

Date: 6 January 2000
To: Bechtel Hanford, Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB - QC Sample Analysis
Subject: Radiochemistry - Data Package No. H0472-TNU (SDG No. H0472)

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INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0472-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
BOW105	07/19/99	Water	C	See note 1

1 - Gamma spectroscopy; alpha spectroscopy (isotopic uranium, isotopic plutonium and americium-241); total strontium; nickel-63; tritium; carbon-14; technetium-99.

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**

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 with liquid scintillation requiring analysis within 7 days of distillation.

All holding times were acceptable.

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- **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.

Equipment Blank

One equipment blank (BOW105) was submitted for analysis. All equipment 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 recovery is 70-130% and matrix spike recovery range is 60-140%. 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.

Due to the lack of a matrix spike analysis, all carbon-14 and tritium results were qualified as estimates and flagged "J".

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

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30 percent, the results are acceptable. If either activities are less than 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 contract required minimum detectable activities (MDAs), to ensure that laboratory detection levels meet the required criteria. All reported laboratory MDAs were at or below the analyte-specific TDL or contract specified MDA.

- **Completeness**

Data Package No. H0472 (SDG No. H0472) was submitted for validation and verified for completeness. The completion rate was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

Due to the lack of a matrix spike analysis, all carbon-14 and tritium 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

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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

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DATA QUALIFICATION SUMMARY

SDG: H0472	REVIEWER: TLI	DATE: 1/6/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS:			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON
Carbon-14, tritium	J	All	No matrix spike

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Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

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Project: BECHTEL-HANFORD																						
Laboratory: TNU																						
Case	SDG: H0472																					
Sample Number	BOW105																					
Location																						
Remarks	Equip. Blank																					
Sample Date	07/19/99																					
Radiochemistry	CRDL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	
Tritium	400	-25.7	UJ																			
Carbon-14	200	-17.4	UJ																			
Technetium-99	15	1.12	U																			
Uranium-234	1	0.036	U																			
Uranium-235	1	0.015	U																			
Uranium-238	1	0	U																			
Plutonium-238	1	0.029	U																			
Plutonium-239/40	1	0.007	U																			
Nickel-63	15	0.089	U																			
Americium-241	1	0.015	U																			
Strontium (total)	2	0.011	U																			
Potassium-40			U																			
Barium-133			U																			
Cobalt 60	25		U																			
Cesium 137	15		U																			
Europium 152	50		U																			
Europium 154	50		U																			
Europium 155	50		U																			
Radium-226			U																			
Radium-228			U																			
Thorium-228			U																			
Thorium-232			U																			
Americium-241 (GEA)			U																			
Uranium-238 (GEA)			U																			
Uranium-235 (GEA)			U																			

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TMA/RICHMOND
SAMPLE DELIVERY GROUP H0472

N907128-01

BOW105

DATA SHEET

SDG <u>7164</u>	Client/Case no <u>Hanford</u>	SDG- <u>H0472</u>
Contact <u>L.A. Johnson</u>	Contract <u>TRB-SBB-207925</u>	
Lab sample id <u>N907128-01</u>	Client sample id <u>BOW105</u>	
Dept sample id <u>7164-001</u>	Location/Matrix <u>105DR</u>	<u>WATER</u>
Received <u>07/22/99</u>	Collected <u>07/19/99 12:50</u>	
	Custody/SAF No <u>B99-082-01</u>	<u>B99-082</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	KDL pCi/L	QUALI- FIERS	TEST
Tritium	10028-17-8	-25.7	110	190	400	U	H
Carbon 14	14762-75-5	-17.4	21	36		U	C
Technetium 99	14133-76-7	1.12	4.0	11	15	U	TC
Uranium 233/234	U-233/234	0.036	0.048	0.092	1.0	U	U
Uranium 235	15117-96-1	0.015	0.029	0.11	1.0	U	U
Uranium 238	U-238	0	0.024	0.092	1.0	U	U
Plutonium 238	13981-16-3	0.029	0.044	0.090	1.0	U	PU
Plutonium 239/240	PU-239/240	0.007	0.044	0.090	1.0	U	PU
Nickel 63	13981-37-8	0.089	1.1	1.9		U	NI_L
Americium 241	14596-10-2	0.015	0.023	0.042		U	AM
Total Strontium	SR-RAD	0.031	0.32	0.45	2.0	U	SR
Potassium 40	13966-00-2	U		250		U	GAM
Barium 133	13981-41-4	U		15		UX	GAM
Cobalt 60	10198-40-0	U		14	25	U	GAM
Cesium 137	10045-97-3	U		13	15	U	GAM
Europium 152	14683-23-9	U		35	50	U	GAM
Europium 154	15585-10-1	U		38	50	U	GAM
Europium 155	14391-16-3	U		30	50	U	GAM
Radium 226	13982-63-3	U		28		U	GAM
Radium 228	15262-20-1	U		64		U	GAM
Thorium 228	14274-82-9	U		21		U	GAM
Thorium 232	TH-232	U		64		U	GAM
Americium 241	14596-10-2	U		44		U	GAM
Uranium 238	U-238	U		1000		U	GAM
Uranium 235	15117-96-1	U		55		U	GAM

