APPENDIX C

CALCULATION BRIEFS

APPENDIX C

CALCULATION BRIEFS

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

100-F-26:9 Cleanup Verification 95% UCL Calculation, Calculation No. 0100F-CA-V0353, Rev. 0.

100-F-26:9 Waste Site Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation, Calculation No. 0100F-CA-V0354, Rev. 0.

100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculation, Calculation No. 0100F-CA-V0363, Rev. 0.

100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation, Calculation No. 0100F CA V0364, Rev. 0.

100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculation, Calculation No. 0100F-CA-V0365, Rev. 0.

DISCLAIMER FOR CALCULATIONS

The calculation that is provided in this appendix has been generated to document compliance with established cleanup levels. This calculation should be used in conjunction with other relevant documents in the administrative record.

Calculation Brief Distribution Sheet

Calculation Number: 0100F-CA-V0353

100-F-26:9 Cleanup Verification 95% UCL Calculation

COA: R10F26-N6W0

TITLE	NAME	MSIN	COPIES
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CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0353

Subject: 100-F-26:9 Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Sheets = 17 Attm. 1 = 21 Total = 39	L. D. Habel	H. M. Sulloway	NA	J. D. Fancher	4/3/08

SUMMARY OF REVISION

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date** 04/03/08	**Calc. No.** 0100F-CA-V0353	**Rev. No.**	0
Project	100-F Field Remediation	**Job No.** 14655	**Checked** H. M. Sulloway	**Date**	04/03/08
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation			**Sheet No.**	1 of 17

Summary

Purpose:

Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the shallow zone excavation of the subject site. Also, perform the Washington Administrative Code (WAC) 173-340-740(7)(e) 3-part test for nonradionuclide contaminants of concern (COCs) and contaminants of potential concern (COPCs) and calculate the relative percent difference (RPD) for primary-duplicate sample pairs, as necessary.

Table of Contents:

Sheets 1 to 4 - Summary
Sheets 5 to 6 - Excavation Shallow Zone Statistical Calculations
Sheets 7 to 8 - Overburden Statistical Calculations
Sheet 9 to 12 - Ecology Software (MTCAStat) Results (Excavation Shallow Zone)
Sheet 13 to 16 - Ecology Software (MTCAStat) Results (Overburden)
Sheet 17 - Split/Duplicate Analysis (Excavation Shallow Zone)
Attachment 1 - Verification Sampling Results (21 sheets)

Given/References:

1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are from DOE-RL (1996), DOE-RL (2001), DOE-RL (2005b) and Ecology (2005).
3) 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.
4) 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.
5) Ecology, 1992, Statistical Guidance for Ecology Site Managers, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
6) 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.
7) Ecology, 2005, Cleanup Levels and Risk Calculations (CLARC) Database, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
8) 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.
9) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.
10) WCH, 2008, *Work Instruction for Verification Sampling of 100-F-26:9, 1607-F2 Sanitary Sewer Pipelines*, 0100F-WI-G0067, Rev. 0. Washington Closure Hanford, Inc., Richland, Washington.

Solution:

Calculation methodology is described in Ecology publication #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2005b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for primary-duplicate sample pairs, 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.

This calculation only pertains to the excavation shallow zone (SZ) and oveburden (OB) sample locations (and four samples located at the center of four overburden stockpiles). Refer to section 5.2.2 of the work instruction (WCH 2008) for additional discussion of the overburden sample design. Three other sample types were collected as grab samples and were not statistically derived. The sample types were: focused samples taken within the shallow zone excavation (FS and RC) and the overburden used to provide backfill material (FB). These results are contained in the attachment and will be evalualated using direct comparison of the maximum values against the RAGs.

CALCULATION SHEET

Washington Closure Hanford

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Summary (continued)

UCL 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.

Calculated cleanup levels are not available in Ecology (2005) under WAC 173-340-740(3) for:

aluminum, calcium, iron, magnesium, potassium, silicon, and sodium;

therefore, these constituents are not considered site COPCs and are also not included in these tables.

The 95% UCL values were not calculated for radium-226, radium-228, thorium-228, thorium-232, and potassium-40, as these isotopes are excluded from consideration as COCs based on natural occurrence and analogous site information.

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

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

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

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

The RPD values are evaluated for analytes detected in a primary-duplicate or primary-split sample pair for the purposes of data quality assessment within the CVP. The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The 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 1994b). If the RPD is greater than 30% (or 35% for regulatory split data), further investigation regarding the usability of the data is performed. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceed a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

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Washington Closure Hanford

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Summary (continued)

Methodology (continued):

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

Results:

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

Sample J16947 (OB-1) had TPH concentration in excess of the RAG. The entire pile associated with this sample was removed, so the data is not used in the UCL calculation. As a result, the sample numbers for the overburden stockpile are sequenced OB-2 through OB-14.

Results Summary[a]

Analyte	Excavation Shallow Zone[b]	Overburden[b]	Focused Samples[c]	Units
Cesium-137	--	0.031	0.289	pCi/g
Antimony	--	1.0	1.6	mg/kg
Arsenic	2.6	2.8	2.7	mg/kg
Barium	109	170	329	mg/kg
Beryllium	0.27	0.29	0.39	mg/kg
Boron	8.4	25.7	28.6	mg/kg
Cadmium	0.20	--	0.23	mg/kg
Chromium	9.1	8.5	9.0	mg/kg
Hexavalent Chromium	0.38	0.27	0.36	mg/kg
Cobalt	6.3	6.3	6.2	mg/kg
Copper	14.5	17.5	26.5	mg/kg
Lead	6.0	7.3	16.9	mg/kg
Manganese	288	279	274	mg/kg
Mercury	0.27	0.10	0.04	mg/kg
Molybdenum	--	1.3	1.1	mg/kg
Nickel	10.1	10.6	9.5	mg/kg
Selenium	--	--	1.3	mg/kg
Silver	--	--	1.2	mg/kg
Vanadium	42.8	39.8	42.3	mg/kg
Zinc	44.2	44.2	77.6	mg/kg
Aroclor-1254	19	--	92	ug/kg
Aroclor-1260	17	180	60	ug/kg
Anthracene	26	22	20	ug/kg
Benzo(a)anthracene	130	100	90	ug/kg
Benzo(a)pyrene	120	110	--	ug/kg
Benzo(b)fluoranthene	96	89	49	ug/kg
Benzo(ghi)perylene	87	70	67	ug/kg
Benzo(k)fluoranthene	101	97	68	ug/kg
Bis(2-ethylhexyl) phthalate	66	295	450	ug/kg
Chrysene	159	140	120	ug/kg
Dibenz(a,h)anthracene	36	22	--	ug/kg
Fluoranthene	287	220	130	ug/kg
Indeno(1,2,3-cd)pyrene	74	71	47	ug/kg
Naphthalene	--	18	23	ug/kg
Phenanthrene	145	110	140	ug/kg
Pyrene	268	260	310	ug/kg

[a]No detections were reported in any data set for COCs/COPCs not listed in this table.

[b]Maximum or 95% UCL result, depending on data censorship, as described in the calculation methodology.

[c]Focused samples include non-statistically derived sample locations that were placed near road crossings. They also inlcude samples taken from overburden stockpiles that were used as backfill for the road crossings. The maximum value for each analyte is shown.

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Summary (continued)

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

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

All data sets evaluated meet the 3-part test criteria when compared to the most stringent cleanup limit.

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

95% UCL > Cleanup Limit? YES
> 10% above Cleanup Limit? YES
Any sample > 2x Cleanup Limit? YES

Because of the "yes" answers to the WAC 173-340 3-part test for barium and lead, additional evaluation of attainment of cleanup criteria will be performed.

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

Analyte	Excavation Duplicate Analysis
Potassium-40	53%
Aluminum	9%
Barium	46%
Calcium	25%
Chromium	36%
Copper	62%
Iron	13%
Magnesium	12%
Manganese	1%
Vanadium	20%
Zinc	38%

[a]Relative percent difference evaluation was not required for analytes not included in this table.
[b]The significance of relative percent difference values are discussed within the RSVP for the subject site.

BCL = below cleanup level
CLARC = Cleanup Levels and Risk Calculations
COC = contaminant of concern
COPC = contaminant of potential concern
DE = direct exposure
GEA = gamma energy analysis
QA/QC = quality assurance/quality control
MDA = minimum detectable activity
RAG = remedial action goal
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = Sampling and Analysis Plan
TDL = target detection limit
U = undetected
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel
Project 100-F Field Remediation
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation

Date 04/03/08
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Checked H. M. Sulloway

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100-F-26:9 Excavation Shallow Zone Statistical Calculations

Verification Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Arsenic Q	Arsenic PQL	Barium mg/kg	Barium Q	Barium PQL	Beryllium mg/kg	Beryllium Q	Beryllium PQL	Boron mg/kg	Boron Q	Boron PQL	Chromium mg/kg	Chromium Q	Chromium PQL	Cobalt mg/kg	Cobalt Q	Cobalt PQL	Copper mg/kg	Copper Q	Copper PQL
SZ-10	J16943	2/14/08	2.1		1.4	73.6		0.28	0.25		0.14	3.6		1.4	8.7		0.57	6.3		0.57	9.0		0.57
Dup. of SZ-10	J16944	2/14/08	3.0		1.5	117		0.30	0.28		0.15	4.2		1.5	12.5		0.61	7.1		0.61	17.0		0.61
SZ-1	J16934	2/14/08	3.3		1.3	62.5		0.25	0.23		0.13	2.4		1.3	8.3		0.51	5.5		0.51	14.1		0.51
SZ-2	J16935	2/14/08	2.7		1.3	56.1		0.26	0.22		0.13	2.6		1.3	9.2		0.52	5.8		0.52	15.7		0.52
SZ-3	J16936	2/14/08	2.2		1.4	64.7		0.27	0.21		0.14	3.1		1.4	7.0		0.54	5.5		0.54	12.4		0.54
SZ-4	J16937	2/14/08	2.5		1.5	63.0		0.30	0.20		0.15	2.9		1.5	9.7		0.59	4.6		0.59	16.0		0.59
SZ-5	J16938	2/14/08	1.8		1.2	41.6		0.23	0.17		0.12	1.2	U	1.2	7.3		0.47	4.6		0.47	11.1		0.47
SZ-6	J16939	2/14/08	1.5	U	1.5	91.9		0.30	0.26		0.15	6.2		1.5	6.7		0.61	6.0		0.61	11.3		0.61
SZ-7	J16940	2/14/08	1.7		1.4	56.2		0.28	0.27		0.14	1.8		1.4	7.6		0.56	6.7		0.56	11.3		0.56
SZ-8	J16941	2/14/08	2.3		1.3	59.1		0.26	0.25		0.13	1.9		1.3	7.7		0.52	6.7		0.52	10.6		0.52
SZ-9	J16942	2/14/08	2.1		1.4	226		0.28	0.34		0.14	23.7		1.4	8.7		0.56	6.2		0.56	15.5		0.56

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Chromium mg/kg	Cobalt mg/kg	Copper mg/kg
SZ-10	J16943/J16944	2/14/08	2.6	95	0.27	3.9	10.6	6.7	13.0
SZ-1	J16934	2/14/08	3.3	62.5	0.23	2.4	8.3	5.5	14.1
SZ-2	J16935	2/14/08	2.7	56.1	0.22	2.6	9.2	5.8	15.7
SZ-3	J16936	2/14/08	2.2	64.7	0.21	3.1	7.0	5.5	12.4
SZ-4	J16937	2/14/08	2.5	63.0	0.20	2.9	9.7	4.6	16.0
SZ-5	J16938	2/14/08	1.8	41.6	0.17	0.60	7.3	4.6	11.1
SZ-6	J16939	2/14/08	0.8	91.9	0.26	6.2	6.7	6.0	11.3
SZ-7	J16940	2/14/08	1.7	56.2	0.27	1.8	7.6	6.7	11.3
SZ-8	J16941	2/14/08	2.3	59.1	0.25	1.9	7.7	6.7	10.6
SZ-9	J16942	2/14/08	2.1	226	0.34	23.7	8.7	6.2	15.5

Statistical Computations

	Arsenic	Barium	Beryllium	Boron	Chromium	Cobalt	Copper
95% UCL based on	Large data set (n ≥10), use MTCAStat normal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat normal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.
N	10	10	10	10	10	10	10
% < Detection limit	10%	0%	0%	10%	0%	0%	0%
Mean	2.2	81.6	0.24	4.9	8.3	5.8	13.1
Standard deviation	0.68	53.3	0.05	6.8	1.3	0.79	2.1
95% UCL on mean	2.6	109	0.27	8.4	9.1	6.3	14.5
Maximum detected value	3.3	226	0.34	23.7	12.5	7.1	17.0
Final Statistical Value (nonRad)	2.6	109	0.27	8.4	9.1	6.3	14.5
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)	20 DE & GW & River Protection	132 GW Protection	1.51 GW & River Protection	320 GW Protection	18.5 GW & River Protection	32 GW Protection	22.0 River Protection
WAC 173-340 3-PART TEST							
95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
WAC 173-340 Compliance? Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0353
Checked H. M. Sulloway HMS

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Date 04/03/08
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1 **100-F-26:9 Excavation Shallow Zone Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Lead			Manganese			Mercury			Nickel			Vanadium			Zinc			Bis(2-ethylhexyl) phthalate		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
5	SZ-10	J16943	2/14/08	4.4		0.85	317		0.11	0.01		0.01	9.5		0.57	37.4		0.4	37.2		1.7	38.0	JB	390
6	Dup. of SZ-10	J16944	2/14/08	4.9		0.91	321		0.12	0.34		0.01	10.7		0.61	45.7		0.4	54.4		1.8	32.0	JB	390
7	SZ-1	J16934	2/14/08	6.1		0.76	239		0.10	0.04		0.01	9.0		0.51	38.0		0.4	42.9		1.5	31.0	JB	350
8	SZ-2	J16935	2/14/08	7.0		0.78	248		0.10	0.02		0.01	9.9		0.52	37.9		0.4	49.3		1.6	26.0	JB	340
9	SZ-3	J16936	2/14/08	5.5		0.81	242		0.11	0.02		0.01	9.0		0.54	37.4		0.4	41.2		1.6	149	JB	350
10	SZ-4	J16937	2/14/08	6.6		0.89	201		0.12	0.15		0.01	9.2		0.59	32.6		0.4	45.7		1.8	39.0	JB	370
11	SZ-5	J16938	2/14/08	3.5		0.70	208		0.09	0.03		0.01	8.8		0.47	29.2		0.3	28.9		1.4	31.0	JB	350
12	SZ-6	J16939	2/14/08	3.8		0.91	242		0.12	0.01	U	0.01	8.7		0.61	39.9		0.4	34.6		1.8	62.0	JB	360
13	SZ-7	J16940	2/14/08	4.0		0.84	284		0.11	0.01	U	0.01	10.6		0.56	48.1		0.4	36.9		1.7	36.0	JB	350
14	SZ-8	J16941	2/14/08	3.0		0.77	277		0.10	0.01	U	0.01	9.9		0.52	47.5		0.4	36.3		1.5	36.0	JB	360
15	SZ-9	J16942	2/14/08	5.6		0.85	335		0.11	0.02		0.01	10.9		0.56	37.5		0.4	38.0		1.7	23.0	JB	360

16 **Statistical Computation Input Data**

17	Sample	Sample	Sample	Lead	Manganese	Mercury	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
18	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
19	SZ-10	J16943/J16944	2/14/08	4.7	319	0.18	10.1	41.6	45.8	35.0
20	SZ-1	J16934	2/14/08	6.1	239	0.04	9.0	38.0	42.9	31.0
21	SZ-2	J16935	2/14/08	7.0	248	0.02	9.9	37.9	49.3	26.0
22	SZ-3	J16936	2/14/08	5.5	242	0.02	9.0	37.4	41.2	149
23	SZ-4	J16937	2/14/08	6.6	201	0.15	9.2	32.6	45.7	39.0
24	SZ-5	J16938	2/14/08	3.5	208	0.03	8.8	29.2	28.9	31.0
25	SZ-6	J16939	2/14/08	3.8	242	0.01	8.7	39.9	34.6	62.0
26	SZ-7	J16940	2/14/08	4.0	284	0.01	10.6	48.1	36.9	36.0
27	SZ-8	J16941	2/14/08	3.0	277	0.005	9.9	47.5	36.3	36.0
28	SZ-9	J16942	2/14/08	5.6	335	0.02	10.9	37.5	38.0	23.0

29 **Statistical Computations**

30		Lead	Manganese	Mercury	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
31	95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.
32	N	10	10	10	10	10	10	10
33	% < Detection limit	0%	0%	30%	0%	0%	0%	0%
34	Mean	5.0	260	0.05	9.6	39.0	40.0	46.8
35	Standard deviation	1.4	44.0	0.06	0.8	5.8	6.2	37.4
36	95% UCL on mean	6.0	288	0.27	10.1	42.8	44.2	66.3
37	Maximum detected value	7.0	335	0.34	10.9	48.1	54.4	149
38	Final Statistical Value	6.0	288	0.27	10.1	42.8	44.2	66.3
39	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	10.2 GW & River Protection	512 GW & River Protection	0.33 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	360 River Protection
40	**WAC 173-340 3-PART TEST**							
41	95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
42	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
43	Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
44	**WAC 173-340 Compliance? Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0353
Checked H. M. Sulloway HMS

Rev. No. 0
Date 04/03/08
Sheet No. 7 of 17

100-F-26:9 Overburden Statistical Calculations

Verification Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Q	MDA	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Boron mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Hexavalent Chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL
OB-2	J16948	2/6/08	0.066	U	0.066	2.3		1.7	69.3	C	0.33	0.24		0.17	3.3		1.7	6.2		0.67	0.53		0.26	5.4		0.67
OB-3	J16949	2/6/08	0.024	U	0.024	2.0		1.5	107	C	0.31	0.25		0.15	5.1		1.5	5.9		0.61	0.24	U	0.24	4.8		0.61
OB-4	J16950	2/6/08	0.034	U	0.034	2.2		1.6	53.3	C	0.32	0.19		0.16	1.6	U	1.6	5.3		0.63	0.23	U	0.23	5.2		0.63
OB-5	J16951	2/11/08	0.038	U	0.038	2.2		1.5	73.6		0.31	0.20		0.15	2.7		1.5	8.0		0.62	0.21	U	0.21	6.1		0.62
OB-6	J16952	2/11/08	0.030	U	0.030	2.9		1.4	86.9		0.28	0.29		0.14	4.8		1.4	8.5		0.57	0.25		0.22	6.6		0.57
OB-7	J16953	2/11/08	0.040	U	0.040	2.9		1.4	52.9		0.29	0.23		0.14	1.4	U	1.4	9.0		0.58	0.24		0.21	5.7		0.58
OB-8	J16954	2/11/08	0.024	U	0.024	1.4	U	1.4	54.6		0.29	0.23		0.14	1.4	U	1.4	8.9		0.58	0.28		0.21	5.5		0.58
OB-9	J16955	2/11/08	0.038	U	0.038	3.5		1.5	66.4		0.31	0.28		0.15	1.8		1.5	7.9		0.62	0.28		0.22	6.6		0.62
OB-10	J16956	2/11/08	0.074		0.038	4.2		1.5	520		0.30	0.61		0.15	48.5		1.5	10.6		0.59	0.22	U	0.22	7.3		0.59
OB-11	J16957	2/11/08	0.036	U	0.036	1.5	U	1.5	53.5		0.29	0.15	U	0.15	1.5	U	1.5	7.1		0.58	0.26		0.21	5.9		0.58
OB-12	J16958	2/11/08	0.028	U	0.028	2.2		1.6	80.7		32.00	0.16	U	0.16	8.0		1.6	6.7		0.63	0.21	U	0.21	6.3		0.63
OB-13	J16959	2/11/08	0.032	U	0.032	1.7		1.6	54.7		0.32	0.16	U	0.16	1.6	U	1.6	6.5		0.64	0.29		0.22	5.5		0.64
OB-14	J16960	2/11/08	0.033		0.022	2.8		1.4	184		0.28	0.20		0.14	14.3		1.4	8.7		0.55	0.22	U	0.22	6.4		0.55

Statistical Computation Input Data

Sample Area	Sample Number	Sample Date	Cesium-137 pCi/g	Arsenic mg/kg	Barium mg/kg	Beryllium mg/kg	Boron mg/kg	Chromium mg/kg	Hexavalent Chromium mg/kg	Cobalt mg/kg
OB-2	J16948	2/6/08	0.033	2.3	69.3	0.24	3.3	6.2	0.53	5.4
OB-3	J16949	2/6/08	0.012	2.0	107	0.25	5.1	5.9	0.12	4.8
OB-4	J16950	2/6/08	0.017	2.2	53.3	0.19	0.80	5.3	0.12	5.2
OB-5	J16951	2/11/08	0.019	2.2	73.6	0.20	2.7	8.0	0.11	6.1
OB-6	J16952	2/11/08	0.015	2.9	86.9	0.29	4.8	8.5	0.25	6.6
OB-7	J16953	2/11/08	0.020	2.9	52.9	0.23	0.70	9.0	0.24	5.7
OB-8	J16954	2/11/08	0.012	0.70	54.6	0.23	0.70	8.9	0.28	5.5
OB-9	J16955	2/11/08	0.019	3.5	66.4	0.28	1.8	7.9	0.28	6.6
OB-10	J16956	2/11/08	0.074	4.2	520	0.61	48.5	10.6	0.11	7.3
OB-11	J16957	2/11/08	0.018	0.75	53.5	0.08	0.75	7.1	0.26	5.9
OB-12	J16958	2/11/08	0.014	2.2	80.7	0.08	8.0	6.7	0.11	6.3
OB-13	J16959	2/11/08	0.016	1.7	54.7	0.08	0.80	6.5	0.29	5.5
OB-14	J16960	2/11/08	0.033	2.8	184	0.20	14.3	8.7	0.11	6.4

Statistical Computations

	Cesium-137	Arsenic	Barium	Beryllium	Boron	Chromium	Hexavalent Chromium	Cobalt
95% UCL based on	Radionuclide data set. Use nonparametric z-statistic.	Large data set (n ≥10), use MTCAStat normal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.
N	13	13	13	13	13	13	13	13
% < Detection limit	85%	15%	0%	23%	38%	0%	46%	0%
Mean	0.023	2.3	112	0.23	7.1	7.6	0.22	5.9
Standard deviation	0.017	0.98	128	0.14	13.0	1.5	0.12	0.69
95% UCL on mean	0.031	2.8	170	0.29	25.7	8.5	0.27	6.3
Maximum detected value (nonRad)	NA	4.2	520	0.61	48.5	10.6	0.53	7.3
Final Statistical Value (nonRad)	NA	2.8	170	0.29	25.7	8.5	0.27	6.3
Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)		20 DE & GW & River Protection	132 GW Protection	1.51 GW & River Protection	320 GW Protection	18.5 GW & River Protection	2 River Protection	32 GW Protection
WAC 173-340 3-PART TEST								
95% UCL > Cleanup Limit?		NO	YES	NO	NO	NO	NO	NO
> 10% above Cleanup Limit?		NO	YES	NO	NO	NO	NO	NO
Any sample > 2X Cleanup Limit?		NO	YES	NO	NO	NO	NO	NO
WAC 173-340 Compliance? **No**		Yes	A detailed assessment using RESRAD will be performed for Barium. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.	Yes	Yes	Yes	Yes	Yes

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation

Date 04/03/08
Job No. 14655

Calc. No. 0100F-CA-V0353
Checked H. M. Sulloway HMS

Rev. No. 0
Date 04/03/08
Sheet No. 8 of 17

1 **100-F-26:9 Overburden Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Copper			Lead			Manganese			Nickel			Vanadium			Zinc			Bis(2-ethylhexyl) phthalate		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
5	OB-2	J16948	2/6/08	20.9	C	0.67	2.6		1.0	230	C	0.13	8.4		0.67	35.2		0.47	31.0		2.0	42.0	JB	440
6	OB-3	J16949	2/6/08	14.2	C	0.61	4.4		0.92	246	C	0.12	8.5		0.61	21.3		0.43	28.0		1.8	65.0	JB	410
7	OB-4	J16950	2/6/08	13.0	C	0.63	2.5		0.95	229	C	0.13	7.9		0.63	30.0		0.44	28.0		1.9	82.0	JB	390
8	OB-5	J16951	2/11/08	19.9	C	0.62	4.0		0.93	273	C	0.12	9.6		0.62	37.7		0.43	35.5		1.9	490	JB	2900
9	OB-6	J16952	2/11/08	13.2	C	0.57	4.4		0.85	302	C	0.11	10.0		0.57	40.3		0.40	37.6		1.7	240	JB	360
10	OB-7	J16953	2/11/08	14.3	C	0.58	7.4		0.87	253	C	0.12	10.5		0.58	33.9		0.40	73.9		1.7	140	JB	350
11	OB-8	J16954	2/11/08	15.0	C	0.58	8.5		0.87	261	C	0.12	10.8		0.58	36.4		0.40	42.7		1.7	140	JB	360
12	OB-9	J16955	2/11/08	12.2	C	0.62	3.8		0.93	296	C	0.12	10.0		0.62	41.2		0.43	36.8		1.9	130	JB	370
13	OB-10	J16956	2/11/08	22.3	C	0.59	11.7		0.89	290	C	0.12	14.7		0.56	44.7		0.41	47.9		1.8	220	JB	370
14	OB-11	J16957	2/11/08	10.4	C	0.58	5.0		0.87	253	C	0.12	8.7		0.58	40.6		0.41	34.2		1.7	110	JB	350
15	OB-12	J16958	2/11/08	13.3	C	0.63	2.8		0.95	245	C	0.13	9.1		0.63	44.2		0.44	33.3		1.9	110	JB	110
16	OB-13	J16959	2/11/08	10.5	C	0.64	3.4		0.96	252	C	0.13	8.0		0.64	37.9		0.45	33.3		1.9	260	JB	370
17	OB-14	J16960	2/11/08	18.8	C	0.55	8.8		0.83	310	C	0.11	10.6		0.55	37.5		0.39	40.8		1.7	330	JB	360

18 **Statistical Computation Input Data**

19	Sample	Sample	Sample	Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
20	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
21	OB-2	J16948	2/6/08	20.9	2.6	230	8.4	35.2	31.0	42.0
22	OB-3	J16949	2/6/08	14.2	4.4	246	8.5	21.3	28.0	65.0
23	OB-4	J16950	2/6/08	13.0	2.5	229	7.9	30.0	28.0	82.0
24	OB-5	J16951	2/11/08	19.9	4.0	273	9.6	37.7	35.5	490
25	OB-6	J16952	2/11/08	13.2	4.4	302	10.0	40.3	37.6	240
26	OB-7	J16953	2/11/08	14.3	7.4	253	10.5	33.9	73.9	140
27	OB-8	J16954	2/11/08	15.0	8.5	261	10.8	36.4	42.7	140
28	OB-9	J16955	2/11/08	12.2	3.8	296	10.0	41.2	36.8	130
29	OB-10	J16956	2/11/08	22.3	11.7	290	14.7	44.7	47.9	220
30	OB-11	J16957	2/11/08	10.4	5.0	253	8.7	40.6	34.2	110
31	OB-12	J16958	2/11/08	13.3	2.8	245	9.1	44.2	33.3	110
32	OB-13	J16959	2/11/08	10.5	3.4	252	8.0	37.9	33.3	260
33	OB-14	J16960	2/11/08	18.8	8.8	310	10.6	37.5	40.8	330

34 **Statistical Computations**

35		Copper	Lead	Manganese	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
36	95% UCL based on	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), 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.
37	N	13	13	13	13	13	13	13
38	% < Detection limit	0%	0%	0%	0%	0%	0%	0%
39	Mean	15.2	5.3	265	9.8	37.0	38.7	181
40	Standard deviation	3.9	2.9	27.1	1.8	6.2	12.0	125
41	95% UCL on mean	17.5	7.3	279	10.6	39.8	44.2	295
42	Maximum detected value	22.3	11.7	310	14.7	44.7	73.9	490
43	Final Statistical Value	17.5	7.3	279	10.6	39.8	44.2	295
44	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	22.0 River Protection	10.2 GW & River Protection	512 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	360 River Protection
45	**WAC 173-340 3-PART TEST**							
46	95% UCL > Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
47	> 10% above Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
48	Any sample > 2X Cleanup Limit?	NO	NO	NO	NO	NO	NO	NO
49	**WAC 173-340 Compliance? Yes**	Yes	Yes	Yes	Yes	Yes	Yes	Yes

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel	**Date** 04/03/08	**Calc. No.** 0100F-CA-V0353	**Rev. No.** 0
Project 100-F Field Remediation	**Job No.** 14655	**Checked** H. M. Sulloway	**Date** 04/03/08
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation			**Sheet No.** 9 of 17

Ecology Software (MTCAStat) - Excavation Shallow Zone Results

95% UCL Calculation

Arsenic

DATA	ID				
2.6	J16943/J16944	Number of samples		Uncensored values	
3.3	J16934	Uncensored	10	Mean	2.2
2.7	J16935	Censored		Lognormal mean	2.2
2.2	J16936	Detection limit or PQL		Std. devn.	0.68
2.5	J16937	Method detection limit		Median	2.3
1.8	J16938	TOTAL	10	Min.	0.75
0.75	J16939			Max.	3.3
1.7	J16940				
2.3	J16941				
2.1	J16942				

Lognormal distribution? r-squared is: 0.797 Normal distribution? r-squared is: 0.937

Recommendations:

Use normal distribution.

