

0051468

Thermo Nutech
W.O. No. N9-03-111-7707

Bechtel Hanford Inc.
SDG H0364

Case Narrative

1.0 GENERAL

Bechtel Hanford Inc. Sample Delivery Group H0364 is comprised of four liquid (water) samples designated under SAF No. B99-054 with a Project Designation of: 200-ZP-1 Process Sampling for Technetium.

The samples were received as stated on the Chain-of-Custody documents. Any discrepancies are noted on the TNU Sample Receipt Checklist. There was a quick turn-around time requirement for the single analyte, technetium-99.

2.0 ANALYSIS NOTES

2.1 Technetium-99 Analyses

The aliquot for the analysis was reduced to 50 mL based on a preliminary rad screen. The sample MDA's were increased as a result of the reduced aliquot, however the technetium-99 activity detected in samples B0V1P5, B0V1P6, and B0V1P8 was much greater than the MDA or RDL. Technetium-99 activity greater than the sample MDA was not detected in sample B0V1P7.



TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0364

SDG 7707
 Contact L.A. Johnson

Client Hanford
 Contract TRB-SBB-207925
 Case no SDG-H0364

SAMPLE SUMMARY

CLIENT SAMPLE ID	LOCATION	MATRIX	LEVEL	LAB		CHAIN OF	
				SAMPLE ID	SAF NO	CUSTODY	COLLECTED
B0V1P5	200 West	WATER		N903111-01	B99-054	B99-054-01	03/17/99 08:45
B0V1P6	200 West	WATER		N903111-02	B99-054	B99-054-01	03/17/99 08:50
B0V1P7	200 West	WATER		N903111-03	B99-054	B99-054-01	03/17/99 09:10
B0V1P8	200 West	WATER		N903111-04	B99-054	B99-054-01	03/17/99 09:25
Method Blank		WATER		N903111-06	B99-054		
Lab Control Sample		WATER		N903111-05	B99-054		
Duplicate (N903111-01)	200 West	WATER		N903111-07	B99-054		03/17/99 08:45

SAMPLE SUMMARY

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 Protocol Hanford
 Version Ver 1.0
 Form DVD-CS
 Version 3.00
 Report date 03/30/99

TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0364

SDG 7707
 Contact L.A. Johnson

Client Hanford
 Contract TRB-SBB-207925
 Case no SDG-H0364

QC SUMMARY

QC BATCH	CHAIN OF CUSTODY	CLIENT SAMPLE ID	MATRIX	% SOLIDS	SAMPLE AMOUNT	BASIS AMOUNT	DAYS SINCE RECEIVED	LAB COLL	LAB SAMPLE ID	DEPARTMENT SAMPLE ID
7707	B99-054-01	BOV1P5	WATER				03/23/99	6	N903111-01	7707-001
		BOV1P6	WATER				03/23/99	6	N903111-02	7707-002
		BOV1P7	WATER				03/23/99	6	N903111-03	7707-003
		BOV1P8	WATER				03/23/99	6	N903111-04	7707-004
		Method Blank	WATER						N903111-06	7707-006
		Lab Control Sample	WATER						N903111-05	7707-005
		Duplicate (N903111-01)	WATER				03/23/99	6	N903111-07	7707-007

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TMA/RICHMOND

SAMPLE DELIVERY GROUP H0364

SDG 7707
 Contact L.A. Johnson

PREP BATCH SUMMARY

Client Hanford
 Contract TRB-SBB-207925
 Case no SDG-H0364

TEST	MATRIX	METHOD	PREPARATION ERROR		PLANCHETS ANALYZED				QUALI-	
			BATCH	2σ %	CLIENT	MORE	RE	BLANK		LCS
Beta Counting										
TC	WATER	Technetium 99 in Water	2851-033	10.0	4			1	1	1/1

Duplicates and Matrix Spikes are those with original (Client) sample in this Sample Delivery Group.
 Blank and LCS planchets are those in the same preparation batch as some Client, Duplicate or Spike sample.

