Waste Site Reclassification Form

Date Submitted: 10/18/06 **Originator:** L. M. Dittmer **Phone:** 372-9664	**Operable Unit(s):** 100-FR-1 **Waste Site ID:** 1607-F7 **Type of Reclassification Action:** Rejected ☐ Closed Out ☐ Interim Closed Out ☒ No Action ☐	**Control Number:** 2006-040 **Lead Agency:** EPA

This form documents agreement among the parties listed below authorizing classification of the subject unit as rejected, closed out, interim closed out, or no action and authorizing backfill of the site, if appropriate. Final removal from the National Priorities List of no action, interim closed-out, or closed-out sites will occur at a future date.

Description of current waste site condition:

The 1607-F7, 141-M Building Septic Tank waste site was a septic tank and drain field that received sanitary sewage from the former 141-M Building. Remedial action was performed in August and November 2005. Sampling and evaluation 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) sampling the site, (2) remediating the portions of the site containing contamination above cleanup goals, (3) demonstrating through verification sampling that cleanup goals have been met, and (4) proposing the site for reclassification as interim closed out.

Basis for reclassification:

The 1607-F7, 141-M Building Septic Tank site meets the remedial action objectives specified in the Remaining Sites ROD. The results of verification sampling demonstrate that residual contaminant concentrations support future unrestricted land uses that can be represented (or bounded) by a rural-residential scenario. These results also show that residual concentrations support unrestricted future use of shallow zone soil (i.e., surface to 4.6 m [15 ft]) and that contaminant levels remaining in the soil are protective of groundwater and the Columbia River. The site does not have a deep zone; therefore, no deep zone institutional controls are required. The basis for reclassification is described in detail in the *Remaining Sites Verification Package for the 1607-F7, 141-M Building Septic Tank* (attached).

D. C. Smith DOE-RL Project Manager	Signature	10-19-06 Date
N/A Ecology Project Manager	Signature	Date
R. A. Lobos EPA Project Manager	Signature	10-19-06 Date

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-F7, 141-M BUILDING SEPTIC TANK

Attachment to Waste Site Reclassification Form 2006-040

October 2006

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-F7, 141-M BUILDING SEPTIC TANK

EXECUTIVE SUMMARY

The 1607-F7 waste site is located near the northwest corner of the former 141-M Building within the Animal Farm Area. The site is part of the 100-FR-1 Operable Unit and is listed in the Waste Information Data System database as a septic tank, tile field, and interconnecting pipeline located under an area that was historically used for animal grazing (i.e., pasture). The septic tank received sanitary sewage from the former 141-M Building and had a volume of 3,800 L (1,000 gal).

The 1607-F7 waste site was evaluated during 2004 confirmatory sampling efforts to decide if remedial action would be required at the site. Based on the analytical results and field observations, it was determined that the 1607-F7 waste site required remedial action. This action was initiated on August 8, 2005, and was completed on November 30, 2005, with excavation of 1,088 metric tons (1,200 US tons) of material that was disposed at the Environmental Restoration Disposal Facility. Remedial actions were performed so as to not preclude any future uses (as bounded by the rural-residential scenario) and to allow unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep).

Following remediation, verification sampling of the excavation and the footprint of the waste staging pile was conducted on April 4, 2006. The results indicated that the waste removal action achieved compliance with the remedial action objectives for the 1607-F7 waste site. A summary of the cleanup evaluation for the soil results against the applicable criteria is presented in Table ES-1. The results of the verification sampling are used to make reclassification decisions for the 1607-F7 site in accordance with the TPA-MP-14 (DOE-RL 1998) procedure.

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* (Remaining Sites ROD) (EPA 1999). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. This site does not have a deep zone; therefore, no deep zone institutional controls are required.

Soil cleanup levels were established in the Remaining Sites ROD (EPA 1999) based on a limited ecological risk assessment. Although not required by the Remaining Sites ROD, a comparison against ecological risk screening levels has been made for the site contaminants of concern, contaminants of potential concern, and other constituents. Screening levels were not exceeded for the site constituents, with the exception of antimony, barium, boron, lead, vanadium, zinc, total DDT/DDE/DDD, and total dibenzofurans. 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, barium, lead, vanadium, and zinc are within the range of Hanford Site background levels. A Hanford Site background level for boron has not been established. The presence of total DDT/DDE/DDD

and total dibenzofurans is believed to be due to historic application of pesticides and herbicides. The exceedance of soil screening values by boron, total DDT/DDE/DDD, and total dibenzofuran concentrations at the site will be evaluated in the context of additional lines of evidence for ecological effects. A baseline risk assessment for the river corridor portion of the Hanford Site began in 2004, which includes a more complete quantitative ecological risk assessment. That baseline risk assessment will be used to support the final closeout decision for this site.

Table ES-1. Summary of Remedial Action Objectives for the 1607-F7 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.	No radionuclide COPCs were detected above single radionuclide dose equivalent lookup values in confirmatory samples. No radionuclide COCs were identified for the 1607-F7 site verification sampling event.	Yes
Direct Exposure – Nonradionuclides	Attain individual COC/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 quotients for both sampling areas (9.9×10^{-2}) is less than 1.	
	Attain an excess cancer risk of $<1 \times 10^{-6}$ for individual carcinogens.	The excess cancer risk values for individual carcinogens are less than 1×10^{-6}.	
	Attain a total excess cancer risk of $<1 \times 10^{-5}$ for carcinogens.	The total excess cancer risk values for both sampling areas (8.7×10^{-7}) is less than 1×10^{-5}.	
Groundwater/River Protection – Radionuclides	Attain single COC groundwater and river protection RAGs.	No radionuclide COPCs were detected above soil lookup values for groundwater and river protection in confirmatory samples. No radionuclide COCs were identified for the 1607-F7 site verification sampling event.	Yes
	Attain national primary drinking water regulations:[a] 4 mrem/yr (beta/gamma) dose rate to target receptor/organs.		
	Meet drinking water standards for alpha emitters: the more stringent of 15 pCi/L MCL or 1/25th of the derived concentration guide from DOE Order 5400.5.[b]		
	Meet total uranium standard of 21.2 pCi/L.[c]		

Table ES-1. Summary of Remedial Action Objectives for the 1607-F7 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.	Lead, zinc, 4,4'-DDT, 4,4'-DDD, and heptachlor exceeded groundwater and/or river protection RAGs. However, results of the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005) indicate that these constituents will not reach groundwater (and, therefore, the Columbia River) within 1,000 years. Therefore, the residual concentrations achieve the RAOs for groundwater and river protection.	Yes

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

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

REMAINING SITES VERIFICATION PACKAGE FOR THE 1607-F7, 141-M BUILDING SEPTIC TANK

STATEMENT OF PROTECTIVENESS

This report demonstrates that the 1607-F7, 141-M Building Septic Tank 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). The results of verification sampling show that residual contaminant concentrations do not preclude any future uses (as bounded by the rural-residential scenario) and allow for unrestricted use of shallow zone soils (i.e., surface to 4.6 m [15 ft] deep). The results also demonstrate that residual contaminant concentrations are protective of groundwater and the Columbia River. This site does not have a deep zone; therefore, no deep zone institutional controls are required.

GENERAL SITE INFORMATION AND BACKGROUND

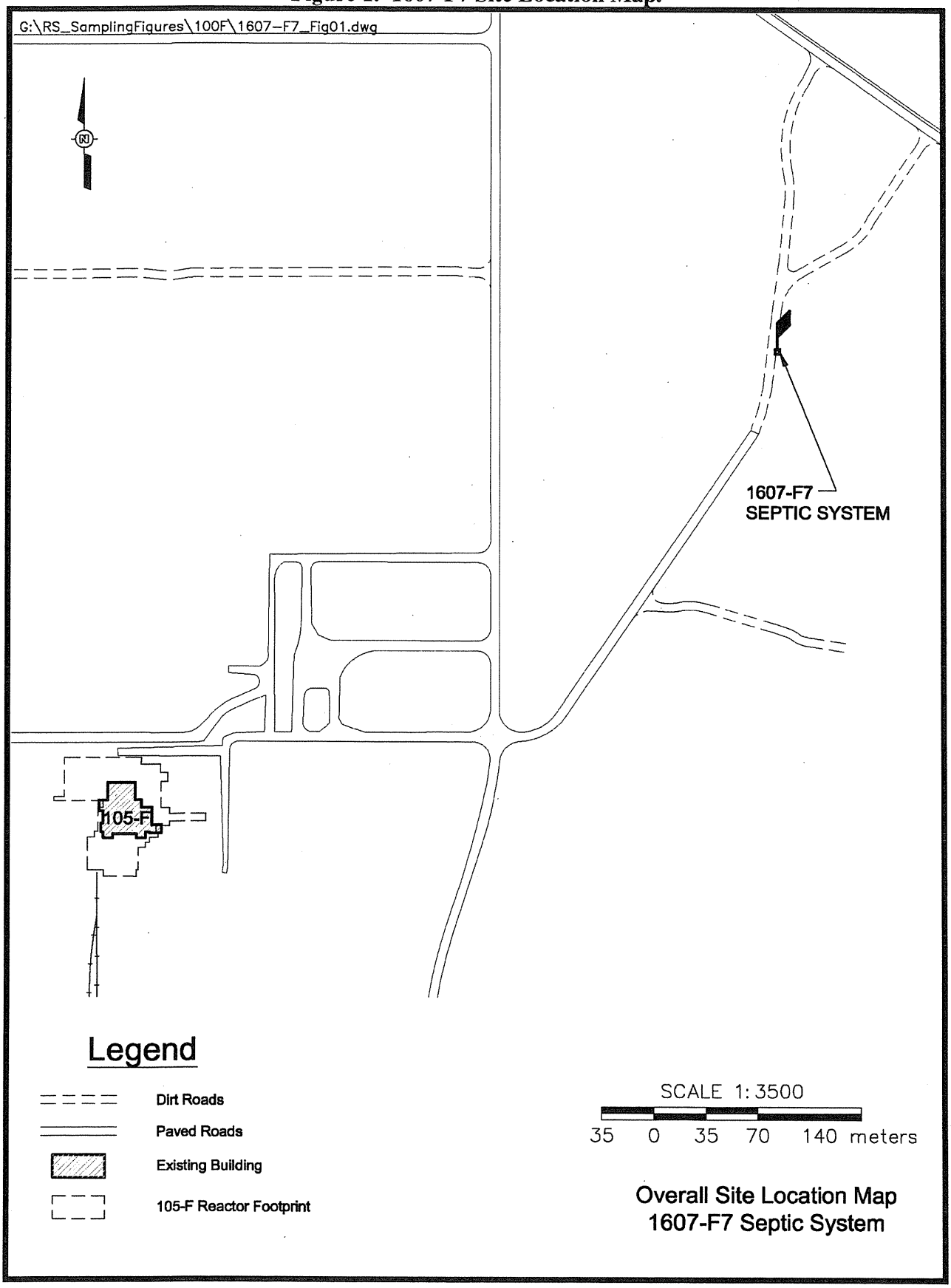
The Waste Information Data System (WIDS) database describes this site as a septic tank, drain field, and interconnecting pipeline. The drain field is located under an area that was historically used for animal grazing (i.e., pasture). No current associated structures remain at the site. The septic tank located at this site received sanitary sewage from the former 141-M Building and had a volume of 3,800 L (1,000 gal). The general location of the site is shown in Figure 1.

The WIDS database identifies the waste as nondangerous/nonradioactive liquid waste; however, the site is included on the Radiation Area Remedial Action Facility listing. Consequently, prior to remedial action, the site was monitored (at least annually) for radiological surface contamination.

CONFIRMATORY SAMPLING ACTIVITIES

A focused sampling approach was implemented at the 1607-F7 sanitary sewer system site, which was biased toward worst-case sample locations and locations that were accessible. Confirmatory sampling was conducted during October 2004. The following sections discuss the results of the confirmatory sampling activities.

Figure 1. 1607-F7 Site Location Map.



Contaminants of Potential Concern

The contaminants of potential concern (COPCs) for the 1607-F7 septic system were identified based on existing historical information for the 1607-F7 site. The COPCs identified in the *100 Area Remedial Action Sampling and Analysis Plan* (SAP) (DOE-RL 2005a) included americium-241, cobalt-60, cesium-137, europium-152, europium-154, europium-155, plutonium-239/240, strontium-90, cadmium, total chromium, hexavalent chromium, mercury, lead, pesticides, and semivolatile organic compounds (SVOCs). Based on further site-specific evaluation, volatile organic compounds (VOCs), arsenic, barium, selenium, silver, and polychlorinated biphenyls (PCBs) were included as COPCs.

No stained soil or suspected asbestos-containing material was encountered during confirmatory sampling activities (BHI 2004c).

Geophysical Investigation

A geophysical survey was performed over the site (BHI 2004b). The first phase of the survey consisted of mapping surface features located at the site (Figure 2). The second phase consisted of identification of subsurface anomalous zones using electromagnetic induction and magnetic total field gradient (magnetometer). The results did not facilitate a reliable location of the septic tank or drain field.

Confirmatory Sample Design

A stratified sampling design with focused sampling of geophysically anomalous areas and surface feature areas, as identified by the geophysical investigations, was used to characterize the 1607-F7 sanitary sewer system. Geophysical data (BHI 2004b), WIDS documentation, and Hanford era engineering drawings were used to locate the boundaries of the 1607-F7 site and assist in identifying areas for excavation to locate the septic tank and drain field for confirmatory sampling. Surface feature mapping identified a manhole in close proximity to the documented location of the septic tank. Trenching was performed to establish the location of the septic tank for sampling (BHI 2004c).

Table 1 provides a summary of confirmatory sampling activities at the 1607-F7 waste site; sample locations are shown in Figure 2.

Figure 2. Confirmatory Sampling Locations at the 1607-F7 Site.

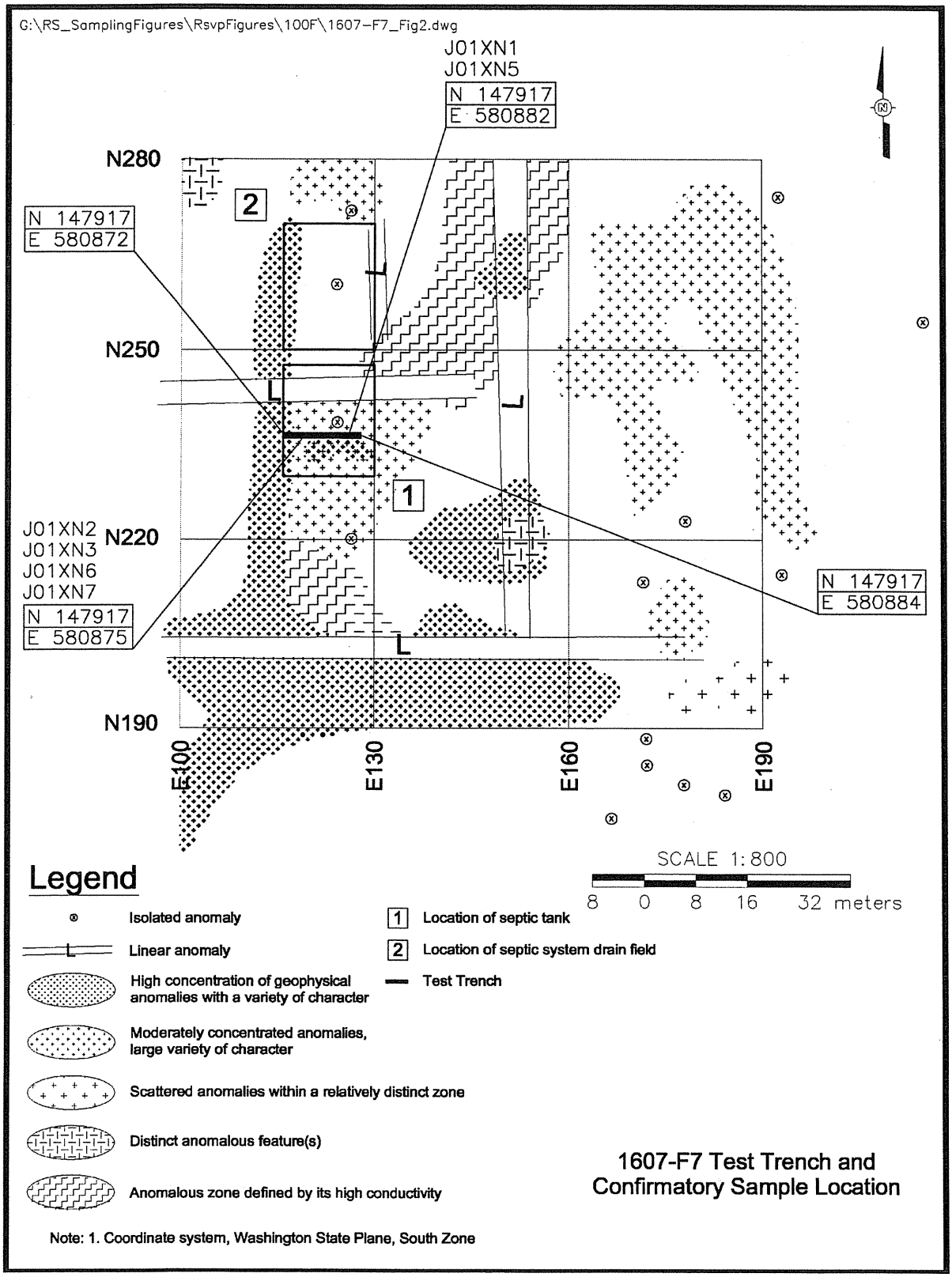


Table 1. 1607-F7 Confirmatory Sample Summary Table.

Sample Location	Sample Media	Sample Number	Coordinate Locations	Depth (m bgs)	Sample Analysis
Septic tank	Septic tank contents	J01XN2	N 147917 E 580875	3	GEA, gross alpha, gross beta, ICP metals, PCB, pesticides, mercury, SVOA, VOA
		J01XN6			Hexavalent chromium
Duplicate septic tank samples	Septic tank contents	J01XN3	N 147917 E 580875	3	GEA, gross alpha, gross beta, ICP metals, PCB, pesticides, mercury, SVOA, VOA
		J01XN7			Hexavalent chromium
Ash located east of septic tank	Ash	J01XN1	N 147917 E 580882	0.5	ICP metals, PCB, pesticides, mercury, SVOA
		J01XN5			Hexavalent chromium
Equipment blank	Silica sand	J01XN4	NA	NA	ICP metals, mercury, SVOA, PCB, pesticides

Source: *Remaining Sites Field Sampling*, Logbook EL-1578-2 (BHI 2004a).
bgs = below ground surface
GEA = gamma energy analysis
ICP = inductively coupled plasma
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

Confirmatory Sample Results

Confirmatory samples were analyzed using analytical methods approved by the U.S. Environmental Protection Agency and the results compared against the cleanup criteria specified in the RDR/RAWP(DOE-RL 2005a). The results are stored in the Environmental Restoration (ENRE) project-specific database prior to providing a copy for the Hanford Environmental Information System (HEIS) and are included in Appendix A.

Trenching was successful in locating the 1607-F7 septic tank (BHI 2004a). The tank was opened and samples taken of the sludge in the bottom of the tank. Several pieces of debris consistent with demolition activities (e.g., broken pipe, concrete, and metal pieces) were encountered during the excavation. None of this debris was sampled. Because a sample was successfully taken of the material from the bottom of the septic tank, no attempt was made to sample the drain field as discussed in the work instruction (BHI 2004c).

Laboratory analysis of the samples collected from the tank-bottom sediments at the 1607-F7 site indicates that the following contaminants were present in excess of the remedial action goals (RAGs):

- Failed direct exposure RAG: 1,4-dichlorobenzene (250 mg/kg) and benzo(a)pyrene (1.1 mg/kg)
- Failed groundwater protection RAG: Lead (31.8 mg/kg), aroclor-1254 (0.35 mg/kg), aroclor-1260 (0.15 mg/kg), alpha-chlordane (0.19 mg/kg), dichlorodiphenyltrichloroethane (0.07 mg/kg), gamma-chlordane (0.46 mg/kg), benzoanthracene (1.2 mg/kg), benzopyrene (1.1 mg/kg), benzo(b)fluoranthene (1.0 mg/kg), benzo(k)fluoranthene (1.0 mg/kg), chrysene (1.4 mg/kg), and indeno(1,2,3-cd)pyrene (0.6 mg/kg)
- Failed river protection RAG: Silver (1.1 mg/kg), zinc (123 mg/kg), aroclor-1254 (0.35 mg/kg), aroclor-1260 (0.15 mg/kg), alpha-chlordane (0.19 mg/kg), dichlorodiphenyltrichloroethane (0.07 kg/mg), gamma-BHC (0.056 mg/kg), gamma-chlordane (0.46 kg/mg), 1,4-dichlorobenzene (250 mg/kg),

benzoanthracene (1.2 mg/kg), benzopyrene (1.1 mg/kg), benzo(b)fluoranthene (1.0 mg/kg), benzo(k)fluoranthene (1.0 mg/kg), chrysene (1.4 mg/kg), and fluoranthene (220 mg/kg).

The 1607-F7 site was recommended for remedial action because the concentrations of multiple contaminants exceeded RAGs (WCH 2006b).

REMEDIAL ACTION SUMMARY

The 1607-F7 site was excavated on August 8, 2005, and November 30, 2005. Remediation of the 1607-F7 waste site involved layback of overburden and removal of the septic tank, drain field, the interconnecting pipeline, and associated soils around and below those structures. Some of these materials were staged just south of the site before disposal; however, most of the waste was excavated using direct loadout and shipment to the Environmental Restoration Disposal Facility (ERDF). The overall depth of the excavation for the septic tank was approximately 3 m (10 ft) below ground surface and approximately 1.5 m (5 ft) below ground surface for the drain field. The excavation depths included removal of 0.6 m (2 ft) of soil below these structures for disposal at ERDF. Approximately 1,088 metric tons (1,200 US tons) of material was disposed at ERDF. A map of the post-excavation footprint of the 1607-F7 site is presented in Figure 3.

