0012369

SINGLE-SHELL TANK WASTE CHARACTERIZATION FOR TANK 241-U-110 CORE 9

DATA PACKAGE

SECTION

6 OF 10

4/26/85 [illegible]

[redacted] ZnS Alpha Scintillation Counter
Standard Counts

NBS T1350 Pu 239 Standard Source See HEDL.N. 3219 pages 1-3

24.90λ 3321 dpm
24.92λ 3324 dpm

NBS T1350		10 minute Count	
24.90λ	#1	14255	
	2	14070	
	3	14025	
	4	14002	$\bar{x}_4$ = 14088
24.92λ	#1	14032	
	2	13923	
	3	13680	
	4	14006	$\bar{x}_4$ = 13910
L-6 Control Repetitive Counts	#1	10477	
	2	10279	
	3	10352	
	4	10348	
	5	10183	
	6	10277	
	7	10230	
	8	10360	
	9	10150	
	10	10328	$\bar{x}_{10}$ = 10298 ± 32 ± 101 : 212 106 26 16
24.90λ	#1	13905	
	2	13675	
	3	13906	
	4	14312	$\bar{x}_4$ = 13949
24.92λ	#1	14123	
	2	13687	
	3	13899	
	4	13617	$\bar{x}_4$ = 13832

4/26/85

Summary T1350 NBS Standard Calibration (L-6)

24.90) 3321 ±35 d/m
24.92) 3324 ±35 d/m

24.90) $\bar{x}_4$ = 1408.8 c/m
$\bar{x}_4$ = 1394.9 c/m
$\bar{x}_8$ = 1401.9 c/m

3321 d/m ÷ 1401.9 c/m = 2.369 d/c or .4221 Eff

24.92) $\bar{x}_4$ = 1391.0 c/m
$\bar{x}_4$ = 1383.2 c/m
$\bar{x}_8$ = 1387.1 c/m

3324 d/m ÷ 1387.1 c/m = 2.396 d/c or .4173 Eff
$\bar{x}_2$ = .4197 Eff

ALPHA ENERGY ANALYSIS

CALIBRATION DATA

D05–071

ALPHA ENERGY DETECTORS

CALIBRATION CHECKS

Sixteen detectors are used for alpha energy analysis (AEA). An electrodeposited source containing Np-237, Pu-239, and AM-241 with an activity of 44.6 dpm is counted on each detector. The activity of the calibration source is low in order to not contaminate the detectors, so counts from 2 days to a week are taken to obtain adequate counting statistics. This data is used to check the gain (energy vs. channel number) and the resolution of each detector. If the gain deviates significantly from normal, adjustments are made as necessary with the corresponding amplifier and the calibration source rectified. Printouts of spectra taken with the calibration source are kept in Room 971 in the 325 Bldg. All of the detectors are checked in this way so during a given year each detector is checked approximately 3-5 times.

The AEA detectors are not used for quantitative measurements, but rather to determine ratios of the alpha emitters present (such as the ratio of Pu-238 to Pu-239 & 240). The total alpha counting rate is obtained in a separate count with a proportional alpha counter, and control checks on these are run daily. This is combined with the ratio information to give a quantitative estimate for each alpha emitter in a given sample.

TOTAL ALPHA

DAILY CONTROL DATA

FOR

PROPORTIONAL DATA COUNTERS (PAC)

D05–073

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TITLE (INDICATE SUBJECT CONTENT)	
Alpha Proportional Counters	
PAC-1 and PAC-2 Daily Control	
Standard Counts and Background Counts	
AUTHOR - DIVISION AND DEPARTMENT	
A. C. Leaf	
Materials and Chemical Science Center	
Chemical Science Department	
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D05-074

PROPORTIONAL ALPHA COUNTERS (PAC)
DAILY CONTROL STANDARD COUNTS & BACKGROUND COUNTS

DATE	PAC-1 100 min Bkgd	PAC-1 10 min Bkgd	PAC-1 10 minute Count	PAC-2 100 min Bkgd	PAC-2 10 min Bkgd	PAC-2 10 minute Count	ANALYST
2/21/90				1.35	1.0	RC 278124	[illegible]
2/21/90						RC 278492	[illegible]
2/22/90	0.94	0.8	275683	1.39	0.9	278982	[illegible]
2/23/90	1.19	1.2	270252	1.39	1.5	277709	AEK
2/23/90						RC 278484	AEK
2/26/90	0.81	0.8	275238	1.33	1.1	279128	[illegible] AEK
2/27/90	0.93	0.7	273746	1.28	1.2	278910	[illegible]
2/28/90	0.97	1.4	275690	1.17	1.6	277891	AEK
2/28/90						RC 278207	[illegible]
2/28/90					Plate Warmed	RC 278779	[illegible]
3/1/90	1.09	0.9	276252	1.25	1.4	278529	AEK
3/2/90	1.20	0.9	268065	1.18	1.2	277670	AEK
3/2/90	1.20	0.9	269713	1.18	1.2	RC 278019	AEK
3/2/90	1.20	0.9		1.18	1.2	RC 278517	AEK
3/5/90	0.91	1.0	269495	1.30	0.8	275943	AEK
3/6/90	0.99	1.2	274294	1.37	1.6	276662	AEK
3/6/90	~~3/7/90~~					RC 276987	AEK
3/6/90	~~1.02~~	~~1.4~~			Plate Warmed	RC 277552	AEK
3/7/90	1.02	1.4	269443	1.21	1.3	278524	[illegible]
3/7/90	Plate Warmed		RC 265553				[illegible]
3/7/90			276406				[illegible]
3/8/90	1.02	0.4	274045	1.30	1.0	279170	[illegible]
3/9/90	1.06	1.0	275278	1.47	1.4	277963	[illegible]
3/9/90						RC 279173	[illegible]
3/10/90	0.77	0.9	274799	1.30	1.2	278823	[illegible]
3/13/90	0.86	1.0	275636	1.34	1.1	278165	AEK
3/13/90						RC 277967	AEK
3/13/90						RC 278326	AEK
3/13/90						278502	[illegible]
3/14/90	1.03	0.7	275798	1.27	Plate Warmed ~~1.29~~ 1.21	280322	[illegible] AEK
3/15/90	0.85	0.9	276225	1.42	1.7	277536	[illegible]
						278580	[illegible]
3/16/90	0.67	0.8	275073	1.04	1.6	277680	AEK

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PROPORTIONAL ALPHA COUNTERS (PAC)

DAILY CONTROL STANDARD COUNTS & BACKGROUND COUNTS

	PAC - 1			PAC - 2			
DATE	100 MIN Bkgr	10 MIN Bkgr	10 MINUTE COUNT	100 MIN Bkgr	10 MIN Bkgr	10 MINUTE COUNT	ANALYST
3/16/90	1.00	0.8		1.30	1	RC 279305	AEK
3/19/90	1.20	0.8	276191	1.30	1.6	279415	[illegible]
3/20/90	0.91	0.7	274011	1.13	1.4	278667	[illegible]
3/21/90	0.79	0.5	275863	1.24	1.7	279755	[illegible]
3/22/90	0.73	0.8	273606	1.44	1.5	278842	[illegible]
3/23/90	0.97	0.9	273215	1.27	1.5	278987	[illegible]
3/26/90	1.1	1.0	274412	1.32	1.4	278784	AEK
3/27/90	0.19	1.0	275251	1.38	1.0	278848	[illegible]
3/28/90	0.72	0.9	275681	1.34	0.9	279369	AEK
3/29/90	0.70	0.9	275232	1.46	0.9	278419	AEK
3/30/90	0.93	0.8	275384	1.45	1.4	279718	AEK
4/2/90	0.84	0.5	274263	1.07	1.9	278451	AEK
4/3/90	0.89	0.8	275618	1.39	1.5	278321	AEK
4/4/90	0.78	1.1	273613	1.28	1.1	278530	AEK
4/5/90	0.94	0.6	275675	1.13	2.0	278632	AEK
4/6/90	0.86	0.7	275543	1.58	1.2	278730	AEK
4/9/90	0.92	0.9	275391	1.17	1.7	278707	AEK
4/10/90	0.98	1.3	275135	1.16	1.5	279655	AEK
4/11/90	1.11	0.6	275624	1.23	1.6	278485	[illegible]
4/12/90	0.72	1.0	275358	1.40	0.9	278811	[illegible]
4/13/90	0.85	0.9	275717	1.30	0.7	278709	AEK
4/16/90	0.91	0.8	273934	1.10	0.8	278914	[illegible]
4/17/90	0.96	0.6	274510	1.41	0.9	278403	AEK
4/17/90						RC 278225	AEK
4/17/90						RC 279547	AEK
4/18/90	1.11	1.6	275118	1.08	1.0	278317	AEK
4/18/90						RC 279271	AEK
4/19/90	0.86	0.7	271853	1.24	0.6	279519	AEK
4/20/90	0.91	1.2	271650	1.14	0.8	279476	AEK
4/23/90	0.75	1.1	275778	1.34	1.3	278318	AEK
4/23/90						RC 279289	AEK
4/24/90	1.09	1.2	270565	1.06	1.4	278866	AEK
4/25/90	0.88	0.7	272786	1.20	1.0	277896	AEK
						RC 278870	AEK
						RC 279232	AEK
						278806	AEK

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Page: 37
LRB No.: BNW-52341

The following provides evidence of surveillance and/or technical reviews of this LRB in accordance with MG 4.3. When complete, this sheet is to be inserted into the LRB each month.

SURVEILLANCE REVIEWS
(Monthly for Impact Level I or II LRB entries by the Line Manager or delegate, and, if appropriate, by the Project Manager):

Pages Reviewed: 32 – 35
Date Reviewed: 4-12-90
Basis of Review: Check for legibility, completeness, traceability of entries, and a sample of requirements (1-14) of MG 4.3.
Results:

Legibility and completeness of daily control data meet requirements

Reviewer's Dated Signature: N R Weiler 4-12-90

TECHNICAL REVIEWS
(Monthly reviews for Impact Level I or II LRB entries and prior to Project close out by a technically competent individual):

Pages Reviewed: 32-35
Date of Review: 4-12-90
Objective/Approach of Review: To determine (check one or more):
- ✓ 1) adequacey/appropriateness of methodology,
- 2) if inferences and conclusions are soundly based,
- ✓ 3) if data reduction and or calculations are correct,
- 4) other (specify):

Results/Conclusions:

Control data methodology meets adequacy requirements

Reviewer's Dated Signature: N R Weiler 4-12-90

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PROPORTIONAL ALPHA COUNTERS (PAC)

DAILY CONTROL STANDARD COUNTS & BACKGROUND COUNTS

	PAC-1				PAC-2			
DATE	100 MIN cpm	10 MIN cpm	10 MINUTE COUNT		100 MIN cpm	10 MIN cpm	10 MINUTE COUNT	ANALYST
4/26/90	1.01	1.2	275359		1.28	6.9	279027	HK
4/27/90	0.93	0.7	274397		1.23	1.8	278365	HK
4/27/90							RC 278840	HK
4/30/90	1.92	0.6	275208		1.36	1.3	279144	HK
5/1/90	1.02	0.9	274630		1.29	1.6	279245	HK
5/2/90	1.05	1.6	274316		1.61	2.0	278467	HK
5/3/90	0.92	0.9	275324		1.65	1.9	277850	HK
5/3/90							RC 278495	HK
5/4/90	1.01	1.1	272130		1.92	1.8	280056	HK
5/7/90	0.85	1.2	267859		1.80	2.0	279185	HK
5/7/90			RC 262541					HK
5/7/90	Alpha Unusual		RC 275000					HK
5/8/90	0.93	1.4	276940		1.84	1.4	278606	HK
5/9/90	0.98	1.1	275357		1.64	1.3	278388	HK
5/9/90							RC 277976	HK
5/9/90							RC 278594	HK
5/10/90	0.81	0.5	274887		1.70	1.3	277854	HK
5/10/90							RC 278552	HK
5/11/90	1.00	0.9	276091		1.58	1.8	278126	HK
5/11/90							RC 278821	HK
5/14/90	1.05	0.6	275236		1.77	2.1	278707	HK
5/15/90	0.91	1.1	275676		1.76	1.7	279262	HK
5/16/90	0.93	0.6	275650		1.61	2.2	279257	HK
5/17/90	1.00	1.0	274816		1.76	1.8	278924	HK
5/18/90	0.96	0.8	275843		1.69	1.7	278823	HK
5/21/90	0.90	0.6	275232		1.81	1.6	279310	HK
5/22/90	0.94	1.0	276151		1.61	2.1	279139	HK
5/23/90	0.97	0.7	274378		1.71	1.6	279636	HK
5/24/90	1.03	0.4	275820		1.71	1.7	278331	[illegible]
5/24/90							RC 279548	[illegible]
5/25/90	1.10	1.1	274506		1.73	0.9	278715	HK
5/29/90	1.13	1.2	275406		1.90	1.2	279022	HK
5/30/90	0.98	0.7	275177		1.81	2.3	278764	HK
5/31/90	1.15	1.1	274967		1.93	1.2	279824	HK

New Control Charts, See page 44.

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TOTAL ALPHA

DAILY CONTROL DATA

FOR

SCINTILLATION ALPHA COUNTERS (SAC)

D05–079

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D05-080

900 min Blgs	Analyst	DATE	Lud Lum-1 10 Minute Count	Lud Lum-1 900 min Blgs	Lud Lum-2 10 Minute Count	Lud Lum-2 900 min Blgs	Lud Lum-3 10 Minute Count	Lud Lum-3 900 min Blgs	Lud Lum-4 10 Minute Count	Lud Lum-4 900 min Blgs	Lud Lum-5 10 Minute Count	Lud Lum-5 900 min Blgs	Lud Lum-6 10 Minute Count	Lud Lum-6 900 min Blgs	Analyst
.209		2/1/90	9765	.218	9876	.539	10033	.298	10472	.283	10210	.280	10133	.214	AGK
		2/1/90	RC 9903				RC 10190		RC 10456				RC 10078		AGK
.221		2/1/90											RC 10284		
		2/2/90	10007	.149	9674	.494	9995	.298	10393	.334	10307	.254	10221	.194	
.187		2/2/90			RC 9682		RC 10107				RC 10223				
		2/5/90	9907	.180	9486	.307	9486	.280	10419 ~~9841~~	.284	10255	.263	10112	.222	
.205		2/5/90	RC 9904		RC 9523		RC 10007 ~~9523~~		~~10419~~ ~~10007~~				RC 10175		
			RC 10124		RC 9796 ~~1000~~		RC 10055 ~~10007~~								
.233	AGK	2/6/90	9815	.212	9621	.401	10118	.227	10323	.312	10102	.203	9989	.216	AGK
	AGK	2/6/90	RC 10016		RC 9661								RC 10140		AGK
.210		2/7/90	9980	2/10/90 ~~1780~~	9846	.377	10000	.263	10418	.291	10206	.251	10287	.181	
.190		2/7/90					RC 9194								
		2/8/90	9974	.196	9597	.297	10105	.224	10389	.290	10243	.229	10225	.189	
.214		2/8/90			RC 9692										
.186		2/9/90	9947	.241	9697	.293	10107	.267	10333	.297	10268	.257	10099	.220	AGK
		2/9/90			RC 9731								RC 10276		AGK
		2/12/90	10192	.227	9394	.262	10180	.256	10450	.299	10265	.250	10164	.174	
		2/12/90			RC 9455				RC 10247				RC 10430		
.230		2/12/90			RC 9785								RC 10167		
		2/13/90	9931	.269	9665	.472	10105	.247	10456	.292	10316	.289	10280	.210	
		2/13/90	RC 10009		RC 9720				RC 10450		RC 10012				
.196		2/13/90									RC 10204				
		2/14/90	9921	.243	9703	.429	10230	.266	10338	.284	10090	.218	10190	.192	
.195		2/14/90	RC 9986		RC 9860										
		2/15/90	9907	.266	9749	.356	10095	.264	10306	.297	10301	.236	10258	.239	
.210	AGK	2/15/90	RC 9809								RC 10178		2/15/90 ~~10~~		
	AGK	2/15/90	RC 9886												
.222	AGK	2/16/90	9903	.290	9605	.389	10200	.264	10266	.289	10229	.241	10124	.221	AGK
	AGK	2/16/90	RC 10013		RC 9626								RC 10159		AGK
	AGK	2/20/90	10032	.238	9709	.373	10217	.273	10416	.289	10213	.240	10164	.193	
.163		2/20/90			RC 9728								RC 10216		
		2/21/90	10115	.262	9584	.303	10167	.257	10363	.313	10081	.216	10115	.193	AGK
.219		2/21/90			RC 9676								RC 10039		AGK
		2/21/90											RC 10256		AGK

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DATE	Ludlum-1 10 MINUTE COUNT	Ludlum-1 900 MIN Alpha	Ludlum-2 10 MINUTE COUNT	Ludlum-2 900 MIN Alpha	Ludlum-3 10 MINUTE COUNT	Ludlum-3 900 MIN Alpha	Ludlum-4 10 MINUTE COUNT	Ludlum-4 900 MIN Alpha	Ludlum-5 10 MINUTE COUNT	Ludlum-5 900 MIN Alpha	Ludlum-6 10 MINUTE COUNT	Ludlum-6 900 MIN Alpha	Analyst
2/22/90	9547	.263	9637	.259	10123	.256	10407	.344	10265	.228	10238	.211	[illegible]
2/22/90			RC 9719										[illegible]
2/23/90	9862	.208	9624	.292	10175	.277	10312	.281	10368	.260	10260	.187	HK
2/23/90	RC 10038		RC 9339						RC 10271				HK
2/23/90			RC 9588										HK
2/26/90	9386	.264	9679	.270	10132	.258	10428	.328	10267	.246	9992	.202	[illegible]
2/26/90	RC 10049		RC 9788								RC 10139		[illegible]
2/27/90	9990	.211	9665	.224	10195	.285	10423	.304	10163	.233	10081	.222	[illegible]
2/27/90			RC 9751								10235		[illegible]
2/28/90	9850	.252	9582	.286	9939	.253	10439	.302	10095	.261	10138	.248	HK
2/28/90	RC 9988		RC 9792		RC 10043						RC 10129		HK
3/01/90	9955	.236	9618	.494	10206	.242	10462	.324	10143	.267	10136	.212	HK
3/01/90			RC 9676				RC 10517				RC 10201		HK
3/01/90							RC 10249						HK
3/02/90	9951	.262	9655	.641	10051	.258	10329	.310	10122	.252	10046	.210	HK
3/02/90			RC 9719		RC 10137						RC 10148		HK
3/05/90	9939	.223	9722	.602	10012	.262	10307	.312	10228	.237	10213	.183	HK
3/ /90	RC 10137				RC 9902								HK
3/ /90	~~RC 9654~~				10292								HK
3/6/90	RC ~~9939~~ 9939	.232	9697	.525	10203	.252	10344	.277	10118	.253	10345	.217	HK
3/6/90	RC 9978		RC 9501										HK
3/6/90	RC 9898												HK
3/7/90	9926	.342	9642	1.032	9991	.263	10335	.355	10204	.243	10024	.163	[illegible]
3/7/90	RC 9917		9734		RC 10152						RC 10256		[illegible]
3/8/90	10087	.246	9743	1.029	10192	.286	10389	.338	10199	.212	10136	.236	[illegible]
3/8/90											RC 10130		[illegible]
3/9/90	9992	.237	9672	1.082	10118	.243	10223	.300	10179	.268	10123	.187	[illegible]
3/9/90			RC 9726				RC 10336				RC 10136		[illegible]
3/13/90	9894	.220	9646	.370	10201	.224	10336	.277	10110	.245	10206	.230	[illegible]
3/13/90	RC 9913		RC 9716										[illegible]
3/13/90	9831	.212	9607	.631	10164	.262	10319	.281	10148	.272	10230	.188	[illegible]
3/13/90	RC 10006		RC 9744										[illegible]
3/14/90	9998	.210	9755	.593	10033	.284	10418	.316	10229	.249	10174	.203	[illegible]
3/14/90					RC 10001						RC 10242		[illegible]

DATE	Audio 10 MINUTE COUNT
3/15/90	10011
3/15/90	
3/16/90	10055
3/16/90	
3/19/90	9946
3/19/90	10009
3/20/90	10021
3/20/90	
3/21/90	9988
3/21/90	
3/22/90	10046
3/22/90	
3/23/90	10055
3/23/90	
3/26/90	9946
3/26/90	
3/27/90	10136
3/27/90	
3/28/90	10077
3/28/90	
3/29/90	9955
3/29/90	RC 10000
3/30/90	9956
3/30/90	RC 9955
4/2/90	RC 9941
4/2/90	RC 9941
4/2/90	RC 9955
4/3/90	10000
4/3/90	
4/4/90	9977
4/4/90	
4/4/90	
4/5/90	10177
4/5/90	
4/5/90	

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D05-082

900 min Bkgr	Analyst	Date	Ludlum-1 10 Minute Count	Ludlum-1 900 min Bkgr	Ludlum-2 10 Minute Count	Ludlum-2 900 min Bkgr	Ludlum-3 10 Minute Count	Ludlum-3 900 min Bkgr	Ludlum-4 10 Minute Count	Ludlum-4 900 min Bkgr	Ludlum-5 10 Minute Count	Ludlum-5 900 min Bkgr	Ludlum-6 10 Minute Count	Ludlum-6 900 min Bkgr	Analyst
.211		3/15/90	10011	.238	9872	.616	9936	.264	10368	.339	10322	.250	10330	.213	
		3/15/90					RC 9971				RC 10035				
.187	AEK	3/16/90	10058	.229	9647	.552	10149	.239	10323	.267	10295	.297	10272	.233	AEK
	AEK	3/16/90			RC 9626						RC 10321				AEK
	AEK	3/19/90	9794	.194	9590	.501	9901	.242	10204	.283	10154	.260	10110	.220	
		3/19/90	RC 10009		9861		RC 10034		RC 10269				RC 10182		
.202		3/20/90	10021	.242	9636	.263	10160	.234	10412	.286	10115	.252	10124	.204	
		3/20/90			RC 9684								RC 10131		
.222		3/21/90	9984	.224	9654	.264	10102	.249	10428	.236	10057	.234	10125	.208	
		3/21/90			RC 9634						RC 10101		RC 10244		
.248	AEK	3/22/90	10043	.226	9527	.407	10175	.274	10209	.286	10246	.251	9976	.212	
	AEK	3/22/90			RC 9636				10402				RC 10320		
.212	AEK	3/23/90	10058	.246	9814	.806	9996	.244	10341	.268	10195	.259	9990	.247	
	AEK	3/23/90					RC 10203						RC 10222		
	AEK	3/26/90	9946	.226	9559	.733	9973	.268	10429	.292	10162	.288	10113	.228	
.210	AEK	3/26/90			9741		10100						10182		
	AEK	3/27/90	10131	.267	9704	.443	9982	.300	10637	.347	10250	.306	10202	.261	
	AEK	3/27/90			RC 9772		RC 10100		RC 10500						
	AEK	3/28/90	10072	.301	9587	.492	10158	.313	10266	.330	10389	.309	10166	.231	AEK
	AEK	3/28/90			RC 9586						RC 10102		RC 10152		AEK
.217	AEK	3/29/90	9805	.236	9569	.478	10228	.290	10448	.310	10197	.241	9985	.217	AEK
	AEK	3/29/90	RC 10007		RC 9776				RC 10381				RC 10270		AEK
	AEK	3/30/90	9886	.274	9525	.580	10041	.260	10405	.318	10283	.323	10199	.231	AEK
.163		3/30/90	RC 9932		RC 9672		RC 10004				RC 10085				AEK
		4/2/90	RC 9941	.269	9640	.450	9927	.293	10315	.303	10284	.287	10093	.212	AEK
.236		4/2/90	RC 9796		RC 9677		RC 9971				RC 10245		RC 10300		AEK
		4/2/90	RC 9959												AEK
.187		4/3/90	10001	.254	9701	.288	10194	.269	10156	.318	10062	.267	10105	.213	AEK
		4/3/90			9593				10449		10114		10280		AEK
.230		4/4/90	9970	.232	9405	.360	10389	.267	10370	.297	10177	.290	10077	.213	AEK
		4/4/90			RC 9755		RC 10154						RC 10021		AEK
.188		4/4/90											RC 10260		AEK
		4/5/90	10145	.221	9377	1.078	9961	.312	10434	.343	10182	.270	10109	.200	AEK
.208		4/5/90			RC 9745		RC 9976						RC 10298		AEK
		4/6/90					RC 9961								AEK

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	Ludlum-1		Ludlum-2		Ludlum-3		Ludlum-4		Ludlum-5		Ludlum-6		
	10 min	400 min	10 min	400 min	10 min	400 min	10 min	400 min	10 min	400 min	10 min	400 min	
DATE	COUNT	BKN	COUNT	BKN	COUNT	BKN	COUNT	BKN	COUNT	BKN	COUNT	BKN	Analyst
4/06/90	10168	.256	9631	.991	10224	.242	10313	.321	10020	.250	10251	.219	HK
4/06/90	RC 9987		RC 9866						RC 10261				
4/09/90	9997	.261	9662	.750	10037	.264	10371	.304	10095	.243	10102	.248	HK
4/09/90	RC 9931		RC 9590								RC 10068		HK
4/10/90	9962	.228	9546	.846	10198	.297	10325	.319	10272	.268	10002	.192	HK
4/10/90			RC 9731								RC 10245		HK
4/11/90	9813	.252	9623	.807	10118	.270	10352	.294	10445	.286	10362	.224	[illegible]
4/11/90	NC 9822		NC 9860						NC 10202				[illegible]
4/11/90	NC 9874												[illegible]
4/12/90	9820	.232	9742	.401	10156	.269	10518	.290	10314	.269	10204	.190	[illegible]
4/12/90	NC						NC 10421		NC 10191				
4/13/90	10096	.292	Not Used. To Be replaced —		10126	.242	10244	.341	10366	.296	10219	.223	HK
4/13/90									RC 10234				HK
4/16/90	9882	.254			10093	.254	10333	.308	10236	.249	10164	.210	[illegible]
4/16/90	NC 10057										NC 10275		[illegible]
4/17/90	Not Used. Performing recalibration				10225	.249	10426	.277	10126	.271	Not Used. Performing recalibration		HK
4/18/90					10147	.274	10383	.323	10128	.278			HK
4/19/90	Recalibration in Review				10081	.283	10324	.327	10242	.278			[illegible]
[illegible]/90					10174	.266	10400	.320	10249	.252	Recalibration in Review		[illegible]
[illegible]/90					10081	.268	10350	.302	10483	.269			HK
4/23/90				.140					RC 10120				HK
4/24/90				.139	10101	.316	10241	.306	10303	.264			[illegible]
4/24/90									NC 10241				[illegible]
4/25/90				.161	10180	.257	10266	.329	10129	.270			HK
4/26/90				.119	10016	.296	10334	.296	10292	.281			HK
4/26/90					RC 10123				10187				HK
4/27/90				.148	10264	.272	10482	.324	10257	.279			HK
4/27/90							RC 10427						HK
4/30/90	HK 4-30-90 10059	.250		.146	10140	.283	10365	.311	10306	.262		.186	[illegible]
4/30/90									NC 10414				
4/30/90									NC 10342				

New Control Charts
See page 109

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Page: 81
LRB No.: BNW-52343

The following provides evidence of surveillance and/or technical reviews of this LRB in accordance with MG 4.3. When completed, this sheet is to be inserted into the LRB each month.

SURVEILLANCE REVIEWS
(Monthly for Impact Level I or II LRB entries by the Line Manager or delegate, and, if appropriate, by the Project Manager):

Pages Reviewed: 70 – 79
Date Reviewed: 4-12-90
Basis of Review: Check for legibility, completeness, traceability of entries, and a sample of requirements (1-14) of MG 4.3.
Results:

Legibility and completeness of daily control data meet requirements

Reviewer's Dated Signature: [signature] 4-12-90

TECHNICAL REVIEWS
(Monthly reviews for Impact Level I or II LRB entries and prior to Project close out by a technically competent individual):

Pages Reviewed: 70 – 79
Date of Review: 4-12-90
Objective/Approach of Review: To determine (check one or more):
- ✓ 1) adequacy/appropriateness of methodology
- ___ 2) if inferences and conclusions are soundly based
- ✓ 3) if data reduction and/or calculations are correct
- ___ 4) other (specify):

Results/Conclusions:

control data methodology meets adequacy requirements

Reviewer's Dated Signature: [signature] 4-12-90

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Project No. 523423 AUG 23 '90 Date of Work
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Date	Pipet #	Weight	Name
4-17-90	# 64 5 ml	5.0012	
25.2°C ρ factor 1.00299		4.9745	
		4.9745	
		4.9723	S S Kellogg
		4.9633	
		4.9663	

$\bar{x}$ 4.9745 × 1.00299 → 4.9944
± 0.0140 (0.28%)

4-17-90	# 4 50 λ	0.0499	
25.2°C ρ factor 1.00299		0.0494	
		0.0497	S S Kellogg
		0.0495	
		0.0495	

$\bar{x}$ 0.04950 × 1.00299 → 0.049648
± 0.0001225 (0.25%)

4-18-90
30g = 30.0002
25°C vol factor: 1.00294
#pipet 63
1000 λ

1.0090	N-L Abley
1.0136	
1.0156	
1.0149	
1.0119	

5.0650 ÷ 5 × 1.00294 = 1.0160 ml.

4-18-90
25°C vol factor: 1.00294
pipet # 14 100 λ

0.1000	N L. Abley
0.1005	
0.1007	
0.1009	
0.1008	

0.5029 ÷ 5 × 1.00294 = 0.1009 ml

4-18-90
25°C vol factor: 1.00294
pipet 500 λ #1

0.5021	N-L Abley
0.5035	
0.5007	
0.5039	
0.5028	

2.5130 ÷ 5 × 1.00294 = 0.5041 ml.

