Analytical Data Package Prepared For

Pacific Northwest National Lab

Radiochemical Analysis By

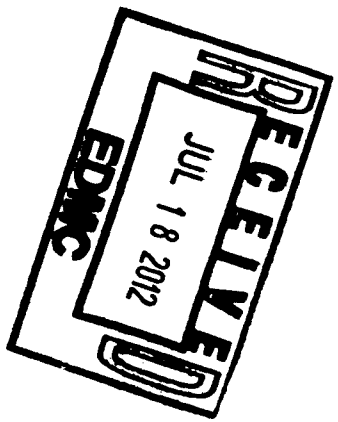
STL Richland STLRL

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

Data Package Contains 29 Pages

Report Nbr: 30416

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER	LOT Nbr	WORK ORDER	RPT DB ID	BATCH
W04803	U06-001	B1DYW8	J5J260369-1		9HNNKJ10	5300499
		B1DYW8	J5J260369-1	HNNKJ1AA	9HNNKJ10	5300500
		B1DYW8	J5J260369-1	HNNKJ1AC	9HNNKJ10	5300499
		B1DYY2	J5J260372-1	HNNK81AA	9HNNK810	5300500
		B1DYY2	J5J260372-1	HNNK81AC	9HNNK810	5300499



Comments:

12154443

The requested analyses were:

Liquid Scintillation Counting
Technetium-99 by TEVA method RICH-RC-5065
Laser Induced Phosphorimetry
Total Uranium by method RICH-RC-5058

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

Liquid Scintillation Counting
Technetium-99 by TEVA method RICH-RC-5065:
The LCS, batch blank, samples, sample duplicate (B1DYW8), and sample matrix spike (B1DYY2) results are within contractual requirements.

Total Uranium
Total Uranium by method RICH-RC-5058:
The LCS, batch blank, samples, sample duplicate (B1DYW8), and sample matrix spike (B1DYY2) 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

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 = constants * f(x,y,z,...). 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/vn), 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 (Result/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) *u_c - Combined Uncertainty.*	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, *u_c 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 * Sqrt(2*(BkgrndCnt/BkgrndCntMin)/SCntMin)) * (ConvFct/(Eff*Yld*Abn*Vol) * 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 * Sqrt((BkgrndCnt/BkgrndCntMin)/SCntMin) + 2.71/SCntMin) * (ConvFct/(Eff * Yld * Abn * Vol) * 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)/[sqrt($TPUs^2$ + $TPUd^2$)] 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.

11/10/2005 3:32:45 PM

STL Richland Report

Lab Code: STLRL

FormNbr: R **FormatType:** FEAD **Version:** 05 **Rpt Nbr:** 30416 **File Name:** h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.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:
9HNNK810	B1DYY2		MW6-SBB-A1	U06-001	W04803					10/26/2005 09:00

Batch	Analyte	CAS#	Result	Unit	CntU 2S	TotU 2S	Qual	MDA	TrcYield	Method	Alq Size	Unit	Analy Date/Time	Act
5300500	TC-99	14133-76-7	2.77E+03	pCi/L	3.0E+01	1.7E+02		1.08E+01	100.0	TC99_ETVDSK_LS	1.232E-01	L	11/10/200 03:03	I
5300499	Uranium	7440-61-1	3.74E+02	ug/L	4.4E+01	4.4E+01		8.12E-02		UTOT_KPA	2.58E-02	ML	11/09/200 13:29	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:
9HNNKJ10	B1DYW8		MW6-SBB-A1	U06-001	W04803					10/26/2005 10:47

Batch	Analyte	CAS#	Result	Unit	CntU 2S	TotU 2S	Qual	MDA	TrcYield	Method	Alq Size	Unit	Analy Date/Time	Act
5300500	TC-99	14133-76-7	2.11E+03	pCi/L	2.5E+01	1.3E+02		1.00E+01	100.0	TC99_ETVDSK_LS	1.324E-01	L	11/10/200 00:59	I
5300499	Uranium	7440-61-1	3.92E+02	ug/L	4.7E+01	4.7E+01		8.42E-02		UTOT_KPA	2.49E-02	ML	11/09/200 13:19	I

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.

