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

Document number: SD-WM-DP-145

Section 12 **of** 12

Title: REVISED 60 DAY SAFETY SCREENING + FERROCYANIDE RESULTS FOR TANK 241-BY-108 ROTARY SAMPLES CORE 98 + CORE 104

Date: 02/02/96 **Revision:** R001

Originator: BALDWIN JH
Co: WHC

Recipient:
Co:

References: ECN-629001

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WHC-SD-WM-DP-145, REV.1

D5 - STRONTIUM-90 ANALYSIS

3-2150

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Sample Number	Prep Batch	*	Total Beta uCi/g	+/- % error	Sr-90 AB	Sr-90 uCi/g	+/- % error
Segment 1							
95-07941-H1T	1	F/smp	2.61E+01	3	1	3.43E+00	8
95-07941-H2T	1	F/dup	2.21E+01	3	1	2.94E+00	8
Mean Difference			1.95			0.68	
RPD			17 x			15 x	
95-07941-HCB	1	F/blk	6.02E-01	10	1	1.19E-01	30
		std			1	104%	
		ms			1	114%	
		blk			1	<3.3E-02	
Segment 2 Drainable Liquid (uCi/mL) **							
95-07932-A1	3	A/smp	1.42E+02	4			
95-07932-A2	3	A/dup	1.44E+02	4			
Mean Difference			0.12				
RPD			1				
95-07932-A3	3	A/blk	1.93E-03	6			
Segment 2A							
95-07942-H1	1	F/smp	2.39E+01	3	1	2.60E-01	16
95-07942-H2	1	F/dup	3.03E+01	3	1	2.70E-01	15
Mean Difference			2.76 $			0.09	
RPD			24 x			4	
95-07942-H3	1	F/blk	1.07E+01	4	1	1.68E+00	9
Segment 2D							
95-07943-H1	1	F/smp	4.94E+01	3	1	2.94E+00	8
95-07943-H2	1	F/dup	4.57E+01	3	1	2.67E+00	8
Mean Difference			0.92			0.11	
RPD			8			2	
95-07943-N1	4	FZ/smp	5.45E+01	3	3	2.63	8
Segment 3 Drainable Liquid (uCi/mL) **							
95-07935-A1	3	A/smp	1.46E+02	4			
95-07935-A2	3	A/dup	1.41E+02	4			
Mean Difference			0.31				
RPD			3				
Segment 3A							
95-07944-H1	1	F/smp	5.23E+01	3	1	5.32E+00	8
95-07944-H2	1	F/dup	6.31E+01	3	1	1.01E+01	8
Mean Difference			2.20 $			2.62 $	
RPD			19 x			62 x	
95-07944-N1	4	FZ/smp	5.15E+01	3	3	6.65E+00	9
05-07941-N3	4	FZ/blk	<9. E-01		3	<3.3E-02	
		std			3	90%	
		blk				<2.4E-02	
Segment 4A							
95-07945-H1	2	F/smp	7.37E+02	4	2	3.38E+02	8
95-07945-H2	2	F/dup	7.21E+02	4	2	3.69E+02	8
Mean Difference			0.19			0.39	
RPD			2			9	
95-07945-H3	2	F/blk	1.30E-01	15	2	<3.3E-02	
		std			2	116%	
		ms			2	96%	
		blk			2	<3.3E-02	
Segment 4B							
95-07946-H1T	2	F/smp	1.22E+03	4	2	5.33E+02	8
95-07946-H2T	2	F/dup	8.41E+02	4	2	3.76E+02	8
Mean Difference			3.20 $			1.50	
RPD			37 x			35 x	
95-07946-HCB	2	F/blk	2.36E-01	11	2	<3.7E-02	
Segment 4C							
95-07947-H1	2	F/smp	2.52E+03	4	2	5.89E+02	8
95-07947-H2	2	F/dup	2.71E+03	4	2	6.62E+02	8
Mean Difference			0.64			0.51	
RPD			7			12 x	
Segment 4D							
95-07948-H1	2	F/smp	3.69E+03	4	2	7.65E+02	8
95-07948-H2	2	F/dup	3.84E+03	4	2	8.56E+02	8
Mean Difference			0.35			0.50	
RPD			4			11 x	

$ = the mean difference result is greater than or equal to 1.96, there is 95% confidence that the two results are not equal.

* smp = sample, dup = duplicate, blk = methods blank, ms = matrix spike, std = standard
F = KOH - KNO3 Fusion in Ni crucible, FZ = Na2O2 - NaOH Fusion in Zr crucible, A = Acid Digestion
x = RPD value is greater than 10%.
** Only Drainable Liquid samples are reported in uCi/mL.

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WHC-SD-WM-DP-145, REV. 1

KOH FUSION SEGMENT AND QUARTER SEGMENT Sr-90 ANALYSIS

3-2152

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DATE TO QC: 09/22/95 WHC-SD-WM-DP-145, REV. 1

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - Strontium-90 - KOH Fusion

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers -

95-07941-H1T	95-07941-H2T	95-07941-HCB
95-07942-H1	95-07942-H2	95-07942-H3
95-07943-H1	95-07943-H2	
95-07944-H1	95-07944-H2	
95-07945-H1	95-07945-H2	95-07945-H3
95-07946-H1T	95-07946-H2T	95-07946-HCB
95-07947-H1	95-07947-H2	
95-07948-H1	95-07948-H2	

PNL ACL Quality Representative

9/25/95
Date

3-2153

WHC-SD-WM-DP-145, REV. 1

LRG 9-22-9.

Tank BY-108 Core 99 Beta Analysis Results

Sample Number	PB	•	Total Beta uCi/g	+/- % error	Sr-90 AB	Sr-90 uCi/g	+/- % error
Segment 1							
95-07941-H1T	2	F/smp	2.61E+01	3	1	3.43E+00	8
95-07941-H2T	2	F/dup	2.21E+01	3	1	2.94E+00	8
95-07941-HCB	2	F/blk	6.02E-01	10	1	1.19E-01	30
		std			1	104%	
		ms			1	114%	
		blk			1	<3.3E-2	
Segment 2 Drainable Liquid							
95-07932-A1	3	A/smp	9.91E+01	4		NR	
95-07932-A2	3	A/dup	1.01E+02	4		NR	
95-07932-A3	3	A/blk	1.35E-03	6		NR	
Segment 2A							
95-07942-H1	1	F/smp	2.39E+01	3	1	2.60E-01	16
95-07942-H2	1	F/dup	3.03E+01	3	1	2.70E-01	15
95-07942-H3	1	F/blk	1.07E+01	4	1	1.68E+00	9
Segment 2D							
95-07943-H1	1	F/smp	4.94E+01	3	1	2.94E+00	8
95-07943-H2	1	F/dup	4.57E+01	3	1	2.87E+00	8
95-07943-N1	4	FZ/smp					
Segment 3 Drainable Liquid							
95-07935-A1	3	A/smp	1.02E+02	4		NR	
95-07935-A2	3	A/dup	9.88E+01	4		NR	
Segment 3A							
95-07944-H1	1	F/smp	5.23E+01	3	1	5.32E+00	8
95-07944-H2	1	F/dup	6.31E+01	3	1	1.01E+01	8
95-07944-N1	4	FZ/smp					
05-07941-N3	4	FZ/blk					
Segment 4A							
95-07945-H1	1	F/smp	7.37E+02	4	2	3.38E+02	8
95-07945-H2	1	F/dup	7.21E+02	4	2	3.69E+02	8
95-07945-H3	1	F/blk	1.30E-01	15	2	<3.3E-2	
		std			2	116%	
		ms			2	96%	
		blk			2	<3.3E-2	

Sample Number	PB	*	Total Beta uCi/g	+/- % error	Sr-90 AB	Sr-90 uCi/g	+/- % error
Segment 4B							
95-07946-H1T	2	F/smp	1.22E+03	4	2	5.33E+02	8
95-07946-H2T	2	F/dup	8.41E+02	4	2	3.76E+02	8
95-07946-HCB	2	F/blk	2.36E-01	11	2	<3.7E-2	
Segment 4C							
95-07947-H1	1	F/smp	4.72E+03	4	2	5.89E+02	8
95-07947-H2	1	F/dup	2.71E+03	4	2	6.62E+02	8
Segment 4D							
95-07948-H1	1	F/smp	3.69E+03	4	2	7.65E+02	8
95-07948-H2	1	F/dup	3.84E+03	4	2	8.56E+02	8

PB = hot cell prep batch; AB = analytical batch; NR = not requested

* smp = sample, dup = duplicate, blk = methods blank, ms = matrix spike, bs = blank spike, lcs = lab control standard, pds = post digestion spike

F = Fusion, A = Acid Digestion

Pacific Northwest Laboratory WHO-SD-WM-DP-145 REV. 1 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. STD-2388 Description : 1.8520E6 dpm/ml

DF ---- .09944 ---> 10.00000 ---- .09944

Dilution factor = 1.0113E+03 +/- 1.73%

Analysts Historical Yield 1.0000 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	13 : 15	15 : 42
Total counts	10203	15613
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	1.92E+06	7.2	8.16E+03
	uCi/ml	8.64E-01		3.68E-03

104%
Historical Yield = 98 ± 6 %
JRG 9-20-95

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by JRGremond Date 9-20-95

3-2156

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38874 ARF(SOW) : ASR 2388

A.L.O. No. : STD-2388 Description : 2.2165 dim/ml 4-26-88

Pipet Nos.: #8 10ml #18

DF ---.09944 → Vol Flask --.09944--- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Std RS-11-13 LRB BNW 52626 Page(s) No. 49 50

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/14/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	13:15	15:42
Total counts	10203	15613
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst [signature] 9/16/95

Samples: 95-7941 H1T, H2T, HCB;
95-7942 H1, H2, H3;
95-7943 H1, H2;
95-7944 H1, H2;
95-7941 HCB + std;
95-8454; ~~95-8482~~ [signature] 9/14/95 (Lost)
Blk - 2388.

3-2157

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95249

Strontium-90.....PNL-ALO-433 & 431

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

A.L.O. No. STD + 95-7941-HCBDescription : 1.8520 E 6 dpm/ml.

DF ---- .09944 ---> 10.00000 ---- .09944

Matrix Spike

(2.11E6)(.09944)
-(2.68E2)(1.98984)
2.1046 E6

Dilution Factor = 1.0113E+03 +/- 1.73%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	13 : 36	16 : 3
Total counts	10495	16308
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

114%

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	2.11E+06	7.2	8.36E+03
	uCi/ml	9.51E-01 ✓		3.77E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by LRGreenwood Date 9/20/95

3-2158

WHC-SD-WM-DP 145 REV. 1

Pacific Northwest Laboratory 95249

Strontium-90.....PNL-ALO-433 & 431

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

A.L.O. No. STD + 95-7941-HCBDescription :

DF ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 5.0512E+00 +/- 1.73%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 12	16 : 35
Total counts	504	616
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	2.68E+02	29.5	4.21E+01
	uCi/ml	1.21E-04		1.89E-05

Data Entry by T Trang-L Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L D Freeman Date 9/20/95

3-2159

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-HCB Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .10155 → 100 — .99492 --- 10 ml — .09944 --- ---

Avg x 2 ml ml Vol Flask ml

#14 .09944 std #8

Pipet checks are recorded on labsheets by pipet number

Std RS-11-13 LRB BNW 52626 Page(s) No. 49, 50

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	13:36	16:03
Total counts	10495	16308
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst [signature] 9/16/95

3-2160

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. BLK-2388 Description :

DF ---- .99492 ---> 10.00000 ---- .99492

Dilution Factor = 1.0102E+01 +/- 1.73%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	13 : 25	15 : 52
Total counts	301	320
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

Avg. mass conversion

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	1.96E+02	222.6	8.34E+01
	uCi/ml	8.83E-05		3.75E-05 ✓ X

$\frac{100\,ml}{0.1123\,g} = 3.3E-2\ \frac{uCi}{g}$

$\bar{X}_7$

LRG 9-20-95

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by LRGreenwood Date 9/20/95

3-2161

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38874 ARF(SOW) : ASR 2388

A.L.O. No. : BLK-2388 Description : DnH_2O

Pipet Nos.: #14 10ml #14

DF --- .99492 → VH --- .99492 --- --- ---

ml flask ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST ~~10~~ 9:00 [initials] 9/16/95

Instrument | P.B.C. - 2 | d/c Y-90 184 |

Date	9/16/95	9/19/95
Time(PST)	13:25	15:52
Total counts	301	320
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst [signature] 9/16/95

3-2162

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7941-H1T Description : CORE 99 TANK BY-108

DF ---- .10050 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 5.0261E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	13 : 46	16 : 14
Total counts	7679	11877
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	7.61E+06	7.4	4.16E+04
	uCi/g	3.43E+00 ✓		1.87E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2163

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order # 28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-HIT Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1005 g → 100 ml --- .99492 #14 → 10 ml Vol Flask --- ~~2(5.~~ #14 9/14/95 — 2(.99492) #14 ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 184
Date	9/16/95	9/19/95
Time(PST)	13:46	16:14
Total counts	7679	11877
Count time	10	10
Bkg C/M	21.90	28.35
Bkg cnt time	100	100

Analyst [signature] 9/16/95

3-2164

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Strontium-90.....PNL-ALO-433 & 431

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7941-H2T Description : C99, BY108

DF ---- .10260 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 4.9232E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400
Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	13 : 57	16 : 25
Total counts	6579	10241
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	6.52E+06	7.5	4.09E+04
	uCi/g	2.94E+00		1.84E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by J R Greenwood Date 9/20/95

3-2165

Pacific Northwest Laboratory WHC-SD-WM-DP 145 REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-H2T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.1026 g → 100 ml --- ~~1426~~ 9/14/95 --- .99492 ml → 10 ml Vol flask --- 2(.99492 ml)

#14 #14

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/16/95 9/14/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	13:57	16:25
Total counts	6579	10241
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst [signature] 9/14/95

3-2166

HO-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Strontium-90.....PNL-ALO-433 & 431

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : T195-TWC-02

A.L.O. No. 95-7941-HCB Description : C99,BY108

DF ---- .10155 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 4.9741E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 12	16 : 35
Total counts	504	616
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	2.64E+05	29.5	4.14E+04
	uCi/g	1.19E-01		1.87E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2167

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 538874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-HCB Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #14

DF ---.10155 → 100 — .99492 → Vol --- 2(.99492) ---

Avg. x2 ml ml Flow ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst Ka Poeppel Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 184
Date	9/16/95	9/19/95
Time(PST)	14:12	16:35
Total counts	504	616
Count time	10	10
Bkg C/M	21.90	28.35
Bkg cnt time	100	100

Analyst Ka Poeppel 9/16/95

3-2168

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H1 Description : CORE 99 TANK BY-108

DF ---- .11520 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution factor = 4.3847E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 26	16 : 45
Total counts	780	1109
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	5.76E+05	16.0	3.66E+04
	uCi/g	2.60E-01		1.65E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2169

Pacific Northwest Laboratory WHC-SD-WM-DP 145, REV.) 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order 128874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #14

DF --- .1152 g → 100 ml --- .99492 ml → Vol Flask --- 2(.99492) ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [illegible] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument | P.B.C. - 2 | d/c Y-90 1.84 |

Date	9/16/95	9/19/95
Time(PST)	14:26	16:45
Total counts	780	1109
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT R 9/16/95

3-2170

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H2 Description : CORE 99 TANK BY-108

DF ---- .11090 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 4.5547E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 37	17 : 0
Total counts	850	1179
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	5.99E+05	15.0	3.81E+04
	uCi/g	2.70E-01		1.72E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L A Greenwood Date 9/20/95

3-2171

Pacific Northwest Laboratory HNC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-M2 Description : CORE 99 TANK BY-108

Pipet Nos.: #74 10ml #14

DF --- .1109 g → 100 ml --- .99492 ml → 10ml Vol Flask --- 2(.99492) ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [illegible] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	14:37	17:00
Total counts	850	1179
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT Ra 9/16/95

3-2172

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H3 Description : CORE 99 TANK BY-108

DF ---- .11305 ---> 100.00000 ---- .99492 ---> 10.00000 ---- 1.98984

Dilution Factor = 4.4681E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 48	17 : 9
Total counts	3671	5943
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	3.73E+06	8.1	3.75E+04
	uCi/g	1.68E+00 ✓		1.69E-02

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by J D Greenwood Date 9/20/95

3-2173

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order #28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H3 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .11305 → 100 --- .99492 → 10 ml Vol Flask --- 2(.99492) ---

#14 #14

5 ASG x 2

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	14:28 48	17:09
Total counts	3671	5943
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT R[signature] 9/16/95

3-2174

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7943-H1 Description : CORE 99 TANK BY-108

DF ---- .33620 ---> 100.00000 ---- .99492 ---> 10.00000 ---- .99492

Dilution Factor = 3.0049E+03 +/- 1.81%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	14 : 59	17 : 20
Total counts	10752	16703
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	6.52E+06	7.2	2.52E+04
	uCi/g	2.94E+00 ✓		1.14E-02

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2175

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 138874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-M1 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10ml #14

DF --- .3362 → 100 --- .99452 → 10ml --- .99452 --- ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [illegible] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument | P.B.C. - 2 | d/c Y-90 1.89 |

Date	9/16/95	9/19/95
Time(PST)	14:59	17:20
Total counts	10752	16703
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT R[illegible] 9/16/95

3-2176

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7943-H2 Description : CORE 99 TANK BY-108

DF ---- .32630 ---> 100.00000 ---- .99492 ---> 10.00000 ---- .99492

Dilution Factor = 3.0960E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	15 : 10	17 : 31
Total counts	8508	14147
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	6.38E+06	7.3	2.61E+04
	uCi/g	2.87E+00 ✓		1.17E-02

Data Entry by T. Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L.D. Greenwood Date 9/20/95

3-2177

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-H2 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #4

DF --- .3263 g → 100 ml --- .99492 ml → 10 ml flask --- .99492 ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [illegible] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument | P.B.C. - 2 | d/c Y-90 1.84 |

Date	9/16/95	9/19/95
Time(PST)	~~14:59~~ 15:10 RTR	17:31
Total counts	8508	14147
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT Ross 9/16/95

3-2178

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7944-K1 Description : CORE 99 TANK BY-108

DF ---- .12120 ---> 100.00000 ---- .99492 ---> 10.00000 ---- .99492

Dilution Factor = 8.3353E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	15 : 21	17 : 42
Total counts	7327	11187
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.18E+07	7.5	7.03E+04
	uCi/g	5.32E+00 ✓		3.17E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2179

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 288714 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-M1 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #14

DF --- .1212 g → 100 ml --- .99493 ml → 10 ml Flask --- .99492 ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [illegible] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	15:21	17:42
Total counts	7327	11187
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT Ross 9/16/95

3-2180

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7944-H2 Description : CORE 99 TANK BY-108

DF ---- .14200 ---> 100.00000 ---- .99492 ---> 10.00000 ---- .99492

Dilution Factor = 7.1144E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 16 / 95 PST 9 : 0

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 16 / 95	9 / 19 / 95
Time(PST)	15 : 32	17 : 53
Total counts	14498	23143
Count time	10	10
Bkg C/M	31.900	28.350
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	2.25E+07	7.1	6.01E+04
	uCi/g	1.01E+01 ✓		2.71E-02

Data Entry by T. Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2181

Pacific Northwest Laboratory 95241

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K38874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1420 g → 100 ml --- .99493 ml (#14) → 10 ml Vol Flask --- .99493 ml (#14) ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95241 Blank card ID 95241

Analyst [signature] Date 9/15/95 9/16/95

To (separation) 9/16/95 PST 9:00

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/16/95	9/19/95
Time(PST)	15:32	17:53
Total counts	14498	23143
Count time	10	10
Bkg C/M	31.90	28.35
Bkg cnt time	100	100

Analyst RT Ross 9/16/95

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. STD-2388 Description : 1.8518 E6 dpm/ml

DF .... .09944 ---> 10.00000 .... .09944

Dilution Factor = 1.0113E+03 +/- 1.73%

Analysts Historical Yield 1.0000 +/- 6.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	12 : 34	10 : 20
Total counts	9967	15850
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/ml	2.14E+06	7.2	8.11E+03
	uCi/ml	9.65E-01		3.65E-03

116%
Historical yield
99±7%

Data Entry by I Trang-6 Date 9/21/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2183

WHC-CD-WM-DP-145, REV.1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K38874 ARF(SOW) : ASR 2388

A.L.O. No. : STD-2388 Description : 2.2165 EC d/m/ml 4-26-88

Pipet Nos.: #8 10ml #8

DF --- .09944 ml → 10ml flask --- .09944 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Std RS-11-13 LRB BNW 52626 Page(s) No. 49, 50

Standard card ID 95240 Blank card ID 95240

Analyst [illegible] Date 9/14/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument	P.B.C. - 2	d/c Y-90 1.89
Date	9/18/95	9/21/95
Time(PST)	12:34	10:20
Total counts	9967	15850
Count time	10 min.	10
Bkg C/M	28.01	27.72
Bkg cnt time	100 min.	100

Analyst T Trang-Le 9/18/95

Samples: 95-7945 - H1, H2, H3
95-7946 - H1T, H2T, HCB
95-7947 - H1, H2
95-7948 - H1, H2
95-7946 HCB. + std
Blk.
95-8483.

3-2184

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95249

Strontium-90.....PNL-ALO-433 & 431

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

A.L.O. No. STD + 95-7946-HCBDescription : 1.8518 E6 dpm/ml

DF .... .09944 ---> 10.00000 .... .09944

Dilution Factor = 1.0113E+03 +/- 1.73%

Analysts Historical Yield .9900 +/- 7.0%

Matrix spike

(1.78E6)(.09944)
-(4.59E2)(.99492)

1.78E6

96%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400
Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	13 : 10	10 : 45
Total counts	9476	14286
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/ml	1.78E+06	8.1	8.26E+03
	uCi/ml	8.04E-01		3.72E-03

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L A Greenwood Date 9-22-95

3-2185

WHC-SD-WM-DP- 145, REV. 1

Pacific Northwest Laboratory 95249

Strontium-90.....PNL-ALO-433 & 431

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

A.L.O. No. 95-7946-HCB + STDDescription :

DF .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 1.0102E+01 +/- 1.73%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 16	13 : 9
Total counts	301	422
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

For Matrix Spike only
9-22-95

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/ml	4.59E+02	172.7	8.25E+01
	uCi/ml	2.07E-04		3.72E-05

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L P Greenwood Date 9-22-95

3- 2186

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : P28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-HCB Description : CORE 99 TANK BY-108

Pipet Nos.: Std + #8 .09944 std

DF --- .11245 g → 100 ml --- .99492 ml → 10 ml Vol Flask --- - .09944 ml ---

Pipet checks are recorded on labsheets by pipet number

Std RS-11-13 LRB BNW 52L26 Page(s) No. 49, 50

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 | TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	13:10	10:45
Total counts	9476	14286
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-Le 9/18/95

3-2187

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. BLK-2388 Description :

DF .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 1.0102E+01 +/- 1.73%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	12 : 52	10 : 33
Total counts	268	316
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

Avg. Mass Conversion

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	1.88E+02	294.1	8.22E+01
	uCi/ml	8.46E-05		3.70E-05

✓ $\chi \frac{100 ml}{.1128 g} = 3.28E-2 \frac{uCi}{g}$

$\bar{x}_7$

JAG 9-22-

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by LR Greenwood Date 9/22/95

3-2188

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : Y28874 ARF(SOW) : ASR 2388

A.L.O. No. : BLK-2388 Description : D.H2O

Pipet Nos.: #14 #14

DF --- .99492 → 10ml vol flask → .99492 --- --- ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.89 TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	12:52	10:33
Total counts	268	316
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

WHC-SD-WM-DP-145 REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H1 Description : CORE 99 TANK BY-108

DF .... .10770 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 9.3850E+04 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	13 : 20	12 : 15
Total counts	40918	62945
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	7.50E+08	7.8	7.59E+05
	uCi/g	3.38E+02 ✓		3.42E-01

Data Entry by T Trang-Le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2190

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 138874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1077 g → 100 ml --- .99472 ml → 10 ml Vol flask --- .09944 ml --- ---

#14 #8

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst Th Pulppl Date 9/14/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 | TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	13:20	12:15
Total counts	40918	62945
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-Le 9/18/95

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H2 Description : CORE 99 TANK BY-108

DF .... .11720 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 8.6243E+04 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	13 : 38	12 : 25
Total counts	47227	73291
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	8.19E+08	7.8	7.00E+05
	uCi/g	3.69E+02 ✓		3.15E-01

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2192

HC-SD-WM-DP- 145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H2 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #8

DF --- .1172 g → 100 ml --- .99492 ml → Vol Flask --- .09944 ml --- ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	13:38	12:25
Total counts	47227	73291
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

3-2193

HO-CD-WM-DP 145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H3 Description : CORE 99 TANK BY-108

DF .... .11245 ---> 100.00000 .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 8.9839E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	13 : 44	12 : 36
Total counts	327	373
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.62E+05	89.0	7.37E+04
	uCi/g	7.29E-02		3.32E-02 ✓

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2194

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H3 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .11245 → 100 ml --- .99492 → 10 ml Vol Flask --- .99492 --- ---

S Avg x2 ml ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 | TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	13:44	12:36
Total counts	327	373
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

HNF-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7946-H1T Description : CORE 99 TANK BY-108

DF ---- .10020 ---> 100.00000 ---- .99492 ---> 10.00000 ---- .09944

Dilution Factor = 1.0087E+05 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	13 : 50	12 : 47
Total counts	59345	91503
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.18E+09	7.8	8.20E+05
	uCi/g	5.33E+02 ✓		3.69E-01

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by J R Greenwood Date 9/22/95

3-2196

WHC-SD-WM-DP-245, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order # 28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-H1T Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10ml #8

DF --- .1002 g → 100 ml --- .99492 ml → 10ml volf flask --- .09944 ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [illegible] Date 9/14/95 9/15/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.89 TTL 9/25/95

Date	9/18/95	9/21/95
Time(PST)	13:50	12:47
Total counts	59345	91503
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-Le 9/18/95

3-2197

WHC-SD-WM-DP-147, REV. 1

Pacific Northwest Laboratory 95226

Strontium-90.....PNL-ALO-433 & 431

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7946-H2T Description : C99, BY-108

DF .... .09920 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 1.0189E+05 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 5	12 : 57
Total counts	42345	64726
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	8.34E+08	7.8	8.31E+05
	uCi/g	3.76E+02 ✓		3.74E-01

Data Entry by T Trang-Le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L A Greenwood Date 9/22/95

3-2198

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-H2T Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10ml #8

DF --- .0992 → 100 --- 99492 → Vol --- .09944 --- ---

g ml ml Flask ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/14/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 |

9/25/95

Date	9/18/95	9/21/95
Time(PST)	142:05	12:57
Total counts	42345	64726
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

3-2199

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Strontium-90.....PNL-ALO-433 & 431

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7946-HCB Description : C99. BY-108

DF .... .09970 ---> 100.00000 .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 1.0133E+04 +/- 1.81%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 16	13 : 9
Total counts	301	422
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	4.60E+05	172.7	8.28E+04
	uCi/g	2.07E-01		3.73E-02 ✓

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by JR Greenwood Date 9/22/95

3-2200

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-HCB Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10ml #14

DF ---.0997 g → 100 ml ---.99492 ml → Vol flask ---.99492 ml ---

AVG x̄2

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/14/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/25/95 TL 9/18/95	9/21/95
Time(PST)	14 2:16	13:09
Total counts	301	422
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-Le 9/18/95

3-2201

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H1 Description : CORE 99 TANK BY-108

DF .... .10890 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 9.2816E+04 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 27	13 : 20
Total counts	72768	111098
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.31E+09	7.8	7.60E+05
	uCi/g	5.89E+02 ✓		3.42E-01

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2202

WHC-CD-WM-DP- 145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #8

DF --- .1089 g → 100 ml --- .99492 → Vol Flask --- .09944 ml --- ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/15/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.89

9/25/95 TL

Date	9/18/95	9/21/95
Time(PST)	14 2:27	13:20
Total counts	72768	111098
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

3-2203

HNF-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H2 Description : CORE 99 TANK BY-108

DF .... .14450 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 6.9949E+04 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 38	13 : 37
Total counts	109576	166764
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/g	1.47E+09	7.7	5.73E+05
	uCi/g	6.62E+02 ✓		2.58E-01

Data Entry by T Trang-Le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2204

Pacific Northwest Laboratory PNL-SD-WM-DP-145, REV. 1 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1445 g → 100 ml --- .99492 ml (#14) → 10 ml Vol Flask --- .09944 ml (#8) ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/14/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument	P.B.C. - 2	d/c Y-90 1.89
Date	9/18/95	9/21/95
Time(PST)	42:38	13:37
Total counts	109576	166769
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

9/25/95

Analyst T Trang-Le 9/18/95

3-2205

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7948-H1 Description : CORE 99 TANK BY-108

DF .... .09880 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 1.0230E+05 +/- 2.01%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	14 : 50	13 : 44
Total counts	85308	130307
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/g	1.70E+09	7.7	8.41E+05
	uCi/g	7.65E+02		3.79E-01

Data Entry by T Trang-Le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by LR Greenwood Date 9/22/95

3-2206

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : #28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7948-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #14 10 ml #8

DF --- .0988 g → 100 ml — .99492 ml → Vol flask --- .09944 ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst Ta Poeppl Date 9/12/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84 |

9/25/95

Date	9/18/95	9/21/95
Time(PST)	12:50	13:44
Total counts	85308	130307
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

3-2207

HNF-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7948-H2 Description : CORE 99 TANK BY-108

DF .... .08760 ---> 100.00000 .... .99492 ---> 10.00000 .... .09944

Dilution Factor = 1.1538E+05 +/- 1.81%

Analysts Historical Yield .9900 +/- 7.0%

To (separation) 9 / 18 / 95 PST 9 : 15

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 18 / 95	9 / 21 / 95
Time(PST)	15 : 2	13 : 49
Total counts	82479	127014
Count time	10	10
Bkg C/M	28.010	27.720
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.90E+09	7.7	9.51E+05
	uCi/g	8.56E+02 ✓		4.28E-01

Data Entry by T Trang-le Date 9/22/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/22/95

3-2208

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K78874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-794B-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .0876 g → 100 ml --- .99493 ml (#14) → 10 ml Vol Flask --- .09944 ml (#8) ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95240 Blank card ID 95240

Analyst [signature] Date 9/16/95 9/18/95

To (separation) 9/18/95 PST 9:15

Instrument | P.B.C. - 2 | d/c Y-90 1.84

9/25/95

Date	9/18/95	9/21/95
Time(PST)	15 3:02	13:49
Total counts	82479	127014
Count time	10	10
Bkg C/M	28.01	27.72
Bkg cnt time	100	100

Analyst T Trang-le 9/18/95

3-2209

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WHC-CD-WM-DP-145, REV. 1

Na2O2 FUSION SEGMENT AND QUARTER SEGMENT Sr-90 ANALYSIS

3-2210

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DATE TO QC: 09/26/95 WHC-SD-WM-DP-145, REV. 1

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - Strontium-90 - Na202

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers - 95-07941-N3 95-07943-N1 95-07944-N1

Julie Drecht 9/25/95

PNL ACL Quality Representative Date

3-2211

WHC-SD-WM-DF-145 REV. 1

Pacific Northwest Laboratory 95258

Strontium-90.....PNL-ALO-433 & 431

TTL 9/26/95

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

TTL 9/26/95

A.L.O. No. 95-7944 – N1 Description :

DF .... .13280 ---> 100.00000 .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 7.6072E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 7.0%

To (separation) 9 / 22 / 95 PST 10 : 40

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 22 / 95	9 / 25 / 95
Time(PST)	13 : 38	9 : 51
Total counts	9359	14575
Count time	10	10
Bkg C/M	28.280	27.210
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty.%	MDA
Strontium-90	dpm/g	1.48E+07	8.1	6.29E+04
	uCi/g	6.65E+00		2.83E-02

Data Entry by T Trang-Le Date 9/26/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/26/95

3-2212

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 22/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-N1 Description :

Pipet Nos.: #14 10 ml #14

DF --- .1328 g → 100 ml --- .99492 ml → 10 ml flask --- .99492 ml ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95250 Blank card ID 95250

Analyst [signature] Date 9/22/95

To (separation) 9/22/95 PST 10:40

Instrument | P.B.C. - 2 | d/c Y-90 1.84

Date	9/22/95	9/25/95
Time(PST)	13:38	9:51
Total counts	9359	14575
Count time	10 min.	10 min.
Bkg C/M	28.28	27.21
Bkg cnt time	100 min.	100 min.

Analyst [signature] 9/22/95
K.T. 9/25/95

3-2213

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 22/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7941-N3 Description :

DF .... .11345 ---> 100.00000 .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 8.9047E+03 +/- 1.81%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 22 / 95 PST 10 : 40

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 22 / 95	9 / 25 / 95
Time(PST)	13 : 12	9 : 19
Total counts	309	336
Count time	10	10
Bkg C/M	28.280	27.210
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	1.24E+05	149.5	7.33E+04
	uCi/g	5.60E-02		3.30E-02

Data Entry by T Trang-le Date 9/26/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/26/95

3-2214

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 22/ 95 Work order : K 38874 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-N3 Description :

Pipet Nos.: #14 10 mo #14

DF --- 11345 → 100 --- 99492 → 100 --- 99492 ---

Avg x̄ 2 me me Flask me

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95250 Blank card ID 95250

Analyst [signature] Date 9/22/95

To (separation) 9/22/95 PST 10:40

Instrument	P.B.C. - 2	d/c Y-90 184
Date	9/22/95	9/25/95
Time(PST)	13:12	9:19
Total counts	309	336
Count time	10 min.	10 min.
Bkg C/M	28.28	27.21
Bkg cnt time	100 min.	100 min.

Analyst [signature] 9/22/95
K. T. 9/25/95

3-2215

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 22/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7943-N1 Description :

DF .... .22560 ---> 100.00000 .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 4.4780E+03 +/- 2.01%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 22 / 95 PST 10 : 40

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 22 / 95	9 / 25 / 95
Time(PST)	13 : 26	9 : 39
Total counts	6669	10438
Count time	10	10
Bkg C/M	28.280	27.210
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/g	6.28E+06	7.5	3.69E+04
	uCi/g	2.83E+00		1.66E-02

Data Entry by T Trang-Le Date 9/26/95

Calculation and Analytical Data Sheet Reviewed by L R Freeman Date 9/26/95

3-2216

PNL-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 22/ 95 Work order : K2887 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-N1 Description :

Pipet Nos.: #14 10 ml #14

DF --- .2250 g → 100 ml --- .99492 → ml 10 ml Flask --- .99492 ml --- ---

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95250 Blank card ID 95250

Analyst [illegible] Date 9/22/95

To (separation) 9/22/95 PST 10:40

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/22/95	9/25/95
Time(PST)	13:26	9:39
Total counts	6669	10438
Count time	10 min.	10 min.
Bkg C/M	28.28	27.21
Bkg cnt time	100 min.	100 min.

Analyst T. Thomas 9/22/95
T.T. 9/25/95

3-2217

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : K2867 ARF(SOW) : ASR 2388

A.L.O. No. STD-2388 Description : 1.8513 E6 dpm/ml

DF ---- .09944 ---> 10.00000 ---- .09944

Dilution Factor = 1.0113E+03 +/- 1.73%

Analysts Historical Yield 1.0000 +/- 6.0%

To (separation) 9 / 22 / 95 PST 10 : 40

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 22 / 95	9 / 25 / 95
Time(PST)	12 : 54	8 : 56
Total counts	8424	12944
Count time	10	10
Bkg C/M	28.280	27.210
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	1.66E+06	7.3	8.14E+03
	uCi/ml	7.47E-01		3.67E-03

90%
Historical Yield
98±6 %

Data Entry by T Trang-le Date 9/26/95

Calculation and Analytical Data Sheet Reviewed by L R Sheerwood Date 9/26/95

3-2218

HC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 22/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : STD-2388 Description : 2.2165E6 d/m/ml 4-26-88

Pipet Nos.: #8 10 ml #8

DF --- .09944 → 10 ml --- .09944 --- --- --- ---

Flask ml

Pipet checks are recorded on labsheets by pipet number

Std RS-11-13 LRB BNW 52624 Page(s) No. 47, 50

Standard card ID 95250 Blank card ID 95250

Analyst [signature] Date 9/22/95

To (separation) 9/22/95 PST ~~10:30~~ 10:40 P 9/22/95

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/22/95	9/25/95
Time(PST)	12:54	8:56
Total counts	8424	12944
Count time	10	10 min.
Bkg C/M	28.28	27.21
Bkg cnt time	100	100 min.

Analyst [signature] 9/22/95
T.T. 9/25/95

Samples: 95-7941-N3; 95-7943-N1,
~~95-795~~; 95-7944-N1; BIK.
KLP 9/22/95

3-2219

HC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. BLK-2388 Description :

DF .... .99492 ---> 10.00000 .... .99492

Dilution Factor = 1.0102E+01 +/- 1.73%

Analysts Historical Yield .9800 +/- 6.0%

To (separation) 9 / 22 / 95 PST 10 : 40

Instrument	P.B.C. - 2	P.B.C - 2
d/c Y-90	1.8400	1.8400

Date	9 / 22 / 95	9 / 25 / 95
Time(PST)	13 : 5	9 : 8
Total counts	283	279
Count time	10	10
Bkg C/M	28.280	27.210
Bkg cnt time	100	100

Calculation and Results

		Activity	Uncertainty,%	MDA
Strontium-90	dpm/ml	2.50E+01	******	8.31E+01
	uCi/ml	1.13E-05		3.74E-05

Conversion to Avg. Mass

$X \frac{100ml}{0.1573} = 2.38E-2 \frac{uC}{g}$

$\bar{X}_3$

JRG 9-26-95

Data Entry by T Trangle Date 9/26/95

Calculation and Analytical Data Sheet Reviewed by LRGreenwood Date 9/26/95

3-2220

Pacific Northwest Laboratory WHC-SD-WM-DP-2/5 , REV. 1 95250

Strontium-90.....PNL-ALO-433 & 431

Customer : SILVERS Date Received : 09/ 22/ 95 Work order : K28874 ARF(SOW) : ASR 2388

A.L.O. No. : BLK-2388 Description : D. H_2O

Pipet Nos.: #14 10 ml #14

DF --- .99492 → 1 ml --- .99492 --- --- ---

ml Flask ml

Pipet checks are recorded on labsheets by pipet number

Std_____ LRB BNW_____ Page(s) No._____

Standard card ID 95250 Blank card ID 95250

Analyst [signature] Date 9/22/95

To (separation) 9/22/95 PST 10:40

Instrument	P.B.C. - 2	d/c Y-90 1.84
Date	9/22/95	9/25/95
Time(PST)	13:05	9:08
Total counts	283	279
Count time	10 min.	10 min.
Bkg C/M	28.28	27.21
Bkg cnt time	100 min.	100 min

Analyst K. Thomas 9/22/95
K.T. 9/25/95

3-2221

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HNF-SD-WM-DP-245, REV. 1

D6 - GEA ANALYSIS

3-2222

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Sample Number	*	Co-60 uCi/g	+/- % Error	Cs-134 uCi/g	+/- % Error	Cs-137 uCi/g	+/- % Error	Eu-154 uCi/g	+/- % Error	Eu-155 uCi/g	+/- % Error	Am-241 uCi/g	+/- % Error
Segment 1													
95-7941-H1T	F/smp	8.49E-03	12	<8.E-03		2.02E+01	3					<3. E-02	
95-7941-H2T	F/dup	<6. E-03		<2.E-02		1.77E+01	3					1.16E-01	15
Mean Difference						1.55							
RPD						13 x							
95-7941-HCB	F/blk	1.77E-03	15	1.67E-03	18	4.30E-01	4					<4. E-03	
95-7941-N3		<6.E-03		<5E-03		3.81E-02	12	<2.E-02		<2.E-02		<2. E-02	
Segment 2 Drainable Liquid (uCi/mL) **													
95-7932-A1	A/smp	<3. E-03		<3. E-02		1.29E+02	6	<6. E-03		<1. E-01		<7. E-02	
95-7932-A2	A/dup	<3. E-03		<3. E-02		1.30E+02	6	<6. E-03		<1. E-01		<7. E-02	
Mean Difference						0.05							
RPD						1							
95-7932-A3	A/blk	<4. E-04		<3. E-04		7.91E-04	35	<6. E-04		<1. E-03		<6. E-04	
Segment 2A													
95-7942-H1	F/smp	<2. E-02		<5.E-02		2.39E+01	5					<1. E-01	
95-7942-H2	F/dup	<3. E-03		<2.E-02		3.30E+01	3					<6. E-02	
Mean Difference						2.93 $							
RPD						32 x							
95-7942-H3	F/blk	1.64E-03	15	<4.E-03		9.36E+00	4					<2. E-02	
Segment 2D													
95-7943-H1	F/smp	1.94E-03	14	<8.E-03		4.82E+01	3					<4. E-02	
95-7943-H2	F/dup	2.83E-03	17	<9.E-03		4.53E+01	3					<3. E-02	
Mean Difference		0.81				0.73							
RPD		37 x				6							
95-7943-N1	F/smp	<6. E-03		<3.E-02		5.23E+01	3	<2.E-02		<8.E-02		<8.E-02	
Segment 3 Drainable Liquid (uCi/mL) **													
95-7935-A1	A/smp	<3. E-03		<4. E-02		1.41E+02	6	<7. E-03		<1. E-01		<7. E-02	
95-7935-A2	A/dup	<3. E-03		<3. E-02		1.37E+02	6	<7. E-03		<1. E-01		<7. E-02	
Mean Difference						0.17							
RPD						3							
Segment 3A													
95-7944-H1	F/smp	3.29E-03	10	<9E-03		4.34E+01	3					<4. E-02	
95-7944-H2	F/dup	2.30E-03	13	<8E-03		4.96E+01	4					<3. E-02	
Mean Difference		1.11				1.31							
RPD		35 x				13 x							
95-7944-N1	FZ/smp	7.82E-3	6	<7E-03		4.33E+1	6	<4.E-03		<2.E-02		<3. E-02	
Segment 4A													
95-7945-H1	F/smp	1.32E-02	3	<5.E-03		7.05E+01	3	3.93E-02	3	3.83E-02	8	1.94E-02	45
95-7945-H2	F/dup	5.44E-03	5	<4.E-03		7.21E+01	3	3.54E-02	3	3.67E-02	8	1.64E-02	40
Mean Difference		8.08 $				0.26		1.23		0.19		0.14	
RPD		83 x				2		10 x		4		17 x	
95-7945-H3	F/blk	2.22E-03	9	<6.E-04		6.05E-02	4	<2. E-03		<2. E-03		<2. E-03	
Segment 4B													
95-7946-H1T	F/smp	6.21E-03	14	<2.E-02		1.13E+02	3	8.28E-02	4	8.62E-02	12	<9. E-02	
95-7946-H2T	F/dup	7.75E-03	11	<2.E-02		9.48E+01	3	6.20E-02	5	6.75E-02	14	3.20E-02	65
Mean Difference		0.63				2.06 $		2.29 $		0.67			
RPD		22 x				18 x		29 x		24 x			
95-7946-HCB	F/blk	1.75E-03	16	<1.E-03				<2. E-03		<2. E-03		<3. E-03	
Segment 4C													
95-7947-H1	F/smp	<3. E-02		<4.E-01		1.20E+03	5	<2. E-01		<2. E+00		<8. E-01	
95-7947-H2	F/dup	<3. E-02		<4.E-01		1.34E+03	5	<2. E-01		<2. E+00		<7. E-01	
Mean Difference						0.78							
RPD						11							
Segment 4D													
95-7948-H1	F/smp	<4. E-02		<5.E-01		2.08E+03	5	<2. E-01		<2. E+00		<1. E+00	
95-7948-H2	F/dup	<4. E-02		<5.E-01		2.12E+03	5	<2. E-01		<2. E+00		<2. E+00	
Mean Difference						0.13							
RPD						2							

$ = the mean difference result is greater than or equal to 1.96, there is 95% confidence that the two results are not equal.

* smp = sample, dup = duplicate, blk = methods blank
F = KOH - KNO3 Fusion in Ni crucible, FZ = Na2O2 - NaOH Fusion in Zr crucible, A = Acid Digestion

** Only Drainable Liquid samples are reported in uCi/mL.

3-2223

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WHC-CD-WM-DP-1215, REV. 1

KOH FUSION HOMOGENIZATION CHECK GEA ANALYSIS

3-2224

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Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

BY-108 Homogeneous Test
9/19/95

Gamma Energy Analysis, (PNL-ALO-450) : Silvers K28872

Cognizant Scientist: L R Greenwood 9-19-95

Review : T Trang-Le 9/19/95

Measured Activities (microCuries/g)

ALO ID Client ID	GEA Filename	Co-60 Error +/-	Cs-134 Error +/-	Cs-137 Error +/-	Am-241 Error +/-
95-7941-H1T	T1827	<3. E-2	<9. E-2	2.05E 1 5%	<2. E-1
95-7941-H2T	G0072	4.50E-3 13%	<1. E-2	1.81E 1 4%	7.87E-2 19%
95-7941-HCB	G0071	3.11E-3 9%	1.95E-3 14%	3.97E-1 4%	<4. E-3
95-7941-H1B	G0073	4.19E-3 14%	<2. E-2	2.40E 1 4%	<4. E-2
95-7941-H2B	H0056	2.17E-3 22%	<1. E-2	2.04E 1 3%	<5. E-2
95-7946-H1B	T1823	<6. E-2	<4. E-1	1.12E 2 5%	<8. E-1
95-7946-H2B	T1824	<8. E-2	<3. E-1	1.02E 2 5%	<8. E-1
95-7946-H1T	T1825	<2. E-1	<4. E-1	1.15E 2 5%	<9. E-1
95-7946-H2T	T1826	<8. E-2	<3. E-1	9. 18E 1 5%	<8. E-1
95-7946-HCB	H0055	<2. E-3	2.30E-3 12%	2.06E-1 4%	<4. E-3

Note: K-40 was detected in samples, but not reported.

3-2225

WHC-SD-WM-DP-145, REV. 1

WHC-SD-WM-DP-145, REV. 1

RT R 9/19/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 14:56:21.98 RTR
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H1T C99.BY108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1827.CNF;2
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;26 - 29-AUG-1995 12:57:12

Acquisition time : 1-SEP-1995 14:26:12. Sample quantity: 9.98020E-03 G
Sample (EOI) time: 1-SEP-1995 14:26:10. Sample geometry: T8SCV
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:30:01.11 0.1%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 1.30
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.904E-02	2.054E+01	2.054E+01	4.90	OK

Final Mean for 1 Valid Peaks = 2.054E+01+/- 1.007E+00 (4.90%)

Flag: "*" = Keyline

3-2226

WHC-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7941-H1T C9

Acquisition date : 1-SEP-1995 14:26:12

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.88*	5704	1.73	883.32	876	14	1.4		CS-137	20.5

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	7.	1460.83	7.0209E-01
CO-60	1.	1332.50	2.9533E-02
SR-85	127.	514.00	1.2792E-01
RU-103	157.	497.05	1.5419E-01
RU-106	42.	621.92	8.8712E-01
SB-125	296.	427.88	5.5596E-01
CS-134	39.	604.71	8.4226E-02
CE-144	444.	133.54	7.2466E-01
EU-152	2.	1408.01	1.8699E-01
EU-154	1.	1274.51	7.4457E-02
EU-155	392.	105.31	3.1100E-01
TH-228	389.	238.58	2.5885E-01
AM-241	354.	59.54	1.8635E-01

3-2227

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95 · 7941 · HIT Description : C99 BY108

Pipet Nos.:

DF --- .1005 g → 100 ml --- 9.4305 ml --- --- --- ---

co recorded

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/1/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1827

Sample size

0.0099802 g

Analyst [signature] Date 9/1/95

3-2228

HC-SD-WM-DP-145, REV 1

RT R 9/19/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 14:43:37.38
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H2T C99.BY108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0072.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;5 - 25-AUG-1995 16:20:08

Acquisition time : 1-SEP-1995 14:13:00.
Sample (EOI) time: 1-SEP-1995 14:13:00.
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:30:23.96 1.3%

Sample quantity: 1.01887E-02 G
Sample geometry: P0-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.791E+00	5.307E-03	5.307E-03	15.41	OK
	1332.50	99.98*	1.585E+00	3.812E-03	3.812E-03	19.89	OK

Final Mean for 2 Valid Peaks = 4.504E-03+/- 5.561E-04 (12.35%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	1.808E+01	1.808E+01	3.47	OK

Final Mean for 1 Valid Peaks = 1.808E+01+/- 6.282E-01 (3.47%)

AM-241	59.54	35.90*	4.401E+00	7.866E-02	7.866E-02	18.22	OK

Final Mean for 1 Valid Peaks = 7.866E-02+/- 1.433E-02 (18.22%)

Flag: "*" = Keyline

3-2229

Post-NID Peak Search Report
Sample ID : 95-7941-H2T C9

Acquisition date : 1-SEP-1995 14:13:00

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	36.79	858	1.11	97.08	96	6	13.0			
0	59.73	843	0.99	158.19	154	9	18.1		AM-241	7.866E-02
0	661.48	326560	1.77	1761.73	1749	24	0.2		CS-137	18.1
0	795.52	46	1.61	2118.92	2111	17	23.1			
0	1173.15*	64	1.67	3125.20	3115	21	15.3		CO-60	5.307E-03
0	1333.24*	41	1.72	3551.79	3541	17	19.8		CO-60	3.812E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
K-40	20.	1460.83	1.9663E-02
SR-85	5120.	514.00	1.2616E-02
RU-103	6098.	497.05	1.4970E-02
RU-106	1998.	621.92	9.4571E-02
SB-125	9642.	427.88	5.0009E-02
CS-134	2221.	604.71	9.7593E-03
CE-144	7275.	133.54	5.2731E-02
EU-152	3.	1408.01	3.7696E-03
EU-154	29.	1274.51	6.5199E-03
EU-155	6625.	105.31	2.5559E-02
TH-228	8864.	238.58	2.0399E-02

HNC-CD-WM-DF-145 REV 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7941-H2T Description : C99, BY108

Pipet Nos.:

DF --- 1026 g → 100 ml --- 9.9305 ml as revised --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/1/95

Counting Information:

Detector: TRACK FOG Y-GeL G A-40% B-40% C-70% D-70% E_LEPS

R.T. 9/1/95

File: G0072

Analyst [signature] Date 9/1/95

Sample size

0.0101887 g

3-2231

WHC-SD-WM-DP-145, REV. 1

RT RS 9/19

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 14:07:19.91
Gamma Energy Analysis (GEA)

Sample Title: 95-07941-HCB METHODS BLK C99.BY108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0071.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;5 - 25-AUG-1995 16:20:08

Acquisition time : 1-SEP-1995 12:27:08.
Sample (EOI) time: 1-SEP-1995 12:27:07.
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:02.61 0.0%

Sample quantity: 1.10000E-02 G
Sample geometry: P0-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.460E+00	1.146E-02	1.146E-02	23.60	OK

Final Mean for 1 Valid Peaks = 1.146E-02+/- 2.704E-03 (23.60%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.790E+00	3.039E-03	3.039E-03	11.52	OK
	1332.50	99.98*	1.586E+00	3.205E-03	3.205E-03	13.37	OK

Final Mean for 2 Valid Peaks = 3.106E-03+/- 2.711E-04 (8.73%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-134	563.24	8.38	3.614E+00	-----	Line Not Found	-----	Absent
	569.32	15.40	3.579E+00	-----	Line Not Found	-----	Absent
	604.71	97.60*	3.393E+00	2.316E-03	2.316E-03	20.70	OK
	795.87	85.40	2.622E+00	1.774E-03	1.774E-03	18.66	OK
	801.95	8.73	2.603E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 1.949E-03+/- 2.724E-04 (13.98%)

WHO-SD-WM-DP-145 REV. 1

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-07941-HCB M Acquisition date : 1-SEP-1995 12:27:08

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.124E+00	3.973E-01	3.973E-01	3.53	OK

Final Mean for 1 Valid Peaks = 3.973E-01+/- 1.401E-02 (3.53%)

Flag: "*" = Keyline

3-2233

Post-NID Peak Search Report
Sample ID : 95-07941-HCB M

Acquisition date : 1-SEP-1995 12:27:08

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	604.34	187	1.46	1609.46	1602	16	20.4		CS-134	2.316E-03
0	661.47	25820	1.81	1761.69	1749	23	0.6		CS-137	0.397
0	795.78	97	1.49	2119.60	2113	18	18.3		CS-134	1.774E-03
0	1173.35*	133	1.73	3125.72	3116	23	11.4		CO-60	3.039E-03
0	1332.59*	124	2.14	3550.08	3539	26	13.3		CO-60	3.205E-03
0	1461.21*	44	1.45	3892.81	3882	22	23.5		K-40	1.146E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	512.	514.00	1.1091E-03
RU-103	567.	497.05	1.2686E-03
RU-106	222.	621.92	8.7526E-03
SB-125	915.	427.88	4.2798E-03
CE-144	749.	133.54	4.7026E-03
EU-152	13.	1408.01	2.1805E-03
EU-154	39.	1274.51	2.0817E-03
EU-155	757.	105.31	2.4002E-03
TH-228	914.	238.58	1.8204E-03
AM-241	673.	59.54	3.1561E-03

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7941-HCB Description : C99.BY108

Pipet Nos.:

DF --- .1087 g average → 100 ml --- 9.9305 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst T.G. Peppard Date 9/1/95

Counting Information:

Detector: TRACK FDG Y-Gel (G) A-40% B-40% C-70% D-70% E_LEPS

File: G0071 T.T. 9/1/95

Analyst K. Thomas Date 9/1/95

sample size 0.0107945 g

3-2235

WHC-SD-WM-DP-745, REV. 1

BTRS 9/19/9

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

2-SEP-1995 10:33:34.32
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H1B C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0073.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_GOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;5 - 25-AUG-1995 16:20:08

Acquisition time : 1-SEP-1995 14:52:20.
Sample (EOI) time: 1-SEP-1995 14:52:19.
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:30:31.70 1.7%

Sample quantity: 1.02086E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM): 0.75
Errors propagated: [illegible]
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyzed by : [illegible] V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
[illegible] V1.8 [illegible]ACT V2.5

Nuclide Line Activity Report

Nuclide Type: [illegible]

Nuclide	Energy	[illegible]	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO 60	1173.24	99.90	1.791E+00	4.061E-03	4.061E-03	23.07	OK
	1332.50	99.98*	1.586E+00	4.273E-03	4.273E-03	16.89	OK

Final [illegible] 2 Valid Peaks = 4.194E-03+/- 5.718E-04 (13.63%)

Nuclide Type: [illegible]

Nuclide	Energy	[illegible]	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.10*	3.123E+00	2.401E+01	2.401E+01	3.47	OK

Final [illegible] 1 Valid Peaks = 2.401E+01+/- 8.337E-01 (3.47%)

Flag: [illegible]

3-2236

Post-NID Peak Search Report
Sample ID : 95-7[illegible] C9

Acquisition date : 1-SEP-1995 14:52:20

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
5	36.59	3[illegible]	0.91	96.54	93	16	3.2	4.00E+01		
5	37.75	2[illegible]	1.37	99.62	93	16	6.3			
5	39.01	[illegible]	1.38	103.00	93	16	12.2			
0	661.49	43[illegible]	1.79	1761.73	1749	24	0.2		CS-137	24.0
0	1172.99*	[illegible]	2.02	3124.73	3112	21	23.0		CO-60	4.061E-03
0	1332.30*	[illegible]	2.90	3549.31	3539	18	16.8		CO-60	4.273E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Cnt	Energy (keV)	MDA (uCi/G)
K-40	33.	1460.83	2.5208E-02
SR-85	6937.	514.00	1.4656E-02
RU-103	8313.	497.05	1.7444E-02
RU-106	2666.	621.92	1.0901E-01
SB-125	12838.	427.88	5.7591E-02
CS-134	3030.	604.71	1.1377E-02
CE-144	9700.	133.54	6.0772E-02
EU-152	4.	1408.01	4.3442E-03
EU-154	16.	1274.51	4.8095E-03
EU-155	8592.	105.31	2.9050E-02
TH-228	11330.	238.58	2.3017E-02
AM-241	7792.	59.54	3.8583E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : T195-TWC-02

A.L.O. No. : 95-7941-HB1 Description : C99, BY-108

Pipet Nos.:

DF --- .1088 g → 100 ml --- 9.9305 ml --- --- as received --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst TG Pappas Date 9/1/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: G0073

K.T. 9/1/95

Analyst T. Thomas Date 9/1/95

sample size

0.0102086g

3-2238

HO-CD-WM-DP-145, REV. 1 RT R 9/19/9

Battelle / Pacific Northwest Laboratories 1-SEP-1995 14:53:08.08
Analytical Chemistry Laboratory Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H2B C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0056.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;5 - 25-AUG-1995 16:21:59

Acquisition time : 1-SEP-1995 14:21:11. Sample quantity: 1.28004E-02 G
Sample (EOI) time: 1-SEP-1995 14:21:10. Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:31:43.60 5.4%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	2.889E-03	2.889E-03	23.18	OK
	1332.50	99.98*	1.318E+00	1.536E-03	1.536E-03	41.21	OK

Final Mean for 2 Valid Peaks = 2.174E-03+/- 4.600E-04 (21.15%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	2.035E+01	2.035E+01	2.82	OK

Final Mean for 1 Valid Peaks = 2.035E+01+/- 5.740E-01 (2.82%)

Flag: "*" = Keyline

3-2239

Post-NID Peak Search Report
Sample ID : 95-7941-H2B C9 Acquisition date : 1-SEP-1995 14:21:11

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
9	35.26	3088	0.91	93.70	91	29	2.5	1.45E+01		
9	36.53	2900	1.44	97.09	91	29	5.1			
9	38.06	2538	1.59	101.18	91	29	6.8			
9	39.69	1809	1.62	105.51	91	29	9.5			
9	41.34	1313	1.64	109.93	91	29	13.1			
9	43.34	564	1.11	115.24	91	29	22.8			
0	661.41	376348	1.81	1763.89	1751	24	0.2		CS-137	20.3
0	795.87	20	1.21	2122.55	2111	18	60.6			
0	1173.34*	36	3.06	3129.42	3120	19	23.2		CO-60	2.889E-03
0	1332.68*	17	1.81	3554.44	3543	20	41.2		CO-60	1.536E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
K-40	19.	1460.83	1.8533E-02
SR-85	6088.	514.00	1.3490E-02
RU-103	7347.	497.05	1.6119E-02
RU-106	2061.	621.92	9.3890E-02
SB-125	11404.	427.88	5.3417E-02
CS-134	2353.	604.71	9.8252E-03
CE-144	7259.	133.54	5.3572E-02
EU-152	3.	1408.01	3.6067E-03
EU-154	16.	1274.51	4.6203E-03
EU-155	6447.	105.31	2.6669E-02
TH-228	9528.	238.58	2.0823E-02
AM-241	5459.	59.54	4.2672E-02

HO-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SSI Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7941-H28 Description : C99, BY-108

Pipet Nos.:

DF ---.1289 g → 100 ml --- 9.9305 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst T. Pappal Date 9/1/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

H

T.T. 9/1/95

File: 40056

Analyst T. Thomas Date 9/1/95

sample size

0.0128004 g

3-2241

WHC-SD-WM-DP-145, REV. 1

RT 25 9/19

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 13:23:12.37
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H1B C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1823.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;26 - 29-AUG-1995 12:57:12

Acquisition time : 1-SEP-1995 12:34:18.
Sample (EOI) time: 1-SEP-1995 12:34:18.
Elapsed live time: 0 00:15:00.00
Elapsed real time: 0 00:15:03.17 0.4%

Sample quantity: 9.95000E-03 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.903E-02	1.117E+02	1.117E+02	4.78	OK

Final Mean for 1 Valid Peaks = 1.117E+02+/- 5.339E+00 (4.78%)

Flag: "*" = Keyline

3-2242

Post-NID Peak Search Report
Sample ID : 95-07946-H1B

Acquisition date : 1-SEP-1995 12:34:18

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.90*	15465	1.73	883.35	876	14	0.8		CS-137	112.

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	2.	1460.83	7.5285E-01
CO-60	1.	1332.50	5.3174E-02
SR-85	367.	514.00	4.3544E-01
RU-103	431.	497.05	5.1180E-01
RU-106	95.	621.92	2.6894E+00
SB-125	820.	427.88	1.8554E+00
CS-134	124.	604.71	3.0000E-01
CE-144	1385.	133.54	2.5679E+00
EU-152	0.	1408.01	0.0000E+00
EU-154	4.	1274.51	2.9873E-01
EU-155	1360.	105.31	1.1614E+00
TH-228	1065.	238.58	8.5940E-01
AM-241	1593.	59.54	7.9303E-01

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : I195-TWC-02

A.L.O. No. : 95-7946-H1B Description : C99. BY-108

Pipet Nos.:

DF --- .1116 g → 100 ml --- 9.9305 ml --- --- --- ---

co received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst Ya Pepper Date 9/1/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: I1823

sample size 0.009950 g

Analyst L. Thomas Date 9/1/95

3-2244

WHC-CD-WM-DP-145, REV. 1 RCR 9/19/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 13:29:52.81
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H2B C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1824.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;26 - 29-AUG-1995 12:57:12

Acquisition time : 1-SEP-1995 12:52:17. Sample quantity: 9.50300E-03 G
Sample (EOI) time: 1-SEP-1995 12:52:16. Sample geometry: T8SCV
Elapsed live time: 0 00:15:00.00
Elapsed real time: 0 00:15:02.79 0.3%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 1.30
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.903E-02	1.018E+02	1.018E+02	4.79	OK

Final Mean for 1 Valid Peaks = 1.018E+02+/- 4.874E+00 (4.79%)

Flag: "*" = Keyline

3-2245

Post-NID Peak Search Report
Sample ID : 95-07946-H2B Acquisition date : 1-SEP-1995 12:52:17

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.89*	13457	1.74	883.34	876	14	0.9		CS-137	102.

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	5.	1460.83	1.2464E+00
CO-60	2.	1332.50	7.8737E-02
SR-85	297.	514.00	4.1013E-01
RU-103	413.	497.05	5.2471E-01
RU-106	105.	621.92	2.9601E+00
SB-125	712.	427.88	1.8100E+00
CS-134	107.	604.71	2.9230E-01
CE-144	1215.	133.54	2.5187E+00
EU-152	1.	1408.01	2.7773E-01
EU-154	2.	1274.51	2.2869E-01
EU-155	1217.	105.31	1.1507E+00
TH-228	908.	238.58	8.3084E-01
AM-241	1424.	59.54	7.8500E-01

Pacific Northwest Laboratory HO-CD-WM-DP 145, REV. 1

95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7946-H28 Description : C99, BY-108

Pipet Nos.:

DF --- .0957 g → 100 ml --- 9.9305 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K a Reppond Date 9/1/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1824

Analyst K. Thomas Date 9/1/95

sample size
0.0099/50g
K.T. 9/1/95

3-2247

...-CD-WM-DP-145, REV. 1

RT RS 9/1

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 13:31:55.81
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H1T C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1825.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;26 - 29-AUG-1995 12:57:12

Acquisition time : 1-SEP-1995 13:16:39. Sample quantity: 9.95000E-03 G
Sample (EOI) time: 1-SEP-1995 13:16:38. Sample geometry: T8SCV
Elapsed live time: 0 00:15:00.00
Elapsed real time: 0 00:15:03.33 0.4%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 1.30
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.903E-02	1.154E+02	1.154E+02	4.78	OK

Final Mean for 1 Valid Peaks = 1.154E+02+/- 5.512E+00 (4.78%)

Flag: "*" = Keyline

3-2248

Post-NID Peak Search Report
Sample ID : 95-7946-H1T C9

Acquisition date : 1-SEP-1995 13:16:39

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	43.87	402	1.46	58.91	55	9	24.9			
0	75.06*	141	0.89	100.53	98	7	50.9			
0	661.91*	15977	1.74	883.36	877	13	0.8		CS-137	115.

