

Analytical Data Package Prepared For

Fluor Hanford

Radiochemical Analysis By

STL Richland STLRL*2800 G.W. Way, Richland Wa, 99354, (509)-375-3131.**Data Package Contains _____ Pages*

Report Nbr: 31851

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER	LOT Nbr	WORK ORDER	RPT DB ID	BATCH
W04885	R06-013	B1HVM7	J6C150127-1	H09EH1AA	9H09EH10	6074250
		B1HVM9	J6C150127-2	H09EN1AA	9H09EN10	6074250
		B1HVN1	J6C150127-3	H09EP1AA	9H09EP10	6074250

RECEIVED
MAY 04 2006
EDMC

0069580

Comments:

Certificate of Analysis

Fluor Hanford
P.O. Box 1000, T6-03
Richland, WA 99352

April 10, 2006

Attention: John Trechter

SAF Number	:	R06-013
Date SDG Closed	:	March 14, 2006
Number of Samples	:	Three (3)
Sample Type	:	Soil
SDG Number	:	W04878
Data Deliverable	:	15 / 30-Day Summary

CASE NARRATIVE

I. Introduction

On March 14, 2006, three soil samples were received at STL Richland (STLR) for radiochemical analysis. Upon receipt, the samples were assigned to lot J6C150127 and assigned the following laboratory ID number to correspond with the Fluor Hanford (FH) specific ID:

<u>FH ID#</u>	<u>STLR ID#</u>	<u>MATRIX</u>	<u>DATE OF RECEIPT</u>
B1HVM7	H09EH	SOIL	3/14/06
B1HVM9	H09EN	SOIL	3/14/06
B1HVN1	H09EP	SOIL	3/14/06

II. Sample Receipt

The samples were received in good condition and no anomalies were noted during check-in.

III. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Liquid Scintillation Counting

Selenium-79 by method RICH-RC-5043

IV. Quality Control

The analytical results for each analysis performed includes a minimum of one laboratory control sample (LCS), one method (reagent) blank, and one duplicate sample analysis. Any exceptions have been noted in the "Comments" section.

QC and sample results are reported in the same units.

V. Comments

Gas Proportional Counting

Selenium-79 by method RICH-RC-5043

There is currently not an available standard for Selenium 79 and an LCS was not analyzed. The batch blank, sample and sample duplicate (B1HVM7) results are within contractual requirements.

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

Reviewed and approved:



Hans Carman
Project Manager

4/10/2006 11:21:43 AM

STL Richland Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD Version: 05 Rpt Nbr: 31851 File Name: h:\Reportdb\edd\Fead\Rad\W04885.Edd, h:\Reportdb\edd\Fead\Rad\31851.Edd

Lab Sample Id:	Client Id:	Test User	Contract Nbr	SAF Nbr	Sdg Nbr:	QC Type:	Moisture/Solids%*:	Distilled Volume	Sample On Date:	Collection Date:				
9H09EH10	B1HVM7		MW6-SBB-A1	R06-013	W04885					03/14/2006 09:50				
Batch	Analyte	CAS#	Result	Unit	CntU 2S	TotU 2S	Qual	MDA	TrcYield	Method	Alq Size	Unit	Analy Date/Time	Act
6074250	SE-79	15758-45-9	-2.18E-01	pCi/g	1.1E+00	1.3E+00	U	2.68E+00	67.9	RICHRC5043	1.08E+00	G	04/03/200 10:47	I
Lab Sample Id:	Client Id:	Test User	Contract Nbr	SAF Nbr	Sdg Nbr:	QC Type:	Moisture/Solids%*:	Distilled Volume	Sample On Date:	Collection Date:				
9H09EN10	B1HVM9		MW6-SBB-A1	R06-013	W04885					03/14/2006 10:10				
Batch	Analyte	CAS#	Result	Unit	CntU 2S	TotU 2S	Qual	MDA	TrcYield	Method	Alq Size	Unit	Analy Date/Time	Act
6074250	SE-79	15758-45-9	2.43E-01	pCi/g	1.1E+00	1.4E+00	U	2.67E+00	72.0	RICHRC5043	1.02E+00	G	04/03/200 12:12	I
Lab Sample Id:	Client Id:	Test User	Contract Nbr	SAF Nbr	Sdg Nbr:	QC Type:	Moisture/Solids%*:	Distilled Volume	Sample On Date:	Collection Date:				
9H09EP10	B1HVN1		MW6-SBB-A1	R06-013	W04885					03/14/2006 10:20				
Batch	Analyte	CAS#	Result	Unit	CntU 2S	TotU 2S	Qual	MDA	TrcYield	Method	Alq Size	Unit	Analy Date/Time	Act
6074250	SE-79	15758-45-9	-8.00E-01	pCi/g	1.0E+00	1.3E+00	U	2.62E+00	71.5	RICHRC5043	1.05E+00	G	04/03/200 12:54	I

STL Richland

rptFeadRadSummaryEdd v3.48

U Qual - Analyzed for, but the result is less than the Mdc or gamma scan did not identify the nuclide.