Thursday, November 10, 2005

STL Richland QC Blank Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNREL1AB	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 10:47
Client Id:	NA	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	BLK		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
	MW6-SBB-A19981								AG	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300499	Uranium	-6.16E-03	ug/L	1.1E-03	U	7.25E-02			UTOT_KPA	2.89E-02	11/09/2005				D
BLK	7440-61-1			1.1E-03						ML	13:02				

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.

STL RICHLAND

Thursday, November 10, 2005

STL Richland QC Blank Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id: HNREP1AB
Client Id: NA
Moisture/Solids%*:

Sdg/Rept Nbr: W04803 30416
Matrix: WATER WATER
QC Type: BLK

Collection Date: 10/26/2005 10:47
Sample On Date:
Received Date: 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
	MW6-SBB-A19981								AJ	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300500	TC-99	3.08E+00	pCi/L	6.4E+00	U	1.05E+01	100.0		TC99_ETVDSK	1.27E-01	11/10/2005				D
BLK	14133-76-7			4.4E+00						L	05:08				

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.

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Thursday, November 10, 2005

STL Richland QC Control Sample Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNREL1CS	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 10:47
Client Id:	NA	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	BS		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
	MW6-SBB-A19981								AH	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300499	Uranium	3.00E+01	ug/L	3.6E+00		7.06E-02		3.03E+01	UTOT_KPA	2.97E-02	11/09/2005			70	D
BS	7440-61-1			3.6E+00				99.0		ML	13:10			130	

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.

Thursday, November 10, 2005

STL Richland QC Control Sample Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNREL1DS	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 10:47
Client Id:	NA	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	BS		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
	MW6-SBB-A19981								AI	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300499	Uranium	3.12E+00	ug/L	3.2E-01		8.32E-02		3.54E+00	UTOT_KPA	2.52E-02	11/09/2005			70	D
BS	7440-61-1			3.2E-01				88.1		ML	13:12			130	

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.

Thursday, November 10, 2005

STL Richland QC Control Sample Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNREP1CS	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 10:47
Client Id:	NA	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	BS		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
	MW6-SBB-A19981								AK	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300500	TC-99	4.89E+02	pCi/L	3.5E+01		1.02E+01	100.0	5.35E+02	TC99_ETVDSK	1.266E-01	11/10/2005			70	D
BS	14133-76-7			1.3E+01				91.5		L	06:10			130	

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.

Thursday, November 10, 2005

STL Richland QC Duplicate Report

Lab Code: STLRL

FormNbr: R FormatType: FEAD VersionNbr: 05 File Name: h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNNKJ1DR	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 10:47
Client Id:	B1DYW8	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	DUP		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
U06-001	MW6-SBB-A19981								AE	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300499	Uranium	3.98E+02	ug/L	4.7E+01		8.38E-02			UTOT_KPA	2.50E-02	11/09/2005	1.4	0.2		D
DUP	7440-61-1	3.92E+02		4.7E+01						ML	13:26	20.0	3		

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.

Thursday, November 10, 2005

STL Richland Qc Matrix Spike Report

Lab Code: STLRL

FormNbr: R **FormatType:** FEAD **VersionNbr:** 05 **File Name:** h:\Reportdb\edd\FeadIV\Rad\W04803.Edd, h:\Reportdb\edd\FeadIV\Rad\30416.Edd

Lab Sample Id:	HNNK81DW	**Sdg/Rept Nbr:**	W04803	30416	**Collection Date:** 10/26/2005 09:00
Client Id:	B1DYY2	**Matrix:**	WATER	WATER	**Sample On Date:**
Moisture/Solids%*:		**QC Type:**	MS		**Received Date:** 10/26/2005

SAF Nbr	Contract Nbr	Test User	Case Nbr	SAS Nbr	Suffix	Decant	Distilled Volume	File Id	FSuffix	RTyp
U06-001	MW6-SBB-A19981								AC	H

