	U	340	360	U	360	340	U	340
Isophorone	340	U	340	340	U	340	360	U	360	340	U	340
Naphthalene	340	U	340	340	U	340	360	U	360	340	U	340
Nitrobenzene	340	U	340	340	U	340	360	U	360	340	U	340
N-Nitroso-di-n-dipropylamine	340	U	340	340	U	340	360	U	360	340	U	340
N-Nitrosodiphenylamine	340	U	340	340	U	340	360	U	360	340	U	340
Pentachlorophenol	860	U	860	840	U	840	900	U	900	860	U	860
Phenanthrene	340	U	340	340	U	340	360	U	360	340	U	340
Phenol	340	U	340	340	U	340	360	U	360	340	U	340
Pyrene	340	U	340	340	U	340	360	U	360	340	U	340

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Checked	L. D. Habel	Date	04/03/08
Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DV7 Duplicate of J16DV6 Sample Date 3/18/07			J16DV6 Sample Location NW-10 Sample Date 3/18/07			J16DT6 Equip Blank Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls									
Aroclor-1016	14	U	14	14	U	14			
Aroclor-1221	14	U	14	14	U	14			
Aroclor-1232	14	U	14	14	U	14			
Aroclor-1242	14	U	14	14	U	14			
Aroclor-1248	14	U	14	14	U	14			
Aroclor-1254	14	U	14	14	U	14			
Aroclor-1260	14	U	14	14	U	14			
Pesticides									
Aldrin	1.4	U	1.4	1.4	U	1.4			
Alpha-BHC	1.4	U	1.4	1.4	U	1.4			
Alpha-Chlordane	1.4	U	1.4	1.4	U	1.4			
Beta-BHC	1.4	U	1.4	1.4	U	1.4			
Delta-BHC	1.4	U	1.4	1.4	U	1.4			
Dichlorodiphenyldichloroethane	1.4	U	1.4	1.4	U	1.4			
Dichlorodiphenyldichloroethylene	1.4	U	1.4	1.4	U	1.4			
Dichlorodiphenyltrichloroethane	1.4	U	1.4	1.4	U	1.4			
Dieldrin	1.4	U	1.4	1.4	U	1.4			
Endosulfan I	1.4	U	1.4	1.4	U	1.4			
Endosulfan II	1.4	U	1.4	1.4	U	1.4			
Endosulfan sulfate	1.4	U	1.4	1.4	U	1.4			
Endrin	1.4	U	1.4	1.4	U	1.4			
Endrin aldehyde	1.4	U	1.4	1.4	U	1.4			
Endrin ketone	1.4	U	1.4	1.4	U	1.4			
Gamma-BHC (Lindane)	1.4	U	1.4	1.4	U	1.4			
gamma-Chlordane	1.4	U	1.4	1.4	U	1.4			
Heptachlor	1.4	U	1.4	1.4	U	1.4			
Heptachlor epoxide	1.4	U	1.4	1.4	U	1.4			
Methoxychlor	1.4	U	1.4	1.4	U	1.4			
Toxaphene	14	U	14	14	U	14			
Semivolatile Organic Analytes									
1,2,4-Trichlorobenzene	360	U	360	360	U	360	330	U	330
1,2-Dichlorobenzene	360	U	360	360	U	360	330	U	330
1,3-Dichlorobenzene	360	U	360	360	U	360	330	U	330
1,4-Dichlorobenzene	360	U	360	360	U	360	330	U	330
2,4,5-Trichlorophenol	900	U	900	900	U	900	830	U	830
2,4,6-Trichlorophenol	360	U	360	360	U	360	330	U	330
2,4-Dichlorophenol	360	U	360	360	U	360	330	U	330
2,4-Dimethylphenol	360	U	360	360	U	360	330	U	330
2,4-Dinitrophenol	900	U	900	900	U	900	830	U	830
2,4-Dinitrotoluene	360	U	360	360	U	360	330	U	330
2,6-Dinitrotoluene	360	U	360	360	U	360	330	U	330
2-Chloronaphthalene	360	U	360	360	U	360	330	U	330
2-Chlorophenol	360	U	360	360	U	360	330	U	330
2-Methylnaphthalene	360	U	360	360	U	360	330	U	330
2-Methylphenol (cresol, o-)	360	U	360	360	U	360	330	U	330
2-Nitroaniline	900	U	900	900	U	900	830	U	830
2-Nitrophenol	360	U	360	360	U	360	330	U	330

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Originator	H. M. Sulloway	Date	04/03/08
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Calc. No.	0100F-CA-V0350	Rev. No.	0

Attachment 1. 120-F-1 Verification Sampling Results.