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TMA/RICHMOND
SAMPLE DELIVERY GROUP H0364

SDG 7707
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0364

WORK SUMMARY

CLIENT SAMPLE ID	MATRIX	LAB SAMPLE ID	COLLECTED	SUP-	TEST	FIX	ANALYZED	REVIEWED	BY	METHOD
LOCATION		RECEIVED	PLANCHET							
CUSTODY	SAF No									
BOV1P5 200 West B99-054-01	WATER B99-054	N903111-01 03/17/99 03/23/99	7707-001		TC		03/30/99	03/30/99	NJV	Technetium 99 in Water
BOV1P6 200 West B99-054-01	WATER B99-054	N903111-02 03/17/99 03/23/99	7707-002		TC		03/29/99	03/30/99	NJV	Technetium 99 in Water
BOV1P7 200 West B99-054-01	WATER B99-054	N903111-03 03/17/99 03/23/99	7707-003		TC		03/29/99	03/30/99	NJV	Technetium 99 in Water
BOV1P8 200 West B99-054-01	WATER B99-054	N903111-04 03/17/99 03/23/99	7707-004		TC		03/30/99	03/30/99	NJV	Technetium 99 in Water
Method Blank B99-054	WATER B99-054	N903111-06 03/23/99	7707-006		TC		03/30/99	03/30/99	NJV	Technetium 99 in Water
Lab Control Sample B99-054	WATER B99-054	N903111-05 03/23/99	7707-005		TC		03/29/99	03/30/99	NJV	Technetium 99 in Water
Duplicate (N903111-01) 200 West B99-054	WATER B99-054	N903111-07 03/17/99 03/23/99	7707-007		TC		03/30/99	03/30/99	NJV	Technetium 99 in Water

COUNTS OF TESTS BY SAMPLE TYPE

TEST	SAF No	METHOD	REFERENCE	CLIENT	MORE	RE	BLANK	LCS	DUP	SPIKE	TOTAL
TC	B99-054	Technetium 99 in Water	TC99TRLSC	4			1	1	1		7
TOTALS				4			1	1	1		7

WORK SUMMARY

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Protocol Hanford
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Form DVD-CWS
Version 3.06
Report date 03/30/99

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0364

N903111-06

Method Blank

METHOD BLANK

SDG 7707 Client/Case no Hanford SDG-H0364
Contact L.A. Johnson Case no TRB-SBB-207925
Lab sample id N903111-06 Client sample id Method Blank
Dept sample id 7707-006 Material/Matrix WATER
SAF No B99-054

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Technetium 99	14133-76-7	-0.639	1.3	2.3	15	U	TC

200-ZP-1 Process Sampling for Tc

QC-BLANK 30372

Lab id TMANC
Protocol Hanford
Version Ver 1.0
Form DVD-DS
Version 3.06
Report date 03/30/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0364

N903111-05

Lab Control Sample

LAB CONTROL SAMPLE

SDG <u>7707</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0364</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N903111-05</u>	Client sample id <u>Lab Control Sample</u>	
Dept sample id <u>7707-005</u>	Material/Matrix <u>WATER</u>	
	SAF No <u>B99-054</u>	

ANALYTE	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ADDED pCi/L	2σ ERR pCi/L	REC %	3σ LMTS (TOTAL)	PROTOCOL LIMITS
Technetium 99	245	11	5.1	15		TC	273	11	90	84-116	80-120

200-ZP-1 Process Sampling for Tc

QC-LCS 30371

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-LCS</u>
Version <u>3.06</u>
Report date <u>03/30/99</u>

TMA/RICHMOND
 SAMPLE DELIVERY GROUP H0364

N903111-07

B0V1P5

DUPLICATE

SDG <u>7707</u>	Client/Case no <u>Hanford</u>	SDG-H0364
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
DUPLICATE	ORIGINAL	
Lab sample id <u>N903111-07</u>	Lab sample id <u>N903111-01</u>	Client sample id <u>B0V1P5</u>
Dept sample id <u>7707-007</u>	Dept sample id <u>7707-001</u>	Location/Matrix <u>200 West</u> <u>WATER</u>
	Received <u>03/23/99</u>	Collected <u>03/17/99 08:45</u>
		Custody/SAF No <u>B99-054-01</u> <u>B99-054</u>

ANALYTE	DUPLICATE pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST	ORIGINAL pCi/L	2σ ERR (COUNT)	MDA pCi/L	QUALI- FIERS	RPD %	3σ TOT	PROT LIMIT
Technetium 99	284	17	13	15		TC	286	19	<u>18</u>		1	25	