UCL (based on t-statistic) is 2.6

95% UCL Calculation

Barium

DATA	ID				
95.3	J16943/J16944	Number of samples		Uncensored values	
62.5	J16934	Uncensored	10	Mean	81.6
56.1	J16935	Censored		Lognormal mean	80.6
64.7	J16936	Detection limit or PQL		Std. devn.	53.3
63.0	J16937	Method detection limit		Median	62.8
41.6	J16938	TOTAL	10	Min.	41.6
91.9	J16939			Max.	226
56.2	J16940				
59.1	J16941				
226	J16942				

Lognormal distribution? r-squared is: 0.788 Normal distribution? r-squared is: 0.603

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 109

95% UCL Calculation

Beryllium

DATA	ID				
0.27	J16943/J16944	Number of samples		Uncensored values	
0.23	J16934	Uncensored	10	Mean	0.24
0.22	J16935	Censored		Lognormal mean	0.24
0.21	J16936	Detection limit or PQL		Std. devn.	0.05
0.20	J16937	Method detection limit		Median	0.24
0.17	J16938	TOTAL	10	Min.	0.17
0.26	J16939			Max.	0.34
0.27	J16940				
0.25	J16941				
0.34	J16942				

Lognormal distribution? r-squared is: 0.968 Normal distribution? r-squared is: 0.943

Recommendations:

Use lognormal distribution.

UCL (Land's method) is 0.27

95% UCL Calculation

Boron

DATA	ID				
3.9	J16943/J16944	Number of samples		Uncensored values	
2.4	J16934	Uncensored	10	Mean	4.9
2.6	J16935	Censored		Lognormal mean	4.7
3.1	J16936	Detection limit or PQL		Std. devn.	6.8
2.9	J16937	Method detection limit		Median	2.8
0.60	J16938	TOTAL	10	Min.	0.60
6.2	J16939			Max.	23.7
1.8	J16940				
1.9	J16941				
23.7	J16942				

Lognormal distribution? r-squared is: 0.885 Normal distribution? r-squared is: 0.531

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 8.4

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	04/03/08	**Calc. No.**	0100F-CA-V0353
Project	100-F Field Remediation	**Job No.**	14655	**Checked**	H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation				

Rev. No. 0
Date 04/03/08
Sheet No. 10 of 17

Ecology Software (MTCAStat) - Excavation Shallow Zone Results

95% UCL Calculation

Chromium

DATA	ID
10.6	J16943/J16944
8.3	J16934
9.2	J16935
7.0	J16936
9.7	J16937
7.3	J16938
6.7	J16939
7.6	J16940
7.7	J16941
8.7	J16942

Number of samples		Uncensored values	
Uncensored	10	Mean	8.3
Censored		Lognormal mean	8.3
Detection limit or PQL		Std. devn.	1.3
Method detection limit		Median	8.0
TOTAL	10	Min.	6.7
		Max.	10.6

Lognormal distribution? r-squared is: 0.977
Normal distribution? r-squared is: 0.961
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 9.1

95% UCL Calculation

Cobalt

DATA	ID
6.7	J16943/J16944
5.5	J16934
5.8	J16935
5.5	J16936
4.6	J16937
4.6	J16938
6.0	J16939
6.7	J16940
6.7	J16941
6.2	J16942

Number of samples		Uncensored values	
Uncensored	10	Mean	5.83
Censored		Lognormal mean	5.84
Detection limit or PQL		Std. devn.	0.79
Method detection limit		Median	5.90
TOTAL	10	Min.	4.60
		Max.	6.7

Lognormal distribution? r-squared is: 0.897
Normal distribution? r-squared is: 0.913
Recommendations:

Use normal distribution.

UCL (based on t-statistic) is 6.3

95% UCL Calculation

Copper

DATA	ID
13.0	J16943/J16944
14.1	J16934
15.7	J16935
12.4	J16936
16.0	J16937
11.1	J16938
11.3	J16939
11.3	J16940
10.6	J16941
15.5	J16942

Number of samples		Uncensored values	
Uncensored	10	Mean	13.1
Censored		Lognormal mean	13.1
Detection limit or PQL		Std. devn.	2.09
Method detection limit		Median	12.7
TOTAL	10	Min.	10.6
		Max.	16.0

Lognormal distribution? r-squared is: 0.918
Normal distribution? r-squared is: 0.909
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 14.5

95% UCL Calculation

Lead

DATA	ID
4.7	J16943/J16944
6.1	J16934
7.0	J16935
5.5	J16936
6.6	J16937
3.5	J16938
3.8	J16939
4.0	J16940
3.0	J16941
5.6	J16942

Number of samples		Uncensored values	
Uncensored	10	Mean	5.0
Censored		Lognormal mean	5.0
Detection limit or PQL		Std. devn.	1.4
Method detection limit		Median	5.1
TOTAL	10	Min.	3.0
		Max.	7.0

Lognormal distribution? r-squared is: 0.963
Normal distribution? r-squared is: 0.967
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 6.0

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	Date 04/03/08	Calc. No. 0100F-CA-V0353
Project	100-F Field Remediation	Job No. 14655	Checked H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation		

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Ecology Software (MTCAStat) - Excavation Shallow Zone Results

95% UCL Calculation

DATA	ID	Manganese			
319	J15P15/J15P16	Number of samples		Uncensored values	
239	J15P09	Uncensored	10	Mean	260
248	J15P10	Censored		Lognormal mean	260
242	J15P11	Detection limit or PQL		Std. devn.	44.0
201	J15P12	Method detection limit		Median	245
208	J15P13	TOTAL	10	Min.	201
242	J15P14			Max.	335
284	J15P17				
277	J15P18				
335	J15P19				

Lognormal distribution? r-squared is: 0.959
Normal distribution? r-squared is: 0.945
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 288

95% UCL Calculation

DATA	ID	Nickel			
10.1	J15P15/J15P16	Number of samples		Uncensored values	
9.0	J15P09	Uncensored	10	Mean	9.6
9.9	J15P10	Censored		Lognormal mean	9.6
9.0	J15P11	Detection limit or PQL		Std. devn.	0.78
9.2	J15P12	Method detection limit		Median	9.6
8.8	J15P13	TOTAL	10	Min.	8.7
8.7	J15P14			Max.	10.9
10.6	J15P17				
9.9	J15P18				
10.9	J15P19				

Lognormal distribution? r-squared is: 0.934
Normal distribution? r-squared is: 0.929
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 10.1

95% UCL Calculation

DATA	ID	Vanadium			
41.6	J15P15/J15P16	Number of samples		Uncensored values	
38.0	J15P09	Uncensored	10	Mean	39.0
37.9	J15P10	Censored		Lognormal mean	39.0
37.4	J15P11	Detection limit or PQL		Std. devn.	5.8
32.6	J15P12	Method detection limit		Median	38.0
29.2	J15P13	TOTAL	10	Min.	29.2
39.9	J15P14			Max.	48.1
48.1	J15P17				
47.5	J15P18				
37.5	J15P19				

Lognormal distribution? r-squared is: 0.936
Normal distribution? r-squared is: 0.936
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 42.8

95% UCL Calculation

DATA	ID	Zinc			
45.8	J15P15/J15P16	Number of samples		Uncensored values	
42.9	J15P09	Uncensored	10	Mean	40.0
49.3	J15P10	Censored		Lognormal mean	40.0
41.2	J15P11	Detection limit or PQL		Std. devn.	6.2
45.7	J15P12	Method detection limit		Median	39.6
28.9	J15P13	TOTAL	10	Min.	28.9
34.6	J15P14			Max.	49.3
36.9	J15P17				
36.3	J15P18				
38.0	J15P19				

Lognormal distribution? r-squared is: 0.961
Normal distribution? r-squared is: 0.977
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 44.2

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	Date	04/03/08	Calc. No.	0100F-CA-V0353
Project	100-F Field Remediation	Job No.	14655	Checked	H. M. Sulloway
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Ecology Software (MTCAStat) - Excavation Shallow Zone Results

95% UCL Calculation
Bis(2-ethylhexyl) phthalate

DATA	ID				
35.0	J15P15/J15P16	Number of samples		Uncensored values	
31.0	J15P09	Uncensored	10	Mean	46.8
26.0	J15P10	Censored		Lognormal mean	45.7
149	J15P11	Detection limit or PQL		Std. devn.	37.4
39.0	J15P12	Method detection limit		Median	35.5
31.0	J15P13	TOTAL	10	Min.	23.0
62.0	J15P14			Max.	149
36.0	J15P17				
36.0	J15P18				
23.0	J15P19				

Lognormal distribution? r-squared is: 0.767
Normal distribution? r-squared is: 0.565
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 66.3

95% UCL Calculation
Mercury

DATA	ID				
0.18	J15P15/J15P16	Number of samples		Uncensored values	
0.04	J15P09	Uncensored	10	Mean	0.05
0.02	J15P10	Censored		Lognormal mean	0.05
0.02	J15P11	Detection limit or PQL		Std. devn.	0.06
0.15	J15P12	Method detection limit		Median	0.02
0.03	J15P13	TOTAL	10	Min.	0.005
0.01	J15P14			Max.	0.18
0.01	J15P17				
0.005	J15P18				
0.02	J15P19				

Lognormal distribution? r-squared is: 0.915
Normal distribution? r-squared is: 0.684
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 0.27

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	04/03/08	**Calc. No.**	0100F-CA-V0353
Project	100-F Field Remediation	**Job No.**	14655	**Checked**	H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation				

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Ecology Software (MTCAStat) - Excavation Overburden Results

95% UCL Calculation

Arsenic

DATA	ID
2.3	J16948
2.0	J16949
2.2	J16950
2.2	J16951
2.9	J16952
2.9	J16953
0.70	J16954
3.5	J16955
4.2	J16956
0.75	J16957
2.2	J16958
1.7	J16959
2.8	J16960

Number of samples		Uncensored values	
Uncensored	13	Mean	2.3
Censored		Lognormal mean	2.4
Detection limit or PQL		Std. devn.	0.98
Method detection limit		Median	2.2
TOTAL	13	Min.	0.70
		Max.	4.2

Lognormal distribution?		Normal distribution?	
r-squared is:	0.851	r-squared is:	0.951

Recommendations:

Use normal distribution.

UCL (based on t-statistic) is 2.8

95% UCL Calculation

Barium

DATA	ID
69.3	J16948
107	J16949
53.3	J16950
73.6	J16951
86.9	J16952
52.9	J16953
54.6	J16954
66.4	J16955
520	J16956
53.5	J16957
80.7	J16958
54.7	J16959
184	J16960

Number of samples		Uncensored values	
Uncensored	13	Mean	112
Censored		Lognormal mean	104
Detection limit or PQL		Std. devn.	128
Method detection limit		Median	69.3
TOTAL	13	Min.	52.9
		Max.	520

Lognormal distribution?		Normal distribution?	
r-squared is:	0.718	r-squared is:	0.481

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 170

95% UCL Calculation

Beryllium

DATA	ID
0.24	J16948
0.25	J16949
0.19	J16950
0.20	J16951
0.29	J16952
0.23	J16953
0.23	J16954
0.28	J16955
0.61	J16956
0.08	J16957
0.08	J16958
0.08	J16959
0.20	J16960

Number of samples		Uncensored values	
Uncensored	13	Mean	0.23
Censored		Lognormal mean	0.23
Detection limit or PQL		Std. devn.	0.14
Method detection limit		Median	0.23
TOTAL	13	Min.	0.08
		Max.	0.61

Lognormal distribution?		Normal distribution?	
r-squared is:	0.869	r-squared is:	0.771

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (Land's method) is 0.29

95% UCL Calculation

Boron

DATA	ID
3.3	J16948
5.1	J16949
0.80	J16950
2.7	J16951
4.8	J16952
0.70	J16953
0.70	J16954
1.8	J16955
48.5	J16956
0.75	J16957
8.0	J16958
0.80	J16959
14.3	J16960

Number of samples		Uncensored values	
Uncensored	13	Mean	7.1
Censored		Lognormal mean	6.7
Detection limit or PQL		Std. devn.	13.0
Method detection limit		Median	2.7
TOTAL	13	Min.	0.70
		Max.	48.5

Lognormal distribution?		Normal distribution?	
r-squared is:	0.907	r-squared is:	0.512

Recommendations:

Use lognormal distribution.

UCL (Land's method) is 25.7

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	04/03/08	**Calc. No.**	0100F-CA-V0353
Project	100-F Field Remediation	**Job No.**	14655	**Checked**	H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation				

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Ecology Software (MTCAStat) - Excavation Overburden Results

95% UCL Calculation
Chromium

DATA	ID				
6.2	J16948	Number of samples		Uncensored values	
5.9	J16949	Uncensored	13	Mean	7.6
5.3	J16950	Censored		Lognormal mean	7.7
8.0	J16951	Detection limit or PQL		Std. devn.	1.5
8.5	J16952	Method detection limit		Median	7.9
9.0	J16953	TOTAL	13	Min.	5.3
8.9	J16954			Max.	10.6
7.9	J16955				
10.6	J16956				
7.1	J16957				
6.7	J16958	Lognormal distribution?		Normal distribution?	
6.5	J16959	r-squared is:	0.977	r-squared is:	0.971
8.7	J16960	Recommendations:			

Use lognormal distribution.

UCL (Land's method) is 8.5

95% UCL Calculation
Hexavalent chromium

DATA	ID				
0.53	J16948	Number of samples		Uncensored values	
0.12	J16949	Uncensored	13	Mean	0.22
0.12	J16950	Censored		Lognormal mean	0.22
0.11	J16951	Detection limit or PQL		Std. devn.	0.12
0.25	J16952	Method detection limit		Median	0.24
0.24	J16953	TOTAL	13	Min.	0.11
0.28	J16954			Max.	0.53
0.28	J16955				
0.11	J16956				
0.26	J16957				
0.11	J16958	Lognormal distribution?		Normal distribution?	
0.29	J16959	r-squared is:	0.852	r-squared is:	0.795
0.11	J16960	Recommendations:			

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.27

95% UCL Calculation
Cobalt

DATA	ID				
5.4	J16948	Number of samples		Uncensored values	
4.8	J16949	Uncensored	13	Mean	5.9
5.2	J16950	Censored		Lognormal mean	5.9
6.1	J16951	Detection limit or PQL		Std. devn.	0.69
6.6	J16952	Method detection limit		Median	5.9
5.7	J16953	TOTAL	13	Min.	4.8
5.5	J16954			Max.	7.3
6.6	J16955				
7.3	J16956				
5.9	J16957				
6.3	J16958	Lognormal distribution?		Normal distribution?	
5.5	J16959	r-squared is:	0.984	r-squared is:	0.979
6.4	J16960	Recommendations:			

Use lognormal distribution.

UCL (Land's method) is 6.3

95% UCL Calculation
Copper

DATA	ID				
20.9	J16948	Number of samples		Uncensored values	
14.2	J16949	Uncensored	13	Mean	15.2
13.0	J16950	Censored		Lognormal mean	15.3
19.9	J16951	Detection limit or PQL		Std. devn.	3.9
13.2	J16952	Method detection limit		Median	14.2
14.3	J16953	TOTAL	13	Min.	10.4
15.0	J16954			Max.	22.3
12.2	J16955				
22.3	J16956				
10.4	J16957				
13.3	J16958	Lognormal distribution?		Normal distribution?	
10.5	J16959	r-squared is:	0.941	r-squared is:	0.912
18.8	J16960	Recommendations:			

Use lognormal distribution.

UCL (Land's method) is 17.5

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	04/03/08	**Calc. No.**	0100F-CA-V0353
Project	100-F Field Remediation	**Job No.**	14655	**Checked**	H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation			**Rev. No.**	0
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Ecology Software (MTCAStat) - Excavation Overburden Results

95% UCL Calculation

DATA	ID	**Lead**			
2.6	J16948	Number of samples		Uncensored values	
4.4	J16949	Uncensored	13	Mean	5.3
2.5	J16950	Censored		Lognormal mean	5.4
4.0	J16951	Detection limit or PQL		Std. devn.	2.9
4.4	J16952	Method detection limit		Median	4.4
7.4	J16953	TOTAL	13	Min.	2.5
8.5	J16954			Max.	11.7
3.8	J16955				
11.7	J16956				
5.0	J16957				
2.8	J16958	Lognormal distribution?		Normal distribution?	
3.4	J16959	r-squared is:	0.946	r-squared is:	0.865
8.8	J16960	Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		7.3	

95% UCL Calculation

DATA	ID	**Manganese**			
230	J16948	Number of samples		Uncensored values	
246	J16949	Uncensored	13	Mean	265
229	J16950	Censored		Lognormal mean	265
273	J16951	Detection limit or PQL		Std. devn.	27.1
302	J16952	Method detection limit		Median	253
253	J16953	TOTAL	13	Min.	229
261	J16954			Max.	310
296	J16955				
290	J16956				
253	J16957				
245	J16958	Lognormal distribution?		Normal distribution?	
252	J16959	r-squared is:	0.944	r-squared is:	0.935
310	J16960	Recommendations:			
		Use lognormal distribution.			
		UCL (Land's method) is		279	

95% UCL Calculation

DATA	ID	**Nickel**			
8.4	J16948	Number of samples		Uncensored values	
8.5	J16949	Uncensored	13	Mean	9.8
7.9	J16950	Censored		Lognormal mean	9.8
9.6	J16951	Detection limit or PQL		Std. devn.	1.8
10.0	J16952	Method detection limit		Median	9.6
10.5	J16953	TOTAL	13	Min.	7.9
10.8	J16954			Max.	14.7
10.0	J16955				
14.7	J16956				
8.7	J16957				
9.1	J16958	Lognormal distribution?		Normal distribution?	
8.0	J16959	r-squared is:	0.882	r-squared is:	0.811
10.6	J16960	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is		10.6	

95% UCL Calculation

DATA	ID	**Vanadium**			
35.2	J16948	Number of samples		Uncensored values	
21.3	J16949	Uncensored	13	Mean	37.0
30.0	J16950	Censored		Lognormal mean	37.1
37.7	J16951	Detection limit or PQL		Std. devn.	6.2
40.3	J16952	Method detection limit		Median	37.7
33.9	J16953	TOTAL	13	Min.	21.3
36.4	J16954			Max.	44.7
41.2	J16955				
44.7	J16956				
40.6	J16957				
44.2	J16958	Lognormal distribution?		Normal distribution?	
37.9	J16959	r-squared is:	0.803	r-squared is:	0.887
37.5	J16960	Recommendations:			
		Reject BOTH lognormal and normal distributions.			
		UCL (based on Z-statistic) is		39.8	

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	04/03/08	**Calc. No.**	0100F-CA-V0353
Project	100-F Field Remediation	**Job No.**	14655	**Checked**	H. M. Sulloway
Subject	100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation				

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Ecology Software (MTCAStat) - Excavation Overburden Results

95% UCL Calculation

DATA	ID	Zinc			
31.0	J16948	Number of samples		Uncensored values	
28.0	J16949	Uncensored	13	Mean	38.7
28.0	J16950	Censored		Lognormal mean	38.6
35.5	J16951	Detection limit or PQL		Std. devn.	12.0
37.6	J16952	Method detection limit		Median	35.5
73.9	J16953	TOTAL	13	Min.	28.0
42.7	J16954			Max.	73.9
36.8	J16955				
47.9	J16956				
34.2	J16957				
33.3	J16958	Lognormal distribution?		Normal distribution?	
33.3	J16959	r-squared is:	0.852	r-squared is:	0.726
40.8	J16960	Recommendations:			

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 44.2

95% UCL Calculation

DATA	ID	Bis(2-ethylhexyl) phthalate			
42.0	J16948	Number of samples		Uncensored values	
65.0	J16949	Uncensored	13	Mean	181
82.0	J16950	Censored		Lognormal mean	186
490	J16951	Detection limit or PQL		Std. devn.	125
240	J16952	Method detection limit		Median	140
140	J16953	TOTAL	13	Min.	42.0
140	J16954			Max.	490
130	J16955				
220	J16956				
110	J16957				
110	J16958	Lognormal distribution?		Normal distribution?	
260	J16959	r-squared is:	0.985	r-squared is:	0.872
330	J16960	Recommendations:			

Use lognormal distribution.