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	4.	1460.83	1.0647E+00
CO-60	4.	1332.50	1.0635E-01
SR-85	374.	514.00	4.3984E-01
RU-103	485.	497.05	5.4325E-01
RU-106	139.	621.92	3.2486E+00
SB-125	779.	427.88	1.8083E+00
CS-134	152.	604.71	3.3156E-01
CE-144	1431.	133.54	2.6103E+00
EU-152	0.	1408.01	0.0000E+00
EU-154	2.	1274.51	2.1124E-01
EU-155	1419.	105.31	1.1865E+00
TH-228	1066.	238.58	8.6008E-01
AM-241	1714.	59.54	8.2273E-01

Pacific Northwest Laboratory WHC-SD-WM-DF-145, REV. 1 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-794C-H17 Description : C99. BY-108

Pipet Nos.:

DF --- .1002 g → 100 mL --- 9.9305 mL --- --- --- ---
as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst La Pappel Date 9/1/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: I1825

sample size
0.009950 g

Analyst L. Thomas Date 9/1/95

3-2250

WHC-SD-WM-DP-145, REV. 1 RTR 9/19/96

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 13:59:01.82
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H2T C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1826.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;26 - 29-AUG-1995 12:57:12

Acquisition time : 1-SEP-1995 13:43:48. Sample quantity: 9.85110E-03 G
Sample (EOI) time: 1-SEP-1995 13:43:48. Sample geometry: T8SCV
Elapsed live time: 0 00:15:00.00
Elapsed real time: 0 00:15:02.59 0.3%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 1.30
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.903E-02	9.183E+01	9.183E+01	4.79	OK

Final Mean for 1 Valid Peaks = 9.183E+01+/- 4.403E+00 (4.79%)

Flag: "*" = Keyline

3-2251

WHC-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7946-H2T C9

Acquisition date : 1-SEP-1995 13:43:48

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.90*	12585	1.75	883.35	876	14	0.9		CS-137	91.8

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	2.	1460.83	7.6041E-01
CO-60	2.	1332.50	7.5955E-02
SR-85	280.	514.00	3.8402E-01
RU-103	335.	497.05	4.5589E-01
RU-106	91.	621.92	2.6504E+00
SB-125	658.	427.88	1.6785E+00
CS-134	105.	604.71	2.7847E-01
CE-144	1056.	133.54	2.2648E+00
EU-152	0.	1408.01	0.0000E+00
EU-154	2.	1274.51	1.9454E-01
EU-155	1119.	105.31	1.0642E+00
TH-228	888.	238.58	7.9281E-01
AM-241	1275.	59.54	7.1658E-01

3-2252

Pacific Northwest Laboratory WHC-CD-WM-DP-145, REV. 1 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7946-H2T Description : C99, BY-108

Pipet Nos.:

DF --- .0992 g → 100 ml --- 9.9305 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst F a Pappal Date 9/1/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1826

0.0098511g
Sample size

Analyst T. Thomas Date 9/1/95

3-2253

WHC-SD-WM-DP-145, REV 1

RJR 9/19/

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

1-SEP-1995 14:13:54.04
Gamma Energy Analysis (GEA)

Sample Title: 95-07946-HCB METHODS BLK C99.BY-108 SST K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0055.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;5 - 25-AUG-1995 16:21:59

Acquisition time : 1-SEP-1995 12:28:51.
Sample (EOI) time: 1-SEP-1995 12:28:50.
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:44:49.32 4.6%

Sample quantity: 1.00000E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	4.141E-03	4.141E-03	109.32	OK

Final Mean for 1 Valid Peaks = 4.141E-03+/- 4.527E-03 (109.32%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-134	563.24	8.38	2.937E+00	-----	Line Not Found	-----	Absent
	569.32	15.40	2.909E+00	-----	Line Not Found	-----	Absent
	604.71	97.60*	2.762E+00	2.529E-03	2.529E-03	18.48	OK
	795.87	85.40	2.148E+00	2.200E-03	2.200E-03	14.13	OK
	801.95	8.73	2.132E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 2.301E-03+/- 2.588E-04 (11.25%)

CS-137	661.66	85.20*	2.547E+00	2.061E-01	2.061E-01	3.01	OK

Final Mean for 1 Valid Peaks = 2.061E-01+/- 6.201E-03 (3.01%)

Flag: "*" = Keyline

3-2254

Post-NID Peak Search Report
Sample ID : 95-07946-HCB M Acquisition date : 1-SEP-1995 12:28:51

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	604.04	151	1.16	1610.87	1602	18	18.3		CS-134	2.529E-03
0	661.38	9926	1.85	1763.82	1751	26	1.1		CS-137	0.206
0	795.70	90	1.58	2122.09	2114	16	13.6		CS-134	2.200E-03
0	1461.14*	12	2.01	3897.10	3885	19	109.3		K-40	4.141E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
CO-60	56.	1332.50	1.1894E-03
SR-85	254.	514.00	1.0583E-03
RU-103	241.	497.05	1.1219E-03
RU-106	91.	621.92	7.5929E-03
SB-125	342.	427.88	3.5515E-03
CE-144	345.	133.54	4.4856E-03
EU-152	16.	1408.01	3.1666E-03
EU-154	31.	1274.51	2.4520E-03
EU-155	304.	105.31	2.2220E-03
TH-228	426.	238.58	1.6913E-03
AM-241	297.	59.54	3.8196E-03

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SST Date Received : 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. : 95-7946-HCB Description : C99, BY-108

Pipet Nos.:

DF ---.1017 → 100 --- 9.9305 --- --- --- ---
g ml ml as received
Average

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/1/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% ~~B~~ H-40% C-70% D-70% E_LEPS

A.T. 9/1/95

File: H0055

Sample size

0.0100993g

Analyst [signature] Date 9-1-95

3-2256

	Cs-137	Co-60	Am-241
95-7941-H1T	2.05E+01		
95-7941-H2T	1.81E+01	4.54E-03	7.87E-02
blank	3.97E-01	3.11E-03	
95-7941-H1B	2.40E+01	4.19E-03	
95-7941-H2B	2.04E+01	2.17E-03	
95-7946-H1T	1.15E+02		
95-7946-H2T	9.18E+01		
blank	2.06E-01		
95-7946-H1B	1.12E+02		
95-7946-H2B	1.02E+02		

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI NO.: TI95-TWC-02 PROJECT NO.: 21372 WBS NO.: 020501 SAMPLE TYPE: SLUDGE

ISSUED BY: Rick T. Steele DATE: 8/28/95 PREP TYPE: Ni/KOH FUSION

ANALYST: Clyde Chamberlain DATE: 9-1-95 CONTROLLING PROCEDURE: PNL-ALO-010

REVIEW: Rick T. Steele D TE: 9/1/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	ANALYTICAL PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
K28872	95-07941-H1T	PNL-ALO-450	GEA	0.1005		100					4.9653	SAMP
	95-07941-H2T			0.1026								SAMP DUP
	95-07941-HCB			.1087	X4 avg							BLANK
	95-07941-H1B			0.1028	0							SAMP
	95-07941-H2B			0.1289								SAMP DUP

Delivered 9.9305 ml of each sample to the lab.

PAGE 1 OF 1

3-2258

WHC-SD-WM-DP-145, REV. 1

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI NO.: TI95-TWC-02 PROJECT NO.: 21372 WBS NO.: 020501 SAMPLE TYPE: SLUDGE

ISSUED BY: Rick T. Steele DATE: 8/28/95 PREP TYPE: Ni/KOH FUSION

ANALYST: [illegible] DATE: 9-1-95 CONTROLLING PROCEDURE: PNL-ALO-010

REVIEW: [illegible] D TE: 9/1/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	ANALYTICAL PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
K28872	95-07946-H1T	PNL-ALO-450	GEA	0.1002		100					4.9653	SAMP
	95-07946-H2T			0.0992								SAMP DUP
	95-07946-HCB			.1017	1.4 avg							BLANK
	95-07946-H1B			0.1116								SAMP
	95-07946-H2B			0.0957								SAMP DUP
		Delivered 9.9305mL of each sample to the lab										

PAGE 1 OF 1

3-2259

WBC-SD-WM-DP-145, REV. 1

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI NO.: TI95-TWC-02 PROJECT NO.: 21372 WBS NO.: 020501 SAMPLE TYPE: SLUDGE

ISSUED BY: Rick T. Steele DATE: 8/28/95 PREP TYPE: Ni/KOH FUSION

ANALYST: [illegible] DATE: 9-1-95 CONTROLLING PROCEDURE: PNL-ALO-010

REVIEW: Rick T. Steele D TE: 9/1/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	ANALYTICAL PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
K28872	95-07946-H1T	PNL-ALO-450	GEA	0.1002		100					4.9653	SAMP
	95-07946-H2T			0.0992								SAMP DUP
	95-07946-HCB			.1017	1.4 avg							BLANK
	95-07946-H1B			0.1116								SAMP
	95-07946-H2B			0.0957								SAMP DUP
		Delivered 9.9305 mL of each sample to the lab										

PAGE 1 OF 1

3-2260

WHC-SD-WM-DP-145, REV. 1

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI NO.: TI95-TWC-02 PROJECT NO.: 21372 WBS NO.: 020501 SAMPLE TYPE: SLUDGE

ISSUED BY: Rick T. Steele DATE: 8/28/95 PREP TYPE: Ni/KOH FUSION

ANALYST: [signature] DATE: 9-1-95 CONTROLLING PROCEDURE: PNL-ALO-010

REVIEW: [signature] D TE: 9/1/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	ANALYTICAL PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
K28872	95-07941-H1T	PNL-ALO-450	GEA	0.1005		100					4.9653	SAMP
	95-07941-H2T			0.1026								SAMP DUP
	95-07941-HCB			.1087	X4 avg							BLANK
	95-07941-H1B			0.1028								SAMP
	95-07941-H2B			0.1289								SAMP DUP

Delivered 9.9305 ml of each sample to the lab.

WHC-SD-WM-DP-145, REV. 1

3-2261

Pacific Northwest Laboratory

SAMPLE RECEIVING/LOG-IN INFORMATION

95226

Customer : SST Date Received 09/ 01/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

ALO #	Customer ID		GEA
95-7941	C99,BY108	H1T	
95-7941-	C99, BY108	H2T	
95-7941-	C99,BY108	HCB	
95-7941-	C99, BY-108	H1B	
95-7941-	C99, BY-108	H2B	
95-7946	C99, BY-108	H1T	
95-7946-	C99, BY-108	H2T	
95-7946-	C99, BY-108	HCB	
95-7946-	C99, BY-108	H1B	
95-7946-	C99, BY-108	H2B	

3-2262

WHC-SD-WM-DP-145, REV. 1

DATA REPORT
PNL Analytical Chemistry Lab.
Radioanalytical Group, 325 Building

09/ 01/ 95

Client: SST
WP #: K28872

Cognizant scientist: _____ Date: _____

Reviewer: _____ Date: _____

ALO #	Customer ID	GEA uCi/
95-7941-H1T	C99,BY108	
95-7941-H2T	C99, BY108	
95-7941-HCB	C99,BY108	
95-7941-~~HB~~ H1B	C99, BY-108	
95-7941-H2B	C99, BY-108	
95-7946 H1T	C99, BY-108	
95-7946-H2T	C99, BY-108	
95-7946-HCB	C99, BY-108	
~~95-7946-H1B~~	~~C99, BY-108~~	
95-7946-H2B	C99, BY-108	

3-2263

WRCCD-WM-DP-145, REV. 1

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WHC-CD-WM-DP-145, REV. 1

KOH FUSION SEGMENT AND QUARTER SEGMENT GEA ANALYSIS

3-2264

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DATE TO QC: 09/20/95

WHC-CD-WM-DP-145, REV. 1

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - GEA - Fusion

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers - 95-07941-H1T 95-07941-HT2 95-7941-HCB
95-07942-H1 95-07942-H2 95-07942-H3
95-07943-H1 95-07943-H2
95-07944-H1 95-07944-H2

PNL ACL Quality Representative

9/22/95
Date

3-2265

Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

95-7941-H1T
9/19/95

Gamma Energy Analysis, (PNL-ALO-450) : Silvers K28872

Cognizant Scientist: LR Greenwood Date : 9/19/95

Review : T Trang-le Date : 9/19/95

Measured Activities (microCuries/g)

ALO ID Client ID	GEA Filename	Co-60 Error +/-	Cs-134 Error +/-	Cs-137 Error +/-	Am-241 Error +/-
95-7941-H1T	G0102	8.49E-3 12%	<8. E-3	2.02E 1 3%	<3. E-2
95-7941-H2T	G0096	<6. E-3	<2. E-2	1.77E 1 3%	1.16E-1 15%
95-7941-HCB	G0085	1.77E-3 15%	1.67E-3 18%	4.30E-1 4%	<4. E-3
95-7942-H1	T1900	<2. E-2	<5. E-2	2.39E 1 5%	<1. E-1
95-7942-H2	H0062	<3. E-3	<2. E-2	3.30 E 1 3%	<6. E-2
95-7942-H3	G0086	1.64E-3 15%	<4. E-3	9.36E 0 4%	<2. E-2
95-7943-H1	H0063	1.94E-3 14%	<8. E-3	4.82E 1 3%	<4. E-2
95-7943-H2	G0101	2.83E-3 17%	<9. E-3	4.53E 1 3%	<3. E-2
95-7944-H1	H0064	3.29E-3 10%	<9. E-3	4.34E 1 3%	<4. E-2
95-7944-H2	G0087	2.30E-03 13%	<8. E-3	4.96E 1 4%	<3. E-2

Note: K-40 was detected in samples, but not reported.

95-7941.XLS

3 2266

WHC-SD-WM-DP-145, REV. 1

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI/ARF NO.: TI95-TWC-03/ASR 2388 PROJECT NO.: 21732 WBS NO.: _____ SAMPLE TYPE: SLUDGE

ISSUED BY: RT STEELE DATE: 8/31/95 PREP TYPE: NI/KOH FUSION

ANALYST: [signature] DATE: 9/11/95 CONTROLLING PROCEDURE: PNL-ALO-110

REVIEW: [signature] DATE: 9/11/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CLIENT: KURT SILVERS CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
SEE BELOW	95-07941-H1T	SEE BELOW	SEE BELOW	0.1005		100						SAMP
	95-07941-H2T			0.1026								DUP
	95-07941-HCB			x̄ 2	.1055							BLANK
	95-07942-H1			0.1152								SAMP
	95-07942-H2			0.1109								DUP
	95-07942-H3			x̄ 2	.1130 5							BLANK
	95-07943-H1			0.3362								SAMP
	95-07943-H2			0.3263								DUP
	95-07944-H1			0.1212								SAMP
	95-07944-H2			0.1420								DUP
K28870		PNL-ALO-421	T. ALPHA									
K28871		PNL-ALO-422/423	AEA / Pu			You received 9.98 39 mL of each sample						
K28872		PNL-ALO-450	GEA									
K28873		PNL-ALO-431	T. BETA									
K28874		PNL-ALO-433/431	Sr-90									
K28875		PNL-ALO-445	U-LASER									

3-22267

MCS-033-PROC-745, REV. 1

WHC-SD-WM-DP-145, REV. 1

RCR 9/4/..

Battelle / Pacific Northwest Laboratories 18-SEP-1995 13:59:24.75
Analytical Chemistry Laboratory Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H1T Core 99 BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0102.CNF;1
Analys. File: ND_SC_ASF:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 16-SEP-1995 12:48:39 Sample quantity: 2.14300E-03 g
Sample (EOI) time: 16-SEP-1995 12:48:38 Sample geometry: P3-GSV-2ML-W
Elapsed live time: 1 00:00:00.00
Elapsed real time: 1 00:00:59.82 0.1%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.969E-01	2.498E-01	2.498E-01	7.86	OK

Final Mean for 1 Valid Peaks = 2.498E-01+/- 1.963E-02 (7.86%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	3.555E-01	7.180E-03	7.181E-03	20.69	OK
	1332.50	99.98*	3.204E-01	9.620E-03	9.622E-03	14.41	OK

Final Mean for 2 Valid Peaks = 8.486E-03+/- 1.014E-03 (11.95%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.603E-01	2.019E+01	2.019E+01	2.52	OK

Final Mean for 1 Valid Peaks = 2.019E+01+/- 5.097E-01 (2.52%)

3-2268

Post-NID Peak Search Report
Sample ID : 95-7941-H1T Co

Acquisition date : 16-SEP-1995 12:48:39

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	75.05*	387	1.14	199.02	197	7	61.9			
0	84.73	872	1.69	224.81	222	7	22.6			
0	92.92	1229	1.27	246.64	243	8	17.9			
0	185.63	580	1.26	493.68	490	9	49.4			
0	661.47*	660257	1.77	1761.71	1749	24	0.1		CS-137	20.2
0	795.76	220	1.93	2119.54	2111	16	19.8			
0	911.20	136	1.31	2427.17	2421	13	22.8			
0	1173.00	175	3.26	3124.80	3114	22	20.7		CO-60	7.181E-03
0	1332.69	211	2.19	3550.33	3539	21	14.4		CO-60	9.622E-03
0	1461.19	542	2.49	3892.75	3880	28	7.7		K-40	0.250
0	1764.69	71	1.51	4701.52	4691	18	27.6			
0	2615.31	214	2.49	6968.21	6955	26	10.2			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	10959.	514.00	1.0499E-02
RU-103	12811.	497.05	1.2408E-02
RU-106	3986.	621.92	7.4384E-02
SB-125	21040.	427.88	4.2130E-02
CS-134	4555.	604.71	7.8040E-03
CE-144	20238.	133.54	5.0756E-02
EU-152	167.	1408.01	1.3723E-02
EU-154	224.	1274.51	8.8872E-03
EU-155	17376.	105.31	2.3848E-02
TH-228	21669.	238.58	1.8151E-02
AM-241	13984.	59.54	2.4332E-02

THC-CD-WM-DP-145, REV. 1

RJ R 9/16/9.

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

15-SEP-1995 03:15:20.04
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H2T COR99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0096.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 14-SEP-1995 15:14:57
Sample (EOI) time: 14-SEP-1995 15:14:56
Elapsed live time: 0 12:00:00.00
Elapsed real time: 0 12:00:25.73 0.1%

Sample quantity: 2.04160E-03 G
Sample geometry: P3-GSV-2ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.970E-01	2.598E-01	2.598E-01	9.40	OK

Final Mean for 1 Valid Peaks = 2.598E-01+/- 2.442E-02 (9.40%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.603E-01	1.774E+01	1.774E+01	2.53	OK

Final Mean for 1 Valid Peaks = 1.774E+01+/- 4.486E-01 (2.53%)

AM-241	59.54	35.90*	9.134E-01	1.164E-01	1.164E-01	14.40	OK

Final Mean for 1 Valid Peaks = 1.164E-01+/- 1.676E-02 (14.40%)

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7941-H2T CO Acquisition date : 14-SEP-1995 15:14:57

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	59.38	1246	1.18	157.25	152	11	14.3		AM-241	0.116
0	71.02	23	0.84	188.28	185		6480.8			
2	72.99*	320	1.06	193.54	190	13	40.2	8.77E-01		
2	74.94*	151	0.95	198.72	190	13	103.9			
0	510.91	811	2.23	1360.50	1354	15	19.6			
0	661.45*	276349	1.76	1761.64	1750	23	0.2		CS-137	17.7
0	695.72	99	5.07	1852.97	1844	18	35.8			
0	1460.73	269	1.90	3891.53	3879	27	9.2		K-40	0.260
0	2614.60	106	3.07	6966.32	6951	29	13.0			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
CO-60	171.	1332.50	5.8190E-03
SR-85	4747.	514.00	1.4467E-02
RU-103	5586.	497.05	1.7126E-02
RU-106	1648.	621.92	1.0035E-01
SB-125	8814.	427.88	5.7234E-02
CS-134	1960.	604.71	1.0743E-02
CE-144	8507.	133.54	6.9043E-02
EU-152	84.	1408.01	2.0434E-02
EU-154	128.	1274.51	1.4129E-02
EU-155	7303.	105.31	3.2455E-02
TH-228	9158.	238.58	2.4766E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Recount

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : _____ ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-H2T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1026 g → 100 ml → 2(.99492 ml) #14 --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/14/95

Counting Information:

Detector: TRACK FOG Y-GeLi ~~A~~ G-40% B-40% C-70% D-70% E_LEPS

File: G0096 K.T. 9/14/95

sample size 2.0416E-3 g

Analyst [signature] Date 9/14/95

3-2272

WHC-SD-WM-DP-145, REV. 1

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 08:27:39.98
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-H2T CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1899.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 13-SEP-1995 06:47:27
Sample (EOI) time: 13-SEP-1995 06:47:27
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:03.23 0.1%

Sample quantity: 1.00000E-02 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.471E-02	3.191E-02	3.191E-02	273.23	OK

Final Mean for 1 Valid Peaks = 3.191E-02+/- 8.719E-02 (273.23%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	1.759E+01	1.759E+01	4.79	OK

Final Mean for 1 Valid Peaks = 1.759E+01+/- 8.416E-01 (4.79%)

Flag: "*" = Keyline

Recount

RTR

3-2273

Post-NID Peak Search Report
Sample ID : 95-7941-H2T CO Acquisition date : 13-SEP-1995 06:47:27

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.69*	16315	1.73	883.07	876	14	0.8		CS-137	17.6
0	1460.98*	2	2.26	1948.93	1944		9273.2		K-40	3.191E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
CO-60	8.	1332.50	2.2447E-02
SR-85	421.	514.00	6.9691E-02
RU-103	466.	497.05	7.9521E-02
RU-106	103.	621.92	4.1741E-01
SB-125	863.	427.88	2.8412E-01
CS-134	158.	604.71	5.0560E-02
CE-144	1312.	133.54	3.7311E-01
EU-152	5.	1408.01	8.8523E-02
EU-154	4.	1274.51	4.2666E-02
EU-155	1171.	105.31	1.6087E-01
TH-228	1146.	238.58	1.3309E-01
AM-241	1069.	59.54	9.6943E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128892 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-H2T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1026 → 100 ml — 9.9839 ml --- --- --- ---
as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K. Pepper Date 9/13/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1899

Analyst K. Thomas Date 9/13/95

sample size
1.02435E-2 g

3-2275

WHC-CD-WM-DP-145, REV. 1 RL R 9/16/96

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 10:23:03.73
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-HCB CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0085.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_GOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;6 - 2-SEP-1995 10:22:49.

Acquisition time : 13-SEP-1995 08:42:48 Sample quantity: 1.01387E-02 G
Sample (EOI) time: 13-SEP-1995 08:42:47 Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:02.60 0.0%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.461E+00	1.518E-02	1.518E-02	23.48	OK

Final Mean for 1 Valid Peaks = 1.518E-02+/- 3.564E-03 (23.48%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.791E+00	2.048E-03	2.048E-03	17.44	OK
	1332.50	99.98*	1.586E+00	1.428E-03	1.428E-03	27.50	OK

Final Mean for 2 Valid Peaks = 1.767E-03+/- 2.643E-04 (14.95%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-134	563.24	8.38	3.614E+00	-----	Line Not Found	-----	Absent
	569.32	15.40	3.579E+00	-----	Line Not Found	-----	Absent
	604.71	97.60*	3.391E+00	1.132E-03	1.132E-03	37.56	OK
	795.87	85.40	2.623E+00	2.123E-03	2.124E-03	18.39	OK
	801.95	8.73	2.603E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 1.670E-03+/- 2.876E-04 (17.22%)

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-7941-HCB CO Acquisition date : 13-SEP-1995 08:42:48

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	4.302E-01	4.302E-01	3.53	OK

Final Mean for 1 Valid Peaks = 4.302E-01+/- 1.518E-02 (3.53%)

Flag: "*" = Keyline

3-2277

Post-NID Peak Search Report
Sample ID : 95-7941-HCB CO

Acquisition date : 13-SEP-1995 08:42:48

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	604.64	84	1.42	1610.24	1604	12	37.4		CS-134	1.132E-03
0	661.49	25770	1.78	1761.73	1749	25	0.6		CS-137	0.430
0	795.59	107	1.67	2119.09	2110	21	18.0		CS-134	2.124E-03
0	1173.07*	82	2.02	3125.00	3114	19	17.4		CO-60	2.048E-03
0	1332.49*	51	3.25	3549.80	3538	21	27.5		CO-60	1.428E-03
0	1460.93*	53	3.07	3892.06	3879	23	23.4		K-40	1.518E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	497.	514.00	1.1856E-03
RU-103	540.	497.05	1.3439E-03
RU-106	190.	621.92	8.7855E-03
SB-125	896.	427.88	4.5955E-03
CE-144	756.	133.54	5.1240E-03
EU-152	11.	1408.01	2.2168E-03
EU-154	30.	1274.51	2.0018E-03
EU-155	750.	105.31	2.5931E-03
TH-228	817.	238.58	1.8669E-03
AM-241	746.	59.54	3.6053E-03

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-HCB Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.10155 → 100 — 9.9839 --- --- ---

g Average x̄ 2 ml ml is received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

G K.T. 9/22/95

File: G0085

Sample size .0101387 g

Analyst [signature] Date 9/13/95

3-2279

WHC-SD-WM-DP-145, REV. 1

9/15/9

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 10:34:41.30
Gamma Energy Analysis (GEA)

Sample Title: 95-7942-H1 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1900.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 13-SEP-1995 08:54:28
Sample (EOI) time: 13-SEP-1995 08:54:27
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:04.74 0.1%

Sample quantity: 1.15015E-02 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	2.389E+01	2.389E+01	4.76	OK

Final Mean for 1 Valid Peaks = 2.389E+01+/- 1.138E+00 (4.76%)

Flag: "*" = Keyline

3- 2280

WHC-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7942-H1 COR

Acquisition date : 13-SEP-1995 08:54:28

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	75.29*	247	1.40	100.82	95	10	38.0			
0	661.66*	25493	1.74	883.03	876	12	0.6		CS-137	23.9

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	14.	1460.83	2.6177E-01
CO-60	7.	1332.50	1.8256E-02
SR-85	631.	514.00	7.4158E-02
RU-103	690.	497.05	8.4140E-02
RU-106	181.	621.92	4.8084E-01
SB-125	1449.	427.88	3.2007E-01
CS-134	176.	604.71	4.6338E-02
CE-144	1983.	133.54	3.9883E-01
EU-152	5.	1408.01	7.6966E-02
EU-154	10.	1274.51	6.1865E-02
EU-155	1704.	105.31	1.6874E-01
TH-228	1646.	238.58	1.3868E-01
AM-241	1403.	59.54	9.6586E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1152 g → 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K G Pappel Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1900
sample size
.0115015g

Analyst K. Thomas Date 9/13/95

3-2282

HC-SD-WM-DP-145, REV. 1 BTR 9/10/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 09:39:40.35
Gamma Energy Analysis (GEA)

Sample Title: 95-7942-H2 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0062.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 13-SEP-1995 09:02:23
Sample (EOI) time: 13-SEP-1995 09:02:23
Elapsed live time: 0 00:35:00.00
Elapsed real time: 0 00:37:08.11 5.7%

Sample quantity: 1.10721E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	3.302E+01	3.302E+01	2.82	OK

Final Mean for 1 Valid Peaks = 3.302E+01+/- 9.309E-01 (2.82%)

Flag: "*" = Keyline

3-2283

Post-NID Peak Search Report
Sample ID : 95-7942-H2 COR

Acquisition date : 13-SEP-1995 09:02:23

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.40*	616377	1.80	1763.88	1751	23	0.1		CS-137	33.0
0	1322.92	28	1.39	3528.40	3517	18	35.5			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
K-40	25.	1460.83	2.0921E-02
CO-60	26.	1332.50	2.0946E-03
SR-85	9729.	514.00	1.6899E-02
RU-103	12039.	497.05	2.0448E-02
RU-106	3611.	621.92	1.2316E-01
SB-125	18887.	427.88	6.8121E-02
CS-134	3781.	604.71	1.2343E-02
CE-144	12069.	133.54	6.8451E-02
EU-152	2.	1408.01	2.6759E-03
EU-154	12.	1274.51	4.0011E-03
EU-155	10316.	105.31	3.3428E-02
TH-228	15211.	238.58	2.6071E-02
AM-241	8566.	59.54	5.2966E-02

Pacific Northwest Laboratory WHC-SD-WM-DP-145, REV. 1 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K88872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.1109 g → 100 ml --- 9.9839 ml --- --- ---

as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% H ~~B~~-40% C-70% D-70% E_LEPS

TT 9/13/95

File: H0062

Sample size

.0110721 g

Analyst T. Thomas Date 9/13/95

3-2285

WHC-SD-WM-DP-145, REV. 1

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 12:10:10.61
Gamma Energy Analysis (GEA)

Sample Title: 95-7942-H3 CORE99 TANK BY-108

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0086.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;6 - 2-SEP-1995 10:22:49.

Acquisition time : 13-SEP-1995 10:29:13
Sample (EOI) time: 13-SEP-1995 10:29:12
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:45.73 0.8%

Sample quantity: 1.12870E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.460E+00	1.586E-02	1.586E-02	19.99	OK

Final Mean for 1 Valid Peaks = 1.586E-02+/- 3.171E-03 (19.99%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.791E+00	1.891E-03	1.892E-03	17.66	OK
	1332.50	99.98*	1.586E+00	1.380E-03	1.380E-03	24.58	OK

Final Mean for 2 Valid Peaks = 1.640E-03+/- 2.380E-04 (14.51%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	9.364E+00	9.364E+00	3.47	OK

Final Mean for 1 Valid Peaks = 9.364E+00+/- 3.251E-01 (3.47%)

3-2286

Nuclide Line Activity Report (continued)
Sample ID : 95-7942-H3 COR Acquisition date : 13-SEP-1995 10:29:13

Flag: "*" = Keyline

WHC-CD-WIM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7942-H3 COR

Acquisition date : 13-SEP-1995 10:29:13

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.51	624365	1.80	1761.80	1749	24	0.1		CS-137	9.36
0	795.98	47	2.04	2120.14	2107	18	30.1			
0	1173.03*	85	2.92	3124.87	3114	19	17.6		CO-60	1.892E-03
0	1332.60*	55	1.59	3550.11	3540	17	24.5		CO-60	1.380E-03
0	1461.14*	62	2.97	3892.61	3881	25	19.9		K-40	1.586E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	9558.	514.00	4.6691E-03
RU-103	11769.	497.05	5.6343E-03
RU-106	3821.	621.92	3.5413E-02
SB-125	18403.	427.88	1.8710E-02
CS-134	4227.	604.71	3.6459E-03
CE-144	13888.	133.54	1.9732E-02
EU-152	14.	1408.01	2.1762E-03
EU-154	27.	1274.51	1.6820E-03
EU-155	12571.	105.31	9.5343E-03
TH-228	16697.	238.58	7.5818E-03
AM-241	11292.	59.54	1.2603E-02

3-2288

Pacific Northwest Laboratory WHO-CD-WM-DP-145, REV. 1 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K98872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H3 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1130 g --- → 100 ml --- 9.9839 --- --- ---

Average x 2 ml as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

K.T. 9/22/95

Counting Information:

Detector: TRACK FOG Y-GeLi G A-40% B-40% C-70% D-70% E_LEPS

File: G 0086

Sample size 0.01128 g

Analyst [signature] Date 9/13/95

3-2289

WHC-SD-WM-DP-145, REV. 1

RTR 9/16/

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 11:33:12.95
Gamma Energy Analysis (GEA)

Sample Title: 95-7943-H1 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0063.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_H0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 13-SEP-1995 10:36:46
Sample (EOI) time: 13-SEP-1995 10:36:46
Elapsed live time: 0 00:50:00.00
Elapsed real time: 0 00:56:15.02 11%

Sample quantity: 3.35660E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	5.739E-03	5.739E-03	26.49	OK

Final Mean for 1 Valid Peaks = 5.739E-03+/- 1.520E-03 (26.49%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.482E+00	3.076E-03	3.076E-03	21.98	OK
	1332.50	99.98*	1.318E+00	1.747E-03	1.747E-03	15.84	OK

Final Mean for 2 Valid Peaks = 1.938E-03+/- 2.562E-04 (13.22%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	4.816E+01	4.816E+01	2.82	OK

Final Mean for 1 Valid Peaks = 4.816E+01+/- 1.356E+00 (2.82%)

3-2290

Nuclide Line Activity Report (continued)
Sample ID : 95-7943-H1 CDR Acquisition date : 13-SEP-1995 10:36:46

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7943-H1 COR

Acquisition date : 13-SEP-1995 10:36:46

It	Energy	Area	FWHM	Channel	Left.	Pw	%Err	Fit	Nuclides	Activity uCi/G
10	35.26	26491	0.83	93.69	90	23	1.2	4.41E+02		
10	36.23	26736	1.43	96.28	90	23	1.8			
10	37.51	25000	1.75	99.70	90	23	2.4			
10	39.06	14153	1.60	103.85	90	23	4.0			
10	40.54	7085	1.46	107.77	90	23	6.5			
0	188.03	7560	3.84	501.20	494	18	14.7			
0	661.41*	3893051	1.80	1763.89	1751	24	0.1		CS-137	48.2
0	1174.14*	170	2.56	3131.54	3116	33	22.0		CO-60	3.076E-03
5	1319.70	383	2.77	3519.82	3513	26	12.3	1.98E+00		
5	1322.77	1027	2.73	3528.01	3513	26	6.3			
7	1331.36*	61	2.61	3550.93	3544	19	19.8	4.49E+00		
7	1333.10*	86	1.92	3555.57	3544	19	15.8		CO-60	1.747E-03
0	1460.91*	28	2.31	3896.47	3884	25	26.4		K-40	5.739E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	62082.	514.00	9.8579E-03
RU-103	75847.	497.05	1.1852E-02
RU-106	22781.	621.92	7.1428E-02
SB-125	118498.	427.88	3.9399E-02
CS-134	24081.	604.71	7.1922E-03
CE-144	76593.	133.54	3.9817E-02
EU-152	8.	1408.01	1.3418E-03
EU-154	89.	1274.51	2.4887E-03
EU-155	65278.	105.31	1.9417E-02
TH-228	97433.	238.58	1.5236E-02
AM-241	54546.	59.54	3.0862E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 638872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- 3362 → 100 --- 9.9838 --- --- --- ---
g ml ml as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

H

K.T. 9/13/95

File: H0063

Sample size
0.033566 g

Analyst [signature] Date 9/13/95

3-2293

WHC-CD-WM-DP-145, REV. 1 RT R 9/16/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

16-SEP-1995 01:50:11.54
Gamma Energy Analysis (GEA)

Sample Title: 95-7943-H2 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0101.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 15-SEP-1995 13:47:21
Sample (EOI) time: 15-SEP-1995 13:47:20
Elapsed live time: 0 12:00:00.00
Elapsed real time: 0 12:02:54.21 0.4%

Sample quantity: 6.49280E-03 G
Sample geometry: P3-GSV-2ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.969E-01	7.590E-02	7.590E-02	11.33	OK

Final Mean for 1 Valid Peaks = 7.590E-02+/- 8.598E-03 (11.33%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	3.555E-01	2.849E-03	2.849E-03	23.83	OK
	1332.50	99.98*	3.204E-01	2.810E-03	2.810E-03	23.99	OK

Final Mean for 2 Valid Peaks = 2.830E-03+/- 4.784E-04 (16.91%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.603E-01	4.534E+01	4.534E+01	2.52	OK

Final Mean for 1 Valid Peaks = 4.534E+01+/- 1.144E+00 (2.52%)

3-2294

Post-NID Peak Search Report
Sample ID : 95-7943-H2 COR

Acquisition date : 15-SEP-1995 13:47:21

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	36.61	17509	1.02	96.59	94	7	1.5			
0	40.17	149	1.06	106.08	104	6	193.0			
0	75.33*	1084	1.03	199.77	197	7	31.0			
0	661.47*	2246161	1.77	1761.70	1749	25	0.1		CS-137	45.3
0	969.00	72	1.00	2581.19	2575	12	26.0			
0	1173.18	105	2.34	3125.28	3114	20	23.8		CO-60	2.849E-03
0	1332.83	93	0.66	3550.71	3541	19	24.0		CO-60	2.810E-03
0	1461.09	250	1.77	3892.49	3879	26	11.2		K-40	7.590E-02
0	2615.40	88	2.50	6968.46	6951	28	18.9			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	34049.	514.00	1.2183E-02
RU-103	41955.	497.05	1.4758E-02
RU-106	11741.	621.92	8.4233E-02
SB-125	67696.	427.88	4.9876E-02
CS-134	12653.	604.71	8.5839E-03
CE-144	59921.	133.54	5.7617E-02
EU-152	90.	1408.01	6.6465E-03
EU-154	74.	1274.51	3.3604E-03
EU-155	50162.	105.31	2.6745E-02
TH-228	65382.	238.58	2.0807E-02
AM-241	39877.	59.54	2.7123E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Recount

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : _____ ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-M2 Description : CORE 99 TANK BY-108

Pipet Nos.: #14

DF --- .3263 g → 100 mo --- 1(.99492 mo) --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst Ta Pappel Date 9/14/95

Counting Information:

Detector: TRACK FOG Y-GeL G A-40% B-40% C-70% D-70% E_LEPS

K.T. 9/15/95

File: G00096

Analyst L. Thomas Date 9/15/95

sample size

6.4928 E-3 g

12hr. * recount K.T. 9/15/95

G0101

3-2296

WHC-SD-WM-DP-145, REV. 1

Battelle / Pacific Northwest Laboratories — 15-SEP-1995 09:33:51.94
Analytical Chemistry Laboratory — Gamma Energy Analysis (GEA)

Sample Title: 95-7943-H2 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0096.CNF;2
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 15-SEP-1995 06:32:57 — Sample quantity: 6.49280E-03 G
Sample (EOI) time: 15-SEP-1995 06:32:55 — Sample geometry: P3-GSV-2ML-W
Elapsed live time: 0 03:00:00.00
Elapsed real time: 0 03:00:43.29 0.4%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 — Half life ratio: 8.00
Errors propagated: Yes — Systematic Erro: 0.00
Abundance limit : 70.00 — WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.970E-01	8.438E-02	8.438E-02	17.98	OK

Final Mean for 1 Valid Peaks = 8.438E-02+/- 1.517E-02 (17.98%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.603E-01	4.503E+01	4.503E+01	2.53	OK

Final Mean for 1 Valid Peaks = 4.503E+01+/- 1.137E+00 (2.53%)

Flag: "*" = Keyline

Recount this one >12 hrs

Recount 9/15/95

3-2297

Post-NID Peak Search Report
Sample ID : 95-7943-H2 COR

Acquisition date : 15-SEP-1995 06:32:57

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.45*	557725	1.76	1761.63	1749	24	0.1		CS-137	45.0
0	818.40	12	2.49	2179.87	2169	15	135.2			
0	1460.84	69	2.29	3891.81	3878	22	17.9		K-40	8.438E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
CO-60	53.	1332.50	4.0707E-03
SR-85	8523.	514.00	2.4334E-02
RU-103	10421.	497.05	2.9322E-02
RU-106	2977.	621.92	1.6959E-01
SB-125	16857.	427.88	9.9541E-02
CS-134	3170.	604.71	1.7184E-02
CE-144	14702.	133.54	1.1411E-01
EU-152	19.	1408.01	1.2272E-02
EU-154	29.	1274.51	8.4389E-03
EU-155	12268.	105.31	5.2901E-02
TH-228	16137.	238.58	4.1340E-02
AM-241	9986.	59.54	5.4291E-02

HO-CD-WM-DP-N5, REV 1

Battelle / Pacific Northwest Laboratories — 13-SEP-1995 12:22:44.11
Analytical Chemistry Laboratory — Gamma Energy Analysis (GEA)

Sample Title: 95-7943-H2 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1901.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 13-SEP-1995 10:42:15 — Sample quantity: 3.25770E-02 G
Sample (EOI) time: 13-SEP-1995 10:42:14 — Sample geometry: T8SCV
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:22.37 0.4%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 — Half life ratio: 8.00
Errors propagated: Yes — Systematic Erro: 1.30
Abundance limit : 70.00 — WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.471E-02	5.215E-02	5.215E-02	52.31	OK

Final Mean for 1 Valid Peaks = 5.215E-02+/- 2.728E-02 (52.31%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	4.367E+01	4.367E+01	4.73	OK

Final Mean for 1 Valid Peaks = 4.367E+01+/- 2.065E+00 (4.73%)

Flag: "*" = Keyline

Recount

RTR

3-2299

WHC-CD-WM-DP-146, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7943-H2 COR

Acquisition date : 13-SEP-1995 10:42:15

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	42.52	327	2.01	57.10	55	6	43.1			
0	75.83*	313	0.85	101.55	99	6	43.5			
0	85.32*	235	1.05	114.21	111	6	57.0			
0	661.65*	131996	1.72	883.02	876	14	0.3		CS-137	43.7
0	1460.89*	10	3.33	1948.81	1942	12	52.2		K-40	5.215E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
CO-60	12.	1332.50	8.4324E-03
SR-85	2898.	514.00	5.6092E-02
RU-103	3618.	497.05	6.8011E-02
RU-106	850.	621.92	3.6787E-01
SB-125	6655.	427.88	2.4221E-01
CS-134	866.	604.71	3.6308E-02
CE-144	9454.	133.54	3.0743E-01
EU-152	5.	1408.01	2.7173E-02
EU-154	6.	1274.51	1.6084E-02
EU-155	7711.	105.31	1.2672E-01
TH-228	8221.	238.58	1.0941E-01
AM-241	6835.	59.54	7.5261E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-MZ Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .3263 g --- 100 ml --- 9.9839 ml --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1901

sample size .032577 g

Analyst [signature] Date 9/13/95

3-2301

WHC-SD-WM-DP-145, REV. 1

RT R 9/14

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 13:29:29.45
Gamma Energy Analysis (GEA)

Sample Title: 95-7944-H1 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0064.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 13-SEP-1995 11:42:24
Sample (EOI) time: 13-SEP-1995 11:42:24
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:46:54.17 6.5%

Sample quantity: 1.21000E-02 G
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	6.235E-03	6.235E-03	46.60	OK

Final Mean for 1 Valid Peaks = 6.235E-03+/- 2.906E-03 (46.60%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	2.884E-03	2.884E-03	18.41	OK
	1332.50	99.98*	1.318E+00	3.529E-03	3.529E-03	11.72	OK

Final Mean for 2 Valid Peaks = 3.285E-03+/- 3.262E-04 (9.93%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	4.338E+01	4.338E+01	2.82	OK

Final Mean for 1 Valid Peaks = 4.338E+01+/- 1.222E+00 (2.82%)

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-7944-H1 COR Acquisition date : 13-SEP-1995 11:42:24

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7944-H1 COR

Acquisition date : 13-SEP-1995 11:42:24

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
10	35.28	20578	0.92	93.76	90	29	1.2	7.30E+02		
10	36.48	19004	1.44	96.96	90	29	2.0			
10	37.91	17693	1.76	100.77	90	29	2.7			
10	39.49	12225	1.77	104.98	90	29	3.9			
10	40.93	8092	1.75	108.81	90	29	5.9			
10	42.61	5421	1.75	113.30	90	29	7.8			
0	185.72*	881	1.26	495.03	492	8	50.1			
0	661.42*	2528455	1.79	1763.92	1751	24	0.1		CS-137	43.4
0	1173.66*	115	2.58	3130.26	3118	25	18.4		CO-60	2.884E-03
0	1322.42	237	2.82	3527.06	3514	29	16.5			
0	1332.41*	125	2.57	3553.72	3542	21	11.7		CO-60	3.529E-03
0	1461.34*	22	2.84	3897.64	3887	19	46.6		K-40	6.235E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	39957.	514.00	1.0971E-02
RU-103	49438.	497.05	1.3276E-02
RU-106	14686.	621.92	7.9547E-02
SB-125	77490.	427.88	4.4192E-02
CS-134	15720.	604.71	8.0601E-03
CE-144	49552.	133.54	4.4423E-02
EU-152	11.	1408.01	2.1919E-03
EU-154	35.	1274.51	2.1792E-03
EU-155	42716.	105.31	2.1786E-02
TH-228	63144.	238.58	1.7013E-02
AM-241	35272.	59.54	3.4422E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1210 g → 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% H B-40% C-70% D-70% E_LEPS

K.T. 9/13/95

File: H0064

sample size .012100g

Analyst [signature] Date 9/13/95

3 2305

WHC-SD-WM-DP 145, REV. 1

RT R 9/14/..

Battelle / Pacific Northwest Laboratories 13-SEP-1995 13:58:50.45
Analytical Chemistry Laboratory Gamma Energy Analysis (GEA)

Sample Title: 95-7944-H2 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0087.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;6 - 2-SEP-1995 10:22:49.

Acquisition time : 13-SEP-1995 12:13:29 Sample quantity: 1.41770E-02 G
Sample (EOI) time: 13-SEP-1995 12:13:28 Sample geometry: P0-GSV-10ML-W
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:45:06.55 4.9%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.461E+00	6.513E-03	6.513E-03	32.17	OK

Final Mean for 1 Valid Peaks = 6.513E-03+/- 2.095E-03 (32.17%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.790E+00	2.212E-03	2.212E-03	22.36	OK
	1332.50	99.98*	1.586E+00	2.346E-03	2.346E-03	15.66	OK

Final Mean for 2 Valid Peaks = 2.298E-03+/- 2.949E-04 (12.83%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	4.955E+01	4.955E+01	3.47	OK

Final Mean for 1 Valid Peaks = 4.955E+01+/- 1.719E+00 (3.47%)

WHC-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7944-H2 COR

Acquisition date : 13-SEP-1995 12:13:29

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
4	36.78	41078	1.23	97.04	93	18	0.9	1.81E+03		
4	38.84	15892	1.03	102.52	93	18	2.6			
4	40.19	9451	1.26	106.13	93	18	5.1			
0	661.52	4149546	1.79	1761.82	1749	25	0.1		CS-137	49.5
0	1173.53*	124	2.07	3126.22	3116	21	22.3		CO-60	2.212E-03
0	1322.45	715	2.98	3523.04	3510	25	7.8			
0	1332.89*	117	2.51	3550.86	3540	19	15.6		CO-60	2.346E-03
0	1461.01*	32	2.36	3892.28	3882	19	32.1		K-40	6.513E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	64694.	514.00	9.6714E-03
RU-103	78721.	497.05	1.1602E-02
RU-106	25342.	621.92	7.2613E-02
SB-125	121982.	427.88	3.8350E-02
CS-134	27205.	604.71	7.3641E-03
CE-144	92280.	133.54	4.0495E-02
EU-152	19.	1408.01	2.0453E-03
EU-154	65.	1274.51	2.0877E-03
EU-155	81934.	105.31	1.9379E-02
TH-228	107845.	238.58	1.5341E-02
AM-241	74293.	59.54	2.5736E-02

3-2307

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1020 g → 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K. Pepper Date 9/13/95

Counting Information:

Detector: TRACK FOG Y-GeLi (D) A-40% B-40% C-70% D-70% E_LEPS

File: D0087 T.T. 9/13/95 Analyst K. Thomas Date 9/13/95

sample size .014177 g

3-2308

WHC-CD-WM-DP-145, REV. 1

DATE TO QC: 09/20/95

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - GEA - Fusion

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers - 95-07945-H1 95-07945-H2 95-07945-H3
95-07946-H1T 95-07946-H2T 95-07946-HCB
95-07947-H1 95-07947-H2
95-07948-H1 95-07948-H2

Celia Buell
PNL ACL Quality Representative

9/20/95
Date

3-2309

Battelle Pacific Northwest Laboratories
Analytical Chemistry Laboratory
325 Shielded Analytical Laboratory

SAMPLE PREP SHEET
(325 SHIELDED ANALYTICAL LABORATORY)

TI/ARF NO.: TI95-TWC-03/ASR 2388 PROJECT NO.: 21732 WBS NO.: _____ SAMPLE TYPE: SLUDGE

ISSUED BY: RT STEELE DATE: 8/31/95 PREP TYPE: NI/KOH FUSION

ANALYST: [signature] DATE: 9/11/95 CONTROLLING PROCEDURE: PNL-ALO-110

REVIEW: [signature] DATE: 9/11/95 QA PLAN: MCS-033 IMPACT LEVEL: II

CLIENT: KURT SILVERS CORE ID: 99 TANK ID: BY-108

WORK PACKAGE NUMBER	ALO NUMBER	PROCEDURE	ANALYTE OR ANALYSIS	SAMPLE WT	WATER WT (g)	TOTAL VOL (mL)	SPIKE ID	SPIKE VOL (mL)	DILUTION FACTOR	DILUTION MATRIX	PIPET CALIB (mL)	MISC
SEE BELOW	95-07945-H1	SEE BELOW	SEE BELOW	0.1077		100						SAMP
	95-07945-H2			0.1172								DUP
	95-07945-H3			x 2 =	.11245							BLANK
	95-07946-H1T			0.1002								SAMP
	95-07946-H2T			0.0992								DUP
	95-07946-HCB			x 2	.0997							BLANK
	95-07947-H1			0.1089								SAMP
	95-07947-H2			0.1445								DUP
	95-07948-H1			0.0988								SAMP
	95-07948-H2			0.0876								DUP
K28870		PNL-ALO-421	T. ALPHA									
K28871		PNL-ALO-422/423	AEA / Pu									
K28872		PNL-ALO-450	GEA				You received 9.9839 ml					
K28873		PNL-ALO-431	T. BETA				of each sample					
K28874		PNL-ALO-433/431	Sr-90									
K28875		PNL-ALO-445	U-LASER									

PAGE 1 OF 1

3-2310

PNL-CD-WM-DP-145, REV. 1

Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

95-7945-H1
9/19/95

Gamma Energy Analysis, (PNL-ALO-450) : Silvers K28872

Cognizant Scientist: LR Greenwood Date : 9-19-95

Review : T Trang-le Date : 9/19/95

Measured Activities (microCuries/g)

ALO ID Client ID	GEA Filename	Co-60 Error +/-	Cs-137 Error +/-	Eu-154 Error +/-	Eu-155 Error +/-	Am-241 Error +/-
95-7945-H1	H0071	1.32E-2 3%	7.05E 1 3%	3.93E-2 3%	3.83E-2 8%	1.94E-2 45%
95-7945-H2	H0074	5.44E-3 5%	7.21E 1 3%	3.54E-2 3%	3.67E-2 8%	1.64E-2 40%
95-7945-H3	G0088	2.22E-3 9%	6.05E-2 4%	<2. E-3	<2. E-3	<2. E-3
95-7946-H1T	H0072	6.21E-3 14%	1.13E 2 3%	8.28E-2 4%	8.62E-2 12%	<9. E-2
95-7946-H2T	H0066	7.75E-3 11%	9.48E 1 3%	6.20E-2 5%	6.75E-2 14%	3.20E-2 65%
95-7946-HCB	G0089	1.75E-3 16%	2.13E-1 4%	<2. E-3	<2. E-3	<3. E-3
95-7947-H1	T1904	<3. E-2	1.20E 3 5%	<2. E-1	<2. E 0	<8. E-1
95-7947-H2	T1908	<3. E-2	1.34E 3 5%	<2. E-1	<2. E 0	<7. E-1
95-7948-H1	T1905	<4. E-2	2.08E 3 5%	<2. E-1	<2. E 0	<1. E 0
95-7948-H2	T1906	<4. E-2	2.12E 3 5%	<2. E-1	<2. E 0	<2. E 0

Note: K-40 was detected in samples, but not reported.

3-2311

HCD-WM-DP-145 REV. 1

PNL-CD-WM-DP-145, REV. 1

RT R 9/16/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

15-SEP-1995 05:47:32.71
Gamma Energy Analysis (GEA)

Sample Title: 95-7945-H1 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0071.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_H0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 14-SEP-1995 15:22:08 Sample quantity: 1.07530E-02 G
Sample (EOI) time: 14-SEP-1995 15:22:07 Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 12:00:00.00
Elapsed real time: 0 13:03:03.20 8.1%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	6.448E-03	6.448E-03	36.03	OK

Final Mean for 1 Valid Peaks = 6.448E-03+/- 2.323E-03 (36.03%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	1.335E-02	1.335E-02	4.23	OK
	1332.50	99.98*	1.318E+00	1.305E-02	1.305E-02	3.14	OK

Final Mean for 2 Valid Peaks = 1.316E-02+/- 3.319E-04 (2.52%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	7.051E+01	7.051E+01	2.82	OK

Final Mean for 1 Valid Peaks = 7.051E+01+/- 1.986E+00 (2.82%)

EU-154 42.75 20.56 4.536E-01 ----- Line Not Found ----- Absent

3-2312

Nuclide Line Activity Report (continued)
Sample ID : 95-7945-H1 COR Acquisition date : 14-SEP-1995 15:22:08

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
	123.07	40.42	7.837E+00	3.359E-02	3.359E-02	8.56	OK
	247.93	6.84	5.704E+00	----- Line	Not Found	-----	Absent
	591.76	4.92	2.812E+00	----- Line	Not Found	-----	Absent
	723.36	19.98	2.348E+00	4.124E-02	4.124E-02	7.51	OK
	756.86	4.50	2.251E+00	----- Line	Not Found	-----	Absent
	873.20	12.09	1.968E+00	3.454E-02	3.454E-02	13.89	OK
	996.30	10.34	1.735E+00	3.318E-02	3.318E-02	11.39	OK
	1004.76	17.90	1.721E+00	4.370E-02	4.370E-02	8.22	OK
	1274.51	34.40*	1.373E+00	4.085E-02	4.085E-02	3.45	OK
	Final Mean for 6 Valid Peaks = 3.930E-02+/- 1.043E-03 (2.65%)						
EU-155	86.54	32.80	6.372E+00	3.787E-02	3.787E-02	9.88	OK
	105.31	21.84*	7.524E+00	3.891E-02	3.892E-02	11.47	OK
	Final Mean for 2 Valid Peaks = 3.830E-02+/- 2.868E-03 (7.49%)						
AM-241	59.54	35.90*	2.644E+00	1.944E-02	1.944E-02	44.25	OK
	Final Mean for 1 Valid Peaks = 1.944E-02+/- 8.603E-03 (44.25%)						

Flag: "*" = Keyline

WHO-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7945-H1 COR

Acquisition date : 14-SEP-1995 15:22:08

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	35.40	263525	0.98	94.08	91	8	0.4			
0	39.73	3427	1.99	105.61	101	9	46.7			
0	56.42	3185	1.08	150.15	148	6	38.4			
0	59.62	3171	0.62	158.66	156	7	44.2		AM-241	1.944E-02
0	75.17*	3873	0.81	200.15	198	6	33.1			
0	86.76*	13603	1.05	231.07	229	6	9.4		EU-155	3.787E-02
0	105.44	10990	0.87	280.89	279	6	11.2		EU-155	3.892E-02
0	123.18	18288	1.06	328.22	325	8	8.4		EU-154	3.359E-02
10	187.17	80759	3.00	498.91	492	34	3.0	5.32E+01		
10	190.66	41626	2.28	508.22	492	34	7.4			
0	661.39*	26295294	1.79	1763.83	1751	24	0.0		CS-137	70.5
0	723.06	3325	1.96	1928.33	1919	18	6.8		EU-154	4.124E-02
0	872.99	1412	2.26	2328.26	2318	20	13.2		EU-154	3.454E-02
0	996.00	1023	2.33	2656.38	2649	17	10.8		EU-154	3.318E-02
0	1004.40	2313	2.56	2678.78	2666	29	7.5		EU-154	4.370E-02
0	1173.10*	3401	2.51	3128.78	3113	32	4.1		CO-60	1.335E-02
0	1274.48	3316	2.59	3399.19	3387	30	3.3		EU-154	4.085E-02
2	1319.41	934	2.60	3519.05	3512	26	10.3	4.17E+00		
2	1322.76	2835	2.55	3527.97	3512	26	4.2			
0	1332.46*	2957	2.69	3553.84	3539	28	3.0		CO-60	1.305E-02
0	1460.83*	144	2.91	3896.27	3884	24	36.0		K-40	6.448E-03
0	1596.59	245	4.15	4258.40	4247	25	13.8			
0	2615.39*	50	3.89	6975.93	6962	27	31.3			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	436203.	514.00	5.6797E-03
RU-103	529984.	497.05	6.8219E-03
RU-106	161366.	621.92	4.1228E-02
SB-125	822744.	427.88	2.2509E-02
CS-134	171945.	604.71	4.1670E-03
CE-144	759671.	133.54	2.7200E-02
EU-152	508.	1408.01	2.3291E-03
TH-228	739552.	238.58	9.1015E-03

WHC-SD-WM-DP-145, REV. 1

Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order #28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.1077 → 100 ---9.9839--- --- --- ---

5 ml ml as recorded

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1902

Sample size .010753 g

Analyst [signature] Date 9/13/95

3-2315

WHC-SD-WM-DP-145, REV. 1

Battelle / Pacific Northwest Laboratories — 14-SEP-1995 12:45:29.93
Analytical Chemistry Laboratory — Gamma Energy Analysis (GEA)

Sample Title: 95-7945-H1 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0070.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 14-SEP-1995 10:43:10 — Sample quantity: 1.07530E-02 G
Sample (EOI) time: 14-SEP-1995 10:43:10 — Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:48:52.65 8.2%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 — Half life ratio: 8.00
Errors propagated: Yes — Systematic Erro: 0.00
Abundance limit : 70.00 — WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	1.971E-02	1.971E-02	26.16	OK

Final Mean for 1 Valid Peaks = 1.971E-02+/- 5.156E-03 (26.16%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.484E+00	1.246E-02	1.246E-02	9.27	OK
	1332.50	99.98*	1.318E+00	1.448E-02	1.448E-02	6.96	OK

Final Mean for 2 Valid Peaks = 1.360E-02+/- 7.592E-04 (5.58%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	7.088E+01	7.088E+01	2.82	OK

Final Mean for 1 Valid Peaks = 7.088E+01+/- 1.997E+00 (2.82%)

EU-154 42.75 20.56 4.536E-01 ----- Line Not Found ----- Absent

recount

Nuclide Line Activity Report (continued)
Sample ID : 95-7945-H1 COR Acquisition date : 14-SEP-1995 10:43:10

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
	123.07	40.42	7.837E+00	3.967E-02	3.967E-02	19.20	OK
	247.93	6.84	5.704E+00	----- Line Not Found		-----	Absent
	591.76	4.92	2.812E+00	----- Line Not Found		-----	Absent
	723.36	19.98	2.348E+00	2.451E-02	2.451E-02	25.43	OK
	756.86	4.50	2.251E+00	----- Line Not Found		-----	Absent
	873.20	12.09	1.967E+00	2.969E-02	2.969E-02	27.97	OK
	996.30	10.34	1.734E+00	----- Line Not Found		-----	Absent
	1004.76	17.90	1.720E+00	4.574E-02	4.574E-02	14.68	OK
	1274.51	34.40*	1.373E+00	3.939E-02	3.939E-02	7.89	OK

Final Mean for 5 Valid Peaks = 3.732E-02+/- 2.337E-03 (6.26%)

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7945-H1 COR

Acquisition date : 14-SEP-1995 10:43:10

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
6	35.21	32531	0.80	93.57	90	15	1.0	6.20E+02		
6	36.15	25923	1.18	96.07	90	15	1.8			
6	37.29	14441	1.19	99.12	90	15	3.7			
0	39.28	44	0.57	104.43	104	5	849.9			
0	41.97	97	0.33	111.61	109	5	381.7			
0	86.59	2505	1.09	230.61	228	7	21.6			
0	123.18	3000	0.75	328.22	325	8	19.1		EU-154	3.967E-02
10	187.17	13241	3.00	498.91	491	36	7.8	1.67E+01		
10	191.32	4551	1.56	509.97	491	36	17.5			
10	193.26	4190	1.94	515.14	491	36	24.4			
10	195.73	2118	1.90	521.73	491	36	34.7			
0	661.40*	3671422	1.79	1763.88	1751	24	0.1		CS-137	70.9
0	722.86	274	1.66	1927.80	1921	14	25.2		EU-154	2.451E-02
0	873.23	169	1.56	2328.91	2323	13	27.6		EU-154	2.969E-02
0	1004.96	336	1.98	2680.27	2670	21	14.3		EU-154	4.574E-02
0	1172.89*	441	2.18	3128.22	3118	22	9.2		CO-60	1.246E-02
0	1274.47	444	1.98	3399.18	3387	24	7.8		EU-154	3.939E-02
0	1322.19	519	2.58	3526.47	3515	27	10.3			
0	1332.54*	455	2.29	3554.06	3541	26	6.9		CO-60	1.448E-02
0	1461.34*	61	2.60	3897.63	3883	26	26.1		K-40	1.971E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	61229.	514.00	1.5283E-02
RU-103	73557.	497.05	1.8223E-02
RU-106	22671.	621.92	1.1122E-01
SB-125	115385.	427.88	6.0681E-02
CS-134	24136.	604.71	1.1238E-02
CE-144	106272.	133.54	7.3205E-02
EU-152	89.	1408.01	7.0189E-03
EU-155	107738.	105.31	3.8933E-02
TH-228	103384.	238.58	2.4496E-02
AM-241	88798.	59.54	6.1458E-02

WHC-SD-WM-DP-145, REV. 1

RCR 9/16/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

16-SEP-1995 06:12:29.60
Gamma Energy Analysis (GEA)

Sample Title: 95-7945-h2 core 99 tank by-108 silvers k28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0074.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 15-SEP-1995 17:07:24
Sample (EOI) time: 15-SEP-1995 17:07:24
Elapsed live time: 0 12:00:00.00
Elapsed real time: 0 13:05:09.23 8.3%

Sample quantity: 1.17010E-02 g
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	5.720E-03	5.720E-03	39.07	OK

Final Mean for 1 Valid Peaks = 5.720E-03+/- 2.235E-03 (39.07%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	5.466E-03	5.466E-03	7.44	OK
	1332.50	99.98*	1.318E+00	5.431E-03	5.432E-03	5.43	OK

Final Mean for 2 Valid Peaks = 5.444E-03+/- 2.386E-04 (4.38%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	7.212E+01	7.213E+01	2.82	OK

Final Mean for 1 Valid Peaks = 7.213E+01+/- 2.031E+00 (2.82%)

EU-154 42.75 20.56 4.536E-01 ----- Line Not Found ----- Absent

3-2319

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-7945-h2 cor Acquisition date : 15-SEP-1995 17:07:24

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
	123.07	40.42	7.837E+00	3.019E-02	3.020E-02	9.22	OK
	247.93	6.84	5.704E+00	----- Line Not Found		-----	Absent
	591.76	4.92	2.812E+00	----- Line Not Found		-----	Absent
	723.36	19.98	2.348E+00	2.974E-02	2.974E-02	9.63	OK
	756.86	4.50	2.251E+00	----- Line Not Found		-----	Absent
	873.20	12.09	1.968E+00	3.746E-02	3.746E-02	10.52	OK
	996.30	10.34	1.734E+00	3.699E-02	3.699E-02	9.94	OK
	1004.76	17.90	1.720E+00	3.455E-02	3.455E-02	7.64	OK
	1274.51	34.40*	1.373E+00	3.740E-02	3.741E-02	3.48	OK
	Final Mean for 6 Valid Peaks = 3.536E-02+/- 9.439E-04 (2.67%)						
EU-155	86.54	32.80	6.369E+00	3.690E-02	3.690E-02	9.88	OK
	105.31	21.84*	7.524E+00	3.652E-02	3.652E-02	11.86	OK
	Final Mean for 2 Valid Peaks = 3.674E-02+/- 2.789E-03 (7.59%)						
AM-241	59.54	35.90*	2.597E+00	1.636E-02	1.636E-02	39.80	OK
	Final Mean for 1 Valid Peaks = 1.636E-02+/- 6.510E-03 (39.80%)						

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7945-h2 cor

Acquisition date : 15-SEP-1995 17:07:24

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
6	35.51	360719	1.16	94.35	90	22	0.4	1.66E+04		
6	37.48	140219	0.81	99.62	90	22	0.8			
6	38.90	106506	0.90	103.40	90	22	1.1			
6	40.46	62354	1.22	107.58	90	22	2.0			
0	56.74	5514	1.36	151.00	148	7	26.5			
0	59.33	2852	1.03	157.89	156	5	39.8		AM-241	1.636E-02
0	74.96*	4168	0.89	199.59	197	7	36.9			
0	86.72*	14415	0.89	230.97	229	6	9.4		EU-155	3.690E-02
0	105.45	11223	0.92	280.91	279	6	11.6		EU-155	3.652E-02
0	123.14	17889	1.00	328.11	325	8	9.1		EU-154	3.020E-02
10	187.44	71776	3.00	499.62	493	27	3.6	1.22E+01		
10	190.09	28368	1.88	506.70	493	27	9.8			
10	192.46	18813	1.90	513.02	493	27	14.7			
0	661.43*	29267260	1.80	1763.94	1751	24	0.0		CS-137	72.1
0	723.12	2609	1.78	1928.49	1919	17	9.1		EU-154	2.974E-02
0	872.90	1667	1.83	2328.02	2319	16	9.6		EU-154	3.746E-02
0	996.19	1241	2.15	2656.88	2648	17	9.3		EU-154	3.699E-02
0	1004.62	1990	2.31	2679.37	2669	20	6.8		EU-154	3.455E-02
0	1173.09*	1515	2.48	3128.74	3114	25	7.4		CO-60	5.466E-03
0	1274.47	3304	2.45	3399.17	3384	29	3.3		EU-154	3.741E-02
2	1318.07	726	3.06	3515.47	3511	31	8.4	1.51E+01		
2	1322.83	3743	2.61	3528.16	3511	31	3.5			
0	1332.60*	1339	2.60	3554.22	3542	24	5.4		CO-60	5.432E-03
0	1460.73*	139	2.47	3896.00	3885	25	39.0		K-40	5.720E-03
1	1594.19	116	2.86	4252.00	4245	31	20.1	2.12E+00		
1	1597.19	191	2.86	4260.00	4245	31	17.3			
3	2615.36*	39	4.27	6975.85	6957	32	39.5	3.32E+00		

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	485135.	514.00	5.5045E-03
RU-103	588910.	497.05	6.6086E-03
RU-106	179569.	621.92	3.9968E-02
SB-125	916972.	427.88	2.1837E-02
CS-134	191666.	604.71	4.0431E-03
CE-144	847460.	133.54	2.6401E-02
EU-152	557.	1408.01	2.2403E-03
TH-228	822171.	238.58	8.8190E-03

WHC-CD-WM-DP-145, REV. 1

Battelle / Pacific Northwest Laboratories — 13-SEP-1995 15:39:42.37
Analytical Chemistry Laboratory — Gamma Energy Analysis (GEA)

Sample Title: 95-7945-H2 Core 99 Tank BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0065.CNF;1
Analys. File: ND_SC_ASF:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 13-SEP-1995 13:50:06 — Sample quantity: 1.17010E-02 g
Sample (EOI) time: 13-SEP-1995 13:50:06 — Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:49:20.85 8.5%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 — Half life ratio: 8.00
Errors propagated: Yes — Systematic Erro: 0.00
Abundance limit : 70.00 — WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	5.760E-03	5.760E-03	15.07	OK
	1332.50	99.98*	1.317E+00	6.232E-03	6.232E-03	12.97	OK

Final Mean for 2 Valid Peaks = 6.012E-03+/- 5.915E-04 (9.84%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	7.220E+01	7.220E+01	2.82	OK

Final Mean for 1 Valid Peaks = 7.220E+01+/- 2.034E+00 (2.82%)

EU-154	42.75	20.56	4.536E-01	----- Line Not Found		-----	Absent
	123.07	40.42	7.836E+00	1.648E-02	1.648E-02	44.59	OK
	247.93	6.84	5.704E+00	----- Line Not Found		-----	Absent
	591.76	4.92	2.812E+00	----- Line Not Found		-----	Absent
	723.36	19.98	2.348E+00	4.140E-02	4.140E-02	15.18	OK
	756.86	4.50	2.251E+00	----- Line Not Found		-----	Absent
	873.20	12.09	1.968E+00	4.296E-02	4.296E-02	21.28	OK
	996.30	10.34	1.734E+00	----- Line Not Found		-----	Absent
	1004.76	17.90	1.720E+00	2.786E-02	2.786E-02	24.28	OK
	1274.51	34.40*	1.373E+00	4.260E-02	4.260E-02	8.14	OK

