BOOK 7R #3274 on bottom edge

Notes:
Outside front, side, and back covers too dark to reproduce, CA-18 is written on front cover.

Blank pages: inside cover opposite page 1, 203-300, back inside cover

-page 1 has grid paper taped to it
-page 17 has 8.5x11 sheet stapled to it
-page 172 has 2(numbered 1-2) graphs glued to it (had to tape down)
-page 173 has 4(numbered 3-6) graphs glued to it

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
July 26, 1999

SECRET
SECURITY INFORMATION

SOME INSTRUCTIONS FOR USE OF THIS NOTEBOOK

1. This notebook is assigned to personnel performing research and development work and must be used for all original calculations, notes and abstracts from reports.

2. Assignee is responsible for the safeguarding of this notebook in accordance with security regulations.

3. This notebook must be returned to issuing office when completed or upon termination of assignee.

4. Every page or entry should bear a date and the signature of the person who made the entry.

5. Entries should be made in ink whenever it is reasonable to do so.

6. Alteration or amplification of entries made on previous dates should be made as separate entries under their own dates and cross referenced to the previous entries.

7. Charts, drawings and graphs drawn on special paper should be glued or otherwise securely fastened in place and should individually bear a date and signature. Do not obscure any information.

8. The notebook should be periodically reviewed by one or more independent persons in the department and should be signed and dated by them. Likewise, they should make a statement that they have "read and understood the foregoing material." Witnessing stamps for this purpose are available in your department's office.

9. It is advisable to preface each new item, such as a heat treatment, process or reaction, etc., with a very brief description of the purpose, objective or approach.

10. Description of the invention or discovery should be complete enough to be understood by anyone skilled in the art.

11. Reference to name or catalogue number should be made when standard items are being discussed, i.e., Westinghouse pump.

12. In cases where work is conducted in cooperation with others, it is often necessary to meet with them from time to time and discuss new developments. The occurences of such conferences should always be entered in your notebook regardless of recording elsewhere, giving the date, who was present (if possible), and an outline of the subjects discussed. This often will establish error in occasional claims of other parties that you have appropriated information from them revealed during an interview, and thus provide you with patent protection.

C-10

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This document consists of 300 pages, 1 of X copies, Series X
10-9-20

LABORATORY RECORDS
1954

NOTEBOOK NO. 3274

Assigned to: A. D. Callihan
Department: Physics Div.
Location: Bldg. 9213
Date: Mar. 12, 1953

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CLASSIFICATION CANCELLED
DATE 5-27-60
Edgar J. Murphy
COORDINATING ORGANIZATION DIRECTOR
OAK RIDGE NATIONAL LABORATORY
AUTHORITY DELEGATED BY AEC 8-18-47
EJM

RESTRICTED DATA
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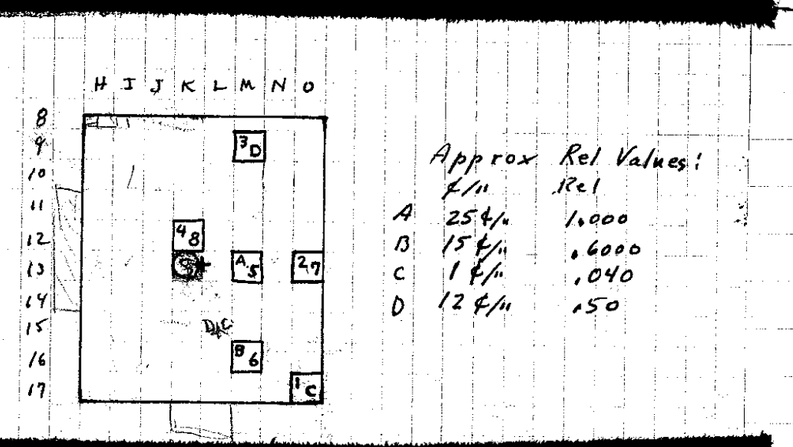
Subject

This document consists of 301 pages, 1 of X copies, Series A
5-25-60

See listing of Experiments starting on page 2.
~~Experiments~~ Location of core elements is shown on page 13

[redacted]



Approx Rel Values:

	$/ℓ	Rel
A	25 $/ℓ	1.000
B	15 $/ℓ	.6000
C	1 $/ℓ	.040
D	12 $/ℓ	.50

[redacted]

The above sketch was used as a rough guide during operation of the critical assembly.

Experiment 1 Approach to Critical.
(For positions refer to page 12.)

Run 1	p 14	— Blanket Run.	
2	p 15	3x3 cell at center	M = 972 gm
3	p 15	4X3 " " "	M = 1296 "
4	p 16		2268
5	p 17	5X5 cell	M = 2700 gm
6	p 17		3132
7	p 18		3564 gm
8	p 18		3996 gm
9	p 19		4644
10	p 19	7X7 except for 4 corners	Critical — 4860 gm
11	p 21	Reduced reflector ~~and control added fuel~~	4.860 Kg
12	p 21	7X7 cells	5.292 Kg
13	p 22		6.048
14	p 23	8x8 "	6.912 Kg
15	p 23	removed reflector	"
16	p 24		
17	p 24		
18	p 26	Clean Critical i.e. a Regular bare assembly.	

Exp 2 — Control Rod Calibrations

Run 1 — p 26,27 Absolute Calibration add ¼" to p reg.
2 p 28 " " remove ¼" " "
3 p 30, 31, 32 Compare .4" on A to changes on B, C, & D.
4 - p 32,33 Continued
5 - p 33,34 Continued
6 - p 35,36,37 Continued
7 - p 37,38,39 } Compared Rod A to other rods
8 - p 41 } extended Rod A limit to 20" out.
also compared various meter ranges (pp. 43 — 45.)

9 p 97 98 Servo Calibration
10 " 187
11 " 189

p 69 — Blanket A calibration
also see Exp 9 — pp 168-173 (Rod Drops)

Pages 43, 44, 45 comparison of instrument readings at various levels.

p 104 ~~Table position vs. p~~
ρ vs. Table position over a small range. This is at end of EGR1 p 103

Expsment 3. γ-n measurements.

*Run 1 p46-54 Series of short preliminary ~~runs~~ trials.
Run 2 p55-59 Several runs power level change ~X10
3 p60-64 " " " " " X100
4 p69-74 Leveled first at low level ~~runs~~ X10
to observe short period γ-n's.
5 p75-77 levels 04→.2 efficx 15 min
~~6 p98 Servo Cal. 4/8 →0.360~~
~~7 p 187 " "~~
~~8~~

6 pg 119 γ-n for long half-life
7 pg 146 γ-n " short " "
8 157 "
9 177 " " short half life

also a short preliminary trial p 42 following calibration runs

Exp. 4. Effect of streaming.
Compare blank rod with control rod
Run 1 p65-67

Exp 5 Foil exposures

Run 1 p 79 Bare Dr Longitudinal
2 p 81 Cd-covered Dr "
3 p 83 Bare Dr horizontal along midplane
4 p 85 cd. Dr. " " "
5 p 87 Al catcher horizontal midplane
6 p 89 Self shielding
7 p 91 Power traverse
8 p 93 Cd Fraction.
9 pg 94 Al Catcher in Teflon -
10 pg 96 do
11 pg 99 In foil spacing (Intermediate)
12 " 101 Dr foil (Intermediate)

Dosage Coeff.

Exp 6

Run 1 pg 103 Zero for neutron coefficients
2 104 Funfunel
3 105 Empty S.S. Can
4 106 H_2O.
5 107 Plexiglass (drilled)
6 108 Zero Run
7 109 " " 7¼" void
8 110 Graphite
9 111 Teflon
10 111 Zero no void
11 192 Zero run
12 193 Mg
13 194 Fe
14 195 Ti
15 197 Al
16 198 Ni
17 199 Mo
18 200 Cb
19 201 Teflon
20 ~~200~~ 202 Zero run

Exp 7 Expose UO$_2$F$_2$ solution capsules

Run 1 pg 112
2 " 114
3 " 115
4 " 164

Exp 8 C vs. period

Run 1 p 141
2 p 142
3 p 143,4
4 p 145
5 p 145
6 p 145
7 p 145
8 p 145
9 p 145
10 p 166,7
11 p 167 ~ 1000 sec.

p 117 This was an unsuccessful first attempt.

short

long period.

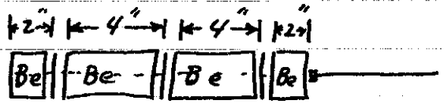
Rod Drops

Exp 9	Run 1	pg 168	SR #1
	2	169	3
	3	169	4
	4	170	1
	5	170	6
	6	171	2
	7	171	5

Self Shielding Uranium substituting of fuel.

Exp 10	Run 1	pg 174
	2	175
	3	175
	4	176

All shields were 12" long and contained three, 10 mil uranium fuel discs.



On the final clean parallelepiped assembly Row 8 contained half sized shields (i.e. 2 quanta) and Column G and G' were empty.

At various times a few cells in column G and G' were filled for shimming. The clean assembly is shown in the operating sketch, page 1.

Loading Chart showing location and numbers of shields.

Movable half.

Fixed half

Row	G	H	I	J	K	L	M	N	O
9	392	393	394	395	396	1	(D) 609	398	399
10	406	397	404	419	403	2	412	418	410
11	438	430	433	408	413	3	422	401	420
12	444	402	475	439	(B) 625	390	428	426	431
13	437	434	427	405	460	5	(5) 415	457	(1) 489
14	407	465	409	440	448	449	445	414	417
15	462	436	453	546	400	423	464	442	451
16	471	421	424	456	435	463	(6) 441	411	458
17	487	491	480	470	432	466	452	488	(C) 598
Row 8 →	653 654	655 656	657 658	659 660	661 662	663 664	665 666	667 668	669 670

Row 8	O'	N'	M' (3)	L'	K'	J'	I'	H'	G'
9	490	498	558	550	492	528	541	544	461
10	516	495	531	503	504	545	494	510	533
11	500	542	511	509	547	(4) 507	549	512	548
12	(2) 486	468	(A) 502	513	565	499	540	523	508
13	(2) 605	482	(A) 597	518	483	524	543	538	496
14	527	561	473	467	522	501	539	479	530
15	485	481	(B) 506	525	520	484	551	517	505
16	497	474	(B) 521	455	534	514	469	536	535
17	(1) 477	515	429	478	493	526	537	529	436
Row 8 →	701 702 703 704 705 706	707 708 709 710 711 712	713 714 715 716 717 718	719 720 721 722 723 724	725 726 727 728 729 730	731 732 733 734 735 736	737 738 739 740 741 742	743 744 745 746 747 748	

C.A. 18 Exp. 1 Run 1

Sheet ~~1~~ Date 3-24 1954 Time 2:30 ~~AM~~ PM

Purpose

checked Earlier (money) 3/24/54

INSTRUMENT CHECK

Time ~~AM~~ PM Scaler

Channel

	A	B	C	D	E
Range					
Source Dist.					
%- F.S. Trip					

For zero point Be. is loaded as shown on p 13
Each shield is 12" long total size 24"x27"x27"
(no U)

MULTIPLICATION

Scaler	c/ 5 min.	Mult.	1/M
1	322		
2	8		
3	58		

(1)

zero run no shields loaded.

(1)

MULTIPLICATION

Scaler	c/ ~~25~~ 5 min. BG/ ~~25~~ 5 min.	Mult.	1/M
1	496 ~~1268~~ 322		.65
2	7 ~~8~~ 8		1.14
3	112 ~~58~~ 58		.518

(2)

Fuel loading J, K, & L 12, 13 & 14
both halves.
Total of 972 gm U

9 shields

MULTIPLICATION

Scaler	c/ 5 min. BG/ 5 min.	Mult.	1/M
1	543	322	.593
2	8	8	1
3	129	58	.45

(3)

Fuel loading I, J, K, & L and 12, 13 & 14
in both halves
Total 1296 gm U

12 shields

MULTIPLICATION

Scaler	c/ 6 min.	BG/ 5 min.	Mult.	1/M
1	1200	322		.268
2	17	8		.147
3	304	58		.191

(4)

Added fuel J, K, L 11+15, J'K'L' 11+15, M12,13,14

2 slugs

Total 2268 gm U

C.A. 15 Expr. 1 Run 5

Sheet ____ Date 3/25 19 5 Time ____ AM PM

Purpose Multiplication

INSTRUMENT CHECK

Time 8:50 AM ~~PM~~ Source 173 174 ~~175~~ 221

	Channel A	B	C	D	E
Range	out		10 ~~100~~	10 ~~1000~~	900
Source Dist.			0	3"	
% F.S. Trip			40	50	

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	1763	322		.183
2	39	8		.205
3	387	58		.150

.183 (5)

.205

.150

added fuel I & M 11 & 15 I "& M" 11 & 15

Total of 2700 gm U

25 slugs

Loading I, J, K, L & M, and primers and 11, 12, 13, 14 & 15

total of 25 slugs.

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	2615	322		.123
2	50	8		.16
3	609	58		.095

(6)

added fuel K (10+16), H (13) & N (13)

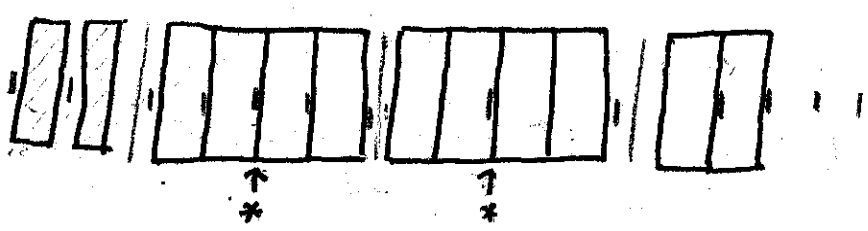
K' (10+16), H' (13) & N' (15)

Total of 3132 gm U

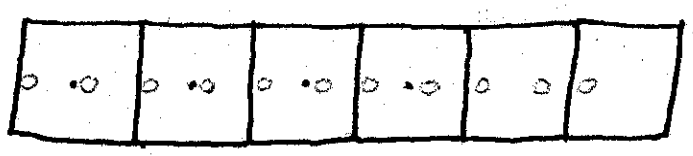
29 slugs

24-18 AL-Foil No 3240

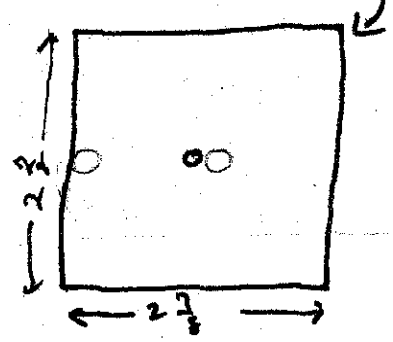
Axial In



Radial In (Midplane)

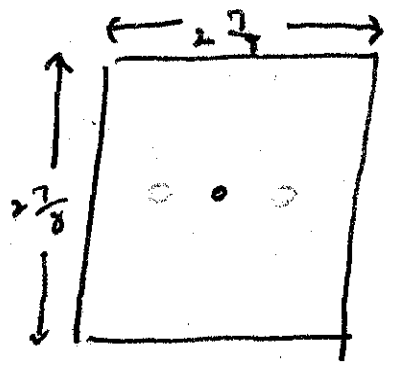


All In in Be



Except at plane noted by *

where Be is



Total of 4 Runs

out	in		
C-124	C-114	K' 13	75
C-74	C-354	[illegible] 13	47 ?
C-1884	C-263	I' 13	98
C-143	C-222	H' 13	73
C-91	C-381	G' 13	
C-391		F' 13	
3237		H-9	

AR. Cedar Ford 32+40 393 10-15/15

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	3840	322		.084
2	84	8		.095
3	958	58		.061

(7)

Added fuel H-14, J-10, L-16, N-12
H'-14, J'-10, L'-16, and N'-12
Total of 3564 gms U.

33 shakes

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	7061	322		.046
2	151	8		.053
3	1834	58		.032

(8)

Added fuel H-12, J-16, L-10 & N-14
H'-12, J'-16, L'-10 & N'-14
Total of 3996 gm U.

37 shakes

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	39860	322		.0081
2	906	8		.0088
3	10102	58		.0057

(9)

Added fuel H-11, H-15, I-10, I-16, M-10, & N-11
H'-11, H'-15, I'-10, I'-16, M'-10, & N'-11
Total of 4644 gms U. (43 shakes)

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1		322	Critical	
2		8	See p 20	
3		58		

(10)

Added fuel M-16, & N-15
M'-16, & N'-15
Total of 4860 gm U. (45 shakes)

CRITICAL POSITIONS

Date 18 Expr 1 Run 10

Tube Pos. 999.985 L 4422 T 0292 F

Control Rod	Channel
A 999.90	A Out
P 999.980	B .00045
C 13.135 (out)	C 42 5×10^{-11}
S ~~2.238~~ 2.248	D 49 10/200
	E 0

Tim Crit. 2:14 ~~AM~~ PM Duration ____ min.

Loading is as indicated on p 21.
~~Reflector extends into~~ 3" refl. on all four sides.

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	5,785	322		.056
2	136	8		.059
3	1,307	58		.044

(11)

Removed all shicken in G and G'
To approach bare critical condition.
Present loading: 10,16[M-J] and [M'-J']
[11-15][N-H] and [
Total # shicken loaded - 45 ~ 4.86 Kg.
Outside dimension 24"x24"x27" (45 shicken)

MULTIPLICATION

Scaler	c/ 5	5	Mult.	1/M
1	6755	322		.0475
2	164	8		.0487
3	1605	58		.0365

(12)

Loaded N,N',H,H' 10 and 16
Total mass 5.292 Kg. 49 shicken

C.A. 18 Expr. 1 Run —

Sheet ____ Date 3/26 1954 Time 9:30 AM ~~PM~~

Purpose Continue Approach to Critical.

INSTRUMENT CHECK

Time 9:30 AM ~~PM~~ Source 173 174 221 175

Chamber

	A	A	B	C	D	E
Range	1/1000	10/50	—	10^{-10}	10/1000	850V
Source Dist.	1"	5"	Control	Control	Control	
% F.S. Trip	72	—	30 OK	OK	.45 Setting	
	Counter	3 OK	2 OK	1 OK.		

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	8510	322	~~382~~	0378
2	205	8	~~8~~	0391
3	1916	58	~~58~~	0303

(13)

added fuel to Row 17 H thru N and H' thru N'
Total mass 6.048 Kg. (56 Sticks)

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	12,780	322		.0252
2	292	8		.0274
3	2,987	58		.01945

(14)

Added fuel to 8 stringers O and O'; 10 thru 17
Mass 6.912 (64 Sticks)

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	4135	322		.078
2	88	8		.091
3	928	58		.0625

(15)

Same fuel loading as above but removed the top row of reflector. Row 9 and 9'
mass 6.912 Kgms.

MULTIPLICATION

Scaler	ℰ/ 5 min.	BG/ 5 min.	Mult.	1/M
1	16907	322		.0190
2	411	8		.0195
3	3984	58		.0145

(16)

Added fuel and moderator to row nine, columns H through O, giving a 8 x 9 array - 72 shishes. Total mass 7.776 Kg.

Add fuel to G and G' 11, 12, 13, and 14, giving a total of 76 shishes and 8.208 Kg (72)

CRITICAL POSITIONS

C.A. 18 Expr. 1 Run 17

1999.985 L 031 T — R 04421

Control Rod	Channel
999.95 Bn	62 10/50
2,182	.00012
13,134 out	C 5.8 X 10⁻¹¹
13.295 out	D out
	E

Tim Crit. 4:10 PM AM PM Duration 10 min.

Added 1

C.A. 18 Expr. 1 Run 18

Sheet Date 3/29 1954 Time 11.00 AM PM

Purpose To approach a clean geometry

INSTRUMENT CHECK

Time 11:00 AM PM Source 173.4.5 /221

	Channel A	B	C	D	E
Range	1/1000 OK		5 x 10⁻¹²		860V (was 850)
Source Dist.	contact	cont	cont		
% F.S. Trip	85		100		

Counters 1, 2, 3 OK.

Removed

CRITICAL POSITIONS

Expr. Run

Control Rod Channel

A

B

C

D

E

Tim Crit. AM PM Duration min.

CRITICAL POSITIONS

C.A. 18 Expr. 1 Run 18

Table Pos. _____ I _____ T _____ R _____

	I Control Rod II	Channel
1	In | In	A 15 10/25
2	In | In	B .0002
3	out | In	C 4 X 2.5X10⁻¹¹
4	0.950 | 1.72	D out
	(compare C and D Rods)	E 0

Tim Crit. 11:20 AM PM Duration 10 min.

Removed 4 slushes in Col. G and G'
Added 1½" slushes in row 8. This is
now a parallelpiped 24"x 24" x 28½"
No change in Mass from previous run.
Present mass. 8.208 Kg.

C.A. 18 Expr. 2 Run ~~1~~ 1
Sheet _____ Date Mar 29 1954 Time 1320 ~~AM~~ PM
Purpose Rod Calibration
To get absolute calibration ¼" Be was placed
on top of slushes in row 8 — ~~The following~~
~~[illegible]~~ These were removed for comparison in
Run 2.

note this amounts to 0.003231 in $\frac{\delta k}{k}$ ff.

CRITICAL POSITIONS Rod Calibration

C.A. 18 Expr. 2 Run ~~1~~ 1

Table Pos. ~~999.985~~ 1.0315 T ~~[illegible]~~ R 04417

Control Rod		Channel	
1	~~2.135~~ 2.600	A	63 10/500
2	In 999.980	B	.01
3	In 999.925	C	3.8 10⁻⁹
4	In 0.032	D	~~[illegible]~~ 50 100/500
		E	.8 @ 860 V.

Tim Crit. 1:30 ~~AM~~ PM Duration _____ min.

→ Run on period 84.7 sec. with control A at 2.135 in.
~~critical~~ leveled at with A at 2.600 in (all others in)
Also critical w/ D at 0.926 and A at 2.135.
(all others in).
Also critical w/ C out A(at) 1.960; C(at) 13.134; D(at) .060;
B at 999.980.
Also critical w/ A(In) 999.990; B 4.396, C(In) 999.925
D(In) .026.
Final critical ~~at~~ same as original with same power level.
(approached this on a long period).

Remeasured this period 84.8
~ ~~9.011~~ ¢ 10.9¢

CRITICAL POSITIONS

C.A. 18 Expr. 2 Run 2

Table Pos. 999.985 .0310 — .1442

Control Rod		Channel	
1	1.000	A	74 10/500
2	999.976 in	B	.01
3	999.925 in	C	7.2 5X10⁻¹⁰
4	.032 in	D	49 100/500
		E	18 @ 860V

Tim Crit. 2:30 ~~AM~~ PM Duration 30 min.

1/4" Be was removed within run to compare to run 1. Super critical with A=1.660 ($T = 166.6$ cm, $\rho = 6.46$ ¢) all other rods in.

Critical positions for comparison:

A	B	C	D
999.990 in	1.506	~~99~~ in	in
in	in	in	1.664
in	in	13.135 out	0.520

C.A. 18 Expr. 2 Run 3

Sheet ____ Date 3/30 1954 Time 2:00 ~~AM~~ PM

Purpose Calebration — Added G6 11–14 numbers indicated on chart p13.

Total mass 8.640 Kg.

INSTRUMENT CHECK

Time ____ AM PM Source 173 174 221 175

	Channel A	B	C	D	E
Range	1/1000	OK	10^{-10}	1/1000	
Source Dist.	c		c	c	
% F.S. Trip	85		40	35	

Counter 643 OK

CRITICAL POSITIONS

C.A. 18 Expr. 2 Run 3

Table Pos. in I T R

Control Rod		Channel	
1	7.90	A	
2	out	B	001
3	out	C	
4	out	D	
		E	

Tim Crit. 2:25 ~~AM~~ PM Duration 1 min.

Probably 999.995 min
Exp 5/11

3/30/54

CRITICAL POSITIONS

C.A. 18 Expr 2 Run 3

Table Pos. IN. 999.985 .4420 T .0306 R

	Control Rod		Channel	
1	A 000.995 IN	A 55		10/100
2	B 13.250	B .001		
3	C 999.922 IN	C 6		10^{-10}
4	D 3.199	D 50		10/500
		E 0		

Tim Crit. 2:40 PM Duration 5 min.

Note These are very approximate

"

	A	B	C	D
critical	.510	13.25	999.922	2.175
to measure period or A	IN 999385	"	"	$\{T=95.6s$ $\rho=10.0¢$
Critical	0.254	13.250	999.922	2.885
Run A back in measure period mA.	999.995	"	"	" $\{T=521s.$ $\rho=2.33¢$

Shut down — set "out" limit switch on A to .400 to be used as a calibration increment.

B	30 @ 100/200
B	.014
C	9×10^{-9}
D	~~685~~ 69.5 100/500
E	.2 — 860V

positions on page 31 taken at this level.

