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SAF-RC-032
100-F Remaining Sites Burial Grounds - Soil Full Protocol
FINAL VALIDATION PACKAGE

COMPLETE COPY OF VALIDATION PACKAGE TO:

Kathy Wendt (2) H4-21

COMMENTS:

SDG K1380 SAF-RC-032

Waste Site: 600-149

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Date: 21 October 2008
To: Washington Closure Hanford Inc. (technical representative)
From: ELR Consulting
Project: 100-F Remaining Sites Burial Grounds – Soil Full Protocol – Waste Site 600-149
Subject: Inorganics - Data Package No. K1380-LLI

INTRODUCTION

This memo presents the results of data validation on Data Package No. K1380 prepared by Lionville Laboratory Inc. (LLI). A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analyte
J17JY7	10/1/08	Soil	C	See note 1
J17JY8	10/1/08	Soil	C	See note 1
J17JY9	10/1/08	Soil	C	See note 1
J17K00	10/1/08	Soil	C	See note 1
J17K01	10/1/08	Soil	C	See note 1
J17K02	10/1/08	Soil	C	See note 1
J17K03	10/1/08	Soil	C	See note 1
J17K04	10/1/08	Soil	C	See note 1
J17K05	10/1/08	Soil	C	See note 1
J17K06	10/1/08	Soil	C	See note 1
J17K07	10/1/08	Soil	C	See note 1
J17K08	10/1/08	Soil	C	See note 1
J17K09	10/1/08	Soil	C	See note 1
J17K10	10/1/08	Soil	C	See note 1
J17K33	10/1/08	Soil	C	See note 1
J17K11	10/1/08	Soil	C	See note 1
J17K12	10/1/08	Soil	C	See note 1
J17K13	10/1/08	Soil	C	See note 1
J17K14	10/1/08	Soil	C	See note 1
J17K15	10/1/08	Soil	C	See note 1

1 - ICP metals (6010B).

Data validation was conducted in accordance with the Washington Closure Hanford (WCH) validation statement of work and the 100 Area Remedial Action Sampling and Analysis Plan (DOE/RL-96-22, February 2005). Appendices 1 through 6 provide the following information as indicated below:

Appendix 1. Glossary of Data Reporting Qualifiers
Appendix 2. Summary of Data Qualification
Appendix 3. Annotated Laboratory Reports
Appendix 4. Laboratory Narrative and Chain-of-Custody Documentation
Appendix 5. Data Validation Supporting Documentation
Appendix 6. Additional Documentation Requested by Client

DATA QUALITY PARAMETERS

- **Holding Times**

Analytical holding times for metals are assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Soil samples must be analyzed within 6 months for ICP metals.

All holding times were acceptable.

- **Preparation (Method) Blanks**

Preparation Blanks

At least one preparation blank, consisting of deionized distilled water processed through each sample preparation and analysis procedure, must be prepared and analyzed with every sample delivery group. In the case of positive blank results, samples with digestate concentrations less than five times the preparation blank value have had their associated values qualified as non-detected and flagged "UJ". Samples with concentrations of greater than five times the highest blank concentration do not require qualification.

In the case of negative blank results, if the absolute value exceeds the contract required detection limit (CRDL), all nondetects are rejected and flagged "UR" and all detects that are less than ten times the absolute value of the associated preparation blank result are qualified as estimates and flagged "J". If the absolute value of the negative preparation blank is greater than the instrument detection limit (IDL) and less than or equal to the CRDL, all nondetects are qualified as estimates and flagged "UJ" and all detects less than ten times the absolute value of the blank are qualified as estimates and flagged "J". If the sample results are greater than ten times the absolute value of the preparation blank, no qualification is necessary.

Due to method blank contamination, all detected tin results were qualified as undetected and flagged "UJ".

All other preparation blank results were acceptable.

Field (Equipment) Blank

No field blank was submitted for analysis.

- **Accuracy**

Matrix Spike and Laboratory Control Sample

Matrix spike (MS) and laboratory control sample (LCS) analyses are used to assess the analytical accuracy of the reported data. The matrix spike is used to assess the effect of the matrix on the ability to accurately quantify sample concentrations. Recoveries must fall within the range of 70% to 130%. Samples with a recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a recovery of greater than 130% or less than 70% and a sample result greater than the IDL are qualified as estimates and flagged "J". Finally, for samples with a recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery outside QC limits, all antimony (43.4%) results were qualified as estimates and flagged "J".

Due to an LCS recovery outside QC limits (27.7%), all silicon results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Analytical precision is expressed by the relative percent differences (RPD) between the recoveries of matrix spike duplicate (MSD) analyses performed on a sample in the analytical batch. Precision may alternatively be assessed using unspiked duplicate analyses performed on a sample in the analytical batch. If both sample and replicate activities (concentrations) are greater than five times the CRDL and the RPD is less than 30%, no qualification is required. If either activity (concentration) is less than five times the CRDL, the RPD control limit is less than or equal to two times the CRDL. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All laboratory duplicate results were acceptable.

Field Duplicate

One set of field duplicates (J17JY7/J17K33) were submitted for analysis. Field duplicates are compared using the same criteria as for laboratory duplicates. All field duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 100 Area RQLs to ensure that laboratory detection levels meet the required criteria. All results met the RQL.

- **Completeness**

Data package No. K1380 was submitted for validation and verified for completeness. Completeness is based on the percentage of data determined to be valid (i.e., not rejected). The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor deficiencies were noted:

- Due to method blank contamination, all detected tin results were qualified as undetected and flagged "UJ".
- Due to a matrix spike recovery outside QC limits, all antimony (43.4%) results were qualified as estimates and flagged "J".
- Due to an LCS recovery outside QC limits (27.7%), all silicon results were qualified as estimates and flagged "J".

Data flagged "J" indicates that the associated concentration is an estimate, but under the WCH statement of work, the data may be usable for decision-making purposes. All other validated results are considered accurate within the standard error associated with the methods.

REFERENCES

Washington Closure Hanford Contract #S00W307A00 (March 2008), *Data Validation Services*, March 2008.

DOE/RL-96-22, Rev. 4, *100 Area Remedial Action Sampling and Analysis Plan*, U.S. Department of Energy, February 2005.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with WCH validation SOW are as follows:

U - Indicates the compound or analyte was analyzed for and not detected in the sample. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.

UJ - Indicates the compound or analyte was analyzed for and not detected in the sample. Due to a minor QC deficiency identified during the data validation, the associated quantitation limit is an estimate.

J - Indicates the compound or analyte was analyzed for and detected. Due to a minor QC deficiency identified during the data validation, the associated concentration is an estimate, but the data are usable for decision-making purposes.