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Date	Pipet #	Weight	Name
4-18-90			
30g = 30.0002	#70	0.9952	P.J. Raney
25°C Vol Factor =	100-1000x	1.0022	
1.00294	@ 1000x	1.0011	
		0.9978	
		1.0011	
		4.9974 ÷ 5 × 1.00294 = 1.0024 ml.	
	#28	0.4842	
	500x	0.4843	P.J. Raney
		0.4808	
		0.4828	
		0.4778	
		2.4099 ÷ 5 × 1.00294 = 0.4834 ml.	
	#75	0.0496	
	50x	0.0503	
		0.0498	P.J. Raney
		0.0496	
		0.0496	
		0.2489 ÷ 5 × 1.00294 = 0.0499 ml	
	#38	0.1999	
	200x	0.2007	
		0.1997	P.J. Raney
		0.1990	
		0.1980	
		0.9973 ÷ 5 × 1.00294 = 0.2000 ml.	
	#64	4.9588	
	0-5 ml	4.9433	
	@ 5 ml	4.9470	P.J. Raney
		4.9443	
		4.9391	
		24.7326 ÷ 5 × 1.00294 = 4.9610 ml	

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DATE	PIPET #	WEIGHT	NAME
4-19-90	# 54 - 100 → 1000λ @1000λ	0.9863	Virginia L Dunn
WT CHECK = 30g = 30.0001g		0.9858	
24°C Vol factor = 1.00294		0.9853	
		0.9820	
		0.9830	
		4.9224 ÷ 5 X 1.00294 = 0.9874	
4-19-90	#2 - 1 → 5 ml @5 ml	5.0396	Virginia L Dunn
24°C vol factor = 1.00294		5.0287	
		5.0243	
		5.0128	
		5.0160	VLD 4/19/90
		25.1214 ÷ 5 X 1.00294 = ~~5.0395~~ 5.0391 ml	
4-19-90	#70 100 X 1000λ @1000λ	1.0018	P J Ravey
~~24°C Vol Factor 1.00294 8gR~~ 1.00268 4-19-90		0.9984	
30g = 30.0001		0.9996	
		0.9972	
		0.9939	
		4.9909 ÷ 5 X 1.00268 = 1.0009 ml	
	#8 100λ	0.1000	P J Ravey
		0.1000	
		0.0993	
		0.0993	
		0.0986	
		0.4972 ÷ 5 X 1.00268 = 0.0992 ml	

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D12-055

DATE	PIPET #	WEIGHT	NAME
4/23/90	#10 - 10 - 100λ		
Wt Check - 3g = 30.0005g @ 25λ		0.0247	P J Raney
25°C Vol Factor = 1.00294		0.0250	
		0.0249	
		0.0249	
		0.0252	
		0.1247 ÷5 X 1.00294 = 0.0250 ml.	
	#63	1.0038	
	100-1000λ	1.0079	
	@ 1000λ	1.0036	P. J Raney
		1.0048	
		1.0019	
		5.0220 ÷5 X 1.00294 = 1.0074 ml.	
4-24-90	#24	0.0097	
Wt. Check - 3g = 30.0002g	2-12λ	0.0096	
24°C Vol. Factor - 1.00268	@ 10λ	0.0098	P. J Raney
		0.0098	
		0.0100	
		0.0489 ÷5 X 1.00268 = 0.0098 ml.	
	#63	1.0110	
	100-1000λ	1.0090	
	@ 1000λ	1.0066	P. J. Raney
		1.0035	
		0.9993	
		5.0294 ÷5 X 1.00268 = 1.0086 ml.	
4-24-90	#8 - 100λ	0.0990	Yuqing L Dunn
24°C vol factor = 1.00268		0.0993	
		0.0998	
		0.0991	
		0.0995	
		0.4967 ÷5 X 1.00268 = 0.0996 ml	

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DATE	PIPET #	WEIGHT	NAME
4-24-90	#33 - 100→1000λ	1.0091	Virginia L Dunn
WT CHECK = 30g = 30.0002g		1.0046	
24°C Vol factor = 1.00268		1.0007	
		1.0032	
		0.9990	
		9.0166 ÷ 5 × 1.00268 = 1.0060 ml	

4-24-90	#2 - 1→5 ml	5.0862	Virginia L Dunn
24°C vol factor = 1.00268	@5ml	5.0641	
		5.0491	
		5.0425	
		5.0391	
		25.2810 ÷ 5 × 1.00268 = 5.0698 ml	

	#68 500λ	0.4942	Imaiti
		0.4962	
		0.4995	
		0.4956	
24°C Vol. factor = 1.00268		0.4999	
		2.4854 ÷ 5 × 1.00268 = 0.4984 ml	

	#30 100λ	0.1001	Imaiti
		0.1008	
		0.1006	
		0.1003	
24°C Vol. factor = 1.00268		0.1009	
		0.5027 ÷ 5 × 1.00268 = 0.1008 ml	

4-24-90	#10 - 10→100λ	0.0249	Virginia L Dunn
24°C Vol factor = 1.00268	@25λ	0.0250	
		0.0248	
		0.0251	
		0.0248	
		0.1246 ÷ 5 × 1.00268 = 0.024987 or 0.0250 ml	

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DATE	PIPET #	WEIGHT	NAME
4-25-90	#8 - 100λ	0.0996	Virginia L. Dunn
WT CHECK = 30g = 29.9998g		0.0992	
24°C Vol factor = 1.00268		0.0990	
		0.0986	
		0.0996	
		0.4960 ÷ 5 X 1.00268 - 0.0995 ml	
4-25-90	#33 - 100 → 1000λ @ 1000λ	1.0143	Virginia L. Dunn
24°C Vol factor = 1.00268		1.0019	
		1.0008	
		1.0001	
		1.0020	
		5.0191 ÷ 5 X 1.00268 = 1.0065 ml	
4-25-90	#63 100 - 1000λ @ 1000λ	1.0044	P. J. Ramey
Wt. Check = 30g = 29.9998g		1.0002	
24°C Vol. Factor = 1.00268		1.0033	
		0.9991	
		0.9975	
		÷ 5 X 1.00268 =	
4-25-90	#2 - 1 → 5 ml @ 5 ml	5.0621	Virginia L. Dunn
25°C Vol factor = 1.00294		5.0510	
		5.0200	
		4.9953	
		4.9961	
		25.1245 ÷ 5 X ~~1.00268~~ 1.00294 = ~~5.0384~~ 5.0397 ml VLD 4/25/90	
4-26-90	#3 100 → 1000λ @ 1000λ	1.0099	Virginia L. Dunn
WT CHECK = 30g = 29.9997		1.0042	
24°C Vol factor = 1.00268		1.0065	
		1.0055	
		1.0041	
		5.0302 ÷ 5 X 1.00268 = 1.0087 ml	

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Date	Pipet #	Weight	Name
4-26-90 Wt. Cu 30g = 29.9997g 24°C Vol. Factor = 1.00268	#15 10-100λ @ 50λ	0.0497 g 0.0497 0.0498 0.0497 0.0499 0.2488 ÷5 X1.00268 = 0.0499ml.	P. J. Raney
	#69 0 - 100λ @ 100λ	0.0997 0.1002 0.1013 0.1002 0.1002 0.5016 ÷5X1.00268 = 0.1006ml.	P. J. Raney
	#64 0-5ml @ 5ml	4.9787 4.9530 4.9423 4.9478 4.9430 24.7648 ÷5X1.00268 = 4.9662ml	P. J. Raney
4-27-90 wt check = 30g = 30.0001g 24°C vol factor = 1.00268	4/27/90 VLD ~~#19~~ - 100 → 1000λ #19 @ 1000λ	0.5024 0.5028 0.5017 0.5029 0.5023 2.5121 ÷5 X1.00268 = 0.5038	Virginia L. Dunn
4-27-90 24°C Vol factor = 1.00268	#33 - 100 → 1000λ @ 1000λ	1.0077 1.0056 1.0109 1.0093 1.0079 5.0414 ÷5 X1.00268 = 1.0098 or 1.0110 ml	Virginia L. Dunn

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DATE	PIPET #	WEIGHT	NAME
4-27-90	# 2-1→5 ml @ 5ml	5.0658	[illegible]
wt check = 30g = 30.0001g		5.0723	
25°c vol factor = 1.00294		5.0558	
		5.0533	
		5.0512	
		25.2984 ÷ 5 × 1.00294 = 5.0746 ml.	

Date	Pipet #	Weight	Name
4-30-90			
30g = 30.0001g			

Date	Pipet #	Weight	Name
5-1-90	#76 500λ	0.5031	Emaiti
30g = 29.9997g		0.5008	
25°c Vol. factor = 1.00294		0.5022	
		0.5004	
		0.5015	
		2.508 ÷ 5 × 1.00294 = 0.5031 ml	
	#4 100λ	0.0981	Emaiti
		0.0991	
		0.0991	
		0.0994	
25°c Vol. factor = 1.00294		0.0989	
		0.4946 ÷ 5 × 1.00294 = 0.0992 ml	
	#5 1000λ	0.9920	COHarvey
		0.9925	
		0.9916	
		0.9927	
		0.9927	
		4.9615 ÷ 5 × 1.00294 = 0.9923 mL	

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Date	Pipet #	Weight	name
5/1/90	14	0.1015	
		0.1000	e O Harvey
25°C vol		0.1000	
factor 1.00294		0.0994	
		0.0998	
		0.5007 ÷5 1.00294 = 0.1004 ml	

5-1-90	#10 — 10→100λ	0.0252	
WT CK = 30g = 29.9997g	@ 25λ	0.0252	
25°C vol factor = 1.00294		0.0248	Virginia L Dunn
		0.0248	
		0.0248	
		0.1248 ÷5 X 1.00294 = 0.0250 ml	

	#75 — 50λ	0.0486	Virginia L Dunn
25°C vol factor = 1.00294		0.0492	
		0.0492	
		0.0492	
		0.0493	
		0.2455 ÷5 X 1.00294 = 0.0492 ml	

	#8 — 100λ	0.0993	Virginia L Dunn
25°C vol factor = 1.00294		0.0997	
		0.0993	
		0.0993	
		0.0991	
		0.4967 ÷5 X 1.00294 = 0.0996 ml	

	#33 — 100→1000λ	1.0077	Virginia L Dunn
25°C vol factor = 1.00294	@ 1000λ	1.0022	
		0.9976	
		1.0012	
		0.9982	
		5.0069 ÷5 X 1.00294 = 1.0043 ml	

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DATE	PIPET #	WEIGHT	NAME
5-1-90	#2 1→5ml @ 5ml	5.0344	Virginia L Dunn
WT CHECK = 30g = 29.9997g		5.0287	
25°C Vol factor = 1.00294		5.0207	
		5.0220	
		5.0200	
		25.1258 ÷ 5 X 1.00294 = 5.0399 ml	
5-1-90	# 41 20λ	0.0196	C O Harvey
		0.0199	
		0.0201	
		0.0201	
		0.0199	
		0.0996 ÷ 5 X 1.00294 = 0.0200 ml	
5-2-90	VLD 5/2/90 #10 - 10→100λ @ 25λ	0.0242	Virginia L Dunn
WT CHECK = 30g = 29.9998		0.0247	
24°C Vol factor = 1.00268		0.0248	
		0.0247	
		0.0249	
		0.1233 ÷ 5 X 1.00268 = 0.0247 ml	
	#75 - 50λ	0.0487	Virginia L Dunn
24°C Vol factor = 1.00268		0.0487	
		0.0495	
		0.0496	
		0.0491	
		0.2456 ÷ 5 X 1.00268 = 0.0493 ml	
	#8 - 100λ	0.0999	Virginia L. Dunn
24°C Vol factor = 1.00268		0.0998	
		0.0996	
		0.0992	
		0.0996	
		0.4981 ÷ 5 X 1.00268 = 0.0999 ml	

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Date	Pipet #	Weight	Name
5-2-90	64	2.9860	
WT. CK.	1000 – 5000	2.9899	
30g = 29.9998g	3000	2.9864	CO Harvey
		2.9926	
wt factor		2.9831	
@ 25°c 1.00294		14.9380 ÷ 5 × 1.00294 = 2.9964 mL	
5-2-90	63		
	100 – 1000	1.0077	
	@ 1000	1.0083	
		1.0099	
		1.0081	CO Harvey
		1.0080	
		5.0420 ÷ 5 × 1.00294 = 1.0114 mL	

Date	Pipet #	Weight	Name
5-3-90	#76	0.4944	
Wt. ck	500λ	0.4997	Kmaiti
30g = 30.0001g	Dr Tom	0.4986	
24°C Vol. factor		0.4993	
= 1.00268		0.5011 ÷ 5 × 1.00268 = 0.5000 ml	
		2.4931	
	#30	0.1011	
	100λ	0.1011	Kmaiti
		0.1009	
		0.1010	
24°C Vol. factor		0.1004 ÷ 5 × 1.00268 = 0.1012 ml	
= 1.00268		0.5045	

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DATE	PIPET #	WEIGHT	NAME
9-3-90	#10 – 10 → 100 λ @ 25 λ	0.0244	Virginia L Stern
WT CHECK = 30g = 30.0001g		0.0244	
24°C Vol factor = 1.00268		0.0252	
		0.0244	
		0.0246	
		0.1230 ÷ 5 X 1.00268 = 0.0247 ml	
	#75 – 50 λ	0.0499	Virginia L Stern
24°C Vol factor = 1.00268		0.0496	
		0.0499	
		0.0494	
		0.0490	
		0.2478 ÷ 5 X 1.00268 = 0.0497	
	#8 – 100 λ	0.0994	Virginia L Stern
24°C Vol factor = 1.00268		0.0993	
		0.0984	
		0.0996	
		0.0990	
		0.4957 ÷ 5 X 1.00268 = 0.0994 ml	
	#33 – 100 → 1000 λ	1.0007	Virginia L Stern
24°C Vol factor = 1.00268	@ 1000 λ	0.9982	
		0.9995	
		0.9975	
		0.9962	
		4.9921 ÷ 5 X 1.00268 = 1.0011 ml	
	# 67 0 – 20 λ @ 20 λ	0.0196	Co Harvey
		0.0200	
		0.0198	
		0.0200	
		0.0199	
		0.0993 ÷ 5 X 1.00268 = 0.0199 mL	

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Date	P. pet #	Weight	Name
5/3/90 24 °c vol factor 1.00268	# 69 10-100 λ @ 100 λ	0.0990 0.0996 0.1002 0.0999 0.1001 0.4988 ÷5 X 1.00268 = 0.1000	CO Harvey
5/3/90	# 64 @ 5000	4.9597 4.9624 4.9726 4.9721 4.9743 24.8411 ÷5 X 1.00268 = 4.9815	CO Harvey

9-24-90 #10 - 10→100 λ
WT CHECK = 30g = 30.0002 @ 25 λ
23°c vol factor - 1.00244

0.0251
0.0251
0.0253
0.0250
0.0248
0.1253 ÷5 X 1.00244 = 0.0251 ml

Virginia L Dunn

#8 - 100 λ
24°c vol factor = 1.00268

0.0998
0.0992
0.0985
0.0996
0.0999
0.4970 ÷5 X 1.00268 = 0.0997 ml

Virginia L Dunn

#75 - 50 λ
24°c Vol factor = 1.00268

0.0499
0.0499
0.0496
0.0497
0.0495
0.2486 ÷5 X 1.00268 = 0.0499 ml

Virginia L Dunn

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DATE	PIPET #	WEIGHT	NAME
5-7-90	#19 — 100 → 100λ @ 100%	0.5063	Virginia L Dean
WT CHECK = 30g = 30.0002		0.5062	
24°C vol factor = 1.00268		0.5071	
		0.5065	
		0.5043	
		2.5304 ÷ 5 × 1.00268 = 0.5074 ml	

Date	Pipet #	Weight	Name
5-7-90	#76 5.00λ	0.4960	Emanti
30g = 29.99999g		0.4958	
		0.4999	
24°C Vol. factor = 1.00268		0.4980	
		0.4991	
		2.4888 ÷ 5 × 1.00268 = 0.4991 ml	
	#30 100λ	0.1013	Emanti
		0.1018	
		0.1008	
24°C Vol. factor = 1.00268		0.1006	
		0.1018	
		0.5063 ÷ 5 × 1.00268 = 0.1015 ml	
	#4 25λ	0.0242	Emanti
		0.0257	
		0.0256	
24°C Vol. factor = 1.00268		0.0241	
		0.0252	
		0.1248 ÷ 5 × 1.00268 = 0.0250 ml	
5-7-90	#10 — 10 → 100λ @ 25	0.0249	Virginia L Dean
WT CHECK = 30g = 29.9999g		0.0254	
24°C vol factor		0.0251	
		0.0250	
		0.0249	
		0.1253 ÷ 5 × 1.00268 = 0.0251 ml	

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DATE	PIPET #	WEIGHT	NAME
5-7-90	#75 – 50λ	0.0492	Virginia L Dunn
WT CHECK = 30g = 29.9999g		0.0492	
24°C Vol factor = 1.00268		0.0492	
		0.0489	
		0.0481	
		VLD 5/7/90 ~~0.2697~~ 0.2446 ÷ 5 X 1.00268 = 0.0491 ml	
	#8 – 100λ	0.0994	Virginia L Dunn
24°C Vol factor = 1.00268		0.0985	
		0.0991	
		0.0986	
		0.0993	

5-8-90	#10 – 10→100λ @25λ	0.0250	Virginia L Dunn
WT CHECK = 30g = 30.0000g		0.0246	
24°C Vol factor = 1.00268		0.0247	
		0.0250	
		0.0248	
		0.1241 ÷ 5 X 1.00268 = 0.0249 ml	
	#75 – 50λ	0.0500	Virginia L Dunn
24°C Vol factor = 1.00268		0.0490	
		0.0494	
		0.0492	
		0.0493	
		0.2469 ÷ 5 X 1.00268 = 0.0495	
	#8 – 100λ	0.0998	Virginia L Dunn
24°C Vol factor = 1.00268		0.0996	
		0.0986	
		0.0994	
		0.0988	
		0.4960 ÷ 5 X 1.00268 = 0.0995 ml	

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DATE	PIPET #	WEIGHT	NAME
5-8-90	#3 – 100 → 1000λ @ 1000λ	1.0050	Virginia Dunn
WT CHECK = 30g = 30.0000g		1.0031	
24°C Vol factor = 1.00268		1.0048	
		1.0027	
		1.0027	
		5.0183 ÷ 5 × 1.00268 = 1.0064 ml	
	#2 – 1 → 5 ml @ 5 ml	5.0750	Virginia Dunn
24°C Vol factor = 1.00268		5.0532	
		5.0472	
		5.0515	
		5.0445	
		25.2714 ÷ 5 × 1.00268 = 5.0678 ml	
24°C Vol factor = 1.00268	#19 – 100 → 1000λ @ 500λ	0.5060	Virginia Dunn
		0.5035	
		0.5015	
		0.5032	
		0.5023	
		2.5165 ÷ 5 × 1.00268 = 0.5046 ml	

Date	Pipet #	Weight	Name
5-9-90	#76 1000λ	1.0004	Emanti
30g = 30.0001g		1.0025	
		1.0010	
24°C Vol. factor = 1.00268		1.0009	
		1.0001	
		5.0049 ÷ 5 × 1.00268 = 1.0037 ml	
5-9-90	#64 500λ	4.9853	C.O Harvey
		4.9633	
		4.9762	
		4.9736	
		4.9730	
		24.8764 ÷ 5 × 1.00268 = 4.9886	

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Date	Pipet #	weights	name
5/9/90	#5 @ 500x	0.4936 0.4973 0.4972 0.4968 0.4971	C O Harvey
vol factor @ 24°C = 1.00268		2.4820 ÷5 X 1.00268 = 0.49773 ml	
5-9-90 WT. check = 30g = 30.0001g 24°C vol factor = 1.00268	#10 ~10→100x @ 25x	0.0252 0.0252 0.0252 0.0250 0.0251	Virginia L Dunn
		0.1257 ÷5 x 1.00268 = 0.0252 ml	
5-9-90 25°C vol factor = 1.00294	#75 — 50x	0.0496 0.0490 0.0495 0.0496 0.0500	Virginia L Dunn
		0.2477 ÷5 X 1.00294 = 0.0497 ml	
5-9-90 25°C vol factor = 1.00294	#8 — 100x	0.0997 0.0993 0.0992 0.0990 0.0994	Virginia L Dunn
		0.4966 ÷5 X 1.00294 = 0.0996 ml	
5-9-90 25°C vol factor = 1.00294	#19 — 100→1000x @ 500x	0.4946 0.4996 0.4990 0.4991 0.5000	Virginia L Dunn
		2.4923 ÷5 X 1.00294 = 0.4999 ml	

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DATE	PIPET #	WEIGHTS	NAME
5-10-90	#8 - 100 λ	0.0997	Virginia S Dunn
WT CHECK = 30g = 30.0002		0.0995	
24°C Vol factor = 1.00268		0.0998	
		0.1000	
		0.0999	
		0.4989 ÷ 5 X 1.00268 = 0.1000 ml	
5-10-90	#19 - 100 → 1000 λ @ 500 λ	0.5041	Virginia S Dunn
24°C Vol factor = 1.00268		0.4993	
		0.4995	
		0.5009	
		0.5041	
		2.5079 ÷ 5 X 1.00268 = 0.5029 ml	
5-10-90	#33 - 100 → 1000 λ @ 1000 λ	1.0127	Virginia S Dunn
24°C Vol factor = 1.00268		1.0097	
		1.0065	
		1.0064	
		1.0064	
		5.0417 ÷ 5 X 1.00268 = 1.0110 ml	
5-10-90	#10 - 10 → 100 λ @ 25 λ	0.0249	Virginia S Dunn
25°C Vol factor = 1.00294		0.0245	
		0.0247	
		0.0242	
		0.0246	
		0.1229 ÷ 5 X 1.00294 = 0.0247 ml	
5-10-90	#2 - 1 → 5 ml @ 5 ml	5.0844	Virginia S Dunn
25°C Vol factor = 1.00294		5.0587	
		5.0472	
		5.0528	
		5.0393	
		25.2824 ÷ 5 X 1.00294 = 5.0713 ml	

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Date	Pipet #	Weights	Name
5-11-90	# 41 @ 20 λ	0.0197 0.0201 0.0197 0.0200 0.0200	C O Harvey

Temp 24 °C
vol factor = 1.00268

0.0997 ÷ 5 X 1.00268 = 0.019994
= 0.0200

"	# 14 @ 100 λ	0.0994 0.0996 0.0996 0.0993 0.0996	C O Harvey

0.4975 ÷ 5 X 1.00268 = 0.998

5-11-90 #10 – 10 → 100 λ @ 25 λ

WT CHECK = 30g = 30.0000
~~25~~ °C vol factor = 1.00~~299~~ 268
24 VLO 5/14/90

0.0248 0.0251 0.0246 0.0247 0.0246	Virginia L Dunn

0.1238 ÷ 5 X 1.00268 = 0.0248 ml

#15 – 50 λ

24°C vol factor = 1.00268

0.0496 0.0493 0.0496 0.0492 0.0494	Virginia L Dunn

0.2471 ÷ 5 X 1.00268 = 0.0496 ml

#8 – 100 λ

24°C vol factor = 1.00268

0.1000 0.0995 0.0993 0.0993 0.0994	Virginia L Dunn

0.4975 ÷ 5 X 1.00268 = 0.0998 ml

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DATE	pipet #	WEIGHTS	NAME
5-11-90 wt check = 30g = 30.0000g 25°C vol factor = 1.00294	#19 – 100 → 1000λ @ 500λ	~~0~~.05037 5-11-90 ~~0~~.05016 ~~0~~.0.4995 0.4988 0.4986 2.5022 ÷ 5 X 1.00294 = 0.5019 ml	Virginia S Dunn
5-11-90 25°C vol factor = 1.00294	# 33 – 100 → 1000λ @ 1000λ	1.0043 0.9953 0.9989 0.9978 0.9967 4.9921 ÷ 5 X 1.00294 = 1.0014 ml	Virginia S Dunn
5-11-90 25°C vol factor = 1.00294	# 67 – 1 → 20λ @ 20λ	0.0197 0.0197 0.0195 0.0198 0.0198 0.0985 ÷ 5 X 1.00294 = 0.0198 ml	Virginia S Dunn
5-11-90 25°C vol factor 1.00294	# 64 @ 5000λ	4.9729 4.9726 4.9725 4.9729 4.9778 24.8687 ÷ 5 X 1.00294 = 4.9884 mL	Co Harvey
5-11-90 25°C vol factor 1.00294	# 5 @ 500λ	0.4819 0.4841 0.4835 0.4831 0.4810 2.4136 ÷ 5 X 1.00294 = 0.4841 mL	Co Harvey

~~5/11/90~~ Km

7794
200

8

48 ml

6 ml

l

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DATE	PIPET #	WEIGHT	NAME
5-11-90	#2 - 1→5 ml @ 5 ml	5.0541 ml	Virginia L Dunn
WT CHECK = 30g = 30.0000g		5.0677	
25°C Vol factor = 1.00294		5.0499	
		5.0507	
		5.0451	
		25.2675	

WD 5/11/90 ~~25.2675~~ ÷ 5 × 1.00294 = ~~5.0451~~ 5.0684 ml WD 5/11/90

#76
500λ
0.5005
0.5003
0.5029
0.5009
0.5000
2.5046 ÷ 5 × 1.00294 = 0.5024 ml

25°C Vol. factor = 1.00294

Kmaiti

#4
25λ
0.0245
0.0250
0.0245
0.0247
0.0245
0.1232 ÷ 5 × 1.00294 = 0.0247 ml

25°C Vol. factor = 1.00294

Kmaiti

5-14-90 #8 - 100λ
WT CHECK = 30g = 30.0000
24°C Vol factor = 1.00268

0.0990
0.0990
0.0988
0.0994
0.0991
0.4953 ÷ 5 × 1.00268 = 0.09933

Virginia L Dunn

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DATE	PIPET #	WEIGHT	NAME
5-14-90	#33 – 100 → 1000 λ	1.0063	Virginia Dunn
WT CHECK = 30g = 30.0000g	@ 1000 λ	1.0012	
24°C VOLFACTOR = 1.00268		1.0005	
		1.0001	
		0.9986	
		5.0067 ÷5 X 1.00268 = 1.0040	

5-14-90	#2 – 1 → 5 ml	5.0960	Virginia L Dunn
24°C Vol factor = 1.00268	@ 5 ml	5.0535	
		5.0470	
		5.0359	
		5.0406	
		25.2730 ÷5 X 1.00268 = 5.0681	

#76
500λ

Emaiti

0.4964
0.4984
0.4974
0.4978
0.4989

24°C Vol. factor = 1.00268

2.4889 ÷5 X 1.00268 = 0.4991 ml

#30
100λ

Emaiti

0.0996
0.0998
0.1000
0.1002
0.1002

24°C Vol. factor = 1.00268

0.4998 ÷5 X 1.00268 = 0.1002 ml

#4
25λ

Emaiti

0.0242
0.0252
0.0247
0.0249
0.0249

24°C Vol. factor = 1.00268

0.1239 ÷5 X 1.00268 = 0.0248 ml

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Date	Pipet #	Weights	Name
5-14-90	# 1	0.5022	Co Herring
	@ 500λ	0.4966	
24°C		0.5057	
vol Factor 1.00268		0.5064	
		0.5080	
		0.5037	
		3.0276 ÷ 6 × 1.00268 = 0.5051	

5-15-90 #8-100λ

WT Check = 30g = 30.0000g

24°C vol factor = 1.00268

0.1002
0.0998
0.1002
0.0999
0.1000
0.~~5000~~ ÷ 5 × 1.00268 = 0.1003 ml
0.5001

Virginia L Dunn

#4
50λ

0.0490
0.0493
0.0494
0.0497
0.0498
0.2472 ÷ 5 × 1.00268 = 0.0496 ml

24°C Vol. factor = 1.00268

Emaiti

76
500λ

0.5006
0.5000
0.5014
0.5013
0.5004
2.5037 ÷ 5 × 1.00268 = 0.5021 ml

24°C Vol. Factor = 1.00268

Emaiti

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DATE	PIPET	WEIGHTS	NAME
5-15-90 wt check = 30g = 30.0000g 24°C vol factor = 1.00268	#19 – 100 → 1000λ @ 500λ	0.5000 0.4996 0.4993 0.4997 0.4985 2.4971 ÷ 5 X 1.00268 = 0.5008ml	Virginia L Dunn
5-15-90 24°C vol factor = 1.00268	#33 – 100 → 1000λ @ 1000λ	1.0076 0.9997 0.9978 1.0075 1.0035 5.0161 ÷ 5 X 1.00268 = 1.0059ml	Virginia L Dunn
5-15-90 24°C vol fraction 1.00268	# 41 20λ	0.0198 0.0200 0.0199 0.0200 0.0198 0.0995 ÷ 5 X 1.00268 = 0.020	C O Harvey
5-16-90 wt check = 30g = 30.0002 25°C Vol factor = 1.00294	#33 – 100 → 1000λ @ 1000λ	1.0097 1.0060 1.0039 1.0035 1.0052 5.0283 ÷ 5 X 1.00294 = 1.0086ml	Virginia L Dunn
5-16-90 25°C vol factor = 1.00294	#2 – 1 → 5ml @ 5ml	5.0685 5.0706 5.0431 5.0372 5.0428 25.2622 ÷ 5 X 1.00294 = 5.0673 ml	Virginia L Dunn

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Date	Pipet#	Weights	Name
Wt. ck 30g = 29.9999g	#2 – 1 → 5 ml @ 5 ml	5.0658	Virginia L Dunn
5-17-90		5.0430	
25°c Vol factor = 1.00294		5.0441	
		5.0380	
		5.0375	
		25.2284 ÷ 5 X 1.00294 = 5.0605 ml	
5/17/90	#75 – 50 λ	0.0497	Virginia L Dunn
24°c vol factor = 1.00268		0.0494	
		0.0496	
		0.0496	
		0.0497	
		0.2480 ÷ 5 X 1.00268 = 0.0497	
5-17-90			
25°c vol factor = 1.00294	#8 – 100 λ	0.0990	Virginia L Dunn
		0.0990	
		0.0991	
		0.0990	
		0.0993	
		0.4954 ÷ 5 X 1.00294 = 0.0994 ml	
5-17-90	#33 – 100 → 1000 λ	1.0077	Virginia L Dunn
24°c Vol factor = 1.00268 @ 1000 λ		1.0043	
		1.0052	
		1.0036	
		1.0052	
		5.0260 ÷ 5 X 1.00268 = 1.0079 ml	
5-17-90	#19 – 100 → 1000 λ @ 500 λ	0.5051	Virginia L Dunn
24°c vol factor = 1.00268		0.5033	
		0.5032	
		0.5041	
		0.5023	
		2.5180 ÷ 5 X 1.00268 = 0.5050	

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Date	Pipet #	Weights	Name
Wt. Ck 30g = 29.9999g 24°C Vol. factor = 1.00268	#76 1000λ	0.9881 0.9874 0.9835 0.9871 0.9853 4.9314 ÷ 5 × 1.00268 = 0.9889 ml	[signature]
5-18-90 wt check = 30g = 30.0000g 23°C vol factor = 1.00244	#10 – 10 → 100λ @ 25λ	0.0245 0.0248 0.0246 0.0249 0.0248 0.1236 ÷ 5 × 1.00244 = 0.0248 ml	Virginia L Dunn
5-18-90 24°C vol factor = 1.00268	#75 – 50λ	0.0498 0.0494 0.0491 0.0497 0.0494 0.2474 ÷ 5 × 1.00268 = 0.0496 ml	Virginia L Dunn
5-18-90 24°C vol factor = 1.00268	#19 – 100 → 1000λ @ 500λ	0.0.5057 0.0.5022 0.0.5014 0.0.5000 0.4988 ~~0.50~~ 2.5081 ÷ 5 × 1.00268 = 0.5030 ml VLD 5/18/90	Virginia L Dunn
5-18-90 24°C vol factor = 1.00268	#33 – 100 → 1000λ @ 1000λ	1.0077 1.0074 1.0110 1.0030 1.0019 ~~5.0211~~ ÷ 5 × 1.00268 = 1.0089 ml VLD 5/18/90 5.0310	Virginia L Dunn

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DATE	PIPET #	WEIGHT	NAME
9-18-90	#2 – 1 → 5ml @ 5ml	5.0805	Virginia L Dunn
CKWT = 30g = 30.0000g		5.0586	
24°C vol factor = 1.00268		5.0565	
		5.0597	
		5.0603	
		25.3116 ÷ 5 × 1.00268 = 5.0759 ml	

5-21-90	#41 – 20λ	0.0198	Virginia L Dunn
CHECK WT. = 30g = 30.0003g		0.0198	
23°C vol factor = 1.00244		0.0202	
		0.0199	
		0.0199	
		0.0996 ÷ 5 × 1.00244 = 0.01996	
		0.0200	
5-21-90	#75 – 50λ	0.0503	Virginia L Dunn
23°C vol factor = 1.00244		0.0495	
		0.0495	
		0.0501	
		0.0498	
		0.2492 ÷ 5 × 1.00244 = 0.04996	
		0.0500	
5-21-90	#8 – 100λ		Virginia L Dunn
23°C vol factor = 1.00244		0.0993	
		0.0994	
		0.0991	
		0.1000	
		0.0997	
		VLD 5/21/90 ~~0.5475~~ ÷ 5 × 1.00244 = 0.0997 ml	
	#3 – 100 → 1000λ @ 1000λ	0.4975	
5-21-90		0.9986	Virginia L Dunn
23°C vol factor = 1.00244		0.9953	
		0.9958	
		0.9935	
		0.9982	
		4.9814 ÷ 5 × 1.00244 = 0.9987 ml	

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DATE	PIPET #	WEIGHT	NAME
5-21-90 CK. WT. 30g = 30.0003g	#76 500λ	0.5016 0.5030 0.5030 0.5032 0.5031 2.5139 ÷5 × 1.00244 = 0.5040 ml	Kmaiti
23°C Vol. factor = 1.00244	#30 100λ	0.1012 0.1013 0.1010 0.1016 0.1009 0.506 ÷5 × 1.00244 = 0.1014 ml	Kmaiti
5-22-90 CK WT = 30g = 29.9998 24°C vol factor = 1.00268	#8-100λ	0.1004 0.1005 0.1001 0.1001 0.1002 0.5013 ÷5 × 1.00268 = 0.1005 ml	Virginia L Dunn
5-22-90 24°C vol factor = 1.00268	#19 - 100 → 1000λ @ 500λ	0.5049 0.5040 0.5014 0.5023 0.5030 2.5156 ÷5 × 1.00268 = 0.5045 ml	Virginia L Dunn

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Date	Pipet #	WT.	Name.
5-22-90	#14	0.0990	PJ Raney
CK.Wt. – 3g = 29.9998	100λ	0.0995	
~~23.5°C~~ . Vol. Factor – ~~1.00256~~		0.0993	
24.0C PJR 5/22/90	1.00268	0.0995	
		0.0995	
		0.4968 ÷ 5 X 1.00268 = 0.0996 ml.	
	#77		
	0-1ml	0.9980	PJ Raney
		0.9965	
		0.9984	
		0.9978	
		0.9962	
		4.9869 ÷ 5 X 1.00268 = 1.0001 ml.	