Final Mean for 5 Valid Peaks = 3.743E-02+/- 2.493E-03 (6.66%)

Recount tomorrow 9/16 IF possible* for ~12 WS H

3-2322

Nuclide Line Activity Report (continued)
Sample ID : 95-7945-H2 Cor Acquisition date : 13-SEP-1995 13:50:06

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
EU-155	86.54	32.80	6.368E+00	4.767E-02	4.767E-02	19.70	OK
	105.31	21.84*	7.527E+00	5.865E-02	5.865E-02	22.06	OK

Final Mean for 2 Valid Peaks = 5.145E-02+/- 7.598E-03 (14.77%)

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7945-H2 Cor

Acquisition date : 13-SEP-1995 13:50:06

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
10	35.28	43605	0.88	93.76	90	22	0.9	1.11E+03		
10	36.48	38077	1.44	96.96	90	22	1.5			
10	37.81	31512	1.76	100.50	90	22	2.3			
10	39.35	17272	1.65	104.60	90	22	3.9			
10	40.64	4991	1.08	108.04	90	22	8.4			
0	43.59	177	0.60	115.92	113	4	186.0			
0	86.72*	2586	1.04	230.96	229	6	19.5		EU-155	4.767E-02
0	105.52	2504	1.12	281.11	278	7	21.9		EU-155	5.865E-02
0	122.84	1356	0.82	327.31	325	8	44.6		EU-154	1.648E-02
0	661.43*	4069352	1.80	1763.94	1751	24	0.1		CS-137	72.2
0	723.15	504	1.74	1928.56	1921	15	14.8		EU-154	4.140E-02
0	873.03	265	2.00	2328.38	2321	15	20.8		EU-154	4.296E-02
0	1004.74	223	2.62	2679.69	2669	21	24.0		EU-154	2.786E-02
0	1173.54*	222	2.22	3129.94	3121	19	15.0		CO-60	5.760E-03
0	1274.61	523	2.88	3399.54	3385	32	8.1		EU-154	4.260E-02
0	1322.06	629	4.32	3526.11	3512	26	9.2			
0	1333.23*	213	3.25	3555.90	3542	28	12.9		CO-60	6.232E-03
0	1463.35	35	2.28	3902.98	3888	29	69.3			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
K-40	109.	1460.83	1.4402E-02
SR-85	67522.	514.00	1.4749E-02
RU-103	82150.	497.05	1.7698E-02
RU-106	24980.	621.92	1.0728E-01
SB-125	127635.	427.88	5.8650E-02
CS-134	26545.	604.71	1.0831E-02
CE-144	117260.	133.54	7.0667E-02
EU-152	82.	1408.01	6.1840E-03
TH-228	114410.	238.58	2.3681E-02
AM-241	97802.	59.54	5.9274E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38873 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1172 g ⇒ 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% (H) B-40% C-70% D-70% E_LEPS

File: H0065 RTR 2 Analyst RTR Date 9/13/95

0.011701 g

3-2325

WHC-SD-WM-DP-145, REV. 1 RT R 9/16/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

14-SEP-1995 11:00:04.99
Gamma Energy Analysis (GEA)

Sample Title: 95-7945-H3 Core 99 Tank BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0088.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: [USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 13-SEP-1995 14:05:01
Sample (EOI) time: 13-SEP-1995 14:05:01
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:00.98 0.0%

Sample quantity: 1.12270E-02 g
Sample geometry: P0-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.461E+00	1.768E-02	1.768E-02	17.33	OK

Final Mean for 1 Valid Peaks = 1.768E-02+/- 3.064E-03 (17.33%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.790E+00	2.297E-03	2.297E-03	12.66	OK
	1332.50	99.98*	1.586E+00	2.161E-03	2.161E-03	12.04	OK

Final Mean for 2 Valid Peaks = 2.222E-03+/- 1.939E-04 (8.73%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	6.048E-02	6.048E-02	3.85	OK

Final Mean for 1 Valid Peaks = 6.048E-02+/- 2.329E-03 (3.85%)

Nuclide Line Activity Report (continued)
Sample ID : 95-7945-H3 Cor Acquisition date : 13-SEP-1995 14:05:01

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7945-H3 Cor Acquisition date : 13-SEP-1995 14:05:01

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	75.11*	19	1.29	199.17	195	7	135.3			
0	92.78	82	0.99	246.27	243	8	33.1			
0	661.51*	4012	1.85	1761.79	1749	26	1.7		CS-137	6.048E-02
0	932.93	6	3.37	2485.07	2470	18	182.9			
0	1173.24	102	2.57	3125.44	3116	21	12.6		CO-60	2.297E-03
0	1332.24	85	2.30	3549.14	3540	16	12.0		CO-60	2.161E-03
0	1461.06	69	2.52	3892.41	3882	18	17.2		K-40	1.768E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	146.	514.00	5.8027E-04
RU-103	121.	497.05	5.7428E-04
RU-106	49.	621.92	4.0514E-03
SB-125	172.	427.88	1.8159E-03
CS-134	93.	604.71	5.4366E-04
CE-144	280.	133.54	2.8146E-03
EU-152	15.	1408.01	2.3264E-03
EU-154	15.	1274.51	1.2825E-03
EU-155	273.	105.31	1.4118E-03
TH-228	268.	238.58	9.6635E-04
AM-241	215.	59.54	1.7472E-03

WHC-SD-WM-DP-145, REV. 1

:ific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-H3 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.11245--- → 100 ml - 9.9839 ml --- --- ---

8 Average x̄ 2 as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

RTR G

File: G0088

Analyst RTR Date 9/18/95

0.011227g

3-2329

WHC-CD-WM-DP-145, REV. 1 RTR5 9/16/97

Battelle / Pacific Northwest Laboratories 15-SEP-1995 07:59:55.37
Analytical Chemistry Laboratory Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H1T CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0072.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 15-SEP-1995 06:08:38 Sample quantity: 1.00040E-02 G
Sample (EOI) time: 15-SEP-1995 06:08:37 Sample geometry: PO-GSV-10ML-W
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:51:05.02 10%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 0.00
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.216E+00	1.529E-02	1.529E-02	36.92	OK

Final Mean for 1 Valid Peaks = 1.529E-02+/- 5.647E-03 (36.92%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.484E+00	3.894E-03	3.894E-03	39.76	OK
	1332.50	99.98*	1.318E+00	7.113E-03	7.113E-03	13.60	OK

Final Mean for 2 Valid Peaks = 6.209E-03+/- 8.203E-04 (13.21%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	1.125E+02	1.125E+02	2.82	OK

Final Mean for 1 Valid Peaks = 1.125E+02+/- 3.167E+00 (2.82%)

EU-154 42.75 20.56 4.536E-01 ----- Line Not Found ----- Absent

Sample ID : 95-7946-H1T CO Acquisition date : 15-SEP-1995 06:08:38

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
	123.07	40.42	7.837E+00	7.191E-02	7.191E-02	13.89	OK
	247.93	6.84	5.704E+00	----- Line Not Found		-----	Absent
	591.76	4.92	2.812E+00	----- Line Not Found		-----	Absent
	723.36	19.98	2.348E+00	7.969E-02	7.969E-02	10.50	OK
	756.86	4.50	2.251E+00	----- Line Not Found		-----	Absent
	873.20	12.09	1.969E+00	1.090E-01	1.090E-01	15.08	OK
	996.30	10.34	1.735E+00	5.821E-02	5.821E-02	21.33	OK
	1004.76	17.90	1.721E+00	8.663E-02	8.664E-02	10.10	OK
	1274.51	34.40*	1.373E+00	8.650E-02	8.650E-02	5.47	OK
Final Mean for 6 Valid Peaks = 8.280E-02+/- 3.293E-03 (3.98%)							
EU-155	86.54	32.80	6.362E+00	8.947E-02	8.947E-02	14.36	OK
	105.31	21.84*	7.525E+00	8.156E-02	8.156E-02	18.99	OK
Final Mean for 2 Valid Peaks = 8.624E-02+/- 9.889E-03 (11.47%)							

Flag: "*" = Keyline

WHC-SD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7946-H1T CO

Acquisition date : 15-SEP-1995 06:08:38

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
5	35.21	43562	0.77	93.57	90	10	0.9	6.81E+02		
5	36.09	22500	1.07	95.92	90	10	2.2			
0	86.65	4146	0.80	230.77	229	6	14.1		EU-155	8.947E-02
0	105.46	2977	1.16	280.94	279	6	18.9		EU-155	8.156E-02
0	123.02	5059	0.99	327.79	325	8	13.8		EU-154	7.191E-02
9	186.44*	12900	2.72	496.94	492	33	6.4	5.79E+00		
9	189.43	10205	2.27	504.92	492	33	13.6			
9	191.93	5612	2.08	511.59	492	33	23.5			
0	661.38*	5419864	1.80	1763.82	1751	24	0.0		CS-137	112.
0	723.02	830	1.99	1928.23	1922	13	10.0		EU-154	7.969E-02
0	872.66	576	2.00	2327.39	2317	20	14.5		EU-154	0.109
0	996.07	232	1.97	2656.55	2649	15	21.0		EU-154	5.821E-02
0	1004.47	593	1.78	2678.98	2669	18	9.5		EU-154	8.664E-02
0	1172.60*	128	1.53	3127.44	3119	24	39.7		CO-60	3.894E-03
0	1274.48	907	2.44	3399.20	3386	28	5.4		EU-154	8.650E-02
4	1320.23	371	3.84	3521.23	3510	31	18.6	2.81E+00		
4	1322.45	994	3.22	3527.15	3510	31	7.4			
0	1332.74*	208	2.22	3554.60	3543	22	13.6		CO-60	7.113E-03
0	1461.20*	44	2.33	3897.25	3889	16	36.9		K-40	1.529E-02
0	1596.39	80	2.61	4257.85	4246	23	18.1			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
SR-85	89699.	514.00	1.9883E-02
RU-103	108464.	497.05	2.3786E-02
RU-106	33083.	621.92	1.4441E-01
SB-125	169453.	427.88	7.9042E-02
CS-134	35463.	604.71	1.4643E-02
CE-144	155950.	133.54	9.5320E-02
EU-152	93.	1408.01	7.7186E-03
TH-228	151709.	238.58	3.1895E-02
AM-241	131163.	59.54	8.0287E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-H1T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1002 → 100 --- 9.9839 --- --- --- ---

8 ml ml ∞ received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K A Poeppel Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T19Ø3

Analyst RT R Date 9/13/95

Ø.Ø1ØØØ4 g

3-2333

HC-CD-WM-DP-145, REV. 1

RT TS 9/18

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 17:35:42.38
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-H2T Core 99 Tank BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_H0066.CNF;1
Analys. File: ND_SC_ASF:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_H0GSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_H.CNF;6 - 2-SEP-1995 10:23:41.

Acquisition time : 13-SEP-1995 15:45:38
Sample (EOI) time: 13-SEP-1995 15:45:37
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:49:48.93 8.9%

Sample quantity: 9.90400E-03 g
Sample geometry: P0-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.217E+00	7.983E-03	7.983E-03	82.65	OK

Final Mean for 1 Valid Peaks = 7.983E-03+/- 6.598E-03 (82.65%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.483E+00	8.778E-03	8.778E-03	14.47	OK
	1332.50	99.98*	1.318E+00	7.076E-03	7.076E-03	14.58	OK

Final Mean for 2 Valid Peaks = 7.752E-03+/- 8.010E-04 (10.33%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	2.547E+00	9.480E+01	9.480E+01	2.82	OK

Final Mean for 1 Valid Peaks = 9.480E+01+/- 2.670E+00 (2.82%)

EU-154	42.75	20.56	4.740E-01	1.295E-01	1.295E-01	192.07	OK

Nuclide Line Activity Report (continued)
Sample ID : 95-7946-H2T Co Acquisition date : 13-SEP-1995 15:45:38

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
	123.07	40.42	7.837E+00	5.078E-02	5.078E-02	17.77	OK
	247.93	6.84	5.704E+00	----- Line Not Found		-----	Absent
	591.76	4.92	2.812E+00	----- Line Not Found		-----	Absent
	723.36	19.98	2.347E+00	5.262E-02	5.262E-02	15.10	OK
	756.86	4.50	2.251E+00	----- Line Not Found		-----	Absent
	873.20	12.09	1.968E+00	3.645E-02	3.645E-02	31.34	OK
	996.30	10.34	1.734E+00	6.070E-02	6.070E-02	23.65	OK
	1004.76	17.90	1.720E+00	6.473E-02	6.473E-02	13.15	OK
	1274.51	34.40*	1.373E+00	7.049E-02	7.049E-02	6.17	OK
Final Mean for 7 Valid Peaks = 6.198E-02+/- 3.054E-03 (4.93%)							
EU-155	86.54	32.80	6.357E+00	6.438E-02	6.438E-02	17.93	OK
	105.31	21.84*	7.525E+00	7.216E-02	7.217E-02	19.42	OK
Final Mean for 2 Valid Peaks = 6.753E-02+/- 8.910E-03 (13.19%)							
AM-241	59.54	35.90*	2.690E+00	3.200E-02	3.200E-02	64.15	OK
Final Mean for 1 Valid Peaks = 3.200E-02+/- 2.053E-02 (64.15%)							

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7946-H2T Co

Acquisition date : 13-SEP-1995 15:45:38

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
5	35.21	37129	0.79	93.57	90	11	0.9	6.46E+02		
5	36.09	20263	1.07	95.92	90	11	2.6			
0	38.58	425	0.61	102.56	101	6	110.3			
3	42.31	338	0.51	112.50	111	8	62.1	1.82E+00		
3	43.01	278	0.93	114.38	111	8	191.7		EU-154	0.130
0	59.90	679	0.87	159.43	157	5	64.1		AM-241	3.200E-02
0	86.60	2952	0.83	230.64	229	6	17.7		EU-155	6.438E-02
0	105.46	2608	0.86	280.96	279	6	19.3		EU-155	7.217E-02
0	123.04	3537	1.05	327.85	325	8	17.7		EU-154	5.078E-02
3	186.79	3005	1.33	497.88	495	15	19.1	1.09E+00		
3	188.59	2734	1.55	502.68	495	15	33.1			
0	661.42*	4522118	1.79	1763.92	1751	24	0.0		CS-137	94.8
0	723.23	543	1.75	1928.80	1923	15	14.7		EU-154	5.262E-02
0	872.96	191	1.54	2328.18	2321	15	31.0		EU-154	3.645E-02
0	996.46	239	2.13	2657.59	2646	22	23.4		EU-154	6.070E-02
0	1004.74	438	1.14	2679.68	2670	21	12.7		EU-154	6.473E-02
0	1173.17*	286	2.69	3128.95	3116	26	14.4		CO-60	8.778E-03
0	1274.68	732	3.01	3399.73	3385	32	6.1		EU-154	7.049E-02
0	1322.10	799	3.37	3526.21	3511	28	8.6			
0	1333.09*	205	2.71	3555.52	3543	30	14.6		CO-60	7.076E-03
1	1459.98*	23	2.75	3894.00	3880	26	82.6	7.85E+00	K-40	7.983E-03
1	1461.86*	6	2.75	3899.00	3880	26	237.9			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	74784.	514.00	1.8338E-02
RU-103	90525.	497.05	2.1949E-02
RU-106	27871.	621.92	1.3389E-01
SB-125	141273.	427.88	7.2900E-02
CS-134	29479.	604.71	1.3485E-02
CE-144	126584.	133.54	8.6744E-02
EU-152	51.	1408.01	5.7865E-03
TH-228	125657.	238.58	2.9321E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-M2T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .0993 → 100 --- 9.9839 --- --- --- ---
5 ml ml as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

9/22/95 RTR H

File: H0066

Analyst RTR Date 9/13/95

0.009904

3-2337

RT TR 9, 1

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 17:31:40.85
Gamma Energy Analysis (GEA)

Sample Title: 95-7946-HCB Core 99 Tank BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0089.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_GOGSV10MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;6 - 2-SEP-1995 10:22:49.

Acquisition time : 13-SEP-1995 15:51:28
Sample (EOI) time: 13-SEP-1995 15:51:27
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:01.61 0.0%

Sample quantity: 9.95400E-03 g
Sample geometry: PO-GSV-10ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.460E+00	1.074E-02	1.074E-02	32.52	OK

Final Mean for 1 Valid Peaks = 1.074E-02+/- 3.494E-03 (32.52%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	1.790E+00	2.064E-03	2.064E-03	18.67	OK
	1332.50	99.98*	1.586E+00	1.465E-03	1.465E-03	24.92	OK

Final Mean for 2 Valid Peaks = 1.749E-03+/- 2.650E-04 (15.16%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.123E+00	2.125E-01	2.125E-01	3.59	OK

Final Mean for 1 Valid Peaks = 2.125E-01+/- 7.638E-03 (3.59%)

Post-NID Peak Search Report
Sample ID : 95-7946-HCB Co

Acquisition date : 13-SEP-1995 15:51:28

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	661.51	12495	1.80	1761.79	1752	23	0.9		CS-137	0.212
0	795.90	63	1.77	2119.91	2112	20	29.3			
0	1173.34*	82	2.28	3125.72	3115	25	18.6		CO-60	2.064E-03
0	1332.75*	51	2.69	3550.51	3540	20	24.9		CO-60	1.465E-03
0	1461.46*	37	2.29	3893.48	3880	24	32.5		K-40	1.074E-02

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	294.	514.00	9.2875E-04
RU-103	274.	497.05	9.7418E-04
RU-106	117.	621.92	7.0252E-03
SB-125	437.	427.88	3.2699E-03
CS-134	202.	604.71	9.0401E-04
CE-144	481.	133.54	4.1639E-03
EU-152	11.	1408.01	2.2165E-03
EU-154	22.	1274.51	1.7300E-03
EU-155	409.	105.31	1.9501E-03
TH-228	472.	238.58	1.4462E-03
AM-241	409.	59.54	2.7212E-03

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-HCB Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .0997 --- → 100 --- 9.9839 --- --- ---

Average x 2 ml ml as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: G0089 A.T. 9/22/95

Analyst [signature] Date 9/13/95

0.009954 g

3-2340

WHC-SD-WM-DP-145, REV. 1

RT R 9/18/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

13-SEP-1995 18:19:44.79
Gamma Energy Analysis (GEA)

Sample Title: 95-7947-H1 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1904.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 13-SEP-1995 16:36:04
Sample (EOI) time: 13-SEP-1995 16:36:03
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:43:27.01 3.3%

Sample quantity: 1.08720E-02 g
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.471E-02	1.877E-01	1.877E-01	45.16	OK

Final Mean for 1 Valid Peaks = 1.877E-01+/- 8.475E-02 (45.16%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	1.197E+03	1.197E+03	4.72	OK

Final Mean for 1 Valid Peaks = 1.197E+03+/- 5.646E+01 (4.72%)

Flag: "*" = Keyline

3-2341

WHC-CD-WM-DP-145, REV. 1

Post-NID Peak Search Report
Sample ID : 95-7947-H1 COR

Acquisition date : 13-SEP-1995 16:36:04

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	44.60	20128	4.77	59.88	55	12	3.8			
2	73.15*	4919	1.65	97.97	95	10	9.5	8.76E+00		
2	75.45*	6954	1.24	101.04	95	10	5.2			
0	85.44*	2125	1.13	114.36	112	6	19.5			
10	187.41	16663	4.25	250.41	244	35	5.3	7.26E+00		
10	191.56	14493	4.27	255.95	244	35	7.7			
10	195.55	11842	4.23	261.27	244	35	9.4			
10	199.88	5686	3.22	267.04	244	35	15.4			
10	202.50	4568	3.90	270.55	244	35	23.0			
0	661.73*	1207293	1.74	883.12	876	14	0.1		CS-137	1.197E+03
0	1274.52	38	1.96	1700.32	1694	13	25.1			
0	1322.88	37	2.99	1764.80	1761	11	40.8			
0	1460.66*	12	2.43	1948.50	1942	13	45.1		K-40	0.188

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
CO-60	16.	1332.50	2.9199E-02
SR-85	26408.	514.00	5.0739E-01
RU-103	32553.	497.05	6.1125E-01
RU-106	7667.	621.92	3.3106E+00
SB-125	60909.	427.88	2.1956E+00
CS-134	7878.	604.71	3.2817E-01
CE-144	86037.	133.54	2.7790E+00
EU-152	10.	1408.01	1.1549E-01
EU-154	45.	1274.51	1.3784E-01
EU-155	72233.	105.31	1.1621E+00
TH-228	74526.	238.58	9.8710E-01
AM-241	66814.	59.54	7.0508E-01

HO-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1089 g → 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [illegible] Date 9/13/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1904

Sample size 0.010872 g.

Analyst [illegible] Date 9/13/95

3-2343

WHC-CD-WM-DP-145, REV. 1

RT R 9/18

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

14-SEP-1995 12:36:15.80
Gamma Energy Analysis (GEA)

Sample Title: 95-7947-H2 CORE 99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1908.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 14-SEP-1995 10:50:56
Sample (EOI) time: 14-SEP-1995 10:50:55
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:45:10.33 4.9%

Sample quantity: 1.44267E-02 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.906E-02	1.343E+03	~~1.343E+03~~	~~4.72~~	OK

Final Mean for 1 Valid Peaks = 1.343E+03+/- 6.344E+01 (4.72%)

Flag: "*" = Keyline

3-2344

Post-NID Peak Search Report
Sample ID : 95-7947-H2 COR

Acquisition date : 14-SEP-1995 10:50:56

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	43.98	19125	4.17	59.05	55	9	3.9			
3	73.08*	6184	1.49	97.88	95	10	8.1	6.99E+00		
3	75.35*	10008	1.29	100.90	95	10	4.4			
0	84.97*	3425	1.13	113.74	112	6	14.8			
10	189.64	12753	4.26	253.39	247	22	8.7	1.55E+01		
10	193.39	8415	4.27	258.38	247	22	16.8			
10	198.24*	2502	2.60	264.85	247	22	29.3			
0	661.59*	1797744	1.76	882.93	876	14	0.1		CS-137	1.343E+03
0	1274.92	42	1.85	1700.86	1694	14	29.4			
0	1322.47	125	3.17	1764.25	1760	12	19.4			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	19.	1460.83	2.3803E-01
CO-60	22.	1332.50	2.6084E-02
SR-85	39083.	514.00	4.6518E-01
RU-103	48517.	497.05	5.6237E-01
RU-106	11450.	621.92	3.0489E+00
SB-125	90171.	427.88	2.0132E+00
CS-134	11739.	604.71	3.0188E-01
CE-144	127288.	133.54	2.5473E+00
EU-152	11.	1408.01	9.1012E-02
EU-154	56.	1274.51	1.1597E-01
EU-155	107521.	105.31	1.0685E+00
TH-228	110423.	238.58	9.0548E-01
AM-241	98988.	59.54	6.4675E-01

WHC-CD-WM-DP-145, REV. 1

Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128832 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-H2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .1445 g → 100 ml --- 9.9839 ml --- --- ---

∞ recorded

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K. Pierpont Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% H ~~B~~-40% C-70% D-70% E_LEPS

K.T. 9/13/95

File: H0067

Sample Size 0.0144267 g

Analyst T. Thomas Date 9/13/95

3-2346

WHC-CD-WM-DP-145, REV. 1

RT RS 9/14/96

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

14-SEP-1995 07:46:31.90
Gamma Energy Analysis (GEA)

Sample Title: 95-7948-H1 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_TT1905.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 14-SEP-1995 06:00:56
Sample (EOI) time: 14-SEP-1995 06:00:56
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:45:26.80 5.2%

Sample quantity: 9.86410E-03 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	2.083E+03	2.083E+03	4.72	OK

Final Mean for 1 Valid Peaks = 2.083E+03+/- 9.825E+01 (4.72%)

Flag: "*" = Keyline

3- 2347

Post-NID Peak Search Report
Sample ID : 95-7948-H1 COR

Acquisition date : 14-SEP-1995 06:00:56

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	44.59	31326	4.99	59.87	55	12	3.0			
4	73.30*	6101	1.22	98.17	96	9	7.3	2.05E+00		
4	75.38*	10455	1.27	100.94	96	9	4.3			
0	84.91*	3310	1.22	113.66	112	5	13.4			
10	187.49	27476	4.25	250.52	244	35	4.0	4.98E+01		
10	191.83	14876	2.91	256.31	244	35	6.9			
10	195.24	19326	4.28	260.86	244	35	7.2			
10	204.74	3306	2.00	273.54	244	35	21.8			
0	661.70*	1905880	1.74	883.09	876	14	0.1		CS-137	2.083E+03
0	1276.05	25	1.50	1702.35	1695	11	41.5			
0	1322.06	188	4.42	1763.71	1757	13	12.6			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	14.	1460.83	3.0138E-01
CO-60	14.	1332.50	3.0100E-02
SR-85	41563.	514.00	7.0159E-01
RU-103	51131.	497.05	8.4436E-01
RU-106	12111.	621.92	4.5861E+00
SB-125	95939.	427.88	3.0371E+00
CS-134	12483.	604.71	4.5530E-01
CE-144	133414.	133.54	3.8141E+00
EU-152	8.	1408.01	1.1074E-01
EU-154	41.	1274.51	1.4488E-01
EU-155	111572.	105.31	1.5919E+00
TH-228	116092.	238.58	1.3579E+00
AM-241	102032.	59.54	9.6034E-01

HNF-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 288873 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7948-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .0988 g → 100 ml --- 9.9839 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [illegible] Date 9/13/95

Counting Information:

Detector: (TRACK) FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T1905

sample size 9.8641 E-3 g

Analyst [illegible] Date 9/14/95

3-2349

WHC-CD-WM-DP-145, REV. 1

RI R5 9/14

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

14-SEP-1995 09:47:10.22
Gamma Energy Analysis (GEA)

Sample Title: 95-7948-H2 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1906.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 14-SEP-1995 08:02:09
Sample (EOI) time: 14-SEP-1995 08:02:08
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:44:54.51 4.7%

Sample quantity: 8.74590E-03 G
Sample geometry: T8SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.905E-02	2.115E+03	2.115E+03	4.72	OK

Final Mean for 1 Valid Peaks = 2.115E+03+/- 9.987E+01 (4.72%)

Flag: "*" = Keyline

3-2350

Post-NID Peak Search Report
Sample ID : 95-7948-H2 COR

Acquisition date : 14-SEP-1995 08:02:09

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	43.90	17546	4.00	58.95	55	9	4.1			
3	73.16*	5770	1.41	97.99	95	10	8.4	9.99E-01		
3	75.35*	9620	1.26	100.91	95	10	4.5			
0	85.12*	3782	1.28	113.94	112	6	12.9			
10	186.32*	17403	4.02	248.95	244	35	4.8	8.25E+00		
10	189.57	16927	4.26	253.30	244	35	7.9			
10	193.25	18622	4.26	258.20	244	35	7.2			
10	197.20*	10733	3.21	263.48	244	35	9.8			
10	201.12	5641	2.42	268.70	244	35	14.8			
10	204.89	3981	2.33	273.73	244	35	19.1			
0	472.62	743	1.64	630.89	629	5	51.2			
0	661.63*	1716415	1.75	882.99	876	14	0.1		CS-137	2.115E+03
0	1275.10	24	1.77	1701.09	1694	14	48.8			
0	1322.84	96	2.28	1764.75	1760	10	20.3			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	23.	1460.83	4.3264E-01
CO-60	14.	1332.50	3.4529E-02
SR-85	36991.	514.00	7.4651E-01
RU-103	46064.	497.05	9.0389E-01
RU-106	10659.	621.92	4.8524E+00
SB-125	86050.	427.88	3.2441E+00
CS-134	11400.	604.71	4.9073E-01
CE-144	121559.	133.54	4.1062E+00
EU-152	9.	1408.01	1.3624E-01
EU-154	42.	1274.51	1.6546E-01
EU-155	101527.	105.31	1.7127E+00
TH-228	104784.	238.58	1.4550E+00
AM-241	92534.	59.54	1.0315E+00

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28832 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7948-MZ Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- .0876 g → 100 ml --- 9.9839 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% ~~B-40%~~ H C-70% D-70% E_LEPS

K.T. 9/14/95

File: ~~H0068~~ T1906

K.T. 9/14/95

70% dead time Sample size

ct. on Tract 8.7459 E-3 g

Analyst [signature] Date 9/14/95

3-2352

WHC-CD-WM-DP-145, REV. 1

ACID DIGESTION DRAINABLE LIQUID AND Na2O2 FUSION SEGMENT AND QUARTER SEGMENT GEA ANALYSIS

3-2353

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WHC-SD-WM-DP-145, REV. 1

DATE TO QC: 09/22/95

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - GEA - Acid Digestion & KOH Fusion

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers - 95-07932-A1 95-07932-A2 95-07932-A3
95-07935-A1 95-07935-A2
95-07941-N3
95-07943-N1
95-07944-N1

PNL ACL Quality Representative

9/22/95
Date

3-2354

Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

95-7932
9/21/95

Client: K. Silvers
WP #: K28866

Cognizant Scientist: LR Greenwood 9-21-95

Concur : T Trang-le 9/21/95

Measured Activities (uCi/g)

ALO ID Client ID	Co-60 Error %	Cs-134 Error %	Cs-137 Error %	Eu-154 Error %	Eu-155 Error %	Am-241 Error %
95-7932-A1 SEG 2 DL	<2. E-3	<2. E-2	9.00E 1 6%	<4. E-3	<8. E-2	<5. E-2
95-7932-A2 SEG 2 DL DUP	<2. E-3	<2. E-2	9.12E 1 6%	<4. E-3	<8. E-2	<5. E-2
95-7932-A3 METHODS BLANK	<3. E-4	<2. E-4	5.53E-4 35%	<4. E-4	<7. E-4	<4. E-4
95-7935-A1 SEG 3 DL	<2. E-3	<3. E-2	9.85E 1 6%	<5. E-3	<9. E-2	<5. E-2
95-7935-A2 SEG 3 DL DUP	<2. E-3	<2. E-2	9.59E 1 6%	<5. E-3	<9. E-2	<5. E-2

3-2355

WHC-CD-WM-DP-145, REV. 1

WHC-CD-WM-DP-145, REV. 1

RT RS 9/18/9 KS 9/22

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

12-SEP-1995 10:55:48.91
Gamma Energy Analysis (GEA)

Sample Title: 95-7932-A1 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1894.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T10SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 12-SEP-1995 10:19:50
Sample (EOI) time: 12-SEP-1995 10:19:50
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:35:47.90 16%

Sample quantity: 1.11779E+00 G ✓
Sample geometry: T10SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.364E-02	8.994E+01	8.994E+01	5.45	OK

Final Mean for 1 Valid Peaks = 8.994E+01+/- 4.899E+00 (5.45%)

Flag: "*" = Keyline

3-2356

Post-NID Peak Search Report
Sample ID : 95-7932-A1 COR

Acquisition date : 12-SEP-1995 10:19:50

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	44.20	21583	4.43	59.35	55	10	3.6			
2	73.14*	7243	1.35	97.95	95	10	6.0	5.42E+00		
2	75.36*	13754	1.37	100.92	95	10	3.2			
0	85.37*	7066	1.31	114.27	111	8	9.0			
10	187.15	21870	4.25	250.06	245	34	4.4	9.86E+01	NOISE	
10	192.07	15253	3.20	256.63	245	34	7.4			
10	201.57	9395	2.93	269.30	245	34	11.1			
10	204.77	3834	3.28	273.58	245	34	25.2			
0	661.66*	1918863	1.78	883.03	876	14	0.1		CS-137	89.9
0	691.67	425	3.59	923.05	917	14	21.2			
0	1322.26	510	3.70	1763.97	1759	11	7.8			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	3.	1460.83	6.3673E-03
CO-60	22.	1332.50	1.7143E-03
SR-85	41763.	514.00	2.9765E-02
RU-103	52118.	497.05	3.6010E-02
RU-106	11985.	621.92	1.9507E-01
SB-125	98076.	427.88	1.2885E-01
CS-134	12285.	604.71	1.9285E-02
CE-144	133907.	133.54	1.7900E-01
EU-152	5.	1408.01	4.0673E-03
EU-154	11.	1274.51	3.2816E-03
EU-155	110211.	105.31	7.8345E-02
TH-228	116634.	238.58	5.7536E-02
AM-241	95925.	59.54	4.5491E-02

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95238

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7932-A1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- 2.7817 g → 25 ml --- 9.9919 ml --- --- --- ---

as needed

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst K G Rodgers Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: 11894

Analyst K. Thomas Date 9/12/95

Sample size 1.111779 g

3-2358

WHC-CD-WM-DP-145, REV. 1

9/14

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

12-SEP-1995 11:40:14.00
Gamma Energy Analysis (GEA)

Sample Title: 95-7932-A2 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1895.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T10SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 12-SEP-1995 11:04:12
Sample (EOI) time: 12-SEP-1995 11:04:12
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:35:49.66 16%

Sample quantity: 1.10730E+00 G
Sample geometry: T10SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.364E-02	9.118E+01	9.118E+01	5.45	OK

Final Mean for 1 Valid Peaks = 9.118E+01+/- 4.966E+00 (5.45%)

Flag: "*" = Keyline

3-2359

WHO-CD-WM-DP-145, REV.)

Post-NID Peak Search Report
Sample ID : 95-7932-A2 COR

Acquisition date : 12-SEP-1995 11:04:12

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
9	43.82	19837	3.47	58.84	55	12	3.3	3.80E+00		
9	46.54*	8304	2.88	62.47	55	12	7.8			
3	73.21*	7563	1.55	98.06	95	10	6.7	1.48E+00		
3	75.38*	12094	1.26	100.95	95	10	3.7			
0	85.35*	6848	1.39	114.25	111	8	9.3			
10	186.16*	7609	2.66	248.74	246	31	6.8	2.42E+01	NOIZE	
10	188.59	16160	4.19	251.98	246	31	7.0			
10	192.20	14809	3.95	256.80	246	31	9.2			
10	196.28	14481	4.28	262.24	246	31	10.0			
0	661.67*	1926982	1.79	883.05	876	14	0.1		CS-137	91.2
0	691.65	484	3.91	923.03	917	12	15.8			
0	1173.47*	26	1.01	1565.58	1562	8	48.0			
9	1318.86	425	5.14	1759.44	1749	21	7.5	1.19E+00		
9	1322.58	447	2.72	1764.40	1749	21	6.1		sum	

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	2.	1460.83	5.2481E-03
CO-60	19.	1332.50	1.6004E-03
SR-85	42331.	514.00	3.0251E-02
RU-103	52802.	497.05	3.6589E-02
RU-106	12067.	621.92	1.9759E-01
SB-125	98084.	427.88	1.3008E-01
CS-134	12631.	604.71	1.9740E-02
CE-144	134931.	133.54	1.8139E-01
EU-152	1.	1408.01	1.8362E-03
EU-154	12.	1274.51	3.5405E-03
EU-155	110931.	105.31	7.9345E-02
TH-228	117786.	238.58	5.8367E-02
AM-241	95919.	59.54	4.5920E-02

DOCUMENT 145 REV

Pacific Northwest Laboratory 95238

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 138870 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7932-AZ Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- 2.7705 g → 25 ml --- 9.9919 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1895

Analyst [signature] Date 9/12/95

Sample size 1.107302 g

3-2361

WHC-CD-WM-DP-145, REV. 1

RCT 12 9/14/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

12-SEP-1995 14:46:12.82
Gamma Energy Analysis (GEA)

Sample Title: 95-7935-A1 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1897.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T10SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 12-SEP-1995 14:09:35
Sample (EOI) time: 12-SEP-1995 14:09:35
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:36:24.66 18%

Sample quantity: 1.11973E+00 G
Sample geometry: T10SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	1.592E-02	3.730E-03	3.730E-03	87.68	OK

Final Mean for 1 Valid Peaks = 3.730E-03+/- 3.271E-03 (87.68%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.364E-02	9.845E+01	9.845E+01	5.45	OK

Final Mean for 1 Valid Peaks = 9.845E+01+/- 5.367E+00 (5.45%)

Flag: "*" = Keyline

3-2362

Post-NID Peak Search Report
Sample ID : 95-7935-A1 COR Acquisition date : 12-SEP-1995 14:09:35

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	44.28	23393	4.43	59.45	55	10	3.5			
4	73.13*	8306	1.41	97.95	95	10	6.3	1.60E+00		
4	75.27*	12752	1.23	100.80	95	10	3.7			
0	85.38*	7828	1.35	114.29	111	8	8.5			
10	186.24*	22145	3.70	248.85	244	35	3.8	1.70E+02		
10	190.81	23570	3.87	254.94	244	35	6.0			
0	661.59*	2104268	1.79	882.93	876	14	0.1		CS-137	98.4
0	692.89	304	1.77	924.68	921	8	20.1			
10	1318.90	656	5.65	1759.49	1750	20	5.4	1.34E+00		
10	1322.81	438	2.28	1764.70	1750	20	6.5			
0	1461.70*	5	1.78	1949.89	1944	9	87.7		K-40	3.730E-03

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
CO-60	24.	1332.50	1.7676E-03
SR-85	46348.	514.00	3.1302E-02
RU-103	57446.	497.05	3.7741E-02
RU-106	13440.	621.92	2.0622E-01
SB-125	107262.	427.88	1.3452E-01
CS-134	13835.	604.71	2.0430E-02
CE-144	146578.	133.54	1.8696E-01
EU-152	3.	1408.01	3.1451E-03
EU-154	16.	1274.51	4.0878E-03
EU-155	119614.	105.31	8.1477E-02
TH-228	128005.	238.58	6.0171E-02
AM-241	104666.	59.54	4.7436E-02

WHC-CD-WM-DP-745, REV. 1

Pacific Northwest Laboratory 95238

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K88872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7935-A1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- 2.8016 → 25 --- 9.9919 --- --- --- ---
8 ml ml as received

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FDG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1897

sample size
1.119732 g.

Analyst T. Thomas Date 9/12/95

3-2364

WHC-SD-WM DP-145, REV. 1 RT R 9/14/

Battelle / Pacific Northwest Laboratories 14-SEP-1995 10:19:50.13
Analytical Chemistry Laboratory Gamma Energy Analysis (GEA)

Sample Title: 95-7932-A3 CORE99 TANK BY-108 BROWN K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1896.CNF;3
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T8SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 12-SEP-1995 12:25:01 Sample quantity: 1.10954E+00 G
Sample (EOI) time: 12-SEP-1995 12:25:00 Sample geometry: T8SCV
Elapsed live time: 0 01:40:00.00
Elapsed real time: 0 01:40:00.52 0.0%

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75 Half life ratio: 8.00
Errors propagated: Yes Systematic Erro: 1.30
Abundance limit : 70.00 WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.470E-02	2.456E-04	2.456E-04	378.72	OK

Final Mean for 1 Valid Peaks = 2.456E-04+/- 9.302E-04 (378.72%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.904E-02	5.530E-04	5.530E-04	34.15	OK

Final Mean for 1 Valid Peaks = 5.530E-04+/- 1.888E-04 (34.15%)

Flag: "*" = Keyline

3-2365

WHC-SD-WM-DF-145 Rev 1

Post-NID Peak Search Report
Sample ID : 95-7932-A3 COR

Acquisition date : 12-SEP-1995 12:25:01

It	Energy	Area	FWHM	Channel	Left	Pw %Err	Fit	Nuclides	Activity uCi/G
0	75.32*	1	1.29	100.87	96	8*****			
0	85.34*	15	2.11	114.24	110	9214.8			
0	511.12*	25	2.88	682.24	675	17 74.4			
0	661.79*	57	1.60	883.20	877	12 33.8		CS-137	5.530E-04
0	1332.13*	11	1.89	1777.14	1772	9 42.6			
0	1461.25*	2	1.04	1949.29	1943	10378.7		K-40	2.456E-04

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
CO-60	17.	1332.50	2.9700E-04
SR-85	53.	514.00	2.2226E-04
RU-103	28.	497.05	1.7470E-04
RU-106	27.	621.92	1.9207E-03
SB-125	49.	427.88	6.1207E-04
CS-134	18.	604.71	1.5290E-04
CE-144	232.	133.54	1.4153E-03
EU-152	1.	1408.01	3.5680E-04
EU-154	3.	1274.51	3.6370E-04
EU-155	239.	105.31	6.5480E-04
TH-228	160.	238.58	4.4797E-04
AM-241	140.	59.54	3.1574E-04

WHC-CD-WM-DF-145, REV 1

Pacific Northwest Laboratory 95238

Gamma-Spectroscopy.....PNL-ALO-450

Re process

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : _____ ARF(SOW) : ASR 2388

A.L.O. No. : 95-7932-A3 Description : CORE 99 TANK BY-108

Pipet Nos.: 2.7761, x2

DF ~~2.7949~~ g → 25 ml --- 99919 ml --- cs received ---

Average ~~xx~~ 9/13/95

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/13/95

Counting Information:

Detector TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1896

sample size 1.10954 g

Analyst [signature] Date 9/14/95

3-2367

WHC-SD-WM-DP-145, REV. 1 RT RS 9/14/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

12-SEP-1995 15:33:25.48
Gamma Energy Analysis (GEA)

Sample Title: 95-7935-A2 CORE99 TANK BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_T1898.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_T10SCV
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_T.CNF;27 - 2-SEP-1995 10:24:44.

Acquisition time : 12-SEP-1995 14:56:56
Sample (EOI) time: 12-SEP-1995 14:56:55
Elapsed live time: 0 00:30:00.00
Elapsed real time: 0 00:36:16.62 17%

Sample quantity: 1.12944E+00 G
Sample geometry: T10SCV

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 1.30
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	3.364E-02	9.585E+01	9.585E+01	5.45	OK

Final Mean for 1 Valid Peaks = 9.585E+01+/- 5.224E+00 (5.45%)

Flag: "*" = Keyline

3-2368

Post-NID Peak Search Report
Sample ID : 95-7935-A2 COR

Acquisition date : 12-SEP-1995 14:56:56

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	43.91	17764	3.72	58.96	55	9	4.2			
2	73.20*	8338	1.38	98.04	95	10	6.3	2.78E+00		
2	75.29*	14100	1.33	100.83	95	10	3.3			
0	85.52*	8012	1.21	114.47	111	8	8.2			
10	187.58	21449	4.25	250.64	246	31	4.0	1.19E+01		
10	192.40	15452	3.52	257.07	246	31	8.1			
10	196.08	7797	2.41	261.98	246	31	12.0			
10	199.06	12042	3.54	265.95	246	31	10.4			
10	202.45	7080	3.55	270.48	246	31	17.6			
0	661.61*	2066394	1.80	882.96	876	14	0.1		CS-137	95.8
0	692.40	671	4.69	924.03	917	16	15.1			
0	1322.28	623	3.29	1764.00	1759	12	7.0			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy ()	MDA (uCi/G)
K-40	5.	1460.83	7.8705E-03
CO-60	11.	1332.50	1.2121E-03
SR-85	45161.	514.00	3.0633E-02
RU-103	56171.	497.05	3.6999E-02
RU-106	12735.	621.92	1.9901E-01
SB-125	104333.	427.88	1.3153E-01
CS-134	13222.	604.71	1.9801E-02
CE-144	144496.	133.54	1.8403E-01
EU-152	6.	1408.01	4.4314E-03
EU-154	23.	1274.51	4.7650E-03
EU-155	118481.	105.31	8.0393E-02
TH-228	126346.	238.58	5.9266E-02
AM-241	103566.	59.54	4.6780E-02

...-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95238

Gamma-Spectroscopy.....PNL-ALO-450

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K88872 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7935-A2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---2.8259 g → 25 ml --- 9.9919 ml as received --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/12/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

File: T 1898

Analyst T. Thomas Date 9/12/95

1.12944g

3-2370

Battelle Pacific Northwest Laboratory
Analytical Chemistry Laboratory
Radiochemistry Group - 325 Bldg.

95-7941-N
9/21/95

Gamma Energy Analysis, (PNL-ALO-450) : Silvers K28872

Cognizant Scientist: L R Greenwood Date : 9-21-95

Review : T Trang-le Date : 9/21/95

Measured Activities (microCuries/g)

ALO ID Client ID	GEA Filename	Co-60 Error +/-	Cs-134 Error +/-	Cs-137 Error +/-	Eu-154 Error +/-	Eu-155 Error +/-	Am-241 Error +/-
95-7941-N3	G0113	<6.E-3	<5. E-3	3.81E-2 12%	<2.E-2	<2.E-2	<2. E-2
95-7943-N1	G0114	<6. E-3	<3. E-2	5.23E+1 3%	<2.E-2	<8.E-2	<8.E-2
95-7944-N1	G0112	7.82E-3 6%	<7. E-3	4.33E+1 6%	<4.E-3	<2.E-2	<3. E-2

Note: K-40 was detected in samples, but not reported.

3-2371

95-7941N.XLS

HO-CD-WM-DP-145, Rev. 1

RTR 9/22/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

21-SEP-1995 11:24:33.99
Gamma Energy Analysis (GEA)

Sample Title: 95-7944-N1 BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0112.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G0GSV5MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 20-SEP-1995 13:39:28
Sample (EOI) time: 20-SEP-1995 13:39:28
Elapsed live time: 0 06:00:00.00
Elapsed real time: 0 06:03:58.94 1.1%

Sample quantity: 2.64250E-03 g
Sample geometry: PO-GSV-2ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.034E+00	3.309E-02	3.309E-02	10.88	OK

Final Mean for 1 Valid Peaks = 3.309E-02+/- 3.599E-03 (10.88%)

Nuclide Type: activation

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CO-60	1173.24	99.90	2.505E+00	7.755E-03	7.755E-03	7.90	OK
	1332.50	99.98*	2.214E+00	7.870E-03	7.870E-03	6.82	OK

Final Mean for 2 Valid Peaks = 7.820E-03+/- 4.036E-04 (5.16%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	4.464E+00	4.334E+01	4.334E+01	5.51	OK

Final Mean for 1 Valid Peaks = 4.334E+01+/- 2.389E+00 (5.51%)

3-2372

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-7944-N1 BY- Acquisition date : 20-SEP-1995 13:39:28

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7944-N1 BY- Acquisition date : 20-SEP-1995 13:39:28

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	36.70	26983	1.07	96.84	93	9	1.4			
0	40.41	584	1.63	106.70	105	8	74.6			
2	42.93	369	0.70	113.44	112	11	67.8	2.96E+00		
2	44.03	746	1.05	116.37	112	11	58.1			
2	45.34	540	0.76	119.84	112	11	63.5			
0	661.58*	3481295	1.79	1761.97	1749	23	0.1		CS-137	43.3
0	1173.48	410	1.91	3126.09	3112	26	7.8		CO-60	7.755E-03
0	1275.17	112	2.05	3397.06	3384	22	16.3			
0	1322.66	144	2.31	3523.60	3510	29	23.7			
0	1332.91	368	2.14	3550.92	3541	25	6.5		CO-60	7.870E-03
0	1461.07	152	2.55	3892.43	3882	21	10.7		K-40	3.309E-02
0	2614.81	48	1.95	6966.89	6957	19	15.6			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
SR-85	51659.	514.00	8.8604E-03
RU-103	62941.	497.05	1.0615E-02
RU-106	18869.	621.92	6.5078E-02
SB-125	97677.	427.88	3.4672E-02
CS-134	20490.	604.71	6.6248E-03
CE-144	68653.	133.54	3.6433E-02
EU-152	40.	1408.01	3.1746E-03
EU-154	155.	1274.51	3.4528E-03
EU-155	62874.	105.31	1.8396E-02
TH-228	81704.	238.58	1.3213E-02
AM-241	57028.	59.54	2.5377E-02

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

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Gamma-Spectroscopy.....PNL-ALO-450

Customer : Silvers Date Received : 9/26/95 Work order : 62872 ARF(SOW) : _____

A.L.O. No. : 95-7944-N1 Description : _____

Pipet Nos.: #14

DF --- .1328 g → 100 ml --- 2(.99492 ml) --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/26/95

Counting Information:

Detector: TRACK FOG Y-GeLi A-40% B-40% C-70% D-70% E_LEPS

K.T. 9/22/95

K.T. 9/22/95

File: G0112

Sample size 2.6425 E-3 g

Pos. 0

2 ml

Analyst [signature] Date 9/21/95

3-2375

WHC-CD-WM-DP-145, REV. 1

RT R 9/21/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

21-SEP-1995 10:03:53.33
Gamma Energy Analysis (GEA)

Sample Title: 95-7941-N3 BY-108 Silvers K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0113.CNF;1
Analys. File: nd_sc_asf:SST.ASF

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 20-SEP-1995 21:46:37
Sample (EOI) time: 20-SEP-1995 21:46:37
Elapsed live time: 0 08:00:00.00
Elapsed real time: 0 08:00:03.14 0.0%

Sample quantity: 2.25750E-03 g
Sample geometry: P3-GSV-2ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: natural

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
K-40	1460.83	10.67*	2.969E-01	2.011E-01	2.011E-01	13.83	OK

Final Mean for 1 Valid Peaks = 2.011E-01+/- 2.781E-02 (13.83%)

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.601E-01	3.804E-02	3.805E-02	11.78	OK

Final Mean for 1 Valid Peaks = 3.805E-02+/- 4.482E-03 (11.78%)

Nuclide Type: INCL PB212 RA224

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
TH-228	74.81	10.50	1.361E+00	3.798E-02	3.798E-02	51.46	OK
	77.11	17.70	1.404E+00	-----	Line Not Found	-----	Absent
	84.26	1.21	1.539E+00	4.517E-01	4.518E-01	26.87	<<WM N-Sigma
	87.19	6.27	1.573E+00	-----	Line Not Found	-----	Absent
	90.13	1.86	1.608E+00	-----	Line Not Found	-----	Absent
	131.50	0.13	1.721E+00	-----	Line Not Found	-----	Absent

3-2376

Nuclide Line Activity Report (continued) Page : 2
Sample ID : 95-7941-N3 BY- Acquisition date : 20-SEP-1995 21:46:37

Nuclide Type: INCL PB212 RA224

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
	166.43	0.08	1.584E+00	-----	Line Not Found	-----	Absent
	205.75	0.03	1.401E+00	-----	Line Not Found	-----	Absent
	215.75	0.28	1.357E+00	-----	Line Not Found	-----	Absent
	238.58	43.60*	1.264E+00	9.621E-03	9.623E-03	41.63	OK
	240.76	3.90	1.255E+00	-----	Line Not Found	-----	Absent
	300.03	3.34	1.060E+00	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 1.077E-02+/- 3.924E-03 (36.45%)

Nuclide Type: U+TH-234+PA-234

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/g	Decay Corr uCi/g	1-Sigma %Error	Status
U-238	63.29	3.81	1.052E+00	1.316E-01	1.316E-01	205.11	OK
	92.51	5.42	1.634E+00	1.586E-01	1.586E-01	76.37	OK
	111.03	0.08	1.734E+00	-----	Line Not Found	-----	Absent
	258.18	0.06	1.191E+00	-----	Line Not Found	-----	Absent
	742.82	0.06	5.111E-01	-----	Line Not Found	-----	Absent
	766.41	0.21	4.987E-01	-----	Line Not Found	-----	Absent
	1001.00	0.65*	4.037E-01	-----	Line Not Found	-----	Absent

Final Mean for 2 Valid Peaks = 1.541E-01+/- 1.105E-01 (71.72%)

Flag: "*" = Keyline

Post-NID Peak Search Report
Sample ID : 95-7941-N3 BY- Acquisition date : 20-SEP-1995 21:46:37

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/g
0	63.60	127	0.71	168.50	165	8	34.9		U-238	0.132
0	72.21*	130	1.04	191.46	187	10	54.4			
0	75.09*	131	0.85	199.12	196	8	51.2		TH-228	3.798E-02
0	84.76	202	1.53	224.91	221	9	26.1		TH-228	0.452
0	92.61	338	1.12	245.81	241	11	19.3		U-238	0.159
0	238.44	128	1.26	634.41	630	10	41.4		TH-228	9.623E-03
0	511.22	613	2.00	1361.32	1352	23	8.2			
0	558.54*	93	1.79	1487.40	1482	13	40.3			
0	582.78	85	1.14	1552.01	1545	14	27.3			
0	661.73*	437	1.70	1762.37	1751	23	11.5		CS-137	3.805E-02
0	1461.38	153	1.89	3893.26	3882	20	13.7		K-40	0.201
0	2615.82	67	4.22	6969.58	6956	24	17.7			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/g)
CO-60	89.	1332.50	5.7005E-03
SR-85	380.	514.00	5.5462E-03
RU-103	219.	497.05	4.5906E-03
RU-106	136.	621.92	3.9095E-02
SB-125	271.	427.88	1.3622E-02
CS-134	180.	604.71	4.4148E-03
CE-144	1025.	133.54	3.2509E-02
EU-152	52.	1408.01	2.1910E-02
EU-154	59.	1274.51	1.3036E-02
EU-155	896.	105.31	1.5420E-02
AM-241	577.	59.54	1.4081E-02

Pacific Northwest Laboratory HC-CD-WM-DP-145, REV. 1 0

Gamma-Spectroscopy.....PNL-ALO-450

Customer : Silvers Date Received : 9/20/95 Work order : K28872 ARF(SOW) : _____

A.L.O. No. : 95-7941-N3 Description : _____

Pipet Nos.:

DF --- .11345 → 100 --- 2(.99492) --- --- ---

#14

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst [signature] Date 9/20/95

Counting Information:

Detector: TRACK FOG Y-GeLi G-40% B-40% C-70% D-70% E_LEPS

File: GΦ113

Analyst [signature] Date 9/21/95

2.2575 E-3 g

3-2379

HC-CD-WM-DP-143, REV. 1 BTB 9/21/95

Battelle / Pacific Northwest Laboratories
Analytical Chemistry Laboratory

21-SEP-1995 10:07:12.09
Gamma Energy Analysis (GEA)

Sample Title: 95-7943-N1 BY-108 SILVERS K28872

Config. File: DKA200:[USER.SCUSR.ARCHIVE]SMP_G0114.CNF;1
Analys. File: ND_SC_ASF:SST.asf

Effic. File : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M
Library File: nd_sc_lib:sst-08-27-93.nlb

Backgnd File: DKA200:[USER.SCUSR.ARCHIVE]BKG_G.CNF;7 - 12-SEP-1995 15:43:38

Acquisition time : 21-SEP-1995 07:26:32
Sample (EOI) time: 21-SEP-1995 07:26:32
Elapsed live time: 0 02:40:00.00
Elapsed real time: 0 02:40:30.93 0.3%

Sample quantity: 4.48910E-03 G
Sample geometry: P3-GSV-2ML-W

Peak Search Sens.: 5.00000
Eng. Tol. (FWHM) : 0.75
Errors propagated: Yes
Abundance limit : 70.00

Half life ratio: 8.00
Systematic Erro: 0.00
WTM error limit: 3.00

Analyses by : PEAK V16.5 PEAKEFF V2.2 ENBACK V1.5 NID V3.1
WTMEAN V1.8 MINACT V2.5

Nuclide Line Activity Report

Nuclide Type: fission

Nuclide	Energy	%Abn	%Eff	Uncorrected uCi/G	Decay Corr uCi/G	1-Sigma %Error	Status
CS-137	661.66	85.20*	5.602E-01	5.225E+01	5.225E+01	2.53	OK

Final Mean for 1 Valid Peaks = 5.225E+01+/- 1.320E+00 (2.53%)

Flag: "*" = Keyline

3-2380

Post-NID Peak Search Report
Sample ID : 95-7943-N1 BY- Acquisition date : 21-SEP-1995 07:26:32

It	Energy	Area	FWHM	Channel	Left	Pw	%Err	Fit	Nuclides	Activity uCi/G
0	661.53*	397695	1.77	1761.84	1749	24	0.2		CS-137	52.3
0	1333.80	20	3.87	3553.29	3540	17	45.8			

Minimum Detectable Activity Report

Nuclide	Bckgnd Sum	Energy (keV)	MDA (uCi/G)
K-40	77.	1460.83	8.0762E-02
CO-60	40.	1332.50	5.7567E-03
SR-85	5989.	514.00	3.3188E-02
RU-103	7572.	497.05	4.0666E-02
RU-106	2117.	621.92	2.3270E-01
SB-125	12079.	427.88	1.3710E-01
CS-134	2287.	604.71	2.3747E-02
CE-144	10565.	133.54	1.5739E-01
EU-152	16.	1408.01	1.8489E-02
EU-154	21.	1274.51	1.1683E-02
EU-155	8992.	105.31	7.3692E-02
TH-228	11691.	238.58	5.7254E-02
AM-241	7120.	59.54	7.4596E-02

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

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Gamma-Spectroscopy.....PNL-ALO-450

Customer : Silvers Date Received : 9/20/95 Work order : E28872 ARF(SOW) : _____

A.L.O. No. : 95-2943-N1 Description : _____

Pipet Nos.: #14

DF --- .2256 → 100 --- 2(.99497) --- --- ---

Pipet checks are recorded on labsheets by pipet number

Data Path: _____ Direct to customer _____ Hold for Radioanalytical

Storage Path: _____ Direct to A.L.O.

Analyst TG Burpo Date 9/26/95

Counting Information:

Detector: TRACK FOG Y-GeLi (Y-40%) B-40% C-70% D-70% E_LEPS

A.T. 9/21/95

File: G0114

sample size 4.4891 E-3 g

Analyst T. Thomas Date 9/21/95

3-2382

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WMO-CD-WM-DP-145, REV. 1

D7 - URANIUM ANALYSIS

3-2383

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Sample Number	Prep Batch	*	Analytical Batch	Uranium ug/g	+/- % error
Segment 1					
95-07941-H1T	1	F/smp	1	1.01E+02	14
95-07941-H2T	1	F/dup	1	1.02E+02	14
Mean Difference				0.02	
RPD				1	
95-07941-HCB	1	F/blk	1	3.33E+01	35
		std	1	105%	
		blk	1	< 5. E-02	
Segment 2A					
95-07942-H1	1	F/smp	1	2.20E+01	51
95-07942-H2	1	F/dup	1	3.05E+01	35
Mean Difference				0.27	
RPD				32 x	
95-07942-H3	1	F/blk	1	1.58E+01	67
Segment 2D					
95-07943-H1	1	F/smp	1	1.26E+02	5
95-07943-H2	1	F/dup	1	1.24E+02	5
Mean Difference				0.11	
RPD				2	
95-07943-N1	4	FZ/smp	3	1.35E+02	5
		std	3	105%	
		blk	3	<2.6E-02	
Segment 3A					
95-07944-H1	1	F/smp	2	5.01E+02	24
95-07944-H2	1	F/dup	2	5.35E+02	18
Mean Difference				0.11	
RPD				7	
		std	2	100%	
		blk	2	<5. E-01	
95-07944-N1	4	FZ/smp	4	4.72E+02	17
05-07941-N3	4	FZ/blk	3	1.34E+01	67
		std	4	105%	
		blk	4	<3.3E-01	
Segment 4A					
95-07945-H1	2	F/smp	1	3.23E+04	6
95-07945-H2	2	F/dup	1	3.19E+04	5
Mean Difference				0.08	
RPD				1	
95-07945-H3	2	F/blk	1	2.19E+01	48
Segment 4B					
95-07946-H1T	2	F/smp	2	5.49E+04	21
95-07946-H2T	2	F/dup	2	4:86E+04	24
Mean Difference				0.19	
RPD				12 x	
95-07946-HCB	2	F/blk	1	<1.1E+01	
Segment 4C					
95-07947-H1	2	F/smp	5	4.67E+04	21
95-07947-H2	2	F/dup	5	4.82E+04	16
Mean Difference				0.06	
RPD				3	
		std		103%	
		blk		<3. E-01	
Segment 4D					
95-07948-H1	2	F/smp	2	4.58E+04	26
95-07948-H2	2	F/dup	1	5.04E+04	5
Mean Difference				0.19	
RPD				10	

NOTE: If the mean difference result is greater than or equal to 1.96, there is 95% confidence that the two results are not equal.

* smp = sample, dup = duplicate, blk = methods blank, std = standard
F = KOH - KNO3 Fusion in Ni crucible, FZ = Na2O2 - NaOH Fusion in Zr crucible, A = Acid Digestion
x = RPD value is greater than 10%.

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WSRC-RD-WM-DP-145, REV. 1

KOH FUSION SEGMENT AND QUARTER SEGMENT URANIUM ANALYSIS

3-2385

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DATE TO QC: 09/22/95 PNL-CD-WM-DP-145, REV. 1

DATA QUALITY REVIEW

I have reviewed the following data for completeness and for compliance with project requirements.

Analyte - Uranium - KOH Fusion

Data Package/Report - BY-108 Core 99

Project No. - 21372

ACL Numbers -

95-07941-H1T	95-07941-H2T	95-07941-HCB
95-07942-H1	95-07942-H2	95-07942-H3
95-07944-H1	95-07944-H2	
95-07945-H1	95-07945-H2	95-07945-H3
95-07946-H1T	95-07946-H2T	95-07946-HCB
95-07947-H1	95-07947-H2	
95-07948-H1	95-07948-H2	

PNL ACL Quality Representative

9/22/95
Date

Analysis performed on 9/29/95 was QC reviewed on 9/29/95 by

3-2386

WHC-CP-WIM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. STD-2388 Description : .10181 ug U/ml

DF .... .01976

Dilution Factor = 5.0607E+01 +/- 2.00%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.18500	U-236 (Mass f)	.00000000
Reading 2	.36000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	1.07E-04	13.	5.96E-06

105%

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L A Greenwood Date 9/20/95

3-2387

HO-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : C28875 ARF(SOW) : ASR 2388

A.L.O. No. : STD-2388 Description : W-97-4 .10181 ug U/ml
BNW 54342 p N3

Pipet Nos.: #3

DF --- 01976 --- --- --- --- --- ---
ml

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.1014 ug/mL		
Vol. of Working Std.	01976	U-234 (Mass %)	
Reading 1	.18 .19	U-235 (Mass %)	
Reading 2	.36 .36	U-236 (Mass %)	
		U-238 (Mass %)	

Analyst [signature] Date 9/19/95

Samples: 95-7941-H1T, H2T, HCB;
95-7942-H1, H2, H3;
95-7943-H1, H2;
95-7945-H1, H2, H3;
95-7946-HCB;
95-7948-H2;
BLK-L.

3-2388

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. BLK-2388 Description :

DF ---- 5.00000

Dilution Factor = 2.0000E-01 +/- 1.00%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.00000	U-236 (Mass f)	.00000000
Reading 2	.18000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	0.00E+00	101.	5.01E-08 ✓

Conversion to Avg. Wt.

$X \frac{100 ml}{.1666 g} = 5E-5 \frac{mg}{g}$

$\bar{X}_{11}$

JRS 9-20-95

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2389

Pacific Northwest Laboratory WHC-CD-WM-DP-145, REV. 1 95241-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28875 ARF(SOW) : ASR 2388

A.L.O. No. : BLK-2388 - L Description : DiH_2O

Pipet Nos.:

DF --- 5ml --- --- --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser			Mass Spec.
Working Std. Conc.	.1014 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	01976		U-235 (Mass %)	
Reading 1	.00	.00	U-236 (Mass %)	
Reading 2	.18	.18	U-238 (Mass %)	

Kup 9/19/95

Analyst [signature] Date 9/19/95

3-2390

PNL-ALO-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7941-H1T Description : CORE 99 TANK BY-108

DF .... .10050 ---> 100.00000 .... .01976

Dilution Factor = 5.0356E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.17000	U-236 (Mass f)	.00000000
Reading 2	.34000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.01E-01 ✓	14.	6.31E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by LA Greenwood Date 9/20/95

3-2391

TIC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95241 -L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-H1T Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.1005 ⇒ 100 --- 01976 --- --- --- ---

#3

TTE 9/20/95

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	#1014 ug/mL		
Vol. of Working Std.	01976		U-234 (Mass %)
Reading 1	.18	.14	U-235 (Mass %)
Reading 2	.34	.34	U-236 (Mass %)
			U-238 (Mass %)

Analyst [signature] Date 9/19/95

3-2392

HO-CD-WM-DP-145, REV 1

Pacific Northwest Laboratory 95226

Uranium Laser.....PNL-ALO-445

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7941-H2T Description : C99, BY108

DF .... .10260 ---> 100.00000 .... .01976

Dilution Factor = 4.9325E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.	
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000	
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000	
Reading 1	.17000	U-236 (Mass f)	.00000000	
Reading 2	.33500	U-238 (Mass f)	.00000000	

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.02E-01	14.	6.27E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2393

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95241 -L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-H2T Description : CORF 99 TANK BY-108

Pipet Nos.: #3

DF ....1026 g → 100 ml ... 01976 ml --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95041-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.1014 ug/mL		
Vol. of Working Std.	01976		U-234 (Mass %)
Reading 1	.16	.18	U-235 (Mass %)
Reading 2	.33	.34	U-236 (Mass %)
			U-238 (Mass %)

Analyst [illegible] Date 9/19/95

3-2394

TWC-03-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95226

Uranium Laser.....PNL-ALO-445

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7941-HCB Description : C99.BY108

DF .... .10155 ---> 100.00000 .... .01976

Dilution Factor = 4.9835E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.06000	U-236 (Mass f)	.00000000
Reading 2	.24000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	3.33E-02	35.	9.08E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2395

HC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241 -L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K.28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7941-HCB Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF ---.10155 → 100 --- 01976 --- --- --- ---

9 ml ml

Avg x 2

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.1014 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.06	U-236 (Mass %)	
Reading 2	.24	U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2396

ALO-CD-WM DP 145 REV 1

Pacific Northwest Laboratory 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H1 Description : CORE 99 TANK BY-108

DF .... .11520 ---> 100.00000 .... .01976

Dilution Factor = 4.3930E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.04000	U-236 (Mass f)	.00000000
Reading 2	.20000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	2.20E-02	51.	9.78E-03

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by J R Greenwood Date 9/20/95

3-2397

PNL-ALO-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241 - L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 138875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-M1 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- .1152 g → 100 mL --- 01976 mL --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std LW ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.1014 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.04	U-236 (Mass %)	
Reading 2	.20	U-238 (Mass %)	

Analyst Ya Poppl Date 9/19/95

3-2398

HC-CD-WM-DP (45, REV 1

Pacific Northwest Laboratory 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H2 Description : CORE 99 TANK BY-108

DF ---- .11090 ---> 100.00000 ---- .01976

Dilution Factor = 4.5633E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.06000	U-236 (Mass f)	.00000000
Reading 2	.24000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	3.05E-02	35.	8.31E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2399

PNO-CD-WM-DP- (45, REV.)