105-DR FSB-QC Sample Analysis

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1/4/00

DATA SHEETS
Page 1
SUMMARY DATA SECTION
Page 10

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>1.06</u>
Report date <u>09/29/99</u>

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

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Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0472 is composed of one liquid (water) sample designated under SAF No. B99-082 with a Project Designation of : 105-DR FSB-QC Sample Analysis.

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 with the exception of the carbon-14 and technetium-99 data, which was faxed to BHI on August 18, 1999.

2.0 ANALYSIS NOTES

2.1 Gamma Scan Analyses

No problems were encountered during the course of the analyses.

2.2 Total Strontium Analyses

No problems were encountered during the course of the analyses.

2.3 Americium-241 Analyses

No problems were encountered during the course of the analyses.

2.4 Isotopic Plutonium Analyses

No problems were encountered during the course of the analyses.

2.5 Nickel-63 Analyses

No problems were encountered during the course of the analyses.

2.6 Isotopic Uranium Analyses

No problems were encountered during the course of the analyses.

2.7 Carbon-14 Analyses

No problems were encountered during the course of the analyses.

2.8 Tritium Analyses

No problems were encountered during the course of the analyses.

2.9 Technetium-99 Analyses

No problems were encountered during the course of the analyses.

Collector Fahlber4g/Porter	Company Contact J Adler	Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround 21 Days
Project Designation 105-DR FSB - QC Sample Analysis	Sampling Location 105 DR	SAF No. B99-082			
Ice Chest No. SML555	Field Logbook No. EL 1281	Method of Shipment Fed. Ex			
Shipped To TMA/RECRA RE 7-19-99	Offsite Property No.	Bill of Lading/Air Bill No. 423579527742			
COA R105D4 2870					

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2		
	Type of Container	P	P	aG	P	P	aG	P		
	No. of Container(s)	1	1	1	1	1	3	5		
	Special Handling and/or Storage	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L	

SAMPLE ANALYSIS				Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) (Lead)	PCBs - 8080	See item (1) in Special Instructions.
							✓			✓
Sample No.	Matrix *	Sample Date	Sample Time							
B0W105	Water	7-19-99	1250	X	X		X*			X*

CHAIN OF POSSESSION	Sign/Print Names	SPECIAL INSTRUCTIONS	Matrix *
Relinquished By <i>Brent Porter</i>	Date/Time 7/20/99 14:30	Received By <i>Ref # 2A</i>	Date/Time 7/20/99 14:30
Relinquished By <i>Brent Porter</i>	Date/Time 7/21/99 09:00	Received By <i>Brent Porter</i>	Date/Time 7/21/99 09:00
Relinquished By <i>Brent Porter</i>	Date/Time 7/21/99 13:00	Received By <i>Fed Express</i>	Date/Time 7/21/99
Relinquished By <i>FedEx</i>	Date/Time 9:40 7/22/99	Received By <i>TNU M. Goldenberg</i>	Date/Time 9:40 7/22/99
LABORATORY SECTION	Received By	Title	Date/Time
FINAL SAMPLE DISPOSITION	Disposal Method	Disposed By	Date/Time

(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155), Isotopic Plutonium, Isotopic Uranium, Americium-241, Strontium-89,90 - Total Sr, Nickel-63