5-23-90	#8 – 100γ	0.1000	Virginia L Dunn
Check wt. = 30g = 30.0000		0.0994	
23°C vol factor =		0.0999	
		0.0993	
		0.0994	
		0.4975 ÷ 5 X 1.00244 = 0.0997 ml	
5-23-90	#33 – 100 → 1000γ	1.0107	Virginia L Dunn
24°C Vol factor	@ 1000γ	0.9998	
		0.9980	
		0.9950	
		0.9952	
		VVD 5/23/90 4.99 9987 X 1.00268 = 1.0024 ml	
5-23-90	#2 – 1 → 5 ml	5.0734	Virginia L Dunn
24°C vol factor =	@ 5ml	5.0349	
		VVD 5/23/90 5.0311	
		5.0245	
		5.0181	
		25.1820 ÷ 5 X 1.00268 = 5.0499 ml	

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Date	Pipet #	wt.	Name
5-23-90 Ck. Wt. = 30g = 30.0000g 24°C Vol. Factor.	#24 2-10λ @10λ	0.0100 0.0099 0.0098 0.0098 0.0097 0.0492 ÷5 X 1.00268 = 0.0099 ml.	P. J. Raney
	#41 20λ	0.0194 0.0197 0.0199 0.0201 0.0203 0.0994 ÷5 X 1.00268 = 0.0199 ml.	P. J. Raney
	#69 0-100λ @50λ	0.0497 0.0493 0.0497 0.0493 0.0499 0.2479 ÷5 X 1.00268 = 0.0497 ml.	P. J. Raney
	#14 100λ	0.0987 0.0999 0.0992 0.0996 0.0996 0.4970 ÷5 X 1.00268 = 0.0997 ml.	P. J. Raney
	#77 0-1ml @1ml.	1.0018 1.0019 1.0028 1.0008 1.0006 5.0079 ÷5 X 1.00268 = 1.0043 ml.	P. J. Raney

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Date	Pipet #	Wt.	Name
5-23-90 CK Wt. 30g = 30.0000g 24°C Vol Factor = 1.00268	#64 0-5ml @5ml	4.9561 4.9446 4.9411 4.9582 4.9427 24.7427 ÷ 5 X 1.00268 = 4.9618 ml.	P.J. Raney
5-24-90 CK Wt. 30g = 30.0002g. 23°C Vol. Factor = 1.00244	#24 2-10ml @10ml	0.0100 0.0099 0.0100 0.0098 0.0102 0.0499 ÷ 5 X 1.00244 = 0.0100 ml.	P.J. Raney
	#41 20X	0.0197 0.0202 0.0205 0.0202 0.0199 0.1005 ÷ 5 X 1.00244 = 0.0201 ml.	P.J. Raney
	#69 0-100X @50X	0.0507 0.0495 0.0497 0.0498 0.0498 0.2495 ÷ 5 X 1.00244 = 0.0500 ml.	P.J. Raney
	#14 100X	0.1002 0.1006 0.1005 0.0994 0.0999 0.5006 ÷ 5 X 1.00244 = ~~1.0037 ml~~ 0.1004 ml	P.J. Raney PJR 5-24-90

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Date	Pipet #	Wt.	Name
5-24-90	#27 0-1ml @	0.9992 0.9970 0.9967 0.9954 0.9954 4.9837 ÷ 5 X 1.00268 = 0.9992 ml	P.J. Raney
P.J.R. 5-24-90	#6X 0-5ml @ 5ml	4.9.345 4.9527 4.9405 4.8993 4.9312 24.6582 ÷ 5 X 1.00268 = 4.9437 ml	P.J. Raney
23°c Vol. factor = 1.00244	#76 1000λ	0.9967 0.9962 0.9972 0.9996 0.9968 4.9865 ÷ 5 X 1.00244 = 0.9997 ml	J. Smaiti
5-24-90 23°C Vol factor = 1.00244	#33 — 100 → 1000λ @ 1000λ	1.0048 1.0045 1.0113 1.0050 1.0040 5.0296 ÷ 5 X 1.00244 = 1.0089 ml	Virginia L. Dunn
5-25-90 Check wt = 30g = 30.0001g 22° Vol Factor = 1.00221	#10 — 10 → 100λ @ 25λ VLD 6/6/90	0.0251 0.0251 0.0248 0.0248 0.0249 0.1247 ÷ 5 X 1.00221 = 0.024996 or 0.0250 ml	Virginia L. Dunn

5-24-90

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DATE	PIPET #	WEIGHT	NAME
5-25-90	#2-1→5 ml	5.0622	Virginia L Dunn
CK WT = 30g = 30.0001g	@ 5 ml	5.0556	
22°C vol factor = 1.00221 ml		5.0463	
		5.0397	
		5.0333	
		25.2371 ÷ 5 X 1.00221 = 5.0586 ml	
	#0-100λ		
5-25-90		0.0995	Virginia L Dunn
23°C vol factor = 1.00244		0.0996	
		0.0995	
		0.0993	
		0.0993	
		0.4972 ÷ 5 X 1.00244 = 0.0997 ml	

Date	Pipet #	Weight	Name
6-4-90			
ck. WT 30g = 29.9999g		1.0003	Emaiti
	#78	1.0005	
	1000λ	1.0004	
		1.0006	
23°C Vol. factor = 1.00244		1.0009	
		5.0027	÷ 5 X 1.00244 ml = 1.0030 ml
		0.0990	Virginia L Dunn
6-4-90	#8-100λ	0.0986	
24°C vol factor = 1.00268		0.0985	
		0.0988	
		0.0985	
		0.4934 ÷ 5 X 1.00268 = 0.0989 ml	

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DATE	PIPET #	WEIGHT	NAME
6-4-90	#2 – 1 → 5 ml	5.0650	Virginia L Dunn
CK WT = 29.9999 g	@ 5 ml	5.0414	
24°C vol factor =		5.0284	
		5.0332	
		5.0265	
		25.1945 ÷ 5 × 1.00268 = 5.0524 ml	
6-5-90	#30 10 → 100	0.0299	
CHK wt 30.0021	@ 30 λ	0.0296	
24.2°C 1/0.99727		0.0299	D D Kellogg
		0.0298	
		0.0296	
		$\bar{x}_s$ 0.02976 × 1.002737 → 0.02984	
		s 0.51%	
6-5-90	#30 10 → 100	0.0406	
24.2°C	@ 40.1 λ	0.0399	D D Kellogg
		0.0398	
		0.0399	
		0.0402	
		$\bar{x}_s$ 0.04008 × 1.002737 → 0.04019	
		s 0.82%	
6-5-90	#62 2 → 10	0.0096	
24.2°C	@ 10 λ	0.0102	
		0.0100	D D Kellogg
		0.0098	
		0.0099	
		$\bar{x}_s$ 0.0099 × 1.002737 → 0.00993	
		s 2.26%	
6-5-90	#77 100 → 1000	0.5003	
24.2°C	@ 500 λ	0.5013	
		0.5021	
		0.4994	
		0.5002	D D Kellogg
		0.5006	
		$\bar{x}_L$ 0.50015 × 1.002737 → 0.50020	
		s 0.19%	

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Date	Pipette # + Set	H_2O obsd wt	Name
6-5-90	#64 1000 → 5000	2.2858	
23.7 $\frac{1}{.99732}$	@ 2.3 ml	2.2869	
		2.2916	
		2.2874	S S Kellogg
		2.2861	
		$\bar{x}_5$ 2.28756 × 1.002615 → 2.29354	
		s 0.10%	
6-5-90	#69 10λ – 100λ	0.1000	CO Harvey
@ 25°C	@ 100λ	0.1000	
$\frac{1}{.99707}$		0.0996	
		0.0999	
		0.1002	
		$\bar{x}_5$ 0.09994 × 1.002939 → 0.10023	
		s 0.22%	
	#41 20λ	0.0193	CO Harvey
		0.0195	
		0.0200	
		0.0197	
		0.0197	
		$\bar{x}_5$ 0.01964 × 1.002939 → 0.01970	
		s (1.37%)	
6-5-90	#64 1000 - 5000	2.4880	
23.8°C $\frac{1}{.99768}$	@ 2.50 ml	2.4823	
		2.4825	
		2.4839	S S Kellogg
		2.4890	
		$\bar{x}_5$ 2.48514 × 1.002639 → 2.49170	
		s (0.13%)	
6-5-90	#64 1000 → 5000	3.9756	
24.6°C $\frac{1}{.99717}$	@ 4.00 ml	3.9770	
		3.9774	
		3.9781	S S Kellogg
		3.9755	
		$\bar{x}_5$ 3.97672 × 1.002838 → 3.98801	
		s (0.029%)	

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Date	Pipette + Set	Obsd Hgt wt	Name
6-5-90	#77 10→1000	0.9981	
24.6°C	@ 1 ml	1.0014	
		1.0003	
		1.0008	L S Kellogg
		0.9998	

$\bar{x}_5$ 1.00008 × 1.002838 → 1.00292
s 0.13%

6-5-90	#8 - 100x	0.0996	
CK wt = 30.0001		0.0993	Virginia L Dunn
25°C Vol factor = 1.00294		0.0994	
		0.0998	
		0.0993	

0.4974 ÷ 5 × 1.00294 = 0.0998 ml

6-5-90			
25°C vol factor	#2 - 1→5 ml	5.0737	
	@ 5 ml	5.0709	Virginia L Dunn
		5.0585	
		5.0489	
		5.0471	

25.2991 ÷ 5 × 1.00294 = 5.0747 ml

6-5-90	#30 2→100	0.0995	
24.5°C 1/.99720	@ 100	0.1000	
		0.0997	
		0.1002	L S Kellogg
		0.1002	

$\bar{x}_5$ 0.09992 × 1.002808 → 0.1002
s (0.31%)

6-6-90	#2 - 1→5 ml	5.0830	
ck wt = 30g = 30.0002 g	@ 5 ml	5.0597	
24°C vol ~~Flask~~ factor = 1.00268		5.0528	Virginia L Dunn
6/6/90		5.0479	
		5.0546	

25.2980 ÷ 5 × 1.00268 = 5.0732 ml

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DATE	PIPET #	WEIGHT	NAME
6-6-90	#39 – 1→5 ml @ 4.7 ml	4.6761	Virginia L Dunn
WT CC = 30g ± 30.0002g		4.6602	
24° Vol factor = 1.00268		4.6518	
		4.6396	
		4.6643	
		23.2920 ÷ 5 X 1.00268 = 4.6709 ml	
	#19 – 100→1000λ @ 250λ	0.2475	
6-6-90		0.2502	Virginia L Dunn
24°C Vol factor = 1.00268		0.2488	
		0.2500	
		0.2501	
		1.2466 ÷ 5 X 1.00268 = 0.249989 ≈ 0.2500	
	#75 – 50λ	0.0496	
6-6-90		0.0502	Virginia L Dunn
23°C Vol factor = 1.00244		0.0506	
		0.0504	
		0.0502	
		0.2510 ÷ 5 X 1.00244 = 0.0503 ml	
	#8 – 100λ	0.1002	Virginia L Dunn
6-6-90		0.1001	
24°C Vol factor = 1.00268		0.0994	
		0.0995	
		0.0997	
		0.4989 ÷ 5 X 1.00268 = 0.1000 ml	
	#33 – 100→1000λ @ 1000λ	1.0110	
6-6-90		1.0100	Virginia L Dunn
24°C Vol factor = 1.00268		1.0066	
		1.0069	
		1.0092	
		5.0437 ÷ 5 X 1.00268 = 1.0114 ml	

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DATE	PIPET #	WEIGHT	NAME
6-6-90	#19 – 100 → 1000x @ 500x	0.5039	Virginia L Dunn
WT CK = 30g = 30.0002g		0.5034	
24°C vol factor = 1.00268		0.5023	
		0.5021	
		0.5013	
		2.5130 ÷ 5 × 1.00268 = 0.5039 ml	
6-6-90	#67 – 1–20x @ 20x	0.0196	Virginia L Dunn
24°C vol factor = 1.00268		0.0196	
		0.0197	
		0.0194	
		0.0201	
		0.0984 ÷ 5 × 1.00268 = ~~0.0984~~ 0.0197 ml VLD 6/6/90	
6-7-90	#75 – 50x	0.0495	Virginia L Dunn
WT. CHECK = 30g = 30.0000g		0.0498	
24°C vol factor = 1.00268		0.0497	
		0.0499	
		0.0498	
		0.2487 ÷ 5 × 1.00268 = 0.0499 ml	
6-7-90	#10 – 10 → 100x @ 25x	0.0251	Virginia L Dunn
24°C vol factor = 1.00268		0.0254	
		0.0249	
		0.0250	
		0.0248	
		0.1252 ÷ 5 × 1.00268 = 0.0251 ml	
6-7-90	#19 – 100 → 1000x @ 500	0.4998	Virginia L Dunn
24°C vol factor = 1.00268		0.4991	
		0.4984	
		0.4987	
		0.4972	
		2.4932 ÷ 5 × 1.00268 = 0.499977	
		0.5000	

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DATE	PIPET #	WEIGHT	NAME
6-7-90	#33 - 100→1000x @1000x	0.9965	Virginia L Dunn
WT CK = 30g = 30.0000g		0.9974	
24°C Vol. factor = 1.00268		0.9945	
		0.9990	
		0.9952	
		4.9826 ÷ 5 X 1.00268 = 0.9992 ml	
6-7-90	#2 - 1→5ml @5ml	5.0778	Virginia L Dunn
24°C Vol factor = 1.00268		5.0631	
		5.0522	
		5.0488	
		5.0423	
		25.2842 ÷ 5 X 1.00268 = 5.0704 ml	
6-8-90	#8 - 100x	0.0995	Virginia L Dunn
WT CHECK = 30g = 29.9997		0.0993	
25°C Vol factor = 1.00294		0.0990	
		0.1005	
		0.0992	
		0.4975 ÷ 5 X 1.00294 = 0.0998 ml	
6-8-90	#19 - 100→1000x @500x	0.5021	Virginia L Dunn
25°C Vol factor = 1.00294		0.4952	
		0.4925	
		0.4932	
		0.4931	
		2.4761 ÷ 5 X 1.00294 = 0.4967 ml	
6-8-90	#3 - 100→1000x @1000x	1.0094	Virginia L Dunn
25°C Vol factor = 1.00294		1.0051	
		1.0026	
		0.9964	
		0.9963	
		5.0098 ÷ 5 X 100 294 = 1.0049 ml	

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BNW LABORATORY NOTEBOOK NO. 52920
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DATE	PIPET #	WEIGHT	NAME
6-8-90	#2 - 1 → 5 ml	5.0561	Virginia S Dunn
WT CHECK = 30g = 29.9997g	@ 5 ml	5.0285	
25°C vol factor = 1.00294		5.0334	
		5.0366	
		5.0300	
		25.1846 ÷ 5 × 1.00294 = 5.0517 ml	

75 - 50λ

6-11-90		0.0496	Virginia S Dunn
WT CHECK = 30g = 29.9998		0.0496	
24°C vol factor = 1.00268		0.0497	
		0.0496	
		0.0494	
		0.2479 ÷ 5 × 1.00268 = 0.0497 ml	

6-11-90	# 19 - 100 → 1000λ	0.05006	Virginia S Dunn
24°C vol factor 1.00268	@ 500λ	0.04988	
		0.04972	
		0.04962	
		0.04964	
		2.4892 ÷ 5 × 1.00268 = 0.4992 ml	

6-11-90	# 33 - 100 → 1000λ	1.0025	Virginia S Dunn
24°C vol factor = 1.00268	@ 1000λ	1.0054	
		0.9988	
		0.9949	
		0.9974	
		4.9990 ÷ 5 × 1.00268 = 1.0025 ml	

	# 78 500λ	0.4959	Kmaniti
24°C Vol. factor = 1.00268		0.4968	
		0.4973	
		0.4992	
		0.4984	
		2.4869 ÷ 5 × 1.00268 = 0.4987 ml	

	# 37 100λ	0.0987	Kmaniti
24°C Vol. factor = 1.00268		0.0992	
		0.0992	
		0.0995	
		0.0992	
		0.4958 ÷ 5 × 1.00268 = 0.0994 ml	

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BNW LABORATORY NOTEBOOK NO. 52920
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Date	Pipet #	weight	Name
4-12-90	42		
@ 24°c	@ 00λ	0.0993	CO Harvey
		0.0992	
		0.1000	
		0.1000	
		0.0997	
		0.4982 ÷5 X1.00268 = 0.09991	

4-12-90
30g = 29.999g
24°C Vol/Factor = 1.00268

#77
c 1ml
@ 1ml.

1.0000
1.0007
1.0010
0.9985
0.9980
4.9982 ÷5 x 1.00268 = 1.0023 ml.

P.J. Ramey

#14
100λ

0.1002
0.0983
0.1001
0.0999
0.1002
0.4987 ÷5 X 1.00268 = ~~0.1000~~ 0.1000 ml.
PJR 4-12-90

P.J. Ramey

42
c 20λ

0.0199
0.0203
0.0203
0.0204
0.0208
~~0.1210~~ .1017 ÷5 x 1.00268 = 0.0204

CO Harvey

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Project No. _____ Date of Work _____
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Date	Pipet	Wt.	Name
4-12-90 Wt-30g = 29.9999 25°C	#41 20λ	0.0201 0.0205 0.0201 0.0204 0.0199 0.1010 ÷5 X 1.00294 = 0.0203 ml	P.J. Raney
	#24 2-10λ @10λ	0.0108 0.0107 0.0109 0.0101 0.0103 0.0528 ÷5 X 1.00294 = 0.0106 ml.	P.J. Raney
	#69 0-100λ @50λ	0.0494 0.0500 0.0497 0.0498 0.0503 0.2492 ÷5 X 1.00294 = 0.0500 ml	P.J. Raney
	#64 0-5ml @5ml	4.9792 4.9392 4.9291 4.9502 4.9323 24.7300 ÷5 X 1.00294 = 4.9605	P.J. Raney
6-12-90 25°C Vol Factor = 1.00294	100 → 1000λ @ #33-1000λ	1.0087 1.0076 1.0076 1.0070 1.0070 5.0379 ÷5 X 1.00294 = 1.0105 ml	Virginia L. Dunn

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DATE	PIPET #	WEIGHT	NAME
6-13-90	#33-100 → 1000x @ 1000x	1.0063	Virginia L Dunn
wt check = 30g = 30.0003		1.0083	
23°C = 1.00244 vol factor		1.0062	
		1.0063	
		1.0056	
		5.0327 ÷ 5 × ~~1.00268~~ 1.00244 VLD 6/13/90 = 1.0090 ml	
6-13-90	# 19 — 100 → 1000x @ 1000x	0.5056	Virginia L Dunn
24°C Vol factor = 1.00268		0.5078	
		0.5044	
		0.5041	
		0.5030	
		2.5249 ÷ 5 × 1.00268 = 0.5063 ml	
6-13-90	#10 — 10 → 100x @ 25x	0.0255	Virginia L Dunn
26°C vol factor = 1.00320		0.0255	
		0.0256	
		0.0256	
		0.0254	
		0.1276 ÷ 5 × 1.00320 = 0.0256 ml	
6-14-90	# 33 — 100 → 1000x @ 1000x	1.0064	Virginia L Dunn
wt. check = 30g = 29.9999g		1.0030	
25°C vol factor = 1.00294		1.0022	
		1.0019	
		1.0026	
		5.0161 ÷ 5 × 1.00294 = 1.0062 ml	
	VLD 6/14/90 #~~14~~ 10 — 10 → 100x @ 25x	0.0255	Virginia L Dunn
6-14-90		0.0254	
25°C vol factor = 1.00294		0.0250	
		0.0247	
		0.0250	
		0.1256 ÷ 5 × 1.00294 = 0.0252 ml	

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DATE	PIPET #	WEIGHT	NAME
6-14-90	#8-100λ	0.1002 ml	Virginia L Dunn
25°C vol factor = 1.00294		0.1001 ml	
		0.0997 ml	
		0.0996	
		0.0996	
		0.4992 ÷ 5 X 1.00294 = 0.1001 ml	

6-14-90	#2 — 1 → 5 ml	5.0045	Virginia L Dunn
25°C Vol factor = 1.00294	@ 5 ml	5.0123	
		5.0133	
		5.0046	
		5.0035	
		25.0382 ÷ 5 X 1.00294 = 5.0224 ml	

6-14-90	vns 6/14/90 ~~Kmiriti (acetic)~~ ~~K97717~~ #19 — 100 → 1000λ @ 500λ	0.5087	Virginia L Dunn
25°C vol factor = 1.00294		0.5028	
		0.5018	
		0.5014	
		0.5009	
		2.5156 ÷ 5 X 1.00294 = 0.5046 ml	

	#4 100λ	0.0990	Kmiriti
25°c Vol. factor = 1.00294		0.0985	
		0.0984	
		0.0987	
		0.0988	
		0.4934 ÷ 5 X 1.00294 = 0.0990 ml	

	# 78 500λ	0.4976	Kmiriti
25°c Vol. factor = 1.00294		0.4953	
		0.4944	
		0.4970	
		0.4960	
		2.4803 ÷ 5 X 1.00294 = 0.4975 ml	

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Date	Pipet #	Weight	Name
6-14-90 Wt. Check - 30g = 30.0003g 25°C Vol Factor = 1.00294	#42 @ λ	0.0973 0.0981 0.0987 0.0993 0.0990 0.4924 ÷ 5 X 1.00294 = 0.0988 ml	P. J. Raney
	#35 200λ	0.2031 0.2011 0.2009 0.2011 0.2002 1.0064 ÷ 5 X 1.00294 = 0.2019 ml	P. J. Raney
	#63 0-1 ml @ 1 ml.	1.0130 1.0007 1.0032 1.0005 1.0026 5.0200 ÷ 5 X 1.00294 = 1.0070 ml.	P. J. Raney
26°C Vol. Factor = 1.00320	#41 20λ	0.0200 0.0198 0.0202 0.0198 0.0199 0.0997 ÷ 5 X 1.00320 = 0.0200 ml.	P. J. Raney
	#24 10λ	0.0098 0.0098 0.0098 0.0096 0.0094 0.0484 ÷ 5 X 1.00320 = 0.0097 ml.	P. J. Raney

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Date	Project #	Wt.	Name
6-14-90	# 64 0-5ml @ 5ml	4.9863 4.9255 4.9310 4.9832 4.9085 24.7345 ÷ 5 X 1.00320 = 4.9627 ml.	P. J. Ramey
6-14-90	# 66 0-100 uL @ 50 uL	0.0443 0.0444 0.0446 0.0438 0.0449 0.0427 0.0435 0.0433 $\bar{X}$ 0.043938 = 0.044067. s 1.69%	C O Harvey
6-14-90	# 42 0-100 uL @ 50 uL	Cancelled COH	

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DATE	PIPET #	WEIGHT	NAME
6-15-90 wt check = 30g = 30.0000 24°C vol factor = 1.00268	# 10 – 10→100 x @25x	0.0254 0.0252 0.0257 0.0257 0.0257 0.1277 ÷ 5 X 1.00268 = 0.0256 ml	Virginia L Dunn
6-15-90 24°C vol factor = 1.00268	#8 – 100x	0.1001 0.1000 0.0995 0.1003 0.1004 0.5003 ÷ 5 X 1.00268 = ~~0.5003 ml~~ 0.1003 ml VMD 6/15/90	Virginia L Dunn
6-15-90 24°C vol factor	# ~~35~~ 19 – 100→1000x VMD 6/15/90 @	0.5069 0.5065 0.5042 0.5041 ~~0.5085~~ VMD 6/15/90 0.5015 2.5232 ÷ 5 X 1.00268 = 0.5060 ml	Virginia L Dunn

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DATE	PIPET #	WEIGHT	NAME
6-13-90	#33 - 100 → 1000λ	1.0054	Virginia L Dunn
24°C vol factor = 1.00268	@ 1000λ	0.9915	
		0.9916	
		0.9890	
		0.9880	
		4.9655 ÷ 5 × 1.00268 = 0.9958	
6-15-90	#63	1.0003	PJ Ramey
24°C Vol Factor = 1.00268		0.9987	
		0.9989	
		0.9967	
		0.9994	
		4.9940 ÷ 5 × 1.00268 = 1.0015 ml.	
			PJR 6-15-90 ~~PJ Ramey~~
6-18-90	# 42	0.0992	
25°C vol factor 1.00294	@ 100λ	0.0986	
		0.0986	
		0.0992	
		0.0986	
		0.0986	
		0.5928 ÷ 6 × 1.00294 = 0.0991	
			E O Harvey 6-18-90
6-18-90	#33 - 100 → 1000λ	1.0046	Virginia L Dunn
wt ck = 30g = 30.0000 g		1.0060	
25°C vol factor = 1.00294		1.0062	
		1.0078	
		1.0073	
		5.0319 ÷ 5 × 1.00294 = 1.0093 ml	

Project No. _____ Date of Work _____

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BNW LABORATORY NOTEBOOK NO. 52920
CORRECTED FOR PNL RECORDS CENTER NOV 21 '90

Date	Pipet #	Weight	Name
6-18-90			
Wt. Cu = 30g = 30.0000g	78 500λ	0.4965	
		0.4975	
		0.4982	
25°C = 1.00294		0.4971	
		0.4974	
		2.4867	÷5 × 1.00294 = 0.4988 ml
	#4 50λ	0.0497	
		0.0496	
		0.0495	
		0.0493	
		0.0495	
		0.2476	÷5 × 1.00294 = 0.0497 ml
6-18-90	#63	1.0069	
Wt. Clk. 30 = 30.0000g	100-1000λ	1.0090	
25°C Vol. Factor	@ 1000λ	1.0076	
= 1.00294		1.0085	
		1.0028	
		5.0348	÷5 × 1.00294 = 1.0099 ml
	#14	0.0990	
	100λ	0.1000	
		0.0995	
		0.0995	
		0.0995	
		0.4975	÷5 × 1.00294 = 0.0998 ml
	#69	0.0500	
	0-100λ @	0.0499	
	50λ	0.0495	
		0.0492	
		0.0492	
		0.2478	÷5 × 1.00294 = 0.0497 ml.

