RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09324-TMA-592 (923-E418, Filename 592RAD.UP2)

9413225.1856

RECEIVED
FEB 23 1994
VALIDATION DOCUMENTATION
SDLA

MEMORANDUM

TO: 200 UP-2 Project QA Record February 23, 1994

FR: Thomas Stapp, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE B09324-TMA-592 (923-E418 592RAD.UP2)

FEB 1994

9413225.1857

INTRODUCTION

This memo presents the results of data validation on data package B09324-TMA-592 prepared by the Teledyne Isotopes laboratory under contract to Weston Analytics Laboratory using WHC approved methods. Information concerning the samples validated along with the analyses reported and the methods of analysis is provided in the following table.

SAMPLE ID	SAMPLE DATE	MEDIA	ANALYSIS
B09323 B09324	9/2/93 9/3/93	SOIL SOIL	SEE NOTE 1.

NOTES:

1. Indicates the samples were analyzed for gross alpha/beta, strontium-90, technetium-99 (beta counting), selenium-79 (liquid scintillation), isotopic plutonium, uranium, curium-244, americium-241, and neptunium-237 (alpha spectroscopy), total uranium (laser fluorometry), and selected radioisotopes by gamma spectroscopy.

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

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

DATA QUALITY OBJECTIVES

Precision. Goals for precision were met except for the relative percent difference (RPD) result for selenium-79 as discussed under "Minor Deficiencies" below.

Accuracy. Goals for accuracy were met except for blank spike sample results as discussed under "Minor Deficiencies" below.

Sample Result Verification. All sample results were supported in the raw data.

Detection Limits. Detection limit goals were acceptable for all sample results except for selenium-79 and iron-59 minimum detectable activities (MDA's) in sample B09323, and technetium-99 and iron-59 MDA's in sample B09324 which exceeded the required detection limits as indicated on the laboratory report forms.

Completeness. The data package was complete for all requested analyses. A total of two samples were validated in this data package with a total of 70 determinations reported, all of which were determined valid. This results in a completeness of 100 percent, which meets the 90% objective of the work plan.

MAJOR DEFICIENCIES

There were no major deficiencies identified during data validation which required qualification of data as unusable.

MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Laboratory Blanks

- Selenium-79 was found in the laboratory blank, therefore associated results for samples B09323 and B09324 found above the MDA and less than 5 times the blank result have been qualified as estimated (J).

Blank Spike Recovery

- Blank spike analysis was not performed for selenium-79, therefore, associated results for samples B09323 and B09324 have been qualified as estimated (J).

Chemical Recovery

- Technetium-99 chemical yield recovery was below 30% and above 10% therefore the associated result for sample B09324 has been qualified as estimated (UJ).

Laboratory Duplicate

- Selenium-79 RPD exceeded the 35% limit for soils, therefore associated results for samples B09323 and B09324 have been qualified as estimated (J).

Reported Results

- Sample results reported as less than (L.T.) by the laboratory have been qualified as undetected (U) on the laboratory result forms (see Attachment 3).

94/3225.1858

- Secondary results reported by the laboratory have been crossed out, initialed and dated to improve the clarity of the laboratory result forms (see attachment 3).

REFERENCES

WHC 1993a, Validation of 200 UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1, 1993. Westinghouse Hanford Company, Richland, Washington.

9413225.1859

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9413225.1860

GLOSSARY OF RADIOCHEMISTRY DATA REPORTING QUALIFIERS

U - Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the MDA corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample MDA. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1862

DATA QUALIFICATION SUMMARY - FORM B-7

SDG: B09324-TMA-592	REVIEWER: T. STAPP	DATE: 2-18-94	PAGE 1 OF 1
COMMENTS: RADIOCHEMISTRY			
COMPOUND/ANALYTE	QUALIFIER	SAMPLES AFFECTED	REASON
ALL VALUES REPORTED AS LESS THAN (L.T.)	U	ALL	QUALIFIER APPLIED TO BE CONSISTENT WITH NORMAL REPORTING PRACTICE
SELENIUM-79	J	B09323 B09324	CONTAMINANT FOUND IN BLANK
SELENIUM-79	J	B09323 B09324	RPD FOR DUPLICATE IS >35%
SELENIUM-79	J	B09323 B09324	BLANK SPIKE SAMPLE WAS NOT ANALYZED
TECHNETIUM-99	UJ	B09324	CHEMICAL YIELD RECOVERY <30% BUT >10%
ALL SECONDARY RESULTS	NONE	B09323 B09324	VALUES HAVE BEEN LINED OUT TO CLARIFY REPORTING OF DATA

9413225.1863

ATTACHMENT 3

QUALIFIED DATA SUMMARY and ANNOTATED LABORATORY REPORTS

9413225.1864

Validated Data Summary, Data Package: B09324-IMA-592

	Samp#	B09323		B09324	
	Date	9-2-93		9-3-93	
	Location	299-W19-95		299-W19-95	
	Depth	4.00 - 6.00		14.50 - 15.50	
	Type	---		---	
	Comments	---		---	
Parameter	Units	Result	Q	Result	Q
GROSS ALPHA	pCi/g	11.000		11.000	
GROSS BETA	pCi/g	14.000		19.000	
SELENIUM-79	pCi/g	81.000	J	10.000	BJ
STRONTIUM-90	pCi/g	0.800	U	0.800	U
TECHNETIUM 99	pCi/g	0.300	U	1.000	UJ
IODINE-129	pCi/g	2.000	U	1.000	U
URANIUM-233/234	pCi/g	0.690		0.680	
URANIUM-235	pCi/g	0.100	U	0.200	U
URANIUM-238	pCi/g	0.690		0.790	
TOTAL URANIUM	UG/G	2.100		2.200	
NEPTUNIUM-237	pCi/g	0.020	U	0.020	U
PLUTONIUM-238	pCi/g	0.030	U	0.030	U
PLUTONIUM-239/240	pCi/g	0.012	J	0.014	J
AMERICIUM-241	pCi/g	0.030	U	0.030	U
CURIUM-244	pCi/g	0.030	U	0.030	U
SODIUM-22	pCi/g	0.050	U	0.050	U
POTASSIUM 40	pCi/g	13.000		14.000	
MANGANESE 54	pCi/g	0.040	U	0.040	U
IRON 59	pCi/g	0.100	U	0.100	U
COBALT-58	pCi/g	0.050	U	0.040	U
COBALT-60	pCi/g	0.050	U	0.050	U
NIOBIUM 94	pCi/g	0.040	U	0.040	U
RUTHENIUM-103	pCi/g	0.050	U	0.050	U
RUTHENIUM 106	pCi/g	0.400	U	0.400	U
TIN-113	pCi/g	0.050	U	0.050	U
CESIUM-134	pCi/g	0.050	U	0.050	U
CESIUM-137	pCi/g	0.040	U	0.040	U
CERIUM-144	pCi/g	0.200	U	0.200	U
EUROPIUM-152	pCi/g	0.100	U	0.080	U
EUROPIUM-154	pCi/g	0.070	U	0.060	U
EUROPIUM-155	pCi/g	0.100	U	0.100	U
RADIUM-226	pCi/g	0.610		0.640	
RADIUM-228	pCi/g	0.960		1.000	
THORIUM-228	pCi/g	0.820		0.800	
THORIUM-232	pCi/g	0.960		1.000	