Constituent	J16DV7 Duplicate of J16DV6 Sample Date 3/18/07			J16DV6 Sample Location NW-10 Sample Date 3/18/07			J16DT6 Equip Blank Sample Date 3/18/07		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Analytes (continued)									
3,3'-Dichlorobenzidine	360	U	360	360	U	360	330	U	330
4-Methylphenol (p-cresol)	360	U	360	360	U	360	330	U	330
3-Nitroaniline	900	U	900	900	U	900	830	U	830
4,6-Dinitro-2-methylphenol	900	U	900	900	U	900	830	U	830
4-Bromophenyl-phenylether	360	U	360	360	U	360	330	U	330
4-Chloro-3-methylphenol	360	U	360	360	U	360	330	U	330
4-Chloroaniline	360	U	360	360	U	360	330	U	330
4-Chlorophenyl-phenylether	360	U	360	360	U	360	330	U	330
4-Nitroaniline	900	U	900	900	U	900	830	U	830
4-Nitrophenol	900	U	900	900	U	900	830	U	830
Acenaphthene	360	U	360	360	U	360	330	U	330
Acenaphthylene	360	U	360	360	U	360	330	U	330
Anthracene	360	U	360	360	U	360	330	U	330
Benzo(a)anthracene	360	U	360	360	U	360	330	U	330
Benzo(a)pyrene	360	U	360	360	U	360	330	U	330
Benzo(b)fluoranthene	360	U	360	360	U	360	330	U	330
Benzo(g,h,i)perylene	360	U	360	360	U	360	330	U	330
Benzo(k)fluoranthene	360	U	360	360	U	360	330	U	330
Bis(2-chloro-1-methylethyl)ether	360	U	360	360	U	360	330	U	330
Bis(2-chloroethoxy)methane	360	U	360	360	U	360	330	U	330
Bis(2-chloroethyl) ether	360	U	360	360	U	360	330	U	330
Bis(2-ethylhexyl) phthalate	28	JB	360	18	J	360	59	J	330
Butylbenzylphthalate	360	U	360	360	U	360	330	U	330
Carbazole	360	U	360	360	U	360	330	U	330
Chrysene	360	U	360	360	U	360	330	U	330
Dibenz(a,h)anthracene	360	U	360	360	U	360	330	U	330
Dibenzofuran	360	U	360	360	U	360	330	U	330
Diethylphthalate	360	U	360	360	U	360	330	U	330
Dimethylphthalate	360	U	360	360	U	360	330	U	330
Di-n-butylphthalate	360	U	360	360	U	360	330	U	330
Di-n-octylphthalate	360	U	360	360	U	360	330	U	330
Fluoranthene	360	U	360	360	U	360	330	U	330
Fluorene	360	U	360	360	U	360	330	U	330
Hexachlorobenzene	360	U	360	360	U	360	330	U	330
Hexachlorobutadiene	360	U	360	360	U	360	330	U	330
Hexachlorocyclopentadiene	360	U	360	360	U	360	330	U	330
Hexachloroethane	360	U	360	360	U	360	330	U	330
Indeno(1,2,3-cd)pyrene	360	U	360	360	U	360	330	U	330
Isophorone	360	U	360	360	U	360	330	U	330
Naphthalene	360	U	360	360	U	360	330	U	330
Nitrobenzene	360	U	360	360	U	360	330	U	330
N-Nitroso-di-n-dipropylamine	360	U	360	360	U	360	330	U	330
N-Nitrosodiphenylamine	360	U	360	360	U	360	330	U	330
Pentachlorophenol	900	U	900	900	U	900	830	U	830
Phenanthrene	360	U	360	360	U	360	330	U	330
Phenol	360	U	360	360	U	360	330	U	330
Pyrene	360	U	360	360	U	360	330	U	330

Attachment	1	Sheet No.	18 of 18
Originator	H. M. Sulloway	Date	04/03/08
Checked	L. D. Habel	Date	04/03/08
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Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0355

Subject: 120-F-1 Waste Site Cleanup Verification Hazard Quotient and Carcinogenic Risk 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 Summary = 3	H. M. Sulloway	L. D. Habel		J. D. Fancher	signed 4/2/08
1	Cover = 1 Summary = 3	H. M. Sulloway	L. D. Habel	NA	J. D. Fancher	5/7/08

SUMMARY OF REVISION

1	Entire calculation revised for simplicity. Changes are as follows: 1. Sheet 2, line 26 and 27, the term 'statistical' replaced with the term maximum as value was not obtained from a statistical calculation, 2. sheet 3, line 5, column heading term "Maximum" changed to "Statistical or Maximum Result", 3. sheet 3, line 13, added fluoride to hazard quotient calculation, and 4. sheet 3, line 19, value of 4,4'-DDT changed from 0.0017 to 0.0021.

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	05/06/08	Calc. No.:	0100F-CA-V0355	Rev.:	1
Project:	100-F Area Field Remediation	Job No:	14655	Checked:	L. D. Habel	Date:	05/06/08
Subject:	120-F-1 Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation					Sheet No.	1 of 3

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk for the 120-F-1 glass dump waste site. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

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

GIVEN/REFERENCES:

1) Capron, J. M., 2008, Revised 120-F-1 Verification Sampling, CCN 138678, email to R. Lobos (EPA) and C. Smith (DOE), dated February 14, 2008, Washington Closure Hanford, Inc., Richland, Washington.

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

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

4) WCH, 2007, *Work Instruction for Verification Sampling of the 120-F-1 Glass Dump Waste Site,* Work Instruction No. 0100F-WI-G0069, Washington Closure Hanford, Inc., Richland, Washington.

5) WCH, 2008, *120-F-1 Cleanup Verification 95% UCL Calculation*, Calc. No. 0100F-CA-V0345, 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 2005).

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

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

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

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	05/06/08	Calc. No.:	0100F-CA-V0355	Rev.:	1
Project:	100-F Area Field Remediation	Job No:	14655	Checked:	L. D. Habel	Date:	05/06/08
Subject:	120-F-1 Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation					Sheet No.	2 of 3

METHODOLOGY:

The 120-F-1 waste site was divided into two sampling areas (northwest and southwest excavations) for verification sampling (WCH 2007). The original area of the northwest excavation was expanded after the original sampling showed additional soil removal would be required. The sample design for the northwest area was updated and approved by the regulators (Capron 2008). The maximum values from the combined results of the two sampling areas were used in developing the HQ and risk calculations. Of the nonradionuclide contaminants of potential concern (COPCs), mercury and selenium required the HQ and risk calculations because they were quantified above background. Boron, molybdenum, and hexavalent chromium values require HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. Aroclor-1254, Aroclor-1260, and multiple organic COPCs (as listed in Table 1) are included because they were detected by laboratory analysis and cannot be attributed to natural occurrence. All other site nonradionuclide COCs were not detected or were quantified below background levels.

