BOOK 118R

Notes:
on spine: "No. 1773 Scott"
on front "CA 8&9"

Blank pages: inside front cover sheet, 4-6, 96-98, 216-295, 297-300

page 16 has big graph paper taped
page 96 has 3 sheets stapled
page 187 has calendar sheet stapled (9/20/51)
pages 199, 202, 205, and 212 have one graph taped to each
small sheet of paper between pages 202 and 203
page 208 has sheet stapled
page 212 also has 1 sheet of paper stapled (faded green ink, hard to read)
page 215 has 2 long graphs stapled
calendar sheet between pages 266 and 267 (10/16/51)
inside back cover sheet has 1 big graph stapled
backside of that sheet has 1 sheet stapled to it

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
May 8, 2001

CAS

SHAW'S
PIONEERS SINCE 1831

This document consists of 313 pages.
No. 1 of 1 copies, Series A

5-25-60

Account Book

No. S 149

NO UNITS

Journal . . . . . .

Ledger, Single Entry . .

Ledger, Double Entry .

Record Ruled (27 Lines)

Made in 150, 200 and 300 Pages

MADE IN U. S. A.

TO REORDER, SPECIFY NUMBER, RULING AND THICKNESS INDICATED ON BACKBONE OF THIS BOOK.

EJM

This document consists of 308 pages.
No. 1 of 1 copies, Series A

10-9-21

LABORATORY RECORDS
1954

Notebook No. Y-NB-1773

Assigned to: A. D. Callihan

Department: 3405

Building: 9735

Date: 8-14-52

10-13-55

Rod 1	~~30.605~~	30.595
Rod 2	34.945	
Rod A	35.396	
Rod B	~~33.678~~	33.580

10-13-55

Samples 5/8 al
+2 al
Iron tube
A - Nickel Rod

CA-8

Exp		Pg
1.	Start-up	7
2.	Rod Calibration	16
3.	Evaluation of aluminum fuel tube 61	
4.	Calibration of ARE Regulating Rod.	65
5.	Evaluation of pressure shell	
6.	Evaluation of fuel Vs. radius.	
7.	Fuel tube Vs. void importance	
8.	Foil activation Vs power level.	
9.	Axial traverse. 13 bare (in.) foils.	
10.		

CA-9

Exp no.	
1	Initial Loading
2	To obtain Criticality with central control rod.
3	Calibration of central control rod.
4	Danger Coff. at several radii of CA-8 type fuel element.
5.	Foil irradiation
6.	Danger Coef.
7. → 8.	Calibration of ARE safety rod (207) Danger Coef

7

8/15/52.

Scott
Calliham

C.A. ~~A-1~~ 8 Expr. 1 Run 1

Sheet _____ Date 8/15 1952 Time 1:00 ~~AM~~ PM

Purpose Initial loading

Po-Be source #21 in BeO assembly

Background - Cd rods up, no fuel or reflector coolant in BeO -

1:00P

~~MULTIPLICATION~~

Scaler	Blk / 5 min.	BG / 5 min.	~~Mult.~~ 1/M ave BG	
1	(91×16)+15 / (84×16)+2	(94×16)+3	(96×16)+11	301.7 c/min
2	(348×16)+13 / (~~464×16~~)+10	(354×16)+3	(347×16)+8	1121 c/min
3				

Loaded Safety Rod #2 - See diagram - (7 tubes)

4:05P

(Cd rod #1 probably in BeO)

MULTIPLICATION

Scaler	c / 5 min.	~~BG~~ c 5 min.	~~Mult.~~ ave.	1/M
1	(113×16)+9 / (119×16)+10	(117×16)+9	374.1 c/min	0.81
2	(392×16)+9	(388×16)+12	1250 c/min	0.90
3				

4:35P Shut down. Channels D & C showed decrease as rods were dropped.

8

8/16/52. 9A Repeat count of 4:05P 8/15.

Conditions: Safety #2 (loaded with Zinc) up

" #1 (Cd only) up.

C_1 c/5 min	C_2 c/5 min
(122×16)+4	(389)(16)+4

c/5 min

Dropped Safety #1 (Cd only).

(122×16)+4 (388×16)+11

Loading #2, i.e. 4 control rod tubes & central tube

11 AM

	C_1	C_2
	~~(129×16)+8~~	(407×16+11)

Scaler	c/—	T/M
1		
2		
3		

MULTIPLICATION

Scaler	C_1 / 5 min. BG/ 1 min.	c/min	T/M
1	~~(129×16)+8~~ (130×16)+7	301.7	415.6	0.73
2	(407×16)+11 (404×16)+5	1121	1299	0.86
3				

9

8/16/57

Third loading: Safety Rod #1, 7 tubes. (Total loading: 19 tubes).

MULTIPLICATION

Scaler	c/ 5 m.n. BG/ 1 min. ~~Matt.~~			1/M
1	(141×16)+0; (142×16)+4	301.7	4532 c/min	0.67
2	(399×16)+4 / (403×16)+6	1121	1284	0.87
3				

8/17 – 5:30A – At least one leg of power to 9213 out from some time eve of 8/16 (probably 8-9PM based on temp. recorder Run 108) until ~ 4AM 8/17 – We not notified until after restoration. (Some clocks found only 20 min slow). C & E tripped. No other apparent symptoms of trouble. D.C.

8/18 Repaired coupling Control rod A
Coupling on Rod 2 slipped – repaired

10

0.504 OD x 0.020 wall x 35.3125 long

9/19

Clean 5 reflector coolant tubes & Label - distilled 5 coolant tubes as follows -

	Tube #	Position Gross	Position net		Gross	net	
1.952	1 = 5-11	340	191	TUBE/Pos.			
1.911	2 = 4-10	340	187	24 = 1-3	342	193	1.972
1.957	3 = 4-9	343.5	192.5	25 = 12-9*	346	194	1.983
1.952	4 = 3-8	345	191.0	26 = 2-2	347	193	1.972
1.983	5 = 3-9	347	194.0	27 = 13-2	338	189	1.932
1.947	6 = 2-8	343.5	190.5	28 = 5-2	342	188	1.924
1.972	7 = 2-7	347	193	29 = 4-8	343	191	1.952
1.942	8 = 3-7	342	190	30 = 14-2	342	189	1.932
1.942	9 = 2-6	341	190	31 = 15-4	344	191	1.952
1.952	10 = 2-5	345	191	32 = 8-1	347	194	1.983
1.911	11 = 2-4	340	187	33 = 8-12	342	190	1.942
1.972	12 = 3-6	346	193	34 = 9-13	346	192	1.962
1.962	13 = 3-4	345	192	35 = 11-10	348	194	1.983
1.942	14 = 3-3	343	190	36 = 5-1	348	194	1.983
1.932	15 = 13-8	342	189	37 = 14-3	344	192	1.962
1.942	16 = 13-9	345	190	38 = 12-1	346	193	1.972
1.983	17 = 13-7	348	194	39 = 12-3	340	189	1.932
1.952	18 = 13-4	344	191	40 = 7-13	342	190	1.942
1.942	19 = 1-4	344	190	41 = 4-11	345	192	1.962
1.932	20 = 3-2	343	189	42 = 8-13*	344	191	1.952
1.924	21 = 13-3	341	188	43 = 15-3	343	190	1.942
	22 = 4-2			44 = 7-12	341	190	1.942
1.942	23 = 4-1	343	190	45 = 12-2	343	190	1.942

16.387 $\frac{cc}{cu\ in}$ Vol of tube = 97.847 cu. cc

	Tube / Pos	Gross	net	
	46 = 14-8	338	189	1.932
	47 = 14-6	341	189	1.932
x	48 = 14-4	342	190	1.942
	49 = 5-12	342	190	1.942
1.972	50 = 14-5	344	190	1.942
1.983	51 = 11-12	342	190	1.942
1.972	52 = 11-1	340	190	1.942
1.932	53 = 12-10	338	189	1.932
1.924	54 = 10-3	343	188	1.924
1.952	55 = 9-3	342	189	1.932
1.932	56 = 11-12	340	190	1.942
1.952	57 = 9-12	343	191	1.952
1.983	58 = 10-12	342	189	1.932
1.942	59 = 11-11*	342	190	1.942
1.962	60 = 12-11	343	192	1.962
1.983	61 = 6-12	344	191	1.952
1.983	62 = 10-2	342	192	1.962
1.962	63 = 9-2	344	191	1.952
1.972	64 = 6-2	345	192	1.962
1.932	65 =	346	194	1.983
1.942	66 = 7-2	342	191	1.952
1.962	67 = 7-3		65	126.721
1.952				1.950 Average

Red - added with 4" fuel tubing -

1.942 * Tube is up-side down because of bulged end.

1.942

1.942

12

8/30/57

Scott

Ellis

Callihan

INSTRUMENT CHECK

Time 8 30 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000		10^{-6}	10/1000	900V
Source Dist.	2'	OK	15"	~~5'~~	6"
% F.S. Trip	50		95"	30	40

Counts 102 OK

Repeat of Count of 8/16 after adding Coolant tubes –

MULTIPLICATION

BG/1'

Scaler	c/ 5 m		Mult. c/min	1/M
1	(132+16)+14][(124+16)+11	302	422	0.715
2	(384+16)+1 (387+16)+6	1121	1235	0.91
3				

Fourth loading: Removed dope structure – added nine Coolant tubes + 9 fuel tubes –

Total loading – 28 tubes. (≈ 5.8 # = 2.6 kg)

MULTIPLICATION

Scaler	c/____min. BG/____min.		~~Mult.~~	1/M
1	(189×16)+10 (184×16)+6	30 ✓	598 c/m	0.51
2	446+10 439×16)+15	112 ~~135~~	1419	0.79 ~~0.87~~
3				

5" Loading - 8 tubes - total ƒ 36 (= ~7.5# = 3.4 kg

MULTIPLICATION

Scaler	c/ 5 min. BG/ 1 min.		c/m Mult.	1/M
1	387 +1 361 +0	302	3	0.24
2	518+13 510+11	1127		0.62
3				

6" Loading 6 tubes - total ƒ 42 (~8.7# = 3.9 kg)

MULTIPLICATION

Scaler	c/ 5 min. BG/____min.	Mult.	1/M
1	382 399 +4 584 582		0.23
2	588 +1		0.60
3			

14

8/30/52 7" Loading - 8 tubes - Total 50

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 1 min.	Mult.	1/M
1	696 x16 = 670	302		.146 ~~.146~~
2	803 x16 = 796	1121		.435 ~~.435~~
3				

8" Loading - 7 tubes Total 57

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 1 min.	Mult.	1/M
1	553x64+22 = 526x64+54	302		0.04
2	494x64+44 = 482x64+40	1121		0.18
3				

15
8/21/52
Scott
Callihan

9" Loading - 4 tubes - Total 61
(~12.6# = 5.75 Kg)

INSTRUMENT CHECK

Time 7 AM ~~PM~~ Source PB×67

	Channel A	B	C	D	E
Range	10/1000	1	10^{-16}	10/1000	900V
Source Dist.	2'	OK	16"	5'	2"
% F.S. Trip	40	1	100+	25	100

Counts 1+2 OK

NOT CRITICAL-

10" Loading - 3 tubes Total 64
(~13.216 ≡ 6 Kg)

CRITICAL POSITIONS 8AM 8/21/52

~~8 A.M.~~ Expr. 1 Run 1

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
A	14.295	A	83 x 100/100
B	In	B	0.0022
1	0.070 Safety (In)	C	~~3.5 x~~ 5.6 x 10^{-10}
2	In	D	67 x 1000/50
		E	1.4 @ 900V

Tim Crit. 8:00 ~~AM~~ Duration 17 min.

16

8/21/57

Approximate control rod position by measurement —

Raised Rod A from 14.295 → 13.995

B_1 increased from 0.0022 → 0.006

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 1 ~~a~~.

Table Pos. L T

Control Rod		Channel	
A	14.275	A	50 x 1000/50
B	do	B	0.006
3	Safetic arm	C	$5.0 \times 2.5 \times 10^{-10}$
4		D	89 x 1000/100
		E	4.4 @ 900V.

Tim Crit. 8:25 AM PM Duration 8 min.

In the above period measurement Rod A consists of two fuel tubes —

Page 16

CA-A-1 & 2 Run 1 8/21/52

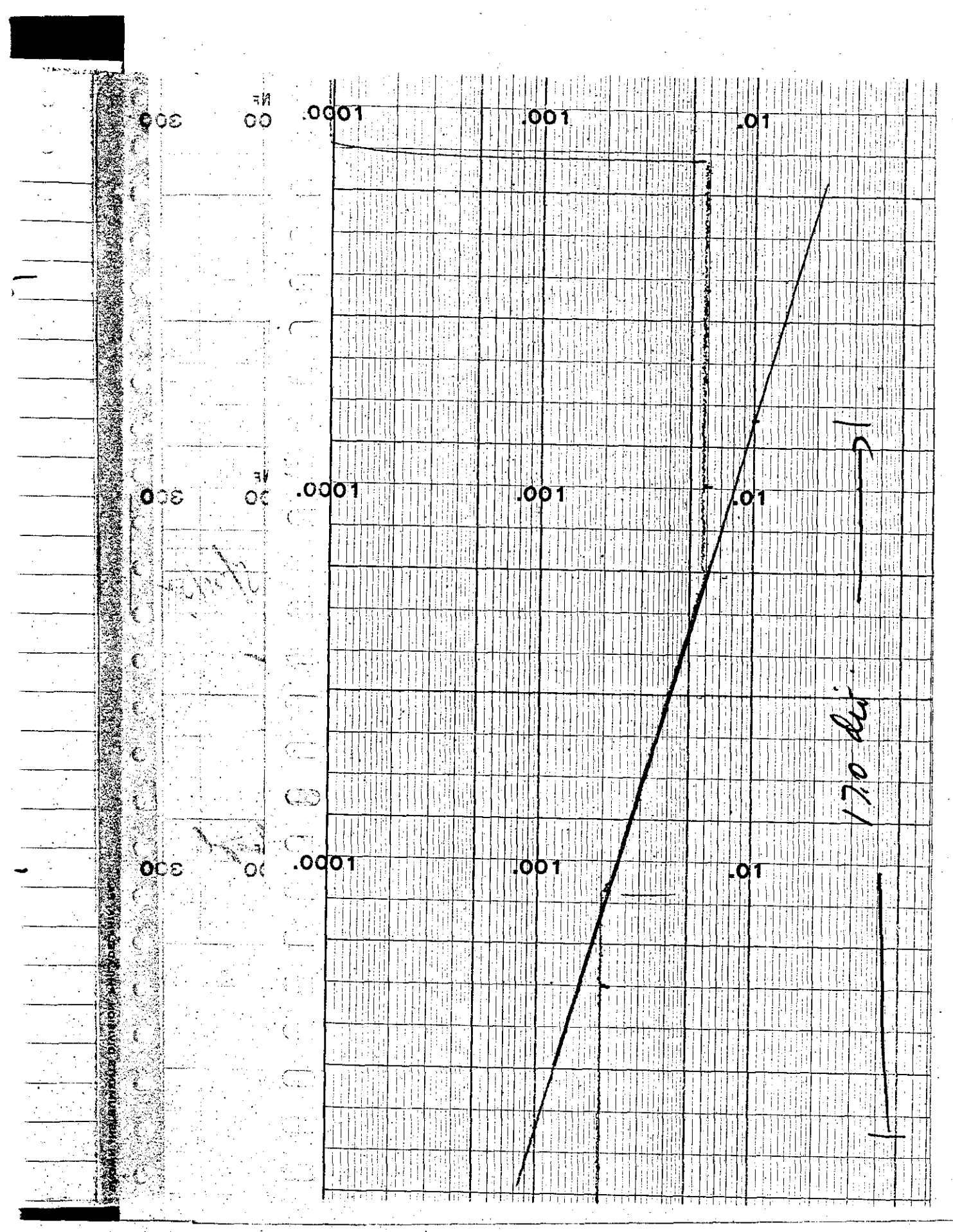
Rod A

Ranges 14.245" → 13.995"

$\frac{\Delta b}{R} = 170 \times 21.7 = 368.9$ cps

$N_L = 3.2$ ft for 0.3" height

$= 10.7$ c/inch


.0001
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170 dia

8/21

One fuel tube was removed from Rod A is was re-inserted in the original position being supported by three S.S. plate (#72 in 9-8) #74 in 9-7 on mechanism

C.A. ~~A-1~~ 8 Expr. 1 Run 2

Sheet _____ Date 8/21 195 2 Time 2:46 ~~AM~~ PM

Purpose To go critical with Rod A having only one fuel tube.

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 1 Run 2

Table Pos. _____ L _____ T _____ R _____

~~Control~~ Rod		Channel	
1	0.075	A	64 x 1000/25
2	99.950	B	0.0035
A	22.890	C	2.9 x 2.5 x 10^{-10}
B	99.96	D	53 x 1000/100
		E	2.4 @ 900v

Tim Crit. 3:20 ~~AM~~ PM Duration _____ min.

18

8/21/52 Removed ~~Rod~~ Tube 64 from position 3-5
Total loading 63 tubes.

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 1 Run 3

Table Pos. _____

Control Rod		Channel	
1	0.075	A	55 ÷100/200
~	99.948	B	0.003
A	15.655	C	$2.3 \times 2.5 \times 10^{-10}$
B	~~99.96~~ 99.956	D	45 ÷1000/100
		E	2.0 @ 900 V

Tim Crit. 4.00 ~~AM~~ PM Duration 8 min.

8/22/52 Removed tube 56 from position 13-6
Total loading 62 tubes ←

C.A. ~~A-78~~ Expr. 1 Run 4

Sheet _____ Date 8/22 1952 Time _____ AM ~~PM~~

Purpose Continue geometry improvement

9/24/52

INSTRUMENT CHECK

Time 8:45 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000	1	10 -10	10/1000	900V
Source Dist.	18"	OK	1'	5"	6"
% F.S. Trip	45	1	.80	25	90

Counts 1 & 2 OK

CRITICAL POSITIONS

C.A. ~~A=1~~ 8 Expr. 1 Run 4

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	0.070	A	46 x 1000/100
2	99.950	B	~~82 x 10~~ 0.015
~~A~~	~~0.007 = 0.~~ 7.780	C	4.4 x 5 x 10^{-10}
B	99.963	D	52 x 1000/200
		E	1.6 @ 750V

Tim Crit. 9:10 AM ~~PM~~ Duration 10 min.

20

8/21/57

Fitted al strips (probably 2S) 30" x 3/4" x 1/16" between Be blocks and inconel sheet to tighten assembly.

CRITICAL POSITIONS

C.A. ~~A-78~~ Expr. 1 Run 5

Table Pos. I T R

Control Rod		Channel	
1	0.072	A 36	100/500
2	999.950	B .005	
A	10.700	C 3.4	2.5×10^{-10}
B	999.959	D 68	100/1000
		~~E .005~~	3.3 900V

Tim Crit. 1:03 ~~AM~~ PM Duration 12 min.

Raised level to check reproducibility of rod position.

CRITICAL POSITIONS

C.A. ~~A-78~~ Expr. 1 Run 5a

Table Pos. I T R

Control Rod		Channel	
1	0.073	A 58	100/1000
2	99.950	B .021	
A	10.696	C 5.5	5×10^{-10}
B	99.958	D 45	1000/500
		E 6.2	840 V

Temp. 1.358 MV

Tim Crit. 1:23 ~~AM~~ PM Duration ____ min.

See Log N Chart

withdrew rod A one in., (from 10.696 to 11.696) inserted source and allowed reactor to drift to equalibrium $B_1 = .005$

Withdrew source and allowed reactor drift down.

Reached equilibrium B_1 at .0004

3:25 P.M. See Log N Chart

Removed tube No 25 from 13-5.
Total loading 61 tubes.

System not critical with all rods in.
$B_1 = .0015$

22
8-25-52

INSTRUMENT CHECK

Time 11-25 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/cm		10^{-10}	10/1000	900V
Source Dist.	16"	OK	14"	5'	6"
% F.S. Trip	40		160+	30	100+

Counts 142 OK

C.A. ~~Act~~ 8 Exp. 2 Run 2

Sheet Date 8-25 AM PM

~~Purpose~~ To Get Reactor Ready for Control Rod Calibration

Replaced tubes 64 in 3-5
56 in 13-6
25 in 13-5

Added tubes 20 in 6-4
24 in 11-3

Tube total now 66.

CRITICAL POSITIONS

C.A. ~~#1~~ 8 Expr. 2 Run 2

Table Pos. _____ L T R

Control Rod		Channel	
1	0.075	A	49 ~ 1000/25
2	99.847	B	.003
A	34.106	C	4.6 ~ 10^{-10}
B	13.540	D	94 ~ 1000/50
		E	1.4 ~ 900 V

Tim Crit. 1:05 ~~AM~~ PM Duration 10 min.

P.t rod A in and finish off with rod B

CRITICAL POSITIONS

C.A. ~~#1~~ 8 Expr. 2 Run 3

Table Pos. _____ L T R

1:10 P

Temp

1.4347 mv

Control Rod		Channel	
1	0.078	A	52 ~ 1000/25
2	99.947	B	.0031
A	0.017	C	5.0 10^{-10}
B	23.786	D	81 1000/50
		E	1.6 ~ 900 V

Tim Crit. 1:15 AM PM Duration 30 min.

24

8/25/5~

Inserted rod B from 23.262 to 22.740 and leveled with 4

CRITICAL POSITIONS

CA A-18 Expr. 2 Run 4'

Table Pos. _____ L _____ T _____

Control Rod		Channel	
1 Saw		A 63	10.3/100
2 Saw		B .022	
4 5.805		C 4.7	5×10^{-10}
6 22.742		D 45	100/500
		E 2.4	750V

Tim Crit. 1:50 AM PM Duration 23 min.

with drew rod B from 22.742 to 24 inches to reduce level

~~Withdrew rod~~ Leveled with rod B.

25

9/25/57

CRITICAL POSITIONS

C A ~~11-18~~ 8 Expr. 2 Run 5

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A 40	1000/25
2	Same	B .0021	
~~5.815~~ 5.805		C .5	5×10^{-10}
6	22.845	D 57	1000/50
		E 1.0	at 900V

Tim Crit. ~~2:18~~ 2:13 ~~AM~~ PM Duration ~~22~~ 33 min.

Inserted B for position period and leveled with H

CRITICAL POSITIONS

C A 8 ~~11-1~~ Expr. 2 Run 6

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A 58	1000/100
2	Same	B .022	
~~9.140~~ 9.410		C 4.3	5×10^{-9}
6	22.350	D 42	1000/500
		E 1.8	750V

Tim Crit. 2:45 ~~AM~~ PM Duration 23 min.

Tempo
3:00 P
1.35^2 C

26

Reduced feed with B and then leveled with B

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 7

Table Pos. L T P

Control Rod	Channel
1 same	A 35 1000/25
2 same	B .0018
A 7.410	C .4 X 5X10^{-10}
B 22.485	D 48 1000/50
	E .9 at 900V

Tim Crit. 3:08 ~~AM~~ PM Duration 24 min.

Inserted rod B to 21,985 for positive period leveled with A.

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 8

Table Pos. L T P

Control Rod	Channel
1 same	A 55 1000/100
2 same	B .02
A 8.697	C 4.0 5X10^{-10}
B 21.985	D 40 1000/500
	E 2.0 750 V

Tim Crit. 3:32 ~~AM~~ PM Duration 23 min.

Reduce level with B and then leveled with B.

CRITICAL POSITIONS

C.A. ~~A=18~~ Expr. 2 Run 9

Table Pos. _____ L T R

Control Rod		Channel	
1	same	A 36	1000/25
2	same	B .0018	
A	8.697	C .4 X $5X10^{-10}$	
B	22.180	D 49	1000/50
		E 1.0 on 900V	

Tim Crit. 3:55 ~~AM~~ PM Duration 13 min.

Inserted rod B to 21.680 for positive period. Leveled with A.

4:20 P
Temp.
1.3435 mv

CRITICAL POSITIONS

~~A~~ 18 Expr. 2 Run 10

Table Pos. _____ L T R

Control Rod		Channel	
1	Same	A 56	1000/100
		B .02	
A	9.616	C 4.1	5×10^{-10}
B	21.680	D 40	1000/500
		E 1.8	950 V

Tim Crit. 4:08 ~~AM~~ PM Duration 27 min.

INSTRUMENT CHECK

Time 9 00 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	40/100	1	10^{-10}	10/100	900V
Source Dist.	18"	OK	6"	5"	6"
% F.S. Trip	40	1	100+	18	100+

Counter OK

C.A. ~~AF~~ 8 Expr. 2 Run 11

Sheet _____ Date 8/26/57 11:00 AM ~~PM~~

Purpose Continuation of Control rod A Calibration.

8/26/57

CRITICAL POSITIONS

C.A. ~~A+8~~ Expr. 2 Run 11

Table Pos. _____ L T R

Control Rod		Channel	
1	99.945	A	42 1000/25
2	99.945	B	.002
A	9.616	C	.5 5X10⁻¹⁰
B	21.697	D	60 1000/50
		E	1.0 on 900V

Tim Crit. 11:15 AM ~~PM~~ Duration _____ min.

Inserted rod B to 21.2 to produce positive period. Level with Rod A.

Temp 11:25A
1.319 mw

CRITICAL POSITIONS

C.A. ~~A+8~~ Expr. 2 Run 12

Table Pos. _____ L T R

Control Rod		Channel	
1	99.945	A	63 x 1000/100
2	99.945	B	0.02
A	10.940	C	4.7 x 5 x 10⁻¹⁰
B	21.200	D	45 x 1000/300
		E	2.2 @ 750V

Tim Crit. 11:33 AM ~~PM~~ Duration 11 min.

Lower level by withdrawing B to 24.

30

Level by inserting B-

CRITICAL POSITIONS

C.A. ~~A+B~~ Expr. 2 Run 13

Table Pos. L T R

Control Rod		Channel	
1	99.945	A	9 x 1000/100
2	99.945	B	0.0015
A	10.940	C	0.4 x 3 x 10^{-9}
B	21.350	D	47 x 1000/50
		E	0.8 @ 900V

Tim Crit. 11:56 AM ~~PM~~ Duration 3 min.

Insert B to 20.8 to give + period

Level with A.

CRITICAL POSITIONS

C.A. ~~A+B~~ Expr. 2 Run 14

Table Pos. L T R

Control Rod		Channel	
1	99.945	A	59 x 1000/100
2	99.945	B	0.020
A	11.850	C	4.4 x 5 x 10^{-10}
B	20.840	D	43 x 1000/500
		E	1.9 @ 750 V

Tim Crit. 12:12 ~~AM~~ PM Duration 8 min.

Temp:
12:20 P
1.326 mV

lowered the level by withdrawing B and then leveled off with the same rod

CRITICAL POSITIONS

C.A. ~~A-78~~ Expr. 2 Run 15

Table Pos. _____ L _____ T _____

Control Rod		Channel	
1		A 39	1000/25
2		B .0019	
A 11.848		C 0.4	5×10^{-10}
B 20.940		D 55	1000/50
		E 0	750

Tim Crit. 12:20 ~~AM~~ PM Duration 21 min.

Inserted B to 20.30 to give positive period
Level with A

CRITICAL POSITIONS

C.A. ~~A-78~~ Expr. 2 Run 16

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1 99.945		A 70	1000/100
2 99.945		B .024	
A 13.143		C 5.4	5×10^{-10}
B 20.300		D 51	1000/500
		E 2.5 on 750V	

Tim Crit. 12:41 ~~AM~~ PM Duration 18 min.

