Date: 21 October 1999
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 108-F Unknown Solid Residual
Subject: Radiochemistry - Data Package No. H0479-TNU (SDG No. H0479)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0479-TNU which was prepared by Thermo NUtech (TNU). A list of samples validated along with the analyses reported and the requested analytes is provided in the following table.

Sample ID	Sample Date	Media	Validation	Analysis
B0W192	07/21/99	Solid	C	See note 1

1 - Gamma spectroscopy; Gross alpha and beta.

Data validation was conducted in accordance with the BHI validation statement of work and the "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **Holding Times**

  Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for radiochemical analysis is 6 months.

  All holding times were acceptable.

- **Blanks**

  Laboratory Blanks

  Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination. If blank analysis results indicate the presence of an analyte above the MDA, the following qualifiers are applied: All positive sample results less than five times the highest blank concentration are qualified as estimates and flagged "J"; sample results below the MDA are qualified as undetected and flagged "U"; sample results above the MDA and greater than five times the highest blank concentration are not qualified.

  All laboratory blank results were acceptable.

- **Accuracy**

  Accuracy is evaluated by analyzing distilled water or field samples spiked with known amounts of radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable laboratory control sample and matrix spike recovery range is either 70-130% or 80-120% depending on the analyte. In addition, samples may be spiked with a radiochemical tracer to assist in isolating the radioisotope of interest with the yield of the tracer being used in calculating sample activity. The acceptable range for tracer recovery is 20% to 105%. Spike sample results outside the above ranges result in associated sample results being qualified as estimates, rejected, or not qualified, depending on the activity of the individual sample.

  All accuracy results were acceptable.

- **Precision**

  Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. Precision may also be assessed using unspiked duplicate sample analyses. If both sample and replicate activities are greater than five times the CRDL and the RPD is less than 30 percent, the results are acceptable. If either activities are less then five times the CRDL, a control limit of less than or equal to two times the CRDL is used for soil samples and less than or equal to the CRDL for water samples. If either the original or replicate value is below the CRDL, the applicable control limits are less than or equal to the CRDL for water samples and less than or equal to two times the CRDL for soil samples. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects or estimated non-detects.

All duplicate results were acceptable.

- **Detection Levels**

  Reported analytical detection levels are compared against the 105DR PQLs or the CRDL if no PQL was specified, to ensure that laboratory detection levels meet the required criteria. The PQL for europium-155 was exceeded in sample B0W192. Under the BHI statement of work, no qualification is required. All other reported laboratory detection levels met the analyte specific PQL or CRDL.

- **Completeness**

  Data Package No. H0479 (SDG No. H0479) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The PQL for europium-155 was exceeded in sample B0W192. Under the BHI statement of work, no qualification is required.

REFERENCES

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils.*

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with the BHI statement of work are as follows:

U - Indicates the compound or analyte was analyzed for and not detected above the minimum detectable activity (MDA) in the sample. The value reported is the sample result corrected for sample dilution and moisture content by the laboratory. The data is usable for decision making purposes.

UJ - Indicates the compound or analyte was analyzed for and not detected at concentrations above the minimum detectable activity (MDA) in the sample. Due to a QC deficiency identified during the data validation, the associated quantitation limit is an estimate, but is usable for decision making purposes.

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

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

Appendix 2

Summary of Data Qualification

DATA QUALIFICATION SUMMARY

SDG: H0479	REVIEWER: TLI	DATE: 10/21/99	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (PCi/G) Page__1 of__1

Project: BECHTEL-HANFORD																					
Laboratory: TNU																					
Case	SDG: H0479																				
Sample Number		B0W192																			
Location		108F																			
Remarks																					
Sample Date		07/21/99																			
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Gross Alpha	10	9.33																			
Gross Beta	15	91.1																			
Potassium-40		9.25																			
Cobalt 60	0.1	U	U																		
Cesium 137	0.1	1.77																			
Europium 152	0.2	U	U																		
Europium 154	0.2	U	U																		
Europium 155	0.1	U	U																		
Radium-226		0.454																			
Radium-228		0.518																			
Thorium-228		0.681																			
Thorium-232		0.518																			
Americium-241 (GEA)		U	U																		
Uranium-238 (GEA)		U	U																		
Uranium-235 (GEA)		U	U																		

0000059

TMA / RICHMOND

SAMPLE DELIVERY GROUP H0479

N907157-01 B0W192

DATA SHEET

SDG 7167	Client/Case no Hanford	SDG-H0479	
Contact L.A. Johnson	Case no TRB-SBB-207925		
Lab sample id N907157-01	Client sample id B0W192		
Dept sample id 7167-001	Location/Matrix 108F	SOLID	
Received 07/28/99	Collected 07/21/99 09:45		
	Custody/SAF No B99-007-18	B99-083	