An example of the HQ and risk calculations is presented below:

1) For example, the statistical value for boron is 4.6 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (boron is identified as a noncarcinogen in WAC 173-340-740[3]), is 2.9×10^{-4}. Comparing this value to the requirement of <1.0, this criteria is met.

2) After the HQ calculation is completed for the appropriate analytes, the cumulative HQ can be obtained by summing the individual values. The sum of the HQ values (shown in Table 1) is 4.2×10^{-2}. Comparing this value to the requirement of <1.0, this criteria is met.

3) To calculate the excess cancer risk, the maximum value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for hexavalent chromium is 1.8 mg/kg, divided by 2.1 mg/kg, and multiplied as indicated, is 8.6×10^{-7}. Comparing this value and all other individual values to the requirement of $<1 \times 10^{-6}$, this criteria 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. The sum of the excess cancer risk values is 1.1×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

1) List individual noncarcinogens and corresponding HQs >1.0: None
2) List the cumulative noncarcinogenic HQ >1.0: None
3) List individual carcinogens and corresponding excess cancer risk $>1 \times 10^{-6}$: None
4) List the cumulative excess cancer risk for carcinogens $>1 \times 10^{-5}$: None.

Table 1 shows the results of the calculations.

Washington Closure Hanford, Inc. CALCULATION SHEET

Originator:	H. M. Sulloway	Date:	05/06/08	Calc. No.:	0100F-CA-V0355	Rev.:	1
Project:	100-F Area Field Remediation	Job No:	14655	Checked:	L. D. Habel	Date:	05/06/08
Subject:	120-F-1 Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation					Sheet No.	3 of 3

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 120-F-1 Waste Site.

Contaminants of Concern[a]	Statistical or Maximum Result[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	4.6	16,000	2.9E-04	--	--
Chromium, hexavalent[c]	1.8	240	7.5E-03	2.1	8.6E-07
Mercury	0.65	24	2.7E-02	--	--
Molybdenum	0.85	400	2.1E-03	--	--
Selenium	1.8	400	4.5E-03	--	--
Anions					
Fluoride	3.9	4,800	8.1E-04		
Semivolatiles					
Bis(2-ethylhexyl) phthalate	0.12	1,600	7.5E-05	71.4	1.7E-09
Dibenzo(a,h)anthracene	0.025	--	--	0.33[d]	7.6E-08
Di-n-butylphthalate	0.027	8,000	3.4E-06	--	--
Pesticides					
Chlordane (alpha, gamma)	0.023	40	5.8E-04	0.769	3.0E-08
DDE, 4,4'-	0.0018	--	--	2.94	6.1E-10
DDT, 4,4'-	0.0021	40	5.3E-05	2.94	7.1E-10
Endosulfan (I, II, sulfate)	0.0018	480	3.8E-06	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.023		--	0.5	4.6E-08
Aroclor-1260	0.010		--	0.5	2.0E-08
Totals					
Cumulative Hazard Quotient:			**4.3E-02**		
Cumulative Excess Cancer Risk:					**1.1E-06**

Notes:

[a] = From WCH (2008).

[b] = Value obtained from the RDR/RAWP (DOE-RL 2005) or *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.

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

[d] Individual carcinogenic risk calculated using the required detection limit. Contribution to cumulative carcinogenic risk calculated based on the remedial action goal instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.

-- = not applicable

RAG = remedial action goal

CONCLUSION:

This calculation demonstrates that the 120-F-1 waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005).

APPENDIX D

SUMMARY OF UPDATED SAMPLE DESIGN FOR 120-F-1 NORTHWEST EXCAVATION

Summary

This appendix summarizes the updated sampling design used and associated statistical assumptions for verification sampling of the northwest excavation of 120-F-1 site, as well as general guidelines to be used for conducting post-sampling data analysis. Sampling plan components presented here include how many sampling locations to choose and where, within the sampling area, to collect those samples. Requirements for collecting and analyzing the samples are provided in (WCH 2007).

Primary Sampling Objective

The primary purpose of sampling at this site is to compare a site mean value with a fixed threshold. The decision rule for demonstrating compliance with the cleanup criteria requires comparison of the true population mean, as estimated by the 95% upper confidence limit on the sample mean, with the cleanup level (DOE-RL 2005). The working hypothesis (or "null" hypothesis) is that the mean value at the site is equal to or exceeds the action threshold (the site is "dirty"). The alternative hypothesis is that the mean value is less than the threshold. Visual Sample Plan[1] (VSP) calculates the number of samples required to reject the null hypothesis in favor of the alternative one, given a selected sampling approach and inputs to the associated equation.

Selected Sampling Approach

A nonparametric, systematic sampling approach with a random start was used to determine the number of samples and to specify sampling locations. A nonparametric formula was selected because the site conceptual model and analogous information (i.e., data from similar sites) indicate that typical parametric assumptions may not be true.