Verified RS 2-23-94

N309030-01

TMA NORCAL
REPORTING GROUP 7239

DATA SHEET

B09323

SDG 7239 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309030-01 Client sample id B09323
Dept sample id 7239-001 Location/Matrix 200-UP-2 SOLID
Received 09/08/93 Collected 09/02/93
% moisture 13.0 Chain of custody id EFL-1091

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALIFIERS	TEST
Gross Alpha	Alpha	11	4.4	4	10		80A
Gross Beta	Beta	14	3.9	5	10		80B
Selenium 79	15758-45-9	81	96	40	10	J	SE
Strontium 90	10098-97-2	~~-0.036~~	~~0.23~~	0.8	2	U	Y
Technetium 99	14133-76-7	~~0.21~~	~~0.11~~	0.3	0.5	U	TC
Iodine 129	15046-84-1	~~0.066~~	~~0.33~~	2	2	U	I
Uranium 233/234		0.69	0.18	0.1	0.3		U
Uranium 235	15117-96-1	~~0.076~~	~~0.076~~	0.1	0.3	U	U
Uranium 238		0.69	0.18	0.1	0.3		U
Total Uranium (ug/g)	7440-61-1	2.1	0.38	0.4		~~X~~	U_T
Neptunium 237	13994-20-2	~~0.002~~	~~0.010~~	0.02	0.2	U	NP
Plutonium 238	13981-16-3	~~0~~	~~0.014~~	0.03	0.05	U	PU
Plutonium 239/240		0.012	0.011	0.01	0.05	J	PU
Americium 241	14596-10-2	~~0.009~~	~~0.017~~	0.03	0.05	U	TP
Curium 244	13981-15-2	~~0.016~~	~~0.014~~	0.03	0.05	U	TP
GAMMA SCAN ANALYTES							
Sodium 22	13966-32-0	U		0.05		J	GAM
Potassium 40	13966-00-2	13	0.78				GAM
Manganese 54	13966-31-9	U		0.04		J	GAM
Iron 59	14596-12-4	U		0.1	0.05	U	GAM
Cobalt 58	13981-38-9	U		0.05		J	GAM
Cobalt 60	10198-40-0	U		0.05	0.05	U	GAM
Niobium 94	14681-63-1	U		0.04		U	GAM
Ruthenium 103	13968-53-1	U		0.05		U	GAM
Ruthenium 106	13967-48-1	U		0.4		U	GAM
Tin 113	13966-06-3	U		0.05		U	GAM
Cesium 134	13967-70-9	U		0.05		U	GAM
Cesium 137	10045-97-3	U		0.04	0.05	U	GAM

Verified
2-18-94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/08/93

N309030-01

TMA NORCAL
REPORTING GROUP 7239

DATA SHEET, cont

809323

SDG 7239 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309030-01 Client sample id 809323
Dept sample id 7239-001 Location/Matrix 200-UP-2 SOLID
Received 09/08/93 Collected 09/02/93
% moisture 13.0 Chain of custody id EFL-1091

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Cerium 144	14762-78-8	U		0.2		U	GAM
Europium 152	14683-23-9	U		0.1	0.1	U	GAM
Europium 154	15585-10-1	U		0.07	0.1	U	GAM
Europium 155	14391-16-3	U		0.1		U	GAM
Radium 226	13982-63-3	0.61	0.098				GAM
Radium 228	15262-20-1	0.96	0.23				GAM
Thorium 228	14274-82-9	0.82	0.057				GAM
Thorium 232	7440-29-1	0.96	0.23				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQUOT	ANALYZED	REVIEWED	BY
N309030-01	30A/80	7239-001		0.100 g	10/08/93	10/12/93	DPK
N309030-01	30B/80	7239-001		0.100 g	10/08/93	10/12/93	DPK
N309030-01	SE	7239-001		0.500 g	10/27/93	11/30/93	DPK
N309030-01	Y	7239-001		1.00 g	10/05/93	10/07/93	DPK
N309030-01	TC	7239-001		2.00 g	09/27/93	09/30/93	DPK
N309030-01	I	7239-001		1.00 g	10/20/93	10/28/93	DPK
N309030-01	U	7239-001		1.00 g	10/18/93	10/20/93	DPK
N309030-01	U_T	7239-001		0.250 g	10/05/93	11/30/93	DPK
N309030-01	NP	7239-001		1.00 g	10/01/93	10/08/93	DPK
N309030-01	PU	7239-001		1.00 g	10/12/93	10/15/93	DPK
N309030-01	TP	7239-001	A2	1.00 g	12/01/93	12/06/93	DPK
N309030-01	GAM	7239-001		742 g	09/23/93	09/28/93	DPK

Verified
2-18-94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/08/93

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N309030-02

TMA NORCAL
REPORTING GROUP 7239

DATA SHEET

809324

SDG 7239 | Client Westinghouse Hanford
Contact Dinkar Kharkar | Contract MBH-SVV-069262

Lab sample id N309030-02 | Client sample id 809324
Dept sample id 7239-002 | Location/Matrix 200-UP-2 SOLID
Received 09/08/93 | Collected 09/03/93
% moisture 5.5 | Chain of custody id EFL-1091