Batch # / Qc Type	Analyt/ CAS#	Result/ Orig Rst	Unit	Tot/Cnt Uncert 2S	Qu-al	MDC	Tracer Yield	Spk Conc/ %Rec	Analy Method	Aliq Size/	Date/Time Analyzed	RPD/ UCL	RER/ UCL	LCS LCL/UCL	R Typ
5300499	Uranium	2.83E+01	ug/L	6.5E+01	U	8.73E-02		3.74E+01	UTOT_KPA	2.40E-02	11/09/2005			60	D
MS	7440-61-1			6.5E+01				75.7		ML	13:33			140	

SEVERN TRENT STL

Data Review/Verification Checklist

RADIOCHEMISTRY, First Level Review

11/10/2005 1:00:22 PM

Lot No., Due Date: J5J260372,J5J260369; 11/10/2005

Client, Site: 384868; PGW 615HANFORD HANFORD

QC Batch No., Method Test: 5300500; RTC99 Tc-99 by LSC

SDG, Matrix: W04803; WATER

1.0 COC

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 [signature] **Date** 11/10/~~05~~ 05 [initials] 11/10/05

SEVERN TRENT **STL**

Data Review Checklist
RADIOCHEMISTRY
Second Level Review

QC Batch Number: 5300500

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: _____ Date: 11-10-05

SEVERN TRENT STL

Data Review/Verification Checklist

RADIOCHEMISTRY, First Level Review

11/10/2005 1:42:48 PM

Lot No., Due Date: J5J260372,J5J260369; 11/10/2005

Client, Site: 384868; PGW 615HANFORD HANFORD

QC Batch No., Method Test: 5300499; RUNAT UNat by KPA

SDG, Matrix: W04803; WATER

	Yes	No	N/A
1.0 COC			
1.1 Is the ICOC page complete; includes all applicable analysis, dates, SOP numbers, and revisions?	✓		
2.0 QC Batch			
2.1 Do the Summary/Detailed Reports include a calculated result for each sample listed on the QC Batch Sheet?	✓		
2.2 Are the QC appropriate for the analysis included in the batch?	✓		
2.3 Is the Analytical Batch Worksheet complete; includes as appropriate, volumes, count times, etc?	✓		
2.4 Does the Worksheets include a Tracer Vial label for each sample?			✓
3.0 QC & Samples			
3.1 Is the blank results, yield, and MDA within contract limits?	✓		
3.2 Is the LCS result, yield, and MDA within contract limits?	✓		
3.3 Are the MS/MSD results, yields, and MDA within contract limits?	✓		
3.4 Are the duplicate result, yields, and MDAs within contract limits?	✓		
3.5 Are the sample yields and MDAs within contract limits?			
4.0 Raw Data			
4.1 Were results calculated in the correct units?	✓		
4.2 Were analysis volumes entered correctly?	✓		
4.3 Were Yields entered correctly?			✓
4.4 Were spectra reviewed/meet contractual requirements?	✓		
4.5 Were raw counts reviewed for anomalies?	✓		
5.0 Other			
5.1 Are all nonconformances included and noted?			✓
5.2 Are all required forms filled out?	✓		
5.3 Was the correct methodology used?	✓		
5.4 Was transcription checked?	✓		
5.5 Were all calculations checked at a minimum frequency?	✓		
5.6 Are worksheet entries complete and correct?	✓		

6.0 Comments on any No response:

First Level Review Anna Lang **Date** 11-10-05

SEVERN TRENT **STL**

Data Review Checklist
RADIOCHEMISTRY
Second Level Review

QC Batch Number: 5300499

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: _____ Date: 11-10-05

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # U06-001-8

Page 1 of 1

Collector DURATEK D.R. BREWINGTON	**Contact/Requester** Dot Stewart	**Telephone No.** 509-376-5056 **MSIN** **FAX**
SAF No. U06-001	**Sampling Origin**	**Purchase Order/Charge Code**
Project Title LTMC/2UP1-Rebound, OCTOBER 2005	Logbook DTS-SACS-1493	**Ice Chest No.** 66506 **Temp.**
Shipped To (Lab) Severn Trent Incorporated, Richland	**Method of Shipment** Govt. Truck	**Bill of Lading/Air Bill No.**
Protocol LTMC	**Priority:** 15 Days **PRIORITY**	**Offsite Property No.**