BJ - Applied to inorganic analyses only. Indicates the analyte concentration was greater than the IDL but less than the CRDL and is considered an estimated value.

R - Indicates the compound or analyte was analyzed for, detected, and due to an identified major QC deficiency, the data are unusable.

UR - Indicates the compound or analyte was analyzed for and not detected in the sample. Additionally, the data is unusable due to an identified major QC deficiency.

NJ - Indicates presumptive evidence of a compound at an estimated value. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

N - Indicates presumptive evidence of a compound. The data may not be valid for some specific applications (i.e., usable for decision-making purposes).

Appendix 2

Summary of Data Qualification

METALS DATA QUALIFICATION SUMMARY*

SDG: K1380	REVIEWER: ELR	Project: 600-149	PAGE 1 OF 1
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Tin	UJ	J17JY7, J17K01 J17K03, J17K05 J17K06, J17K09 J17K10, J17K33 J17K11, J17K12 J17K13, J17K14 J17K15	Method blank contamination
Antimony	J	All	MS recovery
Silicon	J	All	LCS recovery

* - The Qualified Data Summary Table includes laboratory applied "U" qualifiers not specifically identified here. The laboratory applied "U" qualifiers are included to minimize misinterpretation of results contained in the table.

Appendix 3

Annotated Laboratory Reports

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	J17JY7	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.5	MG/KG	0.60	2.0
		Boron, Total	0.78	MG/KG	0.60	2.0
		Barium, Total	79.8	MG/KG	0.12	2.0
		Beryllium, Total	0.11	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.4	MG/KG	0.24	2.0
		Chromium, Total	8.6	MG/KG	0.24	2.0
		Copper, Total	11.9	MG/KG	0.24	2.0
		Manganese, Total	332	MG/KG	0.05	2.0
		Molybdenum, Total	0.45	MG/KG	0.36	2.0
		Nickel, Total	9.4	MG/KG	0.24	2.0
		Lead, Total	4.4	MG/KG	0.36	2.0
		Antimony, Total	0.36 uJ	MG/KG	0.36	2.0
		Selenium, Total	0.75	MG/KG	0.73	2.0
		Silicon, Total	282 J	MG/KG	4.8	2.0
		Tin, Total	0.74 UJ	MG/KG	0.73	2.0
		Vanadium, Total	53.5	MG/KG	0.17	2.0
		Zinc, Total	41.5	MG/KG	0.73	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-002	J17JY8	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	4.4	MG/KG	0.61	2.0
		Boron, Total	1.1	MG/KG	0.61	2.0
		Barium, Total	79.3	MG/KG	0.12	2.0
		Beryllium, Total	0.11	MG/KG	0.06	2.0
		Cadmium, Total	0.1	MG/KG	0.06	2.0
		Cobalt, Total	7.7	MG/KG	0.24	2.0
		Chromium, Total	12.2	MG/KG	0.24	2.0
		Copper, Total	14.2	MG/KG	0.24	2.0
		Manganese, Total	364	MG/KG	0.05	2.0
		Molybdenum, Total	0.60	MG/KG	0.37	2.0
		Nickel, Total	12.3	MG/KG	0.24	2.0
		Lead, Total	8.7	MG/KG	0.37	2.0
		Antimony, Total	0.37 u J	MG/KG	0.37	2.0
		Selenium, Total	0.73 u	MG/KG	0.73	2.0
		Silicon, Total	263 J	MG/KG	4.9	2.0
		Tin, Total	0.73 u	MG/KG	0.73	2.0
		Vanadium, Total	50.0	MG/KG	0.17	2.0
		Zinc, Total	47.1	MG/KG	0.73	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-003	J17JY9	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	4.7	MG/KG	0.62	2.0
		Boron, Total	1.0	MG/KG	0.62	2.0
		Barium, Total	89.6	MG/KG	0.12	2.0
		Beryllium, Total	0.17	MG/KG	0.06	2.0
		Cadmium, Total	0.11	MG/KG	0.06	2.0
		Cobalt, Total	7.7	MG/KG	0.25	2.0
		Chromium, Total	13.5	MG/KG	0.25	2.0
		Copper, Total	16.6	MG/KG	0.25	2.0
		Manganese, Total	364	MG/KG	0.05	2.0
		Molybdenum, Total	0.50	MG/KG	0.37	2.0
		Nickel, Total	13.5	MG/KG	0.25	2.0
		Lead, Total	14.9	MG/KG	0.37	2.0
		Antimony, Total	0.37 u J	MG/KG	0.37	2.0
		Selenium, Total	0.74 u J	MG/KG	0.74	2.0
		Silicon, Total	259	MG/KG	4.9	2.0
		Tin, Total	0.74 u	MG/KG	0.74	2.0
		Vanadium, Total	43.3	MG/KG	0.17	2.0
		Zinc, Total	47.8	MG/KG	0.74	2.0

10/21/08

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SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-004	J17K00	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.1	MG/KG	0.55	2.0
		Boron, Total	0.55 u	MG/KG	0.55	2.0
		Barium, Total	68.1	MG/KG	0.11	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.5	MG/KG	0.22	2.0
		Chromium, Total	6.3	MG/KG	0.22	2.0
		Copper, Total	10.6	MG/KG	0.22	2.0
		Manganese, Total	324	MG/KG	0.04	2.0
		Molybdenum, Total	0.43	MG/KG	0.33	2.0
		Nickel, Total	8.3	MG/KG	0.22	2.0
		Lead, Total	4.2	MG/KG	0.33	2.0
		Antimony, Total	0.33 u J	MG/KG	0.33	2.0
		Selenium, Total	0.66 u	MG/KG	0.66	2.0
		Silicon, Total	255 J	MG/KG	4.4	2.0
		Tin, Total	0.66 u	MG/KG	0.66	2.0
		Vanadium, Total	59.6	MG/KG	0.15	2.0
		Zinc, Total	42.8	MG/KG	0.66	2.0

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Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