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Gross Alpha	Alpha	11	4.1	3	10		80A
Gross Beta	Beta	19	4.3	5	10		80B
Selenium 79	15758-45-9	10	7.2	7	10	B J	SE
Strontium 90	10098-97-2	~~0.029~~	~~0.19~~	0.8	2	U	Y
Technetium 99	14133-76-7	~~0.54~~	~~0.99~~	1	0.5	U J	TC
Iodine 129	15046-84-1	~~0.002~~	~~0.58~~	1	2	U	I
Uranium 233/234		0.68	0.26	0.2	0.3		U
Uranium 235	15117-96-1	~~0~~	~~0.044~~	0.2	0.3	U	U
Uranium 238		0.79	0.27	0.1	0.3		U
Total Uranium (ug/g)	7440-61-1	2.2	0.40	0.4		~~J~~	U_T
Neptunium 237	13994-20-2	~~0.009~~	~~0.012~~	0.02	0.2	U	NP
Plutonium 238	13981-16-3	~~0.005~~	~~0.014~~	0.03	0.05	U	PU
Plutonium 239/240		0.014	0.011	0.01	0.05	J	PU
Americium 241	14596-10-2	~~0.004~~	~~0.016~~	0.03	0.05	U	TP
Curium 244	13981-15-2	~~0.012~~	~~0.016~~	0.03	0.05	U	TP
GAMMA SCAN ANALYTES							
Sodium 22	13966-32-0	U		0.05		U	GAM
Potassium 40	13966-00-2	14	0.98				GAM
Manganese 54	13966-31-9	U		0.04		U	GAM
Iron 59	14596-12-4	U		0.1	0.05	U	GAM
Cobalt 58	13981-38-9	U		0.04		U	GAM
Cobalt 60	10198-40-0	U		0.05	0.05	U	GAM
Niobium 94	14681-63-1	U		0.04		U	GAM
Ruthenium 103	13968-53-1	U		0.05		U	GAM
Ruthenium 106	13967-48-1	U		0.4		U	GAM
Tin 113	13966-06-8	U		0.05		U	GAM
Cesium 134	13967-70-9	U		0.05		U	GAM
Cesium 137	10045-97-3	U		0.04	0.05	U	GAM

Not 2/22/94

Verified 2-18-94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/08/93

TMA NORCAL

REPORTING GROUP 7239

N309030-02

DATA SHEET, cont

B09324

SDG 7239 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309030-02 Client sample id B09324
Dept sample id 7239-002 Location/Matrix 200-UP-2 SOLID
Received 09/08/93 Collected 09/03/93
% moisture 5.5 Chain of custody id EFL-1091

ANALYTE	CAS NO	RESULT pCi/g	2σ ERR (COUNT)	MDA pCi/g	RDL pCi/g	QUALI-FIERS	TEST
Cerium 144	14762-78-8	U		0.2		U	GAM
Europium 152	14683-23-9	U		0.08	0.1	U	GAM
Europium 154	15585-10-1	U		0.06	0.1	U	GAM
Europium 155	14391-16-3	U		0.1		U	GAM
Radium 226	13982-63-3	0.64	0.093				GAM
Radium 228	15262-20-1	1.0	0.22				GAM
Thorium 228	14274-82-9	0.80	0.052				GAM
Thorium 232	7440-29-1	1.0	0.22				GAM

LAB SAMPLE	TEST	PLANCHET	SUFFIX	ALIQUOT	ANALYZED	REVIEWED	BY
N309030-02	80A/80	7239-002		0.100 g	10/11/93	10/12/93	DPK
N309030-02	80B/80	7239-002		0.100 g	10/11/93	10/12/93	DPK
N309030-02	SE	7239-002		0.530 g	10/27/93	11/18/93	DPK
N309030-02	Y	7239-002		1.00 g	10/05/93	10/07/93	DPK
N309030-02	TC	7239-002		2.00 g	09/27/93	09/30/93	DPK
N309030-02	I	7239-002		1.00 g	11/18/93	11/19/93	DPK
N309030-02	U	7239-002		1.00 g	10/12/93	10/13/93	DPK
N309030-02	U_T	7239-002		0.250 g	10/05/93	11/30/93	DPK
N309030-02	NP	7239-002		1.00 g	10/01/93	10/08/93	DPK
N309030-02	PU	7239-002		1.00 g	10/12/93	10/15/93	DPK
N309030-02	TP	7239-002	A2	1.00 g	12/01/93	12/06/93	DPK
N309030-02	GAM	7239-002		730 g	09/23/93	09/28/93	DPK

Verified
12-18-93

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Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/08/93

ATTACHMENT 4

LABORATORY NARRATIVE and CHAIN-OF-CUSTODY DOCUMENTATION

GH/325 1870

TMA
Thermo Analytical Inc.

TMA/Norcal
2030 Wright Avenue
P. O. Box 4040
Richmond, CA 94804-0040
(510) 235-2633 Fax No. (510) 235-0438

DEC 1993
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SDLA

December 10, 1993

Ref: TMA/Norcal N3-09-030-7239

Ms. Briana Colley
Westinghouse Hanford Company
345 Hills Street
Richland, WA 99352

Dear Ms. Colley:

Enclosed is the data report for the two soil samples received September 8, 1993 from location 200-UP-2. Results are given for gross alpha, gross beta, selenium-79, strontium-90, technetium-99, iodine-129, total uranium, isotopic uranium, isotopic plutonium, neptunium-237, americium-241, curium-244, and gamma scan analyses. The data package is paginated 1 through 424.

Please call if you have any questions concerning this data.

Sincerely,

Dinkar P. Kharkar, Ph.D.
Manager, Nuclear Programs

DPK/ck

Enclosure: Data Package

2-21-94

SDG: 7239
Contact: Dinkar Kharkar

TMA NORCAL
REPORTING GROUP 7239

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

CASE NARRATIVE

1.0 GENERAL

TMA/Norcal Sample Delivery Group 7239 is comprised of the samples listed on the Chain-of-Custody documents below. This sample group was processed under the Westinghouse Hanford Company Statement of Work P.O. MBH-SVV-069262.

1.1 Chains-of-Custody
This report includes data for the two soil samples from location 200-UP-2 delivered under Field Logbook #EFL-1091. Chain-of-Custody numbers were not provided.

1.2 Sample Volume
One 1000 mL plastic bottle containing of each sample was received for the analyses.

1.3 Missing Samples
The samples listed on the Chain-of-Custody documents were received.

1.4 Holding Times
The samples were collected on September 2 and 3, 1993 and sample processing was initiated within 180 days of collection.

2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control sample, a blank, and a replicate. All original analyses were performed with QC samples 7239-03 through 7239-05. Americium and curium analyses were performed with QC samples 7239-06 and 7239-07.

The QC samples were prepared by the Quality Control Department. Copies of the QC notebook pages are included in this data package.