J Qual - No U qualifier has been assigned and the result is below the Reporting Limit (CRDL).

B Qual- Analyte was found in the associated laboratory blank above the MDC.

1

Monday, April 10, 2006

STL Richland QC Blank Report

Lab Code: STLRL

FormNbr: R

FormatType: FEAD

VersionNbr: 05

File Name: h:\Reportdb\edd\FeadIV\RadW04885.Edd, h:\Reportdb\edd\FeadIV\Rad31851.Edd

Lab Sample Id: H09TG1AB

Sdg/Rept Nbr: W04885 31851

Collection Date: 03/14/2006 09:50

Client Id: NA

Matrix: SOIL SOLID

Sample On Date:

Moisture/Solids%*:

QC Type: BLK

Received Date: 03/14/2006

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp					
	MW6-SBB-A19981								AE	H					
Batch # / Qc Type	Analy/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu- al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/ G	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
6074250 BLK	SE-79 15758-45-9	5.38E-01	pCi/g	2.3E+00 1.9E+00	U	4.46E+00	44.0		RICHRC5043	1.00E+00 G	04/03/2006 13:36				D

STL Richland
rptFeadRadEdd v3.68

U Qual - Analyzed for, but the result is less than the Mdc or gamma scan did not identify the nuclide.
J Qual - No U qualifier has been assigned and the result is below the Reporting Limit (CRDL).
B Qual- Analyte was found in the associated laboratory blank above the MDC.

Monday, April 10, 2006

STL Richland QC Duplicate Report

Lab Code: STLRL

FormNbr: R

FormatType: FEAD

VersionNbr: 05

File Name: h:\Reportdb\edd\FeadIVRad\W04885.Edd, h:\Reportdb\edd\FeadIVRad\31851.Edd

Lab Sample Id: H09EH1CR

Sdg/Rept Nbr: W04885

31851

Collection Date: 03/14/2006 09:50

Client Id: B1HVM7

Matrix: SOIL

SOLID

Sample On Date:

Moisture/Solids%*:

QC Type: DUP

Received Date: 03/14/2006

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp					
R06-013	MW6-SBB-A19981								AD	H					
Batch # / Qc Type	Analy/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu- al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Allq Size/ G	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
6074250 DUP	SE-79 15758-45-9	3.86E-01 -2.18E-01	pCi/g	1.4E+00 1.1E+00	U	2.70E+00	72.1		RICHRC5043	1.01E+00 G	04/03/2006 11:30	719.4	0.6 3		D

Drinking Water Method Cross References

DRINKING WATER ASTM METHOD CROSS REFERENCES		
Referenced Method	Isotope(s)	STL Richland's SOP number
EPA 901.1	Cs-134, I-131	RICH-RC-5017
EPA 900.0	Alpha & Beta	RICH-RC-5014
EPA 903.1	Ra-226	RICH-RC-5005
EPA 904.0	Ra-228	RICH-RC-5005
EPA 905.0	Sr89/90	RICH-RC-5006
ASTM D2460	Total Radium	RICH-RC-5027
Standard Method 7500-U-C & ASTM D5174	Uranium	RICH-RC-5058
EPA 906.0	Tritium	RICH-RC-5007
NOTE:		
The Gross Alpha LCS is prepared with Am-241 (unless otherwise specified in the case narrative)		
The Gross Beta LCS is prepared with Sr/Y-90 (unless otherwise specified in the case narrative)		

Uncertainty Estimation

STL Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, $R = \text{constants} * f(x,y,z,\dots)$. The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_c) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/\sqrt{n}), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.