Critical positions

A	B	C	D
.400	13.252	999.922	2.350
999.985	"	"	3.085
.397	11.312	"	3.085
999.986	"	"	3.858

Shut down — 4:30 PM. — Start up — 9:30 AM 3/31/54
Continue Calibration: — Instrument check & 1st Critical p 32.

999.978	11.312	999.926	3.842
.405	10.048	"	"
999.976	"	"	4.806
.405	8.740	"	"
999.976	"	"	5.916
.404	7.554	"	"
999.976	7.594	"	7.238
.405	"	"	"
999.980	6.524	"	8.994
.405	"	"	"
999.976	5.626	"	11.324
.405	"	"	"
999.976	4.790	"	"
.404	5.182	"	13.292
"	4.360	"	"
999.980	~~11.674~~ "	13.130	8.505
		"	10.673

continue on p 33

INSTRUMENT CHECK

Time 9:15 AM ~~PM~~ Scaler 173,415,221

	Cell A	B	C	D	E
Pulse	1/1000 OK		2.5×10^{-12}	1/1000	
Source Dist.	C		c	c	
% F.S. Trip	80		100+	38	

Counters 1, 2, 3 OK

~~Continue Instrument Check~~

3/31/54 Continue Calibration → page 31

1st. Critical 3/31/54

other position on p31 —

CRITICAL POSITIONS

C.A. 18 Expr. 2 Run 4

Table Pos. 999.984 L 0306 T — .4425

Control Rod		Channel	
1	999.998 in	A ~~58~~ 28	100/200
2	11.312	B .014	
3	999.926	C 5.2 10^{-9}	
4	3.842	D 69	100/500
		E —	

Tim Crit. 9:40 AM ~~PM~~ Duration ___ min. Off at 11:15 AM

Critical positions (cont.)

Control Rod	A	B	C	D
	.403	3.621	13.130	10.674
	999.980	3.812	"	13.290
	0.402	3.132	"	"
	"	4.352	999.925	"
	999.980	5.195	"	"
	.403	"	"	9.982
	999.980	6.145	"	"

3/31/54 1:05 p.m.

CRITICAL POSITIONS

C.A. 18 Expr. 2 Run 5

Table Pos. 999.985 L 0308 T — .4422

Control Rod		Channel	
1	999.980	A 59	100/100
2	6.066	B .014	
3	999.920	C 5	10^{-9}
4	9.982	D 69.5	100/500
		E (0.2)	

Tim Crit. 1:10 ~~AM~~ PM Duration ___ min.

999.980	6.066	999.920	9.982
0.402	"	"	7.900
999.998	7.025	"	"
0.403	"	"	4.456
999.982	8.155	"	"

(continued)

Critical Position (cont.)

A	B	C	D
.402	8.155	999.920	5.290
999.983 ~~.402~~	9.420	"	"
.403	"	"	4.292
999.983	10.712	"	"
0.402	"	"	3.430
999.985	12.065	"	"
.400	"	"	2.671
999.985	13.240	"	3.105
.400	"	"	2.378 ~~2.358~~
Fired rod 7 →			-
.400	.528	"	.029
999.984	1.138	"	"
.402	.532	"	"
999.985	"	"	.732
.402	999.982	"	2.573

Shut down at 2:30PM.

C.A. 18 Expr. 2 Run 6

Sheet — Date 4/2 1954 Time 1:45 ~~AM~~ PM

Purpose Rod Calibration

INSTRUMENT CHECK

Time 1:45 ~~AM~~ PM Source 173,4,5, 221

	Channel A	B	C	D	E
Range	1/1000	OK 2.5x10^12 ~~2.5x10^12~~	2.5x10^12	1/1000	
Source Dist.	C	10"	1	10"	
% F.S. Trip	75	60	100	60	

Counters OK

CRITICAL POSITIONS

18 Expr. 2 Run 6

Lower Pos. 999.984 .0308 .4426

Control Rod		Control	
1. .410	A	50	100/100
2. 999.980	B	.014	
3. 999.922	C	5.2 10^{-9}	
4.	D	69.5	100/500
	E	2.0 @ 860V	

Tim Crit. 2:05 AM PM Duration ____ min.

Removed Shield in G, G'-12

Super → A-.410 B 999.980 C-999.922 D 4.826 (T=101.3cm, ρ=9.554)

Critical Position.

A	B	C	D
.410	999.980	999.922	6.165
999.975	.638	"	"
.410	"	"	5.016
999.975	1.245	"	"
.412	"	"	3.998
999.974	1.860	"	"
.412	"	"	3.165
999.975	2.436	"	"
.410	"	"	2.422
999.976	3.054	"	"
.410	"	"	1.720
999.976	3.740	"	"

	A	B	C	D
Repeat →	999.976	3.740	999.922	1.720
	.410	"	"	1.050
	999.980	4.565	"	"
	.406	"	"	.406
	999.976	5.472	"	"
	.406	5.014	"	00.026
	999.980	5.980	"	"
	"	5.014	"	0.680
	"	4.432	2.046	"
	"	4.130	4.095	"
	"	3.854	6.024	"
	"	3.730	8.030	"
	"	3.653	10.055	"
	"	3.635	12.014	"
moved A-limit switch →	"	~3.622	13.131	"
~~Setup~~	Super: 999.998	999.978	13.131	4.451
level →	999.999	999.978	13.132	5.310
	.705	"	"	4.295
	.845	"	"	3.362
	1.241	"	"	2.640
	1.654	"	"	1.875
	2.045	"	"	1.142
	2.618	"	"	.024
	3.196	"	999.922	"

added shims 9+9', 12+14

time critical 4:10

A B C D

CRITICAL POSITIONS

C.A. 18 Expr 2 Run 7

Table Pos. 999.985 .422 .0301 D

Control Rod		Channel	
1 A	2.501	A 52	100/100
2 B	13.236	B .014	
3 C	999.925	C 5.2	10^{-9}
4 D	12.012	D 69.5	100/500
		E 2	860v

Tim Crit. 4:10 AM PM Duration ____ min.

A	B	C	D
2.501	13.236	999.925	12.012
3.050	10.505	"	"
3.500	8.922	"	"
4.031	7.330	"	"
4.529	6.139	"	"
5.021	5.140	"	"
5.502	4.192	"	"
6.080	3.185	"	"
6.505	2.488	"	"

A	B	C	D
7.015	1.750	999.925	12.012
7.520	1.005	"	"
8.010	.259	"	"
8.010	8.645	"	.022
8.560	7.115	"	"
9.029	5.961	"	"
9.505	4.832	"	"
10.045	3.630	"	"
10.495	2.788	"	"
11.010	1.858	"	"
11.526	.895	"	"
12.022	999.980	"	"

C.A. 18 Expr. 2 Run 8

Sheet ____ Date 4/5 1954 Time 9:45 AM PM

Purpose Rod Calibration

MULTIPLICATION

Scaler	c/	min. BG/	min.	Mult.	1/M
1					
2					
3					

INSTRUMENT CHECK

Time 9:30 AM PM Source

	Channel A	B	C	D	E
Range	1/1000	O.K.	10^{-10}	1/1000	
Source Dist.	0		0	8"	
% F.S. Trip	60		40	75	

CRITICAL POSITIONS

C.A. 18 Expr. 2 Run 8

Table Pos. 999.983 L .4422 T .0306 R

Control Rod	super	stable	Channel	
A	10.872	10.872	A 36	100/100
B	3.498	3.498	B .014	
C	10.809	10.809	C 53	10^{-9}
D	8.609	10.569 ~~8.609~~	D 69.5	100/500
			E .6	360 v

Tim Crit. 10:25 AM PM Duration ~~185~~ 85 min.

Per period of 152 sec.

A	B	C	D	
10.872	3498	10.809	10.569	
"	2.988	"	13.292	
11.044	"	"	11.440	3.288
11.565	"	"	8.152	1.659
12.979	"	"	6.509 6.493	
12.570	"	2,001	6.508	1.277
"	"	10.810	5.232	.578
13.069	"	"	4.654	
13.560	"	5,366 5.4 1.4	4.654 ~~5.366~~	
13.995	"	3.986 1.00	"	
14.523	"	2.986 1.071	"	
15.485	"	1.915 .936	"	
16.510	"	1.179	"	
18.035	"	.595	"	
20.530	"	999.923		

trial for 15 min.

~~time sec.~~ Look power up to .12 on B,

time sec.	A	B	C	D
0	19.337 ~~19.342~~	2.988	999.923	~~4~~ 4.653
~~50~~ 15	10.260	"		
~~90~~ 30	9.510			
~~85~~ 45	9.300			
~~60~~ 60	8.960			
~~70~~ 75	8.770			
~~90~~ 90	8.690			
~~105~~ 105	8.623			
~~120~~ 120	8.555			
135	8.505			
150	8.460			
165	8.435			
180	8.405			
195	8.362			
210	8.362			
225	8.345			
240	8.320			
2				

Critical at 2:10 p.m April 5, 1954

Check & Cross-check of meter Readings: as follows

B/ln N	A (Recorder)		C	D	(all Recorder)	
ln N 0.0008	28	10/200	5 10^{-10}	39.5	10/500	
	11.5	10/500		97	10/200	
	5.0	10/1,000				
	57.0	10/100				
0.001	33	10/200	2.4 (2.5×10^{-10})	46	10/500	
	66	10/100		5	100/500	
	11	100/100		12	100/200	
	21	100/50		25	100/100	
	43	100/25		51	100/50	
				10	1000/50	
				20	1000/25	
				2.0	1000/1000	
.005	0	1000/1000	3.8 (5×10^{-10})	2.0	1000/1000	
	5	1000/100	~~8.5 (10^{-10})~~	7.5	1000/200	
	11	1000/50	8.4 (2.5×10^{-10})	15	1000/100	
	0	100/1000	9.8 ( )	29	1000/50	
	3.5	100/500	2.0 (10^{-9})	57	1000/25	
	9.5	100/200		12	100/1000	
	20	100/100		24	100/500	
	39	100/50			60 100/200	
	78	100/25				
	55.5	10/1000				
	31	10/500				
	78	10/200				

B	A		D		C
.01	0	1000/1000	3	1000/1000	4.0 (10^{-9})
	2.5	1000/200	5.5	1000/500	
	6.0	1000/100	13.5	1000/200	
	13.5	1000/50	28	1000/100	
	27	1000/25	54	1000/50	
	1.0	100/1000	25	100/1000	
	6.0	100/500	51	100/500	
	15	100/200			
	30	100/100			
	61	100/50			
	25	10/1000			
	51	10/500			
.05	1.0	1000/1000	12.9	1000/1000	4.6 (5×10^{-9})
	2.0	1000/500	25.0	1000/500	
	5.5	1000/200	61.8	1000/200	
	11.5	1000/100			
	23.8	1000/50			
	48.0	1000/25			
	8.0	100/1000			
	16.2	100/500			
	41.0	100/200			
	82.2	100/100			
	77	10/1000			

B	A		D		C	E
0.1	1.4	1000/1000	25	1000/1000	4.8 (10^{-8})	
	2.5	1000/500	51	1000/500		
	8.0	1000/200				
	16.0	1000/100				
	32.4	1000/50				
	65.0	1000/25				
	12.1	100/1000				
	25.0	100/500				
	63.5	100/200				
0.2	40.0	100/500	59	1000/1000	5.5 (2×10^{-8})	(2.5) 750V
	4.5	1000/500				
	2.1	1000/1000				
	20.0	100/1000				
	~~40~~	~~1000/500~~				
	11.4	1000/200				
	23.2	1000/100				
	47.0	1000/50				
	95.0	1000/25				
0.3	25	1000/1000	90.0	1000/1000	8.3 (2×10^{-8})	4.1 (750 V)
	25.5	100/1000				
	5.5	1000/500				
	14.5	1000/200				
	29.4	1000/100				
	59.0	1000/50				

C.A. 18 Expr. 3 Run 1

Sheet / Date 4/6 195 4 Time 11:00 AM ~~PM~~

Purpose To measure effect of β-n's in Beryllium.

INSTRUMENT CHECK 173 179 221

Time 11:05 AM ~~PM~~ Source ~~178~~

	Channel A	B	C	D	E
Range	1/1000	O.K. 2.5x10"	1/1000	0	
Source Dist.	0	0	7"	/	
% F.S. Trip	55	100	70	10.00	

Loaded 2:35 PM

Probably 3:14

8.146 to full critical

Sapar CRITICAL POSITIONS

C A. 18 Expr. 3 Run 1

Table Pos. 999.985 L 0305 T R 4422

Control Rod		Channel
1	8.146 (0.1906 / 0.1040 / 0.276)	A
2	8.615	B
3	13.134	C
4	13.293	D
		E

Tim Crit. 11:30 AM ~~PM~~ Duration ____ min.

Rose on approximately 100 sec. period at above setting to Log N reading (B_1) of about 0.2

Time	Control Rod Reading A	ρ	B	C	D
0	8.146	01053	8.615	13.134	13.293
15	5.000	01621			
30	3.344	01916			
35 - Level					
45	3.455	01897			
1:00	3.427	01903			
1:	3.410	01907			
1.55	3.360	01915			
2.15	3.400	01906			
2.30	3.375	01912			
2.45	3.348	01916			
2.55	3.418	01902			
3:15	3.352	01916			
3:30	3.395	01907			
4:15	"	01907"		12.950	000018
4:45				10.070	00061
4:57				8.055	000159
5:15				9.147	00010
5:48				9.370	00009
6:55				9.987	000068
7:25				12.647	00002
9:05				10.826	00004

(A)

(1)

Rose on period with following control rod position

A	B	C	D
2.870	8.614	10.827	13.293

leveled at the N reading of 0.2 for 5 minutes

Drop with control Rod A from 80 100/200 to 40 100/200 on Recorder A

Time	A	ρ	B	C	D
0	3.367		8.614	10.827	13.293
13	6.222	.01403			
34	5.233	.01582	Power went to .07 on the N meter.		
45	4.610	.01690			
1:00	4.295	.01744	(B)		
1:15	3.998	01796			
1:30	3.810	01831			
1:45	3.712	01850			
2:15	3.522	01885			
2:25	3.622	01867			(2)
2:45	3.516	01886			
3:00	3.488	01913			
3:15	3.510	01899			
3:33	3.485	01890			
3:43	3.470	01895			
3:50	3.460	01896			
4:00	3.437	.01902			
4:27	3.458	(Cont.) 01899			
4:45	3.435	.01902			
6:00	3.412	(Cont.) 01904	A recorder		B recorder
6:23	3.437	.01902	39.6 100/200		87 100/200
7:57	3.419	.01905			

	A	P	
9:00	3.410	01907	C Recorder reads 6.53 at 5.10^{-9}
~~11:22~~	~~3.410~~	01902	
11:24	3.433	01902	
12:07	3.428	01903	
12:25	3:413	01906	
13:56	3:406	01907	
16:04	3:409	01907	
20:00	2.733	02036	Went up on period of abt 80 sec. Leveled at 0.2 on knob 80 on A at 100/200 at about 21:00 (time).

A – 3.385 B 8.615 C 10.826 D 13.292

Leeuton B → (5.567) 345 3.228 006812

Tau							
	15s	8.613	002425	3:30	3.175	006875	10:20 3.030 007058
	30s	7.650	003002	45	3.180	006870	14:30 2.985 007102
	45s	6.400	005925	4m	3.148	006910	
	1m	4.936	005140		3.106	006960	
	15	4.432	005509		3.106	006960	
	30	3.955	006045		"	/	
	45	3.780	006230	5m	3.105	006960	
	2m	3.621	006395	5:12	3.085	006990	
		3.514	006502	6:00	3.065	007010	
		3.303	006740	6:35	3.035	007050	
		3.257	006782	8:30	3.025	007060	
	3m	3.228	006812	10:00	3.005	007082	

Melany 26.07 Ω = 10m

(C) (3)

Raise to (.2) level ~ 1 min drop to .07

Level on D — Start Dat 13.292

30s	11.00	000500			
45s	6.00	.002524			
1m	5.45	002871	5:30	3.875	004016
1:15	4.72	003370			
:20	4.555	003491			
:45	4.375	003628			
2m	4.250	003720			
	4.160	003788			
	4.050	003874			
	4.050	003874			
3m	4.025	003892			
3:20	3.930	003972			
4:10	3.865	004028			

(D) (4)

Raise to .2 back down — read D to lower level. This was too slow a drop — discard this part of run. Level at .07 and repeat below.

Raise level to .2 hold at .2 ~ 1 min drop to .07

Level on D ↓

1 min	5.20	003032	3m	3.79	004090
1:15	4.56	003481		3.76	004120
30	4.34	003650		3.76	
45	4.14	003800		3.76	
2mm	4.04	003880	4m	3.76	
15	3.91	003990			
30	—	—			
2:45	385	004040			

(E) (5)

Critical A 6.065 B 2.765 C 10.825 D 10.29
up to .2 level — return to .07 Stop transmit
with A level with D.
High level ready A - 5.950 B, C, D. scan.

D → 1m —

1:15	8.00	00150
1:30	7.14	01/896
1:45	6.94	001995
2m	6.835	002050
2:15	6.710	002119
2:30	6.590	002185
2:45	6.590	"
3m	6.490	002240
3:15	6.445	002270
3:30	6.474	002258
3:45	6.410	002289
4m	[illegible]	"
4:15	6.355	002320
4:50	6.375	002310
6:00	6.345	002327
6:15	6.301	002350

des

F

6

critical at. A) 3.910 B) 10.460 C) 11.105 D) 7.390
up to .2 level then drop to .07 (.068)
stop transients with A & level with B

Time	B
40 s.	7.30 00326
50 s.	6.570 00379
60 s.	5.922 004385
1m. 10	5.186 00492
1m. 20	4.822 00524
1m. 30s.	4.586 005455
1m 40 s.	4.400 005625
1m 50 s.	4.212 005800
2m 00.	4.114 005892
2m. 20s.	4.013 005985
2m 40 s.	3.874 006135
3m. 00.	3.800 006210
3m 20 s.	3.730 006280
3m 10 s.	3.690 00632
4m 30 s.	3.655 00636
5m 20 s.	3.644 00637
5m 45 s.	3.630 00638
6m 25 s.	3.600 006418
7m 25 s.	3.632 006382
10m 0 s.	3.579 00644
14m 50 s.	3.552 006465

(G)

(7)

90

drop power level from .068 to .010
drop with A and level with B.

D = 11.069

Time Min. Sec.	B	Time	B	
0	11.85 .007740	7-15	2.254 .007980	(H)
1-15	5.400 .004745	8-0	2.292 .007935	
1-30	4.633 .005410	9-0	2.272 .007960	
1-45	3.900 .006100	10-0	2.262 .007972	
2-15	3.275 .006765	12-0	2.205 .008040	← 11?
2-30	3.024 .007060	13-0	2.188 .008065	
2-45	2.887 .007210	14-0	2.154 .008110	(8)
3-0	2.805 .007295	15-0	2.158 .008108	
3-30	2.663 .007475	16-0	" .008107	
3-45	2.604 .007552	16-50	2.146 .008119	
4-0	2.555 .007609	17-20	2.178 .008080	
4-15	2.530 .007640	18-05	2.146 .008119	
4-30	2.503 .007695	19-0	2.134 .008135	
4-45	2.480 .007700	19-25	2.117 .008158	
5-0	2.454 .007735	20-15	2.097 .008180	
5-15	2.437 .007755	21-10	2.127 .008147	
5-30	2.414 .007780	23-30	2.094 .008185	
5-45	2.398 .007800	25-35	2.072 .008210	
6-15	2.365 .007845	27-0	2.087 .008195	
6-30	2.335 .007880	30-0	2.055 .008235	
6-45	2.314 .007902	33-30	2.046 .008248	
7-0	2.290 .007935	34-25	2.033 .008258	

35-15	2.022	.08275
43-10	2.002	.08300
47-50	1.992	.08320
49-0	1.970	.08345
53-15	2.000	.08305
55-30	1.978	.08338
56-40	1.958	.08360
58-55	1.945	.08380
60-55	1.975	.08340
66-0	1.928	.08400
70-0	1.960	.08355
73-0	1.930	.08398
80-0	1.910	.08421
90-0	1.910	.08421

C.A. 18 Expr. 3 Run 2

Sheet ____ Date 1/7 1954 Time 9:25 AM ~~PM~~

Purpose To measure effect of γ-n's in Be

INSTRUMENT CHECK 123 174 221 and γ source

Time 9:30 AM ~~PM~~ Source 175

	Channel A	B	C	D	E
Range	1/1000	O.K.	5×10^{-11}	1/1000	120v
~~Source Dist.~~	0		0	8"	2½ ft.
~~% F.S.~~ Trip	95		4	65	100%

(Rod C – 13.128 out
Rod D – 13.290 – out)

April 7, 54

start up ~~to~~ raise to .2 on B. – run 10 min.
Fired safety #6 – drop to .02
start B – 8.850 .002979

	1:30	5.980	01448				
	1:45	5.060	01612	B ↓ 6:45	7.705	002982	
	2:00	4.710	01674	7:00	7.630	003035	
	2:10	4.590	01694	15	7.600	003055	
	2:20	4.455	01717	7:30	7.634	003030	
	2:30	4.240	01754	7:45	7.580	003062	
Rod A ↑	2:40	4.132	01773	8:00	7.550	003081	
Rod A ↓	2:50	4.005	01795	8:15	7.520	003104	
	3m	3.895	01815	35	7.555	003080	
	3:15	3.895	01815	45	7.476	003138	
	3:30	3.875	01818	50	7.520	003107	
change to (B)	3:45	— 8.680	00239	8m	7.490	003125	
	4m	8.380	002561	9:30	7.455	003150	
B ↑	4:15	8.300	002612	10:10	7.430	003165	
	4:30	8.275	002628	:30	7.400	003185	
	4:45	~~8.230~~ 8.175	002685	11:35	7.430	003165	
B ↓	5m	7.980	002815	11:45	7.408	003180	
	5:15	7.970	002820	12:10	7.390	003195	
	5:30	7.905	002860	:15	7.378	003202	
	:45	7.880	002878	:30	7.360	003218	
	6m	7.840	002900	12:50	7.335	003235	
	~~6:15~~	—		13:20	7.340	003235	
	6:30	7.705	002981	14m	7.363	003212	

B ↓

14:12	7.340	003235
50	7.310	003255
15:05	7.275	003280
15:20	7.310	003255
:30	7.270	003270
55	7.310	003255
16:23	7.272	003280
:35	7.300	003260
18m – 7.300		003260

Meters at lower level

A 66 10/500
D 47 1000/100
B .020

final control Rods
C out
D out
B – 7.300
A – 3.875

(10)

(B) return to 0.2 on B. Hold 20m.

Time	Rod A	Rod B
0	.01977 3.033	.001538 10.222
1.25	.01447 5.981	
1.35	.01477 5.820	.002055 9.272
5 45	002930	2.790
55	003542	6.912
210	004308	5.918
2:20	005000	5.098
35	005260	4.802
45	005510	4.522
3:00	005740	4.275
3:15	006120	3.886
3:30	006230	3.780
3:45	006318	3.695
4:00	006368	3.646
4:15	006538	3.487
4:30	006585	3.443
4:45	006606	3.422
5:00	006700	3.337
5:15	006750	3.289
5:30	006809	3.233
5:45	006880	3.172
6:00	006909	3.148
6:15	006909	3.148
6:30	006892	3.158
6_35	006948	3113

Time	Rod A	Rod B
6:50	006948	3.113
7:00	006982	3.089
7:15	007038	3.043
7:30	007065	3.022
7:45	007080	3.009
8:00	007080	3.009
8.15	007080	3.009
8.45	007102	2.984
9.03	007129	2.965
9:37	007142	2.949
9:44	007165	2.928
10:27	007180	2.912
10:37	007204	2.888
11:17	007190	2.905
11:53	007202	2.890
12:00	007225	2.876
12:13	007252	2.845
13:33	007280	2.820
15:45	007292	2.809
16:10	007302	2.796
16:30	007340	2.770
17:03	007365	2.747
17:48	007342	2.769
18:30	007320	2.789
19:34	007340	2.770

Time	Rod A	Rod B
19:42	007360	2.755
20:04	007385	2.731
24:03	007415	2.708
24:26	007425	2.700
26:42	007442	2.689
out to 30.00	~~007442~~	

A	69	10/500
B	.020	
C	4.15	$2(10^{-9})$
D	44	100/1000

58

C 11

Rose on about 90 sec period to 0.2 on B, meter

Held this level for about ___ min.