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Gross Alpha	12587-46-1	9.33	4.2	3.9	10	J	80A
Gross Beta	12587-47-2	91.1	7.3	5.9	15		80B
Potassium 40	13966-00-2	9.25	0.83	0.45			GAM
Cobalt 60	10198-40-0	U		0.050	0.050	U	GAM
Cesium 137	10045-97-3	1.77	0.089	0.061	0.10		GAM
Europium 152	14683-23-9	U		0.14	0.10	U	GAM
Europium 154	15585-10-1	U		0.14	0.10	U	GAM
Europium 155	14391-16-3	U		0.13	0.10	U	GAM
Radium 226	13982-63-3	0.454	0.11	0.11	0.10		GAM
Radium 228	15262-20-1	0.518	0.23	0.23	0.20		GAM
Thorium 228	14274-82-9	0.681	0.087	0.092			GAM
Thorium 232	TH-232	0.518	0.23	0.23			GAM
Americium 241	14596-10-2	U		0.15		U	GAM
Uranium 238	U-238	U		4.8		U	GAM
Uranium 235	15117-96-1	U		0.18		U	GAM

105F & 105DR ISS Project-Other Solid

10/18/99

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 08/18/99

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0479 is composed of one solid sample designated under SAF No. B99-083 with a Project Designation of: 105F & 105DR ISS Project - Other Solid.

The sample was received as stated on the Chain-of-Custody document. Any discrepancies are noted on the TNU Sample Receipt Checklist. The results were transmitted to BHI via facsimile on August 11, 1999.

2.0 ANALYSIS NOTES

2.1 Gamma Scan Analyses

No problems were encountered during the course of the analyses.

2.2 Gross Alpha and Gross Beta Analyses

No problems were encountered during the course of the analyses.

Bechtel Hanford Inc. | **CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST** | B99-007-10

Collector Fahlberg	**Company Contact** J Adler	**Telephone No.** 373-4316	**Project Coordinator** TRENT, SJ
Project Designation 105F & 105DR ISS Project - Other Solid	**Sampling Location** 108F		**SAF No.** ~~B99-007~~ B99-083
Ice Chest No. ERC 96087	**Field Logbook No.** EL 1435		**Method of Shipment** Fed Ex
Shipped To ~~TMA/RECRA~~ ISS 7-21-99	**Offsite Property No.** A99 0198		**Bill of Lading/Air Bill No.** 4235 7952 7926
			COA R105F029WC

Price Code | **Data Turnaround** 21 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Preservation		None	None	None							
Type of Container	aG	aG	aG	aG							
No. of Container(s)	0	0	1	1							
Volume	250mL	250mL	120mL	250mL							
SAMPLE ANALYSIS	Activity Scan	Gross Alpha; Gross Beta	Metals by ICP (TCLP) - 1311/6010A; Mercury (TCLP) - 1311/7470	See item (1) in Special Instructions.							
Sample No.	**Matrix ***	**Sample Date**	**Sample Time**								
B0W192	Other Solid	7.21.99	0945	X	X		X				tieto B0VXR1

CHAIN OF POSSESSION — **Sign/Print Names**

	Date/Time		Date/Time
Relinquished By R.Fahlberg / R.Fahlberg	7.21.99 1400	Received By Ref 1-C	7.21.99 1400
Relinquished By Ref 1-C	7.27.99 0800	Received By R.Fahlberg / R.Fahlberg	7.27.99
Relinquished By R.Fahlberg / R.Fahlberg	7.27.99 1400	Received By Fed Ex	7-27-99
Relinquished By Fed Ex	7-28-99 9:00	Received By TNV M.Goldenberg	7-28-99 9:00

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

All media contained in one 250ml bottle.

Saf changed to B99-083

Matrix *
Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION — Received By — Title — Date/Time

FINAL SAMPLE DISPOSITION — Disposal Method — Disposed By — Date/Time

0000243

Appendix 5

Data Validation Supporting Documentation

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	(C)	D	E
PROJECT: 108F			DATA PACKAGE: H0479		
VALIDATOR: TLI		LAB: TNU		DATE: 10/19/99	
CASE:			SDG: H0479		

ANALYSES PERFORMED

☒ Gross Alpha/Beta	☐ Strontium-90	☐ Technetium-99	☐ Alpha Spectroscopy	☒ Gamma Spectroscopy	
☐ Total Uranium	☐ Radium-22	☐ Tritium	☐		

SAMPLES/MATRIX B0W192

Soil

1. Completeness . . . . . ☒ N/A

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

Comments: _____

2. Initial Calibration . . . . . ☒ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes No N/A

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

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

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

Comments: _____

3. Continuing Calibration . . . . . ☒ N/A

Calibration checked within one week of sample analysis? . . .	Yes	No	N/A
Calibration check acceptable?	Yes	No	N/A
Calibration check standards NIST traceable?	Yes	No	N/A
Calibration check standards expired?	Yes	No	N/A

Comments:_____

4. Blanks . . . . . ☐ N/A

Method blank analyzed?	(Yes)	No	N/A
Method blank results acceptable?	(Yes)	No	N/A
Analytes detected in method blank?	Yes	(No)	N/A
Field blank(s) analyzed?	Yes	(No)	N/A
Field blank results acceptable?	Yes	No	(N/A)
Analytes detected in field blank(s)?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:_____

