

This document was too large to scan as a whole document, therefore it required breaking into smaller sections.

Document number: SD-WM-DP-054

Section 7 **of** 7

Title: Grout Product Test for Tank 241AP102,
5day & 90day Runs (Ansi Section)

Date: 1-14-94 **Revision:** ADD

Originator: A.P. Hammit, RA St. Denis T.L. Welsh
Co: WHC

Recipient: _____

Co: _____

References: EDT-140726

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WHC-SD-WM-DP-054 REV O

*2 2448

Serial No G 745-5582	Sample Point 302-90 BAY	Date 11-22-93	Time Issued 11:49	Priority
Determination Am241	Method Standard LA-503-156	Result Units % RECOVERY	Charge Code VOGEL	Retruns
Sample Size 100 mL - 10 - 1 mL + 100 mL Spike	Customer ID STD			
Remarks, Calculations Results EDF R201 ARO01 78843 STD# 68843 RESULT 32.9 STD VAL 26.79L %REC 122.87% 122.8% RSD 12-15 OUT FOR RERUN				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i>	Analyst - 3 <i>[Signature]</i>	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs <i>[Signature]</i>
Date 12-6-93	Time Completed	Lab Unit Mon <i>[Signature]</i>	<i>[Signature]</i>	

54 6800-061 (R 10 83)

AM-241: LA-503-156 (D-0) LIQUIDS			STANDARD
Serial No.	Spike (Tracer) Book Number		78843
G745-5582	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	1
Rerun No.	Dilution Factor	(DF)	101
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	47
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	49
Date	Total AT Count	(ATOT)	654
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	6

Am-241 $\mu\text{Ci/L} = ((C241 * SPKA * SPKV * DF * DDF * (1000\text{mL/L})) / ((C243 * SS * (2220000\text{dpm/mL})))$
 $\mu\text{Ci/mL} = \mu\text{Ci/L} / (1000\text{mL/L})$
 Tracer % Rec = $((ATOT / \text{MIN CTd} - \text{BKG}) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100$
 Relative Counting Error = Square Root of $((1 / C241) + (1/C243)) * 100$

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Am-241 $\mu\text{Ci/L}$	=	3.29E+01
Am-241 $\mu\text{Ci/mL}$	=	3.29E-02
Relative counting error	=	20.4%
Am-243 Tracer Recovery	=	2.1%

Data Entry by: <i>[Signature]</i>	Date: 08-Dec-93
Approved by: <i>[Signature]</i>	Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#1 12-7-93 AJ

$\frac{654}{30} - 6$

G 745-5582

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WHC-SD-WM-DP-054 REV O

#3 3572

Serial No G746-5682	Sample Point 107 30' DANA	Date 11-22-93	Time Issued 12:51	Priority 26
Determination Am-241	Method Standard LA 503-156	Result Units µCi/mL	Charge Code VOGEL	Reruns 0
Sample Size 5ml 12-8-93 100ml Spike	Customer ID MLK			
Remarks Calculations Results REAGENT BLANK COUNT AS µCi/L 78843 "REAT - 1000ML" SATTERFIELD < 3.40 x 10 ⁻⁵ µCi/ml OUT FOR RERUN				
Analyst - 1 VANSANT	Analyst - 2 H. Hansen	Analyst - 3 Raymond	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab Use		

54-6800-061 (A-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS			BLANK
Serial No.	Spike (Tracer) Book Number		78843
G746-5682	Activity of Am-241 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	2
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	210
Date	Total AT Count	(ATOT)	422
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	1

Am-241 µCi/L = ((C241 * SPKA * SPKV * DF * DDF * (1000mL/L)) / ((C243 * SS * (2220000dpm/mL)))
 µCi/mL = µCi/L / (1000mL/L)
 Tracer % Rec = ((ATOT / MIN CTd - BKG) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100
 Relative Counting Error = Square Root of ((1 / C241) + (1/C243)) * 100

NOTE: Reported result is a LESS THAN value using 5% of the Am-243 peak as the Am-241 peak.

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Am-241 µCi/L	=	< 3.40E-02
Am-241 µCi/mL	=	< 3.40E-05
Relative counting error	=	71.0%
Am-243 Tracer Recovery	=	3.4%

Data Entry by:	Date: 08-Dec-93
Approved by: J. Vansant	Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#2 12-7-93 *AS*

$\frac{422}{30} - 1$

G746-5682

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4 4621

Serial No G 747-5782	Sample Point 102-90 DAY	Date 11-22-93	Time Issued 10:00	Priority
Determination Am241	Method Standard LA-503-156	Result Units uCi/mL	Charge Code V00001	Requies
Sample Size ? .500mL + .500mL Porting			Customer ID	
Remarks Calculations Results COUNT AS uCi/L + .100mL spike 78843 $< 3.40 \times 10^{-5}$ SPKAL/SPKML uCi/mL 12-13-93 OUT FOR RERUN				
Analyst-1 J Vansant	Analyst-2 [Signature]	Analyst-3 Raymond	Analyst-4	Analyst-5
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab Unit Mgr [Signature]	[Signature]	

54-6800-061 (R 10 83)

AM-241: LA-503-156 (D-0) LIQUIDS			SAMPLE
Serial No.	Spike (Tracer) Book Number		78843
G747-5782	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	3
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	95
Date	Total AT Count	(ATOT)	437
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	4

Am-241 $\mu\text{Ci/L} = ((C241 * SPKA * SPKV * DF * DDF * (1000\text{mL/L})) / ((C243 * SS * (2220000\text{dpm/mL})))$
 $\mu\text{Ci/mL} = \mu\text{Ci/L} / (1000\text{mL/L})$
 Tracer % Rec = $((ATOT / \text{MIN CTd} - \text{BKG}) * 2 * (C243 / (C241 + C243)) / (SPKA * SPKV)) * 100$
 Relative Counting Error = Square Root of $((1 / C241) + (1/C243)) * 100$

NOTE: Reported result is a LESS THAN value using 5% of the Am-243 peak as the Am-241 peak. **BEST AVAILABLE COPY**

Am-241 $\mu\text{Ci/L}$	=	< 3.40E-02
Am-241 $\mu\text{Ci/mL}$	=	< 3.40E-05
Relative counting error	=	58.6%
Am-243 Tracer Recovery	=	2.7%

Data Entry by: [Signature]	Date: 08-Dec-93
Approved by: [Signature]	Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#3 12-7-73 AJ

437-4
30

G747-5782

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45 5944

Serial No G 748-5782	Sample Point 102 99 DAY	Date 11-22-93	Time Issued 12:51	Priority 26
Determination Am-241	Method Standards LA-503-156	Result Units uCi/mL	Charge Code VOGRL	Reruns 0
Sample Size 0.500mL + .500mL CONTINOS	Customer ID E-0			
Remarks Calculations Results COUNT AS uCi/L + .100spike 78B43 1.18 x 10 ⁻⁴ "REA" - ADMIN ATTACH PRINTOUT OUT FOR RERUN				
Analyst - 1 VANSANT	Analyst - 2 [Signature]	Analyst - 3 Raymond	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12.8.93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab Use/Min [Signature]	[Signature]	

54 6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	78B43
G748-5782	Activity of Am243 Tracer in dpm/mL (SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL (SPKV)	0.1
2264	Volume of Sample in mL (SS)	0.5
Rerun No.	Dilution Factor (DF)	1
0	Digest Dilution Factor (DDF)	1
Analyst	Am-241 Area Peak Height from AEA (C241)	4
J VANSANT	Am-243 Area Peak Height from AEA (C243)	23
Date	Total AT Count (ATOT)	299
12/06/93	AT Count Time in Minutes (MIN CTd)	30
	Background in CPM (BKG)	6

Am-241 $\mu\text{Ci/L} = ((\text{C241} * \text{SPKA} * \text{SPKV} * \text{DF} * \text{DDF} * (1000\text{mL/L})) / ((\text{C243} * \text{SS} * (2220000\text{dpm/mL})))$

$\mu\text{Ci/mL} = \mu\text{Ci/L} / (1000\text{mL/L})$

Tracer % Rec = $((\text{ATOT} / \text{MIN CTd} - \text{BKG}) * 2 * (\text{C243} / (\text{C241} + \text{C243})) / (\text{SPKA} * \text{SPKV})) * 100$

Relative Counting Error = Square Root of $((1 / \text{C241}) + (1/\text{C243})) * 100$

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Am-241 $\mu\text{Ci/L} = 1.18\text{E-01}$

Am-241 $\mu\text{Ci/mL} = 1.18\text{E-04}$

Relative counting error = 54.2%

Am-243 Tracer Recovery = 0.9%

Data Entry by: [Signature] Date: 08-Dec-93
 Approved by: [Signature] Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#1 12-7-93 SJ

$\frac{299}{30} - 6$

G748-5782

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#6 6854

Serial No G 749-5782	Sample Point 102 90 DAY	Date 11-23-93	Time Issued 12:55	Priority 26
Determination Am-241	Method Standard LA-503-156	Result Units µCi/mL	Charge Code VOGEL	Reruns 0
Sample Size 2.500mL + .500mL Pw HNO ₃			Customer ID C-8	
Remarks Calculations Results COUNT AS OUT/L + .100spike 78B43 1.94 x 10 ⁻⁴ µCi/mL MIN - 480MIN ATTACH PRINTOUT OUT FOR RERUN				
Analyst - 1 <i>J Van Sant</i>	Analyst - 2 <i>J Van Sant</i>	Analyst - 3 <i>Raymond</i>	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab Util %		

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	78B43
G749-5782	Activity of Am-243 Tracer in dpm/mL (SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL (SPKV)	0.1
2264	Volume of Sample in mL (SS)	0.5
Rerun No	Dilution Factor (DF)	1
0	Digest Dilution Factor (DDF)	1
Analyst	Am-241 Area Peak Height from AEA (C241)	2
J VAN SANT	Am-243 Area Peak Height from AEA (C243)	7
Date	Total AT Count (ATOT)	86
12/06/93	AT Count Time in Minutes (MIN CTd)	30
	Background in CPM (BKG)	1

$$\text{Am-241 } \mu\text{Ci/L} = ((\text{C241} \cdot \text{SPKA} \cdot \text{SPKV} \cdot \text{DF} \cdot \text{DDF} \cdot (1000\text{mL/L})) / ((\text{C243} \cdot \text{SS} \cdot (2220000\text{dpm/mL})))$$

$$\mu\text{Ci/mL} = \mu\text{Ci/L} / (1000\text{mL/L})$$

$$\text{Tracer \% Rec} = ((\text{ATOT} / \text{MIN CTd} - \text{BKG}) \cdot 2 \cdot (\text{C243} / (\text{C241} + \text{C243})) / (\text{SPKA} \cdot \text{SPKV})) \cdot 100$$

$$\text{Relative Counting Error} = \text{Square Root of } ((1 / \text{C241}) + (1 / \text{C243})) \cdot 100$$

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Am-241 µCi/L = 1.94E-01

Am-241 µCi/mL = 1.94E-04

Relative counting error = 80.2%

Am-243 Tracer Recovery = 0.4%

Data Entry by: *J Van Sant* Date: 08-Dec-93
 Approved by: *J Van Sant* Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

#2 12-7-93 AJ

$\frac{86}{30} - 1$

G749-5782

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

#7 7384

Serial No G 750-5782	Sample Point 102 90 DAY	Date 11-22-93	Time Issued 12:55	Priority 26
Determination Am241	Method/Standard LA-503-156	Result Units pCi/mL	Charge Code VOGEL	Reruns 0
Sample Size 1.500ml + .500ml POUTHNO3	Customer ID D-8			
Remarks Calculations Results COUNT AS pCi/L + .100 Spill 78B43 $< 3.40 \times 10^{-5}$ uCi/40MIN ATTACH PRINTOUT				
Analyst - 1 <i>J Vansant</i>	Analyst - 2 <i>J Vansant</i>	Analyst - 3 <i>Raymond</i>	Analyst - 4	Analyst - 5
Hrs	Hrs 12-7-93	Hrs 12-8-93	Hrs	Hrs
Date 12-6-93	Time Completed	Lab. Unit No. <i>L. J. Fitts</i>	<i>[Signature]</i>	

54-6800-061 (R-10-83)

AM-241: LA-503-156 (D-0)

LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		78B43
G750-5782	Activity of Am243 Tracer in dpm/mL	(SPKA)	7537
Batch ID	Spike (Tracer) Volume in mL	(SPKV)	0.1
2264	Volume of Sample in mL	(SS)	0.5
Rerun No.	Dilution Factor	(DF)	1
0	Digest Dilution Factor	(DDF)	1
Analyst	Am-241 Area Peak Height from AEA	(C241)	6
J VANSANT	Am-243 Area Peak Height from AEA	(C243)	318
Data	Total AT Count	(ATOT)	969
12/06/93	AT Count Time in Minutes	(MIN CTd)	30
	Background in CPM	(BKG)	4

$$\text{Am-241 } \mu\text{Ci/L} = ((\text{C241} \cdot \text{SPKA} \cdot \text{SPKV} \cdot \text{DF} \cdot \text{DDF} \cdot (1000\text{mL/L})) / ((\text{C243} \cdot \text{SS} \cdot (2220000\text{dpm/mL})))$$

$$\mu\text{Ci/mL} = \mu\text{Ci/L} / (1000\text{mL/L})$$

$$\text{Tracer } \% \text{ Rec} = ((\text{ATOT} / \text{MIN CTd} - \text{BKG}) \cdot 2 \cdot (\text{C243} / (\text{C241} + \text{C243})) / (\text{SPKA} \cdot \text{SPKV})) \cdot 100$$

$$\text{Relative Counting Error} = \text{Square Root of } ((1 / \text{C241}) + (1 / \text{C243})) \cdot 100$$

NOTE: Reported result is a LESS THAN value using
5% of the Am-243 peak as the Am-241 peak.

BEST AVAILABLE COPY

Am-241 $\mu\text{Ci/L}$ = < 3.40E-02

Am-241 $\mu\text{Ci/mL}$ = < 3.40E-05

Relative counting error = 41.2%

Am-243 Tracer Recovery = 7.4%

Data Entry by: <i>[Signature]</i>	Date: 08-Dec-93
Approved by: <i>[Signature]</i>	Date: December 8, 1993

AMERICIUM 241 ANALYSIS - UNDIGESTED SAMPLE

3 12-7-93 AJ

$\frac{967}{30} - 4$

G750-5782

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Raymond
12-8-13

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REVO

SAMPLE
G745-5582
File ID: 2a2448.CNF

Counted on: 12/ 7/93 @14: 3
Detector: AEA2
Geometry number: 1
Count time: 28805. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	37.2	37.2	298.292	298.292	22.000	16.055	11.000	2.712
2	38.6	38.6	253.519	253.519	26.000	10.847	13.000	2.236

PEAK RESULTS

Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Centroid Exp.	Peak Centroid Obs.	Peak Centroid Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ea
1	Am241	0.517	5.480	5.478	0.002	0.08	2.50	5.7	20.5	0.925E-05
	Pu238		5.499	5.478	0.021				26.8	0.121E-04
2	Am243	0.441	5.276	5.268	0.008	0.05	2.14	6.9	16.6	0.749E-05
Totals:		0.957	<--valid peaks only-->				4.64			

DETECTOR CALIBRATION

Energy(MEV) = 4.076 + (0.0047)*Channel
Energy range (MeV): 4.076 TO 6.483
Efficiency = 0.1297 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	2326.0	100.000
Smoothed	2326.0	100.000
Composite fit	2227.1	95.749
Residuals	98.9	4.251

Analyzed by:

ALJ

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WHC-SD-WM-DP-054 REV O

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Raw Data Dump for AEA Spectrum: 2a2448.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	2.	0.	0.	1.	0.	0.
31	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	1.	0.	0.	1.	0.	1.	0.	0.	1.
61	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
71	0.	0.	1.	0.	0.	1.	0.	0.	0.	0.
81	0.	0.	1.	0.	0.	0.	1.	0.	2.	0.
91	1.	1.	0.	1.	0.	2.	0.	0.	1.	0.
101	0.	0.	0.	0.	0.	0.	0.	2.	0.	1.
111	0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
121	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.
131	0.	0.	0.	1.	0.	1.	0.	1.	1.	0.
141	0.	1.	1.	0.	0.	0.	1.	0.	1.	0.
151	0.	0.	1.	0.	0.	0.	0.	0.	0.	1.
161	2.	0.	0.	1.	1.	0.	1.	0.	1.	1.
171	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
181	1.	0.	0.	0.	1.	2.	2.	1.	0.	0.
191	1.	1.	3.	1.	4.	1.	2.	1.	4.	2.
201	0.	1.	3.	2.	3.	4.	2.	3.	3.	3.
211	4.	2.	3.	3.	2.	1.	5.	5.	8.	2.
221	6.	8.	6.	8.	5.	10.	11.	11.	9.	6.
231	13.	11.	17.	16.	13.	13.	21.	21.	25.	35.
241	23.	33.	37.	41.	41.	39.	46.	38.	49.	42.
251	36.	49.	31.	46.	39.	49.	33.	27.	29.	29.
261	22.	14.	21.	14.	18.	8.	7.	14.	6.	10.
271	10.	16.	10.	9.	13.	9.	16.	12.	12.	21.
281	22.	20.	21.	21.	18.	19.	27.	35.	31.	25.
291	34.	36.	47.	29.	40.	32.	30.	42.	38.	39.
301	26.	34.	28.	25.	13.	18.	21.	14.	15.	5.
311	6.	4.	6.	6.	1.	2.	1.	2.	3.	0.
321	1.	0.	0.	0.	1.	0.	0.	1.	0.	0.
331	1.	3.	0.	1.	0.	1.	0.	1.	1.	3.
341	1.	0.	1.	0.	1.	2.	5.	0.	3.	1.
351	0.	0.	1.	0.	1.	1.	0.	1.	0.	1.
361	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	3.	0.	0.
431	0.	0.	0.	0.	1.	1.	0.	0.	0.	2.
441	0.	0.	0.	0.	0.	0.	1.	1.	0.	1.
451	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
461	1.	0.	1.	0.	0.	2.	0.	1.	1.	1.
471	2.	2.	1.	1.	0.	3.	0.	0.	0.	1.
481	0.	0.	3.	2.	0.	1.	0.	1.	0.	0.
491	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.								