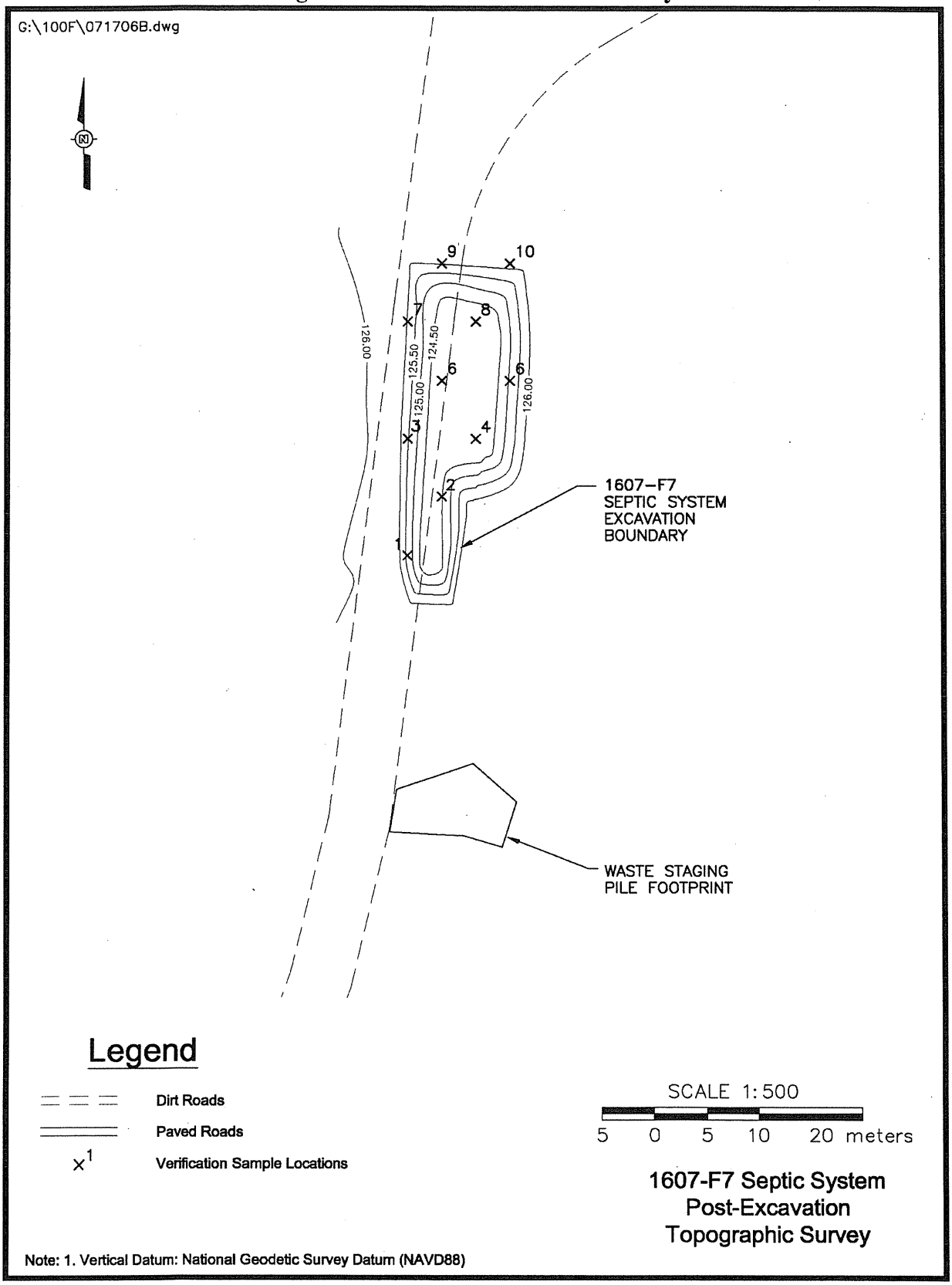
VERIFICATION SAMPLING ACTIVITIES

Remedial action goals are the specific numeric goals against which the cleanup verification data are evaluated in order to demonstrate attainment of the remedial action objectives for the site. Verification sampling for the 1607-F7 site was performed on April 4, 2006, to collect data to determine if the RAGs had been met. Based on statistical evaluation of the resulting data, the residual contaminant concentrations meet the cleanup criteria specified in the RDR/RAWP (DOE-RL 2005b) and the Remaining Sites ROD (EPA 1999). The following 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 Concern and Contaminants of Potential Concern

The results of confirmatory sampling (Appendix A) were used to determine the contaminants of concern (COCs) and COPCs for verification sampling. As stated earlier in the confirmatory sampling results section, multiple constituents failed direct exposure, groundwater, and river protection soil RAGs. In addition, the confirmatory data were deficient with respect to detection limits and other quality control issues in the inductively coupled plasma (ICP) metals, mercury, volatile organic compounds (VOCs), PCBs, pesticides, SVOCs, and hexavalent chromium. This is not unusual for samples taken from within a septic tank.

Figure 3. Post-Excavation Civil Survey.



However, because of the detections and deficiencies listed above, the analyses for ICP metals, mercury, VOCs, PCBs, pesticides, SVOCs, and hexavalent chromium were conducted on the verification samples. Samples collected during loadout to support waste characterization were also considered during the determination of COCs and COPCs and are provided in Appendix A. No additional COPCs were added based on the waste characterization sample results.

Radionuclides were included in the analyses for confirmatory samples. However, radionuclides were not detected above background levels and, therefore, were excluded as COPCs for verification sampling.

Sample Design Selection and Basis

This section describes the basis for selection of an appropriate sample design and determination of the number of verification samples to collect. The post-excavation survey (Figure 3) was used to divide the 1607-F7 site into two decision units for the purpose of verification sampling. The first decision unit is delineated by the surveyed boundary of the excavation, and the second decision unit consists of the waste staging area that was used to temporarily stage waste prior to shipment to ERDF.

Verification Sampling Design – Excavated Area

The decision rule for demonstrating compliance with the cleanup criteria required comparison of the true population mean, as estimated by the 95% upper confidence limit 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."

The excavated area 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. Ten statistical soil samples were collected within the excavated area (Figure 4). A triangular grid was selected for this investigation based on studies that indicate triangular grids are superior to square grids (Gilbert 1987). Table 2 provides a summary of the verification samples collected and the analytical methods performed on those samples

Verification Sample Design – Waste Staging Area

Waste staged on site during remedial activities consisted of soil and debris and has been completely disposed at the ERDF. The waste staging area was sampled per the approved work instruction (WCH 2006c). One sample was collected consisting of 30 aliquots of soil distributed across the surface of the waste staging area.

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

Figure 4. Verification Soil Sampling Locations.

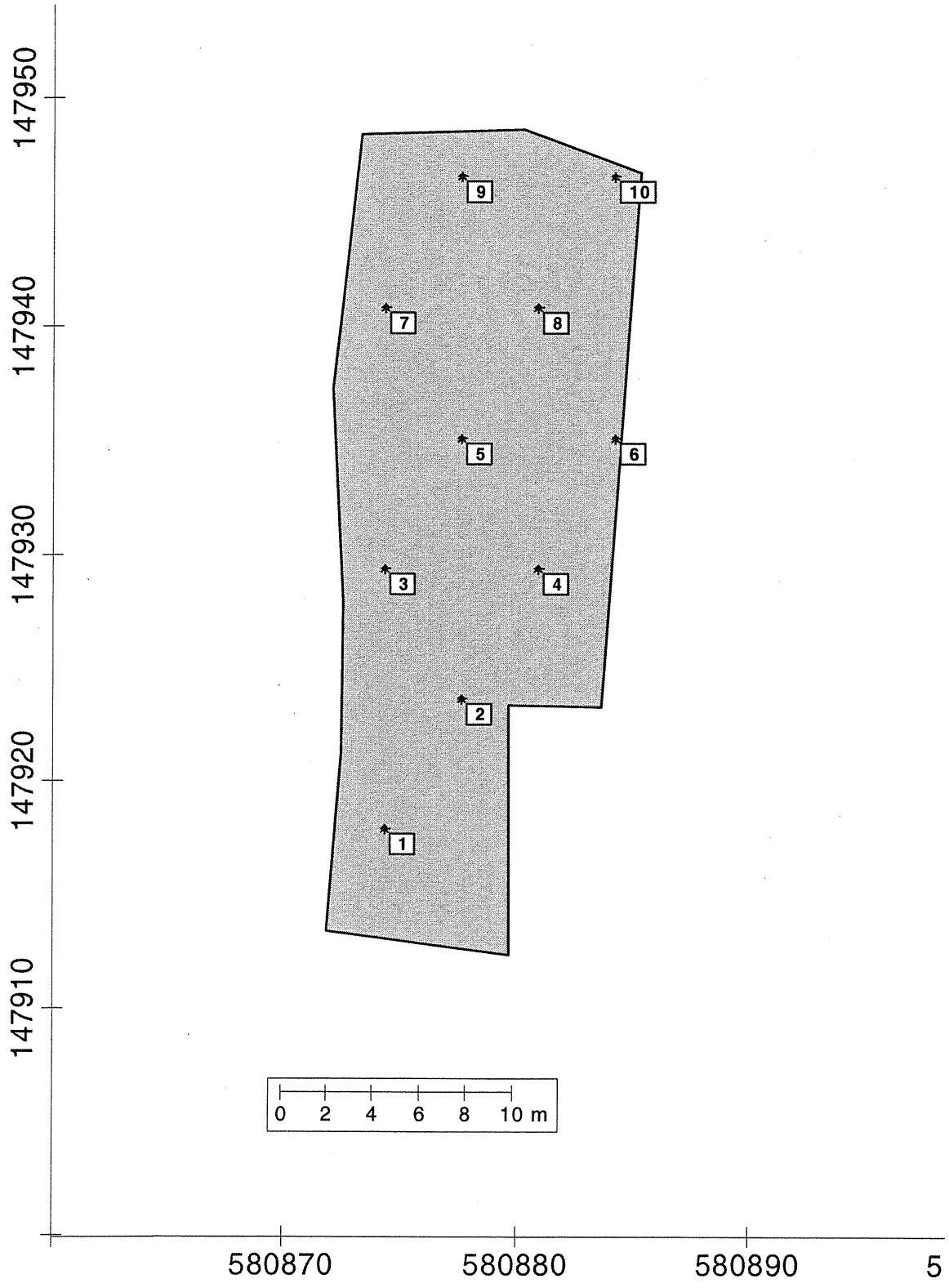


Table 2. Verification Sample Summary Table for the 1607-F7 Site.

Sample Location	Sample Media	Sample Coordinates	Depth	HEIS Number	Sample Analysis
1	Soil	N 147917.9 E 580874.4	Surface	J11VH8	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
2	Soil	N 147923.7 E 580877.7	Surface	J11VH9	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
3	Soil	N 147929.4 E 580874.4	Surface	J11VJ0	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
4	Soil	N 147929.4 E 580881.0	Surface	J11VJ1	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
5	Soil	N 147935.1 E 580877.7	Surface	J11VJ2	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
6	Soil	N 147935.1 E 580884.3	Surface	J11VJ3	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
7	Soil	N 147940.9 E 580874.4	Surface	J11VJ5	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
8	Soil	N 147940.9 E 580881.0	Surface	J11VJ6	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
9	Soil	N 147946.6 E 580877.7	Surface	J11VJ7	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
10	Soil	N 147946.6 E 580884.3	Surface	J11VJ8	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
Staging pile	Soil	NA	Surface	J11VK3	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
Duplicate at location 6	Soil	N 147935.1 E 580884.3	Surface	J11VJ4	ICP metals, mercury, pesticides, PCB, SVOA, VOA, and hexavalent chromium
Equipment blank	Silica sand	NA	NA	J11VH7	ICP metals, mercury, and VOA

Source: *100F Area RAWD Sampling*, Logbook EFL-1174-1 (WCH 2006a).
HEIS = Hanford Environmental Information System
ICP = inductively coupled plasma
NA = not applicable
PCB = polychlorinated biphenyl
SVOA = semivolatile organic analysis
VOA = volatile organic analysis

Verification Sampling Results

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

waste staging area was performed by direct comparison of the sample result for each COC/COPC against cleanup criteria.

Comparisons of the statistical and maximum results for COCs and COPCs and the site RAGs for the remediation footprint and remediation waste staging area are summarized in Tables 3a and 3b, respectively. Contaminants that were not detected by laboratory analysis are excluded from these tables. Calculated cleanup levels are not presented in the Model Toxics Control Act Cleanup Levels and Risk Calculations database 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. The confirmatory sample analytical data are summarized in Appendix B. These data are stored in the ENRE project-specific database prior to providing a copy for the HEIS database.

Table 3a. Comparison of Statistical Residual Contaminant Concentrations to Remedial Action Goals for the 1607-F7 Waste Site Excavated Area. (3 Pages)

Contaminant of Potential Concern	Statistical Result or Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Antimony[b]	0.53 (<BG)	32	5[c]	5[c]	No	--
Arsenic	2.7 (<BG)	20	20	20	No	--
Barium	113 (<BG)	5,600[d]	132[c,e]	224[f]	No	--
Beryllium	0.40 (<BG)	10.4[g]	1.51[c]	1.51[c]	No	--
Boron[h]	4.5	16,000	320	--[i]	No	--
Cadmium[b]	0.17 (<BG)	13.9	0.81[c]	0.81[c]	No	--
Chromium (total)	11.0 (<BG)	80,000[d]	18.5[c]	18.5[c]	No	--
Cobalt	5.7 (<BG)	1,600	32	--[i]	No	--
Copper	13.7 (<BG)	2,960	59.2	22.0[c]	No	--
Lead	18.9	353	10.2[c]	10.2[c]	Yes	Yes[j]
Manganese	283 (<BG)	11,200	512[c]	512[c]	No	--
Mercury	0.02 (<BG)	24	0.33[c]	0.33[c]	No	--
Molybdenum[h]	0.48	400	8	--[i]	No	--
Nickel	9.9 (<BG)	1,600	19.1	27.4[c]	No	--
Vanadium	32.2 (<BG)	560	85.1[c]	--[i]	No	--
Zinc	48.8 (<BG)	24,000	480	67.8[c]	No	--
Aroclor-1254	0.0084	0.5	0.017[k]	0.017[k]	No	--
Aroclor-1260	0.010	0.5	0.017[k]	0.017[k]	No	--
2-Methylnapthalene	0.156	320	3.2	--[i]	No	--
Benzo(a)anthracene	0.026	1.37[l]	0.33[k]	0.33[k]	No	--
Benzo(a)pyrene	0.023	0.33[k]	0.33[k]	0.33[k]	No	--

Table 3a. Comparison of Statistical Residual Contaminant Concentrations to Remedial Action Goals for the 1607-F7 Waste Site Excavated Area. (3 Pages)

Contaminant of Potential Concern	Statistical Result or Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Benzo(b)flouranthene	0.048	1.37[l]	0.33[k]	0.33[k]	No	--
Benzo(g,h,i)perylene[m]	0.058	2,400	48	192	No	--
Benzo(k)flouranthene	0.046	13.7[k]	0.33[k]	0.33[k]	No	--
Bis(2-ethylhexyl) phthalate	0.050	71.4	0.625	0.36	No	--
Butylbenzyphthalate	0.037	16,000	320	250	No	--
Chrysene	0.076	137[l]	1.2[l]	0.33[k]	No	--
Dibenzofuran	0.030	160	3.2	--[i]	No	--
Di-n-butylphthalate	0.307	8,000	160	540	No	--
Flouranthene	0.072	3,200	64	18.0	No	--
Indeno(1,2,3-cd)pyrene	0.058	1.37	0.33[k]	0.33[k]	No	--
Napthalene	0.21	1600	16.0	988	No	--
Phenanthrene[m]	0.205	24,000	240	1920	No	--
Pyrene	0.071	2,400	48	192	No	--
Aldrin	0.00042	0.0588	0.00165[k]	0.00165[k]	No	--
Alpha-BHC	0.0011	0.159	0.00165[k]	0.00165[k]	No	--
Alpha-chlordane	0.0017	2.86[n]	0.025[n]	0.0165[k]	No	--
Beta-BHC	0.0019	0.556	0.00486	0.00554	No	--
DDE, 4,4'	0.0021	2.94	0.0257	0.005[k]	No	--
DDT, 4,4'	0.0095	2.94	0.0257	0.005[k]	Yes	Yes[j]
Acetone	0.0110	72,000	720	--[i]	No	--
Endosulfan I	0.00054	480	9.6	0.186	No	--
Endosulfan sulfate	0.0011	480	9.6	0.186	No	--
Endrin aldehyde	0.0013	24	0.2	0.152	No	--
Endrin ketone	0.00089	24	0.2	0.152	No	--
Gamma-chlordane	0.0011	2.86[n]	0.025[n]	0.0165[k]	No	--
Methoxychlor	0.0014	400	4	1.67	No	--
2-Hexanone	0.002	3,200	64	--[i]	No	--
4-methyl-2-pentanone	0.003	6,400	64	--[i]	No	--
Chloroform	0.003	164	0.71	1.14	No	--

Table 3a. Comparison of Statistical Residual Contaminant Concentrations to Remedial Action Goals for the 1607-F7 Waste Site Excavated Area. (3 Pages)

Contaminant of Potential Concern	Statistical Result or Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Methylene chloride	0.011	133	0.5	0.94	No	--

[a] Lookup values and RAGs obtained from the 100 Area RDR/RAWP (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] Hanford Site-specific background value is not available; not evaluated during background study. Value used is from *Natural Background Soil Metals Concentrations in Washington State* (Ecology 1994).

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

[d] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the 100 Area RDR/RAWP [DOE-RL 2005b]). Updated oral reference dose values (as provided in the Integrated Risk Information System) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

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

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

[g] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750[3], 1996 (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (WDOH 1997).

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

[i] No cleanup level is available from the Washington State Department of Ecology Cleanup Levels and Risk Calculations database (Ecology 2005), and no bioconcentration factor or ambient water quality criteria values are available to calculate cleanup levels (WAC 173-340-730(3)(a)(iii), 1996 [Method B for surface waters]).

[j] Based on *100 Area Analogous Sites RESRAD Calculations* (BHI 2005), with a groundwater table elevation of 114 m (374 ft) and a clean zone extending from groundwater to an elevation of 125.5 m (412 ft).

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

[l] Value listed in the 100 Area RDR/RAWP (DOE-RL 2005b) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using the Oak Ridge National Laboratory oral cancer potency factor.

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

[n] Direct exposure and groundwater protection RAG values for chlordane were mistakenly calculated based on carcinogenicity data for lindane in the 100 Area RDR/RAWP (DOE-RL 2005b). Corrected values are presented in this table

-- = not applicable
BG = background
CFR = *Code of Federal Regulations*
MCL = maximum contaminant level
RAG = remedial action goal
RDL = required detection limit
RDR/RAWP = remedial design report/remedial action work plan
RESRAD = RESidual RADioactivity (dose model)
WAC = *Washington Administrative Code*

Table 3b. Comparison of Residual Contaminant Concentrations to Remedial Action Goals for the 1607-F7 Waste Staging Area. (3 Pages)

Contaminant of Potential Concern	Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Arsenic	3.4 (<BG)	20	20	20	No	--
Barium	147	5,600[b]	132[c,d]	224[e]	No	--
Beryllium	0.30 (<BG)	10.4[f]	1.51[c]	1.51[c]	No	--
Boron[g]	7.7	16,000	320	--[h]	No	--
Cadmium[i]	0.22 (<BG)	13.9	0.81[c]	0.81[c]	No	--
Chromium (total)	12.2 (<BG)	80,000[b]	18.5[c]	18.5[c]	No	--
Cobalt	6.4 (<BG)	1,600	32	--[h]	No	--
Copper	16.4 (<BG)	2,960	59.2	22.0[c]	No	--
Lead	12.3	353	10.2[c]	10.2[c]	Yes	Yes[i]
Manganese	300 (<BG)	11,200	512[c]	512[c]	No	--
Mercury	0.04 (<BG)	24	0.33[c]	0.33[c]	No	--
Nickel	11.3 (<BG)	1,600	19.1	27.4[c]	No	--
Vanadium	40.2 (<BG)	560	85.1[c]	--[h]	No	--
Zinc	72.0	24,000	480	67.8[c]	Yes	Yes[i]
1,4-dichlorobenzene	0.046	41.7	0.33[j]	0.972	No	--
2-Methylnapthalene	0.110	320	3.2	--[h]	No	--
Benzo(a)anthracene	0.022	1.37[k]	0.33[j]	0.33[j]	No	--
Benzo(a)pyrene	0.032	0.33[j]	0.33[j]	0.33[j]	No	--
Benzo(b)flouranthene	0.036	1.37[k]	0.33[j]	0.33[j]	No	--
Benzo(g,h,i)perylene[l]	0.035	2,400	48	192	No	--
Benzo(k)flouranthene	0.032	13.7[k]	0.33[j]	0.33[j]	No	--
Bis(2-ethylhexyl)phthalate	0.035	71.4	0.625	0.36	No	--
Di-n-butylphthalate	0.034	8,000	160	540	No	--
Di-n-octylphthalate	0.018	1,600	32	--[h]	No	--

Contaminant of Potential Concern	Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Flouranthene	0.037	3,200	64	18.0	No	--
Indeno(1,2,3-cd)pyrene	0.027	1.37	0.33[j]	0.33[j]	No	--
Napthalene	0.072	1600	16.0	988	No	--
Phenanthrene[l]	0.044	24,000	240	1920	No	--
Pyrene	0.051	2,400	48	192	No	--
Alpha-chlordane	0.0055	2.86[m]	0.025[m]	0.0165[j]	No	--
DDD, 4,4'	0.058	4.17	0.0365	0.005[j]	Yes	Yes[i]
DDE, 4,4'	0.0022	2.94	0.0257	0.005[j]	No	--
DDT, 4,4'	0.046	2.94	0.0257	0.005[j]	Yes	Yes[i]
Dieldrin	0.023	0.0625	0.003[j]	0.003[j]	No	--
Gamma-chlordane	0.0037	2.86[m]	0.025[m]	0.0165[j]	No	--
Heptachlor	0.015	0.222	0.002	0.002[j]	Yes	Yes[i]
Heptachlor epoxide	0.00089	0.11	0.002[j]	0.002[j]	No	--
Chloroform	0.001	164	0.71	1.14	No	--
Ethylbenzene	0.002	8,000	80	620	No	--
Methylene chloride	0.013	133	0.5	0.94	No	--
Toluene	0.001	6,400	64	1360	No	--

Contaminant of Potential Concern	Maximum Value (mg/kg)	Remedial Action Goals (mg/kg)[a]			Does the Maximum or Statistical Data Set Exceed RAGs?	Does the Maximum or Statistical Result Pass RESRAD Modeling?
		Direct Exposure	Soil Cleanup Level for Groundwater Protection	Soil Cleanup Level for River Protection		
Xylenes (total)	0.006	16,000	160	--[h]	No	--

[a] Lookup values and RAGs obtained from the 100 Area RDR/RAWP (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] Noncarcinogenic cleanup level calculated from WAC 173-340-740(3), 1996 (Method B for soils) (as presented in the 100 Area RDR/RAWP [DOE-RL 2005b]). Updated oral reference dose values (as provided in the Integrated Risk Information System) yield Method B direct exposure RAG values of 16,000 mg/kg and 120,000 mg/kg for barium and chromium, respectively.

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

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

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

[f] Carcinogenic cleanup level calculated based on the inhalation exposure pathway per WAC 173-340-750[3], 1996 (Method B for air quality) and an airborne particulate mass loading rate of 0.0001 g/m^3 (WDOH 1997).

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

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

[i] Based on *100 Area Analogous Sites RESRAD Calculations* (BHI 2005), with a groundwater table elevation of 114 m (374 ft) and a clean zone extending from groundwater to an elevation of 125.5 m (412 ft).

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

[k] Value listed in the 100 Area RDR/RAWP (DOE-RL 2005b) is based on the use of benzo(a)pyrene as a surrogate. Compound-specific carcinogenic cleanup level calculated per WAC 173-340-740(3), 1996 (Method B for soils) using the Oak Ridge National Laboratory oral cancer potency factor.

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

[m] Direct exposure and groundwater protection RAG values for chlordane were mistakenly calculated based on carcinogenicity data for lindane in the 100 Area RDR/RAWP (DOE-RL 2005b). Corrected values are presented in this table.

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DATA EVALUATION

When using a statistical sampling approach, a requirement for nonradionuclides is the WAC 173-340-740(7)(e) three-part test. The WAC 173-340 three-part test consists of the following criteria: (1) the cleanup verification statistical value must be less than the cleanup level, (2) no single detection can exceed two times the cleanup criteria, and (3) the percentage of samples exceeding the cleanup criteria must be less than 10%. The results of the WAC 173-340 three-part test are documented in the 95% upper confidence limit calculation provided in Appendix B and in Table 3a. Where statistical values default to maximum values due to data censorship, the three-part test is not performed, instead a direct comparison of nonstatistical sampling results to the RAGs is used as the compliance basis.

Residual concentrations of lead and 4,4'-DDT in the remediation footprint and lead, zinc, 4,4'-DDD, 4,4'-DDT and heptachlor at the waste staging area exceeded the soil RAGs for groundwater and/or river protection. Given the soil-partitioning coefficients of lead (30 mL/g), zinc (30 mL/g), 4,4'-DDD (45.8 mL/g), and 4,4'-DDT (678 mL/g), the results of the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005a) indicate that these constituents will not reach groundwater (and, therefore, the Columbia River) in 1,000 years given a clean zone extending at least 1 m (3.3 ft). Therefore, residual concentrations of these constituents satisfy the remedial action goals for the protection of groundwater and the Columbia River.