Pacific Northwest Laboratory 95241 -L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H2 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- .1109 g → 100 ml --- 01976 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	.1014 ug/mL
Vol. of Working Std.	01976
Reading 1	.06
Reading 2	.24

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2400

Pacific Northwest Laboratory HO-CD-WM-DP-145, REV. 1 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7942-H3 Description : CORE 99 TANK BY-108

DF .... .11305 ---> 100.00000 .... .01976

Dilution Factor = 4.4765E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.03000	U-236 (Mass f)	.00000000
Reading 2	.20000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.58E-02 ✓	67.	9.97E-03

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2401

Pacific Northwest Laboratory WHC-CD-WM-DP-145, REV. 1 95241-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7942-H3 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- 11305 --> 100 --- 01976 --- --- --- ---

S ml ml

AVG x̄ 2

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	1014 ug/mL
Vol. of Working Std.	01976
Reading 1	.03
Reading 2	.20

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2402

Pacific Northwest Laboratory WHO-CD-WM-DP-145, REV. 1 95249

Uranium Laser.....PNL-ALO-445

Customer : Silvers Date Received 0/ 0/ 0 Work order : ..... ARF(SOW) : .....

A.L.O. No. 95-7943-H1 Description : .....

DF .... .33620 ---> 100.00000 ---- .01976

Dilution Factor = 1.5053E+04 +/- 2.07%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.71000	U-236 (Mass f)	.00000000
Reading 2	.88000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.26E-01 ✓	5.	7.01E-04

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by LRGreenwood Date 9/20/95

3-2403

Pacific Northwest Laboratory HAO-CD-WM-DP-145, REV. 1 95241-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order 428875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF .3362 g → 100 ml --- .01974 ml --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	.1014 ug/mL
Vol. of Working Std.	.01974
Reading 1	.71
Reading 2	.88

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2404

HC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7943-H2 Description : CORE 99 TANK BY-108

DF .... .32630 ---> 100.00000 .... .01976

Dilution Factor = 1.5509E+04 +/- 2.07%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
Vol. of Working Std.	.01976	U-234 (Mass f)	.00000000
Reading 1	.64000	U-235 (Mass f)	.00000000
Reading 2	.80000	U-236 (Mass f)	.00000000
		U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.24E-01 ✓	5.	7.97E-04

Data Entry by T Trang-lo Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2405

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95241-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7943-M2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF --- 3263 → 100 --- #3 01976 --- --- --- ---

g mL µL

Pipet checks are recorded on labsheets by pipet number

Working Std LW ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	.1014 ug/mL
Vol. of Working Std.	.01976
Reading 1	.64
Reading 2	.80

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst H. Pugsley Date 9/19/95

3-2406

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H1 Description : CORE 99 TANK BY-108

DF .... .10770 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 4.7254E+06 +/- 2.65%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.58000	U-236 (Mass f)	.00000000
Reading 2	.75000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	3.23E+01 ✓	6.	2.59E-01

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L P Greenwood Date 9/20/95

3-2407

WHC-CD-WM-DP-145, REV. 1.

Pacific Northwest Laboratory

95240-L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-M1 Description : CORE 99 TANK BY-108

Pipet Nos.: #8 10ml #3

DF --- .1077 g → 100 ml --- .09944 mg → 10ml flask — 01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	.1014 ug/mL
Vol. of Working Std.	01976
Reading 1	.58
Reading 2	.75

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst K G Popp Date 9/19/95

3-2408

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H2 Description : CORE 99 TANK BY-108

DF .... .11720 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 4.3423E+06 +/- 2.65%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.66000	U-236 (Mass f)	.00000000
Reading 2	.84000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	3.19E+01 ✓	5.	2.12E-01

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2409

PNL-CD-WM DF- 145, REV. 1

Pacific Northwest Laboratory

95240 - L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order 298875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-M2 Description : CORE 99 TANK BY-108

Pipet Nos.: #8 #3

DF --- .1172 g → 100 ml --- .09944 ml → 10 ml Vol Flask --- .01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser
Working Std. Conc.	.1014 ug/ml
Vol. of Working Std.	.01976
Reading 1	.66
Reading 2	.84

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2410

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7945-H3 Description : CORE 99 TANK BY-108

DF .... .11245 ---> 100.00000 .... .01976

Dilution Factor = 4.5004E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.04300	U-236 (Mass f)	.00000000
Reading 2	.22000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	2.19E-02	48.	9.02E-03

Data Entry by I Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by T R Greenwood Date 9/20/95

3-2411

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240 -2

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : E28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7945-M3 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- .11245 S AVG x2 → 100 ml --- 01974 ml --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Kuw ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser			Mass Spec.
Working Std. Conc.	.1014 ug/mL			
Vol. of Working Std.	01974		U-234 (Mass %)	
Reading 1	.045	.04	U-235 (Mass %)	
Reading 2	.22	.22	U-236 (Mass %)	
			U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2412

PNO-CD-WIM-DP-145, REV 1

Pacific Northwest Laboratory 95226

Uranium Laser.....PNL-ALO-445

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7946-HCB Description : C99, BY-108

DF .... .09970 ---> 100.00000 .... .01976

Dilution Factor = 5.0760E+04 +/- 2.24%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.02000	U-236 (Mass f)	.00000000
Reading 2	.20000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	1.13E-02	101.	1.13E-02

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

JRS 9-22-95

3-2413

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240 - L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-HCB Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- .10997 → 100 --- 01976 --- --- --- ---

Avg ×2 ml ml

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.104 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.02	U-236 (Mass %)	
Reading 2	.20	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2414

Pacific Northwest Laboratory HNO-CD-WM-DP-145, REV. 1 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7948-H2 Description : CORE 99 TANK BY-108

DF .... .08760 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 5.8096E+06 +/- 2.65%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	.10140 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.78000	U-236 (Mass f)	.00000000
Reading 2	.96000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	5.04E+01	5.	2.48E-01

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L A Sheenwood Date 9/20/95

3-2415

WHC-CS-WM-DF-145, REV. 1

Pacific Northwest Laboratory

95240 - L

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : L98875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7948-H2 Description : CORE 99 TANK BY-108

Pipet Nos.: #8 10ml #3

DF --- .0876 g → 100 ml --- .09944 ml → Vol flask --- 01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Low ACL-0029 Page(s) No. 2

Standard card ID 95241-L Blank card ID 95241-L

Equipment	U Laser		Mass Spec.
Working Std. Conc.	.1014 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.78	U-236 (Mass %)	
Reading 2	.96	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2416

WHC-SD-WM-DP-145, Rev. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. STD-2388 Description : 1.00680 ug/U/ml

DF .... .01976

Dilution Factor = 5.0607E+01 +/- 2.00%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.16500	U-236 (Mass f)	.00000000
Reading 2	.33000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	1.01E-03	14.	6.53E-05

100%

Data Entry by T Trangle Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2417

PNL-ALO-WM-DP-145, Rev. 1

Pacific Northwest Laboratory 95240 - M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order 238875 ARF(SOW) : ASR 2388

A.L.O. No. : STD-2388 Description : W-96-S 1.00680 ug/U/ml
BNW 54342 p 42

Pipet Nos.: #3

DF --- 01974 --- --- --- --- --- ---
ml

Pipet checks are recorded on labsheets by pipet number

Working Std Mod ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser			Mass Spec.
Working Std. Conc.	1012 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	01974		U-235 (Mass %)	
Reading 1	.16	.17	U-236 (Mass %)	
Reading 2	.33	.33	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

Samples: 95-7944-M1, M2;
95-7946-M1T, M2T;
95-7947-M1, M2;
95-7948-M1;
BLK-M.

3-2418

[illegible]-DP 145, REV. 1

Pacific Northwest Laboratory 95155

Uranium Laser.....PNL-ALO-445

Silver TTL 9/20/95

Customer : ~~C. CALL~~ Date Received 5/ 23/ 95 Work order : K32764 ARF(SOW) : ASR 2043

A.L.O. No. BLK Description : PREP BLANK

DF ---- 5.00000

Dilution Factor = 2.0000E-01 +/- .50%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.00000	U-236 (Mass f)	.00000000
Reading 2	.16500	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	0.00E+00	101.	5.52E-07 ✓

Average conversion to mass

$\times \frac{100\ ml}{.1164\ g} = < 5E-4\ \frac{mg}{g}$

$\bar{x}_7$

JRJ 9-20-95

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by J R Greenwood Date 9/20/95

3-2419

PNL-CO-WM-DP 145, REV 1

Pacific Northwest Laboratory

0

95240-M

Uranium Laser.....PNL-ALO-445

Customer : Silvers Date Received : 9/12/95 Work order K21875 ARF(SOW) : 0388

A.L.O. No. : BLK-M Description : DiH_2O

Pipet Nos.:

DF --- 5ml --- --- --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser			Mass Spec.
Working Std. Conc.	1.012 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	01976		U-235 (Mass %)	
Reading 1	.00	.00	U-236 (Mass %)	
Reading 2	.16	.17	U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2420

WMCO-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7944-H1 Description : CORE 99 TANK BY-108

DF .... .12120 ---> 100.00000 .... .01976

Dilution Factor = 4.1755E+04 +/- 2.07%

Instrument	U Laser		Mass Spec.	
Working Std. Conc.	1.01200 ug/ml	U-234 (Mass f)	.00000000	
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000	
Reading 1	.09000	U-236 (Mass f)	.00000000	
Reading 2	.24000	U-238 (Mass f)	.00000000	

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	5.01E-01 ✓	24.	7.59E-02

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2421

HC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241-M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order K28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #3

DF --- .1212 → 100 --- 01976 --- --- ---

g ml ml

Pipet checks are recorded on labsheets by pipet number

Working Std Mod ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser			Mass Spec.
Working Std. Conc.	1.012 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	.01976		U-235 (Mass %)	
Reading 1	.09	.085	U-236 (Mass %)	
Reading 2	.245	.24	U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2422

...HC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95241

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7944-H2 Description : CORE 99 TANK BY-108

DF .... .14200 ---> 100.00000 .... .01976

Dilution Factor = 3.5639E+04 +/- 2.07%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
Vol. of Working Std.	.01976	U-234 (Mass f)	.00000000
Reading 1	.12000	U-235 (Mass f)	.00000000
Reading 2	.28000	U-236 (Mass f)	.00000000
		U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	5.35E-01 ✓	18.	5.48E-02

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2423

TQ-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95241-M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : K38815 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7944-H2 Description : CORE 99 TANK BY-108

Pipet Nos.: 43

DF --- .1420 g → 100 ml --- 01976 ml --- --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Mod ACL-0029 Page(s) No. 8

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1.012 ug/ml	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.12	U-236 (Mass %)	
Reading 2	.28	U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2424

MO-03-WM-DP-245, REV. 1

Pacific Northwest Laboratory

95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7946-H1T Description : CORE 99 TANK BY-108

DF ---- .10020 ---> 100.00000 ---- .09944 ---> 10.00000 ---- .01976

Dilution Factor = 5.0791E+06 +/- 2.51%

Instrument	U Laser
Working Std. Conc.	1.01200 ug/ml
Vol. of Working Std.	.01976
Reading 1	.10000
Reading 2	.28500

Mass Spec.	
U-234 (Mass f)	.00000000
U-235 (Mass f)	.00000000
U-236 (Mass f)	.00000000
U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	5.49E+01	21.	7.67E+00

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2425

PNL-OD-WM-DP-145, REV 1

Pacific Northwest Laboratory 95240-M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 428825 ARF(SOW) : ASR 2388

A.L.D. No. : 95-7946-H1T Description : CORE 99 TANK BY-108

Pipet Nos.: #8 10 ml #3

DF --- .1002 g → 100 ml --- .09944 ml → 10 ml Volf Flask --- .01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1.012 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	.01976	U-235 (Mass %)	
Reading 1	.10	U-236 (Mass %)	
Reading 2	.285	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2426

PNL-CD-WM-DP-145, Rev. 1

Pacific Northwest Laboratory 95226

Uranium Laser.....PNL-ALO-445

Customer : SST Date Received 9/ 1/ 95 Work order : K28872 ARF(SOW) : TI95-TWC-02

A.L.O. No. 95-7946-H2T Description : C99, BY-108

DF .... .09920 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 5.1303E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.09000	U-236 (Mass f)	.00000000
Reading 2	.28000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	4.86E+01	24.	7.89E+00

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2427

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240 -M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7946-H2T Description : CORE 99 TANK BY-108

Pipet Nos.: #8 10ml #3

DF --- .0992 g → 100 ml --- .09944 → 10ml Vol Flask --- 01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1012 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.09	U-236 (Mass %)	
Reading 2	.28	U-238 (Mass %)	

Analyst K A Poppel Date 9/19/95

3-2428

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H1 Description : CORE 99 TANK BY-108

DF ---- .10890 ---> 100.00000 ---- .09944 ---> 10.00000 ---- .01976

Dilution Factor = 4.6733E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.10000	U-236 (Mass f)	.00000000
Reading 2	.29700	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

Rerun

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	4.74E+01	21.	6.75E+00

Data Entry by L Gheewood Date 9/29/95

Calculation and Analytical Data Sheet Reviewed by T Trang-le Date 9/29/95

3-2429

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

9

Uranium Laser.....PNL-ALO-445

Customer : Silvers Date Received : 09/ 12/ 95 Work order : K28875 ARF(SOW) : ASR2388

A.L.O. No. : 95-7947-H1 Description : Core 99 Tank BY-108

Pipet Nos.: #8 10ml #3

DF ---.1089 → 100 ml --- .09944 → Vol Flask — .01976 ml ---

2

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID _____ Blank card ID _____

Equipment	U Laser			Mass Spec.
Working Std. Conc.	1.012 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	.01976		U-235 (Mass %)	
Reading 1	.10	.10	U-236 (Mass %)	
Reading 2	.30	.295	U-238 (Mass %)	

Analyst [signature] Date 9/29/30

3- 2430

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H2 Description : CORE 99 TANK BY-108

DF ---- .14450 ---> 100.00000 ---- .09944 ---> 10.00000 ---- .01976

Dilution Factor = 3.5220E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.13700	U-236 (Mass f)	.00000000
Reading 2	.33700	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Rerun

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	4.82E+01	16.	4.44E+00

Data Entry by J R Henwood Date 9/29/95

Calculation and Analytical Data Sheet Reviewed by T Trang-Le Date 9/29/95

3-2431

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

Uranium Laser.....PNL-ALO-445

Customer : Silvers Date Received : 9/12/95 Work order : K28875 ARF(SOW) : 2388

A.L.D. No. : 95-7947-H2 Description :

Pipet Nos.:

DF ---.1445 g → 100 ml --.09944 ml (#8) → 10 ml Vol Flask --- .01976 ml (#3) --- ---

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID _____ Blank card ID _____

Equipment	U Laser			Mass Spec.
Working Std. Conc.	1012 ug/mL		U-234 (Mass %)	
Vol. of Working Std.	01976		U-235 (Mass %)	
Reading 1	.14	.135	U-236 (Mass %)	
Reading 2	.34	.335	U-238 (Mass %)	

Analyst [signature] Date 9/29/95

WHO-CD-WM DF- 145 R 1

Pacific Northwest Laboratory 95189

Uranium Laser.....PNL-ALO-445

Customer : ~~EBY~~ Silvers * Date Received ~~7/20/95~~ * Work order : ~~ED5270~~ * ARF(SOW) : ~~ASR-2261~~ * JRG 9-29-9

A.L.O. No. STD Description : 1.00680 ug U/ml

DF ---- .01976

Dilution Factor = 5.0607E+01 +/- 2.00%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
Vol. of Working Std.	.01976	U-234 (Mass f)	.00000000
Reading 1	.19700	U-235 (Mass f)	.00000000
Reading 2	.38800	U-236 (Mass f)	.00000000
		U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	1.04E-03	12.	5.50E-05

103.3%

Data Entry by J R Greenwood Date 9-29-95

Calculation and Analytical Data Sheet Reviewed by T Trang-le Date 9/29/95

3-2433

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

Uranium Laser.....PNL-ALO-445

STANDARD C

Standard ID: D-96-5 LRB BNW: 54342 p42 Standard Conc.: 100680 ug/ml Work Order: K28875

Pipet Nos.: #3

DF --- 01976 ml --- --- --- --- --- ---

Pipet checks are recorded on labsheets by pipet number

Samples Run With This Standard: 93- 95-7947-A1; 95-7947-A2; BLK

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1.013 ug/mL		
Vol. of Working Std.	01976		U-234 (Mass %)
Reading 1	.20	.195	U-235 (Mass %)
Reading 2	.395	.38	U-236 (Mass %)
			U-238 (Mass %)

Analyst [signature] Date 9/29/95

Recovery: _____

Historical average recovery of _____ used for calculation of samples run with this standard.

3-2434

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 93206

Uranium Laser.....PNL-ALO-445

Customer : Silvers Date Received 0/ 0/ 0 Work order : ARF(SOW) :

A.L.O. No. Blank Description : BY-108

DF ---- 5.00000

Dilution Factor = 2.0000E-01 +/- .50%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.00000	U-236 (Mass f)	.00000000
Reading 2	.20000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/ml	Uncertainties %	Less than mg/ml
Total uranium	0.00E+00	101.	4.44E-07

Mass Conversion

$\times \frac{100\,ml}{.1267\,g} = 3.50E-4\ \frac{mg}{g}$

Data Entry by L R Greenwood Date 9/29/95

Calculation and Analytical Data Sheet Reviewed by T Trang-le Date 9/29/95

3-2435

*	95.7947-H1	R_1	20 λ	.10	.10
		R_2	20 λm	.30	.295
	.1089 g → 100 ml - .09944 ml (#8) → 10 ml Vol Flask - .01976 ml (#3)				
*	95.7947-H2	R_1	20 λ	.14	.135
		R_2	20 λm	.34	.335
	.1445 g → 100 ml - .09944 ml (#8) → 10 ml Vol Flask - .01976 ml (#3)				
	W-96-5 1.00680 ug U/ml BNW 54342 p 42		20 λ	.195	.20
			20 λm	.38	.395
	Blank 5 ml DiH2O - 20 λm			.00	.00
				.20	.20

Ta Poeppel
9/29/95

Reviewed
YR Greenwood
9/29/95

HNF-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H1 Description : CORE 99 TANK BY-108

DF .... .10890 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 4.6733E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml	U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.14500	U-236 (Mass f)	.00000000
Reading 2	.33500	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	7.13E+01 ✓	15.	5.93E+00

Data Entry by T Trang-le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2437

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95240 - M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 128875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-H1 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ---.1089 g → 100 ml --- #8 .09944 ml → 10 ml Vol Flask --- #3 01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Mid ACL-D029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1.012 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.143	U-236 (Mass %)	
Reading 2	.335	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2438

WHC-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7947-H2 Description : CORE 99 TANK BY-108

DF .... .14450 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 3.5220E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.11500	U-236 (Mass f)	.00000000
Reading 2	.30000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	4.38E+01	19.	5.03E+00

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2439

WHC-SD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95240 - M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : C28875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7947-M2 Description : CORE 99 TANK BY-108

Pipet Nos.:

DF ... .1445 g → 100 ml ... #8 .09944 ml → 10 ml Vol flask ... #3 01976 ml ...

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser
Working Std. Conc.	1012 ug/mL
Vol. of Working Std.	01976
Reading 1	.115
Reading 2	.30

	Mass Spec.
U-234 (Mass %)	
U-235 (Mass %)	
U-236 (Mass %)	
U-238 (Mass %)	

Analyst [signature] Date 9/19/95

3-2440

HNF-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory 95240

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received 9/ 12/ 95 Work order : ARF(SOW) : ASR 2388

A.L.O. No. 95-7948-H1 Description : CORE 99 TANK BY-108

DF .... .09880 ---> 100.00000 .... .09944 ---> 10.00000 .... .01976

Dilution Factor = 5.1510E+06 +/- 2.51%

Instrument	U Laser		Mass Spec.
Working Std. Conc.	1.01200 ug/ml		
		U-234 (Mass f)	.00000000
Vol. of Working Std.	.01976	U-235 (Mass f)	.00000000
Reading 1	.08000	U-236 (Mass f)	.00000000
Reading 2	.26000	U-238 (Mass f)	.00000000

* No Uranium Mass Spectroscopy Analysis Performed

Calculation and Results

	Concentration mg/g	Uncertainties %	Less than mg/g
Total uranium	4.58E+01	26.	8.58E+00

Data Entry by T Trang-Le Date 9/20/95

Calculation and Analytical Data Sheet Reviewed by L R Greenwood Date 9/20/95

3-2441

PNL-CD-WM-DP-145, REV. 1

Pacific Northwest Laboratory

95240-M

Uranium Laser.....PNL-ALO-445

Customer : SILVERS Date Received : 09/ 12/ 95 Work order : 298875 ARF(SOW) : ASR 2388

A.L.O. No. : 95-7948-H1 Description : CORE 99 TANK BY-108

Pipet Nos.: #8 10 ml #3

DF --- .0988 g → 100 ml --- .09944 → Volu flask --- 01976 ml ---

Pipet checks are recorded on labsheets by pipet number

Working Std Med ACL-0029 Page(s) No. 2

Standard card ID 95240-M Blank card ID 95240-M

Equipment	U Laser		Mass Spec.
Working Std. Conc.	1.012 ug/mL	U-234 (Mass %)	
Vol. of Working Std.	01976	U-235 (Mass %)	
Reading 1	.08	U-236 (Mass %)	
Reading 2	.26	U-238 (Mass %)	

Analyst [illegible] Date 9/19/95

3-2442

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WHC-CD-WM-DP-145, REV. 1

FOR Na2O2 FUSION SEGMENT AND QUARTER SEGMENT URANIUM ANALYSIS, SEE SECTION D4

3-2443

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WMS-CD-WM-DP-145 REV 1

D8 - RADIOCHEMISTRY CALIBRATION AND CONTROL CHART DOCUMENTATION

3-2444

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THS-SD-WM-DP-145, REV. 1

GENERAL ELECTRIC ALPHA SCINTILLATION COUNTER USED FOR TOTAL ALPHA, Pu

3-2445

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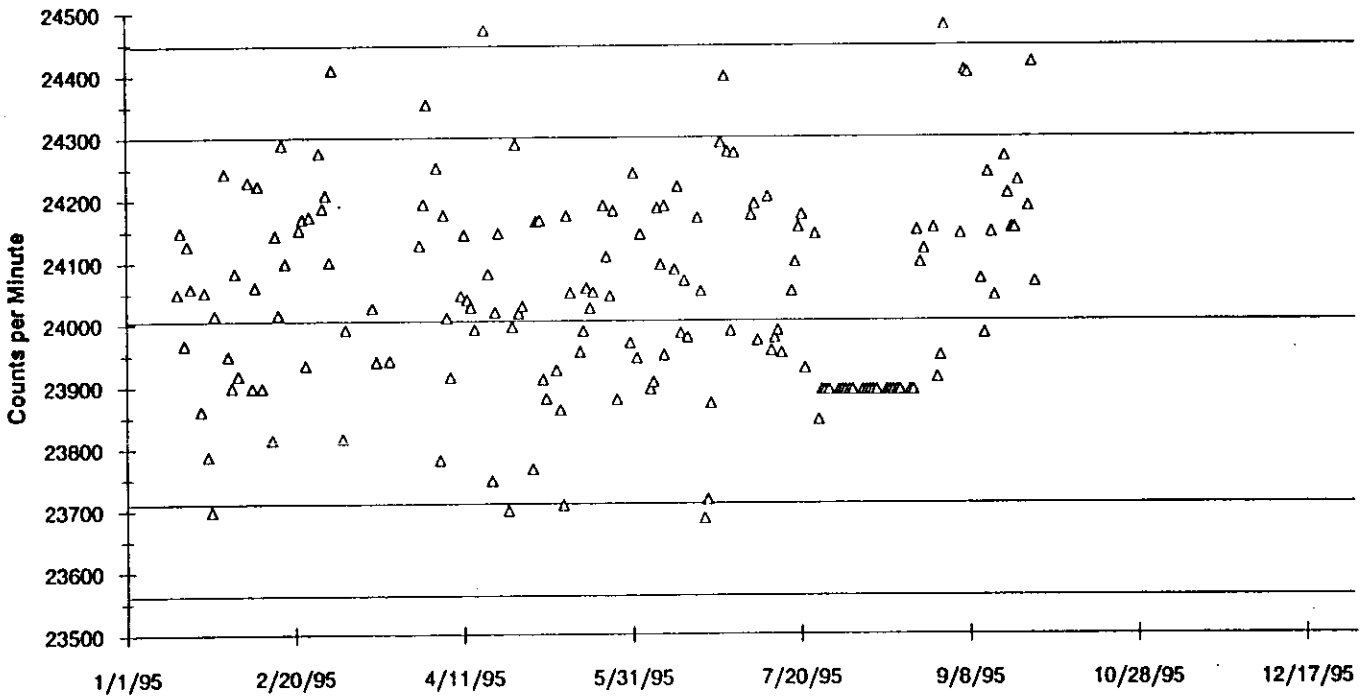
G.E. A.S.C. Control Chart



L R Leonard
9-29-95

G.E. Alpha Scintillation Counter

(G.E. A.S.C.)

High Voltage = 150

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m } HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{24}$ = 1264.342 ± 11.482 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1264.342 ± 11.482 c/m = d/c

2.627849 ± 0.031026 = 0.38054 ~~d/c~~ c/d ± 1.18%

MK 3/29/93

Reviewed L R Greenwood date 2/22/93

3-2447

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY Anne E Hazelwood

REMARKS G.E. A.S.C. Calibration Counts HV = 150
T-1350

SAMPLE NUMBER	DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90 1	2/12		10	+	12588	1258.8		0.295	1258.505		
2				+	12589	1258.9			1258.605		
3				+	12714	1271.4			1271.105		
4				+	12841	1284.1			1283.805		
				+							
24.92 1				+	12769	1276.9			1276.605		
2				+	12791	1279.1			1278.805		
3				+	12488	1248.8			1248.505		
4				+	12641	1264.1			1263.805		
				+							
				+							
				+							
				+							
				+							
				+							
24.90 1	2/16			+	12491	1249.1		0.304	1248.796		
2				+	12881	1288.1			1287.796		0.62, 2.45
3				+	12687	1268.7			1268.396		
4				+	12769	1276.9			1276.596		
				+							
24.92 1				+	12688	1268.8			1268.496		
2				+	12537	1253.7			1253.396		
3				+	12588	1258.8			1255.496		
4				+	12612	1261.2			1260.896		
				+							

1700—132 (5—66) AEC-RL RICHLAND, WASH

3-2448

BNW 52825

HNCC-AMA-DP-145 REV 1

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS G.E. A.S.C. Calibration Counts HV-150
T-1350

SAMPLE NUMBER		DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF 1	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90	1	2/17		10	+	12523	1252.3		0.312	1252.988		
	2				+	12601	1260.1			1259.788		
	3				+	12683	1268.3			1269.988		
	4				+	12745	1274.5			1274.188		
					+							
24.92	1				+	12590	1259.0			1258.688		
	2				+	12596	1259.6			1259.288		
	3				+	12667	1266.7			1266.388		
	4				+	12436	1243.6			1243.288		
					+							
					+							
					+							
					+							
					+							
					+							
					+							
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					+							
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					+							
					+							
					+							

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BNW 52825

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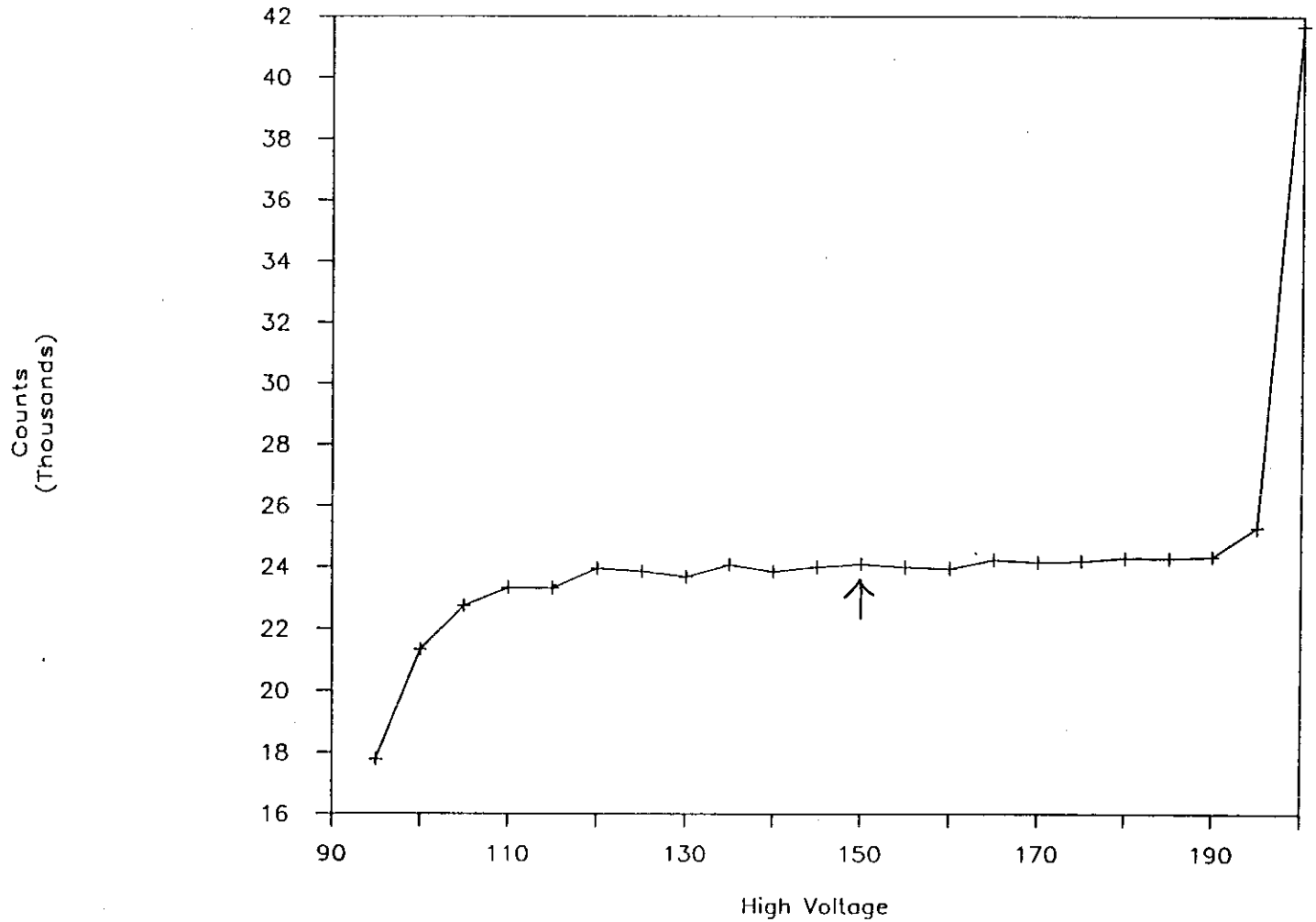
WHC-SD-WM-DP-145, REV. 1

1700-132 (5-66) AEC RI RICHLAND WASH

G.E. A.S.C. HV Plateau



BNW
52825
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[illegible]-SD-WM-DP-145, REV. 1

BNW
52825
p. 62, 5 of 5

G.E. A.S.C. Calibration Counts

High Voltage = 150 (W400822)

Analyst Anne E Kozelisky 2/12/93

HV	Counts
95	17788
100	21336
105	22752
110	23335
115	23316
120	23963
125	23854
130	23667
135	24069
140	23860
145	24003
150	24102
155	24000
160	23962
165	24236
170	24158
175	24193
180	24299
185	24290
190	24343
195	25289
200	41677

3-2451

WMG-SD-WM-DP-145, REV. 1

LUDLUM ZnS ALPHA SCINTILLATION COUNTERS USED FOR TOTAL ALPHA AND Pu LUDLUM 1 THROUGH 10

3-2452

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WHO-CD-WM-DP-145, REV 2

LUDLUM 1
NOTE: RAW CONTROL CHART DATA FOR ALL LUDLUM DETECTORS IS ATTACHED TO LUDLUM 1

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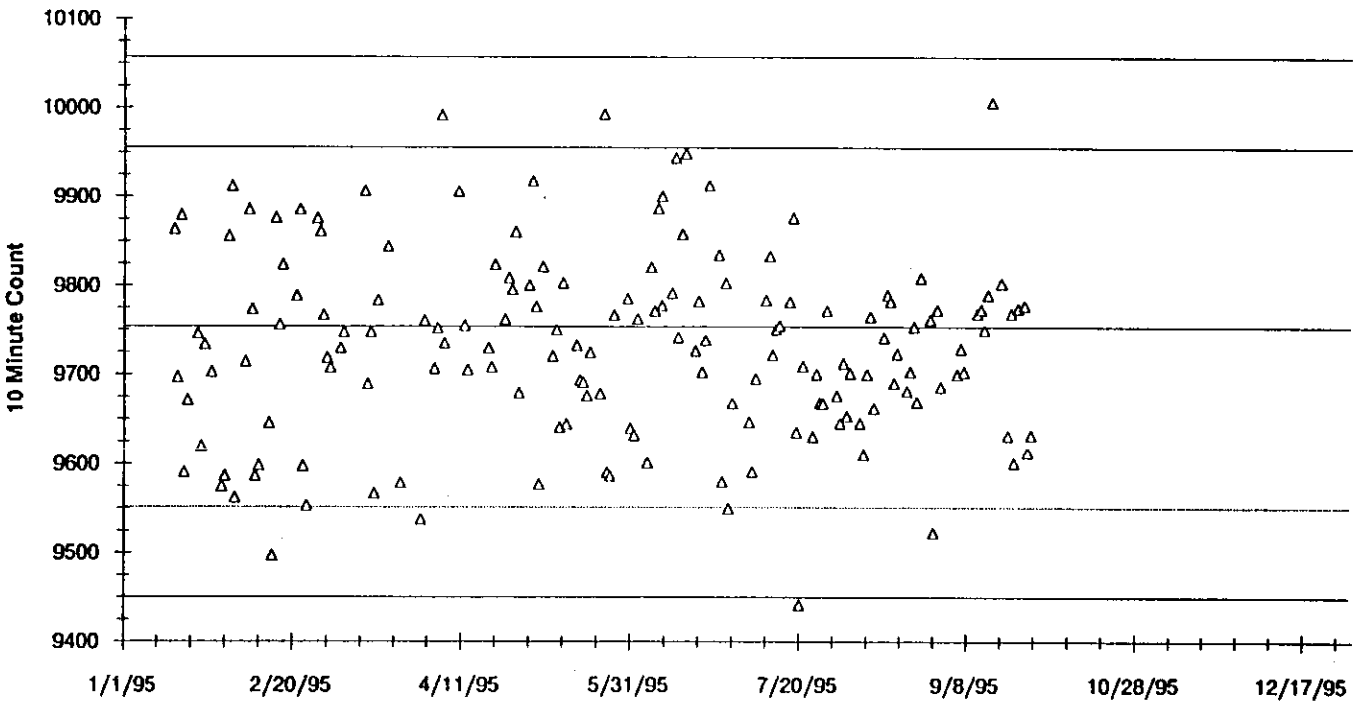
Ludlum-1 Control Chart



3-2454

LRGreenwood
9-29-95

Ludlum-1 WB76863

High Voltage 2.30

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m } HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{16}$ = 1404.407 ± 17.8045 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1404.407 ± 17.8045 c/m = d/c

2.365767 ± 0.034902 = 0.4227 ~~d/c~~ c/d ± 1.48%

Reviewed L R Greenwood date 2/19/93

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY Anne E. Kozelisky

REMARKS Ludlum-1 Calibration Counts HV = 2.30 (WB76863)
T-1350

SAMPLE NUMBER		DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90	1	2/12	L-1	10	+	14160	1416.0		0.173	1415.827		
	2				+	14047	1404.7			1404.527		
	3				+	13860	1386.0			1385.827		
	4				+	14282	1428.2			1428.027		
					+							
24.92	1				+	14205	1420.5			1420.327		
	2				+	13945	1394.5			1394.327		
	3				+	13922	1392.2			1392.027		
	4				+	13998	1399.8			1399.627		
					+							
					+							
					+							
					+							
					+							
					+							
24.90	1	2/17			+	14129	1412.9		0.138	1412.762		
	2				+	13809	1380.9			1380.762		
	3				+	13976	1397.6			1397.462		
	4				+	14320	1432.0			1431.862		
					+							
24.92	1				+	14371	1437.1			1436.962		
	2				+	13828	1382.8			1382.662		
	3				+	13937	1393.7			1393.562		
	4				+	13941	1394.1			1393.962		
					+							

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WHC-CD-WM-DP-145, REV. 1

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54273
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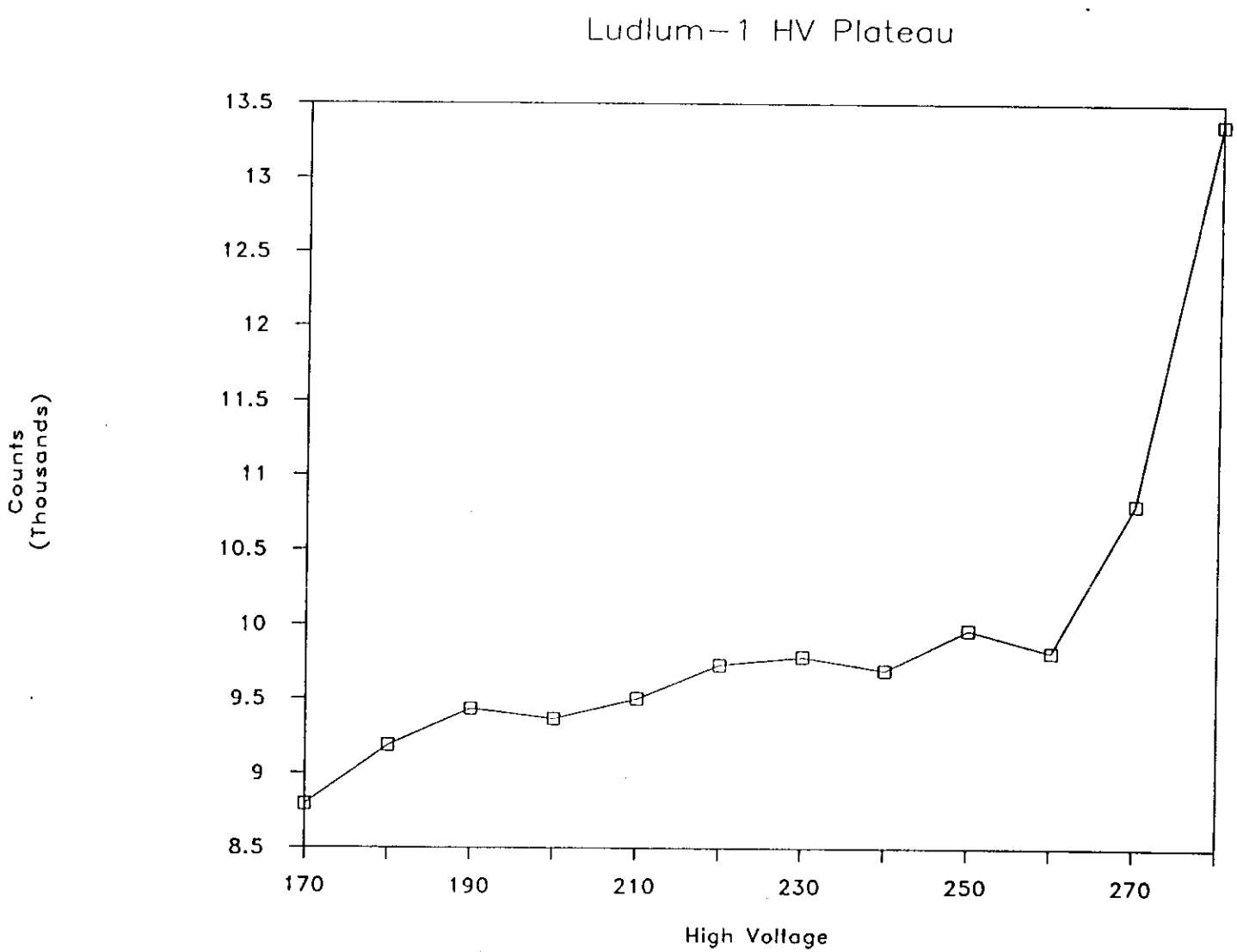
WCD-WM-DP-145, REV. 1



BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS High Voltage Plateau Sodium-1 using Control Standard

SAMPLE NUMBER	DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
2.40	2/11	L-1	10	+	9694						
2.50				+	9964						
2.60				+	9818						
2.70				+	10805						
2.8				+	13362						
				+							
2.30				+	9783						
2.20				+	9730						
2.10				+	9501						
2.00				+	9364						
1.90				+	9431						
1.80				+	9186						
1.70				+	87.92						
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							

BNV
54273
1/12 4/5

WHC-CD-WM-DP-146, REV. 1

3-2458

WHC-CD-WM-DP-145, REV. 1

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS Ludlum-1 Control Chart-Counts HV=230

SAMPLE NUMBER	DATE 19__	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B+C	GEOMETRY %	DISINTEGRATION RATE d/m
	2/12/93	L-1	10	+	9764			0.173			
				+	9742						
				+	9779						
	2/16/93			+	9857			0.151			
				+	9760						
				+	9680						
				+	9709						
				+	9923						
				+	9800						
				+	9745						
				+	9756						
	2/17/93			+	9897			0.138			
				+	9855						
				+	9809						
				+	9865						
				+	9739						
				+	9726						
				+	~~9541~~ 2/17/93						
				+	9969						
				+	9818						
	2/18/93			+	9737			0.161			
				+							
				+							
				+							
				+							

BNW 54273

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FL 1700-132 (5-66) ARCHIVE RICHLAND WASH

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-1	1/1/95	9753.59	9955.998	9551.182	10057.202	9449.978
	12/31/95	9753.59	9955.998	9551.182	10057.202	9449.978
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-2	1/1/95	9487.73	9675.1614	9300.2986	9768.8771	9206.5829
	12/31/95	9487.73	9675.1614	9300.2986	9768.8771	9206.5829
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-3	1/1/95	10159.7	10357.7716	9961.6284	10456.8074	9862.5926
	12/31/95	10159.7	10357.7716	9961.6284	10456.8074	9862.5926
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-4	1/1/95	10423.5	10613.2318	10233.7682	10708.0977	10138.9023
	12/31/95	10423.5	10613.2318	10233.7682	10708.0977	10138.9023
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-5	1/1/95	10215.7	10427.742	10003.658	10533.763	9897.637
	12/31/95	10215.7	10427.742	10003.658	10533.763	9897.637

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-6	1/1/95	10252.4	10449.6092	10055.1908	10548.2138	9956.5862
	12/31/95	10252.4	10449.6092	10055.1908	10548.2138	9956.5862
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-7	1/1/95	8453.516129	8665.728129	8241.304129	8771.834129	8135.198129
	12/31/95	8453.516129	8665.728129	8241.304129	8771.834129	8135.198129
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-8	1/1/95	12610.9	12889.262	12332.538	13028.443	12193.357
	12/31/95	12610.9	12889.262	12332.538	13028.443	12193.357
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-9	1/1/95	11428.3	11672.532	11184.068	11794.648	11061.952
	12/31/95	11428.3	11672.532	11184.068	11794.648	11061.952
		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
Ludlum-10	1/1/95	12404.1	12618.51	12189.69	12725.715	12082.485
	12/31/95	12404.1	12618.51	12189.69	12725.715	12082.485

Control Chart Counts and Backgrounds

	Ludlum-1		Ludlum-2		Ludlum-3		Ludlum-4		Ludlum-5		Ludlum-6		Ludlum-7		Ludlum-8		Ludlum-9		Ludlum-10	
DATE	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count
1/16/95	0.229	9864	0.130	9386	0.190	10061	0.263	10262	0.187	10304										
1/17/95	0.234	9697	0.139	9508	0.164	10182	0.257	10576	0.199	10264										
1/18/95	0.220	9880	na	9377	0.140	10182	0.333	10364	0.174	10194										
1/19/95	0.219	9591	0.134	9310	0.152	10110	0.321	10200	0.179	10087										
1/20/95	0.227	9672	0.167	9289	0.150	10067	0.284	10470	0.169	10262	na	10183	na	8381	na	12428	na	11396	na	12313
1/23/95	0.230	9746	0.112	9437	0.171	10340	0.317	10468	0.186	10346	0.195	10085	0.166	8431	0.158	12241	0.244	11552	0.155	12287
1/24/95	0.196	9620	0.154	9362	0.174	10194	na	10364	0.216	10207	0.192	10375	0.212	8351	0.194	12587	0.235	11194	0.183	12258
1/25/95	0.263	9734	0.144	9407	0.167	9990	0.333	10395	0.212	10108	0.214	10082	0.182	8446	0.159	12460	0.238	11282	0.180	12443
1/27/95	0.217	9703	na	9346	0.161	10037	0.276	10458	0.195	10328	0.241	10106	0.191	8554	0.191	12518	0.267	11474	0.184	12324
1/30/95	0.271	9575	0.177	9333	0.190	10022	0.321	10425	0.258	10044	0.298	10124	0.241	8184	0.194	12384	0.248	11389	0.163	12429
4/03/95	na	9707	0.184	9386	0.216	10181	0.308	10405	0.228	10173	0.340	10187	0.214	8481	0.241	12246	na	11459	0.234	12304
4/04/95	0.273	9752	0.143	9483	0.213	10073	0.368	10464	0.260	10315	0.376	10300	0.239	8367	0.218	12447	0.277	11159	0.229	12196
4/05/95	0.300	9992	0.152	9426	0.204	10146	0.366	10448	0.224	10082	0.341	10213	0.241	8573	0.206	12443	0.299	11399	0.214	12322
4/06/95	0.269	9735	0.173	9402	0.212	9966	0.334	10331	0.236	10108	0.378	10340	0.238	8229	0.210	12489	0.280	11476	0.221	12402
4/10/95	0.308	9906	0.177	9399	0.238	10198	0.351	10288	0.247	10330	0.327	10212	0.243	8426	0.218	12500	0.260	11294	0.216	12300
4/12/95	0.278	9755	0.158	9476	0.221	10172	0.339	10393	0.229	10278	0.324	10308	0.239	8326	0.201	12481	0.307	11430	0.193	12370
4/13/95	0.297	9706	0.140	9492	0.227	10289	0.393	10459	0.238	10399	0.348	10107	0.257	8379	0.192	12530	0.298	11312	0.202	12265
4/19/95	0.290	9730	0.191	9473	0.219	10099	0.353	10536	0.220	10507	0.353	10350	0.224	8374	0.197	12366	0.278	11448	0.238	12426
4/20/95	0.302	9709	0.158	9378	0.191	10092	0.352	10551	0.239	10193	0.318	10275	NA	8385	0.216	12639	0.269	11429	0.240	12294
4/21/95	0.313	9824	0.172	9453	0.217	10107	0.389	10318	0.221	10356	0.318	10174	0.217	8361	0.230	12549	0.296	11385	0.249	12544
4/24/95	0.291	9762	0.168	9326	0.222	10106	0.356	10464	0.258	10507	0.370	10329	0.242	8258	0.196	12636	0.308	11372	0.229	12325
4/25/95	0.284	9809	0.174	9551	0.219	10125	0.367	10428	0.226	10216	0.359	10229	0.297	8449	0.239	12465	0.343	11376	0.254	12252
4/26/95	0.281	9796	0.164	9532	0.191	10228	0.353	10262	0.251	10154	0.438	10075	0.258	8656	0.193	12465	0.327	11422	0.244	12251
4/27/95	0.392	9861	0.173	9439	0.230	10081	0.429	10281	0.261	10236	0.471	10268	0.278	8474	0.251	12734	0.336	11374	0.297	12365
4/28/95	0.311	9680	0.176	9320	0.223	10254	0.417	10480	0.256	10278	0.539	10209	0.301	8322	0.250	12794	0.341	11464	0.253	12346
5/01/95	0.309	9801	0.171	9332	0.227	9932	0.428	10397	0.300	10441	0.502	10340	0.388	8420	0.249	12342	0.347	11509	0.308	12605
5/02/95	0.299	9918	0.188	9397	0.240	10189	0.388	10377	0.301	10273	0.479	10425	0.442	8411	0.246	12517	0.339	11170	0.268	12327
5/03/95	0.313	9777	0.213	9380	0.309	10010	0.471	10380	0.331	10291	0.502	10241	0.424	8318	0.274	12646	0.383	11394	0.290	12325
5/04/95	0.270	9577	0.218	9430	0.297	10219	0.519	10512	0.303	10205	0.550	10304	0.458	8386	0.279	12534	0.406	11483	0.306	12301
5/05/95	0.303	9822	0.258	9471	0.337	10049	0.501	10420	0.329	10384	0.497	10317	0.441	8343	0.307	12395	0.413	11428	0.280	12324
5/08/95	0.308	9721	0.286	9561	0.602	10001	0.563	10328	0.336	10332	0.541	10257	0.469	8465	0.289	12435	0.391	11403	0.302	12478
5/09/95	0.337	9750	0.253	9531	0.589	10129	0.559	10439	0.344	10298	0.543	10122	0.536	8458	0.312	12227	0.439	11475	0.303	12267
5/10/95	0.324	9641	0.280	9387	0.597	10276	0.559	10235	0.389	10380	0.537	10257	0.559	8429	0.366	12374	0.466	11254	0.300	12212
5/11/95	0.313	9803	0.279	9594	0.578	10134	0.520	10411	0.416	10255	0.486	10117	0.631	8329	0.376	12425	0.449	11239	0.339	12089
5/12/95	0.142	9645	0.080	9458	0.131	10224	0.228	10474	0.143	10328	0.119	10281	0.426	8374	0.108	12550	0.097	11417	0.124	12164

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FBC-CC-HM-DP-145, REV. 1

Control Chart Counts and Backgrounds

	Ludlum-1		Ludlum-2		Ludlum-3		Ludlum-4		Ludlum-5		Ludlum-6		Ludlum-7		Ludlum-8		Ludlum-9		Ludlum-10	
DATE	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count
5/15/95	0.147	9733	0.168	9521	0.122	10239	0.223	10514	0.143	10169	0.122	10328	0.263	8451	0.103	12452	0.124	11249	0.139	12344
5/16/95	0.144	9694	0.154	9443	0.147	9886	0.248	10350	0.159	10375	0.167	10292	0.238	8344	0.108	12420	0.106	11110	0.139	12168
5/17/95	0.142	9692	0.180	9428	0.183	10157	0.253	10297	0.202	10275	0.117	10122	0.459	8240	0.134	12887	0.144	11469	0.176	12388
5/18/95	0.146	9677	0.159	9535	0.159	10119	0.209	10391	0.134	10237	0.119	10249	0.374	8526	0.129	12465	0.113	11269	0.180	12388
5/19/95	0.160	9725	0.160	9352	0.149	10308	0.250	10437	0.130	10144	0.143	10102	0.350	8482	0.136	12453	0.126	11447	0.137	12361
5/22/95	0.120	9679	0.162	9365	0.146	9894	0.228	10276	0.123	10340	0.151	10139	0.280	8357	0.130	12344	0.176	11313	0.200	12246
5/23/95	0.176	9993	0.310	9434	0.174	10238	0.230	10291	0.192	10052	0.172	10271	0.343	8580	0.141	12342	0.163	11321	0.199	12201
5/24/95	0.189	9591	0.282	9301	0.180	10013	0.323	10289	0.204	10299	0.184	10377	0.329	8442	0.169	12353	0.197	11414	0.187	12302
5/25/95	0.176	9587	0.300	9463	0.183	10144	0.307	10419	0.198	10237	0.156	10049	0.276	8547	0.167	12447	0.213	11543	0.237	12450
5/26/95	0.198	9767	0.287	9351	0.184	9926	0.288	10209	0.212	10186	0.191	10115	0.302	8456	0.133	12397	0.237	11349	0.249	12288
5/30/95	0.233	9786	0.289	9476	0.201	10242	0.358	10456	0.236	10225	0.200	10162	0.249	8308	0.153	12256	0.254	11490	0.267	12098
5/31/95	0.183	9640	0.299	9535	0.197	10195	0.338	10442	0.218	10099	0.194	10101	0.383	8299	0.126	12499	0.242	11242	0.229	12277
6/01/95	0.209	9632	0.291	9334	0.189	10058	0.388	10265	0.214	10156	0.233	10135	0.417	8420	0.159	12531	0.251	11274	0.249	12191
6/02/95	0.221	9763	0.342	9272	0.240	10103	0.340	10404	0.259	10281	0.328	10119	0.447	8559	0.176	12464	0.241	11223	0.276	12263
6/05/95	0.207	9602	0.431	9416	0.306	10202	0.327	10206	0.290	10286	0.254	10161	0.543	8703	0.191	12430	0.257	11320	0.263	12352
6/06/95	0.219	9821	0.148	9625	0.277	10044	0.350	10517	0.251	10210	0.287	10206	0.442	8414	0.182	12457	0.317	11103	0.244	12266
6/07/95	0.206	9772	0.113	9456	0.293	10145	0.383	10284	0.267	10345	0.407	10334	0.486	8423	0.171	12504	0.311	11384	0.231	12394
6/08/95	0.152	9887	0.136	9371	0.206	10083	0.231	10467	0.156	10164	0.138	10112	0.355	8465	0.107	12502	0.128	11211	0.169	12293
6/09/95	0.158	9901	0.136	9399	0.207	10035	0.267	10447	0.144	10190	0.128	10128	0.280	8441	0.129	12450	0.126	11167	0.171	12309
6/09/95		9778		9393		10069		10298		10161		10251		8297		12410		11269		12398
6/12/95	0.142	9792	0.144	9371	0.209	10015	0.280	10563	0.141	10066	0.146	10121	0.274	8525	0.147	12394	0.158	11484	0.191	12282
6/13/95	0.149	9944	0.116	9422	0.193	9967	0.277	10428	0.220	10122	0.153	10252	0.366	8422	0.227	12655	0.157	11416	0.227	12414
6/14/95	0.172	9742	0.139	9287	0.223	10090	0.296	10459	0.173	10417	0.159	10268	0.318	8376	0.209	12394	0.156	11494	0.198	12315
6/15/95	0.143	9859	0.178	9429	0.236	10051	0.279	10550	0.212	10197	0.189	10345	0.301	8388	0.213	12694	0.156	11381	0.177	12469
6/16/95	0.173	9949	0.144	9455	0.226	10119	0.297	10309	0.209	10231	0.191	10100	0.359	8352	0.231	12369	0.206	11321	0.224	12359
6/19/95	0.179	9727	0.146	9582	0.226	10134	0.286	10291	0.196	10329	0.197	10184	0.361	8331	0.220	12376	0.184	11290	0.251	12291
6/20/95	0.176	9783	0.156	9536	0.220	10172	0.298	10268	0.228	10317	0.196	10165	0.388	8433	0.226	12523	0.196	11430	0.253	12370
6/21/95	0.138	9703	0.146	9341	0.184	10119	0.291	10412	0.176	10221	0.130	10169	0.389	8331	0.127	12385	0.140	11370	0.154	12293
6/22/95	0.137	9739	0.223	9485	0.196	10131	0.270	10359	0.177	10386	0.141	10143	0.411	8282	0.148	12517	0.146	11530	0.171	12501
6/23/95	0.138	9913	0.313	9560	0.342	9998	0.247	10286	0.181	10309	0.188	10201	0.432	8336	0.167	12509	0.152	11104	0.140	12409
6/26/95	0.189	9835	0.291	9377	0.349	10234	0.271	10324	0.192	10471	0.159	10281	0.461	8355	0.186	12444	0.170	11250	0.163	12242
6/27/95	0.177	9580	0.332	9374	0.363	10279	0.282	10380	0.180	10216	0.278	9984	0.150	8345	0.217	12242	0.190	11148	0.227	12231
6/28/95	0.214	9803	0.320	9402	0.368	9967	0.261	10170	0.319	10328	0.274	10285	0.159	8331	0.240	12610	0.183	11328	0.234	12238
/95	0.203	9550	0.310	9345	0.378	10139	0.304	10321	0.366	10	0.266	10384	0.174	8432	0.236	12300	0.187	11300	0.229	12316
/95	0.240	9668	0.333	9401	0.429	10108	0.284	10149	0.387	10	0.284	10246	0.159	8313	0.209	12468	0.209	11328	0.246	12261

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[illegible]-DP-[illegible] REV. 1

Control Chart Counts and Backgrounds

	Ludlum-1		Ludlum-2		Ludlum-3		Ludlum-4		Ludlum-5		Ludlum-6		Ludlum-7		Ludlum-8		Ludlum-9		Ludlum-10	
DATE	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count
7/05/95	0.226	9647	0.311	9318	0.411	10116	0.289	10463	0.392	10134	0.274	10195	0.186	8444	0.227	12381	0.226	11413	0.239	12274
7/06/95	0.223	9592	0.309	9356	0.409	10151	0.250	10399	0.331	10151	0.272	10175	0.194	8431	0.259	12484	0.237	11226	0.249	12341
7/07/95	0.232	9696	0.320	9242	0.378	10330	0.258	10390	0.378	10136	0.288	10260	0.227	8359	0.260	12618	0.231	11372	0.266	12380
7/10/95	0.253	9784	0.300	9621	0.388	10030	0.270	10381	0.369	10296	0.302	10210	0.220	8276	0.260	12461	0.232	11285	0.261	12557
7/11/95	0.267	9834	0.334	9238	0.456	10043	0.321	10514	0.334	10349	0.347	10040	0.244	8389	0.336	12553	0.236	11264	0.256	12279
7/12/95	0.292	9722	0.312	9379	0.467	10079	0.332	10386	0.356	10406	0.336	10215	0.292	8327	0.356	12494	0.249	11216	0.269	12190
7/13/95	0.300	9751	0.322	9587	0.498	10100	0.348	10252	0.334	10284	0.318	10197	0.309	8356	0.377	12445	0.281	11463	0.279	12639
7/14/95	0.197	9755	0.184	9105	0.188	10139	0.237	10336	0.211	10422	0.211	10424	0.166	8410	0.123	12475	0.153	11241	0.172	12232
7/17/95	0.219	9782	0.238	9348	0.164	10178	0.240	10294	0.200	10255	0.234	10172	0.144	8284	0.132	12455	0.147	11338	0.171	12210
7/18/95	0.210	9877	0.219	9307	0.174	10081	0.242	10554	0.243	10222	0.250	10316	0.186	8331	0.201	12636	0.153	11416	0.196	12146
7/19/95	0.200	9636	0.258	9330	0.153	0.153	0.247	10417	0.239	10321	0.263	10161	0.178	8289	0.156	12610	0.191	11308	0.220	12515
7/20/95	0.233	9442	0.238	9420	0.174	10032	0.284	10620	0.213	10281	0.274	10149	0.201	8407	0.201	12530	0.149	11113	0.228	12280
7/21/95	0.229	9710	0.262	9287	0.191	10069	0.268	10316	0.221	10290	0.276	10214	0.276	8240	0.203	12497	0.177	11307	0.218	12340
7/24/95	0.229	9631	0.260	9447	0.181	10102	0.231	10224	0.280	10256	0.340	10288	0.221	8298	0.218	12392	0.187	11550	0.257	12272
7/25/95	0.284	9701	0.271	9283	0.174	10065	0.242	10362	0.282	10343	0.327	10429	0.217	8478	0.240	12366	0.194	11270	0.261	12294
7/26/95	0.213	9669	0.290	9432	0.230	10212	0.263	10413	0.271	10345	0.299	10337	0.236	8422	0.210	12616	0.228	11280	0.233	12397
7/27/95	0.242	9668	0.240	9343	0.199	10060	0.263	10448	0.334	10330	0.344	10000	0.268	8476	0.247	12484	0.256	11374	0.314	12198
7/28/95	0.243	9772	0.251	9377	0.171	10156	0.281	10326	0.350	10259	0.348	10348	0.363	8386	0.263	12428	0.268	11323	0.291	12054
7/31/95	0.262	9677	0.247	9247	0.193	9975	0.227	10372	0.352	10316	0.377	10111	0.361	8297	0.292	12609	0.273	11400	0.296	12068
8/01/95	0.260	9646	0.253	9349	0.212	10159	0.266	10404	0.364	10254	0.368	10188	0.344	8350	0.277	12446	0.221	11368	0.287	12287
8/02/95	0.259	9713	0.254	9405	0.241	10206	0.298	10398	0.371	10218	0.333	10164	0.366	8292	0.282	12393	0.242	11322	0.282	12288
8/03/95	0.231	9654	0.252	9389	0.224	10178	0.283	10354	0.387	10199	0.319	10112	0.356	8310	0.276	12356	0.232	11298	0.238	12239
8/04/95	0.243	9702	0.217	9358	0.226	10159	0.273	10324	0.364	10246	0.332	10125	0.353	8347	0.287	12389	0.238	11302	0.262	12176
8/07/95	0.271	9646	0.229	9366	0.221	10187	0.279	10370	0.383	10212	0.344	10111	0.356	8290	0.289	12353	0.260	11280	0.257	12088
8/08/95	0.238	9611	0.217	9301	0.256	10143	0.273	10332	0.414	10327	0.330	10381	0.337	8263	0.287	12443	0.243	11301	0.224	12268
8/09/95	0.250	9701	0.260	9393	0.224	10181	0.314	10360	0.379	10244	0.348	10289	0.371	8303	0.281	12358	0.270	11294	0.264	12189
8/10/95	0.229	9765	0.267	9258	0.200	10040	0.266	10373	0.362	10208	0.357	10046	0.432	8340	0.279	12390	0.246	11407	0.281	12462
8/11/95	0.268	9663	0.300	9406	0.233	10032	0.188	10284	0.380	10250	0.356	10183	0.427	8426	0.298	12413	0.242	11410	0.300	12433
8/14/95	0.251	9742	0.248	9279	0.211	10125	0.280	10294	0.388	10236	0.186	10099	0.364	8389	0.300	12360	0.260	11358	0.307	12402
8/15/95	0.240	9790	0.339	9407	0.243	10002	0.321	10331	0.358	10313	0.177	10176	0.431	8253	0.324	12624	0.246	11319	0.303	12362
8/16/95	0.234	9783	0.317	9387	0.219	10228	0.313	10552	0.378	10223	0.389	10091	0.421	8406	0.319	12368	0.279	11217	0.331	12445
8/17/95	0.258	9691	0.327	9376	0.232	10106	0.284	10315	0.370	10333	0.401	10169	0.353	8146	0.293	12437	0.343	11343	0.369	12507
8/18/95	0.271	9724	0.338	9402	0.234	10173	0.351	10340	0.388	10243	0.380	10158	0.367	8222	0.368	12388	0.357	11303	0.350	12489
8/21/95	0.292	9682	0.342	9368	0.263	10228	0.310	10253	0.394	10099	0.357	10063	0.311	8380	0.316	12443	0.359	11336	0.315	12415
8/22/95	0.267	9704	0.347	9398	0.239	10199	0.334	10289	0.390	10143	0.361	10104	0.424	8388	0.361	12369	0.361	11299	0.340	12409

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WHC-SD-WM-DP-145, REV. 1

Control Chart Counts and Backgrounds

	Ludlum-1		Ludlum-2		Ludlum-3		Ludlum-4		Ludlum-5		Ludlum-6		Ludlum-7		Ludlum-8		Ludlum-9		Ludlum-10	
DATE	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count	min. bkg.	10 min. count
8/23/95	0.262	9754	0.307	9400	0.263	10180	0.343	10267	0.398	10201	0.381	10098	0.387	8266	0.343	12404	0.358	11311	0.347	12389
8/24/95	0.281	9670	0.338	9379	0.286	10206	0.311	10310	0.378	10278	0.376	10123	0.376	8322	0.351	12386	0.378	11356	0.384	12420
8/25/95	0.252	9809	0.326	9566	0.259	10057	0.324	10398	0.379	10197	0.390	10097	0.383	8301	0.368	12446	0.342	11321	0.370	12413
8/28/95	0.262	9762	0.357	9432	0.231	10112	0.323	10247	0.378	10203	0.409	10101	0.400	8298	0.328	12398	0.396	11278	0.341	12347
8/29/95	NA	9523	0.326	9299	0.278	10088	0.313	10265	0.210	10178	0.392	10084	0.388	8360	0.366	12370	0.377	11309	0.368	12430
8/30/95	0.278	9773	0.314	9477	0.282	10321	0.286	10376	0.358	10363	0.398	10122	0.377	8332	0.344	12378	0.384	11453	0.338	12235
8/31/95	0.278	9687	0.342	9413	0.264	10248	0.363	10288	0.397	10199	0.358	10076	0.362	8356	0.390	12410	0.351	11399	0.360	12380
9/05/95	0.271	9701	0.312	9386	0.261	10306	0.342	10307	0.394	10245	0.388	10190	0.363	8374	0.312	12616	0.380	11559	0.342	12562
9/06/95	0.204	9729	0.224	9331	0.182	10283	0.253	10231	0.221	10218	0.148	10221	0.163	8383	0.163	12491	0.198	11382	0.266	12309
9/07/95	0.204	9704	0.231	9356	0.217	10299	0.279	10287	0.223	10198	0.219	10196	0.201	8376	0.200	12505	0.213	11408	0.238	12272
9/11/95	0.216	9769	0.198	9299	0.193	10385	0.269	10365	0.232	10360	0.241	10185	0.151	8152	0.184	12768	0.177	11433	0.230	12354
9/12/95	0.218	9774	0.251	9441	0.228	10182	0.243	10096	0.233	10256	0.253	10379	0.209	8146	0.186	12450	0.222	11412	0.242	12330
9/13/95	0.218	9750	0.251	9389	0.203	10202	0.268	10143	0.228	10219	0.220	10254	0.212	8189	0.218	12410	0.243	11391	0.288	12289
9/14/95	0.192	9790	0.179	9330	0.203	10320	0.269	10229	0.226	10250	0.184	10195	0.200	8202	0.190	12396	0.233	11309	0.277	12309
9/15/95	0.249	10007	0.198	9481	0.217	10150	0.300	10285	0.246	10110	0.226	10151	0.189	8541	0.209	12482	0.219	11294	0.274	12640
9/18/95		9803		9347		10202		10188	0.262	10101	0.216	10233	0.193	8343	0.259	12389	0.223	11310	0.254	12439