Temp
1.3292

32

~~Withdrew~~ rod B to reduce level and leveled with B.

CRITICAL POSITIONS

~~A I~~ 8 Expr. 2 Run 17

Table Pos. L T P

Control Rod	Channel
same	A 36 1000/25
same	B .0018
A 13.145	C .4 $5X10^{-10}$
B 20.450	D 50 1000/50
	E 0 750V

Tim Crit. 1:15 ~~AM~~ PM Duration 7 min.

Insert rod B to 19.750 to produce positive period. Leveled Rod A.

1:25 P

Temp 1.3280

CRITICAL POSITIONS

A ~~A I~~ 8 Expr. 2 Run 18

Table Pos. L T P

Control Rod	Channel
1 same	A 65 1000/100
2 same	B .022
A 14.425	C 4.8 $5X10^{-10}$
B 19.750	D 47 1000/500
	E 2.3 750V

Tim Crit. 1:22 ~~AM~~ PM Duration 12 min.

withdrew rod 8 to reduce level and leveled with B.

CRITICAL POSITIONS

A. ~~A-1~~ 8 Expr. 2 Run 19

Table Pos. L T R

Control Rod	Channel
1 same	A 39 1000/25
2 same	B .002
A 14.425	C .4 $5X10^{-10}$
B 19.887	D 56 1000/50
	E 0 750V

Tim Crit. ~~1:34 AM~~ 1:34 PM Duration 14 min.

Insert rod B to 19.385 to produce positive period, Leveled rod A.

CRITICAL POSITIONS

A. ~~A-1~~ 8 Expr. 2 Run 20

2:10 P.M.

Temp.

1.3306

Table Pos. L T R

Control Rod	Channel
1 same	A 57 1000/100
2 same	B .02
A 15.245	C 4.2 $5X10^{-10}$
B 19.385	D 41 1000/500
	E 2.0 750V

Tim Crit. ~~1:19~~ 1:48 ~~AM~~ PM Duration 24 min.

34

withdrew rod B to reduce level leveled with B.

CRITICAL POSITIONS

~~A-I~~ 8 Expr. 2 Run 21

Table Pos. _____ L _____ T _____ R _____

Control Rod	Channel
1 same	A 34 1000/25
2 same	B .0018
A 15.245	C 2.3 10^{-10}
B 19.560	D 47 1000/50
	E .8 900 V

Tim Crit. 2:12 ~~AM~~ PM Duration 16 min.

Insert rod B to ~~19.73~~ 19.000 to produce a positive period. Leveled with rod A.

2:42 P.M.
Temp
1.3306

CRITICAL POSITIONS-

~~A-I~~ 8 Expr. 2 Run 22

Table Pos. _____ L _____ T _____ R _____

Control Rod	Channel
1 same	A 58 1000/100
2 same	B .021
A 16.080	C 4.3 5×10^{-10}
B 19.000	D 42 1000/500
	E 1.8 750 V

Tim Crit. 2:28 ~~AM~~ PM Duration 24 min.

withdrew rod B to reduce level leveled with B.

CRITICAL POSITIONS

C.A. ~~A-I~~ 8 Expr. 2 Run 23

Table Pos. _____ L T R

Control Rod		Channel	
1 same		A 36	1000/25
2 same		B .0018	
A 16.090		C 2.5	10^{-10}
B 19.130		D 35	1000/25
		E 0.8	900V

Tim Crit. 2:52 ~~AM~~ PM Duration 24 min.

Inserted rod B to 18.50 to produce a positive period. Level with rod 1.

CRITICAL POSITIONS

~~A-I~~ 8 Expr. 2 Run 24

Table Pos. _____ L T R

Temp. 3:32 P.M. 1.3311

Control Rod		Channel	
1 same		A 56	1000/100
2 same		B 0.020	
A 17.140		C 4.2	5×10^{-10}
B 18.500		D 43	1000/500
		E 1.9	750V

Tim Crit. 3:24 ~~AM~~ PM Duration 12 min.

36

withdrew rod B to reduce level leveled with B.

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 25

Table Pos. _____ L _____ T _____ P _____

Control Rod		Channel	
1 same		A 36	1000/25
2 same		B .0018	
A 17.140		C 0.8	5×10^{-10}
B 18.652		D 50	1000/50
		E 1.0	900V

Tim Crit. ~~8~~:36 ~~AM~~ PM Duration 15 min.

Insert rod B to 18.150 to produce a positive period. Level with rod A

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 26

Table Pos. _____ L _____ T _____ P _____

Control Rod		Channel	
same		A 60	1000/100
same		B .02	
A ~~17.844~~ 17.905		C 4.4	5×10^{-10}
B 18.150		D 43	1000/500
		E 2.0	750V

Tim Crit. ~~9~~:51 ~~AM~~ PM Duration 26 min.

Temp 4:14 P.M.

1.3293

8/27/5~

INSTRUMENT CHECK

Time 8:15 / 9:30 AM PM Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	2'	OK	15"	5'	6"
P/S F.S. Trip	44	1	100+	18	100

Counter 1&2 OK

C.A. 8 Expr. 2 Run

Sheet Date 8/~7 195~ Time AM PM

Purpose Continue Control Rod Calibration

38

8/27/57

withdrew rod B to reduce level leveled with B.

CRITICAL POSITIONS

CA. ~~A-18~~ Expr. 2 Run 27

Table Pos. L T R

10:46 AM

Temp

1.8299

Control Rod		Channel	
1	99.945	A 38	1000/25
2	99.945	B .0018	
A	17.905	C 0.9	2.5×10^{-10}
B	18.170	D 5.4	1000/50
		E 1.0	900V

Tim Crit. 10:36 AM ~~PM~~ Duration 10 min.

Inserted Rod B to 17.670 to produce a positive period. Leveled with rod A

CRITICAL POSITIONS

CA ~~A-18~~ Expr. 2 Run 28

Table Pos. L T R

11:03 A.M.

Temp

1.3306

Control Rod		Channel	
1	same	A 61	1000/100
2	same	S .02	
A	~~17.670~~ 18.890	C 4.5	5×10^{-11}
B	17.670	D 44	1000/500
		E 4.4	810 V

Tim Crit. 10:46 AM ~~PM~~ Duration 21 min.

withdrew rod B to reduce level leveled with B.

CRITICAL POSITIONS

~~AF~~ 8 Expr. 2 Run 29

Rod Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 same		A 41	1000/25
2 same		B .0021	
A 18.890		C 0.5	5×10^{-10}
B 17.762		D 60	1000/50
		E .2	810 V

Tim Crit. 11:07 ~~AM~~ Duration 22 min.

Inserted rod B to 17.260 To produce a positive period. Leveled with rod A

11:46A
Temp
1.3300

CRITICAL POSITIONS

~~A~~ 8 Expr. 2 Run 30

Rod Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 Same		A 63	1013/100
2 Same		B .021	
A 19.740		C 4.7	5×10^{-10}
B 17.~~620~~ 260		D 46	1013/500
		E 4.6	810 V

Tim Crit. 11:29 AM ~~PM~~ Duration 27 min.

40

Withdrew B to lower the level leveled with A

CRITICAL POSITIONS

C A. ~~A-1~~ 8 Expr. 2 Run 31

Table Pos. L T F

	Control Rod		Channel	
1	San	A	37	1000/25 =
2	S	B	.0018	
A	19.740	C	0.5	5×10^{-0}
B	17.378	D	52	1000/50
		E	0.2	810 ✓

Tim Crit. 11:56 ~~AM~~ PM Duration 31 min.

Insert B to 16.88 to get positive period leveled with rod A

CRITICAL POSITIONS

C A. ~~A-8~~ Expr. 2 Run 32

Table Pos.

12:47 p.m.

Tom

1.3300

	Control Rod		Channel	
1	Sam	A	60	1000/101
2	S		.02	
A	20.548	C	4.4	5×10^{-0}
B	16.880	D	43	1000/500
		E	4.4	810 ✓

Tim Crit. 12:27 ~~AM~~ PM Duration 20 min.

8/27/52

Withdrew B to lower the level
leveled with B

CRITICAL POSITIONS

C.A. ~~A-1~~ 8 Expr. 2 Run 33

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	38 x 1000/25
2	Same	B	0.002
A	20.548	C	0.4 x 5 x 10^{-10}
B	16.990	D	52 x 1000/50
		E	0.2 @ 810 v

Tim Crit. 12:47 ~~AM~~ PM Duration 26 min.

Quasi B to ~16.6", + period. Level with A

CRITICAL POSITIONS

8 Expr. 2 Run 34

Pos. _____ L _____ T _____ R _____

Temp 1.40P
1.231 mv

Control Rod		Channel	
1	Same	A	64 x1000/100
2	Same	B	0.021
A	21.217	C	4.7 x 5 x 10^{-10}
B	16.590	D	46 x 1000/500
		E	4.6 @ 810 v

Tim Crit. 1:26 ~~AM~~ PM Duration 15 min.

42

8/27/57

Low power level with B; level with #B

CRITICAL POSITIONS

C.A. 8 Expr. ~~2~~ Run 35

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	39 x 1000/25
2	Same	B	0.00 ~
~~A~~	21.218	C	0.4 x 5 x 10^-0
~~B~~	16.707	D	55 x 1000/50
		E	0.~ @ 820 V

Tim Crit. 1:45 ~~AM~~ PM Duration 17 min.

+period by inserting B to ~ 16.1, level with A

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 36

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	63 x 1000/100
2	Same	B	0.021
~~A~~	22.335	C	4.6 x 5 x 10^-10
~~B~~	16.106	D	45 x 1000/500
		E	4.5 @ 810 V

Tim Crit. 2:10 ~~AM~~ PM Duration 12 min.

Lower ~~Rod~~ level with B; Flatten with A + B

CRITICAL POSITIONS

Run 8 Expr. V Run 37

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	37 x 1000/25
2	Same	D	5 x 1000/50
A	22.337	B	0.002
B	16.228	C	0.3 x 5 x 10^{-10}
		E	0.2 @ 810

Crit. 2:27 ~~AM~~ PM Duration 23 min.

+ period by inserting B to -15.6; Level with A.

CRITICAL POSITIONS

Run 8 Expr. V Run 38

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	63 x 1000/100
2	Same	B	0.021
A	23.550	C	4.6 x 5 x 10^{-10}
B	15.620	D	45 x 1000/500
		E	4.5 @ 810 V

Tim Crit. 2:57 ~~AM~~ PM Duration 13 min.

44

Decrease with B; Level with B.

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 39

Table Pos. L T D

Control Rod		Channel	
1 same		A 26	1000/25
2 same		B .0009	
A 23.550		C .8	$\times 10^{-10}$
B 15.878		D 31	1000/50
		E .4	at 900V

Tim Crit. 3:17 ~~AM~~ PM Duration 17 min.

Temp at 3:25 P.M.
1.33255

Inserted B to 15.3 to produce positive period.
Level with A.

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 40

Table Pos. L T D

Control Rod		Channel	
1 same		A 61.	1000/100
2 same		B .021	
A 24.423		C 4.5	5×10^{-10}
B 15.300		D 44	1000/500
		E 4.4	810 V

Tim Crit. 3:34 ~~AM~~ PM Duration 30 min.

Temp at 4:06 P.M.
1.3327

INSTRUMENT CHECK

Time 8:20 AM 10 15 ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000	|	10^{-10}	10/1000	900V
Source Dist.	18" OK		8"	5'	3"
% F.S. Trip	45	|	100+	30	100+

Counter 142-OK

C.A. 8 Expr. 2 Run 41

Sheet _____ Date 8/28/52 Time 10.15 AM ~~PM~~

Purpose Continuation of rod calibration

8/28/57

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 41

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	99.947	A 37	1000/25
2	99.945	B .002	
A	24.423	C .4	5×10^{-10}
B	15.344	D 51	1000/50
		E .6	810V

Tim Crit. 10:35 AM PM Duration 13 min.

Insert rod B to 14.743 to produce a positive period. Level with A.

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 42

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	same	A 59	1000/100
2	same	B .02	
A	26.164	C 4.4	5×10^{-10}
B	14.742	D 42	1000/500
		E 4.8	810V

Tim Crit. 10:48 AM ~~PM~~ Duration 17 min.

withdraw rod B to reduce level
level with B.

8/28/57

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 43

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	38. X1000/25
2	Same	B	0.00V
A	26.163	C	0.4 x 5 x 10^-10
B	14.875	D	54 X1000/50
		E	0.6 @ 810V

Tim Crit. 11:05 ~~AM~~ PM Duration 25 min.

Drew B to 14.2" level with A

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 44

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	57 X 1000/100
2	Same	B	0.02
A	28.240	C	4.3 x 5 x 10^-10
B	14.224	D	40 X 1000/500
		E	4.5 @ 810V

Tim Crit. 11:40 AM ~~PM~~ Duration 10 min.

48

B removed – Level with B

CRITICAL POSITIONS

C.A. 8 Expr. ✓ Run 45

Table Pos. I T R

Control Rod		Channel	
1 Sam		A	51 x100/100
2 Sam		B	0.0014
A 28.240		C	0.3 x 5 x 10 $^{-10}$
B 14.360		D	40 x 1000/50
		E	0.5 @ 810 v.

Tim Crit. 11:55 AM ~~PM~~ Duration 17 min.

Insert B to 13.75 – Level with A

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 46

Table Pos. I T R

Control Rod		Channel	
1 Sam		A	56 1000/100
2		B	.02
A 31,050		C	4.0 5x10 $^{-10}$
B 13.750		D	39 1000/500
		E	4.4 810 V

Tim Crit. 12:12 ~~AM~~ PM Duration 21 min.

Temp. @ 12:31 P 1.3323 mv

Rea
ris
roo
Lev
and
lim
wi
abo

Be removed - Feed with B

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 47

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A 39	1600/25
2	"	B .002	
A 31.050		C 0.4	5×10^{-10}
B 13.872		D 50	1000/50
		E 0.6	810 V

Tim Crit. 12:33 ~~AM~~ PM Duration 26 min.

Insert B @ 13.27. Feed with A

Reactor still rising with rod A. Out. Level was reduced and the lower limit switch was changed about 2 in.

CRITICAL POSITIONS

C.A. 8 Expr. 2 Run 48

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	Same	A	
2	"	B	
A		C	
B		D	
		E	

Tim Crit. 12:57 ~~AM~~ PM Duration _____ min.

CRITICAL POSITIONS

C.A 8 Expr. 2 Run 48

Table Pos. _____ L _____ T _____ R _____

Control Rod	Channel
1 same	A 39 1000/26
2 same	B .002
A 31.050	C .4 $5X10^{-10}$
B 13.860	D 52 1000/50
	E .6 810V

Tim Crit. 1:25 ~~AM~~ PM Duration 10 min.

Insert rod B to 13.400 to produce positive period. Level with A.

CRITICAL POSITIONS

8 Expr. 2 Run 49

1:55 P.M.

Temp.

1.3306

Table Pos. _____ L _____ T _____ R _____

Control Rod	Channel
same	A 58 1000/400
same	B .021
A 35.380	C 4.2 $5X10^{10}$
B 13.500	D 39 1000/500
	E 4.5 810V

Tim Crit. 1:35 ~~AM~~ PM Duration 24 min.

INSTRUMENT CHECK

Time 1 55 ~~AM~~ PM Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	15"	OK	1"	5'	5"
% F.S. Trip	55	1	100+	26	100+

C.A. 8 Expr. 1 Run 6

Sheet ____ Date 8/29 1957 Time ____ ~~AM~~ PM

Purpose To measure excess reactivity with full TD tube loading.

Temp 2:15P

1.329 mv.

Added	Tube	to	Location
	54		10-11
	23		5-10
	51		5-3
	29		6-3

70 tube loading

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 6

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	99.947	A	65 x 100/100
2	99.934	B	0.002
A 81.8%	26.522	C	7.5 x 5x10^{-11}
B	33.676 (out).	D	52 x 1000/50
		E	1.7 @ 900v

Tim Crit. 2:25 ~~AM~~ PM Duration 20 min.

Removed tubes 29 from 6-3, 23 from 5-10, and ~~56 from 13-6~~. Total loading 68 tubes.

Value of two tubes 56.6 &

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 7

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	99.948	A	76 100/100
2	99.933	B	0.0021
A 95.2%	12.877	C	8.5 5X10^{-11}
B	33.675	D	60 1000/50
		E	1.6 900V

Tim Crit. 3:50 AM PM Duration 23 min.

Temp at 4:15 P.M. 1.3282

2

Rod A withdrawn and levelled with Rd B 53

CRITICAL POSITIONS

Cr 8 Expr 1 Run 8

Table No. L T R

Control Rod		Channel	
1	99.948	A 73	100/100
2	99.932	B .0021	
A	35.383	C 8.3	5×10^{-11}
B	20.334	D 58	1000/50
		E 1.5	900V

Tim Crit. 4:13 ~~AM~~ PM Duration 10 min.

nd

2 Sept

INSTRUMENT CHECK

Time 930 AM ~~PM~~ Source PB26

	Channel A	B	C	D	E
Range	10/1000	|	10^{-10}	10/1000	900V
Source Dist.	14"	OK	8"	5'	3"
% F.S. Trip	45	|	100+	25	100+

Counts 142 ok

C.A. 8 Expr. 1 Run 9

Sheet _____ Date 9/2/ 1952 Time 9:44 AM ~~PM~~

Purpose To measure excess loadings with full 70 tube loading.

temps. 10:14 AM
1.3289

repeated run 8

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 9

Table Pos. _____ L _____ T _____ R _____

Control P. J		Channel	
1	99.945	A 68	100/110
2	99.930	B 0.0021	
A 92.7	35.383	C 6.0	5×10^{-11}
B	20.358	D 54	1000/50
		E 1.7	900 V

Tim Crit. _____ AM PM Duration _____ min.

62.0 ¢ Removed Rods 25 from 13-5
64 from 8-5
total loading = 66 tubes

CRITICAL POSITIONS

8 Expr 1 Run 10

I T R

Temp 11:10 AM
1.3271

Control Rod		Channel	
1	98.840 in	A 72	100/100
2	99.933	B 0.0022	
A (30.7)	14.176	C 7.8	$5X10^{-11}$
B	20.358	D 57	1000/50
		E 1.5	900V

Tim Crit. 11:00 AM ~~PM~~ Duration 15 min.

~~removed tube 54 from 10-11, 51 from 5-3~~
~~total loading 64 tubes~~ withdrew rod A to 35.383 level with B

CRITICAL POSITIONS

8 Expr 1 Run 11

R

Temp. 12:40 P.M.
1.3290

		Channel	
1.	98.960	63	100/100
2.	99.930	B .002	
A. (92.3)	35.383	C 6.9	$5X10^{-11}$
B.	14.080	D 50	1000/50
		E 1.4	900 V

Tim. Crit. 12:42 ~~PM~~ Duration 15 min.

56

65.7 & removed tubes 54 from 10-16 and 51 from 5-3. total loading 64 tubes

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 12

Table Pos. L T R

Control Rod		Channel	
1	98.952 in	A 65	100/100
2	99.930	B 0.002	
270 A	13.296	C 6.9	5×10^{-11}
B	14.080	D 50	1000/50
		E 1.3	900V

Tim Crit. 1:13 ~~AM~~ PM Duration 9 min.

withdrew A to ~~switch B~~. inserted B(in) and ~~switch A~~

Climb 1:30 P.M.

1.3285

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 13

Table Pos.

Control Rod		Channel	
1	98.953	A 67	100/100
2	99.930	B .002	
45 A	27.360	C 7.4	5×10^{-11}
B	99.954	D 52	1000/50
		E 1.3	900V

Tim Crit. 1:27 ~~AM~~ PM Duration 7 min.

646 Removed tubes 24 from 11-3, and 20 from 6-11
Total loading 62 tubes. 57

Temp 1:59 P.M.
1.3294

CRITICAL POSITIONS

C.A. 8 Supr. 1 Run 14

Table [illegible] T [illegible] R [illegible]

	Channel	
1 98.975	65	100/100
99.933	0.002	
A 19.2 11.305	7.0	5×10^{-11}
B 99.953	D 52	1000/50
	E 1.3	900V

Tim Crit. 1:49 ~~AM~~ PM Duration 12 min.

$2.69 expos with 70 tubes
1$ = .00805 k
$\frac{\Delta k}{k}$ 2.2%

Replaced tubes 24 = 11-3 and 20 = 6-11
Removed tubes 58 from 8-7
Tubes replaced 54 in 10-11 and 51 in 5-3

CRITICAL POSITIONS

C.A. 8 Supr. 1 Run 15

Table [illegible]

	Channel	
1 98.955	A 58	100/100
99.930	B .002	
A ~~15.643~~ 14.44	C 6.6	5×10^{-11}
B 99.953	D 47	1000/50
	E 1.2	900V

Tim Crit. _____ AM PM Duration _____ min.

indication on slotted on Rod A S slipping

58

9-2-52

4:00 P.M

Instrument shut-down procedure followed

~ 4:30 P.M. To 6:30 P.M Power Off

7:05 P.M.

Instrument start-up procedure followed

8:00 P.M

Compressor in Room 217 started

INSTRUMENT CHECK

Time 915 AM ~~PM~~ Source P.B. 267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	12"	OK	9"	5'	4"
% F.S. Trip	60	1	100+	28	100+

Counts 1 + 2 OK

Removed selsyn on control rod A drive. Cleaned grease from selsyn's brushes to restore it to operation. Replaced selsyn to rod A.

Repeat of Run 15 to check error of rod position.

64.6
65.7
130.3
23.1
107.2

42.3
19.2
23.1

CRITICAL POSITIONS

8 Expt. 1 Run 16

T R

		Channel	
1	98.895	A 60	100/100
C	99.930	B .002	
A	16.650	C 69	5×10^{-11}
B	99.952	D 49	1000/50
		E 1.3	900V

Tim Crit. 11:19 AM ~~PM~~ Duration 9 min.

temp 11:28 AM
1.3223

Value of #58 in 8-7

Removed tubes 24 from 11-3
20 from 6-11
54 from 10-11
51 from 5-8

Replaced tube 58 into 8-7
total loading 62 tubes

Repeat of run 14 to check for selsyn error

CRITICAL POSITIONS

C.A. 8 Expr. 1 Run 17

Tube Pos. ______

Control Rod	Channel	
1 0.025	A 61	10/100
2 99.930	B .002	
19.3 A 11.341	C 6.3	5×10⁻¹¹
B 99.955	D 50	1000/50
	E 1.2	900 V

Tim Crit. 2:47 ~~AM~~ PM Duration 10 min.

Removed from 8-7 rod 58 and
replaced it with rod 80 (aluminum tube)

C.A. 8 Expr. 3 Run 1

Sheet ____ Date 9/3/ 1952 Time 3:00 ~~AM~~ PM

Purpose Evaluation of Aluminum fuel tube

CRITICAL POSITIONS

C.A. 8 Expr. 3 Run 1

____ T ____ R ____

Channel

0.025

99.928 B 0.005

92.7
A 35.402 C

5.964 inches → B 5.964 D

north 6.44 by pile period

E

Tim Crit. 3:17 ~~AM~~ PM Duration ____ min.

92.7
-19.3
73.4
6.4
79.8C

Removed tube 80 from 8-7
Replaced tube 58 into 8-7
Removed tube 72 from 9-8 and replaced it with tube 80. Total loading 62 tubes.

CRITICAL POSITIONS

Cy 8 Expr. 3 Run 2

Tube

	Channel	
1 0.025	A 63	100/100
2 99.930	B 0.001	
A ~~29.211~~ 29,285	C 6.8	5×10^{-11}
B 99.950	D 52	1000/50
	E 1.2	900V

Tim Crit. 3:47 ~~AM~~ PM Duration 9 min.

87.6
-19.3
68.3

87.6

Removed tube 32 from 10-8
Moved tube 80 from 9-8 to 10-8
Replaced tube 72 in 9-8. Total 62 tubes

CRITICAL POSITIONS

Cy 8 Expr. 3 Run 3

Tube

	Channel	
0.025	A 63.	100/100
99.928	B .002	
A 22.780	C 6.6	5×10^{-11}
B 99.952	D 52	1000/50
	E 1.3	900V

Tim Crit. 4:09 ~~AM~~ PM Duration 7 min.

69.6
19.3
50.3

69.6

Temp at 4:20PM
1.3180 mm

Sept. 4

INSTRUMENT CHECK

Time 9 00 AM ~~PM~~ Source PB267

	Channel A	B	C	D	E
Range	10/100	|	10^{-10}	10/100	900V
Source Dist.	15" OK		7"	6'	3"
% F.S. Trip	35	|	90	22	100+

Counts 142 OK

C.A. 8 Expr. 3 Run 4

Sheet ____ Date Sept 4 1952 Time 9 00 AM PM

Purpose Continue Evaluation of Al. fuel tube

Temp. 9:35 A.M.
1.3336

CRITICAL POSITIONS

8 Expr 3 Run 4

	Channel	
0.024	A 69	100/100
99.930	B .002	
A 22.780	C 7.4	5×10^{-11}
B 99.953	D 57	1000/50
	E 1.3	900V

Tim Crit. 9:25 AM ~~PM~~ Duration 15 min.

64

Removed tube 63 from 11-8
moved tube 80 from 10-8 to 11-8
Replaced tube 32 into 10-8

CRITICAL POSITIONS

Date 8 Expr 3 Run 5

Control Rod | Channel

Temp. 10:10 AM
1.3336

1	0.025	A 70	100/100
2	99.928	D .002	
53.4 A	19.084	C 7.6	$5X10^{-11}$
B	99.953	D 56	1000/50
		E 1.4	900V

53.4
19.3
34.1 &

Tim Crit. 9:56 AM PM Duration 13 min.

Removed tube 28 from 12-8
moved tube 80 from 11-8 to 12-8
Placed tube 63 back in 11-8

CRITICAL POSITIONS

Date 8 Expr 3 Run 6

Control Rod | Channel

Temp. 10:33 AM
1.3319

1	0.025	A 71	100/100
2	99.928	D .002	
39.2 A	15.960	C 7.6	$5X10^{-11}$
B	99.952	D 56	1000/50
		E 1.3	900V

39.2
19.3
19.9 &

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

Removed tube 80 from 12-8
Placed tube 28 into 12-8

Sept. 5

INSTRUMENT CHECK

Time 8 50 AM ~~PM~~ Source RB267

	Channel A	B	C	D	E
Range	$\frac{10}{1000}$	1	10^{-10}	$\frac{10}{1000}$	900V
Source Dist.	16"	OK	6"	7'	4"
% F.S. Trip	35	1	100	18	100+

counts 1 & 2 OK

Removed tube 58 from 8-7 107.2#
Replaced tubes 24 to 11-3 } 64.6
20 to 6-11 }
54 to 10-11 } ~65.7
51 to 5-3 } total loading 65 tubes

C.A. 8 Expr. 4 Run 1
Sheet ____ Date ____ 195__ Time ____ AM PM
Purpose Calibration of B.R.E. Regulating rod.

Thermal-couple displaced from center by one hex blocks.

64.6
65.7
130.3
23.2
107.1

42.5
19.3
23.2

CRITICAL POSITIONS

Run 8 Tape 4 Run 1

Table Pos. ____ T ____ R ____

Temp at 9:52 AM
1.3342

		Channel	
I	0.024	63	100/100
F	99.930	S	.0019
A	16.710	C	7.1 5X10⁻¹¹
B	99.953	D	52 1000/50
		E	1,2 900V

Tim Crit. 9:45 AM ~~PM~~ Duration 10 min.