POSSIBLE SAMPLE HAZARDS/REMARKS ** **

W04803
JSJ260369
Due 11/10/05

SPECIAL INSTRUCTIONS **Hold Time** Total Activity Exemption: Yes ☑ No ☐

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B1DYW8		W	10-26-05	1047	1x20-mL P	Activity Scan HNNKJ	None
B1DYW8		W	"	"	1x500-mL P	TC99_ETVDSK_LSC: Tc-99 (1)	HCl to pH <2
B1DYW8		W	"	"	1x500-mL G/P	UTOT_KPA: Uranium (1)	HNO3 to pH <2

Relinquished By Print D.R. Brewington Sign	Date/Time OCT 26 2005 1457	Received By Print Jeff Jensen Sign	Date/Time OCT 26 2005 1457
Relinquished By DURATEK D.R. BREWINGTON	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Matrix *: <100 CPM

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

FINAL SAMPLE DISPOSITION	Disposal Method (e.g., Return to customer, per lab procedure, used in process)	Disposed By	Date/Time

SITE RECORD

20

SEVERN TRENT STL

Sample Check-in List

Date/Time Received: 10 26 05 1457

Client: PAW SDG #: W04803 NA [ ] SAF #: 406-001 NA [ ]

Work Order Number: JJ526036 9 Chain of Custody # 406-001-2,5,8

Shipping Container ID: GWS 106 Air Bill # _____

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: 5
7. Sample holding times exceeded? NA [✓] Yes [ ] No [ ]
8. Samples have:
   _____tape
   ___X___custody seals
   _____hazard labels
   ___X___appropriate samples labels
9. Samples are:
   ___X___in good condition
   _____broken
   _____leaking
   _____have air bubbles
   (Only for samples requiring head space)
10. Sample pH taken? NA [ ] pH<2 [✓] pH>2 [ ] pH>9 [ ]
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: _____ Date: 10 26 05

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, 9/03, Rev. 5

SHE RICHLAND

PNNL

CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST

C.O.C. # **U06-001-26**

Page 1 of 1

Collector	**Contact/Requester** Dot Stewart	**Telephone No.** 509-376-5056 **MSIN** **FAX**
SAF No. U06-001	**Sampling Origin**	**Purchase Order/Charge Code**
Project Title LTMC/2UP1-Rebound, OCTOBER 2005	SAWS-H95	**Ice Chest No.** SAWS-102 **Temp.**
Shipped To (Lab) Severn Trent Incorporated, Richland	**Method of Shipment** Govt. Truck	**Bill of Lading/Air Bill No.**
Protocol LTMC	**Priority:** 15 Days **PRIORITY**	**Offsite Property No.**

POSSIBLE SAMPLE HAZARDS/REMARKS
** **
W04803
J5J260372
Due 11 10 05

SPECIAL INSTRUCTIONS **Hold Time** Total Activity Exemption: Yes ☑ No ☐

Sample No.	Lab ID	*	Date	Time	No/Type Container	Sample Analysis	Preservative
B1DYY2		W	10.26.05	0900	1x20-mL P	Activity Scan HNNK8	None
B1DYY2		W	"	"	1x500-mL P	TC99_ETVDSK_LSC: Tc-99 (1)	HCl to pH <2
B1DYY2		W	"	"	1x500-mL G/P	UTOT_KPA: Uranium (1)	HNO3 to pH <2

10-26-05

Relinquished By DURATEK R. R. FOX Sign	Date/Time 1440 OCT 26 2005	Received By Jeff Jensen Print Sign	Date/Time 1440 OCT 26 2005
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By	Date/Time

Matrix *

<100 CPM

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

FINAL SAMPLE DISPOSITION Disposal Method (e.g., Return to customer, per lab procedure, used in process) Disposed By Date/Time

22

SEVERN TRENT STL

Sample Check-in List

Date/Time Received: 10 26 05 1400

Client: PNNL SDG #: W04803 NA [ ] SAF #: X05-054 NA [ ]

Work Order Number: JSJ260372 Chain of Custody # 1606-001 - 15, 26, 20, 19, 32, 44, 38