UCL (Land's method) is 295

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel **Date** 04/03/08 **Calc. No.** 0100F-CA-V0353 **Rev. No.** 0
Project 100-F Field Remediation **Job No.** 14655 **Checked** H. M. Sulloway **Date** 04/03/08
Subject 100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation **Sheet No.** 17 of 17

Split/Duplicate Analysis, Excavation Shallow Zone

Sample Area	Sample Number	Sample Date	Potassium-40			Radium-226			Radium-228			Thorium-228			Thorium-232			Gross alpha			Gross beta			Aluminum		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	mg/kg	Q	PQL
SZ-10	J16943	2/14/08	13.0		0.274	0.456		0.084	0.740		0.130	0.669		0.052	0.740		0.130	7.0	U	7.7	19.9		9.0	5980		11.3
Dup. of SZ-10	J16944	2/14/08	7.5		0.591	0.403		0.102	0.543		0.209	0.572		0.070	0.543		0.209	10.7		7.8	22.5		8.8	6570		12.1

Analysis:

TDL		0.5	0.1	0.2	1.0	1	10	15	5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference		No - evaluate difference	**Yes (calc RPD)**
	RPD	***53%***							9%
	Difference >2xTDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable

Sample Area	Sample Number	Sample Date	Arsenic			Barium			Beryllium			Boron			Cadmium			Calcium			Chromium			Hexavalent chromium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-10	J16943	2/14/08	2.1		1.4	73.6		0.28	0.25		0.14	3.6		1.4	0.14	U	0.14	3050		11.3	8.7		0.57	0.23	U	0.23
Dup. of SZ-10	J16944	2/14/08	3.0		1.5	117		0.30	0.28		0.15	4.2		1.5	0.16		0.15	3940		12.1	12.5		0.61	0.38		0.23

Analysis:

TDL		10	2	0.5	2	0.5	100	1	0.5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**	No - evaluate difference
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference		**Yes (calc RPD)**	**Yes (calc RPD)**	
	RPD		***46%***				25%	***36%***	
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable

Sample Area	Sample Number	Sample Date	Cobalt			Copper			Iron			Lead			Magnesium			Manganese			Mercury			Nickel		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SZ-10	J16943	2/14/08	6.3		0.57	9.0		0.57	16900		12.7	4.4		0.85	3490		7.1	317		0.11	0.01		0.01	9.5		0.57
Dup. of SZ-10	J16944	2/14/08	7.1		0.61	17.0		0.61	19300		13.6	4.9		0.91	3920		7.6	321		0.12	0.34		0.01	10.7		0.61

Analysis:

TDL		2	1	5	5	75	5	0.2	4
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference
	RPD		***62%***	13%		12%	1%		
	Difference >2xTDL?	No - acceptable	Not applicable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Sample Area	Sample Number	Sample Date	Potassium			Sodium			Vanadium			Zinc			Aroclor-1260			Bis(2-ethylhexyl)		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SZ-10	J16943	2/14/08	1290		11.3	142		1.9	37.4		0.40	37.2		1.7	3.9	J	16	38	JB	390
Dup. of SZ-10	J16944	2/14/08	1160		12.1	172		2.0	45.7		0.42	54.4		1.8	16	U	16	32	JB	390

Analysis:

TDL		400	50	2.5	1	17	330
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	No - evaluate difference
	Both >5xTDL?	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**		
	RPD			20%	***38%***		
	Difference >2xTDL?	No - acceptable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Americium-241 (GEA)			Barium-133			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	pCi/g	Q	MDA
RC-1	J14JT0	2/14/07	0.082	U	0.082				0.094	U	0.094	0.100	U	0.100	0.230	U	0.230	0.350	U	0.350	0.140	U	0.140
RB-1	J14JT1	2/14/07	0.270	U	0.270				0.082	U	0.082	0.093	U	0.093	0.190	U	0.190	0.300	U	0.300	0.200	U	0.200
RB-2	J14JT2	2/14/07	0.098	U	0.098				0.100	U	0.100	0.12	U	0.12	0.260	U	0.260	0.400	U	0.400	0.170	U	0.170
RC-2	J14JT3	2/14/07	0.260	U	0.260				0.071	U	0.071	0.078	U	0.078	0.180	U	0.180	0.240	U	0.240	0.160	U	0.160
RC-3	J14JT4	2/20/07	0.280	U	0.280				0.289		0.10	0.077	U	0.077	0.190	U	0.190	0.270	U	0.270	0.170	U	0.170
RC-4	J13W57	2/21/07	0.110	U	0.110				0.110	U	0.110	0.130	U	0.130	0.280	U	0.280	0.420	U	0.420	0.170	U	0.170
RB-3	J14JT5	2/21/07	0.250	U	0.250				0.078	U	0.078	0.089	U	0.089	0.190	U	0.190	0.310	U	0.310	0.190	U	0.190
OB-1 (a)	J16947	2/6/08	0.106	U	0.106	0.029	U	0.029	0.030	U	0.030	0.031	U	0.031	0.072	U	0.072	0.111	U	0.111	0.085	U	0.085
OB-2	J16948	2/6/08	0.070	U	0.070	0.076	U	0.076	0.066	U	0.066	0.073	U	0.073	0.179	U	0.179	0.214	U	0.214	0.154	U	0.154
OB-3	J16949	2/6/08	0.144	U	0.144	0.025	U	0.025	0.024	U	0.024	0.023	U	0.023	0.063	U	0.063	0.076	U	0.076	0.074	U	0.074
OB-4	J16950	2/6/08	0.045	U	0.045	0.037	U	0.037	0.034	U	0.034	0.037	U	0.037	0.096	U	0.096	0.126	U	0.126	0.074	U	0.074
OB-5	J16951	2/11/08	0.112	U	0.112	0.032	U	0.032	0.038	U	0.038	0.035	U	0.035	0.079	U	0.079	0.122	U	0.122	0.090	U	0.090
OB-6	J16952	2/11/08	0.196	U	0.196	0.039	U	0.039	0.030	U	0.030	0.030	U	0.030	0.077	U	0.077	0.093	U	0.093	0.105	U	0.105
OB-7	J16953	2/11/08	0.048	U	0.048	0.049	U	0.049	0.040	U	0.040	0.041	U	0.041	0.114	U	0.114	0.136	U	0.136	0.091	U	0.091
OB-8	J16954	2/11/08	0.116	U	0.116	0.025	U	0.025	0.024	U	0.024	0.024	U	0.024	0.069	U	0.069	0.078	U	0.078	0.090	U	0.090
OB-9	J16955	2/11/08	0.314	U	0.314	0.040	U	0.040	0.038	U	0.038	0.042	U	0.042	0.105	U	0.105	0.137	U	0.137	0.121	U	0.121
OB-10	J16956	2/11/08	0.114	U	0.114	0.032	U	0.032	0.074		0.038	0.035	U	0.035	0.077	U	0.077	0.107	U	0.107	0.091	U	0.091
OB-11	J16957	2/11/08	0.154	U	0.154	0.032	U	0.032	0.036	U	0.036	0.024	U	0.024	0.065	U	0.065	0.078	U	0.078	0.109	U	0.109
OB-12	J16958	2/11/08	0.036	U	0.036	0.028	U	0.028	0.028	U	0.028	0.028	U	0.028	0.070	U	0.070	0.104	U	0.104	0.085	U	0.085
OB-13	J16959	2/11/08	0.262	U	0.262	0.038	U	0.038	0.032	U	0.032	0.035	U	0.035	0.083	U	0.083	0.130	U	0.130	0.154	U	0.154
OB-14	J16960	2/11/08	0.095	U	0.095	0.022	U	0.022	0.033		0.022	0.020	U	0.020	0.058	U	0.058	0.061	U	0.061	0.073	U	0.073
FS-3	J169W9	2/13/08	0.079	U	0.079	0.078	U	0.078	0.072	U	0.072	0.065	U	0.065	0.170	U	0.170	0.230	U	0.230	0.158	U	0.158
FS-4	J169X0	2/13/08	0.161	U	0.161	0.061	U	0.061	0.057	U	0.057	0.060	U	0.060	0.148	U	0.148	0.193	U	0.193	0.168	U	0.168
FS-5	J169X1	2/13/08	0.190	U	0.190	0.091	U	0.091	0.085	U	0.085	0.090	U	0.090	0.221	U	0.221	0.281	U	0.281	0.192	U	0.192
FS-1	J16945	2/13/08	0.105	U	0.105	0.123	U	0.123	0.123	U	0.123	0.115	U	0.115	0.319	U	0.319	0.354	U	0.354	0.232	U	0.232
FS-2	J16946	2/13/08	0.092	U	0.092	0.063	U	0.063	0.064	U	0.064	0.068	U	0.068	0.162	U	0.162	0.213	U	0.213	0.154	U	0.154
SZ-1	J16934	2/14/08	0.340	U	0.340	0.088	U	0.088	0.084	U	0.084	0.077	U	0.077	0.205	U	0.205	0.330	U	0.330	0.174	U	0.174
SZ-2	J16935	2/14/08	0.140	U	0.140	0.055	U	0.055	0.054	U	0.054	0.050	U	0.050	0.140	U	0.140	0.171	U	0.171	0.145	U	0.145
SZ-3	J16936	2/14/08	0.082	U	0.082	0.080	U	0.080	0.076	U	0.076	0.071	U	0.071	0.170	U	0.170	0.244	U	0.244	0.155	U	0.155
SZ-4	J16937	2/14/08	0.087	U	0.087	0.061	U	0.061	0.065	U	0.065	0.062	U	0.062	0.156	U	0.156	0.164	U	0.164	0.144	U	0.144
SZ-5	J16938	2/14/08	0.091	U	0.091	0.060	U	0.060	0.071	U	0.071	0.063	U	0.063	0.157	U	0.157	0.235	U	0.235	0.151	U	0.151
SZ-6	J16939	2/14/08	0.085	U	0.085	0.090	U	0.090	0.066	U	0.066	0.068	U	0.068	0.194	U	0.194	0.267	U	0.267	0.161	U	0.161
SZ-7	J16940	2/14/08	0.326	U	0.326	0.080	U	0.080	0.073	U	0.073	0.087	U	0.087	0.181	U	0.181	0.251	U	0.251	0.183	U	0.183
SZ-8	J16941	2/14/08	0.168	U	0.168	0.062	U	0.062	0.057	U	0.057	0.053	U	0.053	0.157	U	0.157	0.202	U	0.202	0.166	U	0.166
SZ-9	J16942	2/14/08	0.060	U	0.060	0.066	U	0.066	0.052	U	0.052	0.054	U	0.054	0.137	U	0.137	0.180	U	0.180	0.123	U	0.123
SZ-10	J16943	2/14/08	0.116	U	0.116	0.042	U	0.042	0.035	U	0.035	0.031	U	0.031	0.110	U	0.110	0.121	U	0.121	0.116	U	0.116
Dup. of SZ-10	J16944	2/14/08	0.112	U	0.112	0.058	U	0.058	0.052	U	0.052	0.059	U	0.059	0.140	U	0.140	0.188	U	0.188	0.116	U	0.116

(a) Sample J16947 had TPH concentration in excess of the RAG. The entire pile associated with this sample was removed, so the data is not used in the UCL calculation.

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

C = method blank contamination (inorganic constituents)
GEA = gamma energy analysis
J = estimated
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Potassium-40			Radium-226			Radium-228			Silver-108			Thorium-228			Thorium-232			Uranium-235		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
RC-1	J14JT0	2/14/07	12.2		1.1	0.254		0.16	0.600	U	0.600	0.071	U	0.071	0.630		0.140	0.600	U	0.600	0.240	U	0.240
RB-1	J14JT1	2/14/07	11.7		0.970	0.432		0.12	0.714		0.33	0.058	U	0.058	0.598		0.110	0.714		0.33	0.310	U	0.310
RB-2	J14JT2	2/14/07	11.6		1.3	0.428		0.19	0.722		0.55	0.082	U	0.082	0.727		0.170	0.722		0.55	0.280	U	0.280
RC-2	J14JT3	2/14/07	11.2		0.091	0.328		0.15	0.515		0.31	0.054	U	0.054	0.517		0.081	0.515		0.31	0.250	U	0.250
RC-3	J14JT4	2/20/07	11.8		0.620	0.274		0.14	0.738		0.27	0.063	U	0.063	0.459		0.085	0.738		0.27	0.270	U	0.270
RC-4	J13W57	2/21/07	12.5		1.3	0.494		0.22	0.565	U	0.58	0.084	U	0.084	0.762		0.190	0.565	U	0.58	0.340	U	0.340
RB-3	J14JT5	2/21/07	10.9		0.74	0.254		0.11	0.444		0.32	0.056	U	0.056	0.430		0.110	0.444		0.32	0.270	U	0.270
OB-1 (a)	J16947	2/6/08	12.6		0.272	0.453		0.053	0.650		0.118	0.022	U	0.022	0.769		0.052	0.650		0.118	0.112	U	0.112
OB-2	J16948	2/6/08	11.9		0.582	0.385		0.157	0.781		0.308	0.054	U	0.054	0.679		0.130	0.781		0.308	0.265	U	0.265
OB-3	J16949	2/6/08	13.6		0.216	0.466		0.045	0.705		0.109	0.017	U	0.017	0.634		0.031	0.705		0.109	0.109	U	0.109
OB-4	J16950	2/6/08	13.4		0.355	0.442		0.069	0.749		0.148	0.026	U	0.026	0.700		0.044	0.749		0.148	0.139	U	0.139
OB-5	J16951	2/11/08	13.6		0.259	0.485		0.060	0.732		0.132	0.023	U	0.023	0.668		0.038	0.732		0.132	0.117	U	0.117
OB-6	J16952	2/11/08	15.7		0.271	0.541		0.066	0.862		0.132	0.020	U	0.020	0.772		0.039	0.862		0.132	0.145	U	0.145
OB-7	J16953	2/11/08	14.7		0.360	0.428		0.068	0.840		0.135	0.027	U	0.027	0.760		0.046	0.840		0.135	0.166	U	0.166
OB-8	J16954	2/11/08	16.6		0.236	0.538		0.051	0.726		0.116	0.020	U	0.020	0.769		0.034	0.726		0.116	0.131	U	0.131
OB-9	J16955	2/11/08	14.8		0.491	0.573		0.073	0.744		0.163	0.030	U	0.030	0.726		0.052	0.744		0.163	0.179	U	0.179
OB-10	J16956	2/11/08	11.0		0.277	0.707		0.064	0.831		0.133	0.022	U	0.022	0.867		0.038	0.831		0.133	0.116	U	0.116
OB-11	J16957	2/11/08	14.9		0.240	0.487		0.044	0.743		0.088	0.017	U	0.017	0.652		0.032	0.743		0.088	0.120	U	0.120
OB-12	J16958	2/11/08	11.7		0.329	0.394		0.052	0.761		0.120	0.020	U	0.020	0.633		0.034	0.761		0.120	0.109	U	0.109
OB-13	J16959	2/11/08	14.1		0.344	0.480		0.073	0.738		0.155	0.025	U	0.025	0.665		0.046	0.738		0.155	0.151	U	0.151
OB-14	J16960	2/11/08	14.3		0.189	0.590		0.039	0.793		0.082	0.017	U	0.017	0.825		0.032	0.793		0.082	0.109	U	0.109
FS-3	J169W9	2/13/08	10.4		0.797	0.617		0.137	0.821		0.296	0.054	U	0.054	0.604		0.079	0.821		0.296	0.272	U	0.272
FS-4	J169X0	2/13/08	12.0		0.705	0.369		0.124	0.596		0.223	0.048	U	0.048	0.571		0.089	0.596		0.223	0.272	U	0.272
FS-5	J169X1	2/13/08	9.0		0.774	0.282		0.165	0.833		0.349	0.068	U	0.068	0.531		0.106	0.833		0.349	0.278	U	0.278
FS-1	J16945	2/13/08	9.2		1.1	0.316		0.219	0.639		0.484	0.086	U	0.086	0.682		0.193	0.639		0.484	0.428	U	0.428
FS-2	J16946	2/13/08	11.6		0.821	0.644		0.130	0.640		0.268	0.051	U	0.051	0.881		0.130	0.640		0.268	0.266	U	0.266
SZ-1	J16934	2/14/08	13.2		0.804	0.348		0.158	0.477		0.383	0.055	U	0.055	0.533		0.095	0.477		0.383	0.303	U	0.303
SZ-2	J16935	2/14/08	13.3		0.379	0.353		0.123	0.668		0.207	0.043	U	0.043	0.708		0.101	0.668		0.207	0.239	U	0.239
SZ-3	J16936	2/14/08	13.4		0.795	0.415		0.120	0.578		0.332	0.057	U	0.057	0.549		0.085	0.578		0.332	0.272	U	0.272
SZ-4	J16937	2/14/08	13.7		0.525	0.404		0.112	0.472		0.264	0.047	U	0.047	0.733		0.117	0.472		0.264	0.226	U	0.226
SZ-5	J16938	2/14/08	14.3		0.412	0.479		0.128	0.962		0.238	0.049	U	0.049	0.536		0.074	0.962		0.238	0.225	U	0.225
SZ-6	J16939	2/14/08	12.6		0.658	0.540		0.162	0.651		0.358	0.059	U	0.059	0.588		0.084	0.651		0.358	0.289	U	0.289
SZ-7	J16940	2/14/08	11.8		0.757	0.349		0.174	0.953		0.259	0.048	U	0.048	0.571		0.130	0.953		0.259	0.273	U	0.273
SZ-8	J16941	2/14/08	12.8		0.526	0.326		0.103	0.449		0.277	0.047	U	0.047	0.596		0.124	0.449		0.277	0.266	U	0.266
SZ-9	J16942	2/14/08	11.9		0.540	0.441		0.108	0.570		0.235	0.042	U	0.042	0.780		0.097	0.570		0.235	0.217	U	0.217
SZ-10	J16943	2/14/08	13.0		0.274	0.456		0.084	0.740		0.130	0.031	U	0.031	0.669		0.052	0.740		0.130	0.182	U	0.182
Dup. of SZ-10	J16944	2/14/08	7.5		0.591	0.403		0.102	0.543		0.209	0.042	U	0.042	0.572		0.070	0.543		0.209	0.188	U	0.188

Attachment	1	Sheet No.	2 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Uranium-238			Strontium			Gross alpha			Gross beta		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
RC-1	J14JT0	2/14/07	12.0	U	12.0				9.16		5.7	17.0		8.9
RB-1	J14JT1	2/14/07	11.0	U	11.0				7.46		4.9	18.1		5.4
RB-2	J14JT2	2/14/07	12.0	U	12.0				14.3		6.8	19.5		5.7
RC-2	J14JT3	2/14/07	8.2	U	8.2				3.50	U	8.0	16.8		5.6
RC-3	J14JT4	2/20/07	9.2	U	9.2				4.44	U	5.5	18.0		5.5
RC-4	J13W57	2/21/07	16.0	U	16.0				11.4		6.5	23.4		8.6
RB-3	J14JT5	2/21/07	10.0	U	10.0				10.1		4.9	20.4		5.4
OB-1 (a)	J16947	2/6/08	3.8	U	3.8				6.28		6.16	27.3		5.42
OB-2	J16948	2/6/08	8.4	U	8.4				1.47	U	7.41	20.8		6.35
OB-3	J16949	2/6/08	4.3	U	4.3				9.50		4.77	22.7		5.37
OB-4	J16950	2/6/08	4.1	U	4.1				10.3		5.17	18.6		5.54
OB-5	J16951	2/11/08	4.1	U	4.1	0.048	U	0.258	8.33		6.08	14.8		6.21
OB-6	J16952	2/11/08	3.4	U	3.4				10.1		6.29	15.4		6.28
OB-7	J16953	2/11/08	4.4	U	4.4				4.57	U	5.72	15.8		5.33
OB-8	J16954	2/11/08	2.9	U	2.9				15.0		4.99	18.3		5.48
OB-9	J16955	2/11/08	5.2	U	5.2				9.05		5.96	20.6		7.67
OB-10	J16956	2/11/08	3.8	U	3.8				11.4		9.90	17.2		5.86
OB-11	J16957	2/11/08	2.9	U	2.9				14.0		5.07	17.2		5.70
OB-12	J16958	2/11/08	3.2	U	3.2				9.97		7.32	22.1		5.67
OB-13	J16959	2/11/08	4.6	U	4.6				5.63	U	7.54	16.1		5.61
OB-14	J16960	2/11/08	2.6	U	2.6				9.82		6.76	19.3		8.86
FS-3	J169W9	2/13/08	8.1	U	8.1				7.33		6.70	18.4		6.05
FS-4	J169X0	2/13/08	7.8	U	7.8				13.7		7.07	19.1		9.25
FS-5	J169X1	2/13/08	10.7	U	10.7				16.8		5.80	26.2		5.39
FS-1	J16945	2/13/08	13.2	U	13.2				14.4		5.59	21.5		6.21
FS-2	J16946	2/13/08	8.1	U	8.1				21.3		5.07	19.1		5.26
SZ-1	J16934	2/14/08	11.0	U	11.0				5.89	U	6.68	15.3		6.09
SZ-2	J16935	2/14/08	5.8	U	5.8				12.5		6.90	17.3		5.41
SZ-3	J16936	2/14/08	9.4	U	9.4				9.89		7.44	21.6		6.42
SZ-4	J16937	2/14/08	7.8	U	7.8				10.6		5.73	18.8		5.41
SZ-5	J16938	2/14/08	7.4	U	7.4				11.0		5.58	18.9		5.72
SZ-6	J16939	2/14/08	10.2	U	10.2				9.96		6.52	17.5		7.65
SZ-7	J16940	2/14/08	9.8	U	9.8				2.08	U	7.55	19.5		5.81
SZ-8	J16941	2/14/08	7.5	U	7.5				9.88		8.29	14.2		5.80
SZ-9	J16942	2/14/08	6.6	U	6.6				7.48	U	8.82	20.9		5.74
SZ-10	J16943	2/14/08	4.3	U	4.3				6.98	U	7.71	19.9		9.00
Dup. of SZ-10	J16944	2/14/08	6.4	U	6.4				10.7		7.81	22.5		8.77

Attachment	1	Sheet No.	3 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
RC-1	J14JT0	2/14/07	3660	C	6.3	0.75	U	0.75	2.3		0.93	56.5	C	0.03	0.36		0.03	1.6	C	0.57	0.23		0.09
RB-1	J14JT1	2/14/07	5150	C	6.3	0.74	U	0.74	2.7		0.92	48.6	C	0.03	0.31		0.03	2.1	C	0.56	0.11		0.09
RB-2	J14JT2	2/14/07	4890	C	6.2	0.74	U	0.74	1.9		0.91	54.4	C	0.03	0.32		0.03	1.9	C	0.56	0.16		0.09
RC-2	J14JT3	2/14/07	4900		6.3	0.74	U	0.74	0.92	U	0.92	53.1	C	0.03	0.39		0.03	1.3		0.56	0.09	U	0.09
RC-3	J14JT4	2/20/07	3620		6.2	0.73	U	0.73	1.3		0.9	24.1	C	0.03	0.18		0.03	0.56	U	0.55	0.09	U	0.09
RC-4	J13W57	2/21/07	4820		5.4	1.6		0.97	2.5		1.2	51	C	0.06	0.2		0.03	2		1.2	0.09	U	0.09
RB-3	J14JT5	2/21/07	4010		5.4	0.97	U	0.97	2.3		1.2	40.5	C	0.06	0.11		0.03	1.2		1.2	0.09	U	0.09
OB-1	J16947	2/6/08	5300		11.8	0.89	U	0.89	2.9		1.5	126	C	0.3	0.25		0.15	6.3		1.5	0.15	U	0.15
OB-2	J16948	2/6/08	5010		13.3	1.00	U	1.0	2.3		1.7	69.3	C	0.33	0.24		0.17	3.3		1.7	0.17	U	0.17
OB-3	J16949	2/6/08	4580		12.2	0.92	U	0.92	2.0		1.5	107	C	0.31	0.25		0.15	5.1		1.5	0.15	U	0.15
OB-4	J16950	2/6/08	4270		12.6	0.95	U	0.95	2.2		1.6	53.3	C	0.32	0.19		0.16	1.6	U	1.6	0.16	U	0.16
OB-5	J16951	2/11/08	6030		12.3	0.93	U	0.93	2.2		1.5	73.6		0.31	0.20		0.15	2.7		1.5	0.15	U	0.15
OB-6	J16952	2/11/08	6590		11.3	0.85	U	0.85	2.9		1.4	86.9		0.28	0.29		0.14	4.8		1.4	0.14	U	0.14
OB-7	J16953	2/11/08	5720		11.5	0.87	U	0.87	2.9		1.4	52.9		0.29	0.23		0.14	1.4	U	1.4	0.14	U	0.14
OB-8	J16954	2/11/08	5680		11.5	1.0		0.87	1.4	U	1.4	54.6		0.29	0.23		0.14	1.4	U	1.4	0.14	U	0.14
OB-9	J16955	2/11/08	6070		12.3	0.93	U	0.93	3.5		1.5	66.4		0.31	0.28		0.15	1.8		1.5	0.15	U	0.15
OB-10	J16956	2/11/08	9650		11.8	0.89	U	0.89	4.2		1.5	520		0.30	0.61		0.15	48.5		1.5	0.15	U	0.15
OB-11	J16957	2/11/08	4680		11.6	0.87	U	0.87	1.5	U	1.5	53.5		0.29	0.15	U	0.15	1.5	U	1.5	0.15	U	0.15
OB-12	J16958	2/11/08	5040		12.7	0.95	U	0.95	2.2		1.6	80.7		32.0	0.16	U	0.16	8.0		1.6	0.16	U	0.16
OB-13	J16959	2/11/08	4830		12.8	0.96	U	0.96	1.7		1.6	54.7		0.32	0.16	U	0.16	1.6	U	1.6	0.16	U	0.16
OB-14	J16960	2/11/08	6900		11.0	0.83	U	0.83	2.8		1.4	184		0.28	0.20		0.14	14.3		1.4	0.14	U	0.14
FS-3	J169W9	2/13/08	7340		11.0	0.82	U	0.82	2.1		1.4	192	C	0.27	0.20		0.14	23.2		1.4	0.14	U	0.14
FS-4	J169X0	2/13/08	5810		11.4	0.86	U	0.86	2.3		1.4	81.1	C	0.28	0.14	U	0.14	3.7		1.4	0.14	U	0.14
FS-5	J169X1	2/13/08	5510		10.0	0.75	U	0.75	2.3		1.2	82.3	C	0.25	0.13		0.12	3.4		1.2	0.12	U	0.12
FS-1	J16945	2/13/08	4920		10.2	0.77	U	0.77	1.3	U	1.3	66.5	C	0.26	0.13	U	0.13	1.9		1.3	0.13	U	0.13
FS-2	J16946	2/13/08	11900		18.0	0.68	U	0.68	1.3		1.1	329	C	0.22	0.27		0.11	28.6		1.1	0.11	U	0.11
Equip. blank	J16933	2/14/08	69.6		3.4	0.26	U	0.26	0.43	U	0.43	1.8		0.09	0.06		0.04	0.43	U	0.43	0.04	U	0.04
SZ-1	J16934	2/14/08	4900		10.2	0.76	U	0.76	3.3		1.3	62.5		0.25	0.23		0.13	2.4		1.3	0.13	U	0.13
SZ-2	J16935	2/14/08	4990		10.4	0.78	U	0.78	2.7		1.3	56.1		0.26	0.22		0.13	2.6		1.3	0.20		0.13
SZ-3	J16936	2/14/08	4500		10.8	0.81	U	0.81	2.2		1.4	64.7		0.27	0.21		0.14	3.1		1.4	0.14	U	0.14
SZ-4	J16937	2/14/08	5090		11.8	0.89	U	0.89	2.5		1.5	63.0		0.30	0.20		0.15	2.9		1.5	0.15	U	0.15
SZ-5	J16938	2/14/08	4240		9.3	0.70	U	0.70	1.8		1.2	41.6		0.23	0.17		0.12	1.2	U	1.2	0.12	U	0.12
SZ-6	J16939	2/14/08	4570		12.1	0.91	U	0.91	1.5	U	1.5	91.9		0.30	0.26		0.15	6.2		1.5	0.15	U	0.15
SZ-7	J16940	2/14/08	4820		11.1	0.84	U	0.84	1.7		1.4	56.2		0.28	0.27		0.14	1.8		1.4	0.14	U	0.14
SZ-8	J16941	2/14/08	4780		10.3	0.77	U	0.77	2.3		1.3	59.1		0.26	0.25		0.13	1.9		1.3	0.13	U	0.13
SZ-9	J16942	2/14/08	6250		11.3	0.85	U	0.85	2.1		1.4	226		0.28	0.34		0.14	23.7		1.4	0.14	U	0.14
SZ-10	J16943	2/14/08	5980		11.3	0.85	U	0.85	2.1		1.4	73.6		0.28	0.25		0.14	3.6		1.4	0.14	U	0.14
Dup. of SZ-10	J16944	2/14/08	6570		12.1	0.91	U	0.91	3.0		1.5	117		0.30	0.28		0.15	4.2		1.5	0.16		0.15