Both parametric and nonparametric equations rely on assumptions about the population. Typically, however, nonparametric equations require fewer assumptions and allow for more uncertainty about the statistical distribution of values at the site. Alternatively, if the parametric assumptions are valid, the required number of samples is usually less than if a nonparametric equation was used.

The Washington State Department of Ecology publication *Guidance on Sampling and Data Analysis Methods* (Ecology 1995) recommends that systematic sampling with sample locations distributed over the entire study area be used. Therefore, a systematic grid sampling design with a random start was selected for use in VSP. Locating the sample points over a systematic grid with a random start ensures spatial coverage of the site. Statistical analyses of systematically collected data are valid if a random start to the grid is used. One disadvantage of systematically

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

collected samples is that spatial variability or patterns may not be discovered if the grid spacing is large relative to the spatial patterns.

Number of Total Samples: Calculation Equation and Inputs

The equation used to calculate the number of samples is based on a Sign test (see Gilbert et al. 2001 for discussion). For this site, the null hypothesis is rejected in favor of the alternative, if the mean is sufficiently smaller than the threshold. The number of samples to collect is calculated such that, if the inputs to the equation are true, the calculated number of samples will cause the null hypothesis to be rejected.

The formula used to calculate the number of samples is as follows:

$$n = 1.20\left[\frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(SignP - 0.5)^2}\right]$$

where:

$$Sign\ P = \Phi\left(\frac{\Delta}{s_{Total}}\right)$$

$\Phi(z)$ = the cumulative standard normal distribution on $(-\infty,z)$ (see Gilbert et al. 2001 for details)
n = the number of samples
S = the estimated standard deviation of the measured values including analytical error
Δ = the width of the gray region
α = the acceptable probability of incorrectly concluding the site mean is less than the threshold
β = the acceptable probability of incorrectly concluding the site mean exceeds the threshold
$Z_{1-\alpha}$ = the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is $1-\alpha$
$Z_{1-\beta}$ = the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is $1-\beta$.

NOTE: The *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)* (EPA et al. 2000) suggests that the number of samples should be increased by at least 20% to account for missing or unusable data and uncertainty in the calculated value of n. VSP allows a user-supplied percent overage as discussed in MARSSIM (EPA et al. 2000, p. 5-33).

The values of these inputs that result in the calculated number of sampling locations are summarized in Table C-1.

Table D-1. VSP User Inputs.

Parameter	Value	Basis
S	0.25	Assumed standard deviation.
Δ	0.45	User defined conservative value.
α	5%	False rejection rate specified in the DQO summary report (BHI 2003).
β	20%	False acceptance rate specified in the DQO summary report (BHI 2003).
$Z_{1-\alpha}$	1.64485	This value is automatically calculated by VSP based on the user-defined value of α.
$Z_{1-\beta}$	0.841621	This value is automatically calculated by VSP based on the user-defined value of β.
MARSSIM overage	20%	User-defined sample increase factor.

DQO = data quality objective
MARSSIM = *Multi-Agency Radiation Survey and Site Investigation Manual*
VSP = Visual Sample Plan

In order to use VSP to calculate the appropriate number of samples, *n*, to collect for estimating the mean, it is necessary to have some estimate of the sample standard deviation. In general, estimates made from samples tend to more closely approximate the true population mean as the number of samples increases. Appropriate statistical parameters (i.e., standard deviation within the population) for the post-remediation residual contaminant concentration levels at the 120-F-1 waste site are unknown. For the purpose of the development of the statistical sampling design, a generic action limit of 1.0 can be assumed (where 0.5 would be 50% of the action limit). The standard deviation for each residual contaminant population was then conservatively assumed to be less than 25% of the corresponding decision threshold for the population. Using this standard deviation value along with a conservative "gray region" (45% or 0.45) in VSP, the estimated number of verification samples to collect is calculated. These assumptions will be verified in the data quality assessment using verification sampling data from the resulting data set.

Table D-2 summarizes the sampling design that was developed. Table D-3 lists sampling location coordinates. Figure D-1 shows sampling locations in the field.

Table D-2. Summary of Sampling Design.

Primary objective of design	Compare a site mean to a fixed threshold
Type of sampling design	Nonparametric
Sample placement (location) in the field	Systematic with a random start location
Working (null) hypothesis	The mean value at the site exceeds the threshold
Formula for calculating number of sampling locations	Sign test – MARSSIM version
Calculated total number of samples	10 per sampling area
Specified sampling area[a]	322.3 m^2 (3468.8 ft^2)
Size of grid/area of grid cell[b]	6.1 m (20.0 ft)/32.2 m^2 (346.9 ft^2)
Grid pattern	Triangular

[a] The sampling area is the total surface area of the selected shaded sample areas on the map of the site.
[b] Size of grid/area of grid cell gives the linear distance between grid points and the grid cell area used to systematically place samples.
MARSSIM = *Multi-Agency Radiation Survey and Site Investigation Manual*

Table D-3. Verification Sample Location Coordinates.

X Coord	Y Coord	Label	Type
581035.4	147211.5	1	Systematic
581041.3	147210.0	2	Systematic
581033.8	147217.4	3	Systematic
581039.7	147215.9	4	Systematic
581045.6	147211.3	5	Systematic
581051.5	147212.7	6	Systematic
581038.1	147221.8	7	Systematic
581044.0	147220.2	8	Systematic
581049.9	147218.6	9	Systematic
581055.8	147217.1	10	Systematic

Figure D-1. Map of 120-F-1 Northwest Excavation Verification Sample Locations.