200-ZP-1 Process Sampling for Tc

QC-DUP#1 30373

DUPLICATES

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Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DUP</u>
Version <u>3.06</u>
Report date <u>03/30/99</u>

TMA / RICHMOND
 SAMPLE DELIVERY GROUP H0364

N903111-01

BOV1P5

DATA SHEET

SDG <u>7707</u>	Client/Case no <u>Hanford</u>	<u>SDG-H0364</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N903111-01</u>	Client sample id <u>BOV1P5</u>	
Dept sample id <u>7707-001</u>	Location/Matrix <u>200 West</u>	<u>WATER</u>
Received <u>03/23/99</u>	Collected <u>03/17/99 08:45</u>	
	Custody/SAF No <u>B99-054-01</u>	<u>B99-054</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Technetium 99	14133-76-7	286	19	<u>18</u>	15		TC

200-ZP-1 Process Sampling for Tc

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Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/30/99</u>

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0364

N903111-02

BOV1P6

DATA SHEET

SDG <u>7707</u>	Client/Case no <u>Hanford</u>	SDG- <u>H0364</u>
Contact <u>L.A. Johnson</u>	Case no <u>TRB-SBB-207925</u>	
Lab sample id <u>N903111-02</u>	Client sample id <u>BOV1P6</u>	
Dept sample id <u>7707-002</u>	Location/Matrix <u>200 West</u>	<u>WATER</u>
Received <u>03/23/99</u>	Collected <u>03/17/99 08:50</u>	
	Custody/SAF No <u>B99-054-01</u>	<u>B99-054</u>

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Technetium 99	14133-76-7	196	23	<u>33</u>	15		TC

200-ZP-1 Process Sampling for Tc

Lab id <u>TMANC</u>
Protocol <u>Hanford</u>
Version <u>Ver 1.0</u>
Form <u>DVD-DS</u>
Version <u>3.06</u>
Report date <u>03/30/99</u>

TMA / RICHMOND
 SAMPLE DELIVERY GROUP H0364

N903111-03

B0V1P7

DATA SHEET

SDG 7707 Client/Case no Hanford SDG-H0364
 Contact L.A. Johnson Case no TRB-SBB-207925

Lab sample id N903111-03 Client sample id B0V1P7
 Dept sample id 7707-003 Location/Matrix 200 West WATER
 Received 03/23/99 Collected 03/17/99 09:10
 Custody/SAF No B99-054-01 B99-054

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Technetium 99	14133-76-7	2.59	5.6	<u>16</u>	15	U	TC

200-ZP-1 Process Sampling for Tc

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TMA / RICHMOND
 SAMPLE DELIVERY GROUP H0364

N903111-04

BOV1P8

DATA SHEET

SDG 7707 Client/Case no Hanford SDG-H0364
 Contact L.A. Johnson Case no TRB-SBB-207925
 Lab sample id N903111-04 Client sample id BOV1P8
 Dept sample id 7707-004 Location/Matrix 200 West WATER
 Received 03/23/99 Collected 03/17/99 09:25
 Custody/SAF No B99-054-01 B99-054

ANALYTE	CAS NO	RESULT pCi/L	2σ ERR (COUNT)	MDA pCi/L	RDL pCi/L	QUALI- FIERS	TEST
Technetium 99	14133-76-7	100	13	<u>16</u>	15		TC

200-ZP-1 Process Sampling for Tc

Lab id TMANC
 Protocol Hanford
 Version Ver 1.0
 Form DVD-DS
 Version 3.06
 Report date 03/30/99

TMA/RICHMOND

SAMPLE DELIVERY GROUP H0364

METHOD SUMMARY

TECHNETIUM 99 IN WATER
BETA COUNTING

Test TC Matrix WATER
SDG 7707
Contact L.A. Johnson

Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0364

RESULTS

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	Technetium PLANCHET	99
Preparation batch 2851-033					
BOV1P5	N903111-01	7707-001			286
BOV1P6	N903111-02	7707-002			196
BOV1P7	N903111-03	7707-003			U
BOV1P8	N903111-04	7707-004			100
BLK (QC ID=30372)	N903111-06	7707-006			U
LCS (QC ID=30371)	N903111-05	7707-005			ok
Duplicate (N903111-01)	N903111-07	7707-007			ok