Removed column of BeO from 8-7 (6 blocks)

CRITICAL POSITIONS

C A ____ T ____ R ____

Table Pos.

not critical

1 ____

2 ____

3 ____ C ____

4 ____ D ____

E ____

Tim Crit. ____ AM PM Duration ____ min.

Tubes replaced:

29 into 6-3 } 56.6
23 into 5-10 }
25 into 13-5 } 62.0
64 into 3-5 }

total loading 69 tubes

10:50 AM. not critical.
$B_1 = 0.0003$

50.3 Removed no. 32 from 10-8 and inserted tube 80 (Aluminum) into 10-8. | 68 SS 1 al

11:09 A.M. not critical.
$B_1 = 0.0005$

62.17 Tube no 49 removed from 6-7 and ~~aluminum~~ tube no. 81(Al) inserted into 6-7. | 67 SS 2 al

CRITICAL POSITIONS

8 E, or 4 Run 2

	I	T	F
	42.5	11.0	31.5

Temp. 1:00 P.M.
1.3388

Channel

	0.024	A 64	100/100
	99.923	B .002	
A 11.0	8.780	C 7.1	5×10^{-11}
B	99.950	D 52	1000/50
		E 1.4	900V

Crit. 12:58 ~~AM~~ PM Duration ____ min.

56.6
62.0
50.3
62.17
231.07
31.5
262.57

↑ value 8-7 BeO

68 2:45 PM Crane in 108 stopped. Electricians found dirt on the 440 volt sliding conductors. Back in operation at 3:40 PM

4 half shells (1/8 in. thick) placed around reactor. total thickness 1/4 in.

CRITICAL POSITIONS

C A. 8 Expr. 5 Run 1

Table Pos. ____ ____ ____

Control Rod	Channel
1 0.024	A 66 100/100
2 99.923	B .0018
A 45.5 17.322	C 7.2 5×10^{-11}
B 99.950	D 52 1000/50
	E 1.4 900V

45.5 / 1.0 / 34.5 &

Tim Crit. 4:05 ~~AM~~ PM Duration 13 min.

C.A. 8 Expr. 5 Run 1

Sheet ____ Date ____ 195__ Time 3:55 ~~AM~~ PM

Purpose Evaluation of pressure shell mockup

added 4 half Shells ($\frac{1}{8}$ in thick) around reactor. Total thickness $\frac{1}{2}$ inch.

9 Sept

INSTRUMENT CHECK

Time 8^{20} AM ~~PM~~ Source PB267

	Channel A	B.	C	D	E
Range	$\frac{10}{1000}$		10^{-6}	$\frac{10}{1000}$	900V
Source Dist.	15" OK		1"	6'	4"
% F.S. Trip	40		100	24	100+

Counter #2 OK

C.A. 8 Expr. 5 Run 2

Sheet — Date 9 Sept 1952 Time 8^{20} AM

Purpose Continue pressure shell evaluation

CRITICAL POSITIONS

C.A. 8 Expr 5 Run 2

Table Pos. ____ T ____ P ____

Control		Channel	
1	0.018	69	100/100
2	99.924	.0018	
A	21.980	C 7.4	5×10^{-11}
B	99.950	D 55	1000/50
		E 1.7	900V

Tim Crit. 9:56 AM Duration 10 min.

temp 9:15 AM
1.300

665

66.5
45.5
21.0

value of second Pressure Shell

¼" off

ARE think

added three tubes to 8-7

CRITICAL POSITIONS

C.A. ____ Expr ____ Run ____

Table Pos. ____ T ____ P ____

not critical

Control		Channel	
1		A	
2		B	
3		C	
4		D	
		E	

Tim Crit. ____ AM PM Duration ____ min.

Pressure shell removed
3 tubes removed from 8-7
BeO returned to 8-7
Tube 58 put into 8-7
81 removed from 6-7
49 inserted in 6-7
80 removed from 6-8
82 inserted in 6-8
25 removed from 13-5
64 " from 3-5
29 " from 6-3
23 " from 5-10
(total loading 66 tubes)

C.A. 8 Expr. 6 Run 1 AM PM
Sheet ____ Date Sep. 9, 1952 Time 2:00
Purpose evaluation of fuel tube
Va. reading.

temp 2:25 PM.
1.300

CRITICAL POSITIONS

C A 8 Expr. 6 Run 1

Test ____ T ____ R ____

Control Rod		Channel	
1	0.016	A 66	100/100
2	99.925	B .001	
A	92.6 35.398	C 7.9	5×10^{-11}
B	14.000	D 57	1000/50
		E 1.7	900V

14" of Rod Bworth
~ 56.8 ¢

Time Crit. 2:15 AM PM Duration 8 min.

72

Sept. 11

INSTRUMENT CHECK

Time 10[10] AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000		10^{-11}	10/1000	900V
Source Dist.	7" ok		8"	6'	3½
% F.S. Trip	100		90	20	100

Counts 1½ ok

Tube 58 removal from 8-7 (65 tubes)

C.A. 8 [illegible] 7 [illegible] 1

Sheet [illegible] Date Sep. 11 1952 Time 10:35 AM ~~PM~~

Purpose Fuel tube No. 58 removal of high importance.

CRITICAL POSITIONS

C.A. 8 Expr. 7 Run 1

[illegible] Channel

1	0.010	A 64	100/100
2	99.926	B .002	
A	16.620	C 7.3	5×10^{-11}
B	99.940	D 53	1000/50
		E 1.5	900V

Tim Crit. 10:40 AM ~~PM~~ Duration 8 min.

42.6
42.2
50.4
56.3
107.2

42.2

104.7¢ — returned no. 58 to 8-7 and removed no. 72 from 9-8. (65 tubes)

CRITICAL POSITIONS

8 Expr 7 Run 2

Table For: I T P

Channel

1	0.010	A 64	100/100
2	99.925	B .001	
44.7 A	17.173	C 5.6	5×10^{-11}
B	99.924	D 53	1000/50
		E 1.4	900V

Tim Crit. 11:15 AM ~~PM~~ Duration 6 min.

Temp at 11:20 AM

1.2805

44.7 / 42.2 / 2.5

102.2 / 2.5 / 104.7

79.8¢ — replace no 72 into 9-8 and removed no 32 from 10-8. (65 tubes)

CRITICAL POSITIONS

8 Expr 7 Run 3

T P

Channel

(1)	0.010	A 64	100/100
(2)	99.927	B .001	
A 1696	22.760	C 5.7	5×10^{-11}
B	99.924	D 52	1000/50
		E 1.4	900V

Tim Crit. 12:46 ~~AM~~ PM Duration 9 min.

102.2 / 22.4 / 79.8

69.6 / 42.2 / 27.4

51.7 — Replaced no 32 into 10-8 and removed no 63 from 11-8.

65.7 ¢ → Tube 54 removed from 10-11, 51 from 5-3 (63 tubes)

42.2
32.5
9.7

(65.7)

CRITICAL POSITIONS

8 Expr. 7 Run 4

		Channel	
	0.010	A 67	100/100
Temp at 1:27 PM.	99.926	B .002	
1.2838	32.5 A 14.572	C ~~58~~ 58	$5X10^{-11}$
	B 99.924	D 54	1000/50
		E 1.4	900V

Tim Crit. 1:16 ~~AM~~ PM Duration 9 min.

return 63 to 11-8 and removed 28 from 12-8. (63 tubes)

37.0 ¢

CRITICAL POSITIONS

8 Expr 7 Run 5

T R

Channel

0.006 A 65 100/100

99.925 .002

temp. 2:48 P.M. A 46.7 17.600 C 5.6 5×10^{-11}

1.2847 B 99.922 D 52 1000/50

E 1.3 900 V

Time Crit. 2:36 ~~AM~~ PM Duration 15 min.

(returned) ⇒ Tube # 34 inserted into 10-11, tube 51 into 5-3, and 63 into 11-8. Tube 32 removed from 10-8. (65 tubes)

This is a check pt.

(bu)

65.7
37.0
102.7
79.8
22.9 ¢

69.7
46.7
23.0 ¢

CRITICAL POSITIONS

8 Expr 7 Run 6

T R

Channel

1. 0.005 A 68 100/100

2. 99.925 B .002

A. 69.7 22.800 C 6.0 5×10^{-11}

B 99.923 D 55 1000/50

E 1.5 900 V

Time Crit. 3:25 ~~AM~~ PM Duration 7 min.

tube 54 removed from 10-11
tube 51 removed from 5-8 } This swap is to check the value of this pair of tubes.

69.7
4.5
65.2 F

(63 tubes)

CRITICAL POSITIONS

C.A. 8 Expr. 7 Run 7

Table Pos. L T R

Control Rod		Channel	
1 0.005		A 69	100/100
2 99.927		B .002	
A 5.842		C 6.1	5×10^{-11}
B 99.923		D 57 (.45)	1000/50
		E 1.6	900 V

Tim Crit. 3:48 ~~AM~~ PM Duration 9 min.

temp. 4:02 P.M.
1.2863

tube 54 returned to 10-11
tube 51 returned to 5-3

(65 tubes)

8:30 AM

Chamber
A not working.
ca. Put in order
at 10:15 AM.

AU. IN.
6C & C4 in 9-7-¢

AU. IN.
S-9 & C43 in 14-7-¢

INSTRUMENT CHECK

Time 8 50 AM PM Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	15	OK	2"	5'	3"
% F.S. Trip	50	1	90	24	100

Counts 142 -Ok

C.A. 8 Expr. 8 Run 1

Sheet ____ Date 12 ~~Sept~~ 1952 Time 8 50 AM ~~PM~~

Purpose Foil activation vs Power level

CRITICAL POSITIONS

C A 8 Expr. 8 Run 1

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
	99.980	A 59	1000/200
	99.925	B .043	
A	22.430	C 8.3	5×10^{-10}
B	99.923	D 93	1000/500
		E 5.5	750V

Tim Crit. 10:45 45/60 AM Duration 20 min.

tube 32 returned to 10-8 (66 tubes)

INSTRUMENT CHECK

Time 10:00 AM PM Source PR 267

	Channel A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	400V
Source Dist.	16"		6"	~~5'~~	3"
% F.S. Trip	45		10+	~~22~~	100+

Counts 142

Fuel tubes removed: 54 from 10-11
51 from 5-3
24 from 11-3
20 from 6-11

Foils placed in reactor:

(Bare)
C-42 in 8-7-18-(21)-7/8
C-36 in 10-8-18-(A)-7/8
C-30 in 11-8-18-(E)-7/8
C-28 in 12-8-18-(F)-7/8
C-23 in 12-8-18-(A)-1 5/8
C-21 in 13-8-18-(1)-1 3/8
C-15 in 13-8-18-(E)-7/8
C-9 in 13-8-18-(A)-1 5/8
C-2 in 14-8-18-(F)-1 3/8

Normalizing foil Au. 201 in 5-7-24-(21)-1/4

C.A. 8 Expr. 8 Run 2

Sheet _____ Sep. 15 1952 Time 10:20 AM ~~PM~~

Purpose radial traverse from center of the reactor

CRITICAL POSITIONS

8 Expr. 8 Run 2

_____ L _____ T _____ R _____

Control Rod		Channel	
1	99.938	A 61	1000/200
2	99.925	B .047	
A	11.342	C 4.4	10^{-9}
B	99.918	D 85	1000/500
		E 5.9	750V

Tim Crit. 10:32 AM Duration 20 min.

~~Tubes placed in reactor:~~

~~54 into 10-11~~

~~51 into 5-3~~

~~24 into 11-3~~

~~20 into 6-11~~

-1/4

Foils placed in Reactor (Cd. covered):

C-39 into 8-7-18-(4)-7/8
C-38 into 10-8-18-(4)-7/8
C-35 into 11-8-18-(4)-7/8
C-34 into 12-8-18-(4)-7/8
C-29 into 12-8-18-(4)-1 5/8
C-3[redacted] into 13-8-18-(1)-1 3/8
C-13 into 13-8-18-(4)-7/8
C-19 into 13-8-18-(4)-1 5/8
C-1 into 14-8-18-(4)-1 3/8
Normalizing foil No. 202 into 5-7-24-(1)-1/4

CRITICAL POSITIONS

8 Expr. 8 Run 3

[illegible] L T R

Control Rod | Channel

Control Rod	Channel	
0.033	A 62	1000/200
99.925	B .048	
A 8.870	C 8.6	5×10^{-10}
B 99.922	D 85	1000/500
	E 5.9	750 V

Tim Crit. 2:25 35/60 ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK

Time 945 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000	|	10^{-10}	10/1000	900V
Source Dist.	14"	OK	7"	5'	3"
% F.S. Trip	50	|	90	25	100

Counts 1+2

Bare foils placed in reactor. (In.)

21 into 8-7-0-(1)-7/8
23 into 8-7-6-(1)-7/8
28 into 8-7-12-(1)-7/8
29 into 8-7-18-(1)-7/8
30 into 8-7-24-(1)-7/8
35 into 8-7-30-(1)-7/8
36 into 8-7-36-(1)-7/8

Normalizing foil AU 209 into 5-7-24-(1)-1/4

Bare in.

9 into 10-8-24-(1)-7/8
13 into 10-8-30-(1)-7/8
15 into 10-8-36-(1)-7/8

1 into 12-8-24-(1)-7/8
2 into 12-8-30-(1)-7/8
3 into 12-8-36-(1)-7/8

C.A. 8 Expr. 9 Run 1

Sheet _____ Date 9/16/1952 Time 10:00 AM PM

Purpose ~~Electro~~ axial traverse bare indium 13 foils

CRITICAL POSITIONS

C.A. 8 Expr. 9 Run 1

		Channel
1	0.010	A 61 1000/200
2	99.925	B .050
A	11.590	C 8.5 $5X10^{-10}$
B	99.918	D 85 1000/500
		E 6.2 750V

Tim Crit. 10:16 50/60 AM PM Duration 20 min.

Cd. Covered (1N.) foils added to reactor:

18 into 8-7-0-(1)-7/8
20 into 8-7-6-(1)-7/8
22 into 8-7-12-(1)-7/8
24 into 8-7-18-(1)-7/8
25 into 8-7-24-(1)-7/8
26 into 8-7-30-(1)-7/8
33 into 8-7-36-(1)-7/8
Normalizing foil A0214 into 5-7-24-(1)-1/4

14 into 10-8-24-(1)-7/8
16 into 10-8-30-(1)-7/8
17 into 10-8-36-(1)-7/8
5 into 12-8-24-(1)-7/8
8 into 12-8-30-(1)-7/8
10 into 12-8-36-(1)-7/8

CRITICAL POSITIONS

Cr. 8 Expr. 9 Run 2

Crit. Pos. ____ L ____ T ____ R ____

Control Rod	Channel	
0.002	A 64	1000/200
99.925	B .051	
A 8.310	C 8.6	$5X10^{-10}$
B 99.920	D 86	1000/500
	E 6.3	750V

Tim Crit. 2:33 0/60 ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK

Time 8:36 ~~AM~~ PM Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	15"	OK	6"	4½"	3"
% F.S. Trip	50	1	95	30	100

Count 1+2 OK

C.A. 8 Expr. Continue 3 Run 7

Sheet ..... Date 9/17/1952 Time 9:15 AM ~~PM~~

Purpose Evaluation of Aluminum fuel tube. (81)

CRITICAL POSITIONS

C.A. 8 Expr. 3 Run 7

Table Pos. ..... I ..... T ..... R .....

Control Rod		Channel	
1	0.135	A 23	100/100
2	99.928	B .0021	
A ~~11.872~~	11.970 21.68	C 6.6	5×10^{-11}
B	99.917	D 54	1000/50
		E 1.5	900V

Tim Crit. 9:32 AM ~~PM~~ Duration 8 min.

Moved tube no. 49 from 6-7, and inserted 81 (Al.) into 6-7, 62.17 ℓ

83.77
21.60
62.17

CRITICAL POSITIONS

C.A. 8 Expr. 3 Run 8

Table Pos. _____ T _____

Control Rod		Channel	
1 0.090	A	71	100/100
2 99.927	B	.0021	
A 27.303 83.779	C	6.4	5×10^{-11}
B 99.918	D	52	1000/50
	E	1.5	900V

Tim Crit. 9:57 AM ~~PM~~ Duration 10 min.

Temp. 10:05 AM.
1.300

removed tube 81 from 67, returned tube 49 to 67. Placed tubes 54 into 10-11
51 into 5-3
24 into 11-3
20 into 6-11

C.A. 8 Expr. 10 Run 1

Sheet _____ Date 9/17/52 Time 10:15 AM

Purpose Comparison of positive and negative period for rod calibration.

CRITICAL POSITIONS

8 Expr. 10 Run 1

L T R

Control Rod	Channel	
0.010	A 84	100/100
99.927	B 0.0027	
29.250	C 7.3	5×10^{-11}
14.920	D 60	1000/50
	E 1.7	900V

Tim Crit. 10:27 AM PM Duration ____ min.

Inserted rod A to 26.800 to produce positive period. at B_1 .03 Withdrew ~~inserted~~ rod A to 35.395 (out). at B_1 = .0025 returned rod A to 26.800 and leveled rod B.

CRITICAL POSITIONS

8 Expr. 10 Run 2

L T R

Control Rod	Channel	
0.010	A 82	100/100
99.927	B .0027	
A 26.800	C 4.5	4×10^{-11}
B 15.458	D 59	1000/50
	E .5	750V

Tim Crit. 11:26 AM ~~PM~~ Duration ____ min.

Insert rod A to 25.05 produce (+) period. at B, [redacted] .03 Withdrew rod A to 29.25 to produce (-) period at B, -.003, insert Rod A 25.05 leveled with rod B.

CRITICAL POSITIONS

C.A. 8 Expr. 10 Run 3

Table Pos. _____ L _____ T _____ P _____

Control Rod		Channel	
1	0.0 10	A	44 1000/25
2	99.927	B	.0028
A	25.050	C	3.3×10^{-10}
B	15.990	D	61 1000/50
		E	5 @ 750V

Tim Crit. _____ AM PM Duration _____ min.

Insert rod A to 23.6 to produce (+) period at B, .03 withdrew rod A 26.78 to produce (-) period at B, .003 inserted rod A to 23.6 leveled with rod B.

CRITICAL POSITIONS

CA 8 Expr. 10 Run 4

Table Pos. L T

Control Rod		Channel	
I	0.010	A	45 1000/25
S	99.927	B	.0028
A	23.600	C	3.2×10^{-10}
B	16.494	D	62 1000/50
		E	.5 @ 750 V

Tim Crit. AM PM Duration min.

Insert rod A to 22.25 to produce a (+) period. At B 1.03 withdrew rod A to 25.05 to produce (-) period. at B 1.003 inserted rod A to 22.25 leveled with rod B.

CRITICAL POSITIONS

CA 8 Expr. 10 Run 5

Table Pos. I T R

Control Rod		Channel	
	0.010	A	44 1000/25
	99.927	B	.0028
A	22.250	C	3.3 10^{-10}
B	17.030	D	61 1000/50
		E	.5 750V

Tim Crit. AM PM Duration min.

Insert rod A to 21.07 to produce (+) period. at B, .03 withdrew rod A to 23.6 to produce a (-) period. ~~at B, = .003 insert rod A to leveled with rod B.~~

Tempo. 2:03 P.M.
1.3070

C.A. 8 Expr. 11 Run 1
Sheet ____ Date 9/17 Page 2 Time 3:00 ~~PM~~
Purpose: Evaluation of reflector coolent tubes.

87
2
6

Removed all coolent tubes except the ones in the following locations:

(removed 53 tubes)
(66 total tubes
13 remaining)

10-12	6-12	9-3	6-2
9-12	10-2	8-1	
9-13	10-3	7-2	
8-13	9-2	7-3	

Removed fuel tubes:

54 from 10-11
51 from 5-3
24 from 11-3
20 from 6-11

CRITICAL POSITIONS

8 Expr. 11 Run 1

L T R

Control Rod	Channel
0.010	A 88 100/100
99.928	B .003
87.6 A 29.230	C 4.3 . 10^{-10}
B 99.917	D 64 1000/50
	E 1.6 900V

Tim Crit. 3:15 ~~AM~~ PM Duration 8 min.

87.6
21.6 (Page 85)
66.0 ¢

C.A. 8 Expr. Continue 10 Run 6

Sheet ____ Date 9/17 1952 Time 3:25 ~~AM~~ PM

Purpose comparison of (+) and (-) period for rod calibration.

Inserted rod A to 27.60 to produce (+) period.

Level at B, .01 with rod A.

CRITICAL POSITIONS

CA 8 Expr. 10 Run 6

Table Pos. L T R

Control Rod		Channel	
1	0.010	A 69	1000/50
2	99.928	B .101	
A	29.110	C 2.6	$5X10^{-10}$
B	99.917	D 56	1000/200
		E 2.4	750V

Tim Crit. ____ AM PM Duration ____ min.

Reduced Level

CRITICAL POSITIONS

CA 8 Expr. 10 Run 7

Table Pos. L T R

Control Rod		Channel	
1	0.010	A 82	100/100
2	99.928	B .0028	
A	27.600	C 3.3	10^{-10}
B	5.077	D 58	1000/50
		E 1.4	750V

Tim Crit. ____ AM PM Duration ____ min.

Inserted Rod A to 26.40 to produce positive period
Scram on B. at .01 with Rod A

Temp @ 4:30 P
1.304 mv

CRITICAL POSITIONS

C.A. 8 Expr. 10 Run 8

Table Pos. L T R

Control Rod		Channel	
1	0.010	A 68	1000/50
2	99.928	B .01	
A	27.310	C 2.4	5×10^{-10}
B	5.078	D 55	1000/200
		E 2.4	750 V

Tim Crit. ____ AM PM Duration ____ min.

Reduced Scram

CRITICAL POSITIONS

C.A. 8 Expr. 10 Run 9

Table Pos. L T

Control Rod		Channel	
1	0.016	A 47	1000/25
2	99.928	B .003	
A	29.320	C 3.5	10^{-10}
B	3.390	D 65	1000/50
		E 1.4	750 V

AM

Inserted Rod 4 to 26.40 to produce + period
Level on B, at .01 with Rod 4

CRITICAL POSITIONS

C.A. 8 Expr. 10 Run 10

Table Pos. _____ L T R

Control Rod		Channel	
1	0.010	A 52	1000/100
2	99.928	B .02	
4	28.945	C 3.2	5×10^{-10}
B	3.390	D 84	1000/200
		E 3.3	750V

Tim Gitt. AM PM Duration: _____ min.

Sept 19
30 Fuel tubes returned to 9212 for new loading
(0.2138 gm/cc U^{25} or 19 lbs. U^{25} in Core)
30 Fuel tubes returned to 9212
Sept 22 12 Fuel tubes returned to 9212

Sept 26 3:30 P 30 Fuel tubes received from 9212

CORRECTED COPY

INTER-COMPANY CORRESPONDENCE

(INSERT NAME) COMPANY CARBIDE AND CARBON CHEMICALS COMPANY LOCATION Post Office Box P OAK RIDGE, TENN.

TO A. D. Callihan
LOCATION

DATE October 3, 1952

ANSWERING LETTER DATE

ATTENTION
COPY TO Dunlap Scott, W. R. Grimes, file

SUBJECT Fuel Slugs

We are delivering this date 14 slugs fabricated for the ARE Cold Critical experiment. Each slug is individually wrapped in 0.00025 inch aluminum foil. Some pertinent properties of these slugs are given below.

Slug No.	Length Including Foil Wrapper	Weight* Grams
1	2-7/16"	126.94
2	3-9/16	183.92
3	2-15/16	151.49
4	4	212.50
5	1-3/4	90.32
6	1-5/16	67.46
7	4-15/16	253.54
8	3-1/4	174.98
9	3-15/16	204.58
10	5-1/16	271.27
* 11	1-5/8	78.80
12	1-3/4	94.43
13	1-1/2	80.50
14	3-1/16	158.55
	41-1/8"	2149.28

Analysis: U ([redacted]) - 6.83 wt. % UF_4 - 9.05 wt. %
Zr - 40.5 " ZrF_4 - 74.2 "
Total U content = 146.80 grams
Total UF_4 " = 194.42 grams

* Estimated by deducting actual foil weight from actual slug plus foil weight.

D. R. Cuneo

dc

L. G. Overholser

227.7 gm UF_4
1910 gm ZrF_4
443 gm NaF
2580.7 gm mtl

L.D. Overholser
7/2/53

8.8232 wt% UF_4
6.664 wt% U
6.2044 wt% U_{235}
74.0 wt% ZrF_4
17.17 wt% NaF

Assay 93.1

$\frac{311.24}{235.08} = \frac{1.323975}{1.323404} = 1.00043$

2149.28 × 6.66 =
143.3 gm U

2068.78 gm mtl in tube × 6.2 wt% U^{25}

= 128.2 gm U^{25} in tube

$\frac{35.62 \text{ inch core}}{40 \text{ in in tube}} \times 128.2 \text{ gm } U^{25}$

= 114.2 gm U^{235}

Cast Fuel

Total Mt'l Slug #13 — 2149.28 gm − 80.50 gm

Mt'l in Tube — 2068.78 gm

	Wt. Per Cent	
	Actual	Specified
U^{25}	6.83	~~8.82~~
UF_4	9.05	8.82
ZrF_4	74.2	74.0
NaF	16.75	17.15
		.2482 $\frac{gm\ U^{25}}{cc}$

$2068.78 \times \frac{6.83}{100} = 141.3\ gm\ U^{25}$ in Tube

$\frac{35.62\ inch\ core}{40\ inch\ Tube} = 125.9\ gm\ U^{25}$ in Core

Compared to 132.7 $gm\ U^{25}$ in Core for Powder

Sept 29

INSTRUMENT CHECK

Time 9 25 AM ~~PM~~ Source PB267

	Channel A	B	C	D	E
Range	10/1000	|	10 -10	10/1000	900V
Source Dist.	15" OK		5"	5'	2"
% F.S. Trip	42	|	100	22	100+

Counter 1+2 OK

C.A. 9 Expr. 1 Run 1

Sheet _____ Date 9-29 195 Time _____ AM PM

Purpose Initial Loading

No fuel 1+2 Cadmium Rd out

MULTIPLICATION

Scaler	c/ 1 min.		min.	Mult.	1/M
1	6x16+1	6.5			
	6x16+11				
2	9x16+9	9.5			
	9x16+14				
3					

#2 Safety Rod loaded 7 tubes
#1 Cadmium Rod Out

MULTIPLICATION

Scaler	c/ 1	c/5 min	min.	Mult.	1/M
1	9x16+2	50x16+10	10		0.65
	10x16				0.61
2	9x16+11	54x16+3	10.7		0.95
	10x16+4				
3					

100
9/29/52

Rod A One fuel tube removed in 9-7 DA 12/11/52

2nd loading (See Chart) 2 control Rods + Center tube added (12 tubes)

MULTIPLICATION

Scaler	c/ 5 min. BG/ min.	Mult.	1/M
1	50x16+2 } 103 / 53x16+8 }		0.64
2	48x16+2 } 9.6 / 47x16+8 }		0.99
3			

3rd Loading - 19 tubes total

1:50P

MULTIPLICATION

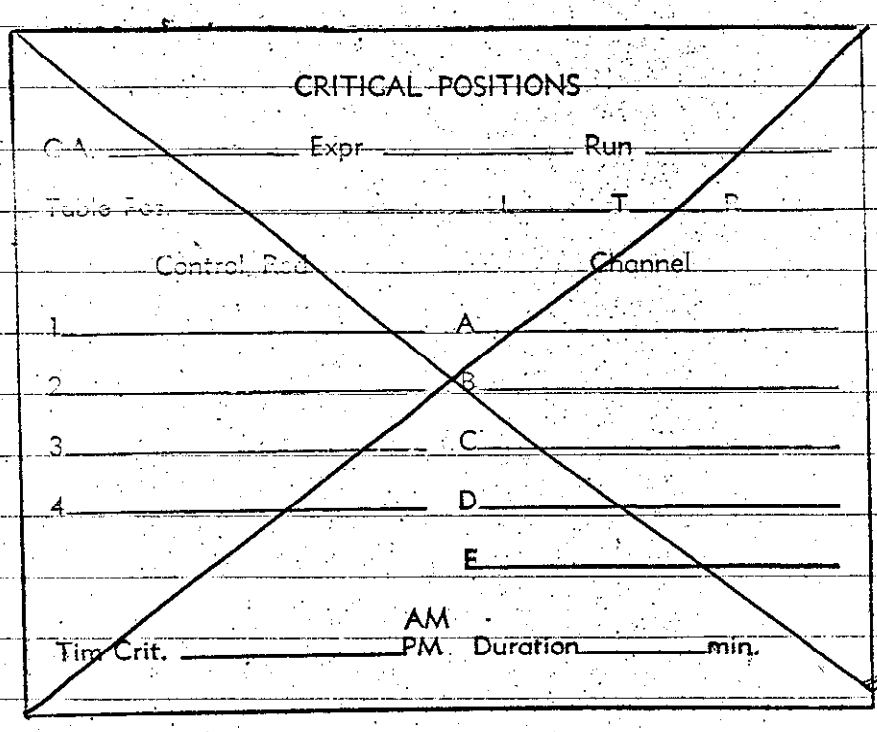
Scaler	c/ 5 min.	Mult.	1/M
1	78x16+5 = / 69x16+15		0.44
2	49x16+12 / 50x16+14		0.95
3			

4th loading - 28 tubes total

3:35P

MULTIPLICATION

Scaler	c/ 5 min. BG/ min.	Mult.	1/M
6.5	118x16+13 23.7 / 244		
1	125x16+15 25.2 / 6.5		.266
9.5	66x16+1 13.2 /		
2	65x16+15 13.2 / 9.5		.719
3			



Just Optimism ←

D. Scott.

5th loading 33 tubes total.