Report Definitions

Action Lev	An agreed upon activity level used to trigger some action when the final result is greater than or equal to the Action Level. Often the Action Level is related to the Decision Limit.
Batch	The QC preparation batch number that relates laboratory samples to QC samples that were prepared and analyzed together.
Bias	Defined by the equation $(\text{Result}/\text{Expected})-1$ as defined by ANSI N13.30.
COC No	Chain of Custody Number assigned by the Client or STL Richland.
Count Error (#s)	Poisson counting statistics of the gross sample count and background. The uncertainty is absolute and in the same units as the result. For Liquid Scintillation Counting (LSC) the batch blank count is the background.
Total Uncert (#s) <i>u_c - Combined Uncertainty.</i>	All known uncertainties associated with the preparation and analysis of the sample are propagated to give a measure of the uncertainty associated with the result, <i>u_c</i> , the combined uncertainty. The uncertainty is absolute and in the same units as the result.
(#s), Coverage Factor	The coverage factor defines the width of the confidence interval, 1, 2 or 3 standard deviations.
CRDL (RL)	Contractual Required Detection Limit as defined in the Client's Statement Of Work or STL Richland "default" nominal detection limit. Often referred to the reporting level (RL)
Lc	Decision Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume associated with the sample. The Type I error probability is approximately 5%. $Lc = (1.645 * \text{Sqrt}(2 * (\text{BkgndCnt}/\text{BkgndCntMin})/\text{SCntMin})) * (\text{ConvFct}/(\text{Eff} * \text{Yld} * \text{Abn} * \text{Vol}) * \text{IngrFct})$. For LSC methods the batch blank is used as a measure of the background variability. Lc cannot be calculated when the background count is zero.
Lot-Sample No	The number assigned by the LIMS software to track samples received on the same day for a given client. The sample number is a sequential number assigned to each sample in the Lot.
MDC MDA	Detection Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume with a Type I and II error probability of approximately 5%. $MDC = (4.65 * \text{Sqrt}((\text{BkgndCnt}/\text{BkgndCntMin})/\text{SCntMin}) + 2.71/\text{SCntMin}) * (\text{ConvFct}/(\text{Eff} * \text{Yld} * \text{Abn} * \text{Vol}) * \text{IngrFct})$. For LSC methods the batch blank is used as a measure of the background variability.
Primary Detector	The instrument identifier associated with the analysis of the sample aliquot.
Ratio U-234/U-238	The U-234 result divided by the U-238 result. The U-234/U-238 ratio for natural uranium in NIST SRM 4321C is 1.038.
Rst/MDC	Ratio of the Result to the MDC. A value greater than 1 may indicate activity above background at a high level of confidence. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Rst/TotUcert	Ratio of the Result to the Total Uncertainty. If the uncertainty has a coverage factor of 2 a value greater than 1 may indicate activity above background at approximately the 95% level of confidence assuming a two-sided confidence interval. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Report DB No	Sample Identifier used by the report system. The number is based upon the first five digits of the Work Order Number.
RER	The equation Replicate Error Ratio = $(S-D)/[\text{sqrt}(\text{TPUs}^2 + \text{TPUD}^2)]$ as defined by ICPT BOA where S is the original sample result, D is the result of the duplicate, TPUs is the total uncertainty of the original sample and TPUD is the total uncertainty of the duplicate sample.
SDG	Sample Delivery Group Number assigned by the Client or assigned by STL Richland upon sample receipt.
Sum Rpt Alpha Spec Rst(s)	The sum of the reported alpha spec results for tests derived from the same sample excluding duplicate result where the results are in the same units.
Work Order	The LIMS software assign test specific identifier.
Yield	The recovery of the tracer added to the sample such as Pu-242 used to trace a Pu-239/40 method.

Analytical Data Package Prepared For

Fluor Hanford

Radiochemical Analysis By

STL Richland

2800 G.W. Way, Richland Wa, 99354, (509)-375-3131.

Assigned Laboratory Code: STLRL

Data Package Contains _____ Pages

Report No.: 31851

SDG No.	Order No.	Client Sample ID (List Order)	Lot-Sa No.	Work Order	Report DB ID	Batch No.
W04885	R06-013	B1HVM7	J6C150127-1	H09EH1AA	9H09EH10	6074250
		B1HVM9	J6C150127-2	H09EN1AA	9H09EN10	6074250
		B1HVN1	J6C150127-3	H09EP1AA	9H09EP10	6074250

Sample Results Summary

Date: 10-Apr-06

STL Richland STLRL

Ordered by Method, Batch No., Client Sample ID.

Report No. : 31851

SDG No: W04885

Batch	Client Id Work Order	Parameter	Result ± Uncertainty (2s)	Qual	Units	Yield	MDC or MDA	CRDL	RPD
8074250	RICHRC5043								
	B1HVM7								
	H09EH1AA	SE-79	-2.18E-01 +- 1.34E+00	U	pCi/g	68%	2.68E+00	1.00E+01	
	B1HVM7 DUP								
	H09EH1AC	SE-79	3.86E-01 +- 1.38E+00	U	pCi/g	72%	2.70E+00	1.00E+01	719.4
	B1HVM9								
	H09EN1AA	SE-79	2.43E-01 +- 1.36E+00	U	pCi/g	72%	2.67E+00	1.00E+01	
	B1HVN1								
	H09EP1AA	SE-79	-8.00E-01 +- 1.29E+00	U	pCi/g	71%	2.62E+00	1.00E+01	
No. of Results:		4							

STL Richland

RPD - Relative Percent Difference.

rptSTLRichSaSummary2 V4.15.0 A97

U Qual - Analyzed for but not detected above limiting criteria. Limit criteria's less than the Mdc/Mda or Total Uncert or not identified by gamma scan software.

QC Results Summary

Date: 10-Apr-06

STL Richland STLRL

Ordered by Method, Batch No, QC Type,.

Report No. : 31851

SDG No.: W04885

Batch	Work Order	Parameter	Result ± Uncertainty (2s)	Qual	Units	Yield	Recovery	Bias	MDC MDA
RICHRC5043									
6074250 BLANK QC									
	H09TG1AA	SE-79	5.38E-01 ± 2.27E+00	U	pCi/g	44%			4.46E+00
No. of Results: 1									

STL Richland Bias - (Result/Expected)-1 as defined by ANSI N13.30.
 rptSTLRichQcSummary V4.15.0 A87 U Qual - Analyzed for but not detected above limiting criteria. Limit criteria is less than the Mdc/Mda or Total Uncert or not identified by gamma scan software.