5. Matrix Spikes . . . . . ☒ N/A

Matrix spike analyzed?	Yes	No	N/A
Spike recoveries acceptable?	Yes	No	N/A
Spike source traceable?	Yes	No	N/A
Spike source expired?	Yes	No	N/A
Transcription/Calculation Errors?	Yes	No	N/A

Comments:_____

A-2

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed?	(Yes)	No	N/A
LCS recoveries acceptable?	(Yes)	No	N/A
LCS traceable?	Yes	No	(N/A)
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added?	Yes	No	N/A
Chemical recovery acceptable?	Yes	No	N/A
Chemical carrier traceable?	Yes	No	N/A
Chemical carrier expired?	Yes	No	N/A
Transcription/Calculation errors?	Yes	No	N/A

Comments:_____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed?	(Yes)	No	N/A
RPD Values Acceptable?	(Yes)	No	N/A
Transcription/Calculation Errors?	Yes	No	(N/A)

Comments:_____

9. Field QC Samples . . . . . ☒ N/A

Field duplicate sample(s) analyzed?	Yes	No	N/A
Field duplicate RPD values acceptable?	Yes	No	N/A
Field split sample(s) analyzed?	Yes	No	N/A
Field split RPD values acceptable?	Yes	No	N/A
Performance audit sample(s) analyzed?	Yes	No	N/A
Performance audit sample results acceptable?	Yes	No	N/A

Comments:_____

10. Holding Times

Are sample holding times acceptable?	(Yes)	No	N/A

Comments:_____

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses?	(Yes)	No	N/A
Results supported in raw data?	Yes	No	(N/A)
Results Acceptable?	(Yes)	No	N/A
Transcription/Calculation errors?	Yes	No	(N/A)
MDA's meet required detection limits?	Yes	(No)	N/A
Transcription/calculation errors?	Yes	No	(N/A)

Comments: Eu-155 over RpL MDA

Date: 21 October 1999
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 108-F Unknown Solid Residual
Subject: Inorganics - Data Package No. H0479-RLN (SDG No. H0479)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0479-RLN prepared by RECRA LabNet (RLN). 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	Analysis
B0W192	7/21/99	Solid	C	See note 1

1 - ICP metals by 6010B (add on phosphorus)

Data validation was conducted in accordance with the BHI validation statement of work and "Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils" (DOE/RL-99-35). Appendices 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

- **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 six (6) months for ICP metals.

  All holding times were acceptable.

- **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 "U". 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 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.

All preparation blank results were acceptable.

- **Accuracy**

Matrix Spike

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must fall within the range of 70% to 130%. Samples with a spike recovery of less than 30% and a sample result below the IDL are rejected and flagged "UR". Samples with a spike recovery of 30% to 69% and a sample result less than the IDL are qualified "UJ". Samples with a spike 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 spike recovery greater than 130% and a sample result less than the IDL, no qualification is required.

Due to a matrix spike recovery of 285% and a MSD recovery of 370%, all aluminum results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 69.9% and a MSD recovery of 59%, all barium results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 1440% and a MSD recovery of 2705%, all iron results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 157% and a MSD recovery of 189%, all manganese results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 50% and a MSD recovery of 47%, all antimony results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery of 194%, all copper results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 139%, all phosphorous results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 147%, all lead results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery of 38%, all strontium results were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

- **Precision**

Laboratory Duplicate Samples

Laboratory duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Results must be within RPD limits of plus or minus 35% for solid samples. If RPD values are out of specification and the sample concentration is greater than five times the CRDL, all associated sample results are qualified as estimated and flagged "J". If RPD values are plus or minus two times the CRDL and the sample concentration is less than five times the CRDL, all associated sample results are qualified as estimated and flagged "J/UJ". The performance criteria for aqueous laboratory duplicates are an RPD less than 30% for positive sample results greater than five times the CRDL or plus or minus the CRDL for positive sample results less than five times the CRDL. Sample results outside the criteria are qualified as estimates and flagged "J/UJ".

Due to an RPD of 41.3%, all strontium results were qualified as estimates and flagged "J".

All laboratory duplicate results were acceptable.

- **Analytical Detection Levels**

Reported analytical detection levels are compared against the 105DR PQLs or the CRDL if no PQL was specified, to ensure that laboratory detection levels meet the required criteria. All reported laboratory detection levels met the analyte specific PQL or CRDL.

- **Completeness**

Data package No. H0479-RLN (SDG No. H0479) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

The following minor defeciencies were noted:

Due to a matrix spike recovery of 285% and a MSD recovery of 370%, all aluminum results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 69.9% and a MSD recovery of 59%, all barium results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 1440% and a MSD recovery of 2705%, all iron results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 157% and a MSD recovery of 189%, all manganese results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 50% and a MSD recovery of 47%, all antimony results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery of 194%, all copper results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 139%, all phosphorous results were qualified as estimates and flagged "J".

Due to a matrix spike recovery of 147%, all lead results were qualified as estimates and flagged "J".