2.1 Laboratory Control Samples
The LCS recoveries for all nuclides were acceptable except technetium-99 and neptunium-237, which had recoveries of 83% and 85% respectively. The recoveries for technetium-99 and neptunium-237 were just outside the 3σ limits of (84-116%) and (86-114%) respectively, but within the (80-120%) contract limits. The MDA of the result for technetium-99 was above the RDL due to a low chemical yield.

2-21-94

SDG: 7239
Contact: Dinkar Kharkar

TMA NORCAL
REPORTING GROUP 7239

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

2.0 QUALITY CONTROL (cont'd)

2.2 Reagent Blanks

The MDA's of the results for all analyses met the RDL's. The result for the selenium-79 blank was higher than the RDL; this is under investigation. The high blank did not compromise the sample results since the process blank was not subtracted from the sample results and the samples did not contain selenium-79 activity. All other results were acceptable.

2.3 Duplicates

Results were satisfactory for all duplicate analyses. The MDA of the result selenium-79 for the original of sample B09323 was higher than the RDL due to quenching which resulted in poor LSC efficiency. The MDA's of the gamma nuclides for the duplicate of sample B09323 were above the RDL's due to small sample aliquot available for analyses. The iron-59 MDA was higher than the RDL due to the short half-life of iron-59.

9413275.1873

3.0 ANALYSIS NOTES

3.1 Gross Alpha Analyses

The average MDA for gross alpha was (4 ± 2) pCi/g. Gross alpha activity above the RDL was found in both the samples.

3.2 Gross Beta Analyses

The average MDA for gross beta was (5 ± 0.0) pCi/g. Gross beta activity above the RDL was found in both the samples.

3.3 Selenium-79 Analyses

The average yield for four analyses was (62 ± 3)%. The lowest yield was 58% and the highest was 67%. The average MDA was (20 ± 30) pCi/g. Selenium-79 activity above the RDL was not found in either sample. The MDA of the sample B09323 was higher than the RDL due to quenching which resulted in low scintillation counting efficiency.

3.4 Strontium-90 Analyses

The average yield for five analyses was (85 ± 6)%. The lowest yield was 80% and the highest was 87%. The average MDA was (0.8 ± 0.09) pCi/g. Strontium-90 activity above the RDL was not found in either sample.

3.5 Technetium-99 Analyses

The average yield for five analyses was (43 ± 53)%. The lowest yield was 13% and the highest was 76%. The average MDA was (0.6 ± 0.6) pCi/g. Technetium-99 activity above the RDL was not found in either sample. The MDA of the result for sample B09324 was higher than the RDL due to low chemical yield.

2-21-94

SDG: 7239
Contact: Dinkar Kharkar

TMA NORCAL
REPORTING GROUP 7239

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

3.0 ANALYSIS NOTES (cont'd)

3.6 Iodine-129 Analyses
The average yield for five analyses was (85 ± 10)%. The lowest yield was 80% and the highest was 91%. The average MDA was (2 ± 0.9) pCi/g. Iodine-129 activity above the RDL was not found in either sample.

3.7 Neptunium-237 Analyses
The average yield for five analyses was (35 ± 21)%. The lowest yield was 18% and the highest was 44%. The average MDA was (0.03 ± 0.04) pCi/g. Neptunium-237 activity above the RDL was not found in either sample.

3.8 Total Uranium Analyses
The average MDA was (0.3 ± 0.3) μg/g. Uranium was found in both samples.

3.9 Isotopic Uranium Analyses
The average yield for five analyses was (66 ± 31)%. The lowest yield was 42% and the highest was 79%. The average MDA was (0.2 ± 0.2) pCi/g. Uranium-233/234 and uranium-238 activity above the RDL was found in both samples.

3.10 Isotopic Plutonium Analyses
The average yield for five analyses was (59 ± 25)%. The lowest yield was 37% and the highest was 67%. The average MDA was (0.03 ± 0.009) pCi/g. Plutonium-238 and plutonium-239/240 activity above the RDL was not found in either sample.

3.11 Americium-241/Curium-244 Analyses
The average yield for five analyses was (81 ± 18)%. The lowest yield was 67% and the highest yield was 89%. The average MDA was (0.03 ± 0.009) pCi/g. Americium-241 and curium-244 activities above the RDL's were not found in either sample.

3.12 Gamma Scan Analyses
A gamma scan analysis found natural potassium-40, radium-226, radium-228, thorium-228, and thorium-232 activity in both the samples.

2-21-94

Westinghouse Hanford Company

CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-2-93

Ice Chest No.: SML-210

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: 2536956026

Offsite Property No.: W93-0-0667 #46

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL)

Sample Identification

1)

~~1,250ml P:CLP;TAL Metals Hg,Ti~~ B09323

~~1,250ml Gs:VOA CLP~~

~~1,250ml aG:Semi-VOA CLP~~

~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~

~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~

~~1,125ml G:Cyanide CLP~~

~~1,125ml Gw:Kerosene (8015M)~~

9-7-93

1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-2-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

Field Transfer of Custody	Chain of Possession	(Sign and Print Names)
Relinquished by: ~~9-2-93~~ ~~Lynn C. Rogers~~	Received by:	Date/Time:
Relinquished by: 9-7-93 Loren C. Rogers	Received by: W.V. Seitzer W.V. SEITZER	Date/Time: 9-7-93 1942
Relinquished by: W. Vella Seitzer	Received by: H. Harusc	Date/Time: 9-8-93 - 11:00
Relinquished by:	Received by:	Date/Time:

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

XS 2-21-94

~~57~~

-013

Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST

Collector L E ROGERS S.A.F. # 93-263 Date 9-2-93

Company Contact L E ROGERS Telephone (509) 376-7690

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Required
B09323	S	9-2-93	1435	~~1,250ml P:CLP;TAL Metals,Hg,Ti~~ ~~1,250ml Gs:VOA CLP~~ ~~1,250ml aG:Semi-VOA CLP~~ ~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~ ~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~ ~~1,125ml G:Cyanide CLP~~ ~~1,125ml Gw:Kerosene (8015M)~~ SAR 9-7-93 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79
				1,250ml P:CLP;TAL Metals,Hg,Ti 1,250ml Gs:VOA CLP 1,250ml aG:Semi-VOA CLP 1,125ml G:Anions F,Cl,SO4 (EPA 300.0) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2) 1,125ml G:Cyanide CLP 1,125ml Gw:Kerosene (8015M) 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79 SAR 9-2-93
				1,250ml P:CLP;TAL Metals,Hg,Ti 1,250ml Gs:VOA CLP 1,250ml aG:Semi-VOA CLP 1,125ml G:Anions F,Cl,SO4 (EPA 300.0) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2) 1,125ml G:Cyanide CLP 1,125ml Gw:Kerosene (8015M) 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