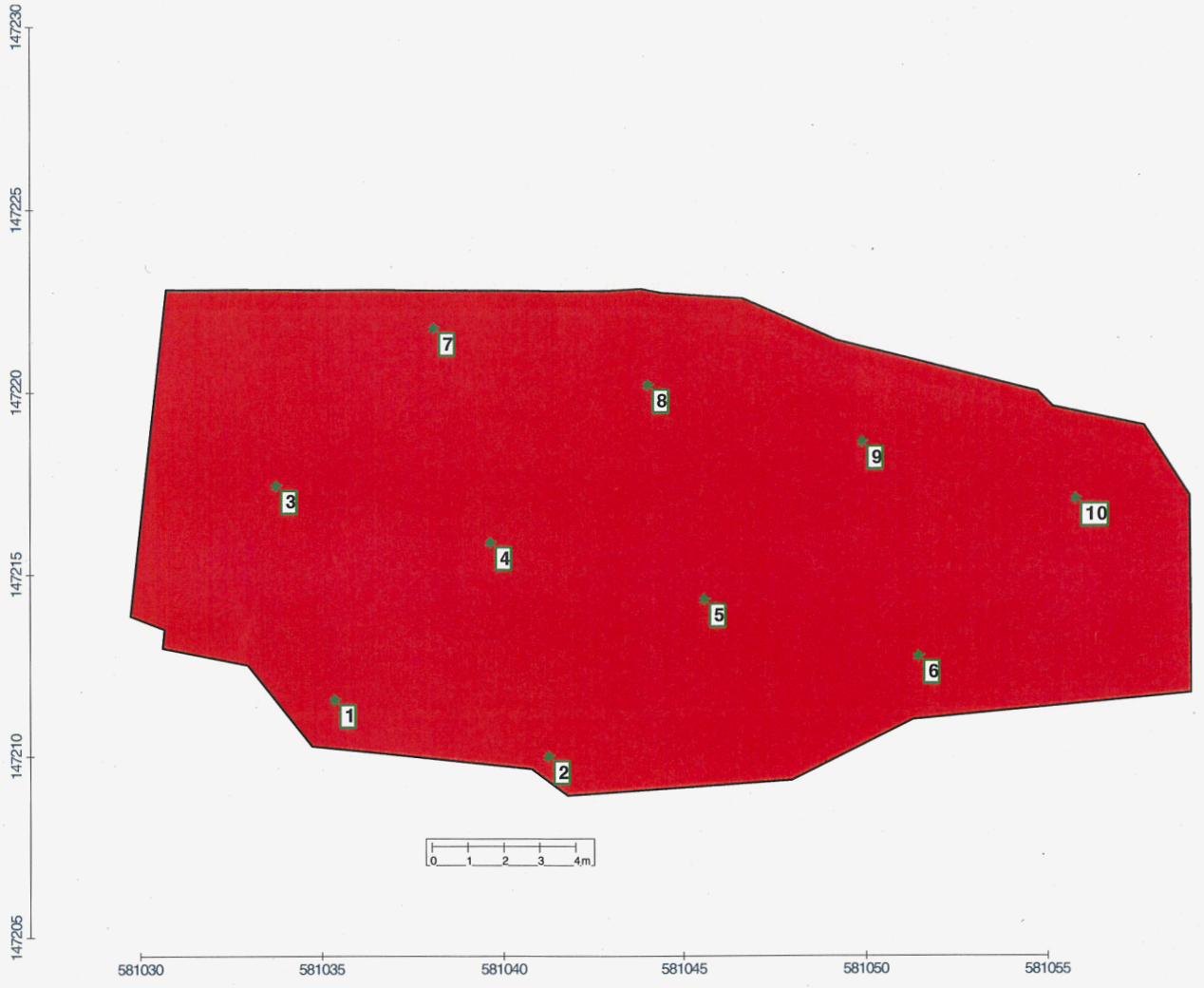
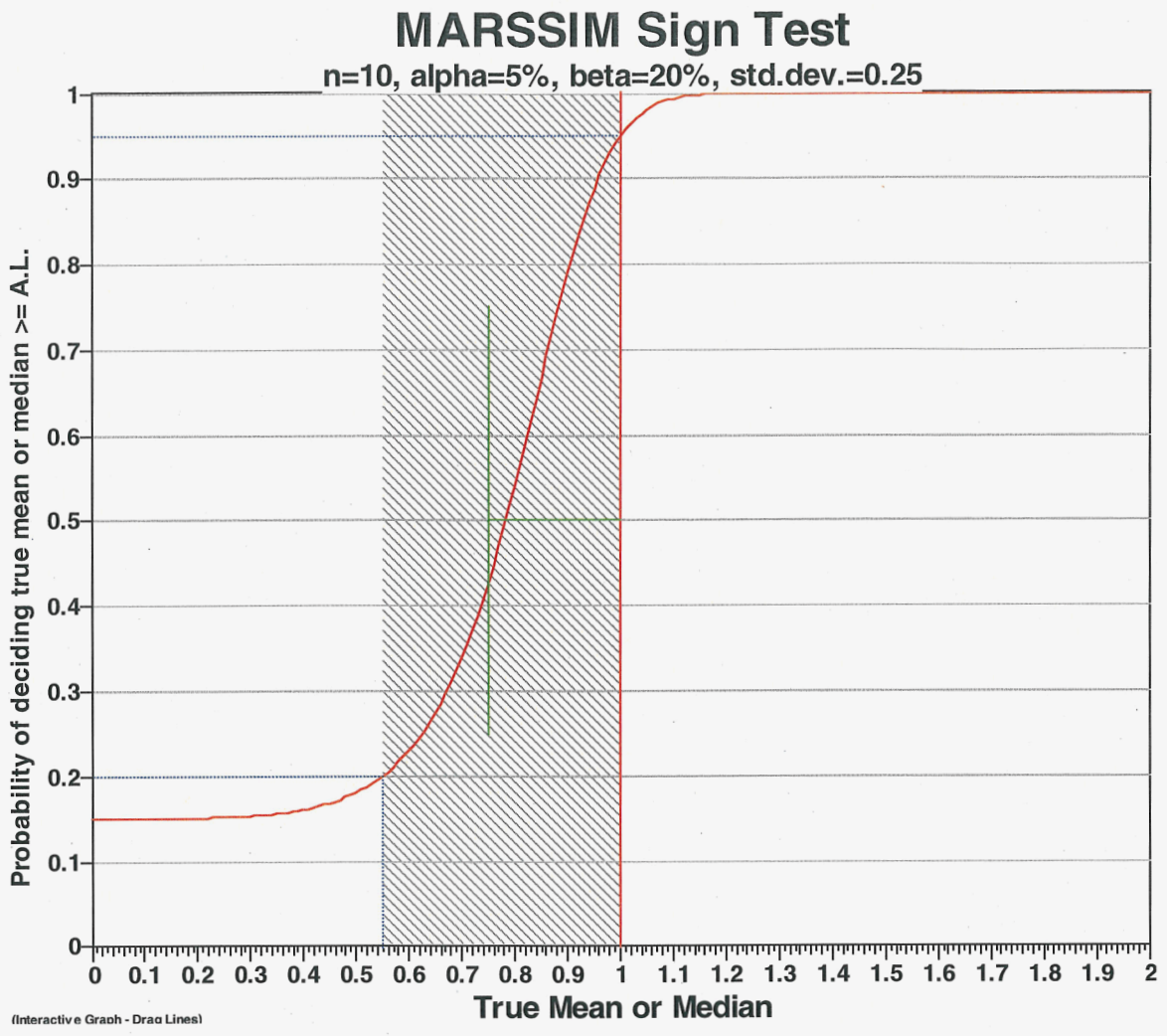