Rod A at 5060 ; B at 2.688 ; Cat 13.126, D at 13.290

Leveled with rod A at 5.655 , B at 2.771

time	Rod A	Rod B
0	02037	000802
	2.736	11.530
1:15	01322	
	6.400	
1:25	01521	
	5.582	
1:35	01622	
	5.000	
1:45	01682	
	4.652	
1:55	01721	
	4.425	
2:10	4.250 01752	001380
	~~[illegible]~~	10.492(?)
25	~~9.780~~	001780
		9.780
40		001900
		9.565
50		002300
		8.840
3.00		002330
		8.780
.10	002402	8.656
.20	002570	8.370
.30	002706	8.146
40	002755	8.074
.50	002780	8.030
4:00	002855	7.913
10	002950	7.767
20	002975	7.722
30	003000	7.680
40	~~003052~~	———
50	003052	7.600

time	Rod A	Rod B
5:00	003132	7.480
:15	003150	7.456
:25	003222	7.350
:36	003250	7.316
5:42	003270	7.285
:58	003310	7.230
6:10	003365	7.157
6:50	003425	7.075
7:15	003470	7.010
7:54	003480	7.000
8:06	003500	6.973
8:05	003522	6.940
8:23	003555	6.900
8:35	003562	6.888
:44	003580 finger	6.862
:56	003600	6.830
9:27	003578	6.865
9:48	003600	6.830
10:26	003602	6.814
10:40	003615	6.802
10:53	003628	6.782
11:09	003650	6.756

time	Rod A	Rod B
11:32	003664	6.732
12:07.5	003675	6.720
12:25	003685	6.706
13:03	003700	6.687
13:21	003720	6.661
13:36	003740	6.638
13:52	003750	6.620
14:5	003768	6.599
15:35	003780	6.580
16:25	003792	6.570
17:50	003800	6.560
18:10	003802	6.550
18:35	003822	6.530
19:00	003832	6.520
19:20	003838	6.510
20:00	003860	6.485
20:40	003878	6.460
22:40	003890	6.440
24:15	003909	6.420
25:45	003925	6.400
27:25	003960	6.360
28:20	003940	6.385

				time	rod B
	003960		004200		004258
28:45	6.360	87:00	6.057	170:00	5.978
	003970	4182			4255
30:05	6.345	93:20	6.080	172:30	5.986
	003988	4202			4260
30:45	6.325	94:35	6.053	181:50	5.976
	3995	4180			4275
31:25	6.316	95:15	6.084	190:00	5.955
	4002	4195			
32:35	6.305	100:20	6.065	shut down at	
	4020	4200			
34:30	6.288	101:30	6.055	191:06	
	4028	4240			
36:00	6.276	104:10	6.000		
	4042	4232			
39:40	6.256	104:45	6.020		
	4062	4200			
40:25	6.230	105:50	6.055		
~~41:05~~		109:45	6.016		
	4039	4235			
41:30	6.264	112:10	6.034		
	4062	4220			
42:30	6.230	114:20	6.066		
	4080	4195			
45:05	6.210	115:20	6.076		
	4092	4210			
48:50	6.194	117:00	6.033		
	4112	4220			
52:05	6.170	119:00	6.018		
	4100	4235			
53:50	6.190	120.45	6.030		
	004120	4222			
55:10	6.157	126:10	6.006		
	4102	4238			
57:05	6.179	130:15	6.020		
	4130	4232			
58:10	6.147	141:00	6.014		
	4138	4235			
63:00	6.138	147:00	6.007		
	4142	4235			
66:00	6.128	148:00	5.976		
	4155	4260			
68:15	6.114	149:35	6.000		
	4160	4245			
73:05	6.106	158.00	5.988		
	4180	4255			
79:00	6.087	161:30	5.993		
	4186	4248			
87:30	6.075	167:00	5.986		
		4255			

60.

C.A. 18 Expr. 3 Run 3

Sheet _____ Date 4/12 1954 Time 10:00 AM ~~PM~~

Purpose Continue γ-n observation.

INSTRUMENT

Time 10:00 ~~P.M.~~ Scale 123-4-5, 212

	Channel A	B	C	D	E
Range	1/1000 OK		OK	1/1000	
Source Dist.	C			18"	
% F.S. Trip	58			70	

Counters 1, 2, 3 OK

CRITICAL POSITIONS

C.A. 18 Expr 3 Run 3

Table Pos. 999.782 L .4423 T .0300 R

Control Rod	super	stable	Channel		
1A	8.482	8.348	A 505	100/200	
2B	7.985	9.338	B .2		
3C	13.127	13.127	C 4.6	2×10^{-8}	
4D	13.290	13.290	D ~~500~~ 498.0	1000/1000	
			E 6	890 ~	

Tim Crit. 10:30 AM ~~PM~~ Duration

after ½ hour (12) $B_1 = a_2$

A	B	C	D
8.348	9.420	13.127	13.290

Fire 6 reduce B_1 by a factor of 100

	A	B	C	D
3 pm 15 m	11.	2.416		
4 pm		5.67		
4 15		3.48		
		1.	(H)	
5 30	10.720	B→ 2.195		
45	10.579 (.00562)	9:30 9.170 (00859)	13:15 8.512 (00985)	
6	10.372 (00609)	9:45 8.832 (00867)	13:30 8.505 (00996)	
6 15	10.200 (00647)	10:00 9.055 (00882)	13:45 8.465 (00944)	
6 30	10.130 (00662)	10:15 7.020 (00890)	14.00 8.410 (01003)	
6 45	10.075 (00674)	10:30 8.943 (00905)	14:15 8.405 (01004)	
7 00	10.021 (00688)	45 8.860 (00920)	14.30 8.398 (01016)	
7:15	9.910 (00709)	11:00 8.830 (00926)	14.45 8.345 (01016)	
	8.760 (00742)	11:15 8.800 (00931)	15.00 8.290 (01026)	
7:45	9.700 (00755)	11:30 8.720 (00946)	15:15 8.310 (01023)	
8:—	9.630 (00770)	11:45 8.780 (00935)	15:30 8.265 (01031)	
8:15	9.550 (00785)	12:00 8.69 (00951)	16:00 8.215 (01042)	
8:30	9.460 (00802)	12:15 8.630 (00963)	16:15 8.155 (01052)	
	9.380 (00817)	12:30 8.660 (00958)	16:30 8.135 (01055)	
9:00	9.310 (00831)	12:45 8.565 (00975)	16:45 8.117 (01057)	
9:15	9.290 (00835)	13:00 8.535 (00980)	round at 3.09	
			17:00 8.095 (01064)	
			17:15 8.075 (01069)	

	D
17:25	8.044 (01075)
17:35	8.012 (01082)
17:50	7.971 (01082)
18:00	7.970 (01085)
18:10	7.950 (01047)
18:20	8.055 (01085)
18:35	7.950 (01085)
19:	7.950
change to B—	
19:15	2.043 (008247)
19:30	2.028 (008265)
19:45	1.978 (008335)
20:00	1.935 (008390)
20:15	1.880 (008460)
20:30	1.855 (008490)
21:00	1.820 (008540)
21:15	1.770 (008585)
21:30	1.735 (008642)
21:45	1.708 (008675)
22:00	1.708 (008675)

B 2.145 (01085) (01120)

continued ↓

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Continued

A accident at 7.949 010855

		Bl ↓			Bl ↓		Bl ↓
		008685			009430		
	22:10	1.700		28:30	1.100	36:45	.480 010180
		008718			009465		
o	22:20	1.675		28:45	1.070	37:00	.465 010195
		008740			009480		
	22:30	1.655		29:10	1.059	37:25	.442 010220
		008779			009515		
	22:50	1.627		29:15	1.030	37:45	.425 010245
		008800			009555		
	23:00	1.610		29:30	1.000	38:05	.410 010260
		008838			9575		
	23:10	1.580		29:50	0.982	38:28	.380 010300
		008855			9600		
	23:25	1.565		30:12	0.960	39:00	.355 010320
		8867			9640		
		1.555		30:30	0.930	39:20	.332 010345
		8912			9652		
		1.517		30:55	0.920	39:45	.328 010350
		008980			9690		
	23:50	1.466		31:30	0.890	40:10	.306 010375
		009022			009720		
	24:00	1.432		31:50	0.864	40:35	.278 010405
		009060			009760		
	24:20	1.405		32:10	0.831	41:00	.245 010440
		009085			9795		
	24:55	1.382		32:30	.805	41:30	.220 010465
		009103			9808		
	25:25	1.370		32:35	.793	42:30	.192 010500
		009140			9846		
	25:30	1.340		32:55	.759	43:25	.175 010515
		009165			9880		
	26:08	1.318		33:15	.728	44:25	.161 010530
		009200			9899		
	26:25	1.290		33:35	.715	44:55	.152 010540
		009237			9926		
	26:35	1.260		34:00	.690	45:18	.130 010562
		009265			9942		
	26:50	1.235		34:15	.675	45:36	.104 010590
		009300			9980		
	26:55	1.206		34:25	.644	46:13	.090 010605
		009340			010012		
	27:10	1.176		34:40	.615	46:47	.058 010640
		009360			010022		
	27:20	1.145		35:00	.605	47:05	.043 010655 A
		009395			010039		
	27:40	1.180		35:20	.595	48:00	010680 .020 7.948
		009375			010055		
	27:46	1.145		35:45	.580		1.
		009402			010079		
	27:55	1.120		36:00	.560	55	3080
					010145		
				36:20	.505	49:07	5940

	A	B	Time	B
	5.132 + 0160	6.902		
49:45	X.618 + 0160	7.142 + 3375	68:05	6.522 003828
50:22	"	7.125 003387	68:45	6.508 003840
50:36		7.108 003400	70:30	6.480 003862
50:55		7.088 003420	71:00	6.465 003872
51:24		7.072 003425	72:19	6.450 003885
52:36		7.045 003445	72:34	6.420 003910
53:30		7.027 003460	73:27	6.398 003930
53:55		7.002 003480	74:42	6.369 003950
54:23		6.987 003485	76:20	6.341 003980
55:00		6.954 003514	78:04	6.291 004015
55:16		6.930 003532	78:50	6.259 004040
56:30		6.998 003481	80:00	6.230 004062
57:05		6.879 003560	80:40	6.205 004080
58:07		6.853 003575	81:25	6.187 004100
58:34		6.822 003600	82:10	6.170 004110
59:35		6.800 003615	83:30	6.140 004138
60:26		6.782 003628	84:55	6.190 004160
61:12		6.770 003640	87:20	6.17 004111
61:40		6.755 003650	88:35	6.15 004128
62:04		6.727 003670	89:10	6.135 004140
62:20		6.691 003700	90:10	6.120 004150
62:28		6.654 003725	91:05	6.092 004170
63:17		6.624 003750	92:00	6.076 004185
64:28		6.605 003762	92:45	6.060 004200
65:40		6.591 003788	93:50	6.029 004220
67:04		6.554 003802	94:45	6.005 004240

B1

96:30	5.985	4255	172:46	5.409 4735
100:00	5.960	4272	190:25	5.380 4760
101:00	5.932	4295	196:25	5.355 4780
103:10	5.906	4320	199:00	5.332 4800
104:55	5.880	4340	209:07	5.320 4808
108:25	5.862	4358	213:13	5.295 4830
108:45	5.905	4320	225:30	5.280 4840
109:20	5.870	4350	231:30	5.260 4858
110:10	5.855	4360	234:45	5.244 4870
113:10	5.830	4380	246:30	5.230 4885
114:45	5.800	4410	248:49	5.200 4915
119:20	5.772	4430	265:10	5.180 4930
121:25	5.745	4455	275:05	5.166 4940
124:45	5.730	4465	281:47	5.140 4962
125:35	5.705	4490		Killed
128:45	5.689	4500	at 283:32 min.	
132:22	5.660	4525		
135:55	5.630	4550		
143:38	5.609	4567		
144:18	5.580	4590		
151:19	5.561	4607		
153:42	5.538	4630		
155:32	5.509	4652		
158:07	5.499	4662		
165:15	5.470	4682		
167:30	5.455	4700		

C.A. 18 Expr. 4 Run 1

Sheet _____ Date 4/13 195 4 Time 2:30 ~~AM~~ PM

Purpose Compare Blank rod to control rod A. (Fuel dopp coeff and channeling effect)

INSTRUMENT CHECK

Time 2:20 ~~AM~~ PM Source 173,45, 212

	Channel A	B	C	D	E
Range	1/1000		2.510	1/1000	900V
Source Dist.	~~Contact~~	OK	O.K.	12 in.	
% F.S. Trip	60		1.4	65	

counters #1, 2, 3 O.K.

CRITICAL POSITIONS

C.A. 18 Expr 4 Run 1

Table Pos. 999.785 .0281 T — P ~~.4420~~ .4420

Control Rod		Channel	
1	24.347	A 52	100/50
2	2.924	B .0208	
3	999.920	C 4.2	2×10^{-9}
4	4.556	D 47	1000/100
		E .70	900V

Tim Crit. 2:55 ~~AM~~ PM Duration 1st 1 5/2 hr min.

Compare to page 41 for corresponding rod.

Blank A calibrate

Critical Positions

A	B	C	D
24.347	2.924	999.920	4.556
20.488	"	.281	"
18.050	"	.870	"
16.505	"	1.517	"
15.505	"	2.150	"
14.435	"	3.414	"
13.993	"	4.360	"
13.480	"	6.208	"
13.018	"	13.130	4.709 (stopping sweep)
12.495	"	"	5.273
12.010	"	"	6.289
11.511	"	"	8.112
10.968	"	"	11.459
10.512	3.504	"	13.295
10.052	4.489	"	"
9.506	5.750	"	"
9.050	6.780	"	"
8.525	8.158	"	"
8.067	9.358	"	"
7.486	10.871	"	"
6.987	12.230	"	"
6.805	13.242	"	"

Fired safety #6 ⟶

new critical positions with #6 out.

A	B	C	D
6.417	999.972	13.130	13.295
6.988	"	"	9.807
6.471	0.770	"	"
6.020	1.447 (supv)	"	"
5.500	2.203	"	"
4.988	2.894	"	"
4.535	3.511	"	"
4.050	4.252	"	"
3.520	5.146	"	"
3.004	6.037	"	"
2.506	7.028	"	"
2.025	8.194	"	"
1.516	9.588	"	"
1.009	10.970	"	"
.509	12.408	"	"
999.995	"	"	11.660

C.A. 18 Expr. 3 & 4 Run 4 & 5

Sheet _____ Date 4/14/54 1954 Time 1:30 ~~AM~~ PM

Purpose To continue γ-n observations:
(for short-lived precursors)

INSTRUMENT CHECK

Time 1:36 ~~AM~~ PM Source _____

	Channel A	B	C	D	E
Range	1/1000			1/1000	
Source Dist.	contact	O.K.	O.K	10"	O.K.
% F.S. Trip	43				
	counted 1, 2, 3,	O.K.			

Start up 1:3

Rose to 0.1 on scaler N and recorded:

	A		B		C		D		E	
1:10	2.330	02118	6:26	2.458	02092	17:30	2.402	2104		
20	2.368	02111	6:37	2.420	2100	~~18:50~~				
28	2.404	02103	6:45	2385	2107	18:04	2.420	2100		
48	2.345	2116	6:55	2.428	2098	19:14	2.455	2093		
52	2.372	2110	13:40	2.442	2096	20:53	2.433	2097		
2:04	2.420	2100	14:30	2.420	2100	23:21	2.400	2104		
24	2.401	2104	14:45	2.446	2095	23:305	2.426	2099		
47	2.385	2107	~~49~~	~~2.399~~		24:34	2.468	2091		
3:07	2.394	2105	16:49	2.439	2097	24:56	2.446	2095		
3:16	2.420	2100								

A:
B:
C:

THINK!

CRITICAL POSITIONS

C.A. 18 Expt. 3 Run 4

Table Pos. 999,785 I 0270 T 4424

Control Rod		Channel	
1	2.447	A	37 100/200
2	13.242	B	0.10
3	13.131	C	4.3 10-8
4	13.295	D	45 100/500
		E	4.8 900V

Tim Crit. 7.08 min.

25:57 2.415 02101

26:40 2.446 02095

27:00 2.429 02098 level for 2 14?

Increased power level & new period at 29:30 min.

A: 3.602		9.980	.01080	2:06	6.720 002113
B: 12.330	10	7.970	001518	2:15	6.689 002131
C: 13.132	17	7.402	001772	3:35	6.662 002142
	25	7.464	001741	6:02	6.632 002160
	33	7.360	001790	8:40	6.647 002154
	40	7.222	001858	8:54	6.669 002141
	47	7.046	001942	Rose at 10:13 with A at 3.120	
	55	6.973	001980		
	1:06	6.890	002021		
	15	6.735	002050		
	25	6.767	002089		

13?

70

~~.07~~	~~4.699~~				
23	4.420	01722			
30	4.232	01756			
40	3.985	01799			
50	3.900	01815			
1.00	3.700	01852			
1:10	3.766	01864			
1:15	3.710	01850			
1:20	3.650	01862			
1:30	3.650	01862			
1:40	3.650	01862			
1:53	3.635	01864			
2:04	3.615	01868			
3:45 ~~3:36~~	3.592	01872			
4:24	3.560	01879			
4:38	3.582	01875			
4:51	3.587	01874			
4:52	〃	01874			

14

Rose at 4:52 with A at 3.118

0.00	R&A 3.118	←	45	3.9	4 80/1806 85 3.718 01849 ~~01844~~
	4.576	01696	50	3.9	14 1811 90 3.690 1854
15	4.576	01696	55	3.885	1817 95 3.690 1854
20	4.576	01696	60	3.818	1829:00" 3.690 1854
25	~~4.576~~	←	65	3.770	1838 1:47 3.660 1860
30	4.295	.01745	70	3.769	M39 2:02 3.618 1867
35	4.029	01791	75	3.769	M39 3:15 3.608 1870
40	4.029	01791	80	3.746	M42 3:39 3.579 1875

Record super

Time	Rod A					
7:03	3.589	01874				
:18	3.625	1866				
:24	3.585	1875				
:33	3.602	1871				
8:09	3.571	01877				
8:41	3.585	1875				
9:03	3.620	1867				
9:40	3.582	1875				
11:12.5	3.628	1867				
11:38	3.594	1872				
12:02	3.570	1877				
12:28	3.615	1868				
12:58	3.570	1877				
13:35	3.614	1868				
14:23	3.588	1874				
15:00	" Rod 01874 with A at 3.598					
	Signal 5 min					
time	Rod A					
0:15	5.740	01492	1:05	3.909	01813	2:08 3.685 01855
0:20	4.818	01654	:10	3.888	1817	2:15 3.660 1860
25	4.495	1710	:15	3.839	1826	33 3.626 1867
30	4.495	"	:20	3.811	1831	37 3.698 1853
35	4.288	1746	:25	3.790	1835	46 3.656 1860
40	4.165	1767	:30	3.790	"	2:59 3.630 1865
45	4.136	1772	:35	3.762	1841	4:03 3.598 1872
50	4.000	1796	1:40	3.740	1845	4:13 3.639 1864
55	3.970	1802	1:45	3.720	1848	4:40 3.620 1867
1:00	3.953	1805	2:00	3.694	1852	4:47 3.611 1869

72

5:45	3.600	01871
8:00	3.630	1865
8:14	3.604	1870
9:35	3.573	1876 —
9:42	3.602	1870
10:00	3.605	1870
10:50	3:594	1872
11:12	3:630	1865
11:25	3:610	1869
11:30	3:594	1872
12:25	3:613	1868
12:40	3:598	1872
14:00	3:631	1866
14:10	3:590	1874
14:22	3:594	1873
15:13	3:672	1858
15:20	3:610	1869
16:00	3:594	1873
17:20	3:601	1870
19:20	3:578	1876 —
19:30	3:608	1869

01876
00001
01877

5 .2 at for 5 min
observe at .10

0:10				01655			
0:15			2:20	3.684		6:15	3.640
0:20			2:25	3.721	48	6:30	3.618
0:25			30	3.680	56	7:40	3.609
0:30	4.505	01708	35	3.680	56		
0:35	4.152	1770	40	3.643	63		
0:40	4.162	1768	45	3.675	57		
0:45	4.138	1772	50	3.642	63		
0:50	4.045	1788	55	3.675	57		
0:55	4.000	1796	3:00	3.675	57		
1:00	3970	1802	3:05	3.632	65		
1:05	3927	1810	3:10	3.632	65		
1:10	3.870	1820	3:15	3.632	65		
1:15	3:861	1821	3:20	3.665	59		
1:20	3:861	1821	3:25	3.635	65		
1:25	3.810	1831	3:30	3.635	65		
1:30	3.780	1837	3:36	3.680	56		
1:35	3:818	1829	3:40	3.660	60		
1:40	3738	1845	3:42	3.629	66		
1:45	3710	1850	4:03	3.652	61		
1:50	3:742	1844	4:05	3.629	66		
1:55	3:720	48	4:15	3.652	61		
2:00	3:720	"	4:38	3.610	70		
2:05	3.702	51	5:00	3.640	63		
2:10	3.732	46	5:08	3.618	67		
2:15	3.694	53	5:25	3.655	61		
			5:35	3.625	66		
			6.05	3.599	73		

74 up to .3 back down to .1 immediately.

~~000~~ 0:05					
0:10			2:20	3.650	01862
15			25	3.675	57
20			30	3.675	|
25	5.	|	35	3.675	|
30	5.155	01595	40	3.635	65
35	4.902	01640	45	3.635	|
40	4:550	1700	50	3.674	58
45	4:360	1733	55	3.674	|
50	4:219	1758	3:00	3.652	61
55	4:140	1772	05	3.652	|
1 min	1:00	4:110 1777	10	3.652	|
05	4.052	1786	3:15	3.629	66
10	3.971	1801	~~4:10~~	3.611	70
15	3.934	1808	6:25	3:585	74
20	3.888	16	7:00	3.628	66
25	3.831	27	7:05	3.585	74
30	3.787	35	7:15	3.615	68
35	3842	25	9:10	3.590	73
40	3.795	33	9:50	3.616	68
45	3.741	44	11:20	3.575	76
50	3.721	48	11:30	3.618	68
55	3.721	|	12:30	3:635	65
2 min	2:00	3.721 |	12:45	3.590	73
05	3.692	53	~~15:15~~ 15:05	3.607	70
10	3.692	1			
15	3:676	01857			

C.A. 18 Expr. 3 Run 5

Sheet _____ Date 4/19 1954 Time 10 AM ~~PM~~

Purpose Continue S-N.

CRITICAL POSITIONS

C.A. 18 Expr. 3 Run _____

Table Pos. 999.786 L0270 T _____ R 4425

Control Rod		Channel	
1	9.348	A	35 1000/25
2		B	1040 (038 Recorder)
3	13,132	C	4.25 - 4x10⁻⁹ (Batteries
4	7.856	D	45 1000/200
		E	1.70 @ 900V

Tim Crit. 10:55 AM ~~PM~~ Duration _____ min.

INSTRUMENT CHECK

Time 10:15 AM ~~PM~~ Source 173-4-5 212

	Channel A	B	C	D	E
Range	1/1000		5x10⁻¹¹ O.K	1/1000	900V
Source Dist	contact	O.K	contact	1.0"	Contact
% F.S. Trip	50		5.6	70	0.6

Counters 1, 2, 3 O.K.

19

Level at .04 – remain 30 minutes
rise to .2 – expose for 15 minutes
return to .04 and observe

time	A	B	C	D
0	7.319	9.120	13.132	7.858
20"	" .00830	11.250	"	"
45"	5.740 01491	"	"	"
50	5.430	01548		
55	5.385	01556		
1	4.900	01635		
1 5	4.800	1658		
10	4.665	1681		
15	4.605	1691		
20	4.474	1713		
25	4.365	1757		
30	4.265	1750		
35	4.185	1765		
40	4.176	1766		
45	4.145	1771		
50	4.074	1783		
55	4.040	1789		
2	4.025	1792		
5	3.955	1805		
10	3.957	1805		
15	3.930	1.809		
20	3.915	1812		

B

?	25	3.915	01812				B
	30	3.870	01820	11.250	000948		
	35	001010	11.140		4 35	001391	10.465
	40	~~1072~~			55	1430	10.395
	45	1072	11.030		5 8	1460	10.348
	50	1087	11.002		5 25	1465	10.328
	55	001115	~~1091~~ 10.956		6 10	1495	10.292
3		001145	~~1095~~ 10.895		6 23	1506	10.270
	5	001218	10.770		6 40	1520	10.259
	10	1235	10.740		6 50	1538	10.221
	15	1255	10.705		7 10	1548	10.200
	20	1255	10.705		7 20	1570	10.165
	25	1255	10.705		7 45	1580	10.145
	30	1261	10.690		7 50	1590	10.125
	35	1278	10.670		8 20	1600	10.105
		1280	10.650		8 40	1591	10.124
	45	1280	10.650		9 10	1590	10.125
	50	1305	10.613		9 25	1578	10.148
	55	1315	10.600		10 20	1582	10.135
4		1330	10.575		11 20	1595	10.120
	5	1351	10.535		12 5	1600	10.110
	10	1372	10.495		12 35	1622	10.068
	15	1420	10.428		15 30	1641	10.035
	20	1391	10.465		17 25	001655	10.021
	25	↓	10.465	time 12:00 noon			
	30	↓	10.465	killed reactor			

4-19-54 Removed shishes from G and G', 11 thru 14 leaving a parallelopiped 24 x 24 by 28 1/2 for field measurement of flux.