- Soil
- Water
- Vapor
- Other Solid
- Other Liquid

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Appendix 5

Data Validation Supporting Documentation

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RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	105-DR FSD- QC samples		DATA PACKAGE: H0472		
VALIDATOR:	JY	LAB: TNU	DATE: 10/6/99		
CASE:			SDG: H0472		
ANALYSES PERFORMED					
<input type="checkbox"/> Gross Alpha/Beta	<input checked="" type="checkbox"/> Strontium-90	<input checked="" type="checkbox"/> Technetium-99	<input checked="" type="checkbox"/> Alpha Spectroscopy	<input checked="" type="checkbox"/> Gamma Spectroscopy	
<input type="checkbox"/> Total Uranium	<input type="checkbox"/> Radium-22	<input checked="" type="checkbox"/> Tritium	<input checked="" type="checkbox"/> C14	<input checked="" type="checkbox"/> M1-63	
SAMPLES/MATRIX	BOW105				
	water				

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: IR J 3H+CIY

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? es No N/A

Transcription/calculation errors? Yes No N/A

Comments: U235 (A+pe) Cobalt-60, CS137 all europiums Am 241

U235 (gen) U235 (gen)

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Date: 6 January 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB - QC Sample Analysis
Subject: PCB - Data Package No. H0472-RLN (SDG No. H0472)

INTRODUCTION

This memo presents the results of data validation on Summary Data Package No. H0472-RLN prepared by Recra LabNet (RLN). A list of the 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
BOW105	07/19/99	Water	C	EPA 8082*

*Equivalent to the requested method (EPA 8080)

Data validation was conducted in accordance with 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**

Sample data were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: Samples must be extracted within 7 days of the date of sample collection and analyzed within 40 days from the date of extraction.

If holding times are exceeded by less than two times the limit, all associated sample results are qualified as estimates and flagged "J" for detects and "UJ" for non-detects. If holding times are exceeded by greater than two times the

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limit, all associated detected sample results are qualified as estimates and flagged "J" and all nondetects are rejected and flagged "UR".

Holding times were met for all samples.

- **Blanks**

Method blank analyses are performed to determine the extent of laboratory contamination introduced through sampling, sample preparation or analysis. At least one method blank analysis must be conducted for every 20 samples. Method blanks should not contain target compounds at a concentration greater than CRQL. If target compounds are present, sample results less than five times the blank concentration are qualified as undetected and flagged "U". If the sample result is less than five times the blank concentration and less than CRQL, the result is qualified as undetected and elevated to the CRQL.

All method blank target compound results were acceptable.

Equipment Blank

One equipment blank (BOW105) was submitted for analysis. All equipment 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 analyses are performed in duplicate and must be within either control limits of 50% to 150% or within the laboratories control limits. If spike recoveries are outside control limits, detected sample results less than five times the spike concentration are qualified as estimates and flagged "J". Nondetected sample results with spike recoveries outside control limits are qualified as estimates and flagged "UJ". Sample results greater than five times the spike concentration require no qualification.

All accuracy results were acceptable.

Surrogate Recovery

The analysis of surrogate compounds provides a measure of performance for individual samples. Matrix-specific surrogate compound recovery control

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windows have been established by the laboratory. When a surrogate compound recovery is outside the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates and flagged "J". Nondetected compounds with surrogate recoveries less than the lower control limit are qualified as having an estimated detection limit and flagged "UJ". Nondetected compounds with surrogate recoveries above the upper control limit require no qualification.

All surrogate recovery results were acceptable.

- **Precision**

Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike/matrix spike duplicate results provide matrix-specific information on the precision of the method for specific target compound classes. Precision is expressed as the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. For all samples, results must be within RPD limits of plus/minus 20%. If RPD values are out of specification and the sample concentration is less than five times the spike concentration, all associated detected sample results are qualified as estimates and flagged "J". If RPD values are out of specification and the sample concentration is greater than five times the spike concentration, no qualification is required.

All precision 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. H0472-RLN (SDG No. H0472) was submitted for validation and verified for completeness. The completion percentage was 100%.