FORM I
SAMPLE RESULTS

Date: 10-Apr-06

Lab Name: STL Richland

SDG: W04885

Collection Date: 3/14/2006 9:50:00 AM

Lot-Sample No.: J6C150127-1

Report No. : 31851

Received Date: 3/14/2006 2:30:00 PM

Client Sample ID: B1HVM7

COC No. :

Matrix: SOIL SOLID

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
Batch: 6074250	RICHRC5043			Work Order: H09EH1AA	H09EH1AA		Report DB ID: 9H09EH10					
SE-79	-2.18E-01	U	1.1E+00	1.3E+00	2.68E+00	pCi/g	68%	-0.08	4/3/06 10:47 a		1.08	LSC6
						1.28E+00	1.00E+01	-0.33			G	

No. of Results: 1

Comments:

STL Richland
rptSTL.RchSample
V4.15.0 A97

MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.
U Qual - Analyzed for but not detected above limiting criteria. Limit criteria is less than the Mdc/Mda or Total Uncert or not identified by gamma scan software.

FORM I
SAMPLE RESULTS

Date: 10-Apr-06

Lab Name: STL Richland

SDG: W04885

Collection Date: 3/14/2006 10:10:00 AM

Lot-Sample No.: J6C150127-2

Report No. : 31851

Received Date: 3/14/2006 2:30:00 PM

Client Sample ID: B1HVM9

COC No. :

Matrix: SOIL SOLID

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst/MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6074250	RICHRC5043				Work Order: H09EN1AA		Report DB ID: 9H09EN10					
SE-79	2.43E-01	U	1.1E+00	1.4E+00	2.67E+00	pCi/g	72%	0.09	4/3/06 12:12 p		1.02	LSC6
							1.28E+00	1.00E+01			G	

No. of Results: 1

Comments:

STL Richland

rptSTLRchSample
V4.15.0 A97

MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

U Qual - Analyzed for but not detected above limiting criteria. Limit criteria is less than the Mdc/Mda or Total Uncert or not identified by gamma scan software.

FORM I
SAMPLE RESULTS

Date: 10-Apr-06

Lab Name: STL Richland

SDG: W04885

Collection Date: 3/14/2006 10:20:00 AM

Lot-Sample No.: J6C150127-3

Report No.: 31851

Received Date: 3/14/2006 2:30:00 PM

Client Sample ID: B1HVN1

COC No.:

Matrix: SOIL SOLID

Ordered by Client Sample ID, Batch No.

Parameter	Result	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA, Action Lev	Rpt Unit, Lc	Yield CRDL(RL)	Rst MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Aliquot Size	Primary Detector
Batch: 6074250	RICHRC5043				Work Order: H09EP1AA		Report DB ID: 9H09EP10					
SE-79	-8.00E-01	U	1.0E+00	1.3E+00	2.62E+00	pCi/g	71%	-0.31	4/3/06 12:54 p		1.05	LSC6
						1.25E+00	1.00E+01	-(1.2)			G	

No. of Results: 1

Comments:

FORM II

Date: 10-Apr-06

DUPLICATE RESULTS

Lab Name: STL Richland

SDG: W04885

Collection Date: 3/14/2006 9:50:00 AM

Lot-Sample No.: J6C150127-1

Report No. : 31851

Received Date: 3/14/2006 2:30:00 PM

Client Sample ID: B1HVM7 DUP

COC No. :

Matrix: SOIL SOLID

Parameter	Result, Orig Rst	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA, Action Lev	Rpt Unit, CRDL	Yield	Rst/MDC, Rst/TotUncert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
Batch: 6074250	RICHRC5043				Work Order: H09EH1AC	Report DB ID: H09EH1CR			Orig Sa DB ID: 9H09EH10			
SE-79	3.86E-01	U	1.1E+00	1.4E+00	2.70E+00	pCi/g	72%	0.14	4/3/06 11:30 a		1.01	LSC6
	-2.18E-01	U		RPD 719.4		1.00E+01		0.56			G	

No. of Results: 1 Comments:

STL Richland

RPD - Relative Percent Difference.

rptSTLRchDupV4.1
5.0 A97

MDC|MDA,Lc - Detection, Decision Level based on instrument background or blank, adjusted by the sample Efficiency, Yield, and Volume.

U Qual - Analyzed for but not detected above limiting criteria. Limit criteria is less than the Mdc/Mda or Total Uncert or not identified by gamma scan software.