Nominal values and limits from method RDLs (pCi/L) 15
200-ZP-1 Process Sampling for Tc

METHOD PERFORMANCE

CLIENT SAMPLE ID	LAB SAMPLE ID	RAW TEST	SUF- FIX	MDA pCi/L	ALIQ L	PREP FAC	DILU- TION	YIELD %	EFF %	COUNT min	FWHM keV	DRIFT KeV	DAYS HELD	ANAL- PREPARED	YZED	DETECTOR
Preparation batch 2851-033 2σ prep error 10.0 % Reference Lab Notebook #2851 pg. 033																
BOV1P5	N903111-01			18	0.0500			39		101			13	03/25/99	03/30	GRB-221
BOV1P6	N903111-02			33	0.0500			21		101			12	03/25/99	03/29	GRB-202
BOV1P7	N903111-03			16	0.0500			43		101			12	03/25/99	03/29	GRB-203
BOV1P8	N903111-04			16	0.0500			24		383			13	03/25/99	03/30	GRB-201
BLK (QC ID=30372)	N903111-06			2.3	0.200			37		383				03/25/99	03/30	GRB-202
LCS (QC ID=30371)	N903111-05			5.1	0.200			33		101				03/25/99	03/29	GRB-205
Duplicate (N903111-01)	N903111-07			13	0.0500			24		383			13	03/25/99	03/30	GRB-203
(QC ID=30373)																

Nominal values and limits from method 15 0.200 20-105 50 180

PROCEDURES	REFERENCE	TC99TRLSC
EP-020		Sample Leach For Technetium-99, rev 0
EP-540		Technetium-99 Purification, rev 0

AVERAGES ± 2 SD	MDA	15	±	20
FOR 7 SAMPLES	YIELD	32	±	17

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0364

SDG 7707
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REPORT GUIDE

Client Hanford
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SAMPLE SUMMARY

The Sample and QC Summary Reports show all samples, including QC samples, reported in one Sample Delivery Group (SDG).

The Sample Summary Report fully identifies client samples and gives the corresponding lab sample identification. The QC Summary Report shows at the sample level how the lab organized the samples into batches and generated QC samples. The Preparation Batch and Method Summary Reports show this at the analysis level.

The following notes apply to these reports:

- * LAB SAMPLE ID is the lab's primary identification for a sample.
- * DEPARTMENT SAMPLE ID is an alternate lab id, for example one assigned by a radiochemistry department in a lab.
- * CLIENT SAMPLE ID is the client's primary identification for a sample. It includes any sample preparation done by the client that is necessary to identify the sample.
- * QC BATCH is a lab assigned code that groups samples to be processed and QCed together. These samples should have similar matrices.

QC BATCH is not necessarily the same as SDG, which reflects samples received and reported together.

- * All Lab Control Samples, Method Blanks, Duplicates and Matrix Spikes are shown that QC any of the samples. Due to possible reanalyses, not all results for all these QC samples may be relevant to the SDG. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.

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Contact L.A. Johnson

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Client Hanford
Contract TRB-SBB-207925
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PREPARATION BATCH SUMMARY

The Preparation Batch Summary Report shows all preparation batches in one Sample Delivery Group (SDG) with information necessary to check the completeness and consistency of the SDG.

The following notes apply to this report:

- * The preparation batches are shown in the same order as the Method Summary Reports are printed.
- * Only analyses of planchets relevant to the SDG are included.
- * Each preparation batch should have at least one Method Blank and LCS in it to validate client sample results.
- * The QUALIFIERS shown are all qualifiers other than U, J, B, L and H that occur on any analysis in the preparation batch. The Method Summary Report has these qualifiers on a per sample basis.

These qualifiers should be reviewed as follows:

- X Some data has been manually entered or modified. Transcription errors are possible.
- P One or more results are 'preliminary'. The data is not ready for final reporting.
- 2 There were two or more results for one analyte on one planchet imported at one time. The results in DVD may not be the same as on the raw data sheets.

Other lab defined qualifiers may occur. In general, these should be addressed in the SDG narrative.