Attachment	1	Sheet No.	4 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Hexavalent Chromium			Cobalt			Copper			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
RC-1	J14JT0	2/14/07	2750	C	3.7	5.4	C	0.36	0.29		0.22	5.3		0.15	10.5	C	0.21	13900	C	7.3	3.9		0.48
RB-1	J14JT1	2/14/07	3540	C	3.7	7.7	C	0.36	0.24		0.21	5.4		0.15	12.9	C	0.21	13000	C	7.3	3.3		0.48
RB-2	J14JT2	2/14/07	3630	C	3.7	7.3	C	0.35	0.23		0.21	5.4		0.15	13	C	0.24	15000	C	7.2	3.5		0.47
RC-2	J14JT3	2/14/07	3290	C	3.7	8.9	C	0.36	0.21	U	0.21	5.5		0.15	10.5	C	0.21	16100		7.2	3.6		0.47
RC-3	J14JT4	2/20/07	4730	C	3.6	6.8	C	0.35	0.20	U	0.20	3.7		0.15	9.9		0.20	9380	C	1.8	2.7		0.47
RC-4	J13W57	2/21/07	3860	C	5.5	8.0	C	0.24	0.21	U	0.21	5.4		0.27	11.5		0.36	15300	C	1.2	3.9		0.85
RB-3	J14JT5	2/21/07	5130	C	5.5	7.9	C	0.24	0.21	U	0.21	3.8		0.27	10.6		0.36	10800	C	1.2	2.3		0.85
OB-1	J16947	2/6/08	5760	C	11.8	7.4		0.59	0.22	U	0.22	5.5		0.59	15.8	C	0.59	14800		13.3	12.3		0.89
OB-2	J16948	2/6/08	4050	C	13.3	6.2		0.67	0.53		0.26	5.4		0.67	20.9	C	0.67	13900		15.0	2.6		1.00
OB-3	J16949	2/6/08	5590	C	12.2	5.9		0.61	0.24	U	0.24	4.8		0.61	14.2	C	0.61	9930		13.7	4.4		0.92
OB-4	J16950	2/6/08	3510	C	12.6	5.3		0.63	0.23	U	0.23	5.2		0.63	13.0	C	0.63	13200		14.2	2.5		0.95
OB-5	J16951	2/11/08	4060	C	12.3	8.0		0.62	0.21	U	0.21	6.1		0.62	19.9	C	0.62	15800		13.9	4.0		0.93
OB-6	J16952	2/11/08	4150	C	11.3	8.5		0.57	0.25		0.22	6.6		0.57	13.2	C	0.57	17000		12.7	4.4		0.85
OB-7	J16953	2/11/08	5350	C	11.5	9.0		0.58	0.24		0.21	5.7		0.58	14.3	C	0.58	15400		13.0	7.4		0.87
OB-8	J16954	2/11/08	4790	C	11.5	8.9		0.58	0.28		0.21	5.5		0.58	15.0	C	0.58	15100		13.0	8.5		0.87
OB-9	J16955	2/11/08	3800	C	12.3	7.9		0.62	0.28		0.22	6.6		0.62	12.2	C	0.62	17800		13.9	3.8		0.93
OB-10	J16956	2/11/08	12900	C	11.8	10.6		0.59	0.22	U	0.22	7.3		0.59	22.3	C	0.59	18200		13.3	11.7		0.89
OB-11	J16957	2/11/08	4390	C	11.6	7.1		0.58	0.26		0.21	5.9		0.58	10.4	C	0.58	16100		13.1	5.0		0.87
OB-12	J16958	2/11/08	5240	C	12.7	6.7		0.63	0.21	U	0.21	6.3		0.63	13.3	C	0.63	17300		14.3	2.8		0.95
OB-13	J16959	2/11/08	3560	C	12.8	6.5		0.64	0.29		0.22	5.5		0.64	10.5	C	0.64	16100		14.4	3.4		0.96
OB-14	J16960	2/11/08	9600	C	11.0	8.7		0.55	0.22	U	0.22	6.4		0.55	18.8	C	0.55	16200		12.4	8.8		0.83
FS-3	J169W9	2/13/08	7080	C	11.0	8.8		0.55	0.36		0.21	6.0		0.55	13.4		0.93	17000	C	12.3	4.4		0.82
FS-4	J169X0	2/13/08	4380	C	11.4	8.6		0.57	0.21		0.21	6.2		0.57	12.3		0.66	17200	C	12.8	3.5		0.86
FS-5	J169X1	2/13/08	4300	C	10.0	8.2		0.50	0.21	U	0.21	5.8		0.50	13.1		0.57	15600	C	11.2	3.9		0.75
FS-1	J16945	2/13/08	4130	C	10.2	9.0		0.51	0.30		0.22	4.8		0.51	12.8		0.59	14300	C	11.5	4.1		0.77
FS-2	J16946	2/13/08	8740	C	9.0	7.9		0.45	0.30		0.22	4.7		0.45	26.5		1.0	25200	C	20.2	16.9		0.68
Equip. blank	J16933	2/14/08	31.7		3.4	0.17	U	0.17				0.17	U	0.17	0.17	U	0.17	1790		3.8	0.31		0.26
SZ-1	J16934	2/14/08	7880		10.2	8.3		0.51	0.21	U	0.21	5.5		0.51	14.1		0.51	15100		11.4	6.1		0.76
SZ-2	J16935	2/14/08	4270		10.4	9.2		0.52	0.21	U	0.21	5.8		0.52	15.7		0.52	15600		11.7	7.0		0.78
SZ-3	J16936	2/14/08	4020		10.8	7.0		0.54	0.24		0.21	5.5		0.54	12.4		0.54	14800		12.2	5.5		0.81
SZ-4	J16937	2/14/08	3290		11.8	9.7		0.59	0.22	U	0.22	4.6		0.59	16.0		0.59	13400		13.3	6.6		0.89
SZ-5	J16938	2/14/08	4120		9.3	7.3		0.47	0.23		0.21	4.6		0.47	11.1		0.47	12300		10.5	3.5		0.70
SZ-6	J16939	2/14/08	4830		12.1	6.7		0.61	0.22	U	0.22	6.0		0.61	11.3		0.61	15800		13.6	3.8		0.91
SZ-7	J16940	2/14/08	3970		11.1	7.6		0.56	0.26		0.21	6.7		0.56	11.3		0.56	18300		12.5	4.0		0.84
SZ-8	J16941	2/14/08	3840		10.3	7.7		0.52	0.22	U	0.22	6.7		0.52	10.6		0.52	18600		11.6	3.0		0.77
SZ-9	J16942	2/14/08	7170		11.3	8.7		0.56	0.22	U	0.22	6.2		0.56	15.5		0.56	17100		12.7	5.6		0.85
SZ-10	J16943	2/14/08	3050		11.3	8.7		0.57	0.23	U	0.23	6.3		0.57	9.0		0.57	16900		12.7	4.4		0.85
Dup. of SZ-10	J16944	2/14/08	3940		12.1	12.5		0.61	0.38		0.23	7.1		0.61	17.0		0.61	19300		13.6	4.9		0.91

Attachment	1	Sheet No.	5 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

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
RC-1	J14JT0	2/14/07	2970	C	1.4	268		0.12	0.03		0.02	0.48	U	0.48	7.9		0.66	635		6.3	1.3	U	1.3
RB-1	J14JT1	2/14/07	3460	C	1.4	244		0.12	0.02	U	0.02	0.48	U	0.48	8.7		0.65	946		6.3	1.3	U	1.3
RB-2	J14JT2	2/14/07	3480	C	1.4	232		0.12	0.01	U	0.01	0.47	U	0.47	9.3		0.65	770		6.2	1.3	U	1.3
RC-2	J14JT3	2/14/07	3340	C	1.4	268		0.12	0.02	U	0.02	0.47	U	0.47	9.1		0.65	929	C	6.3	1.3	U	1.3
RC-3	J14JT4	2/20/07	2880	C	1.3	187		0.12	0.02	U	0.02	0.47	U	0.47	7.2		0.64	438		6.2	1.3	U	1.3
RC-4	J13W57	2/21/07	3540		2.2	251		0.06	0.02	U	0.02	0.53		0.39	9.1		0.58	790		14.8	1.3	C	1.1
RB-3	J14JT5	2/21/07	3410		2.2	193		0.06	0.02	U	0.02	0.39	U	0.39	8.5		0.58	469		14.8	1.1	UC	1.1
OB-1	J16947	2/6/08	3780	C	7.4	253	C	0.12	0.01		0.01	0.89	U	0.89	9.5		0.59	806		11.8	1.8	U	1.8
OB-2	J16948	2/6/08	3470	C	8.3	230	C	0.13	0.01	U	0.01	1.30		1.00	8.4		0.67	1030		13.3	2.0	U	2.0
OB-3	J16949	2/6/08	2870	C	7.6	246	C	0.12	0.01	U	0.01	0.92	U	0.92	8.5		0.61	964		12.2	1.8	U	1.8
OB-4	J16950	2/6/08	3010	C	7.9	229	C	0.13	0.01	U	0.01	0.95		0.95	7.9		0.63	971		12.6	1.9	U	1.9
OB-5	J16951	2/11/08	3560		7.7	273	C	0.12	0.01	U	0.01	0.93	U	0.93	9.6		0.62	961		12.3	1.9	U	1.9
OB-6	J16952	2/11/08	3910		7.1	302	C	0.11	0.01	U	0.01	0.85	U	0.85	10.0		0.57	1110		11.3	1.7	U	1.7
OB-7	J16953	2/11/08	3840		7.2	253	C	0.12	0.09		0.01	0.87	U	0.87	10.5		0.58	788		11.5	1.7	U	1.7
OB-8	J16954	2/11/08	3810		7.2	261	C	0.12	0.01	U	0.01	0.87	U	0.87	10.8		0.58	793		11.5	1.7	U	1.7
OB-9	J16955	2/11/08	3800		7.7	296	C	0.12	0.01	U	0.01	0.93	U	0.93	10.0		0.62	1100		12.3	1.9	U	1.9
OB-10	J16956	2/11/08	5890		7.4	290	C	0.12	0.10		0.01	0.89		0.89	14.7		0.56	1010		11.8	1.8	U	1.8
OB-11	J16957	2/11/08	3530		7.3	253	C	0.12	0.01	U	0.01	0.87	U	0.87	8.7		0.58	803		11.6	1.7	U	1.7
OB-12	J16958	2/11/08	4010		7.9	245	C	0.13	0.01	U	0.01	0.95	U	0.95	9.1		0.63	825		12.7	1.9	U	1.9
OB-13	J16959	2/11/08	3340		8.0	252	C	0.13	0.01	U	0.01	0.96	U	0.96	8.0		0.64	1080		12.8	1.9	U	1.9
OB-14	J16960	2/11/08	4080		6.9	310	C	0.11	0.09		0.01	0.83	U	0.83	10.6		0.55	1030		11.0	1.7	U	1.7
FS-3	J169W9	2/13/08	3990	C	6.9	274	C	0.11	0.01	U	0.01	1.1		0.82	9.3		0.55	973		135	1.6	U	1.6
FS-4	J169X0	2/13/08	3740	C	7.1	272	C	0.11	0.01	U	0.01	0.86	U	0.86	9.5		0.57	1040		140	1.7	U	1.7
FS-5	J169X1	2/13/08	3470	C	6.2	273	C	0.10	0.008	U	0.008	0.97		0.75	9.0		0.50	908		123	1.5	U	1.5
FS-1	J16945	2/13/08	3320	C	6.4	214	C	0.10	0.03		0.01	0.77	U	0.77	8.3		0.51	875		126	1.5	U	1.5
FS-2	J16946	2/13/08	3910	C	5.6	203	C	0.09	0.04		0.009	0.86		0.68	9.4		0.45	1220		222	1.4	U	1.4
Equip. blank	J16933	2/14/08	12.6		2.1	20.8		0.03	0.009	U	0.009	0.26	U	0.26	0.17	U	0.17	26.1		3.4	0.51	U	0.51
SZ-1	J16934	2/14/08	3470		6.3	239		0.10	0.04		0.01	0.76	U	0.76	9.0		0.51	786		10.2	1.5	U	1.5
SZ-2	J16935	2/14/08	3660		6.5	248		0.10	0.02		0.009	0.78	U	0.78	9.9		0.52	730		10.4	1.6	U	1.6
SZ-3	J16936	2/14/08	3350		6.8	242		0.11	0.02		0.009	0.81	U	0.81	9.0		0.54	651		10.8	1.6	U	1.6
SZ-4	J16937	2/14/08	3500		7.4	201		0.12	0.15		0.009	0.89	U	0.89	9.2		0.59	668		11.8	1.8	U	1.8
SZ-5	J16938	2/14/08	3140		5.8	208		0.09	0.03		0.008	0.70	U	0.70	8.8		0.47	607		9.3	1.4	U	1.4
SZ-6	J16939	2/14/08	3550		7.6	242		0.12	0.01	U	0.01	0.91	U	0.91	8.7		0.61	918		12.1	1.8	U	1.8
SZ-7	J16940	2/14/08	3710		7.0	284		0.11	0.01	U	0.01	0.84	U	0.84	10.6		0.56	881		11.1	1.7	U	1.7
SZ-8	J16941	2/14/08	3790		6.4	277		0.10	0.009	U	0.009	0.77	U	0.77	9.9		0.52	861		10.3	1.5	U	1.5
SZ-9	J16942	2/14/08	4150		7.0	335		0.11	0.02		0.009	0.85	U	0.85	10.9		0.56	886		11.3	1.7	U	1.7
SZ-10	J16943	2/14/08	3490		7.1	317		0.11	0.01		0.009	0.85	U	0.85	9.5		0.57	1290		11.3	1.7	U	1.7
Dup. of SZ-10	J16944	2/14/08	3920		7.6	321		0.12	0.34		0.01	0.91	U	0.91	10.7		0.61	1160		12.1	1.8	U	1.8

Attachment	1	Sheet No.	6 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
RC-1	J14JT0	2/14/07	541	C	1.9	0.15	U	0.15	96.6	C	0.75	32.9		0.18	77.6	C	0.12
RB-1	J14JT1	2/14/07	706	C	1.9	0.15	U	0.15	106	C	0.74	27.9		0.18	29	C	0.12
RB-2	J14JT2	2/14/07	481	C	1.9	0.15	U	0.15	101	C	0.74	36.2		0.18	31.1	C	0.12
RC-2	J14JT3	2/14/07	532	C	1.9	0.15	UC	0.15	65		7.4	39.4		0.18	33	C	0.12
RC-3	J14JT4	2/20/07	429	C	3.2	0.28		0.15	77.6	C	0.73	21.8		0.18	24.7	C	0.64
RC-4	J13W57	2/21/07	431	C	1.8	0.27	U	0.27	98.5	C	9	34.4		0.30	31.9	C	0.09
RB-3	J14JT5	2/21/07	373	C	1.8	0.27	U	0.27	91	C	9.0	24.9		0.30	25.2	C	0.09
OB-1	J16947	2/6/08	2300		11.8	0.30	U	0.30	228	C	5.9	36.7		0.41	49.3		1.8
OB-2	J16948	2/6/08	2540		13.3	0.33	U	0.33	226	C	6.7	35.2		0.47	31.0		2.0
OB-3	J16949	2/6/08	3390		12.2	0.31	U	0.31	196	C	6.1	21.3		0.43	28.0		1.8
OB-4	J16950	2/6/08	2600		12.6	0.32	U	0.32	148	C	6.3	30.0		0.44	28.0		1.9
OB-5	J16951	2/11/08	2840		12.3	0.31	U	0.31	216	C	6.2	37.7		0.43	35.5		1.9
OB-6	J16952	2/11/08	3290		11.3	0.28	U	0.28	229	C	5.7	40.3		0.40	37.6		1.7
OB-7	J16953	2/11/08	2490		11.5	0.29	U	0.29	194	C	5.8	33.9		0.40	73.9		1.7
OB-8	J16954	2/11/08	2820		11.5	0.29	U	0.29	207	C	5.8	36.4		0.40	42.7		1.7
OB-9	J16955	2/11/08	4000		12.3	0.31	U	0.31	223	C	6.2	41.2		0.43	36.8		1.9
OB-10	J16956	2/11/08	1650		11.8	0.30	U	0.30	634	C	5.9	44.7		0.41	47.9		1.8
OB-11	J16957	2/11/08	1550		11.6	0.29	U	0.29	151	C	5.8	40.6		0.41	34.2		1.7
OB-12	J16958	2/11/08	3030		12.7	0.32	U	0.32	246	C	6.3	44.2		0.44	33.3		1.9
OB-13	J16959	2/11/08	2770		12.8	0.32	U	0.32	170	C	6.4	37.9		0.45	33.3		1.9
OB-14	J16960	2/11/08	2360		11.7	0.28	U	0.28	323	C	5.5	37.5		0.39	40.8		1.7
FS-3	J169W9	2/13/08	249		11.0	0.27	U	0.27	284	C	5.5	42.3		0.38	33.1		1.6
FS-4	J169X0	2/13/08	265		11.4	0.28	U	0.28	158	C	5.7	39.8		0.40	33.8		1.7
FS-5	J169X1	2/13/08	236		10.0	0.25	U	0.25	148	C	5.0	37.0		0.35	32.0		1.5
FS-1	J16945	2/13/08	221		10.2	1.2		0.26	117	C	5.1	33.9		0.36	36.0		1.5
FS-2	J16946	2/13/08	288		9.0	0.22	U	0.22	980	C	9.0	30.1		0.32	42.3		1.4
Equip. blank	J16933	2/14/08	51.4		3.4	0.09	U	0.09	10.9		1.7	0.22		0.12	2.5		0.51
SZ-1	J16934	2/14/08	316		10.2	0.25	U	0.25	115		1.7	38.0		0.36	42.9		1.5
SZ-2	J16935	2/14/08	282		10.4	0.26	U	0.26	121		1.7	37.9		0.36	49.3		1.6
SZ-3	J16936	2/14/08	407		10.8	0.27	U	0.27	123		1.8	37.4		0.38	41.2		1.6
SZ-4	J16937	2/14/08	382		11.8	0.30	U	0.30	116		2.0	32.6		0.41	45.7		1.8
SZ-5	J16938	2/14/08	384		9.3	0.23	U	0.23	94.7		1.6	29.2		0.33	28.9		1.4
SZ-6	J16939	2/14/08	488		12.1	0.30	U	0.30	162		2.0	39.9		0.42	34.6		1.8
SZ-7	J16940	2/14/08	337		11.1	0.28	U	0.28	118		1.9	48.1		0.39	36.9		1.7
SZ-8	J16941	2/14/08	344		10.3	0.26	U	0.26	120		1.7	47.5		0.36	36.3		1.5
SZ-9	J16942	2/14/08	479		11.3	0.28	U	0.28	406		1.9	37.5		0.39	38.0		1.7
SZ-10	J16943	2/14/08	322		11.3	0.28	U	0.28	142		1.9	37.4		0.40	37.2		1.7
Dup. of SZ-10	J16944	2/14/08	280		12.1	0.30	U	0.30	172		2.0	45.7		0.42	54.4		1.8

Attachment	1	Sheet No.	7 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254			Aroclor-1260		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
RC-1	J14JT0	2/14/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RB-1	J14JT1	2/14/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RB-2	J14JT2	2/14/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RC-2	J14JT3	2/14/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RC-3	J14JT4	2/20/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RC-4	J13W57	2/21/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
RB-3	J14JT5	2/21/07	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-1	J16947	2/6/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	45		14	41		14
OB-2	J16948	2/6/08	17	U	17	17	U	17	17	U	17	17	U	17	17	U	17	17	U	17	17	U	17
OB-3	J16949	2/6/08	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16
OB-4	J16950	2/6/08	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16
OB-5	J16951	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-6	J16952	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-7	J16953	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-8	J16954	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-9	J16955	2/11/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
OB-10	J16956	2/11/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	24		15
OB-11	J16957	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-12	J16958	2/11/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
OB-13	J16959	2/11/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15.0	U	15
OB-14	J16960	2/11/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	180		15
FS-3	J169W9	2/13/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
FS-4	J169X0	2/13/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
FS-5	J169X1	2/13/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
FS-1	J16945	2/13/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
FS-2	J16946	2/13/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	92		14	60		14
SZ-1	J16934	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14.0	U	14
SZ-2	J16935	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
SZ-3	J16936	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
SZ-4	J16937	2/14/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	4	J	15	15	U	15
SZ-5	J16938	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
SZ-6	J16939	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	19		14	9	J	14
SZ-7	J16940	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14.0	U	14
SZ-8	J16941	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14.0	U	14
SZ-9	J16942	2/14/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	5	J	14	17		14
SZ-10	J16943	2/14/08	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	4	J	16
Dup. of SZ-10	J16944	2/14/08	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16	16	U	16
Equip. blank	J16933	2/14/08																					

Attachment	1	Sheet No.	8 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample	HEIS	Sample	TPH			Aldrin			Alpha-BHC			alpha-Chlordane			beta-1,2,3,4,5,6-			Delta-BHC			Dichlorodiphenyldichloroe		
Location	Number	Date	mg/kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	143	U	143																		
RB-1	J14JT1	2/14/07	143	U	143																		
RB-2	J14JT2	2/14/07	139	U	139																		
RC-2	J14JT3	2/14/07	139	U	139																		
RC-3	J14JT4	2/20/07	135	U	135																		
RC-4	J13W57	2/21/07	141	U	141																		
RB-3	J14JT5	2/21/07	141	U	141																		
OB-1	J16947	2/6/08	4930	D	714																		
OB-2	J16948	2/6/08	174	U	174																		
OB-3	J16949	2/6/08	162	U	162																		
OB-4	J16950	2/6/08	156	U	156																		
OB-5	J16951	2/11/08	141	U	141																		
OB-6	J16952	2/11/08	142	U	142																		
OB-7	J16953	2/11/08	138	U	138																		
OB-8	J16954	2/11/08	142	U	142																		
OB-9	J16955	2/11/08	146	U	146																		
OB-10	J16956	2/11/08	148	U	148																		
OB-11	J16957	2/11/08	140	U	140																		
OB-12	J16958	2/11/08	141	U	141																		
OB-13	J16959	2/11/08	147	U	147																		
OB-14	J16960	2/11/08	145	U	145																		
FS-3	J169W9	2/13/08	138	U	138																		
FS-4	J169X0	2/13/08	142	U	142																		
FS-5	J169X1	2/13/08	140	U	140																		
FS-1	J16945	2/13/08	149	U	149																		
FS-2	J16946	2/13/08	142	U	142																		
SZ-1	J16934	2/14/08	138	U	138																		
SZ-2	J16935	2/14/08	137	U	137																		
SZ-3	J16936	2/14/08	141	U	141																		
SZ-4	J16937	2/14/08	148	U	148																		
SZ-5	J16938	2/14/08	140	U	140																		
SZ-6	J16939	2/14/08	143	U	143																		
SZ-7	J16940	2/14/08	140	U	140																		
SZ-8	J16941	2/14/08	144	U	144																		
SZ-9	J16942	2/14/08	144	U	144																		
SZ-10	J16943	2/14/08	155	U	155																		
Dup. of SZ-10	J16944	2/14/08	155	U	155																		
Equip. blank	J16933	2/14/08																					

Attachment	1	Sheet No.	9 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample	HEIS	Sample	Dichlorodiphenyldichloroe			Dichlorodiphenyltrichloro			Dieldrin			Endosulfan I			Endosulfan II			Endosulfan sulfate			Endrin		
Location	Number	Date	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07																					
RB-1	J14JT1	2/14/07																					
RB-2	J14JT2	2/14/07																					
RC-2	J14JT3	2/14/07																					
RC-3	J14JT4	2/20/07																					
RC-4	J13W57	2/21/07																					
RB-3	J14JT5	2/21/07																					
OB-1	J16947	2/6/08																					
OB-2	J16948	2/6/08																					
OB-3	J16949	2/6/08																					
OB-4	J16950	2/6/08																					
OB-5	J16951	2/11/08																					
OB-6	J16952	2/11/08																					
OB-7	J16953	2/11/08																					
OB-8	J16954	2/11/08																					
OB-9	J16955	2/11/08																					
OB-10	J16956	2/11/08																					
OB-11	J16957	2/11/08																					
OB-12	J16958	2/11/08																					
OB-13	J16959	2/11/08																					
OB-14	J16960	2/11/08																					
FS-3	J169W9	2/13/08																					
FS-4	J169X0	2/13/08																					
FS-5	J169X1	2/13/08																					
FS-1	J16945	2/13/08																					
FS-2	J16946	2/13/08																					
SZ-1	J16934	2/14/08																					
SZ-2	J16935	2/14/08																					
SZ-3	J16936	2/14/08																					
SZ-4	J16937	2/14/08																					
SZ-5	J16938	2/14/08																					
SZ-6	J16939	2/14/08																					
SZ-7	J16940	2/14/08																					
SZ-8	J16941	2/14/08																					
SZ-9	J16942	2/14/08																					
SZ-10	J16943	2/14/08																					
Dup. of SZ-10	J16944	2/14/08																					
Equip. blank	J16933	2/14/08																					

Attachment	1	Sheet No.	10 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Endrin aldehyde			Endrin ketone			Gamma-BHC (Lindane)			gamma-Chlordane			Heptachlor			Heptachlor epoxide			Methoxychlor		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07																					
RB-1	J14JT1	2/14/07																					
RB-2	J14JT2	2/14/07																					
RC-2	J14JT3	2/14/07																					
RC-3	J14JT4	2/20/07																					
RC-4	J13W57	2/21/07																					
RB-3	J14JT5	2/21/07																					
OB-1	J16947	2/6/08																					
OB-2	J16948	2/6/08																					
OB-3	J16949	2/6/08																					
OB-4	J16950	2/6/08																					
OB-5	J16951	2/11/08																					
OB-6	J16952	2/11/08																					
OB-7	J16953	2/11/08																					
OB-8	J16954	2/11/08																					
OB-9	J16955	2/11/08																					
OB-10	J16956	2/11/08																					
OB-11	J16957	2/11/08																					
OB-12	J16958	2/11/08																					
OB-13	J16959	2/11/08																					
OB-14	J16960	2/11/08																					
FS-3	J169W9	2/13/08																					
FS-4	J169X0	2/13/08																					
FS-5	J169X1	2/13/08																					
FS-1	J16945	2/13/08																					
FS-2	J16946	2/13/08																					
SZ-1	J16934	2/14/08																					
SZ-2	J16935	2/14/08																					
SZ-3	J16936	2/14/08																					
SZ-4	J16937	2/14/08																					
SZ-5	J16938	2/14/08																					
SZ-6	J16939	2/14/08																					
SZ-7	J16940	2/14/08																					
SZ-8	J16941	2/14/08																					
SZ-9	J16942	2/14/08																					
SZ-10	J16943	2/14/08																					
Dup. of SZ-10	J16944	2/14/08																					
Equip. blank	J16933	2/14/08																					

