

BOOK 124R

Notes:

spine "CA-1"

front "CA-1"

Blank pages: page opposite page 1, 4, 6, 10, 87-100, page opposite 100

pages 3, 5, 7, 9, 11, & 13 each have a page taped to it

page 85 has 4 graphs taped to it

Scanned by:

Sheila Finch

RSICC /Oak Ridge National Lab.

June 1, 2001

SOME INSTRUCTIONS FOR USE OF THIS NOTEBOOK

1. This notebook is assigned to personnel performing research and development work and must be used for all original calculations, notes and abstracts from reports.
2. Assignee is responsible for the safeguarding of this notebook in accordance with security regulations.
3. This notebook must be returned to issuing office when completed or upon termination of assignee.
4. Every page or entry should bear a date and the signature of the person who made the entry.
5. Entries should be made in ink whenever it is reasonable to do so.
6. Alteration or amplification of entries made on previous dates should be made as separate entries under their own dates and cross referenced to the previous entries.
7. Charts, drawings and graphs drawn on special paper should be glued or otherwise securely fastened in place and should individually bear a date and signature. Do not obscure any information.
8. The notebook should be periodically reviewed by one or more independent persons in the department and should be signed and dated by them. Likewise, they should make a statement that they have "read and understood the foregoing material." Witnessing stamps for this purpose are available in your department's office.
9. It is advisable to preface each new item, such as a heat treatment, process or reaction, etc., with a very brief description of the purpose, objective or approach.
10. Description of the invention or discovery should be complete enough to be understood by anyone skilled in the art.
11. Reference to name or catalogue number should be made when standard items are being discussed, i.e., Westinghouse pump.
12. In cases where work is conducted in cooperation with others, it is often necessary to meet with them from time to time and to discuss new developments. The occurrences of such conferences should always be entered in your notebook regardless of recording elsewhere, giving the date, who was present (if possible), and an outline of the subjects discussed. This often will establish error in occasional claims of other parties that you have appropriated information from them revealed during an interview, and thus provide you with patent protection.

~~SECRET~~

10-9-21

C-2

CARBIDE AND CARBON CHEMICALS DIVISION
UNION CARBIDE AND CARBON CORPORATION
OAK RIDGE, TENNESSEE



INV. 69



RESTRICTED DATA
This document contains restricted data as defined in the Atomic Energy Act of 1946.

NOTEBOOK NO. Y-NB-1321

Assigned to: Dw. A. D. Callahan
Department: 3405
Location: Bldg. 9735
Date: Feb. 8, 1951

LABORATORY RECORDS

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

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Be sure to record all personal conferences. **PLANT RECORDS DEPARTMENT**
Y 12 PLANT

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P. O. BOX P

Subject _____

OAK RIDGE, TENNESSEE
CLASSIFICATION CANCELLED
DATE 5-27-60
Edgar J. Murphy
CO-ORDINATING ORGANIZATION DIRECTOR
OAK RIDGE NATIONAL LABORATORY
AUTHORITY DELEGATED BY AEC 9-10-47

This document consists of 168 pages.
No. 1 of 1 copies, Series A

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a summary.
Index of Experiments (added Oct 31, 1954 E.L.Z.)

Approach to Critical. First Critical - p6 ^(class 1, or 15-slugs) 4x4 array + 6" ref 4 sides
Runs + then Page 9 - 5x5 array 3" refl. - 4 sides
Page 12 - changed to 10 1/2" sticks in one half of Assembly
p. 19 gave final, ^{clean} Assembly 7x7 cells - total length 23"
(note p 12-19 several reproducibility checks - no changes in assembly)

page 20²⁹ et seq. Exp 3 R-10²⁰ added combinations of reflector and absorber to check spurious reflectors.

Run 20 - added Scotch tape as reflector check

page 30 - E3 R 21 Irradiation of fuel discs - Cd. fractions.

Page 32 - E3-R 22 Rod Drgs. #5 ~ 3.44 (see p 85 for records)
Run 23²⁴ Remove Scotch tape - released cut joint.

P 36 - R 25 - Raised Assembly up 9 spaces to top
26, 27 Reproducibility checks - interchanged slugs.

P 39 - R-28-29 Danger coefficient of fuel ~ 0.105" c from fuel.

P 41 - R 30-31-32 Danger coefficient of Be.
also check I Beam on top of assembly

P 43 - R 33 - Returns to original position at center of rig.

Following experiments thru 500 p. 63 made various runs to compare power level to control rod settings. The γ -n effect was suspected, but not adequately isolated. Other experiments i.e. R-43, 44, pp 51-53. compared critical position to location of the source.

P 64 - R 52 - 1" Aluminum Reflector Added.

Various danger coefficient runs - shown per 59 p. 76

16 Run 59 - Power Distribution (Last NEPA Run)

p 79 - Trial run after 3 wks shutdown.