WHC-SD-WM-DR-054 REV0

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Kingman
12-8-93

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G746-5682
File ID: 3a3512.CNF

Counted on: 12/ 7/93 @14: 4
Detector: AEA3
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	178.7	178.7	259.095	259.095	14.000	6.988	7.000	3.736

PEAK RESULTS

Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Exp.	Centroid Obs.	Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ea
1		0.940		5.241		0.03	5.53	3.8	37.6	0.169E-04
Totals:		0.940	<--valid peaks only-->				5.53			

DETECTOR CALIBRATION

Energy(MEV) = 4.049 + (0.0046)*Channel
Energy range (MeV): 4.049 TO 6.404
Efficiency = 0.1473 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	2825.0	100.000
Smoothed	2825.0	100.000
Composite fit	2656.4	94.032
Residuals	168.6	5.968

Analyzed by: ALJ

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WHC-SD-WM-DP-054 REV 0

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Raw Data Dump for AEA Spectrum: 3a3512.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
101	1.	0.	0.	0.	0.	0.	0.	1.	0.	0.
111	1.	0.	0.	0.	0.	0.	0.	0.	0.	2.
121	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
131	0.	0.	1.	1.	0.	1.	0.	0.	1.	0.
141	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
151	0.	0.	1.	0.	1.	0.	0.	0.	1.	1.
161	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
171	0.	0.	0.	0.	1.	0.	1.	1.	0.	0.
181	0.	2.	0.	0.	0.	1.	0.	0.	0.	1.
191	0.	2.	0.	1.	0.	1.	0.	0.	1.	1.
201	0.	0.	0.	1.	1.	2.	0.	1.	2.	3.
211	0.	1.	4.	3.	3.	3.	3.	1.	0.	4.
221	1.	3.	1.	3.	2.	8.	5.	6.	6.	3.
231	6.	5.	11.	8.	14.	9.	9.	14.	18.	17.
241	18.	24.	32.	23.	30.	37.	44.	49.	53.	66.
251	90.	69.	95.	114.	130.	164.	168.	204.	210.	197.
261	155.	148.	139.	85.	52.	43.	39.	17.	10.	12.
271	17.	13.	15.	8.	4.	7.	2.	3.	3.	1.
281	0.	1.	0.	0.	0.	0.	0.	1.	0.	0.
291	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
301	0.	1.	2.	1.	0.	2.	1.	1.	1.	2.
311	1.	0.	0.	0.	0.	0.	0.	0.	0.	0.
321	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
341	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
351	0.	1.	0.	0.	0.	0.	0.	0.	0.	1.
361	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
481	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

WHC-SD-WM-DP-054 REV 0

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12/7/93
12.8.93

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-051 REV 0

SAMPLE
G747-5782
File ID: 4a4021.CNF

Counted on: 12/ 7/93 @14: 4
Detector: AEA4
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	80.5	80.5	255.059	255.059	16.000	8.486	8.000	4.772

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac.	Peak Exp.	Centroid Obs.	Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ea
1	Am243	0.906	5.276	5.271	0.0050	0.04	2.62	5.5	34.5	0.154E-04
Totals:		0.906	<--valid peaks only-->				2.62			

DETECTOR CALIBRATION
Energy(MEV) = 4.072 + (0.0047)*Channel
Energy range (MeV): 4.072 TO 6.479
Efficiency = 0.0768 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	1390.0	100.000
Smoothed	1390.0	100.000
Composite fit	1259.0	90.578
Residuals	131.0	9.422

Analyzed by: ALJ

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Raw Data Dump for AEA Spectrum: 4a4021.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
41	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	1.	1.	0.	0.	0.	0.	0.	2.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	1.	0.	1.	0.	0.	0.	1.	0.
91	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
101	1.	0.	0.	2.	0.	0.	0.	0.	0.	0.
111	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
121	0.	0.	0.	0.	0.	0.	1.	0.	0.	2.
131	0.	0.	0.	0.	0.	1.	0.	0.	0.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	1.	0.
151	0.	1.	0.	1.	1.	0.	0.	1.	0.	0.
161	0.	0.	0.	0.	2.	1.	0.	0.	0.	1.
171	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
181	0.	0.	1.	1.	0.	1.	0.	0.	1.	3.
191	0.	0.	1.	0.	1.	1.	1.	1.	0.	1.
201	0.	1.	0.	1.	1.	2.	2.	0.	1.	1.
211	1.	1.	0.	1.	3.	1.	0.	2.	2.	1.
221	2.	6.	1.	1.	2.	3.	1.	5.	2.	5.
231	3.	1.	6.	3.	6.	3.	11.	13.	14.	10.
241	16.	11.	14.	25.	26.	32.	30.	43.	50.	54.
251	58.	71.	80.	95.	95.	79.	82.	64.	54.	51.
261	37.	28.	19.	15.	11.	2.	5.	6.	10.	6.
271	5.	3.	1.	3.	2.	1.	0.	0.	1.	0.
281	0.	0.	0.	0.	0.	1.	1.	0.	0.	0.
291	1.	0.	2.	1.	1.	3.	0.	1.	1.	1.
301	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
311	0.	1.	0.	0.	0.	1.	0.	0.	0.	0.
321	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
341	0.	2.	1.	0.	0.	0.	0.	0.	2.	1.
351	3.	0.	0.	0.	1.	2.	0.	0.	0.	0.
361	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	1.	1.	1.	0.	1.	0.
481	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

WHC-SD-WM-DP-054 REVO

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Wayman
12/8/93

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DR-051 REV 0

SAMPLE
G748-5782
File ID: 5a5944.CNF

Counted on: 12/ 7/93 @14: 5
Detector: AEA5
Geometry number: 1
Count time: 28801. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	15.1	15.1	259.665	256.790	16.000	16.080	8.000	1.726

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Exp.	Centroid Obs.	Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ea	
1	Am243	0.602	5.276	5.280	-.0040	0.07	0.76	10.3	6.6	0.254E-02	
	Pu240		5.144	5.280	-.136				6.6	0.290E-02	
Totals:		0.602	<--valid peaks only-->				0.76				

DETECTOR CALIBRATION
Energy(MEV) = 4.099 + (0.0046)*Channel
Energy range (MeV): 4.099 TO 6.454
Efficiency = 0.1155 CPM/DPM

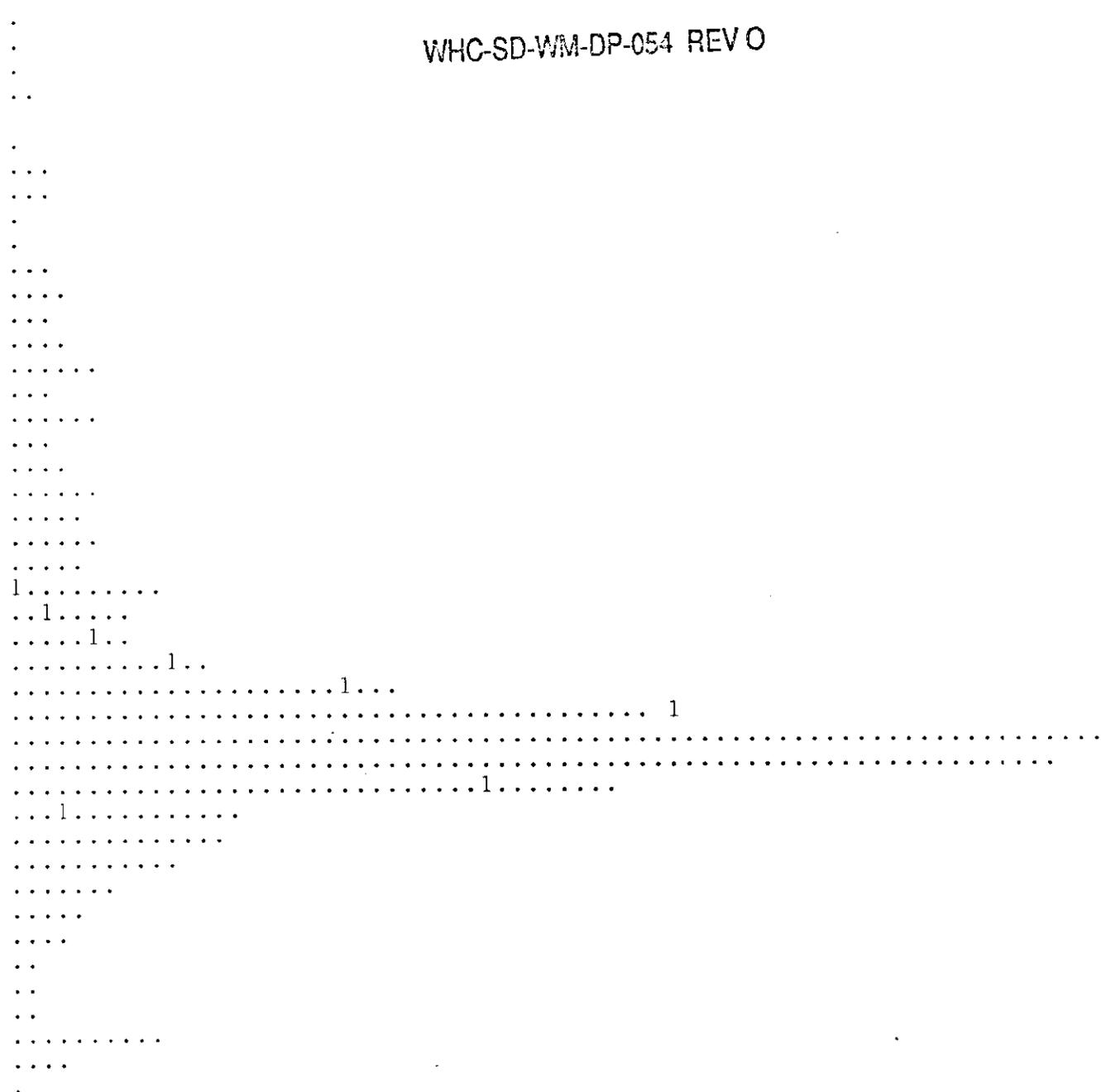
TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	605.0	100.000
Smoothed	604.3	99.892
Composite fit	363.9	60.156
Residuals	241.1	39.844

Analyzed by: _____
ALJ

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WHC-SD-WM-DP-054 REV 0



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Raw Data Dump for AEA Spectrum: 5a5944.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
21	1.	1.	0.	0.	0.	0.	0.	0.	0.	2.
31	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	1.	0.	1.	2.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	1.	1.	0.	0.	0.	3.	0.	0.	0.	0.
71	1.	0.	1.	1.	0.	0.	0.	0.	1.	2.
81	0.	1.	0.	0.	0.	0.	0.	0.	1.	1.
91	0.	1.	0.	0.	0.	0.	1.	3.	1.	1.
101	0.	0.	0.	0.	1.	0.	2.	0.	0.	1.
111	3.	1.	0.	0.	0.	1.	2.	0.	0.	0.
121	0.	2.	1.	0.	0.	1.	2.	0.	1.	2.
131	1.	1.	1.	1.	1.	1.	2.	0.	0.	1.
141	0.	0.	0.	0.	3.	0.	2.	0.	0.	2.
151	2.	1.	0.	0.	1.	0.	0.	1.	1.	0.
161	0.	0.	0.	0.	2.	0.	2.	3.	2.	0.
171	0.	0.	1.	3.	0.	1.	2.	1.	0.	0.
181	0.	1.	3.	0.	2.	0.	1.	0.	1.	3.
191	1.	0.	1.	1.	0.	0.	0.	1.	2.	2.
201	1.	2.	2.	3.	0.	0.	3.	2.	3.	0.
211	0.	2.	3.	0.	0.	2.	3.	0.	1.	1.
221	3.	0.	3.	0.	1.	3.	2.	1.	2.	1.
231	1.	2.	5.	3.	4.	2.	3.	4.	7.	7.
241	6.	6.	5.	11.	4.	9.	6.	5.	6.	10.
251	11.	8.	10.	23.	13.	10.	21.	14.	10.	10.
261	9.	5.	10.	3.	5.	13.	6.	6.	2.	7.
271	5.	3.	4.	0.	4.	0.	2.	1.	2.	4.
281	1.	1.	3.	3.	2.	3.	5.	1.	0.	1.
291	1.	1.	1.	3.	4.	2.	2.	0.	1.	1.
301	1.	1.	1.	1.	2.	0.	0.	2.	0.	2.
311	0.	0.	0.	1.	0.	1.	2.	0.	0.	0.
321	3.	0.	0.	0.	1.	0.	0.	0.	0.	0.
331	0.	1.	0.	2.	0.	0.	1.	0.	0.	1.
341	0.	0.	0.	0.	5.	1.	3.	2.	0.	0.
351	4.	1.	1.	1.	0.	1.	0.	0.	0.	1.
361	0.	0.	0.	1.	0.	0.	0.	0.	1.	0.
371	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	1.	0.	0.	1.	0.	0.
391	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	1.	0.	0.	0.	0.	1.
411	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	1.	2.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	2.
441	0.	1.	1.	0.	0.	0.	0.	0.	1.	0.
451	0.	0.	1.	0.	0.	0.	0.	1.	0.	1.
461	0.	0.	0.	0.	0.	0.	0.	0.	1.	1.
471	1.	2.	0.	1.	1.	3.	1.	0.	3.	1.
481	1.	0.	1.	1.	3.	0.	0.	2.	0.	0.
491	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
511	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

WHC-SD-WM-DP-054 REV0

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Raymond
12.8.93

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G749-5782
File ID: 6a6854.CNF

Counted on: 12/ 7/93 @14: 6
Detector: AEA6
Geometry number: 1
Count time: 28804. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau
	Initial	Final	Initial	Final	Initial	Final	
1	5.3	5.3	261.228	262.021	44.000	28.024	22.000

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Peak Exp.	Centroid Obs.	Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ca
1	Am243	0.594	5.276	5.319	-.0430	.13	0.41	13.9	2.9	0.1298-05
	Pu240		5.144	5.319	-.175				2.8	0.128P-05
Totals:		0.594	<--valid peaks only-->				0.41			

DETECTOR CALIBRATION
Energy(MEV) = 4.088 + (0.0047)*Channel
Energy range (MeV): 4.088 TO 6.494
Efficiency = 0.1457 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	334.0	100.000
Smoothed	327.1	97.933
Composite fit	198.3	59.377
Residuals	135.7	40.623

Analyzed by: ALJ

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WHC-SD-WM-DP-054 REV O



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Raw Data Dump for AEA Spectrum: 6a6854.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
21	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
31	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
41	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
71	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
81	0.	0.	0.	0.	0.	0.	0.	1.	2.	0.
91	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
101	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
111	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
121	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
131	0.	0.	0.	1.	0.	1.	0.	0.	0.	0.
141	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
151	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
161	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
171	0.	0.	0.	0.	1.	0.	0.	0.	0.	0.
181	0.	1.	2.	0.	1.	1.	1.	1.	0.	0.
191	0.	1.	0.	0.	0.	0.	1.	0.	0.	0.
201	1.	0.	0.	0.	0.	1.	2.	1.	0.	0.
211	2.	1.	0.	1.	0.	2.	0.	1.	1.	0.
221	0.	1.	0.	1.	2.	0.	0.	0.	1.	0.
231	2.	1.	0.	3.	0.	2.	2.	0.	0.	0.
241	5.	2.	1.	5.	3.	2.	5.	4.	2.	0.
251	5.	⑦	5.	6.	2.	4.	6.	6.	3.	0.
261	2.	6.	6.	4.	6.	2.	4.	4.	4.	1.
271	3.	3.	3.	0.	0.	1.	2.	1.	0.	1.
281	2	1.	5.	1.	0.	1.	1.	0.	2.	2.
291	②	1	1.	2.	1.	1.	1.	2.	3.	0.
301	0.	1	0.	1.	1.	0.	0.	1.	1.	0.
311	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
321	1.	0.	1.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	1.	2.	2.	1.	2.	0.	2.
341	0.	0.	2.	1.	1.	2.	0.	1.	2.	1.
351	4.	0.	0.	2.	1.	2.	0.	3.	0.	0.
361	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
371	0.	0.	0.	0.	0.	0.	1.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	1.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	1.	1.	1.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	1.	0.	0.
441	0.	0.	0.	0.	0.	1.	2.	1.	0.	0.
451	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	1.	0.	1.	0.	0.	1.	0.	2.	4.
471	1.	3.	0.	1.	4.	1.	0.	1.	0.	0.
481	0.	1.	0.	0.	0.	0.	0.	1.	6.	0.
491	0.	1.	0.	0.	2.	8.	4.	0.	0.	0.
511	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

WHC-SD-WM-DR-054 REV0

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Raymond
12.8.93

Westinghouse Hanford Co.

GENERAL ALPHA ENERGY ANALYSIS
Rev. 2.01

DATA REDUCTION REPORT

WHC-SD-WM-DP-054 REV 0

SAMPLE
G750-5782
File ID: 7a7384.CNF

Counted on: 12/ 7/93 @14: 6
Detector: AEA7
Geometry number: 1
Count time: 28802. Sec

PEAK ANALYSIS

Peak ID	Peak height		Peak center		FWHM		Tau	
	Initial	Final	Initial	Final	Initial	Final	Initial	Final
1	268.8	268.8	256.825	256.825	18.000	9.700	0.000	0.000

PEAK RESULTS
Peak Error Limit: 25%

Peak ID	Isotope	AEA Frac	Exp.	Peak Centroid Obs.	Diff.	FWHM	Count Rate	%err @95	d/m	Activity uCi/ea
1	Am243	0.968	5.276	5.264	0.012	0.04	10.19	2.8	84.9	0.382E-04
Totals:		0.968	<--valid peaks only-->				10.19			

DETECTOR CALIBRATION
Energy(MEV) = 4.083 + (0.0046)*Channel
Energy range (MeV): 4.083 TO 6.438
Efficiency = 0.1213 CPM/DPM

TOTAL COUNT DATA:

Item	Total	% Recovery
Raw spectrum	5055.0	100.000
Smoothed	5055.0	100.000
Composite fit	4892.3	96.781
Residuals	162.7	3.219

Analyzed by: _____
ALJ

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WHC-SD-WM-DP-054 REV 0

1
.. 1
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..... 1
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Raw Data Dump for AEA Spectrum: 7a7384.CNF

1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11	0.	0.	0.	0.	0.	0.	0.	0.	0.	1.
21	1.	0.	0.	0.	0.	1.	0.	0.	0.	0.
31	0.	0.	0.	1.	0.	0.	1.	0.	0.	0.
41	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
51	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
61	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
71	1.	0.	0.	1.	0.	0.	0.	0.	0.	1.
81	0.	0.	0.	1.	0.	0.	0.	0.	0.	0.
91	0.	0.	1.	0.	1.	0.	0.	0.	0.	0.
101	0.	0.	1.	1.	0.	1.	0.	0.	0.	0.
111	0.	2.	1.	0.	1.	0.	0.	1.	0.	0.
121	0.	0.	0.	0.	1.	1.	0.	1.	1.	0.
131	0.	0.	0.	1.	1.	0.	0.	0.	1.	0.
141	0.	1.	3.	0.	2.	2.	0.	1.	1.	2.
151	2.	0.	1.	0.	1.	1.	1.	0.	0.	0.
161	0.	0.	0.	1.	0.	0.	0.	1.	0.	0.
171	0.	0.	1.	1.	0.	2.	1.	0.	0.	1.
181	1.	1.	2.	3.	1.	0.	0.	2.	2.	0.
191	1.	1.	1.	0.	0.	1.	0.	0.	2.	1.
201	0.	2.	2.	2.	1.	3.	0.	2.	1.	1.
211	4.	1.	0.	3.	4.	8.	4.	0.	1.	1.
221	3.	5.	1.	6.	5.	5.	8.	10.	4.	11.
231	11.	16.	14.	18.	17.	25.	29.	35.	33.	51.
241	56.	81.	72.	81.	117.	120.	130.	172.	174.	178.
251	211.	220.	223.	234.	270.	318.	287.	269.	255.	212.
261	196.	159.	141.	72.	47.	37.	43.	28.	17.	17.
271	12.	14.	11.	14.	6.	3.	2.	3.	0.	2.
281	0.	1.	0.	1.	0.	0.	3.	4.	3.	1.
291	4.	0.	2.	3.	4.	3.	2.	3.	3.	1.
301	3.	3.	3.	4.	6.	3.	3.	0.	0.	1.
311	1.	2.	1.	2.	2.	0.	1.	0.	0.	0.
321	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
331	0.	0.	0.	0.	0.	0.	0.	1.	0.	1.
341	0.	1.	1.	0.	1.	1.	0.	0.	0.	1.
351	1.	0.	3.	0.	1.	0.	0.	0.	0.	0.
361	0.	0.	0.	1.	1.	0.	1.	0.	0.	0.
371	0.	1.	0.	0.	0.	0.	0.	0.	0.	0.
381	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
391	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
401	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
411	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
421	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
431	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
441	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
451	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
461	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
471	0.	0.	0.	0.	0.	0.	1.	0.	1.	0.
481	0.	0.	0.	0.	1.	1.	0.	0.	0.	0.
491	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
511	1.	0.								

WHC-SD-WM-DP-051 REV0

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90-DAY - BETA ANALYSES

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

142

Serial No G 696.-5584	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 14:46	Priority 26
Determination Tc99	Method-Standard LA-438-101	Result Units % RECOVERY	Charge Code D44B3	Retuns 0
Sample Size ? .250 ml	Spike # 76B51 101-100 ml		Customer ID STD	
Remarks Calculations Results EDP S363 TC99 STD# 93B51 RESULT 3.48 STD VAL 3,627 %REC 95,9%				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i>	Analyst - 3 <i>[Signature]</i>	Analyst - 4	Analyst - 5
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr <i>[Signature]</i>	10/18	

Tc-99: LA-438-101 (D-1) LIQUIDS

		STANDARD
Serial No	Spike (Tracer) Book Number	76B51
G696-5584	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in ml. (SS)	0.25
1894	Dilution Factor (DF)	1
Run No	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dml)	910.8839
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4757.867
	Background cpm (BKG cpm)	55.5
Date	Background Time Counted in Minutes (BKG time)	20
10/11/93	Instrument Fractional Efficiency (EFF)	0.9346
	Detection Limit (Ld)	8.45
	Critical Level (Lc)	3.88
	Tc-99 Concentration in µCi/L =	3.4774E+00

$Critical\ Level\ (Lc) = 2.33 \cdot \text{the Square Root of } (BKG\ cpm / BKG\ time)$
 $Detection\ Limit\ (Ld) = ((2.72 / BKG\ time) + (2 \cdot Lc)) / EFF$
 $Detection\ Level = Ld \cdot dm3 \cdot DF \cdot DDF / ((2220000\ dpm/\mu Ci) \cdot SS \cdot (dm2 - dml))$
 $Tc-99\ \mu Ci/L = (dml \cdot (1000\ mL/L) \cdot dm3 \cdot DF \cdot DDF) / ((2220000\ dpm/\mu Ci) \cdot SS \cdot (dm2 - dml))$
 $Tc-99\ \mu Ci/mL = \mu Ci/L / (1000\ mL/L)$
 $Spike\ (Tracer)\ Recovery = (dm2 - dml) \cdot 1.5 \cdot 100 / dm3$

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Tc-99 Concentration in µCi/L =	3.48E+00	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	3.48E-03	
Spike (Tracer) Recovery =	70.8%	3.23E-05 µCi/mL

Data Entry by:	<i>[Signature]</i>	Date:	12-Oct-93
Approved by:	<i>[Signature]</i>	Date:	20-Oct-93

3+4

Serial No G 697.-5684	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 14:59	Priority 26
Determination Tc99	Method: Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID BLK			
Remarks Calculations Results REAGENT BLANK COUNT AS uCi/L Spike # 76B51 Vol - .100ml REAGENT BLANK COUNT AS uCi/L $< 8.38 E - 6$ uCi/ml				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i> Hrs 10-11-93 16:30	Analyst - 3 <i>[Signature]</i> Hrs 10-12-93	Analyst - 4	Analyst - 5
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr <i>[Signature]</i> CO Clark	10/15	