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MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

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

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Qualifiers which may be applied by data validators in compliance with the procedures herein 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. 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.
- 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: H0472	REVIEWER: TLI	DATE: 1/6/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

RFW Batch Number: 9907L481

Client: TNU-HANFORD B99-082

Work Order: 10985001001 Page: 1

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Sample Information	Cust ID:	BOW105	BOW105	BOW105	PBLKPK	PBLKPK BS
	RFW#:	001	001 MS	001 MSD	99LE0861-MB1	99LE0861-MB1
	Matrix:	WATER	WATER	WATER	WATER	WATER
	D.F.:	1.00	1.00	1.00	1.00	1.00
	Units:	UG/L	UG/L	UG/L	UG/L	UG/L
Surrogate:	Tetrachloro-m-xylene	58 %	62 %	58 %	32 %	45 %
	Decachlorobiphenyl	74 %	90 %	94 %	93 %	81 %
-----fl-----fl-----fl-----fl-----fl-----fl-----fl						
Aroclor-1016		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1221		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Aroclor-1232		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1242		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1248		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Aroclor-1254		1.0 U	100 %	101 %	1.0 U	99 %
Aroclor-1260		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

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U= Analyzed, not detected. J= Present below detection limit. B= Present in blank. NR= Not reported. NS= Not spiked. % = Percent recovery. D= Diluted out. I= Interference. NA= Not Applicable. *= Outside of EPA CLP QC

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation



**RECRA
LabNet**

a division of Recra Environmental, Inc.

Virtual Laboratories Everywhere



**Recra LabNet Philadelphia
Analytical Report**

Client: TNU-HANFORD B99-082
RFW#: 9907L481
SDG/SAF#: H0472/B99-082

W.O.#: 10985-001-001-9999-00
Date Received: 07-22-99

PCB

One (1) water sample was collected on 07-19-99.

The sample and its associated QC samples were extracted on 07-23-99 and analyzed according to Recra OPs based on SW846, 3rd Edition procedures on 08-02,03-99. The extraction procedure was based on method 3520 and the extracts were analyzed based on method 8082 for Aroclors only.

The following is a summary of the QC results accompanying the sample results and a description of any problems encountered during their analyses:

1. The cooler temperature has been recorded on the chain-of-custody.
2. All required holding times for extraction and analysis have been met.
3. The samples and their associated QC samples received a sulfuric acid cleanup.
4. The method blank was below the reporting limits for all target compounds.
5. All surrogate recoveries were within acceptance criteria.
6. The blank spike recovery was within acceptance criteria.
7. All matrix spike recoveries were within acceptance criteria.
8. All initial calibrations associated with this data set were within acceptance criteria.
9. All continuing calibration standards analyzed prior to sample extracts were within acceptance criteria.

J. Michael Taylor

J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory

08-11-99
Date

pcfr:\group\data\pest\07L-481.pcb

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 7 pages.

Handwritten signature

Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B99-082-01	Page 1 of 1
Collector Fahlber4g/Porter		Company Contact J Adler		Telephone No. 373-4316	Project Coordinator TRENT, SJ	Price Code 7L	Data Turnaround 21 Days
Project Designation 105-DR FSB - QC Sample Analysis		Sampling Location 105 DR		SAF No. B99-082			
Ice Chest No. SML552		Field Loghook No. EL 1281		Method of Shipment Fed. Ex			
Shipped To FMA/RECRA KF 7.19.99		Offsite Property No.		Bill of Lading/Air Bill No. 423579527753			
				COA R105 D42870			

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	None	HNO3 to pH <2	HCl to pH <2	HNO3 to pH <2	Cool 4C	HNO3 to pH <2			
	Type of Container	P	P	aG	P	P	aG	P			
	No. of Container(s)	1	1	1	1	1	3	5			
	Special Handling and/or Storage	Volume	120mL	120mL	500mL	500mL	500mL	1000mL	1L		

SAMPLE ANALYSIS				Carbon-14	Tritium - H3	Mercury - 7470 - (CV)	Technetium-99	ICP Metals - 6010A (Add-on) [Lead]	PCBs - 8080	See item (1) in Special Instructions			
Sample No.	Matrix *	Sample Date	Sample Time										
BOW105	Water	7.19.99	1250			X		X	X				

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS				Matrix *	
Relinquished By	Date/Time	Received By	Date/Time	(1) Gamma Spectroscopy (Water) (Cesium-137, Cobalt-60, Europium-152, Europium-154, Europium-155); Isotopic Plutonium; Isotopic Uranium; Americium-241; Strontium-89,90 - Total Sr; Nickel-63				Soil Water Vapor Other Solid Other Liquid	
Brent Porter	7/20/99 14:30	Ret # 1A	7/20/99 14:30						
Brent Porter	7/21/99 09:00	Brent Porter	7/21/99 09:00						
Brent Porter	7/21/99 12:00	Fed Express	7/21/99						
Relinquished By	Date/Time	Received By	Date/Time						
Fed Ex	7/21/99 08:30	[Signature]	7/21/99 08:30						
LABORATORY SECTION	Received By	Title						Date/Time	
FINAL SAMPLE DISPOSITION	Disposal Method			Disposed By				Date/Time	