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Date	Project #		Wt.	Name
6-19-90	#63		1.0039	
Wt. Chk - 30g = 30.0002g	100-1000		1.0016	P. J. Raney
Vol. Factor - 25°C =	@ 1000		1.0047	
1.00294			1.0050	
			1.0032	
			5.0184 ÷ 5 × 1.00294 = 1.0066 ml.	
	#14		0.0989	
	100x		0.0994	
			0.0999	P. J. Raney
			0.0996	
			0.0993	
			0.4971 ÷ 5 × 1.00294 = 0.0997 ml.	
	#16		5.0760	
	5000λ		5.0701	
			5.0639	
			5.0661	
25°C Vol. factor = 1.00294			5.0526	
			25.3287 ÷ 5 × 1.00294 = 5.0806 ml	
6-20-90	#60		0.0993	
Wt. Check - 3g = 29.9998	0-100λ		0.0993	P. J. Raney
Vol. Factor - 25°C = 1.00294	@ 100λ		0.0992	
			0.0993	
			0.0990	
	PJR 6-20-90		0.4961 ÷ 5 × 1.00294 = 0.0995 ml.	
	#64		5.0056	
	0-5 ml		4.9594	
	@ 5 ml.		4.9514	P. J. Raney
			4.9362	
			4.9441	
			24.7967 ÷ 5 × 1.00294 = ~~4.9744~~ 4.9739 ml.	
			PJR 6-20-90	

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BNW LABORATORY NOTEBOOK NO. 52920
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15 152

DATE	PIPET #	WEIGHT	NAME
6-20-90	#8-1007	0.0999	Virginia L Dunn
WT CHECK = 30g = 29.9998g		0.1001	
25°C Vol Factor = ~~0.0999~~ 1.00294		0.1003	
VLD 6/21/1		0.0999	
		0.1002	
		0.5004 ÷ 5 X 1.00294 = 0.1004 ml	
6-20-90	#41	0.0203	P J Raney
Wt Check = 29.9998g	20x	0.0201	
25°C Vol. Factor = 1.00294		0.0201	
		0.0202	
		0.0200	
		0.1007 ÷ 5 X 1.00294 = 0.0202	
6-21-90	#41	0.0196	P J Raney
Wt Check - 30g = 30.0002g	20x	0.0198	
25°C Vol Factor = 1.00294		0.0194	
		0.0196	
		0.0195	
		0.0979 ÷ 5 X 1.00294 = 0.0196	

Continued in BNW 53645

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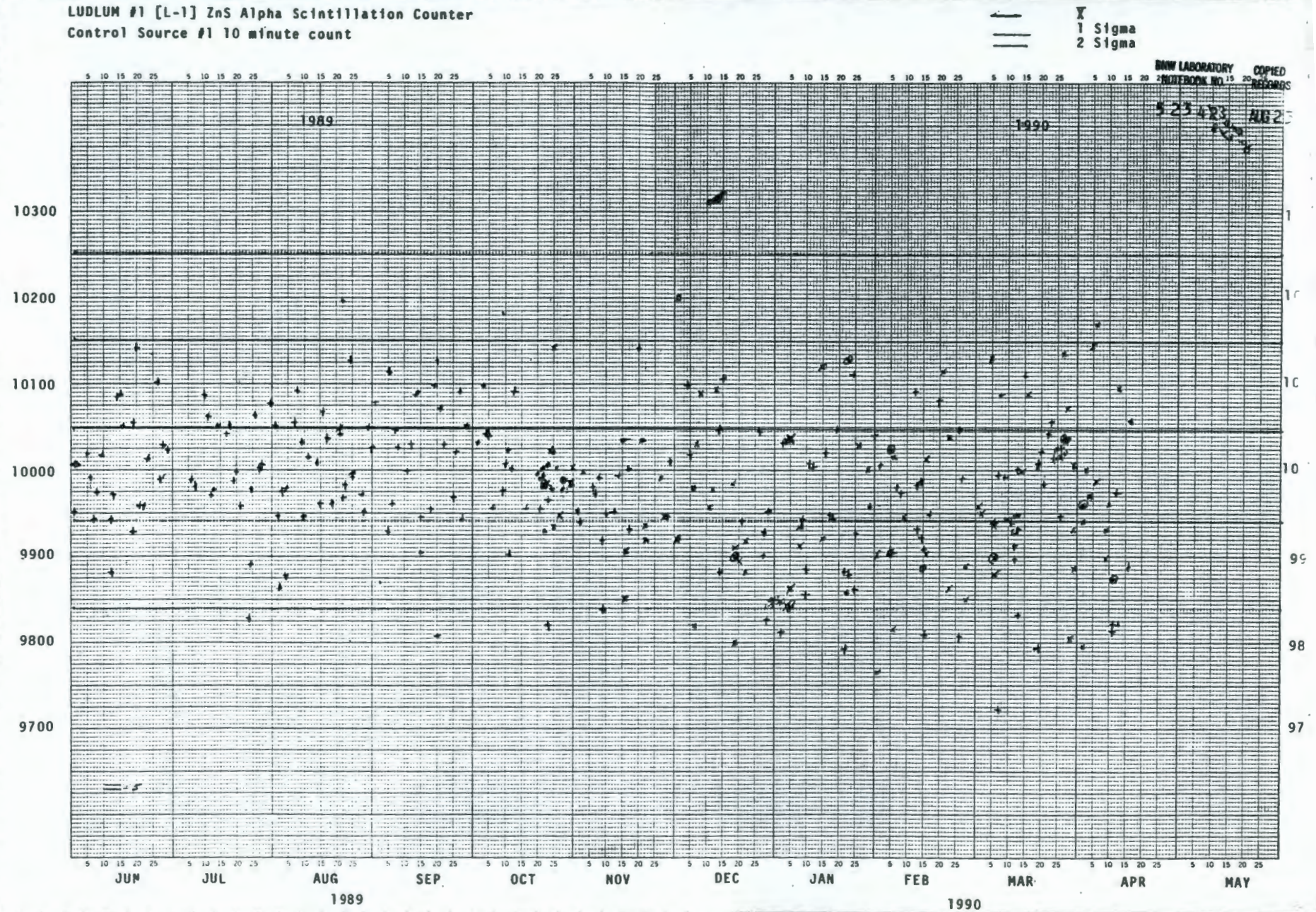
LABORATORY NO. 52920 NOV 21 '90
GPO-1978-797-981

82

LUDLUM #1 [L-1] ZnS Alpha Scintillation Counter
Control Source #1 10 minute count



BNW LABORATORY NOTEBOOK NO. 523423
COPIED RECORDS
AUG 2

80

DATE	COUN
4/06/90	121
4/06/90	99
4/09/90	98
4/09/90	99
4/10/90	95
4/10/90	
4/11/90	98

D05-086

DATE
4/27/90
4/30/90
4/30/90
4/30/90

CONTROL CHART EXTENSION PROGRAM

BNW52345
p. 83

COUNTING SYSTEM: LUDLUM #1 [L-1] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

BNW LABORATORY NOTEBOOK NO. 52343

COPIED FO RECORDS C AUG 23 90

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		10047.30
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		103.89
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9943.41	10151.19
THE 1% X BAR LIMITS ARE	9946.83	10147.77
THE 2% X BAR LIMITS ARE	9846.35	10248.25
THE 3% X BAR LIMITS ARE	9745.88	10348.72
THE REFERENCE DATE IS		10-28-88

THE X BAR OF THE DATA POINTS IS		10047.13
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		103.89
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9943.24	10151.02
THE 1% X BAR LIMITS ARE	9946.66	10147.60
THE 2% X BAR LIMITS ARE	9846.19	10248.07
THE 3% X BAR LIMITS ARE	9745.72	10348.54
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS .591388 YEARS

THE X BAR OF THE DATA POINTS IS		10046.84
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		103.89
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9942.96	10150.73
THE 1% X BAR LIMITS ARE	9946.37	10147.31
THE 2% X BAR LIMITS ARE	9845.90	10247.78
THE 3% X BAR LIMITS ARE	9745.44	10348.25
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 1.58799 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9839.35	10254.91
THE 1% X BAR LIMITS ARE	9946.66	10147.60
THE 2% X BAR LIMITS ARE	9846.19	10248.07
THE 3% X BAR LIMITS ARE	9745.72	10348.54
THE REFERENCE DATE IS		6- 1-89

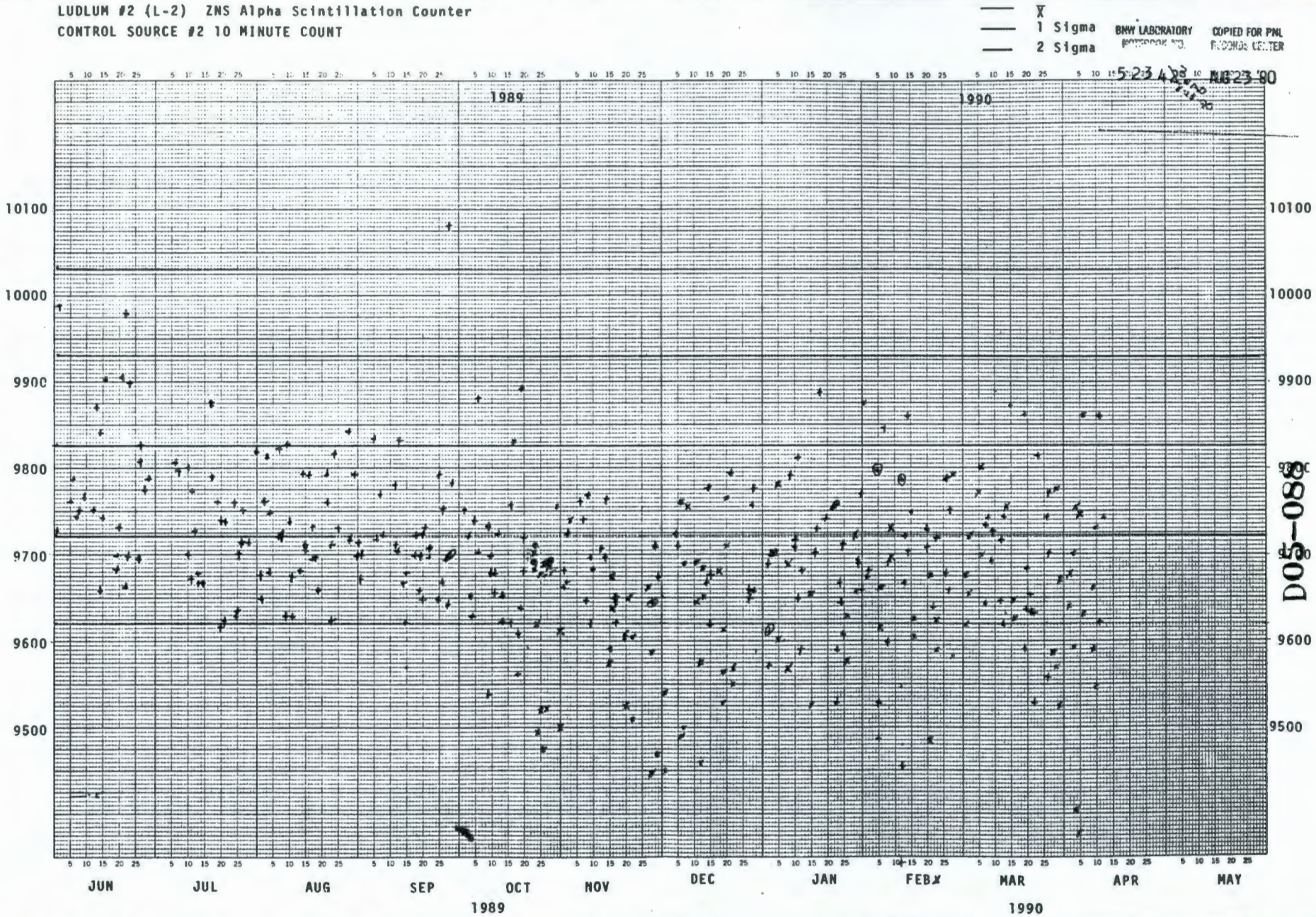
THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS .591388 YEARS

THE X BAR OF THE DATA POINTS IS		10046.84
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		207.77
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9839.07	10254.61
THE 1% X BAR LIMITS ARE	9946.37	10147.31
THE 2% X BAR LIMITS ARE	9845.90	10247.78
THE 3% X BAR LIMITS ARE	9745.44	10348.25
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 1.58799 YEARS

Entered 5/1/90 [illegible]

LUDLUM #2 (L-2) ZNS Alpha Scintillation Counter
CONTROL SOURCE #2 10 MINUTE COUNT



BNW LABORATORY
COPIED FOR PNL RECORDS CENTER
5-23-42 AUG 23 '90

Entered 5/1/90 Jane C Hojilsky

D05-088

BNW LABORATORY NOTEBOOK NO 52343 COPIED FOR PNL RECORDS CENTER AUG 23 '90

CONTROL CHART EXTENSION PROGRAM

BNW52343 p.85

COUNTING SYSTEM: LUDLUM [L-2] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		9826.80
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		104.00
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9722.80	9930.80
THE 1% X BAR LIMITS ARE	9728.53	9925.07
THE 2% X BAR LIMITS ARE	9630.26	10023.34
THE 3% X BAR LIMITS ARE	9532.00	10121.60
THE REFERENCE DATE IS		1-22-87

THE X BAR OF THE DATA POINTS IS		9826.13
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		103.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9722.14	9930.13
THE 1% X BAR LIMITS ARE	9727.87	9924.40
THE 2% X BAR LIMITS ARE	9629.61	10022.66
THE 3% X BAR LIMITS ARE	9531.35	10120.92
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 2.35734 YEARS

THE X BAR OF THE DATA POINTS IS		9825.85
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		103.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	9721.86	9929.84
THE 1% X BAR LIMITS ARE	9727.59	9924.11
THE 2% X BAR LIMITS ARE	9629.34	10022.37
THE 3% X BAR LIMITS ARE	9531.08	10120.63
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 3.35394 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9619.16	10033.11
THE 1% X BAR LIMITS ARE	9727.87	9924.40
THE 2% X BAR LIMITS ARE	9629.61	10022.66
THE 3% X BAR LIMITS ARE	9531.35	10120.92
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 2.35734 YEARS

THE X BAR OF THE DATA POINTS IS		9825.85
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		206.97
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9618.88	10032.82
THE 1% X BAR LIMITS ARE	9727.59	9924.11
THE 2% X BAR LIMITS ARE	9629.34	10022.37
THE 3% X BAR LIMITS ARE	9531.08	10120.63
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 3.35394 YEARS

Entered 5/1/90 [illegible]

LUDLUM #3 (L-3) ZNS ALPHA SCINTILLATION COUNTER
CONTROL SOURCE #3 10 MINUTE COUNT

BNW LABORATORY NOTEBOOK NO. 5 23 42
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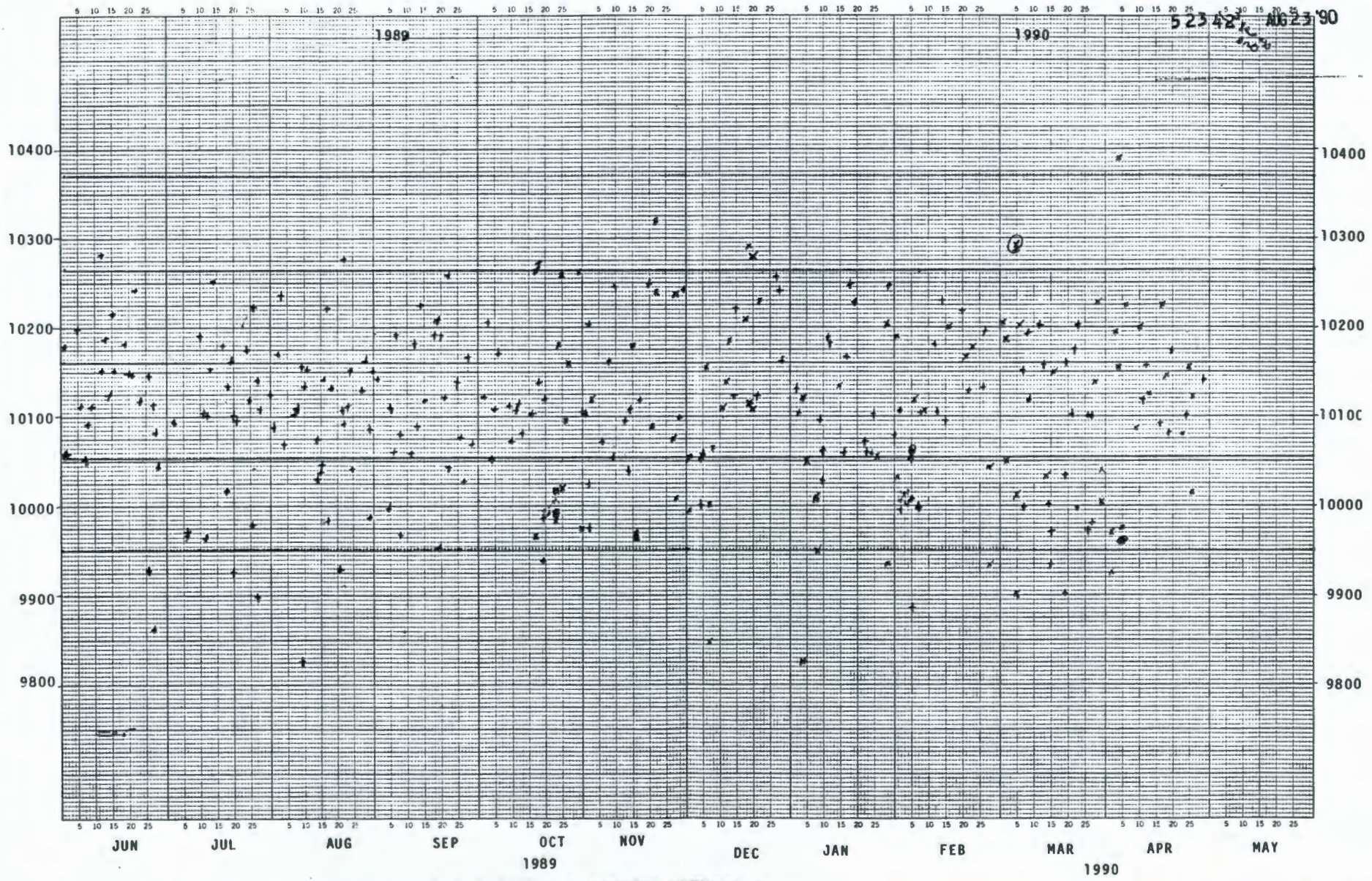

Entered 5/1/90 Jane E Hoyliaty

D05-090

LABORATORY ... NOTEBOOK NO ... RECORDS CENTER

523423 AUG 23 '90

CONTROL CHART EXTENSION PROGRAM

BNW52343
p. 87

COUNTING SYSTEM: LUDLUM #3 [L-3] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		10162.00
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.00
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10057.00	10267.00
THE 1% X BAR LIMITS ARE	10060.38	10263.62
THE 2% X BAR LIMITS ARE	9958.76	10365.24
THE 3% X BAR LIMITS ARE	9857.14	10466.86
THE REFERENCE DATE IS		4-26-85

THE X BAR OF THE DATA POINTS IS		10160.80
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		104.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10055.82	10265.79
THE 1% X BAR LIMITS ARE	10059.20	10262.41
THE 2% X BAR LIMITS ARE	9957.59	10364.02
THE 3% X BAR LIMITS ARE	9855.98	10465.63
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09865 YEARS

THE X BAR OF THE DATA POINTS IS		10160.51
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		104.98
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10055.53	10265.50
THE 1% X BAR LIMITS ARE	10058.91	10262.12
THE 2% X BAR LIMITS ARE	9957.30	10363.72
THE 3% X BAR LIMITS ARE	9855.70	10465.33
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09525 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9950.85	10370.76
THE 1% X BAR LIMITS ARE	10059.20	10262.41
THE 2% X BAR LIMITS ARE	9957.59	10364.02
THE 3% X BAR LIMITS ARE	9855.98	10465.63
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09865 YEARS

THE X BAR OF THE DATA POINTS IS		10160.51
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		209.95
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9950.56	10370.46
THE 1% X BAR LIMITS ARE	10058.91	10262.12
THE 2% X BAR LIMITS ARE	9957.30	10363.72
THE 3% X BAR LIMITS ARE	9855.70	10465.33
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09525 YEARS

Entered 5/1/90 [illegible]

88

LUDLUM #4 (L-4) ZNS ALPHA SCINTILLATION COUNTER
CONTROL SOURCE #4 10 MINUTE COUNT

— $\bar{X}$
— 1 Sigma
— 2 Sigma

BNW LABORATORY NOTEBOOK NO

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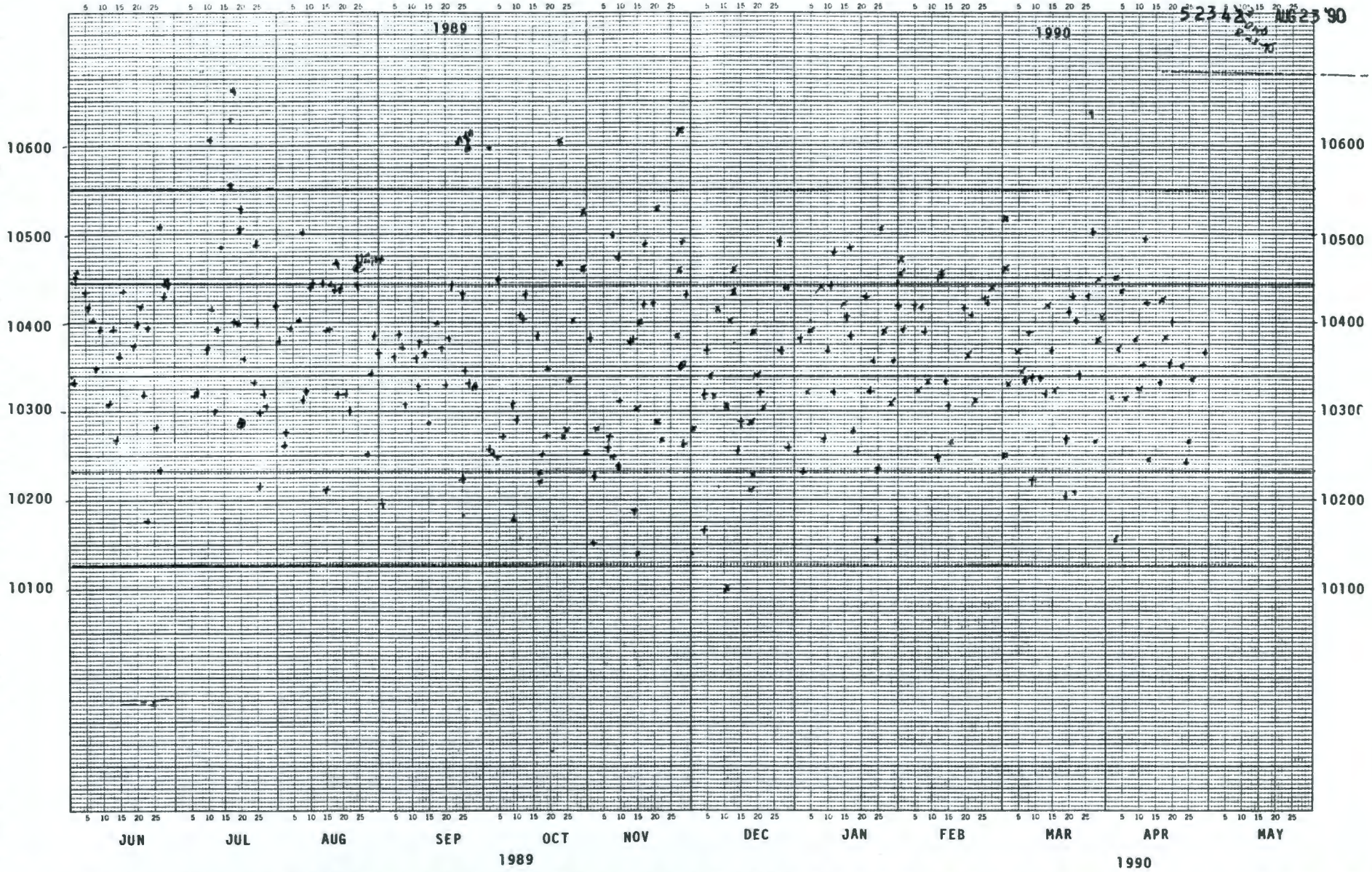
52342 AUG 23 '90



Entered 5/1/90 [illegible]

D05-092

523483 AUG 23 '90

CONTROL CHART EXTENSION PROGRAM

BNWS2343
p-89

COUNTING SYSTEM: LUDLUM #4 [L-4] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		10339.00
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		106.00
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10233.00	10445.00
THE 1% X BAR LIMITS ARE	10235.61	10442.39
THE 2% X BAR LIMITS ARE	10132.22	10545.78
THE 3% X BAR LIMITS ARE	10028.83	10649.17
THE REFERENCE DATE IS		8-28-87

THE X BAR OF THE DATA POINTS IS		10338.48
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10232.48	10444.47
THE 1% X BAR LIMITS ARE	10235.09	10441.86
THE 2% X BAR LIMITS ARE	10131.71	10545.25
THE 3% X BAR LIMITS ARE	10028.32	10648.63
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 1.76048 YEARS

THE X BAR OF THE DATA POINTS IS		10338.18
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10232.19	10444.17
THE 1% X BAR LIMITS ARE	10234.80	10441.56
THE 2% X BAR LIMITS ARE	10131.42	10544.94
THE 3% X BAR LIMITS ARE	10028.04	10648.33
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 2.75707 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	10126.49	10550.47
THE 1% X BAR LIMITS ARE	10235.09	10441.86
THE 2% X BAR LIMITS ARE	10131.71	10545.25
THE 3% X BAR LIMITS ARE	10028.32	10648.63
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 1.76048 YEARS

THE X BAR OF THE DATA POINTS IS		10338.18
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		211.98
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	10126.20	10550.16
THE 1% X BAR LIMITS ARE	10234.80	10441.56
THE 2% X BAR LIMITS ARE	10131.42	10544.94
THE 3% X BAR LIMITS ARE	10028.04	10648.33
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 2.75707 YEARS

LUDLUM #5 (L-5) ZNS ALPHA SCINTILLATION COUNTER
CONTROL SOURCE #5 10 MINUTE COUNT

X̄
1 Sigma
2 Sigma

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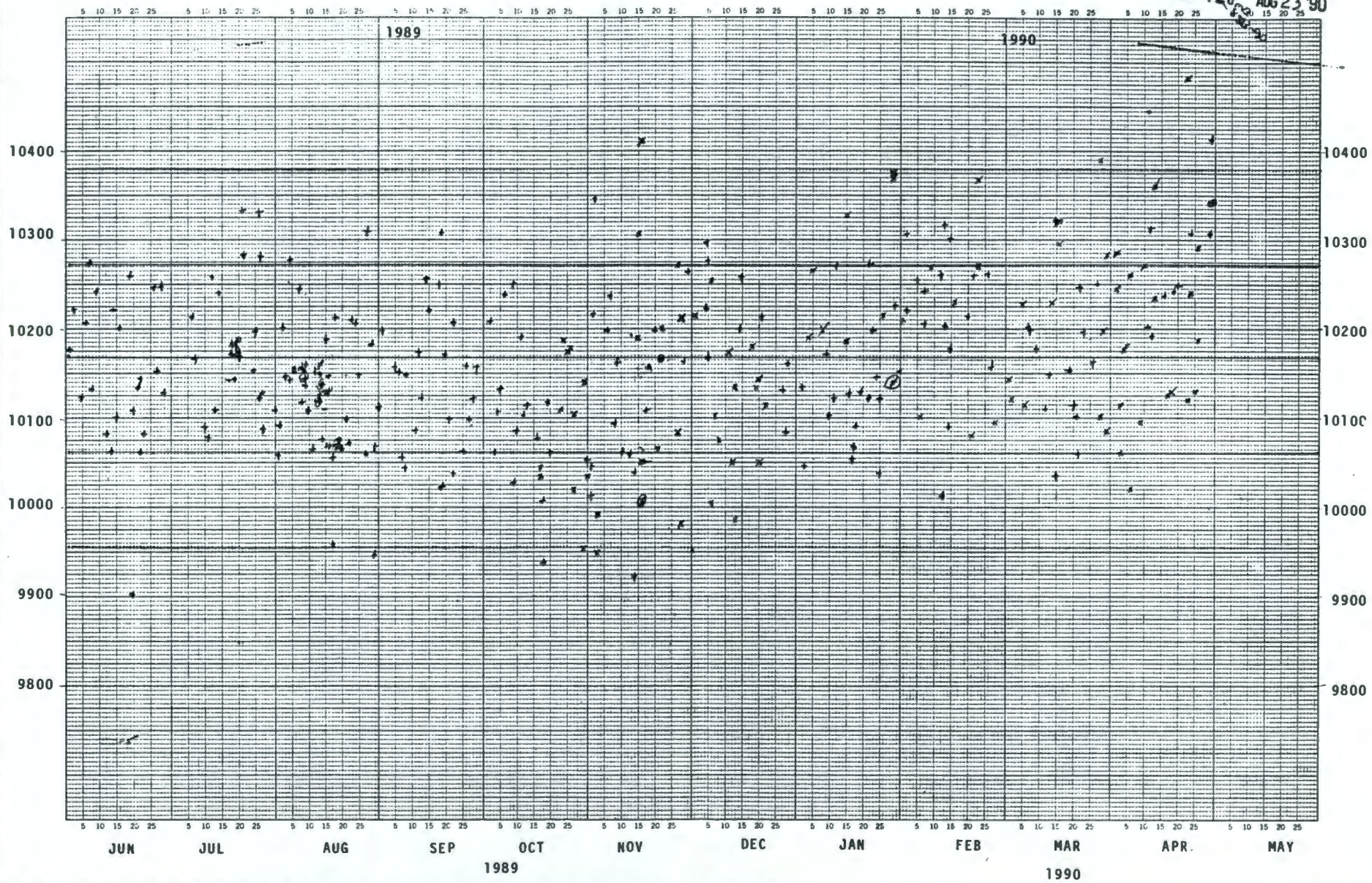