FORM II
BLANK RESULTS

Date: 10-Apr-06

Lab Name: STL Richland

SDG: W04885

Matrix: SOIL

Report No. : 31851

Parameter	Result	Qual	Count Error (2 s)	Total Uncert(2 s)	MDC MDA, Lc	Rpt Unit, CRDL	Yield	Rst/MDC, Rst/TotUcert	Analysis, Prep Date	Total Sa Size	Allquot Size	Primary Detector
Batch: 6074250	RICHRC5043				Work Order: H09TG1AA			Report DB ID: H09TG1AB				
SE-79	5.38E-01	U	1.9E+00	2.3E+00	4.46E+00	pCi/g	44%	0.12	4/3/06 01:36 p		1.0	LSC6
					2.14E+00	1.00E+01		0.47			G	

No. of Results: 1

Comments:

Drinking Water Method Cross References

DRINKING WATER ASTM METHOD CROSS REFERENCES		
Referenced Method	Isotope(s)	STL Richland's SOP number
EPA 901.1	Cs-134, I-131	RICH-RC-5017
EPA 900.0	Alpha & Beta	RICH-RC-5014
EPA 903.1	Ra-226	RICH-RC-5005
EPA 904.0	Ra-228	RICH-RC-5005
EPA 905.0	Sr89/90	RICH-RC-5006
ASTM D2460	Total Radium	RICH-RC-5027
Standard Method 7500-U-C & ASTM D5174	Uranium	RICH-RC-5058
EPA 906.0	Tritium	RICH-RC-5007
NOTE:		
The Gross Alpha LCS is prepared with Am-241 (unless otherwise specified in the case narrative)		
The Gross Beta LCS is prepared with Sr/Y-90 (unless otherwise specified in the case narrative)		

Uncertainty Estimation

STL Richland has adopted the internationally accepted approach to estimating uncertainties described in "NIST Technical Note 1297, 1994 Edition". The approach, "Law of Propagation of Errors", involves the identification of all variables in an analytical method which are used to derive a result. These variables are related to the analytical result (R) by some functional relationship, $R = \text{constants} * f(x,y,z, \dots)$. The components (x,y,z) are evaluated to determine their contribution to the overall method uncertainty. The individual component uncertainties (u_i) are then combined using a statistical model that provides the most probable overall uncertainty value. All component uncertainties are categorized as type A, evaluated by statistical methods, or type B, evaluated by other means. Uncertainties not included in the components, such as sample homogeneity, are combined with the component uncertainty as the square root of the sum-of-the-squares of the individual uncertainties. The uncertainty associated with the derived result is the combined uncertainty (u_c) multiplied by the coverage factor (1,2, or 3).

When three or more sample replicates are used to derive the analytical result, the type A uncertainty is the standard deviation of the mean value (S/\sqrt{n}), where S is the standard deviation of the derived results. The type B uncertainties are all other random or non-random components that are not included in the standard deviation.

The derivation of the general "Law of Propagation of Errors" equations and specific example are available on request.

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Bias	Defined by the equation $(\text{Result}/\text{Expected})-1$ as defined by ANSI N13.30.
COC No	Chain of Custody Number assigned by the Client or STL Richland.
Count Error (#s)	Poisson counting statistics of the gross sample count and background. The uncertainty is absolute and in the same units as the result. For Liquid Scintillation Counting (LSC) the batch blank count is the background.
Total Uncert (#s) <i>u_c - Combined Uncertainty.</i>	All known uncertainties associated with the preparation and analysis of the sample are propagated to give a measure of the uncertainty associated with the result, <i>u_c the combined uncertainty</i> . The uncertainty is absolute and in the same units as the result.
(#s), Coverage Factor CRDL (RL)	The coverage factor defines the width of the confidence interval, 1, 2 or 3 standard deviations. Contractual Required Detection Limit as defined in the Client's Statement Of Work or STL Richland "default" nominal detection limit. Often referred to the reporting level (RL)
Lc	Decision Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume associated with the sample. The Type I error probability is approximately 5%. $L_c = (1.645 * \text{Sqrt}(2 * (\text{BkgndCnt}/\text{BkgndCntMin})/\text{SCntMin})) * (\text{ConvFct}/(\text{Eff} * \text{Yld} * \text{Abn} * \text{Vol})) * \text{IngrFct}$. For LSC methods the batch blank is used as a measure of the background variability. Lc cannot be calculated when the background count is zero.
Lot-Sample No	The number assigned by the LIMS software to track samples received on the same day for a given client. The sample number is a sequential number assigned to each sample in the Lot.
MDC MDA	Detection Level based on instrument background or blank, adjusted by the Efficiency, Chemical Yield, and Volume with a Type I and II error probability of approximately 5%. $MDC = (4.65 * \text{Sqrt}((\text{BkgndCnt}/\text{BkgndCntMin})/\text{SCntMin}) + 2.71/\text{SCntMin}) * (\text{ConvFct}/(\text{Eff} * \text{Yld} * \text{Abn} * \text{Vol})) * \text{IngrFct}$. For LSC methods the batch blank is used as a measure of the background variability.
Primary Detector	The instrument identifier associated with the analysis of the sample aliquot.
Ratio U-234/U-238	The U-234 result divided by the U-238 result. The U-234/U-238 ratio for natural uranium in NIST SRM 4321C is 1.038.
Rst/MDC	Ratio of the Result to the MDC. A value greater than 1 may indicate activity above background at a high level of confidence. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Rst/TotUcert	Ratio of the Result to the Total Uncertainty. If the uncertainty has a coverage factor of 2 a value greater than 1 may indicate activity above background at approximately the 95% level of confidence assuming a two-sided confidence interval. Caution should be used when applying this factor and it should be used in concert with the qualifiers associated with the result.
Report DB No	Sample Identifier used by the report system. The number is based upon the first five digits of the Work Order Number.
RER	The equation Replicate Error Ratio = $(S-D)/[\text{sqrt}(\text{TPUs}^2 + \text{TPUd}^2)]$ as defined by ICPT BOA where S is the original sample result, D is the result of the duplicate, TPUs is the total uncertainty of the original sample and TPUd is the total uncertainty of the duplicate sample.
SDG	Sample Delivery Group Number assigned by the Client or assigned by STL Richland upon sample receipt.
Sum Rpt Alpha Spec Rst(s)	The sum of the reported alpha spec results for tests derived from the same sample excluding duplicate result where the results are in the same units.
Work Order	The LIMS software assign test specific identifier.
Yield	The recovery of the tracer added to the sample such as Pu-242 used to trace a Pu-239/40 method.