Due to a matrix spike duplicate recovery of 38%, all strontium results were qualified as estimates and flagged "J".

Due to an RPD of 41.3%, all strontium results were qualified as estimates and flagged "J".

Data flagged 'J' is an estimate, but under the BHI validation SOW, 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

BHI, MRB-SBB-A23665, *Validation Statement of Work*, Bechtel Hanford Incorporated, September 5, 1997.

DOE/RL-99-35, *Sample and Analysis Plan for 105F and 105DR Phase III Below Grade Structures and Underlying Soils*.

Appendix 1

Glossary of Data Reporting Qualifiers

Qualifiers which may be applied by data validators in compliance with BHI 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 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 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 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 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

DATA QUALIFICATION SUMMARY

SDG: H0479	REVIEWER: TLI	DATE: 10/21/99	PAGE 1 OF 1
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Aluminum, barium, iron, manganese, antimony	J	All	MS/MSD percent recovery
Phosphorus, lead	J	All	MS percent recovery
Copper, strontium	J	All	MSD percent recovery
Strontium	J	All	RPD

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

Project: BECHTEL-HANFORD																			
Laboratory: RECRA LabNet																			
Case	SDG: H0479																		
Sample Number		B0W192																	
Location		108F																	
Remarks																			
Sample Date		7/21/99																	
Inorganics	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Silver	20	0.08	U																
Aluminum		6490	J																
Arsenic		2.5																	
Barium		274	J																
Beryllium		0.57																	
Calcium		8430																	
Cadmium	2	1.6																	
Cobalt		4.9																	
Chromium	2	11.8																	
Copper	2	18.0	J																
Iron	10	11000	J																
Potassium	500	1080																	
Lithium		7.5																	
Magnesium		3520																	
Manganese		218	J																
Molybdenum		0.84																	
Sodium		566																	
Nickel	4	10.8																	
Phosphorus		846	J																
Lead	20	26.1	J																
Antimony		0.19	UJ																
Selenium	25	0.28	U																
Strontium		184	J																
Thallium		0.57																	
Vanadium	2	27.3																	
Zinc	2	70.5																	

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 08/09/99

CLIENT: TNU-HANFORD B99-083 RECRA LOT #: 9907L528

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0W192	Silver, Total	0.08 u	MG/KG	0.08	1.0
		Aluminum, Total	6490 J	MG/KG	0.93	1.0
		Arsenic, Total	2.5	MG/KG	0.25	1.0
		Barium, Total	274 J	MG/KG	0.02	1.0
		Beryllium, Total	0.57	MG/KG	0.008	1.0
		Calcium, Total	8430	MG/KG	1.2	1.0
		Cadmium, Total	1.6	MG/KG	0.02	1.0
		Cobalt, Total	4.9	MG/KG	0.04	1.0
		Chromium, Total	11.8	MG/KG	0.06	1.0
		Copper, Total	18.0 J	MG/KG	0.09	1.0
		Iron, Total	11000 J	MG/KG	1.5	1.0
		Potassium, Total	1080	MG/KG	1.7	1.0
		Lithium, Total	7.5	MG/KG	0.008	1.0
		Magnesium, Total	3520	MG/KG	1.1	1.0
		Manganese, Total	218 J	MG/KG	0.02	1.0
		Molybdenum, Total	0.84	MG/KG	0.1	1.0
		Sodium, Total	566	MG/KG	0.38	1.0
		Nickel, Total	10.8	MG/KG	0.09	1.0
		Phosphorus, Total	846 J	MG/KG	3.0	1.0
		Lead, Total	26.1 J	MG/KG	0.16	1.0
		Antimony, Total	0.19 u J	MG/KG	0.19	1.0
		Selenium, Total	0.28 u	MG/KG	0.28	1.0
		Strontium, Total	184 J	MG/KG	0.008	1.0
		Thallium, Total	0.57	MG/KG	0.40	1.0
		Vanadium, Total	27.3	MG/KG	0.05	1.0
		Zinc, Total	70.5	MG/KG	0.06	1.0

10/18/99

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

RECRA ENVIRONMENTAL INC.

Chemical and Environmental Measurement Information

Recra LabNet Philadelphia
Analytical Report

Client : TNU-HANFORD B99-083
RFW# : 9907L528
SDG/SAF# : H0479/B99-083

W.O.# : 10985-001-001-9999-00
Date Received: 07-28-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 1 solid sample.

2. The sample was prepared and analyzed in accordance with methods checked on the attached glossary. The client requested analyte list was specified per the Sample Discrepancy Report included in this report.

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

4. The cooler temperature has been recorded on the Chain of Custody.

5. All Initial and Continuing Calibration Verifications (ICV/CCVs) were within the 90-110% control limits.

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

7. All preparation/method blanks (MB) were within method criteria {less than the Practical Quantitation Limit (3X the IDL or samples greater than 20X MB value}. Refer to the Inorganics Method Blank Data Summary.

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

9. All laboratory control sample (LCS) were within the laboratory control limits. Refer to the Inorganics Laboratory Control Standards Report.