The pesticide heptachlor was quantified in the sample collected from the waste staging area. The maximum detected concentrations of this pesticide are well below the direct exposure RAG (Table 3b) and believed to be the result of historic pesticide application for the purpose of insect control rather than disposal practices at the 1607-F7 site. Therefore, the total mass of pesticide would be small and as such would not have migrated significantly through the vadose zone. This is demonstrated by the depth profile provided by the statistical sampling of the 1607-F7 waste site excavation. Samples collected within the 1607-F7 waste site excavation did not contain detectable amounts of heptachlor, thus demonstrating that the surface-applied pesticide had not migrated more than 0.5 m (1.6 ft) below grade. Based on the soil-partitioning coefficient value of heptachlor (9.5 mL/g), the results of the *100 Area Analogous Sites RESRAD Calculations* (BHI 2005a) indicate that this constituent will not reach groundwater (and, therefore, the Columbia River) within 1,000 years with a groundwater elevation of 114 m (374 ft) above mean sea level and a clean zone extending from groundwater to an elevation of 125.5 m (412 ft) above mean sea level. Therefore, residual surface concentrations of this constituent satisfy the remedial action goals for the protection of groundwater and the Columbia River.

Nonradionuclide risk requirements for the 1607-F7 site include an individual hazard quotient of less than 1.0, a cumulative hazard quotient of less than 1.0, an individual contaminant carcinogenic risk of less than 1×10^{-6}, and a cumulative carcinogenic risk of less than 1×10^{-5}. These risk values were not calculated for constituents that were not detected. All individual hazard quotient for noncarcinogenic constituents were less than 1.0 (Appendix C). The cumulative hazard quotient for the noncarcinogenic constituents at the 1607-F7 site are 9.9×10^{-2}. All individual cancer risk values were less than the limit of 1×10^{-6}. The cumulative cancer risk is 8.7×10^{-7}, satisfying the cumulative cancer risk limit of 1×10^{-5}.

DATA QUALITY ASSESSMENT

Confirmatory Sampling

A data quality assessment (DQA) review was performed to compare the confirmatory sampling approach and resulting analytical data with the sampling and data requirements specified by the project objectives and performance specifications. This review involved 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 assessment review completes the data life cycle (i.e., planning, implementation, and assessment) that was initiated by the data process (EPA 2000).

This DQA review was performed in accordance with specific data quality objectives for the site, which are found in the SAP (DOE-RL 2005a). A review of the verification work instruction (BHI 2004c), the field logbook (BHI 2004a), and applicable analytical data packages was performed as part of this DQA. All samples were collected per the sample design. The data quality requirements in the SAP are used for assessing data from statistical sampling. To ensure quality data sets, the SAP data assurance requirements, as well as the validation procedures for chemical and radiochemical analysis (BHI 2000a, 2000b) are followed where appropriate.

Data confirmatory samples collected at the 1607-F7 site were provided by the laboratory in sample delivery groups (SDG) H2798 and SDG W04411. SDG H2798 contained samples J01XN1 (ash), J01XN2 (septic tank contents), J01XN3 (duplicate) and J01XN4 (equipment blank). SDG W04411 contained three samples: J01XN35 (ash), J01XN6 (septic tank contents, and J01XN7 (duplicate). The samples in SDG W04411 were only analyzed for hexavalent chromium. No major deficiencies were found in the data. Minor deficiencies are presented in the descriptions of the SDGs that follow.

Volatile Organic Analysis

The common laboratory contaminant methylene chloride was found in the method blank (MB) and the matrix spike (MS)/matrix spike duplicate (MSD) pair, as well as in all of the samples, all at similar levels. This is a laboratory issue rather than an issue with the field samples. There was no impact on the field sample data.

The common laboratory contaminant acetone was found in sample J01XN2 at 210 µg/kg and in the field duplicate of this sample at 10 µg/kg. Both of these results are well below the RAGs and there is no impact on decision making using this sample data.

Semivolatile Organic Analysis

Several issues were observed in the data; however, none of the issues impact any of the results for SVOCs, and those results are useful for decision-making purposes. The practical quantitation limits (PQLs) for the nondetects were not within the acceptance criteria. The SVOCs remained COPCs for verification sampling.

Pesticide Analysis

No quality assurance/quality control information was generated for the analyte toxaphene. In some of the analyses, the pesticide data were reported with high PQLs. All pesticides remained COPCs for verification sampling.

PCB Analysis

The PQLs for the nondetects were within the acceptance criteria; therefore, PCBs remained COPCs for verification sampling.

ICP Metals Analysis

For the metals analyses, minor issues were observed for selenium, silver, arsenic, barium, total chromium, and lead. Low-concentration values of selenium and silver were not within the acceptance criteria. Selenium and silver remained as COPCs for verification sampling.

Hexavalent Chromium Analysis

The holding time for this analysis was not met by the laboratory. The MS had very low recovery (11%). The laboratory duplicate sample had a high relative percent difference (RPD) compared to the native sample. Positive results for hexavalent chromium are useful for decision-making purposes, but the possibility that the data are low compared to the actual value should be considered. Because of the low matrix spike recovery, the non-detected hexavalent chromium results are not useful for decision making purposes. Hexavalent chromium remained a COPC for verification sampling.

Total Petroleum Hydrocarbon Analysis

The total petroleum hydrocarbon analyses had no issues, and the data for this analysis are valid.

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

The DQA review for the 1607-F7 site confirmatory data found the results to be accurate within the standard errors associated with the methods, including sampling and sample handling. Therefore, the data are of the right type, quality, and quantity to support the intended use, except as noted above. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of quality assurance and quality control deficiencies. All analytical data were found to be acceptable for decision-making purposes.

Except as noted specifically and addressed above, the DQA review found the results to be accurate within the standard errors associated with the methods (including sampling and sample handling), and nondetect results have detection limits below established project specifications. The review also verified that the sample design was sufficient for determining the need for remediation.

The confirmatory sample analytical data are stored in the ENRE project-specific database prior to providing a copy to HEIS and are summarized in Appendix A.

Verification Sampling Data Quality Assessment

A DQA was performed to compare the sampling approach and analytical data with the sampling and data requirements specified in the site-specific work instruction (WCH 2006c). This DQA was performed in accordance with specific data quality objectives for the site found in the SAP (DOE-RL 2005a). A review of the verification work instruction (WCH 2006c), the field logbook (WCH 2006a), and applicable analytical data packages was performed as part of this DQA. To ensure quality data, the SAP data assurance

requirements and the chemical validation procedures for chemical and radiochemical analysis (BHI 2000a, 2000b) 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).

Data from verification samples collected at the 1607-F7 site were provided by the laboratory in sample delivery groups (SDG) K0291, SDG K0297, and SDG K0357. No major deficiencies were found in the data. Minor deficiencies are presented in the descriptions of the SDGs that follow.

SDG K0291

SDG K0291 consists of five samples (J11VH8, J11VH9, J11VJ0, J11VJ1, J11VJ2) analyzed for SVOCs, VOCs, pesticides, PCBs, mercury, hexavalent chromium and metals by ICP analysis. A sixth sample (J11VH7) was submitted as the equipment blank and analyzed for VOCs, mercury, and ICP metals analysis.

Semivolatile Organic Analysis

The common laboratory contaminants bis-(2-ethylhexyl)phthalate, and di-n-butyl phthalate were found in the MB at concentrations of 0.40 mg/kg and 0.32 mg/kg, respectively. Detections of these analytes in the field samples were between 0.021 mg/kg and 0.046 mg/kg for both analytes. The detections in the field samples are all similar in magnitude and all below the lowest RAG values (0.36 mg/kg and 160 mg/kg, respectively). These detections could be argued to be laboratory contamination, qualified as non-detected, and reported at the contract-required detection limits (CRDLs) (0.34 mg/kg for both). However, the laboratory-reported values are retained here because they are lower than the PQL values. Either treatment of this data is inconsequential to the disposition of the site. The data are usable for decision-making purposes.

The MS recoveries for 1,2,4-trichlorobenzene, 2 methylnapthalene, 2,6-dinitrotoluene, and pentachlorophenol (51%, 59%, 111%, 137%, respectively) were outside of the laboratory established acceptance criteria. The field sample data are considered estimated but usable for decision-making purposes.

Volatile Organic Analysis

The MS and MSD recoveries for 1,1,1-trichloroethane were outside of acceptance criteria at 141% and 145%, respectively. The MSD recoveries for 1,2-dichloroethane and carbon tetrachloride, (144%, 143%, respectively) were also outside of the acceptance criteria. The laboratory control sample (LCS) recoveries were all within criteria. There may be a high bias in the field sample data for these analytes. High biased data are useable for decision-making purposes.

The common laboratory contaminant methylene chloride was detected in the MB at less than two times the CRDL. Chloroform, 4-methyl-2-pentanone, 2-hexanone, xylenes, and styrene were detected in the MB at less than the CRDL. There may be a high bias in the field sample data for these analytes, but the data are considered useable for decision-making purposes.

Six of the 42 surrogate recoveries in SDG K0291 were outside acceptance criteria. Samples J11VJ0 and J11VJ1 were reanalyzed and the second set of data are reported in Appendix B and used in the calculations. In cases where multiple sets of data exist for any one sample, the data set that has the least negative qualifiers is generally used to evaluate the associated waste site. The reanalysis requirement for sample J11VJ2 was fulfilled by the analysis of the associated MS samples, therefore the original analysis of sample J11VJ2 is

reported in Appendix B and used in the calculations. There may be a high bias in the J11V12 data, which are considered useable for decision-making purposes.

Pesticide Analysis

All LCS recoveries were below acceptance criteria at 11% to 20%, including the LCS surrogates. However, the MS/MSD recoveries were within criteria. The MS/MSD and the field sample surrogates were all within or above the criteria ranges. Surrogate recoveries above the criteria indicate a high bias in the associated samples and the associated data are considered estimated but acceptable for decision-making purposes. The systemic low LCS results are likely due to a partially plugged needle during injection, resulting in the low, but similar, recoveries. The sample surrogates show that this error was limited to the LCS. However, due to the lack of a proper LCS, all of the pesticide data in SDG K0291 are qualified by the project as estimated with "J" flags. The data remain useable for decision-making purposes.

The laboratory identified minor interference with the 4,4'-DDT results in samples J11VJ0 and J11VJ1. This is a common problem in pesticide analysis. The values reported for 4,4'-DDT in samples J11VJ0 and J11VJ1 are considered estimated but useable for decision making purposes.

The analyte toxaphene was not added to the MS, MSD, or LCS. The laboratory quantitates but does not perform quality assurance on the analyte toxaphene. The toxaphene data are considered estimated but useable for decision-making purposes.

PCB Analysis

No deficiencies were found.

Hexavalent Chromium

No deficiencies were found.

ICP Metals and Mercury Analysis

MS recoveries for aluminum, iron, antimony, and silicon were outside of the acceptance criteria. Matrix spikes are prepared from sample matrices whose composition is not known at the time the MSs are being prepared. The concentration of any one analyte in the matrix spiking solution may be small compared to the concentration of that analyte in the field sample with which the MS is prepared. The analytical variability in the field sample concentrations can then be greater than the added MS concentrations. In these cases, the calculated MS recoveries may be significantly impacted, as seen for the analytes mentioned above. To confirm quantitation, serial dilutions and post-digestion spikes were performed on the matrix spikes with good results for these analytes. The data are useable for decision-making purposes.

The LCS recovery for silicon was below acceptance criteria at 57.1%. In addition, calcium was detected in the MB at 1.8 mg/kg. These constituents are not COPCs for the 1607-F7 waste site.

The RPD for boron was above acceptance criteria at 43.1%. Elevated RPDs are attributed to natural heterogeneity of the sample matrices. The data are useable for decision-making purposes.

SDG K0297

SDG K0297 consists of six samples (J11VJ3, J11VJ4, J11VJ5, J11VJ6, J11VJ7, and J11VJ8) analyzed for SVOCs, VOCs, pesticides, PCBs, ICP metals and mercury, and hexavalent chromium. Sample J11VJ4 is a field duplicate of sample J11VJ3. Results of the third-party validation of SDG K0297 will also be presented in the following comments.

Semivolatile Organic Analysis

In the SVOC analysis, the common laboratory contaminant bis-(2-ethylhexyl)phthalate was found in the MB at a concentration below the CRDL. The data are useable for decision-making purposes.

MS recoveries for hexachloroethane, 1,2,4-trichlorobenzene, 3,3'-dichlorobenzidine, 2-methylnaphthalene, and pentachlorophenol (47%, 53%, 10%, 118%, and 146%, respectively) were outside of the acceptance criteria. Third-party validation qualified all undetected sample results for the analytes with low MS recoveries (hexachloroethane, 1,2,4-trichlorobenzene, and 3,3'-dichlorobenzidine) as estimates with "J" flags. For analytes with high MS recoveries (2-methylnaphthalene and pentachlorophenol), the detected results were qualified as estimates and flagged "J". However, there were no detections of pentachlorophenol to qualify. It should also be noted that the MS recovery for 3,3'-dichlorobenzidiene is as low as it can be without the associated data being rejected. Data associated with MS recoveries <10% are qualified as rejected with an R flag. Because the MS recoveries are all equal to or greater than 10%, the data are not rejected and remain useable for decision-making purposes.

Because of an RPD outside of quality control limits, third-party validation qualified all semivolatile results, except for 4-chloroanaline, 4-chloro-3-methylphenol, 2,4,6-trichlorophenol, 2,6-dinitrotoluene, 3-nitroanaline, 4-nitrophenol, 4-nitroanaline, and benzo(k)flouranthene, as estimates with "J" flags. The data are usable for decision-making purposes.

Pesticide Analysis

Five of the 20 surrogate recoveries were above acceptance criteria. Third-party validation qualified all detected pesticide results in samples J11VJ3, J11VJ7, and J11VJ8 with "J" flags as estimates. The data are useable for decision-making purposes.

The analyte toxaphene was not added to the MS, MSD, or LCS. It is typical for the laboratory to quantify toxaphene but not to include it in the quality assurance samples. Third-party validation qualified all toxaphene data in SDG K0297 with "J" flags as estimates. The data are usable for decision-making purposes.

PCB Analysis

No deficiencies were found.

ICP Metals and Mercury Analysis

The LCS for silicon was below acceptance criteria at 54%. Third-party validation qualified all silicon results in SDG K0297 with "J" flags as estimates. Silicon is not a COPC at the 1607-F7 waste site, and the data are usable for decision-making purposes.

The MS recoveries for five ICP metals were out of the acceptance criteria. Serial dilutions and post-digestion spikes were performed with good results, with the exception of iron. Iron is not a COPC. Third-party validation qualified all antimony results with "J" flags as estimates, due to a low (45.1%) initial MS recovery. The data are usable for decision-making purposes.

Barium, calcium, and sodium were detected in the MB below the CRDL. These detections are insignificant to the field sample data. The data are usable for decision-making purposes.

Hexavalent Chromium Analysis

The MS recovery for hexavalent chromium was below acceptance criteria. The LCS recovery was within criteria. These results may suggest a low bias in the field sample data. All of the hexavalent chromium field sample data were undetected. Third-party validation qualified all hexavalent chromium results with "J" flags as estimates due to the low MS recovery. The hexavalent chromium data are estimated but are usable for decision-making purposes.

Volatile Organic Analysis

Surrogate recoveries in samples J11VJ3, J11VJ4, J11VJ6, and J11VJ7 were outside of the acceptance criteria. Samples J11VJ3, J11VJ4, and J11VJ6 were reprepared and reanalyzed. The data reported in Appendix B represent the reanalysis of those samples. Sample J11VJ7 was not reanalyzed because the MS and MSD fulfill the reanalysis requirement for this sample. Surrogate recoveries for bromofluorobenzene in samples J11VJ4 and J11VJ6 were outside of the laboratory criteria in the reprepared samples at 135% and 125%, respectively. Third-party validation did not qualify any data for these minor deficiencies. The data are useable for decision-making purposes.

The MS recovery for 1,1,2,2-tetrachloroethane was above the acceptance criteria at 132%. This may suggest a high bias in the field sample data for 1,1,2,2-tetrachloroethane. A high bias in the data is acceptable for decision-making purposes.

Total xylenes, 4-methyl-2-pentanone, 2-hexanone, styrene, and chloroform were all detected in the method blank below the RQL. Third-party validation raised the reported result for chloroform in all samples to the RQL (0.010 mg/kg) and requalified all chloroform results with "U" flags as nondetected. Third-party validation did not qualify data for the other analytes because the detections were not significant to the field sample data.

The common laboratory contaminant methylene chloride was detected in the MB above the CRDL at 0.007 mg/kg. The lowest RAG for methylene chloride is 0.5 mg/kg. Third-party validation requalified all methylene chloride detections with "U" flags as nondetected. The data are useable for decision-making purposes.

The laboratory reported that an internal standard in the MS did not meet the acceptance criteria. The MSD fulfills the reanalysis requirement for the MS. The field sample data are unaffected. The data are useable for decision-making purposes.

SDG K0357

SDG K0357 consists of one sample (J11VK3) analyzed for VOCs, SVOCs, hexavalent chromium, pesticides, PCBs, ICP metals and mercury.

Volatile Organic Analysis

MS recoveries for dibromochloromethane, 1,1,2-trichloroethane, and 1,1,2,2-tetrachlorethane (146%, 146%, and 160%, respectively) were above the acceptance criteria. MSD recoveries for dibromochloromethane and 1,1,2,2-tetrachlorethane (132% and 143%, respectively) were also above the acceptance criteria. These results suggest a high bias in the field sample data for these analytes. A high bias in the data is acceptable for decision-making purposes.

The common laboratory contaminant methylene chloride was detected in the MB at less than two times the CRDL. Chloroform, total xylenes, and styrene were detected at less than the CRDL. There may be a high bias in the field sample data for these analytes, but the data are usable for decision-making purposes.

The internal standard criteria for sample J11VK3 was not met; however, sample J11VK3 was used to prepare the MS, and the analysis of the MS fulfills the reanalysis requirement for that sample. The data are usable for decision-making purposes.

Semivolatile Organic Analysis

The LCS and LCS duplicate recoveries for 2,4-dinitrophenol (12% and 19%, respectively) were below the acceptance criteria. However, the MS and MSD recoveries were within criteria. The data for 2,4-dinitrophenol should be considered estimated but usable for decision-making purposes.

The common laboratory contaminants bis(2-ethylhexyl)phthalate and di-n-butylphthalate were detected in the MB at less than the CRDL. Detections in the MB below the CRDL are acceptable, and the data are usable for decision-making purposes.

Hexavalent Chromium

No deficiencies were found.

Pesticide Analysis

The sample was extracted one day out of holding time. Because the sample was extracted at less than two times the required holding time, there is no impact to the sample data. The data are usable for decision-making purposes.

Because of temperatures rising above the acceptable range in the sample storage refrigerator, the samples were moved to another sample storage refrigerator that was able to maintain the required holding temperature (4°C ± 2°C). Prior to moving the samples, the temperature in the sample storage refrigerator reached 12°C. Pesticides that have persisted in the environment for long periods of time over a wide range of temperatures should experience little or no impact within the final sample data due to the samples being several degrees above 6°C for a few hours. The data are useable for decision-making purposes.

Recovery of the surrogate tetrachloro-m-xylene was above the laboratory acceptance criteria at 123%. This suggests a slightly high bias in the sample data, which are acceptable for decision-making purposes.

The MS recoveries for 4,4'-DDE, dieldrin, and 4,4'-DDT were unobtainable due to matrix interference. The resulting data for these analytes should be considered estimated with a high bias. However, high biased data are useable for decision-making purposes.

PCB Analysis

Sample J11VK3 was extracted 1 day out of holding time. Because the sample was extracted at less than two times the required holding time, the data are useable for decision-making purposes.

Because of temperatures rising above the acceptable range in the sample storage refrigerator, the samples were moved to another sample storage refrigerator that was able to maintain the required holding temperature (4°C ± 2°C). Prior to moving the samples, the temperature in the sample storge refrigerator reached 12°C. This increase in sample temperature should have little or no impact within the PCB data set as these constituents, have persisted in the environment for long periods of time over a wide range of temperatures. The data are useable for decision-making purposes.

ICP Metals and Mercury Analysis

The LCS for silicon was below the acceptance criteria at 57.6%. Silicon is not a COPC for the 1607-F7 waste site. The data are considered estimated but useable for decision-making purposes.

The MS recoveries for aluminum, iron, antimony, and silicon (219.7%, -520%, 57.7%, and 329.8%, respectively) were outside of the laboratory control limits (75% to 125%). Matrix spikes are prepared from sample matices whose composition is not known at the time the MSs are being prepared. The concentration of any one analyte in the matrix spiking solution may be small compared to the concentration of that analyte in the field sample with which the MS is prepared. The analytical variability in the field sample concentrations can then be greater than the added MS concentrations. In these cases, the calculated MS recoveries may be significantly impacted, as seen for the analytes mentioned above. To confirm quantitation, serial dilutions and post-digestion spikes were performed on the matrix spikes with good results for these analytes. The data are usable for decision-making purposes.

The RPD for mercury in the duplicate analysis was 75.9%. The sample and duplicate pair are prepared using materials collected in the field, which are subject to natural heterogeneities in the matrices collected. The data are usable for decision-making purposes.

Conclusions

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

The DQA of the verification data for the 1607-F7 site found the results to be accurate within the standard errors associated with the methods, including the sampling and sample handling. This DQA concludes that the 1607-F7 verification data reviewed are of the right type, quality, and quantity to support the intended use. Detection limits, precision, accuracy, and sampling data group completeness were assessed to determine if any analytical results should be rejected as a result of quality assurance and quality control deficiencies. All analytical data were found acceptable for decision-making purposes. The verification sample analytical data are stored in the ENRE project-specific database prior to providing a copy to HEIS and are summarized in Appendix B.

SUMMARY FOR INTERIM CLOSURE

The 1607-F7, 141-M Building Septic Tank waste site has been evaluated and remediated in accordance with the Remaining Sites ROD (EPA 1999) and the RDR/RAWP (DOE-RL 2005b). Because of the presence of multiple metals, PCBs, pesticides, SVOCs, and VOCs at concentrations exceeding RAGs and visual observations of debris during confirmatory sampling, approximately 1,088 metric tons (1,200 US tons) of material was removed for disposal at ERDF. Sampling to verify the completeness of remediation was performed, and analytical results are shown to meet the cleanup objectives for direct exposure, groundwater protection, and river protection. In accordance with this evaluation, the verification sampling results support a reclassification of the 1607-F7 site to interim closed out. This site does not have a deep zone; therefore, no deep zone institutional controls are required.

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APPENDIX A

CONFIRMATORY AND WASTE CHARACTERIZATION RESULTS

Note: This appendix contains the sample results for the site that led to a decision that remediation was necessary. Verification sampling results, to support site closeout, are provided in Appendix B.