3-2465

LRGreenwood
9-29-95

WHC-SD-WM-DP-145, REV. 1

LUDLUM 2

3-2466

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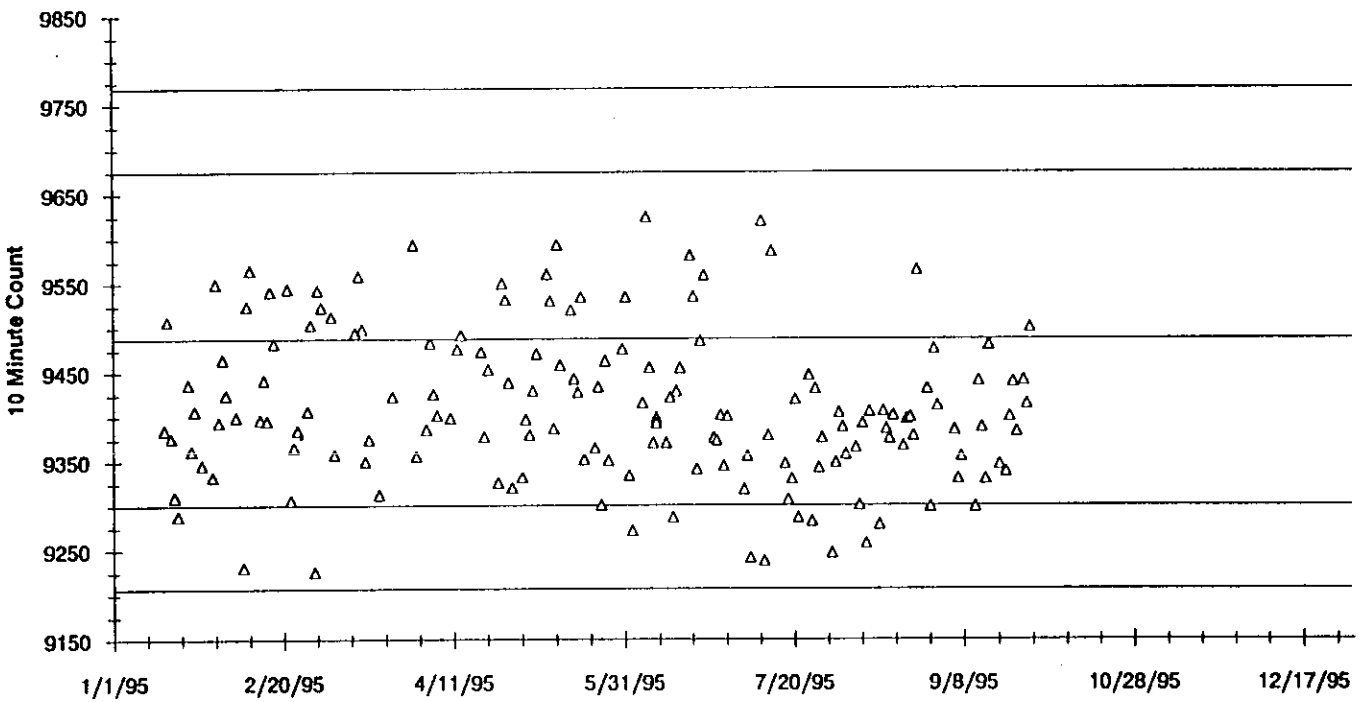
Ludlum-2 Control Chart



WHC-CD-WM-DP-145, REV. 1

LRGreenwood
9-29-95

3-2467

BN W52343 p. 103

L. Greenwood 9-28-90

Ludlum-2 WA94744 [L-2]

T1350 NBS Calibration Summary

24.90ul 3321 ± 35 d/m
24.92ul 3324 ± 35 d/m

24.90ul $\bar{X}_4$ 1394.725 c/m

$\bar{X}_4$ 1396.425 c/m

$\bar{X}_8$ 1395.575 c/m

3321 d/m ÷ 1395.575 c/m = 2.379664
d/c = 0.420227

24.92ul $\bar{X}_4$ 1374.075 c/m

$\bar{X}_4$ 1367.650 c/m

$\bar{X}_8$ 1370.8625 c/m

3324 d/m ÷ 1370.8625 c/m = 2.424750
d/c = 0.412413

$\bar{X}_2$ = 0.416320

Project No. _____ Date of Work _____
Entered By _____ Date _____
Disclosed To and Understood By
Signed 1. _____ Date _____
2. _____ Date _____

Entered 9-26-90 Anne E Rozelsky

102

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE Ludlum-2 WA94744

REMARKS Voltage @ 3.2

SUBMITTED BY

COUNTED BY

SAMPLE NUMBER	DATE 19 90	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90 λ ①	4/19	2	10	+	13726						
②				+	14168						
③				+	13971						
④				+	13992						
				+							
24.92 λ ①	4/20			+	13696						
②				+	13561						
③				+	13790						
④				+	13659						
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							
				+							

BNW52343 p.102

WHC-CD-WM-DP-45, REV. 1

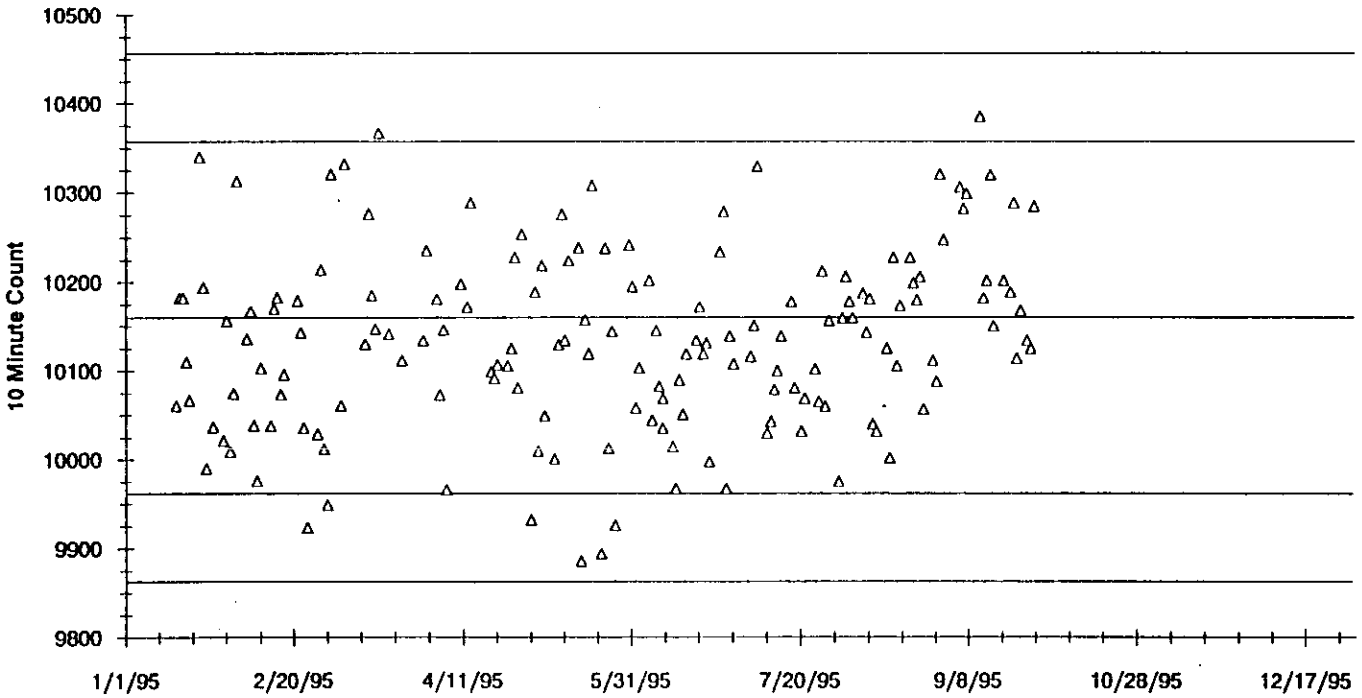
3-2469

WHC-SD-WM-DP-145, REV. 1

LUDLUM 3

3-2470

Ludlum-3 Control Chart



3-2471

WHO-CD-WM-DP-145, REV. 1

LRGreenwood
9-29-95

WHC-CD-WM-DP-145, REV. 1
BNW52343 page 135-9 of 20

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE: Ludlum-3
SUBMITTED BY:
COUNTED BY:

REMARKS: Voltage @ 3.0

SAMPLE NUMBER		DATE 19 91	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B+C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	5-14	3	10	+	14567						
	2				+	14621						
	3				+	14520						
	4				+	14721						
					+							
24.92λ	1				+	14429						
	2				+	14258						
	3				+	14307						
	4				+	14374						
					+							
					+							
					+							
					+							
					+							
					+							
24.90λ	1	5-15			+	14583						
	2				+	14522						
	3				+	14470						
	4				+	14662						
					+							
24.92λ	1				+	14419						
	2				+	14243						
	3				+	14428						
	4				+	14361						
					+							

700-132 (5-66) AEC-RL RICHLAND, WASH

Ludlum-3 WA82316

High Voltage 3.00

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}$ 1460.7250 c/m

$\bar{X}$ 1455.9250 c/m

$\bar{X}$ 1458.3250 c/m ± 8.23 c/m

3321 d/m ÷ 1458.3250 c/m = 2.2773

~~d/c~~ c/d = 0.4391 ± 0.56%

24.92μL $\bar{X}$ 1434.2000 c/m

$\bar{X}$ 1440.6750 c/m

$\bar{X}$ 1435.2375 c/m ± 7.51 c/m

3324 d/m ÷ 1435.2375 c/m = 2.3160

~~d/c~~ = 0.4318 ± 0.52%

$\bar{X}$ = 0.4355 ± 0.76%

Reviewed LR Greenwood date 4/25/91

WHC-CD-WM-DP-145, REV. 1

LUDLUM 4

3-2474

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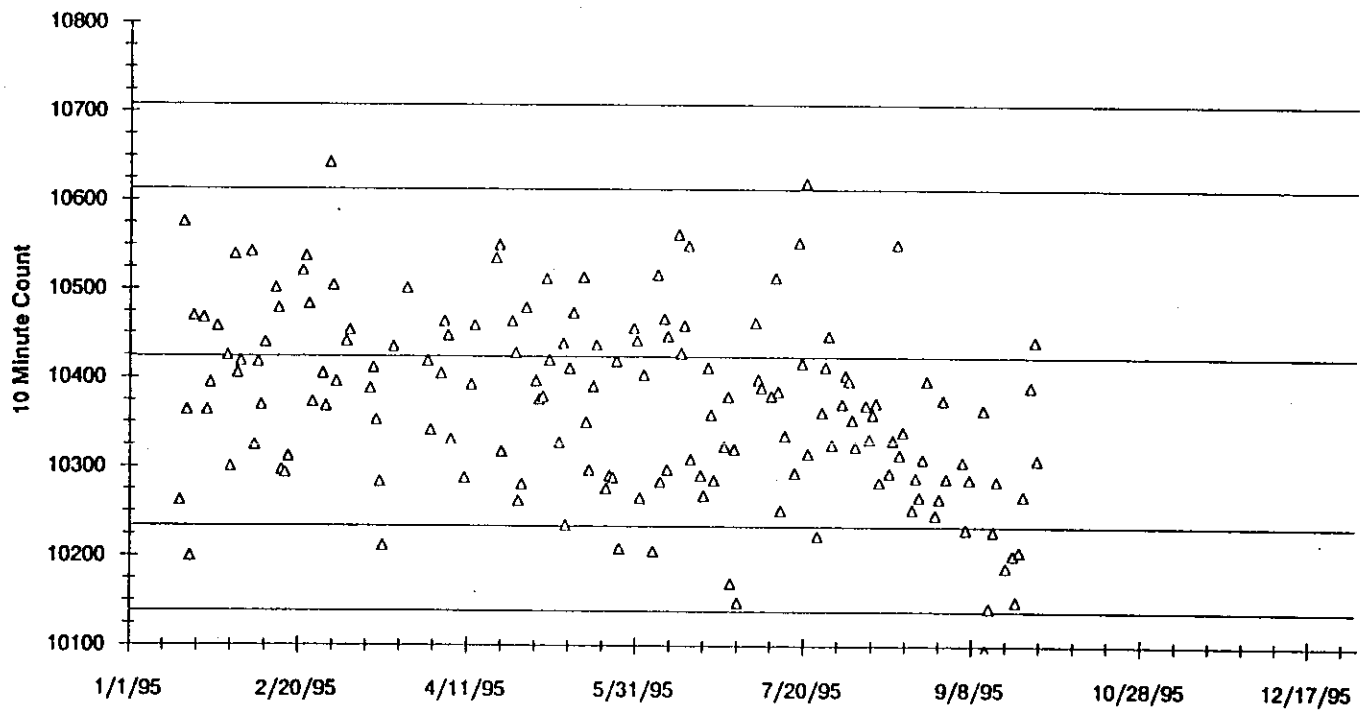
Ludlum-4 Control Chart



3-2475

J R Leonard
9-29-95

Ludlum-4 WA82317

High Voltage 3.00

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}$ 1456.3750 c/m

$\bar{X}$ 1462.1750 c/m

$\bar{X}$ 1459.2750 c/m ± 16.95 c/m

3321 d/m ÷ 1459.2750 c/m = 2.2758

d/c = 0.4394 ± 1.16%

24.92μL $\bar{X}$ 1437.5750 c/m

$\bar{X}$ 1443.9000 c/m

$\bar{X}$ 1440.7375 c/m ± 15.56 c/m

3324 d/m ÷ 1440.7375 c/m = 2.3072

d/c = 0.4334 ± 1.08%

$\bar{X}$ = 0.4364 ± 1.58%

Reviewed L R Greenwood date 9/25/91

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE Ludlum-4

SUBMITTED BY

COUNTED BY

REMARKS Voltage @ 3.0

SAMPLE NUMBER		DATE 19 91	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	5-9	4	10	+	14589						
	2				+	14440						
	3				+	14597						
	4				+	14629						
					+							
24.92λ	1				+	14491						
	2				+	14152						
	3				+	14431						
	4				+	14429						
					+							
					+							
					+							
					+							
					+							
					+							
24.90λ	1	5-10			+	14596						
	2				+	14509						
	3				+	14417						
	4				+	14965						
					+							
24.92λ	1				+	~~14965~~ 14663						
	2				+	14237						
	3				+	14450						
	4				+	14406						
					+							

BNW 52343 page 12 of 20 WHC-SD-WM-DP-145, REV. 1

3-2477

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WHC-CD-WM-DP-145, REV. 0

LUDLUM 5

3-2478

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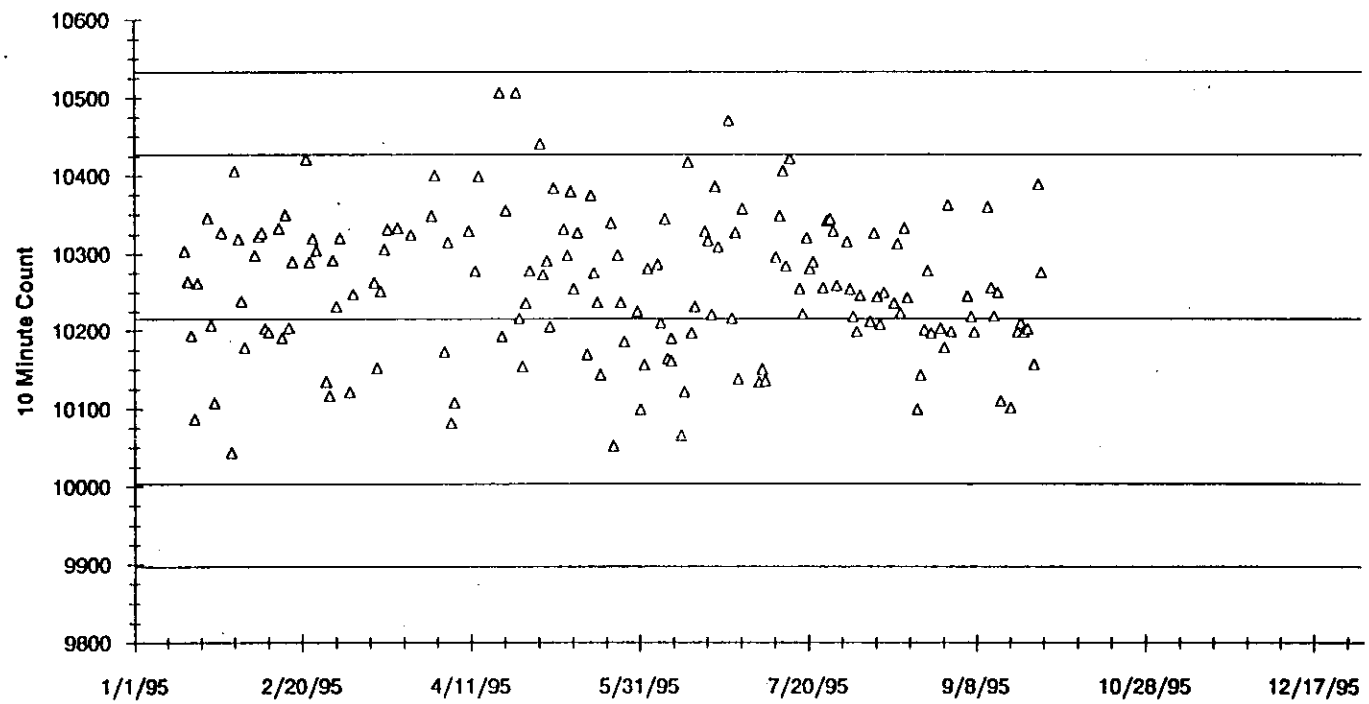
Ludlum-5 Control Chart



WHC-SD-WM-DP-145, REV. 1

3-2479

J R Greenwood
9-29-95

Ludlum-5 WA82318

High Voltage 2.80

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}$ 1403.6500 c/m

$\bar{X}$ 1406.1750 c/m

$\bar{X}$ 1404.9125 c/m ± 12.59 c/m

3321 d/m ÷ 1404.9125 c/m = 2.3638

d/c = 0.4230 ± 0.90%

24.92μL $\bar{X}$ 1379.5000 c/m

$\bar{X}$ 1384.2000 c/m

$\bar{X}$ 1381.8500 c/m ± 12.31 c/m

3324 d/m ÷ 1381.8500 c/m = 2.4055

d/c = 0.4157 ± 0.89%

$\bar{X}$ = 0.4194 ± 1.27%

Reviewed L R Greenwood date 9/25/91

WHC-CD-WM-DP-145, REV. 1
BNW 52343 page 138-15 of 20

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE Sudlum-5
SUBMITTED BY
COUNTED BY

REMARKS Voltage @ 2.8

SAMPLE NUMBER		DATE 19 91	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.902	1	5-15			+	14019						
	2				+	14066						
	3				+	13857						
	4				+	14204						
					+							
24.922	1				+	13945						
	2				+	13639						
	3				+	13727						
	4				+	13869						
					+							
					+							
					+							
					+							
					+							
					+							
24.902	1	5-16			+	14004						
	2				+	13944						
	3				+	14061						
	4				+	14238						
					+							
24.922	1				+	13795						
	2				+	13722						
	3				+	14009						
	4				+	13842						
					+							

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WMO-CD-WM-DP-145, REV. 1

LUDLUM 6

3-2482

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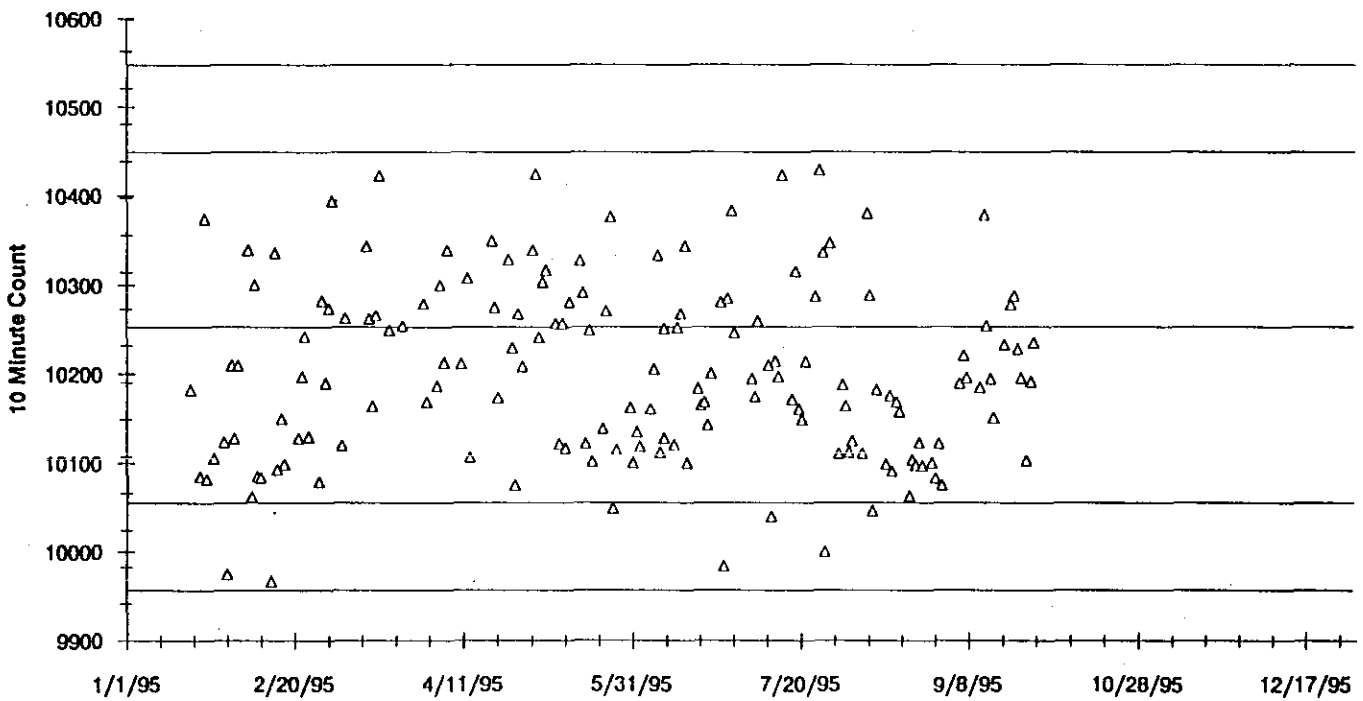
3-2483

Ludlum-6 Control Chart



L R Greenwood
9-29-95

WHO-CD-WM-DP-145, REV. 1

Ludlum-6 WA82319

High Voltage 2.70

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}$ 1419.8250 c/m

$\bar{X}$ 1412.7000 c/m

$\bar{X}$ 1416.2625 c/m ± 14.10 c/m

3321 d/m ÷ 1416.2625 c/m = 2.3449

d/c = 0.4265 ± 1.00%

24.92μL $\bar{X}$ 1389.7000 c/m

$\bar{X}$ 1389.0250 c/m

$\bar{X}$ 1389.3625 c/m ± 15.83 c/m

3324 d/m ÷ 1389.3625 c/m = 2.3925

d/c = 0.4180 ± 1.14%

$\bar{X}$ = 0.4222 ± 1.52%

Reviewed L R Greenwood date 9/25/91

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE Ludlum-6

SUBMITTED BY

COUNTED BY

REMARKS HV Voltage @ 2.7

SAMPLE NUMBER		DATE 19 91	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	5-15			+	14304						
	2				+	14170						
	3				+	13996						
	4				+	14323						
					+							
24.92λ	1				+	14133						
	2				+	13802						
	3				+	13869						
	4				+	13784						
					+	~~14323~~						
					+							
					+							
					+							
					+							
					+							
24.90λ	1	5-16			+	14210						
	2				+	14142						
	3				+	13922						
	4				+	14234						
					+							
24.92λ	1				+	14141						
	2				+	13845						
	3				+	13713						
	4				+	13862						
					+							

BNW 52343 page 138-18 of 20

WHC-CD-WM-DP-145, REV. 1

3-2485

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WMO-CD-WM-DP-145, REV. 1

LUDLUM 7

3-2486

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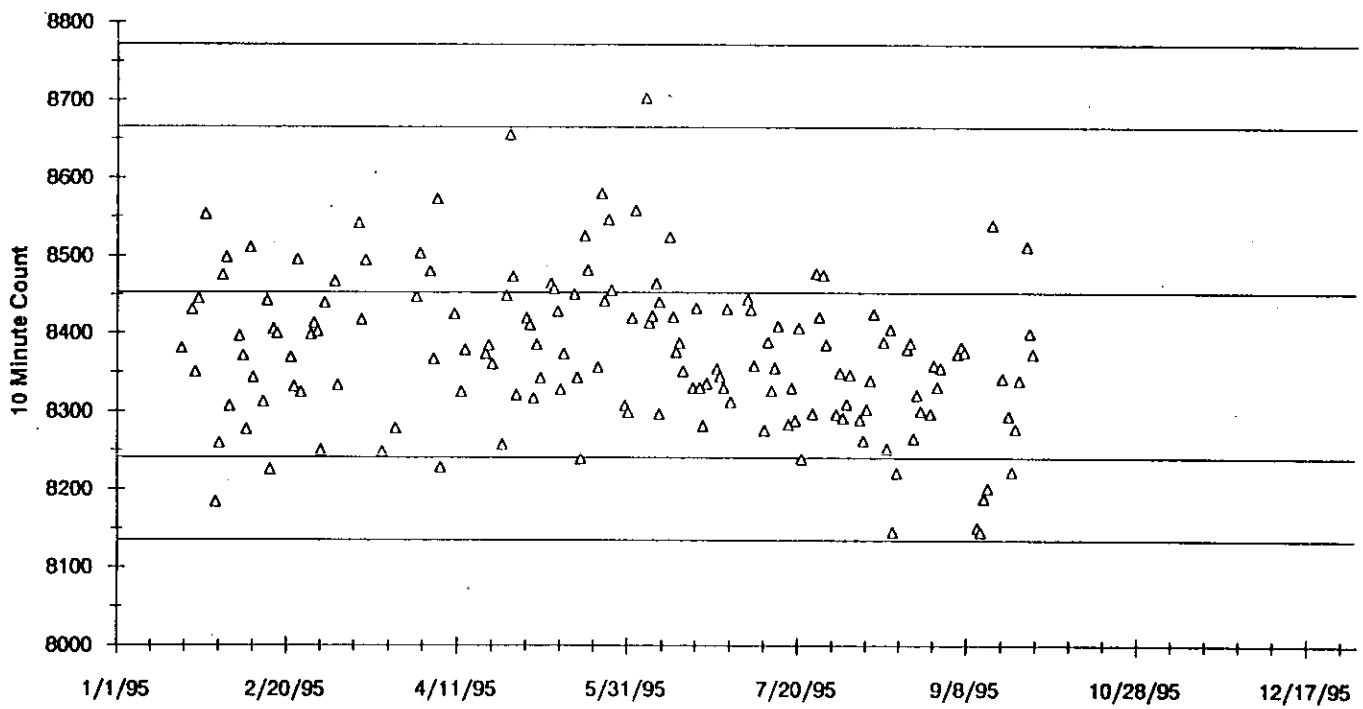
Ludlum-7 Control Chart



3-2487

WMO-CD-WM-DP-145, REV. 1

L R Greenwood
9-29-95

WHC-CD-WM-DP-145, REV. 1

Ludlum-7 WB76764

High Voltage 3.40

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m } HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{32}$ = 1319.381 ± 16.5868 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1319.381 ± 16.5868 c/m = d/c

2.518226 ± 0.036922 = 0.3971 c/d ± 1.47%

Reviewed L R Greenwood date 3/9/94

3-2488

Ludlum-7 T-1350 Calibration Counts
Source: Pu-239 T-1350 7-20-79

10 minute counts

Date	Source Id.	Counts	cpm
2/24/94	24.90µl - 1	13351	1335.1
	1	13349	1334.9
	2	13176	1317.6
	2	13442	1344.2
	3	13234	1323.4
	3	13322	1332.2
	4	13498	1349.8
	4	13279	1327.9
	24.92µl - 1	13019	1301.9
	1	13233	1323.3
	2	12860	1286.0
	2	13056	1305.6
	3	12982	1298.2
2/25/94	3	13151	1315.1
	4	12964	1296.4
	4	13149	1314.9
	24.90µl - 1	13249	1324.9
	1	13328	1332.8
	2	13106	1310.6
	2	13127	1312.7
	3	13150	1315.0
	3	13310	1331.0
	4	13382	1338.2
	4	13369	1336.9
	24.92µl - 1	13238	1323.8
	1	13211	1321.1
	2	12833	1283.3
	2	12977	1297.7
	3	13405	1340.5
2/28/94	3	13187	1318.7
	4	13216	1321.6
	4	13049	1304.9

avg 32 = 1319.381 ± 16.5868

Anne E Kozelisky 3/8/94
Analyst/date

3-2489

LUD7CON.XLS

Ludlum-7 Control Chart Counts

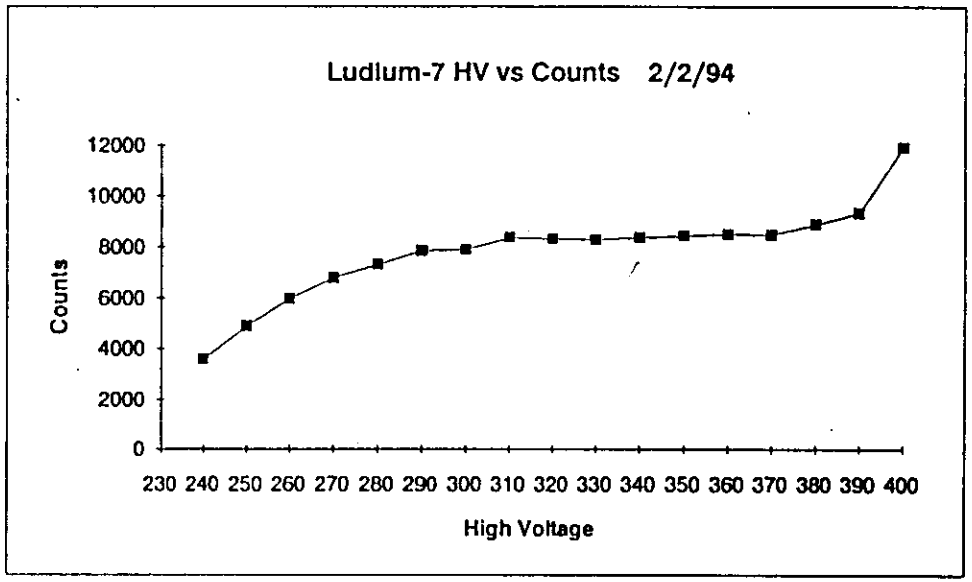
Date	10 minute Count
2/10/94	8591
2/10/94	8365
2/10/94	8492
2/11/94	8615
2/11/94	8558
2/11/94	8302
2/14/94	8492
2/14/94	8310
2/14/94	8610
2/15/94	8459
2/15/94	8559
2/15/94	8584
2/16/94	8324
2/16/94	8489
2/17/94	8315
2/17/94	8492
2/17/94	8470
2/18/94	8445
2/18/94	8655
2/18/94	8321
2/22/94	8571
2/23/94	8489
2/24/94	8463
2/25/94	8348
2/28/94	8317
3/1/94	8432
3/2/94	8350
3/3/94	8491
3/4/94	8472
3/7/94	8358
3/8/94	8320

Avg 31 = 8453.516
1 Sigma : ± 106.1058
2 Sigma : ± 214.4499
3 Sigma : ± 317.7754

Anne E Kozlicky
Analyst/date

Ludlum-7 High Voltage
2/2/94

HV	Counts
240	3582
250	4882
260	5971
270	6793
280	7297
290	7857
300	7897
310	8372
320	8328
330	8301
340	8366
350	8445
360	8509
370	8480
380	8900
390	9363
400	11906



3-2491

Anne E Kozelisky 2/2/94

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WHC-SD-WM-DP-145, REV. 1

LUDLUM 8

3-2492

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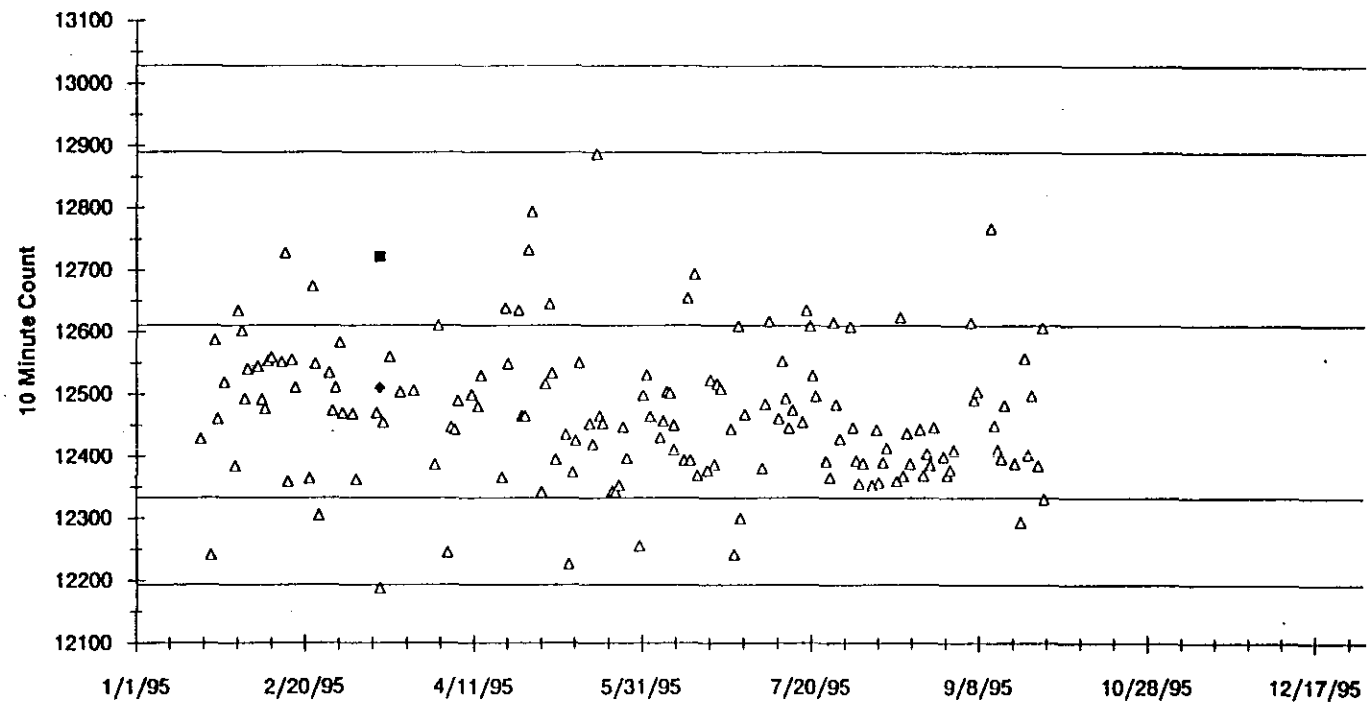
3-2493

Ludlum-8 Control Chart



UNC-CD-WM-DP-145, REV 1

J R Greenwood
9-29-95

Ludlum-8 WA94743

High Voltage 3.30

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m } HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{16}$ = 1434.831 c/m ± 21.933 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1434.831 c/m ± 21.933 c/m = d/c

2.315603 ± 0.039474 = 0.4319 ~~d/c~~ c/d ± 1.70% MK 3/29/93

Reviewed LR Greenwood date 2/12/93

BNW
54273

HV	Ludlum-8 WA94743	Ludlum-9 WA94745	Ludlum-10 WA94746	Ludlum-7 WB76864
180	367	845	304	867
190	1200	1550	1151	1480
200	1789	1950	1747	1912
210	2274	2400	2093	2204
220	2551	2443	2445	2584
230	2675	2600	2622	2637
240	2807	2640	2724	2804
250	2898	2777	2924	2908
260	2838	2778	2860	2991
270	2891	2904	2844	2958
280	2975	2830	2988	3019
290	3003	2794	2931	2979
300	3034	2868	3005	3099
310	3006	2943	2995	3073
320	3070	2955	2892	3071
330	3047	2821	3080	3126
340	2963	2919	3093	3039
350	2965	2865	2982	3277
360	3031	2867	3037	3837
370	3039	2895	3028	4514
380	3045	2875	2958	
390	2992	2854	3074	
400	2978	2904	3046	
410	3107	2989	3099	
420	3246	3358	3463	
430	3845	4538	4694	
440	5123			
450				
460				

Anne E Kozelsky 11/9/92

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE
SUBMITTED BY
COUNTED BY

REMARKS Ludlum - 8 Voltage @ 3.3 (WA94713)
Calibration Counts with T-1350 ^{239}Pu

SAMPLE NUMBER	DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY η	DISINTEGRATION RATE d/m
21.902 1	2/5	L-8	10	+	14534	1453.4		0.070	1453.3		
2				+	14144	1414.4			1414.3		
3				+	14349	1434.9			1434.8		
4				+	14565	1456.5			1456.4		
				+							
21.922 1				+	14367	1436.7			1436.6		
2				+	14049	1404.9			1404.8		
3				+	14238	1423.8			1423.7		
4				+	14201	1420.9			1420.8		
				+							
				+							
				+							
				+							
				+							
				+							
21.902 1	2/8			+	14777	1477.7		0.066	1477.6		0.13
2				+	14202	1420.2			1420.1		
3				+	14150	1415.0			1414.9		
4				+	14640	1464.0			1463.9		
				+							
21.922 1				+	14471	1447.1			1447.0		
2				+	14059	1405.9			1405.8		
3				+	14075	1407.5			1407.4		
4				+	14160	1416.0			1415.9		
				+							

3-2496

BNW 54 273

HNF-CD-WM-DP-145, REV. 1

WHC-CD-WM-DP-145 REV 1

BNW
54273
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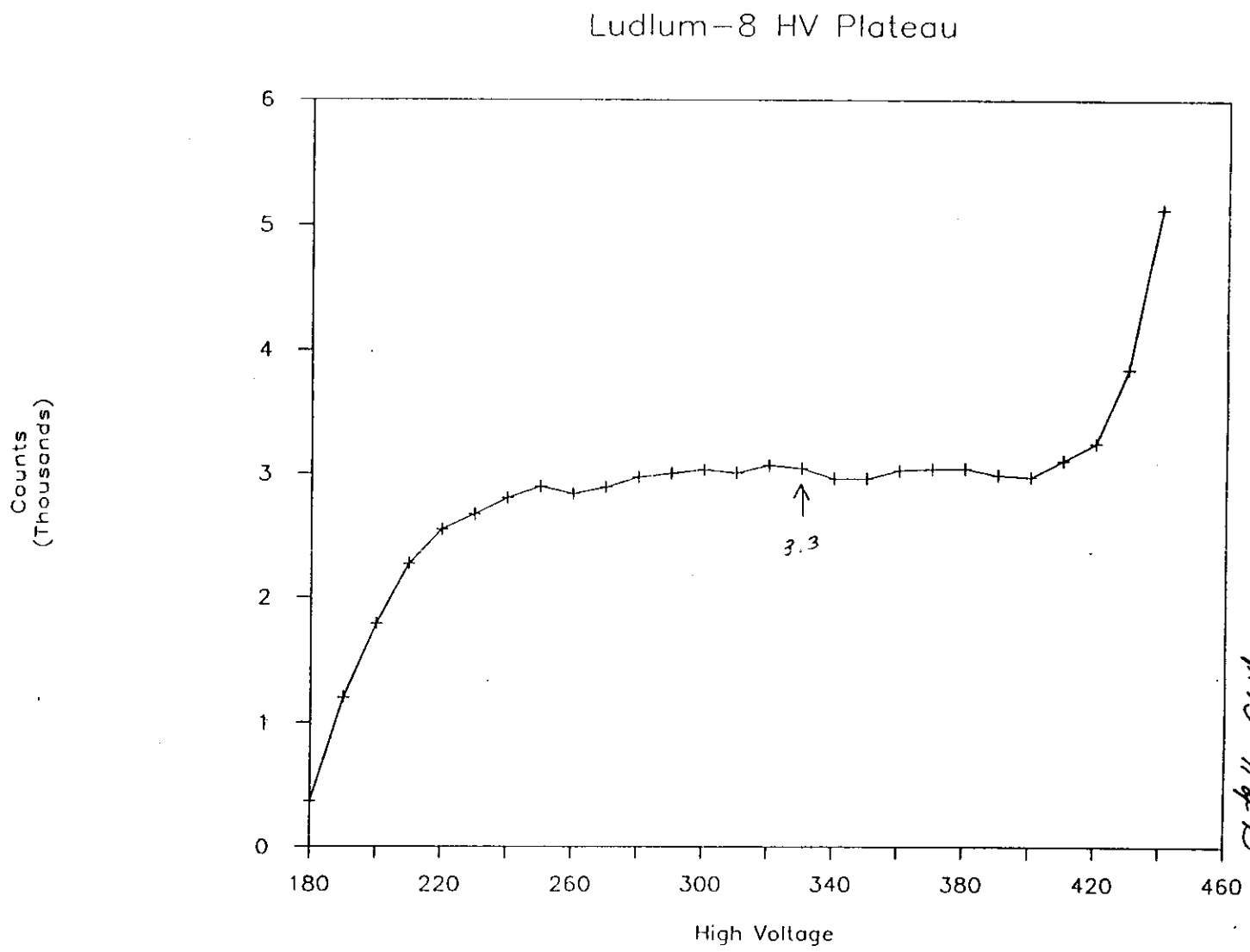

3-2497

BNW
54273

HV	Ludlum-8 WA94743	Ludlum-9 WA94745	Ludlum-10 WA94746	Ludlum-7 WB76864
180	367	845	304	867
190	1200	1550	1151	1480
200	1789	1950	1747	1912
210	2274	2400	2093	2204
220	2551	2443	2445	2584
230	2675	2600	2622	2637
240	2807	2640	2724	2804
250	2898	2777	2924	2908
260	2838	2778	2860	2991
270	2891	2904	2844	2958
280	2975	2830	2988	3019
290	3003	2794	2931	2979
300	3034	2868	3005	3099
310	3006	2943	2995	3073
320	3070	2955	2892	3071
330	3047	2821	3080	3126
340	2963	2919	3093	3039
350	2965	2865	2982	3277
360	3031	2867	3037	3837
370	3039	2895	3028	4514
380	3045	2875	2958	
390	2992	2854	3074	
400	2978	2904	3046	
410	3107	2989	3099	
420	3246	3358	3463	
430	3845	4538	4694	
440	5123			
450				
460				

Gene E Kozelsky 11/9/92

WHC-CD-WM-DP-145, REV. 1

LUDLUM 9

3-2499

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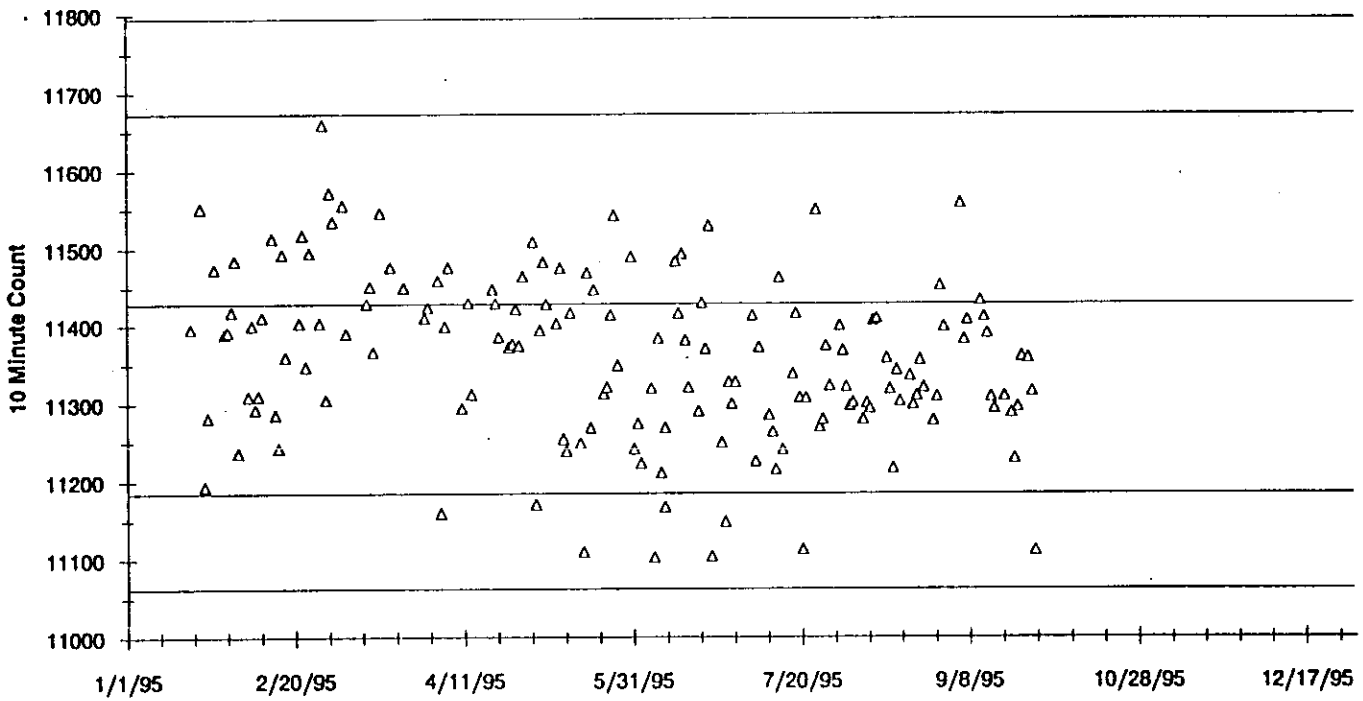
WHC-SD-WM-DP-145, REV. 1

Ludlum-9 Control Chart



L R Greenwood
9-29-95

3-2500

Ludlum-9 WA94745

High Voltage 3.30

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{16}$ = 1422.719 c/m ± 15.587 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1422.719 c/m ± 15.587 c/m = d/c

2.335175 ± 0.031065 = 0.4282 ~~d/c~~ c/d ± 1.33%

MK 3/29/93

Reviewed LR Greenwood date 2/12/93

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS Ludlum-9 Voltage @ 3.3 (WA 94775)
Calibration Counts with T-1350 ^{231}Pa

SAMPLE NUMBER		DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
21.902	1	2/5	L-9	10	+	14097	1409.7		0.092	1409.6		
	2				+	14258	1425.8			1425.7		
	3				+	14145	1414.5			1414.4		
	4				+	14453	1445.3			1445.2		
					+							
21.922	1				+	14337	1433.7			1433.6		
	2				+	14115	1411.5			1411.4		
	3				+	14017	1401.7			1401.6		
	4				+	14053	1405.3			1405.2		
					+							
					+							
					+							
					+							
					+							
					+							
21.902	1	2/8			+	14235	1423.8		0.081	1423.7		
	2				+	14337	1433.7			1433.6		
	3				+	14262	1426.2			1426.1		
	4				+	14435	1443.5			1443.4		
					+							
21.922	1				+	14141	1414.1			1414.0		
	2				+	13983	1398.3			1398.2		
	3				+	14123	1412.3			1412.2		
	4				+	14357	1435.7			1435.6		
					+							

3-2502

BNW 54273

HNC-CD-WM-DP-145, REV. 1

BNW
54273
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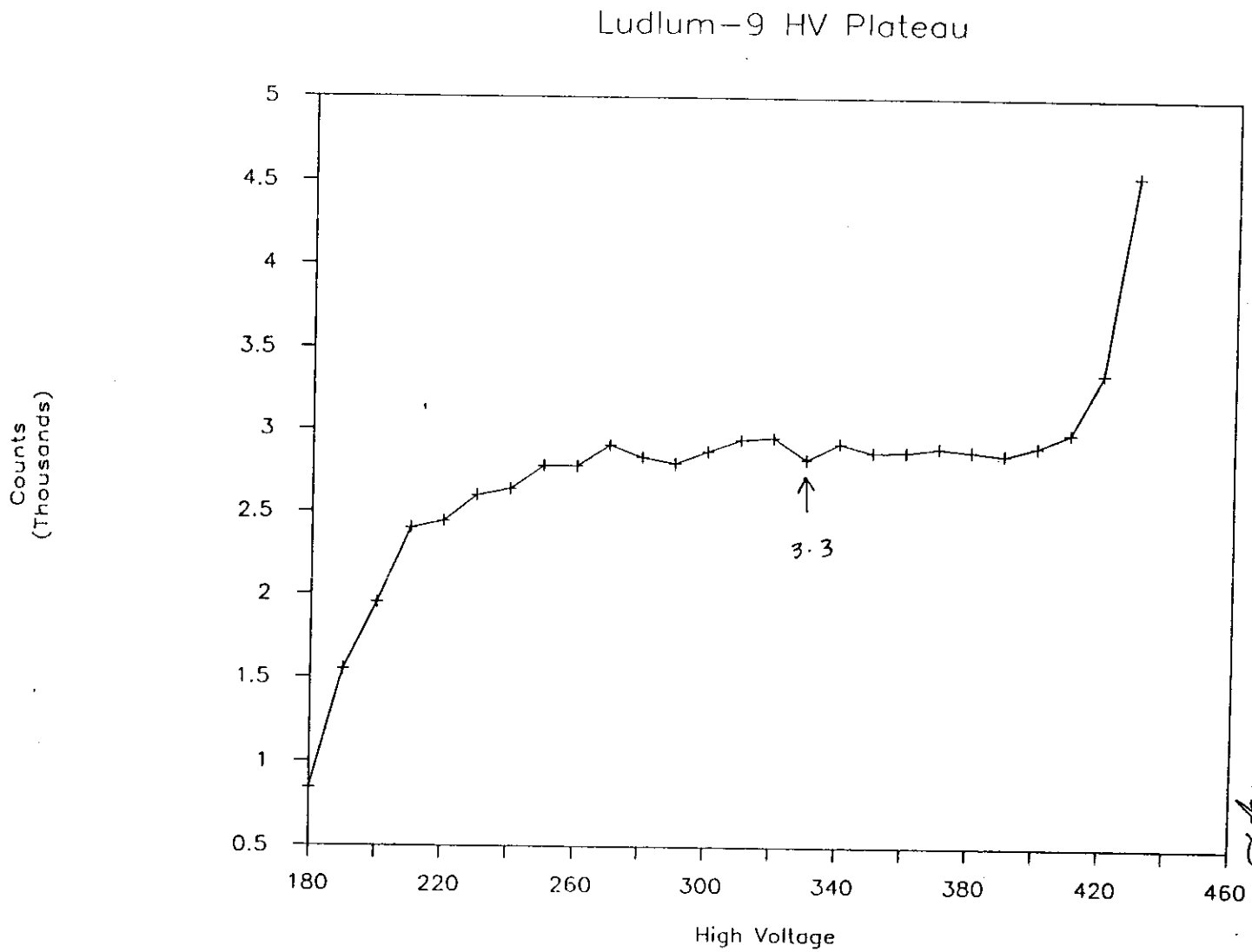
CD-WM-DP-145, REV. 1



BNW
54273

HV	Ludlum-8 WA94743	Ludlum-9 WA94745	Ludlum-10 WA94746	Ludlum-7 WB76864
180	367	845	304	867
190	1200	1550	1151	1480
200	1789	1950	1747	1912
210	2274	2400	2093	2204
220	2551	2443	2445	2584
230	2675	2600	2622	2637
240	2807	2640	2724	2804
250	2898	2777	2924	2908
260	2838	2778	2860	2991
270	2891	2904	2844	2958
280	2975	2830	2988	3019
290	3003	2794	2931	2979
300	3034	2868	3005	3099
310	3006	2943	2995	3073
320	3070	2955	2892	3071
330	3047	2821	3080	3126
340	2963	2919	3093	3039
350	2965	2865	2982	3277
360	3031	2867	3037	3837
370	3039	2895	3028	4514
380	3045	2875	2958	
390	2992	2854	3074	
400	2978	2904	3046	
410	3107	2989	3099	
420	3246	3358	3463	
430	3845	4538	4694	
440	5123			
450				
460				

Gene E Kozelisky 11/9/92

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WMO-CD-WM-DP-145, REV. 1

LUDLUM 10

3-2505

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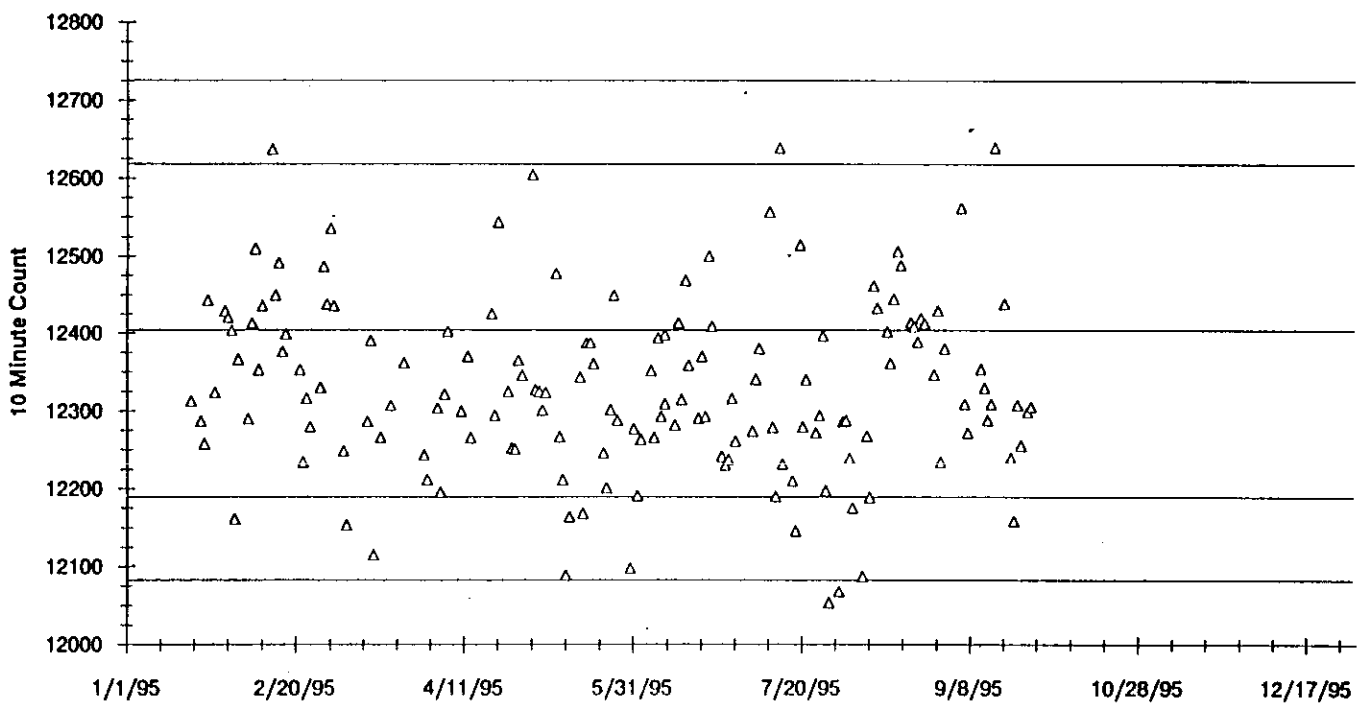
3-2506

Ludlum-10 Control Chart



J R Greenwood
9-29-95

HC-CD-WM-DP 145 REV. 1

Ludlum-10 WA94746

High Voltage 3.30

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m } HEDL-N-3219 page 3

$\overline{X}_2$ = 3322.5 ± 25.067 d/m

Observed Counts:

$\overline{X}_{16}$ = 1402.781 c/m ± 16.529 c/m

Calculation:

3322.5 ± 25.067 d/m ÷ 1402.781 c/m ± 16.529 c/m = d/c

2.368509 ± 0.033139 = 0.4222 ~~d/c~~ c/d ± 1.40% 3/29/93 ASK

Reviewed LR Greenwood date 2/12/93

3-2507

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ALPHA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS Ludlum-10 Voltage @ 3.3 (WA94746)
Calibration Counts with T-1350 ^{239}Pu

SAMPLE NUMBER		DATE 19 93	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	2/5	L-10	10	+	13948	1394.8		0.078	1394.7		
	2				+	13958	1395.8			1395.7		
	3				+	13953	1395.3			1395.2		
	4				+	14375	1437.5			1437.4		
					+							
24.92λ	1				+	14020	1402.0			1401.9		
	2				+	13707	1370.7			1370.6		
	3				+	13820	1382.0			1381.9		
	4				+	13913	1391.3			1391.2		
					+							
					+							
					+							
					+							
					+							
					+							
24.90λ	1	2/8			+	14232	1423.2		0.059	1423.1		
	2				+	14029	1402.9			1402.8		
	3				+	13949	1394.8			1394.7		
	4				+	14185	1418.5			1418.4		
					+							
24.92λ	1				+	14055	1405.5			1405.4		
	2				+	14022	1402.2			1402.1		
	3				+	14221	1422.1			1422.0		
	4				+	14075	1407.5			1407.4		
					+							

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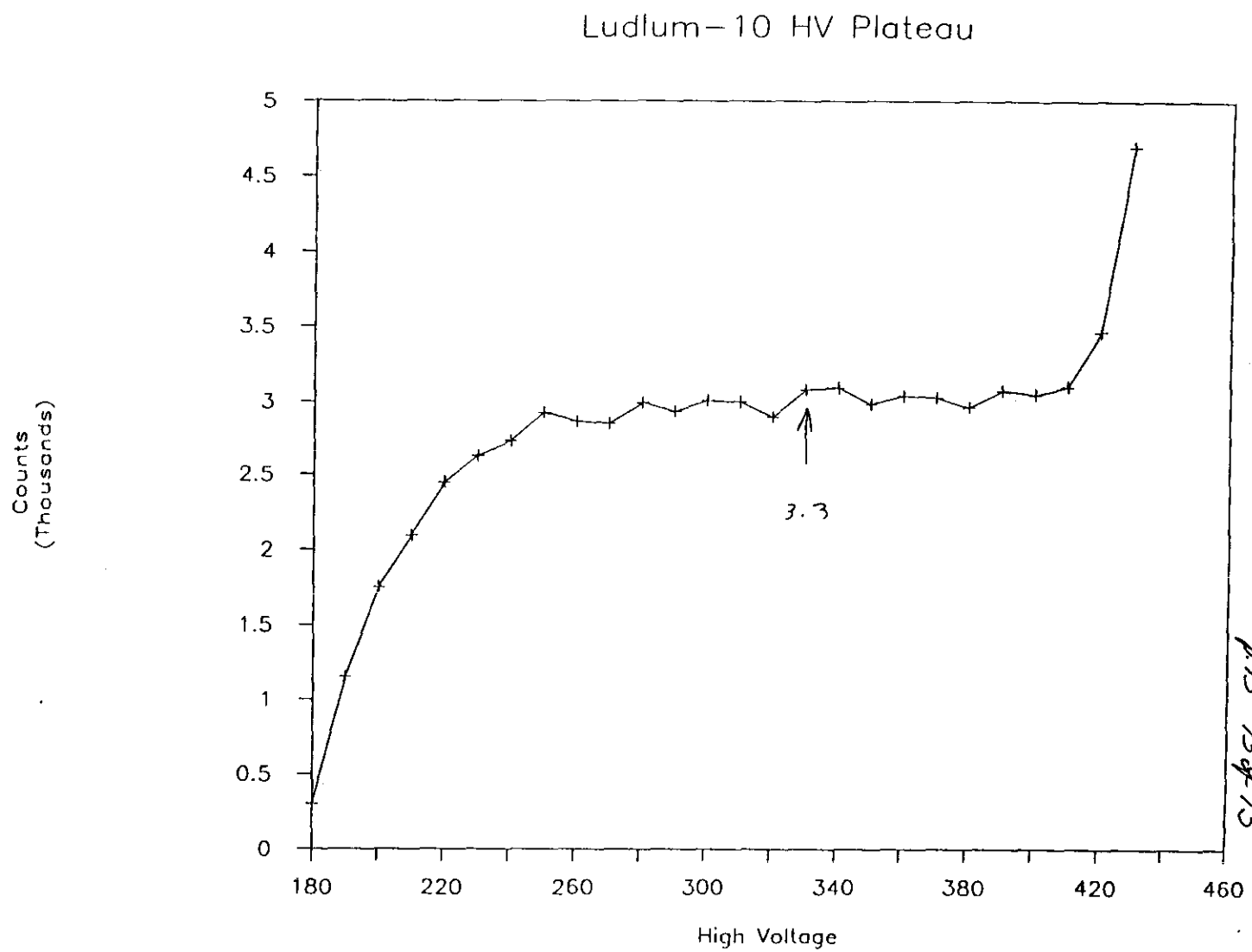
BNW 54273

WHC-CD-WM-DP-145, REV. 1

3-2508



KMO-CD-MM-DP-145, REV. 1
BNW
54273
p.13 13 of 13

BNW

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HV	Ludlum-8 WA94743	Ludlum-9 WA94745	Ludlum-10 WA94746	Ludlum-7 WB76864
180	367	845	304	867
190	1200	1550	1151	1480
200	1789	1950	1747	1912
210	2274	2400	2093	2204
220	2551	2443	2445	2584
230	2675	2600	2622	2637
240	2807	2640	2724	2804
250	2898	2777	2924	2908
260	2838	2778	2860	2991
270	2891	2904	2844	2958
280	2975	2830	2988	3019
290	3003	2794	2931	2979
300	3034	2868	3005	3099
310	3006	2943	2995	3073
320	3070	2955	2892	3071
330	3047	2821	3080	3126
340	2963	2919	3093	3039
350	2965	2865	2982	3277
360	3031	2867	3037	3837
370	3039	2895	3028	4514
380	3045	2875	2958	
390	2992	2854	3074	
400	2978	2904	3046	
410	3107	2989	3099	
420	3246	3358	3463	
430	3845	4538	4694	
440	5123			
450				
460				

Anne E Kozelisky 11/9/92

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WHC-CD-WM-DP-145, REV. 1

PROPORTIONAL ALPHA COUNTERS (PAC) USED FOR TOTAL ALPHA AND Pu PAC 1 PAC 2

3-2511

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HQ-CD-WM-DP-145, REV. 1

PAC 1
NOTE: RAW DATA FOR PAC 1, PAC 2 AND G.E.A.S.C. ON SAME SHEETS

3-2512

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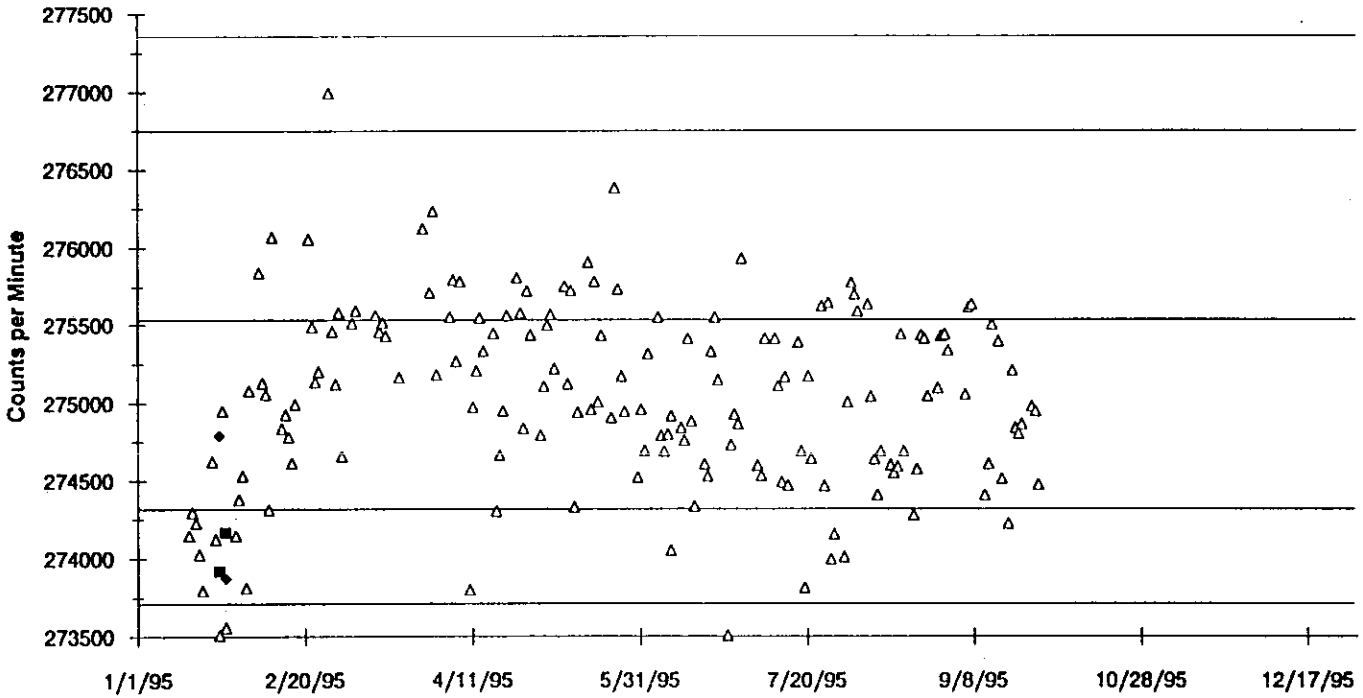
P.A.C.-1 Control Chart