Shipping Container ID: SAWS 102 Air Bill # X05-054 - 71

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: 28
7. Sample holding times exceeded? NA [✓] Yes [ ] No [ ]
8. Samples have:
   - _____ tape
   - 28 custody seals
   - _____ hazard labels
   - 28 appropriate samples labels
9. Samples are:
   - 28 in good condition
   - _____ broken
   - _____ leaking
   - _____ have air bubbles

   (Only for samples requiring head space)
10. Sample pH taken? NA [ ] pH<2 [✓] pH>2 [✓] pH>9 [ ]
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: _____ Date: 10 26 05

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, 9/03, Rev. 5

STL RICHLAND

11/4/2005 2:22:03 PM

Sample Preparation/Analysis

Balance Id:1120482733

384868, Pacific Northwest National Labortories ,
Pacific Northwest National Lab

FP Tc-99 Prp/SepRC5065
S5 Technetium-99 by Liquid Scint
5I CLIENT: HANFORD

Pipet #: _____

Report Due: 11/10/2005 104803

Sep1 DT/Tm Tech:

Batch: 5300500 WATER pCi/L

PM, Quote: HC , 57671

Sep2 DT/Tm Tech:

SEQ Batch, Test: None

Prep Tech: ,GiroirB

Work Order, Lot, Sample Date	Total Amt /Unit	Total Acidified/Unit	Initial Aliquot Amt/Unit	Adj Aliq Amt (Un-Acidified)	QC Tracer Prep Date	Count Time Min	Detector Id	Count On | Off (24hr) Circle	CR Analyst, Init/Date	Comments:
1 HNNKJ-1-AA J5J260369-1-SAMP 10/26/2005 10:47			132.40g,in AmtRec: 20ML,2X500P	132.40g #Containers: 3				Scr: Alpha: 7.21E-04 uCi/Sa 2.5E-01L Beta: 1.26E-04 uCi/Sa		
2 HNNKJ-1-AE-X J5J260369-1-DUP 10/26/2005 10:47			122.40g,in AmtRec: 20ML,2X500P	122.40g #Containers: 3				Scr: Alpha: 7.21E-04 uCi/Sa 2.5E-01L Beta: 1.26E-04 uCi/Sa		
3 HNNK8-1-AA J5J260372-1-SAMP 10/26/2005 09:00			123.20g,in AmtRec: 20ML,2X500P	123.20g #Containers: 3				Scr: Alpha: 2.41E-04 uCi/Sa Beta: 3.42E-04 uCi/Sa		
4 HNNK8-1-AE-S J5J260372-1-MS 10/26/2005 09:00			124.00g,in AmtRec: 20ML,2X500P	124.00g #Containers: 3	TCSG1340 09/27/05,pd			Scr: Alpha: 2.41E-04 uCi/Sa Beta: 3.42E-04 uCi/Sa		
5 HNREP-1-AA-B J5J270000-500-BLK 10/26/2005 10:47			127.00g,in AmtRec:	127.00g #Containers: 1				Scr: Alpha: Beta:		
6 HNREP-1-AC-C J5J270000-500-LCS 10/26/2005 10:47			126.60g,in AmtRec:	126.60g #Containers: 1	TCSE1815 07/18/05,pd			Scr: Alpha: Beta:		
7 HNREP-1-AD-BN J5J270000-500-IBLK 10/26/2005 10:47			AmtRec:	#Containers: 1				Scr: Alpha: Beta:		

11/4/2005 2:22:05 PM

Sample Preparation/Analysis

FP Tc-99 Prp/SepRC5065
S5 Technetium-99 by Liquid Scint
5I CLIENT: HANFORD

Balance Id:1120482733

Pipet #: _____

Sep1 DT/Tm Tech:

Sep2 DT/Tm Tech:

Prep Tech: ,GiroirB

Report Due: 11/10/2005

Batch: 5300500 **pCi/L**
SEQ Batch, Test: None

Work Order, Lot, Sample Date	Total Amt /Unit	Total Acidified/Unit	Initial Aliquot Amt/Unit	Adj Aliq Amt (Un-Acidified)	QC Tracer Prep Date	Count Time Min	Detector Id	Count On | Off (24hr) Circle	CR Analyst, Init/Date	Comments:

Comments:
pH verified

All Clients for Batch:
384868, Pacific Northwest National Labortories Pacific Northwest National Lab, HC , 57671

HNNKJ1AA-SAMP Constituent List:
Tc-99 RDL:15 pCi/L LCL:70 UCL:130 RPD:20
HNNK81AE-MS:

HNREP1AA-BLK:
Tc-99 RDL:15 pCi/L LCL: UCL: RPD:
HNREP1AC-LCS:
Tc-99 RDL:15 pCi/L LCL:70 UCL:130 RPD:20
HNREP1AD-IBLK:
Tc-99 RDL:15 pCi/L LCL: UCL: RPD:

HNNKJ1AA-SAMP Calc Info:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNNK81AE-MS:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREP1AA-BLK:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREP1AC-LCS:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREP1AD-IBLK:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B

Approved By _____ Date: _____

11/10/2005 3:28:55 PM

ICOC Fraction Transfer/Status Report

ByDate: 11/10/2004, 11/15/2005, Batch: '5300500', User: *ALL Order By DateTimeAccepting

Q Batch	Work Ord	CurStatus	Accepting		Comments
5300500					
AC		Rev1C	GiroirB	11/3/2005 6:20:33	
SC			wagarr	IsBatched 10/27/2005 2:21:08 PM	ICOC_RADCALC v4.8.15
SC			GiroirB	InPrep 11/3/2005 6:20:33 AM	RICH-RC-5016 REVISION 5
SC			GiroirB	Prep1C 11/4/2005 2:28:42 PM	RICH-RC-5016 REVISION 5
SC			StringerR	InCnt1 11/9/2005 6:10:28 PM	RICH-RD-0001 REVISION 3
SC			StringerR	CalcC 11/10/2005 9:32:22 AM	RICH-RD-0001 REVISION 3
SC			WhelandS	Rev1C 11/10/2005 1:05:38 PM	RICH-RC-0002 REVISION 7
AC			GiroirB	11/4/2005 2:28:42 PM	
AC			StringerR	11/9/2005 6:10:28 PM	
AC			StringerR	11/10/2005 9:32:22	

AC: Accepting Entry; SC: Status Change

STL Richland

Richland Wa.

Grp Rec Cnt: 4

ICOCFractions v4.8.15

STL RICHLAND

11/8/2005 6:32:10 AM

Sample Preparation/Analysis

Balance Id:1120482733

384868, Pacific Northwest National Labortories , Pacific Northwest National Lab

DH UNat_Laser PrpRC5015
SS Total Uranium by KPA
5i CLIENT: HANFORD

Pipet #: _____

Report Due: 11/10/2005

Sep1 DT/Tm Tech:

Batch: 5300499 **WATER** **ug/L**

PM, Quote: HC , 57671

Sep2 DT/Tm Tech:

SEQ Batch, Test: None All Tests: 5300499 DHSS, 5300500 FPS5,

Prep Tech: ,GiroirB

Work Order, Lot, Sample DateTime	Total Amt/Unit	Initial Aliquot Amt/Unit	QC Tracer Prep Date	Count Time Min	Detector Id	Count On | Off (24hr) Circle	CR Analyst, Init/Date	Comments:
1 HNNKJ-1-AC J5J260369-1-SAMP 10/26/2005 10:47	Final Vol 10.0ml	24.90g,in AmtRec: 20ML,2X500P	#Containers: 3			Scr: Alpha: 7.21E-04 uCi/Sa 2.5E-01L	Beta: 1.26E-04 uCi/Sa	
2 HNNKJ-1-AD-X J5J260369-1-DUP 10/26/2005 10:47		25.00g,in AmtRec: 20ML,2X500P	#Containers: 3			Scr: Alpha: 7.21E-04 uCi/Sa 2.5E-01L	Beta: 1.26E-04 uCi/Sa	
3 HNNK8-1-AC J5J260372-1-SAMP 10/26/2005 09:00		25.80g,in AmtRec: 20ML,2X500P	#Containers: 3			Scr: Alpha: 2.41E-04 uCi/Sa	Beta: 3.42E-04 uCi/Sa	
4 HNNK8-1-AD-S J5J260372-1-MS 10/26/2005 09:00		24.00g,in AmtRec: 20ML,2X500P	UNSF2727 11/03/05,pd #Containers: 3			Scr: Alpha: 2.41E-04 uCi/Sa	Beta: 3.42E-04 uCi/Sa	
5 HNREL-1-AA-B J5J270000-499-BLK 10/26/2005 10:47		28.90g,in AmtRec:	#Containers: 1			Scr: Alpha:	Beta:	
6 HNREL-1-AC-C J5J270000-499-LCS 10/26/2005 10:47		29.70g,in AmtRec:	UNSF2728 11/03/05,pd #Containers: 1			Scr: Alpha:	Beta:	
7 HNREL-1-AD-C J5J270000-499-LCS 10/26/2005 10:47		25.20g,in AmtRec:	UNSC0909 11/05/05,pd #Containers: 1			Scr: Alpha:	Beta:	