4-19-54

C.A. 18 Expr. 5 Run 1

Sheet _____ Date 4-19-1954 Time _____ ~~AM~~ PM

Purpose Bare Indium foil exposures longitudinally in K-13

Foil #	Shish	Location
In C-5	K-13	14 – 2 5/8 – 1.5
C-33	"	13 – " – "
C-24	"	12 – " – "
C-6	"	11 – " – "
C-10	"	10 – " – "
C-4	"	8 – 2 3/16 – "
C-30	"	6 – 2 5/8 – "
C-13	"	5 – " – "
C-27	"	4 – 2 3/16 – "
C-23	"	3 – 2 5/8 – "
C-29	"	2 – " – "
C-31	"	1 – " – "
C-3	"	1/4 – " – "

Al #3240 H-9 (catcher) 10 – 1.5 – 1.5

CRITICAL POSITIONS

Core 18 Expr 5 Run 1

~~99.998~~ 999.788 T. 027 B .4425

Control Rod		Channel	
A	999.993 in	A 46	100/200
B	0.396	B .10	
C	13.134 amps	C 5.8	7.5×10^{-8}
D	0.035 in	D 46	1000/200
		E 3.9	870 V.

Tim Crit. 2:27 10/60 ~~AM~~ PM Duration ~~20~~ min.

Starting Power $B_1 = .037$

4-20-54

C.A. 18 Expr.' 5 Run 2

Sheet _____ Date 4-20 1954 Time _____ AM ~~PM~~

Purpose Cd covered Indium foil exposure longitudinally in K-13

INSTRUMENT CHECK

Time 9:45 AM ~~PM~~ Source PB 173-9-5' 212

	Channel A	B	C	D	E
Range	1/1000		5X10"	1/100	900V
Source Dist.	0"	OK	0"	10"	0"
% F.S. Trip	50		5.6	70	.6

Ctrs at 2,30K

al #3238 H-9 (Gatchn) 10-1.5"-1.5"

In foils numbers and locations same as for 18.5.1

Added shims at P & P'; 16 and 17 in order to override effect of cadmium. (Did not become critical without this; at least there was not sufficient reactivity to rise on a good period.)

CRITICAL POSITIONS

Expr 5 Run 2

999.788 T.0270 B .4425

	Control Rod		Channel	
A	999.993	A	27.5	1000/50
B	999.973	B	.10	
C	5.348	C	2.5	2×10^{-8}
D	000.030	D	51	1000/500
		E	2.5	840 V

Tim Crit. 10:23 10/60 ~~PM~~ AM Duration 20 min.

C.A. 18 Expr. 5 Run 3

Sheet ____ Date 4-20- 1934 Time 1:10 PM

Purpose Bare Indium traverses horizontally along midplane of reactor.

Foil #	Shield	Location B O up
C-19	K'-13	1/4 - 3/16 - 1.5"
C-21	"	" - 1 3/4 - "
C-17	J'-13	" - 3/16 - "
C-43	"	" - 1 3/4 - "
C-40	I'-13	" - 3/16 - "
C-34	"	" - 1 3/4 - "
C-16	H'-13	" - 3/16 - "
C-15	"	" - 1 3/4 - "
C-20	G'-13	" - 3/16 - 1.75"
C-28	"	" - 1 7/8 - "
C-8	F'-13	" - 3/16 - "

Al # 3239 H-9 10 1.5" - 1.5"

Shields were removed at P and P', 16 + 17 since no cadmium was present in this run.

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CRITICAL POSITIONS

CA 18 Expr. 5 Run 3

Table P... 999.797 T .0270 B .4424

Control Rod		Channel	
A	999.994	A	54.5 (1000/20)
B	0.230	B	.10
C	13.130 out	C	3.25 2×10^{-8}
D	0.032	D	51.4 (1000/500)
		E	3.0 840 V.

Tim Crit. 1:28 ~~AM~~ PM Duration 20 min.

4-21-54

C.A. 18 Expr. 5 Run 4

Sheet _____ Date 4-21-1954 Time 8:45 AM ~~PM~~

Purpose Cd covered Indium horizontally along midplane of reactor

INSTRUMENT CHECK

Time 8:50 AM ~~PM~~ Source 173-4-5, 212

	Channel A	B	C	D	E
Range	1/1000		2.5 x10⁻⁷ O.K.	1/1000	900V
Source Dist.	contact	O.K	cont.	8"	O.K
% F.S. Trip	55		1.2	65	

Counters ☐ 1, 2, 3 O.K.

Foil #	Shim	Location
C-12	K'-13	1/4 - 3/16 - 1.5"
C-11	"	" - 1 3/4 - "
C-7	J'-13	" - 3/16 - "
C-35	"	" - 1 3/4 - "
C-18	I'-13	" - 3/16 - "
C-26	"	" - 1 3/4 - "
C-14	H'-13	" - 3/16 - "
C-22	"	" - 1 3/4 - "

C-9	G'-13	1/4 - 3/16 - 1.75"
C-38'	"	" - 1 7/8 - "
C-39	F'-13	" - 3/16 - "
al # 3237	H-9	10 - 1.5" - 1.5"

Added Shishes in P & P'-16, 17 in order to override effect of Cd.

CRITICAL POSITIONS

CA 18 Expr. 5 Run 4

Table Pos. 999.789 T .0270 B .4425"

Control Rod		Channel	
A	998.997	A 26.5"	1000/500
B	999.974	B .10	
C	8.130	C 6.8	8×10^{-8}
D	0.034	D 54.5"	1000/500
		E 3.2	840 V.

Tim Crit. 9:14 30/60 AM ~~PM~~ Duration 20 min.

C.A. 18 Expr. 5 Run 5

Sheet _____ Date 4-21 195 4 Time 10 8:45 AM

Purpose Al catcher foils horizontally along mid plane and longitudinally along axis.

Foil No	Shield	Location
3234 ✓	K-13 (524)	10 - 1.5 - 1.5
3233 ✓	"	6 - 1.5 - 1.5
3236	"	2 - 1.5 - 1.5
3242 ✓	~~3235~~ K'-13 (483)	10 - 1.5 - 1.5
3235 ✓	K'-13	6 - 1.5 - 1.5
3232	"	2 - 1.5 - 1.5
3244	I'-13 (538)	2 - 1.5 - 1.5
3243 ✓	J'-13 (543)	2 - 1.5 - 1.5
3245 ✓	H'-13 (460)	2 - 1.5 - 1.5
3248 ✓ ~~3235~~	H - 9 (393)	10 - 1.5 - 1.5

Removed shields at P and P' - 16 + 17 since Ed. was not present.

CRITICAL POSITIONS

C-A. 18 Expr. 5 Run 5

Table Pos. 999.790 T.0271 T B.4425

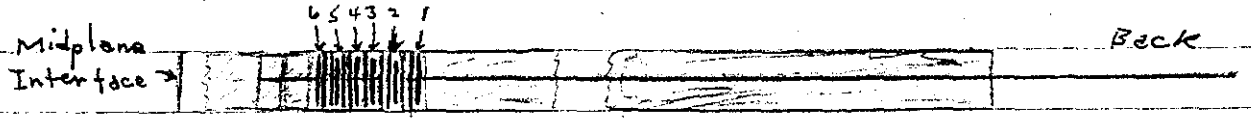
	Control Rod		Channel	
1	000,00	A	37	1000/50
2	~~17~~ 0.465	B	0.20	
3	13.135	C	5.6	2×10^{-8}
4	0.030	D	55.5	1000/1000
		E	2.8	750

Tim Crit. 11:08':49" ~~P.M.~~ AM Duration 20 : min.

11:08 49/60

C.A. 19 Expr. 5 Run 6
Sheet ____ Date 4-21-1954 Time 1:30 ~~AM~~ PM
Purpose Self Shielding in K-13

One 10-mil u disc replaced with 5 2-mil u disc in K-13, [2 - 1.5 - 1.5]
Six 2" dia Catcher foils placed between u disc as shown for sandwich -



— 2 mil u disc
— 2" dia al Catcher foil
— al sheet

1. al # 3247
2. # 3249
3. # 3250
4. # 3251
5. # 3252
6. # 3253

al # 3246 H-9 10 - 1.5 - 1.5

CRITICAL POSITIONS

C.A. 17 Expr. 5 Run 6

Table Pos. 999.790 T .0270 B .4425

Control Rod		Channel	
A. 999.997	A	32	100/200
B. 0.400	B	.05	
C. 13.129	C	5.05	5×10^{-9}
D. 0.031	D	62.4	1000/200
	E	2.7	900 V.

Tim Crit. 1:49 38/60 ~~AM~~ PM Duration 20 min.

4-22-54

C.A. 18 Expr. 5" Run 7

Sheet _____ Date 4-22-1954 Time 10:20 AM ~~PM~~

Purpose Power traverse radially and axially.

INSTRUMENT CHECK

Time 10:30 AM ~~PM~~ Source PB 173-4-5" 212

	Channel A	B	C	D	E
Range	1/1000	0	2.5	1/1000	
Source Dist.	3"	1	3	16"	0
% F.S. Trip	55		1	60	

Count 1-2 0 5

— Fuel Disc
— al Foil

Interface + − Back

al #	3254	K-13	10 −1.5 −1.5
	3255	"	68 −1.5 −1.5
	3256	"	2 − " − "
	3257	K'-13	10 − " − "
	3264	"	10 − " − "
	3258	"	6 − " − "
	3265	"	6 − " − "
	3259	"	2 − " − "
	3266	"	2 − " − "

al #	3260 +	J' - 13	2 -1.5 -1.5
	3261 +	I' - 13	" - " - "
	3262 +	H' - 13	" - " - "
	3267 -	H' - 13	" - " - "
(Norm)	3263	H - 9	10 - 1.5 - 1.5

CRITICAL POSITIONS

Run 18 Expr. 5 Run 7

Table 999.790 I .0279 B .4425

Control Rod		Channel	
A	0.995	A 39	100/200
B	0.240	B .08	
C	13.135	C 7.8	5×10^{-9}
D	0.025	D 40	1000/500
		E 4.5	900 V.

Tim Crit. 10:47 15/60 AM ~~PM~~ Duration 20 min.

C.A. 18 Expr. 5 Run 8
Sheet _____ Date 4-22-1957 Time 1:00 ~~AM~~ PM
Purpose Cd Fraction

2" dia al foils and fuel disc covered with 20 mil Cd.
added shims P & P' – 14, 15, ~~16 + 17~~ 12 + 13
to overcome effects of Cd. Added 12" Be in ~~P & P'~~ P+P'- 11

al	# 3270	L'-13	2-1.5-1.5
	# 3269+	K'-13	10-1.5-1.5
	# 3273+	H'-13	2-1.5-1.5
(Norm)	# 3268	H-9	10-1.5-1.5

CRITICAL POSITIONS

C.A. 18 Expr. 5 Run 8
Table Pos. 999.790 T. 10269T B. 44222

Control Rod		Channel	
A 999.998	A	44	100/200
B 13.242	B	.08	
C 13.134	C	4.0	10-8
D 2.9	D	40	1000/200
	E	4.3	900 V

Tim Crit. 1:38 47/60 ~~AM~~ PM Duration 20 min.

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4-23-54

INSTRUMENT CHECK

Time 9:50 AM ~~PM~~ Source 173-4-5 212

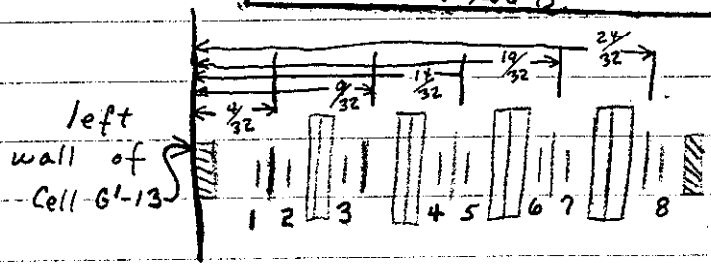
	Channel A	B	C	D	E
Range	1/1000		1/100		
Source Dist.	Contact O.K.		8"	O.K	O.K
% F.S. Trip	50		65		

Counters #1, #2, #3, O.K

C.A. 18 Expr. 5 Run 9

Sheet ____ Date 4-23 195 4 Time 10:00 AM ~~PM~~

Purpose Al Foil (catcher) exposure for Scott type experiment with U-Teflon sandwiches at edge of Reactor; and to check Servo-mech on rod B



1/8" al top
Aluminum Catcher foil.
Uranium discs (2 mil, large, solid
Double teflon (Total thickness 1/8")

~~#~~	Foil Position	Foil No.		Foil Position	Foil No.
All Three are located as in diagram above. in G'-13, ~~#~~ back 1.5, up 1.5, and over as above.	1 (G'-13)	3271		5 (G'-13)	3277
	2 (G'-13)	3274		6 (G'-13)	3278
	3 (G'-13)	3275		7 (G'-13)	3279
	4 (G'-13)	3276		8 (G'-13)	3280

Al foil # 3281 at H-9 back 10 - over 1.5 - up 1.5 (standard)

The beryllium and shicks added in P and P' ~~were removed except~~ in Run 8 (18-5-8) were removed with the exception of the shicks in Rod P'-13.

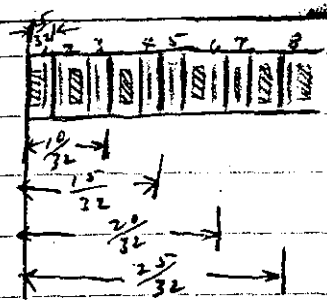
CRITICAL POSITIONS

C.A. 18 Expr. 5 Run 9

Table Pos. 999.790 T .0269 T L .4423

	Control Rod		Channel	
1	999.995	A	29.5	100/500
2	On Servo 4.7	B	.250	
3	3.375	C	7.0	2×10^{-8}
4	0.422	D	70	1000/1000
		E	3.4	750 V.

Tim Crit. 10:25 21/60 ~~EST~~ AM Duration 20 min.



- 2 mil Al
- ~~Au Cu~~
- ½" Al tap
- Al sheet (5 mil)

Loading for 18.5.10

C.A. 18 Expr. 5 Run 10

Sheet _____ Date 4-23-1954 Time 1240 ~~AM~~ PM

Purpose Foil exposure same as for 18.5.9 using ⅛" Al spacers in place of teflon.

A'-13

1.	# 3282	5.	# 3286	} Back 1.5" Up 1.5" over See p 95,
2	3283	6.	3287	
3.	3284	7.	3288	
4.	3285	8.	3289	

3290 H-9 10 – 1.5" – 1.5"

CRITICAL POSITIONS

C.A. 18 Expr. 5 Run 10

Table Pos. 999.789 T .0279 B 44455

Control Rod		Channel	
A	999.997	A	37 1000/50
B	4.68 on Servo	B	.25"
C	4.458	C	6.85 2×10^{-8}
D	0.028	D	69.2 1000/1000
		E	3.2 750V.

Tim Crit. 2:01 36/60 AM PM Duration 20 min.

April 23, 1954 — A servo was tried using the amplifier from a Brown Recorder.

Servo was installed so as to operate the shock in K'13.

Originally control rod B was replaced by the servo, but this rod is relatively insensitive and gave a slow response. The present arrangement allows B to be operated normally with the addition of the servo.

C.A. 18 Expr. 53 Run 4

Sheet _____ Date 4/26 1954 Time 12:30 PM

Purpose Calibration of servo against control rod A.

INSTRUMENT CHECK

Time 12:25 AM PM Source 1, 3, 4, 5, 2(2

	Channel A	B	C -10	D	E
Range	1/1000	ok	1	1/1000	900
Meter Dist.	0		0	12	0
% F.S. Trip	60		30	35	5

CRITICAL POSITIONS 9

C A 18 Expr. 3 2 Run 4

Rod Pos. 999788 L.4430 T.0279R

Control Rod		Channel	
A	.002	A	30. 100/100
B	1.345	B	.020
C	13.135	C	3.8 2.5×10^{-9}
D	13.292	D	48. 100/1000
Servo	4.889	E	.8 900 V

Tim-Crit. 12:55 ~~AM~~ PM Duration ____ min.

Control A.	Servo	Control B
0.002	4.889	1.345
0.504	4.472	1.345
1.005	4.123	1.345
0.001	4.871	1.345
0.001	4.255	2.312
0.001	3.680	3.300
0.001	3.219	4.320
0.001	~~2.87~~ 2.845	5.306
0.001	2.510	6.300
	2.190	7.305
	1.908	8.295
	1.610	9.310
	0.970	11.295
	.560	13.140

with servo calibration p/90

4-27-54

C.A. 18 Expr. 5 Run 11

Sheet ____ Date 4-27 1954 Time ____ AM PM

Purpose Bare Indium foil exposure to try to determine minimum foil spacings.

INSTRUMENT CHECK

Time 8:30 AM PM Source 123.4.5 212

4/27/54

	Channel A	B	C	D	E
Range	1/100 OK		OK	1/1000	OK
Source Dist.	0			6"	
% F.S. Trip	45			25	

Counters OK

			Back	Run	Up	
In	C-22	I-13	4.0	1.5	2 5/32	1.00
	C-18	I'-13	3.0	1.5	"	1.00
	C-31	"	3.5	"	"	1.00
	C-4	"	4.0	"	"	1.10
	C-13	"	4.5	"	"	1.00
	C-15	"	5.0	"	"	1.00

Run 1.5 Up 2 5/32 Gosing corrections to

IN	C-3	N-13	3.0 - 1 21/32 - 2 9/32
	C-33	"	4.0 - 1.5 - "
	C-39	"	5.0 - 1 21/32 - "
	C-21	N'-13	3.0 - 1.5 - 1.75
	C-44	"	3.25 - " - "
	C-14	"	3.50 - " - "
	C-12	"	3.75 - " - "
	C-40	"	4.00 - " - "
	C-5	"	4.25 - " - "
	C-42	"	4.50 - " - "
	C-8	"	4.75 - " - "
	C-20	"	5.00 - " - 2 5/32
al	# 3291	H-9	10.0 - 1.5 - 1.5

CRITICAL POSITIONS

C A. 18 Expr. 5 Run 11

Table Pos. 999.978 L T.0269 B .4424

Control Rod		Channel	
A 0.00.000	A	18	100/500
B 999.994	B	.15	
S 13.135	C	4.2	2×10^{-8}
D 1.20	D	40.	1000/1000
Servo 0.030	E	8.7	900 V.

Tim Crit. 9:51 55/60 AM PM Duration 20 min.

C.A. 18 Expr. 5 Run 12

Sheet ____ Date ____ 195__ Time ____ AM PM

Purpose Irradiation of Cd-In Foils

Back Over Up

In Foils

C-36	I-13	4.0 - 1.5 - 2 5/32
26	I'-13	3.0 " "
9		3.5 " "
43		4.0 " "
17		4.5 " "
17		5.0 " "
19	N-13	3 - 1 21/32 - 2.5/32
29		4 - 1.5 - 2 5/32
6		5 - 1 21/32 - "
38	N'-13	3.00 - 1.5 - ~~2 5/32~~ 2 5/32
44		3.25 " 1.75
23		3.50 " "
12		3.75 " "
16		4.00 " "
5		4.25 " "
34		4.50 " "
48		4.75 " "
24		5.00 " "

CRITICAL POSITIONS

C.A. 18 Expr 5 Run 12

Table Pos. 999.786 0270 4422

Control Rod	Channel
1 000.002	A 48.0 100/200
2 999.987	B .150
3 13.134	C 4.0 @ 2×10^{-8}
4 8.132	D 39.5 1000/1000
Servo 999.997	E 1.65 @ 750v

Tim Crit. 10:43 25/60 AM ~~PM~~ Duration 20 min.

C.A. 18 Expr. 6 Run 1

Sheet _____ Date April 27 1954 Time 1:30 ~~AM~~ PM

Purpose Zero position with no change for danger coefficients.

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 1

Table Pos. 999.9785 T.0278 B.4421

	Control Rod		Channel
1	0.000	A	30 @ 10/1000
2	0.495	B	.021 ~~48 10/1000~~
3	13.13X	C	4.0 2.5×10^{-9}
4	13.291	D	48 @ 100/1000
Servo	0.223	E	1.0 @ 900 V.

Tim Crit. 1:45 ~~AM~~ PM Duration 5 min.

Scrubbers added at K, K'; L and L' 18

C	Table position	L	B	D	Servo
13.134	999.825	.4469	0.494	~~0.95~~	.225
↓	"	"	999.945	0.030	3.573
	999.846	.4600	"	"	3.224
	999.889	.4844	"	"	2.780
	999.951	.5418	"	"	0.045
	"	"	"	"	
999.917	"	"	"	"	0.882

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 2

Table Pos. 999.786 L T B .4422

Control Rod		Channel	
1	~~999.786~~ 0.002	A	35.5 100/100
2	0.482	B	.0205
3	13.133	C	7.5 10^{-9}
4	13.290	D	51 1000/100
Servo	999.949	E	.85 @ 900V

Tim Crit. 2:45 ~~AM~~ PM Duration 10 min.

Danger coeff Fuperal 1" can in L-15

(Gross) Total weight 183.070

Weight of can ~33 gms.

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 3

Table Pos. 999.786 I ____ R 4427

Control Rod		Channel	
1	000.000	A 35.5	100/100
2	999.945	B .021	
3	13.133	C 3.98	2.5×10^{-9}
4	9.213	D 51.25	1000/100
Servo	999.952	E 1.0 @ 900	

Tim Crit. 3:35 ~~PM~~ Duration 15 min.

Danger Coeff — 1" can S.S. containg Terrocene Alc. in L-15

Weight of can 32.59 gm.

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 4 4424

Table Pos. 999.785 4429

Control Rod		Channel	
1	000.001	A	35 100/100
2	999.948	B	.022
3	13.132	C	~~500~~ 405 2.5×10^{-9}
4	13.290	D	48.7 100/1000
Servo	.041	E	1.0 @ 900

Tim Crit. 3:35 ~~AM~~ PM Duration 10 min.

1" Water sample in L-15 (S.S. can)

(Servo Source in at B=.022
~~0.058~~ 0.072
Servo source out at B=.022 – 0.041)

Other readings are the same

Gross Weight of Sample 160.558 gm
weight of can ~33 — gm

CRITICAL POSITIONS

CA 18 Expr. 6 Run 5

Table Pos. 999.786 T R 4428

Control Rod		Channel	
1	000.002	A 35	100/100
2	0.950	B .0200	
3	13.132	C 3.75	2.5×10^{-9}
4	13.290	D 48.2	1000/100
Servo	— 999.950	E .80 @ 900v	

Tim. Crit. 4:00 AM ~~PM~~ Duration 10 min.

1" Plexi glass Holes drilled to approximate
(1" x 2 7/8" x 2 7/8") 1/2 normal density.

157.67 gm (whole)
83.5 gm after drilling holes.

CRITICAL POSITIONS

C.A. 18 Expr. 16 Run 6

Table Pos. 999.784 B 4424

Control Rod	Channel
1 .000	A 68.5 100/50
2 0.495	B .0202
3 13.133	C ~~4.8~~ 3.9@2.5X10^{-7}
4 13.290	D 49.6 1000/100
Servo 0,223	E .8 @ 900V

Tim Crit. 4:20 ~~AM~~ PM Duration 10 min.

Check zero readings compare with first Zero run Page 103

INSTRUMENT CHECK

Time 9:10 AM ~~PM~~ Source

	Channel A	B	C	D	E
Range	1/1000			1/1000	
Source Dist.	0"	O.K.	O.K.	12	O.K
% F.S. Trip	55			75	

Coin 5 ~~th~~ 4, 3, 3, O.K

C.A. 18 Expr. ~~5~~ 6 Run 7

Sheet ____ Date April 28 1954 Time 9:45 AM ~~PM~~

Purpose Danger coefficient of 7¼" void in L-15 (No shim removed; shim was pushed back from mid-plane)

Table Dial Zero position

U 7909

L 6982

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 7

Table Pos. 999.784 T. 4585 B. 51478

Control Rod		Channel		
1	999.995	A	56.5	10/500
2	999.945	B	0.0195	
3	13.134	C	7.8	10^{-9}
4	0.025	D	50.0	1000/100
Servo	1.110	E	0.8	@ 900 V.

Tim Crit. 10:30 AM ~~PM~~ Duration 13 min.

In order to become critical,
A shim was added in each Cabo half
on the last run (run 7) Giving an addition
to the rectangular arrays shims in
K-L-M-; & K'-L'-M' - 1B

Run 8: The 7-1/4" void in L-15 was filled
with graphite. Weight — 1624.30 gm

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 8

Table Pos. 999.785 K 1.4583 L 1.1478

	Control Rod		Channel	
1	999.995		A 59.5	10/500
2	999.947		B 0.0190	
3	13.134		C 7.5	10^{-9}
4	5.474	0.025	D 50.0	1000/100
Servo	1.110	3.290	E 0.8	@ 900V

Tim Crit. 10:50 AM Duration 15 min.