Tc-99: LA-438-101 (D-1) LIQUIDS

		BLANK
Serial No	Spike (Tracer) Book Number	76B51
G697-5684	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1894	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	7.903563
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	3711.69
	Background cpm (BKG cpm)	55.5
Date	Background Time Counted in Minutes (BKG time)	20
10/11/93	Instrument Fractional Efficiency (EFF)	0.9346
	Detection Limit (Ld)	8.45
	Critical Level (Lc)	3.88
	Tc-99 Concentration in µCi/L =	< 8.3781E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld). **BEST AVAILABLE COPY**

Tc-99 Concentration in µCi/L =	< 8.38E-03	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	< 8.38E-06	8.38E-06
Spike (Tracer) Recovery =	68.2%	µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 12-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/20/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

788

Serial No G 699.-5784	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 15: 6	Priority 26
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID B-9			
Remarks Calculations Results COUNT AS uCi/L Spike # 76B51 3.94 E-4 uCi/ml 10/11/93 .100 ml Vol				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i> Hrs 10-11-93 16:30	Analyst - 3 <i>[Signature]</i> Hrs 10-12-93	Analyst - 4	Analyst - 5
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr <i>[Signature]</i>	10/18	

54-6800-881 (Rev. 0-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No	Spike (Tracer) Book Number	76B51
G699-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1894	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	407.8856
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4209.604
	Background cpm (BKG cpm)	55.5
Date	Background Time Counted in Minutes (BKG time)	20
10/11/93	Instrument Fractional Efficiency (EFF)	0.9355
	Detection Limit (Ld)	8.44
	Critical Level (Lc)	3.88
	Tc-99 Concentration in µCi/L =	3.9393E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L	=	3.94E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	3.94E-04	
Spike (Tracer) Recovery	=	70.0%	8.15E-06 µCi/mL

Data Entry by:	<i>[Signature]</i>	Date:	12-Oct-93
Approved by:	<i>[Signature]</i>	Date:	10/20/93

9870

Serial No G 700.-5784	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 15: 6	Priority 26
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID C-9			
Remarks Calculations Results COUNT AS uCi/L Spike #761351 vol - .100 ml 3.79 E-4 uCi/ml				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i> Hrs 10-11-93 16:30	Analyst - 3 <i>[Signature]</i> Hrs 10-12-93	Analyst - 4	Analyst - 5
Date 10/11/93	Time Completed 14:30	Lab Unit Mgr <i>[Signature]</i> PA Clark	10/18	

54 6800 201 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	76B51
G700-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in ml (SS)	1
1894	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	395.8392
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4230.445
	Background cpm (BKG cpm)	55.5
Date	Background Time Counted in Minutes (BKG time)	20
10/11/93	Instrument Fractional Efficiency (EFF)	0.9346
	Detection Limit (Ld)	8.45
	Critical Level (Lc)	3.88
	Tc-99 Concentration in µCi/L =	3.7901E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	3.79E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	3.79E-04	8.09E-06
Spike (Tracer) Recovery =	70.6%	µCi/mL

Data Entry by:	<i>[Signature]</i>	Date:	12-Oct-93
Approved by:	<i>[Signature]</i>	Date:	10/20/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

11/5/2

Serial No G 701.-5784	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 15: 7	Priority 26
Determination Tc-99	Method/Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml			Customer ID D-9	
Remarks Calculations Results COUNT AS uCi/L Spike # 76B51 Vol - .100 ml 4.64E-4 uCi/ml				
Analyst - 1 Hrs	Analyst - 2 <i>Phane</i> Hrs 10-11-93 1630	Analyst - 3 <i>Raymond</i> Hrs 10-12-93	Analyst - 4 Hrs	Analyst - 5 Hrs
Date 10/11/93	Time Completed 14130	Lab Unit Mgr <i>Shippard</i>	<i>Kerry</i>	

[Signature]

CA Mark

54-6400-097 (R 10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	76B51
G701-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1894	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	483.7078
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4309.556
	Background cpm (BKG cpm)	55.5
Date	Background Time Counted in Minutes (BKG time)	20
10/11/93	Instrument Fractional Efficiency (EFF)	0.9355
	Detection Limit (Ld)	8.44
	Critical Level (Lc)	3.88
	Tc-99 Concentration in µCi/L =	4.6421E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L	=	4.64E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	4.64E-04	
Spike (Tracer) Recovery	=	70.4%	8.10E-06 µCi/mL

Data Entry by:	<i>CA Phane</i>	Date:	12-Oct-93
Approved by:	<i>[Signature]</i>	Date:	10/20/93

SER	POS	CH	DPM	2SIDX	TIME	EL TIME	AVG HH	PCNT	SAT
5	**	7	1	55.55	5.95	20.00	126.59	159.0	20.00
				1901 %EFF	CHI:93.36			1901 DPM	:437.808
7	**	9	1	435.10	2.14	20.00	168.65	160.0	1.44
				1901 %EFF	CHI:93.31			1901 DPM	:437.808
8	**	10	1	3993.40	0.71	20.00	189.96	157.0	0.22
				1901 %EFF	CHI:93.55			1901 DPM	:4209.604
9	**	11	1	426.45	2.17	20.00	211.05	155.0	1.96
				1901 %EFF	CHI:93.71			1901 DPM	:439.572
10	**	12	1	4009.43	0.71	20.00	202.17	157.0	0.22
				1901 %EFF	CHI:93.31			1901 DPM	:437.808
11	**	13	1	4086.90	0.70	20.00	274.48	157.0	0.19
				1901 %EFF	CHI:93.55			1901 DPM	:4309.626

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PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

1-2

Serial No G 718.-5584	Sample Point 102 90: DAY	Date 10-15-93	Time Issued 9:48	Priority 2B
Determination Tc99	Method-Standard LA-438-101	Result Units % RECOVERY	Charge Code D44B3	Reruns 0
Sample Size ? .250 ml			Customer ID STD	
Remarks, Calculations, Results EDP S363 TC99 STD# 76B51 RESULT 3.25 STD VAL 3.627 %REC 89.6 Spike IO-76B51 Spike vol - .100 ml <i>[Signature]</i>				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 R.H. Milian Hrs	Analyst - 3 S. Linares Hrs	Analyst - 4 Hrs	Analyst - 5 Hrs
Date 10/22/93	Time Completed 15:00	Lab Unit Mgr <i>[Signature]</i>		

54-6800 (Rev. 10-15-93)

Tc-99: LA-438-101 (D-1) LIQUIDS			STANDARD
Serial No.	Spike (Tracer) Book Number		76B51
G718-5584	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	0.25
1955	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	1003.495
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	5532.269
ROD ACHEN	Background cpm	(BKG cpm)	57
Date	Background Time Counted in Minutes	(BKG time)	20
10/22/93	Instrument Fractional Efficiency	(EFF)	0.9431
	Detection Limit	(Ld)	8.49
	Critical Level	(Lc)	3.93
	Tc-99 Concentration in µCi/L	=	3.2543E+00

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000 dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000 mL/L) * dm3 * DF * DDF) / ((2220000 dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000 mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L	=	3.25E+00	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	3.25E-03	
Spike (Tracer) Recovery	=	83.3%	2.75E-05 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 25-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/27/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

3-4

Serial No G 719.-5684	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:46	Priority 3B
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID BLK			
Remarks Calculations Results REAGENT BLANK COUNT AS uCi/L Spike ID-76B51 Spike vol- .100ml 1.47E-5 uCi/mL <i>[Signature]</i>				
Analyst - 1	Analyst - 2 <i>[Signature]</i> Hrs	Analyst - 3 <i>[Signature]</i> Hrs	Analyst - 4 Hrs	Analyst - 5 Hrs
Date 10/22/93	Time Completed 15:00	Lab Unit Mgr <i>[Signature]</i>		

Tc-99: LA-438-101 (D-1) LIQUIDS

		BLANK
Serial No	Spike (Tracer) Book Number	76B51
G719-5684	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1955	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dml)	17.71495
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4453.103
ROD ACHEN	Background cpm (BKG cpm)	57
Date	Background Time Counted in Minutes (BKG time)	20
10/22/93	Instrument Fractional Efficiency (EFF)	0.9416
	Detection Limit (Ld)	8.50
	Critical Level (Lc)	3.93
	Tc-99 Concentration in µCi/L =	1.4664E-02

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dml))

Tc-99 µCi/L = (dml * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dml))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dml) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	1.47E-02	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	1.47E-05	7.04E-06
Spike (Tracer) Recovery =	81.6%	µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 25-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/27/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

5-6

Serial No G 720.-5784	Sample Point 102 90-DAY	Date 10-15-93	Time Issued 9:47	Priority 26
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID A-10			
Remarks Calculations Results COUNT AS uCi/L Spike ID - 76851 Spike vol - .100ml < 7.07 E-6 uCi/ml				
Analyst - 1 <i>ROD Achen</i>	Analyst - 2 <i>D. H. Milton</i>	Analyst - 3 <i>M. Baran</i>	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date 10/22/93	Time Completed 15:00	Lab Unit Mgr <i>J. Schupp</i>		

Tc-99: LA-438-101 (D-1) LIQUIDS		SAMPLE
Serial No.	Spike (Tracer) Book Number	76851
G720-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1955	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	0
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4404.977
ROD ACHEN	Background cpm (BKG cpm)	57
Date	Background Time Counted in Minutes (BKG time)	20
10/22/93	Instrument Fractional Efficiency (EFF)	0.9431
	Detection Limit (Ld)	8.49
	Critical Level (Lc)	3.93
	Tc-99 Concentration in µCi/L =	< 7.0731E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

NOTE: Reported result is a LESS THAN value calculated from the statistical Detection Limit (Ld).

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Tc-99 Concentration in µCi/L	=	< 7.07E-03	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	< 7.07E-06	
Spike (Tracer) Recovery	=	81.1%	7.07E-06 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 25-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/27/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV O

7-8

Serial No G 721.-5784	Sample Point 102 90 DA	Date 10-15-93	Time Issued 9:50	Priority 26
Determination Tc99	Method: Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID B-10			
Remarks Calculations Results COUNT AS uCi/L Spike ID - 76851 Spike Vol - .100 ml gg 10/27/93 7.08E-6 uCi/ml 3.16E-4 uCi/ml				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>[Signature]</i> Mrs	Analyst - 3 <i>[Signature]</i> Mrs	Analyst - 4 <i>[Signature]</i> Mrs	Analyst - 5 <i>[Signature]</i> Mrs
Date 10/20/93	Time Completed 15:00	Lab Unit Mgr <i>[Signature]</i> 10/25		

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	76851
G721-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
1955	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dml)	378.9085
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4778.491
ROD ACHEN	Background cpm (BKG cpm)	57
Date	Background Time Counted in Minutes (BKG time)	20
10/22/93	Instrument Fractional Efficiency (EFF)	0.9431
	Detection Limit (Ld)	8.49
	Critical Level (Lc)	3.93
	Tc-99 Concentration in µCi/L =	3.1621E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dml))

Tc-99 µCi/L = (dml * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dml))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dml) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	3.16E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	3.16E-04	
Spike (Tracer) Recovery =	81.0%	7.08E-06 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 25-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/27/93

PLACE ANALYTICAL CARD IN BOX BELOW-DO NOT WRITE IN SPACE

WHC-SD-WM-DP-054 REV 0

9-10

Serial No G 722.-5784	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:50	Priority 26
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Reruns 0
Sample Size ? / ml	Customer ID C-10			
Remarks Calculations Results COUNT AS uCi/L Spike vol: 100ml Spike ID-7651 2.84E-4 uCi/ml				
Analyst - 1 	Analyst - 2 D. H. White Hrs	Analyst - 3 L. M. Brown Hrs	Analyst - 4 	Analyst - 5
Date 10/22/93	Time Completed 15:00	Lab Unit Mgr 		

54-500-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

			SAMPLE
Serial No.	Spike (Tracer) Book Number		76851
G722-5784	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
1955	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	347.1517
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4835.365
ROD ACHEN	Background cpm	(BKG cpm)	57
Date	Background Time Counted in Minutes	(BKG time)	20
10/22/93	Instrument Fractional Efficiency	(EFF)	0.9431
	Detection Limit	(Ld)	8.49
	Critical Level	(Lc)	3.93
	Tc-99 Concentration in µCi/L	=	2.8399E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L	=	2.84E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	2.84E-04	
Spike (Tracer) Recovery	=	82.6%	
			6.94E-06 µCi/mL

Data Entry by:	Date: 25-Oct-93
Approved by:	Date: 10/27/93

11-12

WHC-SD-WM-DP-054 REV 0

Serial No G 723.-5784	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:51	Priority 26
Determination Tc99	Method/Standard LA-438-101	Result Units uCi/ML	Charge Code D44B3	Retuns 0
Sample Size 250 ml <i>10/22/93</i> / ml			Customer ID D-10	
Remarks, Calculations, Results COUNT AS uCi/L Spike ID - 76B51 Spike vol - .100 ml 3.11 E - 4 uCi/ml				
Analyst - 1 <i>[Signature]</i>	Analyst - 2 <i>D.A. Milicia</i>	Analyst - 3 <i>[Signature]</i>	Analyst - 4 <i>[Signature]</i>	Analyst - 5 <i>[Signature]</i>
Hrs	Hrs	Hrs	Hrs	Hrs
Date 10/22/93	Time Completed 15:00	Lab Unit Mgr <i>[Signature]</i>		Date 10/28

Tc-99: LA-438-101 (D-1) LIQUIDS

			SAMPLE
Serial No	Spike (Tracer) Book Number		76851
G723-5784	Activity for 100ul of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	1
1955	Dilution Factor	(DF)	1
Run No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	371.4757
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4753.448
ROD ACHEN	Background cpm	(BKG cpm)	57
Date	Background Time Counted in Minutes	(BKG time)	20
10/22/93	Instrument Fractional Efficiency	(EFF)	0.9434
	Detection Limit	(Ld)	8.48
	Critical Level	(Lc)	3.93
	Tc-99 Concentration in uCi/L	=	3.1126E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000 dpm/uCi) * SS * (dm2 - dm1))

Tc-99 uCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000 dpm/uCi) * SS * (dm2 - dm1))

Tc-99 uCi/mL = uCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in uCi/L	=	3.11E-01	DETECTION LEVEL
Tc-99 Concentration in uCi/mL	=	3.11E-04	
Spike (Tracer) Recovery	=	80.6%	7.11E-06 uCi/mL

Data Entry by: <i>[Signature]</i>	Date: 25-Oct-93
Approved by: <i>[Signature]</i>	Date: 10/27/93

Emil 10/23/83
10-23-83

PRESET TIME: 20.00
CORRECTED COUNT RATE: 100.00
CORRECTED COUNT RATE: 100.00
CORRECTED COUNT RATE: 100.00

UNKNORM REPLICATION: 1
UNKNORM NORM FACTOR: 15014.100000
UNKNORM UNITS: 15014.0PM
UNKNORM HALF LIFE CORRECTION:
INDIVIDUAL UNKNORM NORM FACTORS: N BACKGROUND QUENCH CURVES: Y
STANDARD ID: 151B29-A 1-10 QUENCH LIMITS LOW: 73.67 HIGH: 237.5
HALF LIFE(DAYS): 1521.11
CORRECTED COUNT RATE: 15014.1000000

QUENCHING QUENCH CURVES: CONSTANT

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UNKNORM NORM FACTOR: 15014.1000000
UNKNORM UNITS: 15014.0PM
UNKNORM HALF LIFE CORRECTION:
INDIVIDUAL UNKNORM NORM FACTORS: N
STANDARD ID: 151B29-A 1-10
HALF LIFE(DAYS): 1521.11
CORRECTED COUNT RATE: 15014.1000000

BACKGROUND QUENCH CURVES: CONSTANT
UNKNORM NORM FACTOR: 15014.1000000
UNKNORM UNITS: 15014.0PM
UNKNORM HALF LIFE CORRECTION:
INDIVIDUAL UNKNORM NORM FACTORS: N
STANDARD ID: 151B29-A 1-10
HALF LIFE(DAYS): 1521.11
CORRECTED COUNT RATE: 15014.1000000

CH	NO	CPM	2SIG	TIME	EL TIME	AGE	HE	QCOR
1501	1	2269.22	0.62	20.00	47.22	148.0		0.17
					1501	0.17		0.17
1501	1	1005.40	1.41	20.00	63.35	114.0		0.17
					1501	0.17		0.17
1501	1	71.70	8.41	20.00	0.451	14.0		0.17
					1501	0.17		0.17

1501 2000 00194.10 1501 2000 00194.10

WHC-SD-WM-DP-054 REV 0

PAGE: 2

NO	DATE	QTY	CPM	WELDN	TIME	EL TIME	WAB RM	WAB	WAB
1	**	9	1	361.95	2.70	20.00	1261.30	100.0	20.70
				1501 WEFF CH1:94.51					1501 DPM: 14778.491
2	**	9	1	414.35	2.20	20.00	167.11	100.0	2.20
				1501 WEFF CH1:94.31					1501 DPM: 14778.491
3	**	10	1	4556.65	0.66	20.00	190.29	149.0	0.24
				1501 WEFF CH1:94.16					1501 DPM: 14778.491
4	**	11	1	584.40	2.28	20.00	211.44	146.0	2.28
				1501 WEFF CH1:94.51					1501 DPM: 14778.491
5	**	12	1	1114.03	2.14	20.00	270.00	145.0	2.14
				1501 WEFF CH1:94.51					1501 DPM: 14778.491
6	**	12	1	4241.40	0.65	20.00	274.95	145.0	0.65
				1501 WEFF CH1:94.34					1501 DPM: 14778.491

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WHC-SD-WM-DP-054 REV 0

1-2

Serial No G 745-5584	Sample Point 102 90 DAY	Date 11-30-93	Time Issued 12:40	Priority
Determination Tc99	Method Standard LA-438-101	Result Units % RECOVERY	Charge Code VOGEL	Reruns
Sample Size ? 2.50 ml + .100 ml spike # 76851			Customer ID STD	
Remarks Calculations Results EDP 3363 TC99 STD# 93851 RESULT 3.74 STD VAL 3,627 %REC 103.1%				
Analyst - 1 <i>R Meyers</i>	Analyst - 2 <i>J Miller</i>	Analyst - 3 <i>A Hamilton</i>	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 11/30/93	Time Completed 1415	Lab Unit Mgr <i>J. J. Deppert</i>		

54-6800-061-R-10-R31

Tc-99: LA-438-101 (D-1) LIQUIDS

			STANDARD
Serial No	Spike (Tracer) Book Number		76851
G745-5584	Activity for 100µl of Spike Added in dpm	(dm3)	8151
Batch ID	Volume of Sample in mL	(SS)	0.25
2266	Dilution Factor	(DF)	1
Rerun No.	Digest Dilution Factor	(DDF)	1
0	dpm of Sample from Liquid Scintillation Counter	(dm1)	947.0219
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter	(dm2)	4670.286
R MEYERS	Background cpm	(BKG cpm)	53.95
Date	Background Time Counted in Minutes	(BKG time)	20
11/30/93	Instrument Fractional Efficiency	(EFF)	0.9318
	Detection Limit	(Ld)	8.36
	Critical Level	(Lc)	3.83
	Tc-99 Concentration in µCi/L =		3.7355E+00

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	3.74E+00	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	3.74E-03	
Spike (Tracer) Recovery =	68.5%	

Data Entry by: <i>[Signature]</i>	Date: 07-Dec-93
Approved by: <i>[Signature]</i>	Date: 12/16/93

WHC-SD-WM-DP-054 REV 0

3-4

Serial No G 746-5684	Sample Point 102 90 DAY -	Date 11-22-93	Time Issued 10:51	Priority
Determination Tc99	Method-Standard LA-438-101	Result Units uCi/ML	Charge Code VOGEL	Retuns
Sample Size ? ml + 100 ml spike # 76051			Customer ID BLK	
Remarks, Calculations, Results REAGENT BLANK COUNT AS uCi/L 8.78E-6 uCi/mL				
Analyst - 1 <i>R Meyers</i>	Analyst - 2 <i>Fulle</i>	Analyst - 3 <i>Dumilic</i>	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 11/30/93	Time Completed 1415	Lab Unit Mgr <i>J. Deppert</i>		

54 6800-061 R 10 831

Tc-99: LA-438-101 (D-1) LIQUIDS

		BLANK
Serial No	Spike (Tracer) Book Number	76B51
G746-5684	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
2266	Dilution Factor (DF)	1
Run No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	9.223468
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	3865.861
R MEYERS	Background cpm (BKG cpm)	53.95
Date	Background Time Counted in Minutes (BKG time)	20
11/30/93	Instrument Fractional Efficiency (EFF)	0.9324
	Detection Limit (Ld)	8.35
	Critical Level (Lc)	3.83
	Tc-99 Concentration in µCi/L =	8.7810E-03

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L	=	8.78E-03	DETECTION LEVEL
Tc-99 Concentration in µCi/mL	=	8.78E-06	
Spike (Tracer) Recovery	=	71.0%	
			7.95E-06 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 07-Dec-93
Approved by: <i>[Signature]</i>	Date: 12/16/93

WHC-SD-WM-DP-054 REV 0

7-8

Serial No G 748-5784	Sample Point 100 90 DAY	Date 11-22-93	Time Issued 12:54	Priority 36
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code VOGEL	Reruns 0
Sample Size 2 ml + 100ml spike #76B51			Customer ID B-3	
Remarks Calculations Results COUNT AS uCi/L 3.73E-4 uCi/mL				
Analyst - 1 R Meyers	Analyst - 2 J. Schupp	Analyst - 3 D. Miller	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 11/30/93	Time Completed 1415	Lab Unit Mgr J. Schupp		