WHC-CD-WM-DP-145, REV. 1

3-2513

LRGreenwood
9-29-95

WHC-CD-WM-DP-145, REV. 1

BNW52341 page 59

have Lloyd make corrections then re xerox

P.A.C.-1 WM00579

High Voltage 2450

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}_4$ 1690.8750 c/m

$\bar{X}_4$ 1695.3500 c/m

$\bar{X}_8$ 1693.1125 c/m ± 44.1981 c/m

3321 d/m + 1693.1125 c/m = 1.9615 d/c

c/d ~~d/c~~ = 0.5098 ± 2.82%

24.92μL $\bar{X}_4$ 1688.2750 c/m

$\bar{X}_4$ 1690.4000 c/m

$\bar{X}_8$ 1689.3375 c/m ± 35.4788 c/m

3324 d/m + 1689.3375 c/m = 1.9676 d/c

c/d ~~d/c~~ = 0.5082 ± 1.14%

$\bar{X}_2$ = 0.5090 ± 2.15%

Reviewed L S Killgg date 11-13-90

Entered 11-14-90 [illegible]

WHC-CD-WM-DP-145, REV 1

P.A.C - WM00579
High Voltage 2450
T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m

24.90μL X_4 1690.8750 c/m
X_4 1695.3500 c/m
X_8 1693.1125 c/m ± 44.1981 c/m

3321 d/m ÷ 1693.1125 c/m = 1.9615 d/c
c/d = 0.5098 ± 2.82%

24.92μL X_4 1688.2750 c/m
X_4 1690.4000 c/m
X_8 1689.3375 c/m ± 35.4788 c/m

3324 d/m ÷ 1689.3375 c/m = 1.9676 d/c
c/d = 0.5082 ± 1.14%

X_2 = 0.5090 ± 2.15%

Reviewed: LS Kellogg Date: 11/13/90

WHC-CD-WM-DP-145, Rev. 1

Entered 11-14-90 Anne E Kozelisky

BATTELLE-NORTHWEST RICHLAND, WASHINGTON	ALPHA COUNTER DATA SHEET
SAMPLE P.A.C.-1 WM00579	REMARKS Voltage 2450
SUBMITTED BY	Efficiency Determination
COUNTED BY Anne E Kozelisky	

SAMPLE NUMBER		DATE 19 90	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF:	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	11/7		10	+	16736						
	2				+	16887						
	3				+	16982						
	4				+	17030						
					+							
24.92λ	1				+	16877						
	2				+	16797						
	3				+	16832						
	4				+	17025						
					+							
					+							
					+							
					+							
					+							
					+							
24.90λ	1	11/9			+	17037						
	2				+	16705						
	3	11/12			+	17033						
	4				+	17039						
					+							
24.92λ	1				+	16856						
	2				+	16942						
	3				+	16761						
	4				+	057						
					+							

3-2516

Control Charts and Backgrounds

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.A.C. 1	1/1/95	275533	276748.162	274317.838	277355.743	273710.257
	12/31/95	275533	276748.162	274317.838	277355.743	273710.257

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.A.C. 2	1/1/95	277339	278521.214	276156.786	279112.321	275565.679
	12/31/95	277339	278521.214	276156.786	279112.321	275565.679

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
G.E. A.S. C	1/1/95	24004.8	24299.532	23710.068	24446.898	23562.702
	12/31/95	24004.8	24299.532	23710.068	24446.898	23562.702

Control Charts and Backgrounds

	P.A.C.-1		P.A.C.-2		G.E. A.S.C.	
Date	min. bkg.	10 min. count	100 min. bkg.	10 min. count	900 min. bkg.	10 min. count
1/16/95	0.87	274149	3.75	277050	0.380	24050
1/17/95	0.89	274296	2.86	276627	0.384	24149
1/18/95	0.97	274227	3.02	277120	0.362	23967
1/19/95	1.03	274027	2.43	276537	0.403	24128
1/20/95	0.87	273797	2.57	275850	0.331	24059
1/23/95	0.09	274622	2.27	277079	0.340	23861
1/24/95	0.97	274125	2.27	276828	0.366	24053
1/25/95	0.84	273510	2.30	276365	0.369	23788
1/26/95	0.96	274950	2.47	277065	0.376	23698
1/27/95	0.86	273560	2.40	276613	0.320	24015
1/30/95	0.90	274149	2.40	276102	0.326	24243
1/31/95	1.08	274378	2.78	276286	0.402	23949
2/01/95	0.86	274531	2.95	276686	0.366	23899
2/02/95	1.00	273813	2.26	276983	0.397	24084
2/03/95	0.91	275080	2.07	277649	0.343	23918
2/06/95	0.77	275841	2.26	276671	0.373	24229
2/07/95	0.82	275130	2.20	277630	0.356	23898
2/08/95	0.69	275056	2.50	276456	0.378	24061
2/09/95	0.61	274315	2.46	277130	0.322	24223
2/10/95	0.78	276070	2.41	277802	0.353	23898
2/13/95	0.91	274836	2.59	276958	0.356	23814
2/14/95	0.89	274925	2.39	276796	0.353	24143
2/15/95	0.68	274783	2.27	276683	0.347	24016
2/16/95	0.74	274611	2.71	278132	0.354	24289
2/17/95	1.24	274992	2.94	277076	0.415	24099
2/21/95	0.98	276055	2.69	276952	0.458	24153
2/22/95	0.65	275487	2.61	276237	0.511	24170
2/23/95	0.76	275135	2.41	277297	0.450	23934
2/24/95	0.75	275201	2.65	276681	0.437	24173
2/27/95	1.06	276991	2.93	276561	0.490	24276
2/28/95	0.95	275459	2.29	275939	0.414	24187
3/01/95	0.79	275124	2.05	276978	0.416	24208
3/02/95	1.04	275579	2.74	277381	0.453	24101
3/03/95	0.74	274658	2.50	277291	0.486	24409
3/06/95	1.00	275510	3.20	276952	0.462	23816
3/07/95	0.86	275595	2.80	277352	0.431	23991
3/13/95	0.86	275564	3.31	277686	na	na
3/14/95	0.94	275458	2.58	276927	na	na
3/15/95	0.85	275516	2.34	276062	0.472	24026
3/16/95	0.95	275429	2.25	276447	0.526	23939
3/20/95	0.87	275165	2.48	277006	0.408	23941
3/27/95	0.84	276125	2.49	276095	na	na

Control Charts and Backgrounds

	P.A.C.-1		P.A.C.-2		G.E. A.S.C.	
Date	min. bkg.	10 min. count	100 min. bkg.	10 min. count	900 min. bkg.	10 min. count
3/29/95	0.93	275710	2.21	275873	0.483	24128
3/30/95	0.76	276233	2.40	276591	0.480	24193
3/31/95	0.83	275182	2.49	276255	0.486	24353
4/03/95	na	na	na	na	0.451	24252
4/04/95	1.14	275554	2.28	276521	0.429	23781
4/05/95	1.18	275795	2.39	277189	0.463	24176
4/06/95	0.12	275268	2.63	276748	0.431	24010
4/07/95	1.02	275782	2.29	277419	0.503	23914
4/10/95	1.02	273800	2.80	276495	0.476	24046
4/11/95	0.93	274974	2.37	277015	0.483	24144
4/12/95	1.14	275205	2.38	277379	0.473	24039
4/13/95	1.13	275547	2.11	276654	0.470	24027
4/14/95	1.08	275332	2.62	277004	0.471	23991
4/17/95	1.17	275445	2.00	276612	0.483	24473
4/18/95	1.18	274303	2.43	276287	0.518	24081
4/19/95	1.25	274663	2.45	276591	0.501	23747
4/20/95	1.09	274950	2.53	275711	0.474	24019
4/21/95	1.06	275560	2.68	276285	0.451	24147
4/24/95	0.96	275809	2.45	277132	0.454	23699
4/25/95	1.12	275578	2.37	277312	HIGHbk	23995 Clean ASC TTL 9/29/9
4/26/95	1.15	274838	2.70	276900	0.414	24289
4/27/95	1.04	275723	2.65	276767	0.394	24018
4/28/95	1.03	275437	2.54	276236	0.383	24029
5/01/95	1.24	274791	2.31	275992	0.406	23766
5/02/95	1.18	275104	2.59	276636	0.404	24165
5/03/95	1.19	275498	2.51	277303	0.443	24167
5/04/95	1.04	275567	2.56	276861	0.402	23911
5/05/95	1.17	275220	2.39	276162	0.427	23880
5/08/95	1.08	275752	2.63	276683	0.407	23925
5/09/95	1.13	275122	2.55	276965	0.423	23862
5/10/95	1.25	275726	2.26	276069	0.412	23708
5/11/95	1.14	274332	2.61	277609	0.457	24174
5/12/95	1.11	274941	2.44	276148	0.478	24050
5/15/95	1.26	275907	2.23	276787	0.422	23955
5/16/95	1.14	274958	2.38	276715	0.432	23988
5/17/95	1.33	275783	2.89	275884	0.434	24058
5/18/95	1.16	275006	2.44	276370	0.386	24025
5/19/95	1.31	275432	2.76	275981	0.410	24051
5/22/95	1.14	274907	2.44	276416	0.426	24191
5/23/95	1.23	276383	2.48	277137	0.523	24109
5/24/95	1.14	275732	2.29	276855	0.548	24045
5/25/95	1.19	275171	2.40	276490	0.464	24182

Control Charts and Backgrounds

	P.A.C.-1		P.A.C.-2		G.E. A.S.C.	
Date	min. bkg.	10 min. count	100 min. bkg.	10 min. count	900 min. bkg.	10 min. count
5/26/95	0.99	274944	2.69	275710	0.422	23878
5/30/95	1.48	274519	2.39	278253	0.436	23969
5/31/95	1.10	274958	2.77	277490	0.438	24242
6/01/95	1.12	274691	2.43	277412	0.372	23945
6/02/95	1.09	275315	2.81	276732	0.446	24145
6/05/95	1.23	275551	2.75	276253	0.487	23895
6/06/95	1.03	274788	2.63	276482	0.467	23907
6/07/95	1.21	274689	2.25	276392	0.468	24186
6/08/95	0.93	274799	2.20	276331	0.433	24096
6/09/95	0.97	274915	2.52	276253	0.448	24190
6/09/95		274053		277466		23950
6/12/95	0.82	274839	2.18	276088	0.460	24088
6/13/95	1.09	274757	2.58	276449	0.448	24221
6/14/95	1.05	275413	2.39	276842	0.441	23985
6/15/95	1.08	274882	2.56	276142	0.472	24070
6/16/95	0.85	274335	2.57	276733	0.453	23978
6/19/95	1.17	274605	2.91	276413	0.469	24171
6/20/95	1.05	274526	2.53	277148	0.426	24053
6/21/95	0.78	275331	2.30	276384	0.469	23686
6/22/95	0.65	275551	2.25	277004	0.443	23716
6/23/95	0.82	275148	2.33	276766	0.454	23872
6/26/95	0.96	273509	2.13	272093	0.442	24291
6/27/95	0.75	274729	2.19	276422	0.398	24398
6/28/95	1.52	274926	2.43	267033	0.412	24277
6/29/95	0.77	274864	2.44	275278	0.459	23988
6/30/95	0.70	275933	2.62	276819	0.474	24275
7/05/95	0.67	274594	2.52	276337	0.462	24175
7/06/95	0.84	274530	2.09	275800	0.441	24193
7/07/95	0.81	275410	2.35	275954	0.469	23973
7/10/95	0.78	275412	2.29	277013	0.431	24204
7/11/95	0.84	275108	2.39	277561	0.447	23956
7/12/95	0.94	274489	2.59	276669	0.461	23977
7/13/95	0.85	275168	2.61	277447	0.434	23989
7/14/95	0.91	274470	2.40	276584	0.386	23953
7/17/95	0.89	275387	2.57	275959	0.408	24053
7/18/95	0.97	274689	2.57	276239	0.408	24100
7/19/95	0.87	273814	2.53	275979	0.411	24156
7/20/95	0.95	275169	2.67	276234	0.449	24176
7/21/95	1.02	274639	2.72	276290	0.432	23928
7/24/95	0.84	275622	2.50	276993	0.426	24145
7/25/95	1.03	274465	2.50	276151	0.404	23845
7/26/95	1.08	275642	2.84	276156	0.442	23894

1+2 mtbkg TTL 9120

WHC-CD-WM-DP-145, REV. 1

Control Charts and Backgrounds

	P.A.C.-1		P.A.C.-2		G.E. A.S.C.		
Date	min. bkg.	10 min. count	100 min. bkg.	10 min. count	900 min. bkg.	10 min. count	
7/27/95	0.74	273998	2.54	276496	0.442	23894	electronics TTL 9/20
7/28/95	1.01	274154	2.65	276417	0.442	23894	out for repair
7/31/95	1.02	274012	2.65	277132	0.442	23894	
8/01/95	1.01	275006	2.67	277309	0.442	23894	
8/02/95	1.03	275772	2.83	277427	0.442	23894	
8/03/95	0.92	275699	2.76	277430	0.442	23894	
8/04/95	1.01	275589	2.80	276883	0.442	23894	
8/07/95	0.91	275633	2.72	276983	0.442	23894	
8/08/95	1.07	275039	2.63	276899	0.442	23894	
8/09/95	1.23	274636	2.47	276195	0.442	23894	
8/10/95	1.24	274407	2.36	276241	0.442	23894	
8/11/95	1.17	274690	2.85	275819	0.442	23894	
8/14/95	1.24	274600	2.80	276722	0.442	23894	
8/15/95	1.24	274547	3.00	276634	0.442	23894	
8/16/95	1.46	274590	2.61	277338	0.442	23894	
8/17/95	1.25	275439	2.47	276327	0.442	23894	
8/18/95	1.42	274688	2.27	277287	0.442	23894	
8/21/95	1.32	274279	2.11	276575	0.442	23894	
8/22/95	1.27	274573	2.64	276852	0.442	23894	installed new electronics TTL 9/20/
8/23/95	1.32	275432	2.62	277204	0.442	24151	
8/24/95	1.16	275412	2.70	277259	0.426	24099	
8/25/95	1.45	275044	2.65	275742	0.391	24121	
8/28/95	1.50	275094	2.76	276476	0.389	24154	
8/29/95	1.48	275428	2.77	276544	0.466	23913	
8/30/95	1.37	275439	2.40	277301	0.424	23949	
8/31/95	1.52	275336	2.89	275804	0.543	24480	GEASC hi clean 8/31/95 TTL 9/20/95
9/05/95	1.45	275054	2.93	275256	na	24145	
9/06/95	0.85	275614	2.13	275522	0.476	24407	
9/07/95	0.82	275633	2.49	275766	0.472	24403	
9/11/95	0.93	274408	2.69	275693	0.415	24073	
9/12/95	0.87	274606	2.39	275922	0.433	23984	
9/13/95	0.95	275502	2.36	275733	0.468	24243	
9/14/95	0.81		2.32		0.426	24148	
9/15/95	0.77	275396	2.53	275734	0.498	24045	
9/16/95	0.85	274509	2.73	275701			
9/18/95	0.77	274224	2.23	275261	0.467	24269	
9/19/95	1.08	275210	2.24	276460	0.468	24209	
9/20/95	0.98	274840	2.73	275542	0.463	24154	

L R Greenwood
9-29-95

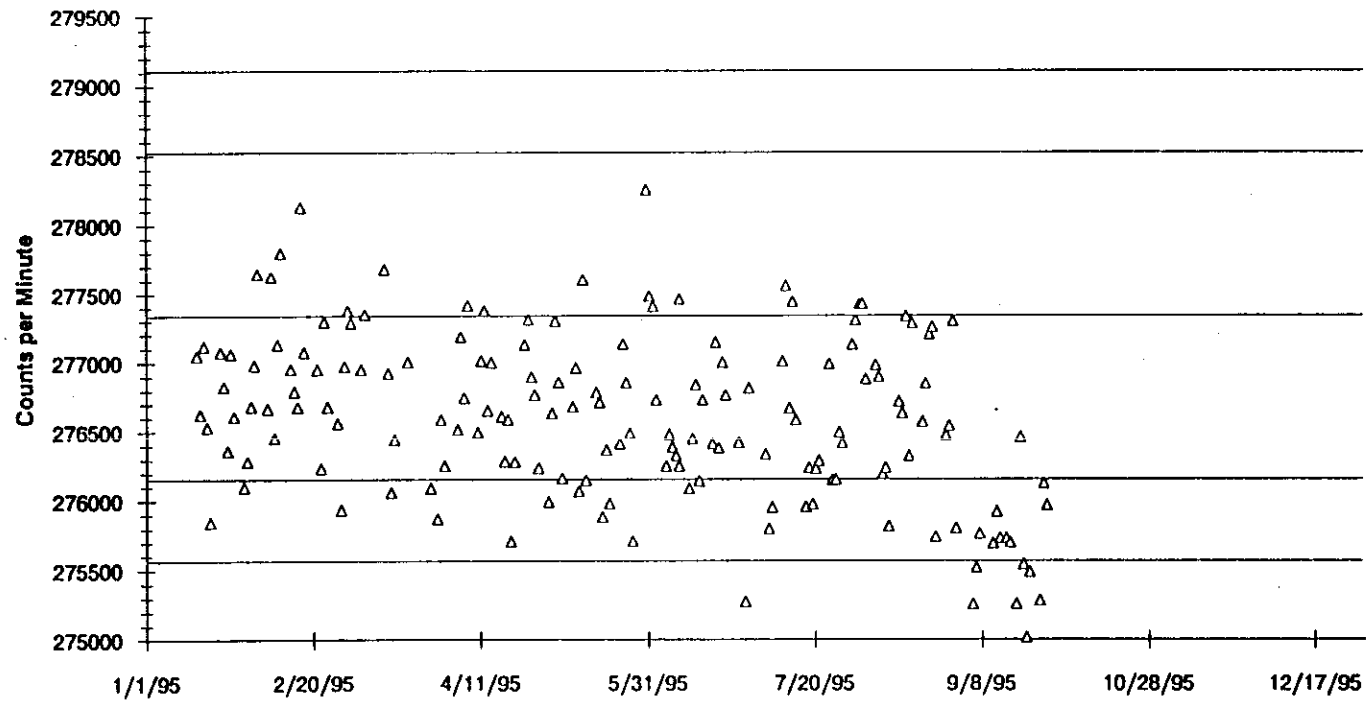
WHC-CD-WM-DP-145, REV. 1

PAC 2

3-2522

3-2523

P.A.C.-2 Control Chart



WHC-CD-WM-DP-145, REV. 1

L R Greenwood
9-29-95

P.A.C.-2 WM00582

High Voltage 2500

T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m
} HEDL-N-3219 page 3

24.90μL $\bar{X}_4$ 1684.2750 c/m

$\bar{X}_4$ 1680.3250 c/m

$\bar{X}_8$ 1682.3000 c/m ± 6.25 c/m

3321 d/m + 1682.3000 c/m = 1.9741 d/c

OK ~~c/d~~ = 0.5066 ± 1.13%

24.92μL $\bar{X}_4$ 1678.4000 c/m

$\bar{X}_4$ 1668.4250 c/m

$\bar{X}_8$ 1673.4125 c/m ± 6.89 c/m

3324 d/m + 1673.4125 c/m = 1.9864

c/d = 0.5034 ± 1.1%

$\bar{X}_2$ = 0.5050 ± 1.6%

Reviewed L S Kellogg date 11/20/90

Entered 12-6-90 Anne E Hopkins

P.A.C.-2 WM00582
High Voltage 2500
T1350 NBS Calibration Summary

24.90μL 3321 ± 35.4 d/m
24.92μL 3324 ± 35.5 d/m

24.90μL X_4 1684.2750 c/m
X_4 1680.3250 c/m
X_8 1682.3000 c/m ± 6.25 c/m

3321 d/m ÷ 1682.3000 c/m = 1.9741 d/c
c/d = 0.5066 ± 1.13%

24.92μL X_4 1678.4000 c/m
X_4 1668.4250 c/m
X_8 1673.4125 c/m ± 6089 c/m

3324 d/m ÷ 1673.4125 c/m = 1.9864 d/c
c/d = 0.5034 ± 1.1%

X_2 = 0.5050 ± 1.6%

Reviewed: LS Kellogg Date: 11/20/90

Entered 12-6-90 Anne C Hopkins

BATTELLE-NORTHWEST RICHLAND, WASHINGTON	ALPHA COUNTER DATA SHEET
SAMPLE	REMARKS P.A.C.-2 WM00582
SUBMITTED BY	Voltage 2500
COUNTED BY	Efficiency Determination

SAMPLE NUMBER		DATE 19 90	INST. NO.	INT. (MIN.) T	RECORDER READING SCALE OF 1	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R − B + C	GEOMETRY %	DISINTEGRATION RATE d/m
24.90λ	1	11-14		10	+	16818						
	2				+	16966						
	3				+	~~16570~~						
	4				+	16815						
	RC 3				+	16772						
24.92λ	1				+	16779						
	2				+	16718						
	3				+	16850						
	4				+	16789						
					+							
24.90λ	1	11-16			+	16771						
	2				+	16914						
	3				+	16853						
	4				+	16675						
					+							
24.92	1	11-19			+	16840						
	2				+	16625						
	3				+	16700						
	4				+	16572						
					+							

3-2526

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BNW52341 p. 64

WHC-CD-WM-DP-145, REV. 1

MTC-CD-WM-DP-145, REV. 1

PROPORTIONAL BETA COUNTERS (PBC) USED FOR TOTAL BETA, SR-90 PBC 1 PBC 2

3-2527

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WHC-CD-WM-DP-145, REV. 1

PBC 1

3-2528

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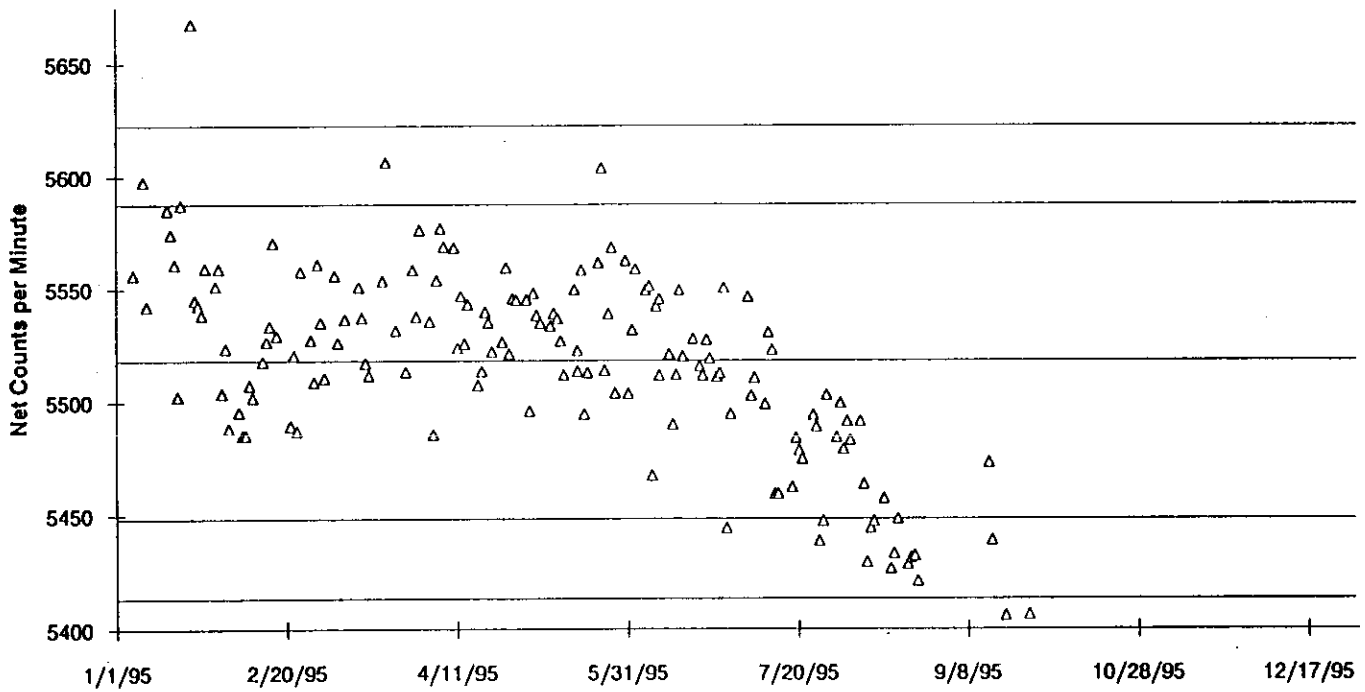
3-2529

P.B.C.-1 Tc-99 Control Chart

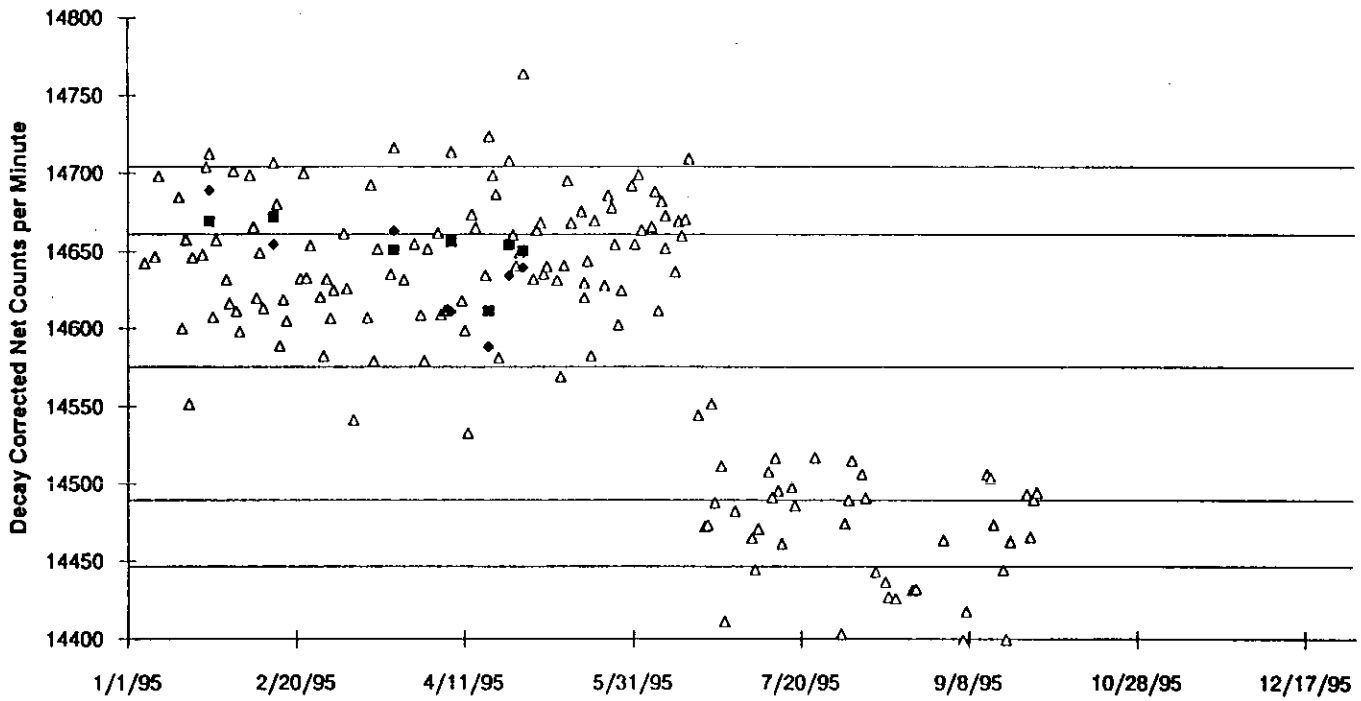


WMC-CD-WM-DP-145, REV. 1

Detector out of service.
L R Greenwood
9-29-95

3-2530

P.B.C.-1 SrY-90 Control Chart



WHC-CD-WM-DP-145, REV. 1

Detector out of service.
Y R Greenwood
9-29-95

Control Chart Information

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.B.C.-1 Tc-99	34700	5518.05	5587.78	5448.32	5622.65	5413.45
	35064	5518.05	5587.78	5448.32	5622.65	5413.45

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.B.C.-1 SrY-90	1/1/95	14575.27	14661.15	14489.4	14704.08	14446.47
	12/31/95	14575.27	14661.15	14489.4	14704.08	14446.47

P.B.C.-1 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm
1/06/95	32.77	137111	14642.52	55893	5556.53
1/09/95	31.59	137112	14646.79	56295	5597.91
1/10/95	31.90	137583	14697.85	55743	5542.40
1/16/95	31.43	137399	14684.46	56169	5585.47
1/17/95	31.51	136604	14600.18	56063	5574.79
1/18/95	31.21	137128	14657.60	55924	5561.19
1/19/95	31.58	136134	14551.68	55340	5502.42
1/20/95	30.80	137000	14646.26	56183	5587.50
1/23/95	31.68	136997	14647.89	56995	5667.82
1/24/95	33.10	137523	14703.71	55783	5545.20
1/25/95	32.23	137586	14712.37	55749	5542.67
1/26/95	31.77	136593	14607.39	55703	5538.53
1/27/95	30.91	137040	14657.19	55905	5559.59
1/30/95	32.37	136789	14631.62	55839	5551.53
1/31/95	32.61	136640	14616.35	55919	5559.29
2/01/95	31.60	137412	14701.18	55355	5503.90
2/02/95	31.40	136560	14610.99	55550	5523.60
2/03/95	31.05	136428	14598.17	55195	5488.45
2/06/95	31.09	137337	14698.53	55268	5495.71
2/07/95	31.77	137028	14665.62	55170	5485.23
2/08/95	30.54	136580	14619.84	55157	5485.16
2/09/95	31.10	136853	14649.50	55386	5507.50
2/10/95	32.62	136521	14613.21	55347	5502.08
2/13/95	31.52	137354	14706.68	55495	5517.98
2/14/95	31.96	137099	14679.81	55587	5526.74
2/15/95	31.50	136238	14588.85	55650	5533.50
2/16/95	32.75	136521	14618.85	56038	5571.05
2/17/95	35.58	136411	14604.97	55650	5529.42
2/21/95	34.50	136621	14632.53	55240	5489.50
2/22/95	35.12	137248	14700.16	55557	5520.58
2/23/95	33.43	136595	14632.82	55206	5487.17
2/24/95	34.65	136795	14653.95	55928	5558.15
2/27/95	33.73	136447	14620.46	55612	5527.47
2/28/95	33.39	136078	14582.15	55423	5508.91
3/01/95	33.81	136540	14632.29	55952	5561.39
3/02/95	34.04	136295	14606.69	55692	5535.16
3/03/95	34.12	136457	14624.97	55448	5510.68
3/06/95	33.55	136762	14661.25	55898	5556.25
3/07/95	34.12	136431	14626.03	55604	5526.28
3/09/95	34.62	135628	14541.11	55713	5536.68
3/13/95	34.94	136209	14607.07	55861	5551.16
3/14/95	33.15	136975	14692.32	55706	5537.45
3/15/95	33.16	135914	14579.19	55505	5517.34
3/16/95	33.40	136582	14651.73	55451	5511.70
3/20/95	33.58	136394	14635.18	55876	5554.02
3/21/95	34.20	137145	14716.26	56406	5606.40
3/24/95	34.75	136337	14631.65	55664	5531.65

P.B.C.-1 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm
3/27/95	32.73	136505	14654.79	55462	5513.47
3/29/95	33.42	136065	14608.63	55924	5558.98
3/30/95	33.23	135780	14579.12	55710	5537.77
3/31/95	34.18	136454	14651.61	56108	5576.62
4/03/95	33.16	136511	14661.74	55688	5535.64
4/04/95	34.30	136025	14609.15	55200	5485.70
4/05/95	34.33	136038	14611.49	55885	5554.17
4/06/95	33.73	136030	14612.23	56110	5577.27
4/07/95	34.84	136972	14713.45	56042	5569.36
4/10/95	34.56	136055	14617.89	56033	5568.74
4/11/95	33.42	135857	14598.75	55573	5523.88
4/12/95	35.12	135251	14532.60	55821	5546.98
4/13/95	34.62	136543	14673.29	55605	5525.88
4/14/95	35.81	136470	14665.11	55790	5543.19
4/17/95	34.68	136148	14634.53	55421	5507.42
4/18/95	35.13	136969	14723.49	55488	5513.67
4/19/95	34.74	136724	14698.48	55747	5539.96
4/20/95	34.81	136605	14686.54	55700	5535.19
4/21/95	35.07	135622	14581.27	55574	5522.33
4/24/95	33.83	136758	14707.97	55602	5526.37
4/25/95	35.23	136321	14660.31	55950	5559.77
4/26/95	34.45	136124	14640.88	55557	5521.25
4/27/95	34.75	136197	14649.39	55806	5545.85
4/28/95	33.85	137243	14764.13	55790	5545.15
5/01/95	34.22	135996	14632.15	55796	5545.38
5/02/95	31.91	136257	14663.76	55280	5496.09
5/03/95	33.42	136304	14668.17	55817	5548.28
5/04/95	34.01	136000	14635.70	55724	5538.39
5/05/95	35.10	136044	14640.24	55702	5535.10
5/08/95	35.84	135944	14631.54	55695	5533.66
5/09/95	36.10	135359	14569.09	55753	5539.20
5/10/95	36.82	136026	14641.26	55736	5536.78
5/11/95	45.69	136605	14695.15	55726	5526.91
5/12/95	41.14	136302	14668.32	55531	5511.96
5/15/95	41.09	136342	14675.60	55909	5549.81
5/16/95	40.54	135815	14620.26	55542	5513.66
5/16/95	31.66	135815	14629.85	55542	5522.54
5/17/95	30.49	135924	14643.85	55892	5558.71
5/18/95	30.13	135340	14582.14	55249	5494.77
5/19/95	29.75	136139	14669.79	55427	5512.95
5/22/95	29.75	135724	14627.87	55917	5561.95
5/23/95	29.76	136251	14685.75	56337	5603.94
5/24/95	30.82	136180	14677.90	55448	5513.98
5/25/95	30.03	135946	14654.45	55690	5538.97
5/26/95	29.69	135454	14602.62	55985	5568.81
5/27/95	29.93	135655	14625.04	55340	5504.07
5/30/95	30.09	136248	14691.85	55930	5562.91

P.B.C.-1 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	Sr/Y-90	Decay-Corrected cpm	Tc-99	ccpm
5/31/95	32.70	135924	14654.98	55364	5503.70
6/01/95	30.40	136300	14699.07	55624	5532.00
6/02/95	29.85	135961	14663.99	55889	5559.05
6/05/95	29.91	135952	14665.86	55795	5549.59
6/06/95	30.43	136155	14688.21	55821	5551.67
6/07/95	29.07	135423	14611.50	54966	5467.53
6/08/95	30.57	136082	14682.10	55728	5542.23
6/09/95	30.28	135985	14672.90	55421	5511.82
6/09/95	30.28	135793	14652.13	55758	5545.52
6/12/95	29.91	135623	14637.04	55509	5520.99
6/13/95	28.99	135904	14669.40	55190	5490.01
6/14/95	29.97	135817	14659.90	55421	5512.13
6/15/95	30.80	135913	14670.35	55805	5549.70
6/16/95	30.02	136256	14709.27	55501	5520.08
6/19/95	29.95	134704	14544.31	55579	5527.95
6/20/95	29.02	129899	14026.28	53883	5359.28
6/21/95	27.14	133989	14471.89	55430	5515.86
6/22/95	26.90	133990	14473.21	55386	5511.70
6/23/95	26.83	134703	14551.42	55542	5527.37
6/24/95	26.49	134099	14487.36	55455	5519.01
6/26/95	27.26	134309	14511.17	55383	5511.04
6/27/95	27.83	133382	14411.15	55405	5512.67
6/28/95	26.42	132651	14334.47	55771	5550.68
6/29/95	28.73	132797	14348.73	54730	5444.27
6/30/95	25.01	133982	14482.03	55197	5494.69
7/05/95	24.18	133771	14464.84	55707	5546.52
7/06/95	24.32	133577	14444.63	55270	5502.68
7/07/95	26.42	133830	14470.72	55371	5510.68
7/10/95	25.49	134133	14507.42	55246	5499.11
7/11/95	25.79	133974	14490.82	55565	5530.71
7/12/95	25.88	134201	14516.28	55489	5523.02
7/13/95	26.54	134006	14495.39	54860	5459.46
7/14/95	25.37	133669	14461.09	54848	5459.43
7/17/95	25.14	133976	14497.48	53896	5364.46
7/18/95	25.80	133866	14485.79	54881	5462.30
7/19/95	28.48	132505	14336.27	55125	5484.02
7/20/95	28.89	132944	14384.38	55076	5478.71
7/21/95	26.98	131662	14248.37	55018	5474.82
7/24/95	26.00	134101	14516.80	55203	5494.30
7/25/95	27.20	132672	14361.45	55164	5489.20
7/26/95	28.00	132700	14364.57	54667	5438.70
7/27/95	28.40	132089	14298.79	54757	5447.30
7/28/95	26.74	132444	14340.05	55297	5502.96
7/31/95	27.59	132144	14309.41	55119	5484.31
8/01/95	27.49	132999	14403.25	55269	5499.41
8/02/95	27.47	133642	14474.01	55067	5479.23
8/03/95	27.41	133774	14489.35	55188	5491.39

P.B.C.-1 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm	
8/04/95	27.06	133997	14514.89	55103	5483.24	
8/07/95	27.35	133891	14505.94	55189	5491.55	
8/08/95	26.13	133728	14490.53	54898	5463.67	
8/09/95	27.10	132121	14315.94	54566	5429.50	
8/10/95	27.27	132368	14343.52	54716	5444.33	
8/11/95	29.30	133297	14443.15	54766	5447.30	
8/14/95	27.73	133195	14436.63	54851	5457.37	
8/15/95	29.50	133113	14426.75	54253	5395.80	
8/16/95	29.17	132779	14391.78	54557	5426.53	
8/17/95	27.44	133066	14425.79	54606	5433.16	
8/18/95	28.41	132705	14386.47	54768	5448.39	
8/21/95	28.12	132688	14387.78	54565	5428.38	low cts TTL 9/20/95
8/22/95	26.40	133063	14431.35	54577	5431.30	
8/23/95	28.03	133078	14432.16	54604	5432.37	
8/24/95	26.70	132343	14354.67	54478	5421.10	
8/25/95	27.69	132350	14355.30	54189	5391.21	
8/28/95	27.74	131405	14255.36	54101	5382.36	
8/29/95	27.63	131225	14236.85	53819	5354.27	
8/30/95	25.53	132103	14335.53	54044	5378.87	Kevin P. checked
8/31/95	28.30	133298	14463.40	53898	5361.50	
9/02/95	27.07	131190	14237.40	53910	5363.93	
9/05/95	29.59	131770	14300.57	53606	5331.01	Mike twiced 9/5/95
9/06/95	28.13	132656	14399.48	53499	5321.77	
9/07/95	27.19	132805	14417.66	53797	5352.51	
9/11/95	30.18	130283	14143.78	53561	5325.92	low cts
9/12/95	44.39	131143	14222.83	54134	5369.01	
9/13/95	26.58	133560	14506.19	54095	5382.92	
9/14/95	27.08	133535	14503.88	55003	5473.22	
9/15/95	27.78	133253	14473.38	54670	5439.22	
9/18/95	26.78	132950	14444.35	53660	5339.22	low cts.
9/19/95	28.41	132547	14399.65	54343	5405.89	
9/20/95	27.62	133108	14462.54	54112	5383.58	

Detector out of service
J R Greenwood
9-29-95

Volumetric dilution of ^{90}Sr Standard #RS-11-9 [BNW52815 pages 145-146.]
^{90}Sr Standard #RS-11-9 is a gravimetric/volumetric dilution of Isotope products ^{90}Sr Standard 7090-4 lot 186-98-A-3 [BNW52626 pp 49, 50]. Half-life reference: Browne and Firestone 1985.
W-80 adjusted for revised (Sr+Y)/Sr ratio at equilibrium:

$(2.03847 \times 10^5)(2.000255 \text{ new ratio}/2.0000 \text{ used ratio}) = 2.03872 \times 10^5$ D 90Sr+^{90}Y/m/ml on 8-1-91.

Assuming 100% ^{90}Y recovery at ion exchange separation time:

^{90}Sr + ^{90}Y decay to separation time = 8-1-91 → 7-10-92 = 344 D = 0.94184 Y

$$(2.03872 \times 10^5)E^{\frac{-(\ln 2)(0.94184)}{28.5Y}} = 1.99256 \times 10^5 \text{ D } ^{90}\text{Sr}+^{90}\text{Y/m/ml} \quad 7\text{-}10\text{-}92$$

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^{90}Y at separation time (all flasks)
(Sr+Y)/Sr = 2.000255
Sr+Y = 2.000255 Sr Y = 2.000255Sr - Sr = 1.000255Sr
Y/(Sr+Y) = (1.000255Sr)/(Sr+1.0002555Sr) = 1.000255Sr/2.000255Sr = 0.5000637
^{90}Y (all flasks) <u>at separation for each flask</u>

$$= (1.99256 \times 10^5 \text{ D } ^{90}\text{Sr}+^{90}\text{Y/m/ml})\left(\frac{0.5000637\ ^{90}\text{Y}}{^{90}\text{Sr}+^{90}\text{Y}}\right)(0.50033\text{mL std \#W-80})/(10.0\text{ml flask vol})$$

= 4985.32277 D ^{90}Y/m/ml flask solution at separation

for flask 1: ^{90}Y sep = 7/10/92 09:50:50
plate A counted 7/10/92 13:16:00, mid point = 13:16:00 + 10/2 = 13:21:00
7/10/92 09:50:50 → 13:21:00 = 3:30:10 = 3.50278 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(3.50278)}{64.1}})(0.99420\text{mL})/2617.78\text{c/m} = 1.82298 \text{ d/c}$$

plate B counted 7/10/92 14:22:00, mid point = 14:22:00 + 10/2 = 14:27:00
7/10/92 09:50:50 → 14:27:00 = 4:36:10 = 4.60278 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(4.60278)}{64.1}})(0.99420\text{mL})/2614.38\text{c/m} = 1.80377 \text{ d/c}$$

for flask 2: ^{90}Y sep = 7/10/92 09:49:55
plate A counted 7/10/92 13:27:00, mid point = 13:27:00 + 10/2 = 13:32:00
7/10/92 09:49:55 → 13:32:00 = 3:42:05 = 3.70139 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(3.70139)}{64.1}})(0.99465\text{mL})/2679.88\text{c/m} = 1.77772 \text{ d/c}$$

plate B counted 7/10/92 14:11:00, mid point = 14:11:00 + 10/2 = 14:16:00
7/10/92 09:49:55 → 14:16:00 = 4:26:05 = 4.43472 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(4.43472)}{64.1}})(0.99465\text{mL})/2656.58\text{c/m} = 1.77915 \text{ d/c}$$

for flask 3: ^{90}Y sep = 7/10/92 09:51:40

plate A counted 7/10/92 13:38:00, mid point = 13:38:00 + 10/2 = 13:43:00

7/10/92 09:51:40 → 13:43:00 = 3:51:20 = 3.85556 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(3.85556)}{64.1}})(0.994796mL)/2667.98c/m = 1.78294\ d/c$$

plate B counted 7/10/92 14:33:00, mid point = 14:33:00 + 10/2 = 14:38:00

7/10/92 09:51:40 → 14:38:00 = 4:46:20 = 4.77222 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.77222)}{64.1}})(0.994796mL)/2653.48c/m = 1.77500\ d/c$$

for flask 4: ^{90}Y sep = 7/10/92 09:52:15

plate A counted 7/10/92 13:49:00, mid point = 13:49:00 + 10/2 = 13:54:00

7/10/92 09:52:15 → 13:54:00 = 4:01:45 = 4.02917 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.02917)}{64.1}})(0.99891mL)/2664.48c/m = 1.78930\ d/c$$

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plate B counted 7/10/92 14:44:00, mid point = 14:44:00 + 10/2 = 14:49:00

7/10/92 09:52:15 → 14:49:00 = 4:56:45 = 4.94583 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.94583)}{64.1}})(0.99891mL)/2631.08c/m = 1.79415\ d/c$$

for flask 5: ^{90}Y sep = 7/10/92 09:51:30

plate A counted 7/10/92 14:00:00, mid point = 14:00:00 + 10/2 = 14:05:00

7/10/92 09:51:30 → 14:05:00 = 4:13:30 = 4.22500 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.22500)}{64.1}})(0.99932mL)/2725.58c/m = 1.74621\ d/c$$

plate B counted 7/10/92 14:55:00, mid point = 14:55:00 + 10/2 = 15:00:00

7/10/92 09:51:30 → 15:00:00 = 5:08:30 = 5.14167 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(5.14167)}{64.1}})(0.99932mL)/2636.58c/m = 1.78735\ d/c$$

$\overline{X}_{10}$ = 1.78585 d/c

s = 0.01977

^{90}Y Calibration for P.B.C.-1

1.79 d/c (Rounded to nearest 0.01)

Anne E Kozlisky 9/23/92
Analyst/Date

L R Weiler 9/23/92
Cognizant Scientist/Date

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY Anne E. Hazelwood

REMARKS 90Y Calibration Counts P.B.C.-1 HV=2650

SAMPLE NUMBER	DATE 19 92	TIME PST	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
1a	7/10	1316	1	1	—	10	+	26469			29.12	2617.78		
1b		1422					+	26435				2614.38		
							+							
							+							
							+							
2a		1327					+	27090				2679.88		
2b		1411					+	26857				2656.58		
							+							
							+							
							+							
3a		1338					+	26971				2667.98		
3b		1433					+	26826				2653.48		
							+							
							+							
							+							
4a		1349					+	26936				2664.48		
4b		1444					+	26602				2631.08		
							+							
							+							
							+							
5a		1400					+	27547				2725.58		
5b		1455					+	26657				2636.58		
							+							
							+							
							+							

BNW 52342 p. 134 13 of 14

3-2538

3-1700-091 (7-65) AEC-RLOO RICHLAND WASH

WHC-SD-WM-DP-145 REV. 1

WHC-CD-WM-DP-145, Rev 1

Prepare five ^{90}Y solutions separated from ^{90}Sr using the SrY-90 standard #W-80 of BNW54342 p. 34. Load 500μL of standard onto glass column of 300μL Dowex 50, X-8, 200-400 mesh NH_4^+ form. Wash ~~pipet~~ column ack 8/9/93 2-1mL portions of deionized water.

Note time when last drop of wash leaves column (begins decay time for ^{90}Y).

Elute ^{90}Y into 10mL volumetric flask with 4-1mL portions of 0.7M αHIBA, pH 4.6. Note time when last drop leaves column (begins T_0 for ^{90}Sr). Elute ^{90}Sr into 10mL volumetric flask with 3.5mL of 1M αHIBA, pH 5.0. Dilute to 10mL with deionized water. Mix and plate (duplicates for ^{90}Y) 1ml portions onto beta dishes, dry and count each source on Beta counter.

For more information, see BNW52626 p. 25-28.

BNW 52342 p. 134 14 of 14

0.50033mL aliquot of #W-80 for all five columns.

Plate	Plated Aliquot	July 10, 1992 ^{90}Y T_0	^{90}Sr T_0
1 -	0.99420mL	0950.50	1047.0
2 -	0.99465mL	0949.55	1048.25
3 -	0.994796mL	0951.40	1048.10
4 -	0.99891mL	0952.15	1050.15
5 -	0.99932mL	0951.30	1045.20

Anne E Kozelisky 7/10/92
Analyst/date

3-2539

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WHC-CD-WM-DP-145, REV. 1

PBC 2

3-2540

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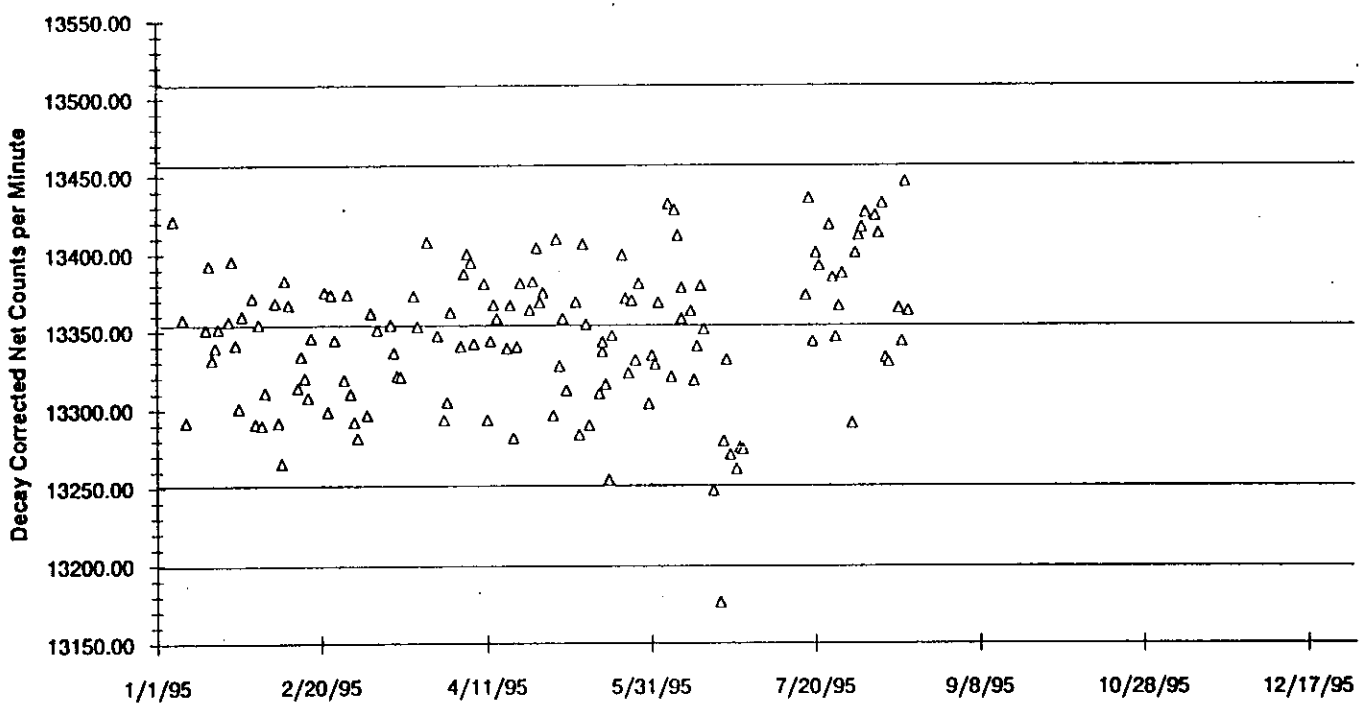
P.B.C.-2 SrY-90 Control Chart



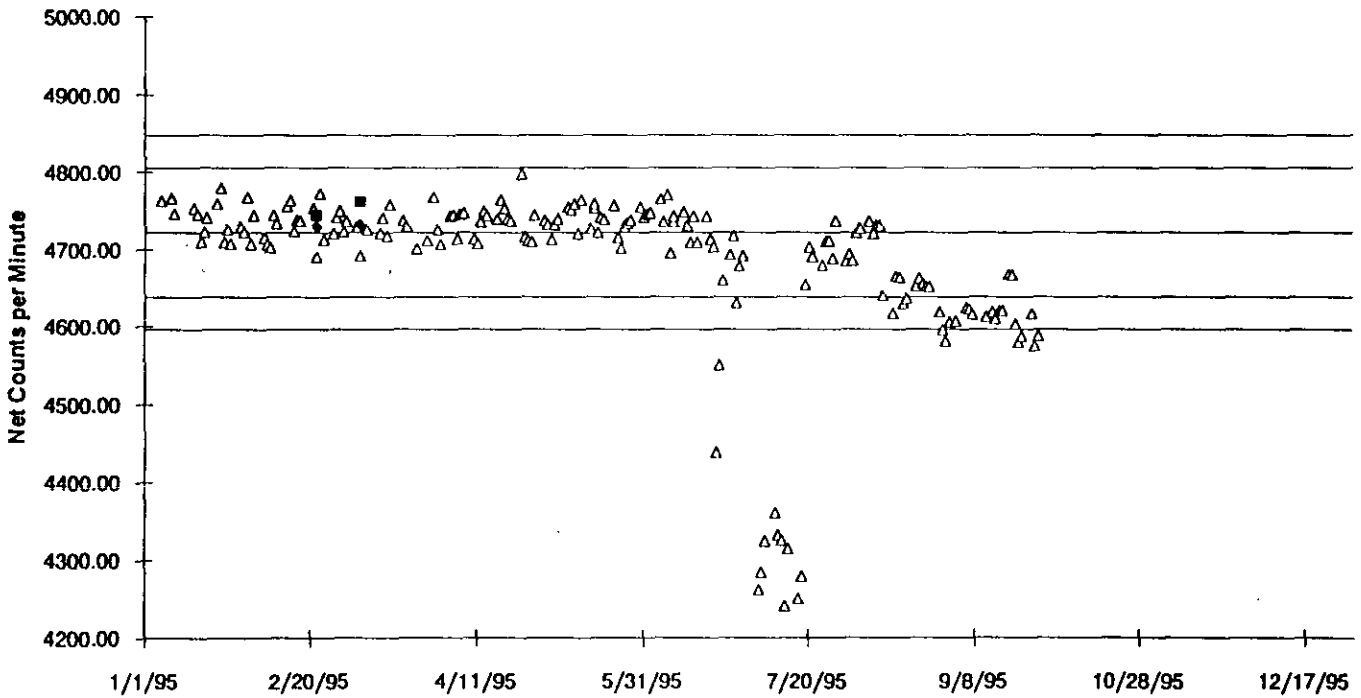
3-2541

WHC-CD-WM-DP-145, REV. 1

LRGreenwood
9-29-95

3-2542

P.B.C.-2 Tc-99 Control Chart



L R Greenwood
9-29-95

WHC-CD-WM-DP-145 REV. 1

WHC-CD-WM-DP-145, REV. 1

Control Chart Information

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.B.C.-2 Tc-99	1/1/95 ~~34700~~ *	4721.83	4805.75	4637.91	4847.71	4595.95
	12/31/95 ~~35064~~ *	4721.83	4805.75	4637.91	4847.71	4595.95

		X-Bar	2-Sigma High	2-Sigma Low	3-Sigma High	3-Sigma Low
P.B.C.-2 SrY-90	1/1/95 ~~34700~~ *	13337.70	13598.95	13076.44	13729.58	12945.82
	12/31/95 ~~35064~~ *	13337.70	13598.95	13076.44	13729.58	12945.82

*LR Greenwood
9-29-95

3-2543

P.B.C.-2 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm
1/06/95	30.00	130903	13421.75	47928	4762.80
1/09/95	30.58	130262	13357.92	47970	4766.42
1/10/95	29.42	129600	13291.95	47755	4746.08
1/16/95	29.98	130134	13351.54	47827	4752.72
1/17/95	30.14	130533	13393.29	47758	4745.66
1/18/95	30.38	129931	13332.02	47408	4710.42
1/19/95	29.73	129992	13339.84	47524	4722.67
1/20/95	30.15	130104	13351.81	47723	4742.15
1/23/95	29.00	130115	13356.76	47875	4758.50
1/24/95	29.80	130495	13395.92	48094	4779.60
1/25/95	28.18	129942	13341.57	47379	4709.72
1/26/95	29.20	129547	13300.75	47556	4726.40
1/27/95	29.97	130122	13360.01	47377	4707.73
1/30/95	29.00	130202	13371.88	47588	4729.80
1/31/95	29.36	129410	13290.87	47520	4722.64
2/01/95	29.76	130023	13354.44	47974	4767.64
2/02/95	29.42	129383	13289.78	47370	4707.58
2/03/95	28.99	129576	13310.97	47735	4744.51
2/06/95	29.86	130121	13368.83	47461	4716.24
2/07/95	29.61	129361	13291.70	47374	4707.79
2/08/95	29.62	129097	13265.38	47328	4703.18
2/09/95	29.59	130231	13383.08	47741	4744.51
2/10/95	29.06	130064	13367.31	47628	4733.74
2/13/95	29.30	129522	13313.87	47851	4755.80
2/14/95	29.73	129713	13333.98	47929	4763.17
2/15/95	29.07	129565	13320.29	47536	4724.53
2/16/95	30.23	129448	13307.92	47679	4737.67
2/17/95	32.21	129827	13345.81	47693	4737.09
2/21/95	31.68	130078	13375.75	47845	4752.82
2/22/95	30.70	129311	13298.58	47215	4690.80
2/23/95	31.43	130042	13374.06	48042	4772.77
2/24/95	31.61	129748	13344.45	47449	4713.29
2/27/95	31.34	129475	13319.21	47524	4721.06
2/28/95	31.59	130001	13374.08	47728	4741.21
3/01/95	31.60	129374	13310.29	47810	4749.40
3/02/95	32.43	129197	13292.05	47560	4723.57
3/03/95	31.78	129081	13281.63	47684	4736.62
3/06/95	31.86	129198	13296.25	47618	4729.94
3/07/95	31.52	129822	13361.86	47243	4692.78
3/09/95	32.66	129711	13350.99	47586	4725.94
3/13/95	33.73	129720	13354.34	47553	4721.57
3/14/95	30.49	129505	13336.37	47713	4740.81
3/15/95	32.70	129375	13321.55	47504	4717.70
3/16/95	31.10	129345	13320.98	47893	4758.20
3/20/95	31.31	129817	13373.02	47688	4737.49
3/21/95	32.40	129629	13353.36	47625	4730.10
3/24/95	32.93	130138	13408.03	47345	4701.57

WHC-CD-WM-DP-145, REV 1

P.B.C.-2 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm
3/27/95	32.97	129526	13347.41	47446	4711.63
3/29/95	31.13	128968	13293.42	47985	4767.37
3/30/95	31.42	129072	13304.74	47577	4726.28
3/31/95	31.76	129625	13362.41	47389	4707.14
4/03/95	30.57	129374	13340.35	47737	4743.13
4/04/95	31.02	129829	13387.79	47757	4744.68
4/05/95	31.01	129941	13400.26	47449	4713.89
4/06/95	31.31	129882	13394.74	47772	4745.89
4/07/95	33.66	129389	13342.22	47823	4748.64
4/10/95	33.92	129744	13381.30	47480	4714.08
4/11/95	33.06	128878	13293.52	47406	4707.54
4/12/95	33.65	129361	13343.73	47692	4735.55
4/13/95	32.42	129567	13367.19	47814	4748.98
4/14/95	33.79	129486	13358.28	47771	4743.31
4/17/95	33.23	129269	13339.05	47724	4739.17
4/18/95	33.34	129532	13367.03	47974	4764.06
4/19/95	33.59	128700	13281.57	47864	4752.81
4/20/95	33.24	129255	13340.23	47723	4739.06
4/21/95	33.78	129650	13381.43	47710	4737.22
4/24/95	33.95	129457	13363.92	48309	4796.95
4/25/95	33.99	129628	13382.46	47503	4716.31
4/26/95	33.30	129823	13404.25	47452	4711.90
4/27/95	32.48	129464	13368.81	47427	4710.22
4/28/95	33.40	129526	13375.16	47773	4743.90
5/01/95	33.19	128734	13296.01	47705	4737.31
5/02/95	33.52	129826	13409.63	47658	4732.28
5/03/95	33.35	129025	13327.74	47462	4712.85
5/04/95	33.62	129316	13358.48	47657	4732.08
5/05/95	33.36	128858	13312.19	47725	4739.14
5/08/95	34.12	129389	13369.05	47888	4754.68
5/09/95	34.89	128563	13283.55	47856	4750.71
5/10/95	35.12	129744	13406.55	47938	4758.68
5/11/95	39.36	129276	13354.55	47603	4720.94
5/12/95	35.35	128603	13289.85	47998	4764.45
5/15/95	35.87	128778	13310.08	47625	4726.63
5/16/95	34.92	129019	13336.92	47877	4752.78
5/16/95	28.70	129019	13343.37	47877	4759.00
5/17/95	28.81	128747	13315.94	47506	4721.79
5/18/95	29.61	128156	13254.72	47711	4741.49
5/19/95	28.85	129032	13347.20	47673	4738.45
5/22/95	28.14	129507	13399.83	47848	4756.66
5/23/95	29.79	129241	13371.42	47455	4715.71
5/24/95	30.06	128771	13323.28	47325	4702.44
5/25/95	28.56	129200	13370.21	47580	4729.44
5/26/95	29.08	128825	13331.65	47636	4734.52
5/27/95	29.80	129300	13381.06	47679	4738.10
5/30/95	28.90	128521	13303.82	47833	4754.40

P.B.C.-2 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm	
5/31/95	28.43	128806	13334.75	47707	4742.27	
6/01/95	29.17	128747	13328.74	47755	4746.33	
6/02/95	28.91	129122	13368.80	47762	4747.29	
6/05/95	29.90	129718	13432.28	47944	4764.50	
6/06/95	30.36	128640	13320.80	47665	4736.14	
6/07/95	30.13	129665	13428.31	48002	4770.07	
6/08/95	30.14	129502	13412.26	47261	4695.96	
6/09/95	28.65	129153	13378.46	47645	4735.85	
6/09/95	28.65	128961	13358.53	47714	4742.75	
6/12/95	29.04	128985	13363.26	47772	4748.16	
6/13/95	29.54	128552	13318.66	47604	4730.86	
6/14/95	28.84	128747	13340.51	47388	4709.96	
6/15/95	29.45	129123	13379.81	47723	4742.85	
6/16/95	29.25	128840	13351.51	47432	4709.96	
6/19/95	29.20	127817	13247.93	47326	4742.85	
6/20/95	30.61	119789	12413.29	44699	4713.95	
6/21/95	27.50	127093	13176.22	45776	4703.40	
6/22/95	29.21	128098	13279.73	46890	4439.29	
6/23/95	28.17	128580	13331.78	47218	4550.10	
6/24/95	28.73	127992	13270.97	47467	4659.79	
6/26/95	29.43	127891	13261.50	46601	4693.63	
6/27/95	28.16	128003	13275.33	47068	4717.97	
6/28/95	28.03	127983	13274.26	47208	4630.67	
6/29/95	27.70	118875	12328.67	42899	4678.64	low cts not in service TTL 9/20/
6/30/95	29.00	118418	12280.62	43138	4692.77	
7/05/95	27.28	119027	12349.80	43519	4262.20	
7/06/95	27.02	118832	12330.60	43886	4284.80	
7/07/95	27.93	118911	12338.68	43610	4324.62	low cts, det. out of position Mike fixed 7/7/95
7/10/95	27.98	118699	12319.02	43541	4361.58	
7/11/95	26.67	118943	12346.58	42688	4333.07	
7/12/95	28.56	118391	12287.99	43443	4326.12	
7/13/95	27.05	118799	12332.83	42772	4242.13	
7/14/95	27.62	118654	12317.96	43073	4315.74	
7/17/95	27.76	128774	13373.51	46821	4250.15	
7/18/95	27.19	129358	13435.77	47311	4279.68	
7/19/95	26.63	128459	13343.66	47175	4654.34	
7/20/95	28.01	129017	13401.19	47080	4703.91	
7/21/95	28.40	128933	13392.92	47395	4690.87	
7/24/95	26.20	129136	13419.00	47383	4679.99	
7/25/95	27.95	128819	13385.05	47167	4711.10	
7/26/95	28.97	128453	13346.76	47666	4712.10	
7/27/95	28.77	128633	13366.59	47135	4688.75	
7/28/95	28.41	128828	13388.16	47231	4737.63	
7/31/95	28.46	127872	13291.17	47150	4684.73	
8/01/95	27.87	128912	13401.01	47498	4694.69	
8/02/95	28.04	129014	13412.34	47554	4686.54	
8/03/95	27.83	129054	13417.61	47641	4721.93	

P.B.C.-2 Control Chart Counts and Backgrounds

Date	100 min. Bkg.	SrY-90	Decay-Corrected cpm	Tc-99	ccpm
8/04/95	28.42	129142	13427.05	47490	4727.36
8/07/95	28.65	129098	13424.88	47599	4736.27
8/08/95	28.58	128983	13413.85	47595	4720.58
8/09/95	27.70	129147	13432.75	46677	4731.25
8/10/95	28.08	128187	13333.17	46446	4730.92
8/11/95	28.91	128162	13330.58	46946	4640.00
8/14/95	28.04	128460	13365.19	46926	4616.52
8/15/95	29.26	128261	13344.05	46590	4665.69
8/16/95	29.67	129239	13446.49	46654	4664.56
8/17/95	28.59	128425	13363.61	46812	4629.74
8/18/95	28.49	129158	13441.05	46913	4635.73
8/21/95	28.12	132688	13812.33	46840	4652.61
8/22/95	27.94	128714	13398.85	46799	4662.81
8/23/95	28.45	129205	13450.43	46803	4655.88
8/24/95	27.74	128671	13396.34	46462	4651.96
8/25/95	28.07	128220	13349.82	46235	4651.85
8/28/95	28.02	128461	13377.66	46089	4618.46
8/29/95	26.79	128653	13399.87	46324	4595.43
8/30/95	28.29	128611	13394.80	46354	4580.88
8/31/95	29.70	128320	13363.84	46541	4605.61
9/02/95	27.12	128571	13394.50	46499	4607.11
9/05/95	28.60	128629	13401.66	46454	4624.40
9/06/95	27.45	128589	13399.57	46398	4622.78
9/07/95	27.63	128612	13402.66	46466	4616.80
9/11/95	27.78	128490	13393.30	46375	4612.35
9/13/95	28.01	128589	13405.17	46485	4618.97
9/14/95	27.85	128723	13420.22	46484	4609.72
9/15/95	29.12	128259	13371.29	46965	4620.49
9/16/95	31.90	128428	13386.93	46991	4620.55
9/18/95	28.01	128310	13380.43	46313	4667.38
9/19/95	28.35	128402	13390.57	46078	4667.20
9/20/95	27.95	128260	13377.03	46152	4603.29

LR Freeman
9-29-95

Volumetric dilution of ^{90}Sr Standard #RS-11-9 [BNW52815 pages 145-146.]
^{90}Sr Standard #RS-11-9 is a gravimetric/volumetric dilution of Isotope products ^{90}Sr Standard 7090-4 lot 186-98-A-3 [BNW52626 pp 49, 50]. Half-life reference: Browne and Firestone 1985.
W-80 adjusted for revised (Sr+Y)/Sr ratio at equilibrium:

$(2.03847 \times 10^5)(2.000255 \text{ new ratio}/2.0000 \text{ used ratio}) = 2.03872 \times 10^5$ D 90Sr+^{90}Y/m/ml on 8-1-91.