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

Field Information TMA

Special Handling and/or Storage Maintain at 4C : (SOIL)

Possible Sample Hazards NONE NOTED

2-21-94

A-6000-406 (06/91) WEF060

~~58~~

-020

Westinghouse Hanford Company	CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-3-93

Ice Chest No.: SML-210

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: 2536956026

Offsite Property No.: 1193-0-0667-46

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL)

Sample Identification

1) B09324

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- * 1,250ml Gs:VOA CLP — 120 ML CLP VOA 2 BOTS.
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2)

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- 1,250ml Gs:VOA CLP
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

3) LER 9-3-93

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- 1,250ml Gs:VOA CLP
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[ ] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

Relinquished by:	Received by:	Date/Time:
9-7-93 Lorne E. Rogers 1440 Hrs	W.T. Setzer W.U. SETZER	9-7-93 0945
W.T. Setzer	H. NARCISO	9-8-93 11:00

Final Sample Disposition

Disposal Method:	Disposed by:	Date/Time:

Comments:

50 3-21-94

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

120 ML.
* 2 BOTS. CLP VOA Recd H. NARCISO TMA/NORCAL 9-8-93

Westinghouse Hanford Company	SAMPLE ANALYSIS REQUEST

Collector L E ROGERS S.A.F. # 93-263 Date ~~9-2-93~~ 9-3-93

Company Contact L E ROGERS Telephone (509) 376-7690

Sample Number	*	Date Collected	Time Collected	Number and Type of Sample Containers/Analysis Required
B093324	S	9-3-93		1,250ml P:CLP;TAL Metals,Hg,Ti 1,250ml Gs:VOA CLP 1,250ml aG:Semi-VOA CLP 1,125ml G:Anions F,Cl,SO4 (EPA 300.0) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2) 1,125ml G:Cyanide CLP 1,125ml Gw:Kerosene (8015M) 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79
			AOR 9-3-93	1,250ml P:CLP;TAL Metals,Hg,Ti 1,250ml Gs:VOA CLP 1,250ml aG:Semi-VOA CLP 1,125ml G:Anions F,Cl,SO4 (EPA 300.0) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2) 1,125ml G:Cyanide CLP 1,125ml Gw:Kerosene (8015M) 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79
				1,250ml P:CLP;TAL Metals,Hg,Ti 1,250ml Gs:VOA CLP 1,250ml aG:Semi-VOA CLP 1,125ml G:Anions F,Cl,SO4 (EPA 300.0) 1,125ml P/G:Anions NO2,NO3 (EPA 353.2) 1,125ml G:Cyanide CLP 1,125ml Gw:Kerosene (8015M) 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152,Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30),TotalUranium(EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

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

Field Information TMA NONE OBSERVED

Special Handling and/or Storage Maintain at 4C ; (SOIL)

Possible Sample Hazards NONE OBSERVED

~~50~~ 2-21-94

A-6000-406 (06/91) WEF060

-022

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.1879

RADIOCHEMICAL DATA VALIDATION CHECKLIST

VALIDATION LEVEL:	A	B	C	D	E
PROJECT: 200-UP-2			DATA PACKAGE:		
VALIDATOR: T. Stapp	LAB: Therm Analytic			DATE: 2-11-94	
CASE:			SDG: B09324 - TmA - 592		
ANALYSES PERFORMED					
☑ Gross Alpha/Beta	☑ Strontium-90	☑ Technetium-99	☑ Alpha Spectroscopy	☑ Gamma Spectroscopy	
☑ Total Uranium	☐ Radium-22	☐ Tritium	☐		
SAMPLES/MATRIX B09323, B09324 / SOIL					

1. Completeness . . . . . ☒ N/A

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

Comments: Performed by WHC

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? ~~Note ①~~ . . . . . Yes No N/A
Calibration check standards NIST traceable? . . . . . Yes No N/A
Calibration check standards expired? . . . . . Yes No N/A

Comments: ① ~~KPA-1 detector identifier not available on sample total U raw data. No qualifier applied.~~ MA 2/22/94 Not applicable to validation procedure

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . Yes No N/A
Method blank results acceptable? . . . . . Yes No N/A
Analytes detected in method blank? . . See note ① . . . . 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: ① Se-79 blank result above MDA. BC9323 qualified as estimated (81 J) and BC9324 (10 J).

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:

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

LCS analyzed? . . . (BSS substituted) Note ①, ② . . . 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: ① Tc-99 BSS activity is >30 times the RDL, no qualif. ~~Same condition for U-23~~

② Selenium-79 not analyzed for BSS. Qualifies BC9323 and BC9324 as estimated (J/UJ).

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A

Chemical recovery acceptable? . See note ① . . . . . 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: ① Tc-99 chemical yield for BC9324 is <30% but >10%. Result is qualified as estimated (0.54 UJ).

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A

RPD Values Acceptable? See Note ① . . . . . Yes No N/A

Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: ① Se-79 RPD is >35% for Duplicate result of Sample BC9323. Se-79 results for BC9323 and BC9324 are qualified as estimated (J/UJ).

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: See comments page.

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? . See note ① . . . . Yes (No) N/A
Transcription/calculation errors? . . . See note ② . . . Yes (No) N/A

Comments: ① Se-79 and Fe-59 MDA's above RDL as indicated in Laboratory narrative. No qualification applied.
② Recalculation of MDA's for many isotopes ~~unsuccessful~~ but verification of reported MDA's with raw data is correct and complete.

Do not check out which may be due to laboratory substitution of calculated background values.
Mat 2/22/94

Comments:

① HOLDING TIMES:

Sample	Collected	U	Gr α/β	Tc99	Sr90	Np	Se	I129	U	Pu	Am	Cur	Gamma
B09323	9-2-93	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
B09324	9-3-93	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓ – Indicates at analysis within acceptable hold time. 2-18-94

② For a summary of sample data qualifications, see attachment 2.