MULTIPLICATION

Scaler	c/ 5 min. BG/ 1 min.	Mult.	1/M
6.5	198 116+7 39.7 / 206 116+1 41.2 → 40.45	6.5	.161
9.5	90 16+10 18.1 / 93 16+12 19.7 → 18.4	9.5	.516
1			
2			
3			

102

9-30-52

INSTRUMENT CHECK

Time 8 40 AM ~~PM~~ Source PB267

Channel

	A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
~~Source Dist.~~ % FS Trip	50	OK	100+	22	100+
~~% F.S. Trip~~ Source Dist	15"	1	2"	5'	~~2"~~

Counters 1 & 2 – OK

6th loading – 38 tubes

9:05 AM

MULTIPLICATION

Scaler	c/ 5 m.n.	1	Mult.	T/M
1	557x16+2 111.4 / 105.4 502x16+6 100.8	6.5		.061
2	174x16+14 35 36.3 187x16+12 37.55	9.5		.262
3				

7th loading, 42 tubes

CRITICAL POSITIONS

CA 9 Expr 1 Run 1

T R

Rod

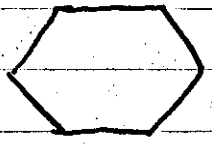
Channel

1.	0.005	A 59	100/200
2.	3.000	B .0036	
A	9.500 ~ 15¢	C 4.9	10^{-10}
B	99.937	D 92	1000/50
		E 2.3	900V

Time Crit. 10:34 ~~PM~~ AM Duration 9 min.

$\frac{42 \text{ Tubes}}{70 \text{ Tubes}} \times 19 \text{ lbs} = 11.4 \text{ lbs}$

9.5 inches on Rod A is approximately 15¢ using C.A.8



plus
10-10
10-4
6-4
6-10
8-3

Oct 1st

Tube #58 Removed from 8-7

36" BeO Removed from 8-7

3 Inconel Tubes placed in 8-7

"Weak" ARE Regulating Rod placed in 8-7 and mounted on Control Rod B drive mechanism. It was mounted so that in the ~~out~~ "in" position the bottom of the rod is flush with the top of the BeO. Total travel 33.34 inches. Tubes #75 (7-7) & 73 (7-8) were disconnected from Rod B drive and mounted in their respective holes. Tube #72 of 9-8 was reconnected to Control Rod A drive.

Summary: 41 tubes
"Weak" Regulating Rod in 8-7

C.A. 9 Expr. 2 Run:

Sheet _____ Date Oct 1, 1952 Time _____ AM PM

Purpose To reach critical point with control rod in center of reactor.

10-2-52
Ellis
Scott

INSTRUMENT CHECK

Time 830 AM ~~P.M.~~ Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	15"	OK	6"	6'	2"
% F.S. Trip	35	1	100+	25	100+

Counts 1+2 OK

2 3.00
A 2.50

MULTIPLICATION

Scaler	c 5		1 min.	Mult.	1/M
1	211x16+14	42.4 42.7	6.5		.152
	214x16+12	42.9			
2	132x16+11	26.5 25.7	9.5		.369
	124x16+7	24.9			
3					

9th loading — 46 tubes

MULTIPLICATION

Scaler	c 5		1 min.	Mult.	1/M
1	386x16+10	79	6.5		.082
	379x16+12				
2	138x16+5	27.6	9.5		.34
	137x16+7				
3					

10th loading 51 Tubes

10:30 AM

MULTIPLICATION

Scaler	c/ 5 min	1 min	Mult.	1/M
1	269x64+51 215.8	218.6 217.2	6.5	.03
	273x64+31 218.4			
	308x16+0 61.6	61.4		
2	305x16+13 61.0		9.5	.15
3				

11th loading 55 tubes

CRITICAL POSITIONS

9 Exp 2 Run 1

Time

Control Rod	Channel	
0.005	A 88	1000/25
3.000	B .0045	
A 2.500	C 7.8	10^{-10}
B 16.000 54.54	D 78	1000/100
	E 3.4	900 V

Tim Crit. 11:05 AM Duration min.

Tube #64 into 10-11 56 tubes

CRITICAL POSITIONS

C.A. 9 Expr. 2 Run 2

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	0.005"	A	47 1000/25"
2	2.500	B	.0021
~~A~~ A	2.500	C	$3.8\ 10^{-10}$
~~B~~ B	22.860 (103.)	D	75 1000/30
		E	~~2.~~ 1.5 900V

Tim Crit. 2:06 ~~AM~~ PM Duration _____ min.

Rod B inserted to 0.08, Rod A withdrawn to ~ 15" in. Rod A was then adjusted to 16.332 to produce positive period. Leveled with Rod B.

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 1

Table Pos. _____ L ____ T ____

Control Rod		Channel	
1	0.005"	A	69 1000/100
2	2.500	B	~~52~~ .01
~~A~~ A	16.332	C	$4.3\ 5 \times 10^{-10}$
~~B~~ B	8.033	D	52 1000/100
		E	2.7 750 V

Tim Crit. 2:35 ~~AM~~ PM Duration _____ min.

108

Withdrew rod A to ~~18.033~~ 8.033 to reduce level.
Level with rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 2

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	0.005	A	37 1000/25
2	2.500	B	.0015
A	16.420	C	3.8 10^{-10}
B	~~18.033~~ 8.033	D	56 1000/50
		E	.4 750 V

Tim Crit. 2:55 PM Duration ____ min.

Inserted rod A to 15.820 to produce (+) period
Leveled w/ rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 3

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	0.005	A	67 1000/100
2	2.500	B	.02
A	15.820	C	4.1 5×10^{-10}
B	9.670	D	51 1000/100
		E	2.7 750 ✓

Tim Crit. ____ PM Duration ____ min.

withdrew rod A to 17.82 to reduce level
Leveled w/rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 4

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	0.005	A 32	1000/25
2	2.500	B .0011	
A	15.960	C 2.6	10^{-10}
B	9.670	D 46	1000/50
		E 1.3	750 V

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

Inserted rod A 15.420 to produce (+) period.
Leveled w/rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 5

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	0.005	A 84	1000/100
2	2.500	B .025	
A	15.420	C 4.0	5×10^{-10}
B	10.690	D 64	1000/500
		E 3.4	750 V

Tim Crit. 4:06 ~~AM~~ PM Duration _____ min.

110 Upper limit Switches on Rods 1 + 2 adjusted to stop at ~ 2.50 inches. Vedo Roots not changed.

#1 - 2.615

#2 - 2.553

INSTRUMENT CHECK

Time 8 30 AM ~~PM~~ Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10^{-10}	10/1000	900V
Source Dist.	15"	ok	6"	5'	3"
% F.S. Trip	45	1	100+	18	100+

Counts 1+2 ok

C.A. 9 Expr. 3 Run 6

Sheet _____ Date 10-3 1952 Time 8 45 AM ~~PM~~

Purpose Continuation of Rod B calibration (Weak ARE Reg. Rod)

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 6

Table T R

Control Rod Channel

1 2.615 A 65 100/100

2 2.553 B .0015

A 15.487 C 4.2 5×10^{-11}

B 10.690 D 54 1000/50

E 1.1 900V

Tim Crit. ~~9:10~~ 8:50 ~~PM~~ AM Duration 20 min.

Inserted A to 14.990 to produce positive period
Level with B

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 7

T R

Control Rod Channel

1. 2.615 A 53 1000/100

2. 2.553 B .012

A 14.990 C 3.4 5×10^{-10}

B 11.750 D 40 1000/500

E 1.9 750V

Tim Crit. 9:10 ~~PM~~ AM Duration 17 min.

temp. at 9:20 AM
1.3964

112

withdrew rod A to 16.990 to reduce level.
Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 8

Test Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 34	1000/25
2	2.553	B .0012	
A	15.052	C 3.7	10^{-10}
B	11.750	D 99	1000/25
		E .3	750V

Tim Crit. 9:27 ~~PM~~ AM Duration ____ min.

Insert rod A to 14.652 to produce (+) period.
Level B.

Temp. 10:57 AM.
1.3954

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 9

Test Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 52	1000/100
2	2.553	B .012	
A	14.650	C 3.2	5×10^{-10}
B	12.475	D 39	1000/500
		E 2.1	750 V

Tim Crit. 9:52 ~~PM~~ AM Duration 25 min.

~~Inserted~~ withdrew rod A to 16.650 to reduce level.
Level with A.

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 10

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 32	1000/25
2	2.552	B .0010	
A	14.740	C 3.4	10^{-10}
B	12.477	D 91	1000/25
		E .4	750V

Tim Crit. 10:17 AM ~~PM~~ Duration 34 min.

Inserted rod A to ~~14.652~~ 14.240 to produce a positive period. Level B.

od.

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 11

Table Pos. ____ L ____ T ____ R ____

Temp. at 10:55 AM. 1.3933

Control Rod		Channel	
1	2.615	A 53	1000/100
2	2.552	B 0.011	
A	14.240	C 3.3	5×10^{-10}
B	13.260	D 39	1000/500
		E 2.2	750V

Tim Crit. 10:51 AM PM Duration 20 min.

114

Withdrew rod A to 16.240 to reduce level.
Level with A.

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 12

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 34	1000/20
2	2.552	B .0010	
A	14.342	C 3.6	10^{-10}
B	13.260	D 96	1000/25
		E 0.4	750 V

Tim Crit. 11:11 AM ~~PM~~ Duration 22 min.

Inserted Rod A to 13.840 to produce 4 period
Leveled with B

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 13

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 53	1000/100
2	2.552	B .012	
A	13.840	C 3.2	3×10^{-10}
B	13.935	D 40	1000/500
		E 2.2	750 V

Tim Crit. 11:33 AM ~~PM~~ Duration 22

Shut down at 11:55 A

Started up at 1:00 PM.
Put at 13.935 Level with A (low level)

CRITICAL POSITIONS

CA 9 Expr. 3 Run 14

Table Pos. ____ L ____ T ____ R

Control Rod		Channel	
1	2.615	A 34	10^{-10}/25
	2.552	B .0012	
A	13.910	C 3.2	10^{-10}
B	13.935	D 97	1000/25
		E 1.1	900V

Tim Crit. 1:00 ~~AM~~ PM Duration 19 min.

Moved rod A to 13.410 to produce positive period. Scrammed K5

CRITICAL POSITIONS

CA 9 Expr. 3 Run 15

Table Pos. ____ L ____ T ____ R

Control Rod		Channel	
1	2.615	A 52	1000/100
	2.552	B .011	
A	13.410	C 3.2	5×10^{-10}
B	14.630	D 39	1000/500
		E 2.1	750V

Tim Crit. 1:19 ~~AM~~ PM Duration 16 min.

116

withdrew rod A. To 15.410 To reduce level. Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 16

Table Pos. _____

Control Rod		Channel	
1	2.615	A 32	1000/25
2	2.552	B 0.0010	
A	13.505	C 3.7	10^{-10}
B	14.630	D 92	1000/25
		E 0.4	750 V

Tim Crit. 1:35 ~~AM~~ PM Duration 15 min.

Inserted rod A to 13.020 to produce (+) period. Level with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 16 (A)

Table Pos. _____

Control Rod		Channel	
1	2.615	A 56	1000/100
2	2.552	B .012	
A	13.020	C 3.5	5×10^{-10}
B	15.210	D 43	1000/500
		E 2.4	750 V

Tim Crit. 1:50 ~~AM~~ PM Duration 24 min.

withdrew rod A to 15.02 to reduce level. Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 17

Table Pos. I T R

Control Rod		Channel	
1 2.615	A	33	1000/25
2 2.552	B	.0011	
A 13.140	C	3.9	10^{-10}
B 15.210	D	96	1000/25
	E	.4	750V

Tim Crit. 2:14 ~~AM~~ PM Duration 17 min.

Inserted rod A to 12.640 to produce (+) period. Level with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 18

Table Pos. I T R

Control Rod		Channel	
1 2.615	A	52	1000/100
2 2.552	B	.012	
A 12.640	C	4.0	5×10^{-10}
B 15.746	D	40	1000/50
	E	2.1	760V

Tim Crit. 2:31 ~~AM~~ PM Duration 27 min.

118

Withdrew rod A to 14.640 to reduce level. Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 19

Table Pos. I T P

Control Rod		Channel	
1 2.615	A	31	1000/25
2 2.552	B	.001	
A 12.810	C	3.7	10^{-10}
B 15.747	D	90	1000/25
	E	.4	750V

Tim Crit. 2:58 ~~AM~~ PM Duration ____ min.

Inserted rod A to 12.310 to produce (+) period. Level with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 20

Table Pos. I T P

Control Rod		Channel	
1 same	A	52	1000/100
2 same	B	.012	
A 12.310	C	3.2	5×10^{-10}
B 16.183	D	97	1000/200
	E	2.2	750V

Tim Crit. 3:21 ~~AM~~ PM Duration 21 min.

withdrew rod A to 14.310 to reduce level.
Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 21

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 33	1000/25
2	2.552	B .0011	
A	~~4.4~~ 12.440	C 3.7	10^{-10}
B	16.184	D 92	1000/25
		E .4	750 V

Tim Crit. 3:42 ~~AM~~ PM Duration 28 min.

Temp at 4:19 P.M.
3.4054

(+) Inserted rod A to 11.84 to produce (+) period.
Level with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 22

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 56	1000/100
2	2.552	B .013	
A	11.840	C 3.4	5×10^{-10}
B	16.780	D 43	1000/500
		E 2.3	750 V

Tim Crit. 4:10 ~~AM~~ PM Duration 32 min.

INSTRUMENT CHECK

Time 8:30 AM ~~PM~~ Source Cs 26

	Channel A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	900V
Source Dist.	18	OK	8"	6'	3"
% F.S. Trip	40		100+	20	100+

Counters OK

C.A. 9 Expr. 3 Run 23

Sheet _____ Date 10-4 1952 Time 8:45 AM ~~PM~~

Purpose Continuation of Rod B Calibration. (Work ARE Reg. Rod)

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 23

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615"	A 34	1000/25"
2	2.552	B .0012	
~~3~~ A	11.855"	C 3.8	10^{-10}
~~4~~ B	16.780	D 98	1000/25"
		E .9	900 V.

Tim Crit. 8:57 AM ~~PM~~ Duration _____ min.

Inserted A to 11.255 to produce (+) period.
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 24

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615"	A 51	1000/100
2	2.552	B .011	
~~3~~ A	11.255"	C 3.2	5×10^{-10}
~~4~~ B	17.460	D 95"	1000/200
		E 3.8	810 V

Tim Crit. 9:04 AM ~~PM~~ Duration _____ min.

122

withdrew Rod A to 13.255 to reduce level. Leveled with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 25

Table Pos. L T R

Control Rod		Channel	
1	2.615	3 2	1000/25
2	2.552	B .0011	
A	11.350	C. 3.6	10^{-10}
B	17.460	D 95	1000/25
		E .4	810 V.

Tim Crit. 9:21 AM ~~PM~~ Duration min.

Inserted Rod A to 10.750 to produce (+) period. Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 26

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 50	1000/100
2	2.552	B .011	
A	10.750	C 3.0	5×10^{-10}
B	18.010	D 93	1000/20
		E 3.6	810 V

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

withdrew Rod A to 12.750 to reduce level. Leveled with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 27

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615"	A 33	1000/25"
2	2.552	B .0011	
A	10.850	C 3.4	10^{-10}
B	18.010	D 94	1000/25"
		E .5"	810 V.

Tim Crit. 10:03 AM ~~PM~~ Duration ____ min.

Inserted to Rod A to 10.250 to produce (+) period. Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3X Run 28

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615"	A 50	1000/100
2	2.552	B .011	
A	10.250	C 2.9	5×10^{-10}
B	18.540	D 92	1000/200
		E 3.5"	810 V

Tim Crit. 10:36 AM ~~PM~~ Duration ____ min.

Withdrew Rod A to 12.250 to reduce level.
Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 29

Table Pos. _____ T _____ P _____

Control Rod		Channel	
1 2.615	A	34	1000/25
2 2.552	B	.0012	
A 10.410	C	3.4	10^{-10}
B 18.540	D	97	1000/25
	E	.5	810 V.

Tim Crit. 11:07 AM ~~PM~~ Duration _____ min.

Inserted Rod A to 9.810 to produce (+) period.
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 30

Table Pos. _____ T _____ P _____

Control Rod		Channel	
1 2.615	A	48X	1000/100
2 2.55V	B	0.011	
A 9.810	C	2.875×10^{-10}	
B 18.980	D	89	X 1000/200
	E	3.4 @ 810V	

Tim Crit. 11:27 AM ~~PM~~ Duration 20 min.

Withdrew Rod A to ~~9.210~~ 11.810 to reduce level
Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 31

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A	32 1000/25
2	2.552	B	.001
A	9.980	C	3 10^{-10}
B	18.980	D	88 1000/25
		E	.5 810 V

Tim Crit. 12:04 ~~AM~~ PM Duration 23 min.

Insert Rod A to 9.18 to produce (+) period
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 32

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A	46 1000/100
2	2.552	B	.01
A	9.180	C	2.9 5×10^{-10}
4	19.570	D	85 1000/200
		E	3.4 810 V.

Tim Crit. 12:21 ~~AM~~ PM Duration 17 min.

withdrew Rod A to 11.180 to reduce level.
Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 33

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A 34	1000/25
2	2.552	B .0011	
~~A~~	9.340	C 3.6	10^{-10}
~~B~~	19.570	D 95	1000/25
		E .5	810 V.

Tim Crit. 12:41 ~~AM~~ PM Duration 20 min.

Insert Rod A to 8.440 to produce (+) period
Level with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 34

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A 49	1000/100
2	2.552	B .01	
~~A~~	8.440	C 3.0	5×10^{-10}
~~B~~	20.210	D 90	1000/200
		E 3.6	810 V

Tim Crit. 1:01 ~~AM~~ PM Duration 20 min.

withdrew Rod A to 10.940 to reduce length
Leveled with Rod A.

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 35

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615"	A 35	1000/25"
2	2.552	B .0012	
A	8.645"	C 3.9	10^{-10}
B	20.210	D 98	1000/25"
		E .6	810 V.

Tim Crit. 1:21 ~~AM~~ PM Duration 20 min.

Insert Rod A to 7.745 to produce (+) period
Leveled with Rod B.

eriod

CRITICAL POSITIONS

C A. 9 Expr. 3 Run 36

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615"	A 49	1000/100
2	2.552	B .011	
A	7.745"	C 3.0	3×10^{-10}
B	20.755"	D 90	1000/200
		E 3.6	810 V.

Tim Crit. 1:50 ~~AM~~ PM Duration ~~30~~ 29 min.

128

withdrew Rod A to 10.745 to reduce level.
Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 37

Table Pos. L T R

Control Rod		Channel	
1	2.615	A	34 1000/25
2	2.552	B	.0011
A	8.010	C	3.8 10^{-10}
B	20.755	D	95 1000/25
		E	.6 810 V.

Tim Crit. 2:09 ~~AM~~ PM Duration 19 min.

Inserted Rod A to ~~6.180~~ 6.810 to produce (+) perio.
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 38

Table Pos. L T R

Control Rod		Channel	
1	2.615	A	50 1000/100
2	2.552	B	.01
A	6.810	C	3.2 5×10^{-10}
B	21.410	D	95 1000/210
		E	3.7 810 V.

Tim Crit. 2:27 ~~AM~~ PM Duration 18 min.

withdrew Rod A to 9.810 to reduce leveb
~~Set~~ Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 39

Table Pos. _____ L _____ T _____

Control Rod		Channel	
1	2.615	A 34	1000/25
2	2.552	B .0011	
A	7.200	C 3.7	10^{-10}
B	21.410	E .6	810 V
		D 97	1000/25

Tim Crit. 2:42 ~~AM~~ PM Duration 15 min.

Inserted Rod A to 5.600 to produce (+) period.
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 40

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A 50	1000/100
2	2.552	B .01	
A	5.600	C 3.1	5×10^{-10}
B	22.090	D 93	1000/200
		E 3.6	810 V

Tim Crit. 3:04 ~~AM~~ PM Duration 22 min.

57 tubes

Shut down and added tube #57 to 11-4. In order to allow the removal of Rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 41

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 2.618	A	32/35	1000/25
2 2.552	B	.001	
A 13.85	C	2.8	10^{-10}
B 22.090	D	88	1000/25
	E	1.0	900 V

Tim Crit. 3:37 ~~AM~~ PM Duration ____ min.

Inserted Rod A to 13.35 to produce (+) period
Leveled with Rod B.

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 42

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 2.618	A	93	1000/50
2 2.552	B	.01	
A 13.350	C	5.5	~~2.5~~ X 10^{-10}
B 22.835	D	85	1000/200
	E	3.5	810 V.

Tim Crit. 3:52 ~~AM~~ PM Duration ____ min.

Withdrew Rod A to 15.350 to reduce level.
Leveled with rod A.

131
10/4/52

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 43

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	2.618	A	31 1000/25
2	2.552	B	0.001
A	13.495	C	.9 2.5 X 10⁻⁶
B	22.834	D	85 1000/25
		E	0.5 810V

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

Inserted A to 13.00 + period - Level with B -

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 44

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	2.618	A	50 X 1000/100
2	2.552	B	0.01
A	13.000	C	5.9 X 2.5 X 10⁻¹⁰
B	23.500 / 23.500	D	92 X 1000/200
		E	3.8 @ 810V.

Tim Crit. _____ AM PM Duration _____ min.

4:45P Shut down -

132

10-6-52

C.A. 9 Expr. 3 Run 45

Sheet _____ Date 6 Oct 1952 Time 900 AM ~~PM~~

Purpose Cont calibration of Rad B

INSTRUMENT CHECK

Time 8:30 AM ~~PM~~ Source PB2C7

	Channel A	B	C	D	E
Range	10/1000	6CF	10^{-10}	10/100	900 V
Source Dist.	15"	6"	4"	3"	
% F.S. Trip	45	6	100	30	1800

ARB Counter 1 & 2 O.K.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 45

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A 29	1000/25
2	2.553	B 0.0009	
#	13.005	C 1.7	10^{-10}
R	23.500	D 78	1000/25
		E .9	900 V

Tim Crit. 9:14 AM ~~PM~~ Duration 7 min.

Inserted A to 12.400 to produce (+) period. Level with B.

CRITICAL POSITIONS

9 Expr. 3 Run 46

_____ L _____ T _____ R _____

Control Rod		Channel	
1	same	A 50	1000/100
2	same	B .01	
A	12.400	C 3.5	5×10^{-10}
B	24.710	D 94	1000/200
		E 3.6	810 V

Tim Crit. 9:21 AM PM Duration 25 min.

134

Withdrew A to 14.400 to reduce level.
Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 47

Table Pos. ____ I ____ T ____ R ____

Control Rod		Channel	
1 same	A	32	1000/25
2 same	B	.0011	
A 12.500	C	5.7	10^{-10}
B 24.710	D	90	1000/25
	E	.6	810V

Tim Crit. 9:46 AM ~~PM~~ Duration 19 min.

Inserted A to 11.900 to produce (+) period.
Level with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 48

Table Pos. ____ I ____ T ____ R ____

Control Rod		Channel	
1 2.614	A	51	1000/100
2 2.553	B	.01	
A 11.900	C	3.4	5×10^{-10}
B 25.935	D	95	1000/200
	E	3.6	710V

Tim Crit. 10:05 AM ~~PM~~ Duration 19 min.

Withdrew A to 13.900 to reduce level.
Level with A.

CRITICAL POSITIONS

CA 9 Expr. 3 Run 49

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1 same	A	31	1000/25
2 same	B	.001	
A 11.935	C	.8	$5X10^{-10}$
B 25.935	D	85	1000/25
	E	.5	710V

Tim Crit. 10:24 AM ~~PM~~ Duration 29 min.

D. Inserted Rod A to 11.200 to produce (+) period.
Level with B.

CRITICAL POSITIONS

CA 9 Expr. 3 Run 50

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1 same	A	32	1000/100
same	B	.01	
A 11.200	C	3.4	$5X10^{-10}$
B 28.580	D	96	1000/200
	E	3.6	810V

Tim Crit. 10:58 AM ~~PM~~ Duration 20 min.

Temp at 11:28
1.3821

136

Withdrew rod A to 13.200 to reduce level.
Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 51

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.614	A	32 1000/25
2	2.553	B	.0012
A	11.330	C	0.8 5×10^{-10}
B	28.580	D	92 1000/25
		E	.6 710 V

Tim Crit. 11:18 AM ~~PM~~ Duration 23 min.

Insert Rod A to 10.750 to produce (+) period
Level with Rod B.

with Rod B all way out Power level still increased.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 52

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.614	A	
2	2.553	B	
~~A~~		C	
~~B~~		D	
		E	

Tim Crit. 11:41 AM ~~PM~~ Duration ____ min.

Reset B to 28.580. withdrew A to 13.650 to reduce level. Leveled with A

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 53

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.614	A	28 1000/25
2	2.553	B	.00095
A	11.380	C	.8 5 X 10⁻¹⁰
B	28.580	D	76 1000/25
		E	.7 750V

Tim Crit. 11:58 AM ~~PM~~ Duration _____ min.

Insert Rod A to ~~73~~ ~~11000~~ 10.900 to produce a positive period. Level with rod B.

rod

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 54

Table Pos. _____ L _____ T _____

Control Rod		Channel	
1	2.614	A	
2	2.553	B	
3		C	
4		D	
		E	

Tim Crit. _____ AM PM Duration _____ min.