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 pages)

Sample Location	HEIS Number	Sample Date	Americium-241 GEA			Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Septic tank	J01XN2	10/06/04	0.088	U	0.088	0.017	U	0.021	0.02	U	0.02	0.053	U	0.053	0.065	U	0.065	0.054	U	0.054
Septic tank	J01XN3	10/06/04	0.13	U	0.13	0.033	U	0.033	0.03	U	0.03	0.08	U	0.08	0.097	U	0.097	0.08	U	0.08
Ash layer	J01XN1	10/06/04	0.036	U	0.036	0.015	U	0.015	0.017	U	0.017	0.039	U	0.039	0.053	U	0.053	0.032	U	0.032

Sample Location	HEIS Number	Sample Date	Gross alpha			Gross beta			Potassium-40			Radium-226			Radium-228			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
Septic tank	J01XN2	10/06/04	5.19		2.7	14.4		5.7	8.19		0.21	0.291		0.041	0.402		0.093	0.33		0.024
Septic tank	J01XN3	10/06/04	5.68		3.1	14.6		6.6	7.51		0.32	0.31		0.059	0.439		0.14	0.334		0.036
Ash layer	J01XN1	10/06/04	4.43		2.8	8.67		5.4	2.47		0.21	0.169		0.029	0.216		0.063	0.198		0.018

Sample Location	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
Septic tank	J01XN2	10/06/04	0.402		0.093	0.07	U	0.07	2.5	U	2.5
Septic tank	J01XN3	10/06/04	0.439		0.14	0.1	U	0.1	3.6	U	3.6
Ash layer	J01XN1	10/06/04	0.216		0.063	0.098	U	0.098	1.9	U	1.9

B = blank contamination (organic constituents)
C = blank contamination (inorganic constituents)
GEA = gamma energy analysis
HEIS = Hanford Environmental Information System
MDA = minimum detectable activity
TPH = total petroleum hydrocarbons
Q = qualifier
U = undetected
J = estimated

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 pages)

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Equipment blank	J01XN4	10/6/04	78.7		0.67	0.25	U	0.25	0.61		0.3	1.9		0.02	0.06		0.008	0.42	U	0.42
Septic tank	J01XN2	10/6/04	5890		4.3	1.6	U	1.6	1.9	U	1.9	126		0.11	0.32		0.05	2.7	U	2.7
Septic tank	J01XN3	10/6/04	5540		5.3	1.9	U	1.9	2.8		2.3	166		0.13	0.32		0.06	3.3	U	3.3
Ash layer	J01XN1	10/6/04	3540		5.4	2	U	2	3.6		2.4	253		0.13	0.34		0.07	9.5		3.4

Sample Location	HEIS Number	Sample Date	Cadmium			Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Equipment blank	J01XN4	10/6/04	0.02	U	0.02	28.3	C	0.57	0.38	C	0.05	0.12	C	0.07	0.28		0.04			
Septic tank	J01XN2	10/6/04	0.37		0.16	3590	C	3.7	16.6	C	0.32	6.7		0.43	58.9	C	0.27			
Septic tank	J01XN3	10/6/04	0.33		0.19	3630	C	4.5	17.5	C	0.39	5.6		0.52	48.2	C	0.32			
Ash layer	J01XN1	10/6/04	0.38		0.2	13700	C	4.6	4.7	C	0.4	4.2		0.54	16.3	C	0.33			
Tank sediment	J01XN6	10/6/04																0.35	U	0.35
Tank sediment	J01XN7	10/6/04																0.35	U	0.35
Ash layer	J01XN5	10/6/04																200		0.35

Sample Location	HEIS Number	Sample Date	Iron			Lead			Magnesium			Manganese			Mercury			Molybdenum		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Equipment blank	J01XN4	10/6/04	510		1.9	0.48		0.16	13.1		0.55	3		0.008	0.01	U	0.01	0.11	U	0.11
Septic tank	J01XN2	10/6/04	26000		12.2	27.6		1	3790		3.5	250		0.05	0.15		0.02	0.69	U	0.69
Septic tank	J01XN3	10/6/04	22100		14.8	31.8		1.2	3650		4.3	221		0.06	0.17		0.02	0.84	U	0.84
Ash layer	J01XN1	10/6/04	8630		15.3	15.2		1.3	2710		4.4	116		0.07	0.06		0.02	0.87	U	0.87

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 Pages)

Sample Location	HEIS Number	Sample Date	Nickel			Potassium			Selenium			Silicon			Silver			Sodium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Equipment blank	J01XN4	10/6/04	0.13		0.1	25.4	C	2.9	0.32	U	0.32	53.4	C	0.42	0.07	U	0.07	10.1	C	0.19
Septic tank	J01XN2	10/6/04	12.3		0.64	827	C	18.6	2.1	U	2.1	423		2.7	0.73		0.48	165	C	1.2
Septic tank	J01XN3	10/6/04	11.9		0.78	764	C	22.7	2.5	U	2.5	443	C	3.2	1.1		0.58	156	C	1.5
Ash layer	J01XN1	10/6/04	8.2		0.8	327	C	23.3	2.6	U	2.6	942	C	3.3	0.6	U	0.6	223	C	1.5

Sample Location	HEIS Number	Sample Date	Vanadium			Zinc			Total Petroleum Hydrocarbons		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Equipment blank	J01XN4	10/6/04	0.26		0.05	2.7		0.03			
Septic tank	J01XN2	10/6/04	43.9		0.32	123		0.21			
Septic tank	J01XN3	10/6/04	42.6		0.39	119		0.26			
Ash layer	J01XN1	10/6/04	20.4		0.4	52.7		2.7	54.1		38.7

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 Pages)

Constituent	J01XN1 Ash layer Sample Date 10/6/04			J01XN2 Inside septic tank Sample Date 10/6/04			J01XN3 Inside septic tank Sample Date 10/6/04			J01XN4 Equipment Blank Sample Date 10/6/04		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
PCBs (polychlorinated biphenyls)												
Aroclor-1016	39	U	39	43	U	43	40	U	40	33	U	33
Aroclor-1221	39	U	39	43	U	43	40	U	40	33	U	33
Aroclor-1232	39	U	39	43	U	43	40	U	40	33	U	33
Aroclor-1242	39	U	39	43	U	43	40	U	40	33	U	33
Aroclor-1248	39	U	39	43	U	43	40	U	40	33	U	33
Aroclor-1254	39	U	39	350		350	40	U	40	33	U	33
Aroclor-1260	39	U	39	43	U	43	150		150	33	U	33
Pesticides												
Aldrin	64		39	43	U	43	40	U	40	1.7	U	1.7
Alpha-BHC	39	U	39	43	U	43	40	U	40	1.7	U	1.7
alpha-Chlordane	39	U	39	190		190	40	U	40	1.7	U	1.7
beta-1,2,3,4,5,6-Hexachlorocyclohexane	39	U	39	43	U	43	40	U	40	1.7	U	1.7
Delta-BHC	39	U	39	43	U	43	40	U	40	1.7	U	1.7
Dichlorodiphenyldichloroethane	77	U	77	86	U	86	79	U	79	3.3	U	3.3
Dichlorodiphenyldichloroethylene	120		77	86	U	86	79	U	79	3.3	U	3.3
Dichlorodiphenyltrichloroethane	77	U	77	70	J	70	79	U	79	3.3	U	3.3
Dieldrin	77	U	77	86	U	86	79	U	79	3.3	U	3.3
Endosulfan I	47		39	43	U	43	40	U	40	1.7	U	1.7
Endosulfan II	160		77	86	U	86	79	U	79	3.3	U	3.3
Endosulfan sulfate	210		77	86	U	86	79	U	79	3.3	U	3.3
Endrin	77	U	77	86	U	86	79	U	79	3.3	U	3.3
Endrin aldehyde	220		77	86	U	86	79	U	79	3.3	U	3.3
Endrin ketone	170		77	86	U	86	79	U	79	3.3	U	3.3
Gamma-BHC (Lindane)	39	U	39	56		56	40	U	40	1.7	U	1.7
gamma-Chlordane	39	U	39	460		460	40	U	40	1.7	U	1.7
Heptachlor	39	U	39	43	U	43	40	U	40	1.7	U	1.7
Heptachlor epoxide	53		53	43	U	43	40	U	40	1.7	U	1.7
Methoxychlor	340	J	530	430	U	430	400	U	400	17	U	17
Toxaphene	3900	U	3900	4300	U	4300	4000	U	4000	170	U	170
SVOAs (semivolitale organics)												
1,2,4-Trichlorobenzene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
1,2-Dichlorobenzene	1900	U	1900	290	J	4300	2000	U	2000	330	U	330
1,3-Dichlorobenzene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
1,4-Dichlorobenzene	1900	U	1900	25000		4300	9800		2000	330	U	330
2,4,5-Trichlorophenol	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
2,4,6-Trichlorophenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2,4-Dichlorophenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2,4-Dimethylphenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2,4-Dinitrophenol	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
2,4-Dinitrotoluene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2,6-Dinitrotoluene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2-Chloronaphthalene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2-Chlorophenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2-Methylnaphthalene	9500		1900	4300	U	4300	2000	U	2000	330	U	330
2-Methylphenol (cresol, o-)	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
2-Nitroaniline	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
2-Nitrophenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
3,3'-Dichlorobenzidine	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
3-Nitroaniline	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
4,6-Dinitro-2-methylphenol	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
4-Bromophenylphenyl ether	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
4-Chloro-3-methylphenol	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
4-Chloroaniline	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
4-Chlorophenylphenyl ether	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 Pages)

Constituent	J01XN1 Ash layer Sample Date 10/6/04			J01XN2 Inside septic tank Sample Date 10/6/04			J01XN3 Inside septic tank Sample Date 10/6/04			J01XN4 Equipment Blank Sample Date 10/6/04		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
SVOAs (semivolitale organics) (continued)												
4-Methylphenol (cresol, p-)	1900	U	1900	260	J	4300	2000	U	2000	330	U	330
4-Nitroaniline	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
4-Nitrophenol	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
Acenaphthene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Acenaphthylene	1900	U	1900	4300	U	4300	100	J	2000	330	U	330
Anthracene	220	J	1900	310	J	4300	260	J	2000	330	U	330
Benzo(a)anthracene	320	J	1900	940	J	4300	1200	J	2000	330	U	330
Benzo(a)pyrene	150	J	1900	830	J	4300	1100	J	2000	330	U	330
Benzo(b)fluoranthene	450	J	1900	620	J	4300	1000	J	1000	330	U	330
Benzo(ghi)perylene	100	J	1900	470	J	4300	600	J	1000	330	U	330
Benzo(k)fluoranthene	1900	U	1900	850	J	4300	1000	J	1000	330	U	330
Bis(2-chloro-1-methylethyl)ether	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Bis(2-Chloroethoxy)methane	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Bis(2-chloroethyl) ether	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Bis(2-ethylhexyl) phthalate	390	JB	1900	230	JB	4300	160	JB	2000	72	JB	330
Butylbenzylphthalate	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Carbazole	160	J	1900	4300	U	4300	140	J	2000	330	U	330
Chrysene	350	J	1900	1100	J	4300	1400	J	2000	330	U	330
Di-n-butylphthalate	110	J	1900	4300	U	4300	2000	U	2000	62	J	330
Di-n-octylphthalate	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Dibenz[a,h]anthracene	1900	U	1900	4300	U	4300	310	J	2000	330	U	330
Dibenzofuran	2000		1900	4300	U	4300	2000	U	2000	330	U	330
Diethylphthalate	1900	U	1900	4300	U	4300	2000	U	2000	63	J	330
Dimethyl phthalate	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Fluoranthene	330	J	1900	2200	J	4300	2200		2000	330	U	330
Fluorene	110	J	1900	4300	U	4300	100	J	2000	330	U	330
Hexachlorobenzene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Hexachlorobutadiene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Hexachlorocyclopentadiene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Hexachloroethane	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Indeno(1,2,3-cd)pyrene	1900	U	1900	490	J	4300	600	J	2000	330	U	330
Isophorone	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
N-Nitroso-di-n-dipropylamine	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
N-Nitrosodiphenylamine	790	J	1900	4300	U	4300	2000	U	2000	330	U	330
Naphthalene	6400		1900	4300	U	4300	2000	U	2000	330	U	330
Nitrobenzene	1900	U	1900	4300	U	4300	2000	U	2000	330	U	330
Pentachlorophenol	4800	U	4800	11000	U	11000	5000	U	5000	830	U	830
Phenanthrene	1600	J	1900	1300	J	4300	1000	J	2000	330	U	330
Phenol	160	J	1900	4300	U	4300	2000	U	2000	330	U	330
Pyrene	410	J	1900	1800	J	4300	1900	J	2000	330	U	330

Table A-1. 1607-F7 Confirmatory Sampling Results. (6 Pages)

Constituent	J01XN1 Ash layer Sample Date 10/6/04			J01XN2 Inside septic tank Sample Date 10/6/04			J01XN3 Inside septic tank Sample Date 10/6/04			J01XN4 Equipment Blank Sample Date 10/6/04		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
VOAs (volatile organics)												
1,1,1-Trichloroethane	--	--	--	7	U	7	6	U	6	--	--	--
1,1,2,2-Tetrachloroethane	--	--	--	7	U	7	6	U	6	--	--	--
1,1,2-Trichloroethane	--	--	--	7	U	7	6	U	6	--	--	--
1,1-Dichloroethane	--	--	--	7	U	7	6	U	6	--	--	--
1,1-Dichloroethene	--	--	--	7	U	7	6	U	6	--	--	--
1,2-Dichloroethane	--	--	--	7	U	7	6	U	6	--	--	--
1,2-Dichloroethene(Total)	--	--	--	5	J	7	4	J	6	--	--	--
1,2-Dichloropropane	--	--	--	7	U	7	6	U	6	--	--	--
2-Butanone	--	--	--	3	J	3	12	U	12	--	--	--
2-Hexanone	--	--	--	14	U	14	12	U	12	--	--	--
4-Methyl-2-Pentanone	--	--	--	14	U	14	12	U	12	--	--	--
Acetone	--	--	--	210		14	10	J	12	--	--	--
Benzene	--	--	--	7	U	7	6	U	6	--	--	--
Bromodichloromethane	--	--	--	7	U	7	6	U	6	--	--	--
Bromoform	--	--	--	7	U	7	6	U	6	--	--	--
Bromomethane	--	--	--	14	U	14	12	U	12	--	--	--
Carbon disulfide	--	--	--	3	J	7	3	J	6	--	--	--
Carbon tetrachloride	--	--	--	7	U	7	6	U	6	--	--	--
Chlorobenzene	--	--	--	4	J	7	6	J	6	--	--	--
Chloroethane	--	--	--	14	U	14	12	U	12	--	--	--
Chloroform	--	--	--	7	U	7	6	U	6	--	--	--
Chloromethane	--	--	--	14	U	14	12	U	12	--	--	--
cis-1,3-Dichloropropene	--	--	--	7	U	7	6	U	6	--	--	--
Dibromochloromethane	--	--	--	7	U	7	6	U	6	--	--	--
Ethylbenzene	--	--	--	7	U	7	6	U	6	--	--	--
Methylene Chloride	--	--	--	10	B	10	6	JB	6	--	--	--
Styrene	--	--	--	7	U	7	6	U	6	--	--	--
Tetrachloroethene	--	--	--	7	U	7	6	U	6	--	--	--
Toluene	--	--	--	7	U	7	6	U	6	--	--	--
trans-1,3-Dichloropropene	--	--	--	7	U	7	6	U	6	--	--	--
Trichloroethene	--	--	--	7	U	7	6	U	6	--	--	--
Vinyl chloride	--	--	--	14	U	14	12	U	12	--	--	--
Xylenes (total)	--	--	--	7	U	7	6	U	6	--	--	--

Table A-2. 1607-F7 Waste Characterization Data Results. (4 Pages)

Sample Location	HEIS Number	Sample Date	Americium-241 GEA			Cesium-137			Cobalt-60			Europium-152			Europium-154			Europium-155		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Soil Sample	J03W98	08/09/05	0.19	U	0.19	0.08		0.069	0.061	U	0.061	0.107	U	0.14	0.21	U	0.21	0.13	U	0.13
Soil Sample	J03W99	08/10/05	0.34	U	0.34	0.05		0.046	0.046	U	0.046	0.11	U	0.11	0.15	U	0.15	0.13	U	0.13

Sample Location	HEIS Number	Sample Date	Plutonium-238			Plutonium-239/240			Potassium-40			Radium-226			Radium-228			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 Sample	J03W98	08/09/05	0	U	0.34	0.044	U	0.34	13.8		0.45	0.639		0.085	0.806		0.27	0.749		0.062
Soil Sample	J03W99	08/10/05	0.036	U	0.28	0.036	U	0.28	13.9		0.42	0.634		0.078	0.886		0.19	0.933		0.075

Sample Location	HEIS Number	Sample Date	Thorium-232 GEA			Uranium-235 GEA			Uranium-238		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
Soil Sample	J03W98	08/09/05	0.806		0.27	0.2	U	0.2	7.5	U	7.5
Soil Sample	J03W99	08/10/05	0.886		0.19	0.18	U	0.18	4.8	U	4.8

Table A-2. 1607-F7 Waste Characterization Data Results. (4 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
Soil Sample	J03W98	8/9/05	6150		2.5	2.5	U	2.5	5.8		2.5	224	C	0.12	0.47		0.06	18.9		1.4	0.44	C	0.198
Soil Sample	J03W99	8/9/05	6520		2.5	2.5	U	2.5	3.1		2.5	196	C	0.12	0.46		0.06	13.7		1.4	0.37	C	0.19

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Cobalt			Copper			Hexavalent Chromium			Iron			Lead		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil Sample	J03W98	8/9/05	5780	C	1.9	10.1	C	0.44	6.1		0.56	18.2	C	0.5	0.72	D	0.44	14300	C	0.4	0.39	C	1.6
Soil Sample	J03W99	8/9/05	5910	C	1.9	10.1	C	0.44	5.9		0.6	16.6	C	0.5	1.3	D	0.45	15400	C		8.8	C	1.6

Sample Location	HEIS Number	Sample Date	Magnesium			Manganese			Mercury			Molybdenum			Nickel			Potassium			Selenium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil Sample	J03W98	8/9/05	3750		4.4	270	C	0.12	0.03		0.02	1	U	1	10.9		1.4	1130		56.7	3.1	UC	3.1
Soil Sample	J03W99	8/9/05	3800		4.4	267	C	0.12	0.02	U	0.02	1	U	1	10.8		1.4	1120		56.6	3.1	UC	3.1

Sample Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc			TPH		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
Soil Sample	J03W98	8/9/05	549	C	2.4	0.56	U	0.56	348	C	2.4	34.7		0.37	56		0.31	148	U	148
Soil Sample	J03W99	8/9/05	433	C	2.4	0.56	U	0.56	385	C	2.4	37.6		0.37	49.7		0.31	151	U	151

Table A-2. 1607-F7 Waste Characterization Data Results.* (4 Pages)

Constituents	J03W98 Soil Sample Sample Date 7/18/05			J03W99 Soil Sample Sample Date 7/18/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL
Pesticides						
Aldrin	1.9	U	1.9	1.9	U	1.9
Alpha-BHC	1.9	U	1.9	1.9	U	1.9
alpha-Chlordane	1.9	U	1.9	1.9	U	1.9
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.9	U	1.9	1.9	U	1.9
Delta-BHC	1.9	U	1.9	1.9	U	1.9
Dichlorodiphenyldichloroethane	3.7	U	3.7	3.8	U	3.8
Dichlorodiphenyldichloroethylene	3.7	U	3.7	3.8	U	3.8
Dichlorodiphenyltrichloroethane	14		3.7	11		3.8
Dieldrin	7.5		3.7	5.5		3.8
Endosulfan I	9.6		3.7	7.2		3.8
Endosulfan II	3.7	U	3.7	3.8	U	3.8
Endosulfan sulfate	3.7	U	3.7	3.8	U	3.8
Endrin	3.7	U	3.7	3.8	U	3.8
Endrin aldehyde	3.7	U	3.7	3.8	U	3.8
Endrin ketone	3.7	U	3.7	3.8	U	3.8
Gamma-BHC (Lindane)	1.9	U	1.9	1.9	U	1.9
gamma-Chlordane	3.5		1.9	1.9	U	1.9
Heptachlor	1.9	U	1.9	1.9	U	1.9
Heptachlor epoxide	1.9	U	1.9	1.9	U	1.9
Methoxychlor	19	U	19	19	U	19
Toxaphene	190	U	190	190	U	190
Semivolatile Organics (SVOAs)						
1,2,4-Trichlorobenzene	370	U	370	380	U	380
1,2-Dichlorobenzene	370	U	370	380	U	380
1,3-Dichlorobenzene	370	U	370	380	U	380
1,4-Dichlorobenzene	150	J	370	380	U	380
2,4,5-Trichlorophenol	930	U	930	940	U	940
2,4,6-Trichlorophenol	370	U	370	380	U	380
2,4-Dichlorophenol	370	U	370	380	U	380
2,4-Dimethylphenol	370	U	370	380	U	380
2,4-Dinitrophenol	930	U	930	940	U	940
2,4-Dinitrotoluene	370	U	370	380	U	380
2,6-Dinitrotoluene	370	U	370	380	U	380
2-Chloronaphthalene	370	U	370	380	U	380
2-Chlorophenol	370	U	370	380	U	380
2-Methylnaphthalene	150	J	370	220	J	380
2-Methylphenol (cresol, o-)	370	U	370	380	U	380
2-Nitroaniline	930	U	930	940	U	940
2-Nitrophenol	370	U	370	380	U	380
3+4 Methylphenol (cresol, m+p)	370	U	370	380	U	380
3,3'-Dichlorobenzidine	370	U	370	380	U	380
3-Nitroaniline	930	U	930	940	U	940
4,6-Dinitro-2-methylphenol	930	U	930	940	U	940
4-Bromophenylphenyl ether	370	U	370	380	U	380
4-Chloro-3-methylphenol	370	U	370	380	U	380
4-Chloroaniline	370	U	370	380	U	380
4-Chlorophenylphenyl ether	370	U	370	380	U	380

*TPH data located with inorganic data.

Table A-2. 1607-F7 Waste Characterization Data Results. (4 Pages)

Constituents	J03W98 Soil Sample Sample Date 7/18/05			J03W99 Soil Sample Sample Date 7/18/05		
	µg/kg	Q	PQL	µg/kg	Q	PQL
SVOAs (continued)						
4-Nitroaniline	930	U	930	940	U	940
4-Nitrophenol	930	U	930	940	U	940
Acenaphthene	370	U	370	380	U	380
Acenaphthylene	370	U	370	380	U	380
Anthracene	370	U	370	380	U	380
Benzo(a)anthracene	24	J	370	33	J	380
Benzo(a)pyrene	29	J	370	79	J	380
Benzo(b)fluoranthene	36	JB	370	75	JB	380
Benzo(ghi)perylene	29	JB	370	71	JB	380
Benzo(k)fluoranthene	30	JB	370	59	JB	380
Bis(2-chloro-1-methylethyl)ether	370	U	370	380	U	380
Bis(2-Chloroethoxy)methane	370	U	370	380	U	380
Bis(2-chloroethyl) ether	370	U	370	380	U	380
Bis(2-ethylhexyl) phthalate	240	JB	370	160	JB	380
Butylbenzylphthalate	370	U	370	380	U	380
Carbazole	370	U	370	380	U	380
Chrysene	37	J	370	42	J	380
Di-n-butylphthalate	84	JB	370	80	JB	380
Di-n-octylphthalate	370	U	370	380	U	380
Dibenz[a,h]anthracene	370	U	370	53	J	380
Dibenzofuran	33	J	370	43	J	380
Diethylphthalate	370	U	370	19	J	380
Dimethyl phthalate	370	U	370	380	U	380
Fluoranthene	43	J	370	26	J	380
Fluorene	370	U	370	380	U	380
Hexachlorobenzene	370	U	370	380	U	380
Hexachlorobutadiene	370	U	370	380	U	380
Hexachlorocyclopentadiene	370	U	370	380	U	380
Hexachloroethane	370	U	370	380	U	380
Indeno(1,2,3-cd)pyrene	24	JB	370	71	JB	380
Isophorone	370	U	370	380	U	380
N-Nitroso-di-n-dipropylamine	370	U	370	380	U	380
N-Nitrosodiphenylamine	370	U	370	380	U	380
Naphthalene	100	J	100	130	J	380
Nitrobenzene	370	U	370	380	U	380
Pentachlorophenol	930	U	930	940	U	940
Phenanthrene	56	J	370	54	J	380
Phenol	370	U	370	380	U	380
Pyrene	55	J	370	42	J	380

APPENDIX B

VERIFICATION SAMPLING RESULTS AND 95% UCL CALCULATIONS

CALCULATION COVER SHEET

Project Title:	100-F Area Field Remediation	**Job No.**	14655
Area	100-F		
Discipline	Environmental	***Calc. No.**	0100F-CA-V0257
Subject	1607-F7 Septic Tank Verification 95% UCL Calculations		
Computer Program	Excel	**Program No.**	Excel 2003

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

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

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 15 Attm. 1 = 11 Total = 27	*Approved 8/21/2006* M. J. Appel	*Approved 8/21/2006* J. M. Capron	*Approved 8/22/2006* T. M. Blakley	*Approved per telecon. 8/23/2006* M. A. Buckmaster	
1	Cover = 1 Sheets = 15 Attm. 1 = 11 Total = 27	mj appel 10/10/06 M. J. Appel	JM Capron 10/10/06 J. M. Capron	X NA	SW Callison 10-12-06 S. W. Callison	10-12-06

SUMMARY OF REVISIONS

1	Updated and replaced cover page for convenience. Revised page 7 (lines 7 ,8, and 10) to add "J" flag qualifiers to beta-BHC and 4,4'-DDT data. The "X" qualifier for 4,4'-DDT (page 7, lines 8 and 9) was changed to "I" to match standard qualifier notation. Revised sheet 4, of Attachment 1, to include "J" flag qualifiers for all pesticide data in samples J11VH8, J11VH9, J11VJ0. Revised sheet 7, of Attachment 1, to include "J" flag qualifiers for all pesticide data in samples J11VJ1, J11VJ2.