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WORK SUMMARY

The Work Summary Report shows all samples, including QC samples, and all relevant analyses in one Sample Delivery Group (SDG). This report is often useful as supporting documentation for an invoice.

The following notes apply to this report:

- * TEST is a code for the method used to measure associated analytes. Results and related information for each analyte are on the Data Sheet Report. In special cases, a test code used in the summary data section is not the same as in associated raw data. In this case, both codes are shown on the Work Summary.
- * SUFFIX is the lab's code to distinguish multiple analyses (recounts, reworks, reanalyses) of a fraction of the sample. The suffix indicates which result is being reported. An empty suffix normally identifies the first attempt to analyze the sample.
- * The LAB SAMPLE ID, TEST and SUFFIX uniquely identify all supporting data for a result. The Method Summary Report for each TEST has method performance data, such as yield, for each lab sample id and suffix and procedures used in the method.
- * PLANCHET is an alternate lab identifier for work done for one test. It, combined with the TEST and SUFFIX, may be the best link to raw data.
- * For QC samples, only analyses that directly QC some regular sample are shown. The Lab Control Sample, Method Blank, Duplicate, Matrix Spike and Method Summary Reports detail these relationships.
- * The SAS (Special Analytical Services) Number is a client or lab assigned code that reflects special processing for samples, such as rapid turn around. Counts of tests done are lists by SAS number since it is likely to affect prices.

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REPORT GUIDE

DATA SHEET

The Data Sheet Report shows all results and primary supporting information for one client sample or Method Blank. This report corresponds to both the CLP Inorganics and Organics Data Sheet.

The following notes apply to this report:

- * TEST is a code for the method used to measure an analyte. If the TEST is empty, no data is available; the analyte was not analyzed for.
- * The LAB SAMPLE ID and TEST uniquely identify work within the Summary Data Section of a Data Package. The Work Summary and Method Summary Reports further identify raw data that underlies this work.

The Method Summary Report for each TEST has method performance data, such as yield, for each Lab Sample ID and a list of procedures used in the method.

- * ERRORS can be labeled TOTAL or COUNT. TOTAL implies a preparation (non-counting method) error has been added, as square root of sum of squares, to the counting error denoted by COUNT. The preparation errors, which may vary by preparation batch, are shown on the Method Summary Report.
- * A RESULT can be 'N.R.' (Not Reported). This means the lab did this work but chooses not to report it now, possibly because it was reported at another time.
- * When reporting a Method Blank, a RESULT can be 'N.A.' (Not Applicable). This means there is no reported client sample work in the same preparation batch as the Blank's result. This is likely to occur when the Method Blank is associated with reanalyses of selected work for a few samples in the SDG.

The following qualifiers are defined by the DVD system:

- U The RESULT is less than the MDA (Minimum Detectable Activity).

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GUIDE, cont.

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DATA SHEET

If the MDA is blank, the ERROR is used as the limit.

- J The RESULT is less than the RDL (Required Detection Limit) and no U qualifier is assigned.
- B A Method Blank associated with this sample had a result without a U flag and, after correcting for possibly different aliquots, that result is greater than or equal to the MDA for this sample.
- Normally, B is not assigned if U is. When method blank subtraction is shown on this report, B flags are assigned based on the unsubtracted values while U's are assigned based on the subtracted ones. Both flags can be assigned in this case.
- For each sample result, all Method Blank results in the same preparation batch are compared. The Method Summary Report documents this and other QC relationships.
- L Some Lab Control Sample that QC's this sample had a low recovery. The lab can disable assignment of this qualifier.
- H Similar to 'L' except the recovery was high.
- P The RESULT is 'preliminary'.
- X Some data necessary to compute the RESULT, ERROR or MDA was manually entered or modified.
- 2 There were two or more results available for this analyte. The reported result may not be the same as in the raw data.

Other qualifiers are lab defined. Definitions should be in the SDG narrative.

The following values are underlined to indicate possible problems:

- * An MDA is underlined if it is bigger than its RDL.

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DATA SHEET

- * An ERROR is underlined if the 1.645 sigma counting error is bigger than both the MDA and the RESULT, implying that the MDA may not be a good estimate of the 'real' minimum detectable activity.
- * A negative RESULT is underlined if it is less than the negative of its 2 sigma counting ERROR.
- * When reporting a Method Blank, a RESULT is underlined if greater than its MDA. If the MDA is blank, the 2 sigma counting error is used in the comparison.