STL RICHLAND

11/8/2005 6:32:13 AM

Sample Preparation/Analysis

DH UNat_Laser PrpRC5015
SS Total Uranium by KPA
5I CLIENT: HANFORD

Balance Id:1120482733

Pipet #: _____

Report Due: 11/10/2005

Sep1 DT/Tm Tech:

Batch: 5300499 ug/L

Sep2 DT/Tm Tech:

SEQ Batch, Test: None

Prep Tech: ,GiroirB

Work Order, Lot, Sample DateTime	Total Amt/Unit	Initial Aliquot Amt/Unit	QC Tracer Prep Date	Count Time Min	Detector Id	Count On | Off (24hr) Circle	CR Analyst, Init/Date	Comments:

Comments:

Verified 11-8-05 added 2nd LCS per QA bg

Samples left on Hotplate overnight (Extra) ≈ 200

All Clients for Batch:
384868, Pacific Northwest National Labortories Pacific Northwest National Lab, HC , 57671

HNNKJ1AC-SAMP Constituent List:
Uranium RDL:1.44E-01 ug/L LCL: UCL: RPD:
HNNK81AD-MS:

HNREL1AA-BLK:
Uranium RDL:1.44E-01 ug/L LCL: UCL: RPD:
HNREL1AC-LCS:
Uranium RDL:0.144343 ug/L LCL:70 UCL:130 RPD:20
HNREL1AD-LCS:
Uranium RDL:0.144343 ug/L LCL:70 UCL:130 RPD:20

HNNKJ1AC-SAMP Calc Info:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNNK81AD-MS:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREL1AA-BLK:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREL1AC-LCS:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B
HNREL1AD-LCS:
Uncert Level (#s).: 2 Decay to SaDt: Y Blk Subt.: N Sci.Not.: Y ODRs: B

Approved By _____ Date: _____

11/10/2005 1:18:38 PM

ICOC Fraction Transfer/Status Report

ByDate: 11/10/2004, 11/15/2005, Batch: '5300499', User: *ALL Order By DateTimeAccepting

Q Batch	Work Ord	CurStatus	Accepting		Comments
5300499					
AC		Cnt1C	GiroirB	11/3/2005 6:20:05	
SC			wagarr	IsBatched 10/27/2005 2:21:08 PM	ICOC_RADCALC v4.8.15
SC			GiroirB	InPrep 11/3/2005 6:20:05 AM	RICH-RC-5015 REVISION 4
SC			GiroirB	Prep1C 11/4/2005 12:36:01 PM	RICH-RC-5015 REVISION 4
SC			ScottM	Prep2C 11/8/2005 4:47:15 PM	RICH-RC-5015 REVISION 4
SC			BarbosaH	Cnt1C 11/9/2005 4:05:45 PM	RICH-RC-5058 REVISION 6
AC			GiroirB	11/4/2005 12:36:01	
AC			ScottM	11/8/2005 4:47:15 PM	
AC			BarbosaH	11/9/2005 4:05:45 PM	

AC: Accepting Entry; SC: Status Change

STL Richland

Richland Wa.

Grp Rec Cnt: 4

ICOCFractions v4.8.15