WCH-DE-018 (09/01/2006) *Obtain Calc. No. from R & DC and Form from Intranet

CALCULATION SHEET

Washington Closure Hanford

Originator M. J. Appel Date 08/21/06 Calc. No. 0100F-CA-V0257 Rev. No. 0
Project 100-F Area Field Remediation Job No. 14655 Checked J. M. Capron Date 8/21/06
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations Sheet No. 1 of 15

Summary

Purpose:
Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the subject site. Also, perform the *Washington Administrative Code* (WAC) 173-340-740(7)(e) Model Toxics Control Act (MTCA) 3-part test for each nonradioactive contaminant of concern (COC) and contaminant of potential concern (COPC) and calculate the relative percent difference (RPD) for primary-duplicate sample pairs, as necessary.

Table of Contents:
Sheets 1 to 4 - Calculation Sheet Summary
Sheets 5 to 7 - Calculation Sheet Shallow Zone Verification Data
Sheet 8 to 9 - Calculation Sheet Duplicate Analysis
Sheets 10 to 15 - Ecology Software (MTCAStat) Results
Attachment 1 - 1607-F7 Verification Sampling Results (11 sheets)

Given/References:
1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are taken from DOE-RL (2005b), DOE-RL (2001), and Ecology (2005).
3) DOE-RL, 2001, *Hanford Site Background: Part 1, Soil Background for Nonradioactive Analytes*, DOE/RL-92-24, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
4) DOE-RL, 2005a, *100 Area Remedial Action Sampling and Analysis Plan* (SAP), DOE/RL-96-22, Rev. 4, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
5) DOE-RL, 2005b, *Remedial Design Report/Remedial Action Work Plan for the 100 Area* (RDR/RAWP), DOE/RL-96-17, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
6) Ecology, 1992, *Statistical Guidance for Ecology Site Managers*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
7) Ecology, 1993, *Statistical Guidance for Ecology Site Managers, Supplement S-6, Analyzing Site or Background Data with Below-detection Limit or Below-PQL Values (Censored Data Sets)*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
8) Ecology, 2005, *Cleanup Levels and Risk Calculations (CLARC) Database*, Washington State Department of Ecology, Olympia, Washington, <http://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
9) EPA, 1994, *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*, EPA 540/R-94/013. U.S. Environmental Protection Agency, Washington, D.C.
10) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," *Washington Administrative Code.*

Solution:
Calculation methodology is described in Ecology Pub. #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2005b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations, as required. The hazard quotient and carcinogenic risk calculations are located in a separate calculation brief as an appendix to the Remaining Sites Verification Package (RSVP).

Calculation Description:
The subject calculations were performed on data from soil verification samples from the subject waste site. The data were entered into an EXCEL 2003 spreadsheet and calculations performed by using the built-in spreadsheet functions and/or creating formulae within the cells. The statistical evaluation of data for use in accordance with the RDR/RAWP (DOE-RL 2005b) is documented by this calculation. Duplicate RPD results are used in evaluation of data quality within the RSVP for this site.

CALCULATION SHEET

Washington Closure Hanford

Originator M. J. Appel Date 08/21/06 Calc. No. 0100F-CA-V0257 Rev. No. 0
Project 100-F Area Field Remediation Job No. 14655 Checked J. M. Capron Date 8/21/06
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations Sheet No. 2 of 15

Summary (continued)

Methodology:

For nonradioactive analytes with ≤50% of the data below detection limits and all detected radionuclide analytes, the statistical value calculated to evaluate the effectiveness of cleanup is the 95% UCL. For nonradioactive analytes with >50% of the data below detection limits, the maximum detected value for the data set is used instead of the 95% UCL. The 95% UCL is not calculated for data sets with no reported detections. The evaluation of the portion of each analyte's data set below detection limits was performed by direct inspection of the attached sample results, and no further calculations were performed for those data sets where >50% of the data was below detection limits. All nonradionuclide data reported as being undetected are set to ½ the detection limit value for calculation of the statistics (Ecology 1993). The 95% UCL values were not calculated for aluminum, calcium, iron, magnesium, potassium, silicon, and sodium, as no cleanup values are available in Ecology (2005) under WAC 173-340-740(3), and these constituents are thus not considered site COPCs. No radionuclide COCs/COPCs were identified for this site.

For the statistical evaluation of duplicate sample pairs, the samples are averaged before being included in the data set, after adjustments for censored data as described above.

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

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

The WAC 173-340-740(7)(e) 3-part test is not performed for data sets where the statistical value defaults to the maximum value, in the data set. Instead, direct comparison of the maximum against site RAGs (within the RSVP) is used as the compliance basis.

The RPD is calculated when both the primary value and the duplicate are above detection limits and are greater than 5 times the target detection limit (TDL). The TDL is a laboratory detection limit pre-determined for each analytical method, listed in Table II-1 of the SAP (DOE-RL 2005a). 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 as necessary is provided in the data quality assessment section of the applicable RSVP, as necessary.

In addition to the statistical samples collected from the remediation footprint at the subject site, a multi-aliquot sample was collected from the remediation waste staging area. Statistical methodology is not applicable to non-statistical sampling, and direct evaluation of detected values in this decision unit will be used as the compliance basis (within the RSVP).

CALCULATION SHEET

Washington Closure Hanford

Originator M. J. Appel MJA Date 08/21/06 Calc. No. 0100F-CA-V0257 Rev. No. 0
Project 100-F Area Field Remediation Job No. 14655 Checked J. M. Capron JMC Date 8/21/06
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations Sheet No. 3 of 15

Summary (continued)

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

Results Summary

Analyte	95% UCL[a]	Maximum[b]	Units
Antimony		0.53	mg/kg
Arsenic	2.7		mg/kg
Barium	113		mg/kg
Beryllium	0.40		mg/kg
Boron	4.5		mg/kg
Cadmium	0.17		mg/kg
Chromium (total)	11.0		mg/kg
Cobalt	5.7		mg/kg
Copper	13.7		mg/kg
Lead	18.9		mg/kg
Manganese	283		mg/kg
Mercury		0.02	mg/kg
Molybdenum	0.48		mg/kg
Nickel	9.9		mg/kg
Vanadium	32.2		mg/kg
Zinc	48.8		mg/kg
Aroclor-1254		0.0084	mg/kg
Aroclor-1260		0.010	mg/kg
2-Methylnapthalene	0 16		mg/kg
Benzo(a)anthracene		0.026	mg/kg
Benzo(a)pyrene		0.023	mg/kg
Benzo(b)flouranthene		0.048	mg/kg
Benzo(g,h,i)perylene		0.058	mg/kg
Benzo(k)flouranthene		0.046	mg/kg
bis(2-Ethylhexyl)phthalate	0.050		mg/kg
Butylbenzylphthalate		0.037	mg/kg
chrysene		0.078	mg/kg
Dibenzofuran		0.030	mg/kg
Di-n-butylphthalate	0.31		mg/kg
Flouranthene		0.072	mg/kg
Indeno(1,2,3-cd)pyrene		0.058	mg/kg
Napthalene	0.21		mg/kg
phenanthrene	0.21		mg/kg
pyrene		0.071	mg/kg
aldrin		0.00042	mg/kg
alpha-BHC		0.0011	mg/kg
alph-chlordane		0.0017	mg/kg
beta-BHC	0.0019		mg/kg
4,4'-DDE		0.0021	mg/kg
4,4'-DDT	0.0095		mg/kg
acetone	0.011		mg/kg
endosulfan I		0.00054	mg/kg
endosulfan sulfate		0.0011	mg/kg
endrin aldehyde		0.0013	mg/kg
endrin ketone		0.00089	mg/kg
gamma-chlordane		0.0011	mg/kg
methoxyclor		0.0014	mg/kg
2-Hexanone		0.002	mg/kg
4-methyl-2-pentanone		0.003	mg/kg
chloroform		0.003	mg/kg
methylene chloride		0.011	mg/kg

[a]For nonradionuclides, where ≤ 50% of a data set is censored (below detection limits), the 95% UCL value is used for a given analyte.
[b]Where > 50% of a data set is censored, the statistical value defaults to the maximum detected value in the data set (Attachment 1).
UCL = upper confidence level

CALCULATION SHEET

Washington Closure Hanford

Originator M. J. Appel MJA Date 08/21/06 Calc. No. 0100F-CA-V0257 Rev. No. 0
Project 100-F Area Field Remediation Job No. 14655 Checked J. M. Capron JMC Date 8/21/06
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations Sheet No. 4 of 15

1 **Summary (continued)**

3	**WAC 173-340-740(7)(e) Evaluation**		Because of the "yes" answers to the WAC 173-340 3-part test for multiple constituents detailed assessments using RESRAD will be performed. All data sets meet the 3-part test criteria when compared to direct exposure cleanup levels.
5	WAC 3-Part Test for most stringent cleanup limit:		
6	95% UCL > Cleanup Limit?	YES	
7	> t0% above Cleanup Limit?	YES	
8	Any sample > 2x Cleanup Limit?	YES	

10 MTCA = *Model Toxic Control Act*
11 RESRAD = RESidual RADioactivity (dose assessment model)
12 WAC = *Washington Administrative Code*

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

Analyte	Duplicate Analysis[b]
Aluminum	8.0%
Barium	0.6%
Calcium	8.0%
Chromium (total)	8.5%
Copper	13.4%
Iron	12.0%
Magnesium	8.8%
Manganese	6.1%
Silicon	12.7%
Vanadium	16.5%
Zinc	6.7%

29 [a]Relative percent difference evaluation was not required for analytes not included in this table.
30 [b]The significance of relative percent difference values are discussed within the RSVP for the subject site.
31 QA/QC = quality assurance/quality control
32 RSVP = remaining sites verification package

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06
Job No. 14655

Calc. No. 0100F-CA-V0257
Checked J. M. Capron

Rev. No. 0
Date 8/21/06
Sheet No. 15 of 15

Shallow Zone Verification Data

Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Chromium (total) mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL
6	J11VJ3	4/3/2006	2.3		0.68	85.6	C	0.02	0.32		0.02	1.5		0.27	0.16		0.08	7.9		0.14	5.1		0.16	12.5		0.13
Duplicate of J11VJ3	J11VJ4	4/3/2006	2.5		0.67	85.1	C	0.02	0.36		0.02	2.3		0.26	0.18		0.08	8.6		0.14	5.5		0.15	14.3		0.13
1	J11VH8	4/3/2006	2.3		0.62	90.0		0.02	0.33		0.02	3.1		0.24	0.07	U	0.07	8.0		0.13	5.1		0.13	12.6		0.12
2	J11VH9	4/3/2006	2.3		0.61	59.4		0.02	0.36		0.02	2.0		0.24	0.07	U	0.07	8.6		0.13	5.6		0.14	13.9		0.12
3	J11VJ0	4/3/2006	2.6		0.63	94.5		0.02	0.46		0.02	1.8		0.25	0.07	U	0.07	9.5		0.13	6.1		0.15	13.0		0.12
4	J11VJ1	4/3/2006	1.8		0.62	44.2		0.02	0.28		0.02	1.0		0.24	0.07	U	0.07	6.3		0.13	3.8		0.14	12.1		0.12
5	J11VJ2	4/3/2006	1.8		0.59	32.0		0.02	0.33		0.02	0.52		0.23	0.07	U	0.07	7.3		0.13	4.1		0.14	12.6		0.12
7	J11VJ5	4/3/2006	2.4		0.67	100	C	0.02	0.44		0.02	3.4		0.26	0.16		0.08	9.5		0.14	6.5		0.15	11.4		0.13
8	J11VJ6	4/3/2006	1.9		0.67	68.5	C	0.02	0.27		0.02	2.5		0.26	0.14		0.08	7.2		0.14	3.8		0.15	10.4		0.13
9	J11VJ7	4/3/2006	2.5		0.66	105	C	0.02	0.36		0.02	3.6		0.26	0.22		0.08	8.3		0.14	4.9		0.15	13.3		0.13
10	J11VJ8	4/3/2006	3.7		0.67	135	C	0.02	0.41		0.02	4.7		0.26	0.32		0.08	18.7		0.14	5.5		0.15	15.3		0.13

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Cadmium mg/kg	Chromium (total) mg/kg	Cobalt mg/kg	Copper mg/kg
6	J11VJ3/J11VJ4	4/3/2006	2.4	85.4	0.34	1.9	0.17	8.3	5.3	13.4
1	J11VH8	4/3/2006	2.3	90.0	0.33	3.1	0.04	8.0	5.1	12.6
2	J11VH9	4/3/2006	2.3	59.4	0.36	2.0	0.04	8.6	5.6	13.9
3	J11VJ0	4/3/2006	2.6	94.5	0.46	1.8	0.04	9.5	6.1	13.0
4	J11VJ1	4/3/2006	1.8	44.2	0.28	1.0	0.04	6.3	3.8	12.1
5	J11VJ2	4/3/2006	1.8	32.0	0.33	0.52	0.04	7.3	4.1	12.6
7	J11VJ5	4/3/2006	2.4	100	0.44	3.4	0.16	9.5	6.5	11.4
8	J11VJ6	4/3/2006	1.9	68.5	0.27	2.5	0.14	7.2	3.8	10.4
9	J11VJ7	4/3/2006	2.5	105	0.36	3.6	0.22	8.3	4.9	13.3
10	J11VJ8	4/3/2006	3.7	135	0.41	4.7	0.32	18.7	5.5	15.3

Statistical Computations

Statistical value based on	Arsenic	Barium	Beryllium	Boron	Cadmium	Chromium (total)	Cobalt	Copper
	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), 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.
N	10	10	10	10	10	10	10	10
% < Detection limit	0%	0%	0%	0%	50%	0%	0%	0%
mean	2.4	81.4	0.38	2.4	0.12	9.2	5.1	12.8
standard deviation	0.5	81.4	0.06	1.3	0.10	3.5	0.90	1.3
95% UCL on mean	2.7	113.1	0.40	4.5	0.17	11.0	5.7	13.7
maximum value	3.7	135	0.46	4.7	0.32	18.7	6.5	15.3
Statistical value	2.7	113	0.40	4.5	0.17	11.0	5.7	13.7
Most Stringent Cleanup Limit for nonradionuclide and RAG type	6.5 BG/GW & River Protection	132 BG/GW Protection	1.51 BG/GW & River Protection	320 GW Protection	0.81 BG/GW & River Protection	18.5 BG/GW & River Protection	32 GW Protection	22.0 BG/River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NA	NO	NA	NO	NA	NO	NA	NA
> 10% above Cleanup Limit?	NA	NO	NA	NO	NA	NO	NA	NA
Any sample > 2X Cleanup Limit?	NA	NO	NA	NO	NA	NO	NA	NA
WAC 173-340 Compliance? **YES**	Because all values are below background (6.5 mg/kg), the MTCA 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (1.51 mg/kg), the MTCA 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (0.81 mg/kg), the MTCA 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (15.7 mg/kg), the MTCA 3-part test is not required.	Because all values are below background (22.0 mg/kg), the MTCA 3-part test is not required.

BG = background
C = blank contamination
GW = groundwater
MTCA = *Model Toxic Control Act*
NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06
Job No. 14655

Calc. No. 0100F-CA-V0257
Checked J. M. Capron

Rev. No. 0
Date 8/21/06
Sheet No. 6 of 15

Shallow Zone Verification Data (continued)

Sampling Area	Sample Number	Sample Date	Lead			Manganese			Molybdenum			Nickel			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
6	J11VJ3	4/3/2006	6.2		0.34	253		0.03	0.51		0.32	9.1		0.27	25.5		0.10	36.0		0.18
Duplicate of J11VJ3	J11VJ4	4/3/2006	6.0		0.34	269		0.03	0.52		0.32	9.9		0.26	30.1		0.10	38.5		0.18
1	J11VH8	4/3/2006	5.3		0.31	262		0.03	0.43		0.29	9.4		0.24	30.6		0.09	31.9		0.16
2	J11VH9	4/3/2006	4.0		0.31	261		0.03	0.35		0.29	10.1		0.24	31.1		0.09	32.5		0.16
3	J11VJ0	4/3/2006	5.2		0.32	307		0.03	0.42		0.30	10.5		0.24	36.5		0.09	36.3		0.17
4	J11VJ1	4/3/2006	3.8		0.31	199		0.03	0.29	U	0.29	7.8		0.24	22.8		0.09	31.6		0.16
5	J11VJ2	4/3/2006	2.7		0.3	230		0.03	0.35		0.28	9.6		0.23	26.0		0.09	28.4		0.16
7	J11VJ5	4/3/2006	4.7		0.34	321		0.03	0.48		0.32	10.0		0.26	36.8		0.10	38.9		0.18
8	J11VJ6	4/3/2006	46.3		0.34	183		0.03	0.45		0.32	8.3		0.26	21.1		0.10	35.9		0.17
9	J11VJ7	4/3/2006	7.8		0.34	233		0.03	0.52		0.32	9.1		0.26	27.4		0.10	46.8		0.17
10	J11VJ8	4/3/2006	28.2		0.34	276		0.03	0.50		0.32	9.5		0.26	27.2		0.10	84.0		0.18

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	Lead mg/kg			Manganese mg/kg			Molybdenum mg/kg			Nickel mg/kg			Vanadium mg/kg			Zinc mg/kg		
6	J11VJ3/J11VJ4	4/3/2006	6.1			261			0.52			9.5			27.8			37.3		
1	J11VH8	4/3/2006	5.3			262			0.43			9.4			30.6			31.9		
2	J11VH9	4/3/2006	4.0			261			0.35			10.1			31.1			32.5		
3	J11VJ0	4/3/2006	5.2			307			0.42			10.5			36.5			36.3		
4	J11VJ1	4/3/2006	3.8			199			0.15			7.8			22.8			31.6		
5	J11VJ2	4/3/2006	2.7			230			0.35			9.6			26.0			28.4		
7	J11VJ5	4/3/2006	4.7			321			0.48			10.0			36.8			38.9		
8	J11VJ6	4/3/2006	46.3			183			0.45			8.3			21.1			35.9		
9	J11VJ7	4/3/2006	7.8			233			0.52			9.1			27.4			46.8		
10	J11VJ8	4/3/2006	28.2			276			0.50			9.5			27.2			84.0		

Statistical Computations

Statistical value based on	Lead	Manganese	Molybdenum	Nickel	Vanadium	Zinc
	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.
N	10	10	10	10	10	10
% < Delection limit	0%	0%	10%	0%	0%	0%
mean	11.4	253	0.42	9.4	28.7	40.4
standard deviation	14.3	43	0.11	0.8	5.2	16.1
95% UCL on mean	18.9	283	0.48	9.9	32.2	48.8
maximum value	46.3	321	0.52	10.5	36.8	84.0
Statistical value	18.9	283	0.48	9.9	32.2	48.8
Most Stringent Cleanup Limit for nonradionuclide and RAG type	10.2 BG/GW & River Protection	512 BG/GW Protection	8 GW Protection	19.1 BG/GW Protection	85.1 BG/GW Protection	67.8 BG/River Protection
WAC 173-340 3-PART TEST						
95% UCL > Cleanup Limit?	YES	NA	NO	NA	NA	NO
> 10% above Cleanup Limit?	YES	NA	NO	NA	NA	NO
Any sample > 2X Cleanup Limit?	YES	NA	NO	NA	NA	NO
WAC 173-340 Compliance? NO	Because of the "yes" answer to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	Because all values are below background (512 mg/kg), the MTCA 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.	Because all values are below background (19.1 mg/kg), the MTCA 3-part test is not required.	Because all values are below background (85.1 mg/kg), the MTCA 3-part test is not required.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

BG = background
GW = groundwater
MTCA = *Model Toxic Control Act*
NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose assessment model)
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel MJA
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 10/10/06 Calc. No. 0100F-CA-V0257
Job No. 14655 Checked J. M. Capron JMC

Rev. No. 0 1 JMC
Date 10/10/06
Sheet No. 7 of 15

Shallow Zone Verification Data (continued)

Sampling Area	Sample Number	Sample Date	2-Methylnapthalene			bis(2-ethylhexyl)phthalate			Di-n-butylphthalate			Napthalene			Phenanthrene			beta-BHC			4,4'-DDT			Acetone		
			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
6	J11VJ3	4/3/2006	0.083	J	0.38	0.021	J	0.38	0.38	UJ	0.38	0.046	J	0.38	0.027	J	0.38	0.0023	JD	0.0015	0.0035	JD	0.0015	0.0015	J	0.011
Duplicate of J11VJ3	J11VJ4	4/3/2006	0.083	J	0.38	0.022	J	0.38	0.024	J	0.38	0.047	J	0.38	0.027	J	0.38	0.0031	JD	0.0015	0.0052	D	0.0015	0.008	J	0.012
1	J11VH8	4/3/2006	0.040	J	0.04	0.039	JB	0.04	0.043	JB	0.35	0.027	J	0.35	0.35	UJ	0.040	0.0009	JD	0.0014	0.0012	JD	0.0012	0.011	U	0.011
2	J11VH9	4/3/2006	0.35	U	0.35	0.046	JB	0.35	0.027	JB	0.35	0.35	U	0.35	0.35	UJ	0.35	0.0014	UDJ	0.0014	0.0014	UDJ	0.0014	0.005	J	0.010
3	J11VJ0	4/3/2006	0.17	J	0.37	0.032	JB	0.37	0.043	JB	0.37	0.13	J	0.37	0.041	J	0.37	0.0007	JD	0.0015	0.0022	IDJ	0.0022	0.011	U	0.011
4	J11VJ1	4/3/2006	0.036	J	0.35	0.027	JB	0.35	0.022	JB	0.35	0.027	J	0.35	0.018	J	0.35	0.0013	JD	0.0013	0.0013	JID	0.0013	0.010	U	0.010
5	J11VJ2	4/3/2006	0.34	UJ	0.34	0.030	JB	0.34	0.037	JB	0.34	0.34	U	0.34	0.34	UJ	0.34	0.0014	UDJ	0.0014	0.0014	UDJ	0.0014	0.011	U	0.011
7	J11VJ5	4/3/2006	0.39	UJ	0.39	0.019	J	0.39	0.39	UJ	0.39	0.39	UJ	0.39	0.39	UJ	0.39	0.0015	UD	0.0015	0.0015	UD	0.0015	0.029		0.012
8	J11VJ6	4/3/2006	0.088	J	0.38	0.066	J	0.38	0.047	J	0.38	0.068	J	0.38	0.073	J	0.38	0.0039	D	0.0015	0.0045	D	0.0015	0.022		0.012
9	J11VJ7	4/3/2006	0.15	JD	0.77	0.063	JD	0.77	0.77	UJD	0.77	0.097	JD	0.77	0.10	JD	0.77	0.0015	UD	0.0015	0.0065	JD	0.0015	0.011	J	0.011
10	J11VJ8	4/3/2006	0.12	J	0.38	0.029	J	0.38	0.030	J	0.38	0.087	J	0.38	0.063	J	0.38	0.0085	UJD	0.0015	0.010	JD	0.0015	0.010	J	0.011