Attachment	1	Sheet No.	11 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Toxaphene			1,2,4-Trichlorobenzene			1,2-Dichlorobenzene			1,3-Dichlorobenzene			1,4-Dichlorobenzene			2,4,5-Trichlorophenol			2,4,6-Trichlorophenol		
			ug/Kg	Q	PQL	#N/A	Q	PQL	#N/A	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
RB-1	J14JT1	2/14/07				360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	360	U	360
RB-2	J14JT2	2/14/07				350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	350	U	350
RC-2	J14JT3	2/14/07				350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	350	U	350
RC-3	J14JT4	2/20/07				340	U	340	340	U	340	340	U	340	340	U	340	850	U	850	340	U	340
RC-4	J13W57	2/21/07				350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	350	U	350
RB-3	J14JT5	2/21/07				350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	350	U	350
OB-1	J16947	2/6/08				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
OB-2	J16948	2/6/08				440	U	440	440	U	440	440	U	440	440	U	440	1100	U	1100	440	U	440
OB-3	J16949	2/6/08				410	U	410	410	U	410	410	U	410	410	U	410	1000	U	1000	410	U	410
OB-4	J16950	2/6/08				390	U	390	390	U	390	390	U	390	390	U	390	980	U	980	390	U	390
OB-5	J16951	2/11/08				2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	7100	UD	7100	2900	UD	2900
OB-6	J16952	2/11/08				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
OB-7	J16953	2/11/08				350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	350	U	350
OB-8	J16954	2/11/08				360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	360	U	360
OB-9	J16955	2/11/08				370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	370	U	370
OB-10	J16956	2/11/08				370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	370	U	370
OB-11	J16957	2/11/08				350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	350	U	350
OB-12	J16958	2/11/08				360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	360	U	360
OB-13	J16959	2/11/08				370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	370	U	370
OB-14	J16960	2/11/08				360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	360	U	360
FS-3	J169W9	2/13/08				340	U	340	340	U	340	340	U	340	340	U	340	860	U	860	340	U	340
FS-4	J169X0	2/13/08				350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	350	U	350
FS-5	J169X1	2/13/08				350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	350	U	350
FS-1	J16945	2/13/08				370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	370	U	370
FS-2	J16946	2/13/08				360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	360	U	360
SZ-1	J16934	2/14/08				350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	350	U	350
SZ-2	J16935	2/14/08				340	U	340	340	U	340	340	U	340	340	U	340	860	U	860	340	U	340
SZ-3	J16936	2/14/08				350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	350	U	350
SZ-4	J16937	2/14/08				370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	370	U	370
SZ-5	J16938	2/14/08				350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	350	U	350
SZ-6	J16939	2/14/08				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
SZ-7	J16940	2/14/08				350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	350	U	350
SZ-8	J16941	2/14/08				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
SZ-9	J16942	2/14/08				360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
SZ-10	J16943	2/14/08				390	U	390	390	U	390	390	U	390	390	U	390	970	U	970	390	U	390
Dup. of SZ-10	J16944	2/14/08				390	U	390	390	U	390	390	U	390	390	U	390	980	U	980	390	U	390
Equip. blank	J16933	2/14/08				340	U	340	340	U	340	340	U	340	340	U	340	840	U	840	340	U	340

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Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	2,4-Dichlorophenol			2,4-Dimethylphenol			2,4-Dinitrophenol			2,4-Dinitrotoluene			2,6-Dinitrotoluene			2-Chloronaphthalene			2-Chlorophenol		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	850	U	850	340	U	340	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	1100	U	1100	440	U	440	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	1000	U	1000	410	U	410	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	7100	UD	7100	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350
OB-8	J16954	2/11/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	860	U	860	340	U	340	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360
SZ-1	J16934	2/14/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350
SZ-2	J16935	2/14/08	340	U	340	340	U	340	860	U	860	340	U	340	340	U	340	340	U	340	340	U	340
SZ-3	J16936	2/14/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	840	U	840	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	13 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	2-Methylnaphthalene			2-Methylphenol (cresol, o-)			2-Nitroaniline			2-Nitrophenol			3+4 Methylphenol (cresol,			3,3'-Dichlorobenzidine			3-Nitroaniline		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	890	U	890
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	870	U	870
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	870	U	870
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	850	U	850	340	U	340	340	U	340	340	U	340	850	U	850
RC-4	J13W57	2/21/07	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	880	U	880
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	880	U	880
OB-1	J16947	2/6/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
OB-2	J16948	2/6/08	440	U	440	440	U	440	1100	U	1100	440	U	440	440	U	440	440	U	440	1100	U	1100
OB-3	J16949	2/6/08	410	U	410	410	U	410	1000	U	1000	410	U	410	410	U	410	410	U	410	1000	U	1000
OB-4	J16950	2/6/08	390	U	390	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390	980	U	980
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	7100	UD	7100	2900	UD	2900	2900	UD	2900	2900	UD	2900	7100	UD	7100
OB-6	J16952	2/11/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
OB-7	J16953	2/11/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	870	U	870
OB-8	J16954	2/11/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	890	U	890
OB-9	J16955	2/11/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	920	U	920
OB-10	J16956	2/11/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	930	U	930
OB-11	J16957	2/11/08	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	880	U	880
OB-12	J16958	2/11/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	890	U	890
OB-13	J16959	2/11/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	930	U	930
OB-14	J16960	2/11/08	27	J	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	910	U	910
FS-3	J169W9	2/13/08	340	U	340	340	U	340	860	U	860	340	U	340	340	U	340	340	U	340	860	U	860
FS-4	J169X0	2/13/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	890	U	890
FS-5	J169X1	2/13/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	870	U	870
FS-1	J16945	2/13/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	930	U	930
FS-2	J16946	2/13/08	360	U	360	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360	890	U	890
SZ-1	J16934	2/14/08	350	U	350	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350	870	U	870
SZ-2	J16935	2/14/08	340	U	340	340	U	340	860	U	860	340	U	340	340	U	340	340	U	340	860	U	860
SZ-3	J16936	2/14/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	890	U	890
SZ-4	J16937	2/14/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	930	U	930
SZ-5	J16938	2/14/08	350	U	350	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350	890	U	890
SZ-6	J16939	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
SZ-7	J16940	2/14/08	350	U	350	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350	880	U	880
SZ-8	J16941	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
SZ-9	J16942	2/14/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
SZ-10	J16943	2/14/08	390	U	390	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390	970	U	970
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390	980	U	980
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	840	U	840	340	U	340	340	U	340	340	U	340	840	U	840

Attachment	1	Sheet No.	14 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample	HEIS	Sample	4,6-Dinitro-2-methylphenol			4-Bromophenylphenyl ether			4-Chloro-3-methylphenol			4-Chloroaniline			4-Chlorophenylphenyl ether			4-Nitroaniline			4-Nitrophenol		
Location	Number	Date	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
RB-1	J14JT1	2/14/07	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	890	U	890
RB-2	J14JT2	2/14/07	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	870	U	870
RC-2	J14JT3	2/14/07	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	870	U	870
RC-3	J14JT4	2/20/07	850	U	850	340	U	340	340	U	340	340	U	340	340	U	340	850	U	850	850	U	850
RC-4	J13W57	2/21/07	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	880	U	880
RB-3	J14JT5	2/21/07	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	880	U	880
OB-1	J16947	2/6/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
OB-2	J16948	2/6/08	1100	U	1100	440	U	440	440	U	440	440	U	440	440	U	440	1100	U	1100	1100	U	1100
OB-3	J16949	2/6/08	1000	U	1000	410	U	410	410	U	410	410	U	410	410	U	410	1000	U	1000	1000	U	1000
OB-4	J16950	2/6/08	980	U	980	390	U	390	390	U	390	390	U	390	390	U	390	980	U	980	980	U	980
OB-5	J16951	2/11/08	7100	UD	7100	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	7100	UD	7100	7100	UD	7100
OB-6	J16952	2/11/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
OB-7	J16953	2/11/08	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	870	U	870
OB-8	J16954	2/11/08	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	890	U	890
OB-9	J16955	2/11/08	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	920	U	920
OB-10	J16956	2/11/08	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	930	U	930
OB-11	J16957	2/11/08	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	880	U	880
OB-12	J16958	2/11/08	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	890	U	890
OB-13	J16959	2/11/08	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	930	U	930
OB-14	J16960	2/11/08	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	910	U	910
FS-3	J169W9	2/13/08	860	U	860	340	U	340	340	U	340	340	U	340	340	U	340	860	U	860	860	U	860
FS-4	J169X0	2/13/08	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	890	U	890
FS-5	J169X1	2/13/08	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	870	U	870
FS-1	J16945	2/13/08	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	930	U	930
FS-2	J16946	2/13/08	890	U	890	360	U	360	360	U	360	360	U	360	360	U	360	890	U	890	890	U	890
SZ-1	J16934	2/14/08	870	U	870	350	U	350	350	U	350	350	U	350	350	U	350	870	U	870	870	U	870
SZ-2	J16935	2/14/08	860	U	860	340	U	340	340	U	340	340	U	340	340	U	340	860	U	860	860	U	860
SZ-3	J16936	2/14/08	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	890	U	890
SZ-4	J16937	2/14/08	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	930	U	930
SZ-5	J16938	2/14/08	890	U	890	350	U	350	350	U	350	350	U	350	350	U	350	890	U	890	890	U	890
SZ-6	J16939	2/14/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
SZ-7	J16940	2/14/08	880	U	880	350	U	350	350	U	350	350	U	350	350	U	350	880	U	880	880	U	880
SZ-8	J16941	2/14/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
SZ-9	J16942	2/14/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
SZ-10	J16943	2/14/08	970	U	970	390	U	390	390	U	390	390	U	390	390	U	390	970	U	970	970	U	970
Dup. of SZ-10	J16944	2/14/08	980	U	980	390	U	390	390	U	390	390	U	390	390	U	390	980	U	980	980	U	980
Equip. blank	J16933	2/14/08	840	U	840	340	U	340	340	U	340	340	U	340	340	U	340	840	U	840	840	U	840

Attachment	1	Sheet No.	15 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(ghi)perylene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	350	U	350	350	U	350	22	J	350	100	J	350	92	J	350	79	J	350	63	J	350
OB-8	J16954	2/11/08	360	U	360	360	U	360	360	U	360	37	J	360	36	J	360	27	J	360	27	J	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	350	U	350	350	U	350	19	J	350	95	J	350	110	J	350	89	J	350	70	J	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	350	U	350	350	U	350	350	U	350	30	J	350	32	J	350	25	J	350	22	J	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	360	U	360	360	U	360	20	J	360	90	J	360	71	J	360	49	J	360	67	J	360
SZ-1	J16934	2/14/08	350	U	350	350	U	350	26	J	350	130	J	350	120	J	350	96	J	350	87	J	350
SZ-2	J16935	2/14/08	340	U	340	340	U	340	340	U	340	66	J	340	68	J	340	62	J	340	56	J	340
SZ-3	J16936	2/14/08	350	U	350	350	U	350	350	U	350	30	J	350	35	J	350	38	J	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	360	U	360	360	U	360	360	U	360	18	J	360	360	U	360	18	J	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	16 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Benzo(k)fluoranthene			Bis(2-chloro-1-			Bis(2-			Bis(2-chloroethyl) ether			Bis(2-ethylhexyl) phthalate			Butylbenzylphthalate			Carbazole		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	130	JB	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	450	B	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	270	JB	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	27	JB	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	340	U	340	340	U	340	220	JB	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	28	JB	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	360	U	360	360	U	360	110	JB	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	440	U	440	440	U	440	42	JB	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	410	U	410	410	U	410	65	JB	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	390	U	390	390	U	390	82	JB	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	490	JBD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	240	JB	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	97	J	350	350	U	350	350	U	350	350	U	350	140	JB	350	350	U	350	350	U	350
OB-8	J16954	2/11/08	43	J	360	360	U	360	360	U	360	360	U	360	140	JB	360	360	U	360	360	U	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	130	JB	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	220	JB	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	90	J	350	350	U	350	350	U	350	350	U	350	110	JB	350	350	U	350	350	U	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	110	JB	110	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	260	JB	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	330	JB	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	340	U	340	340	U	340	23	J	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	41	J	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	68	J	360	360	U	360	360	U	360	360	U	360	21	J	360	360	U	360	360	U	360
SZ-1	J16934	2/14/08	101	J	350	350	U	350	350	U	350	350	U	350	31	JB	350	350	U	350	350	U	350
SZ-2	J16935	2/14/08	59	J	340	340	U	340	340	U	340	340	U	340	26	JB	340	340	U	340	340	U	340
SZ-3	J16936	2/14/08	34	J	350	350	U	350	350	U	350	350	U	350	149	JB	350	350	U	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	370	U	370	370	U	370	39	JB	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	31	JB	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	62	JB	360	360	U	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	36	JB	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	36	JB	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	23	JB	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	38	JB	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	32	JB	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	17 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Chrysene			Di-n-butylphthalate			Di-n-octylphthalate			Dibenz[a,h]anthracene			Dibenzofuran			Diethylphthalate			Dimethyl phthalate		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	140	J	350	350	U	350	350	U	350	19	J	350	350	U	350	350	U	350	350	U	350
OB-8	J16954	2/11/08	48	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	130	J	350	350	U	350	350	U	350	22	J	350	350	U	350	350	U	350	350	U	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	46	J	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	120	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-1	J16934	2/14/08	159	J	350	350	U	350	350	U	350	36	J	350	350	U	350	350	U	350	350	U	350
SZ-2	J16935	2/14/08	84	J	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
SZ-3	J16936	2/14/08	56	J	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	26	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	18 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Fluoranthene			Fluorene			Hexachlorobenzene			Hexachlorobutadiene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	200	J	350	350	U	350	350	U	350	350	U	350
OB-8	J16954	2/11/08	73	J	360	360	U	360	360	U	360	360	U	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	220	J	350	350	U	350	350	U	350	350	U	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	63	J	350	350	U	350	350	U	350	350	U	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	130	J	360	360	U	360	360	U	360	360	U	360
SZ-1	J16934	2/14/08	287	J	350	350	U	350	350	U	350	350	U	350
SZ-2	J16935	2/14/08	131	J	340	340	U	340	340	U	340	340	U	340
SZ-3	J16936	2/14/08	67	J	350	350	U	350	350	U	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	18	J	360	360	U	360	360	U	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	19 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Hexachlorocyclopentadien			Hexachloroethane			Indeno(1,2,3-cd)pyrene			Isophorone			-Nitroso-di-n-dipropylamin			N-Nitrosodiphenylamine			Naphthalene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	350	U	350	350	U	350	55	J	350	350	U	350	350	U	350	350	U	350	350	U	350
OB-8	J16954	2/11/08	360	U	360	360	U	360	30	J	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-9	J16955	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	350	U	350	350	U	350	71	J	350	350	U	350	350	U	350	350	U	350	350	U	350
OB-12	J16958	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	18	J	360
FS-3	J169W9	2/13/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	350	U	350	350	U	350	24	J	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-5	J169X1	2/13/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	360	U	360	360	U	360	47	J	360	360	U	360	360	U	360	360	U	360	23	J	360
SZ-1	J16934	2/14/08	350	U	350	350	U	350	74	J	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-2	J16935	2/14/08	340	U	340	340	U	340	57	J	340	340	U	340	340	U	340	340	U	340	340	U	340
SZ-3	J16936	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-4	J16937	2/14/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-7	J16940	2/14/08	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	20 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Nitrobenzene			Pentachlorophenol			Phenanthrene			Phenol			Pyrene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
RC-1	J14JT0	2/14/07	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360
RB-1	J14JT1	2/14/07	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360
RB-2	J14JT2	2/14/07	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350
RC-2	J14JT3	2/14/07	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350
RC-3	J14JT4	2/20/07	340	U	340	850	U	850	340	U	340	340	U	340	340	U	340
RC-4	J13W57	2/21/07	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350
RB-3	J14JT5	2/21/07	350	U	350	880	U	880	350	U	350	350	U	350	350	U	350
OB-1	J16947	2/6/08	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360
OB-2	J16948	2/6/08	440	U	440	1100	U	1100	440	U	440	440	U	440	440	U	440
OB-3	J16949	2/6/08	410	U	410	1000	U	1000	410	U	410	410	U	410	410	U	410
OB-4	J16950	2/6/08	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390
OB-5	J16951	2/11/08	2900	UD	2900	7100	UD	7100	2900	UD	2900	2900	UD	2900	2900	UD	2900
OB-6	J16952	2/11/08	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360
OB-7	J16953	2/11/08	350	U	350	870	U	870	100	J	350	350	U	350	250	J	350
OB-8	J16954	2/11/08	360	U	360	890	U	890	40	J	360	360	U	360	91	J	360
OB-9	J16955	2/11/08	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370
OB-10	J16956	2/11/08	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370
OB-11	J16957	2/11/08	350	U	350	880	U	880	110	J	350	350	U	350	260	J	350
OB-12	J16958	2/11/08	360	U	360	890	U	890	360	U	360	360	U	360	360	U	360
OB-13	J16959	2/11/08	370	U	370	930.0	U	930	370	U	370	370	U	370	370	U	370
OB-14	J16960	2/11/08	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360
FS-3	J169W9	2/13/08	340	U	340	860	U	860	340	U	340	340	U	340	340	U	340
FS-4	J169X0	2/13/08	350	U	350	890	U	890	27	J	350	350	U	350	63	J	350
FS-5	J169X1	2/13/08	350	U	350	870	U	870	350	U	350	350	U	350	350	U	350
FS-1	J16945	2/13/08	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370
FS-2	J16946	2/13/08	360	U	360	890	U	890	140	J	360	360	U	360	310	J	360
SZ-1	J16934	2/14/08	350	U	350	870.0	U	870	145	J	350	350	U	350	268	J	350
SZ-2	J16935	2/14/08	340	U	340	860	U	860	78	J	340	340	U	340	149	J	340
SZ-3	J16936	2/14/08	350	U	350	890	U	890	42	J	350	350	U	350	67	J	350
SZ-4	J16937	2/14/08	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370
SZ-5	J16938	2/14/08	350	U	350	890	U	890	350	U	350	350	U	350	350	U	350
SZ-6	J16939	2/14/08	360	U	360	900	U	900	360	U	360	360	U	360	26	J	360
SZ-7	J16940	2/14/08	350	U	350	880.0	U	880	350	U	350	350	U	350	350	U	350
SZ-8	J16941	2/14/08	360	U	360	900.0	U	900	360	U	360	360	U	360	360	U	360
SZ-9	J16942	2/14/08	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360
SZ-10	J16943	2/14/08	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390
Dup. of SZ-10	J16944	2/14/08	390	U	390	980	U	980	390	U	390	390	U	390	390	U	390
Equip. blank	J16933	2/14/08	340	U	340	840	U	840	340	U	340	340	U	340	340	U	340

Attachment	1	Sheet No.	21 of 21
Originator	L. D. Habel	Date	04/03/08
Checked	H. M. Sulloway	Date	04/03/08
Calc. No.	0100F-CA-V0353	Rev. No.	0

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0354

Subject: 100-F-26:9 Waste Site Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Cover = 1 Summary = 4	L. D. Habel	H. M. Sulloway		J. D. Fancher	
						4/3/08

SUMMARY OF REVISION

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

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	4/3/08	Calc. No.:	0100F-CA-V0354	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	4/3/08
Subject:	100-F-26:9 Pipelines Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 4	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk values for the 100-F-26:4 subsite 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, 2008, *100-F-26:9 Pipelines Cleanup Verification 95% UCL Calculation*, 0100F-CA-V0353, 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:	L.D. Habel	Date:	4/3/08	Calc. No.:	0100F-CA-V0354	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	4/3/08
Subject:	100-F-26:9 Pipelines Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

HQ and carcinogenic risk calculations were conservatively calculated for the excavation portion of the 100-F-26:9 waste site using the higher of the statistically determined value for each analyte in the shallow zone and overburden stockpile decision units (WCH 2008) and the maximum detected values in the focused samples. Of the nonradionuclide contaminants of potential concern (COPC) barium, copper, lead, selenium, silver, and zinc required the HQ and risk calculations because they were quantified above background. Additionally, boron and molybdenum required the HQ and risk calculations because these COPCs were detected and a Washington State or Hanford Site background value is not available. Hexavalent chromium, aroclor-1254, aroclor-1260 and multiple organic COPCs (as listed in Table 1) required the HQ and risk calculations because they were detected and cannot be attributed to natural occurrence. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

1) For example, the statistical result for molybdenum (1.3 mg/kg), divided by the noncarcinogenic RAG value of 400 mg/kg (calculated in accordance with the noncarcinogenic toxic effects WAC 173-340-740[3]), is 3.3×10^{-3}. 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 1.9×10^{-1} 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 hexavalent chromium is 0.38 mg/kg; divided by 2.1 mg/kg, and multiplied as indicated, is 1.8×10^{-7}. 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 2.1×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

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

Table 1 shows the results of the calculation.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	4/3/08	Calc. No.:	0100F-CA-V0354	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	4/3/08
Subject:	100-F-26:9 Pipelines Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site.

Contaminants of Potential Concern	Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	329	5,600	5.9E-02	--	--
Boron	28.6	16,000	1.8E-03	--	--
Chromium, hexavalent[c]	0.38	240	1.6E-03	2.1	1.8E-07
Copper	26.5	2,960	9.0E-03	--	--
Lead[d]	16.9	353	4.8E-02	--	--
Molybdenum	1.3	400	3.3E-03	--	--
Selenium	1.3	400	3.3E-03	--	--
Silver	1.2	400	3.0E-03	--	--
Zinc	77.6	24,000	3.2E-03	--	--
Semivolatiles					
Anthracene	0.026	24,000	1.1E-06	--	--
Benzo(a)anthracene	0.13	--	--	1.37	9.5E-08
Benzo(a)pyrene	0.12	--	--	0.33[e]	3.6E-07
Benzo(b)fluoranthene	0.096	--	--	1.37	7.0E-08
Benzo(k)fluoranthene	0.101	--	--	13.7	7.4E-09
Benzo(ghi)perylene[f]	0.087	2,400	3.6E-05	--	--
Bis(2-ethylhexyl) phthalate	0.450	1,600	2.8E-04	71.4	6.3E-09
Chrysene	0.159	--	--	137	1.2E-09
Dibenzo(a,h)anthracene	0.036	--	--	0.33[e]	1.1E-07
Fluoranthene	0.287	3,200	9.0E-05	--	--
Indeno(1,2,3-cd) pyrene	0.074	--	--	1.37	5.4E-08
Naphthalene	0.023	1,600	1.4E-05	--	--
Phenanthrene[f]	0.145	24,000	6.0E-06	--	--
Pyrene	0.310	2,400	1.3E-04	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.092	1.6	5.8E-02	0.5	1.8E-07
Aroclor-1260	0.180	--	--	0.5	3.6E-07
Totals					
Cumulative Hazard Quotient:			**1.9E-01**		
Cumulative Excess Cancer Risk:					**2.1E-06**

Notes:
RAG = remedial action goal
-- = not applicable

[a] = From WCH 2008.

[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] = Value for the noncarcinogen RAG obtained from EPA (1994).
[e] = Individual carcinogenic risk calculated using the required detection limit. Contribution to cumulative carcinogenic risk calculated based on the remedial action goal instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.
[f] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemicals: Contaminant: phenathrene, surrogate: anthracene; benzo(g,h,i)perylene, surrogate: pyrene.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	4/3/08	Calc. No.:	0100F-CA-V0354	Rev.:	0
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sullowa	Date:	4/3/08
Subject:	100-F-26:9 Pipelines Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

CONCLUSION:

This calculation demonstrates that the 100-F-26:9 waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005).

Calculation Brief Distribution Sheet

Calculation Number: 0100F-CA-V0354

100-F-26:9 Waste Site Cleanup Verification Hazard Quotient and Carcinogenic Risk Calculation

COA: R10F26-N6W0

TITLE	NAME	MSIN	COPIES
Originator	L. D. Habel	H4-23	**1**
Checker	H. M. Sulloway	H4-23	**1**
Reviewer	NA		
Approver	J. D. Fancher	X9-07	
CVP Files			
Document Control	M. L. Cockrum	H4-11	**1**
100 Area Project Files			
Calc. Brief Files	M. T. Hughes	H4-23	**Original**
Other			

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CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0363

Subject: 100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Total = 12	L. D. Habel	H. M. Sulloway		J.M. Capron	5/28/08
1	Total = 12	L. D. Habel	H. M. Sulloway	n/a	J.M. Capron	
					for J. M. Capron	7/15/08

SUMMARY OF REVISION

1	Corrected RAG entry for benzo(k)fluoranthene in table 1. Changed oral reference doses for barium, cadmium, mercury, molybdenum, silver and zinc in table 6. Footnote b modified in table 6.

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

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 11	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk values for the 100-F-26:9 subsite confirmatory sampling. 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) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

3) WCH, 2008, *Remaining Sites Verification Package for 100-F-26:9 1607-F2 Sanitary Sewer Pipelines*, Attachment to Waste Site Reclassification Form 2008-029, May 2008, 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:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 11	

METHODOLOGY:

HQ and carcinogenic risk calculations were determined for each service area of the 100-F-26:9 waste site. The calculations used the maximum value for each analyte from the results of the pipe material, pipe contents (sediment) and underlying soil from among the test pit associated with each service area. Service Areas 2, 9, 10 and 11 were remediated and are included in a separate calculation. Of the nonradionuclide contaminants of potential concern (COPC) barium, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc required the HQ and risk calculations for one or more service areas because they were quantified above background. Additionally, boron and molybdenum required the HQ and risk calculations for one or more service areas because these COPCs were detected and a Washington State or Hanford Site background value is not available. Hexavalent chromium, aroclor-1254, aroclor-1260, and multiple semivolatile organic analytes (as shown in Tables 1 - 7, below) and are included for one or more service areas because they were detected by laboratory analysis and cannot be attributed to natural occurrence. All other site nonradionuclide COPCs were not detected or were quantified below background levels. Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration is reported but not included in the hazard quotient calculation. Total petroleum hydrocarbon (TPH) data are not included in the calculations since TPH includes a broad range of constituents rather than an individual contaminant.

A site specific area factor was determined for Service Area 7 to account for the small size of the waste site. This value was used to calculate the soil ingestion daily intake (Figure 1).