Run 9: 7-1/2" filled with teflon and graphite removed. weight of teflon — 2026.02 gm

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 9

Table Pos. 999.786 T. 4583 L.P. 1480

	Control Rod		Channel	
1	~~999.997~~ 999.997	A	60.2	@ 10/500
2	999.945	B	0.0720	
3	13.134	C	7.5	@ 10^{-9}
4	{0.025 / 3.471}	D	50.1	@ 1000/100
Servo	{2.692 / 1.110}	E	0.8	@ 900V

Tim Calt. 11:20 ~~AM~~ PM Duration 15 min.

Removed Teflon — returned slinch in L-15 to its normal position.

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 10

999.784 4582 T R 1497

	Control Rod			Channel	
1	999.998	999.998	999.998	A 35.3	100/100
2	3.680	999.944	999.944	.0202	
3	13.134	13.134	13.134	7.55×10^{-9}	
4	13.292	13.292	.025	D 50.4	1000/100
Servo	1.110	3.192	6.667	E .7 @ 900V	

Tim Calt. 11:50 AM PM Duration 15 min.

C.A. 12 Expr. 7 Run 1

Sheet _____ Date 4/29 195 4 Time 9.05 AM PM

Purpose Expose Uranium ~~Plexiglas~~ foils

[J.T. Thomas Experiment] [20 M.V.]

INSTRUMENT CHECK

Time 8:20 AM ~~PM~~ Source 173, 4, 5, 22/

	Channel A	B	C	D	E
Range	1000	off	10^{-10}	1000	900
Source Dist.	0		0	15	0
% F.S. Trip	60		34	48	05

Expose foils #10 and #15 at L-14 (Stationary Wolf).

CRITICAL POSITIONS

C A 18 Expr. 7 Run 1

Table Pos. .999.783 T.4592T R.1452

Control Rod		Channel		
1	999.995	A 39.5	@	100/200
2	5.562	B 0.100		
3	13.133	C 5.0	@	10^{-8}
4	13.295	D 50.0	@	1000/6000
"Servo"	0.058	E 1.1	@	750 V.

Demand setting 4.62

Tim Crit. 9.12 AM Pile Dilation 20 min.

C.A. 18 Expr. 7 Run 2

Sheet _____ Date 4-29-1954 Time 10:30 ~~PM~~ AM

Purpose Exposure of re-packaged Capsule fails [30 Minute Exposure]

# 1	L-14	1/8 - 1/8 - 2 3/8
# 7	L-14	1/8 - 1 1/2 - 2 3/7

CRITICAL POSITIONS

C.A. 18 Expr. 7 Run 2

Table Pos. 999.785 T. 4584 B. 1461

Control Rod	Channel	
A 999.999	A 41	100/200
B 5.312	B .10	
C 13.134	C 2.6	2×10^{-8}
D 13.295	D .50	1000/500
Servo 1.50	E .9	.750 V.
Demand Setting 4.62		

Tim Crit. 10:46 69/60 AM ~~PM~~ Duration 30 min.

C.A. 18 Expr. 2 Run 3

Sheet _____ Date 4-29 1954 Time 1:10 ~~PM~~ AM

Purpose _____

CRITICAL POSITIONS

C A 18 Expr. 2 Run 3

Table Pos. 999.875 L 1475 T 4588 R

Control Rod		Channel	
1	999.995	A	32 x 100/150
2	5.220	B	.30
3	13.134	C	8.4 2×10^{-8}
4	13.295	D	83.5 1000/1000
Dano	0.150	E	4.6 200 ✓
D. S.	759		

Tim Crit. 1:20 ~~PM~~ AM Duration 25 min.

CRITICAL POSITIONS

Run 18 Expr Date

7.000	28 100/50
999.944	.0010
999.916	$1.2@5X10^{-10}$
000.021	D 50.05 10/500
	E — Low range.

Time Estt. 2:30 ~~AM~~ PM Duration ____ min.

Comparison of SK vs ρ (T)
Assembly is now the clean system ~~EE~~ (see p 28) except for added shields in G and G', 12 & 13.

Low level RN— .0010 D-50 10/500
Servo demand 4,62

Blend A Servo

~~Cut~~

~~Super~~ 9.495 999.910

~~Subject~~

~~Side~~ A Servo Ln. N

Critical 7.000 1.244 .001

Super ½": ~~6.505~~ 6.507 "

Rock to .00185 & stabilized — total time 11 min. after change.

apparent level A-6.507, servo 1.244 Ln N-

Super A=6.005, servo 1.244 —

See next page.

originally a level was found at .0010
with A = 7.000, Servo = 1.244
A was run in to 6.507 causing a positive period. This, however ~~decreased~~ increased until a new power level was reached at .00185
11 minutes after the change in rod A, no further change in power level was noticable. At this time A was again run in to a new setting 6.005". The resulting period ~~was~~ continued for only a short time and again ~~decreased~~ increased. The linear recorder (A,C,O) showed an essentially linear, rather than exponential rise. This is similar to rising on a source, rather than on a reactivity period. A was changed to hold the new level at 02
A is 6.044 at this level.

Change A to 5.505 to increase rise rate
Stopped period at $\ln N = 0.30$
A = 6.032 level at 0.30
Removed rod A and rod B to lower level.
First reached .001 in about 7 minutes.

C.A. 18 Expr. 3 Run 6 (4)

Sheet — Date 4/30 1954 Time 8:30 AM ~~PM~~

Purpose γ-n To observe long half life γ-n's

INSTRUMENT CHECK

Time 8:30 a — Neutron 173,415,212

	A	B	C	D
Range	1/1000 OK	OK	1/1000 @ 900V	
Source Dist.	0		12	OK
% F.S. Trip	55		75	

Counters OK.

CRITICAL POSITIONS

C.A. 18 Expr. 3 Run 6

Pile Osc. 999.783 4579 — 1474

	Scale	Decimal		
1	1.062	999.994	42.0	1000/50
2	8.661	8.661	0.30	
3	13.134	13.134	9.09	2×10^{-8}
4	0.035	0.035	D 94.0	1000/1000
Servo	~1.134	2.172	E ~~9.1~~ @ 750V	

(On Servo control)

(Ohms 8.511)

Tim Crit. 8:52 40/60 AM ~~PM~~ Duration 15 hrs.? min

Ex final level.

10:45 Checked and adjusted calibration on the Ln N meter. This changed the power reading somewhat —

11:09 AM. The reading on Ln N after 2 hr 15 min running time is 0.324 —

Servo demand setting is 8.511 D is 93.9 $\frac{1000}{1000}$

A — 43.5 1000/50

C — 8.88 2×10^{-8}

E — 9.20 @ 750V

Power reduction procedure —

1) set control rod selector to B.
2) Press "All Demand"
3) Immediately set servo demand at 0.25.
(Pull servo power plug when position indicator reads ~9".
4) Run control rod B in to 8.661 immediately after control rods reach their "out" position.
5) When Ln N drops to .0015, run control rod A in to hold this level start recording rod positions. ~5 sec intervals
6) Run B Control rod D in to hold this power level, recording changes in D.
7) When D is approximately in turn on servo. then adjust demand to hold indicator constant until D is all the way in.
8) when D is in — servo to take control.

Instruments.

450 A: 43.50 1000/50
B: 0.332
C: 8.85 @ 2×10⁻⁸
D. 93.8 @ 1000/100.0
E. 9.25 @ 750 V.

Initial Positions before power level change

A — 999.994, B — 8.661, C — 13.134, D — .035
Servo — 2.173

Initial Positions during transient

A B C D
Servo - -

Rod positions:

Time:	A	B	C	D	Servo.
1:30		8.661	13.134	13.290	
3:03					8.9850
4:10	13.141 ~~0.0116~~ .00133				7.01256
15	12.250 ~~.0011~~ .00221				
20	11.390 .00376				
25	10.90 .00491				
30	~~10.63~~ ~~.00622~~				
35	10.314 .00622				
40	9.720 .00750				
45	9.720 .00750				
50	9.518 .00791				
~~55~~	9.307 831				
5:00	9.090 .00875				
:05	8.873 .00944				
10	8.25 .01035				
15	8.130 .01055				
20	7.528 .01162				

Time final positions after run on page 140

% change in B or C
final settings A - 999.994
D - 0.031
Servo - 2.395

:25	2.294	01205	
30	7.162	1230	
35	7.162	1230	
40	6.813	1295	
45	6.480	1353	Interpolated values from plot
50	6.394	1371	
55	6.120	1423	
60	5.922	1459	01460
6:05	5.719	1495	
:10	5.632	1512	
:15	5.448	1545	.01550
:20	5.383	1557	
:25	5.187	1590	
:30	5.004	1620	.01630
:35	4.840	1650	
:40	4.660	1681	
:45	4.460	1716	01726
:50	4.294	1745	
:55	4.097	1780	
7:00	3.879	1818	01818
:05	3.660	1860	
:10	3.515	1887	
:15	3.309	1928	01908
:20	3.045	1977	
:25	3.045	1977	
:30	2.958	1995	01980

35	2.458	01995	
40	2.539	2018	
45	2.660	2052	02068
50	2.501	2083	
55	2.346	2116	
8:00	2.185	2150	02135
:05	2.052	2176	
:10	1.893	2207	
15	1.764	2234	02202
20	1.764	2234	
25	1.635	2260	
30	1.635	2260	02245
35	1.635	|	
40	1.635	|	
45	1.635	|	02286
50	1.518	2283	
55	1.518	1	
9:00	1.320	2322	02320
:05	1.201	2345	
:10	1.202	2344	
:15	1.121	2361	02355
:20	1.121	|	
:25	1.018	2381	
:30	1.018	|	02388
:35	1.018	|	
:40	~~0.931~~	2398	

45	0.931	02398	02412
50	0.842	2415	
55	0.830	2417	
10.00	0.250	2431	02445
05	0.750	2431	
10	0.560	2465	
15	0.468	2482	02480
20	0.355	2502	
25	0.244	2521	
30	0.244	|	02510
35	0.244	|	
40	0.243	2521	
45	0.005	2555	02545
50	.004	02555	

	D		
	13.290	.000110	Interpolate from plot
11.00	13.060	000127	0
05	13.060	1	
10	12.502	137	
15	12.300	209	.00025
20	12.250	217	
25	11.898	289	
30	11.498	376	00051
35	11.074	478	
40	10.650	595	
45	10.180	740	00076
50	9.250	001044	

	D				D			D
:55	9.278	001035	14:40	4.692	3391	18:00	2.357	00552 00554 5
12:00	9.270	1238 001004	50	4.692		10	2.101	5705
12:05	8.580	1276	15:00	4.692	00350	20	1.981	5832
10	8.310	1380	10	4.517	003520	30	1.981	00575
:15	7.842	1570	20	4.399	3611	40	1.982	
:20	7.610	1675	30	4.300	3682 00378	50	1.982	
:25	7.610	1675	40	4.160	3785	20:00	1.982	00599
:30	7.610	| 00152	50	3.893	4000	10	1.878	5941
:35	7.230	001853	16:00	3.716	4155 00405	20	1.799	00602 6025
:40	7.208	1864	10	3.582	4270	30	1.708	00624 6121
:45	7.014	1958	20	3.445	4390	40	1.608	6232
:50	←	~~204~~	30	3.290	4530 00453	50	1.552	6285
:55	6.835	2050	40	3.135	4675	21:00	1.486	00646 6358
13:00	6.835	| 00200	50	3.135		10	1.390	6460
05	6.674	2139	17:00	3.135	00458	20	1.276	6590
10	6.674	|	:10	3.135		30	1.195	00670 6679
15	6.674	|	:20	3.135		40	1.120	6765
20	6.575	2229	:30	3.135	00482	50	1.085	6800
25			40	2.925	4870	22:00	1.017	6980 00691
30	6315	2340 00245	50	2.925	|	10	0.920	6990
13:35	6.010	2518	18:00	2.837	00507 4956	20	0.900	7010
:50	6.010	|	10	2.739	5055	30	0.831	7085 00710
N:00	5.702	2708 00283	20	2.635	5155	40	0.792	7130
:10	5.405	2900	30	2.533	5255 00534	50	0.725	7200
:20	5.120	3090	40	2.256	5545	23:00	0.683	7240 00726
:30	4.780	3175 00318	50	2.257	|	10	.636	7292

	D			Servo
			28:45	8.494
23.20	0.589	7340	29:00	8.463
30	0.537	7392.042	29:15	8.415
40	0.466	7470	29:30	8.400
50	0.417	7522	29:45	8.390
24:00	0.316	7627 00760	30:00	8.350
10	0.290	7649	30:15	8.310
20	0.264	7675	30:30	8.290
30	0.240	007701 00776	30:45	8.228
40	0.150	7792	31:00	8.208
50	0.115	7828	31:15	8.194
25 00	0.084	7855 07880 Servo.	31:30	8.163
10	.032	007902 8.980 01257	31:45	8.133
20		8.985 01257	32:00	8.105
40		8.920 1261	32:15	8.094
50		8.930 1271	32:30	8.075
26 00		8.912 1276	32:45	8.030
10		8.900 1290	33:00	8.000
26:20		8.811 1305	33:15	7.995
:45		8.780 1314	33:30	7.985
27:00		8.710 1332	33:45	7.915
:15		8.667 1345	34:00	7.898
:30		8.630 1355 ~~1421~~	34:15	7.882
45		8.603 1361	34:30	7.840
28:00		8.562 1372	34:45	7.804
28:15		8.543 1378	35:00	7.796
28:30		8.508 1389		

Time	servo	Time	Servo		
35:15	7.793	42:00	7.184		
35:30	7.788	42:15	7.181	48:45	6.760
35:45	7,783	42:30	7.177	49:00	6.740
36:00	7,704	42:45	7.153	49:15	6.735
36.15	7,693	43:00	7.139	49:30	6.715
36.30	7,680	43:15	7.093	49:45	6.710
36.45	7,617	43:30	7.090	50:00	6.690 01846
37:00	7.613	43:45	7.084	50 15	6.680
37:15	7;597	44:00	7.070	50 30	6.655
37:30	7;586	44:15	7.048 0	50:45	6.650
37:45	7:565	44:30	7.017	51:00	6.630
38:00	7.516	44:45	6.996	51:15	6.600
38:15	7,497	45:00	6.990	51.30	6.585
38:30	7,494	45:15	6.985	51:45	6.585
38:45	7;485	45:30	6.980	52:00	6.585
39:00	7.450	45:45	6.975	52:15	6.585
39:15	7.421	46:00	6.897	52:30	6.575
39:30	7.392	46:15	6.890	45	6.520
39:45	7.393	46 30	6.885	53:00	6.495
40:00	7.385	46:45	6.860	15	6.482
40:15	7.355	47:00	6.835	30	6.480
40:30	7.300	47:15	6.825	45	6.485
40:45	7.290	47:30	6.835	54:00	6.480
41:00	7.279	47:45	6.835	15	6.460
41:15	7.260	48:00	6.805	30	6.430
41:30	7.235	48:15	6.785	54:45	6.385
41:45	7.200	48:30	6.780	55:00	6.390

time	Servo		Servo		
55:15	6.395	61:45	6.080	68:15	5.815
30	6.382	62.00	6.080	30	5.820
45	6.380	:15	6.080	45	5.809
56:00	6.375	30	6.075	69:00	5.795
15	6.365	45	6.071	15	5.785
30	6.335	63.00	6.070	30	5.780
45	6.302	63:15	6.069	45	5.778
57:00	6.322	30	6.040	70:00	5.778
15	6.305	45	6.005	15	5.760
30	6.282	64:00	5.985	30	5.745
45	6.285	15	5.980	45	5.735
58:00	6.280	30	5.975	71:00	5.730
15	6.275	45	5.972	:15	5.728
30	6.278	65:00	5.950	30	5.700
45	6.245	15	5.935	45	5.710
59.00	6.215	30	5.945	72:00	5.710
15	6.215	45	5.922	72:15	5.704
30	6.205	66.00	5.885	72:30	5.695
45	6.182	15	5.880	72:45	5.690
60:00	6.182	30	5.875	73:00	5.678
15	6.175	45	5.870	73:15	5.676
30	6.152	67:00	5.860	73:30	5.670
45	6.138	67:15	5.860	73:45	5.644
61:00	6.130	:30	5.860	74:00	5.638
61:15	6.115	:45	5.849	74:15	5.617
61:30	6.082	68:00	5.820	74:30	5.605

Time	servo	Time	servo	Time	servo
74:45	5.605	81:30	5.380	90:20	5.115
75:00	5.590	81:45	5.380	90:40	5.080
75:15	5.585	82:00	5.380	91:00	5.074
75:30	5.578	82:20	5.371	91:20	5.073
75.45	5.577	82:40	5.330	91:40	5.072
76:00	5.580	83:00	5.338	92:00	5.071
76:15	5.580	83.20	5.310	92:20	5.074
76:30	5.577	83.40	5.300	92:40	5.067
76:45	5.576	84:00	5.278	93:00	5.065
77:00	5.560	84:20	5.290	93:20	5.022
77:15	5.528	84:40	5.275	93:40	5.021
77:30	5.488	85:00	5.274	94:00	5.005
77:45	5.490	85.20	5.280	94:20	5.004
78:00	5.513	85.40	5.270	~~95:00~~ 94:40	4.999
78:15	5.530	86.00	5.268	95:00	4.982
78:30	5.512	86.20	5.255	95:20	4.978
78:45	5.485	86.40	5.220	~~96:00~~ 95:40	4.973
79:00	5.474	87:00	5.180	96:00	4.970
79:15	5.469	87:20	5.193	96:20	4.968
79:30	5.438	87:40	5.184	96:40	4.945
79:45	5.435	88:00	5.185	97:00	4.918
80:04	5.409	88:20	5.191	97:20	4.915
80:15	5.412	88:40	5.176	97:40	4.922
80:30	5.422	89:00	5.175	98:00	4.915
80:45	5.432	89:20	5.174	98:20	4.895
81:00	5:415	89:40	5.166	98:40 ? 92:80	4.900
81:15	5:439	90:00	5.132	99:00	4.910

Time	Servo	Time	Servo	Time	Servo
99:20	4.908	108:20	4:670	117:20	4.485
99:40	4.875	108:40	4.677	117:40	4.484
100:00	4.872 02240	109:00	4.668	118:00	4.476
100:20	4.870	109:20	4.666	118:20	4.467
100:40	4.874	109:40	4.659	118:40	4.471
101:00	4.868	110:00	4.639	119:00	4.472
101:20	4.830	110:20	4.620	119:20	4.466
101:40	4.800	110:40	4.604	119:40	4.465
102:00	4.814	111:00	4.598	120:00	4.455
102:20	4.798	111:20	4.593	120:20	4.449
102:40	4:804	111:40	4.582	120:40	4.440
103:00	4:771	112:00	4.590	121:00	4:415
103:20	4:765	112:20	4.568	121:20	4:390
103:40	4:762	112:40	4.580	121:40	4:388
104:00	4.757	113:00	4.580	122:00	4:388
104:20	4.755	113:20	4.571	122:20	4:386
104:40	4.743	113:40	4.567	122:40	4:390
105:00	4.741	114:00	4.567	123:00	4:387
105:20	4.722	114:20	4.567	123:20	4:385
105:40	4.712	114:40	4.557	123:40	4:365
106.00	4.689	115:00	4.519	124:00	4:365
106:20	4.695	115:20	4.540	124:20	4:363
106:40	4.716	115:40	4.538	124:40	4:360
107:00	4.710	116:00	4.525	125:00	4.355
107:20	4.689	116:20	4.516	125:20	4.350
107:40	4.680	116:40	4.479	125:40	4.348
108:00	4.678	117:00	4.479	126:00	4.345

Time	Servo	Time	Servo	Time	Servo
126:30	4.305	1:40:00	4.124	153 30	3.994
127:00	4.307	140:30	4.120	154	3.950
127:30	4.282	141	4.118	154 30	3.934
128:00	4.303	141:30	4.118	155	3.895
128:30	4.294	142	4.099	155 30	3.886
129:00	4.276	142:30	4.081	156	3.914
129:30	4.268	143	4.065	156 30	3.899
130:00	4.265	143 30	4.075	157	3.884
130:30	4.252	144	4.080	157 30	3.895
131	4.245	144 30	4.075	158	3.884
131:30	4.233	145	4.090	158 30	3.884
132	4.208	145 30	4.071	159	3.892
132:30	4.185	146	4.065	159 30	3.872
133	4.202	146 30	4.049	160	3.904
133:30	4.197	147	4.027	160 30	
134	4.188	147 30	4.028	161	3.870
134:30	4.185	148	4.012	162	3.856
135	4.178	148 30	3.998	163	3.842
135.30	4.198	149	3.986	164	3.790
136	4.188	149 30	3.992	165	3.835
136.30	4.180	150	3.990 D2423	166	3.784
137	4.169	150 30	3.985	167	3.790
137.30	4.162	151	3.978	168	3.794
138	4.154	151 30	3.976	169	3.802
138.30	4.140	152	3.965	170	3.764
139	4.126	152 30	3.965	171	3.742
139:30	4.138	153	3.958	172	3.730

TIME	Servo	TIME min	Servo		TIME min	Servo	
173 min	3.728	200	3.488	2536	227	3.302	
174	3.680	201	3.492		228	3.290	
175	3.690	202	3.478		229	3.292	
176	3.694	203	3.483		230	3.274	
177	3.682	204	3.462		231	3.282	
178	3.682	205	3.463		232	3.286	
179	3.682	206	3.459		233	3.284	
180	3.678	207	3.434		234	3.290	
181	3.655	208	3.423		235	3.265	
182	3.638	209	3.413		236	3.257	
183	3.614	210	3.407		237	3.234	
184	3.600	211	3.393		238	3.222	
185	3.595	212	3.388		239	3.222	
186	3.596	213	3.398		240	3.225	
187	3.590	214	3.386		241	3.215	
188	3.582	215	3.385		242	3.238	
189	3.613	216	3.382		243	3.180	
190	3.583	217	3.386		244	3.222	
191	3.582	218	3.372		245	3.208	
192	3.538	219	3.365		246	3.190	
193	3.530	220	3.350		247	3.192	
194	3.535	221	3.370		248	3.189	
195	3.510	222	3.346		249	3.182	
196	3.495	223	3.314		250	3.188	02605
197	3.508	224	3.340		251	3.183	
198	3.485	225	3.298		252	3.182	
199	3.500	226	3.300		253	3.195	

TIME MIN	SERVO	TIME MIN	SERVO	TIME MIN.	SERVO
254	3.170	281	3.082	308	2.979
255	3.164	282	3.080	309	2.956
256	3.167	283	3.060	310	2.973
257	3.157	284	3.038	311	2.960
258	3.150	285	3.025	312	2.967
259	3.140	286	3.023	313	2.962
260	3.148	287	3.000	314	2.925
261	3.120	288	3.018	315	2.918
262	3.113	289	3.023	316	2.918
263	3.123	290	3.027	317	2.942
264	3.108	291	3.018	318	2.915
265	3.133	292	3.006	319	2.930
266	3.081	293	3.005	320	2.926
267	3.108	294	2.999	321	2.912
268	3.103	295	2.996	322 323	2.924
269	3.100	296	2.990	324	2.906
270	3.090	297	2.988	325	2.925
271	3.110	298	2.985	326	2.886
272	3.112	299	2.995	327	2.904
273	3.090	300	2.993 02650	328	2.889
274	3.088	301	2.992	329	2.885
275	3.083	302	2.975	330	2.907
276	3.092	303	3.000	331	2.914
277	3.090	304	2.987	332	2.895
278	3.090	305	2.976	333	2.886
279	3.070	306	2.988	334	2.883
280	3.053	307	2.982	335	2.902

Time min	Servo	Time min	Servo	Time min	Servo
336	2.905	363	2.815	390	2.770
337	2.887	364	2.820	391	2.762
338	2.881	365	2.792	392	2.760
339	2.912	366	2.802	393	2.770
340	2.877	367	2.814	394	2.772
341	2.893	368	2.805	395	2.765
342	2.883	369	2.822	396	2.760
343	2.881	370	2.790	397	2.728
344	2.859	371	2.800	398	2.720
345	2.882	372	2.815	399	2.749
346	2.864	373	2.815	400	2.755 02707
347	2.862	374	2.795	401	2.765
348	2.860	375	2.789	402	2.745
349	2.872	376	2.789	403	2.755
350	2.855 02683	377	2.800	404	2.739
351	2.833	378	2.785	405	2.755
352	2.828	379	2.805	406	2.740
353	2.846	380	2.795	407	2.715
354	2.838	381	2.782	408	2.689
355	2.863	382	2.780	409	2.725
356	2.841	383	2.781	410	2.705
357	2.833	384	2.785	411	2.720
358	2.816	385	2.825	412	2.700
359	2.815	386	2.785	413	2.690
(6hrs.) 360	2.804	387	2.775	414	2.702
361	2.820	388	2.768	415	2.715
362	2.788	389	2.765	416	2.709