Figure D-2 is a performance goal diagram, described in the U.S. Environmental Protection Agency's QA/G-4 guidance (EPA 2000b). This figure shows the probability of concluding that the sample area is dirty on the vertical axis versus a range of possible unit true median (mean) values (where 0.5 would be 50% of the action limit for a specific contaminant of concern) for the site on the horizontal axis. These graphs contain all of the inputs to the number of samples equation and pictorially represent the calculations.

The solid vertical line to the right of the gray region is shown at the threshold (unit action limit) on the horizontal axis. The width of the gray shaded area is equal to Δ; the upper horizontal dashed line is positioned at $1-\alpha$ on the vertical axis; and the lower horizontal dashed line is positioned at β on the vertical axis. The short vertical line in the gray region to the left of the action level is positioned at one standard deviation below the threshold. The shape of the curve corresponds to the estimates of variability. The calculated number of samples results in the curve that passes through the lower bound of Δ at β and the upper bound of Δ at $1-\alpha$.

Figure D-2. Performance Goal Diagram.



Statistical Assumptions

The assumptions associated with the formulae for computing the number of samples are as follows:

1. The computed Sign test statistic is normally distributed.
2. The variance estimate, S^2, is reasonable and representative of the population being sampled.
3. The population values are not spatially or temporally correlated.
4. The sampling locations will be selected probabilistically.

The first three assumptions will be assessed in a post-data collection analysis. The last assumption is valid because the gridded sample locations were selected based on a random start.

Sensitivity Analysis

The sensitivity of the calculation of number of samples was explored by varying s, lower bound of the gray region (LBGR), β and α and examining the resulting changes in the number of samples. Table D-4 shows the results of this analysis.

Table D-4. Sensitivity Analysis.

Number of Samples							
AL=1		**α =5**		**α =10**		**α =15**	
		***S* =0.5**	***S* =0.25**	***S* =0.5**	***S* =0.25**	***S* =0.5**	***S* =0.25**
LBGR=90	**β=15**	345	90	257	68	206	54
	β=20	297	77	216	57	170	45
	β=25	258	68	184	48	141	38
LBGR=80	**β=15**	90	27	68	21	54	16
	β=20	77	23	57	17	45	14
	β=25	68	21	48	15	38	11
LBGR=70	**β=15**	44	16	33	12	27	10
	β=20	38	14	28	10	22	8
	β=25	33	12	23	9	18	6

LBGR = lower bound of the gray region

Recommended Data Analysis Activities

Post-data collection activities generally follow those outlined in the U.S. Environmental Protection Agency's *Guidance for Data Quality Assessment* (EPA 2000a). The data analysts will become familiar with the context of the problem and goals for data collection and assessment. The data will be verified and validated before being subjected to statistical or other analyses. Graphical and analytical tools will be used to verify, to the extent possible, the assumptions of any statistical analyses that are performed as well as to achieve a general understanding of the data. The data will be assessed to determine if they are adequate in both quality and quantity to support the primary objective of sampling.

Because the primary objective for sampling for this site is to compare the site mean values with threshold values, the data will be assessed in this context. Assuming the data are adequate, statistical tests will be done, as necessary, to perform a comparison between the data and the threshold(s) of interest. Results of the exploratory and quantitative assessments of the data will be reported, along with conclusions that may be supported by them.