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

1) For example, the maximum result for molybdenum (0.71 mg/kg) in Service Area 1, divided by the noncarcinogenic RAG value of 400 mg/kg (calculated in accordance with the noncarcinogenic toxic effects WAC 173-340-740[3]), is 1.8×10^{-3}. 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 for Service Area 1 is 1.5×10^{-2} Comparing this value and the values from the other service areas to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the maximum value is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the maximum value for hexavalent chromium in Service Area 1 is 0.26 mg/kg; divided by 2.1 mg/kg, and multiplied as indicated, is 1.2×10^{-7}. Comparing this value, and all other individual values, to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The sum of the excess cancer risk values for Service Area 1 is 3.2×10^{-7}. Comparing this value and the values from the other service areas to the requirement of $<1 \times 10^{-5}$, this criterion is met.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 11	

RESULTS:

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

Figure 1. Supporting Calculations for Determining Site-Specific HQs for the 100-F-26:9 Waste Site: Service Area 7.

Site-specific area factor for soil ingestion pathway (from DOE-RL 1995).
DOE-RL, 1995, *Hanford Site Risk Assessment Methodology* (HSRAM), DOE/RL-91-45, Rev. 3, Appendix D, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

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

AFS = 1 for A > 1000 m^2, where A is the area of the contaminated zone, m^2

Servive Area 7 = 1.17E+01 m^2 (11.7 m long x 1 m wide)

Site-specific area factor (AFS) = 1.17E-02

Soil Ingestion Daily Intake Factor = (AFS*SI*ED*OFS*UCF1)/(BW*AL*UCF2) = AFS*(Soil Ingestion Constant)
Contaminant Ingestion Daily Intake = (CONC)*(Soil Ingestion Daily Intake Factor)

Variable	Value	Description
AFS	1.17E-02	unitless, Site-specific area factor
SI	73	g/yr, Soil Ingestion rate
ED	30	years, Exposure Duration
OFS	0.8	unitless, Occupancy factor
UCF1	0.001	kg/gm, Units conversion factor
BW	70	kg, Body weight
AL	70	years, Average lifetime
UCF2	365	days/year, Units conversion factor
RfD	contaminant specific	(mg/kg-day) Oral reference dose
CSF	contaminant specific	(kg-day/mg) Oral Cancer Slope Factor
CONC	contaminant specific	concentration of contaminant (mg/kg)

Soil Ingestion Daily Intake Factor = AFS*(Soil Ingestion Constant)
Soil Ingestion Constant = 9.80E-07 day^{-1}
Soil Ingestion Daily Intake Factor = 1.15E-08 day^{-1}
Contaminant Ingestion Daily Intake = (Soil Ingestion Daily Intake Factor)*(Contaminant Concentration)
Hazard Quotient = (Contaminant Ingestion Daily Intake)/(RfD)
Carcinogenic Risk = (Contaminant Ingestion Daily Intake)*(CSF)

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 11	

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 1.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	4.8	16,000	3.0E-04	--	--
Chromium, hexavalent[c]	0.26	240	1.1E-03	2.1	1.2E-07
Molybdenum	0.711	400	1.8E-03	--	--
Zinc	83.5	24,000	3.5E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.019	--	--	1.37[d]	1.4E-08
Benzo(a)pyrene	0.021	--	--	0.33[e]	6.4E-08
Benzo(k)fluoranthene	0.022	--	--	13.7[d]	1.6E-09
Bis(2-ethylhexyl) phthalate	0.022	1,600	1.4E-05	71.4	3.1E-10
Chrysene	0.029	--	--	137[d]	2.1E-10
Di-n-butylphthalate	0.018	8,000	2.3E-06	--	--
Fluoranthene	0.037	3,200	1.2E-05	--	--
Phenanthrene[f]	0.029	24,000	1.2E-06	--	--
Pyrene	0.047	2,400	2.0E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.014	1.6	8.8E-03	0.5	2.8E-08
Totals					
Cumulative Hazard Quotient:			**1.5E-02**		
Cumulative Excess Cancer Risk:					**3.2E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[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] = Calculated with toxicity values updated through May 1, 2008, using the appropriate formulas from WAC 173-340-740 (Ecology 1996). Updated toxicity values are available from the EPA Integrated Risk Information System (IRIS) at < http://www.epa.gov/iris > or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at < http://risk.lsd.ornl.gov >.
[e] = Individual carcinogenic risk calculated using the required detection limit. Contribution to cumulative carcinogenic risk calculated based on the remedial action goal instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.
[f] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemical: Contaminant: phenathrene, surrogate: anthracene

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Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 5 of 11	

Table 2. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 3.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	13.6	16,000	8.5E-04	--	--
Cadmium	0.90	80	1.1E-02	13.9	6.5E-08
Copper	26.1	2,960	8.8E-03	--	--
Lead[c]	17.8	--	--	--	--
Mercury	0.90	24	3.8E-02	--	--
Molybdenum	1.0	400	2.5E-03	--	--
Zinc	359	24,000	1.5E-02	--	--
Semivolatiles					
Anthracene	0.069	24,000	2.9E-06	--	--
Benzo(a)anthracene	0.36	--	--	1.37[d]	2.6E-07
Benzo(a)pyrene	0.29	--	--	0.33[e]	8.8E-07
Benzo(b)fluoranthene	0.28	--	--	1.37[d]	2.0E-07
Benzo(k)fluoranthene	0.29	--	--	13.7[d]	2.1E-08
Benzo(ghi)perylene[f]	0.18	2,400	7.5E-05	--	--
Bis(2-ethylhexyl) phthalate	0.14	1,600	8.8E-05	71.4	2.0E-09
Butylbenzylphthalate	0.071	16,000	4.4E-06	--	--
Carbazole	0.065	--	--	50	1.3E-09
Chrysene	0.37	--	--	137[d]	2.7E-09
Dibenzo(a,h)anthracene	0.079	--	--	0.33[e]	2.4E-07
Di-n-butylphthalate	0.50	8,000	6.3E-05	--	--
Fluoranthene	0.62	3,200	1.9E-04	--	--
Indeno(1,2,3-cd) pyrene	0.18	--	--	1.37	1.3E-07
Phenanthrene[f]	0.22	24,000	9.2E-06	--	--
Pyrene	0.47	2,400	2.0E-04	--	--
Polychlorinated Biphenyls					
Aroclor-1260	0.013	--	--	0.5	2.6E-08
Totals					
Cumulative Hazard Quotient:			**7.7E-02**		
Cumulative Excess Cancer Risk:					**3.4E-06**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[b] = Value obtained from *Washington Administrative Code* (WAC) 173-340-740(3), Method B, 1996, unless otherwise noted.
[c] = No RfD or CSF
[d] = Calculated with toxicity values updated through May 1, 2008, using the appropriate formulas from WAC 173-340-740 (Ecology 1996). Updated toxicity values are available from the EPA Integrated Risk Information System (IRIS) at < http://www.epa.gov/iris > or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at < http://risk.lsd.ornl.gov >.
[e] = Individual carcinogenic risk calculated using the required detection limit. Contribution to cumulative carcinogenic risk calculated based on the remedial action goal instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.
[f] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemicals: Contaminant: phenathrene, surrogate: anthracene; benzo(g,h,i)perylene, surrogate: pyrene.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
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Table 3. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 4.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	16.7	16,000	1.0E-03	--	--
Chromium, hexavalent[c]	0.25	240	1.1E-03	2.1	1.2E-07
Lead[d]	23.5	--	--	--	--
Mercury	1.3	24	5.4E-02	--	--
Molybdenum	0.338	400	8.5E-04	--	--
Zinc	79.4	24,000	3.3E-03	--	--
Semivolatiles					
Benzo(a)anthracene	0.029	--	--	1.37[e]	2.1E-08
Benzo(a)pyrene	0.024	--	--	0.33[f]	7.3E-08
Benzo(b)fluoranthene	0.033	--	--	1.37[e]	2.4E-08
Benzo(k)fluoranthene	0.021	--	--	13.7[e]	1.5E-09
Benzo(ghi)perylene[g]	0.023	2,400	9.6E-06	--	--
Bis(2-ethylhexyl) phthalate	0.067	1,600	4.2E-05	71.4	9.4E-10
Chrysene	0.037	--	--	137[e]	2.7E-10
Di-n-butylphthalate	0.045	8,000	5.6E-06	--	--
Fluoranthene	0.046	3,200	1.4E-05	--	--
Indeno(1,2,3-cd) pyrene	0.018	--	--	1.37	1.3E-08
Pyrene	0.032	2,400	1.3E-05	--	--
Totals					
Cumulative Hazard Quotient:			**6.1E-02**		
Cumulative Excess Cancer Risk:					**3.6E-07**

Notes:

RAG = remedial action goal

-- = not applicable

[a] = From WCH 2008.

[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] = No RfD or CSF

[e] = Calculated with toxicity values updated through May 1, 2008, using the appropriate formulas from WAC 173-340-740 (Ecology 1996). Updated toxicity values are available from the EPA Integrated Risk Information System (IRIS) at < http://www.epa.gov/iris > or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at < http://risk.lsd.ornl.gov >.

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

[g] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemical: Contaminant: benzo(g,h,i)perylene, surrogate: pyrene.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
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Table 4. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 5 Samples.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Barium	198	5,600	3.5E-02	--	--
Boron	11.5	16,000	7.2E-04	--	--
Chromium, hexavalent[c]	0.53	240	2.2E-03	2.1	2.5E-07
Copper	33.6	2,960	1.1E-02	--	--
Lead[d]	62.7	--	--	--	--
Mercury	10.50	24	4.4E-01	--	--
Molybdenum	1.6	400	4.0E-03	--	--
Nickel	39.4	1,600	2.5E-02	--	--
Silver	0.862	400	2.2E-03	--	--
Zinc	93.4	24,000	3.9E-03	--	--
Semivolatiles					
Acenaphthylene	0.022	4,800	4.6E-06	--	--
Anthracene	0.019	24,000	7.9E-07	--	--
Benzo(a)anthracene	0.041	--	--	1.37[e]	3.0E-08
Benzo(a)pyrene	0.039	--	--	0.33[f]	1.2E-07
Benzo(b)fluoranthene	0.065	--	--	1.37[e]	4.7E-08
Benzo(k)fluoranthene	0.062	--	--	13.7[e]	4.5E-09
Bis(2-ethylhexyl) phthalate	0.456	1,600	2.9E-04	71.4	6.4E-09
Chrysene	0.076	--	--	137[e]	5.5E-10
Fluoranthene	0.122	3,200	3.8E-05	--	--
Phenanthrene[f]	0.04	24,000	1.7E-06	--	--
Phenol	0.066	24,000	2.8E-06	--	--
Pyrene	0.077	2,400	3.2E-05	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.18	1.6	1.1E-01	0.5	3.6E-07
Totals					
Cumulative Hazard Quotient:			**6.3E-01**		
Cumulative Excess Cancer Risk:					**9.8E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[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] = No RfD or CSF
[e] = Calculated with toxicity values updated through May 1, 2008, using the appropriate formulas from WAC 173-340-740 (Ecology 1996). Updated toxicity values are available from the EPA Integrated Risk Information System (IRIS) at < http://www.epa.gov/iris > or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at < http://risk.lsd.ornl.gov >.
[f] = Individual carcinogenic risk calculated using the required detection limit. Contribution to cumulative carcinogenic risk calculated based on the remedial action goal instead of the required detection limit, per WAC 173-340-740(3), Method B, 1996.
[g] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemicals: Contaminant: phenathrene, surrogate: anthracene.

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Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 8 of 11	

Table 5. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 6 Samples.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	4.1	16,000	2.6E-04	--	--
Chromium, hexavalent[c]	0.26	240	1.1E-03	2.1	1.2E-07
Molybdenum	0.33	400	8.3E-04	--	--
Semivolatiles					
Bis(2-ethylhexyl) phthalate	0.049	1,600	3.1E-05	71.4	6.9E-10
Butylbenzylphthalate	0.048	16,000	3.0E-06	--	--
Diethylphthalate	0.034	64,000	5.3E-07	--	--
Di-n-butylphthalate	0.036	8,000	4.5E-06	--	--
Polychlorinated Biphenyls					
Aroclor-1260	0.028	--	--	0.5	5.6E-08
Totals					
Cumulative Hazard Quotient:			**2.2E-03**		
Cumulative Excess Cancer Risk:					**1.8E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[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.

Washington Closure Hanford CALCULATION SHEET

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Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
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Table 6. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 7 Samples.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Oral Reference Dose[b] (RfD) (mg/kg-day)	Hazard Quotient	Carcinogen Slope[b] Factor (kg-day/mg)	Carcinogen Risk
Metals					
Barium	133	2.00E-01	7.6E-06	--	--
Boron	7.5	2.00E-01	4.3E-07	--	--
Cadmium	1.8	1.00E-03	2.1E-05	6.30E+00	1.3E-07
Chromium, total	30	1.50E+00	2.3E-07		
Copper	48.6	3.70E-02	1.5E-05	--	--
Lead[d]	131	--	--	--	--
Mercury	15.4	3.00E-04	5.9E-04	--	--
Molybdenum	0.95	5.00E-03	2.2E-06	--	--
Silver	1.2	5.00E-03	2.8E-06	--	--
Zinc	140	3.00E-01	5.4E-06	--	--
Semivolatiles					
Bis(2-ethylhexyl) phthalate	0.33	2.00E-02	1.9E-07	1.40E-02	5.3E-11
Di-n-butylphthalate	0.23	1.00E-01	2.6E-08	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.55	2.00E-05	3.2E-04	2.00E+00	1.3E-08
Totals					
Cumulative Hazard Quotient:			**9.6E-04**		
Cumulative Excess Cancer Risk:					**1.4E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[b] = Obtained from the Ecology Cleanup Levels and Risk Calculations (CLARC) database at <http://www.ecy.wa.gov>.
[c] = Value for the carcinogen RAG calculated based on the inhalation exposure pathway (WAC) 173-340-750(3), 1996.
[d] = No RfD or CSF

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
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Table 7. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Waste Site: Service Area 8 Samples.

Contaminants of Potential Concern	Maximum Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	7.2	16,000	4.5E-04	--	--
Chromium, hexavalent[c]	0.34	240	1.4E-03	2.1	1.6E-07
Lead[d]	156	--	--	--	--
Molybdenum	0.69	400	1.7E-03	--	--
Semivolatiles					
Bis(2-ethylhexyl) phthalate	0.11	1,600	6.9E-05	71.4	1.5E-09
Butylbenzylphthalate	0.049	16,000	3.1E-06	--	--
Diethylphthalate	0.031	64,000	4.8E-07	--	--
Totals					
Cumulative Hazard Quotient:			**3.7E-03**		
Cumulative Excess Cancer Risk:					**1.6E-07**

Notes:
RAG = remedial action goal
-- = not applicable
[a] = From WCH 2008.
[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] = No RfD or CSF

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0363	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sullowav	Date:	7/15/08
Subject:	100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 11 of 11	

CONCLUSION:

This calculation demonstrates that the 100-F-26:9 waste site meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005) for Service Areas 1, 3, 4, 5, 6, 7 and 8.

Calculation Brief Distribution Sheet

Calculation Number: 0100F-CA-V0363

100-F-26:9 Confirmatory Sampling Hazard Quotient and Carcinogenic Risk Calculation

TITLE	NAME	MSIN	COPIES
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CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	05/21/08	**Calc. No.** 0100F-CA-V0364	**Rev. No.** 0
Project	100-F Field Remediation	**Job No.**	14655	**Checked** H. M. Sulloway	**Date** 05/21/08
Subject	100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation				**Sheet No.** 4 of 11

Summary (continued)

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

95% UCL > Cleanup Limit? YES
> 10% above Cleanup Limit? YES
Any sample > 2x Cleanup Limit? YES

Because of the "yes" answers to the WAC 173-340 3-part test for lead and bis(2-ethylhexyl) phthalate, additional evaluation of attainment of cleanup criteria will be performed.

Relative Percent Difference Results[a,b] -

Analyte	Staging Pile Duplicate Analysis
Potassium-40	32%
Aluminum	4%
Barium	3%
Calcium	3%
Chromium	7%
Copper	5%
Iron	3%
Magnesium	2%
Manganese	0%
Silicon	58%
Vanadium	3%
Zinc	0%

[a]Relative percent difference evaluation was not required for analytes not included in this table.
[b]The significance of relative percent difference values are discussed within the RSVP for the subject site.

BCL = below cleanup level
CLARC = Cleanup Levels and Risk Calculations
COC = contaminant of concern
COPC = contaminant of potential concern
DE = direct exposure
GEA = gamma energy analysis
GW = groundwater
QA/QC = quality assurance/quality control
MDA = minimum detectable activity
RAG = remedial action goal
RDR/RAWP = Remedial Design Report/Remedial Action Work Plan
RPD = relative percent difference
RSVP = remaining sites verification package
SAP = Sampling and Analysis Plan
TDL = target detection limit
U = undetected
UCL = upper confidence limit

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel	**Date** 05/21/08	**Calc. No.** 0100F-CA-V0364	**Rev. No.** 0
Project 100-F Field Remediation	**Job No.** 14655	**Checked** H. M. Sulloway	**Date** 05/21/08
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation			**Sheet No.** 3 of 11

Summary (continued)

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

Results:

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

Results Summary[a]

Analyte	Staging Pile[b]	Units
Arsenic	6.7	mg/kg
Barium	58.7	mg/kg
Beryllium	0.46	mg/kg
Boron	1.8	mg/kg
Chromium	10.4	mg/kg
Hexavalent Chromium	0.23	mg/kg
Cobalt	5.8	mg/kg
Copper	15.5	mg/kg
Lead	20.2	mg/kg
Manganese	264	mg/kg
Mercury	0.12	mg/kg
Molybdenum	0.75	mg/kg
Nickel	11.1	mg/kg
Vanadium	30.6	mg/kg
Zinc	36.3	mg/kg
Aroclor-1254	23	ug/kg
Aroclor-1260	19	ug/kg
TPH	418	mg/kg
Dichlorodiphenyldichloroethylene	2.9	ug/kg
Endrin ketone	2.6	ug/kg
gamma-Chlordane	2.6	ug/kg
Anthracene	26	ug/kg
Benzo(a)anthracene	120	ug/kg
Benzo(a)pyrene	140	ug/kg
Benzo(b)fluoranthene	75	ug/kg
Benzo(ghi)perylene	87	ug/kg
Benzo(k)fluoranthene	120	ug/kg
Bis(2-ethylhexyl) phthalate	245	ug/kg
Chrysene	160	ug/kg
Di-n-butylphthalate	26	ug/kg
Fluoranthene	200	ug/kg
Indeno(1,2,3-cd)pyrene	83	ug/kg
Phenanthrene	150	ug/kg
Pyrene	260	ug/kg

[a]No detections were reported in any data set for COCs/COPCs not listed in this table.
[b]Maximum or 95% UCL result, depending on data censorship, as described in the calculation methodology.

CALCULATION SHEET

Washington Closure Hanford

Originator	L. D. Habel	**Date**	05/21/08	**Calc. No.**	0100F-CA-V0364
Rev. No.	0	**Project**	100-F Field Remediation	**Job No.**	14655
Checked	H. M. Sulloway	**Date**	05/21/08	**Subject**	100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation
Sheet No.	2 of 11				

Summary (continued)

UCL 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.

Calculated cleanup levels are not available in Ecology (2005) under WAC 173-340-740(3) for:

aluminum, calcium, iron, magnesium, potassium, silicon, and sodium;

therefore, these constituents are not considered site COPCs and are also not included in these tables.

The 95% UCL values were not calculated for radium-226, radium-228, thorium-228, thorium-232, and potassium-40, as these isotopes are excluded from consideration as COCs based on natural occurrence and analogous site information.

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

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

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

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

The RPD values are evaluated for analytes detected in a primary-duplicate or primary-split sample pair for the purposes of data quality assessment within the CVP. The RPD is calculated when both the primary value and the duplicate value for a given analyte are above detection limits and are greater than 5 times the target detection limit (TDL). The 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. To assist in the identification of anomalous sample pairs, when an analyte is detected in the primary or duplicate/split sample, but was quantified at less than 5 times the TDL in one or both samples, an additional parameter is evaluated. In this case, if the difference between the primary and duplicate/split results exceed a control limit of 2 times the TDL, further assessment regarding the usability of the data is performed. Additional discussion is provided in the data quality assessment section of the applicable RSVP, as necessary.

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel		**Date** 05/21/08	**Calc. No.** 0100F-CA-V0364	**Rev. No.** 0	
Project 100-F Field Remediation		**Job No.** 14655	**Checked** H. M. Sulloway	**Date** 05/21/08	
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation				**Sheet No.** 1 of 11	

Summary

Purpose:

Calculate the 95% upper confidence limit (UCL) values to evaluate compliance with cleanup standards for the shallow zone excavation of the subject site. Also, perform the Washington Administrative Code (WAC) 173-340-740(7)(e) 3-part test for nonradionuclide contaminants of concern (COCs) and contaminants of potential concern (COPCs) and calculate the relative percent difference (RPD) for primary-duplicate sample pairs, as necessary.

Table of Contents:

Sheets 1 to 4 - Summary
Sheets 5 to 6 - Staging Pile Statistical Calculations
Sheet 7 to 10 - Ecology Software (MTCAStat) Results (Staging Pile)
Sheet 11 - Split/Duplicate Analysis (Staging Pile)
Attachment 1 - Verification Sampling Results (21 sheets)

Given/References:

1) Sample Results (Attachment 1).
2) Background values and remedial action goals (RAGs) are from DOE-RL (1996), DOE-RL (2001), DOE-RL (2005b) and Ecology (2005).
3) 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.
4) 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.
5) Ecology, 1992, *Statistical Guidance for Ecology Site Managers*, Publication #92-54, Washington Department of Ecology, Olympia, Washington.
6) 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.
6) DOE-RL, 1996, *Hanford Site Background: Part 2, Soil Background for Radioactive Analytes*, DOE/RL-96-12, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
7) Ecology, 2005, *Cleanup Levels and Risk Calculations (CLARC) Database*, Washington State Department of Ecology, Olympia, Washington, <https://fortress.wa.gov/ecy/clarc/CLARCHome.aspx>.
8) 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.
9) WAC 173-340, 1996, "Model Toxic Control Act - Cleanup," Washington Administrative Code.
10) WCH, 2008, *Work Instruction for Verification Sampling of 100-F-26:9, 1607-F2 Sanitary Sewer Pipelines*, 0100F-WI-G0067, Rev. 0. Washington Closure Hanford, Inc., Richland, Washington.

Solution:

Calculation methodology is described in Ecology publication #92-54 (Ecology 1992, 1993), below, and in the RDR/RAWP (DOE-RL 2005b). Use data from attached worksheets to perform the 95% UCL calculation for each analyte, the WAC 173-340-740(7)(e) 3-part test for nonradionuclides, and the RPD calculations for primary-duplicate sample pairs, 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.

This calculation only pertains to the statistically derived sample locations relating to the staging pile footprint (SP) of the 100-F-26:9, 1607-F2 Sanitary Sewer Pipelines (WCH 2008).