A-5 2-18-94

WESTINGHOUSE/ HANFORD RADIOCHEMISTRY 21-Feb-94 SDG: B09324-TMA-592

						GROSS ALPHA				GROSS BETA			
SDG	HEIS#	Lab No.	Detector GAW/GRB	Spl. Amt.	Count Time	Gr-Alpha Counts	Alpha Bkgd cpm	Alpha Eff.	Alpha X-talk	Gr-Beta Counts	Beta Bkgd cpm	Beta Eff.	Beta X-Talk
B09324	B09323	N309030-01	115	0.1	100	45	0.086	0.149	0.006	238	1.01	0.422	0.261
	B09324	N309030-02	112	0.1	100	41	0.043	0.149	0.006	291	1.08	0.422	0.261
	BLANK SPIKE	N309030-03	109	0.1	100	514	0.046	0.109	0.006	3080	1.014	0.415	0.285
	BLANK	N309030-04	102	0.1	100	10	0.057	0.108	0.006	97	1.117	0.414	0.287
	B09323 DUP	N309030-05	104	0.1	100	26	0.057	0.163	0.006	246	1.044	0.423	0.255

Verified [illegible] 2-21-94

			GROSS ALPHA		GROSS BETA					
SDG	HEIS#	Lab No.	Alpha Rslt Calc	Alpha Rslt Rptd	Beta Rslt Calc	Beta Rslt Rptd	Alpha MDA Calc	Alpha MDA Rptd	Beta MDA Calc	Beta MDA Rptd
B09324	B09323	N309030-01	10.77	11.00	13.6	14	4.1	4	5.0	5
	B09324	N309030-02	10.78	11.00	18.5	19	2.9	3	5.2	5
	BLANK SPIKE	N309030-03	203.48	200.00	308.1	310	4.1	4	5.1	5
	BLANK	N309030-04	1.83	1.80	-1.7	-1.7	4.6	5	5.4	5
	B09323 DUP	N309030-05	5.38	5.40	14.5	15	3.1	3	5.1	5

Verified 2-21-94

SELENIUM-79 RESULTS

SDG	HEIS#	Lab No.	Det ID	SE-79 Gross Counts	Count Time	Sample Amount	Bkgnd cpm	Decay Factor	Detect Eff.	Yield	Selenium Result Calc.	Result Rptd	MDA Calc	MDA Rptd
B09324	B09323	N309030-01	4	2838	150	0.5	15.86	1	0.053	0.6444	80.72	81.00	40	40
	B09324	N309030-02	4	2318	150	0.53	13.41	1	0.288	0.5992	10.06	10	7	7
	BLANK SPIKE	N309030-03	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	BLANK	N309030-04	4	2486	150	0.5	13.41	1	0.209	0.6857	19.89	20	9	9
	B09323 DUP	N309030-05	4	2331	150	0.51	13.41	1	0.469	0.584	6.87	6.9	4	5

Verified RB 2-21-94

STRONTIUM-90 RESULTS

SDG	HEIS	Lab No.	Spl Amt.	P-Factor	Yield	Elapsed time (days)	Lambda	Ingrowth	Decay	Y-90 Net CPM	Count Time	Bkg. cpm
B09324	B09323	N3090 30-01	1	1.859	0.8501	32.449	6.86E-05	0.002223	0.9978	-0.0433	33	0.0E+00
	B09324	N3090 30-02	1	1.859	0.869	31.449	6.86E-05	0.002155	0.9978	0.03	33	9.3E-01
	BLANK SPIKE	N3090 30-03	1	1.859	0.8636	0	6.86E-05	0	1.0000	12.04	33	1.2E+00
	BLANK	N3090 30-04	1	1.859	0.8011	0	6.86E-05	0	1.0000	0.052	33	1.1E-01
	B09323 DUP	N3090 30-05	1	1.859	0.8649	32.449	6.86E-05	0.002223	0.9978	-0.2379	33	0.0E+00

Verified [illegible] 2-22-94

STRONTIUM-90 RESULTS

SDG	HEIS	Lab No.	Sr90 Result Calc.	Sr90 Result Rptd	MDA Calc.	MDA Rptd.
B09324	B09323	N309030-01	-0.043	-0.036	0.23	0.83
	B09324	N309030-02	0.029	0.029	0.76	0.78
	BLANK SPIKE	N309030-03	11.675	11.675	0.86	0.802
	BLANK	N309030-04	0.054	0.054	0.29	0.88
	B09323 DUP	N309030-05	-0.231	-0.200	0.23	0.793

Verified [illegible] 2-22-94

TECHNETIUM-99 RESULTS

SDG	HEIS	Lab No.	Det. ID	Spl Amt.	P-Factor	Yield	Elapsed time (days)	Lambda	Decay	TC-99 Net CPM	Count Time	Bkg. cpm
B09324	B09323	N309030-01	LBG-13	2	2.34	0.6141	25.687	8.9E-09	1.00	0.24	123.7	0.47
	B09324	N309030-02	LBG-14	2	2.34	0.1281	24.687	8.9E-09	1.00	0.13	122.9	0.49
	BLANK SPIKE	N309030-03	LBG-2	2	2.34	0.2098	0	8.9E-09	1.00	6.37	112.1	0.48
	BLANK	N309030-04	LBG-16	2	2.34	0.7635	0	8.9E-09	1.00	0.21	100.5	0.51
	B09323 DUP	N309030-05	LBG-14	2.02	2.34	0.4541	27.751	8.9E-09	1.00	0.02	103.1	0.49

Verified [illegible] 2-21-94

TECHNETIUM-99 RESULTS

SDG	HEIS	Lab No.	TC-99 Result Calc.	TC-99 Result Rptd	MDA Calc.	MDA Rptd.
B09324	B09323	N309030-01	0.206	0.210	0.247	0.30
	B09324	N309030-02	0.535	0.540	1.211	1.30
	BLANK SPIKE	N309030-03	16.002	16.000	0.766	0.80
	BLANK	N309030-04	0.145	0.150	0.229	0.18
	B09323 DUP	N309030-05	0.023	0.028	0.369	0.40

Verified [illegible] 2-21-94

9413225.1892

IODINE-129 RESULTS

SDG	HEIS	Lab No.	Det. ID	Spl Amt.	P-Factor	Yield	Elapsed time (days)	Lambda	Decay	I-129 Net CPM	Count Time	Bkg. cpm
B09324	B09323	N309030-01	XSPEC 15	1	4.87	0.8415	48.932	8.9E-09	1.00	0.025	586.87	0.653
	B09324	N309030-02	XSPEC 14	1	4.57	0.8163	76.895	8.9E-09	1.00	-0.00112	617.8	0.614
	BLANK SPIKE	N309030-03	XSPEC 14	1	4.57	0.9101	0	8.9E-09	1.00	18.604	400.53	0.982
	BLANK	N309030-04	XSPEC 15	1	4.87	0.9001	0	8.9E-09	1.00	-0.114	819.98	0.918
	B09323 DUP	N309030-05	XSPEC 14	1	4.57	0.805	42.87	8.9E-09	1.00	0.307	644.02	1.135