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No.	Spike (Tracer) Book Number	76B51
G748-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
2266	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	384.3827
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4167.239
R MEYERS	Background cpm (BKG cpm)	53.95
Date	Background Time Counted in Minutes (BKG time)	20
11/30/93	Instrument Fractional Efficiency (EFF)	0.9324
	Detection Limit (Ld)	8.35
	Critical Level (Lc)	3.83
	Tc-99 Concentration in µCi/L =	3.7308E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)

Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF

Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))

Tc-99 µCi/mL = µCi/L / (1000mL/L)

Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	3.73E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	3.73E-04	
Spike (Tracer) Recovery =	69.6%	8.11E-06 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 07-Dec-93
Approved by: <i>[Signature]</i>	Date: 12/16/93

9-10

WHC-SD-WM-DP-054 REV 0

Serial No G 749.-5784	Sample Point 102 30 DAY	Date 11-23-93	Time Issued 12:55	Priority 26
Determination Tc99	Method Standard LA-438-101	Result Units uCi/ML	Charge Code VOGEL	Reruns 0
Sample Size ? [m] + 100ml spike #76B51			Customer ID C-8	
Remarks, Calculations, Results COUNT AS uCi/L 4.12E-4 uCi/mL				
Analyst - 1 <i>R Meyers</i>	Analyst - 2 <i>J. Deppen</i>	Analyst - 3 <i>D. Miller</i>	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 11/30/93	Time Completed 1415	Lab Unit Mgr <i>J. Deppen</i>		

54-5800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No	Spike (Tracer) Book Number	76B51
G749-5784	Activity for 100ul of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
2266	Dilution Factor (DF)	1
Rerun No.	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	448.4607
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4440.337
R MEYERS	Background cpm (BKG cpm)	53.95
Date	Background Time Counted in Minutes (BKG time)	20
11/30/93	Instrument Fractional Efficiency (EFF)	0.9346
	Detection Limit (Ld)	8.33
	Critical Level (Lc)	3.83
	Tc-99 Concentration in uCi/L =	4.1248E-01

$Critical\ Level\ (Lc) = 2.33 * \text{the Square Root of } (BKG\ cpm / BKG\ time)$
 $Detection\ Limit\ (Ld) = ((2.72 / BKG\ time) + (2 * Lc)) / EFF$
 $Detection\ Level = Ld * dm3 * DF * DDF / ((2220000\ dpm/\mu Ci) * SS * (dm2 - dm1))$
 $Tc-99\ \mu Ci/L = (dm1 * (1000\ mL/L) * dm3 * DF * DDF) / ((2220000\ dpm/\mu Ci) * SS * (dm2 - dm1))$
 $Tc-99\ \mu Ci/mL = \mu Ci/L / (1000\ mL/L)$
 $Spike\ (Tracer)\ Recovery = (dm2 - dm1) * 1.5 * 100 / dm3$

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Tc-99 Concentration in uCi/L =	4.12E-01	DETECTION LEVEL 7.67E-06 uCi/mL
Tc-99 Concentration in uCi/mL =	4.12E-04	
Spike (Tracer) Recovery =	73.5%	

Data Entry by: <i>[Signature]</i>	Date: 07-Dec-93
Approved by: <i>[Signature]</i>	Date: 12/16/93

WHC-SD-WM-DP-054 REV O

11-12

Serial No G 750-5784	Sample Point 102 90 DAY	Date 11-22-93	Time Issued 12:55	Priority 06
Determination Tc-99	Method-Standard LA-438-101	Result Units µCi/ML	Charge Code VOGEL	Reruns 0
Sample Size ? [ml] + (100ml) spike #76B51			Customer ID D-8	
Remarks Calculations Results COUNT AS µCi/L 6.08E-4 µCi/mL				
Analyst - 1 <i>R Meyers</i>	Analyst - 2 <i>[Signature]</i>	Analyst - 3 <i>[Signature]</i>	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 11/30/93	Time Completed 1415	Lab Unit Mgr <i>[Signature]</i>		

54-6800-061 (R-10-83)

Tc-99: LA-438-101 (D-1) LIQUIDS

		SAMPLE
Serial No	Spike (Tracer) Book Number	76B51
G750-5784	Activity for 100µl of Spike Added in dpm (dm3)	8151
Batch ID	Volume of Sample in mL (SS)	1
2266	Dilution Factor (DF)	1
Run No	Digest Dilution Factor (DDF)	1
0	dpm of Sample from Liquid Scintillation Counter (dm1)	619.8493
Analyst	dpm of Sample + Spike from Liquid Scintillation Counter (dm2)	4362.644
R MEYERS	Background cpm (BKG cpm)	53.95
Date	Background Time Counted in Minutes (BKG time)	20
11/30/93	Instrument Fractional Efficiency (EFF)	0.9324
	Detection Limit (Ld)	8.35
	Critical Level (Lc)	3.83
	Tc-99 Concentration in µCi/L =	6.0806E-01

Critical Level (Lc) = 2.33 * the Square Root of (BKG cpm / BKG time)
 Detection Limit (Ld) = ((2.72 / BKG time) + (2 * Lc)) / EFF
 Detection Level = Ld * dm3 * DF * DDF / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/L = (dm1 * (1000mL/L) * dm3 * DF * DDF) / ((2220000dpm/µCi) * SS * (dm2 - dm1))
 Tc-99 µCi/mL = µCi/L / (1000mL/L)
 Spike (Tracer) Recovery = (dm2 - dm1) * 1.5 * 100 / dm3

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Tc-99 Concentration in µCi/L =	6.08E-01	DETECTION LEVEL
Tc-99 Concentration in µCi/mL =	6.08E-04	
Spike (Tracer) Recovery =	68.9%	
		8.20E-06 µCi/mL

Data Entry by: <i>[Signature]</i>	Date: 07-Dec-93
Approved by: <i>[Signature]</i>	Date: 12/16/93

D. Armitage
12-1-93

USER: 5 ID:TC 99 PRESET TIME: 20.00 TUE 30 NOV 1993 21:08
SAMPLE REPEAT: 1 CYCLE REPEAT: 1 SCR:N RS232:N
H#: 1 AQC:Y QCF:N RCM:Y 2 PHASE MONITOR:N
RCM-TIME: 0.10 INT:999.95
CHANNEL 1-LL:150 UL: 800 2SIGMA: 0.10 BKG SUB: 0.00 BKG 2SIG: 0.00 LSR: 0

97:ISLC LABEL DPM SET UP ON 20 DEC 1991 13:14

UNKNOWN ID:TC 99 UNKNOWN REPLICATES: 1
UNKNOWN NORM FACTOR IS01:0 1.00000
UNKNOWN UNITS IS01:DPM
UNKNOWN HALF LIFE CORRECTION:N
INDIVIDUAL UNKNOWN NORM FACTORS:N BACKGROUND QUENCH CURVES:Y
STANDARD ID:131B28-A 1-10 QUENCH LIMITS LOW:73.67 HIGH:207.7
HALF LIFE(DAYS) IS01:N
STANDARD DPM IS01:0.00000000

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
01	**	1	53.95	6.07	20.00	20.94	148.0	1.00	

BACKGROUND QUENCH CURVES: CONSTANT

BEST AVAILABLE COPY

CHANNEL 1
QUENCH CURVE COEFFICIENTS
A: 53.95000 B:0.00000000 C:0.00000000 D:0.000000000000

BACKGROUND QUENCH CURVE CORRELATION TABLE

BKG	H#	MEASURED CPM.	CALCULATED CPM.	PERCENT DIFF.	FLAG
1	148.0	53.95	53.95	0.00	

BACKGROUND QUENCH LIMITS LOW:0.000 HIGH:1000.
TOTAL QUENCH LIMITS LOW:73.67 HIGH:207.7

SAM	POS	CH	CPM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
1	**	3	936.35	1.46	20.00	42.17	162.0	0.60	
			IS01 %EFF CH1:93.18					IS01 DPM :947.0219	
2	**	4	4405.55	0.67	20.00	63.32	162.0	0.14	
			IS01 %EFF CH1:93.18					IS01 DPM :4670.286	
3	**	5	62.55	5.65	20.00	84.40	161.0	2.94	
			IS01 %EFF CH1:93.24					IS01 DPM :9.223458	
4	**	6	3864.10	0.74	20.00	105.54	159.0	0.16	
			IS01 %EFF CH1:93.39					IS01 DPM :3865.861	

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WHC-SD-WM-DP-054 REV 0

AM	POS	CH	DFM	2SIG%	TIME	EL TIME	AVG H#	RCM%	ERR
5	**	7	1	59.50	5.85	20.00	126.61 153.0	4.29	
				ISO1 %EFF	CH1:93.88		ISO1 DFM	:4.846776	
6	**	8	1	2761.55	0.85	20.00	147.70 149.0	0.21	
				ISO1 %EFF	CH1:94.16		ISO1 DFM	:2875.388	
7	**	9	1	412.35	2.20	20.00	168.80 161.0	1.60	
				ISO1 %EFF	CH1:93.24		ISO1 DFM	:384.3827	
8	**	10	1	3939.50	0.71	20.00	189.96 161.0	0.17	
				ISO1 %EFF	CH1:93.24		ISO1 DFM	:4167.239	
9	**	11	1	473.10	2.06	20.00	211.06 158.0	1.27	
				ISO1 %EFF	CH1:93.46		ISO1 DFM	:448.4607	
10	**	12	1	4197.25	0.69	20.00	232.15 160.0	0.12	
				ISO1 %EFF	CH1:93.31		ISO1 DFM	:4440.337	
11	**	1	1	631.90	1.78	20.00	253.31 161.0	1.13	
				ISO1 %EFF	CH1:93.24		ISO1 DFM	:619.8493	
12	**	2	1	4118.90	0.70	20.00	274.46 162.0	0.18	
				ISO1 %EFF	CH1:93.18		ISO1 DFM	:4362.644	

WHC-SD-WM-DP-054 REV 0

90-DAY - OTHER ANALYSES

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TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 696.-5526	102 90 DAY	9-23-93	14:46	26
Determination	Method: Standard	Result Units	Charge Code	Remarks
TOC	LA-344-105	% RECOVERY	D44B3	0
Sample Size	Customer ID			
? .200-2ml-.200	STD			
Remarks, Calculations, Results				
S356 C03TOC				
STD#10N/2A RESULT 2.84				
STD VAL %REC 95%				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr		
10/4/93	13:57	RW Schroeder 10-25-93		

Serial No	Sample Point	Date	Time Issued	Priority
G 697.-5626	102 90 DAY	9-23-93	14:59	26
Determination	Method: Standard	Result Units	Charge Code	Remarks
TOC	LA-344-105	uG C/ML	D44B3	0
Sample Size	Customer ID			
? .200ml H ₂ SO ₄	BLK			
Remarks, Calculations, Results				
REAGENT BLANK				
$\frac{<5.50E^{-3} \text{ g/l} \times 1,000,000}{1000} = <5.50 \text{ uG/ML}$				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr		
10/12/93	14:07	RW Schroeder 10-25-93		

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TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 698.-5726	102 90 DAY	9-23-93	15: 6	26
Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0
Sample Size	Customer ID			
? 2ml-.200-.200	A-9			
Remarks, Calculations, Results				
$\frac{< 5.50E-3 \text{ g/l} \times 1,000,000}{1000} = < 5.50 \text{ ug/ml}$				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr		
10/12/93	14:16	<i>[Signature]</i>	<i>[Signature]</i>	

Rw Schroeder 10-25-93

54 (Rev. 06) (R. 10-83)

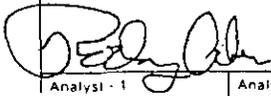
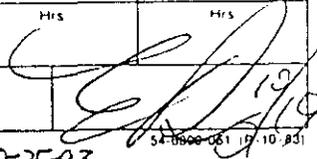
Serial No	Sample Point	Date	Time Issued	Priority
G 699.-5726	102 90 DAY	9-23-93	15: 6	26
Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	uG C/ML	D44B3	0
Sample Size	Customer ID			
? 2ml-.200-.200	B-9			
Remarks, Calculations, Results				
$\frac{< 5.50E-3 \text{ g/l} \times 1,000,000}{1000} = < 5.50 \text{ ug/ml}$				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr		
10/12/93	14:28	<i>[Signature]</i>	<i>[Signature]</i>	

Rw Schroeder 10-25-93

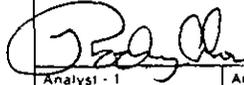
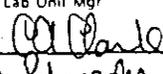
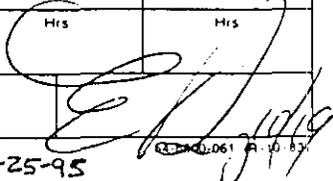
54 (Rev. 06) (R. 10-83)

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TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No G 700.-5726	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 15: 6	Priority 26
Determination TOC	Method: Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Retuns 0
Sample Size ? 2ml - .200 - .200			Customer ID C-9	
Remarks, Calculations, Results $\frac{7.7E-3 \text{ g/l} \times 1,000,000}{1000} = 7.7 \text{ ug/ml}$				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date 10/2/93	Time Completed 14:36	Lab Unit Mgr 		

RW Schroeder 10-25-93

Serial No G 701.-5726	Sample Point 102 90 DAY	Date 9-23-93	Time Issued 15: 7	Priority 26
Determination TOC	Method: Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Retuns 0
Sample Size ? 2ml - .200 - .200			Customer ID D-9	
Remarks, Calculations, Results $\frac{1.1E-2 \text{ g/l} \times 1,000,000}{1000} = 1.1E+1 \text{ ug/ml}$				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date 10/12/93	Time Completed 14:45	Lab Unit Mgr 		

RW Schroeder 10-25-95

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Sample: STD

Date: 10/12/93

Time: 13:57:30

Sample Size = 200 uL

Dil Factor = 11

Blank ID # = BLK

Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.70	0.00
2	1.00	30.20	97.68
3	1.50	45.50	33.63
4	2.00	50.50	9.90
5	2.50	52.50	3.81
6	3.00	53.60	2.05
7	3.50	54.00	0.74
8	4.00	54.50	0.92
9	4.50	54.90	0.73
10	5.00	55.50	1.08
11	5.50	55.70	0.36
12	6.00	56.10	0.71
13	6.50	56.40	0.53
14	7.00	56.70	0.53

BEST AVAILABLE COPY

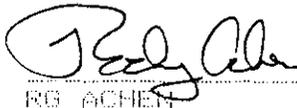
BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = 5.1 / 7.003723 = +7.3E-01 ug/min Carbon

SAMPLE RESULTS:

(56.7 - 5.100089) (11) / (200) = +2.84E+00 g/L Carbon
(56.7 - 5.100089) (11) / (200) (12) = +2.36E-01 Molar Carbon

Sample Run By:


RG ACHEN

10/12/93

SIGNATURE ABOVE REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 143 TO 144.

TDC- TOTAL ORGANIC CARBON ANALYSIS REPORT

TIC(TOC) REV 2.0

<<< BLANK ANALYSIS >>>

WHC-SD-WM-DP-054 REV 0

Sample: BLK

Date: 10/12/93

Time: 13:41:15

Sample Size = 200 uL
 Dil Factor = 1
 Blank ID # = BLK
 Blank Value = N/A

Analyst : RG ACHEN
 Min Readings = 14
 Max Readings = 14
 % Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.20	66.67
3	1.50	1.60	25.00
4	2.00	2.00	20.00
5	2.50	2.30	13.04
6	3.00	2.70	14.81
7	3.50	3.00	10.00
8	4.00	3.30	9.09
9	4.50	3.60	8.33
10	5.00	3.90	7.69
11	5.50	4.20	7.14
12	6.00	4.70	10.64
13	6.50	4.90	4.08
14	7.00	5.10	3.92

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BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = $5.1 / 7.003723 =$

$+7.3E-01$ ug/min Carbon

Sample Run By:

 10/12/93
 RG ACHEN

Sample: G 697-5626

Date: 10/12/93

Time: 14:07:30

Sample Size = 200 uL

Dil Factor = 11

Blank ID # = BLK

Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.90	88.89
3	1.51	1.20	25.00
4	2.01	1.50	20.00
5	2.51	1.90	21.05
6	3.01	2.30	17.39
7	3.51	2.50	8.00
8	4.01	2.90	13.79
9	4.50	3.20	9.37
10	5.00	3.50	8.57
11	5.50	3.80	7.89
12	6.00	4.20	9.52
13	6.51	4.40	4.55
14	7.00	4.70	6.38

BEST AVAILABLE COPY

BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = 5.1 / 7.003723 =

+7.3E-01 ug/min Carbon

SAMPLE RESULTS:

(4.7 - 5.100844) (11) / (200) =

(4.7 - 5.100844) (11) / (200) (12) =

cac 10/13/93
1.1
< 5.50 E-3

cac 10/13/93
< 5.00

E-3 g/L Carbon

< 4.17 E-4 Molar Carbon

Sample Run By:

RG ACHEN
RG ACHEN

10/12/93

TOD- TOTAL ORGANIC CARBON ANALYSIS REPORT
TIC/TDC REV 2.0

WHC-SD-WM-DP-054 REV 0

Sample: G 698-5726

Date: 10/12/93

Time: 14:16:11

Sample Size = 200 uL

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.20	66.67
3	1.51	1.80	33.33
4	2.01	2.00	10.00
5	2.51	2.40	16.67
6	3.01	2.70	11.11
7	3.51	3.10	12.90
8	4.01	3.30	6.06
9	4.50	3.60	8.33
10	5.01	3.90	7.69
11	5.51	4.30	9.30
12	6.01	4.70	8.51
13	6.51	5.00	6.00
14	7.00	5.20	3.85

BEST AVAILABLE COPY

BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = $5.1 / 7.003723 =$

$+7.3E-01$ ug/min Carbon

SAMPLE RESULTS:

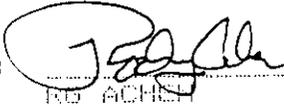
$(5.2 - 5.1008)(1.1)/(200) =$

$(5.2 - 5.1008)(1.1)/(200)(12) =$

$< 5.50 E^{-3}$
CAC 10/13/93

E-3 g/L Carbon

< 4.17 E-4 Molar Carbon

Sample Run By: 

RG ACHEN

10/2/93

Sample: G 699-5726

Date: 10/12/93

Time: 14:28:32

Sample Size = 200 uL
 Dil Factor = 1.1
 Blank ID # = BLK
 Blank Value = .7281941 ug/minute C

Analyst : RO ACHEN
 Min Readings = 14
 Max Readings = 14
 % Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	1.40	78.57
3	1.51	1.70	17.65
4	2.01	2.10	19.05
5	2.51	2.60	19.23
6	3.01	2.90	10.34
7	3.51	3.00	3.33
8	4.01	3.30	9.09
9	4.51	3.70	10.85
10	5.01	4.10	9.76
11	5.51	4.30	4.66
12	6.01	4.60	6.52
13	6.51	5.00	8.00
14	7.00	5.20	3.85

BEST AVAILABLE COPY

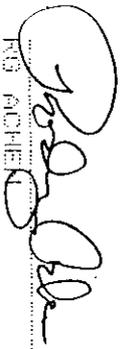
BLANK VALUE = 5.1 micrograms carbon
 BLANK FACTOR = 5.1 / 7.005723 =

+7.3E-01 ug/min Carbon

SAMPLE RESULTS:
 (5.2 - 5.100844) / (1.1) / (200) =
 (5.2 - 5.100844) / (1.1) / (200) (12) =

< 5.50E-3
~~4.5E-3~~ 10/12/93 E-3 g/L Carbon
 < 4.17 E-4 Polar Carbon

Sample Run By:



10/12/93

957

TOTC- TOTAL ORGANIC CARBON ANALYSIS REPORT
 TIC/TOC REV 2.0

WHC-SD-WM-DP-054 REV 0

Sample: G 700-5726

Date: 10/12/93

Time: 14:36:39

Sample Size = 200 uL

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.40	0.00
2	1.01	1.90	78.95
3	1.51	2.50	24.00
4	2.01	3.10	19.35
5	2.51	3.50	11.43
6	3.01	3.70	5.41
7	3.51	4.10	9.76
8	4.00	4.50	8.89
9	4.50	4.80	6.25
10	5.00	5.30	9.43
11	5.50	5.70	7.02
12	6.00	5.70	0.00
13	6.50	6.00	5.00
14	7.00	6.50	7.69

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BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = $5.1 / 7.003723 =$

$+7.3E-01$ ug/min Carbon

SAMPLE RESULTS:

$(6.5 - 5.100089) (1.1) / (200) =$

$+7.7E-03$ g/L Carbon

$(6.5 - 5.100089) (1.1) / (200) (12) =$

$+6.4E-04$ Molar Carbon

Sample Run By:

RG Achen
 RG ACHEN

10/12/93

Sample: G 701-5726

Date: 10/12/93

Time: 14:44:30

Sample Size = 200 uL

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .7281841 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis	Time	Coulometer	% Difference
1	0.51		0.30	0.00
2	1.01		2.30	86.96
3	1.51		3.10	25.81
4	2.01		3.60	13.89
5	2.51		4.00	10.00
6	3.01		4.40	9.09
7	3.51		4.60	4.35
8	4.01		5.00	8.00
9	4.50		5.40	7.41
10	5.00		5.70	5.26
11	5.50		6.00	5.60
12	6.00		6.40	6.25
13	6.50		6.80	5.88
14	7.00		7.10	4.23