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WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-005	J17K01	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	6.6	MG/KG	0.58	2.0
		Boron, Total	0.99	MG/KG	0.58	2.0
		Barium, Total	101	MG/KG	0.12	2.0
		Beryllium, Total	0.20	MG/KG	0.06	2.0
		Cadmium, Total	0.22	MG/KG	0.06	2.0
		Cobalt, Total	9.1	MG/KG	0.23	2.0
		Chromium, Total	19.0	MG/KG	0.23	2.0
		Copper, Total	22.3	MG/KG	0.23	2.0
		Manganese, Total	452	MG/KG	0.05	2.0
		Molybdenum, Total	0.49	MG/KG	0.35	2.0
		Nickel, Total	17.7	MG/KG	0.23	2.0
		Lead, Total	13.1	MG/KG	0.35	2.0
		Antimony, Total	0.35 u J	MG/KG	0.35	2.0
		Selenium, Total	0.79	MG/KG	0.69	2.0
		Silicon, Total	222 J	MG/KG	4.6	2.0
		Tin, Total	0.80 UJ	MG/KG	0.69	2.0
		Vanadium, Total	50.4	MG/KG	0.16	2.0
		Zinc, Total	61.3	MG/KG	0.69	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-006	J17K02	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.3	MG/KG	0.63	2.0
		Boron, Total	0.78	MG/KG	0.63	2.0
		Barium, Total	78.1	MG/KG	0.13	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.6	MG/KG	0.25	2.0
		Chromium, Total	8.6	MG/KG	0.25	2.0
		Copper, Total	11.9	MG/KG	0.25	2.0
		Manganese, Total	334	MG/KG	0.05	2.0
		Molybdenum, Total	0.51	MG/KG	0.38	2.0
		Nickel, Total	9.6	MG/KG	0.25	2.0
		Lead, Total	4.2	MG/KG	0.38	2.0
		Antimony, Total	0.38 u J	MG/KG	0.38	2.0
		Selenium, Total	0.75 u	MG/KG	0.75	2.0
		Silicon, Total	307 J	MG/KG	5.0	2.0
		Tin, Total	0.75 u	MG/KG	0.75	2.0
		Vanadium, Total	54.3	MG/KG	0.18	2.0
		Zinc, Total	42.6	MG/KG	0.75	2.0

10/21/08

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SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-007	J17K03	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	7.2	MG/KG	0.61	2.0
		Boron, Total	0.88	MG/KG	0.61	2.0
		Barium, Total	110	MG/KG	0.12	2.0
		Beryllium, Total	0.26	MG/KG	0.06	2.0
		Cadmium, Total	0.19	MG/KG	0.06	2.0
		Cobalt, Total	9.4	MG/KG	0.24	2.0
		Chromium, Total	20.4	MG/KG	0.24	2.0
		Copper, Total	22.3	MG/KG	0.24	2.0
		Manganese, Total	464	MG/KG	0.05	2.0
		Molybdenum, Total	0.72	MG/KG	0.37	2.0
		Nickel, Total	19.2	MG/KG	0.24	2.0
		Lead, Total	10.4	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	0.78	MG/KG	0.73	2.0
		Silicon, Total	322 J	MG/KG	4.9	2.0
		Tin, Total	0.90 UJ	MG/KG	0.73	2.0
		Vanadium, Total	45.7	MG/KG	0.17	2.0
		Zinc, Total	61.9	MG/KG	0.73	2.0

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WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-008	J17K04	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.7	MG/KG	0.61	2.0
		Boron, Total	1.2	MG/KG	0.61	2.0
		Barium, Total	77.2	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.12	MG/KG	0.06	2.0
		Cobalt, Total	7.2	MG/KG	0.25	2.0
		Chromium, Total	7.7	MG/KG	0.25	2.0
		Copper, Total	10.7	MG/KG	0.25	2.0
		Manganese, Total	327	MG/KG	0.05	2.0
		Molybdenum, Total	0.37 u	MG/KG	0.37	2.0
		Nickel, Total	8.3	MG/KG	0.25	2.0
		Lead, Total	7.9	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	0.78	MG/KG	0.74	2.0
		Silicon, Total	289 J	MG/KG	4.9	2.0
		Tin, Total	0.74 u	MG/KG	0.74	2.0
		Vanadium, Total	51.5	MG/KG	0.17	2.0
		Zinc, Total	48.3	MG/KG	0.74	2.0

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WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-009	J17K05	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.3	MG/KG	0.60	2.0
		Boron, Total	0.64	MG/KG	0.60	2.0
		Barium, Total	71.6	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	8.2	MG/KG	0.24	2.0
		Chromium, Total	7.3	MG/KG	0.24	2.0
		Copper, Total	11.0	MG/KG	0.24	2.0
		Manganese, Total	348	MG/KG	0.05	2.0
		Molybdenum, Total	0.54	MG/KG	0.36	2.0
		Nickel, Total	9.2	MG/KG	0.24	2.0
		Lead, Total	4.3	MG/KG	0.36	2.0
		Antimony, Total	0.36 u J	MG/KG	0.36	2.0
		Selenium, Total	0.72 u	MG/KG	0.72	2.0
		Silicon, Total	270 J	MG/KG	4.8	2.0
		Tin, Total	0.73 UJ	MG/KG	0.72	2.0
		Vanadium, Total	59.4	MG/KG	0.17	2.0
		Zinc, Total	43.1	MG/KG	0.72	2.0

10/21/08

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INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-010	J17K06	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	4.9	MG/KG	0.62	2.0
		Boron, Total	0.84	MG/KG	0.62	2.0
		Barium, Total	90.1	MG/KG	0.12	2.0
		Beryllium, Total	0.07	MG/KG	0.06	2.0
		Cadmium, Total	0.13	MG/KG	0.06	2.0
		Cobalt, Total	8.8	MG/KG	0.25	2.0
		Chromium, Total	12.2	MG/KG	0.25	2.0
		Copper, Total	17.0	MG/KG	0.25	2.0
		Manganese, Total	402	MG/KG	0.05	2.0
		Molybdenum, Total	0.37 u	MG/KG	0.37	2.0
		Nickel, Total	12.3	MG/KG	0.25	2.0
		Lead, Total	24.2	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	0.74 u	MG/KG	0.74	2.0
		Silicon, Total	248 J	MG/KG	4.9	2.0
		Tin, Total	0.83 UJ	MG/KG	0.74	2.0
		Vanadium, Total	56.5	MG/KG	0.17	2.0
		Zinc, Total	51.9	MG/KG	0.74	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-011	J17K07	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.4	MG/KG	0.62	2.0
		Boron, Total	0.83	MG/KG	0.62	2.0
		Barium, Total	73.2	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.6	MG/KG	0.25	2.0
		Chromium, Total	8.1	MG/KG	0.25	2.0
		Copper, Total	11.9	MG/KG	0.25	2.0
		Manganese, Total	332	MG/KG	0.05	2.0
		Molybdenum, Total	0.50	MG/KG	0.37	2.0
		Nickel, Total	9.2	MG/KG	0.25	2.0
		Lead, Total	4.4	MG/KG	0.37	2.0
		Antimony, Total	0.37 u J	MG/KG	0.37	2.0
		Selenium, Total	0.78	MG/KG	0.74	2.0
		Silicon, Total	270 J	MG/KG	4.9	2.0
		Tin, Total	0.74 u	MG/KG	0.74	2.0
		Vanadium, Total	54.4	MG/KG	0.17	2.0
		Zinc, Total	41.6	MG/KG	0.74	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-012	J17K08	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	7.7	MG/KG	0.62	2.0
		Boron, Total	1.0	MG/KG	0.62	2.0
		Barium, Total	99.8	MG/KG	0.12	2.0
		Beryllium, Total	0.29	MG/KG	0.06	2.0
		Cadmium, Total	0.21	MG/KG	0.06	2.0
		Cobalt, Total	9.1	MG/KG	0.25	2.0
		Chromium, Total	20.1	MG/KG	0.25	2.0
		Copper, Total	23.0	MG/KG	0.25	2.0
		Manganese, Total	460	MG/KG	0.05	2.0
		Molybdenum, Total	0.55	MG/KG	0.37	2.0
		Nickel, Total	19.2	MG/KG	0.25	2.0
		Lead, Total	10.3	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	0.82	MG/KG	0.75	2.0
		Silicon, Total	237 J	MG/KG	5.0	2.0
		Tin, Total	0.75 u	MG/KG	0.75	2.0
		Vanadium, Total	36.5	MG/KG	0.17	2.0
		Zinc, Total	56.6	MG/KG	0.75	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032