Time	Servo	Time	Servo	Time	Servo
417	2.705	444	2.670	471	2.615
418	2.690	445	2.682	472	2.607
419	2.701	446	2.684	473	2.602
(7h) 420	2.719	447	2.676	474	2.595
421	2.698	448	2.666	475	2.590
422	2.710	449	2.664	476	2.595
423	2.698	450	2.658 0 2730	477	2.591
424	2.698	451	2.658	478	2.610
425	2.685	452	2.657	479	2.591
426	2.710	453	2.660	(8h) 480	2.608
427	2.695	454	2.645	481	2.610
428	2.687	455	2.647	482	2.605
429	2.688	456	2.648	483	2.588
430	2.688	457	2.661	484	2.605
431	2.687	458	2.638	485	2.585
432	2.688	459	2.625	486	2.590
433	2.688	460	2.640	487	2.605
434	2.710	461	2.630	488	2.598
435	2.695	462	2.655	489	2.610
436	2.710	463	2.638	490	2.590
437	2.688	464	2.620	491	2.600
438	2.695	465	2.630	492	2.600
439	2.710	466	2.622	493	2.595
440	2.686	467	2.620	494	2.600
441	2.680	468	2.635	495	2.609
442	2.685	469	2.622	496	2.605
443	2.695	470	2.583	497	2.604

time	Servo	time	Servo		
498	2.585	524	2.585	550	2.548 02757
499	2.586	525	2.580	551	2.543
500	2.592 02746	526	2.565	552	2.530
501	2.590	527	2.570	553	2.545
502	2.585	528	2.562	554	2.552
503	2.585	529	2.576	555	2.538
504	2.590	530	2.580	556	2.513
505	2.585	531	2.575	557	2.533
506	2.585	532	2.580	558	2.508
507	2.589	533	2.548	559 560	2.526
508	2.585	534	2.563	561	2.518
509	2.585	535	2.548	562	2.503
510	2.585	536	2.575	563	2.505
511	2.589	537	2.548	564	2.531
512	2.615	538	2.550	5684	2.508
513	2.590	539	2.525	5665	2.496
514	2.615	94 540	2.545	5676	2.554
515	2.589	541	2.573	5687	2.532
516	2.603	542	2.548	568	2.503
517	2.590	543	2.523	569	2.508
518	2.582	544	2.537	570	2.494
519	2.582	545	2.528	571	2.518
520	2.582	546	2.518	572	2.507
521	2.565	547	2.512	573	2.503
522	2.582	548	2.515	574	2.498
523	2.570	549	2.510	575	2.488
				576	2.502

577	2.506	604	2.495	631	2.480
578	2.509	605	2.485	632	2.480
579	2.493	606	2.488	633	2.452
580	2.491	607	2.482	634	2.495
581	2.496	608	2.480	635	2.482
582	2.503	609	2.480	636	2.478
583	2.474	610	2.480	637	2.480
584	2.488	611	2.505	638	2.455
585	2.492	612	2.485	639	2.479
586	2.488	613	2.478	640	2.480
587	2.487	614	2.475	641	2.474
588	2.518	615	2.480	642	2.463
589	2.523	616	2.480	643	2.452
590	2.479	617	2.490	644	2.479
591	2.503	618	2.485	645	2.468
592	2.495	619	2.485	646	2.461
593	2.482	620	2.480	647	2.456
594	2.513	621	2.462	648	2.470
595	2.488	622	2.480	649	2.449
596	2.487	623	2.484	650	2.455 02780
597	2.489	624	2.488	651	2.445
598	2.477	625	2.488	652	2.479
599	2.498	626	2.480	653	2.440
600	2.502 02767	627	2.471	654	2.445
601	2.485	628	2.485	655	2.450
602	2.489	629	2.473	656	2.425
603	2.481	630	2.479	657	2.432

time	servo
658	2.460
659	2.445
660	2.448
661	2.437
662	2.458
663	2.449
664	2.446
665	2.435
666	2.450
667	2.449
668	2.418
669	2.434
670	2.437
671	2.403
672	2.411
673	2.442
674	2.407
675	2.413
676	2.435
677	2.408
678	2.413
679	2.406
680	2.400
681	2.411
682	2.420
683	2.417
684	2.403

Time	Servo	
685	2.398	
686	2.394	
687	2.408	
688	2.398	
689	2.437	
690	2.416	
691	2.440	
692	2.411	
693		
694		
695		
696		
697		
698		
699		
700		
69300	2420	02788
10	2423	
20	2446	
30	2420	
40	2414	
50	2408	
69400	2426	02787
10	2402	
20	2392	
30	2399	
40	2417	

50	2420	10	2408	40	2.401
695 00	2399 02794	20	2417	50	2.397
10	2398	30	2407	705 00	2.408 02792
20	2414	40	2409	10	2.396
30	2405	50	2406	20	2.423
40	2410	701 00	2403 02792	30	2.411
50	2412	10	2405	40	2.462
696 00	2414 02790	20	2426	50	2.397
10	2431	30	2425	706 00	2.421 02788
20	2424	40	2413	10	2.398
30	2408	50	2423	20	2.405
40	2420	702 00	2434 02785	30	2.395
50	2405	10	2432	40	2.400 02793
697 00	2447 02781	20	2398	50	2.401
10	2446	30	2402	707 00	2.395 02795
20	2446	40	2396		
30	2422	50	2421		
40	2420	703 00	2395 02794		
50	2444	10	2424		
698 00	2427 2786	20	2462		
Moved A into	999.994	30	2404		
699 10	2430	40	2405		
20	2414	50	2401		
30	2400	704 00	2394 02794		
40	2396	10	2410		
50	2407	20	2400		
700 00	2420 2788	30	2397		

Preliminary Mean Value of this data set, ~10.0001 at end of data, Nadine

Final Reading Time 1:45 a.m.

A - 51 10/100

B - .00135

C 7.15 @ 7×10^{-11}

D 64 100/50

E 2.13 @ 900 V

Rods

A 999.994

B 8.661

C 13.134

D 0.031

Servo Demand Setting 5.900

Shut down at 2:~~46~~ a.m.

C.A. 18 Expr ~~May 4~~ Run _____

Sheet _____ Date May 4 1954 Time 9:45 AM PM

Purpose To observe period vs. δk

INSTRUMENT CHECK

Time 9:45 AM ~~PM~~ Source 173, 4, 5, 212

	Channel A	B	C	D	E
Range	~~1/1000~~ OK	OK		1/1000	OK
Source Dist.	0	0		12"	0
% F.S. Trip	45			45	

Counters OK.

Produce 1 period with RoD

Rod Dot 0.027

CRITICAL POSITIONS

C.A. 18 Expr. 3 Run 1

Table Pos. 999.285 L T.4581 B.1454

Control Rod	Channel
A 9.998	A ~~OK~~ 46.5 @ 100/200
B 6.200	B 0.102
C 13.134	C $2.8 \times 2 \times 10^{-8}$
D ~~1.355~~ 1.372	D 54.0 1000/500
Servo 2.172 2.765 final	E .9 @ 750V

Servo 2.172 OK

Tim Crit. 10 05 AM Duration 30 min.

Reduce level with Rod B, Return Rd D to Level
Reduce period with Rod B

CRITICAL POSITIONS

CA 18 Exp 8 Run 2

Table Pos. 999.785 T .4581 P .1854

	Control Rod 11 3/5 A.	Channel
A	0.998 999.994	A 18.15 100/500
B	6.705 999.948	B 2.08
C	13.134 999.916	C 2.72 @ 2×10^{-8}
D	0.027 0.022	D 53.5 1000/500
Servo.	6.245	E 1.17 @ 700 V.

Tim Crit 1046 AM PM Duration ____ min.

Four trial runs were made using rod D to hold the upper level. This gave the difficulty that the smallest jog on D was enough to over control. The servo was connected, and however appreciable oscillations in the servo rod made its use here questionable. The level was raised to .2 on the N but the level still fluctuated considerably. It was decided to use D to level starting about 7" out to get to a less sensitive region of Rod D.

5/4/54

startup ~12:30 PM

just critical →

CRITICAL POSITIONS

Cr. 18 Expr 8 Run 3

Volume Pos. 999.785 T T P

Control Rod		Channel	
	999.995	A 51	1000/25
	0.985	B 0.12	
3	0.200	C 2.6	2×10^{-8}
4	13.209	D 54	1000/500
Servo	2.178	E 1.2	@ 750 v

Tim Crit. 12:50 ~~AM~~ PM Duration _____ min.

Super → A - 999.995 level → (see above)

B 0.985

C 999.915

D 7.001

Servo 2.178

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The recorder trace for these runs is lost — (11/26/54)

A B C D Sens

Run: no record of levels

	Run					
Super	3 (p 143)	999.995	0.985	999.915	7.001	2.178
level (.12)	3	999.995	0.985	0.200	13.209	"

	Run				
Super	4	999.995	1.305	999.915	7.000	2.178
level (.11)	4	"	1.305	"	11.365	"
also level at (Read only B and D	"		2.546	"	7.000	"
			other rods are constant			

	Run	B	D	
Super	5	1.611	7.000	$\delta K = .001164$
level	5	1.611	9.975	

	Run	B	D	
Super	6	1.800	7.000	$\delta K = .000911$
level	6	1.800	9.215	

	Run	B	D	
Super	7	1.995	7.000	$\delta K = .000646$
level	7	1.995	8.465	

	Run	B	D	
Super	8	2.099	7.000001967	$\delta T = .000519$
Level	8	2.099	8.141 001448	

	Run	B	D	
Super	9	2.246	7.000101967	$\delta K = .00342$
Level	9	2.246	7.719001625	Time of Day 4:25 P.M.

See p 167 for a continuation of this exp.

C.A. 18 Expr. 3 Run 7

Sheet _____ Date 5/5 1954 Time 9:30 AM PM

Purpose Short life Y-no

INSTRUMENT CHECK

Time 9:25 AM ~~PM~~ Source 1 7 3, 4, 5, 2 1 2

	Channel A	B	C	D	E
Range	1/1000	ok	25 NO^{-12}	1/1000	ok
Source Dist.	0			12"	
% F.S. Trip	50 50			50	

Counter 1,2, OK

CRITICAL POSITIONS

C.A. 18 Expr 3 Run 7

Table Pos. 999.785 T.4582 S.1457

Control Rod	Channel
A 999.993	A 32 @ 100/50
B 4.552	B .00300
C 13.132	C 6.4 on 2.5×10^{-10}
D 13.290	D 71 @ 100/100
servo 8.002	E 0
servo demand 6.500	

Tim Crit. 9 45 AM ~~PM~~ Duration _____ min.

Time 10[20] Level at .003 for ~ 1/2 hr.
Increase power label by a factor of 100 using Rod B.
Hold at power level ~.3 for 1/2 hr.
Upper level readings

Time	A	B	C	D	#	Servo
~~1045~~ 21	999.993	999.945	13.132	1.422		12.072
	← " all decrease					
30						
32 00	12.000002581					
05						
10	9.000 00892		45	6.505		.003841
15	7.3000 01204		50	6.030		004220
20	5.860 01466		55	5.335		004628
25	4.680 01681 (?)		34 ~~60~~	4.90		005172
30	4.264 1750		05	4.646		005400
35	3.357 1917		10			servo
40	2.618 2061		20			12.020 Plotter
45	1.794 2228		25			12.000
50	1.793 2228		30			11.925
55	1.227 2340		35			11.900
33 ~~60~~	.700 2441		~~60~~			11.800
05	000 2563 B		45			11.710
15		13.144 010 260	50			11.627
20		11.110 001028	55			11.578
25		9.800 001770	35 ~~60~~			11.480
30		8.111 002730	05			11.418
35		7.400 003185	10			11.369
40		6.740 03660	15			11.290

20	11.237	30	10.355	40	9.952
25	11.185	35	10.316	45	9.940
30	11.118	40	30.301	50	9.926
35	11.088	45	10.290	55	9.[illegible]8
40	11.110	50	10.281		9.884
45	10.908	55	10.262	05	9.875
50	10.907	38	10,241	10	9.872
55	10.903	05	10,222	15	9.862
60	10.878	10	10,206	20	9.855
05	10.847	15	18.187	25	9.844
10	10.800	20	10.176	30	9.834
15	10.768	25	10.158	35	9.824
20	10.721	30	10.124	40	9.795
25	10.690	35	10.110	45	9.790
30	10.645	40	10.106	50	9.792
35	10.610	45	10.095	55	9.780
40	10.592	50	10.082	41	9.776
45	10.569	55	10.074	05	9.774
50	10.546	39	10.055	10	9.757
55	10.508	05	10.029	20	9.736
37	10.491	10	10.010	20	9.732
05	10.480	15	10.002	25	9.737
10	10.449	20	9.995	30	9.718
15	10.435	25	9.982	35	9.701
20	10.394	30	9.976	40	9.701
25	10.380	35	9.970	45	9.689

50	9,684	44—	9,518	10	9,336
55	9,675	05	9,483	15	,327
48—	9,674	10	9,476	20	,315
05	9,670	15	9,475	25	,320
10	9,667	20	9,470	30	,341
15	9,665	25	9,466	35	,327
20	9,649	30	9,456	40	,314
25	9,620	35	9,438	45	,303
30	9,607	40	9,437	50	,305
35	9,602	45	9,429	55	,296
40	9,590	50	9,425	47—	,281
45	9,608	55	9,419	05	9,280
50	9,610	45—	9,427	10	,280
55	9,590	05	9,420	15	,282
43—	9,578	10	9,410	20	,284
05	,574	15	9,399	25	,278
10	,571	20	9,405	30	,274
15	,561	25	9,417	35	,270
20	,548	30	9,410	40	,267
25	,532	35	9,380	45	9,246
30	,528	40	9,381	50	9,238
35	,530	45	9,380	55	9,243
40	,532	50	9,374	48—	,251
45	,524	55	9,367	05	,233
50	,524	46—	9,361	10	,235
55	,524	05	9,352	15	,234

Time min	Servo	Time min	Servo	Time min	Servo
20	9,231	55	9,098	55:10	8.9.58
25	9.232	51—	9:110	20	8,934
30	9,219	10	9 .104	30	8.930
35	9,229	20	9 ,105	40	8 .936
40	9,220	30	9 .084	50	8 .934
45	9 ,209	40	9.075	56—	8.925
50	9.190	50	9 .070	10	8.916
55	9 .190	52—	9 ,068	20	8.923
49—	9 .192	10	9 ,064	30	8.915
05	9 ,190	20	9. 044	40	8.917
10	9. 182	30	9.033	50	8.908
15	9.178	40	9.030	57—	8,895
20	9 .183	50	9.038	10	8.870
25	9.180	53—	9.035	20	8.875
30	9 .184	10	9.007	30	8.868
35	9 .178	20	9.000	40	8.867
40	9.175	30	8.994	50	8,867
45	9 .174	40	8.990	58—	8,867
50	9 .164	50	8.991	10	8,867
55	9 .141	54—	8.984	20	8.867
50—	9 .138	10	8.974	30	8.867
05	9 .277	20	8.980	40	8 .866
10	9 .126	30	8,980	50	8.845
25	9 .124	40	8.976	59—	8,830
35	9 .110	50	8.970	10	8,833
45	9 .110	55—	8.967	20	8.836

Time min	Servo	Time	Servo		
30	8.830	50	8.703	68:10	8.646
40	8.820	64	8.692	20	8.647
50	8.809	10	8.701	30	8.644
60 —	8.831	20	8.716	40	8.632
10	8.811	30	8.710	50	8.621
20	8.796	40	8.691	69	8.600
30	8.800	50	8.684	10	8.591
40	8.787	65 —	8.690	20	8.600
50	8.790	10	8.692	30	8.610
61 —	8.789	20	8.688	40	8.608
10	8.788	30	8.700	50	8.617
20	8.783	40	8.697	70 —	8.592
30	8.773	50	8.690	10	8.600
40	8.771	66 —	8.680	20	8.605
50	8.770	10	8.675	30	8.601
62 —	8.769	20	8.683	40	8.594
10	8.767	30	8.680	50	8.590
20	8.765	40	8.675	71 —	8.588
30	8.762	50	8.677	10	8.587
40	8.747	67 —	8.680	20	8.591
50	8.746	10	8.673	30	8.590
63 —	8.745	20	8.673	40	8.591
10	8.745	30	8.666	50	8.587
20	8.746	40	8.663	72 —	8.586
30	8.737	50	8.655	10	8.592
40	8.728	68 —	8.646	20	8.621

Time min	Servo	Time	Servo	Time	Servo
72:30	8.606	77:15	8.498	83:45	8.463
40	8.583	30	8.508	84:00	8.454
50	8.588	45	8.503	15	8.440
73 —	8.593	78 —	8.492	30	8.432
10	8.582	15	8.496	45	8.423
20	8.585	30	8.493	85 —	8.405
30	8.586	45	8.492	15	8.436
40	8.575	79 —	8.496	30	8.432
50	8.569	15	8.491	45	8.422
74 —	8.568	30	8.491	86 —	8.412
10	8.568	45	8.490	15	8.400
20	—	80 —	8.488	30	8.395
30	8.566	15	8.492	45	8.417
40	8.563	30	8.522	87 —	8.415
50	8.558	45	8.495	15	8.405
75 —	8.545	81 —	8.487	30	8.417
10	8.538	15	8.477	45	8.415
20	8.546	30	8.468	88 —	8.395
30	8.546	45	8.476	15	8.402
40	8.546	82 —	8.482	30	8.390
50	8.546	15	8.482	45	8.410
76	8.542	30	8.473	89 —	8.412
15	8.522	45	8.469	15	8.402
30	8.540	83 —	8.467	30	8.394
45	8.542	15	8.467	45	8.390
77 —	8.510	30	8.467	90 —	8.400

Time	Servo	Time	Servo		
90:15	8.391	96.45	8.354	103.15	8.300
30	8.388	97—	8.362	30	8.315
45	8.390	15	8.362	45	8.305
91—	8.395	30	8.360	104	8.290
15	8.387	45	8.361	15	8.310
30	8.388	98—	8.362	30	8.300
45	8.384	15	8.368	45	8.295
92—	8.394	30	8.365	105	8.318
15	8.425	45	8.355	15	8.300
30	8.380	99—	8.352	30	8.315
45	8.376	15	8.350	45	8.315
93—	8.378	30	8.350	106	8.299
15	8.388	45	8.349	15	8.325
30	8.383	100—	8.348	30	8.295
45	8.382	15	8.347	45	8.300
94—	8.384	30	8.340	107	8.319
15	8.392	95	8.335	15	8.300
30	8.387	101—	8.330	30	8.290
45	8.371	15	8.325	45	8.290
95	8.365	30	8.310	108	8.290
15	8.365	45	8.322	15	8.300
30	8.366	102	8.322	30	8.289
45	8.374	15	8.315	45	8.325
96—	8.368	30	8.325	109	8.305
15	8.358	45	8.320	15	8.290
30	8.354	103.00	8.325	30	8.290

10945 8.305	11615 8.300	12245 8.270
11000 8.290	30 8.285	123 8.272
15 8.300	45 8.278	15 8.263
30 8.295	117 8.270	30 8.255
45 8.292	15 8.270	45 8.255
11100 8.295	30 8.272	124 8.255
15 8.290	45 8.275	15 8.255
30 8.289	118 8.280	30 8.255
45 8.295	15 8.282	45 8.255
112 8.292	30 8.290	125 8.255
15 8.290	45 8.270	15 8.264
30 8.291	119 8.270	30 8.260
45 8.300	15 8.270	45 8.260
113 8.290	30 8.268	126 8.259
15 8.290	45 8.270	15 8.249
30 8.290	120 8.269	30 8.245
45 8.318	15 8.280	45 8.245
114 8.290	30 8.282	127 8.250
15 8.310	45 8.271	15 8.230
30 8.295	12100 8.270	30 8.225
45 8.285	15 8.270	45 8.230
115 8.283	30 8.268	128 8.236
15 8.289	45 8.268	15 8.235
30 8.290	122 8.268	30 8.239
45 8.292	15 8.265	45 8.230
116 8.285	30 8.265	129 8.220

129 15 8.235	136 8.230	45 8.208
30 8.225	15 8.200	143 8.190
45 8.223	30 8.185	15 8.205
130 8.210	45 8.220	30 8.205
15 8.205	137 00 8.225	45 8.195
30 8.210	15 8.210	144 8.192
45 8.230	30 8.190	15 8.195
131 8.225	45 8.199	30 8.210
15 8.230	138 8.230	45 8.192
30 8.222	15 8.210	145 8.210
45 8.230	30 8.190	15 8.190
132 8.215	45 8.220	30 8.190
15 8.210	139 8.205	45 8.190
30 8.225	15 8.205	146 8.190
45 8.232	30 8.208	15 8.205
133 8.235	45 8.219	30 8.190
15 8.215	140 8.210	45 8.190
30 8.205	15 8.205	147 8.210
45 8.222	30 8.210	15 8.190
134 8.190	45 8.190	30 8.195
15 8.215	141 8.205	45 8.192
30 8.210	15 8.205	148 8.190
45 8.240	30 8.205	15 8.230
135 8.230	45 8.200	30 8.206
15 8.195	142 8.222	45 8.219
30 8.205	15 8.190	149 8.192
45 8.225	30 8.210	15 —
		30 8.195

149-45	8.205	163	8.190	177	8.170
150	8.195	30	—	30	8.170
30	8.205	164	8.192	178	8.171
151	8.192	30	8.175	30	8.170
30	8.195	165	8.170	179	8.170
152	8.205	30	8.181	30	8.160
30	8.192	166	8.185	180	8.168
153	8.190	30	8.179	181	8.160
30	8.190	167	8.175	182 30	8.160
154	8.205	30	8.189	182	8.159
30	8.196	168	8.180	30	8.160
155	8.185	30	8.190	183	8.172
30	8.210	169	8.175	30	8.170
156	8.195	30	8.179	184	8.165
30	8.209	170	8.180	30	8.155
157	8.192	30	8.180	185	8.153
30	8.210	171	8.182	30	8.170
158	8.205	30	8.175	186	8.170
30	8.192	172	8.180		
159	8.215	30	8.180		
30	8.185	173	8.173		
160	8.182	30	8.170		
30	8.189	174	8.180		
161	8.190	30	8.180		
30	8.194	175	8.170		
162	8.190	30	8.170		
30	8.205	176	8.170		
		30	8.174		

Time Servo

195 – Increase power level by factor of 10 using servo – other instruments remain unchanged.

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18 CRITICAL POSITIONS 3 8-M

999.785 Dum

999.994	24.85 100/200
4.535	0.0302
13.131	6.62 2.5×10^{-9}
13.291	D 70.95 1000/100
Servo 8.000 Demand 6.500	E .32 @ 750
Tim Crit. 1:40 AM PM	Duration 58 min.

Reached this level at 1:40 PM.

Rise on servo to ~ 0.3 on B_1

Hold 10 min and return to this level by Rundy A and Servo out. Stop on A then Servo.