10. The matrix spike (MS) and matrix spike duplicate (MSD) recoveries for 8 analytes were outside the 75-125% control limits. Refer to the Inorganics Accuracy Report.

208 Welsh Pool Road • Lionville, PA 19341-1333 • (610) 280-3000 • Fax (610) 280-3041

11. 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 levels, due to high concentrations of the following analytes:

Sample ID	Element	PDS Concentration (ppb)	PDS % Recovery
B0W192	Aluminum	20,000	94.6
	Barium	500	85.0
	Chromium	500	106.0
	Iron	20,000	103.8
	Manganese	500	106.4
	Phosphorus	2000	90.0
	Lead	500	105.4
	Antimony	500	104.8

12. The MSs and MSDs for 7 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Matrix Spike Duplicate Report.

13. The duplicate analyses for 6 analytes were outside the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

14. For the purposes of this report, the data has been reported to the Instrument Detection Limit (IDL). Values between the IDL and the Practical Quantitation Limit (PQL) are acquired in a region of less-certain quantification.

Pat E

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

8-9-99
Date

mld/m07-528

002

Specialty Analytical Inc.

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

B99-007-18

Page 1 of 1

Collector: Fahlberg	Company Contact: J Adler	Telephone No.: 373-4316	Project Coordinator: TRENT, SJ
Project Designation: 105F & 105DR ISS Project - Other Solid	Sampling Location: 108F		SAF No.: ~~B99-007~~ B99-083
Ice Chest No.: CHI 009	Field Logbook No.: EL 1435		Method of Shipment: Fed Ex
Shipped To: ~~TMA/~~RECRA ISE 7.21.99	Offsite Property No.: A99 0197		Bill of Lading/Air Bill No.: 4235 7952-7915 2A
			COA: R105F029WC

Price Code: 528

Data Turnaround: 21 Days

POSSIBLE SAMPLE HAZARDS/REMARKS

Special Handling and/or Storage

Sample No.	Matrix *	Sample Date	Sample Time	Preservation		None	None	None						
				Type of Container		sG	sG	sG	sG					
				No. of Container(s)		0	0	1	1					
				Volume		250mL	250mL	120mL	250mL					
				SAMPLE ANALYSIS		Activity Scan	Gross Alpha; Gross Beta	Metals by ICP (6010A); 1311/6010A; Mercury 1311/7470 RF 7.27.99	See item (1) in Special Instructions.					
B0W192	Other Solid	7.21.99	0945					X					tie to B0VXR1	

CHAIN OF POSSESSION — **Sign/Print Names**

Relinquished By	Date/Time	Received By	Date/Time
R.Fahlberg / R.Fahlberg	7.21.99 1400	Ref 1-C	7.21.99 1400
Ref 1-C	7-27-99 0800	R.Fahlberg / R.Fahlberg	7.27.99 0800
R.Fahlberg / R.Fahlberg	7-27-99 1400	Fed Ex	
FedEx		Bruce Miller	7/28/99 0930

SPECIAL INSTRUCTIONS

(1) Gamma Spectroscopy (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155)

SAF changed to B99-083

Matrix *

Soil
Water
Vapor
Other Solid
Other Liquid

LABORATORY SECTION — Received By — Title — Date/Time

FINAL SAMPLE DISPOSITION — Disposal Method — Disposed By — Date/Time

0010016

Appendix 5

Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 100 D&F Unk Sol Resub			DATA PACKAGE: H0479		
VALIDATOR: TLI		LAB: RECRA		DATE: 10/8/99	
CASE:			SDG: H0479		
ANALYSES PERFORMED					
☐ CLP/ICP	☐ CLP/GFAA	☐ CLP/Hg	☐ CLP/Cyanide	☐	☐
☒ SW-846/ICP	☐ SW-846/GFAA	☐ SW-846/Hg	☐ SW-846 Cyanide	☐	☐
SAMPLES/MATRIX: BOW192					
					Solid

1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . Yes No (N/A)

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

A-10

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments?	Yes	No	N/A
Are initial calibrations acceptable?	Yes	No	N/A
Are ICP interference checks acceptable?	Yes	No	N/A
Were ICV and CCV checks performed on all instruments?	Yes	No	N/A
Are ICV and CCV checks acceptable?	Yes	No	N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses?	Yes	No	N/A
Are ICB and CCB results acceptable?	Yes	No	N/A
Were preparation blanks analyzed?	Yes	No	N/A
Are preparation blank results acceptable?	Yes	No	N/A
Were field/trip blanks analyzed?	Yes	No	N/A
Are field/trip blank results acceptable?	Yes	No	N/A

Comments: Al Calcium K Li Mg Pb SR
ok ok ok ok ok ok ok

5. ACCURACY

Were spike samples analyzed?	Yes	No	N/A
Are spike sample recoveries acceptable?	Yes	No	N/A
Were laboratory control samples (LCS) analyzed?	Yes	No	N/A
Are LCS recoveries acceptable?	Yes	No	N/A