Statistical Computation Input Data

Sampling Area	Sample Number	Sample Date	2-Methylnapthalene mg/kg	bis(2-ethylhexyl)phthalate mg/kg	Di-n-butylphthalate mg/kg	Napthalene mg/kg	Phenanthrene mg/kg	beta-BHC mg/kg	4,4'-DDT mg/kg	Acetone mg/kg
6	J11VJ3/J11VJ4	4/3/2006	0.083	0.022	0.11	0.047	0.027	0.0027	0.0044	0.0048
1	J11VH8	4/3/2006	0.040	0.039	0.043	0.027	0.020	0.0009	0.0012	0.0055
2	J11VH9	4/3/2006	0.18	0.046	0.027	0.18	0.18	0.0007	0.0007	0.0050
3	J11VJ0	4/3/2006	0.17	0.032	0.043	0.13	0.041	0.0007	0.0022	0.0055
4	J11VJ1	4/3/2006	0.036	0.027	0.022	0.027	0.018	0.0013	0.0013	0.0050
5	J11VJ2	4/3/2006	0.17	0.030	0.037	0.17	0.170	0.0007	0.0007	0.0055
7	J11VJ5	4/3/2006	0.20	0.019	0.195	0.20	0.027	0.0008	0.0035	0.0015
8	J11VJ6	4/3/2006	0.088	0.066	0.047	0.068	0.073	0.0039	0.0045	0.022
9	J11VJ7	4/3/2006	0.15	0.063	0.39	0.097	0.10	0.0008	0.0065	0.011
10	J11VJ8	4/3/2006	0.12	0.029	0.030	0.087	0.063	0.0008	0.010	0.010

Statistical Computations

Statistical value based on	2-Methylnapthalene: Large data set (n ≥10), use MTCAStat normal distribution.	bis(2-ethylhexyl)phthalate: Large data set (n ≥10), use MTCAStat lognormal distribution.	Di-n-butylphthalate: Large data set (n ≥10), use MTCAStat lognormal distribution.	Napthalene: Large data set (n ≥10), use MTCAStat lognormal distribution.	Phenanthrene: Large data set (n ≥10), use MTCAStat lognormal distribution.	beta-BHC: Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.	4,4'-DDT: Large data set (n ≥10), use MTCAStat lognormal distribution.	Acetone: Large data set (n ≥10), lognormal and normal distribution rejected, use z-statistic.
N	10	10	10	10	10	10	10	10
% < Detection limit	30%	0%	20%	30%	40%	50%	30%	40%
mean	0.12	0.037	0.094	0.10	0.071	0.0013	0.0035	0.0076
standard deviation	0.058	0.016	0.12	0.062	0.059	0.0011	0.0030	0.0057
95% UCL on mean	0.16	0.050	0.31	0.21	0.21	0.0019	0.0095	0.011
maximum value	0.39	0.066	0.77	0.39	0.39	0.0085	0.0100	0.029
Statistical value	0.16	0.050	0.31	0.21	0.21	0.0019	0.0095	0.011
Most Stringent Cleanup Limit for nonradionuclide and RAG type	3.2 GW Protection	0.36 River Protection	160 GW Protection	16 GW Protection	240 GW Protection	0.0049 GW Protection	0.005 River Protection/RDL	720 River Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	YES	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	YES	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO	NO
WAC 173-340 Compliance? NO	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.	Because of the "yes" answers to the MTCA 3-part test, a detailed assessment using RESRAD will be performed. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	The data set meets the 3-part test criteria when compared to the most stringent cleanup limit.

BG = background
B = blank contamination
D = diluted
GW = groundwater
I = interference
J = estimate
MTCA = *Model Toxic Control Act*
NA = not applicable
PQL = practical quantitation limit
Q = qualifier
RAG = remedial action goal
RESRAD = RESidual RADioactivity (dose assessment model)
RDL = Required detection limit
U = undetected
UCL = upper confidence limit
WAC = *Washington Administrative Code*

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06
Job No. 14855

Calc. No. 0100F-CA-V0257
Checked J. M. Capron

Rev. No. 0
Date 8/21/06
Sheet No. 8 of 15

Duplicate Analysis

Sampling Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Aluminum mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Cadmium mg/kg	Q	PQL	Calcium mg/kg	Q	PQL
6	J11VJ3	4/3/2006	2.3		0.68	4830		3.2	85.6	C	0.02	0.32		0.02	1.5		0.27	0.16		0.08	3440	C	1.8
Duplicate of J11VJ3	J11VJ4	4/3/2006	2.5		0.67	5210		3.2	85.1	C	0.02	0.36		0.02	2.3		0.26	0.18		0.08	3710	C	1.8
Analysis:																							
(TDL)			10			5			2			0.5			2			0.2			100		
Duplicate Analysis	Both > PQL?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)		
	RPD					8%			0.6%												8%		

Sampling Area	Sample Number	Sample Date	Chromium (total) mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL
6	J11VJ3	1/24/2006	7.9		0.14	5.1		0.16	12.5		0.13	6.2		0.34	253		0.03	3080		1.1	456		2.5
Duplicate of J11VJ3	J11VJ4	1/24/2006	8.6		0.14	5.5		0.15	14.3		0.13	6		0.34	269		0.03	3290		1.1	518		2.5
Analysis:																							
(TDL)			1			2			1			5			5			75			2		
Duplicate Analysis	Both > PQL/MDA?		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)			Yes (calc RPD)			Yes (calc RPD)			Yes (calc RPD)		
	RPD		8.5%						13.4%						8.1%			6.6%			12.7%		

Sampling Area	Sample Number	Sample Date	Molybdenum mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Sodium mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Iron mg/kg	Q	PQL
6	J11VJ3	1/24/2006	0.51		0.32	9.1		0.27	25.5		0.1	36.0		0.18	89.5	C	0.84	949		2.5	11800		3.9
Duplicate of J11VJ3	J11VJ4	1/24/2006	0.52		0.32	9.9		0.26	30.1		0.1	38.5		0.18	95.5	C	0.83	1010		2.5	13300		3.8
Analysis:																							
(TDL)			2			4			2.5			1			50			400			5		
Duplicate Analysis	Both > PQL/MDA?		Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)			Yes (continue)		
	Both >5xTDL?		No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)			Yes (calc RPD)			No-Stop (acceptable)			No-Stop (acceptable)			Yes (calc RPD)		
	RPD								16.5%			6.7%									12.0%		

C = blank contamination
HEIS = Hanford Environmental Information System
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit

CALCULATION SHEET

Washington Closure Hanford

Originator M. J. Appel MJA
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06 Calc. No. 0100F-CA-V0257 Rev. No. 0
Job No. 14655 Checked J. M. Capron JMC Date 8/21/06
Sheet No. 9 of 15

1 **Duplicate Analysis (Continued)**

Sampling Area	Sample Number	Sample Date	2-Methylnapthalene			bis(2-ethylhexyl)phthalate			Di-n-butylphthalate			Napthalene			Phenanthrene		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
6	J11VJ3	4/3/2006	0.083	J	0.38	0.021	J	0.380	0.38	UJ	0.38	0.046	J	0.38	0.027	J	0.38
Duplicate of J11VJ3	J11VJ4	4/3/2006	0.083	J	0.38	0.022	J	0.380	0.024	J	0.380	0.047	J	0.38	0.027	J	0.38

Analysis:

(TDL)		0.33	0.33	0.33	0.33	0.33
Duplicate Analysis	Both > PQL?	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)	No-Stop (acceptable)
	Both >5xTDL?					
	RPD					

Sampling Area	Sample Number	Sample Date	beta-BHC			4,4'-DDT			Acetone		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
6	J11VJ3	1/24/2006	0.0023	JD	0.0015	0.0035	JD	0.0015	0.002	J	0.011
Duplicate of J11VJ3	J11VJ4	1/24/2006	0.0031	D	0.0015	0.0052	D	0.0015	0.008	J	0.012

Analysis:

(TDL)		0.00165	0.0033	0.020
Duplicate Analysis	Both > PQL/MDA?	**Yes (continue)**	**Yes (continue)**	No-Stop (acceptable)
	Both >5xTDL?	No-Stop (acceptable)	No-Stop (acceptable)	
	RPD			

D = diluted
J = estimate
PQL = practical quantitation limit
Q = qualifier
RPD = relative percent difference
TDL = target detection limit
U = undetected

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06
Job No. 14655

Calc. No. 0100F-CA-V0257
Checked J. M. Capron

Rev. No. 0
Date 8/21/06
Sheet No. 10 of 15

Ecology Software (MTCAStat) Results

Arsenic 95% UCL Calculation

DATA	ID
2.4	I11VJ3/J11VJ4
2.3	J11VH8
2.3	J11VH9
2.6	J11VJ0
1.8	J11VJ1
1.8	J11VJ2
2.4	J11VJ5
1.9	J11VJ8
2.5	J11VJ7
3.7	J11VJ6

Number of samples		Uncensored values	
Uncensored	10	Mean	2.4
Censored		Lognormal mean	2.4
Detection limit or PQL		Std. devn.	0.55
Method detection limit		Median	2.4
TOTAL	10	Min.	1.8
		Max.	3.7

Lognormal distribution?
r-squared is: 0.874
Normal distribution?
r-squared is: 0.808
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 2.7

Barium 95% UCL Calculation

DATA	ID
85.4	J11VJ3/J11VJ4
90	J11VH8
59.4	J11VH9
94.5	J11VJ0
44.2	J11VJ1
32	J11VJ2
100	J11VJ5
68.5	J11VJ6
105	J11VJ7
135.0	J11VJ9

Number of samples		Uncensored values	
Uncensored	10	Mean	81.4
Censored		Lognormal mean	82.9
Detection limit or PQL		Std. devn.	30.8
Method detection limit		Median	87.7
TOTAL	10	Min.	32.0
		Max.	135

Lognormal distribution?
r-squared is: 0.931
Normal distribution?
r-squared is: 0.976
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 113

Beryllium 95% UCL Calculation

DATA	ID
0.34	I11VJ3/J11VJ4
0.33	J11VH8
0.36	J11VH9
0.46	J11VJ0
0.28	J11VJ1
0.33	J11VJ2
0.44	J11VJ5
0.27	J11VJ6
0.36	J11VJ7
0.41	J11VJ8

Number of samples		Uncensored values	
Uncensored	10	Mean	0.36
Censored		Lognormal mean	0.36
Detection limit or PQL		Std. devn.	0.06
Method detection limit		Median	0.35
TOTAL	10	Min.	0.27
		Max.	0.46

Lognormal distribution?
r-squared is: 0.962
Normal distribution?
r-squared is: 0.956
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.40

Boron 95% UCL Calculation

DATA	ID
1.9	J11VJ3/J11VJ4
3.1	J11VH8
2	J11VH9
1.8	J11VJ0
0.97	J11VJ1
0.52	J11VJ2
3.4	J11VJ5
2.5	J11VJ8
3.6	J11VJ7
4.7	J11VJ6

Number of samples		Uncensored values	
Uncensored	10	Mean	2.4
Censored		Lognormal mean	2.6
Detection limit or PQL		Std. devn.	1.3
Method detection limit		Median	2.3
TOTAL	10	Min.	0.52
		Max.	4.7

Lognormal distribution?
r-squared is: 0.913
Normal distribution?
r-squared is: 0.961
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 4.5

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel

Date 08/21/06

Calc. No. 0100F-CA-V0257

Rev. No. 0

Project 100-F Area Field Remediation

Job No. 14655

Checked J. M. Capron

Date 8/21/06

Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Sheet No. 11 of 15

Ecology Software (MTCAStat) Results

Chromium (total) 95% UCL Calculation

DATA	ID
8.3	J11VJ3/J11VJ4
8.0	J11VH8
8.6	J11VH9
9.5	J11VJ0
6.3	J11VJ1
7.3	J11VJ2
9.5	J11VJ5
7.2	J11VJ6
8.3	J11VJ7
18.7	J11VJ8

Number of samples		
Uncensored	10	
Censored		
Detection limit or PQL		
Method detection limit		
TOTAL	10	

Uncensored values	
Mean	9.2
Lognormal mean	9.1
Std. devn.	3.5
Median	8.3
Min.	6.3
Max.	18.7

Lognormal distribution?
r-squared is: 0.748

Normal distribution7
r-squared is: 0.613

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 11.0

Cobalt 95% UCL Calculation

DATA	ID
5.3	J11VJ3/J11VJ4
5.1	J11VH8
5.6	J11VH9
6.1	J11VJ0
3.8	J11VJ1
4.1	J11VJ2
6.5	J11VJ5
3.8	J11VJ6
4.9	J11VJ7
5.5	J11VJ8

Number of samples		
Uncensored	10	
Censored		
Detection limit or PQL		
Method detection limit		
TOTAL	10	

Uncensored values	
Mean	5.1
Lognormal mean	5.1
Std. devn.	0.93
Median	5.2
Min.	3.8
Max.	6.5

Lognormal distribution?
r-squared is: 0.938

Normal distribution?
r-squared is: 0.955

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 5.7

Copper 95% UCL Calculation

DATA	ID
13.4	J11VJ3/J11VJ4
12.6	J11VH8
13.9	J11VH9
13	J11VJ0
12.1	J11VJ1
12.6	J11VJ2
11.4	J11VJ5
10.4	J11VJ6
13.3	J11VJ7
15.3	J11VJ8

Number of samples		
Uncensored	10	
Censored		
Detection limit or PQL		
Method detection limit		
TOTAL	10	

Uncensored values	
Mean	12.8
Lognormal mean	12.8
Std. devn.	1.3
Median	12.8
Min.	10.4
Max.	15.3

Lognormal distribution?
r-squared is: 0.965

Normal distribution?
r-squared is: 0.969

Recommendations:
Use lognormal distribution.

UCL (Land's method) is 13.7

Lead 95% UCL Calculation

DATA	ID
6.1	J11VJ3/J11VJ4
5.3	J11VH8
4.0	J11VH9
5.2	J11VJ0
3.8	J11VJ1
2.7	J11VJ2
4.7	J11VJ5
46.3	J11VJ6
7.8	J11VJ7
28.2	J11VJ8

Number of samples		
Uncensored	10	
Censored		
Detection limit or PQL		
Method detection limit		
TOTAL	10	

Uncensored values	
Mean	11.4
Lognormal mean	10.8
Std. devn.	14.3
Median	5.3
Min.	2.7
Max.	46.3

Lognormal distribution?
r-squared is: 0.611

Normal distribution?
r-squared is: 0.611

Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 18.9

Ecology Software (MTCAStat) Results

DATA	ID
261	J11VJ3/J11VJ4
262	J11VH8
261	J11VH9
307	J11VJ0
199	J11VJ1
230	J11VJ2
321	J11VJ5
183	J11VJ6
233	J11VJ7
276	J11VJ8

Manganese 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	10	Mean	253
Censored		Lognormal mean	254
Detection limit or PQL		Std. devn.	43.5
Method detection limit		Median	261
TOTAL	10	Min.	183
		Max.	321

Lognormal distribution?
r-squared is: 0.959
Normal distribution?
r-squared is: 0.970
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 283

DATA	ID
0.52	J11VJ3/J11VJ4
0.43	J11VH8
0.35	J11VH9
0.42	J11VJ0
0.15	J11VJ1
0.35	J11VJ2
0.48	J11VJ5
0.45	J11VJ6
0.52	J11VJ7
0.50	J11VJ8

Molybdenum 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	10	Mean	0.42
Censored		Lognormal mean	0.42
Detection limit or PQL		Std. devn.	0.11
Method detection limit		Median	0.44
TOTAL	10	Min.	0.15
		Max.	0.52

Lognormal distribution?
r-squared is: 0.879
Normal distribution?
r-squared is: 0.822
Recommendations:
Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.48

DATA	ID
9.5	J11VJ3/J11VJ4
9.4	J11VH8
10.1	J11VH9
10.5	J11VJ0
7.9	J11VJ1
9.6	J11VJ2
10.0	J11VJ5
8.3	J11VJ6
9.1	J11VJ7
9.5	J11VJ8

Nickel 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	10	Mean	9.4
Censored		Lognormal mean	9.4
Detection limit or PQL		Std. devn.	0.81
Method detection limit		Median	9.5
TOTAL	10	Min.	7.8
		Max.	10.6

Lognormal distribution?
r-squared is: 0.908
Normal distribution?
r-squared is: 0.928
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 9.9

DATA	ID
27.8	J11VJ3/J11VJ4
30.6	J11VH8
31.1	J11VH9
36.5	J11VJ0
22.9	J11VJ1
26	J11VJ2
36.8	J11VJ5
21.1	J11VJ6
27.4	J11VJ7
27.2	J11VJ8

Vanadium 95% UCL Calculation

Number of samples		Uncensored values	
Uncensored	10	Mean	28.7
Censored		Lognormal mean	28.8
Detection limit or PQL		Std. devn.	5.2
Method detection limit		Median	27.6
TOTAL	10	Min.	21.1
		Max.	36.8

Lognormal distribution?
r-squared is: 0.962
Normal distribution?
r-squared is: 0.951
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 32.2

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel MJA — Date 08/21/06 — Calc. No. 0100F-CA-V0257 — Rev. No. 0

Project 100-F Area Field Remediation — Job No. 14655 — Checked J. M. Capron JMC — Date 8/21/06

Subject 1607-F7 Septic Tank Verification 95% UCL Calculations — Sheet No. 13 of 15

Ecology Software (MTCAStat) Results

Zinc 95% UCL Calculation

DATA	ID
37.3	J11VJ3/J11VJ4
31.9	J11VH8
32.5	J11VH9
36.3	J11VJ0
31.8	J11VJ1
28.4	J11VJ2
38.9	J11VJ5
35.9	J11VJ6
46.8	J11VJ7
84.0	J11VJ8

Number of samples
Uncensored 10
Censored
Detection limit or PQL
Method detection limit
TOTAL 10

Uncensored values
Mean 40.4
Lognormal mean 40.2
Std. devn. 16.1
Median 36.1
Min. 28.4
Max. 84.0

Lognormal distribution?
r-squared is: 0.749
Normal distribution?
r-squared is: 0.820
Recommendations:
Reject BOTH lognormal and normal distributions

UCL (based on Z-statistic) is 46.6

2-Methylnapthalene 95% UCL Calculation

DATA	ID
0.083	J11VJ3/J11VJ4
0.040	J11VH8
0.175	J11VH9
0.170	J11VJ0
0.038	J11VJ1
0.170	J11VJ2
0.195	J11VJ5
0.088	J11VJ6
0.150	J11VJ7
0.120	J11VJ8

Number of samples
Uncensored 10
Censored
Detection limit or PQL
Method detection limit
TOTAL 10

Uncensored values
Mean 0.12
Lognormal mean 0.013
Std. devn. 0.058
Median 0.14
Min 0.038
Max 0.20

Lognormal distribution?
r-squared is: 0.880
Normal distribution?
r-squared is: 0.925
Recommendations:
Use normal distribution.

UCL (based on t-statistic) is 0.16

bis(2ethylhexyl)phthalate 95% UCL Calculation

DATA	ID
0.022	J11VJ3/J11VJ4
0.039	J11VH8
0.046	J11VH9
0.032	J11VJ0
0.027	J11VJ1
0.030	J11VJ2
0.019	J11VJ5
0.066	J11VJ6
0.063	J11VJ7
0.029	J11VJ8

Number of samples
Uncensored 10
Censored
Detection limit or PQL
Method detection limit
TOTAL 10

Uncensored values
Mean 0.037
Lognormal mean 0.038
Std. devn. 0.016
Median 0.031
Min 0.019
Max 0.066

Lognormal distribution?
r-squared is: 0.960
Normal distribution?
r-squared is: 0.893
Recommendations:
Use lognormal distribution.

UCL (Land's method) is 0.050

Di-n-butylphthalate 95% UCL Calculation

DATA	ID
0.107	J11VJ3/J11VJ4
0.043	J11VH8
0.027	J11VH9
0.185	J11VJ0
0.022	J11VJ1
0.037	J11VJ2
0.195	J11VJ5
0.047	J11VJ6
0.385	J11VJ7
0.030	J11VJ8

Number of samples
Uncensored 10
Censored
Detection limit or PQL
Method detection limit
TOTAL 10

Uncensored values
Mean 0.11
Lognormal mean 0.11
Std. devn. 0.12
Median 0.045
Min 0.022
Max 0.39

Lognormal distribution?
r-squared is: 0.912
Normal distribution?
r-squared is: 0.750
Recommendations:
Use lognormal distribution

UCL (Land's method) is 0.31

Washington Closure Hanford **CALCULATION SHEET**

Originator M. J. Appel MJA
Project 100-F Area Field Remediation
Subject 1607-F7 Septic Tank Verification 95% UCL Calculations

Date 08/21/06
Job No. 14655

Calc. No. 0100F-CA-V0257
Checked J. M. Capron JMC

Rev. No. 0
Date 8/21/06
Sheet No. 14 of 15

Ecology Software (MTCAStat) Results

DATA	ID	Naphthalene 95% UCL Calculation			
0.047	J11VJ3/J11VJ4				
0.027	J11VH8				
0.175	J11VH8	Number of samples		Uncensored values	
0.130	J11VJ0	Uncensored	10	Mean	0.10
0.027	J11VJ1	Censored		Lognormal mean	0.11
0.170	J11VJ2	Detection limit or PQL		Std. devn	0.062
0.195	J11VJ5	Method detection limit		Median	0.092
0.068	J11VJ6	TOTAL	10	Min	0.027
0.097	J11VJ7			Max.	0.20
0.087	J11VJ8				

Lognormal distribution?
r-squared is: 0.929
Recommendations:
Use lognormal distribution.