Time

2:00 Top level on B, ~.280

9:30 servo = 9.960 Demand setting ~6.500, D = 71.3 @ 1000/1000

10 00 A out

Time			Time	Servo		
10 50	3.80	01814				
11	3.270	1934	50	8.640	40	8.300
11 05	2.799? 2.799?	2026	55	8.655	45	8.255
10	2.285	2128	13 —	8.655	50	8.235
15	1.985	2188	5	8.500	55	8.235
20	1.715	2243	10	8.440	15	8.235
25	1512	2284	15	8.385	05	8.235
30	.975	2389	20	8.445	10	8.235
35	.620	2454	25	8.460	15	8.235
40	.62002454	9.249-0117	30	8.440	20	8.232
45	.		35	8.420	25	8.230
50	.06002552		40	8.335	30	8.220
55		Δ=00031	45	8.355	35	8.125
12 00 — 60			50	8.360	40	8.140
05	9.135	01213	55	8.360	45	8.150
10	9.03		14 —	8.345	50	8.170
15	8.855		05	8.335	55	8.189
20	8.750		10	8.335	16 —	8.188
25	8.780		15	8.320	05	8.185
30	8.775		20	8.272	10	8.182
35	8.735		25	8.271	15	8.180
40	8.635		30	8.280	20	8.180
45	8.629		35	8.229	25	8.170

time	servo	Time	Servo
-30	8.165	20:15	8.080
35	8.153	30	8.085
40	8.152	45	8.085
45	8.152	21-	8.085
50	8.154	15	8.082
55	8.152	30	8.075
17-	8.154	45	8.072
05	—	22-	8.064
10	8.152		
20	8.150	30: A : 999.9999	
30	8.135	Servo 8.030	Demand 4.969
40	8.130	channel D	54.0 100%/100
50	8.129		B_1 .0240
18-	8.128	32- Up in power level by factor of 10	
10	8.125	by the servo.	
20	8.125	37 30 at .220 on B	
30	8.120	47 30 down with Rod A and servo.	
40	8.110	Time	A
50	8.110	0:45	4.200 01761
19-	8.100	50	3.45 1899
10	8.082	55	2.97 1992
20	8.075	1 —	2.71 2042
30	8.074	1:05	2.27 2131
40	8.075	10	1.830 2220
50	8.079	15	1.630 2260
20-	8.079	20	1.365 2313

Time	A	Servo	Time	Servo	Time	Servo
1-25	1.120	02361	3:35	8.335	6:30	8.145
30	.880	02407	40	8.334	40	8.132
35	.680	02444	45	8.332	50	8.130
40	.445	2486	50	8.328	7—	8.128
45	.350	2503	55	8.300	10	8.125
50	.165	02535 8.800 .01308	4—	8.255	20	8.125
55	.068	2551	05	8.235	30	8.128
2—	.070	02551	10	8.233	40	8.125
05	999.89	48 02565	15	8.232	50	8.124
10		8.675	20	8.231	8—	8.122
15		8.630	25	8.230	15	8.117
20		8.560	30	8.230	30	8.112
25		8.554	35	8.228	45	8.085
30		8.565	40	8.229	9—	8.075
35		8.568	45	8.225	15	8.075
40		8.540	50	8.220	30	8.079
45		8.535	55	8.200	45	8.079
50		8.529	5—	8.179	10—	8.079
55		8.432	10	8.159	15	8.079
3—		8.365	20	8.158	30	8.079
05		8.365	30	8.160	45	8.079
10		8.355	40	8.161	11—	8.079
15		8.345	50	8.164	15	8.078
20		8.340	6—	8.162	30	8.075
25		8.340	10	8.162	45	8.075
30		8.338	20	8.158	12—	8.073

Time	Servo	Time	Servo
12 15	8.071	18:45	8.048
12 30	8.069	19—	8.048
45	8.068	15	8.048
13—	8.065	30	8.048
15	8.065	45	8.045
30	8.065	20—	8.030
45	8.064	21—	increase power level by a factor of 10 with Servo.
14—	8.060	25 15	$B_1 = .228$
15	8.059	35 15	down with A and D Servo.
30	8.055		A Servo
45	8.055	36—	5.550 1527 8.504 01389
15—	8.055	05	4.185 1764
15	8.053	10	3.770 1838
30	8.048	15	3.045 1976
45	8.045	20	2.770 2031
16—	8.049	25	2.420 02100
15	8.050	30	2.135 2160
30	8.050	35	1.950 2196
45	8.050	40	1.650 2256
17—	8.050	45	1.430 2300
15	8.050	50	1.210 2344
30	8.0495	55	1.050 2375
45	8.039	37—	.879 2407
18—	8.038	05	.759 2430
15	8.040	10	.685 2443
30	8.045	15	.498 2476

Zero time

35:15

24

			Time	Servo	Time	Servo
20	.422	02491	39:35	8.235	41 45	8.155
25	.350	02504	40	8.235	50	8.155
30	.257	2518	45	8.235	55	8.155
35	.210	2528	50	8.235	42 —	8.152
40	.150	2538	~~40~~ 55	8.235	10	8.139
45	999.997	02564 Servo	40 —	8.232	20	8.130
55		8.490	05	8.232	30	8.125
38 ~~60~~		8.474	80	8.231	~~30~~	8.122
5		8.470	15	8.230	50	8.122
10		8.445	20	8.229	43 —	8.120
15		8.435	25	8.225	15	8.115
20		8.425	30	8.220	30	8.105
25		8.390	35	8.205	45	8.090
30		8.360	40	8.172	44 —	8.082
35		8.340	45	8.155	15	8.081
40		8.335	50	8.140	30	8.079
45		8.332	55	8.135	45	8.079
50		8.330	41 —	8.135	45 —	8.079
55		8.325	05	8.135	15	8.079
39 —		8.300	10	8.135	30	8.079
05		8.275	15	8.135	45	8.079
10		8.268	20	8.135	46 —	8.079
15		8.255	25	8.136	15	8.079
20		8.245	30	8.140	30	8.078
25		8.240	35	8.150	45	8.075
30		8.238	40	8.154	47 —	8.072

Zero time — 35:15

Time	Servo
47:15	8.070
30	8.070
45	
48 –	8.068
30	8.066
49 –	8.059
30	8.056
50 –	8.054
30	8.055
51 –	8.055
30	8.055
52 –	8.045
30	8.045
53 –	8.049
30	8.049
54	8.044
30	8.035
55 –	8.042
30	8.048
56 –	8.042
30	8.035

C.A. 18' 7 4

Sheet 5/6 4 8:30

Purpose Activation of U^{25} capsule.

J.T. Thomas,

Sample in tip of L-14

INSTRUMENT CHECK

Time 8:30 AM PM Source 123-4-5, 212

	Channel A	B	C	D	E
Range	1/1000 OK	OK	OK	1/1000	OK
Source Dist.	1"			12	
% F.S. Trip	50			50	

Counters OK

Expose samples #1 and 20 for 20 minutes at .3 on B.

CRITICAL POSITIONS

CA 18 Expr 7 Run 4

Table No. 999.285 T.4582 R.1468

Expected Read	Channel
A 999.998	A 27.5 @ 100/1000
B (2.245*) 3.129	B 0.30
C 13.131	C 8.4 @ 2×10^{-8}
D 13.290	D 86.2 @ 100/1000
Servo=0.159	
Servo Demand 8.89	E 4.8 @ 750 V.

Tim Crit. 9 17 AM Duration 20 min.

*T = 92.3 sec with B = 2.245

C.A. 18 Expr. 8 Run 10

Sheet _____ Date 6 May 1954 Time 10:00 AM ~~PM~~

Purpose Continue Evo Period

(See pp 143, 4, 5)

CRITICAL POSITIONS

C.A. 18 Expr. 8 Run 10

Table Pos 99.785 L 4590 1456

Control Rod		Channel	
A	9.998	A 17.2	100/500
B2	2.544	F	0.052
C3	9.920	C 7.5	2.5×10^{-9}
D4	7.000	D 61	1000/200
Servo	1.929 (6.59)	E 6	750V

Tim Crit. 1015 ~~AM~~ PM Duration 20 min.

Raised level to 0.101 on B, leveled with servo at 1.929 (0 on 4.44) to determine effect of T from morning run D → 48 1000/500

Reduce level by running B out

Hold Servo fixed and control manually.
Servo 1.929, A = 999.998, C 999.920

	Run	B	D	
~~Super~~				T = 417 sec
Super	10	~~2.3~~ 2.301	7.000 .001967	~ 39 ~~sec~~
level (0.101)	10	2.301	7.720 .01620	(this is probably a better reading than the value in run 9.)
			~~SK~~ .00347	
super	11	2.440 .00777	7.000 .001967	
Level (0.101)	11	2.440	7.335 .01502	T = 770 sec
aver level		2.590 .00757	7.000 .001967	
			δK .00020 → .000165	

Note there is a difference between the final level on R4B and the initial critical reading. This is probably due to backlash in the ~~servo~~ drive ~~mechanism~~. However no change in the servo was made during ~~the~~ reading in Run 10 and 11 so that the last B reading should be a good zero.

CA 18 Exp 9 Rod Drops.

CRITICAL POSITIONS

CA 18 Exp 7 Run 1

999.785

Calculated		Observed
999.997	A	26.5 100/500
2.589	B	.101
999.920	C	out of Count
7.000	D	48. 1000/500
Servo 1.929	E	1.0 @ 750V

Tim Crit. 1:00 PM Duration ____ min.

Initial Critical Conditions

Note this is continuation of E8R11.

Fire Safety #1.

CRITICAL POSITIONS

C.A. 18 Expr. 9 Run 2

Table Pos. L T R

Control Rod		Channel
1 999.997	999.997 A	Same as Run 1
2 ~~1.580~~ 1.490	5.572	
3 999.920	999.920 C	
4 7.000	7.008 B	
Servo 1.920	999.835 E	

Tim Crit. AM PM Duration min.

control after Rod #1 is out.

fire # 3.

CRITICAL POSITIONS

C.A. 18 Expr. 7 Run 3

Table Pos. L T R

Control Rod		Channel
1 999.997	A	
2 999.945	B	
3 999.920	C	
4	D	
Servo 999.835	E	

Tim Crit. AM PM Duration min.

exit with 1 and 3 out.

fire #4

added # 2 channels in cols.
new critical.

CRITICAL POSITIONS

C.A. 18 Expr 9 Run 4

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.814	A	
2	?	B	101
3	13.132	C	
4	13.295	D	48 1000/500
Surr	3.555	E	

Tim Crit. 1:30 AM PM Duration _____ min.

Fuel #1.

CRITICAL POSITIONS

C.A. 18 Expr. 9 Run 5

Table Pos. _____ L _____ T _____ R _____

critical with #1 out.

Control Rod		Channel	
	2.814	A	
~~9.052~~	9.190	B	
	13.132	C	
	13.295	D	
	3.555	E	

_____ AM PM Duration _____ min.

Fuel #6

Crit with 1 and 6 out

CRITICAL POSITIONS

C.A. 18 Expr. 1 Run 6

Table Pos. L T R

	Control Rod	Channel
1	11.079	A
2	3.009	B
3	13.130	C
4	13.293	D
Servo	2.808	E

Tim Crit. AM PM Duration min.

fuel 2

Crit 1, 6, 2 out

CRITICAL POSITIONS

C.A. 18 Expr. 9 Run 7

Table Pos. L T R

	Control Rod	Channel
1	999.998	A
2	999.940	B
3	11	C
4	12.245	D
servo	999.984	E

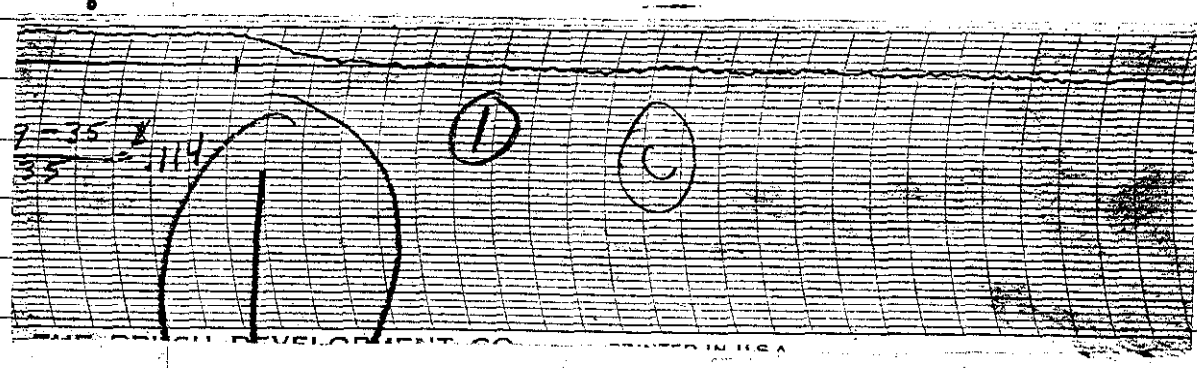
Tim Crit. AM PM Duration min.

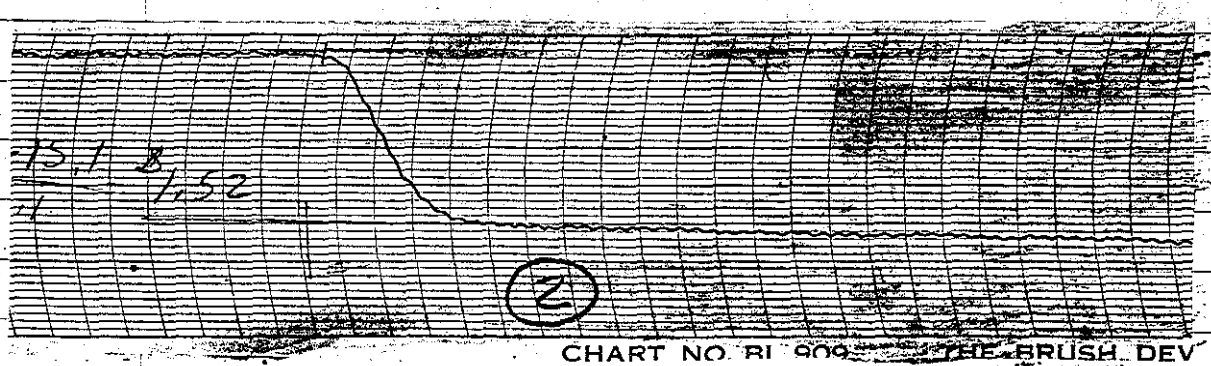
fuel 5

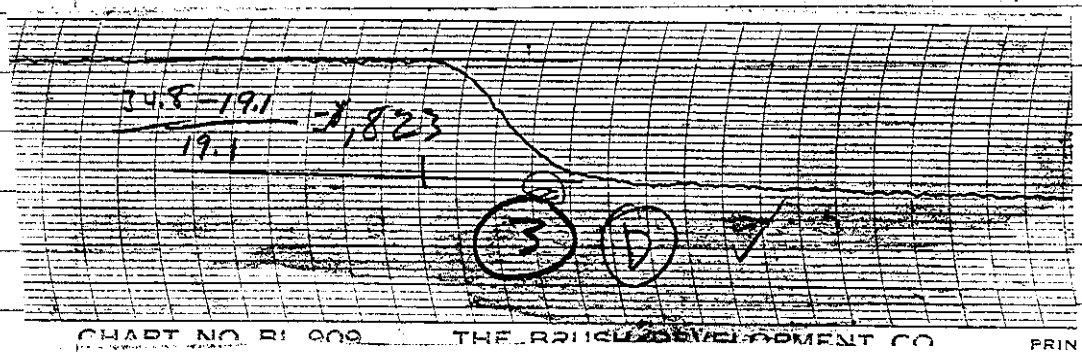
Results of Rod dips.

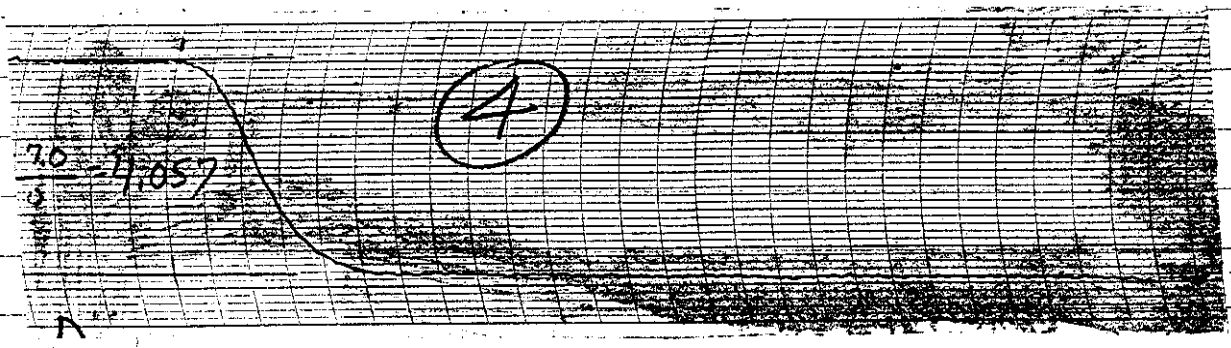
Rod	N_o	N_1	$N_o - N_1$	ΔP
1	39.0	35.0	4.0	0.114
2	38.6	15.1	22.9	1.52
3	34.8	19.1	15.7	0.823
4	35.4	7.0	28.4	4.057
5	37.5	8.8	28.8	3.27
6	38.0	18.0	20.0	1.11
7				
8				

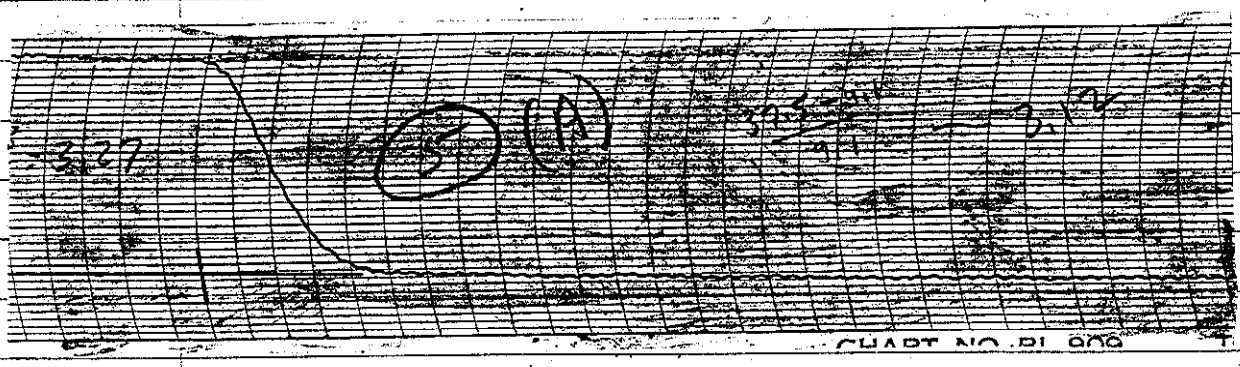
See p 34 for rates of Rods

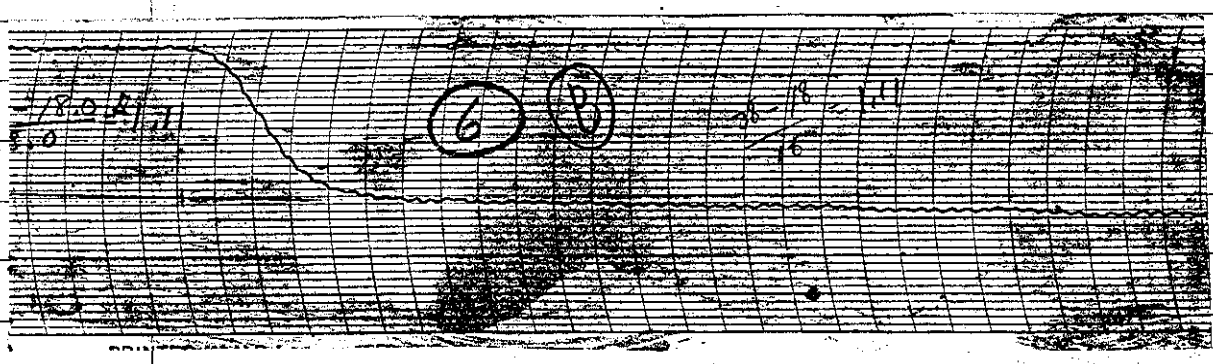





34.8 - 19.1 = 1,823
19.1
3
D
CHART NO. BI 909
THE BRUSH DEVELOPMENT CO
PRIN


4
7.0 - 4,057


3.27
5
(D)
CHART NO. BI 909


18.0 - 1,11
6.0
6
B

C.A. 118 Expr. 10 Run 1

Sheet _____ Date 5/6 1954 Time 330 PM

Purpose Self-shielding data.

Run #1 : Conventional fuel loading.

CRITICAL POSITIONS

C.A. 18 Expr. 10 Run 1

Table Pos. _____ L T P

	Control Rod		Channel	
A	000.000	A	70	100/200
B	6.345/Final 6.372	B	0.102	
C	13,130	C	2.4	2×10^{-8}
D	7.000	D	48.4	100/500
		E	1.3 @ 250	

Tim B
0 – 7:30 6.345
7:30 6.372

Tim Crit. 340 PM Duration 9 min.

Servo – all the way in.

Note: Two extra stringers present in G-12, G-12 and G-13 & G-13

CRITICAL POSITIONS

C.A. 18 Expr. 10 Run 2

Table Pos. 999.785 L T.4572 R.1472

Control Rod		Channel	
A	000.000	A	70.2 100/200
B	6.373	B	0.100
C	13.133	C	4.8 × 10⁻⁹
D	0.138/15	D	49. 1009/500
		E	1.3 @ 750 V.

Tim Crit. 4⁰⁴ ~~AM~~ PM Duration 9 min.

Run #2: Removed fuel from L-14 replaced with blank.

CRITICAL POSITIONS

C.A. 18 Expr. 10 Run 3

Table Pos. L T R

Control Rod		Channel	
A	00.000	A	
B	8.507	B	
C3	13.133	C	
D4	13.295	D	
		E	

Tim Crit. ~~AM~~ PM Duration min.

Run #3. Replaced Blank in L-14 with uniform fuel loading i.e., 0.002" fuel disc every 3/4".

CRITICAL POSITIONS

C.A. 18 Expr 10 Run 4

Table Pos. 999.9 L. 4572 T. 1472

Control Rod		Channel	
A	000.000	A	70 100/200
B	6.373	B	0.100
C	13.133	C	4.8 2×10^{-8}
D	66.76	D	48 1000/500
		E	1.1 @ 750 V.

Tim Crit. 450 RM Duration 10 min.

Run # 4: Modified uniform distribution: 8 fuel discs ... the first at 3/4" from center plane of reactor, the remaining spaced at 1½" intervals.

C.A. 18 Expr. 3 Run 9

Sheet _____ Date _____ 195__ Time _____ AM PM

Purpose S-n Shut half line

INSTRUMENT CHECK

Time 9:00 AM ~~PM~~ Source 173.4.5, 212

	Channel A	B	C	D	E
Range	1/1000 OK	OK	OK	1/1000	OK
Source Dist.	0			12"	
% F.S. Trip	65			68	

Counters OK

Note: Extra strikers present in G and G' = 12, 13, 14.

CRITICAL POSITIONS

C.A. 18 Expr. 3 Run 9

Table Pos. 999.785 T. 4584 B. 4476

Control Rod		Channel		
1	999.998	A	30.5	100/200
2	6.000	B	0.031	
3	13.133	C	5.[illegible]	2.5×10^{-9}
4	13.285	D	71.0	1000/100
Servo	2.798	E	[illegible] .3 @750V	

Tim Crit. 9:30 AM ~~PM~~ Duration _____ min.

Increase power level by a factor of 10 with rod B for 0 time. Come back down with A and B Insert A and level with B.

Time	B	A	Time	B	Time	A
0:15	8.430					
40	3.270	01933	30	6.823 003600	20	6.205 004280
45	2.604	02063	35	6.778 3635	25	6.204 004080
50	2.188	02148	40	6.685 3700	30	6.204
55	1.712	2244	45	6.644 3732	35	6.203
1—	1.483	2289	50	6.570 3795	40	6.179 004106
05	1.181	2350	55	6.488 3848	45	6.152 004125
10	0.832	2416	3—	6.428 3902	50	6.152 4125
15	0.652	2448	05	6.366 3954	55	6.135 4140
20	0.488	2461	10	6.345 3930	5—	6.134 4140
25	0.260	2518	15	6.450 3995	05	6.102 4160
30	.161 002536	8.430 002535	20	6.410 3920	10	6.103 4160
35	.	B ~~002808~~	25	6.327 3945	15	6.104 4160
40		8.986 002802	30	6.358 3960	20	6.103 4160
45		7.870 2880	35	6.300 4004	25	6.121 4150
50		7.744 2960	40	6.265 4035	30	6.121 4150
55		7.334 3240	45	6.266 4035	35	6.121 4150
		7.436 3160	50	6.236 4060	40	6.142 4135
05		7.375 3205	55	6.236 1	45	6.105 4160
10		7.164 3400	4—	6.275 4030	50	6.104 4160
15		6.984 3490	05	6.295 4010	55	6.105 4160
20		6.900 3555	10	6.256 4042	6—	6.105 4160
25		6.803 3610	15	6.226 4065	05	6.104 4160

Time	B
6:10	6.105 0074160
15	6.110 4158
20	6.111 4158
25	6.110
30	6.110
35	6.110
40	6.094 4170
45	6.094
50	6.094
55	6.093
7—	6.093
05	6.093
10	6.074 4185
15	6.078
20	6.078
25	6.079
30	6.079
35	6.079
40	6.079
45	6.079
50	6.079
55	6.059 4198
8—	6.059
43	6.046 4208
10—	6.046
1(—	6.046

Increase power level by factor of 10 with B remain at 10×P. for 10 min. Push all decrease, and level insert A and level with B.