Appendix 5
Data Validation Supporting Documentation

PESTICIDE/PCB DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 105 DR FSB QC Samples					
DATA PACKAGE: H0472					
VALIDATOR:		LAB: Recra		DATE: 10/7/89	
CASE:			SDG: H0472		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP3/90	<input type="checkbox"/> SW-846 8080	<input type="checkbox"/> SW-846 8081	<input checked="" type="checkbox"/> 8082	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX	BOW105				
	Water				

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: _____

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

3.1 INSTRUMENT PERFORMANCE (METHOD 8080 AND 8081)

Are DDT retention times acceptable Yes No N/A
 Are calibration standard retention times acceptable? Yes No N/A
 Are DDT and endrin breakdowns acceptable? Yes No N/A

A-5

PESTICIDE/PCB DATA VALIDATION CHECKLIST

Are DBC retention times acceptable? Yes No (N/A)
Is the GC/MS tuning/performance check acceptable? Yes No (N/A)

Comments: _____

3.2 CALIBRATIONS (METHOD 8080 AND 8081)

Are EVAL standard calibration factors and %RSD values acceptable? Yes No (N/A)
Are quantitation column calibration factor %RSD values acceptable? Yes No (N/A)
Were the analytical sequence requirements met? Yes No (N/A)
Are continuing calibration %D values acceptable? Yes No (N/A)

Comments: _____

3.3 INSTRUMENT PERFORMANCE AND INITIAL CALIBRATION (3/90 SOW)

Was the initial calibration sequence performed? Yes No (N/A)
Was the resolution acceptable in the resolution check mix? . . . Yes No (N/A)
Is resolution acceptable in the PEM, INDA and INDB? Yes No (N/A)
Are DDT and Endrin breakdowns acceptable? Yes No (N/A)
Are retention times in PEMs and calibration mixes acceptable? . Yes No (N/A)
Are RPD values in the PEMs acceptable? Yes No (N/A)
Are %RSD values acceptable? Yes No (N/A)

Comments: _____

3.4 CALIBRATION VERIFICATION (3/90 SOW)

Were the analytical sequence requirements met? Yes No (N/A)
Is resolution acceptable in the PEMs? Yes No (N/A)
Are initial calibrations acceptable? Yes No (N/A)

PESTICIDE/PCB DATA VALIDATION CHECKLIST

- Are retention times acceptable in the PEMS, INDA and INDB mixes? Yes No **N/A**
- Are RPD values in the PEMS acceptable? Yes No **N/A**
- Are the DDT and endrin breakdowns acceptable? Yes No **N/A**
- Was GPC cleanup performed? Yes No **N/A**
- Is the GPC calibration check acceptable? Yes No **N/A**
- Was Florisil cleanup performed? Yes No **N/A**
- Is the Florisil performance check acceptable? Yes No **N/A**

Comments: _____

4. BLANKS

- Were laboratory blanks analyzed? **Yes** No N/A
- Are laboratory 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: _____

5. ACCURACY

- Were surrogates analyzed? **Yes** No N/A
- Are surrogate recoveries acceptable? **Yes** No N/A
- Were MS/MSD samples analyzed? **Yes** No N/A
- Are MS/MSD results acceptable? **Yes** No **N/A**
- Were LCS samples analyzed? Yes No **N/A**
- Are LCS results acceptable? Yes No **N/A**

Comments: _____

PESTICIDE/PCB DATA VALIDATION CHECKLIST

5. PRECISION

- Are MS/MSD RPD values acceptable? Yes No N/A
- Are laboratory duplicate results 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: _____

7. SYSTEM PERFORMANCE

- Is chromatographic performance acceptable? Yes No N/A
- Are positive results resolved acceptably? Yes No N/A

Comments: _____

8. COMPOUND IDENTIFICATION AND QUANTITATION

- Is compound identification acceptable? Yes No N/A
- Is compound quantitation acceptable? Yes No N/A

Comments: _____

9. REPORTED RESULTS AND QUANTITATION LIMITS

- Are results reported for all requested analyses? Yes No N/A
- Are all results supported in the raw data? Yes No N/A
- Do results meet the CRQLs? Yes No N/A

Comments: _____

A-*[Signature]*

Date: 6 January 2000
To: Bechtel Hanford Inc. (technical representative)
From: TechLaw, Inc.
Project: 105-DR FSB - QC Sample Analysis
Subject: Inorganics - Data Package No. H0472-RLN (SDG No. H0472)

INTRODUCTION

This memo presents the results of data validation on Data Package No. H0472-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
B0W105	07/19/99	Water	C	See note 1

1 - ICP metals by 6010B (lead); mercury by 7470A.