Comments: Al 285.2 (ms) 370 (MSD) Barium 69.9 (ms) 594 (MSD)
~~Calcium~~ Cu MSD (194.2) Fe (1440) MS (2705) MSD
Manganese 157 MS 189 MSD Phosphorus 139 (MS) Pb 147 MS
Antimony 49.9 MS 47.3 MSD SR (37.4) MSD

A-7

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed?	(Yes)	No	N/A
Are laboratory duplicate samples RPD values acceptable?	Yes	(No)	N/A
Were ICP serial dilution samples analyzed?	Yes	No	(N/A)
Are ICP serial dilution %D values acceptable?	Yes	No	(N/A)
Are field duplicate RPD values acceptable?	Yes	(No)	N/A
Are field split RPD values acceptable?	Yes	No	(N/A)

Comments: SRmin 4776 J

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required?	Yes	No	(N/A)
Are duplicate injection %RSD values acceptable?	Yes	No	N/A
Were analytical spikes performed as required?	Yes	No	N/A
Are analytical spike recoveries acceptable?	Yes	No	N/A
Was MSA performed as required?	Yes	No	N/A
Are MSA results acceptable?	Yes	No	N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses?	(Yes)	No	N/A
Are all results supported in the raw data?	Yes	No	(N/A)
Are results calculated properly?	Yes	No	(N/A)
Do results meet the CRDLs?	Yes	No	N/A

Comments:

Recra LabNet - Lionville

INORGANICS PRECISION REPORT 08/09/99

CLIENT: TWU-HANFORD B99-083 RECRA LOT #: 9907L528

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	INITIAL RESULT	REPLICATE	RPD	DILUTION FACTOR(REP)
-001REP	B0W192	Silver, Total	0.08u	0.07u	NC	1.0
		Aluminum, Total	6490	5840	10.7	1.0
		Arsenic, Total	2.5	2.0	22.2	1.0
		Barium, Total	274	202	30.4	1.0
		Beryllium, Total	0.57	0.47	18.5	1.0
		Calcium, Total	8430	8260	2.1	1.0
		Cadmium, Total	1.6	1.7	6.1	1.0
		Cobalt, Total	4.9	5.0	2.0	1.0
		Chromium, Total	11.8	15.6	27.7	1.0
		Copper, Total	18.0	18.3	1.7	1.0
		Iron, Total	11000	11600	5.3	1.0
		Potassium, Total	1080	1140	5.5	1.0
		Lithium, Total	7.5	6.4	15.8	1.0
		Magnesium, Total	3520	4080	14.7	1.0
		Manganese, Total	218	231	5.9	1.0
		Molybdenum, Total	0.84	0.89	5.5	1.0
		Sodium, Total	566	429	27.7	1.0
		Nickel, Total	10.8	11.3	4.5	1.0
		Phosphorus, Total	846	710	17.5	1.0
		Lead, Total	26.1	27.7	5.9	1.0
		Antimony, Total	0.19u	0.18u	NC	1.0
		Selenium, Total	0.28u	0.27u	NC	1.0
		Strontium, Total	184	121	41.3	1.0
		Thallium, Total	0.57	0.43	27.8	1.0
		Vanadium, Total	27.3	26.1	4.5	1.0
		Zinc, Total	70.5	72.4	2.7	1.0

Recra LabNet - Lionville

INORGANICS DUPLICATE SPIKE REPORT 08/09/99

CLIENT: TWO-HANFORD B99-083 RECRA LOT #: 9907L528

WORK ORDER: 10985-001-001-9999-00

SAMPLE	SITE ID	ANALYTE	SPIKE#1 %RECOV	SPIKE#2 %RECOV	%DIFF
-001	B0W192	Silver, Total	89.6	91.7	2.3
		Aluminum, Total	285.2	370.6*	~~NC~~ 26.0
		Arsenic, Total	95.0	97.6	2.7
		Barium, Total	69.9	59.4	16.4
		Beryllium, Total	94.5	96.6	2.2
		Calcium, Total	109.1	76.2	35.5
		Cadmium, Total	95.8	102.1	6.3
		Cobalt, Total	93.5	96.9	3.5
		Chromium, Total	127.1	113.5	11.3
		Copper, Total	92.1	194.2	71.4
		Iron, Total	1440	2705 *	~~NC~~ 61.0
		Potassium, Total	101.0	106.1	5.0
		Lithium, Total	101.9	104.3	2.4
		Magnesium, Total	113.5	115.5	1.8
		Manganese, Total	157.0	189.3*	~~NC~~ 18.7
		Molybdenum, Total	91.9	94.7	3.0
		Sodium, Total	88.0	90.5	2.9
		Nickel, Total	95.4	103.5	8.1
		Phosphorus, Total	139.0	108.4	24.7
		Lead, Total	147.0	109.5	29.2
		Antimony, Total	49.9	47.3	5.3
		Selenium, Total	92.1	94.2	2.2
		Strontium, Total	90.3	37.6	82.3
		Thallium, Total	89.3	91.5	2.5
		Vanadium, Total	97.5	103.1	5.6
		Zinc, Total	114.8	129.8	12.2

Corrections JMD 8/9/99

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 October 1999

Information Request

110479 - Rad/inorg

I need to know if the validation for this last group of SDGs is to be validated to the 100 area criteria.