(26)

Time	A	B
35	6.20	01425 13.147
40	4.50	01908
45	3.746	01842
50	2.945	01997
55	2.722	02040
1—	2.045	02177
05	1.622	02262
10	1.070	2370
15	.750	2432
20	.455	2485
25	.280	2516
30	000.001	02563B
35		12000 00060
40		10.985 001098
45		10.778 001213
50		10.405 1425
55		10.073 1620
2—		9.500 1930
05		9.302 2035
10		9.100 2150
15		8.975 2220
20		8.820 2310

Time	B
25	002335 8.573
30	2585 8.346
35	2800 8.000
40	2845 7.922
45	2845 7.924
50	2895 7.852
55	2926 7.800
3 00	3000 7.678
05	3065 7.577
10	3135 7.480
15	3185 7.402
20	3240 7.327
25	3295 7.256
30	3340 7.194
35	3370 7.148
40	3370 7.147
45	3386 7.125
50	3420 7.085
55	3440 7.052
4—	3460 7.027
05	3480 7.000
10	3522 6.941

Time	B	Time	B
20	6.900 3555	30	6.472 3865
25	6.842 3582	35	6.472
30	6.843 3582	40	6.472
35	6.812 3605	45	6.472
40	6.812 3605	50	6.472
45	6.746 3660	55	6.472
50	6.746	7 —	6.472
55	6.746	05	6.472
5 —	6.746	10	6.446 3890
05	6.719 3675	15	6.446
10	6.671 3715	22	6.411 3920
15	6.672	8:25	6.392 3935
20	6.637 3740	38	6.35? 3960
25	6.637	58	6.334 3980
30	6.637	9 41	6.314 3995
35	6.596 3772	10 12	6.293 4015
40	6.596	11 13	6.261 4040
45	6.586	12 20	6.241 4060
50	6.575 3785	13 19	6.241 ↓
55	6.575	14 51	6.210 4080
6 —	6.575	16 39	6.185 4107
05	6.553 3803	19 —	6.185 4107
10	6.553		
15	6.528 3822		
20	6.528		
25	6.509 3840		

Increase Power level to 10×P₀
hold for 30 min. Push
all decrease, insert A and
level with B.

A: 999.9984 | level readings
B: 5.995

Time	A	B
40	4.65	01683
45	3.66	01860
50	2.80	2006
55	2.465	2091
1 —	2.00	2186
05	1.700	2246
10	1.215	2342
15	.945	2395
20	.650	2449
25	.320	2508
30	.100	2546
,		13/45 000260
45		12.00 000600
50		10.5 001370
55		10.3 1491
2 —		9.96 1680
05		9.76 1790
10		9.54 1910
15		9.33 2020
20		9.11 2145

Time	B		Time	B		Time	B		Time	B	
25	9.080	2200	35	7.160	3361	45	6.830	3592	55	6.661	3720
30	8.29	2325	40	7.160		50	6.830		9 00	6.644	3732
35	8.65	2405	45	7.142	3380	55	6.792	3622	05	6.644	
40	8.465	2520	50	7.102	3405	7 —	6.785	3625	10	6.670	3712
45	8.355	2580	55	7.135	3382	05	6.785		15	6.670	
50	8.201	2670	5 —	7.100	3405	10	6.770	3638	20	6.647	3730
55	8.130	2720	05	7.075	3424	15	6.762	3642	25	6.659	3720
8 —	8.055	2765	10	7.075		20	6.745	3655	30	6.659	
05	8. —	—	15	7.075		25	6.745		35	6.642	3731
10	8.010	2795	20	7.052	3440	30	6.729	3670	40	6.644	3731
15	7.79	2930	25	7.035	3452	35	6.740	3660	45	6.644	3731
20	7.720	2980	30	6.978	3495	40	6.743	3655	50	6.635	3740
25	7.630	3030	35	6.928		45	6.755	3650	55	6.627	3745
30	7.668	3005	40	6.948	3520	50	6.755		10 —	6.620	3752
35	7.618	3040	45	6.915	3540	55	6.725	3670	15	6.609	3760
40	7.568	3075	50	6.882	3558 —		6.725		27	6.602	3762
45	7.492	3125	55	6.910	3535	05	6.745	3655	35	6.585	3780
50	7.500	3120	6 —	6.910		10	6.728	3670	42	6.570	3792
55	7.440	3160	05	6.910		15	6.728	3670	11 —	6.560	3800
4 —	7.440		10	6.872	3560	20	6.695	3695	-10	6.535	3820
15	7.385	3200	15	6.908	3536	25	6. —		27	6.555	3800
10	7.325	3240	20	6.892	3545	30	6.675	3717	45	6.530	3822
25	7.300	3260	25	—	356	35	6.675		12 40	6.498	3848
20	7.275	3280	30	6.863	3565	40	6.675		50	6.520	3832
25	7.240	3302	35	6.842	3582	45	6.661	3720	13-25	6.500	3845
30	7.182	3345	40	6.852	3580	50	6.661		13 50	6.485	3860

Time min.	B	Time	B	Time	B
14^{05}	6.470 3878	44-	6.210* 004081	1:05	6.410 3919
14^{37}	6.450 3888	45^{37}	6.218* 004075	10	6.350 3965
15^{45}	6.435 3900	46^{30}	6.200 004086	15	6.251 4048
16^{35}	6.419 3910	46^{45}	6.212 004080	20	6.200 4086
17^{25}	6.385 3940	47^{30}	6.210 004081	25	6.210 4081
17^{35}	6.402 3925	48-	6.200 004086	30	6.225 4065
20-	6.386 3940			35	6.159 4121
20^{35}	6.372 3950	A = 999.9955		40	6.138 4138
21^{40}	6.365 3955	~ .. ~		45	6.138 |
21^{55}	6.360 3960	Zero Readings for power		50	6.120 4150
22^{45}	6.345 3972	level of 0.15 : (Increase		55	6.120 |
23^{30}	6.325 3988	power level by a factor		2-	6.102 4162
26^{15}	6.316 3995	of 2.)		05	6.078 4222
27-	6.301 4006	A = 999.9986		10	6.085 4180
29^{20}	6.285 4020	B = 6.022		15	6.110 4160
30^{26}	6.275 4028	C : D : + Servo = same.		20	6.075 4185
31^{50}	6.260* 4040	Time	B	25	6.098 4165
32^{40}	6.270* 4035	0	4.145	30	6.090 4175
36^{55}	6.265 4038	0:25	7.61 3044	35	6.090 4175
37^{15}	6.251 4048	30	7.08 003422	40	6.080 4181
37^{40}	6.234* 4060	35	6.95 3502	45	6.075 4175
38^{50}	6.245* 4050	40	6.77 3639	50	6.042 4215
39^{20}	6.234 4060	45	6.65 3730	55	6.070 4190
40^{10}	6.227 4065	50	6.595 3768	3-	6.050 4205
41-	6.218 4072	55	6.442 3895	05	6.028 4221
43^{35}	6.204 4082	1-	6.380 3942	10	6.028 |

Time	B		Time	B		Time	B	
15	6.028	4221	25	—		35	6.270	004032
20	6.042	4215	:30	6.030	4221	40	6.250	004048
25	6.042	4215	:40	6.030		45	6.218	~~3972~~ 4075
30	6.043		45	—		50	6.180	4102
35	6.040	4212	6 —	6.030		55	6.162	4120
40	6.045	4210	7:5	6.025	4225	2 —	6.160	4120
45	6.045		10 —	6.025		05	6.141	4138
50	6.045		Repeat the above			10	6.132	4141
55	6.045		Run. — (24)			15	6.125	4145
4 —	6.045		Time	B		20	6.125	
05	6.029	4220	0	5.070	——	25	6.113	4155
10	6.039	4212	20	9.50	001930	30	6.095	4170
15	6.039		25	8.10	002735	35	6.085	4180
20	6.035	4219	30	7.50	3120	40	6.085	
25	6.020	4238	35	7.38	3200	45	6.085	
30	—		40	7.03	3455	50	6.072	4187
35	—		45	6.83	3592	55	6.072	
40	6.035	4219	50	6.79	3622	3 —	6.060	4198
45	6.035		55	6.62	3752	05	6.060	
50	6.035		1 —	6.61	3760	10	6.060	
55	6.045	4210	05	6.47	3870	15	6.060	
5 —	6.025	4225	10	6.45	3870 ✓	20	6.050	4205
05	6.028	4222	15	6.29	~~4018~~ 3935	25	6.050	
10	6.028		20	6.365	3955 ✓	4 05	6.050	
15	6.028		25	6.330	3982	4 08	6.042	4212
20	6.030	4221	30	6.300	4005	5 —	6.039	4215

Time	B
5-25	6.035 004220
	—— " ——
	Increase power level by a factor of 2 with rod B, hold level for 5 minutes.

Time	B	
0	5.987	—
20	11.4	000869
25	10.8	001200
30	9.1	2155
35	8.4	2550
40	8.05	2770
45	7.73	2970
50	7.51	3115
55	7.32	3242
1 —	7.23	3312
05	7.05	3442
10	6.925	3520
15	6.825	3598
20	6.712	3680
25	6.702	3688
30	6.595	3773
35	6.560	3800
40	6.538	3815
45	6.462	3875
50	6.450	3885
55	6.435	3900
2 —	6.385	3940
05	6.328	3982
10	6.310	4000
15	6.255	4042
20	6.218	4070
25	6.218	|
30	6.235	4060
35	6.235	|
40	6.235	|
45	6.208	4080
50	6.195	4092
55	6.165	4115
3 —	6.175	4108
05	6.195	4092
10	6.170	4110
15	6.178	4105
20	6.152	4125
25	6.120	4146
30	6.125	4145
35	6.125	|
40	6.165	4115
45	6.142	4139
50	6.142	|
55	6.135	4140
4 —	6.122	4150
05	6.110	4159
10	6.109	|
15	6.109	|
20	6.109	|
25	6.101	4162
30	6.101	|
35	6.101	|
40	6.101	|
45	6.101	|
50	6.111	4159
55	6.111	|
5 —	6.085	4180
05	6.110	4159
10	6.100	4165
15	6.078	4182
20	6.090	4175
25	6.090	|
30	6.072	4185

Time min.	B		Time	B		Time	B	
35	6.085	4180	1-20	6.750	3650	4 20	6.105	4160
6 —	6.085	|	25	6.630	3742	5 —	6.090	4175
6 05	6.065	4195	30	6.630	|	6 10	6.080	4182
6 30	6.078	4182	35	6.552	3802	6 30	6.089	4175
7 —	6.078	|	40	6.510	3838	6 45	6.080	4180
8 —	6.075	4185	45	6.450	3885	7 45	6.090	4175
8 10	6.065	4195	50	6.450	|	8 03	6.085	4178
8 32	6.062	4195	55	6.402	3920	8 15	6.078	4182
8 45	6.049	004205	2 —	6.370	3950	9 03	6.070	4192
9 15	6.055	4200	05	6.370	|	9 38	6.063	4195
— " —			10	6.350	3965	10 35	6.068	4190
Repeat the above (31)			15	6.322	3990	11 25	6.068	4195
Time	B		20	6.285	4020	12 40	6.056	4200
0	5.979 —		25	6.275	4025	13 13	6.052	4201
20	11.5	.000920	30	6.255	4042			
25	10.3	001480	35	6.235	4060			
30	9.01	002203	40	6.224	4065			
35	8.445	2525	45	6.208	41080			
40	8.130	2720	50	6.185	4100			
45	7.780	2940	55	6.185	|			
50	7.540	3092	3 —	6.185	|			
55	7.400	3185	10	6.159	4120			
1 02 60	7.192	3340	15	6.159	|			
05	7.050	3440	3 30	6.150	|			
10	6.972	3485	37	6.135	4140			
15	6.850	3580	3 52	6.118	4130			

Increase power level to $2 \times P_o$
hold for 10 minutes and return.

Time	B	Time min.	B	Time	B
0	6.004	15	6.331 3980	13^{20}	6.069 4192
20	11.860 00612	20	6.332 |	14^{55}	6.061 4198
25	10.50 00137	25	6.322 3987	17^{25}	6.060 4199
30	9.100 02150	30	6.295 4012	20^{10}	6.056 4201
35	8.56 2460	35	6.272 4032	23^{10}	6.058 4202
40	8.125 2685	40	6.272 |	26^{05}	6.058 4200
45	7.850 2895	45	6.245 4055	30 min still level at 6.059	
50	7.99 3125	50	6.228 4062	36^{30}	6.050 4205
55	7.400 3185	55	6.228 |		
1 —	7.250 3300	3 —	6.203 4080		
05	7.090 3410	15	6.185 4101		
10	7.005 3478	35	6.160 4121		
15	6.85 3580	4 —	6.131 4145		
20	6.795 3620	4^{12}	6.155 4142		
25	6.740 3660	4^{19}	6.135 4140		
30	6.655 3725	4^{30}	6.145 4130		
35	6.552 3802	4^{55}	6.123 4117		
40	6.515 3835	5^{30}	6.112 4159		
45	6.515 |	6 —	6.095 4170		
50	6.480 3862	7 —	6.092 4172		
55	6.445 3890	7^{50}	6.086 4180		
2 —	6.385 3940	8^{30}	6.076 4185		
05	6.385 |	10^{45}	6.075 4195		
10	6.362 3960	11^{30}	6.072 4188		

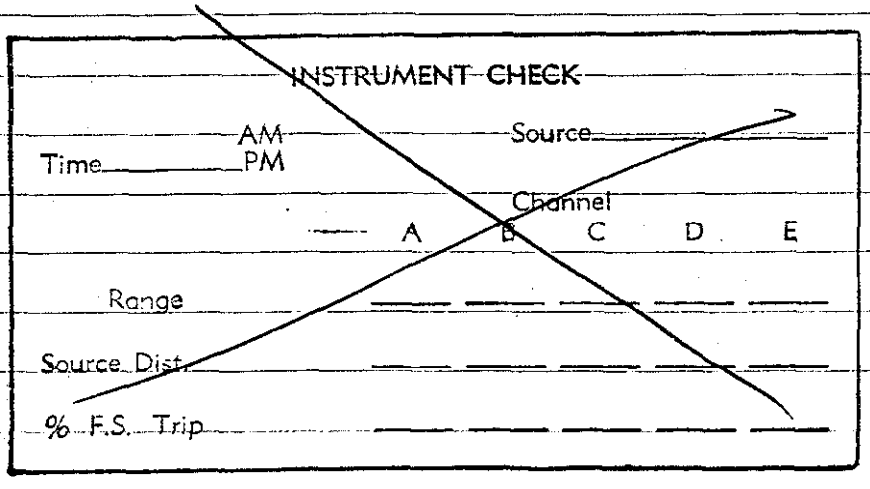
C.A. 18 Expr. 2 Run 8 10
Sheet ____ Date 5/7 195 4 Time 3:00 ~~AM~~ PM
Purpose Continue Servo Calibrate.
Level has been at .150 for
the previous runs. — on 5/7

Control rod Settings — Servo demand.
6.500 ~~6.484~~
servo: 2.814 A -999.998, B-6.050, C-13.132, D-13.285

Zero, or Servo (?)	999.489
A is reading	2.000
B	13.135
C	13.133
D	13.285

~~Data~~ all rods in ~~AT~~

A	B	C	D	Servo
000.000	999.940	999.915	000.025	9.289


INSTRUMENT CHECK
Time
AM
PM
Source
Channel
A
B
C
D
E
Range
Source Dist.
% F.S. Trip

C.A. 18 Expr. 2 Run 9 11

Sheet _____ Date _____ 195__ Time _____ AM PM

Purpose Calibrate Servo Rod & Check Back-lash.

INSTRUMENT CHECK

Time 8:55 AM PM

Source 173,4,5,212

5/8/54

	Channel A	B	C	D	E
Range	1/1000 OK	OK	OK	1/1000	OK
Source Dist.	0			6"	
% F.S. Trip	50			80	

Counters OK

CRITICAL POSITIONS

C.A. 18 Expr 2 Run 9 11

Table Pos. 999.786 L 4582 T 1462

Control Rod	Channel
1 999.998	A 34 100/200
2 999.942	B .050
3 999.915	C 4.7 @ 5X10⁻⁹
4 000.714	D 59.5 1000/200
zero 12.110	E 2.5 @ 900 v
Demand - 5.450	

Tim Crit. 9:30 PM AM PM Duration _____ min.

Regular assembly plus shim G-1 G' 11, 12, 13, 14 Shim L 14 out 1/2"

A	Servo	D
999.998	12.110	0.714
0.505	11.850 .29	
1.000	11.610 .21 .59	
2.012	11.023	
3.009	10.385 .64	
4.002	9.770 .61	
4.997	9.150 .62	
6.002	8.488 .67	
6.998	7.778 .71	
8.000	7.008 .77	
9.000	6.265 .74	
10.004	5.395 .87	servo 1.05
11.006	~~4.238 4.250~~ 4.339	
12.011	3.392 .95	
13.172	2.878	D → 0.714
	servo .87	
D → 2.700	2.012 .93	A – 13.172
4.711	1.276	
6.710	~~0.590~~ 0.590	
9.029	.082	

Check Backlash on servo.

5/27/54 191 LL-3 DC

Servo demand changed to cause servo rod position to change monotonically from 0.082" to 2.005"

Level load by inserting D from 9.029" to **2.737"**

Servo demand changed other rate in same ~~direct~~ direction to ~~set~~ move servo rod to ~ 2.5" then reversed. Servo rod reset at 2.005" (without subsequential reversal) and power demand with D at ~~2.750~~" **2.748"**

EL² ∝ C

C.A. 18 Expr. 6 Run 11

Sheet ____ Date 5/9 1954 Time 1:30 AM (PM)

Purpose More reactivity coefficients —

INSTRUMENT CHECK

Time 1:30 ~~AM~~ PM Source 173.4.5, 212

	Channel A	B	C	D	E
Range	1/1000 OK	5X10⁻¹²	1/1000	1000	
Source Dist.	0	OK	8"	OK	
% F.S. Trip	45		60		

Counter OFF.

① Removed G - G' - 11
G - G' - 14
Now smooth parallelepipeds + G + G' - 12, 13 -

② Pushed K - 13 1/2" away from mid-plane leaving a 1/2" void at mid-plane.

This is zeroing run.

Samples to be used are 27/8" squares originally from NEPA

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 11
T 0.4587 B 0.1462
Table Pos. 999.786 L T R

	Control Rod		Channel	
A	999.997	A	33 x 100/200	
B	2.346 / 13.131	B	0.050	
C	~~13.065~~ out	C	5.1 x 5 x 10^{-9}	
D	13.283 out	D	63 x 1000/200	
Servo	00.000	E	2.6 @ 900V	

Tim Crit. 1.45 AM PM Duration ~~1.45~~ min.

Inserted Mg Sample #1, 2 7/8" x 2 7/8 x 1/2" in K-13

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 12
T 0.5578 B 0.1471
Table Pos. 999.786 L T R

	Control Rod		Channel	
1	Panel	Rw	A	
B	2.252	2.346	B	0.050
3	Panel 13.283	out 12.415	C	
D	Panel		D	
			E	

Tim Crit. AM PM Duration min.

DANGER COEFFICIENT Run 12

Sample Mg #1 Weight 5.775 Moles

Thickness 1/2" Pieces 1 Composition

Time AM PM Sample Pos. K-13 middle

Can yes ☐ no ☒ C.R. Pos. c c c, M

Control B 2.346 D 13.283

Sample B 2.252 D 12.415

Removed Mg
Inserted Fe.

CRITICAL POSITIONS

Cycle 18 Expr. 6 Run 13

Date Pos. 999.786 T 0.4578 B 0.1471

	Control Rod		Channel
A	Bank 0.000 dn	A	
B	2.346 1.305	B	0.050
C	Bank	C	
D	0.028 dn	D	
		E	

Tim Crit. AM PM Duration min

DANGER COEFFICIENT

Sample Fe #1 Fe #2 Weight 533.6754 Moles ____

Thickness 1/4" 1/2" total Pieces 2 @ 1/4" Composition ____

Time ____ AM PM Sample Pos. K-13 mid plane C.R. ____

Cont Rod yes ☐ ☑ G.R. Pos. ____ c ____ c ____ c/M ____

Control { D = 13.283 / B = 2.346

Sample { D = 0.028 / B = 1.345

Control ____

Removed Fe

Added Fe

CRITICAL POSITIONS

C.A. 18 Expr 6 Run 14 T 0.4581 B 0.1472

Table Pos. 999.785 L ____ T ____ R ____

Control Rod		Channel	
A	0.000 dn	A	
B	0.992	B	~~0.050~~ 0.053
C	13.133 out	C	
D	0.025 dn	D	
		E	

Tim Crit. ____ AM PM Duration ____ min.

Source may have been in during this run

From 18-6-15 D should be have been further out - get correction for source from Pg 197

DANGER COEFFICIENT

Sample Ti #1,2,3 ~~4~~ Weight 185.67 gm Moles _____

~~3/16"~~ ~~1/4" total~~ 0.32" tot. Thickness _____ Pieces ~~4~~ 3 Composition _____

Time 3:15 AM (PM) Sample Pos. K-13 mid plane

Can yes ☐ no ☑ C.R. Pos. c c c

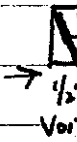
Control B - 2,346 D - 13,283

Sample B - 0.992 D - ~~0.025~~

Control _____

(Not critical with 3pc Ti) Void still 1/16" with 3pc Ti loaded.

Ti tilted



Removed Ti added Al

CRITICAL POSITIONS

C.A. _____ Expr. _____ Run _____

Pile Pos. _____ L _____ T _____ D _____

Control Rod	Channel
1 _____	A _____
2 _____	B _____
3 _____	C _____
4 _____	D _____
	E _____

Tim Crit. _____ AM PM Duration _____ min.

J/9/JV 197

CRITICAL POSITIONS

Case 18 Expr. 6 - Run 15

T 0.4582 B 0.1472

Table Pos. 499.790 L T B

	Control Rod		Channel
A	999.998 In 2.346	A	
B	~~2.4746~~	B	0.050
C	13.133 out	C	
D	8.845 (Source In)	9.510 (Source out)	D
		E	

Apparently Source Capsule material is a poison at predominate at this level

Tim Crit: ____ AM PM Duration ____ min.

DANGER COEFFICIENT

Sample Al #1 Weight 179.300 Moles ____

Thickness 1/2" Pieces 1 Composition ____

Time 3130 AM PM Sample Pos. K-13 midplane

Control Rod C.R. Pos. C C C/M

Control D 13.283

Sample D-9.510

Control

198 7/9/54

Removed Al; added Ni (can not filled).

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 16

Table Pos. 99.788 T 0.4581 B 0.1472

	Control Rod		Channel
A	0.000 do	A	
B	7.346	B	0.050
C	13.133 Out	C	
D	1.806	D	
		E	

Tim Crit. ____ AM PM Duration ____ min.

DANGER COEFFICIENT

Sample Ni #1,2,3 Weight 183.148 Moles ____

Thickness = 0.16" total Pieces 3 Composition ____

Time 4:10 AM (PM) Sample Pos. K-13 midplane C.R. ____

Can yes ☐ no ☑ C.R. Pos. c c c/M

Control D = 13.283 ____ ____

Sample D = 1.806 ____ ____ ____

Control ____ ____

Removed Ni
added Mo

CRITICAL POSITIONS

C A 18 Expr. 6 Run 17
T 0.4581 A 0.1477
Table Pos 999.788 I T R

	Control Rod		Channel
A	0.000 dn	A	
B	0.516	B	0.050
C	999.915 dn	C	
D	0.025 dn	D	
		E	

Tim Crit. ____ AM / PM Duration ____ min.

#1-4
#1→6 inc
DANGER COEFFICIENT

Sample Mo 0.425 Weight 475.200 Moles ____
Thickness 2.525" total Pieces 4 Composition ____
Time 4:20 AM (PM) Sample Pos. K-13 mid plane

Cans yes ☐ no ☑ C.R. Pos. c c c M
Control B - 2.346 D - 13283
Sample B - 0.516 D - 0.025
Control ____

200

5/9/54

Removed Mo
added Cb

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 18

1.04584 B 0.1472

Table Pos. 999.788 L T P

Control Rod		Channel	
A	0.000 dn	A	
B	7.346	B	0.050
C	13.130 out	C	
D	4.570	D	
		E	

Tim Crit. ____ AM / PM Duration ____ min.

DANGER COEFFICIENT

Sample Cb Weight 277.420 Moles ____

Thickness 0.25" total Pieces 3 Composition ____

Time ____ AM / PM Sample Pos. K-13 midplane C.R. ____

Can yes ☐ no ☑ C.R. Pos. c c c, M

Control D 13.283

Sample D 4.570

Control ____

Removed Cb added Teflon

CRITICAL POSITIONS

Run 18 Expr. 6 Run 19

T0.4582 β-0.1470

Control Rod 999.788 I T P

Control Rod		Channel	
A	999.998 Ins	A	
B	V. 346	B	0.050
3	13.131 out	C	
4	12.770	D	
		E	

Tim Crit. AM PM Duration min.

DANGER COEFFICIENT

Sample Teflon #1 Weight 152.275 Moles

Thickness 1/2" Pieces 1 Composition

Time 5:10 AM PM Sample Pos. K-13 midplane C.R.

Con	yes ☐	C.R. Pos.	c	c	c/M
Control		D-13.283			
Sample		D-12.770			
Control					

202

5/9/57

Removed Teflon

Zero Run - 1/2" void K-13 mid-plane

CRITICAL POSITIONS

C.A. 18 Expr. 6 Run 20

Table Pos. 999.788 L T. -0.4579 R 0.1476

Control Rod		Channel	
A	0.000	A	73 X 100/100
B	2.277	B	0.050
C	13.131 Out	C	4.8 X 5 X 10^{-9}
D	13.291 Out	D	61 X 1000/200
Servo	0.000	E	Out of order

Tim Crit. 5:30 AM (PM) Duration ____ min.

Checked depth of void - 1/2" -