DOS-094

NOTEBOOK NO 52343 AUG 23 '90

CONTROL CHART EXTENSION PROGRAM

BNW52343 p. 91

COUNTING SYSTEM: LUDLUM #5 [L-5] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		10169.00
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		106.00
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10063.00	10275.00
THE 1% X BAR LIMITS ARE	10067.31	10270.69
THE 2% X BAR LIMITS ARE	9965.62	10372.38
THE 3% X BAR LIMITS ARE	9863.93	10474.07
THE REFERENCE DATE IS		4-27-85

THE X BAR OF THE DATA POINTS IS		10167.80
THE STANDARD DEVIATION AT THE I SIGMA CONFIDENCE LEVEL IS		105.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10061.82	10273.79
THE 1% X BAR LIMITS ARE	10066.13	10269.48
THE 2% X BAR LIMITS ARE	9964.45	10371.16
THE 3% X BAR LIMITS ARE	9862.77	10472.84
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09591 YEARS

THE X BAR OF THE DATA POINTS IS		10167.51
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.98
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10061.53	10273.50
THE 1% X BAR LIMITS ARE	10065.84	10269.19
THE 2% X BAR LIMITS ARE	9964.16	10370.86
THE 3% X BAR LIMITS ARE	9862.49	10472.54
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09251 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9955.83	10379.78
THE 1% X BAR LIMITS ARE	10066.13	10269.48
THE 2% X BAR LIMITS ARE	9964.45	10371.16
THE 3% X BAR LIMITS ARE	9862.77	10472.84
THE REFERENCE DATE IS		6- 1-89

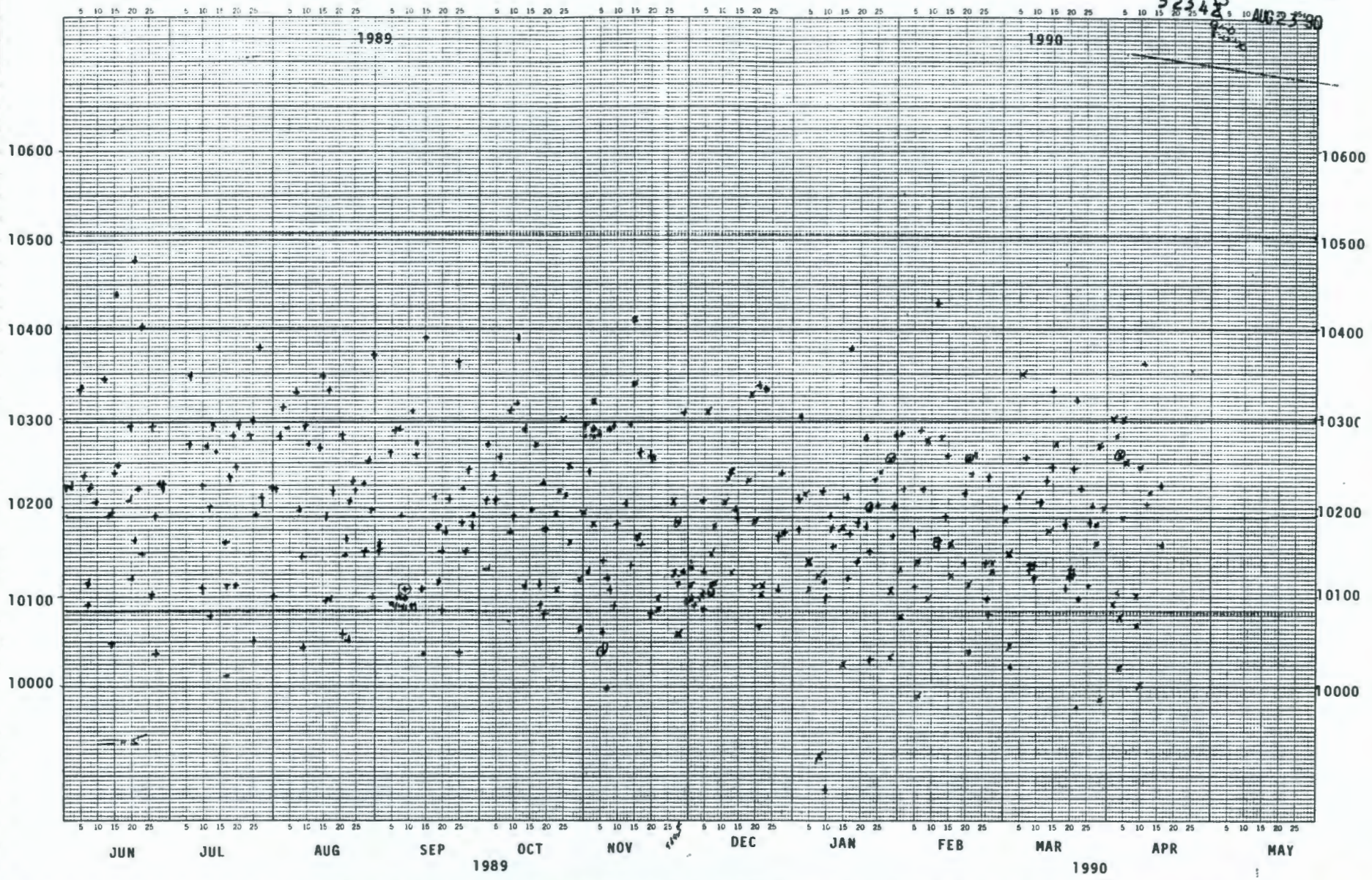
THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09591 YEARS

THE X BAR OF THE DATA POINTS IS		10167.51
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		211.97
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	9955.54	10379.48
THE 1% X BAR LIMITS ARE	10065.84	10269.19
THE 2% X BAR LIMITS ARE	9964.16	10370.86
THE 3% X BAR LIMITS ARE	9862.49	10472.54
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09251 YEARS

Entered 5/1/90 [illegible]

LUDLUM #6 (L-6) ZNS ALPHA SCINTILLATION COUNTER
CONTROL SOURCE #6 10 MINUTE COUNT



NOTEBOOK NO. 52343
RECORDS CENTER
AUG 23 '90

D05-096

NOTEBOOK NO RECORDS CENTER
52348 AUG 23 '90

CONTROL CHART EXTENSION PROGRAM

BNW52343
p.93

COUNTING SYSTEM: LUDLUM #6 [L-6] ZNS ALPHA SCINTILLATION COUNTER
CONTROL NUCLIDE: 239PU
NUCLIDE HALF LIFE: 24119 YEARS

THE EXISTING CONTROL LIMITS UPON WHICH THE EXTENSION IS BASED ARE:

THE X BAR OF THE DATA POINTS IS		10298.00
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		106.00
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10192.00	10404.00
THE 1% X BAR LIMITS ARE	10195.02	10400.98
THE 2% X BAR LIMITS ARE	10092.04	10503.96
THE 3% X BAR LIMITS ARE	9989.06	10606.94
THE REFERENCE DATE IS		4-26-85

THE X BAR OF THE DATA POINTS IS		10296.79
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.99
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10190.80	10402.77
THE 1% X BAR LIMITS ARE	10193.82	10399.75
THE 2% X BAR LIMITS ARE	10090.85	10502.72
THE 3% X BAR LIMITS ARE	9987.88	10605.69
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09865 YEARS

THE X BAR OF THE DATA POINTS IS		10296.49
THE STANDARD DEVIATION AT THE 1 SIGMA CONFIDENCE LEVEL IS		105.98
THE 1 SIGMA CONFIDENCE LEVEL LIMITS ARE	10190.51	10402.48
THE 1% X BAR LIMITS ARE	10193.53	10399.46
THE 2% X BAR LIMITS ARE	10090.56	10502.42
THE 3% X BAR LIMITS ARE	9987.60	10605.39
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09525 YEARS

THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	10084.81	10508.76
THE 1% X BAR LIMITS ARE	10193.82	10399.75
THE 2% X BAR LIMITS ARE	10090.85	10502.72
THE 3% X BAR LIMITS ARE	9987.88	10605.69
THE REFERENCE DATE IS		6- 1-89

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 4.09865 YEARS

THE X BAR OF THE DATA POINTS IS		10296.49
THE STANDARD DEVIATION AT THE 2 SIGMA CONFIDENCE LEVEL IS		211.97
THE 2 SIGMA CONFIDENCE LEVEL LIMITS ARE	10084.52	10508.46
THE 1% X BAR LIMITS ARE	10193.53	10399.46
THE 2% X BAR LIMITS ARE	10090.56	10502.42
THE 3% X BAR LIMITS ARE	9987.60	10605.39
THE REFERENCE DATE IS		5-31-90

THE DECAY INTERVAL MEASURED FROM THE EXISTING CONTROLS DATE IS 5.09525 YEARS

Entered 5/1/90 [illegible]

DATE	10 min Count	100 min dkg	10 min Count	100 min dkg	10 min Count	100 min dkg	10 min Count	100 min dkg	10 min Count	100 min dkg	10 min Count	100 min dkg	Analyst
5/24/90	Recalibration in Review				10216	.263	10553	.262	10297	.228	Recalibration in Review		AEK
5/25/90					AEK 5/29/90 ~~9953~~	~~.248~~	RC 10424		RC 10282				AEK
5/25/90					9953	.284	10270	.321	10318	.242			AEK
5/25/90					RC 10100				RC 10315				AEK
5/25/90									RC 10428				AEK
5/25/90									RC 10254				AEK
5/29/90					9994	.256	10312	.281	10114	.240			AEK
5/29/90					RC 10036								AEK
5/30/90					10175	.249	10261	.286	10096	.249			AEK
5/31/90					10075	.267	10428	.287	10335	.249			AEK
5/31/90									RC 10211				AEK
6/1/90					10293	.247	10342	.289	10208	.244			AEK
6/1/90					RC 10076								AEK
6/4/90					10235	.259	10344	.277	10381	.247			AEK
6/4/90									RC 10328				AEK
6/5/90					10212	.242	10408	.298	10113	.239			AEK
6/6/90	~~9902~~ AEK 6-6-90	~~.207~~	~~9995~~	~~.153~~	10251	.229	10410	.247	10127	.246			AEK
6/7/90					10190	.261	10222	.273	10118	.268			AEK
6/7/90							RC 10378						AEK
6/8/90					10129	.272	10360	.276	10276	.242			AEK
90									RC 10258				AEK
6/8/90									RC 10270				AEK
6/11/90					10199	.276	10468	.294	9949	.231			AEK
6/11/90							RC 10524		RC 10091				AEK
6/11/90							RC 10234						AEK
6/12/90					10001	.263	10446	.289	10032	.263			AEK
6/12/90					RC 10074		RC 10319		RC 10243				AEK
6/13/90					10260	.261	10434	.278	10234	.248			AEK
6/14/90					10049	.258	10397	.254	10289	.283			AEK
6/14/90					RC 10214				RC 10037				AEK
6/15/90					10203	.237	10478	.278	10300	.237			AEK
6/15/90							RC 10340		RC 10194				AEK
6/18/90					10030	.251	10456	.274	10231	.238			AEK
6/18/90					RC 10066		RC 10399						AEK
6/19/90					10137	.272	10437	.268	10247	.227			AEK / JHK
6/20/90					1007[illegible]	.250	1047[illegible]	[illegible]	10232	.250			AEK / JHK

DATE	10 min COUNT
6/21/90	Recalib
6/22/90	
6/25/90	
6/25/90	
6/26/90	
6/26/90	
6/28/90	
6/29/90	
7-2-90	
7-2-90	
7-3-90	
7-3-90	
7/5/90	
7/5/90	
7/6/90	
7/6/90	
7/9/90	
7/10/90	
7/10/90	
7/11/90	
7/12/90	
7/12/90	
7/13/90	
7/13/90	
7/16/90	
7/16/90	
7/16/90	
7/17/90	
7/17/90	
7/18/90	
7/18/90	
7/19/90	
7/19/90	
7/20/90	
7/23/90	
7/23/90	

Project No. _____ RC 10181 Date of Work _____

Entered By _____ RC 10457 Date _____

Disclosed To and Understood By _____ Anne E Kozelich

Signed 1. _____ Date _____

2. _____ Date _____

D6 - BETA ANALYSIS

TOTAL BETA
Tc-99
Sr-90

PRIMARY DATA PACKAGE

D06-001

SST

TOTAL BETA DATA COVER SHEET

Sample Number: 90-0300-A-1/2/3 90-1255-A-1/2/3
90-0301-A-1/2/3 90-1256-A-1/2
90-0304-A-1/2/3 90-1257-C-1/2/5
90-0305-A-1/2/3

Procedure: HTA-4-23, HTA-4-8

Pipet Calibration LRB#: BNW 52920

Equipment (M&TE#): #1 W700873, #2 W700878

System Calibration LRB#: BNW 52626

Control Data LRB#: BNW 52342

SST

Tc-99 DATA COVER SHEET

Sample Number: 90-1255-A-1/2/3
90-1256-A-1/2
90-1257-C-1/2

Procedure: HTA-4-12, HTA-4-23, HTA-4-8

Pipet Calibration LRB#: BNW 52912, 52920

Equipment (M&TE#): #1 W700873, #2 W700878

System Calibration LRB#: BNW 52342

Control Data LRB#: 52342

Analysts Spike Recovery
Average File Location: 325 Bldg. Room 971

SST

Sr-90 DATA COVER SHEET

Sample Number: 90-1255-A-1/2/3
90-1256-A-1/2
90-1257-C-1/2

Procedure: HTA-4-11, HTA-4-23, HTA-4-8

Pipet Calibration LRB#: BNW 52912, 52920

Equipment (M&TE#): #1 W700873, #2 W700878

System Calibration LRB#: BNW 52342

Control Data LRB#: BNW 52342

Analysts Spike Recovery
Average File Location: 325 Bldg. Rm. 971

TOTAL BETA
Tc-99
Sr-90

SUMMARY DATA REPORTS

D06-005

SST DATA RESULTS FOR CORE 9

TOTAL BETA

Customer No.	Tot beta (dpm/g) @Sr90-Y90	+/- % error
Core 9 - Segment 3		
90-0300-A-1	4.16E+07	3.6
90-0300-A-2	3.92E+07	3.6
90-0300-A-3	1.24E+06	4.7
90-0301-A-1	3.87E+07	4.0
90-0301-A-2	3.79E+07	4.2
90-0301-A-3	2.35E+05	8.4
Core 9 - Segment 5		
90-0304-A-1	2.75E+07	4.4
90-0304-A-2	2.86E+07	4.4
90-0304-A-3	1.37E+05	10.6
90-0305-A-1	2.81E+07	4.4
90-0305-A-2	2.72E+07	4.5
90-0305-A-3	2.11E+05	8.6
Core 9 Composite		
90-1255-A-1	2.37E+08	3.7
90-1255-A-2	2.39E+08	3.7
90-1255-A-3	2.12E+05	4.9
90-1256-A-1	2.43E+08	4.7
90-1256-A-2	2.38E+08	4.7
Composite Water Leach		
90-1257-C-1	1.98E+07	3.6
90-1257-C-2	2.07E+07	3.7
90-1257-C-5	1.71E+05	5.7

Sr-90 and Tc-99 DATA

Customer No.	Sr-90 dpm/g	+/- % error	Tc-99 dpm/g	+/- % error
Core 9 Composite				
90-1255-A-1	1.11E+08	6.5	3.50E+04	7.6
90-1255-A-2	1.11E+08	6.5	3.35E+04	8.4
90-1255-A-3	6.82E+04	21.5	<1.40E+03	
90-1256-A-1	1.06E+08	6.5	3.30E+04	8.8
90-1256-A-2	1.03E+08	6.5	3.29E+04	7.6
Composite Water Leach				
90-1257-C-1	1.48E+04	13.1	3.47E+04	5.2
90-1257-C-2	3.10E+04	9.9	3.45E+04	5.2

Customer No.	Methods Blank + Spike	Spike Recovery	% Recovery
90-1255-A-3	2.1160E+06	2.0735E+06	98.23%

TOTAL BETA
Tc-99
Sr-90

ANALYTICAL REPORT CARDS

D06–007

TOTAL BETA ANALYSIS

Total beta analysis for SST samples is accomplished by using proportional beta counters. A Radiochemistry ANALYTICAL REPORT card accompanies each sample. This card has a card serial number, the date the sample was received into the radiochemistry laboratory, work package number, a radiochemistry lab serial number, customer identification number, the 325A Hot Cell sample identification number, the constituent requested (i.e., total beta), and the results. The balance ID number, BNW laboratory record book (LRB) number that holds the pipet calibration data, and the M&TE number of the beta counting system are noted in the "Serial No." column. A copy of the pipet calibration is provided under separate cover. The beta counter M&TE number cross references to the LRB that contains the calibration data and the daily control data. The total beta procedure number used for this analysis is noted in the "Constituent" column.

The volume of the aliquot taken from the sample solution (the dissolved fusion or the water leach) is written under the carD "SERIAL NUMBER" on the right side of the card. The second aliquot (if any) is the dilution of the first volume and the third volume is the portion of the dilution evaporated on the dish that is then beta counted. If only one volume appears then that volume is evaporated directly on the dish and then beta counted. The mass of sample sludge aliquot and the volume of solution used in the dissolution of the fusion or the water leach is written below the sample aliquot volumes.

The hand calculation of the data is located on the bottom half of the card under "DATA". This calculation comes from the procedure. The corrected count rate, sample volume, counter efficiency, sample weight and volume of solution of fusion or water leach are incorporated. If a "CCL=" is given then a coincidence counting loss is calculated and factored into the final results. Final results are given in disintegrations per gram.

On the back side of the card (xeroxed on the bottom half of page) is the counting raw data. The counter number and efficiency, date counted, total counts, time counted, calculated count rate, background counts per minute and the calculated corrected count rate are listed.

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
107-90	90-0300-A-1	TOTAL BETA	4.16 E+7 d/m/g
T1-SST-59	110B-C9-3T FUSION		± 3.6 %
			@ Sr+Y 90
W700873 MTE No. ~~W700~~ BNW52920 p.74		HTA-4-23	
Serial Number 104464		Date 3/16/90	Approval Coll

SERIAL NUMBER 104464

0.5535g + 250 ml.

0.0506ml

DATA

$$(2491.59)\left(\frac{.5535 \times 250}{(.0506)(.5535)}\right)(1.87) = 4.1590 \times 1.2941 \text{ E+7 dlm/g}$$

Calcd as Sr+Y 90

± 3.6 %

(Over)

84

d/c Sr+Y 90 = 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1	Shelf No. 1	ABS —	By [signature]
Date	3/18/90		
Total Counts	25204		
Min	10.		
C/M	2520.4		
Bkg.	28.81		
Corr C/M	2491.59		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 104464

54-1700-177R (005/89)

D06-009

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
108 -90	90-0300-A-2	TOTAL BETA	3.92 E+7 d/m/g wet wt
TLSST-57	1108-C9-35 FUSION		± 3.6%
MTE No. W704878 BNW52920 p. 74		HTA-4-23	@ Sr+y90 3.6
Serial Number 104468		Date 3/16/90	Approval CoH

SERIAL NUMBER 104468

0.6287g. → 250 ml.

0.0506 ml

54-1700-177 (05/89)

DATA

$$(2559.12)\left(\frac{.6287 \times 250}{(.0506)(.6287)}\right)(1.95) = 3.9216 \text{ E+7 d/m/g}$$

3/13/90 4 .05 .25 3/13/90 9

Calcd as Sr+y90

AMB 10-21-90

± 3.6%

(Over)

84

d/c Sr+y90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By [signature]
Date	3/12/90		
Total Counts	25881		
Min	10.		
C/M	2588.1		
Bkg.	28.98		
Corr C/M	2559.12		

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Serial No. 104468

54-1700-177R (005/89)

D06-010

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
109 -90	90-0300-A-3	TOTAL BETA	1.24E+6 d/m/g wet wt
T1-SS1-59	110B-C9-3T FUSION		± 4.7% @ Sr+y90
MTE No. W7a873 BNW52920 p.74		HTA-4-23	4.7
Serial Number 104472		Date 3/16/90	Approval Cor

SERIAL NUMBER 104472

BLANK

0.4982 ml

54-1700-177 (05/89)

DATA

$(782.39)(\frac{1}{.4982})(1.87) = 2.936$ E+3 d/m/g ml $\times \frac{250 \text{ ml}}{.5911 \text{ g}} = 1.2421$ E+6

Calc'd as Sr+y90 3/18/90

based on average wt of Samples fused ± 4.7%

(Over)

84

d/c Sr+y90 = 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1	Shelf No. 1	ABS —	By [signature]
Date	3/18/90		
Total Counts	8112		
Min	10		
C/M	811.2		
Bkg.	28.81		
Corr C/M	782.39		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 104472

54-1700-177R (005/89)

D06-011

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
110 -90	90-0301-A-1	TOTAL BETA	3.87 E+7 d/m/g wet wt
T1-SST-59	110B-C9-3B FUSION		± 40%
			@ Sr+y90
MTE No. N700878 BNW52920 p. 74		HTA-4-23	4.0
Serial Number 104476		Date 3/12/90 3/16/90	Approval CGH

SERIAL NUMBER 104476

0.5814g. → 250ml.

0.0506ml

54-1700-177 (05/89)

DATA

$$(2334.82)\left(\frac{\cancel{.5814}\ 3/13/90\ \text{g} \times 250}{(.0506)(.5814)}\right)(1.95) = \cancel{1.3078}\ 3.8690\ E+7\ d/m/g$$

3/13/90 Calcd as Sr+y90 BMD 10-21-90

± 40%

(Over)

84

d/c Sr+y90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By [signature]
Date	3/18/90		
Total Counts	23638		
Min	10.		
C/M	2363.8		
Bkg.	28.98		
Corr C/M	2334.82		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 104476

54-1700-177R (005/89)

D06-012

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
111 -90	90-0301-A-2	TOTAL BETA	3.79E+7 d/m/g wet wt ±4.2% @ Sr+Y90
T1-SST-57	110B-C9-3B FUSION		
MTE No. M7008 73 BNW52920 p. 74		HTA-4-23	4.2
Serial Number 103901	Virginia L Dunn 3/12/90	Date 3/16/90	Approval CO4

54-1700-177 (05/89)

SERIAL NUMBER 103901

0.5801 g. + 250ml.

0.0506 ml

DATA

$$(2381.09)\left(\frac{.5801 \times 250}{(.0506)(.5801)}\right)(1.87) = 3.7923 \text{ E+7 d/m/g}$$

3/13/90 Calcd as Sr+Y90 1021-90

± 4.2%

(Over)

84

d/c Sr+Y90 = 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1	Shelf No. 1	ABS —	By Jean Ruggles
Date	3/12/90		
Total Counts	24099		
Min	10.		
C/M	2409.9		
Bkg.	28.81		
Corr C/M	2381.09		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 103901

54-1700-177R (005/89)

D06-013

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
112 — 90	90-0301-A-3	TOTAL BETA	2.35 Et5 d/m/wt
T1-SST-59	110B-C9-3B FUSION		± 8.4% 2 wt
			@ Srty 90
MTE No. 7 704878 BNW52920 p. 74		HTA-4-23	8.4
Serial Number 103905	Virginia L Dunn 3/12/90	Date 3/16/90	Approval COH

SERIAL NUMBER 103905

BLANK

0.4982 ml

54-1700-177 (05/89)

DATA

5.8 7.5

$(139.24)\left(\frac{1}{0.4982}\right)(1.95) = 5.4499$ Et 2 d/m/ml $\times \frac{250 \text{ ml}}{.5808 \text{ g}} = 2.3459$ Et5 ✓ amb

.7 .5 .5 d/m/g 10-21-90

Calcd ad Srty 90

based on Average wt. of Sample fused ± 8.4%

(Over)

84

d/c Srty 90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By Jean Ruggles
Date	3/13/90		
Total Counts	16867		
Min	100		
C/M	168.67		
Bkg.	29.43		
Corr C/M	139.24		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 103905

54-1700-177R (005/89)

D06-014

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
113 -90	90-0304-A-1	TOTAL BETA	2.75 E+7 d/m/g wet wt 0.0506 ml
TI SST-60	110B-C9-5T FUSION		±4.4 % @ Sr+Y 90
MTE No. N900878 BNW52920 p. 74		HTA-4-23	
Serial Number 103910		Date 3/16/90	Approval Coll

SERIAL NUMBER 103910

0.5564g. → 250ml.

54-1700-177 (05/89)

DATA

$(1590.32)\left(\frac{.5564 \times 250}{(.0506)(.5564)}\right)(1.95) = 2.7537 \times 10^{7}$ ~~8.5250 E+6~~ d/m/g

3/14/90 3/14/90 2

Calcd as Sr+Y 90

± 4.4 %

(Over)

84

d/t Sr+Y 90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By [signature]
Date	3/18/90		
Total Counts	16193		
Min	10.		
C/M	1619.3		
Bkg.	28.98		
Corr C/M	1590.32		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 103910

54-1700-177R (005/89)

D06-015

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M620 39
Serial No	Customer Ident	Constituent	Result
114-90	90-0304-A-2	TOTAL BETA	2.86 E+7 d/m/g wet wt 0.0506 ml
T1-SST-60	110B-C9-5T FUSION		± 4.4 % @ Sr+y 90
MTE No. N700873 BNW52920 p. 74		HTA-4-23	
Serial Number 103914		Date 3/16/90	Approval CAH

SERIAL NUMBER 103914

0.5571g. → 250ml.

54-1700-177 (05/89)

DATA

$(1724.09)\left(\frac{.5571 \times 250}{(.0506)(.5571)}\right)(1.87) = 2.85928 E+7$ d/m/g

Calcd as Sr+y 90

± 4.4 %

(Over)

84

d/e Sr+y 90 = 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1	Shelf No. 1	ABS —	By [signature]
Date	3/12/90		
Total Counts	17529		
Min	10.		
C/M	17529		
Bkg.	28.81		
Corr C/M	1724.09		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 103914

54-1700-177R (005/89)

D06-016

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
115 -90	90-0304-A-3	TOTAL BETA	1.37 E+5 d/m/g wet wt
T1-SST-60	110B-C9-5T FUSION		±10.6%
			@ Srty 90
MTE No. 2700873 BNW52920 p. 74		HTA-4-23	
Serial Number 103918		Date 3/12/90	Approval COH

SERIAL NUMBER 103918

BLANK

0.4982 ml

54-1700-177 (05/89)

DATA

$(81.17)\left(\frac{1}{.4982}\right)(1.87) = 3.0467\ E+2\ d/m/ml$ Calcd wt Sr + Y 90 $\times \frac{250}{.5568} = 1.3678\ E+5$ ✓ cmb 10-21-90

± 10.6%

based on average wt of samples fused

(Over)

84

d/c Sr + Y 90 = 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1	Shelf No. 1	ABS —	By [signature]
Date	3/13/90		
Total Counts	108 07		
Min	100.		
C/M	108.07		
Bkg.	26.90		
Corr C/M	81.17		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 103918

54-1700-177R (005/89)

D06-017

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
116 -90 T1-SST-60	90-0305-A-1 110B-C9-5B FUSION	TOTAL BETA	2.81 E+7 d/m/g wet wt ± 4.4% @ Sr+Y90
MTE No. N700878 BNW52920 p. 74		HTA-4-23	
Serial Number 103922	Virginia L Dunn 3/12/90	Date 3/16/90	Approval COH

SERIAL NUMBER 103922

0.5778g. → 250ml.

0.0506 ml

DATA

$$(1687.92)\left(\frac{\cancel{.5778}\times 250}{(.0506)(.5778)}\right)(1.95) = \cancel{9.3962\ E+6}\ 2.81448\ E+7\ \text{d/m/g}$$

(Calcd as Sr+Y90

± 4.4%

Bmb 10-21-90

(Over)

84

d/c Sr+Y90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By [signature]
Date	3/15/90		
Total Counts	17169		
Min	10.		
C/M	1716.9		
Bkg.	28.98		
Corr C/M	1687.92		

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Serial No. 103922

54-1700-177R (005/89)

D06-018

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
117 -90	90-0305-A-2	TOTAL BETA	2.72E+7 d/m/g wet
TI-SST-60	110B-C9-5B FUSION		± 4.5%
			e Sr+y 90
MTE No. M 1e4878 BNW52920 p. 74		HTA-4-23	
Serial Number 103926	Virginia L Dunn 3/12/90	Date 3/16/90	Approval CEH

SERIAL NUMBER 103926

0.5668g. + 250ml.