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BLANK VALUE = 5.1 micrograms carbon

BLANK FACTOR = 5.1 / 7.003723 =

+7.3E-01 ug/min Carbon

SAMPLE RESULTS:

(7.1 - 5.100222)(1.1)/(200) =

+1.1E-02 g/L Carbon

(7.1 - 5.100222)(1.1)/(200)(12) =

+9.2E-04 Molar Carbon

Sample Run By:  10/12/93
 RG ACHEN

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No'	Sample Point	Date	Time Issued	Priority
G 718.-5526	102 90 DAY	10-15-93	9:43	26
Determination	Method-Standard	Result Units	Charge Code	Returns
TOC	LA-344-105	% RECOVERY	D44B3	0
Sample Size	Customer ID			
? .200-.2ml-.200	STD			
Remarks, Calculations, Results				
S356 C03TOC				
STD# 10NDA RESULT 2.88 G/L				
STD VAL 3.00 G/L REC 96.00%				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		PA Clark		
Date	Time Completed	Lab Unit Mgr	10-21-93	
10/20/93	13:05	RWS		10/21

54-6800-061 (R 10 83)

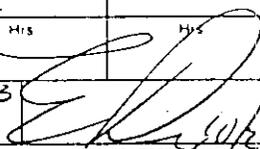
Serial No'	Sample Point	Date	Time Issued	Priority
G 719.-5626	102 90 DAY	10-15-93	9:46	26
Determination	Method-Standard	Result Units	Charge Code	Returns
TOC	LA-344-105	ug C/ML	D44B3	0
Sample Size	Customer ID			
? .200 - Direct	BLK			
Remarks, Calculations, Results				
REAGENT BLANK				
5.50 ug C $\times 10$ $\times 1,000,000$ $\times 10/21/93$ $\times 10$ $\times 10$ $\times 10$				
4.50 ug $\div 0.200ml = 2.25 \times 10^{-4} ug/ml C$ RWS 10-21-93				
5.50 ug/ml C				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
		PA Clark		
Date	Time Completed	Lab Unit Mgr	10-21-93	
10/20/93	13:17	RWS		10/21

54-6800-061 (R 10 83)

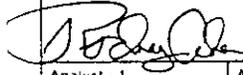
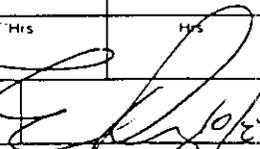
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WHC-SD-WM-DP-054 REV O

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No G 720.-5726	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:47	Priority 26
Determination TOC	Method-Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Retuns 0
Sample Size ? 2ml - 200 - 200			Customer ID A-10	
Remarks, Calculations, Results $< 5.50 \times 10^{-3} \text{ g/L} \times \frac{1000000}{1000} =$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $< 5.50 \text{ mg/mL}$ </div>				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs CA Clark	Hrs	Hrs
Date 10/20/93	Time Completed 13:36	Lab Unit Mgr 10-21-93 Rus Schneider 		

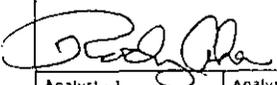
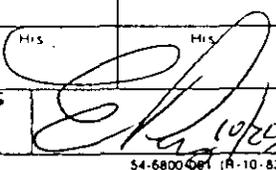
54-6800-00 (R/10-93)

Serial No G 721.-5726	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:50	Priority 26
Determination TOC	Method-Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Retuns 0
Sample Size ? 2ml - 200 - 200			Customer ID B-10	
Remarks, Calculations, Results $< 5.50 \text{ g/L} \times 10^{-3} \times \frac{1000000}{1000} =$ <div style="border: 1px solid black; padding: 5px; display: inline-block;"> $< 5.50 \text{ mg/mL}$ </div>				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs CA Clark	Hrs	Hrs
Date 10/20/93	Time Completed 13:44	Lab Unit Mgr 10-21-93 Rus Schneider 		

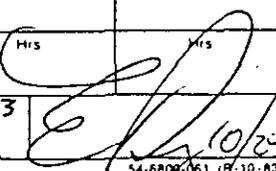
54-6800-00 (R/10-93)

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TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No G 722.-5726	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:50	Priority 26
Determination TOC	Method Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Reruns 0
Sample Size ? 2ml - .200 - .200			Customer ID C-10	
Remarks, Calculations, Results $7.15 \times 10^{-5} \text{ g/L} \times \frac{1,000,000}{1,000} = 7.15 \text{ mg/L}$				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date 10/20/93	Time Completed 13:56	Lab Unit Mgr RW Schroeder	10-21-93 	

54-6800-001 (R-10-83)

Serial No G 723.-5726	Sample Point 102 90 DAY	Date 10-15-93	Time Issued 9:51	Priority 26
Determination TOC	Method Standard LA-344-105	Result Units uG C/ML	Charge Code D44B3	Reruns 0
Sample Size ? 2ml - .200 - .200			Customer ID D-10	
Remarks, Calculations, Results $8.80 \times 10^{-3} \text{ g/L} \times \frac{1,000,000}{1,000} = 8.80 \text{ mg/L}$				
Analyst - 1 	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
	Hrs	Hrs	Hrs	Hrs
Date 10/20/93	Time Completed 14:05	Lab Unit Mgr RW Schroeder	10-21-93 	

54-6800-001 (R-10-83)

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WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT TICTOC REV 2.0

Sample: STD

Date: 10/20/93

Time: 13:04:56

Sample Size = 200 ul

Dil Factor = 11

Blank ID # = BLK

Blank Value = .642493 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.50	0.00
2	1.01	28.00	98.21
3	1.51	45.70	38.73
4	2.01	51.10	10.57
5	2.51	53.00	3.58
6	3.01	54.10	2.03
7	3.51	54.50	0.73
8	4.01	54.80	0.55
9	4.51	55.30	0.90
10	5.01	55.60	0.54
11	5.51	56.00	0.71
12	6.01	56.30	0.53
13	6.51	56.50	0.35
14	7.01	56.80	0.53

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SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 965 TO 976.

BLANK VALUE = 4.5 micrograms carbon

BLANK FACTOR = $4.5 / 7.003967 =$

+6.4E-01 ug/min Carbon

SAMPLE RESULTS:

(56.8 - 4.501098)(11)/(200) =

+2.88E+00 g/L Carbon

(56.8 - 4.501098)(11)/(200)(12) =

+2.40E-01 Molar Carbon

Sample Run By:

 10/20/93
RG ACHEN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLK

Date: 10/20/93

Time: 12:56:50

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLK
Blank Value = N/A

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.30	0.00
2	1.01	0.90	66.67
3	1.51	1.60	43.75
4	2.00	1.80	11.11
5	2.50	2.10	14.29
6	3.00	2.50	16.00
7	3.51	2.70	7.41
8	4.01	2.90	6.90
9	4.50	3.10	6.45
10	5.00	3.50	11.43
11	5.50	3.70	5.41
12	6.00	4.00	7.50
13	6.50	4.50	11.11
14	7.00	4.50	0.00

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BLANK VALUE = 4.5 micrograms carbon
BLANK FACTOR = $4.5 / 7.003967 =$

+6.4E-01 ug/min Carbon

Sample Run By:  10/20/93
RG ACHEN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 720-5726

Date: 10/20/93

Time: 13:36:25

Sample Size = 200 uL

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .642493 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.60	66.67
3	1.50	1.00	40.00
4	2.00	1.40	28.57
5	2.50	1.80	22.22
6	3.00	2.00	10.00
7	3.50	2.40	16.67
8	4.00	2.70	11.11
9	4.50	2.80	3.57
10	5.00	3.10	9.68
11	5.50	3.30	6.06
12	6.00	3.50	5.71
13	6.50	3.80	7.89
14	7.00	4.10	7.32

BEST AVAILABLE COPY

BLANK VALUE = 4.5 micrograms carbon

BLANK FACTOR = $4.5 / 7.003967 =$

$+6.4E-01$ ug/min Carbon

SAMPLE RESULTS:

(4.1 - 4.499922)(1.1)/(200) =

(4.1 - 4.499922)(1.1)/(200)(12) =

5.50 *2x 10/21/93*
~~5.00~~ E-3 g/L Carbon
 < 4.17 E-4 Molar Carbon

Sample Run By: *RG Achen*

RG ACHEN

10/20/93

WHC-SD-WM-DP-054 REV O

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 721-5726

Date: 10/20/93

Time: 13:44:22

Sample Size = 200 ul

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .642493 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.50	80.00
3	1.50	1.60	68.75
4	2.00	2.00	20.00
5	2.50	2.50	20.00
6	3.00	2.80	10.71
7	3.50	3.00	6.67
8	4.00	3.40	11.76
9	4.50	3.60	5.56
10	5.00	4.00	10.00
11	5.50	4.10	2.44
12	6.00	4.30	4.65
13	6.50	4.80	10.42
14	7.00	5.00	4.00

BEST AVAILABLE COPY

BLANK VALUE = 4.5 micrograms carbon

BLANK FACTOR = 4.5 / 7.003967 =

+6.4E-01 ug/min Carbon

SAMPLE RESULTS:

(5 - 4.499372) (1.1) / (200) =

(5 - 4.499372) (1.1) / (200) (12) =

^{5.50} ^{2x 10/21/93}
~~5.00~~ E-3 g/l Carbon
 < 4.17 E-4 Molar Carbon

Sample Run By:  10/20/93
 RG ACHEN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 722-5726

Date: 10/20/93

Time: 13:56:27

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .642493 ug/minute C

Analyst : RG ACHEN
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	1.70	88.24
3	1.51	2.50	32.00
4	2.00	2.90	13.79
5	2.51	3.00	3.33
6	3.01	3.40	11.76
7	3.51	3.70	3.11
8	4.01	4.00	7.50
9	4.50	4.30	6.98
10	5.00	4.60	6.52
11	5.50	4.80	4.17
12	6.00	5.10	5.88
13	6.50	5.40	5.56
14	7.00	5.80	6.90

BEST AVAILABLE COPY

BLANK VALUE = 4.5 micrograms carbon

BLANK FACTOR = $4.5 / 7.003967 =$

$+6.4E-01$ ug/min Carbon

SAMPLE RESULTS:

$(5.8 - 4.500588)(1.1)/(200) =$

$+7.1E-03$ g/L Carbon

$(5.8 - 4.500588)(1.1)/(200)(12) =$

$+6.0E-04$ Molar Carbon

Sample Run By:  10/20/93.
RG ACHEN

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: G 723-5726

Date: 10/20/93

Time: 14:05:27

Sample Size = 200 ul.

Dil Factor = 1.1

Blank ID # = BLK

Blank Value = .642493 ug/minute C

Analyst : RG ACHEN

Min Readings = 14

Max Readings = 14

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.60	0.00
2	1.01	2.00	70.00
3	1.51	2.90	31.03
4	2.01	3.10	6.45
5	2.51	3.50	11.43
6	3.01	3.80	7.89
7	3.51	4.10	7.32
8	4.01	4.40	6.82
9	4.50	4.70	6.38
10	5.00	4.90	4.08
11	5.50	5.30	7.55
12	6.00	5.50	3.64
13	6.50	5.80	5.17
14	7.00	6.10	4.92

BEST AVAILABLE COPY

BLANK VALUE = 4.5 micrograms carbon

BLANK FACTOR = 4.5 / 7.003967 =

+6.4E-01 ug/min Carbon

SAMPLE RESULTS:

(6.1 - 4.499412)(1.1)/(200) =

+8.8E-03 g/L Carbon

(6.1 - 4.499412)(1.1)/(200)(12) =

+7.3E-04 Molar Carbon

Sample Run By:

Rodriguez Achen
RG ACHEN

10/20/93

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No G 747.-5726	Sample Point 102 90 DAY	Date 11-22-93	Time Issued 12:52	Priority 26
Determination TOC	Method Standard LA-344-105	Result Units UG C/ML	Charge Code VOGEL	Reruns 0
Sample Size ? 2ml - .200 - .200 ml			Customer ID A-8	
Remarks, Calculations, Results $7.1 \text{ E-}3 \text{ g/L} \cdot 1000000 \mu\text{g/g} \cdot \frac{1}{1000 \text{ mL}} = 7.1 \mu\text{g C/mL}$ <p>RWS 12-10-93</p> <p><i>Danica Bates</i></p>				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 12-8-93	Time Completed 1300	Lab Unit Mgr RWS 12-10-93	E. Cantores	

54-6800-061 (R-10-83)

Serial No G 748.-5726	Sample Point 102 90 DAY	Date 11-22-93	Time Issued 12:54	Priority 26
Determination TOC	Method Standard LA-344-105	Result Units UG C/ML	Charge Code VOGEL	Reruns 0
Sample Size ? 2ml - .200 → .200 ml			Customer ID B-8	
Remarks, Calculations, Results $7.1 \text{ E-}3 \text{ g/L} \cdot 1000000 \mu\text{g/g} \cdot \frac{1}{1000 \text{ mL}} = 7.1 \mu\text{g C/mL}$ <p>RWS 12-10-93</p> <p><i>Danica Bates</i></p>				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
Hrs	Hrs	Hrs	Hrs	Hrs
Date 12-8-93	Time Completed 1300	Lab Unit Mgr RWS 12-10-93	E. Cantores	

54-6800-061 (R-10-83)

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WHC-SD-WM-DP-054 REV O

TOTAL ORGANIC CARBON ANALYSIS - UNDIGESTED SAMPLE

Serial No	Sample Point	Date	Time Issued	Priority
G 749.-5726	102 90 DAY	11-22-93	12:55	26
Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	UG C/ML	VOGEL	0
Sample Size	Customer ID			
? 2 ml - .200 → .200 ml	C-8			
Remarks, Calculations, Results				
<p>9.3 $9.3 \times 10^{-3} \text{ g/L} \cdot 1000000 \text{ } \mu\text{g/g} \cdot \frac{1 \text{ L}}{1000 \text{ mL}} = 9.3 \text{ } \mu\text{g C/ML}$ RWS 12-10-93 RWS 12-10-93</p>				
Daniel Bates				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
			E. Cantor	
Hrs	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr	12-10-93	
12-8-93	1300	RWS Schroeder	E. Cantor	

54-6800-061 (R-10-83)

Serial No	Sample Point	Date	Time Issued	Priority
G 750.-5726	102 90 DAY	11-22-93	12:55	26
Determination	Method Standard	Result Units	Charge Code	Reruns
TOC	LA-344-105	UG C/ML	VOGEL	0
Sample Size	Customer ID			
? 2 ml - .200 → .200 ml	D-8			
Remarks, Calculations, Results				
<p>1.5E-2 g/L · 1000000 μg/g · 1L/1000mL = 1.5E1 μg C/ML</p>				
Daniel Bates				
Analyst - 1	Analyst - 2	Analyst - 3	Analyst - 4	Analyst - 5
			E. Cantor	
Hrs	Hrs	Hrs	Hrs	Hrs
Date	Time Completed	Lab Unit Mgr	12-10-93	
12-8-93	1300	RWS Schroeder	E. Cantor	

54-6800-061 (R-10-83)

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WHC-SD-WM-DP-054 REV 0

TDC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 0745

Date: 12/08/93

Time: 11:32:40

Sample Size = 200 uL
Dil Factor = 11
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.00	0.00
2	1.01	1.50	100.00
3	1.51	27.10	94.46
4	2.01	41.50	34.70
5	2.51	47.60	12.82
6	3.01	50.30	5.37
7	3.51	51.50	2.53
8	4.01	52.20	1.34
9	4.51	52.80	1.14
10	5.01	53.30	0.94
11	5.51	53.70	0.74
12	6.01	53.90	0.37
13	6.51	54.30	0.74
14	7.00	54.40	0.18

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SIGNATURE BELOW REPRESENTS CHEMICAL TECHNOLOGIST/CHEMIST THAT COMPLETED/VERIFIED THE CALIBRATION/ANALYSIS ON PAGES 974 TO 971.

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = $3.1 / 7.004028 = +4.4E-01$ ug/min Carbon

SAMPLE RESULTS:
(54.4 - 3.100351)(11)/(200) = +2.82E+00 g/L Carbon
(54.4 - 3.100351)(11)/(200)(12) = +2.35E-01 Molar Carbon

Sample Run By:

Jamie Bates
TB BATES

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0
<<< BLANK ANALYSIS >>>

Sample: BLK

Date: 12/08/93

Time: 11:23:06

Sample Size = 200 uL
Dil Factor = 1
Blank ID # = BLK
Blank Value = N/A

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.00	0.00
2	1.01	0.20	100.00
3	1.51	0.70	71.43
4	2.00	1.10	36.36
5	2.50	1.30	15.38
6	3.00	1.50	13.33
7	3.50	1.70	11.76
8	4.00	2.00	15.00
9	4.50	2.20	9.09
10	5.00	2.40	8.33
11	5.50	2.50	4.00
12	6.00	2.70	7.41
13	6.50	2.80	3.57
14	7.00	3.10	9.68

BEST AVAILABLE COPY

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 =

+4.4E-01 ug/min Carbon

< 5.50 mg/ml

Sample Run By:

Jamie Bates
TB BATES

977

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: U 247

Date: 12/02/93

Time: 12:21:33

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis	Time	Coulometer	% Difference
1	0.51		0.20	
2	1.01		0.40	0.00
3	1.51		0.80	50.00
4	2.01		1.20	50.00
5	2.51		1.30	33.33
6	3.01		1.60	7.69
7	3.51		1.90	18.75
8	4.01		1.90	15.79
9	4.50		2.10	0.00
10	5.00		2.40	9.52
11	5.50		2.50	12.50
12	6.00		2.90	4.00
13	6.50		2.90	13.79
14	7.00		3.10	0.00
				6.45

BEST AVAILABLE COPY

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 =

+4.4E-01 ug/min Carbon

SAMPLE RESULTS:

(3.1 - 3.1) (1.1) / (200) =
(3.1 - 3.1) (1.1) / (200) (12) =

RWS
12-10-93
 $\frac{< 5.50}{3.00}$
 $\frac{< 4.17}{< 4.17}$

E-3 g/L Carbon
E-4 Molar Carbon

Sample Run By:

Tania Bates
TB BATES

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: B 748

Date: 12/08/93

Time: 11:30:01

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.20	0.00
2	1.01	0.50	60.00
3	1.51	1.40	64.29
4	2.01	2.10	33.33
5	2.51	2.50	16.00
6	3.01	2.90	13.79
7	3.51	2.90	0.00
8	4.00	3.10	6.45
9	4.50	3.40	8.82
10	5.00	3.80	10.53
11	5.50	3.80	0.00
12	6.00	4.00	5.00
13	6.51	4.40	9.09
14	7.00	4.40	0.00

BEST AVAILABLE COPY

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = $3.1 / 7.004028 =$

+4.4E-01 ug/min Carbon

SAMPLE RESULTS:

(4.4 - 3.100351) (1.1) / (200) =
(4.4 - 3.100351) (1.1) / (200) (12) =

+7.1E-03 g/L Carbon
+6.0E-04 Molar Carbon

Sample Run By:

Danica Bates
TB BATES

WHC-SD-WM-DP-054 REV 0

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sampler: 0749

Date: 12/08/93

Time: 12:40:24

Sample Size = 200 uL

Analyst : TB BATES

Dil Factor = 1.1

Min Readings = 14

Blank ID # = BLK

Max Readings = 14

Blank Value = .4426024 ug/minute C

% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.60	83.33
3	1.51	1.90	68.42
4	2.01	2.30	17.39
5	2.51	2.70	14.81
6	3.01	3.10	12.90
7	3.51	3.30	6.06
8	4.01	3.50	5.71
9	4.51	3.70	5.41
10	5.01	3.90	5.13
11	5.51	4.20	7.14
12	6.01	4.40	4.55
13	6.51	4.80	8.33
14	7.00	4.80	0.00

BEST AVAILABLE COPY

BLANK VALUE = 3.1 micrograms carbon

BLANK FACTOR = 3.1 / 7.004028 =

+4.4E-01 ug/min Carbon

SAMPLE RESULTS:

(4.8 - 3.100351) (1.1) / (200) =

+9.3E-03 g/L Carbon

(4.8 - 3.100351) (1.1) / (200) (12) =

+7.8E-04 Molar Carbon

Sample Run By:

Dania Bates

TB BATES

980

WHC-SD-WM-DP-054 REV O

TOC- TOTAL ORGANIC CARBON ANALYSIS REPORT
TICTOC REV 2.0

Sample: 6750

Date: 12/08/95

Time: 12:48:53

Sample Size = 200 uL
Dil Factor = 1.1
Blank ID # = BLK
Blank Value = .4426024 ug/minute C

Analyst : TB BATES
Min Readings = 14
Max Readings = 14
% Difference = 10

Reading	Analysis Time	Coulometer	% Difference
1	0.51	0.10	0.00
2	1.01	0.60	83.33
3	1.51	2.20	72.73
4	2.01	3.10	29.03
5	2.51	3.60	13.89
6	3.01	3.90	7.69
7	3.51	4.40	11.36
8	4.01	4.60	4.35
9	4.51	4.80	4.17
10	5.01	5.00	4.00
11	5.51	5.20	3.85
12	6.01	5.40	3.70
13	6.51	5.60	3.57
14	7.00	5.80	3.45

BEST AVAILABLE COPY

BLANK VALUE = 3.1 micrograms carbon
BLANK FACTOR = 3.1 / 7.004028 =

+4.4E-01 ug/min Carbon

SAMPLE RESULTS:

(5.8 - 3.100378)(1.1)/(200) =
(5.8 - 3.100378)(1.1)/(200)(12) =

+1.5E-02 g/L Carbon
+1.2E-03 Molar Carbon

Sample Run by:

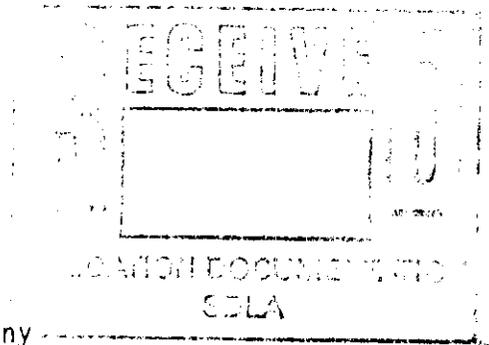
Danica Bates
TB BATES

981

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APPENDUM 1A

DATA VALIDATION REPORT
for the
GROUT PRODUCT TESTS
of
TANK 241-AP-102
(Physical, Inorganic, and Radiochemical Data)



Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

January 6, 1994

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ADDENDUM 1A

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This document consists of pages 1A-1 through 1A-73, plus pages 10.1 and 11.1 and pages 2, 10.1, 11.1, 19, 21, 27, and 29 are intentionally left blank.