Assuming 100% ^{90}Y recovery at ion exchange separation time:

^{90}Sr + ^{90}Y decay to separation time = 8-1-91 → 7-10-92 = 344 D = 0.94184 Y

$$(2.03872 \times 10^5)E^{\frac{-(\ln 2)(0.94184)}{28.5Y}} = 1.99256 \times 10^5 \text{ D } ^{90}\text{Sr}+^{90}\text{Y/m/ml} \quad 7\text{-}10\text{-}92$$

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^{90}Y at separation time (all flasks)
(Sr+Y)/Sr = 2.000255
Sr+Y = 2.000255 Sr Y=2.000255Sr - Sr = 1.000255Sr
Y/(Sr+Y)=(1.000255Sr)/(Sr+1.0002555Sr)=1.000255Sr/2.000255Sr = 0.5000637
^{90}Y (all flasks) <u>at separation for each flask</u>

$$= (1.99256 \times 10^5 \text{ D } ^{90}\text{Sr}+^{90}\text{Y/m/ml})\left(\frac{0.5000637\ ^{90}\text{Y}}{^{90}\text{Sr}+^{90}\text{Y}}\right)(0.50033\text{mL std \#W-80})/(10.0\text{ml flask vol})$$

= 4985.32277 D ^{90}Y/m/ml flask solution at separation

for flask 1: ^{90}Y sep = 7/10/92 09:50:50
plate A counted 7/10/92 14:13:00, mid point = 14:13:00 + 10/2 = 14:18:00
7/10/92 09:50:50 → 14:18:00 = 4:27:10 = 4.45278 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(4.45278)}{64.1}})(0.99420\text{mL})/2585.14\text{c/m} = 1.82714 \text{ d/c}$$

plate B counted 7/10/92 15:07:00, mid point = 15:07:00 + 10/2 = 15:12:00
7/10/92 09:50:50 → 15:12:00 = 5:21:10 = 5.35278 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(5.35278)}{64.1}})(0.99420\text{mL})/2569.34\text{c/m} = 1.82057 \text{ d/c}$$

for flask 2: ^{90}Y sep = 7/10/92 09:49:55
plate A counted 7/10/92 14:24:00, mid point = 14:24:00 + 10/2 = 14:29:00
7/10/92 09:49:55 → 14:29:00 = 4:39:05 = 4.65139 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(4.65139)}{64.1}})(0.99465\text{mL})/2596.74\text{c/m} = 1.81590 \text{ d/c}$$

plate B counted 7/10/92 15:17:30, mid point = 15:17:30 + 10/2 = 15:22:30
7/10/92 09:49:55 → 15:22:30 = 5:32:35 = 5.54306 H

$$(4985.32277 \text{ D } ^{90}\text{Y/m/ml})(E^{\frac{-(\ln 2)(5.54306)}{64.1}})(0.99465\text{mL})/2592.74\text{c/m} = 1.80125 \text{ d/c}$$

for flask 3: ^{90}Y sep = 7/10/92 09:51:40
plate A counted 7/10/92 14:35:00, mid point = 14:35:00 + 10/2 = 14:40:00
7/10/92 09:51:40 → 14:40:00 = 4:48:20 = 4.80556 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.80556)}{64.1}})(0.994796mL)/2605.14c/m = 1.80729\ d/c$$

plate B counted 7/10/92 15:28:00, mid point = 15:28:00 + 10/2 = 15:33:00
7/10/92 09:51:40 → 15:33:00 = 5:41:20 = 5.68889 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(5.68889)}{64.1}})(0.994796mL)/2605.64c/m = 1.78977\ d/c$$

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for flask 4: ^{90}Y sep = 7/10/92 09:52:15
plate A counted 7/10/92 14:46:00, mid point = 14:46:00 + 10/2 = 14:51:00
7/10/92 09:52:15 → 14:51:00 = 4:58:45 = 4.97917 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(4.97917)}{64.1}})(0.99891mL)/2607.34c/m = 1.80983\ d/c$$

plate B counted 7/10/92 15:39:00, mid point = 15:39:00 + 10/2 = 15:44:00
7/10/92 09:52:15 → 15:44:00 = 5:51:45 = 5.86250 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(5.86250)}{64.1}})(0.99891mL)/2628.84c/m = 1.77797\ d/c$$

for flask 5: ^{90}Y sep = 7/10/92 09:51:30
plate A counted 7/10/92 14:56:30, mid point = 14:56:30 + 10/2 = 15:01:30
7/10/92 09:51:30 → 15:01:30 = 5:10:00 = 5.16667 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(5.16667)}{64.1}})(0.99932mL)/2663.64c/m = 1.76872\ d/c$$

plate B counted 7/10/92 15:49:30, mid point = 15:49:30 + 10/2 = 15:54:30
7/10/92 09:51:30 → 15:54:30 = 6:03:00 = 6.05000 H

$$(4985.32277\ D\ ^{90}Y/m/ml)(E^{\frac{-(\ln 2)(6.05000)}{64.1}})(0.99932mL)/2622.34c/m = 1.77949\ d/c$$

$\overline{X}_{10}$ = 1.79979 d/c

s = 0.01987

^{90}Y Calibration for P.B.C.-2

1.80 d/c (Rounded to nearest 0.01)

Anne E Kozlisky 9/23/92
Analyst/Date

[signature] 9/23/92
Cognizant Scientist/Date

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY Anne E. Kylikey

REMARKS ^{90}Y Calibration Counts P.B.C.-2 HV=3860

SAMPLE NUMBER	DATE 19 92	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF ____	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
1a	7/10	1413	2	1	—	10	+	26146			29.46	2585.14		
1b		1507					+	25988				2569.34		
							+							
							+							
							+							
2a		1424					+	26262				2596.74		
2b		1517.30					+	26222				2592.74		
							+							
							+							
							+							
3a		1435					+	26346				2605.14		
3b		1528					+	26351				2605.64		
							+							
							+							
							+							
4a		1446					+	26368				2607.34		
4b		1539					+	26583				2628.84		
							+							
							+							
							+							
5a		1456.30					+	26931				2663.64		
5b		1549.30					+	26518				2622.34		
							+							
							+							
							+							

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WHC-CD-YM-DP-145, REV. 1

B-1700-091 (7-65)

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WHC-CD-WM-DP-145, REV. 1

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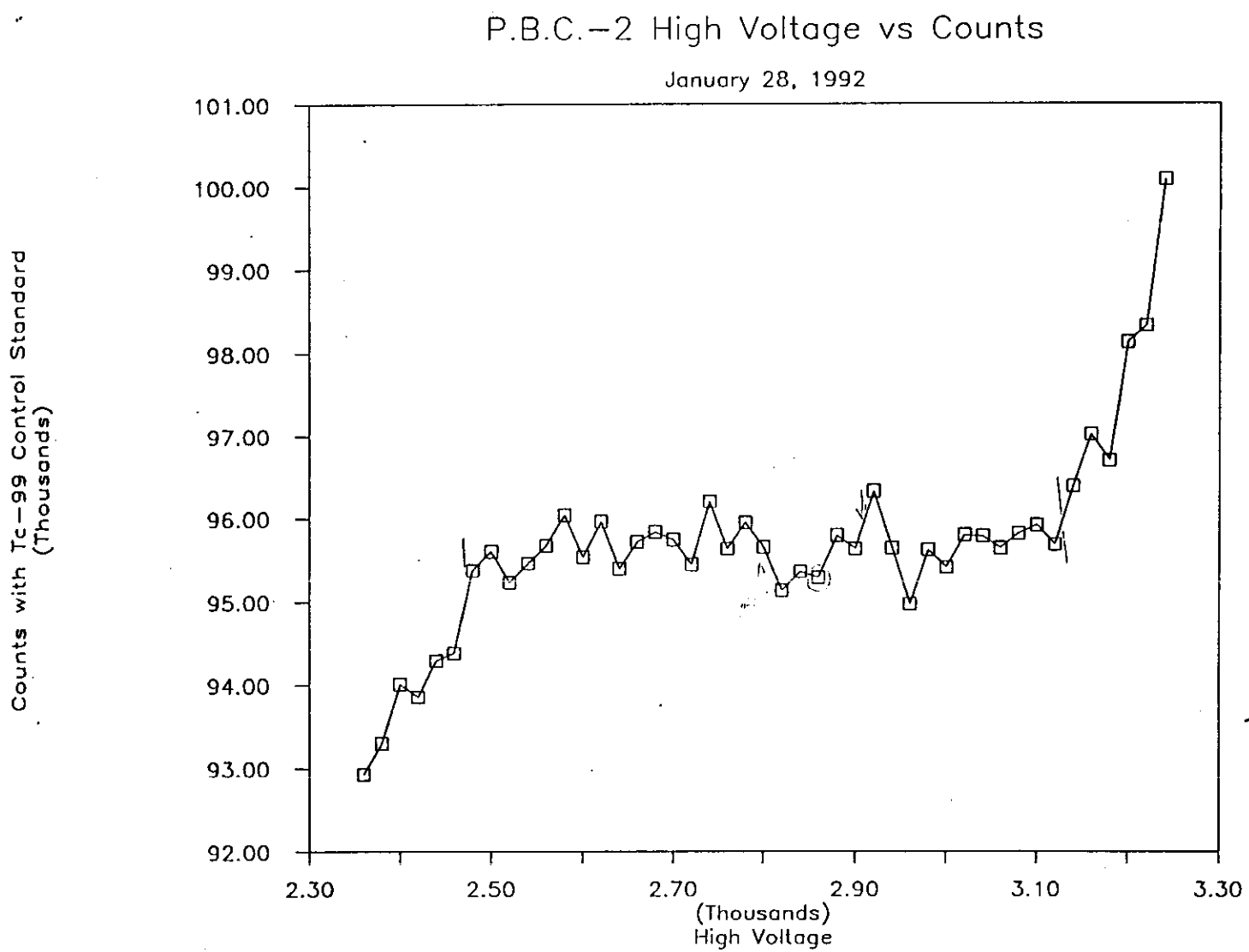
p. 134 1 of 14



WHC-SD-WM-DP-145, REV 1

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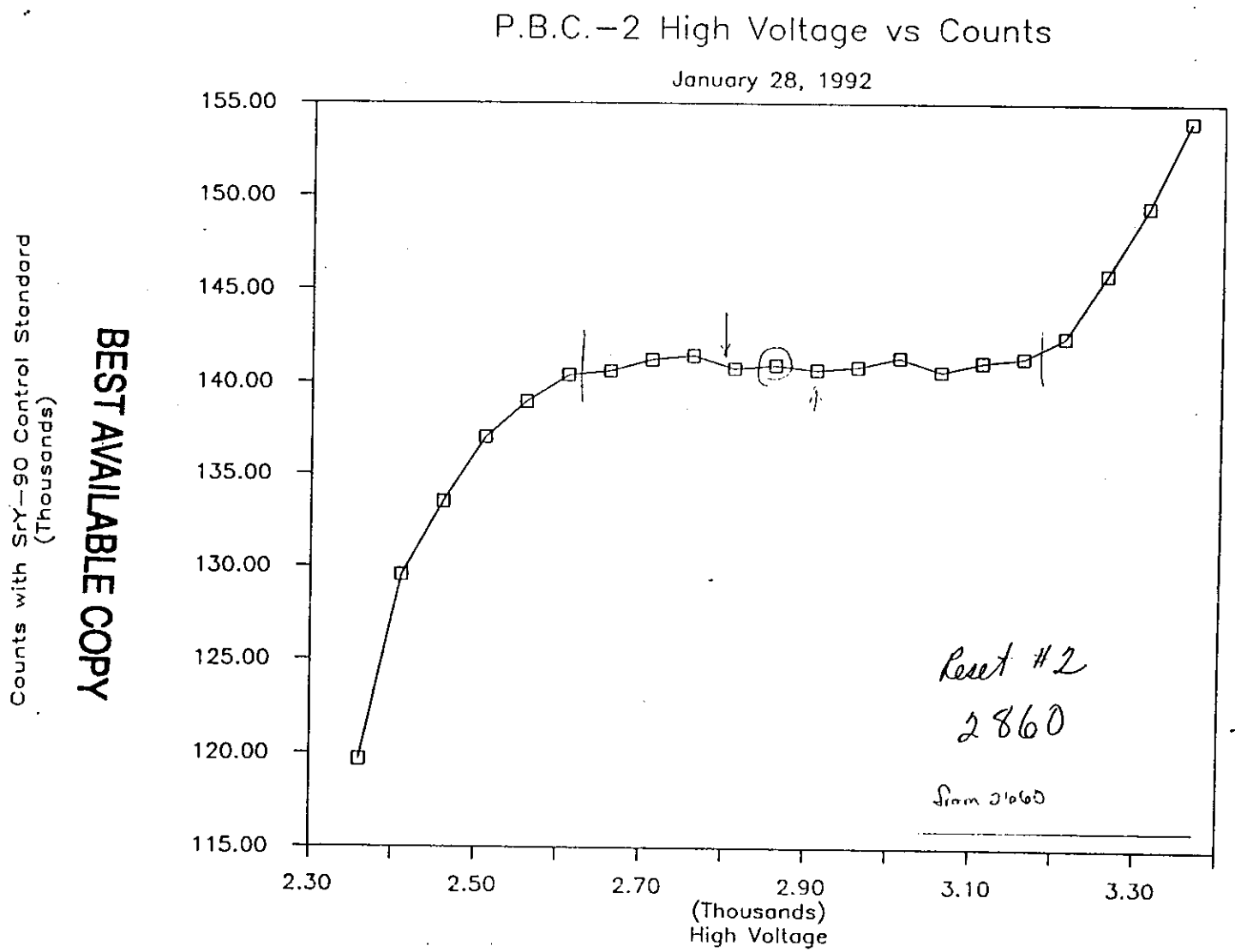

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3-2552

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS P.B.C.-2 High Voltage Plateau Counts with Tc^{99} Control Standard

page 1 of 3

SAMPLE NUMBER	DATE 19 92	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
HV 2660	1/14	0750	2	1	—	10	+	95720						
2680		0836					+	95837						
2700							+	95741						
2720							+	95447						
2740							+	96196						
2760							+	95636						
2780							+	95942						
2800							+	95653						
2820							+	95139						
2840							+	95363						
2860							+	95288						
2880							+	95791						
2800							+	95632						
2920							+	96317						
2940							+	95646						
2960							+	94975						
2980							+	95626						
3000							+	95414						
3020							+	95798						
3040							+	95788						
3060							+	95644						
3080							+	95815						
3100							+	95917						
							+							
							+							

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WHC-SD-WM-DP-145, REV. 1

BB-1780-091 (7-85)

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS P.B.C.-2 High Voltage Plateau Counts with Tc^{99} Control Standard

page 2 of 3

SAMPLE NUMBER	DATE 19 92	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
HV 3120	1/15	1056		1	—	10	+	96585						
3140							+	96375						
3160							+	97006						
3180							+	96687						
3200							+	98123						
3220							+	98318						
3240							+	100085						
2640							+	95394						
2620							+	95961						
2600							+	95538						
2580							+	96037						
2560							+	95673						
2540							+	95462						
2520							+	95234						
2500							+	95607						
2480							+	95378						
2460	1/16						+	99384						
2440							+	94291						
~~94~~							+	94823						
~~2420~~							+	~~98588~~						
~~2400~~	2420						+	93857						
~~81~~	2400						+	94013						
2380							+	93302						
2360							+	92933						
							+							

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HW-55145 REV. 1

38-1700-091 (7-65) AEC-RLDO RICHLAND, WASH.

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE

SUBMITTED BY

COUNTED BY

REMARKS P.B.C.-2 High Voltage Plateau Counts with Sr/Y^{90} Control Standard

page 3 of 3

SAMPLE NUMBER	DATE 19 92	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF ____	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
2360	1/16		2	1	—	10	+	119672						
2410							+	129549						
2460							+	133511						
2510							+	137002						
2560							+	138963						
2610							+	140704						
2660							+	140623						
2710							+	141238						
2760							+	141452						
2810	1/22						+	140768						
2860							+	140950						
2910	1/27						+	140707						
2960							+	140869						
3010							+	141363						
3060							+	140611						
3110							+	141131						
3160							+	141358						
3210							+	142452						
3260							+	145859						
3316							+	149467						
3360							+	154038						
							+							
							+							
							+							
							+							
							+							

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WRS-CD-WM-DP-145, REV. 1

ANALYTICAL LABORATORIES — BETA AND GAMMA COUNTER DATA SHEET

SAMPLE: ^{90}Sr Y Calibration Counts

SUBMITTED BY:

COUNTED BY: Anne E Hoglidy

REMARKS: ^{90}Sr Y $1.00216 \times 10^4 \pm 2.685 \times 10^2$ d/m 3/25/92 #W-80 BNW54342 p34
P.B.C.-2 HV=2860 Methane Flow Rate ~17

SAMPLE NUMBER	DATE 1992	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF 1	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N. C	BGD B	NET RATE X = R−B+C	NORMALIZING RATE N. F.	NORMALIZED RATE COUNTS/MIN.
^{90}Sr Y-1	7/17	1035	2	1	–	10	+	53112			29.17	5282.03		
-2		1046					+	53733				5344.13		
-3		1057					+	52411				5211.93		
-4		1148					+	53168				5287.63		
-5		1159					+	53661				5336.93		
-6		1210					+	53521				5322.93		
-7		1221					+	53702				5341.03		
-8		1231					+	53800				5350.83		
-9		1242					+	53952				5366.03		
-10		1254					+	53888				5359.63		
-11		1305					+	54277				5398.53		
-12		1416					+	53535				5324.33		
							+							
							+							
							+							
Decay Period: 3/25/92 → 7/17/92 = ~~115~~ 114 days = 0.312121 ~~0.314859~~ Y							+		$\bar{X}_{12}$ = 5327.1633 ± 48.334					
							+							
Decay: (1.00216×10^4) E $\left(\frac{-(\ln 2)(0.312121)}{28.5}\right)$ = 9945.15 d/pm (9945.51)							+							
± (268.5) E (same as above) = ± 266.15 d/pm (266.46)							+							
							+							
9945.91		266.46					+	1.866999						
~~9945.15~~ ± ~~266.15~~ d/pm ÷ 5327.1633 ± 48.334 =							+	1.866876	± 0.0528 d/c					
							+							
							+	P.B.C.-2	d/c = 1.87 ± 0.05			Anne E Hoglidy 10/21/92		
							+							
							+					Reviewed: All ↓ M R Vanlen 11-21-92		

BNW 52342 p 34 A

7600—022 (7—57) AEC-GE RICHLAND, WASH.

3-2556

WHC-CD-WM-DP-145, REV 1

ANALYTICAL LABORATORIES – BETA AND GAMMA COUNTER DATA SHEET

SAMPLE: Tc^{99} Calibration

SUBMITTED BY:

COUNTED BY: Anne E Kozelisky

REMARKS: Tc^{99} Secondary Standard 1.4013E+5 ± 5.74E+2 d/m/ml BNW52626 p. 8-10
(1-3-5-7-9) 100.01λ glass calib. pipet (2-4-6-8-10) 100.06λ glass calib. pipet
P.B.C.-2 HV=2860 Methane Flow Rate ~47

SAMPLE NUMBER	DATE 19 92	TIME	INST. NO.	SHELF NO.	ABSBR. MG/CM²	INT. (MIN) T	RECORDER READING SCALE OF	TOTAL COUNTS N	RECORDED RATE R = N/T	COINC. CORR'N C	BGD B	NET RATE X=R−B+C	NORMALIZING RATE N.F.	NORMALIZED RATE COUNTS/MIN.
TC1	1/29		2			20	+	99095			28.65	4926.10		
TC2							+	102027				5072.70		
TC3							+	99768				4959.75		
TC4							+	98045				4873.60		
TC5							+	102352				5088.95		
TC6							+	95611				4751.90		
TC7							+	101068				5024.75		
TC8							+	94309				4936.80		
TC9							+	96841				4813.40		
TC10							+	99841				4963.40		
TC1	7/15						+	98750			29.32	4908.18		
TC2							+	101727				5057.03		
TC3							+	99764				4958.88		
TC4							+	98034				4872.38		
TC5							+	102569				5099.13		
TC6	7/16						+	96012			29.30	4771.30		
TC7							+	100464				4993.90		
TC8							+	98939				4917.65		
TC9							+	97036				4822.50		
TC10							+	99322				4936.80		
							+				$\bar{X}_{20}$ =	4937.455 ± 101.16388 c/m		
Average pipet volume = 0.100035 ml							+							
0.100035 ml * 1.4013E+5 ± 5.74E+2 d/m/ml = 14017.90455 ± 57.42 d/m												Anne E Kozelisky 7/29/92		
14017.90455 ± 57.42 d/m ÷ 4937.455 ± 101.16388 c/m = 2.84 ± 0.0593														
							+							

Reviewed: [signature] 10-21-92

BNW 52342 p.134

BB-1700-091 (7-65) AEC-RLOO RICHLAND WASH

3-2557

WHC-CD-WM-DP-145, REV. 1

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RHO-CD-WM-DP-145, REV. 1

GEA
CALIBRATION AND CONTROL CHARTS
DETECTOR G
DETECTOR H
DETECTOR T

3-2558

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WHC-CD-WM-DP-145, REV. 1

CERTIFIED COPY: Standards Laboratory Radiochemical Preparation Data Base

Printed By: R.G. SWOBODA

Signature: R.G. Swoboda 10/2/95
Printing Date: Oct 2, 1995

Rec_118
Initiated 08-11-95
Entered by R.G. Swoboda

Gamma Source Preparations
for
Initial Efficiency Calibration

Dilutions of Vendor Supplied (Amersham QCY.48) Mixed-Gamma Calibration sources were prepared in a number of various geometries for initial calibration and/or calibration verification of several 325 Bldg. gamma detectors.

Preparation work for the gamma efficiency calibrations was initiated with the receipt of the standard material on 5-3-95. The last source was prepared on 8-11-95.

Work Plan Description:

-Two QCY.48 Mixed-Gamma Sources received from Amersham on 5-2-95 were assigned sequential Certificate #'s RS-126 and RS-127. which are specific to Amersham Solution Source Numbers R5/130/51 and R5/130/50 respectively. The certificates for the two QCY.48 standards used for source preparation of several gamma geometries are photoscanned into this document (see below).

- Projections for proper aliquot sizes were planned based on estimated counting efficiencies. The GEASOURC.XLS spreadsheet was used to transcribe and document the requirements for proper aliquots to use of the QCY.48 source. The efficiency sources were required to be prepared at an activity level which would provide a minimum of 10,000 counts at each energy line when counted for a nominal 30 min to 1 hr count.

- Aliquots of these sources were directly added to each preparation with accurate weights taken and recorded (if at all possible) to insure the integrity of each preparation. This information was transferred to the preparation spreadsheet as each geometry was initiated. -- see the following GEAPREP.XLS

- Using the certificate information from the QCY.48 sources and the specific aliquot vol/wt. information from the prepared gamma standards, Efficiency File data was uploaded into the Canberra GENIE Gamma Efficiency Library for each source that was prepared at a different aliquot size. Thus, each geometry source was cross-referenced to a unique Certificate File. Examples of two Cert. Files are included in this document following the prepsheet information. The only information that would appear different for subsequent certificate files would be the extension on the Standard ID which changes to depict a different aliquot size (Quantity).

-The Canberra GENIE system automatically calibrates the detector for the particular geometry and generates a "best fit" efficiency curve for each geometry based on one or more counts. The Calibration File for each source clearly identifies the source description and the Certificate File used to generate the efficiency curve. These data files are stored on the Gamma counting systen with backup files located in the initial and continuing calibration records for each detector. The actual calibrations are continuing as time permits with those geometries used most often taking precident over seldom used geometries.

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WHC-SD-WM-DP-145, REV. 1

Amersham (QCY.48) GEA calibration standard, ref. date =						5/1/95		Density = 1.073 g/ml.					
nominal total volume = 10 ml.			elapsed days =		21				gammas/sec	gammas at	*estimated	estimated	estimated
							gamma/s/g at T=	gammas/s/g	vol taken ml.	ount time (min)	efficiency	total gammas	counting
	intensity %	t1/2		g/sec/g	error %	g/s/g	5/22/95	5/22/95	0.25	60			error %
Am-241	35.7	432.7	yrs	1092	2.1	1,092	1,092	1,092	273	982,709	0.1	98,271	0.32
Cd-109	3.6	1.2665	yrs	620	3.6	620	601	601	150	540,715	0.06	32,443	0.56
Co-57	85.5	271.77	days	561	1.7	561	532	532	133	478,569	0.055	26,321	0.62
Ce-139	84	138	days	679	1.5	679	611	611	153	549,925	0.05	27,496	0.60
Hg-203	10	47	days	1916	2.3	1,916	1,406	1,406	351	1,265,130	0.045	56,931	0.42
Sn-113	64	115.09	days	2015	4.4	2,015	1,776	1,776	444	1,598,048	0.04	63,922	0.40
Sr-85	99	64.84	days	3769	1.9	3,769	3,011	3,011	753	2,710,022	0.035	94,851	0.32
Cs-137	85	30	years	2339	2.1	2,339	2,336	2,336	584	2,102,303	0.03	63,069	0.40
Y-88	99	106.61	days	6346	3.7	6,346	5,536	5,536	1,384	4,982,483	0.02	99,650	0.32
Co-60	99	5.271	yrs	3311	0.6	3,311	3,286	3,286	822	2,957,455	0.01	29,575	0.58
* Efficiency estimate based on previous Cs-137 GeLi calibrations in 10 ml LSC geometry													
NAS GEA calibration standard, reference date					3/1/95		need density, assuming 1 until further information is provided						
nominal total volume = 10 ml.			elapsed days =		40				gammas/sec	gammas at count	estimated	estimated	estimated
							dpm/g at date=	gammas/s/g	vol (ml.)	time (min)	efficiency	total gammas	counting
	intensity %	t1/2		kBq/g	error %	dpm/g	4/10/95	4/10/95	0.25	40			error %
Am-241	35.7	432.7	yrs	6.592	2.16	395,520	395,451	2,353	588	1,411,759	0.09	127,058	0.28
Cd109	3.6	1.2665	yrs	37.39	2.18	2,243,400	2,112,889	1,268	317	760,640	0.09	68,458	0.38
Co57	85.5	271.77	days	1.33	2.2	79,800	72,060	1,027	257	616,116	0.055	33,886	0.54
Te123m	84	119.7	days	2.308	2.16	138,480	109,848	1,538	384	922,723	0.05	46,136	0.47
Cr51	10	27.704	days	15.88	2.25	952,800	350,239	584	146	350,239	0.07	24,517	0.64
Sn113	64	115.09	days	2.091	2.28	125,460	98,601	1,032	263	631,046	0.04	25,242	0.63
Sr85	99	64.84	days	2.259	2.74	135,540	88,381	1,458	365	874,976	0.035	30,624	0.57
Cs137	85	30	years	1.761	2.33	105,660	105,393	1,493	373	895,840	0.0359	32,161	0.56
Y-88	99	106.61	days	3.974	2.24	238,440	183,837	3,033	758	1,819,986	0.02	36,400	0.52
Co-60	99	5.271	yrs	1.873	2.38	112,380	110,773	1,828	457	1,096,654	0.0163	17,875	0.75

3-2563

Prepsheet for QCY.48 (RS-126 and RS-127 Standards) at specific geometries.

QCYPREP.XLS

GEA standards---Prepared from Amersham QCY.48 Sources -- Ref Date 5-1-95

Density of QCY.48 Standard in g/mL = 1.073

Actual measured density of 4 M HCl = 1.0393

Date Prepared for Counting Rm.	Source description	Standard used	Vol (ml) of Std	Measured Mass wt. of standard (g)	Calculated Expected Weight (g)	Bias meas./calc.
5-15-95	point sources (pill vial)	RS-126	0.25	0.26769	0.26404	0.0138
5-15-95	2-mL in glass LSC vial	RS-126	0.25	0.26701	0.26404	0.0113
5-15-95	5-mL in glass LSC vial	RS-126	0.25	0.2677	0.26404	0.0139
5-15-95	10-mL in glass LSC vial	RS-126	0.25	0.26767	0.26404	0.0137
5-15-95	50-mL in 4 oz PC jar (PSJ)	RS-126	0.25	0.26314	0.26404	-0.0034
5-15-95	100-mL poly bottle	RS-126	0.25	0.26745	0.26404	0.0129
5-15-95	1000-mL marinelli beaker	RS-126a	0.5	not possible	0.51965	
5-15-95	100-mL water in 4oz PC jar	RS-126a	0.5	0.5228	0.51965	0.0061
5-15-95	100 mL in 8oz PC jar	RS-126a	0.5	0.5131	0.51965	-0.0126
5-15-95	500 mL in 8oz PC Jar	RS-126a	0.5	0.5119	0.51965	-0.0149
Additional Sources Prepared as Requested by Richard Ratner						
8-10-95	10-mL in glass LSC vial	RS-126b	1.5	1.56633	1.55895	0.0047
8-11-95	2-mL in glass LSC vial	RS-127a	1.5	1.53612	1.55895	-0.0146

Opted to use the density of 4 M HCl for Bias Calc.

A bias greater than 2% (+/- 0.02) between the actual measured weight and the expected weight based on the measured density of 4 M HCl was considered unacceptable and a repreparation of the geometry source was made.

Certificate Files for RS-126b and RS-127a as they appear in the Canberra GENIE Gamma Library

DKA200:[GAMMA.EFF]RS-126-B.CER;1
2-OCT-1995 11:22

Title : QCY.48 Amersham standard RS/130/51 RS-126
Quantity : 1.6 Assay date : 1-MAY-1995 12:00:00.

Nuclide Name	Half Life	Energy (keV)	Rate	% Err	% Abn	CAL/INIT?
Am-241	432.70Y	59.5	1092.	0.70	35.7	Yes
Cd-109	1.27Y	88.0	620.	1.20	3.6	Yes
Co-57	271.77D	122.1	561.	0.57	85.5	Yes
Ce-139	138.00D	165.9	679.	0.50	84.0	Yes
Hg-203	47.00D	279.2	1916.	0.77	10.0	Yes
Sn-113	115.09D	391.7	2015.	1.47	64.0	Yes
Sr-85	64.84D	514.0	3769.	0.63	99.3	Yes
Cs-137	30.00Y	661.7	2339.	0.70	85.2	Yes
Y-88	106.61D	898.1	5988.	1.23	92.7	Yes
Co-60	5.27Y	1173.2	3311.	0.20	99.9	Yes
Co-60	5.27Y	1332.5	3313.	0.20	100.0	Yes
Y-88	106.61D	1836.1	6346.	1.23	99.3	Yes

DKA200:[GAMMA.EFF]RS-127-A.CER;1
2-OCT-1995 11:22

Title : QCY.48 Amersham standard RS/130/50 RS-127 FOR TRACK DETECTOR
Quantity : 1.5 Assay date : 1-MAY-1995 12:00:00.

Nuclide Name	Half Life	Energy (keV)	Rate	% Err	% Abn	CAL/INIT?
Am-241	432.70Y	59.5	1092.	0.70	35.7	Yes
Cd-109	1.27Y	88.0	620.	1.20	3.6	Yes
Co-57	271.77D	122.1	561.	0.57	85.5	Yes
Ce-139	138.00D	165.9	679.	0.50	84.0	Yes
Hg-203	47.00D	279.2	1916.	0.77	10.0	Yes
Sn-113	115.09D	391.7	2015.	1.47	64.0	Yes
Sr-85	64.84D	514.0	3769.	0.63	99.3	Yes
Cs-137	30.00Y	661.7	2339.	0.70	85.2	Yes
Y-88	106.61D	898.1	5988.	1.23	92.7	Yes
Co-60	5.27Y	1173.2	3311.	0.20	99.9	Yes
Co-60	5.27Y	1332.5	3313.	0.20	100.0	Yes
Y-88	106.61D	1836.1	6346.	1.23	99.3	Yes

3-2565

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WHC-SD-WM-DP-145, REV. 1

DETECTOR G

3-2566

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VMS Calibration Report V1.5 Generated 2-OCT-1995 11:06:24

Configuration : MCA0:[USER]G$1
Analyses by : SCRCAL V1.1
Detector Name : G
Efficiency type : Empirical
Detector Geometry: PO-4PC-100ML-W

Energy Calib Time: 10-JUL-1995 08:56:39
Effncy Calib Time: 9-AUG-1995 16:41:15
Shelf : 0

Energy Calibration Report

Energy = 0.3639 + 0.3753*Channel + 0.0000E+00*(Channel**2)

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	158.07	59.50	59.68	-0.184
2	233.97	88.00	88.17	-0.166
3	324.57	122.10	122.17	-0.065
4	441.27	165.90	165.96	-0.059
5	743.09	279.20	279.22	-0.020
6	1042.56	391.70	391.60	0.097
7	1368.37	514.00	513.87	0.129
8	1761.68	661.70	661.46	0.236
9	2391.66	898.10	897.88	0.223
10	3125.06	1173.20	1173.10	0.101
11	3549.87	1332.50	1332.51	-0.013
12	4892.55	1836.10	1836.38	-0.280

FWHM Calibration Report

FWHM = 0.5296 + 5.1664E-02*(Energy**1/2)

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	59.50	1.06	0.93	0.136
2	88.00	1.10	1.01	0.083
3	122.10	1.13	1.10	0.031
4	165.90	1.19	1.20	-0.002
5	279.20	1.29	1.39	-0.105
6	391.70	1.50	1.55	-0.055
7	514.00	1.59	1.70	-0.110
8	661.70	1.74	1.86	-0.123
9	898.10	2.02	2.08	-0.060
10	1173.20	2.38	2.30	0.086
11	1332.50	2.40	2.42	-0.015
12	1836.10	2.88	2.74	0.135

Approved by: Richard T. R Approval Date: 10/ 2 / 95

Additional print-out of July 10 energy & FWHM calibration.

RTR

WHC-SD-WM-DP-145, REV 1

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:11:51

Configuration : DKA200:[USER.SCUSR.EFF]EFF_GOGSV10MLW_M.CNF;1
Analyses by : CALIBRATE V1.7,PEAK V16.5
Detector Name : G
Efficiency type : Empirical
Detector Geometry: PO-GSV-10ML-W

Energy Calib Time: 10-JUL-1995 08:56:39
Effncy Calib Time: 7-AUG-1995 15:13:59
Shelf : 0

Efficiency Calibration Report

Eff = exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), x=ln(a1/energy)

a1	a2	a3	a	a5	a6	a7
947.8	-3.812	0.9890	-3.0955E-02	-0.1698	0.1510	-4.3621E-02

Average Deviation = 1.57 % Reduced Chi-Square = 4.20

Nbr	Energy (keV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
1	59.54	4.42E-02	2.24E-04	4.36E-02	2.84	1.44
2	88.03	8.70E-02	5.06E-04	9.03E-02	-6.51	-3.79
3	122.06	1.03E-01	4.80E-04	1.01E-01	3.18	1.48
4	165.85	9.45E-02	4.70E-04	9.17E-02	6.01	2.99
5	279.19	6.45E-02	3.90E-04	6.45E-02	0.15	0.09
6	391.69	4.89E-02	2.77E-04	4.92E-02	-1.29	-0.73
7	514.00	3.88E-02	1.58E-04	3.92E-02	-2.03	-0.83
8	661.66	3.23E-02	1.11E-04	3.12E-02	9.76	3.35
9	898.07	2.26E-02	1.06E-04	2.33E-02	-6.95	-3.28
10	1173.24	1.80E-02	5.06E-05	1.79E-02	1.14	0.32
11	1332.50	1.60E-02	4.60E-05	1.59E-02	2.55	0.73
12	1836.08	1.25E-02	6.06E-05	1.23E-02	2.70	1.31

Approved by: Richard T. RS Approval Date: 10/ 2/ 95

This is an additional print-out of Aug-7-1995 efficiency calibration of GØGSV1ØMLW.

RTR

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:12:52

Configuration : DKA200:[USER.SCUSR.EFF]EFF_G3GSV2MLW_M.CNF;1
Analyses by : CALIBRATE V1.7,PEAK V16.5
Detector Name : G Energy Calib Time: 10-JUL-1995 08:56:39
Efficiency type : Empirical Effncy Calib Time: 2-AUG-1995 17:02:20
Detector Geometry: P3-GSV-2ML-W Shelf : 3

Efficiency Calibration Report

Eff = exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), x=ln(a1/energy)

a1	a2	a3	a4	a5	a6	a7
947.8	-5.469	0.7929	-2.0840E-02	4.4022E-02	-2.7428E-03	-1.2491E-02

Average Deviation = 1.55 % Reduced Chi-Square = 3.08

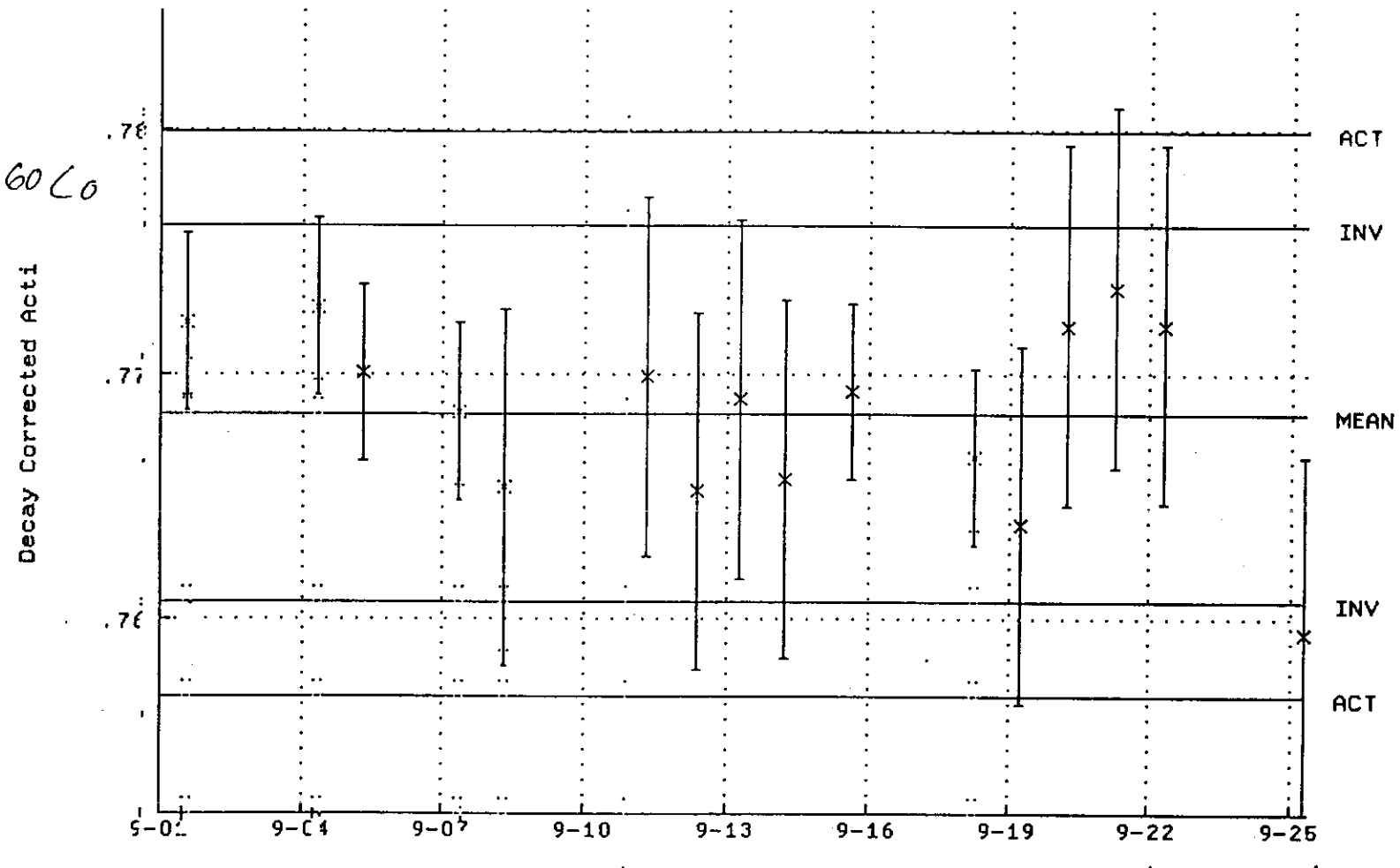
Nbr	Energy (keV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
1	59.54	9.18E-03	4.63E-05	9.19E-03	-0.20	-0.10
2	88.03	1.55E-02	9.86E-05	1.58E-02	-3.25	-2.06
3	122.06	1.74E-02	9.65E-05	1.74E-02	0.22	0.12
4	165.85	1.61E-02	9.33E-05	1.59E-02	2.89	1.67
5	279.19	1.12E-02	7.29E-05	1.12E-02	-0.06	-0.04
6	391.69	8.48E-03	5.38E-05	8.54E-03	-1.12	-0.71
7	514.00	6.69E-03	2.99E-05	6.85E-03	-5.47	-2.45
8	661.66	5.67E-03	2.16E-05	5.60E-03	3.19	1.21
9	898.07	4.39E-03	2.23E-05	4.40E-03	-0.44	-0.22
10	1173.24	3.56E-03	1.01E-05	3.55E-03	0.10	0.03
11	1332.50	3.20E-03	9.27E-06	3.20E-03	-0.71	-0.21
12	1836.08	2.49E-03	1.29E-05	2.44E-03	3.30	1.72

Approved by: Richard T. R Approval Date: 10/ 2/ 95

This is an additional print-out of the Aug-2-1995 efficiency calibration of G3GSV2MLW.

RTR

QA filename : [illegible]KA200:[GAMMA]QAF]TEST_G.QAF;1
Parameter Name : NLACTVTY (Decay Corrected Activity)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 0.768445 +- 3.852703E-03 (0.50 %)

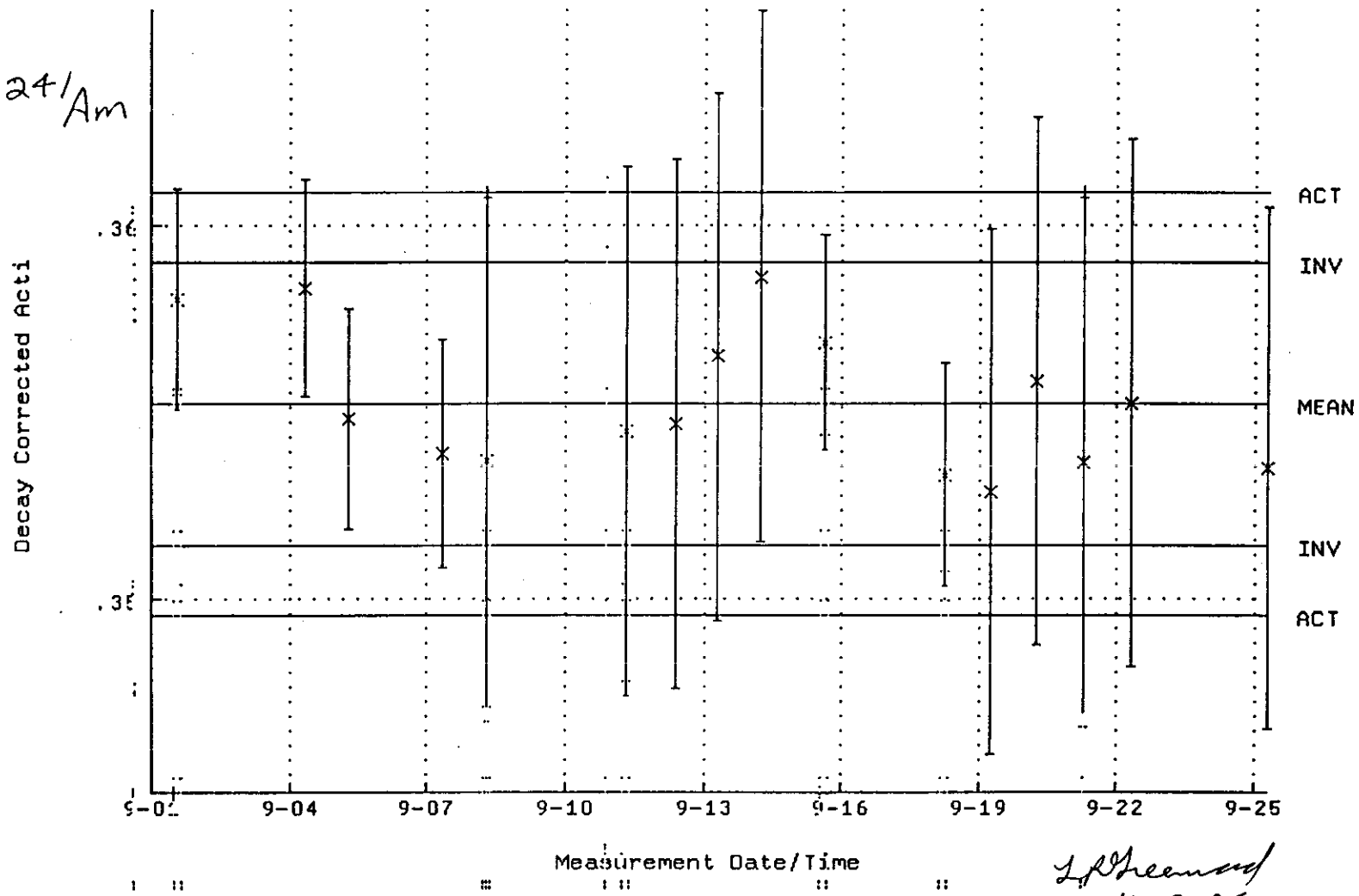


WHC-SD-WM-DP-145, REV 1

J R Greenwood
10-3-95

3-2570

QA filename : DKA200:[GAMMA][QAF]TES[illegible]G.QAF;1
Parameter Name : NLACTVTY (Decay Corrected Activity)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 0.355251 +- 1.889686E-03 (0.53 %)

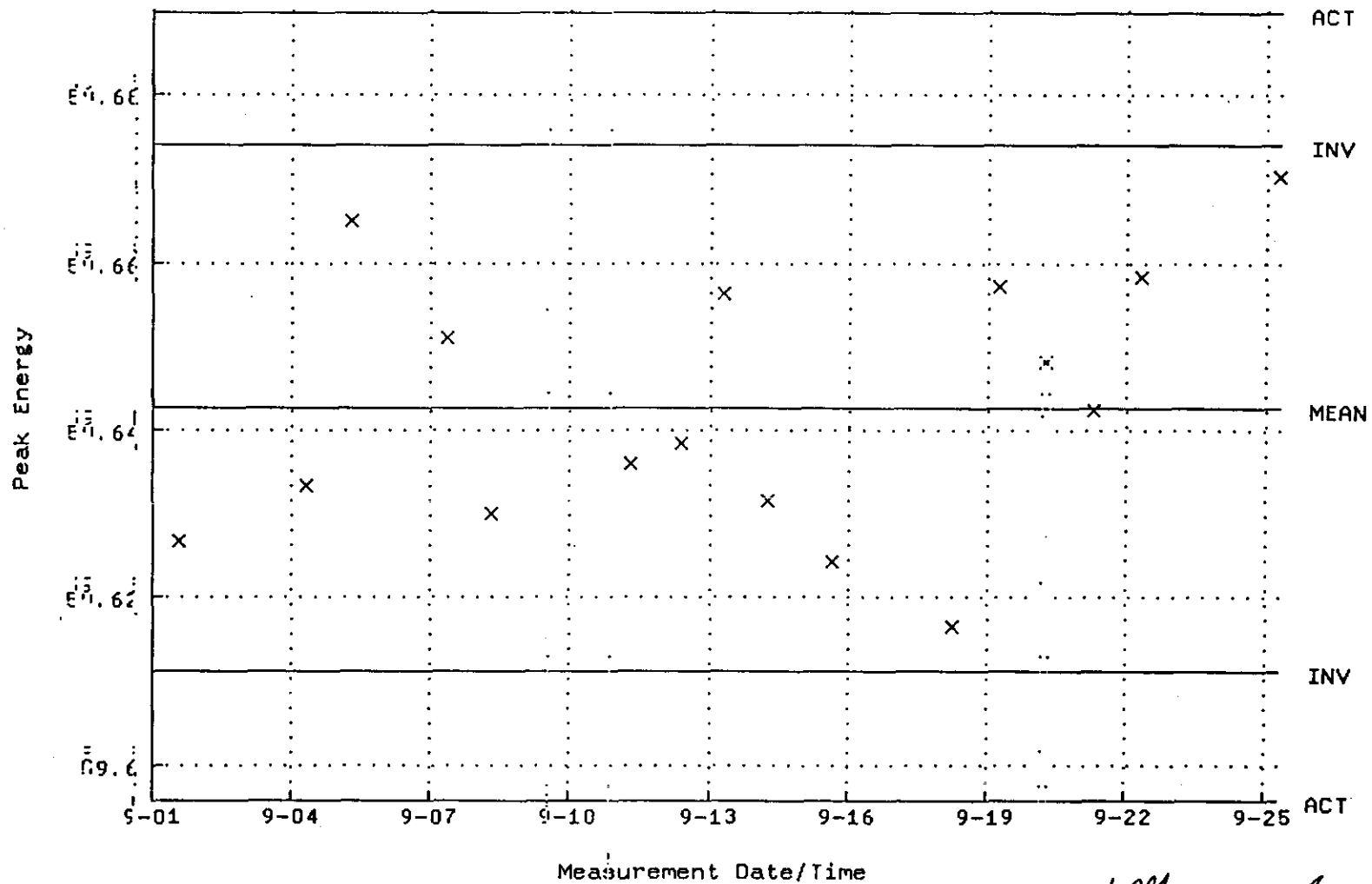


WHC-CD-WM-DP-145, REV. 1

L R Greenwood
10-3-95

3-2571

QA filename : DKA200:[GAMMA.QAF]TEST_G.QAF;1
Parameter Name : PSENERGY-AM (Peak Energy)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 59.6428 +- 1.566330E-02 (0.03 %)

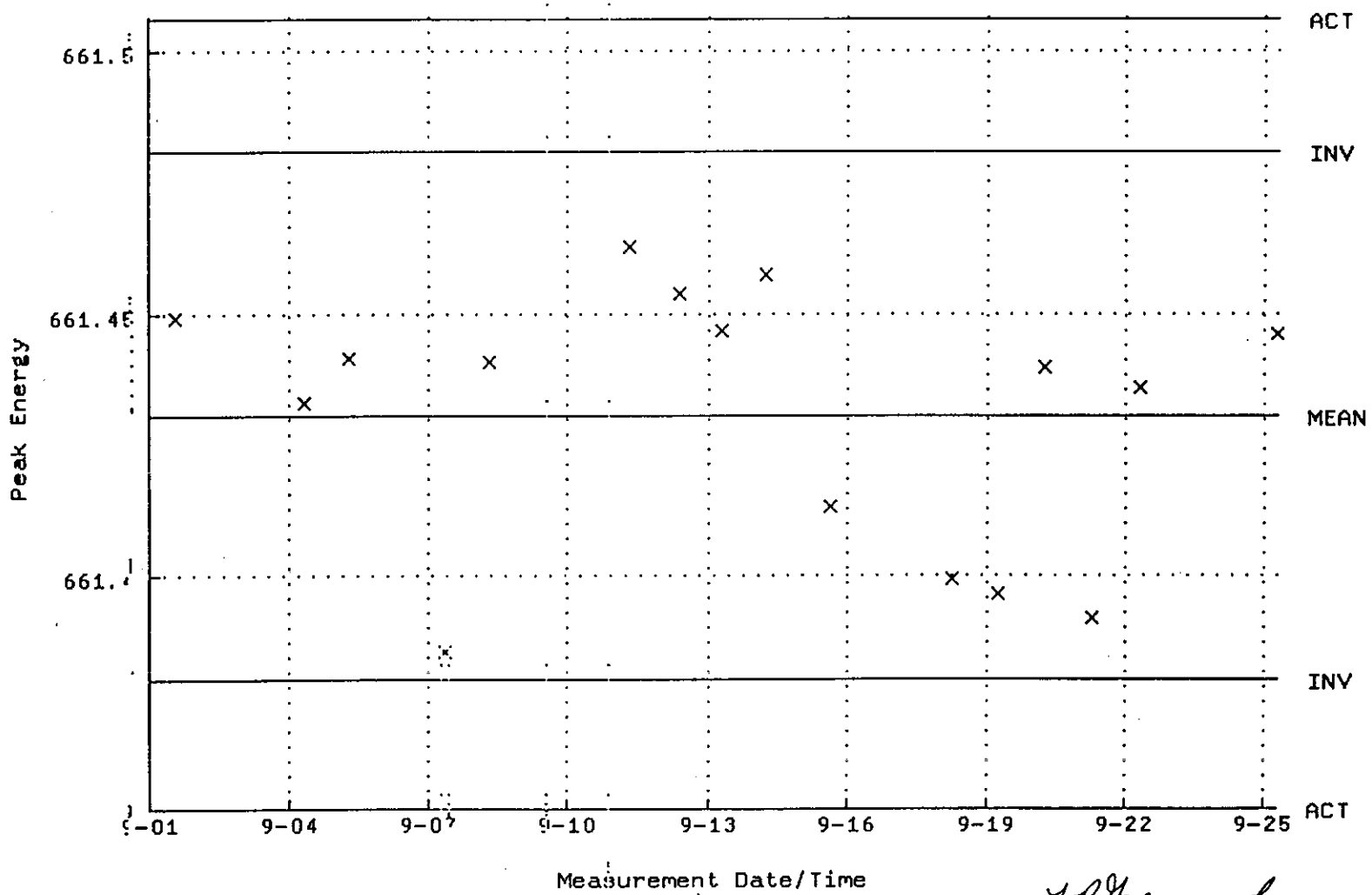


L R Greenwood
10-3-95

WHC-CD-WM-DP-145, REV. 1

3-25772

QA filename : DKA200:[GAMMA.QAF]TES_G.QAF;1
Parameter Name : PSENERGY-CS (Peak Energy)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 661.431 +- 2.509929E-02 (0.00 %)

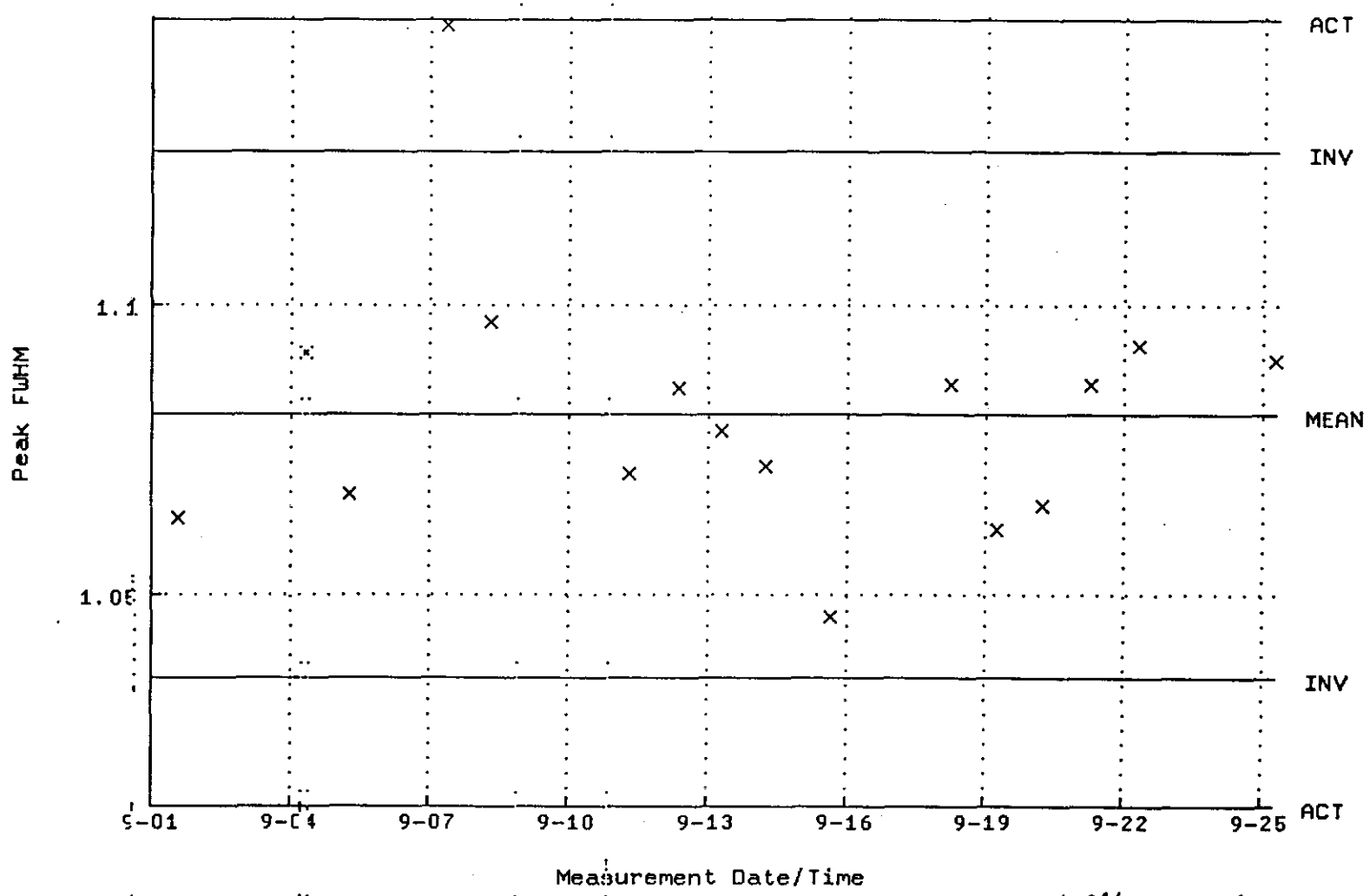


3-2573

HC-CD-WM-DP-145, REV 1

LRGreenwood
10-3-95

QA filename : [illegible]A200:[GAMMA.QAF]TES[illegible]_G.QAF;1
Parameter Name : PSFWHM-AM (Peak FWHM)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 1.08128 +- 2.267895E-02 (2.10 %)

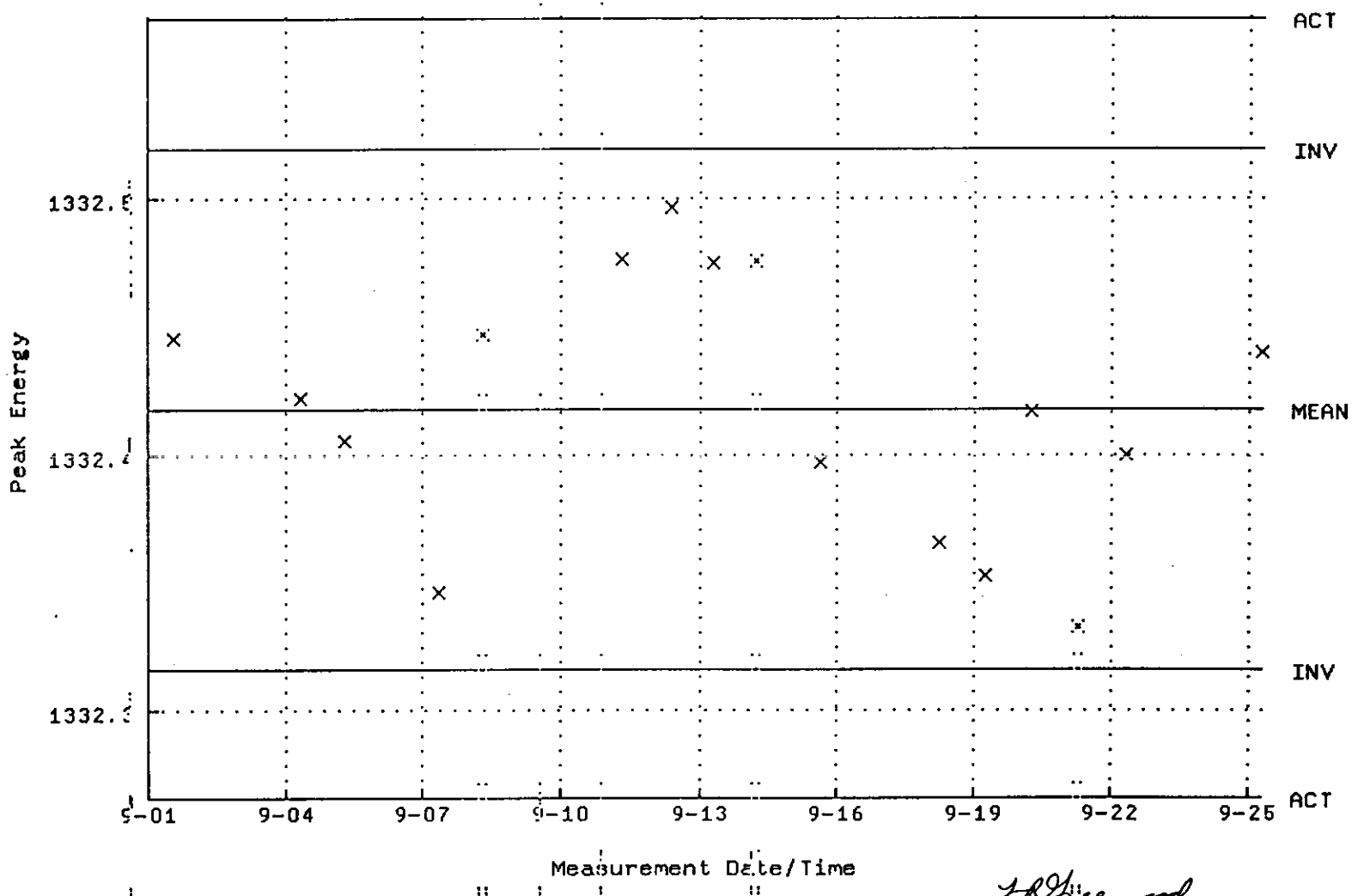


3-2574

WHC-SD-WM-DP-145, REV. 1

10-3-95

QA filename : DKA200:[GAMMA$QAF]TEST_G.QAF;1
Parameter Name : PSENERGY-CO (Peak Energy)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 1332.42 +- 5.068472E-02 (0.00 %)

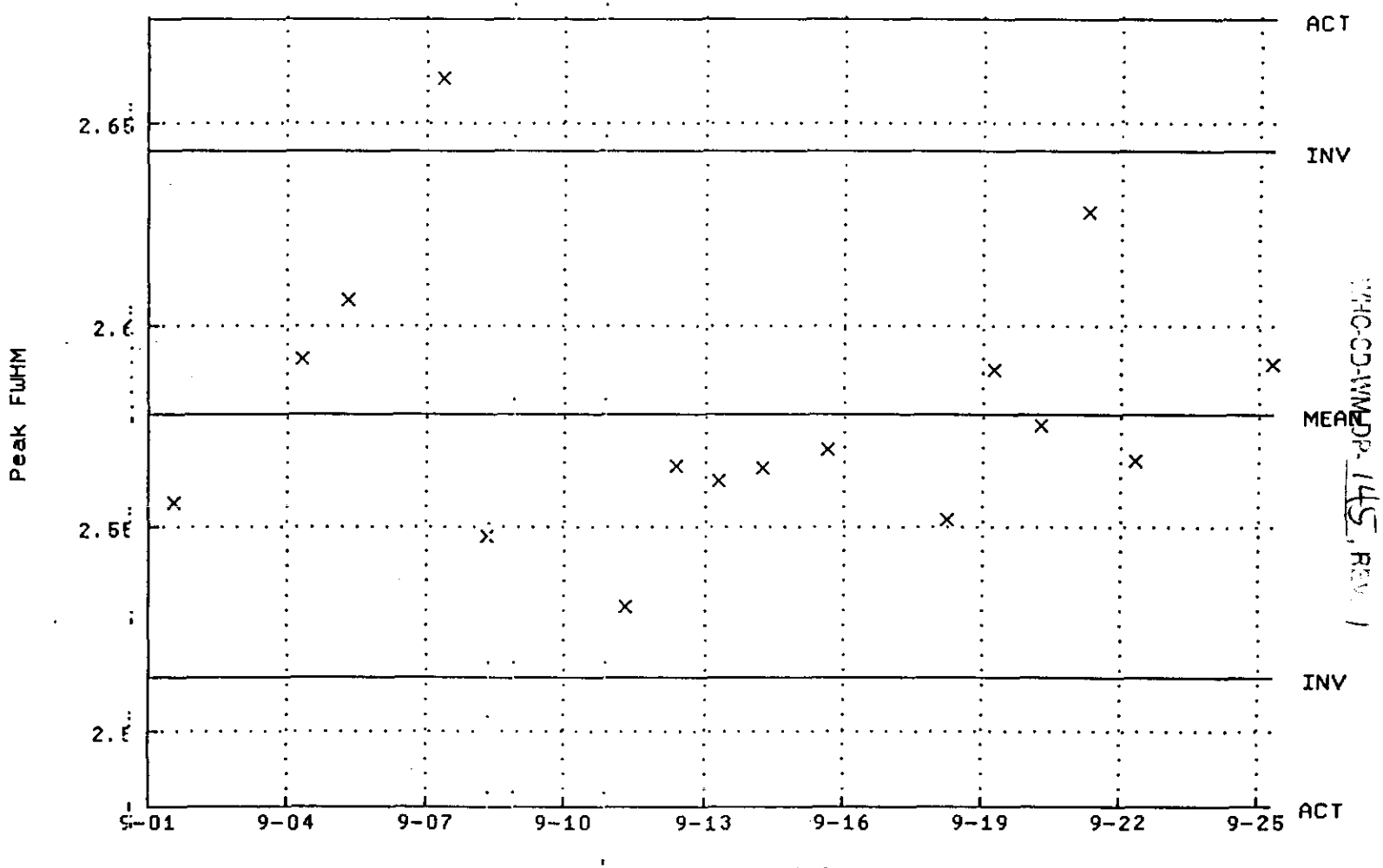


3-2575

WHC-CD-WM-DP-145, REV. 1

11-3-95

QA filename : DKA200:[GAMMA&QAF]TEST_G.QAF;1
Parameter Name : PSFWHM-CO (Peak FWHM)
Start/End Dates : 1-SEP-1995 13:10:22 through 25-SEP-1995 05:42:39
Mean +- Std Dev : 2.57832 +- 3.240179E-02 (1.26 %)



WHC-CD-WM-DP-145, REV. 1

3-2576

L R Greenwood
10-3-95

NIC-CD-WM-DP-145, REV. 1

DECTECTOR H

3-2577

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WHC-CD-WM-DP-145, REV. 1

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:06:09

Configuration : MCA0:[USER]H$1
Analyses by : SCRCAL V1.1
Detector Name : H
Efficiency type : Empirical
Detector Geometry: PO-4PC-100ML-W

Energy Calib Time: 10-JUL-1995 14:06:54
Effncy Calib Time: 7-AUG-1995 11:58:19
Shelf : 0

Energy Calibration Report

Energy = 0.1326 + 0.3749*Channel + 0.0000E+00*(Channel**2)

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	158.77	59.54	59.66	-0.117
2	234.85	88.03	88.18	-0.147
3	325.58	122.06	122.19	-0.131
4	442.39	165.85	165.98	-0.132
5	744.42	279.19	279.21	-0.022
6	1044.23	391.69	391.61	0.078
7	1370.18	514.00	513.81	0.191
8	1763.92	661.66	661.42	0.238
9	2394.48	898.07	897.82	0.253
10	3128.72	1173.24	1173.08	0.161
11	3554.20	1332.50	1332.59	-0.090
12	4897.96	1836.08	1836.36	-0.282

FWHM Calibration Report

FWHM = 0.2752 + 6.4642E-02*(Energy**1/2)

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	59.54	0.98	0.77	0.201
2	88.03	0.99	0.88	0.107
3	122.06	1.03	0.99	0.041
4	165.85	1.11	1.11	0.002
5	279.19	1.27	1.36	-0.088
6	391.69	1.42	1.55	-0.132
7	514.00	1.58	1.74	-0.156
8	661.66	1.81	1.94	-0.127
9	898.07	2.06	2.21	-0.148
10	1173.24	2.50	2.49	0.007
11	1332.50	2.71	2.63	0.078
12	1836.08	3.26	3.05	0.215

Approved by: Richard T Ross Approval Date: 10/2/95

This is an additional print-out of the July 10, 1995 energy & FWHM ~~Aug-7-1995 efficiency~~ calibration of ~~position PO4PC100ML-W detector~~ Detector H

RTR 10/2/95

RTR 10/2/95

RTR

3-2578

WHO-SD-WM-DP-145, REV. 1

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:14:00

Configuration : DKA200:[USER.SCUSR.EFF]EFF_HOGSV10MLW_M.CNF;1
Analyses by : CALIBRATE V1.7,PEAK V16.5
Detector Name : H — Energy Calib Time: 10-JUL-1995 14:06:54
Efficiency type : Empirical — Effncy Calib Time: 15-AUG-1995 17:07:06
Detector Geometry: PO-GSV-10ML-W — Shelf : 0

Efficiency Calibration Report

Eff = exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), x=ln(a1/energy)

a1	a2	a3	a	a5	a6	a7
947.8	-4.007	0.9588	-2.9952E-02	-0.1462	0.1413	-4.4620E-02

Average Deviation = 1.14 % Reduced Chi-Square = 2.89

Nbr	Energy (keV)	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
1	59.54	2.64E-02	1.91E-04	2.63E-02	0.67	0.48
2	88.03	6.43E-02	4.78E-04	6.49E-02	-1.21	-0.90
3	122.06	7.82E-02	4.84E-04	7.83E-02	-0.25	-0.15
4	165.85	7.44E-02	4.75E-04	7.32E-02	2.49	1.59
5	279.19	5.10E-02	4.20E-04	5.22E-02	-2.78	-2.29
6	391.69	3.90E-02	2.93E-04	3.99E-02	-3.07	-2.30
7	514.00	3.16E-02	1.72E-04	3.18E-02	-1.33	-0.72
8	661.66	2.61E-02	1.20E-04	2.55E-02	5.46	2.50
9	898.07	1.86E-02	1.16E-04	1.92E-02	-4.38	-2.74
10	1173.24	1.51E-02	5.49E-05	1.48E-02	4.31	1.57
11	1332.50	1.32E-02	5.10E-05	1.32E-02	0.77	0.30
12	1836.08	1.04E-02	6.57E-05	1.03E-02	1.55	0.98

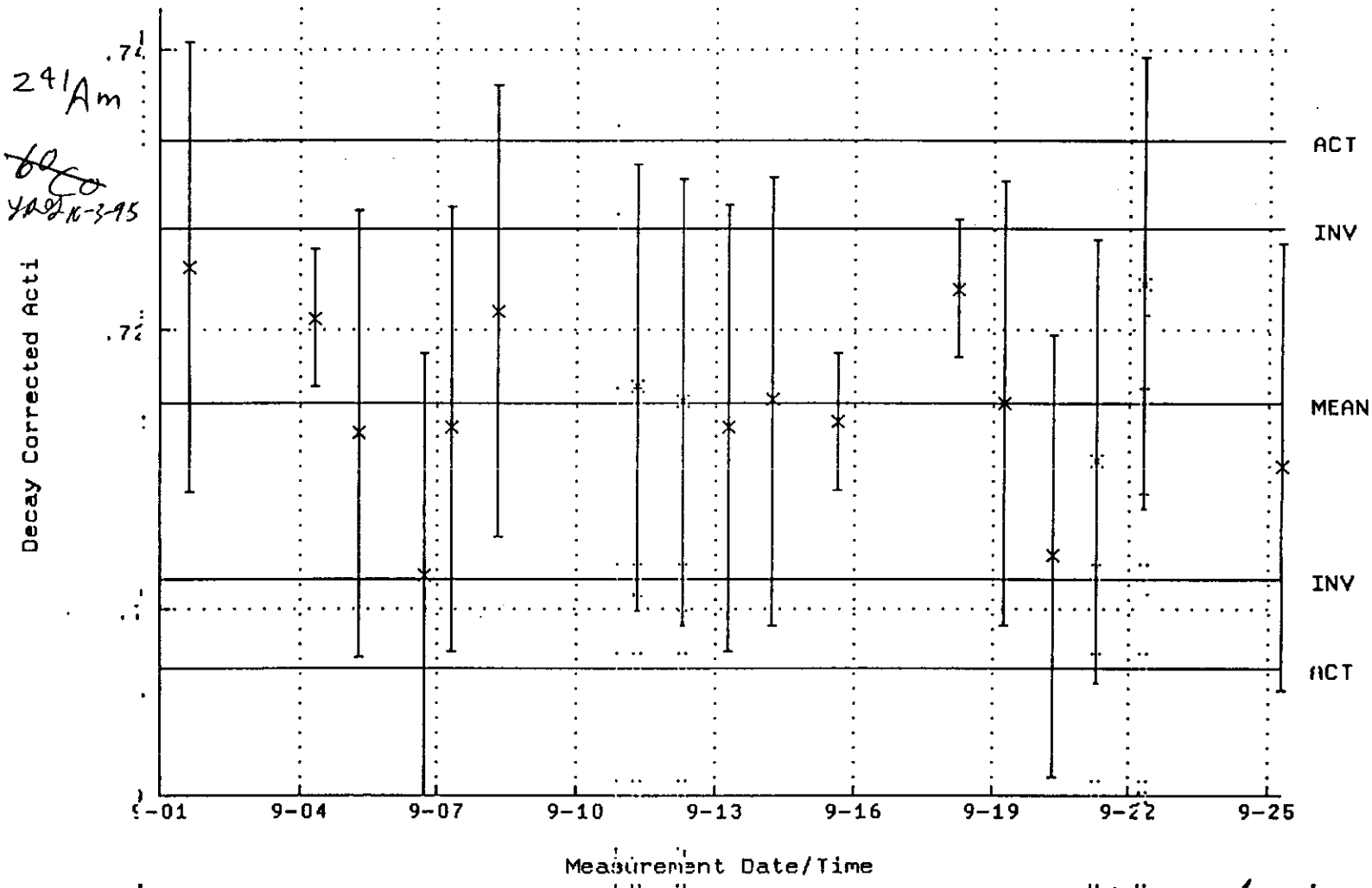
Approved by: Richard T. Ro Approval Date: 10 / 2 / 95

This is an additional print-out of the 15-Aug-1995 efficiency calibration of position PØGSVIØMLW.