0.0506 ml

DATA

$(1599.27)\left(\frac{.5668 \times 250}{.0506}\right)(1.95) = 2.7184E+7$ ~~8.7332 E+6~~ d/m/g ✓ nmb 10-21-90

3/14/90 .05 2.5 3/14/90 1 .5

Calcd as Sr+y 90

± 4.5%

(Over)

84

d/c Sr+y 90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS	By - Jean Ruggles
Date	3/13/90		
Total Counts	16287		
Min	10.		
C/M	1628.7		
Bkg.	29.43		
Corr C/M	1599.27		

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Serial No. 103926

54-1700-177R (005/89)

D06-019

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
118 -90	90-0305-A-3	TOTAL BETA	2.11 E+5 d/m/g wet wt
T1-SST-60	110B-C9-5B FUSION		± 8.6%
			@ Sr+Y 90
MTE No. N7008B BNW52920 p. 74		HTA-4-23	
Serial Number 103930		Date 3/16/90	Approval COH

SERIAL NUMBER 103930

BLANK

0.4982 ml

54-1700-177 (05/89)

DATA

$(123.41)\left(\frac{1}{.4982}\right)(1.95) = 4.8303$ E+2 d/m/ml

Calcd as Sr+Y 90

$\times \frac{250}{.5723} = 2.1101$ E+5 Y BMD 10-21-90

± 8.6% based on average wt of the fused Samples

(Over)

84

d/c Sr+Y 90 = 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2	Shelf No. 1	ABS —	By [signature]
Date	3/13/90		
Total Counts	15284		
Min	100		
C/M	152.84		
Bkg.	29.43		
Corr C/M	123.41		

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Serial No. 103930

54-1700-177R (005/89)

D06-020

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M 62039 ~~M260~~ 4-6-90
Serial No	Customer Ident	Constituent	Result
188 -90 TI-SST-67 M&TE 360-06-01-018 BNW52920 p. 95	110B-C9-T 90-1255-A-1 TK110B-C9 Segment COM Ni FUSION	Total beta HTA-4-23	2.37 E+8 dpm/g wet wt ±3.7% as SrY 90
Serial Number 102741 N L Albey 4-10-90		Date 6-6-90	Approval Coy

54-1700-177 (05/89)

SERIAL NUMBER 102741

0.5560g + 250ml
0.0500ml

$$df = \frac{250}{(0.5560)(0.0500)} = 8.9928\ E+3$$

DATA

14069.61 (1.87) 8.9928 E+3 = 2.3660 E+8
✓ ± 3.7 %
BMB
10-21-90

(Over)

SrY 90 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-1	Shelf No. 1	ABS —	By Anne E Kozelisky
Date	4/11/90		
Total Counts	140979		
Min	10		
C/M	14097.9		
Bkg.	28.29		
Corr C/M	14069.61		

±.5
W700873
BNW52342 p 85

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Serial No. 102741

54-1700-177R (005/89)

D06-021

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. m 6 2039 ~~M260~~ 4-10-90
Serial No	Customer Ident	Constituent	Result
189 -90 TISST-67 M&TE 360-06-01-018 BNW52920 p. 95	110B-C9-T 90-1255-A-2 TK110B-C9 Segment COM Ni FUSION	Total beta HTA-4-23	2.39E+8 dpm/g wet wt ±37% @ Sry 90
Serial Number 102751 N L Allen 4-10-90		Date 6-6-90	Approval COH

54-1700-177 (05/89)

SERIAL NUMBER 102751

0.5749g + 250ml
0.0500ml

$$df = \frac{250}{(0.5749)(0.0500)} = 8.6972\ E+3$$

DATA

$(14685.11)(1.87)(8.6972\ E+3) = 2.3883\ E+8$ d/m/g ✓ SMB
Calculated as Sry 90. ± 3.7% 10-21-90

(Over)

Sry 90 1.87

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-1	Shelf No. 1	ABS —	By Anne E Kozelisky
Date	4/11/90		
Total Counts	147134		
Min	10		
C/M	14713.4		
Bkg.	28.29		
Corr C/M	14685.11		

W700873
BNW52342 p 85

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102751

54-1700-177R (005/89)

D06-022

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. CL 2039 ~~M260~~
Serial No	Customer Ident	Constituent	Result
190 -90 TI-35567 M&TE 360-06-01-018 BNW52920 p. 95	110B-C9-T 90-1255-A-3 TK110B-C9 Segment COM Ni FUSION	Total beta HTA-4-23	2.12 E+5 dpm / g wet wt ± 4.9% @ $Sr\gamma^{90}$
Serial Number 102761 N L Alley 4-10-90		Date 6-6-90	Approval Cole

54-1700-177 (05/89)

SERIAL NUMBER 102761 [illegible]

$\frac{0.5560 + 0.5749}{2g} + 250ml$

0.4913ml

$df = \frac{250}{(0.5655)(0.4913)} = 8.9983\ E2$

DATA

120.84 (1.95) 8.9983 E+2 = 2.1203 E+5 d/m/g ✓ BMB 10-21-90

calculated as $Sr\gamma^{90}$

± 4.9%

based on average wt of sample fused

(Over)

$Sr\gamma^{90}$ 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Rogehoke
Date	4/13/90		
Total Counts	14985		
Min	100		
C/M	149.85		
Bkg.	29.01		
Corr C/M	120.84		

± 2.2

W700878

BNW52342 p. 85

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Serial No. 102761

54-1700-177R (005/89)

D06-023

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No ~~M260~~ M62039 4-10-90
Serial No	Customer Ident	Constituent	Result
191 -90 TI-SST-67 M&TE 360-06-01-018 BNW52920 p. ~~95~~ 97	110B-C9-B 90-1256-A-1 TK110B-C9 Segment COM Ni FUSION	Total beta HTA-4-23	2.43 E+8 dpm/2 wet wt ± 4.7 % as $Sr\gamma^{90}$
Serial Number 102771		Date 6-6-90	Approval Cost

54-1700-177 (05/89)

SERIAL NUMBER 102771

0.5252g + 250ml
0.0251-1.

$$df = \frac{250}{(0.5252)(0.0251)} = 1.8965\ E+4$$

DATA

$6579.67\ (1.95)\ 1.8965\ E+4 = 2.4332\ E+8\ d/m/g$ ✓ 10-2-90
Calculated as $Sr\gamma^{90}$
± 4.7 %

(Over)

$Sr\gamma^{90}$ 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Kozelisky
Date	4/11/90		
Total Counts	66089		
Min	10		
C/M	6608.9		
Bkg.	29.23		
Corr C/M	6579.67		

W700878 ± .8
BNW52342 p85

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102771

54-1700-177R (005/89)

D06-024

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M6 2039 ~~[illegible]~~ NLA 4-10-90
Serial No	Customer Ident	Constituent	Result
192 -90 TI-SST-G7 M&TE 360-06-01-018 BNW52920 p. ~~95~~ 97 NLA 4-10-90	110B-C9-B 90-1256-A-2 TK110B-C9 Segment COM Ni FUSION	Total beta HTA-4-23	2.38 E+8 dpm/g wet wt ± 4.7% @ Sry 90
Serial Number 102781 N Lakey 4-10-90		Date 6-6-90	Approval Col4

54-1700-177 (05/89)

SERIAL NUMBER 102781

0.5922g + 250ml
0.0251ml

$$df = \frac{250}{(0.5922)(0.0251)} = 1.6819\ E+4$$

.05 .5 2

DATA

7261.47 (1.95) 1.6819 E+4 = 2.3815 E+8 d/m/g
Calculated as Sry 90
± 4.7 %

✓ BMB 10-21-90

(Over)

Sry 90 1.95

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Kozelsky
Date	4/11/90		
Total Counts	72907		
Min	10		
C/M	7290.7		
Bkg.	29.23		
Corr C/M	7261.47		

.7
W700878
BNW52342 p. 85

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102781

54-1700-177R (005/89)

D06-025

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M620 39
Serial No	Customer Ident	Constituent	Result
249 -90 TE-SST-68 BNW52920 p. 138	110B-C9-AN 90-1257-C-1 H2OLEACH	TOTAL BETA HTA-4-9	1.98E+7 d/m / g wet wt ± 3.6%
Serial Number	103202 [signature] 6/6/90	Date 6-13-90	Approval COH

54-1700-177 (05/89)

SERIAL NUMBER 103202

2.0799g + 202.0588g. H2O = 202.7156 mL
@ 22.5°C ρ H2O = .98676

0.1000 ml

DATA

CCL $\frac{1}{1-(10788.5)(6.634-7)} \rightarrow 1.0072$

$$\frac{(10759.13)(1.0072)}{} \frac{(1.97)\ 202.7156}{(2.0799)(0.100)} = 1.97505E+7 \frac{dpm}{g}$$

.5 2.5 .5 .5 .7

± 3.6 %

✓ BMB 10-21-90

(Over)

ALPHA COUNTING DATA			
Counter PAL-1 1.87		By [signature]	
Date	6/7/90		
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. #2 1.87 6/7/90	Shelf No. 1	ABS —	By [signature]
Date	6/7/90		
Total Counts	107885		
Min	10		
C/M	10788.5		
Bkg.	29.37		
Corr C/M	10759.13		

W700873

BNW52342 p. 87

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Serial No. 103202

54-1700-177R (005/89)

D06-026

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M620 39
Serial No	Customer Ident	Constituent	Result
250 -90 TI-SST-68 BNW52920 p. 138	110B-C9-AN 90-1257-C-2 H2OLEACH	TOTAL BETA HTA-4-9	2.07E+7 d/m/g wet wt ± 3.7%
Serial Number 103212	Virginia L. Dunn 6/6/9	Date 6-13-90	Approval CAH

100X

SERIAL NUMBER 103212

@ 22.5°C ρH2O = .99676

2.0215g. + 199.0698g. H2O = 199.7169

0.1000 ml

DATA

cor 1-(11139.6)(6.634-7) → 1.0074

$$(11110.23)(1.0074)(1.87)\frac{(199.7169)}{(2.0215)(0.100)} = 2.0678\ E+7\ d/m/g$$

± 3.77%

BMB 10-21-90

(Over)

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1.87 PBC-1	Shelf No. 1	ABS —	By Anne E Kozelisky
Date	6/7/90		
Total Counts	111396		
Min	10		
C/M	11139.6		
Bkg.	29.37		
Corr C/M	11110.23		
	W700873 ±.6		
	BNW52392 p87		
	Serial No. 103212		

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54-1700-177R (005/89)

D06-027

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M62039
Serial No	Customer Ident	Constituent	Result
251 -90	110B-C9-AM 90-1257-C-5	TOTAL BETA	1.715 E+5 pCi/g wet wt
TI-SST-68	H2OLEACH	HTA-4-9	± 5.7%
BNW52920 p. 189			
Serial Number 103222		Date 6/6/90	Approval

500x

SERIAL NUMBER 103222

BLANK- 200.3024 g H2O

0.5039 ml

$$\frac{(469.03)(1.87)(200.9535)}{(2.0507)(0.5039)} = 1.7056 \text{ E+5 pCi/g wet wt}$$

± 5.7%

based on average wt of Samples leached

(Over)

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1.87 PDC-1	Shelf No. 1	ABS —	By
Date	6/7/90		
Total Counts	4984		
Min	10		
C/M	498.4		
Bkg.	29.37		
Corr C/M	469.03 ± 3		
W700873			
BNW52342 p. 87			
Serial No. 103222			

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54-1700-177R (005/89)

D06-028

Tc-99 BETA ANALYSIS

Tc-99 beta analysis for SST samples is accomplished by using proportional beta counters (of which we have 2). A Radiochemistry ANALYTICAL REPORT card accompanies each sample. This card has the date the sample was received into the radiochemistry laboratory, work package number, serial no. (a consecutive number system used in the lab), the constituent requested (Tc-99 in this case), and the results. Under the "Serial no." the balance ID number and the BNW laboratory record book (LRB) number that holds the pipet calibration data for that volume of sample aliquot used in this analysis is logged. A copy of the pipet calibration is provided under separate cover. The M&TE number of the beta counting system is located under the pipet calibration LRB. This number cross references to the LRB that contains the calibration data and the daily control data. Under the "Constituent" and Tc-99 is the procedure used in this analysis.

The volume of the aliquot taken from the sample solution (the dissolved fusion or the water leach) is written under the "SERIAL NUMBER" of the card on the right side of the card. The second volume is the amount of solvent that the first volume is extracted into and the third volume is the portion of the solvent evaporated on the dish that is then beta counted. The mass of sample sludge aliquot and the volume of solution used in the dissolution of the fusion or the water leach is written below the sample aliquot volumes.

On the bottom half of the card under "DATA" is the hand calculation of the data. This follows from the procedure. The corrected count rate, sample volume, counter efficiency, analysts yield, sample weight and volume of solution of fusion or water leach are incorporated. If a "CCL=" is given then a coincidence counting loss is calculated and factored into the final results. Final results are given in disintegrations per gram.

On the back side of the card (xeroxed on the bottom half of page) is the counting raw data. The counter number and efficiency, date counted, total counts, time counted, calculated count rate, background counts per minute and the calculated corrected count rate are listed.

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. ~~M260~~ M62041
Serial No	Customer Ident	Constituent	Result
188 -90 TI-385-67 BNW52942 p 85 W700878 M&TE 360-06-01-018 BNW52920 p. 39	110B-C9-T 90-1255-A-1 TK110B-C9 Segment COM Ni FUSION	Tc-99 HTA-4-12	3.50 E+4 dpm/g wet wt ± 7.6 %
Serial Number 102747 4-5-90		Date 6-6-90	Approval Cog

SERIAL NUMBER 102747

0.5560g + 250ml

2(1.0083 ml) - 5.0311 ml
- 8 (0.5008 ml)

$$df = \frac{(250)(5.0311)}{(0.5560)(2.0166)(4.0064)} = 2.8000\ E+2$$

DATA

$(43.19)(2.74)(2.8000\ E+2) = 3.3135\ E+1\ d/m/g \div .948 = 3.495\ E+4$ dpm/g ± 7.6 %

AMB 6-21-90

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2 2.74	Shelf No. 1	ABS —	By
Date	4/6/90		
Total Counts	7305		
Min	100		
C/M	73.05		
Bkg.	29.86		
Corr C/M	43.19		
	± 4.5 %		

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Serial No. 102747

54-1700-177R (005/89)

54-1700-177 (05/89)

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. ~~M260~~ M62041
Serial No	Customer Ident	Constituent	Result 4/5/90
189 -90 TI-SST-67 BNW52342 p 85 W700878 M&TE 360-06-01-018 BNW52920 p. 89, 90	110B-C9-T 90-1255-A-2 TK110B-C9 Segment COM Ni FUSION	Tc-99 HTA-4-12	3.35E+4 dpm 2 wet wt ± 8.4%
Serial Number 102757	Virginia L Dunn 4-5-90	Date 6-6-90	Approval COY

54-1700-177 (05/89)

SERIAL NUMBER 102757

0.5749g + 250ml

2(1.0083 ml) — 5.0311 ml

— 8 (0.5008 ml)

$$df = \frac{(250)(5.0311)}{(0.5749)(2.0166)(4.0064)} = 2.7079\ E+2$$

.05 .2 .5 .5 2

DATA

$(42.76)(2.74)(2.7079\ E+2) \cdot 3.1727\ E+4\ d/m/g \div .948 = 3.3467\ E+4$

5.5 2.5

± 8.4 %

RMB 10-21-90

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2 274	Shelf No. 1	ABS —	By Anne E Kozelisky
Date	4/6/90		
Total Counts	7262		
Min	100		
C/M	72.62		
Bkg.	29.86		
Corr C/M	42.76		
	5.5		

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Serial No. 102757

54-1700-177R (005/89)

D06-031

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. ~~M260~~ M62041
Serial No	Customer Ident	Constituent	Result VLP 4/5/90
190 -90 TI-SST-67 BNW52342 p 85 W700878 M&TE 360-06-01-018 BNW52920 p. 89	110B-C9-T 90-1255-A-3 TK110B-C9 Segment COM Ni FUSION	Tc-99 HTA-4-12	< 1.4 E+3 dpm/g wet wt
Serial Number 102767	Virginia L Dunn 4-5-90	Date 6-6-90	Approval RCH

54-1700-177 (05/89)

SERIAL NUMBER 102767

-A-1 -A-2
0.5560 + 0.5749
2 g + 250ml

2(1.0083ml) - 5.0311ml
- 8(0.5008ml)

$$df = \frac{(250)(5.0311)}{(0.5655)(2.0166)(1.0064)} = 2.7529\ E+2$$

DATA

$$< 1.7\ \frac{(2.74)\ 2.7529\ E+2}{.948} = < 1.35\ E+3\ \frac{dpm}{g\ wet\ wt}$$

✓ Bmb 10-21-90

Based on average wt of Samples fused

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Kozlosky
Date	4/9/90		
Total Counts	2935		
Min	100		
C/M	29.35		
Bkg.	30.61		
Corr C/M	- 1.26		

W700878
BNW52342 p. 85

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Serial No. 102767

54-1700-177R (005/89)

D06-032

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. ~~M260~~ M62041
Serial No	Customer Ident	Constituent	Result 4/5/90
191 -90 TI-SST-67 BNW52342 p 85 W700878 M&TE 360-06-01-01B BNW52920 p. 89, 90	110B-C9-B 90-1256-A-1 TK110B-C9 Segment COM Ni FUSION	Tc-99 HTA-4-12	3.30 E+4 dpm / g wet wt ±8.8%
Serial Number	102777 [signature] 4-5-90	Date 6-6-90	Approval CDK

54-1700-177 (05/89)

SERIAL NUMBER 102777

0.5252g + 250ml

2(1.0083ml) → 5.0311ml

— 8(0.5008ml)

$df = \frac{(250)(5.0311)}{(0.5252)(2.0166)(4.0064)} = 2.9642\ E+2$

.05 .2 .5 .7 2

DATA

$(38.51)(2.74)(2.9642\ E+2) = 3.1277\ E+4\ d/m/g \div .948 = 3.299\ E+4\ \frac{dpm}{g\ wet\ wt}$

±8.8%

✓ 3mb 10-21-90

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2 2.74	Shelf No. 1	ABS —	By [signature]
Date	4/6/90		
Total Counts	6837		
Min	100		
C/M	68.37		
Bkg.	29.86		
Corr C/M	38.51		
	+6		

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102777

54-1700-177R (005/89)

D06-033

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer: SST		Date Received: 3-13-90	Work Order No.: ~~M260~~ M62041
Serial No	Customer Ident	Constituent	Result 4/5/90
192 -90 TI-SST- 67 BNW 52348 p85 W700978 MATE 360-06-01-01B BNW52920 p. 59 90	110B-C9-B 90-1256-A-2 TK110B-C9 Segment COM Ni FUSION	Tc-99 HTA-4-12	3.29 E+4 dpm/g wet wt 7.6 %
Serial Number: 102787		Date: 6-6-90	Approval: COG

SERIAL NUMBER 102787

0.5922g + 250ml

2(1.0083 ml) → 5.0311 ml
— 8 (0.5008 ml)

df = (250)(5.0311) / (0.5922)(2.0166)(1.0064) = 2.6288 E+2
.04 .12 .7 .5 .2

±

DATA

(43.36)(2.74)(2.6288 E+2) = 3.1232 E+1 d/m/g ÷ .948 = 3.294 E+4 dpm/g wet wt
4.6 2.5

± 7.6 %

✓ BMB 10-21-90

(Over)

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2 2.74	Shelf No. 1	ABS —	By Anne Etzenhiser
Date	4/6/90		
Total Counts	7322		
Min	100		
C/M	73.22		
Bkg.	29.86		
Corr C/M	43.36		
	4.6		
Serial No.	102787		

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D06-034

54-1700-177R (005/89)

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M62048
Serial No	Customer Ident	Constituent	Result
249 -90	110B-C9-AN 90-1257-C-1	99TECHNECIUM	3.47 E+4 d/m/g wet wt
	H2OLEACH	HTA-4-12	± 5.2 %
BNW52920 p. 140, 141			
Serial Number 103207	Virginia Lohman 6/8/90	Date 6-14-90	Approval COH

54-1700-177 (05/89)

SERIAL NUMBER 103207

@ 22.5°C ρ H2O = .99676

2.0799g + 202.0588g. H2O = 202.7156 ml

2(1.0049 ml) − 5.0517 ml − 7(0.4967 ml)

DATA

$$201.46 \; (2.39) \; \frac{202.7156 \; (5.0517)}{(2.0799) \; (2.0098) \; (7)(0.4967) \; .9765} = 3.4742 \text{ E+4 } d/m/g$$

± 5.2 %

BNW 1021-90

103

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2-39 PBC-1	Shelf No. 1	ABS —	By [signature]
Date	6/11/90		
Total Counts	22981		
Min	100		
C/M	229.81		
Bkg.	28.35		
Corr C/M	201.46		

± 1.6%

W700873

BNW52342 p. 87

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Serial No. 103207

54-1700-177R (005/89)

D06-035

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M62048
Serial No	Customer Ident	Constituent	Result
250 -90	110B-C9-AN 90-1257-C-2	99TECHNECIUM	3.45E+4 dpm/g wet wt
	H2OLEACH	HTA-4-12	± 5.2%
BNW52920 p.140, 141			
Serial Number	103217 [signature] 6/8/90	Date 6-14-90	Approval Cock

54-1700-177 (05/89)

SERIAL NUMBER 103217 (2nd) (7/5/90)

@ 22.5°C ρ H2O = .99676

2.0215g. + 199.0698g. H2O = 199.7169 ml

2(1.0049 ml) − 5.0517 ml − 7(0.4967 ml)

DATA

$$\frac{(197.26)^{1.6}(2.39)^{(2.5)}\ 199.7169^{.5}\ \cancel{2.0098}\ (5.0517)^{.2}}{2.0215^{.5}\ (2.0098)^{.7}\ (7)(0.4967)^{1.9}\ .9765} = 3.4482E+4\ \frac{dpm}{g}$$

6-14-90 Cock

± 5.2

Bmb 10-21-90

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2.39 PBC-1	Shelf No. 1	ABS —	By [signature]
Date	6/11/90		
Total Counts	22561		
Min	100		
C/M	225.61		
Bkg.	28.35		
Corr C/M	197.26		

W7 00873

BNW 52342 pg 87

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Serial No. 103217

54-1700-177R (005/89)

D06-036

Sr-90 BETA ANALYSIS

Proportional beta counters are used to perform the Sr-90 beta analysis. A Radiochemistry ANALYTICAL REPORT card accompanies each sample. This card has a card serial number, the date the sample was received into the radiochemistry laboratory, work package number, a radiochemistry lab serial number, customer identification number, the 325A Hot Cell sample identification number, the constituent requested (i.e., Sr-90), and the results. The balance ID number, BNW laboratory record book (LRB) number that holds the pipet calibration data, and the M&TE number of the proportional beta counting system are noted in the "Serial No." column. The M&TE number cross references to the LRB that contains the calibration data and the daily control data. A copy of the pipet calibration is provided under separate cover. The Sr-90 procedure number used for this analysis is noted in the "Constituent" column.

The volume of the aliquot taken from the sample solution (the dissolved fusion or the water leach) is written under the "SERIAL NUMBER" of the card on the right side of the card. The Sr-90 separation procedure is a cation exchange separation. The second volume, 10 ml, is the eluate diluted to 10 ml with deionized water and the third volume is the portion of the dilution evaporated on the dish that is then beta counted. Time, T_0, is recorded under the volumes. This is the time of the separation (i.e. yttrium from strontium). The mass of sample sludge aliquot and the volume of solution used in the dissolution of the fusion or the water leach is written below the sample aliquot volumes.

On the bottom half of the card under "DATA" is the hand calculation of the data. Also, the time, T_1, of the first count and T_2, of the second count are noted (two counts are needed to determine the ingrowth of yttrium). This follows from the procedure. The corrected count rate, sample volume, counter efficiency, analysts yield, sample weight and volume of solution of fusion or water leach are incorporated. If a "CCL=" is given then a coincidence counting loss is calculated and factored into the final results. Final results are given in disintegrations per gram.

On the back side of the card (xeroxed on the bottom half of page) is the counting raw data. The counter number and efficiency, date counted, total counts, time counted, calculated count rate, background counts per minute and the calculated corrected count rate are listed.

Pacific Northwest Laboratory		ANALYTICAL REPORT		SERIAL NUMBER 102746
Customer SST		Date Received 3-13-90	Work Order No. ~~H260~~ ~~H62062~~	
Serial No	Customer Ident	Constituent	Result	
188 -90	110B-C9-T 90-1255-A-1 TK110B-C9 Segment COM Ni FUSION	Sr-90	1.11 E+8 dpm g wet wt	
TI-SST-67 M&TE 360-06-01-018 BNW52920 p. 101, 103		HTA-4-11	± 6.5%	
Serial Number 102746			Date 5-25-90	Approval Coy

0.5560g + 250ml

1.0062 ml → 10 ml Vol Flask — 0.2000 ml

To = 10:13 PDT

DATA

Sr y90 1.8f

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Kozelsky
Date	4/18/90 1232 PST	4/23/90 0706 PST	
Total Counts	23928	41526	
Min	10	10	
C/M	2392.8	4152.6	
Bkg.	30.98	29.33	
Corr C/M	2361.82	4123.27	

W700878

BNW52342 p 85

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Serial No. 102746

54-1700-177R (005/89)

D06-038

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M260
Serial No	Customer Ident	Constituent	Result
189 -90 TISST-67 M&TE 360-06-01-018 BNW52920 p. 101,103	110B-C9-T 90-1255-A-2 TK110B-C9 Segment COM Ni FUSION	Sr-90 HTA-4-11	1.11 E+8 dpm/g wet wt ± 6.5%
Serial Number 102756		P.J. Ramey 4-18-90	Date 5-25-90 / Approval COH

54-1700-177 (05/89)

SERIAL NUMBER 102756

1 ml

0.5749g + 250ml

1.0062 ml → 10ml Vol Flask — 0.2000 ml

T_0 = 10:14 PDT

DATA

(Over)

Y^{90} 1.84

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By Anne E Kozelich
Date	4/18/90 PST 1243	4/23/90 PST 0718	
Total Counts	24520	42654	
Min	10	10	
C/M	2452.0	4265.4	
Bkg.	30.98	29.33	
Corr C/M	2421.02	4236.07	

W700878

BNW52342 p 85

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Serial No. 102756

54-1700-177R (005/89)

D06-039

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M260
Serial No	Customer Ident	Constituent	Result
190 -90 M&TE 360-06-01-018 BNW52920 p. 101	110B-C9-T 90-1255-A-3 TK110B-C9 Segment COM Ni FUSION	Sr-90 HTA-4-11	6.82 E+4 dpm/g wet wt ± 21.5%
Serial Number 102766		P. J. Ramey 4-17-90	Date 5-25-90 / Approval CO4

54-1700-177 (05/89)

SERIAL NUMBER 102766

0.5560 + 0.5749 ml

2 g 3 + 250ml

2(1.0062) → 10ml Vol Flask — 1.0024 ml

To = 10:13 PDT

DATA

T_0 4-18-90 @ 10:13 PDT

T_1 " @ 11:55 PDT

T_2 4-23-90 @ 6:30 PDT

$$\left(\frac{24.27 - 13.32}{.98178 - .28382}\right)\frac{(1.84)(10)(250)}{(2.0124)(1.0024)(.5655)} = 6.326\ E+4$$

Recovery 92.93%

$$\frac{6.326\ E+4}{.9293} = 6.807\ E+4$$

y90 1.84

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By [signature]
Date	4/18/90 PST 1255	4/23/90 PST 0730	
Total Counts	443	536	
Min	10	10	
C/M	44.3	53.6	
Bkg.	30.98	29.33	
Corr C/M	13.32	24.27	

W700878

BNW52342 p 85

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102766

54-1700-177R (005/89)

D06-040

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M62044
Serial No	Customer Ident	Constituent	Result
190-90 +50% Sr Spike Spike @ 2.2465x10 4-26-88 d/m/ml BNW 52626 pp 49,50 BNW52920 pp 101	110B-C9-T 90-1255-A-3 TK 110B-C1 Segment COM Ni Fusion	^{90}Sr	
Serial Number 102620		[signature] 4-17-90	Date / Approval

SERIAL NUMBER 102620

$\frac{0.5560 + 0.5749}{2}$ g → 250 ml

[2(1.0062 ml) + 0.0498 ml Spike] → 10 ml Vol Flask 1.0024 ml

To = 10:13 PDT

DATA

$\frac{8955.17 - 5120.92}{.97984 - .28367}$ → 5507.60 cts/min (Sample cts/min = 15.70)

$\frac{(5507.60 - 15.70)(1.84)(10)}{(1.0024)(0.0498)}$ → 2.0243 E+6 dpm/ml

Std 721 dry decay T½ 28.5 y → 2.1126 E+6

Y^{90} 1.84

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-2	Shelf No. 1	ABS —	By [signature]
Date	4/18/90 1306 PST	4/23/90 0744	
Total Counts	51519	89845	
Min	10	10	
C/M	5151.9	8984.5	
Bkg.	30.98	29.33	
Corr C/M	5120.92	8955.17	

W700878

BNW52342 p 85

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Serial No. 102620

54-1700-177R (005/89)

D06-041

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M260
Serial No	Customer Ident	Constituent	Result
191 -90 TI-SST-67 M&TE 360-06-01-018 BNW52920 p. 101	110B-C9-B 90-1256-A-1 TK110B-C9 Segment COM Ni FUSION	Sr-90 HTA-4-11	1.06 E+8 dpm/g wet wt ±6.5%
Serial Number 102776		P J Raney 4-17-90	Date 5-25-90 / Approval CAH

54-1700-177 (05/89)

SERIAL NUMBER 102776

1 ml

0.5252g + 250ml

1.0062 → 10 ml Vol Flask — 0.2000 ml

T_0 = 10:15 PDT

DATA

T_0 4/18/90 @ 10:15 PDT

T_1 4/18/90 @ 11.36

T_2 4/23/90 @ 6.06

ΔT_1 1.35 hrs

ΔT_2 115.54 85 coff 5-25-90

Recovery 92.93%

$$\frac{3937.75 - 2347.79}{.98551 - .28572} \frac{(1.81)(10)(250)}{(1.0062)(0.2000)(0.5252)} = 9.741\ E+7\ \frac{d/m}{g}$$

$$\frac{9.741\ E+7}{.9293} = 1.048\ E+8\ \frac{d/m}{g}$$

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-1	Shelf No. 1	ABS —	By Anne E Kozelish
Date	4/18/90 1236 PST	4/23/90 0706 PST	
Total Counts	23539	39683	
Min	10	10	
C/M	2353.9	3968.3	
Bkg.	29.11	28.35	
Corr C/M	2324.79	3939.95	

W700873

BNW52342 p. 85

Please Do Not Write In This Space While Report Sheet is Attached

Serial No. 102776

54-1700-177R (005/89)

D06-042

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 3-13-90	Work Order No. M260
Serial No	Customer Ident	Constituent	Result
192 -90 TI-SST-67 M&TE 360-06-01-018 BNW52920 p. 101	110B-C9-B 90-1256-A-2 TK110B-C9 Segment COM Ni FUSION	Sr-90 HTA-4-11	1.03 E+8 dpm Sr wet wt ± 6.5%
Serial Number 102786		P. J. Ramey 4-17-90	Date 5-25-90 / Approval CAG

54-1700-177 (05/89)

SERIAL NUMBER 102786

1 ml

0.5922g + 250ml

1.0062 → 10ml — 0.2000 ml
Vol
Flask

To = 10:14 PDT

DATA

T_0	10:14	4/18
T_1	11.47	4/18
T_2	6.18	4/20
ΔT_1	1.55 hr	
ΔT_2	114.5	

$$\frac{4322.05 - 2565.89}{.98338 - .28987}$$

~~2565.89~~ calf

$$\frac{(1.81)(10)(250)}{(1.0062)(0.20)(0.5922)} = 9.6149\ E+7$$

Recovery 92.93%

$$\frac{9.6149\ E7}{.9293} = 1.0346\ E+8$$

(Over)

γ^{90} 1.81

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. PBC-1	Shelf No. 1	ABS —	By Anne E Hogelish
Date	4/18/90 1247 PST	4/23/90 0718 PST	
Total Counts	25950	43504	
Min	10	10	
C/M	2595.0	4350.4	
Bkg.	29.11	28.35	
Corr C/M	2565.89	4322.05	