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Client Hanford
Contract TRB-SBB-207925
Case no SDG-H0364

LAB CONTROL SAMPLE

The Lab Control Sample Report shows all results, recoveries and primary supporting information for one Lab Control Sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. Refer to its Report Guide for details.
- * An amount ADDED is the lab's value for the actual amount spiked into this sample with its ERROR an estimate of the error of this amount.

An amount added is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- * REC (Recovery) is RESULT divided by ADDED expressed as a percent.
- * The first, computed limits for the recovery reflect:
 1. The error of RESULT, including that introduced by rounding the result prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.
 2. The error of ADDED.
 3. A lab specified, per analyte bias. The bias changes the center of the computed limits.
- * The second limits are protocol defined upper and lower QC limits for the recovery.
- * The recovery is underlined if it is outside either of these ranges.

TMA / RICHMOND
SAMPLE DELIVERY GROUP H0364

SDG 7707
Contact L.A. Johnson

REPORT GUIDE

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DUPLICATE

The Duplicate Report shows all results, differences and primary supporting information for one Duplicate and associated Original sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. This applies both to the Duplicate and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Duplicate has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- * The RPD (Relative Percent Difference) is the absolute value of the difference of the RESULTS divided by their average expressed as a percent.

If both RESULTS are less than their MDAs, no RPD is computed and a '-' is printed.

For an analyte, if the lab did work for both samples but has data for only one, the MDA from the sample with data is used as the other's result in the RPD.

- * The first, computed limit is the sum, as square root of sum of squares, of the errors of the results divided by the average result as a percent, hence the relative error of the difference rather than the error of the relative difference. The errors include those introduced by rounding the RESULTS prior to printing.

If this limit is labeled TOT, it includes the preparation error in the RESULTS. If labeled CNT, it does not.

This value reported for this limit is at most 999.

- * The second limit for the RPD is the larger of:
 1. A fixed percentage specified in the protocol.

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DUPLICATE

2. A protocol factor (typically 2) times the average MDA as a percent of the average result. This limit applies when the results are close to the MDAs.

- * The RPD is underlined if it is greater than either limit.
- * If specified by the lab, the second limit column is replaced by the Difference Error Ratio (DER), which is the absolute value of the difference of the results divided by the quadratic sum of their one sigma errors, the same errors as used in the first limit.

Except for differences due to rounding, the DER is the same as the RPD divided by the first RPD limit with the limit scaled to 1 sigma.

- * The DER is underlined if it is greater than the sigma factor, typically 2 or 3, shown in the header for the first RPD limit.

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MATRIX SPIKE

The Matrix Spike Report shows all results, recoveries and primary supporting information for one Matrix Spike and associated Original sample.

The following notes apply to this report:

- * All fields in common with the Data Sheet Report have similar usage. This applies both to the Spiked and Original sample data. Refer to the Data Sheet Report Guide for details.

If the Spike has data for a TEST and the lab did not do this test to the Original, the Original's RESULTS are underlined.

- * An amount ADDED is the lab's value for the actual amount spiked into the Spike sample with its ERROR an estimate of the error of this amount.

An amount is underlined if its ratio to the corresponding RDL is outside protocol specified limits.

- * REC (Recovery) is the Spike RESULT minus the Original RESULT divided by ADDED expressed as a percent.

- * The first, computed limits for the recovery reflect:

1. The errors of the two RESULTS, including those introduced by rounding them prior to printing.

If the limits are labeled (TOTAL), they include preparation error in the result. If labeled (COUNT), they do not.

2. The error of ADDED.

3. A lab specified, per analyte bias. The bias changes the center of the computed limits.

- * The second limits are protocol defined upper and lower QC limits

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MATRIX SPIKE

for the recovery.

These limits are left blank if the Original RESULT is more than a protocol defined factor (typically 4) times ADDED. This is a way of accounting for that when the spike is small compared to the amount in the original sample, the recovery is unreliable.

- * The recovery is underlined (out of spec) if it is outside either of these ranges.

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METHOD SUMMARY

The Method Summary Report has two tables. One shows up to five results measured using one method. The other has performance data for the method. There is one report for each TEST, as used on the Data Sheet Report.