Verified RE 2-21-94

9413225.1893

IODINE-129 RESULTS

SDG	HEIS	Lab No.	I-129 Result Calc.	I-129 Result Rptd	MDA Calc.	MDA Rptd.	
B09324	B09323	N309030-01	0.065	0.066	0.405		2
	B09324	N309030-02	-0.003	-0.002	0.370		1
	BLANK SPIKE	N309030-03	42.080	42	0.522		2
	BLANK	N309030-04	-0.278	-0.28	0.380		2
	B09323 DUP	N309030-05	0.785	0.79	0.500		2

Verified RS 2-21-94

-037

9413225.1894

U-233/234 RESULTS

SDG	HEIS No.	Lab No.	Det.	Spl Amt	Detector Eff.	Sample Count Time (min)	Bkgd Count Time (min)	Tracer Gross Counts	Tracer Bkgd Counts	Spike Act.	Tracer Recovery
B09324	B09323	N309030-01	SS-21	1	0.2468	220.12	2610.82	452	1	10.58	0.7863
	B09324	N309030-02	SS-3	1	0.2766	214.33	2353.32	266	3	10.58	0.4237
	BLANK SPIKE	N309030-03	SS-4	1	0.2578	214.33	2353.32	454	2	10.58	0.7763
	BLANK	N309030-04	SS-19	1	0.2628	214.33	2366.75	420	3	10.58	0.7043
	B09323 DUP	N309030-05	SS-20	1	0.2665	214.33	2366.75	368	2	10.58	0.6087

Verified 2-22-94 TS

9413225.1895

U-233/234 RESULTS

SDG	HEIS No.	Lab No.	U234 Gr-Cnts	U234 Bkgd Cnts	U234 Lambda	U234 Decay Factor	U-234 Calc.	U-234 Rptd	U-234 MDA Calc	MDA Rptd
B09324	B09323	N309030--01	69	1	1.17E-08	1.0000	0.717	0.69	0.049	0.1
	B09324	N309030--02	41	3	1.17E-08	1.0000	0.682	0.68	0.145	0.2
	BLANK SPIKE	N309030--03	368	1	1.17E-08	1.0000	3.854	3.5	0.049	0.3
	BLANK	N309030--04	2	1	1.17E-08	1.0000	0.011	0.00	0.053	0.1
	B09323 DUP	N309030--05	53	2	1.17E-08	1.0000	0.661	0.65	0.085	0.1

Verified [illegible] 2-22-94

-039

U 238/235 RESULTS

SDG	HEIS No.	Lab No.	Det.	Spl Amt	Detector Eff.	Sample Count Time (min)	Bkgd Count Time (min)	Tracer Gross Counts	Tracer Bkgd Counts	Spike Act.	Tracer Recovery
B09324	B09323	N309030-01	SS-21	1	0.2468	220.12	2610.82	452	1	10.58	0.7863
	B09324	N309030-02	SS-3	1	0.2766	214.33	2353.32	266	3	10.58	0.4237
	BLANK SPIKE	N309030-03	SS-4	1	0.2578	214.33	2353.32	454	2	10.58	0.7763
	BLANK	N309030-04	SS-19	1	0.2628	214.33	2366.75	420	3	10.58	0.7043
	B09323 DUP	N309030-05	SS-20	1	0.2665	214.33	2366.75	368	2	10.58	0.6087

Verified [illegible] 2-22-94

U 238/235 RESULTS

SDG	HEIS No.	Lab No.	U-238 Gr-Cnts	U-238 Bkgd Cnts	U-238 Lambda	U-238 Decay Factor	U-235 Gr-Cnts	U-235 Bkgd Cnts	U-235 Lambda	U-235 Decay Factor
B09324	B09323	N309030-01	69	1	4.23E-13	1.0000	7	1	2.67E-12	1.0000
	B09324	N309030-02	44	0	4.23E-13	1.0000	0	0	2.67E-12	1.0000
	BLANK SPIKE	N309030-03	447	0	4.23E-13	1.0000	263	0	2.67E-12	1.0000
	BLANK	N309030-04	1	0	4.23E-13	1.0000	0	0	2.67E-12	1.0000
	B09323 DUP	N309030-05	45	0	4.23E-13	1.0000	4	0	2.67E-12	1.0000

Verified 2-22-94

U 238/235 RESULTS

SDG	HEIS No.	Lab No.	U-238 Calc.	U-238 Rptd	U-238 MDA Calc	U-238 MDA Rptd	U-235 Calc.	U-235 Rptd.	U-235 MDA Calc	U-235 MDA Rptd
B09324	B09323	N309030-01	0.717	0.69	0.049	0.1	0.0633	0.076	0.049	0.1
	B09324	N309030-02	0.789	0.79	0.138	0.1	0.0000	0.0	0.138	0.2
	BLANK SPIKE	N309030-03	4.694	4.40	0.081	0.3	2.7619	3.3	0.081	0.1
	BLANK	N309030-04	0.011	0.01	0.087	0.1	0.0000	0.0	0.087	0.1
	B09323 DUP	N309030-05	0.583	0.58	0.099	0.1	0.0518	0.063	0.099	0.1

Verified [illegible] 2-22-94

9413225.1899

NEPTUNIUM-237

SDG	HEIS	Lab No.	Date Analyzed	Det. ID	Spl Amt.	Yield	Gross cnts	Count Time	Bkg. cpm	Det. Eff.	NP-237 Result Calc.	NP-237 Result Rptd	MDA Calc.	MDA Rptd.
B09324	B09323	N309030-01	10/07/93	SS-63	1	0.441	2	1039.62	0.001	0.402	0.0023	0.002	0.01	0.02
	B09324	N309030-02	10/06/93	SS-64	1	0.3579	4	1039.62	0.001	0.409	0.0088	0.009	0.01	0.02
	BLANK SPIKE	N309030-03	10/18/93	SS-28	1	0.4226	966	767.37	0	0.383	3.5034	3.500	0.01	0.01
	BLANK	N309030-04	10/07/93	SS-66	1	0.1751	2	1039.62	0.002	0.412	-0.0005	0.000	0.04	0.06
	B09323 DUP	N309030-05	10/07/93	SS-41	1	0.3702	2	1006.12	0.002	0.436	-0.0000	0.000	0.02	0.03