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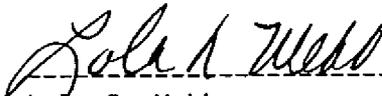
WHC-SD-WM-DP-054 REV 0

ADDENDUM 7A

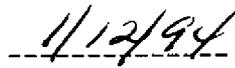
This document has under gone two or three pagination processes. Two are from WHC, one is from PNL and one is from HASM.

The different formats are identified as follows:

- | | Number Series |
|----|--|
| 1) | WHC 1, 2, 3 etc |
| 2) | WHC 1A-1, 1A-2, etc (for 222-S & PNL Addendums to original Document) |
| 3) | HASM 000006, 000007 etc |
| 4) | PNL B01-001, B02-002 etc |



Lofa R. Webb
Records Management Specialist



Date

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ADDENDUM 1A

VALIDATION NARRATIVE

1A-1

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ADDENDUM 1A

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1A:2

Grout Product Tests for Tank 241-AP-102

Validation of the inorganic and radiochemical data associated with the Grout Product Tests for Tank 241-AP-102 (102-AP) was performed according to RCRA Level B requirements as depicted in Section 2.0, of WHC-CM-5-3, Rev. 0.

The primary objective of the data validation effort was to ensure the usability and defensibility of the data produced for the project. This was accomplished through a detailed examination of the data package to recreate the analytical process and verify that proper and acceptable analytical techniques had been applied. The data package was checked for correct submission of required deliverables, correct transcription of raw data to the summary forms, and for proper calculation of a number of parameters. An overall assessment of the data is provided on the Data Assessment Summary Form as required by WHC-CM-5-3. Assessments of individual quality control checks performed by the laboratory are located with the Data Assessment Summary Forms.

Data qualifiers are assigned to any results that have been determined to be deficient. If required, the following data qualifiers are added by the data validator to the laboratory data summary to signify the nature and magnitude of a deficiency:

- U Indicates the compound or analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for sample dilution and moisture content by the laboratory.
- UJ This qualifier indicates that the analyte was analyzed for and not detected. Since a quality control deficiency has been identified during the validation process, the value reported may not accurately reflect the sample detection limit.
- J Indicates the compound or analyte was analyzed for and detected. The associated value is estimated but the data is usable for decision making purposes.
- R Indicates the analyte was analyzed for and found to be unusable due to significant quality control deficiencies.

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ADDENDUM 1A

Data Validation Narrative

Analyses Performed

Waste from the 241-AP-102 (102-AP) tank was combined with Type II Portland cement, attapulgite clay, and class F fly ash in order to generate grout samples. Several analyses investigating the physical properties of the grout mixtures were conducted and included rheology, compressive strength, and pulse velocity tests. Most of the quality control requirements associated with data validation do not apply to analyses designed to examine physical characteristics, and these tests were only briefly discussed within the Data Assessment Summary Forms.

The Toxicity Characteristics Leaching Procedure (TCLP) was performed on five grout specimens composed from 102-AP tank waste and one made from water; the resulting leachate samples were then evaluated for chromium. Three grout specimens comprised of 102-AP tank waste and one composed from water were subjected to five-day and ninety-day leach tests, and the ensuing leachate accumulated during specific time intervals was analyzed for pH, nitrite, nitrate, Am-241, Tc-99, and TOC.

MAJOR DEFICIENCIES (REJECTED DATA)

- Americium-241 results which were calculated from low tracer recoveries were qualified as unusable.

MINOR DEFICIENCIES

- The Tc-99 results associated with all samples except G720, G721, G722, and G723 were qualified due to either inadequate duplicate data, unacceptable spike recoveries, or both.
- The TOC results corresponding to the following samples were determined to be non-detect as a consequence of blank contamination: G597-G600, G602, G606-G610, and G630-G634.
- The TOC values derived from the following samples were considered to be estimated due to inadequate duplicate data: G699-G701, G721-G723, and G748-G750.

REPORTING INFORMATION

The laboratory reported all of the results in tables which immediately follow the Westinghouse Case Narrative, and the sample numbers corresponding to the data listed in Tables 6-11 are identified by the grid in Table 5. The data associated with samples G698-G701, G720-G723, and G747-G750 were also listed on the Sample Data Summary sheets; as a consequence, qualifiers were inscribed on both the data tables and the Sample Data Summary sheets. Therefore, several sample results and their respective qualifiers are reported in duplicate.



CASE NARRATIVE

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Grout Product Tests
for
Tank 241-AP-102

ADDENDUM 3A

INTRODUCTION

On 4/28/93 grout feed Tank 241-AP-102 (102-AP) was sampled for a full characterization under the protocol listed in Hanford Grout Disposal Program-Campaign 102 Feed Characterization and Test Plan, WHC-SD-WM-TP-136, and Technical Project Plan for The 222-S Laboratory in Support of The Grout Treatment Facility Sampling and Characterization Plans for Tanks 105-AP, 106-AP, and 102-AP, WHC-SD-WM-TPP-008.

The results of the inorganic and radiochemical constituents are reported in WHC-SD-WM-DP-046, Revision 0. The organic analyses were performed by PNL. The grout treatment tests specified in the test plan were performed by the Process Chemistry Laboratory (PCL) and 222-S Analytical Operations (222-S). This data package reports the results of the grout product tests.

RHEOLOGY

Since the waste in 102-AP was determined to be homogeneous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared using equal volumes of each of the 15 samples (field duplicates were not included). The dry blend, which was mixed with 102-AP waste, consisted of three components (Type II Portland cement (21%), attapulgite clay (11%), and class F fly ash (68%)).

Grout was prepared by blending seventy-five mL of the composite (102-AP waste) with 75.5 grams (g) of the dry blend (8.4 pounds per gallon) for two minutes using a separatory funnel mixer in the hot cell. The relative weight percent of each dry blend component and the mix time were recorded by PCL in laboratory notebook WHC-N-583. Two additional grout specimens were prepared using water for the liquid.

Several grout mixtures were prepared and the density, using the procedure specified in the test plan, was determined for each grout mixture. The viscosity, critical flow rate, and frictional pressure drop for each grout mixture were determined using procedure LA-519-174. The 10 minute gel strength for each grout mixture was determined using procedure LA-519-175. The drainable liquid for each grout mixture was determined using procedure LA-519-176. A Brookfield standard oil with a value of 95 centipoise was used as the standard for the viscometer. The standard results varied between 86.5 and 96.5 centipoise.

Results of the rheology tests are reported in laboratory notebook WHC-N-583 and listed in Table 1.

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The summary statistics for the rheology properties are as follows.

- The mean density for the seven grout mixtures made using 102-AP waste is 13.23 pounds per gallon (lb/gal) with a standard deviation of 0.16 lb/gal. The mean density for the water grout mixtures is 11.34 lb/gal with a standard deviation of 0.35 lb/gal.
- The mean viscosity for the seven grout mixtures made using 102-AP waste is 28.3 centipoise (cP) with a standard deviation of 5.0 cP. The mean viscosity for the water grout mixtures is 9.8 cP with a standard deviation of 1.1 cP.
- The mean critical flow rate for the seven grout mixtures made using 102-AP waste is 31.4 gallons per minute (gpm) with a standard deviation of 4.4 gpm. The upper limit of a one-sided 95% confidence interval for the mean is 34.6 gpm. One of the criteria for processing (Riebling and Fadeff, 1991) is that the critical flow rate be ≤ 60 gpm. This grout product has a mean critical flow rate well below this limit. The mean critical flow rate for the water grout mixtures is 19.4 gpm with a standard deviation of 2.0 gpm.
- The mean frictional pressure drop for the seven grout mixtures made using 102-AP waste is 2.49 pounds force per square inch (psi) with a standard deviation of 0.73 psi. The upper limit of a one-sided 95% confidence interval for the mean is 3.02 psi. One of the criteria for processing (Riebling and Fadeff, 1991) is that the frictional pressure drop be ≤ 14 psi. This grout product has a mean frictional pressure drop value well below this limit. The mean frictional pressure drop for the water grout mixtures is 0.82 psi with a standard deviation of 0.20 psi.
- The mean 10-minute gel strength for the seven grout mixtures made using 102-AP waste is 13.2 pounds force per one hundred square feet ($lb_f/100 ft^2$) with a standard deviation of 0.2 $lb_f/100 ft^2$. The upper limit of a one-sided 95% confidence interval for the mean is 13.4 $lb_f/100 ft^2$. One of the criteria for processing (Riebling and Fadeff, 1991) is that the 10-minute gel strength be $\leq 100 lb_f/100 ft^2$. This grout product has a mean 10-minute gel strength value well below this limit. The mean 10-minute gel strength for the water grout mixtures is 13.4 $lb_f/100 ft^2$ with a standard deviation of 0.2 $lb_f/100 ft^2$.

After the rheology measurements were obtained the grout specimens were placed in a programmable oven and cured to a maximum temperature of 65 °C. The curing oven was programmed to simulate the adiabatic temperature rise specified in the test plan. The quantity of drainable liquid was to be estimated after one day of curing and after 15 days of curing by single visual observations. Since it was not possible to get into the curing oven in the hot cell, these observations were not performed. After the grout specimens were cured for 28 days, the specimens were removed from their container and the quantity of drainable liquid determined. No drainable liquid was observed in any of the grout specimens and therefore no drainable liquid samples were sent to 222-S Laboratory for analysis.

Pulse velocity measurements were obtained on five grout specimens (made with 102-AP waste) using procedure LA-519-181. The pulse velocity readings varied from 2176 to 2477 meter per second (m/s). The pulse velocity readings for the water grout specimens were 978 and 1102 m/s. The pulse velocity measurements are listed in Table 2.

The compressive strength instrument was calibrated using a calibrated load cell and the calibration equation was calculated and reported in laboratory notebook WHC-N-583. Compressive strength measurements were then obtained for five grout specimens (the same specimens used for the pulse velocity measurements). These measurements are recorded in the laboratory notebook and are listed in Table 2.

The mean compressive strength is 1064 psi with a standard deviation of 521 psi. The lower limit of a one-sided 95% confidence interval for the mean is 568 psi. The NRC guideline for compressive strength is ≥ 60 psi (NRC, 1991) with a recommendation of ≥ 500 psi (NRC, 1993). This grout product has a mean greater and the associated lower limit of a one-sided 95% confidence interval for the mean greater than this criteria.

The compressive strength measurement for one of the water grout specimens was 359 psi. The second specimen cracked prior to the compressive strength measurement. It is postulated that the water grout specimens have lower compressive strength than those of the 102-AP waste grout specimens because there is more H₂O per gallon of water than H₂O per gallon of waste.

Toxicity Characteristics Leach Procedure (TCLP)

After the compressive strength measurements were completed, five grout specimens (made with 102-AP waste) and one grout specimen (made with water) were prepared for the TCLP tests through particle size reduction according to procedure LA-544-131. The analysis of 102-AP waste (see Table 3) showed Cr as the only hazardous metal that exists in concentration (630 mg/L) exceeding 20 times the TCLP limit (5 milligram per liter [mg/L]). The concentrations of the other metals (As, Ba, Cd, Pb, Hg, Se, and Ag) were lower than 20 times the corresponding limits. Thus, according to recent guideline from EPA (EPA, 1993), only Cr in the TCLP leachate samples was required to be analyzed.

The Cr was analyzed using the ICP procedure LA-505-151. The TCLP leachate samples were analyzed twice. The first measurement used a modification to the TCLP procedure where the spike was added after the preservation. The second measurement followed the TCLP procedure where the spike was added before the preservation.

Seven samples were submitted to 222-S laboratory for Cr analysis, one was an acid blank, one was from a grout mixture using water, and five were from grout mixtures using 102-AP waste. For the Cr analysis, both the beginning and ending laboratory measurement control system (LMCS) standards were within the control limits. The spike recovery for the sample with the spike added after the preservation was 90.4%, which is within limits. The spike recovery for the sample with the spike added before the preservation was 100.9%, which is within limits. The data are listed in Table 4.

The mean TCLP Cr value (spike added after the preservation) for the samples associated with 102-AP waste was 9.70E-02 mg/L with a standard deviation of

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9.92E-03 mg/L. The upper limit of a 95% confidence interval for the mean is 1.06E-01 mg/L. The criteria (EPA, 1989) for Cr is 5 mg/L. Thus, the grout TCLP leachate Cr concentration is below the limit.

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The maximum TCLP Cr value (spike added before the preservation) observed for the samples associated with 102-AP waste was 1.4E-01 mg/L. The maximum value for the TCLP leachate Cr concentration is below the limit.

The TCLP Cr value for the sample associated with the water grout specimen is < 1.1E-01 mg/L. The spike recovery for this sample was 88.9%. The Cr value for the acid blank was 5.70E-02 mg/L.

ANSI 16.1 LEACHATE TEST

Four grout specimens (one made with water and three made with waste) were prepared for ANSI 16.1 leach testing (NRC, 1991b). The results of the 90-day ANSI leach indices are presented in this document.

The ANSI samples were submitted to 222-S laboratory for analysis of NO_2^- , NO_3^- , ^{241}Am , ^{99}Tc , TOC, and pH. The ANSI samples were not analyzed for ^{129}I because it was not detected in the 102-AP waste samples. The ANSI sample numbers are listed in Table 5. The IC analyses were performed using procedure LA-533-105, Rev. C-0. Americium-241 analysis is performed using procedures LA-503-156, Rev. D-0 and LA-508-051, Rev. A-3. Technetium-99 analyses were performed using procedure LA-438-101, Rev. D-1. The TOC analyses were performed using procedure LA-344-105, Rev. B-2. The pH analyses were performed using procedure LA-212-102, Rev. C-5. The analytical results from the ANSI samples are listed in Tables 6, 7, 8, 9, 10, and 11.

The laboratory values (except for pH) were put into a spreadsheet which calculated the leach index. For those samples where the analytical result was given as a "less than" value, the "less than" value itself was used in the spreadsheet. Therefore, the actual leach index is expected to be greater than the value obtained from the spreadsheet calculations.

The NO_2^- leach indices for the three grout specimens made with the 102-AP waste are 8.0, 8.1, and 7.6 (see Tables 12, 13, and 14). The mean leach index is 7.90 with a standard deviation of 0.26 (RSD = 3.3%). The lower limit of a one-sided 95% CI for the mean is 7.45. The criterion (Riebling and Fadeff, 1991) is 6.0. Thus, the NO_2^- grout leachate value is above the limit.

The NO_3^- leach indices for the three grout specimens made with the 102-AP waste are 8.4, 8.5, and 8.0 (see Tables 15, 16, and 17). The mean leach index is 8.30 with a standard deviation of 0.26 (RSD = 3.1%). The lower limit of a one-sided 95% CI for the mean is 7.85. The criterion (Riebling and Fadeff, 1991) is 6.0. Thus, the NO_3^- grout leachate value is above the limit.

Since "less than" analytical results existed for the leachate samples, the ^{99}Tc leach index is a "greater than" value. The leach indices for the three grout specimens made with the 102-AP waste are > 7.3, 8.2, and > 7.2 (see Tables 18, 19, 20). Summary statistics were not calculated due to the "greater than" values.

Since "less than" analytical results (detection limits) existed for the ^{241}Am leachate samples, the leach index is a "greater than" value. The leach indices for the three specimens made with the 102-AP waste are > 5.3, > 5.7,

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ADDENDUM 1A

and > 5.7 (see Tables 21, 22, and 23). Summary statistics were not calculated due to the "greater than" values. Since all but one analytical result were below the detection limit, the three leach indices may not be meaningful because the actual leach index for ²⁴¹Am may be much higher.

Since "less than" analytical results existed for the TOC leachate samples, the leach index is a "greater than" value. The leach indices for the three specimens made with the 102-AP waste are > 7.7, > 7.8, and > 7.7 (see Tables 24, 25, and 26). Summary statistics were not calculated due to the "greater than" values.

A. P. Hammitt
A. P. Hammitt
Advanced Scientist

12-16-93

R. A. St Denis
R. A. St. Denis
Senior Scientist

12-16-93

T. L. Welsh
T. L. Welsh
Senior Statistician

12-16-93

REFERENCES

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

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ADDENDUM 17

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ADDENDUM 1A

DATA SUMMARY TABLES

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ADDENDUM 1A

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WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Table 1. 102-AP Rheology Results.

Grout sample	Density (lb/gal)	Viscosity (cP)	Critical flow rate (gpm)	Frictional pressure drop (psi)	10 Minute gel strength (lb _c /100 ft ²)
Water - 1	11.09	9.053	17.957	0.679	NA
Water - 2	11.59	10.581	20.825	0.955	13.53
102AP - 1	13.03	24.696	30.378	2.284	13.36
102AP - 2	13.14	30.112	34.272	2.931	13.43
102AP - 3	13.28	32.395	34.453	2.994	12.96
102AP - 4	13.13	35.398	38.238	3.646	12.82
102AP - 5	13.43	NA	NA	NA	NA
102AP - Gas1	13.25	23.759	26.679	1.791	13.34
102AP - Gas2	13.11	22.835	26.605	1.632	NA
102AP - Gas3	13.50	27.636	28.989	2.155	13.29
Summary statistics for the 102-AP grout samples					
N	8	7	7	7	6
mean	13.23	28.262	31.373	2.490	13.20
standard deviation	0.16	4.992	4.406	0.726	0.248
UL-95% CI mean	13.34	31.928	34.609	3.023	13.404
criterion	None	None	≤ 60	≤ 14	≤ 100

ADP
1-7-94

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Table 2. 102-AP Compressive Strength/Pulse Velocity Results.

Grout sample	Compressive strength (psi)	Pulse velocity (m/s)
102-AP - 1	1887	2304
102-AP - 2	753	2176
102-AP - 3	953	2457
102-AP - 4	1196	2477
102-AP - 5	533	2387
Water - 1	NA	978
Water - 2	359	1102
Summary statistics for the 102-AP grout samples		
N	5	required criterion ≥ 60 psi
mean	1064.4 psi	recommended criterion ≥ 500 psi
standard deviation	521.0 psi	
LL 95% CI - mean	567.6 psi	

ASD
1-7-99

Table 3. Concentration of Hazardous Metals in 102-AP Waste.

Analyte	Concentration limits	Required quantitation limits	Mean of the sample results () = number of observations
As	5 mg/L	0.5 mg/L	< 0.25 mg/L (3)
Ba	100 mg/L	10 mg/L	0.284 mg/L (13)
Cd	1 mg/L	0.1 mg/L	1.47 mg/L (15)
Cr	5 mg/L	0.5 mg/L	6.302 E2 mg/L (15)
Pb	5 mg/L	0.5 mg/L	< 1.55 mg/L (15)
Hg	0.2 mg/L	0.02 mg/L	< 0.01 mg/L (4)
Se	1 mg/L	0.1 mg/L	0.367 mg/L (9)
Ag	5 mg/L	0.5 mg/L	< 0.125 mg/L (15)

Table 4. 102-AP Grout TCLP Cr Leachate Results.

TCLP Cr results				
Sample numbers.			Cr result (µg/mL or mg/L)	
Type	AP	BP	Spike added after preservation	Spike added before preservation
(Reagent)	G679	G734	5.70E-02	< 1.1E-01
(Water Grout)	G680	G735	2.32E-01	1.48E-01
(102AP Grout)	G681	G728	9.50E-02 *	8.29E-02 * < 1.1E-01
(102AP Grout)	G682	G729	1.03E-01	< 1.1E-01
(102AP Grout)	G683	G731	1.10E-01	< 1.1E-01
(102AP Grout)	G684	G732	8.40E-02	1.4E-01
(102AP Grout)	G685	G733	9.30E-02	< 1.1E-01
Summary statistics (102AP grout samples)				
N			5	Maximum concentration is 1.4E-01
mean			9.70E-02	
standard deviation			9.92E-03	
UL 95% CI - mean			1.06E-01	

AP: Spike added after the preservation.
 BP: Spike added before the preservation.
 *: Spike was added to this sample.