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0364

Subject: 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Total = 33	L. D. Habel	H. M. Sulloway	NA	J. D. Fancher	
						4/27/08

SUMMARY OF REVISION

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

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Naphthalene			Nitrobenzene			Pentachlorophenol			Phenanthrene			Phenol			Pyrene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	360	U	360	360	U	360	900	U	900	150	J	360	360	U	360	260	J	360
SP-4	J16964	2/12/08	360	U	360	360	U	360	910	U	910	22	J	360	360	U	360	42	J	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	930.0	U	930	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	940	U	940	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	950	U	950	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	960	U	960	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	940	U	940	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	21 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Hexachlorocyclopentadiene			Hexachloroethane			Indeno(1,2,3-cd)pyrene			Isophorone			N-Nitroso-di-n-dipropylamine			N-Nitrosodiphenylamine		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	360	U	360	360	U	360	83	J	360	360	U	360	360	U	360	360	U	360
SP-4	J16964	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	20 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Fluoranthene			Fluorene			Hexachlorobenzene			Hexachlorobutadiene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	200	J	360	360	U	360	360	U	360	360	U	360
SP-4	J16964	2/12/08	28	J	360	360	U	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	19 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Chrysene			Di-n-butylphthalate			Di-n-octylphthalate			Dibenz[a,h]anthracene			Dibenzofuran			Diethylphthalate			Dimethyl phthalate		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	22	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	160	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-4	J16964	2/12/08	25	J	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	26	J	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	18 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Benzo(k)fluoranthene			Bis(2-chloro-1-methylethyl)ether			Bis(2-Chloroethoxy)methane			Bis(2-chloroethyl) ether			Bis(2-ethylhexyl) phthalate			Butylbenzylphthalate			Carbazole		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	510	B	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360	59	JB	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	120	J	360	360	U	360	360	U	360	360	U	360	61	JB	360	360	U	360	360	U	360
SP-4	J16964	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360	110	JB	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	110	JB	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	390	U	390	390	U	390	89	JB	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	410	B	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	150	JB	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	46	JB	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	58	JB	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	67	JB	370	370	U	370	370	U	370

Attachment	1	Sheet No.	17 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Acenaphthene			Acenaphthylene			Anthracene			Benzo(a)anthracene			Benzo(a)pyrene			Benzo(b)fluoranthene			Benzo(ghi)perylene		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	360	U	360	360	U	360	26	J	360	120	J	360	140	J	360	75	J	360	87	J	360
SP-4	J16964	2/12/08	360	U	360	360	U	360	360	U	360	21	J	360	360	U	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	16 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	4,6-Dinitro-2-methylphenol			4-Bromophenylphenyl ether			4-Chloro-3-methylphenol			4-Chloroaniline			4-Chlorophenylphenyl ether			4-Nitroaniline			4-Nitrophenol		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	920	U	920
SP-2	J16962	2/12/08	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	910	U	910
SP-3	J16963	2/12/08	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	900	U	900
SP-4	J16964	2/12/08	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	910	U	910
SP-5	J16965	2/12/08	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	930	U	930
SP-6	J16966	2/12/08	970	U	970	390	U	390	390	U	390	390	U	390	390	U	390	970	U	970	970	U	970
SP-7	J16967	2/12/08	940	U	940	380	U	380	380	U	380	380	U	380	380	U	380	940	U	940	940	U	940
SP-8	J16968	2/12/08	950	U	950	380	U	380	380	U	380	380	U	380	380	U	380	950	U	950	950	U	950
SP-9	J16969	2/12/08	960	U	960	380	U	380	380	U	380	380	U	380	380	U	380	960	U	960	960	U	960
SP-10	J16970	2/12/08	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	920	U	920
Dup. of SP-10	J16971	2/12/08	940	U	940	370	U	370	370	U	370	370	U	370	370	U	370	940	U	940	940	U	940

Attachment	1	Sheet No.	15 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	2-Methylnaphthalene			2-Methylphenol (cresol, o-)			2-Nitroaniline			2-Nitrophenol			3+4 Methylphenol (cresol, m+p)			3,3'-Dichlorobenzidine			3-Nitroaniline		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	920	U	920
SP-2	J16962	2/12/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	910	U	910
SP-3	J16963	2/12/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	900	U	900
SP-4	J16964	2/12/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	910	U	910
SP-5	J16965	2/12/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	930	U	930
SP-6	J16966	2/12/08	390	U	390	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390	970	U	970
SP-7	J16967	2/12/08	380	U	380	380	U	380	940	U	940	380	U	380	380	U	380	380	U	380	940	U	940
SP-8	J16968	2/12/08	380	U	380	380	U	380	950	U	950	380	U	380	380	U	380	380	U	380	950	U	950
SP-9	J16969	2/12/08	380	U	380	380	U	380	960	U	960	380	U	380	380	U	380	380	U	380	960	U	960
SP-10	J16970	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	920	U	920
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	940	U	940	370	U	370	370	U	370	370	U	370	940	U	940

Attachment	1	Sheet No.	14 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	2,4-Dichlorophenol			2,4-Dimethylphenol			2,4-Dinitrophenol			2,4-Dinitrotoluene			2,6-Dinitrotoluene			2-Chloronaphthalene			2-Chlorophenol		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370
SP-2	J16962	2/12/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360
SP-3	J16963	2/12/08	360	U	360	360	U	360	900	U	900	360	U	360	360	U	360	360	U	360	360	U	360
SP-4	J16964	2/12/08	360	U	360	360	U	360	910	U	910	360	U	360	360	U	360	360	U	360	360	U	360
SP-5	J16965	2/12/08	370	U	370	370	U	370	930	U	930	370	U	370	370	U	370	370	U	370	370	U	370
SP-6	J16966	2/12/08	390	U	390	390	U	390	970	U	970	390	U	390	390	U	390	390	U	390	390	U	390
SP-7	J16967	2/12/08	380	U	380	380	U	380	940	U	940	380	U	380	380	U	380	380	U	380	380	U	380
SP-8	J16968	2/12/08	380	U	380	380	U	380	950	U	950	380	U	380	380	U	380	380	U	380	380	U	380
SP-9	J16969	2/12/08	380	U	380	380	U	380	960	U	960	380	U	380	380	U	380	380	U	380	380	U	380
SP-10	J16970	2/12/08	370	U	370	370	U	370	920	U	920	370	U	370	370	U	370	370	U	370	370	U	370
Dup. of SP-10	J16971	2/12/08	370	U	370	370	U	370	940	U	940	370	U	370	370	U	370	370	U	370	370	U	370

Attachment	1	Sheet No.	13 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Toxaphene			1,2,4-Trichlorobenzene			1,2-Dichlorobenzene			1,3-Dichlorobenzene			1,4-Dichlorobenzene			2,4,5-Trichlorophenol			2,4,6-Trichlorophenol		
			ug/Kg	Q	PQL	#N/A	Q	PQL	#N/A	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	15	UD	15	370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	370	U	370
SP-2	J16962	2/12/08	15	UD	15	360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	360	U	360
SP-3	J16963	2/12/08	14	UD	14	360	U	360	360	U	360	360	U	360	360	U	360	900	U	900	360	U	360
SP-4	J16964	2/12/08	15	UD	15	360	U	360	360	U	360	360	U	360	360	U	360	910	U	910	360	U	360
SP-5	J16965	2/12/08	15	UD	15	370	U	370	370	U	370	370	U	370	370	U	370	930	U	930	370	U	370
SP-6	J16966	2/12/08	15	UD	15	390	U	390	390	U	390	390	U	390	390	U	390	970	U	970	390	U	390
SP-7	J16967	2/12/08	15	UD	15	380	U	380	380	U	380	380	U	380	380	U	380	940	U	940	380	U	380
SP-8	J16968	2/12/08	15	UD	15	380	U	380	380	U	380	380	U	380	380	U	380	950	U	950	380	U	380
SP-9	J16969	2/12/08	15	UD	15	380	U	380	380	U	380	380	U	380	380	U	380	960	U	960	380	U	380
SP-10	J16970	2/12/08	15	UD	15	370	U	370	370	U	370	370	U	370	370	U	370	920	U	920	370	U	370
Dup. of SP-10	J16971	2/12/08	15	UD	15	370	U	370	370	U	370	370	U	370	370	U	370	940	U	940	370	U	370

Attachment	1	Sheet No.	12 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Endrin aldehyde			Endrin ketone			Gamma-BHC (Lindane)			gamma-Chlordane			Heptachlor			Heptachlor epoxide			Methoxychlor		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-2	J16962	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-3	J16963	2/12/08	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4
SP-4	J16964	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-5	J16965	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-6	J16966	2/12/08	1.5	UD	1.5	2.6	JD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-7	J16967	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-8	J16968	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-9	J16969	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	2.6	JD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-10	J16970	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dup. of SP-10	J16971	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5

Attachment	1	Sheet No.	11 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Dichlorodiphenyldichloroethylene			Dichlorodiphenyltrichloroethane			Dieldrin			Endosulfan I			Endosulfan II			Endosulfan sulfate			Endrin		
			ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-2	J16962	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-3	J16963	2/12/08	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4
SP-4	J16964	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-5	J16965	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-6	J16966	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-7	J16967	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-8	J16968	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-9	J16969	2/12/08	2.9	JD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-10	J16970	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dup. of SP-10	J16971	2/12/08	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5

Attachment	1	Sheet No.	10 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	TPH			Aldrin			Alpha-BHC			alpha-Chlordane			beta-1,2,3,4,5,6-Hexachlorocyclohexane			Delta-BHC			Dichlorodiphenyldichloroethane		
			mg/kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL	ug/Kg	Q	PQL
SP-1	J16961	2/12/08	147	U	147	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-2	J16962	2/12/08	145	U	145	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-3	J16963	2/12/08	143	U	143	1.4	UD	1.4	1.4	UD	1.4	1.4	UD	1.4	3.9	JD	3.9	1.4	UD	1.4	1.4	UD	1.4
SP-4	J16964	2/12/08	145	U	145	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-5	J16965	2/12/08	149	U	149	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-6	J16966	2/12/08	418		154	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-7	J16967	2/12/08	150	U	150	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-8	J16968	2/12/08	152	U	152	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-9	J16969	2/12/08	153	U	153	1.5	UD	1.5	1.5	UD	1.5	2.7	JD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
SP-10	J16970	2/12/08	146	U	146	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5
Dup. of SP-10	J16971	2/12/08	149	U	149	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5	1.5	UD	1.5

Attachment	1	Sheet No.	9 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aroclor-1016			Aroclor-1221			Aroclor-1232			Aroclor-1242			Aroclor-1248			Aroclor-1254			Aroclor-1260		
			ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL	ug/kg	Q	PQL
SP-1	J16961	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-2	J16962	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-3	J16963	2/12/08	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14	14	U	14
SP-4	J16964	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-5	J16965	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-6	J16966	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	23	J	15	19		15
SP-7	J16967	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-8	J16968	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-9	J16969	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
SP-10	J16970	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15
Dup. of SP-10	J16971	2/12/08	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15	15	U	15

Attachment	1	Sheet No.	8 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Silicon			Silver			Sodium			Vanadium			Zinc		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SP-1	J16961	2/12/08	220		10.7	0.27	U	0.27	119	C	5.4	26.4		0.38	32.4	C	1.6
SP-2	J16962	2/12/08	207		9.8	0.25	U	0.25	122	C	4.9	28.2		0.34	30.9	C	1.5
SP-3	J16963	2/12/08	196		10.0	0.25	U	0.25	149	C	5.0	29.4		0.35	37.4	C	1.5
SP-4	J16964	2/12/08	209		9.9	0.25	U	0.25	115	C	5.0	25.2		0.35	32.3	C	1.5
SP-5	J16965	2/12/08	189		10.5	0.26	U	0.26	143	C	5.2	33.1		0.37	38.3	C	1.6
SP-6	J16966	2/12/08	242		9.7	0.24	U	0.24	223	C	4.8	29.5		0.34	38.4	C	1.5
SP-7	J16967	2/12/08	193		11.4	0.28	U	0.28	131	C	5.7	33.7		0.40	35.7	C	1.7
SP-8	J16968	2/12/08	259		8.9	0.22	U	0.22	119	C	4.5	27.1		0.31	32.8	C	1.3
SP-9	J16969	2/12/08	279		11.5	0.29	U	0.29	118	C	5.8	28.1		0.40	38.0	C	1.7
SP-10	J16970	2/12/08	213		10.5	0.26	U	0.26	121	C	5.2	28.8		0.37	30.7	C	1.6
Dup. of SP-10	J16971	2/12/08	117		7.0	0.17	U	0.17	116	C	3.5	29.8		0.24	30.7	C	1.0

Attachment	1	Sheet No.	7 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

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
SP-1	J16961	2/12/08	3460		6.7	240	C	0.11	0.01	U	0.01	0.80	U	0.80	10.3		0.54	1030		132	1.6	U	1.6
SP-2	J16962	2/12/08	3470		6.1	236	C	0.10	0.009	U	0.009	0.75		0.74	10.4		0.49	929		121	1.5	U	1.5
SP-3	J16963	2/12/08	3510		6.3	230	C	0.10	0.02		0.008	0.75	U	0.75	9.9		0.50	897		123	1.5	U	1.5
SP-4	J16964	2/12/08	3340		6.2	228	C	0.10	0.009	U	0.009	0.74	U	0.74	10.0		0.50	941		122	1.5	U	1.5
SP-5	J16965	2/12/08	4300		6.5	268	C	0.10	0.01	U	0.01	0.79	U	0.79	11.7		0.52	1130		129	1.6	U	1.6
SP-6	J16966	2/12/08	3930		6.0	268	C	0.10	0.12		0.009	0.73	U	0.73	10.8		0.48	1300		119	1.5	U	1.5
SP-7	J16967	2/12/08	4210		7.1	267	C	0.11	0.009	U	0.009	0.86	U	0.86	12.0		0.57	1140		140	1.7	U	1.7
SP-8	J16968	2/12/08	3730		4.5	261	C	0.09	0.01	U	0.01	0.67	U	0.67	10.1		0.45	1180		110	1.3	U	1.3
SP-9	J16969	2/12/08	3660		7.2	285	C	0.12	0.01	U	0.01	0.86	U	0.86	10.8		0.58	1180		142	1.7	U	1.7
SP-10	J16970	2/12/08	3690		6.5	233	C	0.10	0.01	U	0.01	0.78	U	0.78	11.5		0.52	911		129	1.6	U	1.6
Dup. of SP-10	J16971	2/12/08	3630		4.4	233	C	0.07	0.008	U	0.008	0.52	U	0.52	10.6		0.35	808		86.0	1.0	U	1.0

Attachment	1	Sheet No.	6 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Calcium			Chromium			Hexavalent Chromium			Cobalt			Copper			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
SP-1	J16961	2/12/08	3480	C	10.7	9.5	C	0.54	0.22	U	0.22	5.4		0.54	13.7		0.62	14500		12.1	4.0		0.80
SP-2	J16962	2/12/08	4000	C	9.8	8.5	C	0.49	0.22	U	0.22	5.5		0.49	13.5		0.57	13700		11.1	5.4		0.74
SP-3	J16963	2/12/08	4680	C	10.0	10.4	C	0.50	0.36		0.22	5.2		0.50	16.5		0.58	14200		11.3	6.9		0.75
SP-4	J16964	2/12/08	3600	C	9.9	8.7	C	0.50	0.23		0.22	5.0		0.50	12.7		0.57	13200		11.3	4.8		0.74
SP-5	J16965	2/12/08	3820	C	10.5	11.0	C	0.52	0.27		0.22	6.1		0.52	14.9		0.60	16700		11.8	60.1		0.79
SP-6	J16966	2/12/08	5430	C	9.7	11.0	C	0.48	0.26		0.23	5.7		0.48	13.3		0.56	15000		10.9	11.2		0.73
SP-7	J16967	2/12/08	4120	C	11.4	10.7	C	0.57	0.23	U	0.23	6.1		0.57	17.2		0.66	16200		12.8	4.6		0.86
SP-8	J16968	2/12/08	3710	C	8.9	8.9	C	0.45	0.23	U	0.23	5.6		0.45	12.9		0.51	14000		10.0	5.4		0.67
SP-9	J16969	2/12/08	3760	C	11.5	10.4	C	0.58	0.23	U	0.23	5.8		0.58	15.4		0.66	14600		13.0	5.6		0.86
SP-10	J16970	2/12/08	3270	C	10.5	9.4	C	0.52	0.24		0.22	5.4		0.52	15.6		0.60	14400		11.8	4.1		0.78
Dup. of SP-10	J16971	2/12/08	3370	C	7.0	8.8	C	0.35	0.22	U	0.22	5.7		0.35	14.9		0.40	14800		7.9	4.1		0.52

Attachment	1	Sheet No.	5 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Aluminum			Antimony			Arsenic			Barium			Beryllium			Boron			Cadmium		
			mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
SP-1	J16961	2/12/08	5850		10.7	0.80	U	0.80	1.6		1.3	52.1		0.27	0.38		0.13	1.3	U	1.3	0.13	U	0.13
SP-2	J16962	2/12/08	5520		9.8	0.74	U	0.74	3.1		1.2	46.7		0.25	0.41		0.12	1.2	U	1.2	0.12	U	0.12
SP-3	J16963	2/12/08	5250		10.0	0.75	U	0.75	2.7		1.3	49.1		0.25	0.39		0.13	1.3	U	1.3	0.13	U	0.13
SP-4	J16964	2/12/08	5270		9.9	0.74	U	0.74	2.6		1.2	46.2		0.25	0.37		0.12	1.2	U	1.2	0.12	U	0.12
SP-5	J16965	2/12/08	7480		10.5	0.79	U	0.79	18.3		1.3	66.3		0.26	0.51		0.13	1.3	U	1.3	0.13	U	0.13
SP-6	J16966	2/12/08	6260		9.7	0.73	U	0.73	2.7		1.2	66.2		0.24	0.45		0.12	1.8		1.2	0.12	U	0.12
SP-7	J16967	2/12/08	6770		11.4	0.86	U	0.86	2.3		1.4	52.0		0.28	0.48		0.14	1.4	U	1.4	0.14	U	0.14
SP-8	J16968	2/12/08	5730		8.9	0.67	U	0.67	2.7		1.1	55.6		0.22	0.44		0.11	1.5		1.1	0.11	U	0.11
SP-9	J16969	2/12/08	6020		11.5	0.86	U	0.86	2.8		1.4	63.8		0.29	0.46		0.14	1.4	U	1.4	0.14	U	0.14
SP-10	J16970	2/12/08	5760		10.5	0.78	U	0.78	2.4		1.3	45.0		0.26	0.44		0.13	1.3	U	1.3	0.13	U	0.13
Dup. of SP-10	J16971	2/12/08	5520		7.0	0.52	U	0.52	2.5		0.87	46.2		0.17	0.46		0.09	0.87	U	0.87	0.09	U	0.09

Attachment	1	Sheet No.	4 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Uranium-238			Gross alpha			Gross beta		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SP-1	J16961	2/12/08	3.9	U	3.9	13.5		6.63	17.6		6.07
SP-2	J16962	2/12/08	5.0	U	5.0	11.0		8.13	23.7		9.15
SP-3	J16963	2/12/08	3.1	U	3.1	3.45	U	6.70	12.6		5.63
SP-4	J16964	2/12/08	3.8	U	3.8	16.3		8.94	21.1		5.39
SP-5	J16965	2/12/08	11.4	U	11.4	12.3		7.43	20.8		8.76
SP-6	J16966	2/12/08	11.5	U	11.5	10.5		5.33	18.9		5.53
SP-7	J16967	2/12/08	6.4	U	6.4	6.41	U	7.20	16.5		6.11
SP-8	J16968	2/12/08	4.1	U	4.1	7.26	U	8.46	24.7		9.25
SP-9	J16969	2/12/08	3.9	U	3.9	8.79		7.11	19.6		5.41
SP-10	J16970	2/12/08	2.5	U	2.5	14.4		6.91	19.7		6.36
Dup. of SP-10	J16971	2/12/08	8.4	U	8.4	9.00		5.96	15.5		5.36

Attachment	1	Sheet No.	3 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Potassium-40			Radium-226			Radium-228			Silver-108			Thorium-228			Thorium-232			Uranium-235		
			pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA	pCi/g	Q	MDA
SP-1	J16961	2/12/08	14.2		0.345	0.500		0.061	0.780		0.146	0.024	U	0.024	0.693		0.042	0.780		0.146	0.124	U	0.124
SP-2	J16962	2/12/08	6.4		0.440	0.191		0.082	0.584		0.168	0.033	U	0.033	0.490		0.054	0.584		0.168	0.158	U	0.158
SP-3	J16963	2/12/08	13.7		0.302	0.479		0.051	0.732		0.112	0.017	U	0.017	0.638		0.033	0.732		0.112	0.097	U	0.097
SP-4	J16964	2/12/08	12.3		0.349	0.484		0.070	0.680		0.149	0.025	U	0.025	0.678		0.044	0.680		0.149	0.156	U	0.156
SP-5	J16965	2/12/08	11.8		0.926	0.486		0.157	0.751		0.394	0.065	U	0.065	0.907		0.153	0.751		0.394	0.315	U	0.315
SP-6	J16966	2/12/08	12.8		0.746	0.418		0.165	0.526		0.348	0.073	U	0.073	0.779		0.190	0.526		0.348	0.316	U	0.316
SP-7	J16967	2/12/08	13.7		0.531	0.401		0.103	0.634		0.220	0.052	U	0.052	0.831		0.128	0.634		0.220	0.268	U	0.268
SP-8	J16968	2/12/08	13.6		0.347	0.510		0.071	0.722		0.131	0.024	U	0.024	0.825		0.063	0.722		0.131	0.122	U	0.122
SP-9	J16969	2/12/08	11.5		0.304	0.390		0.063	0.627		0.134	0.025	U	0.025	0.897		0.059	0.627		0.134	0.108	U	0.108
SP-10	J16970	2/12/08	13.0		0.184	0.385		0.048	0.727		0.091	0.017	U	0.017	0.753		0.047	0.727		0.091	0.101	U	0.101
Dup. of SP-10	J16971	2/12/08	9.4		0.637	0.301		0.134	0.388		0.315	0.053	U	0.053	0.516		0.084	0.388		0.315	0.231	U	0.231

Attachment	1	Sheet No.	2 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	
Calc. No.	0100F-CA-V0364	Rev. No.	0

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
Job No. 14655

Calc. No. 0100F-CA-V0364
Checked H. M. Sulloway

Rev. No. 0
Date 05/21/08
Sheet No. 5 of 11

1 **100-F-26:12 Excavation Shallow Zone Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Arsenic			Barium			Beryllium			Chromium			Hexavalent Chromium			Cobalt			Copper		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL
5	SP-10	J16970	2/12/08	2.4		1.3	45.0		0.26	0.44		0.13	9.4	C	0.5	0.24		0.22	5.4		0.52	15.6		0.60
6	Dup. of SP-10	J16971	2/12/08	2.5		0.87	46.2		0.17	0.46		0.09	8.8	C	0.4	0.22	U	0.22	5.7		0.35	14.9		0.40
7	SP-1	J16961	2/12/08	1.6		1.3	52.1		0.27	0.38		0.13	9.5	C	0.5	0.22	U	0.22	5.4		0.54	13.7		0.62
8	SP-2	J16962	2/12/08	3.1		1.2	46.7		0.25	0.41		0.12	8.5	C	0.5	0.22	U	0.22	5.5		0.49	13.5		0.57
9	SP-3	J16963	2/12/08	2.7		1.3	49.1		0.25	0.39		0.13	10.4	C	0.5	0.36		0.22	5.2		0.50	16.5		0.58
10	SP-4	J16964	2/12/08	2.6		1.2	46.2		0.25	0.37		0.12	8.7	C	0.5	0.23		0.22	5.0		0.50	12.7		0.57
11	SP-5	J16965	2/12/08	18.3		1.3	66.3		0.26	0.51		0.13	11.0	C	0.5	0.27		0.22	6.1		0.52	14.9		0.60
12	SP-6	J16966	2/12/08	2.7		1.2	66.2		0.24	0.45		0.12	11.0	C	0.5	0.26		0.23	5.7		0.48	13.3		0.56
13	SP-7	J16967	2/12/08	2.3		1.4	52.0		0.28	0.48		0.14	10.7	C	0.6	0.23	U	0.23	6.1		0.57	17.2		0.66
14	SP-8	J16968	2/12/08	2.7		1.1	55.6		0.22	0.44		0.11	8.9	C	0.5	0.23	U	0.23	5.6		0.45	12.9		0.51
15	SP-9	J16969	2/12/08	2.8		1.4	63.8		0.29	0.46		0.14	10.4	C	0.6	0.23	U	0.23	5.8		0.58	15.4		0.66

16 **Statistical Computation Input Data**

17	Sample	Sample	Sample	Arsenic	Barium	Beryllium	Chromium	Hexavalent Chromium	Cobalt	Copper
18	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
19	SP-10	J16970/J16971	2/12/08	2.5	45.6	0.45	9.1	0.18	5.6	15.3
20	SP-1	J16961	2/12/08	1.6	52.1	0.38	9.5	0.11	5.4	13.7
21	SP-2	J16962	2/12/08	3.1	46.7	0.41	8.5	0.11	5.5	13.5
22	SP-3	J16963	2/12/08	2.7	49.1	0.39	10.4	0.36	5.2	16.5
23	SP-4	J16964	2/12/08	2.6	46.2	0.37	8.7	0.23	5.0	12.7
24	SP-5	J16965	2/12/08	18.3	66.3	0.51	11.0	0.27	6.1	14.9
25	SP-6	J16966	2/12/08	2.7	66.2	0.45	11.0	0.26	5.7	13.3
26	SP-7	J16967	2/12/08	2.3	52.0	0.48	10.7	0.12	6.1	17.2
27	SP-8	J16968	2/12/08	2.7	55.6	0.44	8.9	0.12	5.6	12.9
28	SP-9	J16969	2/12/08	2.8	63.8	0.46	10.4	0.12	5.8	15.4

29 **Statistical Computations**

30		Arsenic	Barium	Beryllium	Chromium	Hexavalent Chromium	Cobalt	Copper
31	95% UCL based on	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.
32	N	10	10	10	10	10	10	10
33	% < Detection limit	0%	0%	0%	0%	50%	0%	0%
34	Mean	4.1	54.4	0.43	9.8	0.19	5.6	14.5
35	Standard deviation	5.0	8.3	0.05	1.0	0.09	0.35	1.6
36	95% UCL on mean	6.7	58.7	0.46	10.4	0.23	5.8	15.5
37	Maximum detected value	18.3	66.3	0.51	11.0	0.36	6.1	17.2
38	Final Statistical Value (nonRad)	6.7	58.7	0.46	10.4	0.23	5.8	15.5
39	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg)**	20 DE & GW & River Protection	132 GW Protection	1.51 GW & River Protection	18.5 GW & River Protection	2 River Protection	32 GW Protection	22 River Protection
40	**WAC 173-340 3-PART TEST**							
41	95% UCL > Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA
42	> 10% above Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA
43	Any sample > 2X Cleanup Limit?	NA	NA	NA	NA	NO	NA	NA
44	**WAC 173-340 Compliance? Yes**	Because all values are below background (20 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (132 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (1.51 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (18.5 mg/kg), the WAC 173-340 3-part test is not required.	Yes	Because all values are below background (15.7 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (22.0 mg/kg), the WAC 173-340 3-part test is not required.