W700873

BNW52342 p85

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Serial No. 102786

54-1700-177R (005/89)

D06-043

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M620
Serial No	Customer Ident	Constituent	Result
249 -90	110B-C9-AN 90-1257-C-1 H2OLEACH	90STRONTIUM HTA-4-11	1.48E+4 d/m/g wet wt ±13.1 Mc
BNW52920 p. 150, 157			
Serial Number 103206	PJ Raney 6-18-90 19	Date 6-26-90	Approval CDH

54-1700-177 (05/89)

SERIAL NUMBER 103206

@ 225 ¢ ρ H2O = .98676

202.7156 ml H2O

2.0799g + 202.0588g. H2O

2(1.0099) ml → 10ml vol Flask − 2(1.0066) ml

To = 10:20

6-19-90 PDT

DATA

(Over)

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 2 1.84	Shelf No. 1	ABS —	By Anne E Kozelich
Date	6/19/90 PST 1325	6/22/90 PST 1142	
Total Counts	532	693	
Min	10	10	
C/M	53.2	69.3	
Bkg.	28.86	28.63	
Corr C/M	24.34	46.67	

W700878

BNW52342 p 88

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Serial No. 103206

54-1700-177R (005/89)

D06-044

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 4-6-90	Work Order No. M620
Serial No	Customer Ident	Constituent	Result
250 -90	110B-C9-AN 90-1257-C-2	90STRONTIUM	3.10E+4 d/m/g wet wt
	H2OLEACH	HTA-4-11	±9.8%
BNW52920 p. 150, 157			
Serial Number 103216		P J Ramey 6-18-90 19	Date 6-26-90 / Approval CBG

54-1700-177 (05/89)

SERIAL NUMBER 103216

@ 22.5°C ρ H2O = .97676

199.7169 mL

2.0215g. → 199.0698g. H2O

2(1.0099) mL → 10 mL Vol. Flask − 2(1.0066) mL

Toz 10:22 6-19-90 PDT

DATA

(Over)

ALPHA COUNTING DATA			
Counter		By	
Date			
Registers			
Total Counts			
Min			
C/M			
Bkg.			
Corr C/M			

BETA OR GAMMA COUNTING DATA			
Inst. No. 1.84 PBC-2	Shelf No. 1	ABS —	By [signature]
Date	6/19/90 PST 1340	6/22/90 PST 1156	
Total Counts	969	1303	
Min	10	10	
C/M	96.9	130.3	
Bkg.	28.86	28.63	
Corr C/M	68.04	101.67	

W700878

BNW52342 p. 88

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Serial No. 103216

54-1700-177R (005/89)

D06-045

TOTAL BETA
Tc-99
Sr-90

CALIBRATION DATA

FOR

PROPORTIONAL BETA COUNTER

D06-046

22 Entered 3/16/88 by [illegible]

Sr+β Calibration Sr490 Std Amersham 51Z.24 57/34/155 See page 20-21

Primary dilution

0.1200 μCi Sr90/g × 2.22×10^6 d/m/g = 2.664×10^5 d/m/g (±.38%) 1200 GMT 25 Sept 87 / 0400 PST 15 Sept 87

Correct decay to 1200 PST 17 March 88 = 184.33 days

184.33 days ÷ 365.25 = .50466 years $T_{1/2}$ = 28.6 ± .3 years

$\frac{N}{N_0} = e^{-\lambda t} = \frac{(\ln 2)(.50466\,y)}{28.6\,y} = .98784$

2.664×10^5 d/m/g × .98784 = 2.6316×10^5 d/m/g (±.38%)

Balance: 360-06-03-003 Exp 6-20-88

RS-5 Primary Dilution + 25 ml vol flask

Std + tare : 27.6858
Tare : 22.7203
4.9655 g

Total weight of dilution:
total : 47.6453
Tare : 22.7203
24.9250

4.9655 g × 2.6316×10^5 d/m/g ÷ 24.9250 = 5.243×10^4 d/m/g Sr90 17 March 88

4.9655 g × 2.6316×10^5 d/m/g ÷ 25 I.D. ml = 5.2269×10^4 ± 63 d/m/ml (±.38%, ±.197, ±.207)

Prepare Beta source using glass pipets 100.01 and 100.06 ml
Do Search for Sr+Y90 calibration using 5.2269×10^4 ± 55 d/m/ml Sr90 (±.207 [illegible])

[redacted] See page 24 this book for data
[redacted] See page 23 this book for data

BNW LABORATORY NOTEBOOK NO. 52626
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BNW 52626

Project No. _____ Date of Work _____
Entered By _____ Date _____
Disclosed To and Understood By

ANALYTICAL LABORATORIES · BETA AND GAMMA COUNTER DATA SHEET

SAMPLE: Sr-90 std

SUBMITTED BY: See BNW 52626 pp 20-22

COUNTED BY: [illegible]

REMARKS: Sr 90 = 2.369 ± 1.3 × 10³ dpm/ml (3203 dpm/ml) Plates (1,3,5,7,9) 100.01 µl, plates (2,4,6,8,10) 100.06

Sr+Y 90 = 1.045 × 10⁵ dpm/ml ± 304

SAMPLE NUMBER	DATE 10 88	TIME	INST. NO.	SHELF NO.	ABSOR. 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.
Sr-1	3-7	0948	2	1	0	20	+	108325	5416.25		59.42	5383.83		
Sr-2		1019					+	108423	5421.15			5413.73		
Sr-3		1020					+	108190	5409.5			5377.08		
Sr-4		1159					+	108735	5436.75			5404.33		
Sr-5		1222			52 626		+	107070	5353.5			5321.08		
Sr-6		1245		Pl 5		BNW	+	107463	5373.15			5340.73		
Sr-7		1323					+	107010	5350.5			5318.08		
Sr-8		1344					+	107703	5385.15			5352.73		
Sr-9		1407					+	107185	5359.25			5326.83		
Sr-10		1521 ~~0804~~					+	107664	5383.2			5350.78		
							+							
							+		$\bar{x}_5$ (1,3,5,7,9)			5345.38 ± 32		
							+		$\bar{x}_5$ (2,4,6,8,10)			5372.46 ± 34		
		Average volume of aprts				100.01 µl	+		$\bar{x}_{10}$ (1,3,5,7,9,2,4,6,8,10)			5358.92 ± 34		
						100.06 µl	+							
					$\bar{x}_2$ = 100.035		+							
							+					± .7942		
		.100035 ml × 1.045 × 10⁵ ± 304 dpm/ml = 1.0454 × 10⁴ dpm plated					± 50 +			dpm = 1.0454 × 10⁴ ± 50 / 5358.92 ± 34		1.951 ± .015		dpm Sr-Y90
							+							
							+							
							+							
							+							
							+							
							+							

LABORATORY TIEBOX NO. 52626A

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D06-048

NB-1700-001 (7-65) AEC-DOE DICKLAND, WASH.

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ANALYTICAL LABORATORIES – BETA AND GAMMA COUNTER DATA SHEET

SAMPLE: Sr/90 Std

SUBMITTED BY: See Book 52626 pp 20-22

COUNTED BY: Glen Kuegler

REMARKS: Sr90 5.2269 x10⁵ ±2.3 dpm/ml (±.207 per cent error), Plates (1,3,5,7,9) 100.01ml plates (2,4,6,8,10) 100.16ml

Sr+Y90 = 1.045 ±.105 dpm/ml (160 dpm/ml)

SAMPLE NUMBER	DATE 19 88	TIME	INST. NO.	SHELF NO.	ABSOR. 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
Sr/Y-1	3-17	0824	1	1	0	20	+	113424	5696.2		3466	5661.54		
Sr/Y-2		0845					+	113164	5658.2			5623.54		
Sr/Y-3		0911					+	112191	5609.55			5574.89		
Sr/Y-4		0932					+	112750	5637.5			5602.84		
Sr/Y-5		0953					+	110702	5535.1			5500.44		
Sr/Y-6		1019					+	112249	5612.45			5577.79		
Sr/Y-7		1039					+	111389	5569.45			5534.79		
Sr/Y-8		1105					+	112631	5631.55			5596.85		
Sr/Y-9		1159					+	112439	5621.95			5587.29		
Sr/Y-10		1222					+	111826	5591.3			5557.64		
							+							
							+		$\bar{x}_5$(1,3,5,7,9) =			5571.79 ± 61		
							+		$\bar{x}_5$(2,4,6,8,10) =			5591.54 ± 25		
							+		$\bar{x}_{10}$(1,2,3,4,5,6,7,8,9,10) =			5581.67 ± 45		
							+							
							+							
							+							
							+							
							+							
							+							
							+							
							+							
							+							
							+							

Average volume of plates 100.01 + 100.16 / 100.085 ml

.100 ml × 55 ml = 1.045 ±.105 dpm/ml = 1.0454 ±.10 dpm plate ±50

±50 ±45 d/c = 1.0454 x10⁴ ± 5581.67 = ±.9%, 1.873 d/c ±.018

BNW LABORATORY NOTEBOOK NO. 52626

SUPPLIED FOR PNL RECORDS CENTER NOV 11 '88

BNW 52626 p.24

D06-049

Amersham

MARKETING COMMUNICATIONS

TRACEABILITY TO NBS

The radiation measurement value reported for this product is the result of measurement procedures which are considered to be "NBS traceable" and which satisfy requirements outlined in Regulatory Guide 4.15, Revision 1, February 1979. These claims are supported by the following considerations:

1) Many direct activity measurement intercomparisons have been made between Amersham and NBS over a period of many years. Some specific examples that illustrate the magnitude of the work which has occurred are listed below:

   a) Randomly selected samples of each production batch of the QCY.44, QCY.46, and QCD.1 mixed radionuclide products are measured by NBS and a Report of Traceability issued to Amersham. During the period 1978 through 1984, 65 separate solution standards and point sources have been intercompared in this manner.

   b) Amersham participates in intercomparison exercises with NBS which involve single nuclides in standardized solution form. During the period 1983 through 1984, nuclides which were intercompared in this manner included Cs-137/Ba-137m, Sr-89 and Ba-133. In addition, 17 separate nuclides have been intercompared during the period 1971 through 1982, and repeat intercomparisons of some of these nuclides at different times bring the total to 24.

   c) To further strengthen Amersham's direct links to NBS, it is planned, for the period 1985 through 1987, to carry out intercomparison exercises between NBS and Amersham which will include the following radionuclides:

i)	Am-241	alpha	reference source
ii)	Ni-63	beta	solution
iii)	C-14	beta	solution
iv)	Cl-36	beta	solution
v)	Sr-90	beta	solution
vi)	Pm-147	beta	solution
vii)	Tl-204	beta	solution
viii)	Ba-133	gamma	point source
ix)	Am-241	gamma	point source
x)	I-129	beta	solution

These comparisons will be in addition to the mixed nuclide standard intercomparisons.

BNW
52626
P9

BNW LABORATORY NOTEBOOK NO. 52626

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D06-050

BATTELLE-NORTHWEST
RICHLAND, WASHINGTON

ANALYTICAL LABORATORIES – BETA AND GAMMA COUNTER DATA SHEET

SAMPLE: Tc-99 calibration

SUBMITTED BY

COUNTED BY Steve Lingafelter

REMARKS: Tc99 Secondary Std 1.4013 x10^5 ± 5.74x10^2 dpm/ml BNW52626 p8-10
(1-3-5-7-9) 100.01λ glass calib pipet, (2-4-6-8-10) 100.06λ glass, calib pipet
(11-12-13-14-15) 100.15λ automatic calib BNW52626 p14, All plated in 1mM HCl 1" bitrate ch

SAMPLE NUMBER	DATE 10 88	TIME		SHELF NO.	ABSOR. 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
Tc 1	3-11			1	0	20	+	103044	5152.2		31.16	5121.04		
Tc 2							+	104092	5204.6			5173.44		
Tc 3							+	100812	5040.6			5009.44		
Tc 4							+	103064	5153.2			5122.04		
Tc 5							+	103198	5159.9			5128.74		
Tc 6							+	102430	5121.5			5090.34		
Tc 7							+	103996	5199.8			5168.64		
Tc 8							+	102653	5132.65			5101.45		
Tc 9							+	103624	5181.2			5150.04		
Tc 10							+	101174	5058.7			5127.54		
							+				$\bar{X}_{10}$ =	5109.27 ± 55		
							+	Average pipet volume = 100.0441						
							+	1.0004 ml x 1.4013 x10^5 ± 5.74x10^2 dpm/ml = 1.4019x10^5 ± 5.74x10^2 dpm						
							+	1.4019 x10^5 ± 57 dpm ÷ 5109.27 ± 55 cpm = 2.749 ± .032 dpm/cpm						
							+							
Tc 11							+	99837	4991.85		31.16	4960.69		
Tc 12							+	100381	5019.05			4987.89		
Tc 13							+	103251	5162.55			5131.39		
Tc 14							+	102177	5108.85			5077.69		
Tc 15							+	101908	5095.4			5064.24		
							+							
							+							
							+							
							+							
							+							

SAIW LABORATORY NOTEBOOK NO. 52626
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BNW 52626 p-12

BN-1700-001 (10-87)

D06-651

Amersham

MARKETING COMMUNICATIONS

TRACEABILITY TO NBS

The radiation measurement value reported for this product is the result of measurement procedures which are considered to be "NBS traceable" and which satisfy requirements outlined in Regulatory Guide 4.15, Revision 1, February 1979. These claims are supported by the following considerations:

1) Many direct activity measurement intercomparisons have been made between Amersham and NBS over a period of many years. Some specific examples that illustrate the magnitude of the work which has occurred are listed below:

   a) Randomly selected samples of each production batch of the QCY.44, QCY.46, and QCD.1 mixed radionuclide products are measured by NBS and a Report of Traceability issued to Amersham. During the period 1978 through 1984, 65 separate solution standards and point sources have been intercompared in this manner.

   b) Amersham participates in intercomparison exercises with NBS which involve single nuclides in standardized solution form. During the period 1983 through 1984, nuclides which were intercompared in this manner included Cs-137/Ba-137m, Sr-89 and Ba-133. In addition, 17 separate nuclides have been intercompared during the period 1971 through 1982, and repeat intercomparisons of some of these nuclides at different times bring the total to 24.

   c) To further strengthen Amersham's direct links to NBS, it is planned, for the period 1985 through 1987, to carry out intercomparison exercises between NBS and Amersham which will include the following radionuclides:

i)	Am-241	alpha	reference source
ii)	Ni-63	beta	solution
iii)	C-14	beta	solution
iv)	Cl-36	beta	solution
v)	Sr-90	beta	solution
vi)	Pm-147	beta	solution
vii)	Tl-204	beta	solution
viii)	Ba-133	gamma	point source
ix)	Am-241	gamma	point source
x)	I-129	beta	solution

These comparisons will be in addition to the mixed nuclide standard intercomparisons.

BNW 52626 P9

BNW LABORATORY NOTEBOOK NO. 52626

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D06-052

Amersham International plc
Amersham UK

RS-1

Certificate of calibration of absolutely standardized radioactive solution

P

BRITISH CALIBRATION SERVICE
Approval No. 0146

Description Principal radionuclide: Technetium-99

Product code: TCZ.64
Solution number: S6/60/12

Measurement

Reference time:	1200 GMT on 1 January 1987	
Radioactive concentration of technetium-99:	12.54	microcuries per gram of solution
which is equivalent to:	464	kilobecquerels per gram of solution
Mass of solution:	5.0299	grams
Total activity of technetium-99:	63.1	microcuries
which is equivalent to:	2.33	megabecquerels

Method of measurement used (see reverse of the certificate): K

Accuracy Overall uncertainty in the radioactive concentration quoted above: ± 1.20 % ÷ 3 = ± 0.4 % (99.7 CL, 67 % CL)

Random uncertainty: ± 0.43 % Systematic uncertainty: ± 0.77 %

Overall uncertainty is defined on the reverse of the certificate.

Radionuclidic Purity The estimated activities of any radioactive impurities are listed below expressed as percentages of the activity of the principal radionuclide at the reference time.

Other radionuclides less than 0.01 %

Chemical Composition 0.01M NH_4OH containing 740 micrograms of technetium per ml as ammonium pertechnetate

Physical Data Recommended half life: $(2.13 \pm 0.05) \times 10^5$ years

100% beta particle emission.

BNW
52626 i
P8

Remarks This product meets the quality assurance requirements of NRC Regulatory Guide 4.15 for achieving implicit NBS traceability as defined in NCRP 58 (1985).

BNW LABORATORY NOTEBOOK NO. 52626

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Approved
natory

A.G.Tuck

Amersham

D06-053

TOTAL BETA

Tc-99
Sr-90

DAILY CONTROL DATA

D06–054

7-17-87

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M133956

LABORATORY RECORD BOOK NUMBER BNW- 52342	This document consists of ..... pages, copy no. .....

TITLE (INDICATE SUBJECT CONTENT)
Beta Counters, Daily Control Standards and Backgrounds

AUTHOR - DIVISION AND DEPARTMENT
A. C. LEAF
Materials and Chemical Sciences Center
Chemical Sciences Department

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D06-055

DAILY CONTROL STANDARD COUNTS AND BACKGROUNDS

	BETA COUNTER #1				BETA COUNTER #2						
DATE	100 Min Bkgn	10 Min Bkgn	$^{90}Sr/Y$ 10 Minute COUNT	^{99}Tc 10 Minute COUNT	100 Min Bkgn	10 Min Bkgn	$^{90}Sr/Y$ 10 Minute COUNT	^{99}Tc 10 Minute COUNT	ANALYST	DATE	100 Min Bkgn
3/7/90	31.21	28.3	155412	111296	30.37	30	147771	95746		4/05/90	
3/9/90								RC 96170		4/06/90	28.67
3/07/90	28.81	32.1	154592	111044	28.98	29.5	147317	96669		4/06/90	
3/13/90	26.90	28.5	153771	110321	29.43	28.6	147506	95125		4/09/90	28.97
3/13/90			RC 154639					RC 95333		4/10/90	28.26
3/13/90								RC 96125		4/11/90	28.29
3/14/90	29.65	30.2	154399	110937	29.60	31.5	147759	95709		4/12/90	29.37
3/15/90	29.14	27.1	154277	RC 3/15/90	29.80	30.1		RC 95983		4/12/90	
3/15/90	29.14	27.1	154277	110425	29.80	30.1	147338	95718		4/13/90	29.79
								RC 95768		4/16/90	29.63
3/16/90	27.42	26.1	153620	110941	29.10	29.70	147522	95872		4/17/90	30.09
			RC 154165							4/18/90	29.11
3/19/90	26.90	27.7	154483	110919	29.66	27.6	146900	96023		4/19/90	
3/20/90	29.51	30.2	153984	110531	29.64	29.4	147395	96404		4/19/90	28.46
3/21/90	28.08	29.2	154211	111092	29.16	27.3	147855	96028		4/20/90	29.4
3/22/90	27.34	26.3	154122	111303	28.89	27.4	147844	96086		4/23/90	28.3
3/23/90	30.18	26.7	154516	111068	29.41	29.8	147556	96170		4/24/90	30.06
3/23	28.76	30.1	153913	111124	29.28	30.1	147020	95295		4/25/90	29.4
3/24/90								RC 95440		4/25/90	
3/24/90								RC 96155		4/26/90	28.84
3/27/90	29.32	30.4	154564	111112	29.14	32.8	147774	95640		4/27/90	29.[illegible]
3/27/90								RC 95301		4/28/90	27.44
3/28/90	27.05	27.9	154174	110346	29.90	29.9	147305	96007		4/30/90	
3/29/90	29.21	31.4	153589	110779	29.19	31.5	147737	95455		5/1/90	28.2
3/29/90			RC 154251					RC 96399		5/2/90	27.8
3/30/90	27.16	27.2	154908	111317	29.80	29.9	147762	96384		5/3/90	28.1
4/2/90	29.09	27.5	155038	110630	29.07	29.4	147659	96122		5/3/90	
4/3/90	28.32	27.9	153542	110440	29.79	26.6	135088 off chart	96326		5/4/90	28.3
4-3			RC 153561	RC 110601			RC 147394	RC 95743		5/4/90	
4-3			RC 154236	RC 111181						5/4/90	
4/4/90	27.97	30.1	153510	111619	29.34	27.1	147169	96314		5/4/90	
4/4/90			RC 154442							5/7/90	27.31
4/5/90	28.53	28.0	154143	110564	28.77	32.6	147549	95769		5/8/90	25.[illegible]
										5/8/90	

Analyst: HK

Project No. _____ Date of Work _____

Date _____

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BNW LABORATORY NOTEBOOK NO. 52327

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BNW LABORATORY NOTEBOOK NO. 52327

ANALYST	DATE	BETA COUNTER #1 100 MIN Blgn	BETA COUNTER #1 10 MIN Blgn	BETA COUNTER #1 ^{90}Sr Y 10 MINUTE COUNT	BETA COUNTER #1 ^{99}Tc 10 MINUTE COUNT	BETA COUNTER #2 100 MIN Blgn	BETA COUNTER #2 10 MIN Blgn	BETA COUNTER #2 ^{90}Sr Y 10 MINUTE COUNT	BETA COUNTER #2 ^{99}Tc 10 MINUTE COUNT	ANALYST
	4/05/90								RC 96045	HEK
	4/06/90	28.69	28.6	153796	110131	29.86	28.1	146858	95726	HEK
	4/06/90				RC 110895				RC 95938	HEK
	4/09/90	28.94	28.4	154292	110835	30.61	29.6	147299	95901	HEK
	4/10/90	28.26	28.7	153987	110714	29.22	28.1	147401	96016	HEK
	4/11/90	28.79	28.1	154040	111247	29.23	32.8	147600	96441	HEK
HEK	4/12/90	29.37	28.7	154495	110405	30.81	31.1	147389	95466	HEK
	4/12/90								RC 96591	HEK
	4/13/90	29.79	28.0	154441	110991	29.01	29.8	147324	96188	HEK
	4/16/90	29.63	27.0	154143	111234	29.07	27.1	147085	95942	HEK
HEK	4/17/90	30.09	29.1	154673	111374	30.27	30.1	146933	96044	HEK
HEK	4/18/90	29.11	25.8	153880	110883	30.98	30.6	147011	95701	HEK
	4/18/90								RC 96322	HEK
	4/19/90	28.44	33.2	153943	111547	29.60	25.3	146567	96127	HEK
	4/20/90	29.45	28.8	154004	110854	29.23	30.2	147299	96074	HEK
	4/23/90	28.35	32.1	154385	111107	29.33	29.6	147026	96423	HEK
	4/24/90	30.06	29.6	154214	110504	30.78	27.9	146821	96442	HEK
HEK	4/25/90	29.46		154061	110690	30.16		147287	95847	HEK
	4/25/90								RC 96139	HEK
	4/26/90	28.84	27.4	153871	110506	28.51	27.8	147304	96161	HEK
	4/27/90	29.18	31.2	154791	111092	29.36	31.0	146759	96165	HEK
	4/28/90	27.99	26.4	152929	110772	29.10	29.1	147273	95686	HEK
HEK	4/30/90			RC 153643					RC 96144	HEK
HEK	5/1/90	28.25	28.0	153405	110916	28.82	31.8	147004	95954	HEK
HEK	5/2/90	27.87	29.3	153727	111133	28.58	29.3	147717	96054	HEK
HEK	5/3/90	28.18	26.4	155067	110865	28.43	27.0	147247	96133	HEK
HEK See Chg	5/3/90			RC 154257						HEK
	5/4/90	28.39	27.0	153550	110637	28.35	29.0	147298	95701	HEK
	5/4/90								RC 95435	HEK
	5/4/90								RC 95742	HEK
HEK	5/4/90								RC 96274	HEK
HEK	5/7/90	27.31	25.0	153445	111680	28.27	27.9	147295	95973	HEK
HEK	5/8/90	28.04	28.8	153918	110867	28.67	29.8	146184	95923	HEK
	5/8/90							RC 147258		

Project No.

Date of Work

Date Anne Edgerly

BNW LABORATORY NOTEBOOK NO. 52327

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2. Date

D06-057

Page: 86
LRB No.: BNW-52342

The following provides evidence of surveillance and/or technical reviews of this LRB in accordance with MG 4.3. When complete, this sheet is to be inserted into the LRB each month.

SURVEILLANCE REVIEWS
(Monthly for Impact Level I or II LRB entries by the Line Manager or delegate, and, if appropriate, by the Project Manager):

Pages Reviewed: 74-84
Date Reviewed: 4-12-90
Basis of Review: Check for legibility, completeness, traceability of entries, and a sample of requirements (1-14) of MG 4.3.
Results:

Legibility and completeness of daily control data meet requirements.

Reviewer's Dated Signature: N R Weiler 4-12-90

TECHNICAL REVIEWS
(Monthly reviews for Impact Level I or II LRB entries and prior to Project close out by a technically competent individual):

Pages Reviewed: 74-84
Date of Review: 4-12-90
Objective/Approach of Review: To determine (check one or more):
✓ 1) adequacey/appropriateness of methodology,
✓ 2) if inferences and conclusions are soundly based,
✓ 3) if data reduction and or calculations are correct,
_ 4) other (specify):

Results/Conclusions:

Control data methodology meets adequacy requirements

Reviewer's Dated Signature: N R Weiler 4-12-90

Inserted 4/12/90 Where Applicable

DATE	Bkgr.
5/9/90	28.7
5/10/90	28.4
5/10/90	
5/11/90	28.[illegible]
5/14/90	28.4
5/14/90	
5/15/90	28.4
5/16/90	28.6
5/17/90	27.7
5/18/90	28.6
5/18/90	
5/21/90	28.49
5/22/90	28.54
5/23/90	27.3
5/24/90	27.5
5/24/90	
5/25/90	28.6
5/29/90	27.30
5/30/90	27.6
5/30/90	
5/31/90	28.9
6/1/90	27.5
6/1/90	
6/4/90	29.2
6/5/90	28.4
6/6/90	28.4
6/7/90	29.37
6/8/90	28.74
6/8/90	
6/11/90	28.35
6/12/90	28.5
6/13/90	28.0
6/13/90	Note

BNW LABORATORY NOTEBOOK NO.
52327

Project No. ____ Date of Work ____
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Daily Control Standard Counts and Backgrounds

	Beta Counter #1				Beta Counter #2				
DATE	100 min Bkgn	10 min Bkgn	^{90}Sr Y 10 Minute COUNT	^{99}Tc 10 Minute COUNT	100 min Bkgn	10 min Bkgn	^{90}Sr Y 10 Minute Count	^{99}Tc 10 Minute COUNT	Analyst
5/9/90	28.44	28.7	154772	110762	28.38	30.2	147320	96234	AEK
5/10/90	28.46	27.9	153221	110460	28.86	27.1	146830	96078	AEK
5/10/90			RC 154008						AEK
5/11/90	28.22	26.3	153740	111334	29.27	29.6	147243	95859	AEK
5/14/90	28.64	27.6	152949	110839	28.59	30.7	146540	96372	AEK
5/14/90			RC 154096						AEK
5/15/90	28.48	26.9	153992	110993	30.55	30.4	146345	96351	AEK
5/16/90	28.61	26.9	153395	110987	31.19	30.8	146505	96072	AEK
5/17/90	27.74	30.6	153615	111403	29.43	27.6	146458	96245	AEK
5/18/90	28.69	31.3	153555	110647	29.35	27.4	146774	95757	AEK
5/18/90								RC 96687	AEK
5/21/90	28.49	28.5	153820	110918	29.58	27.5	147261	96848	AEK
5/22/90	28.54	28.1	153296	110762	29.43	29.1	146840	95876	AEK
5/23/90	27.31	30.2	153987	110681	29.47	27.4	147041	96286	AEK
5/24/90	27.81	27.7	153913	111075	28.20	29.9	146589	95530	[illegible]
5/24/90								RC 96245	[illegible]
5/25/90	28.65	29.8	154047	110814	28.77	29.5	147362	96198	AEK
5/29/90	27.30	27.2	153475	110666	28.83	28.4	146800	95824	AEK
5/30/90	27.68	27.7	153783	110854	28.78	29.2	147132	95522	AEK
5/30/90								RC 95933	AEK
5/31/90	28.98	29.2	153743	111290	29.47	28.9	147077	96110	AEK
6/1/90	27.59	27.5	153577	110946	30.18	28.2	145947	96284	AEK
6/1/90							RC 147118		AEK
6/4/90	29.27	28.7	153352	110258	30.36	30.5	147471	96103	AEK
6/5/90	28.47	28.3	153098	110291	29.34	27.3	146807	96168	AEK
6/6/90	28.49	27.4	153305	110854	29.48	28.3	146587	96000	AEK
6/7/90	29.37	28.0	153875	110930	28.97	32.5	146543	95896	AEK
6/8/90	28.74	26.8	153477	110791	29.09	29.1	146406	95430	AEK
6/8/90								RC 96619	AEK
6/11/90	28.35	29.3	153655	110947	28.88	32.0	146227	95879	AEK
6/12/90	28.59	29.2	153861	110946	29.20	27.8	146138	95828	AEK
6/13/90	28.06	24.7	153325	110439	28.49	28.9	147097	96123	AEK

6/13/90 Note: Prior to running controls, it was noticed that the gas flow was off. The main valve on the tank was closed. Gas flow was resumed and monitored during control counts and sample counting. Annie E. Kozelisky 6-13-90.