The following notes apply to this report:

- * Each table is subdivided into sections, one for each preparation batch. A preparation batch is a group of aliquots prepared at roughly the same time in one work area of the lab using the same method.

There should be Lab Control Sample and Method Blank results in each preparation batch since this close correspondence makes the QC meaningful. Depending on lab policy, Duplicates need not occur in each batch since they QC sample dependencies such as matrix effects.

- * The RAW TEST column shows the test code used in the raw data to identify a particular analysis if it is different than the test code in the header of the report. This occurs in special cases due to method specific details about how the lab labels work.

The Lab Sample or Planchet ID combined with the (Raw) Test Code and Suffix uniquely identify the raw data for each analysis.

- * If a result is less than both its MDA and RDL, it is replaced by just 'U' on this report. If it is greater than or equal to the RDL but less than the MDA, the result is shown with a 'U' flag.

The J and X flags are as on the data sheet.

- * Non-U results for Method Blanks are underlined to indicate possible contamination of other samples in the preparation batch. The Method Blank Report has supporting data.
- * Lab Control Sample and Matrix Spike results are shown as: ok, No data, LOW or HIGH, with the last two underlined. 'No data'

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METHOD SUMMARY

means no amount ADDED was specified. 'LOW' and 'HIGH' correspond to when the recovery is underlined on the Lab Control Sample or Matrix Spike Report. See these reports for supporting data.

- * Duplicate sample results are shown as: ok, No data, or OUT, with the last two underlined. 'No data' means there was no original sample data found for this duplicate. 'OUT' corresponds to when the RPD is underlined on the Duplicate Report. See this report for supporting data.
- * If the MDA column is labeled 'MAX MDA', there was more than one result measured by the reported method and the MDA shown is the largest MDA. If not all these results have the same RDL, the MAX MDA reflects only those results with RDL equal to the smallest one.

MDAs are underlined if greater than the printed RDL.

- * Aliquots are underlined if less than the nominal value specified for the method.
- * Preparation factors are underlined if greater than the nominal value specified for the method.
- * Dilution factors are underlined if greater than the nominal value specified for the method.
- * Residues are underlined if outside the range specified for the method. Residues are not printed if yields are.
- * Yields, which may be gravimetric, radiometric or some type of recovery depending on the method, are underlined if outside the range specified for the method.
- * Efficiencies are underlined if outside the range specified for the method. Efficiencies are detector and geometry dependent so this test is only approximate.

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METHOD SUMMARY

- * Count times are underlined if less than the nominal value specified for the method.
- * Resolutions (as FWHM; Full Width at Half Max) are underlined if greater than the method specified limit.
- * Tracer drifts are underlined if their absolute values are greater than the method specified limit. Tracer drifts are not printed if percent moistures are.
- * Days Held are underlined if greater than the holding time specified in the protocol.
- * Analysis dates are underlined if before their planchet's preparation date or, if a limit is specified, too far after it.

For some methods, ratios as percentages and error estimates for them are computed for pairs of results. A ratio column header like '1+3' means the ratio of the first result column and the third result column.

Ratios are not computed for Lab Control Sample, Method Blank or Matrix Spike results since their matrices are not necessarily similar to client samples'.

The error estimate for a ratio of results from one planchet reflects only counting errors since other errors should be correlated. For a ratio involving different planchets, if QC limits are computed based on total errors, the error for the ratio allows for the preparation errors for the planchets.

The ratio is underlined (out of spec) if the absolute value of its difference from the nominal value is greater than its error estimate. If no nominal value is specified, this test is not done.

For Gross Alpha or Gross Beta results, there may be a column showing the sum of other Alpha or Beta emitters. This sum includes all relevant

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METHOD SUMMARY

results in the DVD database, whether reported or not. Results in the sum are weighted by a particles/decay value specified by the lab for each relevant analyte. Results less than their MDA are not included. No sums are computed for Lab Control, Method Blank or Matrix Spike samples since their various planchets may not be physically related.

If a ratio of total isotopic to Gross Alpha or Beta is shown, the error for the ratio reflects both the error in the Gross result and the sum, as square root of sum of squares, of the errors in the isotopic results.