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
Job No. 14655

Calc. No. 0100F-CA-V0364
Checked H. M. Sulloway

Rev. No. 0
Date 5/22/08
Sheet No. 11 of 11

Split/Duplicate Analysis, Staging Pile

Sample Area	Sample Number	Sample Date	Potassium-40 pCi/g	Q	MDA	Radium-226 pCi/g	Q	MDA	Radium-228 pCi/g	Q	MDA	Thorium-228 pCi/g	Q	MDA	Thorium-232 pCi/g	Q	MDA	Gross alpha pCi/g	Q	MDA	Gross beta pCi/g	Q	MDA	Aluminum mg/kg	Q	PQL
SP-10	J16970	2/12/08	13.0		0.184	0.385		0.048	0.727		0.091	0.753		0.047	0.727		0.091	14.4		6.91	19.7		6.36	5760		10.5
Dup. of SP-10	J16971	2/12/08	9.4		0.637	0.301		0.134	0.388		0.315	0.516		0.084	0.388		0.315	9.0		5.96	15.5		5.36	5520		7.0

Analysis:

TDL		0.5	0.1	0.2	1	1	10	15	5
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**
	RPD	***32%***							4%
	Difference >2xTDL?	Not applicable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	No - acceptable	Not applicable

Sample Area	Sample Number	Sample Date	Arsenic mg/kg	Q	PQL	Barium mg/kg	Q	PQL	Beryllium mg/kg	Q	PQL	Calcium mg/kg	Q	PQL	Chromium mg/kg	Q	PQL	Hexavalent chromium mg/kg	Q	PQL	Cobalt mg/kg	Q	PQL	Copper mg/kg	Q	PQL
SP-10	J16970	2/12/08	2.4		1.3	45.0		0.26	0.44		0.13	3270	C	10.5	9.4	C	0.52	0.24		0.22	5.4		0.52	15.6		0.60
Dup. of SP-10	J16971	2/12/08	2.5		0.87	46.2		0.17	0.46		0.09	3370	C	7.0	8.8	C	0.35	0.22	U	0.22	5.7		0.35	14.9		0.40

Analysis:

TDL		10	2	0.5	100	1	0.5	2	1
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	No - evaluate difference	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**		No - evaluate difference	**Yes (calc RPD)**
	RPD		3%		3%	7%			5%
	Difference >2xTDL?	No - acceptable	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable

Sample Area	Sample Number	Sample Date	Iron mg/kg	Q	PQL	Lead mg/kg	Q	PQL	Magnesium mg/kg	Q	PQL	Manganese mg/kg	Q	PQL	Nickel mg/kg	Q	PQL	Potassium mg/kg	Q	PQL	Silicon mg/kg	Q	PQL	Sodium mg/kg	Q	PQL
SP-10	J16970	2/12/08	14400		11.8	4.1		0.78	3690		6.5	233	C	0.10	11.5		0.52	911		129	213		10.5	121	C	5.2
Dup. of SP-10	J16971	2/12/08	14800		7.9	4.1		0.52	3630		4.4	233	C	0.07	10.6		0.35	808		86	117		7.0	116	C	3.5

Analysis:

TDL		5	5	75	5	4	400	2	50
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**	**Yes (continue)**
	Both >5xTDL?	**Yes (calc RPD)**	No - evaluate difference	**Yes (calc RPD)**	**Yes (calc RPD)**	No - evaluate difference	No - evaluate difference	**Yes (calc RPD)**	No - evaluate difference
	RPD	3%		2%	0%			***58%***	
	Difference >2xTDL?	Not applicable	No - acceptable	Not applicable	Not applicable	No - acceptable	No - acceptable	Not applicable	No - acceptable

Sample Area	Sample Number	Sample Date	Vanadium mg/kg	Q	PQL	Zinc mg/kg	Q	PQL	Bis(2-ethylhexyl) phthalate ug/kg	Q	PQL
SP-10	J16970	2/12/08	28.8		0.37	30.7	C	1.6	58	JB	370
Dup. of SP-10	J16971	2/12/08	29.8		0.24	30.7	C	1.0	67	JB	370

Analysis:

TDL		2.5	1	330
Duplicate Analysis	Both > PQL?	**Yes (continue)**	**Yes (continue)**	No - evaluate difference
	Both >5xTDL?	**Yes (calc RPD)**	**Yes (calc RPD)**	
	RPD	3%	0%	
	Difference >2xTDL?	Not applicable	Not applicable	No - acceptable

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
Job No. 14655

Calc. No. 0100F-CA-V0364
Checked H. M. Sulloway

Rev. No. 0
Date 5/22/08
Sheet No. 10 of 11

Ecology Software (MTCAStat) - Staging Pile Results

95% UCL Calculation

DATA	ID
63	J16970/J16971
510	J16961
59	J16962
61	J16963
110	J16964
110	J16965
89	J16966
410	J16967
150	J16968
46	J16969

Bis(2-ethylhexyl) phthalate

Number of samples		Uncensored values	
Uncensored	10	Mean	161
Censored		Lognormal mean	158
Detection limit or PQL		Std. devn.	162
Method detection limit		Median	100
TOTAL	10	Min.	46
		Max.	510

Lognormal distribution? r-squared is: 0.877
Normal distribution? r-squared is: 0.696

Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 245

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel **Date** 05/21/08 **Calc. No.** 0100F-CA-V0364 **Rev. No.** 0
Project 100-F Field Remediation **Job No.** 14655 **Checked** H. M. Sulloway **Date** 5/22/08
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation **Sheet No.** 9 of 11

Ecology Software (MTCAStat) - Staging Pile Results

95% UCL Calculation
Manganese

DATA	ID
233	J16970/J16971
240	J16961
236	J16962
230	J16963
228	J16964
268	J16965
268	J16966
267	J16967
261	J16968
285	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	252
Censored		Lognormal mean	252
Detection limit or PQL		Std. devn.	20.3
Method detection limit		Median	251
TOTAL	10	Min.	228
		Max.	285

Lognormal distribution? r-squared is: 0.901
Normal distribution? r-squared is: 0.900
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 264

95% UCL Calculation
Nickel

DATA	ID
11.1	J16970/J16971
10.3	J16961
10.4	J16962
9.9	J16963
10.0	J16964
11.7	J16965
10.8	J16966
12.0	J16967
10.1	J16968
10.8	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	10.7
Censored		Lognormal mean	10.7
Detection limit or PQL		Std. devn.	0.71
Method detection limit		Median	10.6
TOTAL	10	Min.	9.9
		Max.	12.0

Lognormal distribution? r-squared is: 0.937
Normal distribution? r-squared is: 0.927
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 11.1

95% UCL Calculation
Vanadium

DATA	ID
29.3	J16970/J16971
26.4	J16961
28.2	J16962
29.4	J16963
25.2	J16964
33.1	J16965
29.5	J16966
33.7	J16967
27.1	J16968
28.1	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	29.0
Censored		Lognormal mean	29.0
Detection limit or PQL		Std. devn.	2.7
Method detection limit		Median	28.8
TOTAL	10	Min.	25.2
		Max.	33.7

Lognormal distribution? r-squared is: 0.945
Normal distribution? r-squared is: 0.930
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 30.6

95% UCL Calculation
Zinc

DATA	ID
30.7	J16970/J16971
32.4	J16961
30.9	J16962
37.4	J16963
32.3	J16964
38.3	J16965
38.4	J16966
35.7	J16967
32.8	J16968
38.0	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	34.7
Censored		Lognormal mean	34.7
Detection limit or PQL		Std. devn.	3.2
Method detection limit		Median	34.3
TOTAL	10	Min.	30.7
		Max.	38.4

Lognormal distribution? r-squared is: 0.886
Normal distribution? r-squared is: 0.883
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 36.3

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
Job No. 14655

Calc. No. 0100F-CA-V0364
Checked H. M. Sulloway

Rev. No. 0
Date 5/22/08
Sheet No. 8 of 11

Ecology Software (MTCAStat) - Staging Pile Results

95% UCL Calculation
Hexavalent chromium

DATA	ID
0.18	J16970/J16971
0.11	J16961
0.11	J16962
0.36	J16963
0.23	J16964
0.27	J16965
0.26	J16966
0.12	J16967
0.12	J16968
0.12	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	0.19
Censored		Lognormal mean	0.19
Detection limit or PQL		Std. devn.	0.09
Method detection limit		Median	0.15
TOTAL	10	Min.	0.11
		Max.	0.36

Lognormal distribution? r-squared is: 0.853
Normal distribution? r-squared is: 0.842
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 0.23

95% UCL Calculation
Cobalt

DATA	ID
5.6	J16970/J16971
5.4	J16961
5.5	J16962
5.2	J16963
5.0	J16964
6.1	J16965
5.7	J16966
6.1	J16967
5.6	J16968
5.8	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	5.6
Censored		Lognormal mean	5.6
Detection limit or PQL		Std. devn.	0.35
Method detection limit		Median	5.6
TOTAL	10	Min.	5.0
		Max.	6.1

Lognormal distribution? r-squared is: 0.971
Normal distribution? r-squared is: 0.971
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 5.8

95% UCL Calculation
Copper

DATA	ID
15.3	J16970/J16971
13.7	J16961
13.5	J16962
16.5	J16963
12.7	J16964
14.9	J16965
13.3	J16966
17.2	J16967
12.9	J16968
15.4	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	14.5
Censored		Lognormal mean	14.5
Detection limit or PQL		Std. devn.	1.55
Method detection limit		Median	14.3
TOTAL	10	Min.	12.7
		Max.	17.2

Lognormal distribution? r-squared is: 0.948
Normal distribution? r-squared is: 0.941
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (Land's method) is 15.5

95% UCL Calculation
Lead

DATA	ID
4.1	J16970/J16971
4.0	J16961
5.4	J16962
6.9	J16963
4.8	J16964
60.1	J16965
11.2	J16966
4.6	J16967
5.4	J16968
5.6	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	11.2
Censored		Lognormal mean	9.7
Detection limit or PQL		Std. devn.	17.3
Method detection limit		Median	5.4
TOTAL	10	Min.	4.0
		Max.	60.1

Lognormal distribution? r-squared is: 0.644
Normal distribution? r-squared is: 0.427
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 20.2

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
Job No. 14655

Calc. No. 0100F-CA-V036h
Checked H. M. Sulloway

Rev. No. 0
Date 5/22/08
Sheet No. 7 of 11

Ecology Software (MTCAStat) - Staging Pile Results

95% UCL Calculation
Arsenic

DATA	ID
2.5	J16970/J16971
1.6	J16961
3.1	J16962
2.7	J16963
2.6	J16964
18.3	J16965
2.7	J16966
2.3	J16967
2.7	J16968
2.8	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	4.1
Censored		Lognormal mean	3.8
Detection limit or PQL		Std. devn.	5.0
Method detection limit		Median	2.7
TOTAL	10	Min.	1.6
		Max.	18.3

Lognormal distribution? r-squared is: 0.570
Normal distribution? r-squared is: 0.405
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 6.7

95% UCL Calculation
Barium

DATA	ID
45.6	J16970/J16971
52.1	J16961
46.7	J16962
49.1	J16963
46.2	J16964
66.3	J16965
66.2	J16966
52.0	J16967
55.6	J16968
63.8	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	54.4
Censored		Lognormal mean	54.4
Detection limit or PQL		Std. devn.	8.3
Method detection limit		Median	52.1
TOTAL	10	Min.	45.6
		Max.	66.3

Lognormal distribution? r-squared is: 0.899
Normal distribution? r-squared is: 0.883
Recommendations:

Reject BOTH lognormal and normal distributions.

UCL (based on Z-statistic) is 58.7

95% UCL Calculation
Beryllium

DATA	ID
0.45	J16970/J16971
0.38	J16961
0.41	J16962
0.39	J16963
0.37	J16964
0.51	J16965
0.45	J16966
0.48	J16967
0.44	J16968
0.46	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	0.43
Censored		Lognormal mean	0.43
Detection limit or PQL		Std. devn.	0.05
Method detection limit		Median	0.45
TOTAL	10	Min.	0.37
		Max.	0.51

Lognormal distribution? r-squared is: 0.965
Normal distribution? r-squared is: 0.967
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 0.46

95% UCL Calculation
Chromium

DATA	ID
9.1	J16970/J16971
9.5	J16961
8.5	J16962
10.4	J16963
8.7	J16964
11.0	J16965
11.0	J16966
10.7	J16967
8.9	J16968
10.4	J16969

Number of samples		Uncensored values	
Uncensored	10	Mean	9.8
Censored		Lognormal mean	9.8
Detection limit or PQL		Std. devn.	1.0
Method detection limit		Median	10.0
TOTAL	10	Min.	8.5
		Max.	11.0

Lognormal distribution? r-squared is: 0.912
Normal distribution? r-squared is: 0.912
Recommendations:

Use lognormal distribution.

UCL (Land's method) is 10.4

CALCULATION SHEET

Washington Closure Hanford

Originator L. D. Habel LH
Project 100-F Field Remediation
Subject 100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

Date 05/21/08
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Calc. No. 0100F-CA-V0364
Checked H. M. Sulloway HMS

Rev. No. 0
Date 05/21/08
Sheet No. 6 of 11

1 **100-F-26:12 Excavation Shallow Zone Statistical Calculations**
2 **Verification Data**

3	Sample	Sample	Sample	Lead			Manganese			Nickel			Vanadium			Zinc			Bis(2-ethylhexyl) phthalate		
4	Area	Number	Date	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	mg/kg	Q	PQL	ug/kg	Q	PQL
5	SP-10	J16970	2/12/08	4.1		0.78	233	C	0.10	11.5		0.52	28.8		0.37	30.7	C	1.60	58	JB	370
6	Dup. of SP-10	J16971	2/12/08	4.1		0.52	233	C	0.07	10.6		0.35	29.8		0.24	30.7	C	1.00	67	JB	370
7	SP-1	J16961	2/12/08	4.0		0.80	240	C	0.11	10.3		0.54	26.4		0.38	32.4	C	1.60	510	B	370
8	SP-2	J16962	2/12/08	5.4		0.74	236	C	0.10	10.4		0.49	28.2		0.34	30.9	C	1.50	59	JB	360
9	SP-3	J16963	2/12/08	6.9		0.75	230	C	0.10	9.9		0.50	29.4		0.35	37.4	C	1.50	61	JB	360
10	SP-4	J16964	2/12/08	4.8		0.74	228	C	0.10	10.0		0.50	25.2		0.35	32.3	C	1.50	110	JB	360
11	SP-5	J16965	2/12/08	60.1		0.79	268	C	0.10	11.7		0.52	33.1		0.37	38.3	C	1.60	110	JB	370
12	SP-6	J16966	2/12/08	11.2		0.73	268	C	0.10	10.8		0.48	29.5		0.34	38.4	C	1.50	89	JB	390
13	SP-7	J16967	2/12/08	4.6		0.86	267	C	0.11	12.0		0.57	33.7		0.40	35.7	C	1.70	410	B	380
14	SP-8	J16968	2/12/08	5.4		0.67	261	C	0.09	10.1		0.45	27.1		0.31	32.8	C	1.30	150	JB	380
15	SP-9	J16969	2/12/08	5.6		0.86	285	C	0.12	10.8		0.58	28.1		0.40	38.0	C	1.70	46	JB	380

16 **Statistical Computation Input Data**

17	Sample	Sample	Sample	Lead	Manganese	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
18	Area	Number	Date	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	ug/kg
19	SP-10	J16970/J16971	2/12/08	4.1	233	11.1	29.3	30.7	63
20	SP-1	J16961	2/12/08	4.0	240	10.3	26.4	32.4	510
21	SP-2	J16962	2/12/08	5.4	236	10.4	28.2	30.9	59
22	SP-3	J16963	2/12/08	6.9	230	9.9	29.4	37.4	61
23	SP-4	J16964	2/12/08	4.8	228	10.0	25.2	32.3	110
24	SP-5	J16965	2/12/08	60.1	268	11.7	33.1	38.3	110
25	SP-6	J16966	2/12/08	11.2	268	10.8	29.5	38.4	89
26	SP-7	J16967	2/12/08	4.6	267	12.0	33.7	35.7	410
27	SP-8	J16968	2/12/08	5.4	261	10.1	27.1	32.8	150
28	SP-9	J16969	2/12/08	5.6	285	10.8	28.1	38.0	46

29 **Statistical Computations**

30		Lead	Manganese	Nickel	Vanadium	Zinc	Bis(2-ethylhexyl) phthalate
31	95% UCL based on	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), use MTCAStat lognormal distribution.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.	Large data set (n ≥10), lognormal and normal distribution rejected, use Z-statistic.
32	N	10	10	10	10	10	10
33	% < Detection limit	0%	0%	0%	0%	0%	0%
34	Mean	11.2	252	10.7	29.0	34.7	161
35	Standard deviation	17.3	20.3	0.71	2.7	3.2	162
36	95% UCL on mean	20.2	264	11.1	30.6	36.3	245
37	Maximum detected value	60.1	285	12.0	33.7	38.4	510
38	Final Statistical Value	20.2	264	11.1	30.6	36.3	245
39	**Most Stringent Cleanup Limit for nonradionuclide and RAG type (mg/kg); bis(2-ethylhexyl) phthalate is (ug/kg)**	10.2 GW & River Protection	512 GW & River Protection	19.1 GW Protection	85.1 GW Protection	67.8 River Protection	360 River Protection
40	**WAC 173-340 3-PART TEST**						
41	95% UCL > Cleanup Limit?	YES	NA	NA	NA	NA	NO
42	> 10% above Cleanup Limit?	YES	NA	NA	NA	NA	YES
43	Any sample > 2X Cleanup Limit?	YES	NA	NA	NA	NA	NO
44	**WAC 173-340 Compliance? No**	A detailed assessment using RESRAD will be performed for Lead. 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 WAC 173-340 3-part test is not required.	Because all values are below background (19.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (85.1 mg/kg), the WAC 173-340 3-part test is not required.	Because all values are below background (67.8 mg/kg), the WAC 173-340 3-part test is not required.	A detailed assessment using RESRAD will be performed for Bis(2-ethylhexyl) phthalate. The data set meets the 3-part test criteria when compared to direct exposure cleanup levels.

Attachment 1. 100-F-26:9 Verification Sampling Results.

Sample Location	HEIS Number	Sample Date	Americium-241 (GEA)			Barium-133			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	pCi/g	Q	MDA
SP-1	J16961	2/12/08	0.036	U	0.036	0.036	U	0.036	0.031	U	0.031	0.031	U	0.031	0.079	U	0.079	0.101	U	0.101	0.071	U	0.071
SP-2	J16962	2/12/08	0.040	U	0.040	0.046	U	0.046	0.069	U	0.069	0.043	U	0.043	0.112	U	0.112	0.143	U	0.143	0.088	U	0.088
SP-3	J16963	2/12/08	0.031	U	0.031	0.026	U	0.026	0.022	U	0.022	0.026	U	0.026	0.062	U	0.062	0.089	U	0.089	0.057	U	0.057
SP-4	J16964	2/12/08	0.149	U	0.149	0.044	U	0.044	0.075	U	0.075	0.033	U	0.033	0.093	U	0.093	0.100	U	0.100	0.104	U	0.104
SP-5	J16965	2/12/08	0.355	U	0.355	0.093	U	0.093	0.074	U	0.074	0.088	U	0.088	0.225	U	0.225	0.270	U	0.270	0.214	U	0.214
SP-6	J16966	2/12/08	0.212	U	0.212	0.096	U	0.096	0.098	U	0.098	0.087	U	0.087	0.262	U	0.262	0.306	U	0.306	0.216	U	0.216
SP-7	J16967	2/12/08	0.183	U	0.183	0.067	U	0.067	0.051	U	0.051	0.060	U	0.060	0.157	U	0.157	0.193	U	0.193	0.175	U	0.175
SP-8	J16968	2/12/08	0.134	U	0.134	0.034	U	0.034	0.031	U	0.031	0.034	U	0.034	0.077	U	0.077	0.114	U	0.114	0.076	U	0.076
SP-9	J16969	2/12/08	0.073	U	0.073	0.033	U	0.033	0.033	U	0.033	0.032	U	0.032	0.084	U	0.084	0.103	U	0.103	0.075	U	0.075
SP-10	J16970	2/12/08	0.063	U	0.063	0.023	U	0.023	0.020	U	0.020	0.021	U	0.021	0.060	U	0.060	0.061	U	0.061	0.063	U	0.063
Dup. of SP-10	J16971	2/12/08	0.154	U	0.154	0.071	U	0.071	0.069	U	0.069	0.067	U	0.067	0.176	U	0.176	0.220	U	0.220	0.153	U	0.153

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

B = blank contamination (organic constituents)
C = blank contamination (inorganic constituents)
D = diluted
GEA = gamma energy analysis
MDA = minimum detectable activity
PQL = practical quantitation limit
Q = qualifier
U = undetected

Attachment	1	Sheet No.	1 of 21
Originator	L. D. Habel	Date	05/21/08
Checked	H. M. Sulloway	Date	5/22/08
Calc. No.	0100F-CA-V0364	Rev. No.	0

Calculation Brief Distribution Sheet

Calculation Number: 0100F-CA-V0364

100-F-26:9 Staging Pile Cleanup Verification 95% UCL Calculation

TITLE	NAME	MSIN	COPIES
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Calc. Brief Files	M. T. Hughes	H4-23	**Original**
Other			

Acrobat 8.0

CALCULATION COVER SHEET

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

Area: 100-F

Discipline: Environmental *Calculation No: 0100F-CA-V0365

Subject: 100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculation

Computer Program: Excel Program No: Excel 2003

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

Committed Calculation ☒ Preliminary ☐ Superseded ☐ Voided ☐

Rev.	Sheet Numbers	Originator	Checker	Reviewer	Approval	Date
0	Total = 5	L. D. Habel	H. M. Sulloway		J. D. Fancher	4/27/08
1	Total = 5	L. D. Habel	H. M. Sulloway	NA	J. D. Fancher	
						6/15/08

SUMMARY OF REVISION

1	Added beta-BHC and revised value for chlordane (alpha, gamma).

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

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0365	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 1 of 4	

PURPOSE:

Provide documentation to support the calculation of the hazard quotient (HQ) and carcinogenic (excess cancer) risk values for the 100-F-26:9 subsite staging pile footprint. 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) WAC 173-340, "Model Toxics Control Act – Cleanup," *Washington Administrative Code*, 1996.

3) WCH, 2008, *Remaining Sites Verification Package for 100-F-26:9 1607-F2 Sanitary Sewer Pipelines*, Attachment to Waste Site Reclassification Form 2008-029, May 2008, 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:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0365	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 2 of 4	

METHODOLOGY:

HQ and carcinogenic risk calculations were calculated for the staging pile portion of the 100-F-26:9 waste site using the statistically determined value for each analyte (WCH 2008). Boron and molybdenum required the HQ and risk calculations because these nonradionuclide contaminants of potential concern (COPCs) were detected and a Washington State or Hanford Site background value is not available. Hexavalent chromium, aroclor-1254, aroclor-1260 and multiple organic COPCs (as listed in Table 1) required the HQ and risk calculations because they were detected and cannot be attributed to natural occurrence. All other site nonradionuclide COPCs were not detected or were quantified below background levels. An example of the HQ and risk calculations is presented below:

Lead does not have a reference dose for calculation of a hazard quotient because toxic effects of lead are correlated with blood-lead levels rather than exposure levels or daily intake. As a result, the maximum lead concentration is reported but not included in the hazard quotient calculation. Total petroleum hydrocarbon (TPH) data are not included in the calculations since TPH includes a broad range of constituents rather than an individual contaminant.

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

1) For example, the maximum result for molybdenum (0.75 mg/kg), divided by the noncarcinogenic RAG value of 400 mg/kg (calculated in accordance with the noncarcinogenic toxic effects WAC 173-340-740[3]), is 1.9×10^{-3}. 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 1.8×10^{-2} Comparing this values to the requirement of <1.0, this criterion is met.

3) To calculate the excess cancer risk, the statistical result is divided by the carcinogenic RAG value, then multiplied by 1×10^{-6}. For example, the statistical result for hexavalent chromium is 0.23 mg/kg; divided by 2.1 mg/kg, and multiplied as indicated, is 1.1×10^{-7}. Comparing this value, and all other individual values, to the requirement of $<1 \times 10^{-6}$, this criterion is met.

4) After these calculations are completed for the carcinogenic analytes, the cumulative excess cancer risk is obtained by summing the individual values. The sum of the excess cancer risk values is 1.4×10^{-6}. Comparing this value to the requirement of $<1 \times 10^{-5}$, this criterion is met.

RESULTS:

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

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0365	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 3 of 4	

Table 1. Hazard Quotient and Excess Cancer Risk Results for the 100-F-26:9 Staging Pile Footprint

Contaminants of Potential Concern	Maximum or Statistical Value[a] (mg/kg)	Noncarcinogen RAG[b] (mg/kg)	Hazard Quotient	Carcinogen RAG[b] (mg/kg)	Carcinogen Risk
Metals					
Boron	1.8	16,000	1.1E-04	--	--
Chromium, hexavalent[c]	0.23	240	9.6E-04	2.1	1.1E-07
Lead[d]	20.2	--	--	--	--
Molybdenum	0.75	400	1.9E-03	--	--
Semivolatiles					
Anthracene	0.026	24,000	1.1E-06	--	--
Benzo(a)anthracene	0.12	--	--	1.37[e]	8.8E-08
Benzo(a)pyrene	0.14	--	--	0.33[f]	4.2E-07
Benzo(b)fluoranthene	0.075	--	--	1.37[e]	5.5E-08
Benzo(k)fluoranthene	0.12	--	--	13.7[e]	8.8E-09
Benzo(ghi)perylene[g]	0.087	2,400	3.6E-05	--	--
Bis(2-ethylhexyl) phthalate	0.245	1,600	1.5E-04	71.4	3.4E-09
Chrysene	0.16	--	--	137[e]	1.2E-09
Di-n-butylphthalate	0.026	8,000	3.3E-06	--	--
Fluoranthene	0.20	3,200	6.3E-05	--	--
Indeno(1,2,3-cd) pyrene	0.083	--	--	1.37	6.1E-08
Phenanthrene[g]	0.15	24,000	6.3E-06	--	--
Pyrene	0.26	2,400	1.1E-04	--	--
Pesticides					
BHC, beta (Hexachlorocyclohexane)	0.0039	--	--	0.556	7.0E-09
Chlordane (alpha, gamma)	0.0053	40	1.3E-04	2.86	1.9E-09
DDE, 4,4'-	0.0029	--	--	2.94	9.9E-10
Endrin (and ketone, aldehyde)	0.0026	24	1.1E-04	--	--
Polychlorinated Biphenyls					
Aroclor-1254	0.023	1.6	1.4E-02	0.5	4.6E-08
Aroclor-1260	0.019	--	--	0.5	3.8E-08
Totals					
Cumulative Hazard Quotient:			**1.8E-02**		
Cumulative Excess Cancer Risk:					**1.4E-06**

Notes:

RAG = remedial action goal

-- = not applicable

[a] = From WCH 2008.

[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] = No oral reference dose (RfD) or cancer slope factor (CSF)

[e] = Calculated with toxicity values updated through May 1, 2008, using the appropriate formulas from WAC 173-340-740 (Ecology 1996). Updated toxicity values are available from the EPA Integrated Risk Information System (IRIS) at <http://www.epa.gov/iris > or from the Risk Assessment Information System (RAIS) database of the Oak Ridge National Laboratory (ORNL) on the Internet at < http://risk.lsd.ornl.gov >.

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

[g] = Toxicity data for this chemical are not available. RAG based on the following surrogate chemicals: Contaminant: phenathrene, surrogate: anthracene; benzo(g,h,i)perylene, surrogate: pyrene.

Washington Closure Hanford CALCULATION SHEET

Originator:	L.D. Habel	Date:	7/15/08	Calc. No.:	0100F-CA-V0365	Rev.:	1
Project:	100-F Field Remediation	Job No:	14655	Checked:	H. M. Sulloway	Date:	7/15/08
Subject:	100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculations					Sheet No. 4 of 4	

CONCLUSION:

This calculation demonstrates that the 100-F-26:9 staging pile meets the requirements for the hazard quotients and carcinogenic (excess cancer) risk as identified in the RDR/RAWP (DOE-RL 2005).

Calculation Brief Distribution Sheet

Calculation Number: 0100F-CA-V0365

100-F-26:9 Staging Pile Hazard Quotient and Carcinogenic Risk Calculation

TITLE	NAME	MSIN	COPIES
Originator	L. D. Habel	H4-23	**1**
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100 Area Project Files			
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Other			