Review Comment Record (RCR)

1. Date	2. Review No.
11/05/1999	BHI/QA99022
3. Project	4. Page
108-F	Page 1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
W0479-RLN & TNU (SDG No. W0479)	108-F Unknown Solid Residue	Claude Stacey	BHI/QA	H0-16/372-9208

17. Comment Submittal Approval:

10. Agreement with indicated comment disposition(s)

11. CLOSED

Organization Manager (Optional) _____ Date _____

Reviewer/Point of Contact _____ Date _____

Author/Originator _____

Reviewer/Point of Contact _____

Author/Originator _____

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
1	OK -No Comments.			
2				
3				

Duncan, Jeanette M

From: Weiss, Richard L
Sent: Thursday, November 18, 1999 3:21 PM
To: Duncan, Jeanette M
Subject: Validation Package Review

Jeneatte,

I've reviewed the data packages for HO479 (Rad, Inorganic) and W02841 (Inorganic). No items needing correction or revision were noted.

Rich

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Rich Weiss Date: 10-20-99

Re: Count data Pages: 3

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

Bruce

Look this over for places in the procedure that I've missed and for areas that make validation either "blow up" or would apply more restrictive qualifiers than currently

Rich

Inconsistencies and inadequately defined criteria have been identified in "Data Validation Procedures for Radiochemical Analysis", WHC-SD-EN-SPP-001, Rev.1. The following identifies the affected sections, provides a consistent replacement, and clarifies interpretation for these issues.

Laboratory Blanks

Current Wording (by section):

4.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

5.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

6.3.1 - Prepared at the same time and analyzed with the samples using the same procedure, aliquot size, and counting time.

5.3.1 – Analyzed using a similar aliquot size, counted in the same geometry and count time as the samples.

7.3.1 - Prepared at the same time and analyzed with the samples using the same procedure.

8.3.1 – Laboratory blanks have been prepared, distilled and analyzed using the same procedure and aliquot size as the samples.

9.3.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Laboratory Control or Blank Spike Samples

Current Wording (by section):

4.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

5.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

6.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

7.4.1 – LCS of BSS was analyzed in the same geometry, count duration, and aliquot size as the samples.

8.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

9.4.1 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Matrix Spike Samples

Current Wording (by section):

Section 4 - no matrix spike requirements

5.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

6.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Section 7 – no matrix spike requirements.

8.4.3 - Prepared at the same time and analyzed in the same batch, using the same procedure, as the associated samples.

Section 9 – no matrix spike requirements.

Laboratory Duplicates

Current Wording (by section):

4.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

5.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

6.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

7.5.1 – The duplicate analysis was prepared and analyzed at the same time, using the same geometry, aliquot size and count duration as the samples.

8.5.1 – Prepared and analyzed using the same aliquot size as the samples.

9.5.1 – The duplicate analysis was prepared and analyzed in the same batch, using the same procedure as the associated samples.

Replacement Wording (all sections above):

Preparation performed as part of an analytical batch, at the same time, using the same procedures and aliquot sizes as the associated samples. All components of the analytical batch (QC and sample) counted using the same or comparable geometry and count duration within a two week time period.

Laboratory failure to meet the criteria (in any section) – qualify all associated sample results as estimated (J for detects, UJ for non-detects).

TRANSMISSION RESULT REPORT (OCT 20 '99 11:32AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
057	MEMORY TX		3755151	03/03	OK

ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

BHI Sample Management
Phone: (509) 372-9346
FAX: (509) 372-9487

facsimile transmittal

To: Bruce Christian Fax: 375-5151

From: Rich Weiss Date: 10-20-99

Re: Count data Pages: 3

CC:

☐ Quick Turn / Priority Data ☐ Final Data Package

Bruce

I am this over for placed in the

FAX

TECHLAW, INC.
451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 8 October 1999

Information Request

110479 - Rad/inorg

I need to know if the validation for this last group of SDGs is to be validated to the 100 area criteria.

use "PQL" values ~~for~~ & from attached sheets,

R2 on 10/11/99

Title of document is

"Sample & Analysis Plan for 105-F & 105 DR Phase III Below Grade Structures and Underlying Soils"

- Precision is a measure of the data spread when more than one measurement has been taken for the same sample. Precision can be expressed as the RPD for duplicate measurements. A quantitative definition of the RPD is provided in Section 2.4.3. The level of effort for precision measurements will be a minimum of 1 per 20 samples.

- Completeness is a measure of the amount of valid data obtained from the analytical measurement system and the complete implementation of defined field procedures. The quantitative definition of completeness is given in Section 2.2.2. The target completeness objective for this project is identified in Table 2-2.