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PSD

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WHC-SD-WM-DP-054 REV O

Table 5. 102-AP Grout ANSI Sample Numbers. ^{ADDENDUM 1A}

Sample numbers				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0 (Wash)	G597	G608	G622	G633
1 (2 Hours)	G598	G609	G623	G634
2 (7 Hours)	G599	G610	G624	G637
3 (24 Hours)	G600	G614	G625	G638
4 (48 Hours)	G601	G615	G626	G639
5 (72 Hours)	G602	G616	G630	G640
6 (96 Hours)	G606	G617	G631	G641
7 (120 Hours)	G607	G618	G632	G642
8 (456 Hours)	G747	G748	G749	G750
9 (1128 Hours)	G698	G699	G700	G701
10 (2160 Hours)	G720	G721	G722	G723

Table 6. 102-AP Grout ANSI pH Results.

pH				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	1.07E+01	9.44E+00	8.49E+00	8.15E+00
1	1.06E+01	9.87E+00	9.94E+00	1.05E+01
2	1.04E+01	9.81E+00	9.82E+00	9.75E+00
3	1.08E+01	1.00E+01	9.45E+00	9.99E+00
4	1.08E+01	1.02E+01	1.01E+01	1.02E+01
5	1.06E+01	1.01E+01	1.03E+01	1.01E+01
6	1.04E+01	1.01E+01	1.02E+01	1.01E+01
7	1.04E+01	1.00E+01	1.01E+01	1.00E+01
8	1.14E+01	1.11E+01	1.11E+01	1.11E+01
9	9.93E+00 9.37E+00	9.44E+00 9.91E+00	1.10E+01 1.09E+01	1.10E+01 1.10E+01
10	1.12E+01	1.11E+01	1.11E+01	1.11E+01

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Table 7. 102-AP Grout ANSI NO₃⁻ Results.

NO ₃ ⁻ (µg/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< 1	7.91E+00	6.74E+00	1.57E+01
1	< 1	3.64E+01	4.51E+01	5.74E+01
2	< 1	2.29E+01	2.78E+01	4.36E+01
3	< 1	4.27E+01	5.24E+01	8.27E+01
4	< 1	3.79E+01	4.91E+01	7.42E+01
5	< 1	2.88E+01	3.67E+01	5.43E+01
6	< 1	2.46E+01	3.16E+01	4.70E+01
7	< 1	2.10E+01	2.75E+01	3.93E+01
8	< 1	2.03E+02	2.43E+02	3.35E+02
9	< 1	1.99E+02	2.00E+02	2.45E+02
10	< 1	1.56E+02	1.41E+02	1.50E+02

Table 8. 102-AP Grout ANSI NO₃⁻ Results.

NO ₃ ⁻ (µg/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< 1	1.07E+01	9.03E+00	2.25E+01
1	< 1	4.69E+01	5.73E+01	7.37E+01
2	< 1	3.01E+01	3.63E+01	5.47E+01
3	< 1	5.42E+01	6.56E+01	1.03E+02
4	< 1	4.86E+01	6.18E+01	9.12E+01
5	< 1	3.70E+01	4.70E+01	6.83E+01
6	< 1	3.19E+01	4.11E+01	5.94E+01
7	< 1	2.76E+01	3.64E+01	5.00E+01
8	< 1	2.66E+02	3.17E+02	4.54E+02
9	< 1	2.63E+02	2.69E+02	3.43E+02
10	< 1	2.12E+02	1.92E+02	2.14E+02

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Table 9. 102-AP Grout ANSI ⁹⁹Tc Results.

⁹⁹ Tc (μCi/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< ^{UJ} 1.47E-05	^J 2.23E-05	^J 3.20E-05	^J 3.40E-05
1	< ^{UJ} 1.45E-05	^J 7.64E-05	^J 9.40E-05	^J 1.22E-04
2	< ^{UJ} 1.45E-05	^J 4.16E-05	^J 5.27E-05	< ^{UJ} 2.80E-04
3	< ^{UJ} 1.45E-05	^J 4.70E-04	^J 9.07E-05	^J 4.50E-04
4	< ^{UJ} 1.46E-05	^J 5.69E-04	^J 8.55E-05	^J 3.31E-04
5	< ^{UJ} 1.53E-05	< ^{UJ} 3.00E-04	^J 7.48E-05	< ^{UJ} 2.84E-04
6	< ^{UJ} 9.26E-06	^J 3.32E-04	^J 7.22E-05	< ^{UJ} 2.79E-04
7	< ^{UJ} 9.56E-06	^J 3.60E-04	^J 5.85E-05	< ^{UJ} 2.84E-04
8	< ^{UJ} 1.06E-05	^J 3.73E-04	^J 4.12E-04	^J 6.08E-04
9	< ^{UJ} 8.14E-06	^J 3.94E-04	^J 3.79E-04	^J 4.64E-04
10	< 7.07E-06	3.16E-04	2.84E-04	3.11E-04

Table 10. 102-AP ANSI ²⁴¹Am Results.

²⁴¹ Am (μCi/mL)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	< ^R 6.37E-06	< ^R 6.37E-06	< ^R 6.37E-06	< 1.27E-05
1	< ^R 6.37E-06	< 6.37E-06	< ^R 6.37E-06	< ^R 1.27E-05
2	< ^R 6.37E-06	< ^R 6.37E-06	< ^R 6.37E-06	< ^R 6.37E-06
3	< ^R 6.37E-06	< 1.27E-05	< 6.37E-06	< 6.37E-06
4	< ^R 6.37E-06	< ^R 1.27E-05	< 6.37E-06	< 6.37E-06
5	< ^R 6.37E-06	< ^R 1.27E-05	< ^R 1.27E-05	< 6.37E-06
6	< ^R 6.37E-06	< 1.27E-05	< 1.27E-05	^R 7.64E-06
7	< ^R 6.37E-06	< ^R 1.27E-05	< ^R 1.27E-05	< 6.37E-06
8	< ^R 3.40E-05	< ^R 3.40E-05	^R 5.48E-05	< ^R 3.40E-05
9	< ^R 1.27E-05	< 1.27E-05	< 1.27E-05	< 1.27E-05
10	< 1.27E-05	< 1.27E-05	< ^R 1.27E-05	< ^R 1.27E-05

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ADDENDUM 1A
Table 11. 102-AP Grout ANSI TOC Results.

TOC ($\mu\text{g/mL}$)				
Time period	Water grout sample	102AP grout sample 1	102AP grout sample 2	102AP grout sample 3
0	4.07E+01 ^U	1.20E+01 ^U	< 5.50E+00	7.70E+00 ^U
1	6.33E+01 ^U	7.70E+00 ^U	< 5.50E+00	9.40E+00 ^U
2	2.81E+01 ^U	7.70E+00 ^U	< 5.50E+00	< 5.50E+00
3	5.50E+00 ^U	< 5.50E+00	< 5.50E+00	< 5.50E+00
4	< 5.50E+00	< 5.50E+00	< 5.50E+00	< 5.50E+00
5	5.50E+00 ^U	< 5.50E+00	1.60E+01 ^U	< 5.50E+00
6	1.90E+01 ^U	< 5.50E+00	8.20E+00 ^U	< 5.50E+00
7	1.40E+01 ^U	< 5.50E+00	5.50E+00 ^U	< 5.50E+00
8	< 5.00E+00	7.10E+00 ^J	9.30E+00 ^J	1.50E+01 ^J
9	< 5.50E+00	< 5.50E+00 ^{UJ}	7.70E+00 ^J	1.10E+01 ^J
10	< 5.50E+00	< 5.50E+00 ^{UJ}	7.15E+00 ^J	8.8 E+00 ^J

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ADDENDUM 1A

SAMPLE DATA SUMMARY

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pH

RESULTS		QC RESULTS		QC ID INFO.	
ID:	SAMPLE	BEGIN STC % REC	BLANK	BEGIN STC ID:	BLANK I.D.
G698	9.37	100.20	NA	G696	NA
G699	9.91	100.20	NA	G696	NA
G700	10.92	100.20	NA	G696	NA
G701	11.02	100.20	NA	G696	NA
G720	11.17	101.00	NA	G718	NA
G721	11.09	101.00	NA	G718	NA
G722	11.05	101.00	NA	G718	NA
G723	11.14	101.00	NA	G718	NA
G747	11.44	100.10	5.50	G745	G746
G748	11.12	100.10	5.50	G745	G746
G749	11.11	100.10	5.50	G745	G746
G750	11.11	100.10	5.50	G745	G746

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ION CHROMATOGRAPHY

RESULTS			QC RESULTS		QC ID INFO.	
ID	ANALYTE	SAMPLE	BEG STD	BLANK	BEG STD	BLANK
		ug/ml	% REC	ug/ml	ID:	I.D.
G698	NO2	<1.0E+00	95.86	<1.0E+00	G696	G697
G699	NO2	1.99E+02	95.86	<1.0E+00	G696	G697
G700	NO2	2.00E+02	95.86	<1.0E+00	G696	G697
G701	NO2	2.45E+02	95.86	<1.0E+00	G696	G697
G720	NO2	<1.0E+00	95.86	<1.0E+00	G718	G719
G721	NO2	1.56E+02	95.86	<1.0E+00	G718	G719
G722	NO2	1.41E+02	95.86	<1.0E+00	G718	G719
G723	NO2	1.50E+02	95.86	<1.0E+00	G718	G719
G747	NO2	<1.0E+00	98.66	<1.0E+00	G745	G746
G748	NO2	2.03E+02	98.66	<1.0E+00	G745	G746
G749	NO2	2.43E+02	98.66	<1.0E+00	G745	G746
G750	NO2	3.35E+02	98.66	<1.0E+00	G745	G746
G698	NO3	<1.0E+00	98.27	<1.0	G696	G697
G699	NO3	2.63E+02	98.27	<1.0	G696	G697
G700	NO3	2.69E+02	98.27	<1.0	G696	G697
G701	NO3	3.43E+02	98.27	<1.0	G696	G697
G720	NO3	<1.0E+00	97.93	<1.0	G718	G719
G721	NO3	2.13E+02	97.93	<1.0	G718	G719
G722	NO3	1.93E+02	97.93	<1.0	G718	G719
G723	NO3	2.15E+02	97.93	<1.0	G718	G719
G747	NO3	<1.0E+00	98.96	<1.0	G745	G746
G748	NO3	2.66E+02	98.96	<1.0	G745	G746
G749	NO3	3.17E+02	98.96	<1.0	G745	G746
G750	NO3	4.54E+02	98.96	<1.0	G745	G746

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RESULTS			QC RESULTS		QC ID INFO	
ID:	SAMPLE uci/ml		BEGIN STD % REC	BLANK uci/ml	BEGIN STD ID:	BLANK I.D.
R	G698	<1.27E-05	100.00	<1.27E-05	G696	G697
	G699	<1.27E-05	100.00	<1.27E-05	G696	G697
	G700	<1.27E-05	100.00	<1.27E-05	G696	G697
	G701	<1.27E-05	100.00	<1.27E-05	G696	G697
	G720	<1.27E-05	108.20	<1.27E-05	G178	G719
	G721	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G722	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G723	<1.27E-05	108.20	<1.27E-05	G178	G719
R	G747	<3.40E-05	122.80	<3.40E-05	G754	G746
R	G748	<3.40E-05	97.40	<3.40E-05	G754	G746
R	G749	5.48E-05	97.40	<3.40E-05	G754	G746
R	G750	<3.40E-05	122.80	<3.40E-05	G754	G746

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	RESULTS		QC RESULTS:		QC ID INFO.	
	ID:	SAMPLE	BEGIN STD % REC	BLANK uCi/ml	BEG STD ID:	BLANK I.D.
<i>UJ</i>	G698	<8.14E-06	95.90	<8.38E-06	G696	G697
<i>J</i>	G699	3.94E-04	95.90	<8.38E-06	G696	G697
<i>J</i>	G700	3.79E-04	95.90	<8.38E-06	G696	G697
<i>J</i>	G701	4.64E-04	95.90	<8.38E-06	G696	G697
	G720	<7.07E-06	89.60	1.47E-05	G718	G719
	G721	3.16E-04	89.60	1.47E-05	G718	G719
	G722	2.84E-04	89.60	1.47E-05	G718	G719
	G723	3.11E-04	89.60	1.47E-05	G718	G719
<i>UJ</i>	G747	<1.06E-05	103.10	8.78E-06	G745	G746
<i>J</i>	G748	3.73E-04	103.10	8.78E-06	G745	G746
<i>J</i>	G749	4.12E-04	103.10	8.78E-06	G745	G746
<i>J</i>	G750	6.08E-04	103.10	8.78E-06	G745	G746

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APPENDIX 1A

TOC

RESULTS		QC RESULTS		QC ID INFO	
ID:	SAMPLE ugC/mL	BEGIN STC % REC	BLANK ugC/mL	BEGIN STC ID:	BLANK I.D.
G698	<5.50E+00	95.00	<5.50E+00	G696	G697
G699	<5.50E+00	95.00	<5.50E+00	G696	G697
G700	7.70E+00	95.00	<5.50E+00	G696	G697
G701	1.10E+01	95.00	<5.50E+00	G696	G697
G720	<5.50E+00	96.00	<5.50E+00	G718	G719
G721	<5.50E+00	96.00	<5.50E+00	G718	G719
G722	7.15E+00	96.00	<5.50E+00	G718	G719
G723	8.80E+00	96.00	<5.50E+00	G718	G719
G747	<5.50E00	94.60	<5.50E+00	G745	G746
G748	7.10E+00	94.60	<5.50E+00	G745	G746
G749	9.30E+00	94.60	<5.50E+00	G745	G746
G750	1.50E+01	94.60	<5.50E+00	G745	G746

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APPENDIX 12

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ADDENDUM 1A

DATA ASSESSMENT SUMMARY TABLES

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ADDENDUM 7A

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WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

RHEOLOGY AND COMPRESSIVE STRENGTH DATA ASSESSMENT

DATE	<u>1-5-94</u>	SAMPLES/MATRIX	<u>102-AP Tank Waste Grout Mixture</u>
REVIEWED BY	<u>A. T. DiCenso</u>		
LABORATORY	<u>222-S</u>		
CASE #	<u>Grout Test Project</u>		
SDG #	<u>241-AP-102</u>		

DATA ASSESSMENT SUMMARY

	<u>Rheology</u>	<u>Comp. Strength/Pulse Velocity</u>
1. <u>Chain of Custody</u>	<u>0</u>	<u>0</u>
2. <u>Preparation Blanks</u>	<u>N/A</u>	<u>N/A</u>
3. <u>Duplicate Analysis</u>	<u>0</u>	<u>0</u>
4. <u>Spike Recoveries</u>	<u>N/A</u>	<u>N/A</u>
5. <u>Other Quality Control</u>	<u>N/A</u>	<u>N/A</u>

0 = data had no problems

X = minor problems, data may be qualified

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: No problems were found with the data.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

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WHC-SD-WM-DP-054 REV O
ADDENDUM 1A
RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso

Date 1-5-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. Furthermore, the physical evaluations were not subject to holding time requirements due to the nature of the tests.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso

Date 1-5-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks were not applicable to the tests.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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WHC-SD-WM-DP-054 REV O
ADDENDUM 1A
RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso

Date 1-5-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: With respect to each physical test, 5-8 analyses were conducted with the 102-AP tank waste grout mixture. Average and standard deviation values were calculated for each evaluation, and all results were satisfactory.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

RHEOLOGY AND COMPRESSIVE STRENGTH QC

Name A. T. DiCenso

Date 1-5-94

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spike analyses were not applicable to the tests.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

CHROMIUM ANALYSIS DATA ASSESSMENT

DATE	<u>Jan. 5, 1994</u>	SAMPLES/MATRIX	<u>G679-G685</u> G727-G729 <i>G728-G729</i> <u>G731-G735</u>
REVIEWED BY	<u>D.S. De Lorenzo</u>	<i>DSO</i>	
LABORATORY	<u>222-S</u>	<i>1/5/94</i>	<i>ASD</i> <i>1-10-94</i>
CASE #	<u>Grout Test Project</u>		
SDG #	<u>241-AP-102</u>		

DATA ASSESSMENT SUMMARY

	<u>Cr</u>	<u> </u>	<u> </u>	<u> </u>
1. <u>Chain of Custody</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
2. <u>Preparation Blanks</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
3. <u>Duplicate Analysis</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
4. <u>Spike Recoveries</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
5. <u>Other Quality Control</u>	<u>N/A</u>	<u> </u>	<u> </u>	<u> </u>

O = data had no problems
 X = minor problems, data may be qualified
 M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: All quality control criteria were met, with no exceptions.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

WHC-SD-WM-DP-054 REV O
ADDENDUM 1A
ICP ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4/28/93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to TCLP tests, and the resulting leachate samples were evaluated for Cr. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications are irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A:36

000029

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A
ICP ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blanks were free of contamination, and no action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A:37

000030

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

ICP ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. Chromium was determined for 5-day leached grout specimens through ICP analysis. Grout specimens were prepared by blending composite 102-AP waste with a dry blend consisting of Type II Portland cement, attapulgite clay, and class F fly ash. Additional grout specimens were prepared using water as the liquid instead of using the composite waste.

Five 102-AP grout samples were evaluated for Cr, in addition to grout water samples. Duplicate analyses were not performed. The laboratory, however, states that "Since the waste in 102-AP was determined to be homogenous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared..." In order to evaluate precision with respect to grout sample preparation and method performance, the percent Relative Standard Deviation (%RSD) of the five-time analyses was calculated for the 5-day leach-time interval. Percent RSD values exceeding 20% indicate imprecision with respect to sample heterogeneity, grout sample preparation, or method performance, and the associated results will be qualified as estimated (J or UJ). (Relative Standard Deviation is equal to the sample standard deviation divided by the mean value.)

<u>TCLP Cr Results</u>	<u>%RSD</u>
Spike added after preservation (AP)	10.2%
Spike added before preservation (BP)	NC

NC - not calculable (some or all sample results below the detection limit)

ACTION: No action required.

sample # constituent value/qualifier

1A 38

000031

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

ICP ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spike sample analysis provides information about the effect of each sample matrix on the digestion and measurement methodology. Matrix spikes must be analyzed with every analytical batch or every 20 samples, whichever is more frequent, and recoveries should be between 75-125%. If the spike result is between 30-74% or >125%, results are qualified as estimated. Sample results associated with a spike recovery of less than 30% are qualified as unusable.

ACTION: No action required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-39

000032

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

NITRATE AND NITRATE DATA ASSESSMENT

DATE	<u>Jan. 5, 1994</u>	SAMPLES/MATRIX	<u>G597-G602</u> <u>G606-G610</u>
REVIEWED BY	<u>D.S. De Lorenzo</u>	DSD 1/5/94	<u>G614-G618</u> <u>G622-G626</u>
LABORATORY	<u>222-S</u>		<u>G630-G634</u> <u>G637-G642</u>
CASE #	<u>Grout Test Project</u>		<u>G698-G701</u> <u>G720-G723</u>
SDG #	<u>241-AP-102</u>		<u>G747-G750</u>

DATA ASSESSMENT SUMMARY

	<u>NO₂</u>	<u>NO₃</u>	<u> </u>	<u> </u>
1. <u>Chain of Custody</u>	<u>0</u>	<u>0</u>	<u> </u>	<u> </u>
2. <u>Preparation Blanks</u>	<u>0</u>	<u>0</u>	<u> </u>	<u> </u>
3. <u>Duplicate Analysis</u>	<u>0</u>	<u>0</u>	<u> </u>	<u> </u>
4. <u>Spike Recoveries</u>	<u>0</u>	<u>0</u>	<u> </u>	<u> </u>
5. <u>Other Quality Control</u>	<u>N/A</u>	<u>N/A</u>	<u> </u>	<u> </u>

0 = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: All quality control criteria were met, with no exceptions.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A
ANION ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4/28/93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for NO₂ and NO₃. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications are irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-41

000034

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blanks were free of contamination, and no action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-42

000035

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens were evaluated for NO₂ and NO₃ through 5-day and 90-day anion analyses. For each time period, triplicate analyses were performed (three samples evaluated). Grout specimens were prepared by blending composite 102-AP waste with a dry blend consisting of Type II Portland cement, attapulgite clay, and class F fly ash. Additional grout specimens were prepared using water as the liquid instead of using the composite waste.

Three 102-AP grout samples were evaluated for NO₂ and NO₃, in addition to a grout water sample. Duplicate analyses were performed for the 90-day leachate, with percent Relative Standard Deviation (%RPD) values all less than 1.0%. It is therefore reasonable to believe that the precision of the ion chromatography anion analysis methods is acceptable.

The laboratory, however, states that "Since the waste in 102-AP was determined to be homogenous (the mean concentrations at each location could not be distinguished from each other), a composite solution was prepared..." In order to evaluate precision with respect to grout sample preparation, the percent Relative Standard Deviation (%RSD) of the triplicate analyses was calculated for each leach-time interval. Percent RSD values exceeding 20% indicate imprecision with respect to sample heterogeneity or grout sample preparation. (Relative Standard Deviation is equal to the sample standard deviation divided by the mean value.)