With Rod B all way out power level still increases

Reset Rod B back to 28.580 and withdraw A to 13.650 to reduce level. Level with A

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 55

Table Pos.

Control Rod			
1	2.614	A	32 1000/25
2	2.553	B	0.001
A	11.330	C	0.8 5×10^{-10}
B	28.580	D	91 1000/25
		E	0.6 @ 710 V

Tim Crit. ____ AM PM Duration ____ min.

Inserted A to 11.030 to produce (+) period. Leveled with B. Reactor was still rising after a very long period. Temp. 1:29 P.M. 1.3819

CRITICAL POSITIONS

C.A. 9 Expr 3 Run 56

Table Pos. ____ T ____ R ____

Control Rod			Ganged
1	2.614	A	50 1000/100
2	2.553	B	.01
A	11.030	C	$8.5 \times 2.5 \times 10^{-10}$
B	31.000	D	93 1000/200
		E	3.7 810 V

Tim Crit. 1:05 ~~AM~~ PM Duration 45 min.

withdrew Rod B to 33.400 and observed (+) period. Leveled with Rod A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 57

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 58	1000/200
2	2.553	B .03	
A	11.230	C 2.9	10^{-9}
B	33.400	D 87	1000/500
		E 4.5	750 V.

Tim Crit. 1:50 ~~AM~~ PM Duration 17 min.

Temp. 2:15 P.M. 1.3822

~~Inserted rod A to to produce (+) period. Level with B.~~ withdrew Rod A and inserted Rod B to 1.00 in. Leveled with

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 58

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 32	1000/25
2	2.553	B .001	
A	21.375	C 6.2	10^{-10}
B	1.000	D 91	1000/25
		E .6	810 V

Tim Crit. 2:07 ~~AM~~ PM Duration ____ min.

Inserted rod A to 20.875 to produce (+) period.
Leveled with B

CRITICAL POSITIONS

CA 9 Expr. 3 Run 59

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 same		A 53	1000/100
2 same		B .01	
A 20.875		C 7.1	2.5×10^{-10}
B 7.590		D 98	1000/200
		E 3.9	810 V

Tim Crit. 2:30 ~~AM~~ PM Duration 23 min.

Withdrew rod A to 22.875 to reduce level.
Inserted B to 2.00 in, level with A

CRITICAL POSITIONS

CA 9 Expr. 3 Run 60

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1 2.615		A 33	1000/25
2 2.553		B .061	
A 21.440		C 5.9	10^{-10}
B 2.000		D 91	1000/25
		E .6	810 V

Tim Crit. 2:48 AM PM Duration 16 min

iod.

Inserted rod A to 20.940 to produce a (+) period.
Leveled with B.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 61

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 52	1000/100
2	2.553	B .013	
A	20.940	C 3.5	5×10^{-10}
B	7.318	D 94	1000/200
		E 3.8	810V

Tim Crit. 3:04 ~~AM~~ PM Duration 21 min.

ıal.

Withdrew rod A to 22.940 to reduce level.
Inserted B to 3.00 in g Level with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 62

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	same	A 33	1000/25
2	same	B .0012	
A	21.490	C 5.9	10^{-10}
B	3.000	D 93	1000/25
		E .6	810V

Tim Crit. 3:26 ~~AM~~ PM Duration 17 min.

142

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 63

Table Pos. L T R

Control Rod		Channel	
1 same	A	51	1000/100
2 same		.012	
A 20.990	C	3.4	5×10^{-10}
B 7.070	D	94	1000/200
	E	3.8	810V

Tim Crit. 3:43 ~~PM~~ Duration 10 min.

Inserted rod A to 20.990 to produce (+) period. Leveled with B.

withdrew rod A to 22.99. Inserted B to 3.400 and leveled with A.

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 64

Table Pos. L T R

Control Rod		Channel	
1 same	A	33	1000/25
2 same	B	.0011	
A 21.515	C	~~2.8~~ 5.3	10^{-10}
B 3.400	D	90	1000/25
	E	.6	810V

Tim Crit. 3:59 ~~AM~~ PM Duration min.

Inserted A to 21.015 → fuel with B. 21.015

143
9/10/52

CRITICAL POSITIONS

C.A. 9 Expr. 3 Run 65

Table Pos. I T R

Control Rod		Channel	
1	same	A	53 x 1000/100
2	same	B	0.01
A	21.015	C	2.8 x 5 x 10^{-10}
B	6.950	D	96 x 1000/200
		E	3.9 @ 810V.

Tim Crit. 4:35 ~~AM~~ PM Duration ____ min.

144

10-6-52

C.A. 9 Expr. 4 Run 1

Sheet Date 195 Time 7:45 ~~AM~~ PM

Purpose Danger Coeff. at several radii of CH-8 type fuel element

For 9.4.1 (Zero Run) Fuel element #57 removed from position 11-4 and element #64 removed from 10-11 (55 tub

3rd

CRITICAL POSITIONS

C.A. 9 Expr. 4 Run 1

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 86	100/200
2	2.550	B .004	
#4	0.033	C 7	1000
#8 58.7#	16.510	D 70	1,000/100
		E 3.0	900 ✓

Tim Crit. 8:23 ~~AM~~ PM Duration 15 min.

58.7
29.7
29.04 → Remove Tube # 72 from 9-8
→ Placed Tube # 46 in 9-8 (#46 has 24-8 type fuel)
55 tubes

tubes)

46 in 9-7

CRITICAL POSITIONS

CA 9 Expr. 4 Run 2

Table Pos. L T P

	Control Rod		Channel	
1	2.615	A	89	100/100
2	2.550	B	.007	
A 29.7	0.030	C	7.1	x 10^-10
B	12.393	D	70	1000/100
		E	3.1	900 V

Tim Crit. 9:00 ~~AM~~ PM Duration 21 min.

58.7
37.6
21.14 → Removed #46 from 10-8 55 Tube
Replaced #72 in 9-8
→ Placed #46 in 10-8

46-10-8

CRITICAL POSITIONS

C.A. 9 Expr. 4 Run 3

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 91	10²/200
2	2.550	B .004	
A	0.030	C 7.2	10^{-10}
B 37.6¢	13.615	D 72	1000/100
		E 3.1	900V

Tim Crit. 9:43 ~~AM~~ PM Duration 19 min.

58.7
44.2
14.54 → Replaced #68 in 10-8
Placed #46 in ~~10~~ 11-8
Removed #12 from 11-8 55 Tube

Temp
10:15 P
1.382 mv

46-11-9

CRITICAL POSITIONS

C.A. 9 Expr. 4 Run 4

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 85	1000/200
2	2.550	B ~~.004~~ .0045	
A	0.030	C 7.0	10^{-10}
B 44.2¢	14.635	D 68	1000/100
		E 2.9	900V

Tim Crit. 10:20 ~~AM~~ PM Duration 10 m.

58.7
49.7
9.0 Replaced #12 in 11-8
Removed #45 from 12-8
Placed #46 in 12-8

55 tubes

46 ← 12-8

CRITICAL POSITIONS

C.A. 9 Expr. 4 Run 5

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 88	100/200
2	2.548	B .005	
A	0.030	C 7.0	10-10
B (49.7)	15.285	D 70	1000/100
		E 2-9	900 ✓

Tim Crit. 10:49 ~~AM~~ PM Duration 11 min.

Removed 46 from 12-8 Placed #45 in 12-8
Replaced #64 in 10-11 & 57 in 11-4
Removed #53 ~~and~~ from 6-9, #65 (empty) in 6-9
Placed #39 into 11-3

57 full tubes + 1 empty

C.A. 9 Expr. 5 Run 1

Sheet _____ Date 1/7 195✓ Time ~~AM~~ PM

Purpose Foil Traverses - Some In Some Al Catcher

INSTRUMENT CHECK

Time _____ AM PM Source _____

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/100	900 v
Source Dist.	12" to 5"			5'	5"
% F.S. Trip	55			25	100 40

#1 & 2 OK - 33

~~Tube 58 placed in 9-4, tube 33 in 7-11, Tube 25 out of 47~~

(58 tubes 6 tamps)

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 1a

Table Pos. _____ I _____ T _____ R _____

Control Rod		Channel	
1	In	A	
2	In	B	0.001
A	In	C	
B	18"	D	
		E	

Tim Crit. _____ AM PM Duration 1 min.

Pat. (1:34 P.M.)
Temperature
1.3840

Add 58 to 9-4 } approx 81.7¢
33 to 7-11 }

B
18" -70.0¢
22.7 +10.3
#25 +48.7
81.7

CRITICAL POSITIONS

C.A. 9 Expr. ✓ Run 1b

Table Pos: L T R

Control Rod		Channel	
1	do	A	
2	do	B	0.001
A	~8.9"	C	
B	out	D	
		E	

Tim Crit: AM PM Duration min.

(48.7¢) Removed tube 25 from ~~4-7~~ 4-7 (58 tubes +1 empty)

(47 + tube 25 out)

CRITICAL POSITIONS

C.A. 9 Expr. ✓ Run 1c

Table Pos. L T R

Control Rod		Channel	
1	do	A	
2	do	B	0.001
A	do	C	
B	22.7	D	
		E	

Tim Crit: AM PM Duration min.

150

10/7/57

~~fuels~~

Remove 15 from 6-7
added 80 to 6-7 (substitution of an Al fuel tube for a stainless tube to gain some reactivity).

CRITICAL POSITIONS

Run 9 Expr 5 Run 1d

Table Pos. I T R

Control Rod		Channel	
1	in	A	
2	in	B	
A	9.00 in	C	
B	out	D	
		E	

Tim Crit. AM PM Duration min.

Remove #80 from 6-7 returned #15 to 6-7 probably
Returned 25 to 4-7

(58 tube
1 Empty)

C.A. 9 Expr. 5 Run 2

Sheet _____ Date Oct 8, 1952 Time 9:00 AM ~~PM~~

Purpose Fail Traverses

INSTRUMENT CHECK

Time 8:20 AM ~~PM~~ Source F-0267

	Channel A	B	C	D	E
Range	10/1000	0K	10^{-10}	10/1m	500V
Source Dist.	16"		5"	6"	2.5"
% F.S. Trip	35		100+	24	100+

Counter 1+2 OK

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 2

Table Pos. _____ L T R

Control Rod		Channel	
1	2.618	A	20 100V/1000
2	2.550	B	.048
B	33.400	C	$4.8\ 10^{-9}$
A	9.053	D	74 1000/
		E	3.5 690V

Tim Crit. 9:12 20/60 AM ~~PM~~ Duration 20 min.

Foil Location for 9.5.2

Catcher

✓	113	24.4.4 (1/16) -1.25	Std
	112	18.11.5 (3/4) -1.25	
Cd	111	18.13.3 (3/4) -1.25	

1.25" Im E-1 30.6.3 -0-0

Indium Bar

E-30	18.8.7 (1/2)	-1 3/32
E-24	18.8.7 (1/2)	-1 11/16
E-36	18.9.8 (4)	1 23/32
E-35	18.9.8 (1)	25/32
E-34	18.11.8 (1)	-.94

Indium Cd cover

E-9	0. 11.8 -(1)	-25/32
E-2	6. 11.8 -(1)	-25/32
E15	12. 11.8 -(1)	-25/32
E6	18. 11.8 -(1)	-25/32
E14	24. 11.8 -(1)	-25/32
E19	30. 11.8 -(1)	-25/32
E23	36. 11.8 -(1)	-25/32

Foil Location for 9.5.3

Catchers

# 115	24-4-4	(1/16)	-1.25	Std.
Cl # ~~116~~ 114	18-11-5	(3/4)	-1.25	
# 116	18-13-3	(3/4)	-1.25	

1.25" Au #E1 30-6-3-◎-0

Indium Bare

#C33	0-11-8	①	-25/32
#C28	6-11-8	①	-25/32
#C26	12-11-8	①	-25/32
#C22	18-11-8	①	-25/32
#C21	24-11-8	①	-25/32
#C18	30-11-8	①	-25/32
#C10	36-11-8	①	-25/32

Indium Cl. Cvd.

# C1	18-8-7	(1/2)	-1 1/32
# C5	18-8-7	(1/2)	-1 11/16
# C13	18-9-8	(4)	-1 23/32
# C17	18-9-8	①	25/32
# C3	18-14-8	①	.94

(2)

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 3

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.658	A 51	1000/500
2	2.571	B 0.051	
A	6.358	C 2.8	2.5×10^{-9}
B	33.395 (out)	E ~~4.9~~	4.9 x 690V
		D ~~93~~	1000/1000

Tim Crit. 11:36 ~~PM~~ AM Duration 20 min.

Catcher #118 18-12-4-(3/4) 1.25

Cd cvd #117 18-14-2-(3/4) 1.25

↓ 4th #119 24-4-4-(1/6) 1.25

Indium Bare

#C 40 18-6-9-(6)-1 23/32

#C 32 18-6-9-(0)-0

#C 44 18-14-8-(4)-25/32

~~#C 42 18-8-7-(0)-0~~

~~#C 31 18-8-2-(1/2)-19/32~~

~~#C 20 18-8-7-(1/2)-2 1/16~~

Indium Cd cvd.

~~#C 11 18-98-(4) 25/32~~

~~#C 12 18-98-(1)-1 23/32~~

↓ #C 16 18-14-8 Ept 1/16 in Inconel Shell

Au #204 Cd. Covered @ 30.6.3-0-0

Fuel Tube #12 was inadvertently left out of position 11-8 — this omission affects foils exposed in 9-8 & 8-7 since it required the poison rod in 8-7 to be removed about half way —

CRITICAL POSITIONS (3)

(3) CA 9 Expr 5 Run 4

Table Pos. L T R

Control Rod		Channel	
1 2.619	A 50		100%/50.
2 2.544	B .052		
A 0.030 in	C 5.9		10^{-9}
B 19.306	D 90		100%/1000
	E 7.1		720V

Tim Crit. 2:07 AM PM Duration 20 min.

Catcher Cd cvd #122 | -18-12-4-(3/4)-1.25
#120 | -18-14-2 (3/4) 1.25
Std #121 | -18-4-4 (3/4) 1.25

Indium Cd Cvd

C 39 | 18-6-9-(6)-23/32
C 8 | 18-6-9-(6)-0
C 27 | 18 14-8-(4)-25/32
C 11 | 18 9-8 (4) -25/32
C 12 | 18 9-8 (1) 23/32

MN #7 @ 30.6.3.0.0

Indium Bare

C 42 | 18-8-7-(6)-0
C 31 | 18-8-7-(1/2)-1 9/32
C 20 | 18-8-7-(1/2)-2 1/16
C 7 | 18-14-8 Extend to 1/16 in Uranium Shell

Oct 9-52

INSTRUMENT CHECK

Time 9:00 AM ~~PM~~ Source PB26)

	Channel A	B	C	D	E
Range	10/1000	1	10^{-16}	10/100	900V
Source Dist.	15"	OK	3"	5'	2½"
% F.S. Trip	35	1	100	24	100+

Combs 1+2 OK

C.A. 9 Expr. 5 Run 5

Sheet 2 Date 10-9 195 2 Time 9:15 AM ~~PM~~

Purpose Continue foil irradiations

(Page 155-)

CRITICAL POSITIONS

(1)

C.A. 9 Expr. 5 Run 5

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	~~2.9~~ 2.615	A 49	1000/500
2	2.548	B .055	
A	7.190	C 2.2	2.5×10^{-9}
B	33.403	D 90	1000/1000
		E 5.3	700 V

Tim Crit. 9:33 15/60 AM ~~PM~~ Duration 20 min.

CRITICAL POSITIONS (5)

CA. 9 Expr. 5 Run 6

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 50	1000/500
2	2.547	B .065	
A	2.500	C 2.2	2.5×10^{-9}
B	25.360	D 89	1000/1000
		E 4.1	680V

Tim Crit. 2:05 ~~AM~~ PM Duration 20 min.

Co #1 30.6.3.⑥.0

Catcher #124 24.4.4. (1/6) 1.25 Std

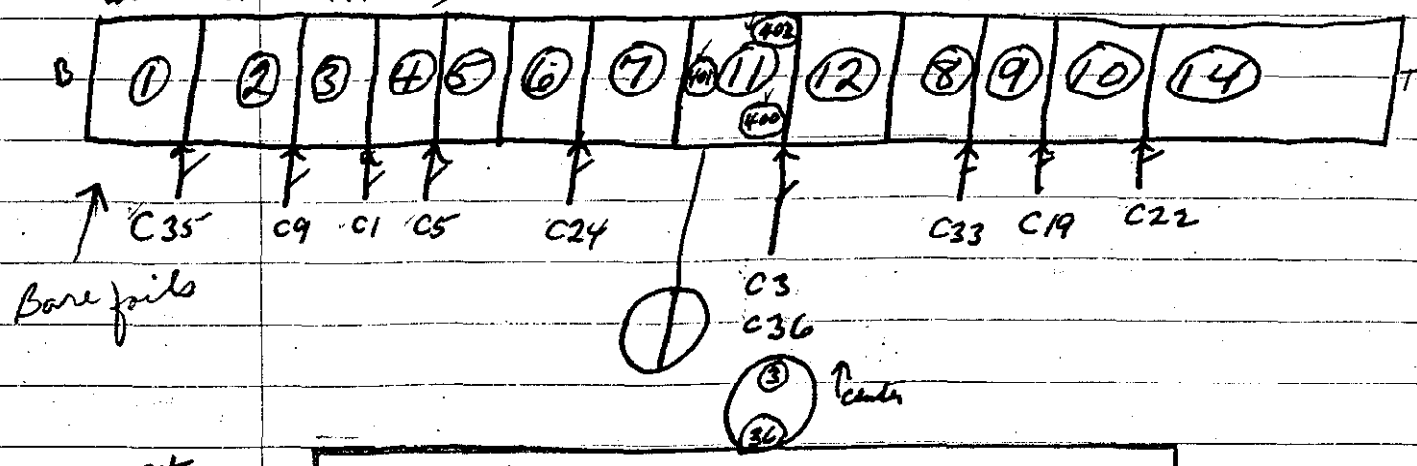
Cd comp catcher #125 18.9.7 (3/4) 1.25

# 26	Cd - In	18.10.8.	④	25/32
# 18	Bare In	18.11.8	④	1 23/32
# 21	" "	18.11.8	①	1 23/32
6	"	18.6.9	⑥	25/32
15	"	18.6.9	⑤	25/32

Inconel tube with cast fuel slugs loaded into 11-8 for run 6. (see p 158 for foils)

158

Diagonal Table (11-8)



10 Oct

INSTRUMENT CHECK

Time 9:10 AM ~~PM~~ Source BB26

	Channel A	B	C	D	E
Range	10/1000		10	10/1000	400
Source Dist.	17"	OK	8"	5'	4"
% F.S. Trip	50		100+	24	100+

Counts / ℓ

C.A. 9 Expr. 5 Run 7

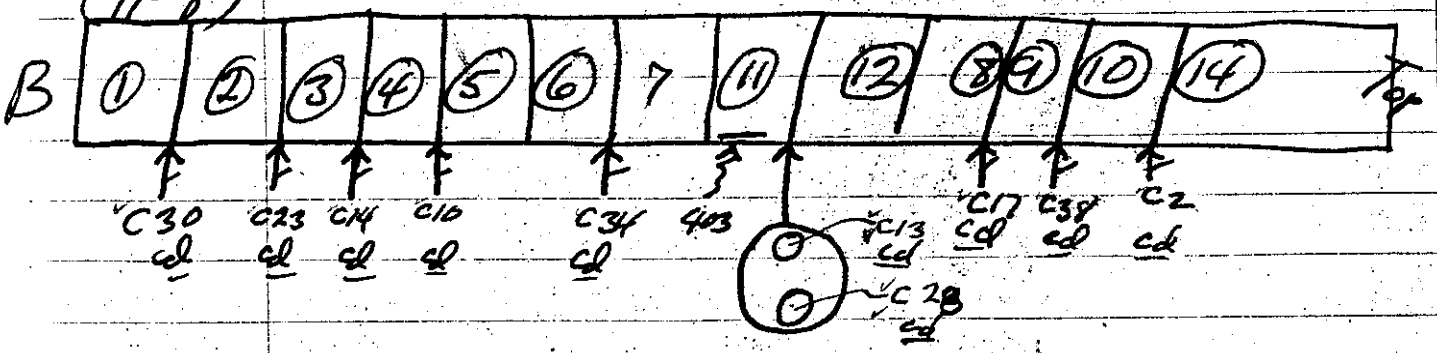
Sheet ____ Date ____ 195__ Time ____ AM PM

Purpose ____

Catchers #123 – 24-4-4 (1/6) – 1.25" Std
#126 18-9-7 (3/4) – 1.25" Bare

Indium In #22 – 18-10-8 (4) – 25/32"
Cd In #26 18-11-8 (4) – 1 23/32
Cd In #5 18-11-8 (1) 1 23/32 Co #2 e 30.6.3.0.0
Cd In #44 18-6-9 (6) 25/32
Cd In #24 18-6-4 (3) 25/32

Channel Tube (11-8)



(6)

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 7

Table Pos. _____ L T R

Control Rod		Channel	
1	2.618	A 50	1000/500
2	2.549	B .051	
A	4.660	C 2.3	2.5×10^{-9}
B	33.398	D 91	1000/1000
		E 4.4	690V

Tim Crit. 9:37:15 AM PM Duration 20 min.

Catcher

Bar Al #128 18-9-7-(5/6) 1.25

√ Al #127 24-4-4-(1/6) 1.25 Std

Cd Cvd Mn #8 30-6-3-⊙-0

Indium

C6 18-9-8-(4)- 25/32

C11 18-9-8-(1)- 1 23/32

√ Cd C32 18-11-8-(4)- 25/32

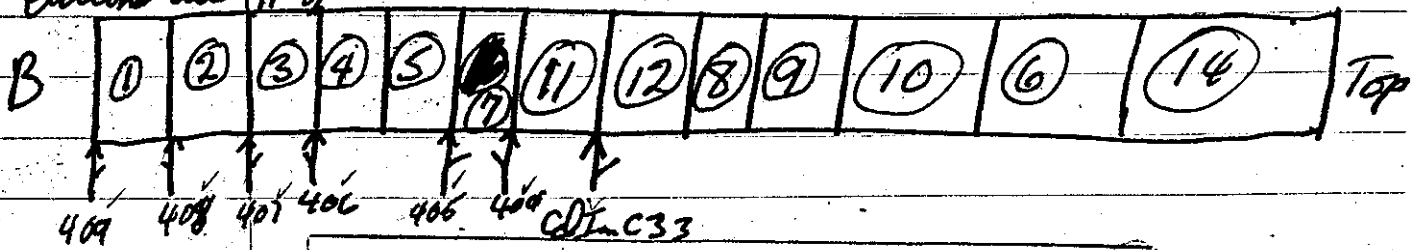
Cd C31 18-11-8-(1)- 25/32

~~Cd C19 - 18-8-7-⊙-0~~

√ Cd C21 - 18-8-7-(1/2)-19/32

√ Cd C ~~26~~ 29 - 18-8-7-(1/2)-2 1/16

Second Tube (11-8)



(1)

CRITICAL POSITIONS

C 9 Expr 5 Run 8

Table Pos. ____ ____ T

Control Rod		Chemical	
1	2.555	A 46	1000/500
2	2.547	B .054	
A	5.020	C 2.3	2.5×10^{-9}
B	33.396	D 90	1000/1000
		E 4.3	680 V

Tim Crit. 2:47 25/60 AM PM Duration ____ min.

10-10-52

Catcher

Cd-A1 @ 130 18-9-7-(5/16) 1.25

A1 @ 129 24-4-4-(5/16) 1.25 Std

Cd-In E-1 30-6-3-(6)-0

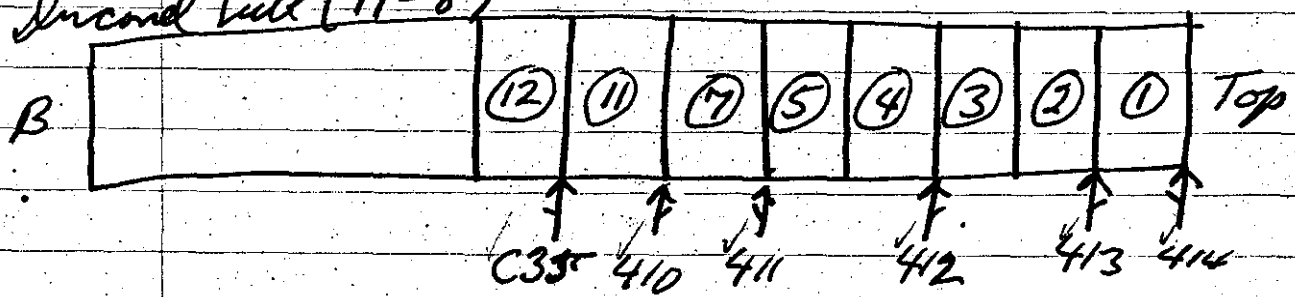
C27 Bare In 18-11-8-0-25/32

C35 Bare In 18-11-8-(6)-0

C42 Bare In 18-11-8-(4)-25/32

C40 Cd In 18-8-7-(1/2)-19/32

Inconel Tube (11-8)



Top

CRITICAL POSITIONS

CA 9 Expr. 5 Run 9

Table Pos. L T R

	Control Rod		Channel	
1	2615	A	50	4000/500
2	2.546	B	.05	
A	2.500	C	2.2	2.5×10^{-9} 1000/1000
B	23.500	D	90	
		E	4.3	680 V

Tim Crit. 8:02 23/100 ~~AM~~ PM Duration 20 min.

162

10-11-52

INSTRUMENT CHECK

Time 945 AM ~~PM~~ Source

	Channel A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	9001
Source Dist.	15	OK	8	5'	3"
% F.S. Trip	35		100+	18	100+

Counts 142 ea

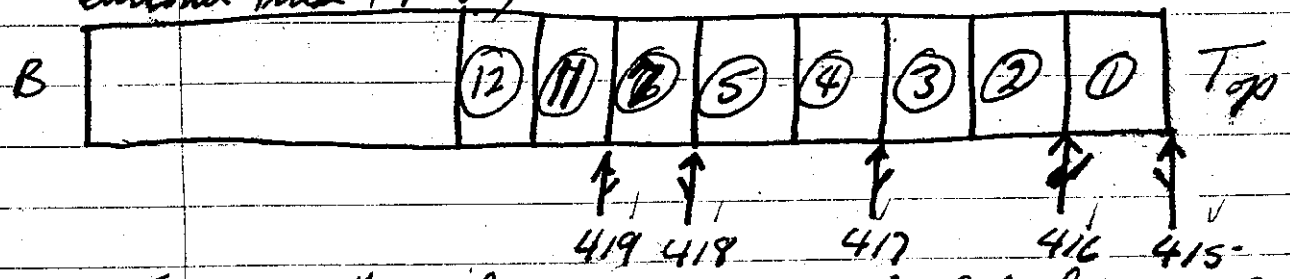
Norm Catcher #al134 24-4-4 (1/6) - 1.25 Std

Bar Catcher #al131 24-11-5 (3/4) - 1.25

al Catcher #al133 18-11-5 (3/4) - 1.25

al Catcher #al132 36-11-5 (3/4) - 1.25

Inconel Tube (9-8)



Fuel tube #72 disconnected from Rod A drive and replaced in (9-8) by Inconel test fuel element

(1)

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 10

Table Pos. L T R

Control Rod		Channel	
1	2.609	A 35	1000/520
2	2.545	B 0.049	
A	0.037	C 1.6	2.5×10^{-9}
B	22.588	D 70	1000/1000
		E 3.5	690 V

Tim Crit. 10:11:0 AM ~~PM~~ Duration 20 min.