Verified [illegible] 2-22-94

9413225.1900

Pu 239/238 RESULTS

SDG	HEIS No.	Lab No.	Det.	Spl Amt	Detector Eff.	Sample Count Time (min)	Bkgd Count Time (min)	Tracer Gross Counts	Tracer Bkgd Counts	Spike Act.	Tracer Recovery
B09324	B09323	N309030-01	SS-40	1	0.411	947.62	2388.47	1251	1	4.86	0.6607
	B09324	N309030-02	SS-41	1	0.4128	947.62	2388.47	1211	2	4.86	0.6366
	BLANK SPIKE	N309030-03	SS-42	1	0.4054	947.62	2388.47	1101	1	4.86	0.5895
	BLANK	N309030-04	SS-48	1	0.3889	942.78	2393.8	662	0	4.86	0.3715
	B09323 DUP	N309030-05	SS-49	1	0.3654	942.78	2393.8	1129	2	4.86	0.6739

Verified [illegible] 2-22-94

Pu 239/238 RESULTS

SDG	HEIS No.	Lab No.	PU-239 Gr-Cnts	PU-239 Bkgd Cnts	Pu-239 Lambda	Pu-239 Decay Factor	Pu-238 Gr-Cnts	Pu-238 Bkgd Cnts	Pu-238 Lambda	Pu-238 Decay Factor
B09324	B09323	N309030-01	8	1	7.78E-08	0.9999	8	8	2.20E-05	0.9794
	B09324	N309030-02	9	1	7.78E-08	0.9999	5	8	2.20E-05	0.9794
	BLANK SPIKE	N309030-03	507	3	7.78E-08	0.9999	22	7	2.20E-05	0.9794
	BLANK	N309030-04	1	0	7.78E-08	0.9999	8	2	2.20E-05	0.9795
	B09323 DUP	N309030-05	1	2	7.78E-08	0.9999	2	4	2.20E-05	0.9795

Verified RS 2-22-94

9413225.1902

Pu 239/238 RESULTS

SDG	HEIS No.	Lab No.	Pu239 Calc.	Pu239 Rptd	Pu239 MDA Calc	MDA Rptd	Pu238 Calc.	Pu238 Rptd.	Pu238 MDA Calc	MDA Rptd
B09324	B09323	N309030-01	0.012	0.012	0.008	0.01	0.0000	0	0.024	0.03
	B09324	N309030-02	0.014	0.014	0.008	0.01	-0.0055	-0.005	0.024	0.03
	BLANK SPIKE	N309030-03	1.003	1.000	0.016	0.02	0.0305	0.030	0.025	0.03
	BLANK	N309030-04	0.003	0.003	0.025	0.03	0.0203	0.020	0.022	0.03
	B09323 DUP	N309030-05	-0.002	-0.002	0.013	0.02	-0.0040	-0.004	0.018	0.02

Verified TS 2-22-94

045

AM 241 RESULTS

SDG	HEIS No.	Lab No.	Det.	Spl Amt	Detector Eff.	Sample Count Time (min)	Bkgd Count Time (min)	Tracer Gross Counts	Tracer Bkgd Counts	Spike Act.	Tracer Recovery
B09324	B09323	N309030-01	SS-29	1	0.3904	771.6	2588.68	1316	4	4.95	0.8818
	B09324	N309030-02	SS-30	1	0.3698	771.6	2588.68	1119	3	4.95	0.7916
	BLANK SPIKE	N309030-03	SS-42	1	0.392	769.93	2589.6	1005	4	4.95	0.6719
	BLANK	N309030-04	SS-43	1	0.369	764.45	2588.68	1163	2	4.95	0.8325
	B09323 DUP	N309030-05	SS-37	1	0.402	771.6	2588.68	1372	5	4.95	0.8926

Verified [illegible] 2-22-94

9413225.1904

AM 241 RESULTS

SDG	HEIS No.	Lab No.	AM-241 Gr-Cnts	AM-241 Bkgd Cnts	AM-241 Lambda	AM-241 Decay Factor	AM-241 Calc.	AM-241 Rptd	AM-241 MDA Calc	MDA Rptd
B09324	B09323	N309030-01	18	11	4.03E-06	0.9969	0.012	0.009	0.026	0.03
	B09324	N309030-02	12	8	4.03E-06	0.9969	0.008	0.004	0.026	0.03
	BLANK SPIKE	N309030-03	407	9	4.03E-06	0.9969	0.887	0.88	0.031	0.04
	BLANK	N309030-04	7	10	4.03E-06	0.9969	-0.006	-0.01	0.028	0.03
	B09323 DUP	N309030-05	14	12	4.03E-06	0.9969	0.003	0	0.026	0.03

Verified RS 2-22-94

CM 244 RESULTS

SDG	HEIS No.	Lab No.	CM-244 Gr-Cnts	CM-244 Bkgd Cnts	CM-244 Lambda	CM-244 Decay Factor	CM-244 Calc.	CM-244 Rptd	CM-244 MDA Calc	MDA Rptd
B09324	B09323	N309030-01	6	13	1.06E-04	0.9212	-0.013	-0.014	0.031	0.03
	B09324	N309030-02	4	9	1.06E-04	0.9212	-0.011	-0.012	0.030	0.03
	BLANK SPIKE	N309030-03	282	7	1.06E-04	0.9214	0.663	0.61	0.030	0.03
	BLANK	N309030-04	7	8	1.06E-04	0.9219	-0.002	-0.004	0.027	0.03
	B09323 DUP	N309030-05	5	8	1.06E-04	0.9212	-0.005	-0.007	0.023	0.03

Verified [illegible] 2-22-94

9413225.1906

CM 244 RESULTS

SDG	HEIS No.	Lab No.	Det.	Spl Amt	Detector Eff.	Sample Count Time (min)	Bkgd Count Time (min)	Tracer Gross Counts	Tracer Bkgd Counts	Spike Act.	Tracer Recovery
B09324	B09323	N309030-01	SS-29	1	0.3904	771.6	2588.68	1316	4	4.95	0.8818
	B09324	N309030-02	SS-30	1	0.3698	771.6	2588.68	1119	3	4.95	0.7916
	BLANK SPIKE	N309030-03	SS-42	1	0.392	769.93	2589.6	1005	4	4.95	0.6719
	BLANK	N309030-04	SS-43	1	0.369	764.45	2588.68	1163	2	4.95	0.8325
	B09323 DUP	N309030-05	SS-37	1	0.402	771.6	2588.68	1372	5	4.95	0.8926

Verified 2-22-94

050