RTR
2

3-2579

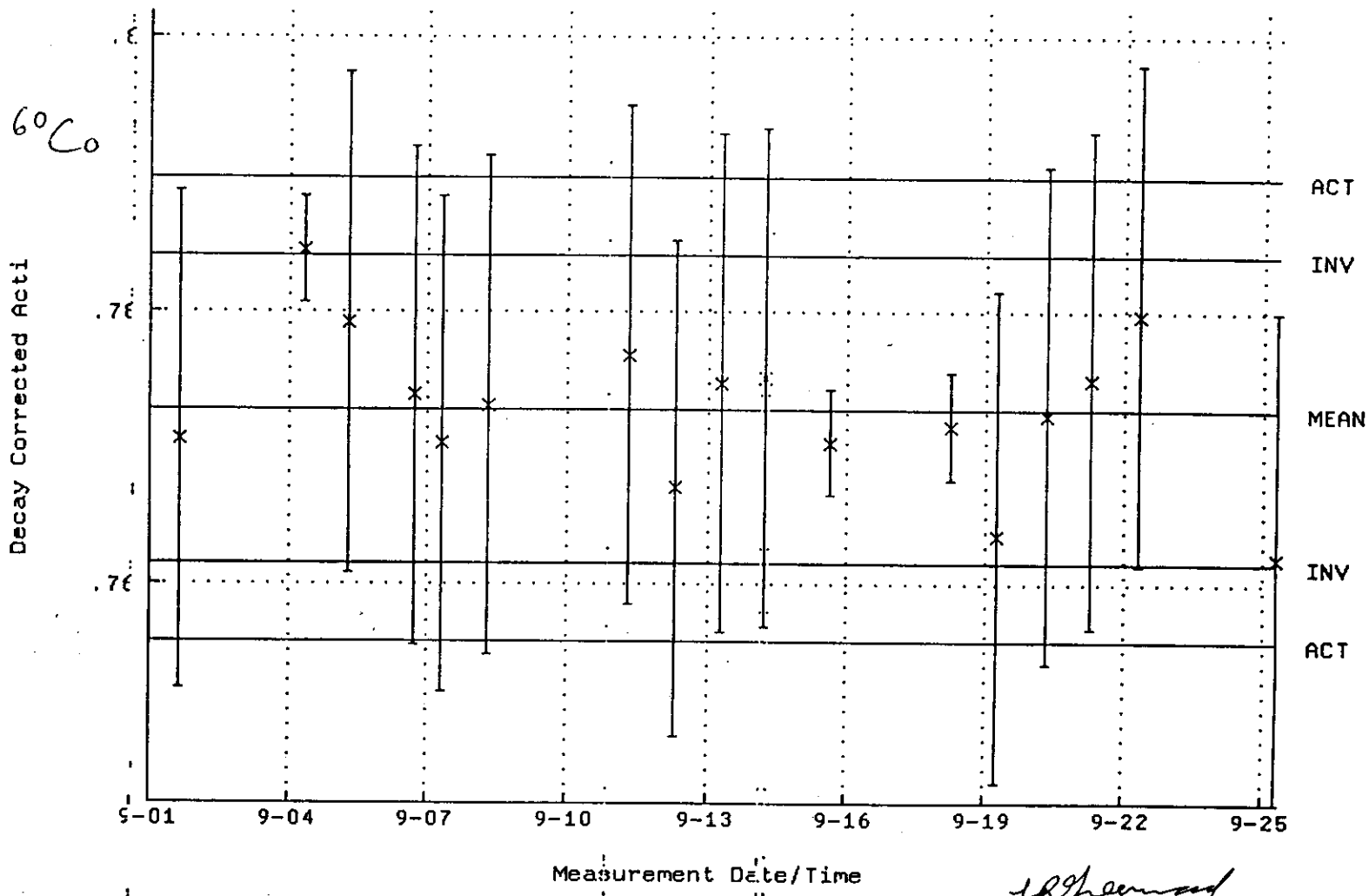
QA filename : DKA200:[GAMMA.QAF]TEST[illegible].QAF;1
Parameter Name : NLACTVTY (Decay Corrected Activity)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 0.714771 +- 6.290697E-03 (0.88 %)



3-2580

WHC-SD-WM-DP-145, REV. 1

QA filename : DKA200:[GAMMA.QAF]TEST_H.QAF;1
Parameter Name : NLACTVTY (Decay Corrected Activity)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 0.772826 +- 5.626168E-03 (0.73 %)

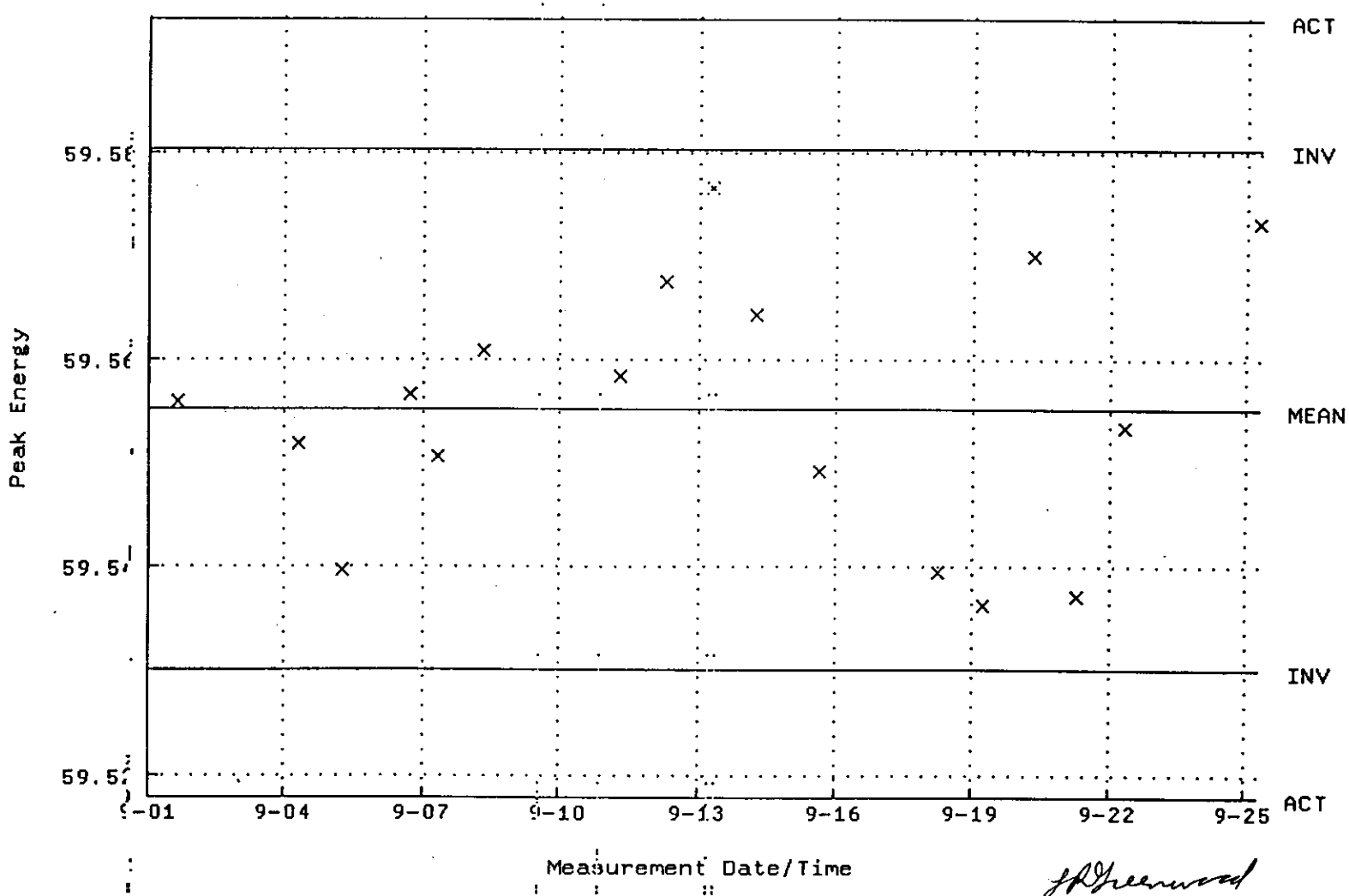


WHC-CD-WM-DP-145, REV. 1

3-2581

10-3-98

QA filename : DKA200:[GAMMA.QAF]TEST_H.QAF;1
Parameter Name : PSENERGY-AM (Peak Energy)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 59.5554 +- 1.251489E-02 (0.02 %)

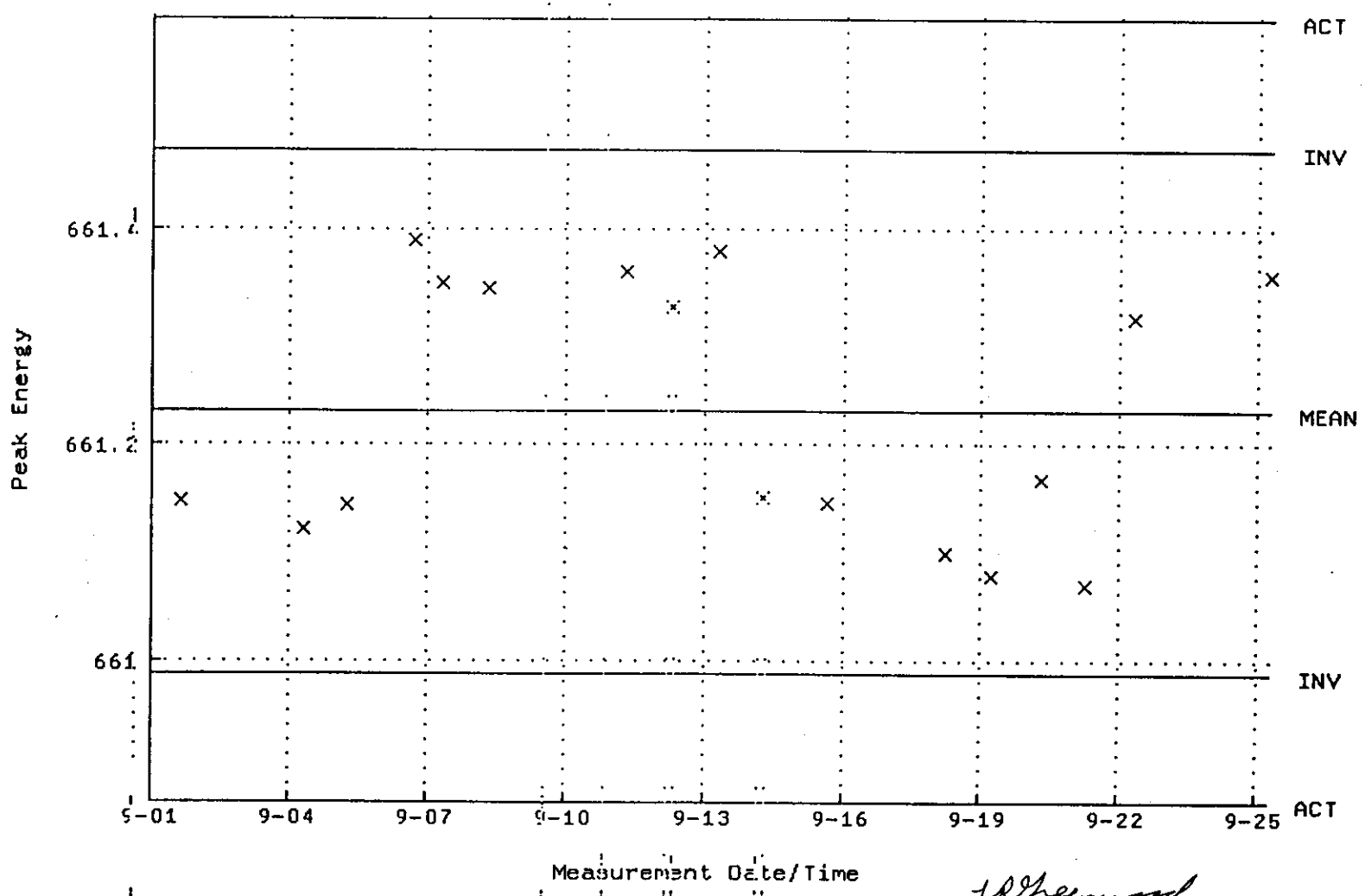


3-2582

WHC-SD-WM-DP-165, REV. 1

J P Greenwood
10-3-95

QA filename : DKA200:[GAMMA.QAF]TEST_H.QAF;1
Parameter Name : PSENERGY-CS (Peak Energy)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 661.232 +- 0.121098 (0.02 %)

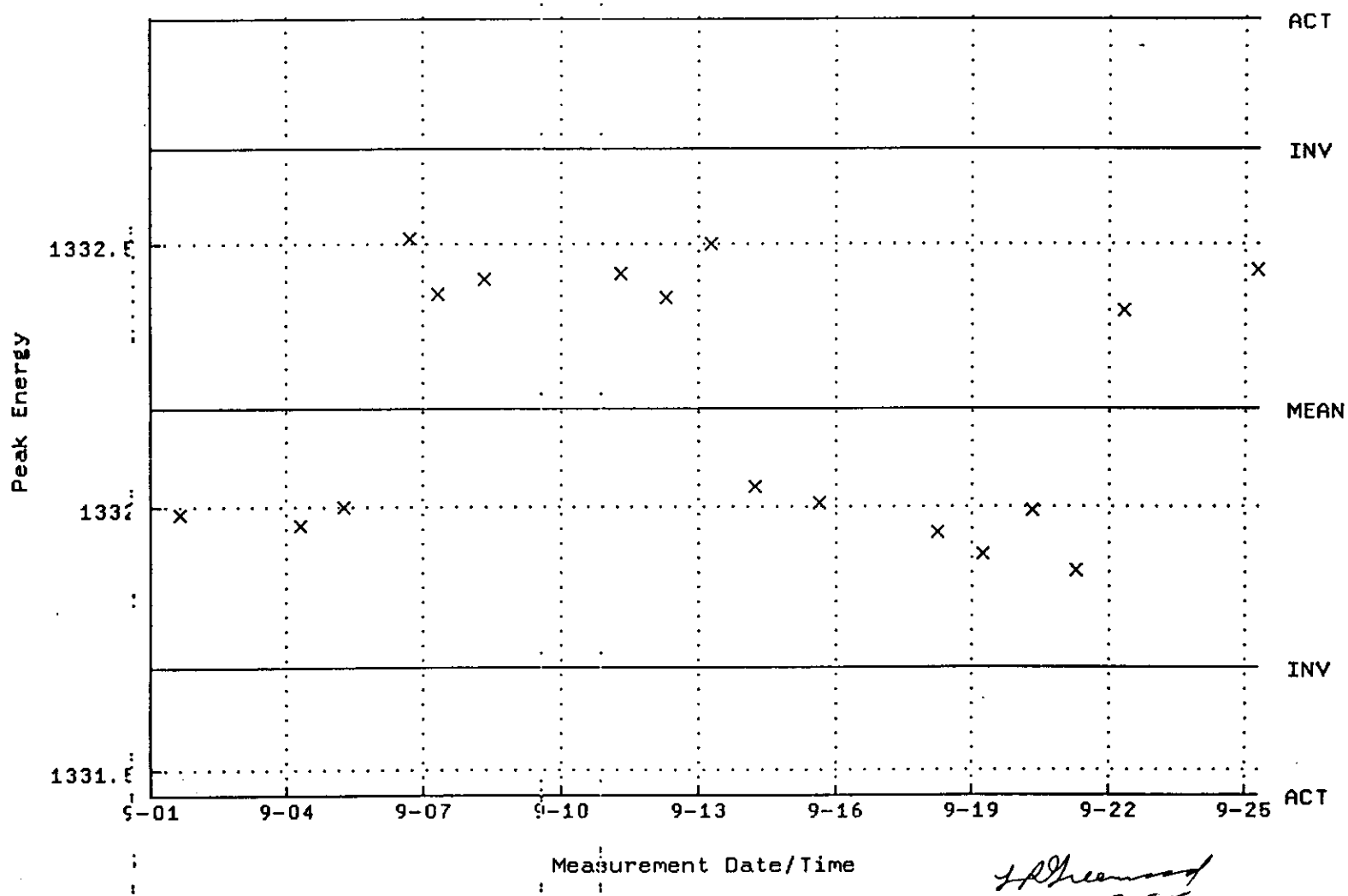


J R Greenwood
10-3-95

3-2583

WCSD-WM-DP-145, REV. 1

QA filename : DKA200:[GAMMA.QAF]TEST_H.QAF;1
Parameter Name : PSENERGY-CO (Peak Energy)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 1332.19 +- 0.245436 (0.02 %)

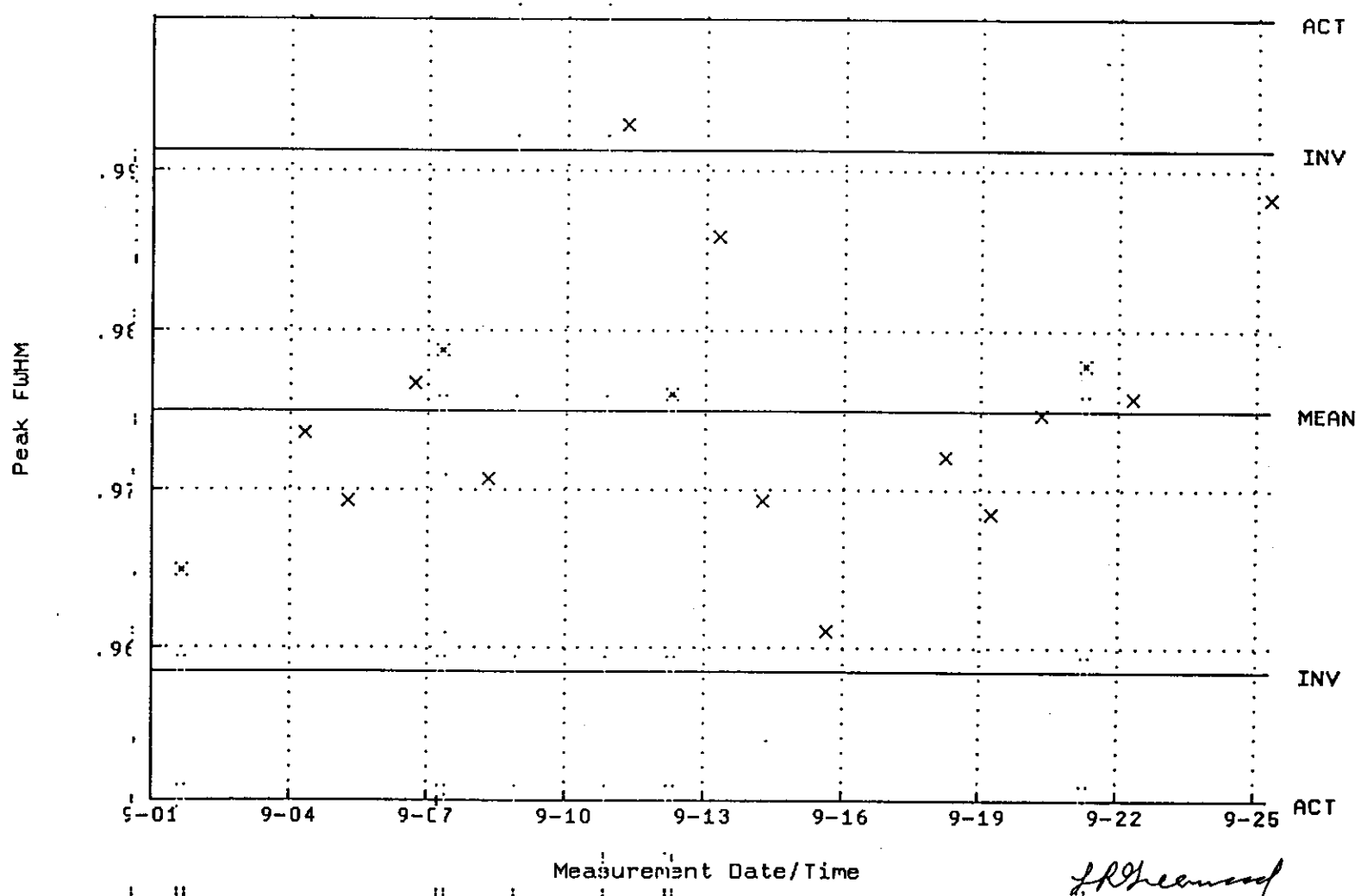


HHC-CD-WM-DP-145, REV. 1

3-2584

10-3-95

QA filename : DKA200:[GAMMA.QAF]TEST_H.QAF;1
Parameter Name : PSFWHM-AM (Peak FWHM)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 0.974977 +- 8.161040E-03 (0.84 %)

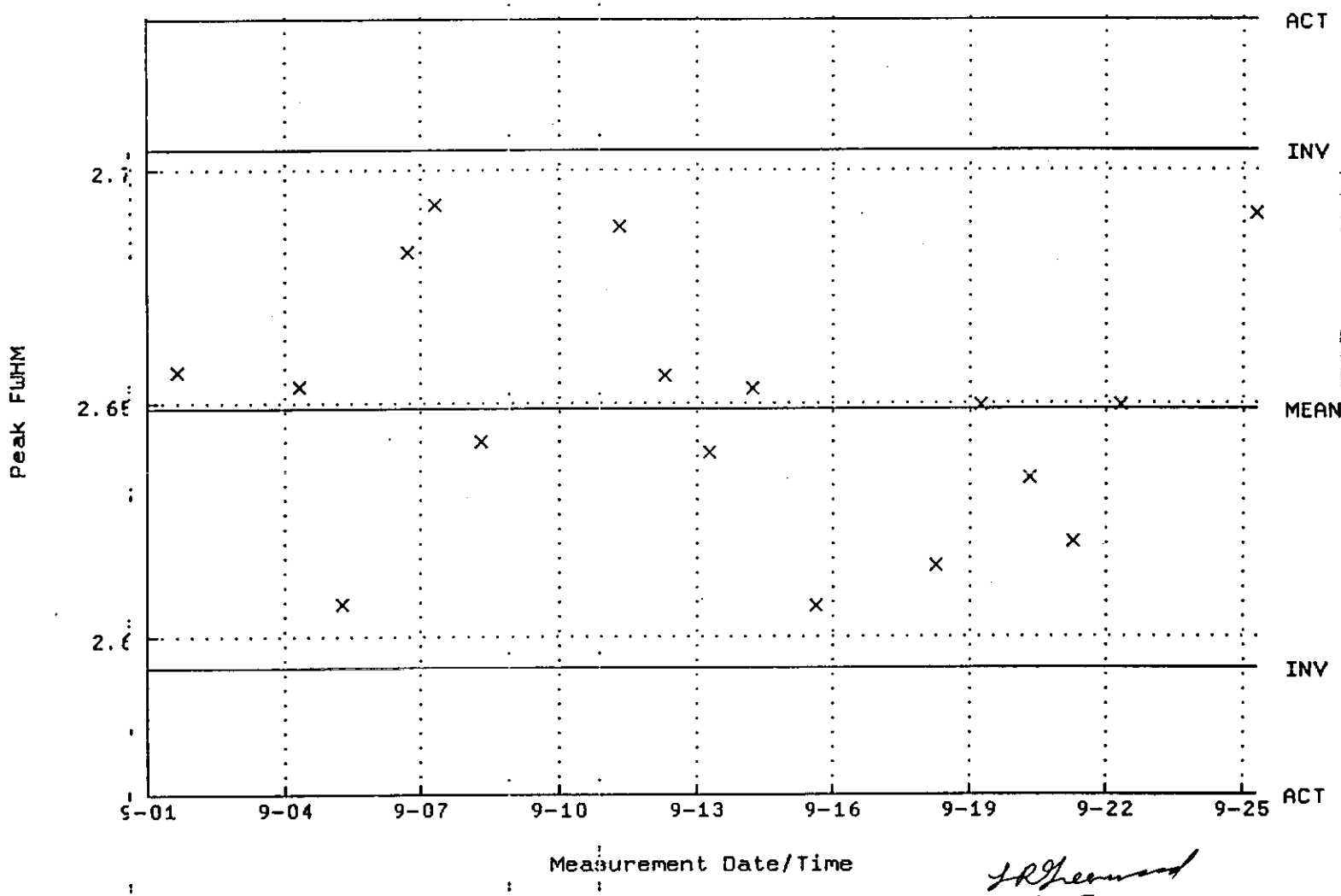


WHC-CD-WM-DP-145, REV.1

3-2585

L R Greenwood
10-3-95

QA filename : DKA200:[GAMMA.QAF]TESS_H.QAF;1
Parameter Name : PSFWHM-CO (Peak FWHM)
Start/End Dates : 1-SEP-1995 15:11:43 through 25-SEP-1995 05:42:45
Mean +- Std Dev : 2.64897 +- 2.760456E-02 (1.04 %)



WHC-CD-WM-DP-145 REV 1

J R Greenwood
10-3-95

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WHC-CD-WM-DP-145, REV. 1

DETECTOR T

3-2587

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WHC-CD-WM-DP-145, Rev 1

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:01:11

Configuration : MCA0:[USER]T$1
Analyses by : CALIBRATE V1.3
Detector Name : T
Efficiency type : Empirical
Arrangement/Geom : P2-GSV-2ML-W

Energy Calib Time: 24-JUL-1990 14:32:05
Effncy Calib Time: 15-AUG-1995 16:03:36
Counter Name : GLASS

Energy Calibration Report

Energy = -0.2810 + 0.7495*Channel + 1.4483E-07*(Channel**2)

Nbr	Centroid Channel	True Energy	Computed Energy	Difference
1	57.53	42.80	42.84	-0.040
2	115.61	86.50	86.37	0.133
3	140.91	105.30	105.33	-0.031
4	164.60	123.10	123.09	0.011
5	235.62	176.30	176.32	-0.024
6	331.10	248.00	247.89	0.105
7	571.32	427.90	427.97	-0.065
8	618.65	463.40	463.45	-0.051
9	789.96	591.80	591.88	-0.083
10	801.68	600.60	600.66	-0.064
11	848.77	635.90	635.97	-0.072
12	965.33	723.36	723.36	-0.004
13	1165.18	873.23	873.21	0.019
14	1329.24	996.33	996.24	0.093
15	1340.53	1004.70	1004.70	-0.003
16	1700.07	1274.54	1274.33	0.210
17	2129.89	1596.58	1596.72	-0.136

FWHM Calibration Report

FWHM = 1.315 + 2.3799E-02*(Energy**1/2)

Nbr	Energy	True FWHM	Computed FWHM	Difference
1	42.80	1.76	1.47	0.289
2	86.50	1.57	1.54	0.030
3	105.30	1.47	1.56	-0.088
4	123.10	1.61	1.58	0.030
5	176.30	1.62	1.63	-0.011
6	248.00	1.60	1.69	-0.091
7	427.90	1.76	1.81	-0.045
8	463.40	1.77	1.83	-0.056
9	591.80	1.86	1.89	-0.033
10	600.60	1.77	1.90	-0.126
11	635.90	1.87	1.91	-0.049
12	723.36	1.92	1.95	-0.037
13	873.23	2.00	2.02	-0.022
14	996.33	2.02	2.07	-0.047
15	1004.70	2.02	2.07	-0.047
16	1274.54	2.22	2.16	0.057

FWHM Calibration Report (continued)
Sample ID : 95-8846 S104-C

Acquisition date : 2-OCT-1995 09:38:48

Nbr	Energy	True FWHM	Computed FWHM	Difference
17	1596.58	2.51	2.27	0.246

Approved by: RTR Approval Date: 10/2/95

This is an additional print-out of the energy & FWHM calibration of Detector T.

RTR
2

WHC-CD-WM-DP-145, Rev. 1

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:15:07

Configuration : DKA200:[USER.SCUSR.EFF]EFF_T8SCV.CNF;1
Analyses by : CALIBRATE V1.3,PEAK V16.0,PEAKEFF V2.2
Detector Name : Energy Calib Time: 25-JUL-1990 07:52:28
Efficiency type : Empirical Effncy Calib Time: 25-JUL-1990 07:54:08
Detector Geometry: T8SCV Shelf : 6

Efficiency Calibration Report

Eff = exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), x=ln(a1/energy)

a1	a2	a3	a	a5	a6	a7
819.7	-7.821	0.9285	6.5376E-02	-0.1167	5.6130E-02	-1.4870E-02

Average Deviation = 2.38 % Reduced Chi-Square = 12.3

Nbr	Energy ()	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
1	42.80	1.37E-03	1.81E-05	1.38E-03	-0.53	-0.70
2	86.50	2.27E-03	2.33E-05	2.13E-03	5.68	5.84
3	105.30	1.87E-03	2.76E-05	2.04E-03	-6.27	-9.25
4	123.10	1.85E-03	1.51E-05	1.91E-03	-3.87	-3.15
5	176.30	1.57E-03	1.63E-05	1.54E-03	1.79	1.86
6	248.00	1.22E-03	1.08E-05	1.18E-03	3.35	2.98
7	427.90	7.28E-04	6.62E-06	7.37E-04	-1.28	-1.16
8	463.40	6.80E-04	7.95E-06	6.85E-04	-0.60	-0.71
9	591.80	5.36E-04	6.25E-06	5.45E-04	-1.39	-1.62
10	600.60	5.26E-04	4.77E-06	5.37E-04	-2.28	-2.06
11	635.90	5.38E-04	6.48E-06	5.09E-04	4.46	5.38
12	723.36	4.48E-04	3.32E-06	4.51E-04	-0.90	-0.67
13	873.23	3.78E-04	3.45E-06	3.78E-04	-0.13	-0.11
14	996.33	3.39E-04	3.75E-06	3.36E-04	0.78	0.86
15	1004.70	3.32E-04	2.79E-06	3.33E-04	-0.37	-0.31
16	1274.54	2.75E-04	1.66E-06	2.73E-04	1.01	0.61
17	1596.58	2.26E-04	4.10E-06	2.33E-04	-1.79	-3.24

Approved by: RTR Approval Date: 10/ 2/ 95

This is an additional print-out of the efficiency calibration of position T8SCV.

RTR

VMS Calibration Report V1.5 Generated 2-OCT-1995 11:16:38

Configuration : DKA200:[USER.SCUSR.EFF]EFF_T10SCV.CNF;1
Analyses by : CALIBRATE V1.5
Detector Name :
Efficiency type : Empirical
Detector Geometry: T10SCV

Energy Calib Time: 12-MAR-1992 10:49:08
Effncy Calib Time: 12-MAR-1992 10:49:08
Shelf : 6

Efficiency Calibration Report

Eff = exp(a2 + a3*x + a4*x**2 + a5*x**3 + a6*x**4 + a7*x**5), x=ln(a1/energy)

a1	a2	a3	a4	a5	a6	a7
947.8	-8.348	0.9528	7.9447E-02	-2.5939E-02	-4.7237E-02	1.0380E-02

Average Deviation = 3.52 % Reduced Chi-Square = 3.76

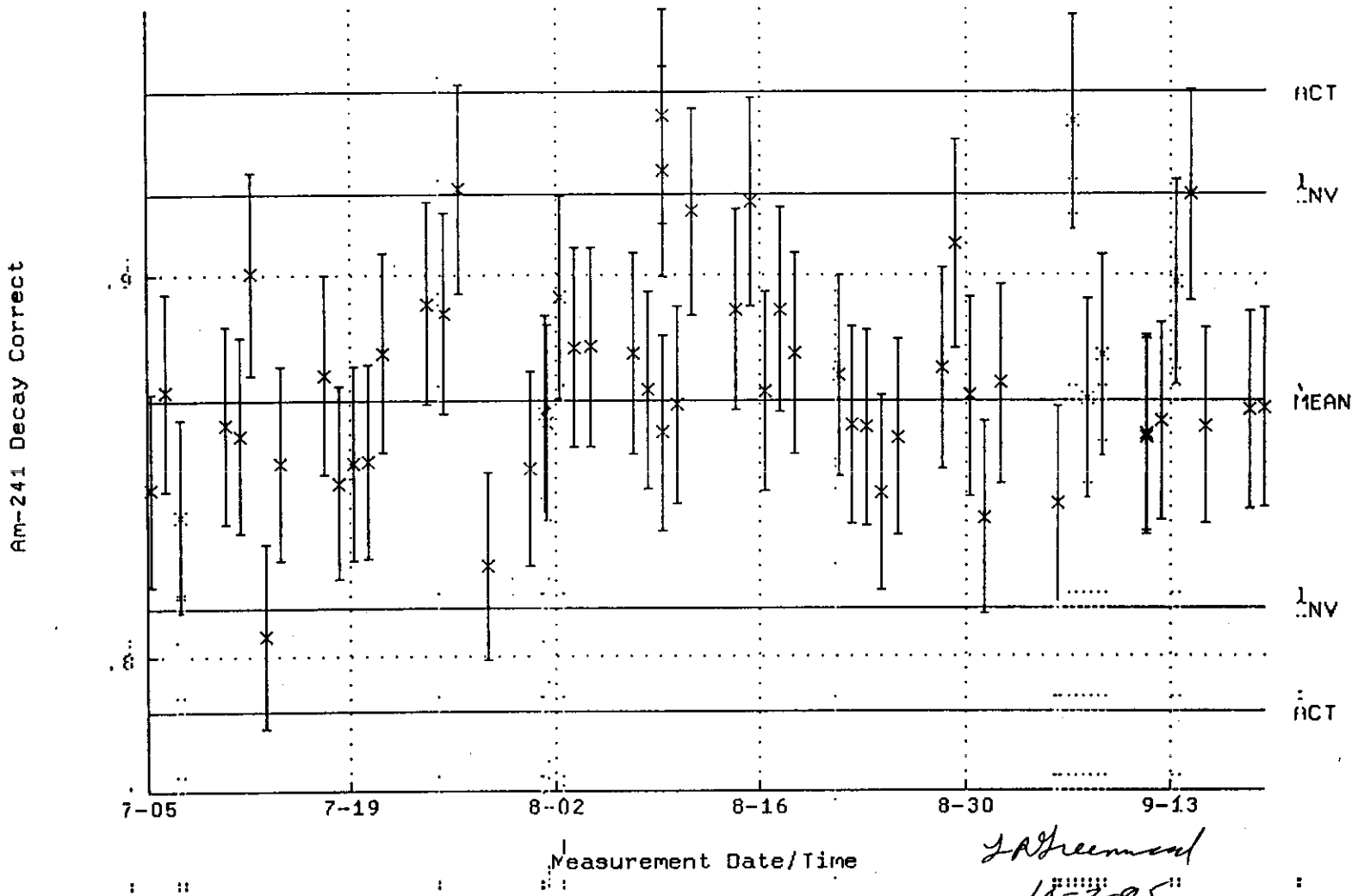
Nbr	Energy ()	Measured Efficiency	Efficiency Error	Computed Efficiency	Diff/ /Error	% Diff
1	59.54	1.19E-03	2.62E-05	1.18E-03	0.13	0.29
2	88.03	1.20E-03	3.98E-05	1.23E-03	-0.79	-2.63
3	122.06	1.19E-03	2.85E-05	1.18E-03	0.35	0.83
4	165.80	1.08E-03	3.22E-05	1.06E-03	0.67	1.98
5	279.19	6.96E-04	4.04E-05	7.55E-04	-1.44	-8.38
6	391.70	5.12E-04	2.24E-05	5.61E-04	-2.18	-9.54
7	514.00	4.87E-04	1.68E-05	4.32E-04	3.26	11.25
8	661.66	3.21E-04	9.36E-06	3.36E-04	-1.62	-4.71
9	898.04	2.46E-04	7.27E-06	2.49E-04	-0.49	-1.45
10	1173.24	1.95E-04	1.30E-06	1.94E-04	0.60	0.40
11	1332.52	1.72E-04	1.14E-06	1.73E-04	-0.51	-0.34
12	1836.06	1.31E-04	2.58E-06	1.30E-04	0.20	0.39

Approved by: RTR Approval Date: 10 / 2 / 95

This is an additional printout of the efficiency calibration of position T10SCV.

RTR

QA filename : DKA200:[USER]TRACQAF;2
Parameter Name : NLACTVTY (Am-241 Decay Corrected Activity)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Mean +- Std Dev : 0.867000 +- 2.700000E-02 (3.11 %) <USER>

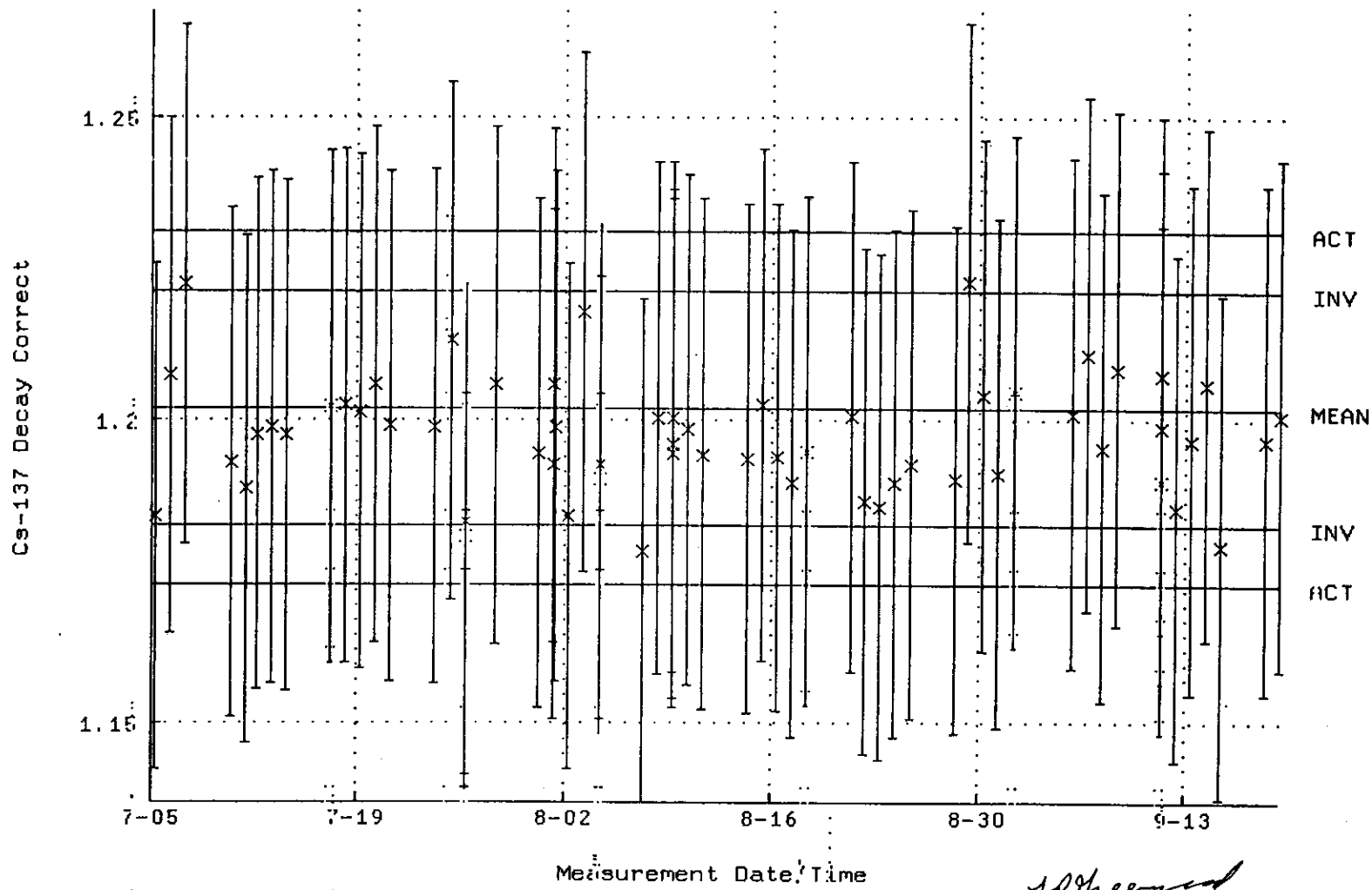


J A Greenwood
10-3-95

3-2592

WHC-CD-WM-DP-145, REV. 1

QA filename : DK[illegible]200:[US[illegible]]TRACK.Q[illegible]F;2
Parameter Name : NLACTVTY (Cs-137 Decay Corrected Activity)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Mean +- Std Dev : 1.20200 +- 9.700000E-03 (0.81 %) <USER>

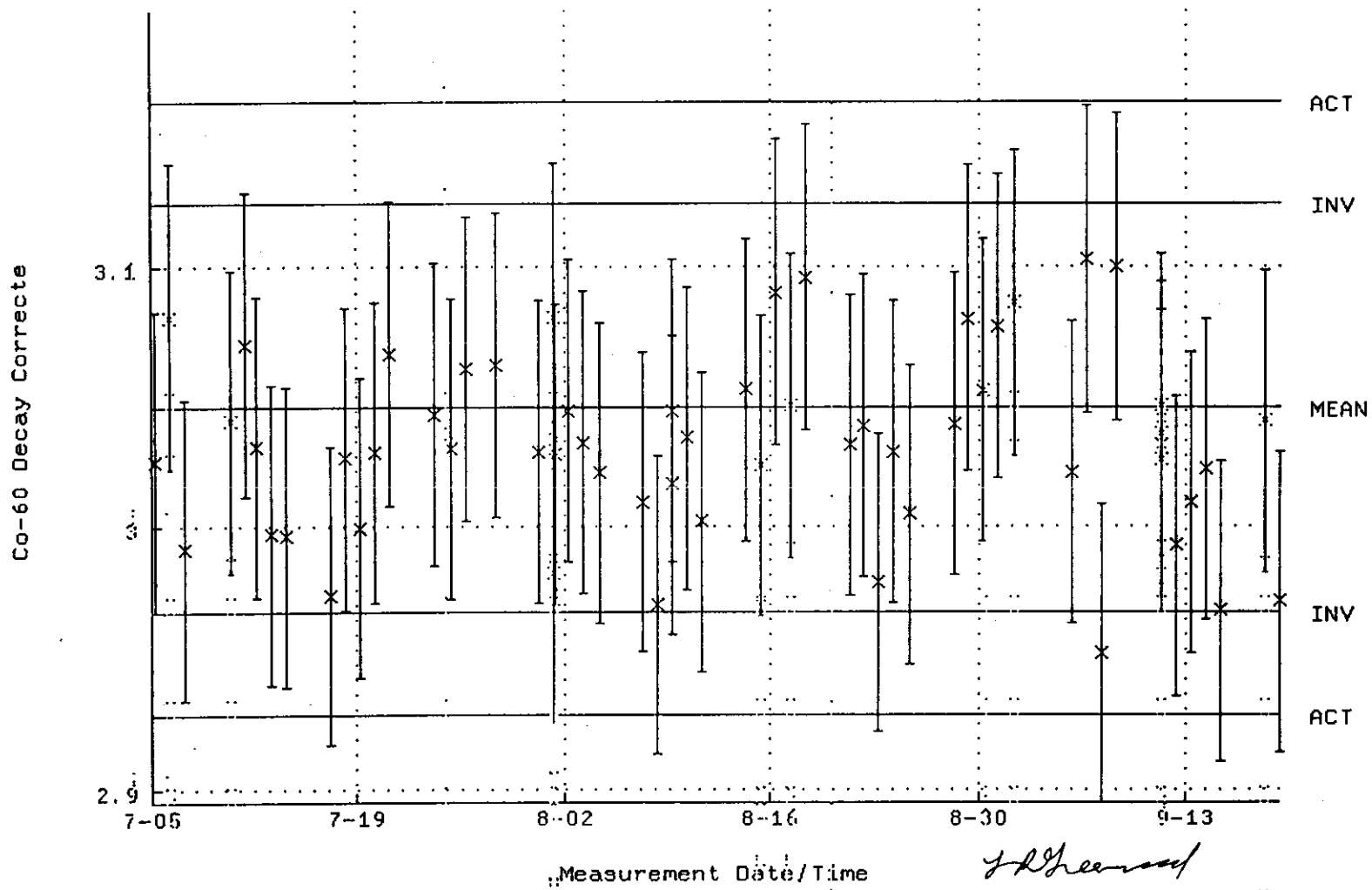


3-2593

WMC-CD-WM-DP-145, REV. 1

10-3-95

QA filename : DKA200:[USER]TRACE.QAF;2
Parameter Name : NLACTVTY (Co-60 Decay Corrected Activity)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Mean +- Std Dev : 3.04600 +- 3.900000E-02 (1.28 %) <USER>

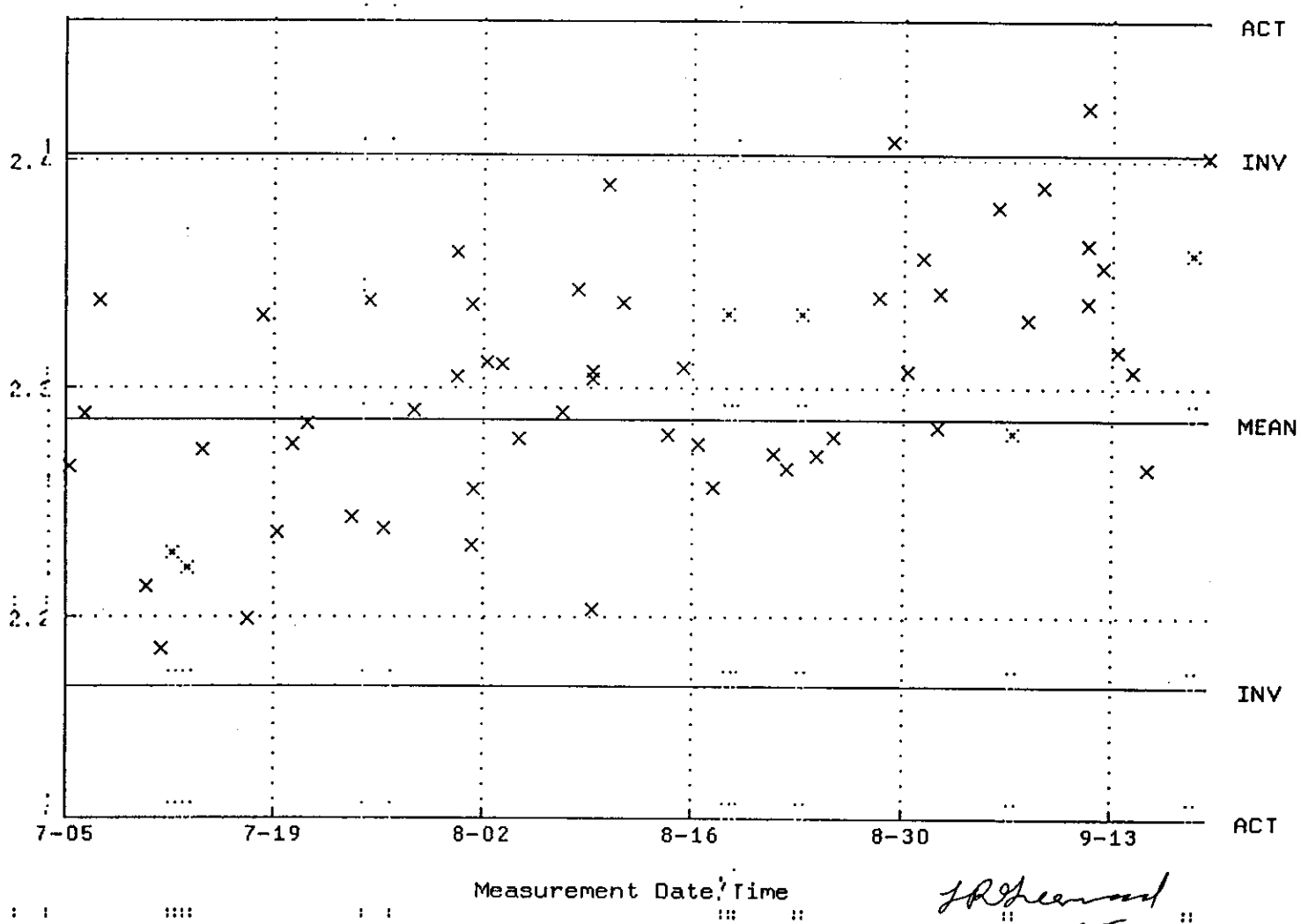


10-3-95

3-2594

WHC-CD-WM-DP-145, REV. 1

QA filename : DKA200:[USER]TRACK.QAF;2
Parameter Name : PSFWHM (Peak FWHM @ Co-60's 1332.5keV)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Mean +- Std Dev : 2.28657 +- 5.785351E-02 (2.53 %)

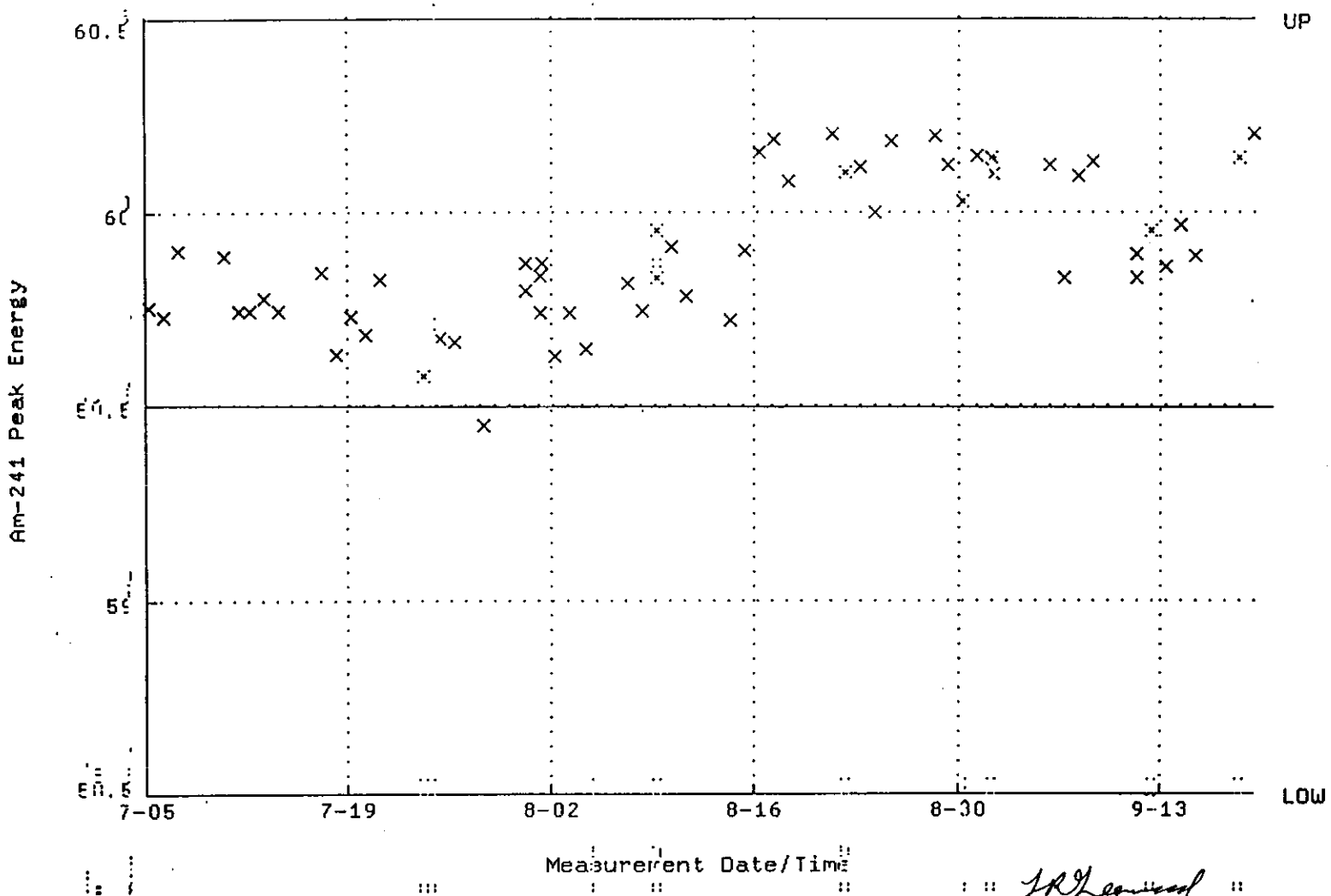


3-2595

HQ-CD-WM-DP-145, REV. 1

J R Greenwood
10-3-95

QA filename : DKA200:[USER]TRACK.QAS;2
Parameter Name : PSENERGY (Am-241 Peak Energy)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Lower/Upper Lmts: 58.5000 through 60.5000

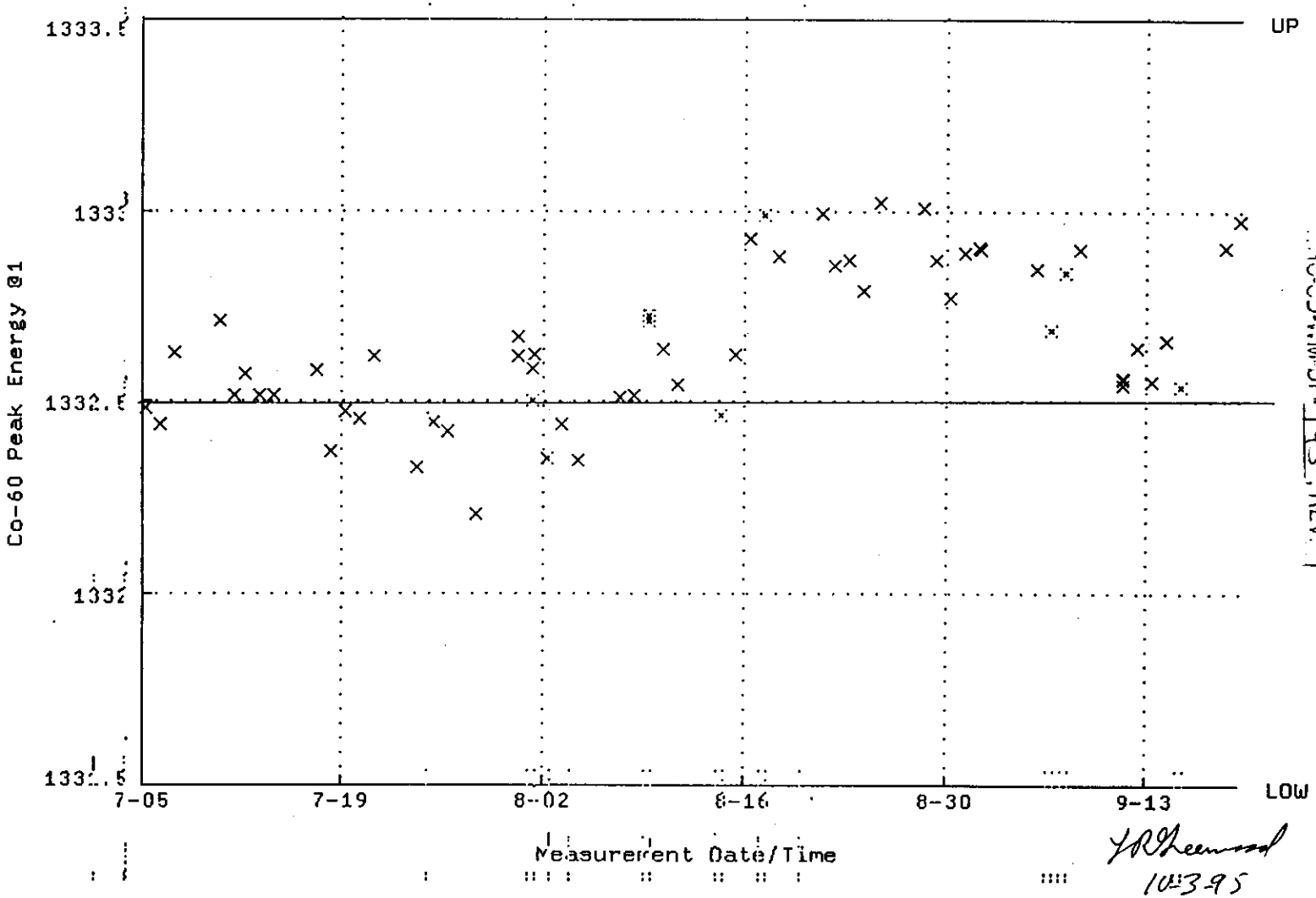


WHC-CD-WM-DP-145, REV. 1

J R Leonard
10-3-95

3-2596

QA filename : DKA200:[USER]TRACK.DAF;2
Parameter Name : PSENERGY (Co-60 Peak Energy @1332.5keV)
Start/End Dates : 5-JUL-1995 05:57:25 through 19-SEP-1995 06:34:22
Lower/Upper Lmts: 1331.50 through 1333.50



3-2597

HC-CD-WM-DP-145, REV. 1

10-3-95