WORK ORDER: 60049-001-001-0001-00

LVL LOT #: 0810L031

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-013	J17K09	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.8	MG/KG	0.58	2.0
		Boron, Total	0.80	MG/KG	0.58	2.0
		Barium, Total	79.5	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.08	MG/KG	0.06	2.0
		Cobalt, Total	7.6	MG/KG	0.23	2.0
		Chromium, Total	8.9	MG/KG	0.23	2.0
		Copper, Total	11.1	MG/KG	0.23	2.0
		Manganese, Total	342	MG/KG	0.05	2.0
		Molybdenum, Total	0.34 u	MG/KG	0.34	2.0
		Nickel, Total	9.6	MG/KG	0.23	2.0
		Lead, Total	6.6	MG/KG	0.34	2.0
		Antimony, Total	0.34 u J	MG/KG	0.34	2.0
		Selenium, Total	0.87	MG/KG	0.69	2.0
		Silicon, Total	267 J	MG/KG	4.6	2.0
		Tin, Total	1.2 U J	MG/KG	0.69	2.0
		Vanadium, Total	49.7	MG/KG	0.16	2.0
		Zinc, Total	42.8	MG/KG	0.69	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-014	J17K10	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	4.1	MG/KG	0.61	2.0
		Boron, Total	0.85	MG/KG	0.61	2.0
		Barium, Total	82.9	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.14	MG/KG	0.06	2.0
		Cobalt, Total	8.3	MG/KG	0.24	2.0
		Chromium, Total	12.5	MG/KG	0.24	2.0
		Copper, Total	16.8	MG/KG	0.24	2.0
		Manganese, Total	365	MG/KG	0.05	2.0
		Molybdenum, Total	0.36 u	MG/KG	0.36	2.0
		Nickel, Total	12.6	MG/KG	0.24	2.0
		Lead, Total	44.4	MG/KG	0.36	2.0
		Antimony, Total	0.38 J	MG/KG	0.36	2.0
		Selenium, Total	0.81	MG/KG	0.73	2.0
		Silicon, Total	232 J	MG/KG	4.9	2.0
		Tin, Total	1.6 UJ	MG/KG	0.73	2.0
		Vanadium, Total	52.8	MG/KG	0.17	2.0
		Zinc, Total	46.9	MG/KG	0.73	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-015	J17K33	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.3	MG/KG	0.62	2.0
		Boron, Total	0.87	MG/KG	0.62	2.0
		Barium, Total	77.4	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	8.0	MG/KG	0.25	2.0
		Chromium, Total	9.1	MG/KG	0.25	2.0
		Copper, Total	11.4	MG/KG	0.25	2.0
		Manganese, Total	340	MG/KG	0.05	2.0
		Molybdenum, Total	0.39	MG/KG	0.37	2.0
		Nickel, Total	9.6	MG/KG	0.25	2.0
		Lead, Total	4.6	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	1.2	MG/KG	0.75	2.0
		Silicon, Total	351 J	MG/KG	5.0	2.0
		Tin, Total	0.87 uJ	MG/KG	0.75	2.0
		Vanadium, Total	54.3	MG/KG	0.17	2.0
		Zinc, Total	41.6	MG/KG	0.75	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032

LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-016	J17K11	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.0	MG/KG	0.65	2.0
		Boron, Total	1.2	MG/KG	0.65	2.0
		Barium, Total	73.1	MG/KG	0.13	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.7	MG/KG	0.26	2.0
		Chromium, Total	8.4	MG/KG	0.26	2.0
		Copper, Total	11.1	MG/KG	0.26	2.0
		Manganese, Total	324	MG/KG	0.05	2.0
		Molybdenum, Total	0.39 u	MG/KG	0.39	2.0
		Nickel, Total	9.4	MG/KG	0.26	2.0
		Lead, Total	8.1	MG/KG	0.39	2.0
		Antimony, Total	0.39 uJ	MG/KG	0.39	2.0
		Selenium, Total	0.78 u	MG/KG	0.78	2.0
		Silicon, Total	342 J	MG/KG	5.2	2.0
		Tin, Total	0.96 UJ	MG/KG	0.78	2.0
		Vanadium, Total	53.5	MG/KG	0.18	2.0
		Zinc, Total	43.5	MG/KG	0.78	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-017	J17K12	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.3	MG/KG	0.58	2.0
		Boron, Total	0.96	MG/KG	0.58	2.0
		Barium, Total	72.8	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06	MG/KG	0.06	2.0
		Cobalt, Total	7.9	MG/KG	0.23	2.0
		Chromium, Total	8.3	MG/KG	0.23	2.0
		Copper, Total	11.1	MG/KG	0.23	2.0
		Manganese, Total	331	MG/KG	0.05	2.0
		Molybdenum, Total	0.46	MG/KG	0.34	2.0
		Nickel, Total	9.2	MG/KG	0.23	2.0
		Lead, Total	4.6	MG/KG	0.34	2.0
		Antimony, Total	0.34 uJ	MG/KG	0.34	2.0
		Selenium, Total	1.1	MG/KG	0.69	2.0
		Silicon, Total	283 J	MG/KG	4.6	2.0
		Tin, Total	0.78 UJ	MG/KG	0.69	2.0
		Vanadium, Total	56.4	MG/KG	0.16	2.0
		Zinc, Total	42.2	MG/KG	0.69	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-018	J17K13	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	4.1	MG/KG	0.63	2.0
		Boron, Total	0.80	MG/KG	0.63	2.0
		Barium, Total	66.9	MG/KG	0.13	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.11	MG/KG	0.06	2.0
		Cobalt, Total	8.0	MG/KG	0.25	2.0
		Chromium, Total	8.4	MG/KG	0.25	2.0
		Copper, Total	10.8	MG/KG	0.25	2.0
		Manganese, Total	325	MG/KG	0.05	2.0
		Molybdenum, Total	0.45	MG/KG	0.38	2.0
		Nickel, Total	9.5	MG/KG	0.25	2.0
		Lead, Total	4.3	MG/KG	0.38	2.0
		Antimony, Total	0.38 uJ	MG/KG	0.38	2.0
		Selenium, Total	0.78	MG/KG	0.75	2.0
		Silicon, Total	253 J	MG/KG	5.0	2.0
		Tin, Total	0.84 UJ	MG/KG	0.75	2.0
		Vanadium, Total	55.1	MG/KG	0.18	2.0
		Zinc, Total	42.8	MG/KG	0.75	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-019	J17K14	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.7	MG/KG	0.60	2.0
		Boron, Total	0.60	MG/KG	0.60	2.0
		Barium, Total	70.2	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.1	MG/KG	0.06	2.0
		Cobalt, Total	7.7	MG/KG	0.24	2.0
		Chromium, Total	9.4	MG/KG	0.24	2.0
		Copper, Total	12.1	MG/KG	0.24	2.0
		Manganese, Total	318	MG/KG	0.05	2.0
		Molybdenum, Total	0.51	MG/KG	0.36	2.0
		Nickel, Total	10.1	MG/KG	0.24	2.0
		Lead, Total	4.1	MG/KG	0.36	2.0
		Antimony, Total	0.36 u J	MG/KG	0.36	2.0
		Selenium, Total	1.1	MG/KG	0.72	2.0
		Silicon, Total	270 J	MG/KG	4.8	2.0
		Tin, Total	0.82 uJ	MG/KG	0.72	2.0
		Vanadium, Total	54.6	MG/KG	0.17	2.0
		Zinc, Total	42.7	MG/KG	0.72	2.0