#72 returned to 9-8 and Connected to Rod A
#53 replacing Empty tube in 6-9
~~#47 into 4-8~~
~~#[illegible] into 5-10~~
#25 out of 4-7
#56 out of 5-9
#11 out of 5-8
#59 out of 4-6

56

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 11

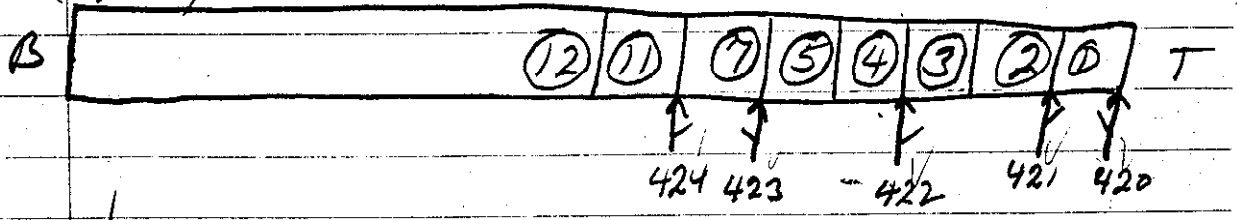
Table Pos. L T P

Control Rod		Channel	
1	dn	A	
2	dn	B	0.001
A	~ 11.5	C	
B	dn (ie poison all out).	D	
		E	

Tim Crit. 11:40 (AM) PM Duration 3 min.

(12-8)

(10)



Norm #al 135 24-4-4-(1/6) 1.25 Std

al 138 18-11-5 (3/4) 1.25

al 136 24-11-5 (3/4) 1.25

al 137 36-11-5 (3/4) 1.25

Table C8 in 10-4

(16)

CRITICAL POSITIONS

C A. 9 Expr. 5 Run 12

Table Pos. ____ L ____ I ____ R ____

Control Rod		Channel	
1	2.605	A 50	1000/500
2	2.545	B .055	
A	8.270	C 2.2	2.5×10^{-9}
B	0.80	D 90	1000/1000
		E 4.3	680V

Tim Crit. 1:03 30/60 ~~AM~~ PM Duration 20 min.

11 Nom Al # 139 24-4-4 (1/6) 1.25- Std

Indium

B C8 18-8-7-⊙-0

Cd C12 18-8-7-①-1 9/32

B C7 18-8-7-① 1 11/16

Cd C43 18-9-8-④ 1 23/32

B C20 18-9-8-① 1 23/32

Cd C15 18-10-8④ 25/32

B C9 18-10-8①-1 23/32

(11)

CRITICAL POSITIONS

C.A. 9 Expr. 5 Run 13

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1 2.608		A 50	100/1000
2 2.545		B 0.01	
A 10.733		C 4.9	2.5×10^{-10}
B 0.084		D 40	1000/500
		E 5.1	840 V

Tim Crit. 2:31:51 PM Duration 20 min.

↓ Norm 140 24-4-4-(F/6) 1.25 Std

(12) Indium

Cd *C36 18-8-7-(0)-0

B *C41 18-8-7-(1)-1 9/32

Cd C39 18-8-7-(1)-1 11/16

B C3 18-9-8-(4)-1 23/32

Cd C18 18-9-8-(1)-1 23/32

B C4 18-10-8-(4)-25/32

Cd C16 18-10-8-(1)-1 23/32

(12)

CRITICAL POSITIONS

C.A. 9 Expr. 5⁻ Run 14

Table Pos. L T R

Control Rod		Channel	
1	2.615	A	54 1000/100
2	2.545	B	0.011
A	10.551	C	4.9 2.5 x 10⁻¹⁰
B	0.084	D	40 1000/500
		E	5.0 840V

Tim Crit. 2:38 ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK

Time 9:20 AM ~~PM~~ Source PB267

	Channel A	B	C	D	E
Range	10/1000	1	10	10/1000	900V
Source Dist.	12	OK	5"	5'	3"
% F.S. Trip	40	1	100+	25	100+

Counts 1+2 - OK

Pot. Temp. 10:00 AM.

1.3793

~~Tube 11 placed into 5-8, Tube 59 into 4-6~~

Removed tube 39 from 11-3

These tubes were probably added at this time 6/4/53

C.A. 9 Expr. 6 Run 1

Sheet ____ Date ____ 195__ Time ____ AM PM

Purpose Danger coll. of uncanel lead tube (powder packed) (Vs. stainless steel tube)

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 1

Table ____ I ____ T ____ R ____

Control Rod		Channel	
1	2.605	A 48	100/200
2	2.545	B .0022	
A	0.028	C 4.8	5×10^{-11}
B (105.0)	23.120	D 76	1000/50
		E 1.5	900V

Tim Crit. 10:33 ~~PM~~ AM Duration 10 min.

Tube 45 out of 12-8, inconel no. 82 into 12-8.

105.0
94.9
10.1

#82 → 12-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 2

Table ____ I ____ T ____ R ____

Control Rod		Channel	
1	2.600	A 90	100/100
2	2.544	B .0021	
A	0.023	C 4.6	5×10^{-11}
A (94.9)		D 74	1000/50
B	21.410	E 1.5	900V

Tim Crit. 11:15 ~~PM~~ AM Duration 11 min.

Pot. Temp 11:26 AM
1.3784

170

Inconel tube # 82 out of 12-8, then placed in 11-8. Tube # 45 placed in 12-8. ~~Then~~ tube # 12 out of 11-8.

105.0
87.8
17.2¢

#82 in 11-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 3

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.595	A 94	100/100
2	2.545	B	0.0022
#1 87.82	0.025	C 4.8	5×10^{-11}
B	20.350	D 72	1000/50
		E 1.6 @	900 V.

Tim Crit. 11:56 AM ~~PM~~ Duration 14 min.

Jump @ 12:14 P.M.
1.3775 mr.

Inconel tube #82 out of 11-8, then placed in 10-8. Returned tube #12 to 11-8. Removed tube # 68 from 10-8.

105.0
80.1
24.9¢

#82 - 10-8

CRITICAL POSITIONS

C.A. 9 Expr 6 Run 4

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.600	A 96	100/100
2	2.545	B	.0022
#1	0.025	C 4.7	5×10^{-11}
80.14 B	19.270	D 76	1000/50
		E 1.6	900 V.

Tim Crit. 12:37 ~~AM~~ PM Duration 11 min.

11-8.
11-8.

Removed inconel #82 from 10-8, placed it in 9-8.
Returned Tube 68 to 10-8. Removed Tube 72 from 9-8.

105.0
77.8
27.24

#82 in 9-8

CRITICAL POSITIONS

C A 9 Expr. 6 Run 5

Table Pos. _____ L T R

Control Rod		Channel	
1	2.600	A 94	100/100
2	2.544	B .0022	
A 77.8 E.	0.030	C 4.5	$5X10^{-11}$
B	19.060	D 75	1000/50
		E 1.5	900V

Tim Crit. 1:15 AM PM Duration 7 min.

Pat. Temp 2:16 P.M.
1.3802

1 in 10
+ 68

~~Removed Tube 82 from 9-8.~~ Coupling on B slipping

48.7 Tube 25 placed into 4-7.

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 6

Table Pos. _____ L T P

Control Rod		Channel	
1	2.610	A 92	100/100
2	2.545	B .0021	
A	0.030	C 4.6	$5X10^{-11}$
B	31.000	D 75	1000/50
125.5	323	E 1.5	900V
126.5	31.323		

very slightly super ~ 1¢

Tim Crit. 2:13 ~~AM~~ PM Duration 6 min.

172

Removed Tube 82 from 9-8.

Voids 9-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 7

Table Pos. L T R

Control Rod		Channel	
1	2.600	A 90	100/100
2	2.544	B .0021	
A	0.033	C 4.5	5×10^{-11}
B	10.840	D 73	1000/50
22.7%	1323 / 11.163	E 1.5	900V

Tim Crit. 3:04 AM PM Duration ____ min.

126.5
22.7
103.84

Inc. ss. rod

ss. ns. rod
105.0
48.7
153.7
22.7
131.0

Checked and replaced coupling on Rod 1
Reset Rod 1 zero to 2.615
Reset Rod B zero to 0.084

Exp. 6 Run 8
is a rerun of
Exp. 6 Run 7

Voids 9-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 8

Table Pos. L T P

Control Rod		Channel	
1	2.615	A 91	100/100
2	2.543	B .0021	
A	.033	C 4.8	5×10^{-11}
22.7% B	11.180	D 74	1000/50
		E 1.5	900V

Tim Crit. 8:19 AM ~~PM~~ Duration 15 min.

Run 8 checked Run 7 close enough that it was not necessary to rerun Run 6

Replaced Tube #72 in 9-8
Removed Tube #68 from 10-8

153.7
59.6
94.1

void in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 9

Table Pos. _____ L T R

Control Rod		Channel	
1	2.614	A 91	100/100
2	2.545	B .0022	
A 59.64	.036	C 4.8	5×10^{-11}
B	16.640	D 77	100/50
		E 1.5	900V

Tim Crit. 8:55 ~~AM~~ PM Duration 15 min.

Replaced Tube #68 in 10-8
Removed Tube #12 from 11-8

153.2
83.9
69.3

Rod in 11-8

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 10

Table Pos. L T P

Control Rod		Channel	
1	2.615	A 90	100/100
2	2.545	B 0.0021	
A	0.025	C 4.5	5×10^{-11}
B 83.84	19.778	D 71	1000/50
		E 1.5	900 V

Tim Crit. 9:34 ~~AM~~ PM Duration 15 min.

Replaced #12 in 11-8
Removed #45 from 12-8

153.7
96.4
57.3

Rod in 12-4

CRITICAL POSITIONS

C.A. 9 Expr. 6 Run 11

Table Pos. L T P

Control Rod		Channel	
1	2.615	A 91	100/100
2	2.545	B .0022	
A	0.025	C 4.6	5×10^{-11}
B 96.4	21.630	D 72	1000/50
		E 1.5	900 V

Tim Crit. 16:07 ~~AM~~ PM Duration 18 min.

INSTRUMENT CHECK

Time 9:40 AM / PM Source PB267

	Channel A	B	C	D	E
Range	10/1000		10^{-6}	10/1000	900V
Source Dist.	14"	OK	4"	5'	3"
% F.S. Trip	35		80	20	100

Counts 1+2 OK

96.4 − 94.1 = 2.3

59.2 − 2.3 = 56.9

Removed #68 from 10-8 ~ all

Returned #45 to 12-8

C.A. 9 Expr. 7 Run 1

Sheet ____ Date ____ 195__ Time ____ AM / PM

Purpose Zero run for danger coefficients to be made in 10-8.

CRITICAL POSITIONS

Added 10/6

C.A. 9 Expr. 7 Run 1

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615	A 86	100/100
2	2.545	B .0021	
A 59.2¢	0.025	C 4.4	5×10^{-11}
B	16.600	D 70	1000/50
		E 1.4	900V

Tim Crit. 9:14 AM / PM Duration 9 min.

Pot. temp.
1.3832
at 9:23 AM.

176
(Nickel)

Inserted 1 in. dia. (A) Nickel solid rod into 10-8.

"A" Ni. Rod in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 2

Table Pos. ____ I ____ T ____ R ____

Control Rod ____ Channel

1 in ____ A ____

2 in ____ B .00015 Source in

3 in ____ C Critical

4 in ____ D ____

E ____

Tim Crit. ____ AM PM Duration ____ min.

Removed above "A" Nickel rod from 10-8. Inserted empty tube #34 into 10-8; NOT CRITICAL - B = 0.0009 Source in

Added 4 fuel tube 39 to 11-3.

Empty tube #34 shell in 10-8

Pot. Temp at 11:09 AM.

1.3832

10/14/52
Stainless

F.T. #34 (Empty) - 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 3

Table Pos. L T R

Control Rod		Channel	
1	2.613	A	90 x 100/100
2	2.545	B	~~75~~ 0.0022
A (37.24)	0.025	C	4.4 x 5 x 10^-11
B	13.550	D	72 x 1000/50
		E	1.4 @ 900 v

Tim Crit. 11:37 AM ~~PM~~ Duration 10 min.

Coupling slipping / of R5

Remove Empty Stainless Fuel tube #34 from 10-8

Void in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 4

Table Pos. L T R

Control Rod		Channel	
1	2.610	A	26 100/200
2	2.545	B	.002
A	0.024	C	3.5 ~~2.8~~ 5x10^-11
B (106.7)	23.365 + 66 = 23.431	D	59 1000/50
		E	1.2 900V

Tim Crit. 12:20 ~~AM~~ PM Duration 10 min.

B coupling Slipping

106.7 / 7.5 ¢ value 339

Rupland tube #34 (Empty) in 10-8
for the purpose of checking Exp 7 Run 3

F.T. #34 (Empty) in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 5

Table Pos. ____ L ____ T ____ P ____

Control Rod		Channel	
1	2.612	A 85	100/100
2	2.545	B .002	
~~A~~ 37.4	0.025	C 4.3	5×10^{-11}
B	13.594	D 69	1000/50
		E 1.4	900V

Tim Crit. 12:51 ~~AM~~ PM Duration ~~2:15~~ 6 min min.

106.7
37.4
69.3

Tube 39 removed from 11-3, 25 from 4-7.
Tube 34 (Empty) out of 10-8, Inconel (~~cast~~ Slug filled) placed in 10-8.

Inconel + Slugs.

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 6

Table Pos. I T R

Control Rod		Channel	
1	2.610	A 90	100/100
2	2.545	B .0022	
A	0.025	C 4.4	5×10^{-10}
B	18.460	D 72	1000/50
		E 1.4	900V

Tim Crit. 1:21 ~~AM~~ PM Duration 5 min.

Inconel (Cast slug filled) tube removed from 10-8. Cast slugs removed from inconel tube and placed in Stainless-steel tube 34, and 34 placed into 10-8.

Stainless steel + Slugs.

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 7

Table Pos. I T R

Control Rod		Channel	
1	2.608	A 85	100/100
2	2.545	B .0021	
A	0.025	C 4.3	5×10^{-11}
B	12.050	D 68	1000/50
		E 1.3	900V

Tim Crit. 1:48 ~~AM~~ PM Duration min.

Pot. temp 1.3857 at 1:42 P.M.

180

Removed St. Steel tube 34 (Slug filled) from 10-8, and inserted empty Inconel tube into 10-8. Returned tube 39 to 11-3, and tube 25 to 4-7.

Inconel* (Empty) in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 8

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 84	100/100
2	2.543	B .0021	
A	0.025	C 4.2	5×10^{-11}
B	9.320	D 67	1000/50
		E 1.5	900V

Tim Crit. 2122 ~~AM~~ PM Duration 6 min.

R4 106.7 / 13.7 / 93.0

R12 107.2 / 13.7 / 93.5

A 13.7 B

Removed empty inconel tube from 10-8, inserted 1.240 Fe rod. Not Critical B, 0.00019. ~~Removed~~

Removed 1.240 Fe rod, inserted a iron rod (1/2 in. dia.)

½" Fe Rod in 10-8
CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 9

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	~~80~~ 85 100/100
2	2.545	B	.0021
3	0.025	C	4.1 5×10^{-11}
4	16.185	D	68 1000/50
		E	1.5 900V

Tim Crit. 3:16 ~~AM~~ PM Duration 12 min.

½ iron tube removed from 10-8, and 1 in. OD X
2S aluminum tube inserted into 10-8.

1 in O.D. Aluminum tube in 10-8.
CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 10

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	49 100/200
2	2.545	B	.0027
3	0.025	C	4.6 5×10^{-11}
4	23.155	D	78 1000/50
		E	1.6 900V

Tim Crit. 3:42 ~~AM~~ PM Duration 14 min.

182 2S aluminum tube removed from 10-8 — (O.D. 1 in) (.035 wall thickness) nickel? tube is — into 10-8.

.035 Wall Nickel 1" Tube

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 11

Table Pos. ____ L ____ T ____ P ____

Control Rod		Channel	
1	2.610	A 88	100/100
2	2.545	B .0022	
A 53.3¢	0.025	C 4.3	5×10^{-11}
B	15.800	D 68	1000/50
		E 1.5	900V

Tim Crit. 4:16 ~~AM~~ PM Duration 6 min.

107° 53.3 / 9° / 53°

Pat temp. 1.3877 at 4:23 P.M.

Removed 1" Nickel tubing from 10-8

Empty hole in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 12

Table Pos. ____ L ____ T ____ P ____

Control Rod		Channel	
1	2.610	A 90	100/100
2	2.544	B .0025	
A 107.2¢	0.025	C 4.6	5×10^{-11}
B	23.522	D 90	1000/50
		E 1.4	900 V

Tim Crit. 8:10 ~~AM~~ PM Duration 16

Temp @ 8:05 P 1.389 mv

New Zero

Placed 1" #1 tube of SiO_2 (Density 1.96) in 10-8 (Tagged end up)

SiO_2 in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 13

Table Pos. ____ L ____ T ____ R ____

Control		Channel	
1	2.610	A 85	100/100
2	2.545	B 0.0022	
A	0.024	C 4.2	5×10^{-4}
B (106.1)	23.350	D 69	100/50
		E 1.4	900V

Tim Crit. 8:38 AM/PM Duration 8 min.

105.2 − 106.1 = −0.94

Remove SiO_2 from 10-8

Placed 1" #1 tube of NaF (Density 1.08) in 10-8 (Tagged end up)

NaF in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 14

Table Pos. ____ L ____ T ____ R ____

Control		Channel	
1	2.610	A 85	100/100
2	2.544	B .0022	
A	0.025	C 4.2	5×10^{-4}
B (100.7)	22.368	D 69	100/50
		E 1.4	900V

Tim Crit. 9:04 AM/PM Duration 7 min.

105.2 − 100.7 = 4.50

184

Removed NaF from 10-8

Placed 1" Al tube of KF (Density 1.43) in 10-8 (Taped and cup)

KF in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 15

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 87	100/100
2	2.545	B 0.0022	
A 77.6¢	0.025	C 4.2	5×10^{-4}
B	18.955	D 69	1000/50
		E 1.4	900 V

Tim Crit. 9:32 AM PM Duration 13 min.

105.2 − 77.6 = 27.6¢

Removed KF again 10-8

Placed Empty 1" Al Tubing in 10-8 (w/ #5 Rubber Stoppers)

Empty 1" Al Tubing

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 16

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 90	100/100
2	2.545	B .0025	
A 105.2¢	0.025	C 4.2	5×10^{-11}
B	23.170	D 70	1000/50
		E 1.5	900 V

Tim Crit. 10:02 AM PM Duration 12 min.

Temp. @ 10:00 AM = 1.389 mv

Zero with tube

10-15-52
Ellis
Scott

INSTRUMENT CHECK

Time 9 05 AM ~~PM~~ Source PB267

	Channel A	B	C	D	E
Range	10 / 1000	1	10^{-6}	10 / 1000	900V
Source Dist.	15"	OK	4"	5'	2 1/2"
% F.S. Trip	37	1	30	18	100+

Count 145

C.A. 9 Expr. 7 Run 17

Sheet _____ Date 10/15 1952 Time 9:10 AM ~~PM~~

Purpose Continuation of danger coefficients. (Empty aluminum tube still in 10-8)

Empty Al tube

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 17

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2,610	A	90 100/100
2	2.545	B	.0021
A	0.025 10.54	C	4.4 5×10^{-11}
B	23.200	D	71 1000/50
		E	1.4 900V

Crit. 9:30 AM ~~PM~~ Duration 13 min.

186

Loaded 1 in dia. Aluminum Tube (filled with 1273 grams Mn.) into 10-8.
(Removed 1 in dia Empty aluminum tube from 10-8)

~~Added tube 56 to 5-9~~ — Not Critical —
B, 0.0002

Added tube 56 to 5-9.
— not critical, B, .00031 —

Tube 47 placed in 7-4

Mn in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 18

Table Pos. ____ L ____ T ____ R ____

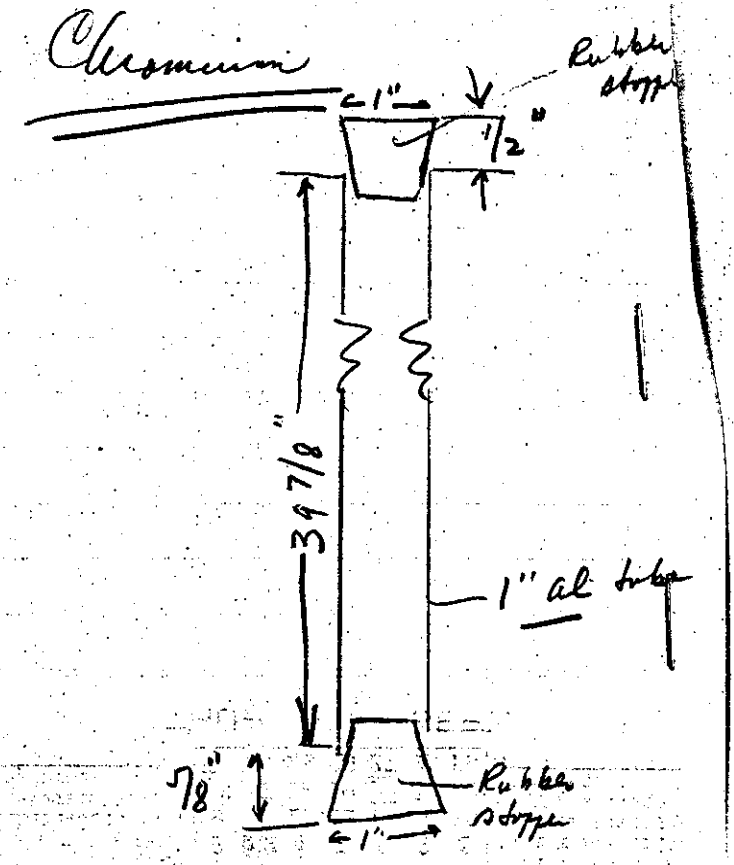
Control Rod		Channel	
1	2.610	A 92	100/100
2	2.545	B .0023	
A	0.025	C 4.5	5×10^{-4}
B	6.970 5.034	D 72	1000/150
		E 1.5	900V

Tim Crit. 10:39 ~~PM~~ AM Duration 9 min. ~~10'4"~~ min.

105.5 / 5.0 / 100.5 R17

51.8 / 56.5 / TD8 3 / 100.5 / 208.8

Removed Mn filled al tube from 10-8.
Placed cromium filled al. tube
in 10-8. Cr - 1801.6 gm net.


Aluminium
1"
Rubber stopper
1/2"
39 7/8"
1" al tube
7/8"
Rubber stopper
1"

Net — 1801.6 gm

(-8)

105.5 - ℓ
107.2
= 1.7

108.3
- 1.7
106.6 ℓ

CRITICAL POSITIONS

CA 9 Expr. 7 Run 19

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.610	A 89	100/100
2	2.545	B .0022	
A	0.025	C 4.3	5×10^{-11}
B	23.550 107.2 ℓ	D 70	1000/50
		E 1.5	900V

Tim Crit. 11:09 AM ~~PM~~ Duration 6 min.

Removed Cronnium filled tube and inserted Cobalt filled Al. tube in 10-8. 1969.0 grams net.

CRITICAL POSITIONS

CA 9 Expr. 7 Run 20

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	NOT CRITICAL	A	
	Source dr	B	0.0002.
		C	
		D	
		E	

Tim Crit. _____ AM PM Duration _____ min.

188

10/15/57 Removed Co filled al tube from 10-8
Inserted Std A-Ni rod - 1" diameter - in 10-8

Temp 11:58 A
1.386 mv

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 21

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.610	A	92 x 100/100
2	2.545	B	0.0023
A	0.025	C	4.4 x 5 x 10⁻¹¹
B	8.290 9.4¢	D	72 x 1000/50
		E	1.5 @ 900v

Tim Crit. 11:50 A. AM PM Duration 10 min.

107.2
9.4¢
97.8
108.3
206.1¢

56+47 =

69.9
9.4¢
60.5¢

A-Ni Rod still in 10-8

~~Placed Tube * 26 in 4-5~~

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 22

Table Pos. _____ L _____ T _____ R _____

Temp @ 12:30 PM
1.3855 mv.

Control Rod		Channel	
1	2.610	A	90. 100/100
2	2.536	B	0.0022
A	0.024	C	4.3 5 x 10⁻¹¹
B	17.940 69.9¢	D	70.0 1000/50
		E	1.5 @ 900 V.

Tim Crit. 12:17 ~~A~~PM Duration 14 min.

Put 1.240" dia. Zr rod in 10-8
Removed A-Ni grain 10-8

107.2
79.3
27.9
108.3 56+47
60.5
196.7¢

CRITICAL POSITIONS

CA. 9 Expr. 7 Run 23

Table Pos. _____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 92	100/100
2	2.546	B .0025	
#	0.025	C 4.4	5×10^{-11}
¢	19.170 79.3¢	D 70	1000/50
		E 1.5	900V

Tim Crit. 12:59 ~~AM~~ PM Duration 10 min.

Temp at 1:17 P.M.
1.3852

107.2 Rod
108.3 56+47
60.5 26
39.3 28
327.3¢

Removed the ~~fuller~~ Rod (1.240" dia.) from 10-8
Placed Cobalt filled tube in 10-8. 1969.0 grams net.

— not Critical — $\beta_1 = .00037$

Tube no 28 into 5-10 39.3¢
— not Critical — $\beta_1 = .001$ (source in)

Source removed and negative period observed indicated the reactor subcritical by ~ 12¢ +.9¢ -.7¢
Since the total value of the Cobalt tube is given as ±3 this measurement should suffice.

Removed Co filled tube from 10-8
Plus 1" Al rod in 10-8

109.2
69.9
39.3 = value of R22

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 24

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 86	100/100
2	2.545	B .0024	
A	0.024	C 4.5	5×10^{-11}
B	23.930 109.24	D 68	1000/50
		E 1.5	900V

Tim Crit. 3:04 ~~AM~~ PM Duration 10 min.

Temp. at 3:12 P.M.
1.3883

Removed tube 26 from 4-5
Removed tube 28 from 5-10

109.2
9.4
99.8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 25

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 89	100/100
2	2.545	B .0025	
A	0.020	C 4.3	5×10^{-11}
B	8.290 9.44	D 70	1000/60
		E 1.5	900V

Tim Crit. 3:31 ~~AM~~ PM Duration 3 min.

Removed 1 in. (A) Nickel ~~tube~~ rod from 10-8.

I inserted Cobalt filled Al. tube in 10-8.
(5/8 in dia Tube) 3/32 wall thickness. &
Slugs .395 dia   Loading 719.1 grams Cobalt.

107.2
25.1
82.1
108.3 56.47
190.4
− 1.5
188.94

Temp. at
1.3890

Co @ island

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 26

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	93 100/100
2	2.545	B	.0025
A	0.025	C	4.4 5X10^-11
B	11.580 25.1¢	D	72 1000/50
		E	1.6 900V

Tim Crit. 4:57 ~~AM~~ PM Duration 10 min.

Removed 5/8 in Cobalt filled tube from 10-8, and inserted Cominum filled tube into 10-8. (See Run 19)
Removed fuel tube #47 from 7-4

Run 19 107.2
Run 27 − 50.7
56.5¢

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 27

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	88 x 100 /100
2	2.545	B	0.0022
A	0.025	C	43 x 5 x 10^-3
B	15.460 50.7	D	70 x 1000 /50
		E	1.5 @ 900 v

Tim Crit. 4:27 AM/PM Duration 10 min.