<u>Time Period</u>	<u>NO₂ %RSD</u>	<u>NO₃ %RSD</u>
0 (Wash)	48.1%	52.2%
1 (2 hours)	22.8%	22.8%
2 (7 hours)	34.4%	31.7%
3 (24 hours)	35.2%	34.4%
4 (48 hours)	34.6%	32.5%
5 (72 hours)	32.7%	31.5%
6 (96 hours)	33.3%	31.7%
7 (120 hours)	31.7%	29.7%
8 (456 hours)	26.0%	28.1%
9 (1128 hours)	12.2%	15.3%
10 (2160 hours)	5.1%	5.9%

ACTION: Duplicate analyses which allowed for the calculation of relative percent differences were conducted on the 90-day leachate samples and yielded values of less than 1%; therefore, the %RSD data was not utilized to qualify the results but was provided for information purposes.

sample # constituent value/qualifier

1A-43

1-11-94
36

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

ANION ANALYSIS QC

Name D.S. De Lorenzo

Date Jan. 5, 1994

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spikes are used in to indicate overall accuracy for a given matrix. Spike analyses were not performed for the NO₂ or NO₃ determinations. In the absence of spike recovery data, performance of the Laboratory Control Standard (LCS), or blank spike, shall be considered. Results outside of the control limits are qualified as estimated or unusable based on the judgement of the reviewer. In all cases, the LCS recoveries were within the applicable control limits.

ACTION: No action required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-44

000037

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Am-241 DATA ASSESSMENT

DATE	<u>1-5-94</u>	SAMPLES/MATRIX	<u>G597-G602</u>
			<u>G606-G610</u>
REVIEWED BY	<u>A. T. DiCenso</u> <i>ATD</i>		<u>G614-G618</u>
			<u>G622-G626</u>
LABORATORY	<u>222-S</u>		<u>G630-G634</u>
			<u>G637-G642</u>
CASE #	<u>Grout Test Project</u>		<u>G698-G701</u>
			<u>G720-G723</u>
SDG #	<u>241-AP-102</u>		<u>G747-G750</u>

DATA ASSESSMENT SUMMARY

	<u>Am-241</u>	<u> </u>	<u> </u>	<u> </u>
1. <u>Chain of Custody</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
2. <u>Preparation Blanks</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
3. <u>Duplicate Analysis</u>	<u>0</u>	<u> </u>	<u> </u>	<u> </u>
4. <u>Tracer Recoveries</u>	<u>M</u>	<u> </u>	<u> </u>	<u> </u>
5. <u>Other Quality Control</u>	<u>N/A</u>	<u> </u>	<u> </u>	<u> </u>

0 = data had no problems

X = minor problems, data may be qualified

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: Results calculated from inadequate tracer recoveries were qualified as unusable.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

1A.45

000038

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A
Am-241 QC

Name A. T. DiCenso

Date 1-5-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Am-241. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-46

000039

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

Am-241 QC

Name A. T. DiCenso

Date 1-5-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blank data were satisfactory, and no action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-47

000040

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Am-241 QC

Name A. T. DiCenso

Date 1-5-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Am-241 consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Am-241 analyses were actually run in triplicate. All grout results within each leachate time interval were either non-detect or near the detection limit; therefore, the reported data were considered to be acceptable with respect to precision requirements.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-48

000041

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Am-241 QC

Name A. T. DiCenso

Date 1-5-94

QC Check: TRACER RECOVERIES

COMMENTS: Tracers are used in radiochemical analyses to indicate overall accuracy for a given matrix. Results calculated from tracer recoveries of less than 30% or greater than 115% were qualified as unusable (R).

ACTION: The following data were qualified due to unacceptable tracer recoveries.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
G597	Am-241	< 6.37E-6 uCi/ml R
G598	Am-241	< 6.37E-6 R
G599	Am-241	< 6.37E-6 R
G600	Am-241	< 6.37E-6 R
G601	Am-241	< 6.37E-6 R
G602	Am-241	< 6.37E-6 R
G606	Am-241	< 6.37E-6 R
G607	Am-241	< 6.37E-6 R
G608	Am-241	< 6.37E-6 R
G610	Am-241	< 6.37E-6 R
G615	Am-241	< 1.27E-5 R
G616	Am-241	< 1.27E-5 R
G618	Am-241	< 1.27E-5 R
G622	Am-241	< 6.37E-6 R
G623	Am-241	< 6.37E-6 R
G624	Am-241	< 6.37E-6 R
G630	Am-241	< 1.27E-5 R
G632	Am-241	< 1.27E-5 R
G634	Am-241	< 1.27E-5 R
G637	Am-241	< 6.37E-6 R
G641	Am-241	7.64E-6 R
G698	Am-241	< 1.27E-5 R
G722	Am-241	< 1.27E-5 R
G723	Am-241	< 1.27E-5 R
G747	Am-241	< 3.40E-5 R
G748	Am-241	< 3.40E-5 R
G749	Am-241	5.48E-5 R
G750	Am-241	< 3.40E-5 R

1A-49

000042

WHC-SD-WM-DP-054 REV 0

ADDENDUM 7A

Tc-99 DATA ASSESSMENT

DATE	<u>1-3-94</u>	SAMPLES/MATRIX	<u>G597-G602</u>
			<u>G606-G610</u>
REVIEWED BY	<u>A. T. DiCenso</u> <i>ATD</i>		<u>G614-G618</u>
			<u>G622-G626</u>
LABORATORY	<u>222-S</u>		<u>G630-G634</u>
			<u>G637-G642</u>
CASE #	<u>Grout Test Project</u>		<u>G698-G701</u>
			<u>G720-G723</u>
SDG #	<u>241-AP-102</u>		<u>G747-G750</u>

DATA ASSESSMENT SUMMARY

	<u>Tc-99</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
1. <u>Chain of Custody</u>	<u>0</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
2. <u>Preparation Blanks</u>	<u>0</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
3. <u>Duplicate Analysis</u>	<u>X</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
4. <u>Spike Recoveries</u>	<u>X</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>
5. <u>Other Quality Control</u>	<u>N/A</u>	<u>_____</u>	<u>_____</u>	<u>_____</u>

0 = data had no problems

X = minor problems, data may be qualified

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The data associated with all samples except G720, G721, G722, and G723 were qualified with respect to either the duplicate data, spike data, or both.

NOTES: The data were validated according to RCRA Level B criteria.

o Refer to the corresponding attachments for explanation of any problems.

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso

Date 1-3-94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Tc-99. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-51

000044

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso

Date 1-3-94

QC Check: PREPARATION BLANKS

COMMENTS: Preparation blanks are evaluated for the presence of contaminants, and at least one preparation blank is required for each sample batch. If the concentration of an analyte in a sample is less than 5 times the concentration exhibited by the analyte in the blank, the associated results are qualified as non-detected (U).

ACTION: The blank data were satisfactory, and no action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-52

000045

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso

Date 1-3-94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Tc-99 consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Tc-99 analyses were actually run in triplicate. In order to evaluate precision, the percent relative standard deviation (%RSD) was calculated for each time interval in which all three grout mixtures yielded a detectable Tc-99 value. The results of these calculations are listed in the following table.

Time Period	%RSD
0	21.3%
1	23.6%
3	63.4%
4	73.6%
8	27.1%
9	11.0%
10	5.66%

The %RSD values pertaining to time periods 0, 1, 3, 4, and 8 were greater than 20%, and the data corresponding to time periods 2, 5, 6, and 7 could not verify precision since each time interval yielded both detect and non-detect results. Therefore, all data associated with grout specimens composed from tank waste pertaining to time intervals 0-8 were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered in the analyses is due to method error or sample heterogeneity, but in this validator's opinion, it is most likely due to the latter.

ACTION: The data were qualified as indicated by the following table.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
G608	Tc-99	2.23E-5 J
G609	Tc-99	7.64E-5 J
G610	Tc-99	4.16E-5 J
G614	Tc-99	4.70E-4 J
G615	Tc-99	5.69E-4 J
G616	Tc-99	< 3.00E-4 UJ
G617	Tc-99	3.32E-4 J
G618	Tc-99	3.60E-4 J
G622	Tc-99	3.20E-5 J
G623	Tc-99	9.40E-5 J
G624	Tc-99	5.27E-5 J
G625	Tc-99	9.07E-5 J

1A-53

000046

WHC-SD-WM-DP-054 REV O

ADDENDUM I A

Tc-99 QC

Name A. T. DiCenso

Date 1-3-94

QC Check: DUPLICATE ANALYSIS (continued)

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>	
G626	Tc-99	8.55E-5	J
G630	Tc-99	7.48E-5	J
G631	Tc-99	7.22E-5	J
G632	Tc-99	5.85E-5	J
G633	Tc-99	3.40E-5	J
G634	Tc-99	1.22E-4	J
G637	Tc-99	< 2.80E-4	UJ
G638	Tc-99	4.50E-4	J
G639	Tc-99	3.31E-4	J
G640	Tc-99	< 2.84E-4	UJ
G641	Tc-99	< 2.79E-4	UJ
G642	Tc-99	< 2.84E-4	UJ
G748	Tc-99	3.73E-4	J
G749	Tc-99	4.12E-4	J
G750	Tc-99	6.08E-4	J

1A-54

000047

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

Tc-99 QC

Name A. T. DiCenso

Date 1-3-94

QC Check: SPIKE RECOVERIES

COMMENTS: Matrix spikes are used in radiochemical analyses to indicate overall accuracy for a given matrix. The recoveries associated with spikes shall be within three standard deviations of normal operating conditions. When laboratory defined control limits are not available, spike recoveries must be between 75 and 125%. Results outside the limits are qualified as estimated or unusable based on the judgement of the reviewer.

ACTION: The following data failed to satisfy the established criteria.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
G597	Tc-99	< 1.47E-5 uCi/ml UJ
G598	Tc-99	< 1.45E-5 UJ
G599	Tc-99	< 1.45E-5 UJ
G600	Tc-99	< 1.45E-5 UJ
G601	Tc-99	< 1.46E-5 UJ
G602	Tc-99	< 1.53E-5 UJ
G606	Tc-99	< 9.26E-6 UJ
G607	Tc-99	< 9.56E-6 UJ
G608	Tc-99	2.23E-5 J
G609	Tc-99	7.64E-5 J
G610	Tc-99	4.16E-5 J
G622	Tc-99	3.20E-5 J
G623	Tc-99	9.40E-5 J
G624	Tc-99	5.27E-5 J
G625	Tc-99	9.07E-5 J
G626	Tc-99	8.55E-5 J
G630	Tc-99	7.48E-5 J
G631	Tc-99	7.22E-5 J
G632	Tc-99	5.85E-5 J
G633	Tc-99	3.40E-5 J
G634	Tc-99	1.22E-4 J
G698	Tc-99	< 8.14E-6 UJ
G699	Tc-99	3.94E-4 J
G700	Tc-99	3.79E-4 J
G701	Tc-99	4.64E-4 J
G747	Tc-99	< 1.06E-5 UJ
G748	Tc-99	3.73E-4 J
G749	Tc-99	4.12E-4 J
G750	Tc-99	6.08E-4 J

1A-55

000048

WHC-SD-WM-DP-054 REV O
ADDENDUM 1A

WET CHEMISTRY DATA ASSESSMENT

DATE	01/04/94	SAMPLES/MATRIX	G597 - G602
REVIEWED BY	J.D. Franklin		G606 - G610
LABORATORY	222S		G614 - G618
CASE #	GROUT PRODUCT TEST		G622 - G626
SDG #	241-AP-102		G630 - G634
			G637 - G642

DATA ASSESSMENT SUMMARY

	<u>TOC</u>
1. <u>Chain of Custody/Holding Times</u>	<u>0</u>
2. <u>Blanks</u>	<u>X</u>
3. <u>Laboratory Control Sample</u>	<u>0</u>
4. <u>Duplicate Analysis</u>	<u>0</u>

O = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data. All blanks in this sample series were contaminated.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA-344-105 B-2, at the five-day interval. The data were validated to 'B' level criteria.

1A-56

000049

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY

Name J.D. Franklin

Date 01/04/94

QC Check: CHAIN OF CUSTODY

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for Total Organic Carbon. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A57

000050

WHC-SD-WM-DP-054 REV 0
ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/04/94

QC Check: BLANKS

COMMENTS: Calibration and preparation blanks were evaluated for the presence of contaminants. Calibration blanks should be run at a 10% frequency. Analytes exhibiting a concentration less than five times the corresponding blank result shall be qualified as non-detects. If the absolute value of any negative blank values exceeded the Instrument Detection Limit (IDL), non-detects were qualified as estimated (UJ) and positive results within 2 times the absolute value of the blank value as estimated.

ACTION: Contamination in all blanks made necessary the qualification of all positive results as undetected.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
G597	TOC	<5.50 ug/ml U
G598	TOC	<5.50 U
G599	TOC	<5.50 U
G600	TOC	<5.50 U
G602	TOC	<5.50 U
G606	TOC	<5.50 U
G607	TOC	<5.50 U
G608	TOC	<5.50 U
G609	TOC	<5.50 U
G610	TOC	<5.50 U
G630	TOC	<5.50 U
G631	TOC	<5.50 U
G632	TOC	<5.50 U
G633	TOC	<5.50 U
G634	TOC	<5.50 U

1A-58

1-11-94

51

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/04/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of $\pm 20\%$ of the true value. If the LCS recovery is $> 120\%$ or $50 - 79\%$, sample results are qualified as estimated. Results associated with an LCS recovery of $< 50\%$ are qualified as unusable.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1# 59

000052

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/04/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Total Organic Carbon consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Total Organic Carbon analyses were actually run in triplicate. Since all sample results were qualified as non-detects as a consequence of the blank criteria, precision was satisfactory.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-60

000053

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

WET CHEMISTRY DATA ASSESSMENT

DATE	<u>01/05/94</u>	SAMPLES/MATRIX	<u>G698 - G701</u>
REVIEWED BY	<u>J.D. Franklin</u> <i>JDF</i>		<u>G720 - G723</u>
LABORATORY	<u>222S</u>		<u>G746 - G750</u> <i>02-01-1994</i>
CASE #	<u>GROUT PRODUCT TEST</u>		<u> </u> <i>6/27</i>
SDG #	<u>241-AP-102</u>		<u> </u> <i>1-10-94</i>

DATA ASSESSMENT SUMMARY

	<u>TOC</u>
1. <u>Chain of Custody/Holding Times</u>	<u>0</u>
2. <u>Blanks</u>	<u>0</u>
3. <u>Laboratory Control Sample</u>	<u>0</u>
4. <u>Duplicate Analysis</u>	<u>X</u>

0 = data had no problems
 X = minor problems, data may be qualified
 M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data. %RSD data were calculated for the one time interval (Sample nos. G748, G749, G750) which contained all positive results and were found to be out of control limits.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA-344-105 B-2, at the ninety-day interval. The data were validated to 'B' level criteria.

1A-61

000054

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for TOC. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A.62

000055

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: BLANKS

COMMENTS: Calibration and preparation blanks were evaluated for the presence of contaminants. Calibration blanks should be run at a 10% frequency. Analytes exhibiting a concentration less than five times the corresponding blank result shall be qualified as non-detects. If the absolute value of any negative blank values exceeded the Instrument Detection Limit (IDL), non-detects were qualified as estimated (UJ) and positive results within 2 times the absolute value of the blank value as estimated.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-63

000056

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of $\pm 20\%$ of the true value. If the LCS recovery is $> 120\%$ or $50 - 79\%$, sample results are qualified as estimated. Results associated with an LCS recovery of $< 50\%$ are qualified as unusable.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-64

000057

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for Total Organic Carbon consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the Total Organic Carbon analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation (%RSD) was calculated for the one time interval (Sample nos. G748, G749, G750) which yielded three positive results and that %RSD (31.5%) was compared to a $\pm 20\%$ control limit. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All analysis series with detectable results were qualified as estimated.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
G699	TOC	<5.50 ug/ml UJ
G700	TOC	7.70 ug/ml J
G701	TOC	11.0/ug/ml J
G721	TOC	<5.50 ug/ml UJ
G722	TOC	7.15 ug/ml J
G723	TOC	8.80 ug/ml J
G748	TOC	7.10 ug/ml J
G749	TOC	9.30 ug/ml J
G750	TOC	15.0 ug/ml J

1A-65

000058

WHC-SD-WM-DP-054 REV 0

ADDENDUM 7A

WET CHEMISTRY DATA ASSESSMENT

DATE	<u>01/06/94</u>	SAMPLES/MATRIX	<u>G597 - G602</u>
REVIEWED BY	<u>J.D. Franklin</u> <i>QJA</i>	<u>1/6/94</u>	<u>G606 - G610</u>
LABORATORY	<u>222S</u>		<u>G614 - G618</u>
CASE #	<u>GROUT PRODUCT TEST</u>		<u>G630 - G634</u>
SDG #	<u>241-AP-102</u>		<u>G637 - G642</u>

DATA ASSESSMENT SUMMARY

- | | <u>pH</u> |
|--|-----------|
| 1. <u>Chain of Custody/Holding Times</u> | <u>0</u> |
| 2. <u>Laboratory Control Sample</u> | <u>0</u> |
| 3. <u>Duplicate Analysis</u> | <u>0</u> |

0 = data had no problems

X = minor problems, data may be qualified

M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA212-102/C-5, at the 5-day interval. The data were evaluated to 'B' level criteria.

1A-66

000059

WHC-SD-WM-DP-054 REV 0
ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/06/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for pH. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-67

000060

WHC-SD-WM-DP-054 REV 0

ADDENDUM 7A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/06/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of $\pm 20\%$ of the true value. If the LCS recovery is $> 120\%$ or $50 - 79\%$, sample results are qualified as estimated. Results associated with an LCS recovery of $< 50\%$ are qualified as unusable.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-68

000061

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/06/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for pH consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the pH analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation %RSD was calculated for each time interval. If a %RSD value exceeded 20%, the results were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-69

000062

WET CHEMISTRY DATA ASSESSMENT

DATE 01/05/94 SAMPLES/MATRIX G698 - G701
REVIEWED BY J.D. Franklin *JDF 1/5/94* G720 - G723
G746 - G750 *ASD*
LABORATORY 222S 1-10-94
CASE # GROUT PRODUCT TEST
SDG # 241-AP-102

DATA ASSESSMENT SUMMARY

	<u>pH</u>
1. <u>Chain of Custody/Holding Times</u>	<u>0</u>
2. <u>Laboratory Control Sample</u>	<u>0</u>
3. <u>Duplicate Analysis</u>	<u>0</u>

0 = data had no problems
X = minor problems, data may be qualified
M = data qualified due to major problems/some data may be unusable

OVERALL ASSESSMENT: The composite nature of the original sample, and the use of the sample to manufacture a new sample source enabled the modification of some of the validation standards. The criteria for custody/holding times and duplicate analysis were modified, and the LCS data were evaluated in place of the matrix spike/matrix spike duplicate data.

NOTES: The analyses were conducted in accordance with 222S Laboratory Procedure No. LA212-102/C-5, at the 90-day interval. The data were evaluated to 'B' level criteria.

1A-70

000083

WHC-SD-WM-DP-054 REV O

ADDENDUM 7A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: HOLDING TIMES

COMMENTS: The grout feed tank, 241-AP-102 (102-AP), was sampled by WHC on 4-28-93 and subsequently analyzed for chemical and radiochemical constituents; the inorganic and radiochemical results were reported in WHC-SD-WM-DP-046. After completing the analyses, the 102-AP tank waste was combined with cement, clay, and fly ash by the lab in order to generate grout product specimens. Since the lab maintained possession of the formulated samples from origination through evaluation, chain of custody documentation was not mandatory. The grout product specimens were subjected to five-day and ninety-day leach tests, and the resulting leachate accumulated during specified time intervals was evaluated for pH. The stability of the grout specimens with respect to time was the focus of the analyses; therefore, holding time specifications were irrelevant.

ACTION: No action was required.

sample # constituent value/qualifier

1A-71

000064

WHC-SD-WM-DP-054 REV O

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: LABORATORY CONTROL STANDARD

COMMENTS: The Laboratory Control Sample (LCS) serves as a monitor of the overall performance of all steps in the analysis, including sample preparation. All LCS results must fall within the control limits of $\pm 20\%$ of the true value. If the LCS recovery is $> 120\%$ or $50 - 79\%$, sample results are qualified as estimated. Results associated with an LCS recovery of $< 50\%$ are qualified as unusable.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-72

000065

WHC-SD-WM-DP-054 REV 0

ADDENDUM 1A

WET CHEMISTRY QC

Name J.D. Franklin

Date 01/05/94

QC Check: DUPLICATE ANALYSIS

COMMENTS: Duplicate samples are evaluated to monitor the precision of an analysis. The leached grout specimens which were evaluated for pH consisted of one grout product made from water and three composed from 102-AP tank waste. Since the waste in the 102-AP tank was determined to be homogeneous by the lab, the pH analyses were actually run in triplicate. In order to evaluate precision with respect to the three samples, the percent relative standard deviation %RSD was calculated for each time interval. If a %RSD value exceeded 20%, the results were considered to be estimated. This interpretation of the duplicate data, however, cannot accurately determine whether the imprecision encountered with the analyses is due to method error or sample heterogeneity.

ACTION: All criteria were met.

<u>sample #</u>	<u>constituent</u>	<u>value/qualifier</u>
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1A-73

66