STL

Data Review/Verification Checklist
RADIOCHEMISTRY, First Level Review

4/7/2006 3:50:30 PM

Lot No., Due Date: J6C150127; 03/29/2006
Client, Site: 108302; RUS TEDF HANFORD
QC Batch No., Method Test: 6074250; RSE79 Se-79 by LSC
SDG, Matrix: W04885; SOIL

1.0 ICOC

1.1 Is the ICOC page complete; includes all applicable analysis, dates, SOP numbers, and revisions? Yes No N/A

2.0 QC Batch

2.1 Do the Summary/Detailed Reports include a calculated result for each sample listed on the QC Batch Sheet? Yes No N/A

2.2 Are the QC appropriate for the analysis included in the batch? Yes No N/A

2.3 Is the Analytical Batch Worksheet complete; includes as appropriate, volumes, count times, etc? Yes No N/A

2.4 Does the Worksheets include a Tracer Vial label for each sample? Yes No N/A

3.0 QC & Samples

3.1 Is the blank results, yield, and MDA within contract limits? Yes No N/A

3.2 Is the LCS result, yield, and MDA within contract limits? Yes No N/A

3.3 Are the MS/MSD results, yields, and MDA within contract limits? Yes No N/A

3.4 Are the duplicate result, yields, and MDAs within contract limits? Yes No N/A

3.5 Are the sample yields and MDAs within contract limits? Yes No N/A

4.0 Raw Data

4.1 Were results calculated in the correct units? Yes No N/A

4.2 Were analysis volumes entered correctly? Yes No N/A

4.3 Were Yields entered correctly? Yes No N/A

4.4 Were spectra reviewed/meet contractual requirements? Yes No N/A

4.5 Were raw counts reviewed for anomalies? Yes No N/A

5.0 Other

5.1 Are all nonconformances included and noted? Yes No N/A

5.2 Are all required forms filled out? Yes No N/A

5.3 Was the correct methodology used? Yes No N/A

5.4 Was transcription checked? Yes No N/A

5.5 Were all calculations checked at a minimum frequency? Yes No N/A

5.6 Are worksheet entries complete and correct? Yes No N/A

6.0 Comments on any No response:

First Level Review Pam Anderson

Date 4-7-06



STL

Data Review Checklist RADIOCHEMISTRY Second Level Review

QC Batch Number: 6074250

Review Item	Yes (✓)	No (✓)	N/A (✓)
A. Sample Analysis			
1. Are the sample yields within acceptance criteria?	✓		
2. Is the sample Minimum Detectable Activity < the Contract Detection Limit?	✓		
3. Are the correct isotopes reported?	✓		
B. QC Samples			
1. Is the Minimum Detectable Activity for the blank result ≤ the Contract Detection Limit?	✓		
2. Does the blank result meet the Contract criteria?	✓		
3. Is the blank result < the Contract Detection Limit?	✓		
4. Is the blank result > the Contract Detection Limit but the sample result < the Contract Detection Limit?			✓
5. Is the LCS recovery with contract acceptance criteria?			✓
7. Is the LCS Minimum Detectable Activity ≤ the Contract Detection Limit?			✓
8. Do the MS/MSD results and yields meet acceptance criteria?			✓
9. Do the duplicate sample results and yields meet acceptance criteria?	✓		
C. Other			
1. Are all Nonconformances included and noted?			✓
2. Are all required forms filled out?		✓	
3. Was the correct methodology used?		✓	
4. Was transcription checked?		✓	
5. Were all calculations checked at a minimum frequency?		✓	
6. Were units checked?		✓	