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APPENDIX E

VERIFICATION SAMPLING DATA QUALITY ASSESSMENT

Verification Sampling Data Quality Assessment

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 (DOE-RL 2005a, WHC 2007, WCH 2008a). This DQA was performed in accordance with site specific data quality objectives found in the SAP (DOE-RL 2005b).

A review of the sample design (WCH 2007, WCH 2008a), the field logbook (WCH 2008b), and applicable analytical data packages has been performed as part of this DQA. All samples were collected per the sample design. In addition, ion chromatography (IC) anions, sulfides, cyanide, and pH analyses were performed on the verification samples collected at the 120-F-1 waste site. These constiuents are not contaminants of concern (COCs) for the 120-F-1 waste site. This DQA limited the data review for the 120-F-1 verification sampling to the data required per the sample design.

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

The closeout sampling approach for the 120-F-1 Glass Dump waste site included a sample design with multiple subunit areas. Verification sample data collected at the 120-F-1 waste site were provided by the laboratories in four sample delivery groups (SDGs). For the 120-F-1 southeastern dump site, verification sample data was provided in SDG K1066, SDG K1067, and SDG K1134. SDG K1066 was submitted for third-party validation. For the 120-F-1 northwestern dump site, verification sample data was provided in SDG K1155. No major deficiencies were found in the in the DQA review of the analytical data set. Minor deficiencies found in the analytical data set are discussed below.

SDG K1066

This SDG comprises six verification samples (J16337-J16342) collected from the southeastern dump site. These samples were analyzed for inductively coupled plasma (ICP) metals, mercury, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), and total petroleum hydrocarbon (TPH). Anions, sulfides, cyanide, and pH analyses were also performed for these samples; however, these constituents are outside the scope of the sample design and are not included in this DQA review. In addition, one equipment blank (J16354) was collected and analyzed for ICP metals and mercury. SDG K1066 was submitted for formal third-party validation. No major deficiencies were found in SDG K1066. No major deficiencies were found in SDG K1066. Minor deficiencies are as follows:

In the SVOC analysis, the common laboratory contaminants bis(2-ethylhexyl)phthalate are detected in the method blank (MB). Third party validation raised the reported values for bis(2-ethylhexyl)phthalate for all samples to the required quantitation limit of 660 µg/kg and

qualified them as undetected and flagged "U". The data are useable for decision-making purposes.

In the SVOC analysis, the matrix spike (MS) and matrix spike duplicate (MSD) recoveries are below the acceptance criteria for 2,2'-oxybis(1-chloropropane), at 49% and 45%, respectively. The laboratory control sample (LCS) recovery was outside QC limits for 2,4-dinitrophenol (28%), 4,6-dinitro-2-methylphenol (47%), and pentachlorophenol (48%). All results for analytes with low MS or LCS recoveries were qualified as estimates and flagged "J" by third party validation. Estimated data are useable for decision making purposes.

The relative percent difference (RPD) for 2,4-dinitrophenol (56%) is greater than 30%. The results for 2,4-dinitrophenol in all samples were qualified as estimates and flagged "J" by third party validation. Estimated data are useable for decision making purposes.

The MS and MSD samples (J16337 MS and MSD) for the pesticide and PCB analyses in SDG K1066 were prepared in separate preparation batches. As a result, all pesticide and PCB results for samples J16338-J16342 were qualified by third-party validation as estimated with "J" flags. Estimated, or "J"-flagged, data are acceptable for decision making purposes.

All of the toxaphene data in SDG K1066 was qualified by third-party validation as estimated with "J" flags, due to lack of a MS, MSD, or LCS analysis for the analyte. Estimated, or "J" flagged, data are acceptable for decision making purposes.

In the ICP metals analysis, the calcium, sodium, and zinc results for sample J16354 (the equipment blank) are of similar magnitude as the method blank results. These results are qualified by third party validation as undetected estimates with "UJ" flags, due to method blank contamination. The data are useable for decision-making purposes.

Also in the ICP metals analysis, the MS recoveries for three ICP metals (aluminum, iron, and silicon) are out of acceptance criteria. For these analytes, the spiking concentration is insignificant compared to the native concentration in the sample from which the MS was prepared. Therefore, the deficiency in the MS result is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, post digestion spikes (PDSs) and serial dilutions were prepared for all three analytes with acceptable results. The data are useable for decision making purposes.

Also in the ICP metals analysis, the laboratory duplicate RPD for boron is above the acceptance criteria at 98.7%. Elevated RPDs in environmental soil samples are generally attributed to heterogeneities in the sample matrix and not to deficiencies in the laboratory procedures. The data are useable for decision making purposes.

SDG K1067

This SDG comprises five verification samples (J16337-J16342) collected from the southeastern dump site. A field duplicate pair (J16333/J16334) is included in this SDG. These samples were analyzed for ICP metals, mercury, SVOCs, pesticides, PCBs, and TPH. Anions, sulfides,

cyanide, and pH analyses were also performed for these samples; however, these constituents are outside the scope of the sample design and are not included in this DQA review. No major deficiencies were found in SDG K1067. Minor deficiencies are as follows:

In the ICP metals analysis, the MS recoveries for three ICP metals (aluminum, iron, and silicon) are out of acceptance criteria. For these analytes, the spiking concentration is insignificant compared to the native concentration in the sample from which the MS was prepared. Therefore, the deficiency in the MS result is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, PDSs and serial dilutions were prepared for all three analytes with acceptable results. The data are useable for decision making purposes.