Remove Cn filled Al tube from 10-8

Placed ½" Iron Rod in 10-8

Purpose: To evaluate End tube ° 56 in 5-9 (See Run 9)

½" ~~Iron~~ Fe in 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 28

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	90 10^4/100
2	2.545	B	.0022
~~A~~	0.025	C	4.5 5 x 10^-11
B	23.750 108.24	D	70 1000/50
		E	1.5 900 v

Tim Crit. 8:10 ~~AM~~ PM Duration 11 min.

Temp. @
8:06 PM
1.390 mv

108.2 ✓
56.4 / 51.4

Removed Fuel tube # 39 from 11-3

Purpose: To evaluate F.T. # 39

½" Fe rod in 10-8

CRITICAL POSITIONS

C A. 9 Expr. 7 Run 29

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 90	100/100
2	2.545	B .0022	
#	0.025	C 4.4	5×10^{-11}
B	16.930 61.9 F	D 70	1000/50
		E 1.5	900 V

Tim Crit. 8:45 ~~AM~~ PM Duration 8 min.

106.2
61.8
46.4 ¢

(Run 9)

To in 1.001" O.D. Al tube with 25 #1 tube insert. Insert was 39" long with 0.D. of 0.545" (40" long)

Total Wt of To = 1193.1 gm

Replaced #39 (Fuel Tube) in 11-3

Placed To (1193.1 gm) in 1" Al tube in 10-8

Removed ½" Fe rod from 10-8

~~Initial Estab~~ Cr in Al with island

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 30

Table Pos. _____ L T R

Control Rod		Channel	
1	2.610	A 93	100/100
2	2.546	B 0.0022	
A	0.025	C 5.3	5×10^{-4}
B	18.960 77.7	D 74	1000/50
		E 1.6	900V

Tim Crit. 9:20 ~~AM~~ PM Duration 9 min.

46.4 / 51.8 / 98.2 / -21.9 / 76.30

55.8 (B53) / 77.7 / -21.9

Removed Cr_2 tube (@ island) from 10-8

Inserted ½" O.D. Fe Pipe into 10-8

Removed FT #39 from 11-3

79.8 / (B27) 61.9 / 17.0

50.8 Value of Fe Rod / 17.0 / 33.80

½" Fe Pipe

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 31

Table Pos. _____ L T R

Control Rod		Channel	
1	2.610	A 83	100/100
2	2.545	B 0.0021	
A	0.025	C 4.9	5×10^{-11}
B	19.110 78.8 C	D 68	1000/50
		E 1.5	900V

Tim Crit. 9:46 ~~AM~~ PM Duration 10 min.

Removed ½" Fe pipe from 10-8
Placed 1" Al (with island) tube full of Mn
in 10-8 770gm
Replaced FT #39 in 11-3

Temp @
10:13 PM
1.390 mv

Mn in Al tube with island

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 32

Table Pos. ______ L ______ T ______ R ______

Control Rod		Channel	
1	2.610	A 90	100/150
2	2.545	B .0022	
A	0.025	C 5.0	5x10⁻¹¹
B	5.570 0.24	D 70	1000/50
		E 1.5	900 V

Tim Crit. 10:25 PM Duration 16 min.

55.8 253
0.2
55.6

51.8 156
46.4 154
98.2
55.6
153.8

196

10/16/52

INSTRUMENT CHECK

Time (AM) PM Source 267

Channel	A	B	C	D	E
Range	10/1000	OK	10	10/100	900V
Source Dist.	15" 24"		OK	4½'	2½"
% F.S. Trip	40%			20	100

#1 + 2 OK.

F Tube 56 out of 5-9

F tube 39 out of 11-3

Mn filled tube removed from row 10-8, Al tube (Empty but on island) placed in 10-8

C.A. 9 Expr. 7 Run 33

Sheet ___ Date ___ 195 ___ Time ___ AM PM

Purpose Continuation of danger coefficient

Zero Al tube with island

Al. tube with st.

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 33

Table Pos. L T R

Control Rod		Channel	
1	2.609	A 33	100/200
2	2.545	B 0.0019	
A	0.022	C 3.5	5×10^{-11}
B	16.155 ~~50.84~~ 55.84	D 50	100/500
		E 1.1	900V

Tim Crit. 10:19 AM ~~PM~~ Duration 12 min.

Temp 10:38 AM.
1.3860

empty

Removed empty al. Tube from 10-8
Place no. 68 S.S. tube in 10-8
Remove Tube 25 from 4-7.

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 34

Table Pos. L T

Control Rod		Channel	
1	2.609	A 38	100/200
2	2.544	B .0021	
A	0.020	C 4.0	5×10^{-11}
B	23.335 106.1	D 59	100/500
		E 1.2	900V

Tim Crit. 11:07 AM ~~PM~~ Duration 13 min.

temp at 11:17 AM.
1.3860

198

Removed #66 from 5-4
Removed #59 from 4-6

106.1
6.8
99.3¢

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 35

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.608	A 40	100/200
2	2.545	B 0.002	
A	0.019	C 8.0	2.5×10^{-11}
B	7.535 6.8¢	D 60	100/500
		E 1.3	900 V

Tim Crit. 11 44 AM ~~PM~~ Duration 13 min.

Removed FT #68 (55) from 10-8
Inserted Al. FT #80 into 10-8

68.2
6.8
61.4¢

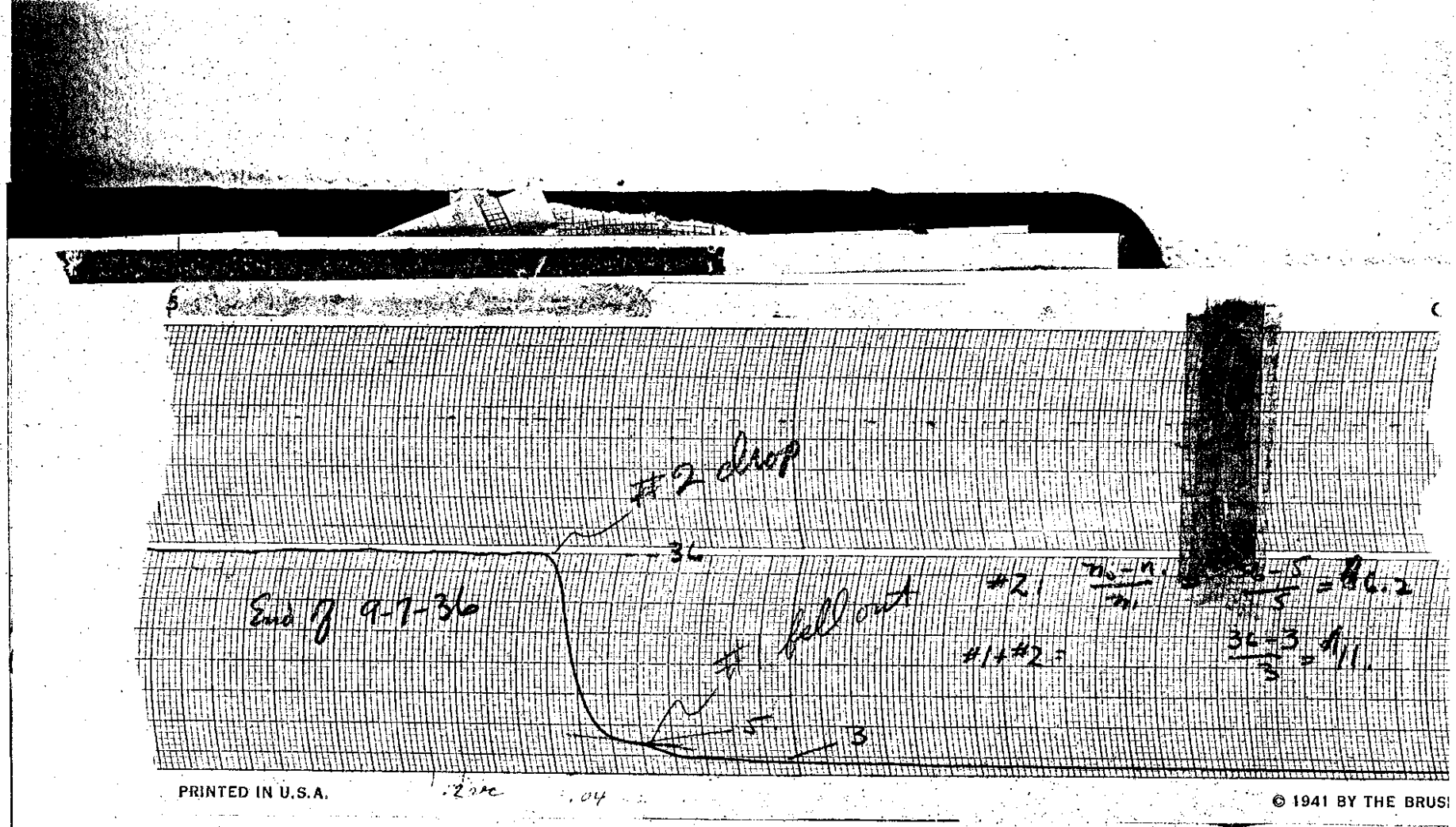
CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 36

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.609	A 40	100/200
2	2.545	B .0015	
3	0.020	C ~~8.2~~ 8.2	2.5×10^{-11}
4	17.730 68.2¢	D 62	100/500
		E 1.4	900 V

Tim Crit. 12:13 ~~AM~~ PM Duration ____ min.



PRINTED IN U.S.A.

On Run 36 the level was raised to 0.01 and S. Rod #2 was dropped. The vibration knocked Safety Rod #1 loose from its magnet. The estimated value of Rod #2 is $6.2 and of Rod 1 & 2 combined is $11.

Temp @ 3:45 P
1.3885 mv.

Removed Al. FT #80 from 10-8, replaced FT #68 into 10-8

6"x9" (2⅜ x 2⅞ 55 Blocks) S. Steel was placed on top of the fuel tubes (See Chart for location)

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 37

Table Pos. _____ L T R

12.7
6.8 R 3.5
5.9 C S. Stl

Control Rod		Channel	
1	2.610	A	89 100/100
2	2.540	B	0.002
A	0.021	C	out
B ~~9.0000~~	9.123 (12.7)	D	71 1000/50
		E	1.6 900 V

Tim Crit. 3 58 ~~AM~~ PM Duration 19 min.

Chamber B moved close to the reactor (on step ladder ~4 ft from mid plane edge.)
Stainless Steel removed from top of reactor and replaced with Na (6" x 9") (See Chart).

Temp @ 4:52 PM
1.3852

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 38

Table Pos. ____ L ____ T ____ P ____

Control Rod		Channel	
1	2.610	A	86 100/100
2	2.540	*S	0.0034
A	0.020	C	out
B	8.365 9.7	D	70 1000/50
		E	1.5 900V

Tim Crit. 4:50 PM Duration 22 min.

9.7
6.8 x 3.5
2.9 & Na

Na	Can #	Can Wt.	Na wt (Net)
	00126	33.156 gm	121.568 gm
	00137	32.484	121.357
	00131	33.530	119.964
	00128	32.876	120.667
	00127	32.984	120.502
	00136	32.864	121.737

INSTRUMENT CHECK

Time 9:00 AM ~~PM~~ Source PB 267

	Channel A	B	C	D	E
Range	10/1000			10/1000	900
Source Dist.	16"	OK	out	4½'	2½
% F.S. Trip	30			22	100+

Counters 1 & 2 OK

Removed F.T. #68 from 10-8. Probably 10-9 DL
Inserted Al tube @ in 10-4
Inserted F.T. 66 in 5-4, Inserted F.T. #59 in 4-6, Inserted F.T #25 in 4-7.

Purpose: To check apparent high Value of Run 33.

Temp. 9:45 A
1.3802

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 39

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.615"	A 90	100/100
2	2.545"	B .005	
R.	0.025"	C out	
B.	16.325" 5).2	D 72	1000/50
		E 1.4	900 V

Tim Crit. 9:45 AM ~~PM~~ Duration 19 min.

Removed Al tube @ from 10-4 ← Probably 10-8

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 40

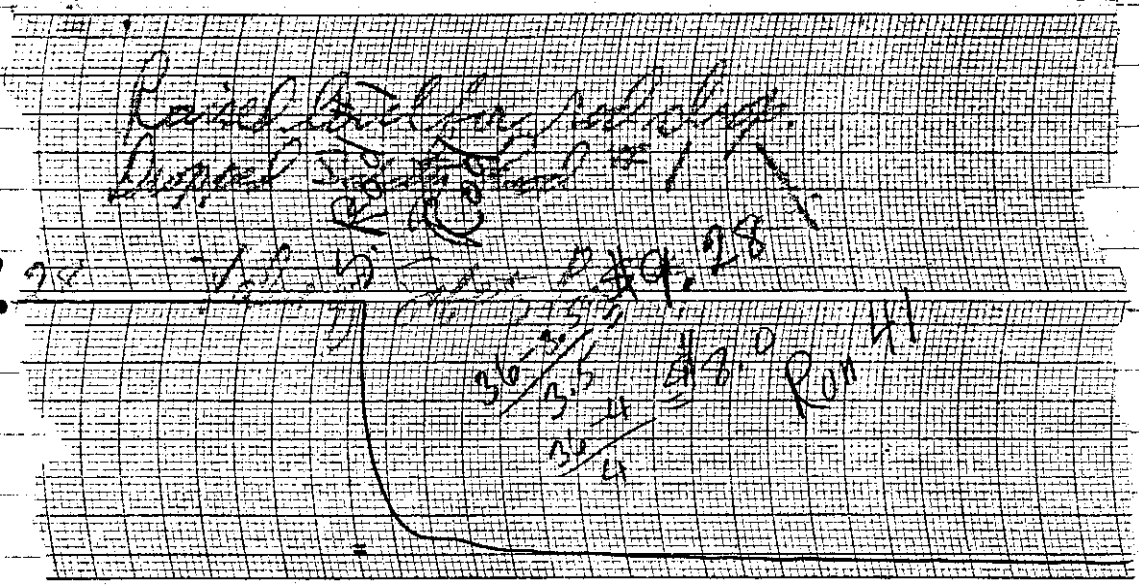
Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.610	A 86	100/100
2	2.540	B .0049	
A	0.025	C out	
B	16.870 61.4	D 69	1000/50
		E 1.4	900 V.

Tim Crit. 10:13 AM ~~PM~~ Duration 25 min.

61.4
57.2
4.2 ✓

CHART No. 4-25



#9.

1 & 2

.600 .106
.106 .050
.494 .056

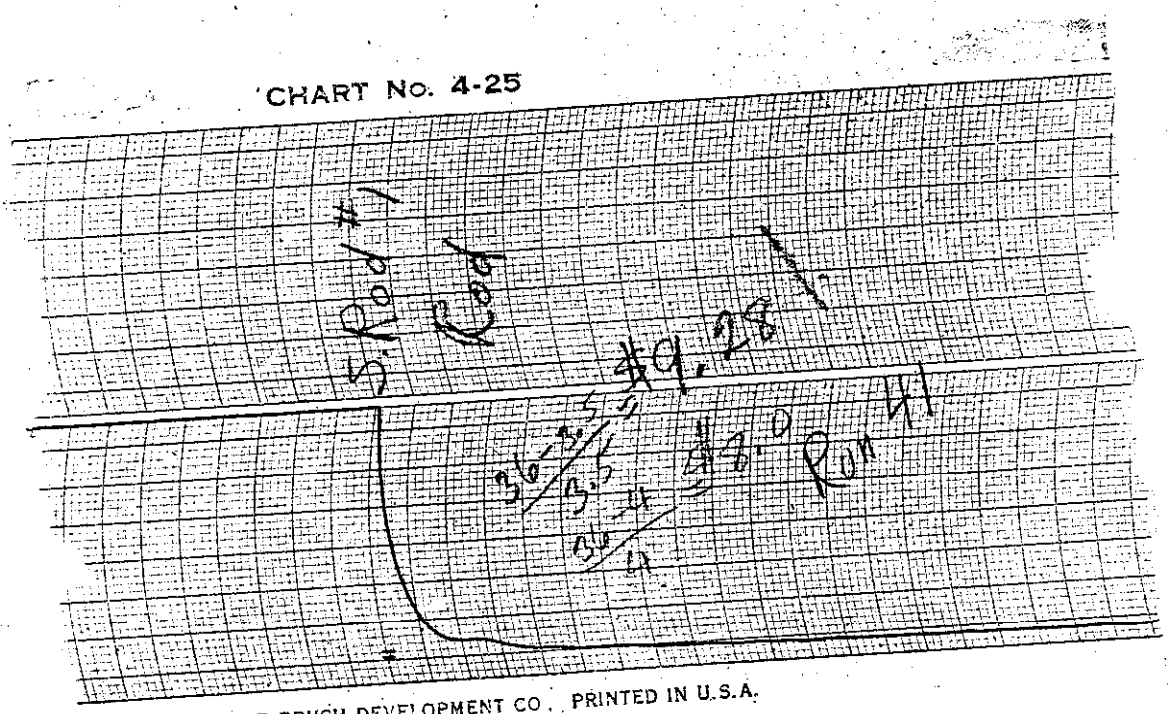
.494 = $9.85
.056

5 Rod 2

.600 .145
.145 50
.455 .095

$4.8

CHART No. 4-25



Removed Al tube @ from 10-4 (Probably 10-8)

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 40

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	86 100/100
2	2.540	B	.0049
~~A~~	0.025	C	out
~~B~~	16.870 61.4	D	69 1000/SD
		E	1.4 900 V.

Tim Crit. 10:13 AM ~~PM~~ Duration 25 min.

61.4
57.2
4.29

Raised level for rod drop.
Dropped ~~Safety~~ Rod #1

#9.28 Value of Safety Rod #1

CRITICAL POSITIONS

CA 9 Expr. 7 Run 41

Table Pos. _____ L _____ T _____ R _____

Control Rod		Channel	
1	2.615	A 55	1000/200
2	2.538	B .05	
A	0.024	C 8.2	10-10
B (61.0)	16.821	D 82	1000/500
		E 4.0	750 V.

Tim Crit. _____ AM PM Duration _____ min.

Removed all reflector coolant tubes (including the inconel) except the following: 6-12, 10-12, 6-2, 7-2, 7-3, 8-1, 9-2, 9-3, 10-2, & 10-3. Removed F.T. # 25 from 4-7.

9.14
61.0
30.4
47.8
78.2

Rod #25

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 42

Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 93	100/100
2	2.545	B .005	
A	0.025	C out	
B	20.850 91.4	D 74	1000/50
		E 1.5	900 V.

Tim Crit. 12:45 AM PM Duration 14 min.

Raised level for rod drop.

CRITICAL POSITIONS

C.A. 9 Expr. 7 Run 43

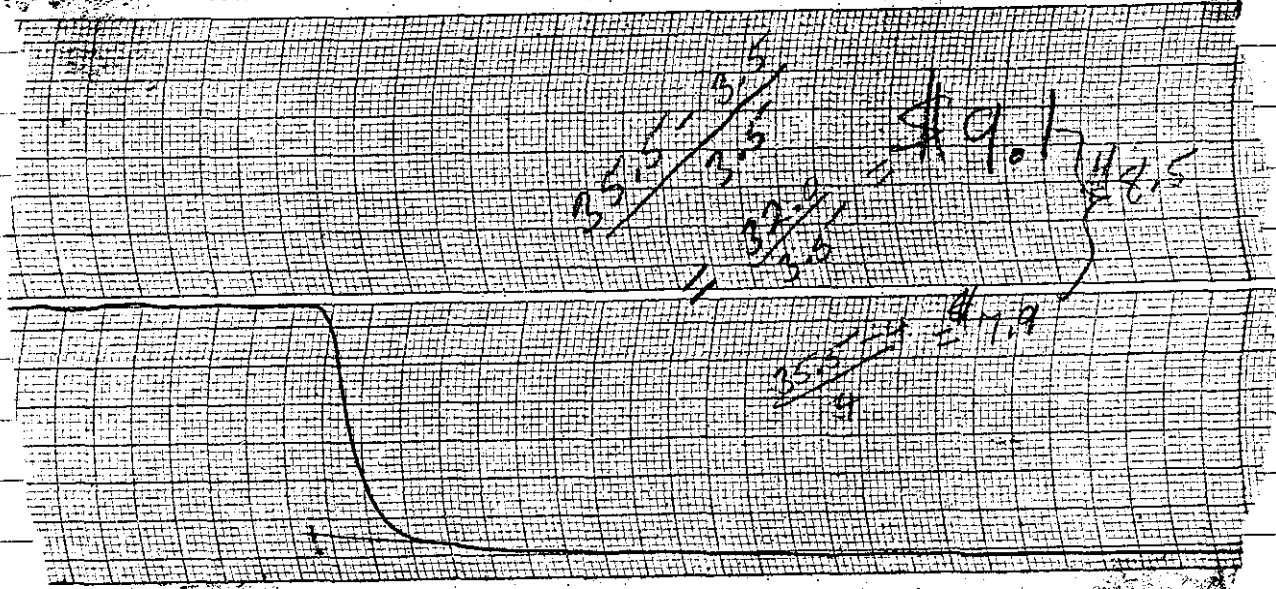
Table Pos. ____ L ____ T ____ R ____

Control Rod		Channel	
1	2.610	A 92	1000/100
2	2.545	B .05	
A	0.025	C out	
B	91.7 20.810	D 69	1000/500
		E 3.2	750 V.

Tim Crit. 1:06 AM PM Duration ____ min.

Rod drop of Safety Rod #2

CHART No. 4-25



Removed Column of BeO in 10-8
Not Critical B .00031.

Added: F.T. # 56 - X in 5-9. 51.8
F.T. # 39 in 11-3. 46.4
F.T. # 25 in 4-7. 48.7
Value of Control Rd 77
223.9

91.2
14.2
77.0

CRITICAL POSITIONS

C.A. 9 Expr. 8 Run 1

Table Pos. L T R

Control Rod		Channel	
1	2.608	A	97 100/100
2	2.545	B	.0052
A	0.025	C	out
B	9.470 14.2%	D	75 1000/50
		E	1.5 900 V

Tim Crit. 2:47 ~~AM~~ PM Duration 8 min.

4'7"
14.2
15.0

Placed F.T. # 68 in 5-10 + F.T. #27 in 6-11.

CRITICAL POSITIONS

C.A. 9 Expr. 8 Run 2

Table Pos. L T R

Control Rod		Channel	
1	2.608	A	88 100/100
2	2.545	B	.005
A.	0.025	C	out
B	21,890 97.7	D	70 1000/50
		E	1.5 900 V.

Tim Crit. 3:11 ~~AM~~ PM Duration ~~8~~ 13 min.

Inserted the two (2) larger inconel thimble tubes into 10-8

INSTRUMENT CHECK

Time 8 35 AM PM Source PB267

	Channel A	B	C	D	E
Range	1%/100	OFF	10	1%/100	900 V
Source Dist.	15"		out	5'	3"
% F.S. Trip	35	6		18	100

Counter 1 & 2 OK

C.A 9 Expr 8 Run 3

Sheet Date 25 Time AM PM

Purpose Calibration of A.R.E. safety-rod.

not critical B_1 = .0005, (Source in)

Tube 47 placed into 7-4 56.5
" 26 " into 4-5 60.5
54.9
171.9

97.7
42.8
54.9

208

10/18/52

CRITICAL POSITIONS

9 Expr. 8 Run 3

Tests For: L T R

Control Rod		Channel	
1 2.610	A	88	100/100
2 2.545	B	.006	
A 0.025	C	aut	
B 14.380 42.8#	D	70	1000/50
	E	1.4	900

Tim Crit. 9:21 AM ~~PM~~ Duration 6 min.

Removed Fuel Tube 47 from 7-4 52.5 60.5 112.0

" " " 26 " 4-5

Added " " 28 to 5-3

" " " 60 " 4-8

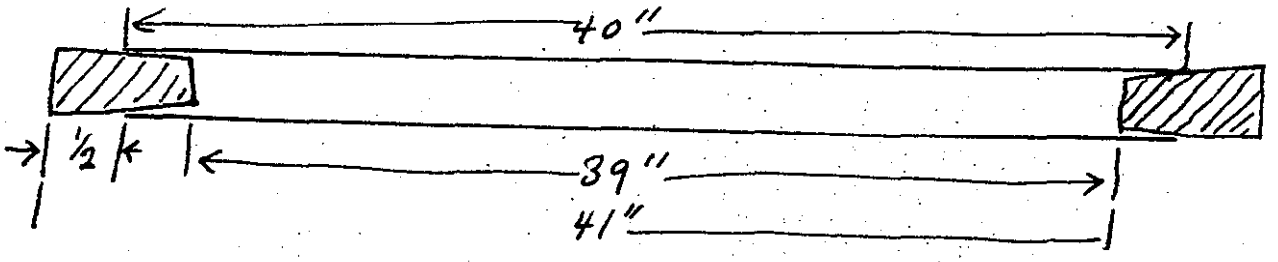
" " " 18 " 4-4

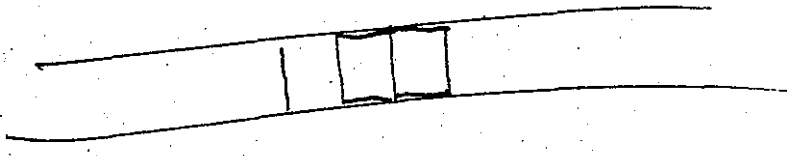
Δ Rods 75.5 / 42.8 / 32.7

117.0 / 32.7 / 149.7

Aluminum tube (SiO_2 filled)

No. 5 rubber stopper in each end





#56	51.8	91.4
#39	46.4	14.2
#25	48.7 ¢	77.2
	146.9	
Rds	77.2	
	224.1 ¢	value of Be O column in 10-8

#47	56.5	97.7
#26	60.5	42.8
Rds.	54.9	54.9
	171.9 ¢	value of 2 outer inconel tubes

75.5	
44.6	
30.9 ¢	value of third inconel tube

94.1 ¢ value of #68 in 10-8

44.2 ~~left~~ ARE

209
10/12/52

CRITICAL POSITIONS

C.A. 9 Expr. 8 Run 4

Table Pos. L T R

Control Rod		Channel	
2.610		A 87	100/100
2.545		B .0062	
A 0.025		C 0+	
B 18.690	75.5	D 70	1000/50
		E 1.4	500V

Tim Crit. 9:50 AM PM Duration 10 min.

Installed central (third) inconel guide tube for ARE safety rd

75.5
44.6
30.9

CRITICAL POSITIONS

C.A. 9 Expr. 8 Run 5

Table Pos. L T R

Control Rod		Channel	
1 2.610		A 93+100/100	
2 2.535		B ~~0.006~~ 0.007	
A 0.024		C —	
B 14.614	44.6	D 73 x 1000/~~50~~	
		E 1.5 @ 900V	

Tim Crit. 10:35 AM PM Duration 5 min.

Installed ARE Safety on rod drop rig – ie pulley & wire to 107 –
See D chart for details of ARE Safety Rod Sensitivity

Safety ARE Rod at 32.25 above 0. 0 = the end of rod is 3 in above al plate.

1.383 mr. Temp at 3:14 P.M.