10/21/08

Lionville Laboratory, Inc.

INORGANICS DATA SUMMARY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-020	J17K15	Silver, Total	0.06 u	MG/KG	0.06	1.0
		Arsenic, Total	3.6	MG/KG	0.62	2.0
		Boron, Total	0.62 u	MG/KG	0.62	2.0
		Barium, Total	68.5	MG/KG	0.12	2.0
		Beryllium, Total	0.06 u	MG/KG	0.06	2.0
		Cadmium, Total	0.06 u	MG/KG	0.06	2.0
		Cobalt, Total	7.9	MG/KG	0.25	2.0
		Chromium, Total	7.4	MG/KG	0.25	2.0
		Copper, Total	10.9	MG/KG	0.25	2.0
		Manganese, Total	319	MG/KG	0.05	2.0
		Molybdenum, Total	0.37 u	MG/KG	0.37	2.0
		Nickel, Total	9.0	MG/KG	0.25	2.0
		Lead, Total	4.1	MG/KG	0.37	2.0
		Antimony, Total	0.37 uJ	MG/KG	0.37	2.0
		Selenium, Total	0.85	MG/KG	0.74	2.0
		Silicon, Total	264 J	MG/KG	5.0	2.0
		Tin, Total	0.85 UJ	MG/KG	0.74	2.0
		Vanadium, Total	56.5	MG/KG	0.17	2.0
		Zinc, Total	42.9	MG/KG	0.74	2.0

10/21/08

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

LIONVILLE LABORATORY INC.

Analytical Report

Client: WC-HANFORD RC-032
LVL#: 0810L031
SDG/SAF#: K1380/RC-032

W.O.#: 60049-001-001-0001-00
Date Received: 10-03-08

METALS CASE NARRATIVE

The following is a summary of the QC results accompanying the sample results. Lionville Laboratory (LvLI) certifies that all test results meet the requirements of NELAC except as noted below.

All soil samples are reported on a dry weight basis unless requested by the client, required by the method, or noted otherwise.

1. This narrative covers the analyses of 20 soil samples.

2. The samples were prepared and analyzed in accordance with methods checked on the attached glossary.

   The samples were reported for Silver from file TA1009C. The remainder of the analytes were reported from file TA1010B with 2-fold dilutions due to sample matrix.

3. All analyses were performed within the required holding times.

4. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits. All sample results contained within this report were surrounded by QC within control.

5. All Initial and Continuing Calibration Blanks (ICB/CCBs) were within control limits (less than the LOQ).

6. All preparation/method blanks (MB) were within method criteria {less than the Limit of Quantitation (3-10X the LOD), samples read greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

7. All ICP Interference Check Standards were within control limits.

8. All laboratory control samples (LCS) were within the 80-120% control limits with the exception of Silicon (27.7%). Sample results for Silicon may be biased low. Refer to the Inorganics Laboratory Control Standards Report.

9. The matrix spike (MS) recoveries for 2 analytes were outside the 75-125% control limits. Refer

The results presented in this report relate only to the analytical testing and conditions of the samples at receipt and during storage. All pages of this report are integral parts of the analytical data. Therefore, this report should only be reproduced in its entirety of 50 pages.

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to the Inorganics Accuracy Report.

10. For analytes where the ICP MS is out-of-control, a post-digestion MS (PDS) and serial dilution are performed. A PDS was prepared at meaningful concentration level for the following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
J17JY7	Antimony	200	95.0
	Silicon	200	96.3

11. The duplicate analyses for 4 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

12. For the purposes of this report, the data has been reported to the Limit of Detection (LOD). Values between the LOD and the Limit of Quantitation (LOQ) are acquired in a region of less-certain quantification.

13. LvLI is NELAP accredited by the state of Pennsylvania. For a complete listing of accrediting authorities and the corresponding analytes/methods, please contact your Project Manager.