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: Samples must be analyzed within six (6) months for lead and 28 days for mercury.

All holding times were acceptable.

000001

- **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 Practical Quantitation Limit (PQL) or if no PQL is specified 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.

Equipment Blank

One equipment blank (B0W105) was submitted for analysis. All equipment 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 75% to 125%. 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 74% and a sample result less than the IDL are qualified "UJ". Samples with a spike recovery of greater than 125% 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 125% and a sample result less than the IDL, no qualification is required.

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All matrix spike recovery 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 20% for liquid 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".

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. H0472-RLN (SDG No. H0472) was submitted for validation and verified for completeness. The completion percentage was 100%.

MAJOR DEFICIENCIES

None found.

MINOR DEFICIENCIES

None found.

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

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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).

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Appendix 2

Summary of Data Qualification

000007

DATA QUALIFICATION SUMMARY

SDG: H0472	REVIEWER: TLI	DATE: 1/6/00	PAGE <u>1</u> OF <u>1</u>
COMMENTS: No qualifiers assigned			
COMPOUND	QUALIFIER	SAMPLES AFFECTED	REASON

000008

Appendix 3

Qualified Data Summary and Annotated Laboratory Reports

000009

Recra LabNet - Lionville

INORGANICS DATA SUMMARY REPORT 08/04/99

CLIENT: TNU-HANFORD B99-082
WORK ORDER: 10985-001-001-9999-00

RECRA LOT #: 9907L481

SAMPLE	SITE ID	ANALYTE	RESULT	UNITS	REPORTING LIMIT	DILUTION FACTOR
-001	B0W105	Mercury, Total	0.10	u UG/L	0.10	1.0
		Lead, Total	30.9	u UG/L	30.9	1.0

pu
10/12/99

000011

005

Appendix 4

Laboratory Narrative and Chain-of-Custody Documentation

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**Recra LabNet Philadelphia
Analytical Report**

Client : TNU-HANFORD B99-082
RFW# : 9907L481
SDG/SAF# : H0472/B99-082

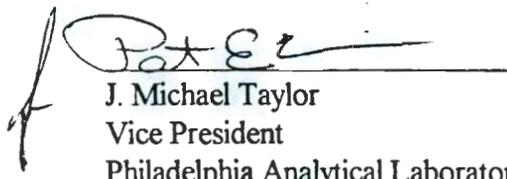
W.O.# : 10985-001-001-9999-00
Date Received: 07-22-99

METALS CASE NARRATIVE

1. This narrative covers the analyses of 1 water sample.
2. The sample was prepared and analyzed in accordance with methods checked on the attached glossary.
3. 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 (80-120% for Mercury).
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. All matrix spike (MS) recoveries were within the 75-125% control limits. Refer to the Inorganics Accuracy Report.
11. All duplicate analyses were within the 20% Relative Percent Difference (RPD) control limits. Refer to the Inorganics Precision Report.

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12. 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.


J. Michael Taylor
Vice President
Philadelphia Analytical Laboratory
mld/m07-481

8-4-99
Date



000014



Appendix 5
Data Validation Supporting Documentation

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT:	10SDR FSB QC samples		DATA PACKAGE: H0472		
VALIDATOR:	HLI	LAB: QES		DATE: 10/22/99	
CASE:			SDG: H0472		
ANALYSES PERFORMED					
<input type="checkbox"/> CLP/ICP	<input type="checkbox"/> CLP/GFAA	<input type="checkbox"/> CLP/Hg	<input type="checkbox"/> CLP/Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> SW-846/ICP	<input type="checkbox"/> SW-846/GFAA	<input checked="" type="checkbox"/> SW-846/Hg	<input type="checkbox"/> SW-846 Cyanide	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLES/MATRIX	Bowios				
water					

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: _____

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: _____

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: _____

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: _____

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: _____