Normal distribution?
r-squared is: 0.943

UCL (Land's method) is 0.21

DATA	ID	Phenanthrene 95% UCL Calculation			
0.027	J11VJ3/J11VJ4				
0.020	J11VH8				
0.175	J11VH8	Number of samples		Uncensored values	
0.041	J11VJ0	Uncensored	10	Mean	0.087
0.018	J11VJ1	Censored		Lognormal mean	0.093
0.170	J11VJ2	Detection limit or PQL		Std. devn.	0.065
0.027	J11VJ5	Method detection limit		Median	0.068
0.073	J11VJ8	TOTAL	10	Min.	0.018
0.100	J11VJ7			Max	0.18
0.083	J11VJ8				

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

Normal distribution?
r-squared is: 0.887

UCL (Land's method) is 0.21

DATA	ID	beta-BHC 95% UCL Calculation			
0.0027	J11VJ3/J11VJ4				
0.0009	J11VH8				
0.0007	J11VH9	Number of samples		Uncensored values	
0.0007	J11VJ0	Uncensored	10	Mean	0.0013
0.0013	J11VJ1	Censored		Lognormal mean	0.0013
0.0007	J11VJ2	Detection limit or PQL		Std. devn.	0.0011
0.0006	J11VJ5	Method detection limit		Median	0.0006
0.0039	J11VJ8	TOTAL	10	Min.	0.0007
0.0008	J11VJ7			Max	0.0039
0.0008	J11VJ8				

Lognormal distribution?
r-squared is. 0.741
Recommendations.
Reject BOTH lognormal and normal distributions

Normal distribution?
r-squared is. 0.643

UCL (based on Z-statistic) is 0.0019

DATA	ID	4,4'-DDT 95% UCL Calculation			
0.0044	J11VJ3/J11VJ4				
0.0012	J11VH8				
0.0007	J11VH9	Number of samples		Uncensored values	
0.0022	J11VJ0	Uncensored	10	Mean	0.0035
0.0013	J11VJ1	Censored		Lognormal mean	0.0038
0.0007	J11VJ2	Detection limit or PQL		Std. devn.	0.0030
0.0035	J11VJ5	Method detection limit		Median	0.0029
0.0045	J11VJ8	TOTAL	10	Min	0.0007
0.0085	J11VJ7			Max.	0.0100
0.0100	J11VJ8				

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

Normal distribution?
r-squared is. 0.874

UCL (Land's method) is 0.0085

Washington Closure Hanford

CALCULATION SHEET

Originator M. J. Appel **Date** 08/21/06 **Calc. No.** 0100F-CA-V0257 **Rev. No.** 0

Project 100-F Area Field Remediation **Job No.** 14655 **Checked** J. M. Capron **Date** 8/21/06

Subject 1607-F7 Septic Tank Verification 95% UCL Calculations **Sheet No.** 15 of 15

Ecology Software (MTCAStat) Results

DATA	ID	Acetone			
0.0048	J11VJ3/J11VJ4				
0.0055	J11VH8				
0.0050	J11VH9	Number of samples		Uncensored values	
0.0055	J11VJ0	Uncensored	10	Mean	0.0076
0.0050	J11VJ1	Censored		Lognormal mean	0.0078
0.0055	J11VJ2	Detection limit or PQL		Std. devn.	0.0057
0.0015	J11VJ5	Method detection limit		Median	0.0055
0.0220	J11VJ6	TOTAL	10	Min.	0.0015
0.0110	J11VJ7			Max.	0.0220
0.0100	J11VJ8				

Lognormal distribution? Normal distribution?

r-squared is: 0.863 r-squared is: 0.727

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.011

DATA	ID	Cadmium			
0.1700	J11VJ3/J11VJ4				
0.0350	J11VH8				
0.0350	J11VH9	Number of samples		Uncensored values	
0.0350	J11VJ0	Uncensored	10	Mean	0.12
0.0350	J11VJ1	Censored		Lognormal mean	0.13
0.0350	J11VJ2	Detection limit or PQL		Std. devn.	0.10
0.1600	J11VJ5	Method detection limit		Median	0.09
0.1400	J11VJ6	TOTAL	10	Min.	0.04
0.2200	J11VJ7			Max.	0.32
0.3200	J11VJ8				

Lognormal distribution? Normal distribution?

r-squared is: 0.807 r-squared is: 0.831

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.17

Attachment 1. 1607-F7 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			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	mg/kg	Q	PQL
1	J11VH8	4/3/06	4720		2.9	0.44	U	0.44	2.3		0.62	90.0		0.02	0.33		0.02	3.1		0.24	0.07	U	0.07	3420	C	1.7	5.1		0.13
2	J11VH9	4/3/06	5010		2.9	0.44	U	0.44	2.3		0.61	59.4		0.02	0.36		0.02	2.0		0.24	0.07	U	0.07	3920	C	1.6	5.6		0.14
3	J11VJ0	4/3/06	5880		3	0.46	U	0.46	2.6		0.63	94.5		0.02	0.46		0.02	1.8		0.25	0.07	U	0.07	3810	C	1.7	6.1		0.15
4	J11VJ1	4/3/06	3540		2.9	0.44	U	0.44	1.8		0.62	44.2		0.02	0.28		0.02	0.97		0.24	0.07	U	0.07	3110	C	1.7	3.8		0.14
5	J11VJ2	4/3/06	3910		2.8	0.43	U	0.43	1.8		0.59	32.0		0.02	0.33		0.02	0.52		0.23	0.07	U	0.07	2380	C	1.6	4.1		0.14
6	J11VJ3	4/4/06	4830		3.2	0.49	UJ	0.49	2.3		0.68	85.6	C	0.02	0.32		0.02	1.5		0.27	0.16		0.08	3440	C	1.8	5.1		0.16
Duplicate of J11VJ3	J11VJ4	4/4/06	5210		3.2	0.48	UJ	0.48	2.5		0.67	85.1	C	0.02	0.36		0.02	2.3		0.26	0.18		0.08	3710	C	1.8	5.5		0.15
7	J11VJ5	4/4/06	6470		3.2	0.53	J	0.49	2.4		0.67	100	C	0.02	0.44		0.02	3.4		0.26	0.16		0.08	3380	C	1.8	6.5		0.15
8	J11VJ6	4/4/06	3680		3.1	0.48	UJ	0.48	1.9		0.67	68.5	C	0.02	0.27		0.02	2.5		0.26	0.14		0.08	3490	C	1.8	3.8		0.15
9	J11VJ7	4/4/06	4970		3.1	0.48	UJ	0.48	2.5		0.66	105	C	0.02	0.36		0.02	3.6		0.26	0.22		0.08	4520	C	1.8	4.9		0.15
10	J11VJ8	4/4/06	5640		3.2	0.48	UJ	0.48	3.7		0.67	135	C	0.02	0.41		0.02	4.7		0.26	0.32		0.08	5360	C	1.8	5.5		0.15
Waste Staging Pile	J11VK3	4/4/06	7100		8.4	1.3	U	1.3	3.4		1.8	147		0.06	0.30		0.06	7.7		0.07	0.22		0.20	4600		4.8	6.4		0.41
Equipment Blank	J11VH7	4/3/06	45.1		2.7	0.41	U	0.41	0.6	U	0.58	1.3		0.02	0.04		0.02	0.23		0.23	0.07	U	0.07	20.8	C	1.5	0.13	U	0.13

Sample Location	HEIS Number	Sample Date	Chromium (total)			Copper			Hexavalent Chromium			Iron			Lead			Magnesium			Manganese			Mercury			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	mg/kg	Q	PQL
1	J11VH8	4/3/06	8.0		0.13	12.6		0.12	0.21	U	0.21	13100		3.5	5.3		0.31	3080		0.98	262		0.03	0.01	U	0.01	411		2.3
2	J11VH9	4/3/06	8.6		0.13	13.9		0.12	0.24	U	0.21	14600		3.5	4.0		0.31	3960		0.97	261		0.03	0.01	U	0.01	436		2.3
3	J11VJ0	4/3/06	9.5		0.13	13.0		0.12	0.50	U	0.21	15700		3.6	5.2		0.32	3590		1.0	307		0.03	0.02	U	0.02	481		2.4
4	J11VJ1	4/3/06	6.3		0.13	12.1		0.12	0.21	U	0.21	9890		3.5	3.8		0.31	2610		0.98	199		0.03	0.02	U	0.02	454		2.3
5	J11VJ2	4/3/06	7.3		0.13	12.6		0.12	0.27	U	0.21	10800		3.4	2.7		0.30	3090		0.94	230		0.03	0.02	U	0.02	353		2.2
6	J11VJ3	4/4/06	7.9		0.14	12.5		0.13	2.3	UJD	2.3	11800		3.9	6.2		0.34	3080		1.1	253		0.03	0.02		0.02	456	J	2.5
Duplicate of J11VJ3	J11VJ4	4/4/06	8.6		0.14	14.3		0.13	2.3	UJD	2.3	13300		3.8	6.0		0.34	3290		1.1	269		0.03	0.02	U	0.02	518	J	2.5
7	J11VJ5	4/4/06	9.5		0.14	11.4		0.13	2.3	UJD	2.3	16000		3.9	4.7		0.34	3780		1.1	321		0.03	0.02	U	0.02	606	J	2.5
8	J11VJ6	4/4/06	7.2		0.14	10.4		0.13	2.3	UJD	2.3	9200		3.8	46.3		0.34	2670		1.1	183		0.03	0.02	U	0.02	475	J	2.5
9	J11VJ7	4/4/06	8.3		0.14	13.3		0.13	2.3	UJD	2.3	11900		3.8	7.8		0.34	3260		1.1	233		0.03	0.02		0.02	490	J	2.5
10	J11VJ8	4/4/06	18.7		0.14	15.3		0.13	2.3	UJD	2.3	12500		3.8	28.2		0.34	3420		1.1	276		0.03	0.02		0.02	450	J	2.5
Waste Staging Pile	J11VK3	4/4/06	12.2		0.38	16.4		0.35	0.20	U	0.20	17500		10.2	12.3		0.91	4300		2.8	300		0.09	0.04		0.02	637		6.6
Equipment Blank	J11VH7	4/3/06	0.12	U	0.12	0.11	U	0.11				107		3.3	0.37		0.29	6.7		0.91	5.7		0.03	0.02	U	0.02	30.5		2.1

Note: The following abbreviations apply to all Attachment 1 tables. Data qualified with C, D, and/or J are considered acceptable values.

C = blank contamination (inorganic constituents)
D = diluted
HEIS = Hanford Environmental Information System
I = interference
J = estimated
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	8/21/06
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Sodium			Molybdenum			Nickel			Potassium			Selenium			Silver			Vanadium			Zinc		
			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
1	J11VH8	4/3/06	97.3		0.77	0.43		0.29	9.4		0.24	861		2.3	0.47	U	0.47	0.07	U	0.07	30.6		0.09	31.9		0.16
2	J11VH9	4/3/06	82.9		0.76	0.35		0.29	10.1		0.24	902		2.3	0.47	U	0.47	0.07	U	0.07	31.1		0.09	32.5		0.16
3	J11VJ0	4/3/06	99.6		0.79	0.42		0.30	10.5		0.24	1180		2.4	0.49	U	0.49	0.07	U	0.07	36.5		0.09	36.3		0.17
4	J11VJ1	4/3/06	79.7		0.77	0.29	U	0.29	7.8		0.24	553		2.3	0.47	U	0.47	0.07	U	0.07	22.8		0.09	31.6		0.16
5	J11VJ2	4/3/06	79.7		0.74	0.35		0.28	9.6		0.23	533		2.2	0.46	U	0.46	0.07	U	0.07	26.0		0.09	28.4		0.16
6	J11VJ3	4/3/06	89.5	C	0.84	0.51		0.32	9.1		0.27	949		2.5	0.52	U	0.52	0.08	U	0.08	25.5		0.10	36.0		0.18
Duplicate of J11VJ3	J11VJ4	4/3/06	95.5	C	0.83	0.52		0.32	9.9		0.26	1010		2.5	0.52	U	0.52	0.08	U	0.08	30.1		0.10	38.5		0.18
7	J11VJ5	4/3/06	150	C	0.84	0.48		0.32	10.0		0.26	1480		2.5	0.52	U	0.52	0.08	U	0.08	36.8		0.10	38.9		0.18
8	J11VJ6	4/3/06	89.5	C	0.83	0.45		0.32	8.3		0.26	719		2.5	0.51	U	0.51	0.08	U	0.08	21.1		0.10	35.9		0.17
9	J11VJ7	4/3/06	116	C	0.83	0.52		0.32	9.1		0.26	1050		2.5	0.51	U	0.51	0.08	U	0.08	27.4		0.10	46.8		0.17
10	J11VJ8	4/3/06	126	C	0.84	0.50		0.32	9.5		0.26	1200		2.5	0.52	U	0.52	0.08	U	0.08	27.2		0.10	84.0		0.18
Waste Staging Pile	J11VK3	4/3/06	167		2.2	0.85	U	0.85	11.3		0.70	1440		6.6	1.4	U	1.4	0.20	U	0.20	40.2		0.26	72.0		0.47
Equipment Blank	J11VH7	4/3/06	6.2		0.72	0.27	U	0.27	0.23	U	0.23	14.3		2.1	0.44	U	0.44	0.07	U	0.07	0.08	U	0.08	1.1		0.15

Attachment	1	Sheet No.	2 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VH7 Equipment Blank Sample Date 4/3/06			J11VH8 Sample Location 1 Sample Date 4/3/06			J11VH9 Sample Location 2 Sample Date 4/3/06			J11VJ0 Sample Location 3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016				14	U	14	14	U	14	15	U	15
Aroclor-1221				14	U	14	14	U	14	15	U	15
Aroclor-1232				14	U	14	14	U	14	15	U	15
Aroclor-1242				14	U	14	14	U	14	15	U	15
Aroclor-1248				14	U	14	14	U	14	15	U	15
Aroclor-1254				14	U	14	14	U	14	15	U	15
Aroclor-1260				14	U	14	14	U	14	15	U	15
1,2,4-Trichlorobenzene				350	U	350	350	U	350	370	U	370
1,2-Dichlorobenzene				350	U	350	350	U	350	370	U	370
1,3-Dichlorobenzene				350	U	350	350	U	350	370	U	370
1,4-Dichlorobenzene				350	U	350	350	U	350	370	U	370
2,4,5-Trichlorophenol				880	U	880	880	U	880	920	U	920
2,4,6-Trichlorophenol				350	U	350	350	U	350	370	U	370
2,4-Dichlorophenol				350	U	350	350	U	350	370	U	370
2,4-Dimethylphenol				350	U	350	350	U	350	370	U	370
2,4-Dinitrophenol				880	U	880	880	U	880	920	U	920
2,4-Dinitrotoluene				350	U	350	350	U	350	370	U	370
2,6-Dinitrotoluene				350	U	350	350	U	350	370	U	370
2-Chloronaphthalene				350	U	350	350	U	350	370	U	370
2-Chlorophenol				350	U	350	350	U	350	370	U	370
2-Methylnaphthalene				40	J	40	350	U	350	170	J	370
2-Methylphenol (cresol, o-)				350	U	350	350	U	350	370	U	370
2-Nitroaniline				880	U	880	880	U	880	920	U	920
2-Nitrophenol				350	U	350	350	U	350	370	U	370
3,3'-Dichlorobenzidine				350	U	350	350	U	350	370	U	370
4-Methylphenol (p-cresol)				350	U	350	350	U	350	370	U	370
3-Nitroaniline				880	U	880	880	U	880	920	U	920
4,6-Dinitro-2-methylphenol				880	U	880	880	U	880	920	U	920
4-Bromophenyl-phenylether				350	U	350	350	U	350	370	U	370
4-Chloro-3-methylphenol				350	U	350	350	U	350	370	U	370
4-Chloroaniline				350	U	350	350	U	350	370	U	370
4-Chlorophenyl-phenylether				350	U	350	350	U	350	370	U	370
4-Nitroaniline				880	U	880	880	U	880	920	U	920
4-Nitrophenol				880	U	880	880	U	880	920	U	920
Acenaphthene				350	U	350	350	U	350	370	U	370
Acenaphthylene				350	U	350	350	U	350	370	U	370
Anthracene				350	U	350	350	U	350	370	U	370
Benzo(a)anthracene				350	U	350	350	U	350	370	U	370
Benzo(a)pyrene				350	U	350	350	U	350	370	U	370
Benzo(b)fluoranthene				350	U	350	350	U	350	27	J	370
Benzo(g,h,i)perylene				350	U	350	350	U	350	370	U	370
Benzo(k)fluoranthene				350	U	350	350	U	350	370	U	370
bis(2-Chloro-1-methylethyl)ether				350	U	350	350	U	350	370	U	370
bis(2-Chloroethoxy)methane				350	U	350	350	U	350	370	U	370
bis(2-Chloroethyl) ether				350	U	350	350	U	350	370	U	370
bis(2-Ethylhexyl) phthalate				39	JB	350	46	JB	350	32	JB	370

Attachment	1	Sheet No.	3 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VH7 Equipment Blank Sample Date 4/3/06			J11VH8 Sample Location 1 Sample Date 4/3/06			J11VH9 Sample Location 2 Sample Date 4/3/06			J11VJ0 Sample Location 3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate				350	U	350	350	U	350	370	U	370
Carbazole				350	U	350	350	U	350	370	U	370
Chrysene				350	U	350	350	U	350	370	U	370
Dibenz(a,h)anthracene				350	U	350	350	U	350	370	U	370
Dibenzofuran				350	U	350	350	U	350	30	J	370
Diethylphthalate				350	U	350	350	U	350	370	U	370
Dimethylphthalate				350	U	350	350	U	350	370	U	370
Di-n-butylphthalate				43	JB	350	27	JB	350	43	JB	370
Di-n-octylphthalate				350	U	350	350	U	350	370	U	370
Fluoranthene				350	U	350	350	U	350	370	U	370
Fluorene				350	U	350	350	U	350	370	U	370
Hexachlorobenzene				350	U	350	350	U	350	370	U	370
Hexachlorobutadiene				350	U	350	350	U	350	370	U	370
Hexachlorocyclopentadiene				350	U	350	350	U	350	370	U	370
Hexachloroethane				350	U	350	350	U	350	370	U	370
Indeno(1,2,3-cd)pyrene				350	U	350	350	U	350	370	U	370
Isophorone				350	U	350	350	U	350	370	U	370
Naphthalene				27	J	350	350	U	350	130	J	370
Nitrobenzene				350	U	350	350	U	350	370	U	370
N-Nitroso-di-n-dipropylamine				350	U	350	350	U	350	370	U	370
N-Nitrosodiphenylamine				350	U	350	350	U	350	370	U	370
Pentachlorophenol				880	U	880	880	U	880	920	U	920
Phenanthrene				350	U	350	350	U	350	41	J	370
Phenol				350	U	350	350	U	350	370	U	370
Pyrene				350	U	350	350	U	350	370	U	370
Pesticides												
Aldrin				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Alpha-BHC				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
alpha-Chlordane				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
beta-1,2,3,4,5,6-Hexachlorocyclohexane				0.92	JD	1.4	1.4	UDJ	1.4	0.66	JD	1.5
Delta-BHC				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Dichlorodiphenyldichloroethane				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Dichlorodiphenyldichloroethylene				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Dichlorodiphenyltrichloroethane				1.2	JD	1.2	1.4	UDJ	1.4	2.2	IDJ	2.2
Dieldrin				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Endosulfan I				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Endosulfan II				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Endosulfan sulfate				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Endrin				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Endrin aldehyde				1.4	UDJ	1.4	1.4	UDJ	1.4	1.3	JD	1.3
Endrin ketone				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Gamma-BHC (Lindane)				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
gamma-Chlordane				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Heptachlor				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Heptachlor epoxide				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Methoxychlor				1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UDJ	1.5
Toxaphene				14	UJD	14	14	UJD	14	15	UJD	15

Attachment	1	Sheet No.	4 of 11
Originator	M. J. Appel	Date	10/10/06
Checked	J. M. Capron	Date	10/10/06
Calc. No.	0100F-CA-V02207	Rev. No.	0 1 gmc

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J111H7 Equipment Blank Sample Date 4/3/06			J11VH8 Sample Location 1 Sample Date 4/3/06			J11VH9 Sample Location 2 Sample Date 4/3/06			J11VJ0 Sample Location 3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	6	U	6	5	U	5	6	U	6
1,1,2,2-Tetrachloroethane	5	U	5	6	U	6	5	U	5	6	U	6
1,1,2-Trichloroethane	5	U	5	6	U	6	5	U	5	6	U	6
1,1-Dichloroethane	5	U	5	6	U	6	5	U	5	6	U	6
1,1-Dichloroethene	5	U	5	6	U	6	5	U	5	6	U	6
1,2-Dichloroethane	5	U	5	6	U	6	5	U	5	6	U	6
1,2-Dichloroethene(Total)	5	U	5	6	U	6	5	U	5	6	U	6
1,2-Dichloropropane	5	U	5	6	U	6	5	U	5	6	U	6
2-Butanone	9	U	9	11	U	11	10	U	10	11	U	11
2-Hexanone	9	U	9	11	U	11	2	JB	10	11	U	11
4-Methyl-2-Pentanone	9	U	9	11	U	11	10	U	10	11	U	11
Acetone	4	J	9	11	U	11	5	J	10	11	U	11
Benzene	5	U	5	6	U	6	5	U	5	6	U	6
Bromodichloromethane	5	U	5	6	U	6	5	U	5	6	U	6
Bromoform	5	U	5	6	U	6	5	U	5	6	U	6
Bromomethane	9	U	9	11	U	11	10	U	10	11	U	11
Carbon disulfide	5	U	5	6	U	6	5	U	5	6	U	6
Carbon tetrachloride	5	U	5	6	U	6	5	U	5	6	U	6
Chlorobenzene	5	U	5	6	U	6	5	U	5	6	U	6
Chloroethane	9	U	9	11	U	11	10	U	10	11	U	11
Chloroform	2	JB	5	3	JB	10	3	JB	10	2	JB	10
Chloromethane	9	U	9	11	U	11	10	U	10	11	U	11
cis-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	6	U	6
cis-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	6	U	6
Dibromochloromethane	5	U	5	6	U	6	5	U	5	6	U	6
Ethylbenzene	5	U	5	6	U	6	5	U	5	6	U	6
Methylenechloride	6	B	5	9	B	6	11	B	5	10	B	6
Styrene	5	U	5	6	U	6	5	U	5	6	U	6
Tetrachloroethene	5	U	5	6	U	6	5	U	5	6	U	6
Toluene	5	U	5	6	U	6	5	U	5	6	U	6
trans-1,2-Dichloroethylene	5	U	5	6	U	6	5	U	5	6	U	6
trans-1,3-Dichloropropene	5	U	5	6	U	6	5	U	5	6	U	6
Trichloroethene	5	U	5	6	U	6	5	U	5	6	U	6
Vinyl chloride	9	U	9	11	U	11	10	U	10	11	U	11
Xylenes (total)	5	U	5	6	U	6	5	U	5	6	U	6

Attachment	1	Sheet No.	5 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VJ1 Sample Location 4 Sample Date 4/3/06			J11VJ2 Sample Location 5 Sample Date4/3/06			J11VJ3 Sample Location 6 Sample Date 4/3/06			J11VJ4 Duplicate of J11VJ3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls												
Aroclor-1016	14	U	14	14	U	14	15	U	15	15	U	15
Aroclor-1221	14	U	14	14	U	14	15	U	15	15	U	15
Aroclor-1232	14	U	14	14	U	14	15	U	15	15	U	15
Aroclor-1242	14	U	14	14	U	14	15	U	15	15	U	15
Aroclor-1248	14	U	14	14	U	14	15	U	15	15	U	15
Aroclor-1254	4.4	J	4.4	8.4	J	8.4	15	U	15	15	U	15
Aroclor-1260	14	U	14	14	U	14	2	J	15	2.2	J	15
Semivolatile Organic Compounds												
1,2,4-Trichlorobenzene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
1,2-Dichlorobenzene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
1,3-Dichlorobenzene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
1,4-Dichlorobenzene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2,4,5-Trichlorophenol	880	U	880	850	U	850	960	UJ	960	960	UJ	960
2,4,6-Trichlorophenol	350	U	350	340	U	340	380	U	380	380	U	380
2,4-Dichlorophenol	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2,4-Dimethylphenol	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2,4-Dinitrophenol	880	U	880	850	U	850	960	UJ	960	960	UJ	960
2,4-Dinitrotoluene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2,6-Dinitrotoluene	350	U	350	340	U	340	380	U	380	380	U	380
2-Chloronaphthalene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2-Chlorophenol	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2-Methylnaphthalene	36	J	350	340	UJ	340	83	J	380	83	J	380
2-Methylphenol (cresol, o-)	350	U	350	340	U	340	380	UJ	380	380	UJ	380
2-Nitroaniline	880	U	880	850	U	850	960	UJ	960	960	UJ	960
2-Nitrophenol	350	U	350	340	U	340	380	UJ	380	380	UJ	380
3,3'-Dichlorobenzidine	350	U	350	340	U	340	380	UJ	380	380	UJ	380
4-Methylphenol (p-cresol)	350	U	350	340	U	340	380	UJ	380	380	UJ	380
3-Nitroaniline	880	U	880	850	U	850	960	U	960	960	U	960
4,6-Dinitro-2-methylphenol	880	U	880	850	U	850	960	UJ	960	960	UJ	960
4-Bromophenyl-phenylether	350	U	350	340	U	340	380	UJ	380	380	UJ	380
4-Chloro-3-methylphenol	350	U	350	340	U	340	380	U	380	380	U	380
4-Chloroaniline	350	U	350	340	U	340	380	U	380	380	U	380
4-Chlorophenyl-phenylether	350	U	350	340	U	340	380	UJ	380	380	UJ	380
4-Nitroaniline	880	U	880	850	U	850	960	U	960	960	U	960
4-Nitrophenol	880	U	880	850	U	850	960	U	960	960	U	960
Acenaphthene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Acenaphthylene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Anthracene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Benzo(a)anthracene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Benzo(a)pyrene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Benzo(b)fluoranthene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Benzo(g,h,i)perylene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Benzo(k)fluoranthene	350	U	350	340	U	340	380	U	380	380	U	380
bis(2-Chloro-1-methylethyl)ether	350	U	350	340	U	340	380	UJ	380	380	UJ	380
bis(2-Chloroethoxy)methane	350	U	350	340	U	340	380	UJ	380	380	UJ	380
bis(2-Chloroethyl) ether	350	U	350	340	U	340	380	UJ	380	380	UJ	380
bis(2-Ethylhexyl) phthalate	27	JB	350	30	JB	340	21	J	380	22	J	380