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BNW LABORATORY NOTEBOOK NO. 52327

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D06-059

Proportional Beta Counters PBC-1 & PBC-2
Daily Control Standard Counts and Backgrounds

	Beta Counter #1				Beta Counter #2				
			^{90}Sr Y	^{99}Tc			^{90}Sr Y	^{99}Tc	
DATE	100 min bkg	10 min bkg	10 minute COUNT	10 minute COUNT	100 min bkg	10 min bkg	10 minute COUNT	10 minute COUNT	Analyst
6/14/90	28.02	29.7	153314	111514	28.04	28.6	145942	96324	AEK
6/15/90	27.68	29.1	153416	110954	28.42	27.7	145775	96121	AEK
6/15/90							RC 146932 ~~146932~~ 6/18/90		AEK
6/18/90	28.26	30.6	152721	111004	28.55	29.3	146070	95563	AEK
6/18/90			RC 153396					RC 95476	AEK
6/19/90	27.09	28.3	153682	110104	28.86	28.2	146354	96087	AEK
6/19/90				RC 110413					AEK
6/20/90	27.96	25.5	153080	110402	27.01	25.1	145821	95151	AEK
6/20/90							RC 146061	RC 96206	AEK
6/21/90	27.91	24.3	152713	110362	27.27	28.3	146472	95693	AEK
6/21/90			RC 152787					RC 95337	AEK
6/22/90	28.47	29.9	153078	110665	28.63	25.7	146113	96458	AEK
6/25/90	27.30	28.1	153115	JK 6/25/90	28.57	31.5	146219	95759	AEK
6/25/90				111222				RC 95150	AEK
6/25/90								RC 96050	AEK
6/26/90	28.18	29.9	153258	110569	29.17	24.5	146183	96177	JK/AEK
/90	28.56	28.9	153877	110754	28.47	30.0	146038	95899	JK/AEK
6/28/90	27.99	24.5	152692	110824	28.09	29.87	146195	95612	JK JK
6/28/90			RC 153737	~~110824~~ JK 6/28/90				95969	JK
6/29/90	27.19	27.8	153472	110932	29.31	30.7	146274	96401	JK
7-2-90	28.72	28.8	153021	110706	29.41	34.1	146197	95871	LSK
7-3-90	27.85	26.9	152340	110305	29.41 ~~26.41~~	26.7	145626	95670	JSS/AEK
7-3-90			152572				146064	95762	JSS/AEK
7/5/90	26.86	28.8	153844	111705	29.08	29.3	145859	96023	AEK
7/6/90	29.18	28.9	152801	111226	29.63	32.7	146544	95615	AEK
7/6/90								RC 96206	AEK
7/9/90	27.77	30.3	152916	111552	29.07	27.8	145604	95328	AEK
7/9/90							RC 146476	RC 95920	AEK
7/10/90	28.11	26.9	153087	111170	27.74	30.6	145776	95097	AEK
7/10/90								RC 95655	AEK
7/11/90	28.37	25.6	153662	110927	27.65	27.0	145958	95616	AEK gas chg
7/11/90								RC 95621	AEK
7/12/90	28.60	26.7	153031	111438	26.72	28.5	146075	95834	AEK

DATE | 100 min bkg

DATE | 100 min bkg

Project No. _____ Date of Work _____

Entered By _____ Date _____

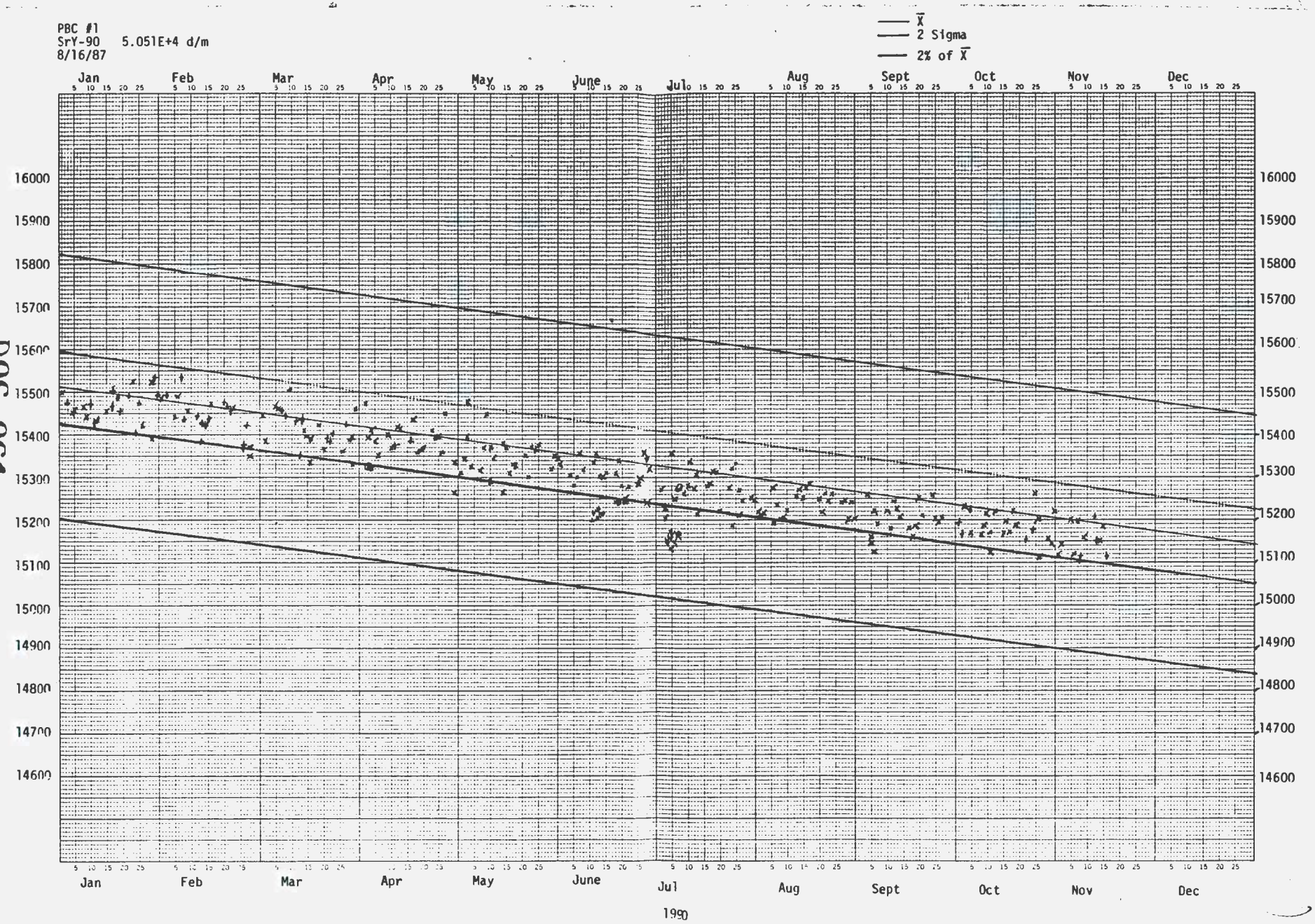
Disclosed To and Understood By _____ Anne E Kopelsky

Signed 1. _____ Date _____

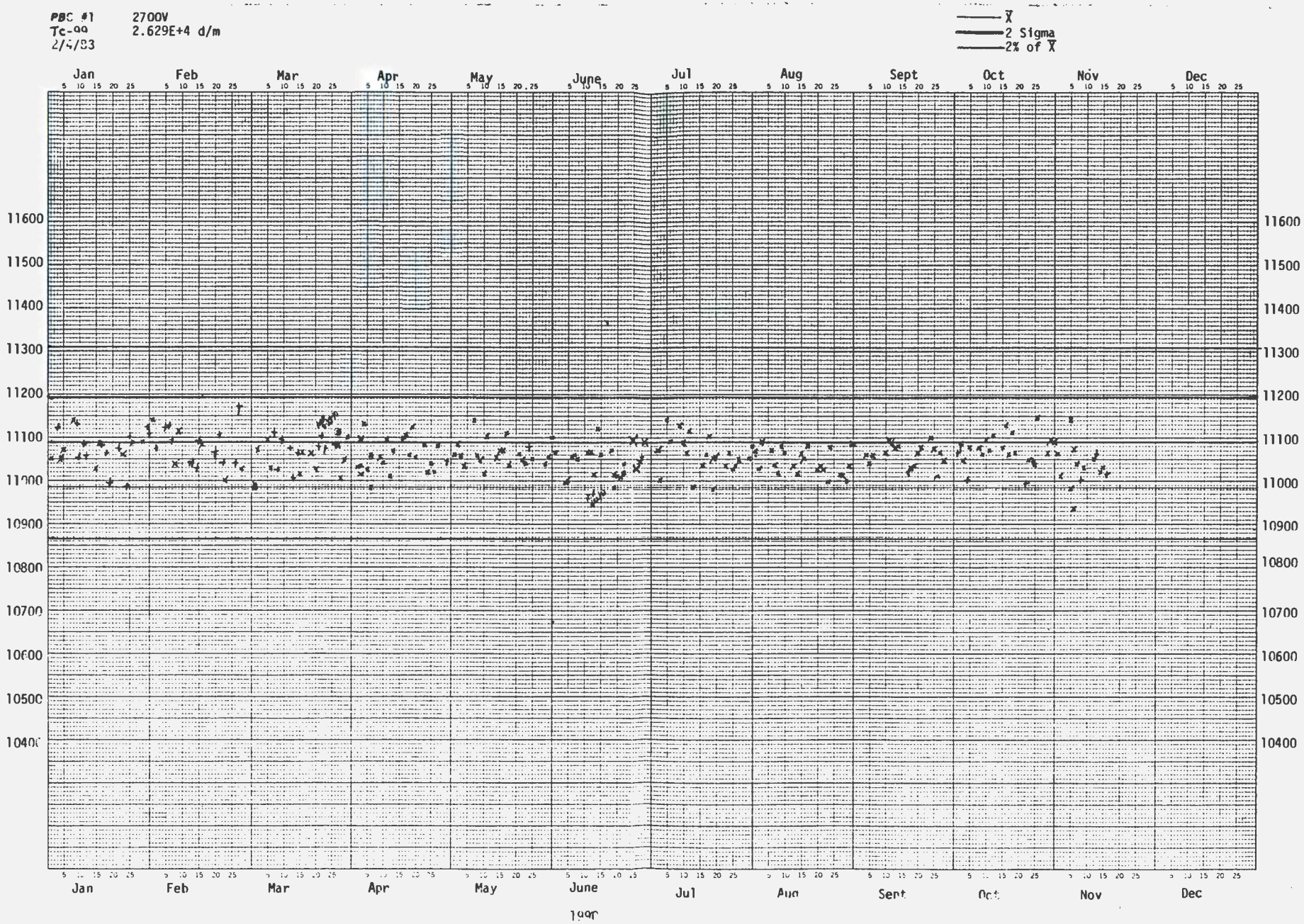
2. _____ Date _____

BNW52342
page 89

PBC #1
SrY-90 5.051E+4 d/m
8/16/87

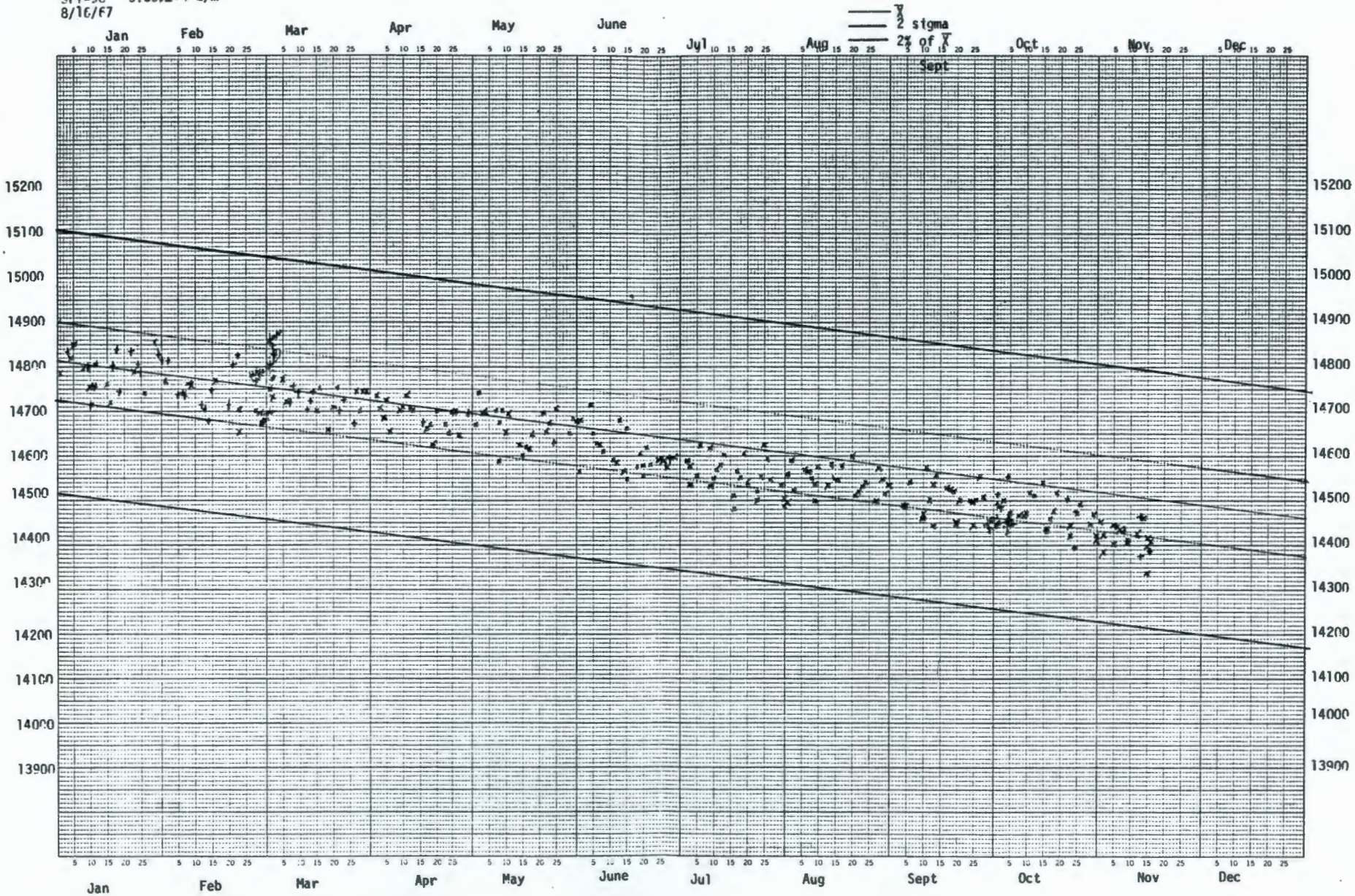


K+E 1 YEAR BY DAYS X 180 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.
47 2730
D06-061



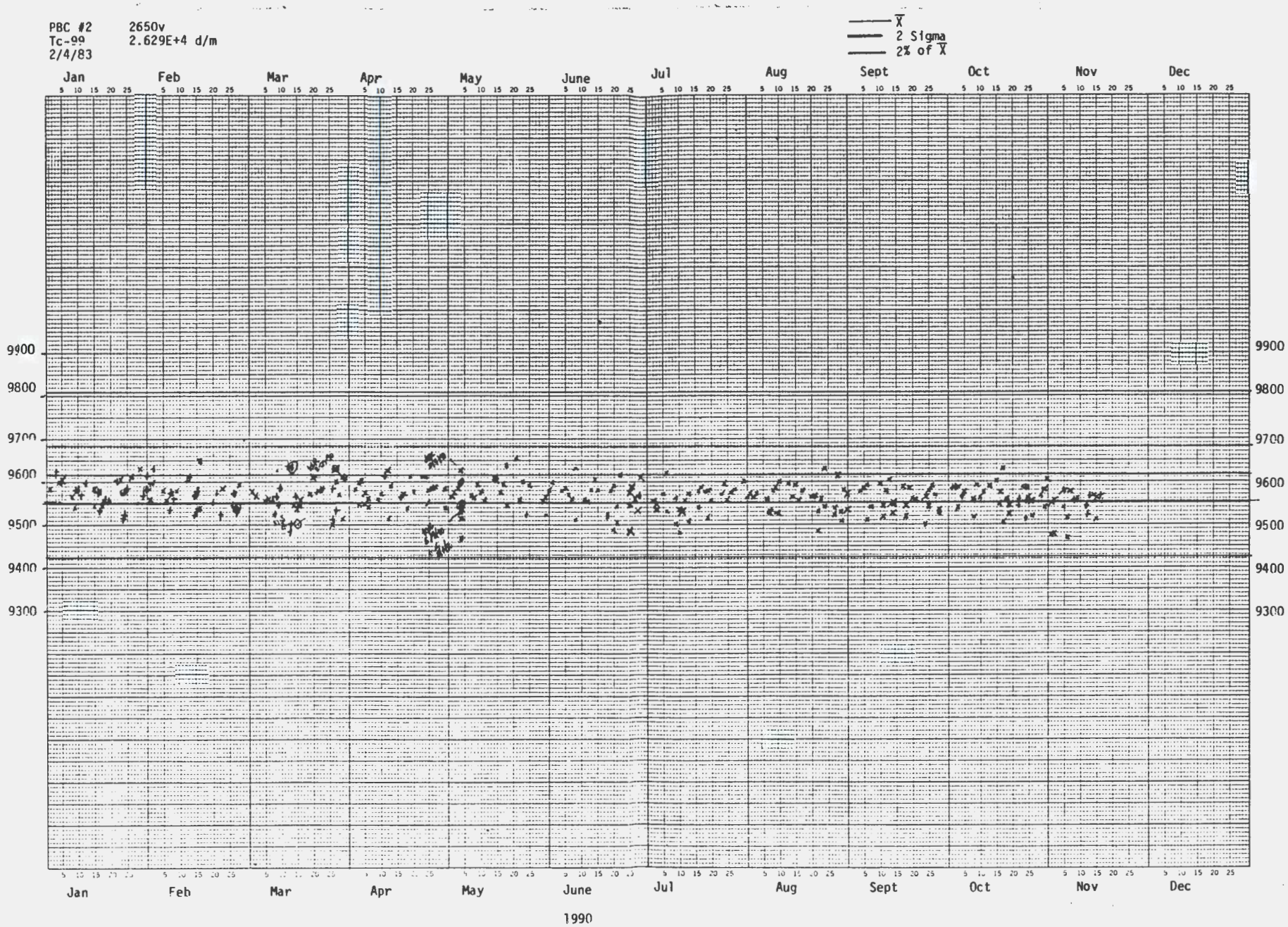
K+E 1 YEAR BY DAYS X 180 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.
47 2730
D06-062

PBC #2 2650v
SrY-90 5.05E+4 d/m
8/16/67



K+E 1 YEAR BY DAYS X 180 DIVISIONS KEUFFEL & ESSER CO. MADE IN U.S.A.
47 2730
D06-063

PBC #2 2650v
Tc-99 2.629E+4 d/m
2/4/83



K+E 1 YEAR BY DAYS X 180 DIVISIONS
KEUFFEL & ESSER CO. MADE IN U.S.A.
47 2730

D06-064

D7 - TOTAL URANIUM BY

LASER FLUOROMETRY

URANIUM

PRIMARY DATA PACKAGE

D07-001

SST

TOTAL URANIUM DATA COVER SHEET

Sample Number: 90-0300-A-1/2/3
90-0301-A-1/2/3
90-0304-A-1/2/3
90-0305-A-1/2/3
90-1255-A-1/2/3
90-1256-A-1/2
90-1257-C-1/2/5

Procedure: HTA-4-16

Pipet Calibration LRB#: BNW 52912, 52920

Equipment (M&TE#): WA 52164

System Control LRB#: BNW 52442

URANIUM

SUMMARY DATA PACKAGE

D07–003

SST DATA RESULTS FOR CORE 9

Customer No.	Uranium ug/g wet wt.	+/- % error
Core 9 - Segment 3		
90-0300-A-1	175	7.6
90-0300-A-2	171	7.6
90-0300-A-3	0.64	73.4
90-0301-A-1	163	7.7
90-0301-A-2	174	7.7
90-0301-A-3	0.34	144
Core 9 - Segment 5		
90-0304-A-1	55	9.2
90-0304-A-2	49	10.4
90-0304-A-3	0.64	73.4
90-0305-A-1	47	10.4
90-0305-A-2	43	11.7
90-0305-A-3	0.35	144
Core 9 Composite		
90-1255-A-1	182	7.6
90-1255-A-2	176	7.6
90-1255-A-3	<2	
90-1256-A-1	193	7.6
90-1256-A-2	177	7.7
Composite Water Leach		
90-1257-C-1	0.77	15
90-1257-C-2	0.26	15
90-1257-C-5		

URANIUM

ANALYTICAL REPORT CARDS

D07–005

TOTAL URANIUM ANALYSIS

A Scintrex UA-3 laser-excited fluorescence instrument is used for the total uranium analysis for SST samples. A Radiochemistry ANALYTICAL REPORT card accompanies each sample. This card has a card serial number, the date the sample was received into the radiochemistry laboratory, work package number, a radiochemistry lab serial number, customer identification number, the 325A Hot Cell identification number, the constituent requested (i.e., uranium), and the results. The balance ID number and BNW laboratory record book (LRB) number that holds the pipet calibration data are noted in the "Serial No." column. A copy of the pipet calibration is provided under separate cover. The M&TE number of the laser fluorometer is listed in the "Customer Ident." column. This number cross references to the LRB that contains the daily control data. The Uranium procedure used for this analysis is noted in the "Constituent" column.

The volume of the aliquot taken from the sample solution (the dissolved fusion or the water leach) is written under the "SERIAL NUMBER" of the card on the right side of the card along with the initial meter reading. The U procedure is a standard addition method so the second volume is the volume of standard added (and its concentration) along with its meter reading. The mass of sample sludge aliquot and the volume of solution used in the dissolution of the fusion or the water leach is written below the sample aliquot volumes.

On the bottom half of the card under "DATA" is the hand calculation of the data. This follows from the procedure. The initial and final meter readings, sample volume, std volume and concentration, sample weight and volume of solution of fusion or water leach are incorporated. Final results are given in ug or mg per gram.

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M620 40
Serial No	Customer Ident	Constituent	Result
107 – 90 T1-SST-59 MTE No. ------ BNW52920 p. 55	90-0300-A-1 110B-C9-3T FUSION	URANIUM LASER HTA-4-16 MLTE WA52164	1.75 E+2 ug/g wet wt ± 7.6 %
Serial Number 104465		P.J. Raney 2-22-90	Date 3/6/90 / Approval Cost

54-1700-177 (05/89)

SERIAL NUMBER 104465

0.5535g + 250 ml.

0.0504 ml – R_1 = 0.32

0.0098 ml – R_2 = 0.55 of 0.4325 ug/ml

0.0098 ml – R_3 = 0.78 of 1.4325 ug/ml

DATA

$$\frac{0.32}{0.55-0.32} \times 1.4325 \frac{ug/l}{ml} \times \frac{0.0098}{0.0504} = 0.38754 \frac{ug/l}{ml} \times \frac{250}{.5535} = 1.75E+2 \text{ ug/g wet wt}$$

calc check

7.6%

SMD 10-21-90

(Over)

D07-007

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62040
Serial No	Customer Ident	Constituent	Result
108 -90 T1-SST-59 MTE No. BNW52920 p.55	90-0300-A-2 110B-C9-37 FUSION	URANIUM LASER HTA-4-16 M&TE WA52164	1.71 E+2 ug/g wet wt ± 7.6%
Serial Number 104469		P.J. Ramey 2-22-90	Date 3/6/90 / Approval COH

SERIAL NUMBER 104469

.5 .05

0.6287g. → 250 ml.

0.0504 ml – $R_1 = 0.34$

0.0098 ml of 1.4325 ug/ml – $R_2 = 0.56$

0.0098 ml of 1.4325 ug/ml – $R_3 = 0.77$

DATA

$$\frac{0.34}{0.56-0.34} \times 1.4325 \frac{ug\,U}{ml} \times \frac{0.0098}{0.0504} \quad 0.43047 \frac{ug\,U}{ml} \times \frac{250}{.6287g} = 1.71 \frac{ug}{g\ wet\ wt}$$

3% 1.8% 3% 2.5% 2% 1%

P.J.R. 2-22-90

error 7.6%

✓ BMD 10-21-90

(Over)

54-1700-177 (05/89)

D07-008

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No M620 40
Serial No	Customer Ident	Constituent	Result
109-90	90-0300-A-3	URANIUM LASER	.64 mg/g
T1-SST-59	110B-C9-3 FUSION		≈ 73.4 %
MTE No. BNW52920 p.		HTA-4-16 M&TE WA52164	
Serial Number 104473	P. J. Raney 2-23-90	Date	Approval

SERIAL NUMBER 104473

BLANK

0.0993 ml − R_1 = 0.02

0.0100 ml − R_2 = 0.21 of 0.1424 mg/ml

0.0100 ml − R_3 = 0.38 of 0.1424 mg/ml

Tried 200x — No $R_2 - R_1$ or $R_3 - R_2$ differences

$$\frac{0.02}{0.21-0.02} \times \frac{0.1424}{} \times \frac{0.0100}{0.0993} = 0.0015095 \frac{mg\,U}{ml} \times \frac{250}{.5911} = 6.4E^{-1}\ mg/gm\ wt$$

73.4% based on average wt of fused samples 1-24-90

(Over)

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No M62040
Serial No	Customer Ident	Constituent	Result
110 – 90 TI-SST-59 MTE No. ____ BNW52920 p. 55	90-0301-A-1 110B-C9-3B FUSION	URANIUM LASER HTA-4-16 M&TE WA52164	$\times 10^2$ 1.63 $\frac{\mu g}{g\ wt\ wt}$ ± 7.7%
Serial Number 104477	P.J. Ramey 2-22-90	Date 3/6/90	Approval COH

54-1700-177 (05/89)

SERIAL NUMBER 104477

0.5814g. → 250ml.

0.0504 ml – R_1 = 0.30

0.0098 ml of 1.4325 $\frac{\mu g/l}{ml}$ – R_2 = 0.52

0.0098 ml of 1.4325 $\frac{\mu g/l}{ml}$ – R_3 = 0.72

DATA

$$\frac{0.30}{0.52-0.30} \times 1.4325 \frac{\mu g/l}{ml} \times \frac{0.0098}{0.0504} = 0.37983 \frac{\mu g/l}{ml} \times \frac{250\ ml}{.5814} = 1.63 \times 10^2 \frac{\mu g}{g\ wt\ wt}$$

3% 2.5 2% 1.9 3% 1% .052 .52

± 7.7%

✓ DMB 10-21-90

(Over)

D07-010

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62040
Serial No	Customer Ident	Constituent	Result
111-90 T1-SST-59 MTE No. ____ BNW52920 p. 55	90-0301-A-2 110B-C9-3B FUSION	URANIUM LASER HTA-4-16 M&TE WA52164	1.74 E+2 ug/g wet wt ± 7.7%
Serial Number 103902		P.J. Roney 2-22-90	Date 3/6/90 Approval CCH

54-1700-177 (05/89)

SERIAL NUMBER 103902

0.5801 g. → 250ml.

0.0504 ml − R_1 = 0.29

0.0098 ml of 1.4325 ug/ml − R_2 = 0.49

0.0098 ml of 1.4325 ug/ml − R_3 = 0.68

DATA

$$\frac{0.29}{0.49-0.29} \times 1.4325 \frac{ug/ml}{} \times \frac{0.0098}{0.0504} = 0.40389 \frac{ug/ml}{} \times \frac{250\ mL}{0.5801\ gm} = 1.74\ E+2 \frac{ug}{gm\ wet\ wt}$$

3% 2.5% 2% 2% 3% 1% .5 .5

± 7.7%

BMB 10-21-90

(Over)

D07-011

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M62040
Serial No	Customer Ident	Constituent	Result
112-90 T1-SST-59 MTE No. ____ BNW52920 p. 58	90-0301-A-3 110B-C9-3B FUSION	URANIUM LASER HTA-4-16 M&TE WA52164	3.4 E-1 ug/g wet wt ± 144%
Serial Number 103906	P.J. Raney 2-23-90	Date 3/6/90	Approval Cott

54-1700-177 (05/89)

SERIAL NUMBER 103906

BLANK

0.0993 ml – $R_1 = 0.01$

0.0100 ml – $R_2 = 0.19$

PJR 2-23-90

of 0.1424 ug/ml

0.0100 ml – $R_3 = 0.36$

of 0.1424 ug/ml

Tried 200x – No R_2–R_1 differences

DATA

$$\frac{0.01}{0.19-0.01} \times 0.1424\ \frac{ug/l}{ml} \times \frac{0.0100}{0.0993} = 0.0007967\ \frac{ug/l}{ml} \times \frac{250\ ml}{0.5808\ g} = 0.34\ \frac{ug}{g\ wet\ wt}$$

based on average wt of samples

error 144%

10-21-90

(Over)

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M620 40
Serial No	Customer Ident	Constituent	Result
113-90 T1-SST-60	90-0304-A-1 110B-C9-ST FUSION	URANIUM LASER	5.45E+1 ug/g wet wt. ± 9.2%
MTE No. ------ BNW52920 p. 55		HTA-4-16 M&TE WA52164	
Serial Number 103911		P.J. Raney 2-22-90	Date 3/7/90 Approval CAH

54-1700-177 (05/89)

SERIAL NUMBER 103911

0.5564g. → 250ml.

0.0098ml $R_1 = 0.23$

0.0098ml of 0.1424 ug/ml $- R_2 = 0.50$

DATA

$$\frac{0.23}{0.50-0.23} \times \frac{0.1424\ \text{ug/ml}}{} \times \frac{0.0098}{0.0098} = 0.12130\ \text{ug/ml} \times \frac{250\ \text{ml}}{0.5564\ \text{g}} = 5.45\ \text{E+1}\ \text{ug/g wet wt}$$

error 9.2 %

✓ BMD 10-21-90

(Over)

D07-013

Pacific Northwest Laboratory		ANALYTICAL REPORT	
Customer SST		Date Received 2-16-90	Work Order No. M620 40
Serial No	Customer Ident	Constituent	Result
114 -90 T1-SST-60 MTE No. BNW52920 p. 55	90-0304-A-2 110B-C9-5T FUSION	URANIUM LASER HTA-4-16 M&TE WA52164	4.86 E+1 ug/g wet wt ± 10.4 %
Serial Number 103915		P.J. Roney 2-22-90	Date 3/7/90 Approval Coff

54-1700-177 (05/89)

SERIAL NUMBER 103915

0.5571g. → 250ml.

0.0098ml – $R_1 = 0.19$

0.0098ml of 0.1424 ug/ml. $R_2 = 0.44$

DATA

$$\frac{0.19}{0.44-0.19} \times \frac{0.1424\ \text{ug/ml}}{} \times \frac{0.0098}{0.0098} = 0.10822\ \frac{\text{ug/ml}}{} \times \frac{250\ \text{mL}}{0.5571\ \text{g}} = 4.86\ E+1\ \frac{\text{ug}}{\text{g wet wt.}}$$

✓ JMB 10-21-90

error 10.4 %

(Over)

D07-014