Also in the ICP metals analysis, the laboratory duplicate RPD for boron is above the acceptance criteria at 90.9%. Elevated RPDs in environmental soil samples are generally attributed to heterogeneities in the sample matrix and not to deficiencies in the laboratory procedures. The data are useable for decision making purposes.

All of the toxaphene data in SDG K1067 is considered estimated due to lack of a MS, MSD, or LCS analysis for the analyte. Estimated data are acceptable for decision making purposes.

In the SVOC analysis, 3 of 128 MS recoveries are outside the acceptance criteria. The MSD recoveries are below the acceptance criteria for 2,2'-oxybis(1-chloropropane) and 4,6-dinitro-2-methylphenol, at 45% and 37% respectively. The MS recovery was below QC limits for pentachlorophenol (29%). All results for analytes with low MS recoveries are considered estimated. Estimated data are useable for decision making purposes.

SDG K1134

This SDG comprises eleven verification samples (J16B36-J16B46) collected from the southeastern dump site. A field duplicate pair (J16B45/J16B46) is included in this SDG. These samples were all analyzed for hexavalent chromium. No major deficiencies were found in SDG K1134. Minor deficiencies are as follows:

The laboratory duplicate RPD for hexavalent chromium is above the acceptance criteria at 35.4%. Elevated RPDs in environmental soil samples are generally attributed to heterogeneities in the sample matrix and not to deficiencies in the laboratory procedures. The data are useable for decision making purposes.

SDG K1155

This SDG comprises eleven verification samples (J16DT7-J16DT9 and J16DV0-J16DV7) collected from the northwestern dump site. A field duplicate pair (J16DV7/J16DV6) is included in this SDG. These samples were analyzed for ICP metals, mercury, hexavalent chromium, SVOCs, pesticides, PCBs, and TPH. Anions, sulfides, cyanide, and pH analyses were also performed for these samples; however, these constituents are outside the scope of the sample

design and are not included in this DQA review. In addition, one equipment blank (J16DT6) was collected and analyzed for ICP metals and mercury. Major and minor deficiencies are as follows:

All of the toxaphene data in SDG K1155 is considered estimated due to lack of a MS, MSD, or LCS analysis for the analyte. Estimated data are acceptable for decision making purposes.

Six of 128 MS recoveries in the SVOC analysis are below the acceptance criteria. The MS and MSD recoveries for 4-chloro-3-methylphenol are 55% and 58%, respectively. The MS recoveries for nitrobenzene and isophorone are 47% and 56%, respectively. The MS for 1,2,4-trichlorobenzene is 51% and the MS for 2-methylnaphthalene is 57%. Six LCS recoveries were outside QC limits. The LCS recoveries for isophorone, 1,2,4-trichlorobenzene, and 4-chloro-3-methylphenol, are 59%, 57%, and 56%, respectively. The LCS recoveries for 2-methylnaphthalene, 2,4-dinitrophenol, and 4,6-dinitro-2-methylphenol, are 58%, 16%, and 28%, respectively. The results for these analytes may be considered estimated. Estimated data are useable for decision making purposes.

In the ICP metals analysis, the MS recoveries for four ICP metals (aluminum, iron, antimony, and silicon) are out of acceptance criteria. For most of these analytes, the spiking concentration is insignificant compared to the native concentration in the sample from which the MS was prepared. Therefore, the deficiency in the MS result is a reflection of the analytical variability of the native concentration rather than a measure of the recovery from the sample. To confirm quantitation, PDSs and serial dilutions were prepared for the analytes with acceptable results. Antimony did not have mismatched spike and native concentrations in the original MS. The original MS recovery for antimony was 54.7%. The antimony results in SDG K1155 may be considered estimated. Estimated data are useable for decision making purposes.

FIELD QUALITY ASSURANCE/QUALITY CONTROL

RPD 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 2008b), are summarized in Table 1. The main and QA/QC sample results are presented in Appendix C.

Table 1. Field Quality Assurance/Quality Control Samples.

Sample Area	Main Sample	Duplicate Sample
Southeastern dump site	J16333	J16334
Southeastern dump site	J16B45	J16B46
Northwestern dump site	J16DV7	J16DV6

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 duplicate samples for each COC. The 95% upper confidence limit (UCL) calculation brief in Appendix C provides details on duplicate pair evaluation and RPD calculation. Only analytes with values above five times the detection limits for both the main and duplicate samples are compared. None of the RPDs calculated exceeded the acceptance criteria of 30%.

RPDs for the remaining analytes are not calculated because an evaluation of the data shows the analytes 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 five times the detection limit) are not considered to be indicative of the analytical system performance. The data are useable for decision making purposes.

A secondary check of the data variability is used when one or both of the samples being evaluated (main and duplicate) 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 C) to indicate that a visual check of the data is required by the reviewer. For the southern tank footprint focused duplicate sample, the difference was less than 2 times the TDL (for all analytes with one or both of the samples less than 5 times the TDL), and did not required the visual check. However, a visual inspection of all of the data is also performed. No additional major or minor deficiencies are noted. The data are useable for decision-making purposes.

Summary

Limited, random, or sample matrix-specific influenced batch quality control (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 120-F-1 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 120-F-1 waste site concludes that the reviewed data are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of QA and QC deficiencies. The analytical data were found acceptable for decision-making purposes. The verification sample analytical data are stored in the Environmental Restoration (ENRE) project-specific database prior to being submitted for

inclusion in the Hanford Environmental Information System (HEIS) database. The verification sample analytical data are also summarized in Appendix C.

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