Attachment	1	Sheet No.	6 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VJ1 Sample Location 4 Sample Date 4/3/06			J11VJ2 Sample Location 5 Sample Date4/3/06			J11VJ3 Sample Location 6 Sample Date 4/3/06			J11VJ4 Duplicate of J11VJ3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)												
Butylbenzylphthalate	37	J	350	340	UJ	340	380	UJ	380	380	UJ	380
Carbazole	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Chrysene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Dibenz(a,h)anthracene	350	U	350	340	U	340	380	UJ	380	380	UJ	380
Dibenzofuran	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Diethylphthalate	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Dimethylphthalate	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Di-n-butylphthalate	22	JB	350	37	JB	340	380	UJ	380	24	J	380
Di-n-octylphthalate	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Fluoranthene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Fluorene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Hexachlorobenzene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Hexachlorobutadiene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Hexachlorocyclopentadiene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Hexachloroethane	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Indeno(1,2,3-cd)pyrene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Isophorone	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Naphthalene	27	J	350	340	U	340	46	J	380	47	J	380
Nitrobenzene	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
N-Nitroso-di-n-dipropylamine	350	U	350	340	U	340	380	UJ	380	380	UJ	380
N-Nitrosodiphenylamine	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Pentachlorophenol	880	U	880	850	UJ	850	960	UJ	960	960	UJ	960
Phenanthrene	18	J	350	340	UJ	340	27	J	380	27	J	380
Phenol	350	U	350	340	UJ	340	380	UJ	380	380	UJ	380
Pyrene	350	U	350	340	UJ	340	30	J	30	380	UJ	380
Pesticides												
Aldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	0.42	JD	1.5
Alpha-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
alpha-Chlordane	0.92	JD	1.4	1.4	UDJ	1.4	1.2	JD	1.5	1.7	JD	1.5
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.3	JD	1.3	1.4	UDJ	1.4	2.3	JD	1.5	3.1	D	1.5
Delta-BHC	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Dichlorodiphenyldichloroethane	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Dichlorodiphenyldichloroethylene	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	JD	1.5
Dichlorodiphenyltrichloroethane	1.3	JID	1.3	1.4	UDJ	1.4	3.5	JD	1.5	5.2	D	1.5
Dieldrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Endosulfan I	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	0.46	JD	1.5
Endosulfan II	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Endosulfan sulfate	1.4	UDJ	1.4	1.4	UDJ	1.4	1	JD	1.5	1.5	UD	1.5
Endrin	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Endrin aldehyde	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Endrin ketone	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Gamma-BHC (Lindane)	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
gamma-Chlordane	0.71	JD	1.4	1.4	UDJ	1.4	0.92	JD	1.5	1.1	JD	1.5
Heptachlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Heptachlor epoxide	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.5	UD	1.5
Methoxychlor	1.4	UDJ	1.4	1.4	UDJ	1.4	1.5	UD	1.5	1.4	JD	1.5
Toxaphene	14	UJD	14	14	UJD	14	15	UDJ	15	15	UJD	15

Attachment 1 Sheet No. 7 of 11
Originator M. J. Appel Date 10/10/06
Checked J. M. Capron Date 10/10/06
Calc. No. 0100F-CA-V0257 Rev. No. 1

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VJ1 Sample Location 4 Sample Date 4/3/06			J11VJ2 Sample Location 5 Sample Date4/3/06			J11VJ3 Sample Location 6 Sample Date 4/3/06			J11VJ4 Duplicate of J11VJ3 Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds												
1,1,1-Trichloroethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,1,2,2-Tetrachloroethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,1,2-Trichloroethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,1-Dichloroethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,1-Dichloroethene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,2-Dichloroethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,2-Dichloroethene(Total)	5	U	5	6	U	6	6	UJ	6	6	UJ	6
1,2-Dichloropropane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
2-Butanone	10	U	10	11	U	11	11	UJ	11	12	UJ	12
2-Hexanone	10	U	10	11	U	11	11	UJ	11	11	UJ	12
4-Methyl-2-Pentanone	10	U	10	11	U	11	11	UJ	11	3	J	12
Acetone	10	U	10	11	U	11	15	J	11	8	J	12
Benzene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Bromodichloromethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Bromoform	5	U	5	6	UJ	6	6	UJ	6	6	UJ	6
Bromomethane	10	U	10	11	U	11	11	UJ	11	12	UJ	12
Carbon disulfide	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Carbon tetrachloride	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Chlorobenzene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Chloroethane	10	U	10	11	U	11	11	UJ	11	12	UJ	12
Chloroform	10	U	10	10	U	10	10	UJ	10	10	UJ	10
Chloromethane	10	U	10	11	U	11	11	UJ	11	12	UJ	12
cis-1,2-Dichloroethylene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
cis-1,3-Dichloropropene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Dibromochloromethane	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Ethylbenzene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Methylenechloride	10	UB	5	8	UB	6	18	UJ	6	12	UJ	6
Styrene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Tetrachloroethene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Toluene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
trans-1,2-Dichloroethylene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
trans-1,3-Dichloropropene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Trichloroethene	5	U	5	6	U	6	6	UJ	6	6	UJ	6
Vinyl chloride	10	U	10	11	U	11	11	UJ	11	12	UJ	12
Xylenes (total)	5	U	5	6	U	6	6	UJ	6	6	UJ	6

Attachment	1	Sheet No.	8 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VJ5 Sample Location 7 Sample Date 4/3/06			J11VJ6 Sample Location 8 Sample Date 4/3/06			J11VJ7 Sample Location 9 Sample Date 4/3/06			J11VJ8 Sample Location 10 Sample Date 4/3/06			J11VK3 Waste Staging Pile Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Polychlorinated Biphenyls															
Aroclor-1016	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1221	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1232	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1242	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1248	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1254	15	U	15	15	U	15	15	U	15	15	U	15	14	U	15
Aroclor-1260	15	U	15	4.2	J	15	7	J	15	10	J	15	60		15
Semivolatile Organic Compounds															
1,2,4-Trichlorobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
1,2-Dichlorobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
1,3-Dichlorobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
1,4-Dichlorobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	46	J	340
2,4,5-Trichlorophenol	970	UJ	970	950	UJ	950	1900	UJD	1900	960	UJ	960	850	U	850
2,4,6-Trichlorophenol	390	U	390	380	U	380	770	UD	770	380	U	380	340	U	340
2,4-Dichlorophenol	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2,4-Dimethylphenol	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2,4-Dinitrophenol	970	UJ	970	950	UJ	950	1900	UJD	1900	960	UJ	960	850	U	850
2,4-Dinitrotoluene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2,6-Dinitrotoluene	390	U	390	380	U	380	770	UD	770	380	U	380	340	U	340
2-Chloronaphthalene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2-Chlorophenol	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2-Methylnaphthalene	390	UJ	390	88	J	380	150	JD	770	120	J	380	110	J	340
2-Methylphenol (cresol, o-)	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
2-Nitroaniline	970	UJ	970	950	UJ	950	1900	UJD	1900	960	UJ	960	850	U	850
2-Nitrophenol	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
3,3'-Dichlorobenzidine	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
4-Methylphenol (p-cresol)	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
3-Nitroaniline	970	U	970	950	U	950	1900	UD	1900	960	U	960	850	U	850
4,6-Dinitro-2-methylphenol	970	UJ	970	950	UJ	950	1900	UJD	1900	960	UJ	960	850	U	850
4-Bromophenyl-phenylether	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
4-Chloro-3-methylphenol	390	U	390	380	U	380	770	UD	770	380	U	380	340	U	340
4-Chloroaniline	390	U	390	380	U	380	770	UD	770	380	U	380	340	U	340
4-Chlorophenyl-phenylether	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
4-Nitroaniline	970	U	970	950	U	950	1900	UD	1900	960	U	960	850	U	850
4-Nitrophenol	970	U	970	950	U	950	1900	UD	1900	960	U	960	850	U	850
Acenaphthene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Acenaphthylene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Anthracene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Benzo(a)anthracene	390	UJ	390	26	J	26	770	UJD	770	21	J	380	22	J	340
Benzo(a)pyrene	390	UJ	390	23	J	380	770	UJD	770	380	UJ	380	32	J	340
Benzo(b)fluoranthene	390	UJ	390	28	J	380	48	JD	770	380	UJ	380	36	J	340
Benzo(g,h,i)perylene	390	UJ	390	20	J	380	58	JD	770	380	UJ	380	35	J	340
Benzo(k)fluoranthene	390	U	390	28	J	380	46	JD	770	380	U	380	32	J	340
bis(2-Chloro-1-methylethyl)ether	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
bis(2-Chloroethoxy)methane	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
bis(2-Chloroethyl) ether	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
bis(2-Ethylhexyl) phthalate	19	J	390	66	J	380	63	JD	770	29	J	380	35	JB	340

Attachment	1	Sheet No.	9 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 1607-F7 Verification Sampling Results.

Constituent	J11VJ5 Sample Location 7 Sample Date 4/3/06			J11VJ6 Sample Location 8 Sample Date 4/3/06			J11VJ7 Sample Location 9 Sample Date 4/3/06			J11VJ8 Sample Location 10 Sample Date 4/3/06			J11VK3 Waste Staging Pile Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Semivolatile Organic Compounds (continued)															
Butylbenzylphthalate	390	UJ	390	24	J	380	770	UJD	770	380	UJ	380	340	U	340
Carbazole	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Chrysene	390	UJ	390	47	J	380	76	JD	770	39	J	380	50	J	340
Dibenz(a,h)anthracene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Dibenzofuran	390	UJ	390	23	J	380	770	UJD	770	26	J	380	27	J	340
Diethylphthalate	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Dimethylphthalate	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Di-n-butylphthalate	390	UJ	390	47	J	380	770	UJD	770	30	J	380	34	JB	340
Di-n-octylphthalate	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	18	J	340
Fluoranthene	390	UJ	390	62	J	380	72	JD	770	47	J	380	37	J	340
Fluorene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Hexachlorobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Hexachlorobutadiene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Hexachlorocyclopentadiene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Hexachloroethane	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Indeno(1,2,3-cd)pyrene	390	UJ	390	21	J	380	58	JD	770	380	UJ	380	27	J	340
Isophorone	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Naphthalene	390	UJ	390	68	J	380	97	JD	770	87	J	380	72	J	340
Nitrobenzene	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
N-Nitroso-di-n-dipropylamine	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
N-Nitrosodiphenylamine	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Pentachlorophenol	970	UJ	970	950	UJ	950	1900	UJD	1900	960	UJ	960	850	U	850
Phenanthrene	390	UJ	390	73	J	380	100	JD	770	63	J	380	44	J	340
Phenol	390	UJ	390	380	UJ	380	770	UJD	770	380	UJ	380	340	U	340
Pyrene	390	UJ	390	54	J	380	71	JD	770	64	J	380	51	J	340
Pesticides															
Aldrin	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Alpha-BHC	1.5	UD	1.5	0.53	JD	1.5	0.62	JD	1.5	1.1	JD	1.5	1.4	UD	1.4
alpha-Chlordane	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	5.5		1.4
beta-1,2,3,4,5,6-Hexachlorocyclohexane	1.5	UD	1.5	3.9	D	1.5	1.5	UD	1.5	8.5	UJD	1.5	1.4	UD	1.4
Delta-BHC	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Dichlorodiphenyldichloroethane	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	58		1.4
Dichlorodiphenyldichloroethylene	1.5	UD	1.5	1.4	JD	1.5	2.1	JD	1.5	1.5	UD	1.5	2.2		1.4
Dichlorodiphenyltrichloroethane	1.5	UD	1.5	4.5	D	1.5	6.5	JD	1.5	10	JD	1.5	46		1.4
Dieldrin	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	23		1.4
Endosulfan I	1.5	UD	1.5	0.46	JD	1.5	0.54	JD	1.5	1.5	UD	1.5	1.4	UD	1.4
Endosulfan II	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Endosulfan sulfate	1.5	UD	1.5	0.76	JD	1.5	1.1	JD	1.5	1.5	UD	1.5	1.4	UD	1.4
Endrin	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Endrin aldehyde	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Endrin ketone	1.5	UD	1.5	1.5	UD	1.5	0.89	JD	1.5	1.5	UD	1.5	1.4	UD	1.4
Gamma-BHC (Lindane)	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	0.92	J	1.5	1.4	UD	1.4
gamma-Chlordane	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	3.7		1.4
Heptachlor	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	15	J	1.4
Heptachlor epoxide	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	0.89	J	1.4
Methoxychlor	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.4	UD	1.4
Toxaphene	15	UJD	15	15	UJD	15	15	UJD	15	15	UJD	15	14	UJD	14

Attachment	1	Sheet No.	10 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

Attachment 1. 100-F-33 Verification Sampling Results.

Constituent	J11VJ5 Sample Location 7 Sample Date 4/3/06			J11VJ6 Sample Location 8 Sample Date 4/3/06			J11VJ7 Sample Location 9 Sample Date 4/3/06			J11VJ8 Sample Location 10 Sample Date 4/3/06			J11VK3 Waste Staging Pile Sample Date 4/3/06		
	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL	µg/kg	Q	PQL
Volatile Organic Compounds															
1,1,1-Trichloroethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,1,2,2-Tetrachloroethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,1,2-Trichloroethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,1-Dichloroethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,1-Dichloroethene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,2-Dichloroethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,2-Dichloroethene(Total)	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
1,2-Dichloropropane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
2-Butanone	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
2-Hexanone	12	U	12	11	UJ	12	11	U	11	10	U	11	10	U	10
4-Methyl-2-Pentanone	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
Acetone	29		12	22		12	11	J	11	10	J	11	10	U	10
Benzene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Bromodichloromethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Bromoform	6	UJ	6	6	UJ	6	6	UJ	6	5	UJ	5	5	U	5
Bromomethane	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
Carbon disulfide	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Carbon tetrachloride	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Chlorobenzene	6	U	6	6	UJ	6	6	U	6	6	U	6	1	J	5
Chloroethane	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
Chloroform	10	U	10	10	UJ	10	10	U	10	10	U	10	1	JB	5
Chloromethane	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
cis-1,2-Dichloroethylene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
cis-1,3-Dichloropropene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Dibromochloromethane	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Ethylbenzene	6	U	6	6	UJ	6	6	U	6	6	U	6	2	J	5
Methylenechloride	13	U	6	12	UJ	6	17	U	6	14	U	6	13	B	5
Styrene	6	U	6	6	UJ	6	6	U	6	6	U	6	3	JB	5
Tetrachloroethene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Toluene	6	U	6	6	UJ	6	6	U	6	6	U	6	1	J	5
trans-1,2-Dichloroethylene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
trans-1,3-Dichloropropene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Trichloroethene	6	U	6	6	UJ	6	6	U	6	6	U	6	5	U	5
Vinyl chloride	12	U	12	12	UJ	12	11	U	11	11	U	11	10	U	10
Xylenes (total)	6	U	6	6	UJ	6	6	U	6	6	U	6	6	B	5

Attachment	1	Sheet No.	11 of 11
Originator	M. J. Appel	Date	08/21/06
Checked	J. M. Capron	Date	
Calc. No.	0100F-CA-V0257	Rev. No.	0

APPENDIX C

HAZARD QUOTIENT AND CARCINOGENIC RISK CALCULATIONS

CALCULATION COVER SHEET

Project Title 100-F Field Remediation **Job No.** 14655
Area 100-F
Discipline Environmental *Calc. No. 0100F-CA-V0265
Subject 1607-F7 Hazard Quotient and Carcinogenic Risk Calculations
Computer Program Excel **Program No.** Excel 2003

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

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

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 3 Total = 4	M. J. Appel MJ Appel 8/22/06	J. M. Capron JM Capron 8/22/06	T. M. Blakley T M Blakley 8/22/06	M. A. Buckmaster MA Buckmaster per telecon 8/23/06	8/23/06

SUMMARY OF REVISION

WCH-DE-018 (04/14/2006) *Obtain Calc. No. from R&DC and Form from Intranet

Washington Closure Hanford CALCULATION SHEET

Originator:	M. J. Appel	Date:	8/22/06	Calc. No.:	0100F-CA-V0265	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	J. M. Capron	Date:	8/22/06
Subject:	1607-F7 Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 3	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk values for the 1607-F7, 141 M Building Septic Tank site remedial action. In accordance with the remedial action goals (RAGs) in the remedial design report/remedial action work plan (RDR/RAWP) (DOE-RL 2005), the following criteria must be met:

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

GIVEN/REFERENCES:

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

2) EPA, 1994, *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children*, EPA/540/R-93/081, Publication No. 9285.7, U.S. Environmental Protection Agency, Washington, D.C.

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

4) WCH, 2006, Waste Site Reclassification Form 2006-040, and Attachment *Remaining Sites Verification Package for 1607-F7, 141 M Building Septic Tank*, Washington Closure Hanford, Richland, Washington.

SOLUTION:

1) Calculate an HQ for each noncarcinogenic constituent detected above background and compare it to the individual HQ of <1.0 (DOE-RL 2005).

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

3) Calculate an excess cancer risk value for each carcinogenic constituent detected above background and compare it to the individual excess cancer risk criterion of $<1 \times 10^{-6}$ (DOE-RL 2005).

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

Washington Closure Hanford CALCULATION SHEET

Originator:	M. J. Appel MJA	Date:	8/22/06	Calc. No.:	0100F-CA-V0265	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	J. M. Capron JMC	Date:	8/22/06
Subject:	1607-F7 Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 3	

METHODOLOGY:

Hazard quotient and carcinogenic risk calculations were computed for the excavated and waste staging areas using the data set presented in WCH (2006). The statistical values from the excavated area and the maximum detected values from the waste staging area were compared for each analyte; the larger of the two values was used for the HQ and carcinogenic risk calculations. Of the contaminants of potential concern for the excavated area and waste staging area, barium, lead, and zinc require the HQ and risk calculations because they were detected above background. Additionally, boron, molybdenum, and multiple semivolatiles, pesticides, polychlorinated biphenyls, and volatiles require the HQ and risk calculations because these analytes were detected and a Washington State or Hanford Site background value is not available. All other site nonradionuclide COCs/COPCs were not detected or were detected below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the maximum value for boron 7.7 mg/kg, divided by the noncarcinogenic RAG value of 16,000 mg/kg (calculated in accordance with the noncarcinogenic toxic effects WAC 173-340-740[3]), is 4.8×10^{-4}. Comparing this value, and all other individual values, to the requirement of <1.0, this criterion is met.

2) After the HQ calculations are completed for the appropriate analytes, the cumulative HQ is obtained by summing the individual values. (To avoid errors due to intermediate rounding, the individual HQ values prior to rounding are used for this calculation.) The sum of the HQ values is 9.9×10^{-2}. Comparing this values to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum or statistical value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for aroclor-1254 is 0.0084 mg/kg; divided by 0.5 mg/kg, and multiplied as indicated, is 1.7×10^{-8}. Comparing this value to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The sum of the excess cancer risk values is 8.7×10^{-7}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

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

Table 1 shows the results of the calculation.

CONCLUSION:

This calculation demonstrates that the 1607-F7 waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005).

Washington Closure Hanford		CALCULATION SHEET					
Originator:	M. J. Appel	Date:	8/22/06	Calc. No.:	0100F-CA-V0265	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	J. M. Capron	Date:	8/22/06
Subject:	1607-F7 Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 3	

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 1607-F7 Waste Site.

Contaminants of Potential Concern[a]	Statistical or Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	147	5,600	2.6E-02	--	--
Boron	7.7	16,000	4.8E-04	--	--
Lead[c]	18.9	353	5.4E-02	--	--
Molybdenum	0.48	400	1.2E-03	--	--
Zinc	72.0	24,000	3.0E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.026	--	--	1.37	1.9E-08
Benzo(a)pyrene	0.032	--	--	0.33[d]	9.7E-08
Benzo(b)fluoranthene	0.048	--	--	1.37	3.5E-08
Benzo(k)fluoranthene	0.046	--	--	13.7	3.4E-09
Benzo(ghi)perylene	0.058	2,400	2.4E-05	--	--
Bis(2-ethylhexyl) phthalate	0.050	1,600	3.1E-05	71.4	7.0E-10
Butylbenzylphthalate	0.037	16,000	2.3E-06	--	--
Chrysene	0.076	--	--	137	5.5E-10
Dibenzofuran	0.030	160	1.9E-04	--	--
Dichlorobenzene; 1,4-	0.046	1,600	2.9E-05	41.7	1.1E-09
Di-n-butylphthalate	0.31	8,000	3.9E-05	--	--
Di-n-octylphthalate	0.018	1,600	1.1E-05	--	--
Fluoranthene	0.072	3,200	2.3E-05	--	--
Indeno(1,2,3-cd) pyrene	0.058	--	--	1.37	4.2E-08
Methylnapthalene; 2-	0.156	320	4.9E-04	--	--
Naphthalene	0.21	1,600	1.3E-04	--	--
Phenanthrene[c]	0.21	24,000	8.8E-06	--	--
Pyrene	0.071	2,400	3.0E-05	--	--
Pesticides					
Aldrin	0.00042	2.40	1.8E-04	0.0588	7.1E-09
BHC, alpha	0.0011	--	--	0.159	6.9E-09
BHC, beta (Hexachlorocyclohexane)	0.0019	--	--	0.556	3.4E-09
Chlordane (alpha, gamma)	0.0092	40	2.3E-04	2.86	3.2E-09
DDD, 4,4'-	0.058	--	--	4.17	1.4E-08
DDE, 4,4'-	0.0022	--	--	2.94	7.5E-10
DDT, 4,4'-	0.046	40	1.2E-03	2.94	1.6E-08
Dieldrin	0.023	4	5.8E-03	0.0625	3.7E-07
Endosulfan (I, II, sulfate)	0.00164	480	3.4E-06	--	--
Endrin (and ketone, aldehyde)	0.00219	24	9.1E-05	--	--
Heptachlor	0.015	40	3.8E-04	0.222	6.8E-08
Heptachlor epoxide	0.00089	1.04	8.6E-04	0.11	8.1E-09
Methoxychlor	0.0014	400	3.5E-06	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.0084	1.6	5.3E-03	0.5	1.7E-08
Aroclor-1260	0.010	--	--	0.5	2.0E-08
Volatiles					
Acetone	0.011	72,000	1.5E-07	--	--
Methylene chloride	0.013	4,800	2.7E-06	133	9.8E-11
Totals					
Cumulative Hazard Quotient:			**9.9E-02**		
Cumulative Excess Cancer Risk:					**8.7E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2006.
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d] = Cumulative carcinogenic risk calculated using the cleanup level of 0.137 mg/kg instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996. Individual carcinogenic risk calculated using the required detection limit.
[e] = Value for the noncarcinogenic RAG based on the surrogate chemical anthracene