Table 2-2. Analytical Performance Requirements. (2 pages)

Data Type	Analytical Method	Analyte	Preliminary Action Level[a]	Detection Limit Requirements		Accuracy Req't (% Recovery)[b]	Precision Req't (%RSD or RSD)
				MDL[a]	PQL[a]		
Performance Requirements for Laboratory Measurements							
Rad	AmAEA	Am-241	TBD	0.1	1	70-130	±30
Rad	GeLi/HPGe	Ba-133	TBD			80-120	±30
Rad	Chemical separation/liquid scintillation	C-14	TBD	5	50	70-130	±30
Rad	GeLi/HPGe	Co-60	100/40[d]	0.05	0.1	80-120	±30
Rad	GeLi/HPGe	Ce-137	TBD	0.05	0.1	80-120	±30
Rad	GeLi/HPGe	Eu-152	TBD	0.1	0.2	80-120	±30
Rad	GeLi/HPGe	Eu-154	TBD	0.1	0.2	80-120	±30
Rad	GeLi/HPGe	Eu-155	TBD	0.05	0.1	80-120	±30
Rad	Chemical separation/liquid scintillation	Ni-63	TBD	5	30	70-130	±30
Rad	PuAEA	Pu-238	TBD	0.1	1	70-130	±30
Rad	PuAEA	Pu-239/240	TBD	0.1	1	70-130	±30
Rad	Rad-Sr	Sr-90	TBD	0.2	1	70-130	±30
Rad	Chemical separation/liquid scintillation	Tc-99	TBD	5	15	70-130	±30
Rad	Distillation liquid separation	Tritium	TBD	5	400	70-130	±30
Rad	UAEA	U-234	TBD	0.1	1	70-130	±30
Rad	UAEA	U-235/236	TBD	0.1	1	70-130	±30
Rad	UAEA	U-238	TBD	0.1	1	70-130	±30

Table 2-2. Analytical Performance Requirements. (2 pages)

Data Type	Analytical Method	Analyte	Preliminary Action Level[a]	Detection Limit Requirements		Accuracy Req't (% Recovery)[b]	Precision Req't (%RSD or RSD)
				MDL[a]	PQL[a]		
Performance Requirements for Field Measurements							
Rad	Portable NaI detector	Gross Cs-137 counts	100/40[d] pCi/g	N/A	60/32 pCi/g[c]	±80-120	±20
Performance Requirements for Laboratory Measurements							
Chem	EPA 7196	Cr6+	2.2 mg/kg	0.03	0.1	70-130	±30
Chem	EPA 6010	Pb	353 mg/kg	5 (0.1)	20 (0.5)	70-130	±30
Chem	EPA 7471	Hg	4 mg/kg	0.02	0.08	70-130	±30
Chem	EPA 8080/8082	PCBs	0.5 mg/kg	0.03	0.1	70-130	±30

[a] Units are in pCi/g or mg/kg unless otherwise specified.
[b] Accuracy for radionuclides are evaluated via associated batch laboratory control sample percent recoveries. The "AEA" and radioactive strontium measurements also require tracer/carrier recoveries to be 20% to 105%.
[c] Minimum detectable activities are achieved with static surveys of 5 and 15 seconds. See Appendix D.
[d] Based on preliminary dose modeling. See Appendix C.
MDL = minimum detection limit
NaI = sodium iodide
PQL = practical quantitation limit
RSD = relative standard deviation
TBD = to be determined

2.1.5 Project Narrative

The following list identifies the project objectives and associated methods (incorporated by reference) to achieve each objective:

- Determining survey and sampling design requirements and description (Section 2.2)
- Determining sample type and sampling location requirements (Section 2.2.2)
- Determining sampling methods (Section 2.2.3)
- Determining sample handling and custody requirements (Section 2.2.4)
- Selecting analytical methods (Section 2.2.5)
- Determining quality control requirements (Section 2.2.6)
- Determining sampling or analytical instrumentation requirements (Section 2.2.5)
- Maintaining ongoing assessments during actual operation (i.e., oversight) (Section 2.3.1)
- Determining data validation by the methods defined (Section 2.4)
- Determining data quality assessment of the sampling design, sampling procedures, and analytical measurement system (Section 2.5).

2.1.6 Special Training Requirements/Certification

Personnel training and certification requirements are described in BHI-HR-02, *ERC Training Procedures*. Field personnel shall have completed the following mandatory training, as described in BHI-HR-02, before starting work:

TRANSMISSION RESULT REPORT (OCT 11 '99 09:46AM)

BHI S&D MANAGEMENT 509 372 9487

(AUTO)

THE FOLLOWING FILE(S) ERASED

FILE	FILE TYPE	OPTION	TEL NO.	PAGE	RESULT
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ERRORS

1) HANG UP OR LINE FAIL 2) BUSY 3) NO ANSWER 4) NO FACSIMILE CONNECTION

)ct-07-99 08:29A OCT 07 '99 08:43AM P.02

FAX

TECHLAW, INC.

451 Hills, Suite 23
Richland, WA 99352
509-375-5667
509-375-5151 (fax)

To: Jeanette Duncan

From: Bruce Christian

Pages: 1

Date: 7 October 1999

Information Request