14. I certify that this sample data package is in compliance with SOW requirements, both technically and for completeness, other than the conditions detailed above. Release of the data contained in this hard-copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Iain Daniels
Laboratory Manager
Lionville Laboratory Incorporated
alm/m10-031

10/15/08
Date

LVLI
LIONVILLE LABORATORY INC.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-001 | Page 1 of 1

Collector: Tony Welch-Koelling	Company Contact: Doug Bowers	Telephone No.: 509 531-0701	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 day		
Project Designation: 100-H Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 600-149		SAF No.: RC-032 ~~RC-109~~ 10-2-08
Ice Chest No.: GWS 132	Field Logbook No.: EL 1627	COA: R601492000	Method of Shipment: FED EX
Shipped To: EBERLINE SERVICES (LIONVILLE)	Offsite Property No.: A090026		Bill of Lading/Air Bill No.: SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None										
Type of Container	sG										
No. of Container(s)	1										
Volume	250mL										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time								
J17JY7	SOIL	10-1-08	1539	X							
J17JY8	SOIL	10-1-08	1537	X							
J17JY9	SOIL	10-1-08	1541	X							
J17K00	SOIL	10-1-08	1533	X							
J17K01	SOIL	10-1-08	1535	X							

CHAIN OF POSSESSION	Date/Time	Sign/Print Names: Received By/Stored In	Date/Time
Relinquished By/Removed From: Tim Welch-Koelling	10-1-08 1600	Doug Bowers/Doug Bowers	10-1-08/1600
Relinquished By/Removed From: Doug Bowers/Doug Bowers	10-1-08/1820	Received By/Stored In: Ref 2A 1060b/dg	10-1-08/1820
Relinquished By/Removed From: Ref 2A/J.E. Bernhard	10-2-08 1000	Received By/Stored In: J.E. Bernhard	10-2-08 1000
Relinquished By/Removed From: J.E. Bernhard	10-2-08 1015	Received By/Stored In: FED EX	
Relinquished By/Removed From: FED EX	10-3-08 0935	Received By/Stored In:	10-3-08 0935
Relinquished By/Removed From		Received By/Stored In	

SPECIAL INSTRUCTIONS

Statistical samples

DTW 10-1-08

(1) ICP Metals - 6010 (Client List) (~~Aluminum~~, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, ~~Calcium~~, Chromium, Cobalt, Copper, ~~Iron~~, Lead, ~~Magnesium~~, ~~Manganese~~, Molybdenum, Nickel, ~~Potassium~~, Selenium, Silicon, Silver, ~~Sodium~~, Vanadium, Zinc); ~~Mercury~~ - 7471 - (CV) and tin

10-2-08 JEB

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *: S=Soil, SE=Sediment, SO=Solid, Sl=Sludge, W = Water, O=Oil, A=Air, DS=Drum Solids, DL=Drum Liquids, T=Tissue, Wi=Wipe, L=Liquid, V=Vegetation, X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

0000034

0000000046

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-001 | Page 2 of 3

Collector: Tony Welch-Koelling	Company Contact: Doug Bowers	Telephone No.: 509 531-0701	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 day		
Project Designation: 100-H Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 600-149		SAF No. RC-032 ~~RC-107~~
Ice Chest No.: GWS 132	Field Logbook No.: EL 1627	COA: R601492000	Method of Shipment: FED EX
Shipped To: EBERLINE SERVICES / LONVILLE	Offsite Property No.: A090026		Bill of Lading/Air Bill No.: SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None											
Type of Container	aO											
No. of Container(s)	1											
Volume	250mL											
SAMPLE ANALYSIS	See item (1) in Special Instructions.											
Sample No.	Matrix *	Sample Date	Sample Time									
J17K02	SOIL	10-1-08	1527	X								
J17K03	SOIL	10-1-08	1531	X								
J17K04	SOIL	10-1-08	1523	X								
J17K05	SOIL	10-1-08	1525	X								
J17K06	SOIL	10-1-08	1529	X								

000035

CHAIN OF POSSESSION

Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Tony Welch-Koelling	1600 10/1/08	Doug Bowers/Doug Bowers	10-1-08/1600
Doug Bowers/Doug Bowers	10-1-08/1820	Ref 2A 1060 Bldg	10-1-08/1820
Ref 2A/J.E. Bernhard	1000 10-2-08	J.E. Bernhard	1000 10-2-08
J.E. Bernhard	1015 10-2-08	FED EX	
FED EX	10-3-08 0935		10-3-08 0935
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

Sign/Print Names

SPECIAL INSTRUCTIONS

Statistical samples

(1) ICP Metals - 6010 (Client List) (~~Aluminum~~, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, ~~Calcium~~, Chromium, Cobalt, Copper, ~~Iron~~, Lead, ~~Magnesium~~, ~~Manganese~~, Molybdenum, Nickel, ~~Potassium~~, Selenium, Silicon, Silver, ~~Sodium~~, Vanadium, Zinc); ~~Mercury 7471~~ - (CV)

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *
S=Soil
SE=Sediment
SO=Solid
Sl=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
Wi=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

000000047

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-001 | Page 2 of 2

Collector: Tony Welch-Koelling	Company Contact: Doug Bowers	Telephone No.: 509 531-0701	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 day		
Project Designation: 100-H Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 600-149		SAF No. RC-032 RC-107
Ice Chest No. GWS 132	Field Logbook No.: EL 1627	COA: R601492000	Method of Shipment: FED EX
Shipped To: EBERLINE SERVICES / CLONVILLE	Offsite Property No. A090026		Bill of Lading/Air Bill No. SEE OSAC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None										
Type of Container	sG										
No. of Container(s)	1										
Volume	250mL										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										
Sample No.	Matrix *	Sample Date	Sample Time								
J17K07.	SOIL	~~1519~~ 10/1/08	1519	X							
J17K08	SOIL	~~1521~~ 10/1/08	1521	X							
J17K09	SOIL	~~1515~~ 10/1/08	1515	X							
J17K10	SOIL	~~1517~~ 10/1/08	1517	X							
J17K33		10-1-08	1540	X							

CHAIN OF POSSESSION	Sign/Print Names		
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
TWELCH-KOELLING	10/1/08 1600	Doug Bowers/Doug Bowers	10-1-08 1600
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
Doug Bowers/Doug Bowers	10-1-08 1800	REF 2A 1066 Bldg	10-1-08 1800
Relinquished By/Removed From	Date/Time 1000	Received By/Stored In	Date/Time 1000
Ref 2A/J.E. Bernhard	10-2-08	J.E. Bernhard	10-2-08
Relinquished By/Removed From	Date/Time 1015	Received By/Stored In	Date/Time
J.E. Bernhard WCH	10-2-08	FED EX	
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time
FED EX	10-3-08 0935		10-3-08 0935
Relinquished By/Removed From	Date/Time	Received By/Stored In	Date/Time

SPECIAL INSTRUCTIONS

Statistical samples

(1) ICP Metals - 6010 (Client List) {~~Aluminum~~, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, ~~Calcium~~, Chromium, Cobalt, Copper, ~~Iron~~, Lead, ~~Magnesium~~, ~~Manganese~~, Molybdenum, Nickel, ~~Potassium~~, Selenium, Silicon, Silver, ~~Sodium~~, Vanadium, Zinc}; ~~Mercury~~ 7471 - (CV) and tin

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *
S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

000036

00000048

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

RC-107-002 | Page 1 of 3

Collector: Tony Welch-Koelling	Company Contact: Doug Bowers	Telephone No.: 509 531-0701	Project Coordinator: KESSNER, JH
Price Code: 8J	Data Turnaround: 7 day		
Project Designation: 100-H Remaining Sites Burial Grounds - Soil Full Protocol	Sampling Location: 600-149		SAF No. RC-032 ~~RC-107~~ JL 10-2-08
Ice Chest No.: GWS 132	Field Logbook No.: EL 1627	COA: R601492000	Method of Shipment: FED EX
Shipped To: EBERLINE SERVICES, LIONVILLE	Offsite Property No.: A090026		Bill of Lading/Air Bill No.: SEE OSPC

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation	None										
Type of Container	sG										
No. of Container(s)	1										
Volume	250mL										
SAMPLE ANALYSIS	See item (1) in Special Instructions.										