Comments on any "No" response: _____

Second Level Review: *Jim [Signature]* Date: 4-7-06

Fluor Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				R06-013-001	PAGE 1 OF 1
COLLECTOR <i>KB Hulse</i>		COMPANY CONTACT TRECHTER, JE		TELEPHONE NO. 373-7046	PROJECT COORDINATOR TRECHTER, JE		
SAMPLING LOCATION 200-UW-1		PROJECT DESIGNATION 200-UW-1 Operable Unit, Soil from Trench between 216-U-8 and 216-U-12			SAF NO. R06-013	PRICE CODE 9C	DATA TURNAROUND 15 Days / 15 Days
ICE CHEST NO.		FIELD LOGBOOK NO.		COA 121595E520	METHOD OF SHIPMENT GOVERNMENT VEHICLE		
SHIPPED TO Severn Trent Incorporated, Richland		OFFSITE PROPERTY NO. N/A			BILL OF LADING/AIR BILL NO. N/A		
MATRIX* OL = OTHER LIQUID OS = OTHER SOLID S = SOIL W = WATER	SPECIAL HANDLING AND/OR STORAGE			POSSIBLE SAMPLE HAZARDS/ REMARKS			
					<i>JLC 150127 W04885 due 3/22/06</i>		
SAMPLE NO.	LAB ID	MATRIX*	SAMPLE DATE	SAMPLE TIME	NO./TYPE CONTAINER(S)	ANALYSIS	PRESERVATION
B1HVM7	<i>H09EH</i>	S	<i>3-14-06</i>	<i>0950</i>	1X60mL G/P <i>23 grams</i>	Selenium-79 (Se-79)	None
B1HVM9	<i>H09EN</i>	S	<i>3-14-06</i>	<i>1010</i>	1X60mL G/P <i>20.6 grams</i>	Selenium-79 (Se-79)	None
B1HVN1	<i>H09EP</i>	S	<i>3-14-06</i>	<i>1020</i>	1X60mL G/P <i>24.3 grams</i>	Selenium-79 (Se-79)	None
CHAIN OF POSSESSION		SIGN/ PRINT NAMES				SPECIAL INSTRUCTIONS	
RELINQUISHED BY/REMOVED FROM <i>KB Hulse</i>	DATE/TIME <i>3-14-06</i>	RECEIVED BY/STORED IN <i>DAVID HARDINSON</i>	DATE/TIME <i>3-14-06</i>	RECEIVED BY/STORED IN <i>[Signature]</i>	DATE/TIME <i>3-14-06</i>	STL, send copy of chain of custody (COC) to John Trechter within 24 hours of sample receipt. All samples have been taken using the multiple-increment sampling program. This requires the entire sample provided in each bottle to be used in analysis.	
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
RELINQUISHED BY/REMOVED FROM	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME	RECEIVED BY/STORED IN	DATE/TIME		
LABORATORY SECTION	RECEIVED BY	TITLE			DATE/TIME		
FINAL SAMPLE DISPOSITION	DISPOSAL METHOD	DISPOSED BY			DATE/TIME		

STL

Sample Check-in List

Date/Time Received: 3-14-06 14:36

Client: Prac (Bus) SDG #: W04885 NA SAF #: R06-013 NA

Work Order Number: J6C15D127 Chain of Custody # R06-013-001 W06-003-115

Shipping Container ID: NIA Air Bill # NIA S06-003-101
S06-003-231
W06-003-116

1. Custody Seals on shipping container intact? NA Yes No
2. Custody Seals dated and signed? NA Yes No
3. Chain of Custody record present? Yes No
4. Cooler temperature: _____ NA 5. Vermiculite/packing materials is NA Wet Dry
6. Number of samples in shipping container: 19
7. Sample holding times exceeded? NA Yes No
8. Samples have:
 tape
 custody seals
 hazard labels
 appropriate samples labels
9. Samples are:
 in good condition
 broken
 leaking
 have air bubbles
(Only for samples requiring head space)
10. Sample pH taken? yes NA pH < 2 pH > 2 adjusted pH
11. Sample Location, Sample Collector Listed? * Yes No
*For documentation only. No corrective action needed.
12. Were any anomalies identified in sample receipt? Yes No
13. Description of anomalies (include sample numbers): _____

Sample Custodian: [Signature] Date: 3/14/06

Client Sample ID	Analysis Requested	Condition	Comments/Action

Client Informed on _____ by _____ Person contacted _____

[] No action necessary; process as is.

Project Manager _____ Date _____

LS-023, 12/05, Rev. 6

3/29/2006 12:54:04 PM

Sample Preparation/Analysis

Balance Id:1120373922

108302, Fluor Hanford Inc
Management Federal Servi

, Waste

CW Se-79 PrpRC5013, SepRC5043
TM Selenium-79 by Liquid Scint
SI CLIENT: HANFORD

PRIORITY

Pipet #: _____

Report Due: 03/29/2006

W04885

Sep1 DT/Tm Tech:

Batch: 6074250 SOIL
SEQ Batch, Test: None

pCi/g

PM, Quote: HC , 27045

Sep2 DT/Tm Tech:

Prep Tech: ,HansenM

Work Order, Lot, Sample Date/Time	Total Amt/Unit	Initial Aliquot Amt/Unit	QC Tracer Prep Date	Tracer Yield	Count Time Min	Detector Id	Count On Off (24hr) Circle	CR Analyst, Init/Date	Comments:
1 H09EH-1-AA J6C150127-1-SAMP [REDACTED] 03/14/2006 09:50		1.00g,in	SETA0099 03/29/06						
		AmtRec: 60ML	#Containers: 1				Scr: Alpha: 0.00E+00pCi/L	Beta: 0.00E+00pCi/L	
2 H09EH-1-AC-X J6C150127-1-DUP [REDACTED] 03/14/2006 09:50		1.01g,in	SETA0100 03/29/06						
		AmtRec: 60ML	#Containers: 1				Scr: Alpha: 0.00E+00pCi/L	Beta: 0.00E+00pCi/L	
3 H09EN-1-AA J6C150127-2-SAMP [REDACTED] 03/14/2006 10:10		1.02g,in	SETA0101 03/29/06						
		AmtRec: 60ML	#Containers: 1				Scr: Alpha: 6.14E+01pCi/g	Beta: 1.98E+01pCi/g	
4 H09EP-1-AA J6C150127-3-SAMP [REDACTED] 03/14/2006 10:20		1.05g,in	SETA0102 03/29/06						
		AmtRec: 60ML	#Containers: 1				Scr: Alpha: 3.78E+01pCi/g	Beta: 9.90E+00pCi/g	
5 H09TG-1-AA-B J6C150000-250-BLK [REDACTED] 03/14/2006 09:50		1.00g,in	SETA0103 03/29/06						
		AmtRec:	#Containers: 1				Scr: Alpha:	Beta:	
6 H09TG-1-AC-BN J6C150000-250-IBLK [REDACTED] 03/14/2006 09:50									
		AmtRec:	#Containers: 1				Scr: Alpha:	Beta:	

3/29/2006 12:54:07 PM

Sample Preparation/Analysis

Balance Id:

CW Se-79 PrpRC5013, SepRC5043
 TM Selenium-79 by Liquid Scint
 5I CLIENT: HANFORD

Pipet #:

Report Due: 03/29/2006

Sep1 DT/Tm Tech:

Batch: 6074250
 SEQ Batch, Test: None

pCi/g

Sep2 DT/Tm Tech:

Prep Tech:

Work Order, Lot, Sample Date/Time	Total Amt/Unit	Initial Aliquot Amt/Unit	QC Tracer Prep Date	Tracer Yield	Count Time Min	Detector Id	Count On Off (24hr) Circle	CR Analyst, Init/Date	Comments:
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Comments: *Initial prep taken to dress. On 3/29/06*

All Clients for Batch:

108302, Fluor Hanford Inc

Waste Management Federal Servi, HC , 27045

H09EH1AA-SAMP Constituent List:

Se-79	RDL:10	pCi/g	LCL:	UCL:	RPD:
H09TG1AA-BLK:					
Se-79	RDL:10	pCi/g	LCL:	UCL:	RPD:
H09TG1AC-IBLK:					
Se-79	RDL:10	pCi/g	LCL:	UCL:	RPD:

H09EH1AA-SAMP Calc Info:

Uncert Level (#): 2	Decay to SaDt: Y	Blk Subt.: N	Sci.Not.: Y	ODRs: B
H09TG1AA-BLK:				
Uncert Level (#): 2	Decay to SaDt: Y	Blk Subt.: N	Sci.Not.: Y	ODRs: B
H09TG1AC-IBLK:				
Uncert Level (#): 2	Decay to SaDt: Y	Blk Subt.: N	Sci.Not.: Y	ODRs: B

Approved By _____

Date: _____

4/7/2006 3:49:40 PM

ICOC Fraction Transfer/Status Report

ByDate: 4/7/2005, 4/12/2006, Batch: '6074250', User: *ALL Order By DateTimeAccepting

Q Batch	Work Ord	CurStatus	Accepting	Comments
6074250				
AC	CalcC	WhitneyT	3/28/2006 2:16:59 PM	
SC		wagarr	IsBatched	3/15/2006 10:09:00 AM
SC		WhitneyT	Prep1C	3/28/2006 2:16:59 PM
SC		ManisD	InSep1	4/2/2006 9:01:11 AM
SC		ManisD	Sep1C	4/2/2006 10:08:57 AM
SC		ManisD	InTrace	4/2/2006 10:09:57 AM
SC		StringerR	InCnt1	4/2/2006 10:15:28 AM
SC		ManisD	TraceC	4/3/2006 1:14:44 PM
SC		BlackCL	CalcC	4/4/2006 7:46:27 AM
AC		ManisD	4/2/2006 9:01:11 AM	
AC		ManisD	4/2/2006 10:08:57	
AC		ManisD	4/2/2006 10:09:57	
AC		StringerR	4/2/2006 10:15:28	
AC		ManisD	4/3/2006 1:14:44 PM	
AC		BlackCL	4/4/2006 7:46:27 AM	

ICOC_RADCALC v4.8.20
 RICH-RC-5013 REVISION 5
 RICH-RC-5043 REV 2
 RICH-RC-5043 REV 2
 BHI-MT-0001 REV 4
 RICH-RD-0001 REVISION 3
 BHI-MT-0001 REV 4
 RICH-RD-0001 REVISION 3

AC: Accepting Entry; SC: Status Change

STL Richland
Richland Wa.