For total elemental uranium or thorium results, there may be a column showing the total weight computed from associated isotopic results. Ignoring results less than their MDAs, this is a weighted sum of the isotopic results. The weights depend on the molecular weight and half-life of each isotope so as to convert activities (decays) to weight (atoms).

If a ratio of total computed to measured elemental uranium or thorium is shown, the error for the ratio reflects the errors in all the measurements.

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Bechtel Hanford Inc.		CHAIN OF CUSTODY/SAMPLE ANALYSIS REQUEST				B99-054-01	Page 1 of 1
Collector Renee Nielson		Company Contact Bob Raidl		Telephone No. 372-9585	Project Coordinator TRENT, SJ	Price Code	Data Turnaround 7 Days
Project Designation 200-ZP-1 Process Sampling for Technetium		Sampling Location 200 West		SAF No. B99-054			
Ice Chest No. SML-223		Field Logbook No. EFL 1133-7	Method of Shipment Federal Express				
Shipped To TMA/RECRA		Offsite Property No. A990091		Bill of Lading/Air Bill No. 423579523611			
COA R20ZP1 D760							

POSSIBLE SAMPLE HAZARDS/REMARKS	Preservation	None	HCl to pH <2									
	Type of Container	P	P									
Special Handling and/or Storage	No. of Container(s)	1	1									
	Volume	20mL	1000mL									
SAMPLE ANALYSIS				Activity Scan	Technetium-99							
Sample No.	Matrix *	Sample Date	Sample Time									
v1 B0V1P5	Water	3-17-99	0845	X	X							299-W15-32
v2 B0V1P6	Water	3-17-99	0850	X	X							299-W15-35
v3 B0V1P7	Water	3-17-99	0910	X	X							Ch. Han Knock out
v4 B0V1P8	Water	3-17-99	0925	X	X							EFF knock T-02

CHAIN OF POSSESSION		Sign/Print Names		SPECIAL INSTRUCTIONS ** Close SDG upon receipt of samples.				Matrix * Soil Water Vapor Other Solid Other Liquid	
Relinquished By <i>Doug Bauer</i> Date/Time <i>3-17-99 1254</i>		Received By <i>Renee Nielson</i> Date/Time <i>3/17/99 1254</i>							
Relinquished By <i>Renee Nielson</i> Date/Time <i>3/22/99</i>		Received By <i>Fed Ex</i> Date/Time <i>3-22-99</i>							
Relinquished By <i>Fed Ex</i> Date/Time <i>3-23-99 11:00</i>		Received By <i>Bob Raidl</i> Date/Time <i>3-23-99</i>							
Relinquished By		Received By							
LABORATORY SECTION		Received By		Title		Date/Time			
FINAL SAMPLE DISPOSITION		Disposal Method		Disposed By				Date/Time	

Thermo NUtech - Richmond

SAMPLE RECEIPT CHECKLIST

SAMPLE RECEIPT

Client: Bechtel Hanford Date/Time received 3-23-99 11:00
CoC No. B99-001-132, B99-054-01
Container I.D. No. SML-229 Requested TAT (Days) 7 P.O. Received Yes [] No []

INSPECTION

1. Custody seals on shipping container intact? Yes [] No [] N/A []
2. Custody seals on shipping container dated & signed? Yes [] No [] N/A []
3. Custody seals on sample containers intact? Yes [] No [] N/A []
4. Custody seals on sample containers dated & signed? Yes [] No [] N/A []
5. Cooler Temperature: _____ Packing material is: Wet [] Dry []
6. Number of samples in shipping container: 6
7. Number of containers per sample: 2 (Or see CoC ✓)
8. Paperwork agrees with samples? Yes [] No []
9. Samples have: Tape [] Hazard labels [] Rad labels [] Appropriate sample labels []
10. Samples are: In good condition [] Leaking [] Broken Container [] Missing []
11. Describe any anomalies: _____

13. Was P.M. notified of any anomalies? Yes [] No [] Date 3-23-99
14. Received by J. Brown Date: 3-23-99 Time: 11:00

LOGIN

TNU W.O. No. _____ Group No. _____ Client W.O. No. _____

PROGRAM MANAGER

Sample holding times exceeded? Yes [] No []
Client Notified: Name _____ Date/time _____