Sample No.	Matrix *	Sample Date	Sample Time										
J17K11	SOIL	10-01-08	1334	X									
J17K12	SOIL	10-01-08	1345	X									
J17K13	SOIL	10-01-08	1347	X									
J17K14	SOIL	10-01-08	1349	X									
J17K15	SOIL	10-01-08	1351	X									

CHAIN OF POSSESSION	Sign/Print Names	Date/Time
Relinquished By/Removed From	[illegible]	10/1/08 1600
Received By/Stored In	Doug Bowers/Doug Bowers	10-1-08/1600
Relinquished By/Removed From	Doug Bowers/Doug Bowers	10-1-08/1820
Received By/Stored In	Rec 2A 1060 Bldg	10-1-08/1820
Relinquished By/Removed From	Rec 2A/J.E. Bernhard	10-2-08 1000
Received By/Stored In	J.E. Bernhard	10-2-08 1000
Relinquished By/Removed From	J.E. Bernhard with	10-2-08 1015
Received By/Stored In	FED EX	
Relinquished By/Removed From	FED EX	10-3-08 0935
Received By/Stored In	[illegible]	10-3-08 0935
Relinquished By/Removed From		
Received By/Stored In		

SPECIAL INSTRUCTIONS

Focused samples

DZB 10-1-08

(1) ICP Metals - 6010 (Client List) (~~Aluminum~~, Antimony, Arsenic, Barium, Beryllium, Boron, Cadmium, ~~Calcium~~, Chromium, Cobalt, Copper, ~~Iron~~, Lead, ~~Magnesium~~, ~~Manganese~~, Molybdenum, Nickel, ~~Potassium~~, Selenium, Silicon, Silver, ~~Sodium~~, Vanadium, Zinc); ~~Mercury 7471~~ (CV) and tin

JEB 10-2-08

Sampler unavailable to remove samples from controlled storage. Shipper removed samples from storage location taking custody of samples for shipment to lab.

Matrix *

S=Soil
SE=Sediment
SO=Solid
SL=Sludge
W = Water
O=Oil
A=Air
DS=Drum Solids
DL=Drum Liquids
T=Tissue
WI=Wipe
L=Liquid
V=Vegetation
X=Other

LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

WCH-EE-011

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Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100-F 600-149			DATA PACKAGE: K1380		
VALIDATOR: ELR		LAB: LLI		DATE: 10/18/05	
			SDG: K1380		

ANALYSES PERFORMED					
SW-846/ICP	SW-846/GFAA	SW-846/Hg	SW-846 Cyanide		

SAMPLES/MATRIX					
J17J47	J17J48	J17J49	J17K00	J17K01	J17K02
J17K03	J17K04	J17K05	J17K06	J17K07	J17K08
J17K09	J17K10	J17K33	J17K11	J17K12	J17K13
J17K14	J17K15				
					Soil

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Technical verification documentation present? ..... Yes No N/A

Comments:

2. INSTRUMENT PERFORMANCE AND CALIBRATIONS (Levels D and E)

Initial calibrations performed on all instruments? ..... Yes No N/A

Initial calibrations acceptable? ..... Yes No N/A

ICP interference checks acceptable? ..... Yes No N/A

ICV and CCV checks performed on all instruments? ..... Yes No N/A

ICV and CCV checks acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Calculation check acceptable? ..... Yes No N/A

Comments:

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. BLANKS (Levels B, C, D, and E)

ICB and CCB checks performed for all applicable analyses? (Levels D, E) ..... Yes No N/A

ICB and CCB results acceptable? (Levels D, E) ..... Yes No N/A

Laboratory blanks analyzed? ..... Yes No N/A

Laboratory blank results acceptable? ..... Yes No N/A

Field blanks analyzed? (Levels C, D, E) ..... Yes No N/A

Field blank results acceptable? (Levels C, D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: tin - UJ all detects

4. ACCURACY (Levels C, D, and E)

MS/MSD samples analyzed? ..... Yes No N/A

MS/MSD results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

LCS/BSS samples analyzed? ..... Yes No N/A

LCS/BSS results acceptable? ..... Yes No N/A

Standards traceable? (Levels D, E) ..... Yes No N/A

Standards expired? (Levels D, E) ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Performance audit sample(s) analyzed? ..... Yes No N/A

Performance audit sample results acceptable? ..... Yes No N/A

Comments: MS antimony 43.42 - J all no PES
LCS Silicon 27.770 - J all

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

5. PRECISION (Levels C, D, and E)

Duplicate RPD values acceptable? ..... Yes No N/A

Duplicate results acceptable? ..... Yes No N/A

MS/MSD standards NIST traceable? (Levels D, E) ..... Yes No N/A

MS/MSD standards expired? (Levels D, E) ..... Yes No N/A

Field duplicate RPD values acceptable? ..... Yes No N/A

Field split RPD values acceptable? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments: _____

6. ICP QUALITY CONTROL (Levels D and E)

ICP serial dilution samples analyzed? ..... Yes No N/A

ICP serial dilution %D values acceptable? ..... Yes No N/A

ICP post digestion spike required? ..... Yes No N/A

ICP post digestion spike values acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

7. FURNACE AA QUALITY CONTROL (Levels D and E)

Duplicate injections performed as required? ..... Yes No N/A

Duplicate injection %RSD values acceptable? ..... Yes No N/A

Analytical spikes performed as required? ..... Yes No N/A

Analytical spike recoveries acceptable? ..... Yes No N/A

Standards traceable? ..... Yes No N/A

Standards expired? ..... Yes No N/A

MSA performed as required? ..... Yes No N/A

MSA results acceptable? ..... Yes No N/A

Transcription/calculation errors? ..... Yes No N/A

Comments: _____

8. HOLDING TIMES (all levels)

Samples properly preserved? ..... Yes No N/A

Sample holding times acceptable? ..... Yes No N/A

Comments: _____

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

9. RESULT QUANTITATION AND DETECTION LIMITS (all levels)

Results reported for all requested analyses? ..... Yes No N/A

Results supported in the raw data? (Levels D, E) ..... Yes No N/A

Samples properly prepared? (Levels D, E) ..... Yes No N/A

Detection limits meet RDL? ..... Yes No N/A

Transcription/calculation errors? (Levels D, E) ..... Yes No N/A

Comments:

Appendix 6

Additional Documentation Requested by Client

Lionville Laboratory, Inc.