CRITICAL POSITIONS

C.A. 9 Expr. B Run 6

Table Pos. ____ I ____ T ____ R ____

Control Rod		Channel	
1	2.610	A	10 x 1000/200
2	2.53'	B	0.05
A	0.022	C	—
B	14.810	D	75 x 1000/500
		E	42 @ 750V

Tim Crit. 2:01 ~~AM~~ PM Duration 28 min.

Unsatisfactory Trace on Brush Recorder.
ARE safety rod drop repeated.

CRITICAL POSITIONS

C.A. 9 Expr. 8 Run 7

Table Pos. L T R

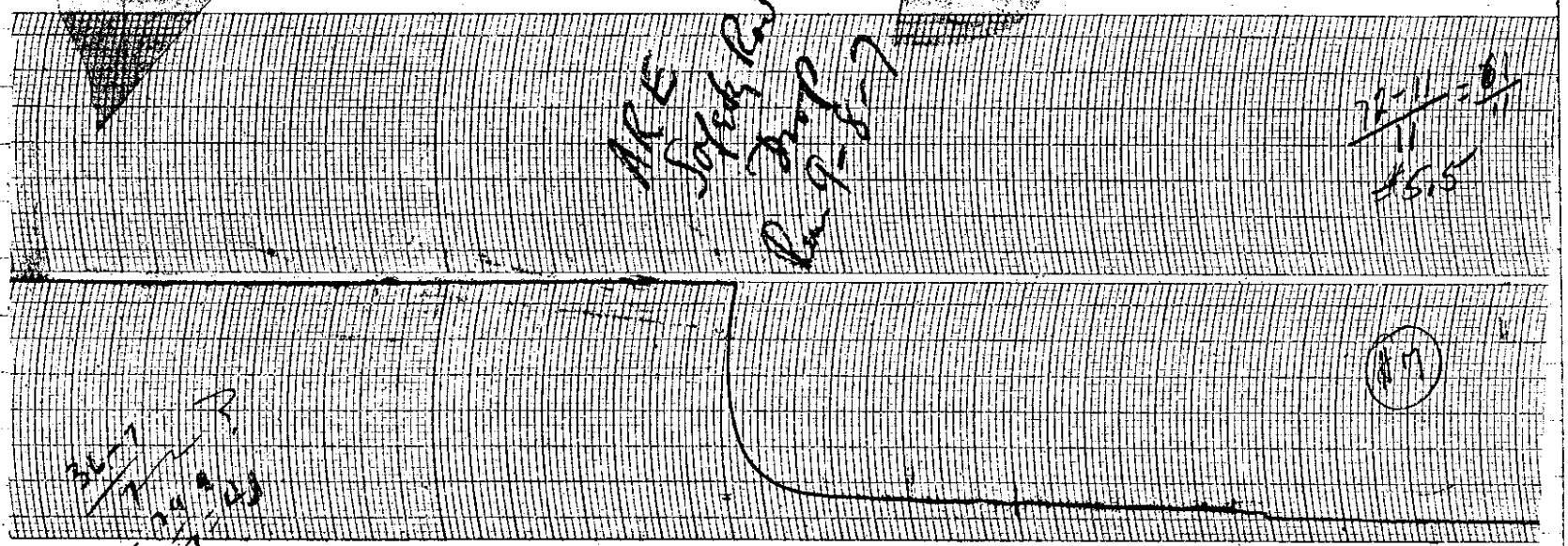
Control Rod		Channel	
1	2.610	A 46	1000/200
2	2.535	B .05	
3	0.022	C out	
4	14.804	D 70	1000/500
		E 3.9	750V

Tim Crit. 3:09 ~~AM~~ PM Duration 10 min.

ARE Safety Rod at 32.25 on scale in Run 107—

Dropped Rod See over.

CHART No. 4-25



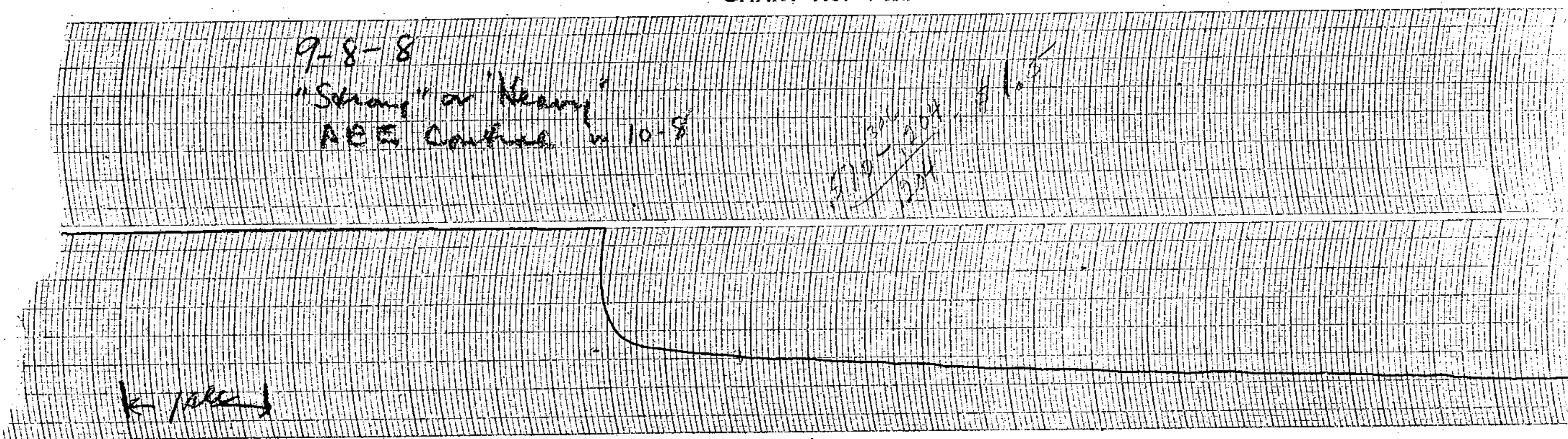
10/19/55

Removed "light" Rod A-2-5-1 from B- installed "Heavy" A-2-5-2 -

Set up "light" Rod A-2-5-1 for Rod Drop in 10-8

The reflecting properties of A-2-5-1 was assumed to be the same as A-2-5-2 and therefore was withdrawn 32 1/4" before rod drop

CHART No. 4-25



(1) 113

CHART No. 4-25

$\frac{34-12}{13} = \frac{22}{13} = 1.69$

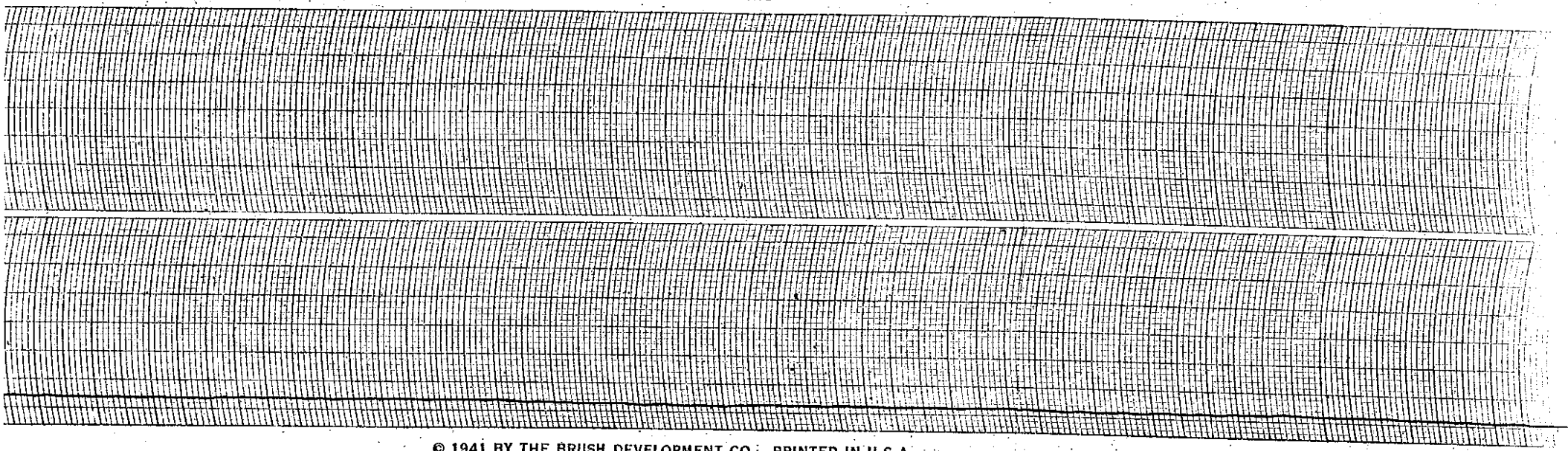
.67

$\frac{36-14}{14} = \frac{22}{14} = 1.57$

≈ 1.6

E 8/2

CHART No. 4-25



F 3/3

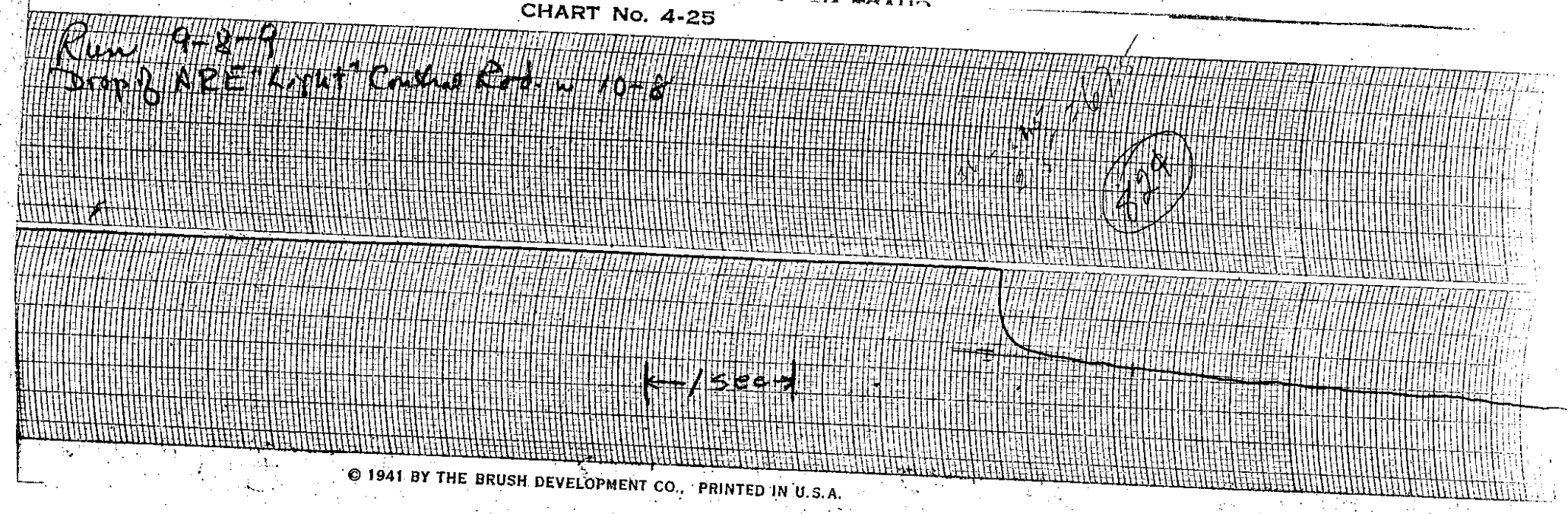
CHART No. 4-25

$\frac{36-28}{10} = \frac{16}{20} = 80\%$

Run 9-2-R
Drop 2 NE 4

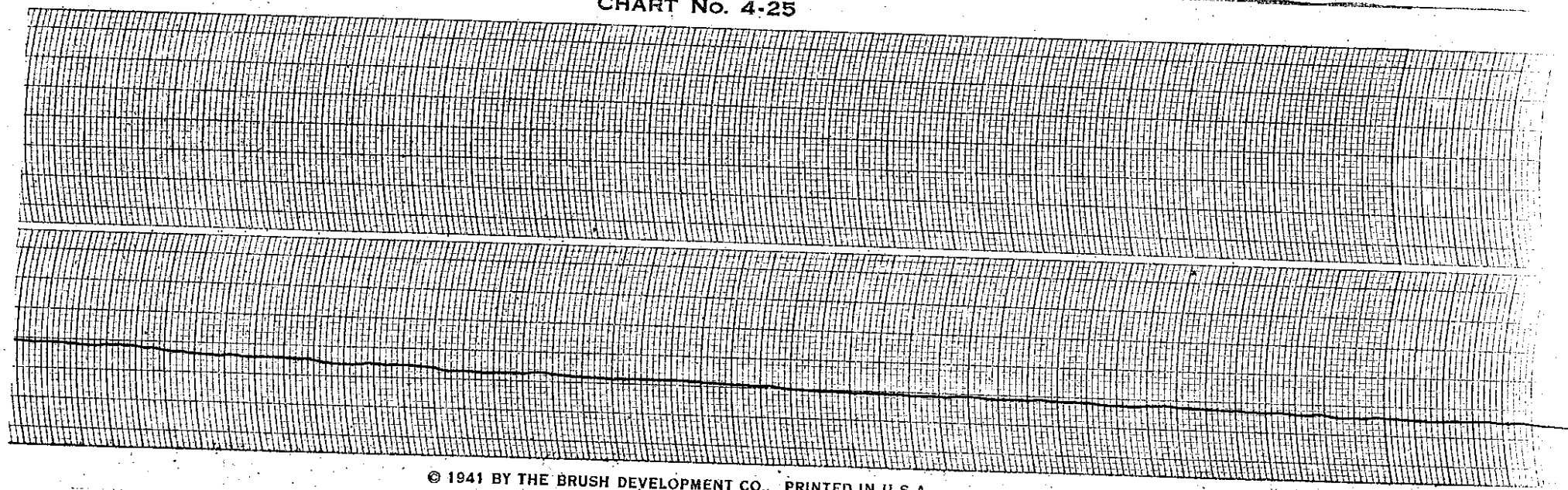
CHART No. 4-25

Run 9-2-9
Drop 26 ABE "Light" Crushed Rock ~ 10-6



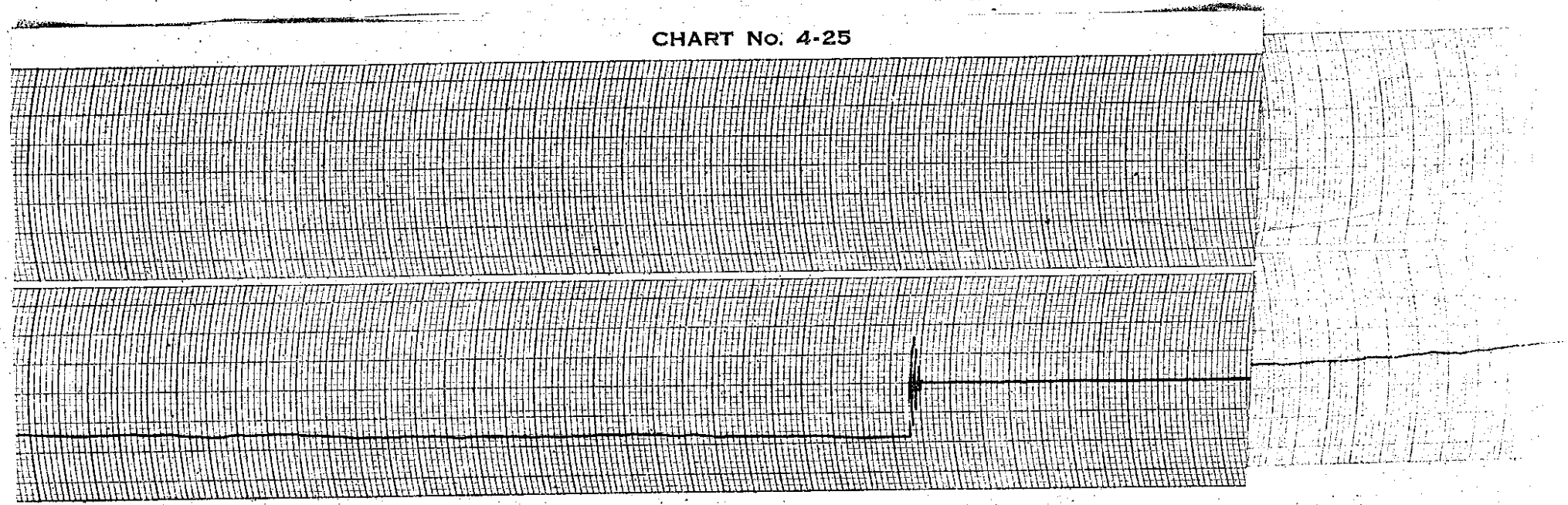
(2) 2-14

CHART No. 4-25



(2) 314

CHART No. 4-25



15

10/19/52

CRITICAL POSITIONS

CA 9 Expr. 8 Run 9

Table Pos. L T R

Control Rod		Channel	
1	2.615	A 46	1000/200
2	2.535	B .083	
~~1~~	0.021	C out (10^-10 Amp)	
~~2~~	12.180	D 70	1000/500
		E 3.5	750V

Tim Crit. 1:13 AM ~~PM~~ Duration 15 min.

Overholser –

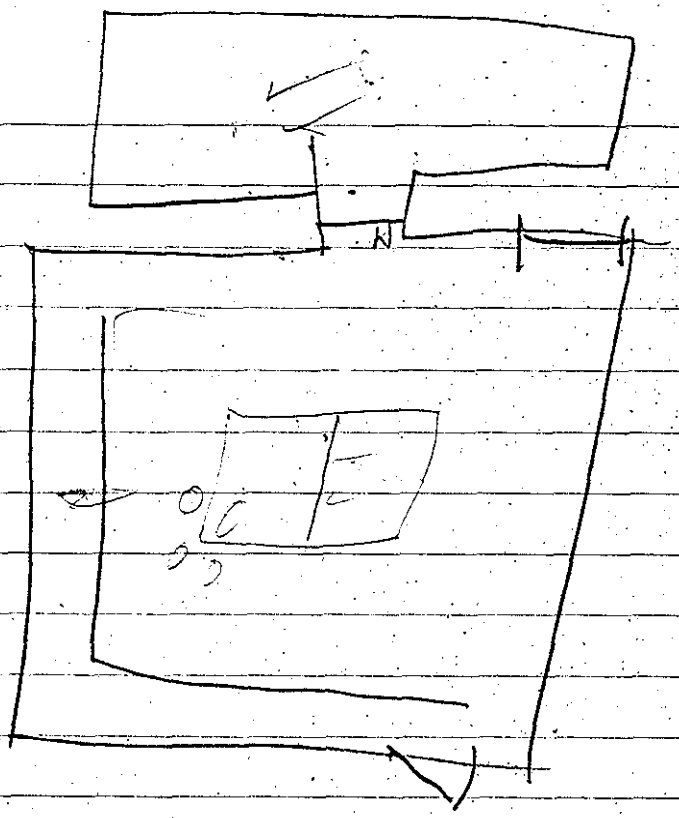
Slug 1 1/16" dia –

what 0.235 density ?

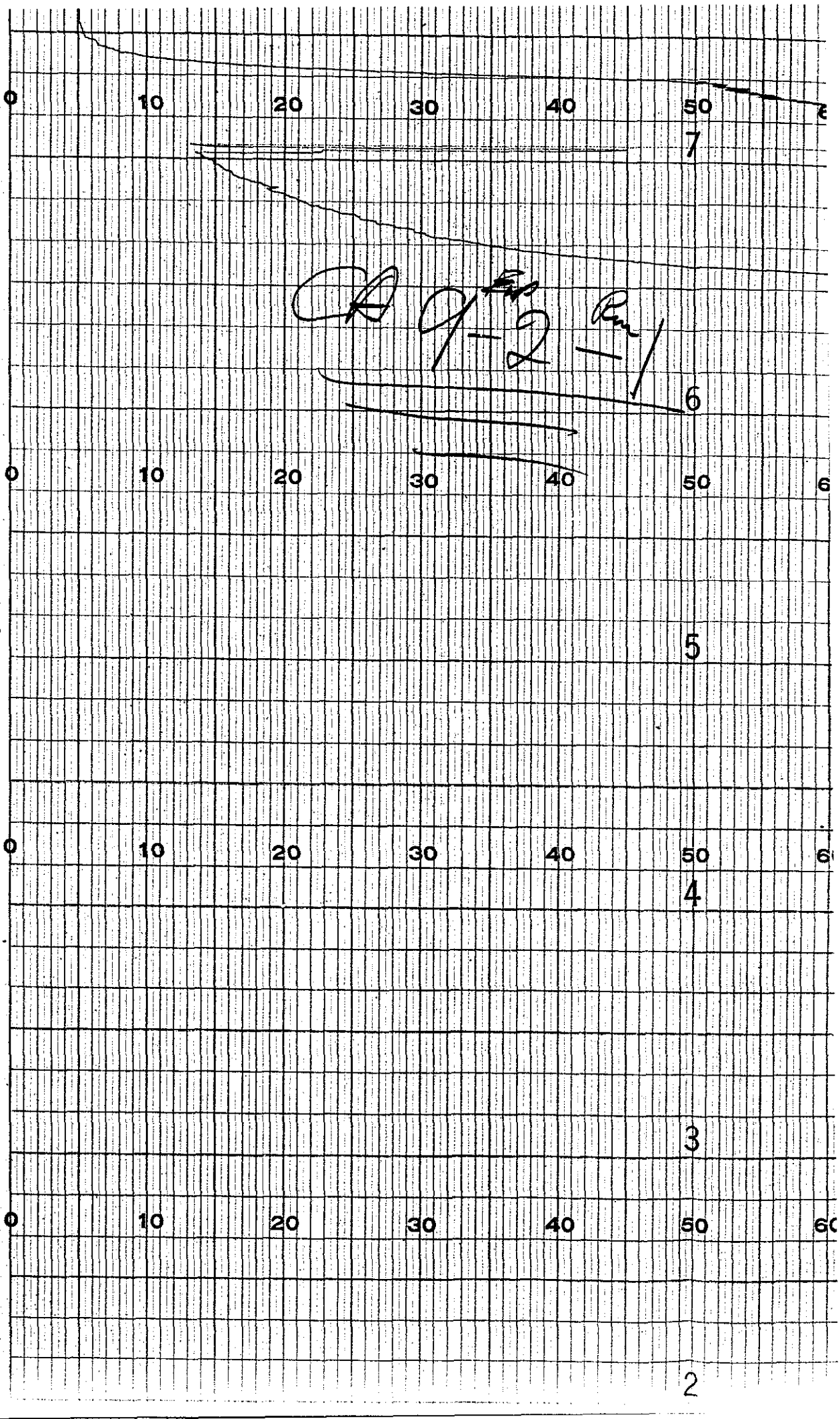
2" long –

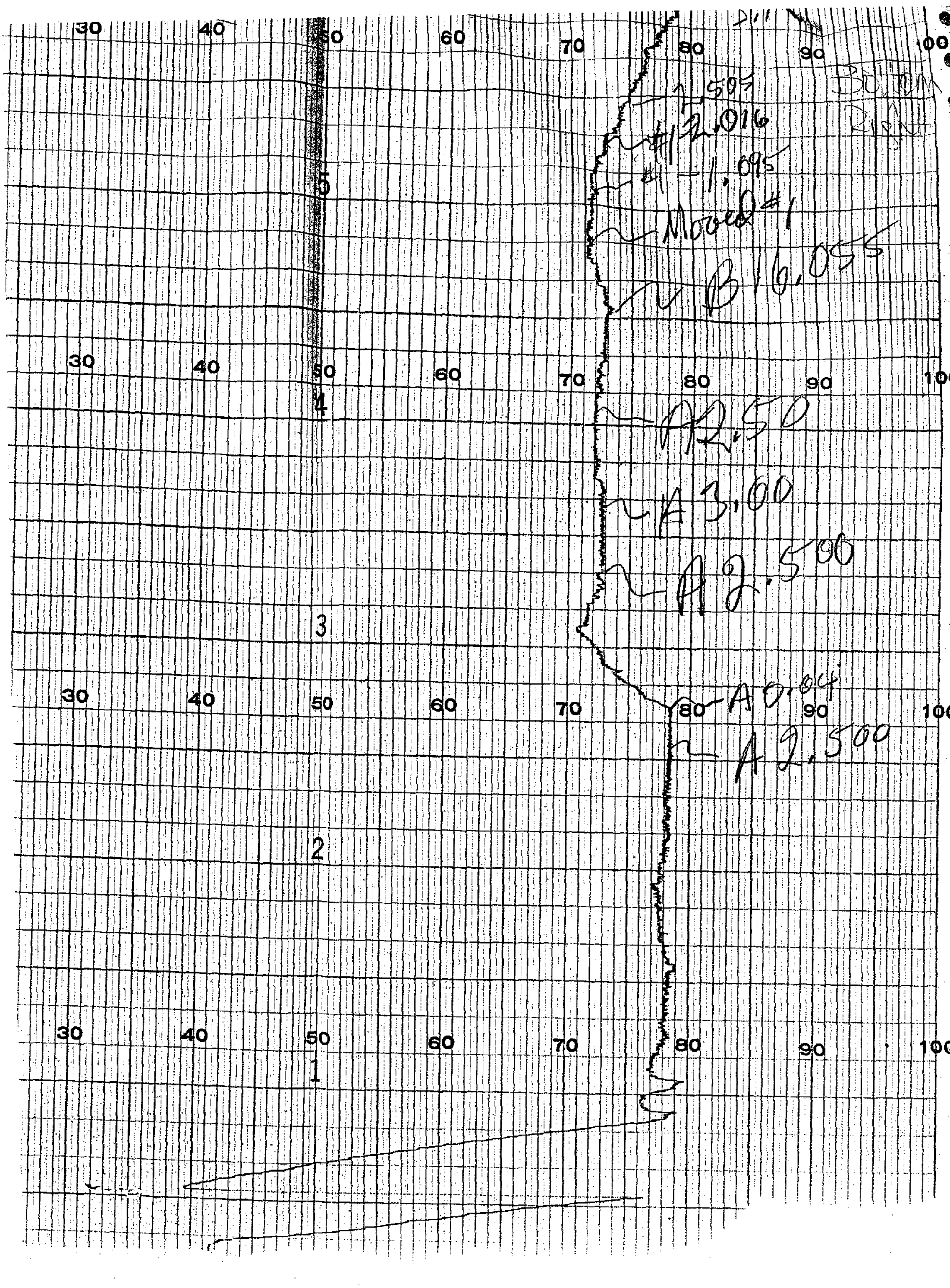
14.5 lb/ft³ √5/4 ?
17

25
0.1632 gm/cc


N
E
C

Top Left





58 tubes ~~+ empty~~

in	out
53	~~empty~~
~~42~~	~~25~~ ✓
~~2~~	~~[illegible]~~
~~24~~	44
~~[illegible]~~	~~54~~
~~[illegible]~~	~~39~~
~~[illegible]~~	45
41	42
~~26~~	~~[illegible]~~
~~28~~	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	~~[illegible]~~
	56 ✓
	39 ✓
	~~[illegible]~~ ✓
	~~[illegible]~~ ✓
	~~[illegible]~~ ✓
	~~[illegible]~~
	68 ✓
53 in	25 ✓

58

53 ~~[illegible]~~ 56
39
68
25

55 tubes Red 91.2¢ ~~cobalt~~ – 78.2¢

10 – 8 empty

55 tubes
+ 56 Be Out 14.2¢
+ 39
+ 25

58 tubes
68
27
~~[illegible]~~
~~26~~
28
60
18

63 tubes 44.6¢

Classification Changed to Decl By
Authority of E. J. Murphy Date 5/27/60