INORGANICS METHOD BLANK DATA SUMMARY PAGE 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
BLANK1	08L0369-MB1	Silver, Total	0.10 u	MG/KG	0.10	1.0
		Arsenic, Total	0.50 u	MG/KG	0.50	1.0
		Boron, Total	0.50 u	MG/KG	0.50	1.0
		Barium, Total	0.15	MG/KG	0.10	1.0
		Beryllium, Total	0.05 u	MG/KG	0.05	1.0
		Cadmium, Total	0.05 u	MG/KG	0.05	1.0
		Cobalt, Total	0.20 u	MG/KG	0.20	1.0
		Chromium, Total	0.21	MG/KG	0.20	1.0
		Copper, Total	0.20 u	MG/KG	0.20	1.0
		Manganese, Total	0.44	MG/KG	0.04	1.0
		Molybdenum, Total	0.30 u	MG/KG	0.30	1.0
		Nickel, Total	0.20 u	MG/KG	0.20	1.0
		Lead, Total	0.30 u	MG/KG	0.30	1.0
		Antimony, Total	0.30 u	MG/KG	0.30	1.0
		Selenium, Total	0.60 u	MG/KG	0.60	1.0
		Silicon, Total	7.7	MG/KG	4.0	1.0
		Tin, Total	1.0	MG/KG	0.60	1.0
		Vanadium, Total	0.14 u	MG/KG	0.14	1.0
		Zinc, Total	1.4	MG/KG	0.60	1.0

Lionville Laboratory, Inc.

INORGANICS ACCURACY REPORT 10/13/08

CLIENT: WC-HANFORD RC-032

LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	INITIAL RESULT	SPIKED AMOUNT	%RECOV	DILUTION FACTOR(SPK)
-001	J17JY7	Silver, Total	2.8	0.06u	3.0	93.3	1.0
		Arsenic, Total	115	3.5	121	92.0	2.0
		Boron, Total	55.0	0.78	60.5	89.6	2.0
		Barium, Total	193	79.8	121	93.7	2.0
		Beryllium, Total	2.9	0.11	3.0	92.9	2.0
		Cadmium, Total	2.8	0.06u	3.0	93.3	2.0
		Cobalt, Total	35.6	7.4	30.2	93.4	2.0
		Chromium, Total	20.1	8.6	12.1	95.0	2.0
		Copper, Total	26.0	11.9	15.1	93.4	2.0
		Manganese, Total	367	332	30.2	115.9*	2.0
		Molybdenum, Total	54.8	0.45	60.5	89.8	2.0
		Nickel, Total	37.7	9.4	30.2	93.7	2.0
		Lead, Total	32.6	4.4	30.2	93.4	2.0
		Antimony, Total	13.1	0.36u	30.2	43.4	2.0
		Selenium, Total	108	0.75	121	89.0	2.0
		Silicon, Total	446	282	60.5	272.4*	2.0
		Tin, Total	54.6	0.74	60.5	89.0	2.0
		Vanadium, Total	83.3	53.5	30.2	98.7	2.0
		Zinc, Total	69.7	41.5	30.2	93.4	2.0

Lionville Laboratory, Inc.

INORGANICS PRECISION REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	J17JY7	Silver, Total	0.06u	0.06u	NC	1.0
		Arsenic, Total	3.5	3.4	2.9	2.0
		Boron, Total	0.78	0.60u	~~NC~~ * 200	2.0
		Barium, Total	79.8	78.1	2.2	2.0
		Beryllium, Total	0.11	0.09	20.6	2.0
		Cadmium, Total	0.06u	0.06u	NC	2.0
		Cobalt, Total	7.4	7.5	1.3	2.0
		Chromium, Total	8.6	8.4	2.4	2.0
		Copper, Total	11.9	11.8	0.84	2.0
		Manganese, Total	332	336	1.2	2.0
		Molybdenum, Total	0.45	0.45	0.49	2.0
		Nickel, Total	9.4	9.5	1.1	2.0
		Lead, Total	4.4	4.3	2.3	2.0
		Antimony, Total	0.36u	0.36u	NC	2.0
		Selenium, Total	0.75	1.1	37.5	2.0
		Silicon, Total	282	293	3.9	2.0
		Tin, Total	0.74	0.72u	~~NC~~ * 200	2.0
		Vanadium, Total	53.5	53.4	0.19	2.0
		Zinc, Total	41.5	40.9	1.5	2.0

* Corrected RPD
Acm 10/13/08

Lionville Laboratory, Inc.

INORGANICS LABORATORY CONTROL STANDARDS REPORT 10/13/08

CLIENT: WC-HANFORD RC-032 LVL LOT #: 0810L031

WORK ORDER: 60049-001-001-0001-00

SAMPLE	SITE ID	ANALYTE	SPIKED SAMPLE	SPIKED AMOUNT	UNITS	%RECOV
LCS1	08L0369-LC1	Silver, LCS	46.5	50.0	MG/KG	93.0
		Arsenic, LCS	915	1000	MG/KG	91.5
		Boron, LCS	458	500	MG/KG	91.5
		Barium, LCS	455	500	MG/KG	91.0
		Beryllium, LCS	24.3	25.0	MG/KG	97.2
		Cadmium, LCS	24.6	25.0	MG/KG	98.4
		Cobalt, LCS	246	250	MG/KG	98.3
		Chromium, LCS	48.8	50.0	MG/KG	97.6
		Copper, LCS	114	125	MG/KG	91.4
		Manganese, LCS	74.0	75.0	MG/KG	98.7
		Molybdenum, LCS	482	500	MG/KG	96.4
		Nickel, LCS	194	200	MG/KG	97.0
		Lead, LCS	243	250	MG/KG	97.2
		Antimony, LCS	271	300	MG/KG	90.3
		Selenium, LCS	888	1000	MG/KG	88.8
		Silicon, LCS	139	500	MG/KG	27.7
		Tin, LCS	492	500	MG/KG	98.3
		Vanadium, LCS	247	250	MG/KG	98.8
		Zinc, LCS	101	100	MG/KG	100.7