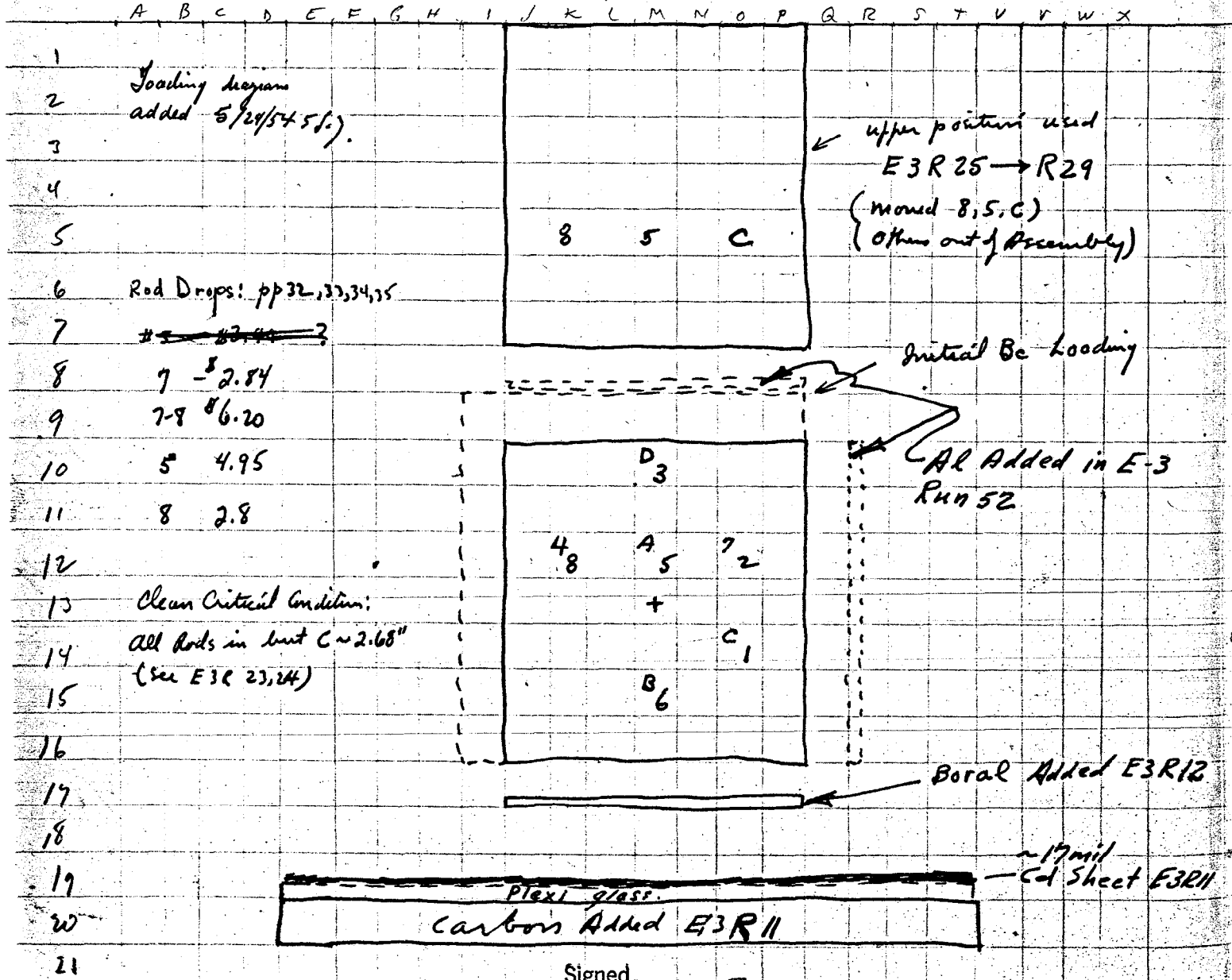
Runs 61 on - Power distribution - using fuel discs.

Signed

Note: Information on pages 3-13 inclusive transferred from NEPA Book "Critical Experiments Log Book, From 11/2/50 on 7/8/51 -

Beck

- OK
- Questions - 1) Type A & B sliders. page 12, p. 19. also p 5 Y-NB-1320
 2) Interface continuity
 3) Control & Safety rod positions. } from loading sheet.



Date Feb. 4 1951 Chief CALLIHAN
 Recorder HUNTER Crew PRESSEY

CA. 1 Expt. 1 Run 1-2
 Sheet 1 Date 2-4 1951 Time 1 PM
 Purpose Two Foot cube
Theory check.

OVERALL DIMENSIONS OF ASSEMBLY - 2'x2'x25"
 as in each of the following there is BG reflector -
 Repeat of $\frac{2}{3}$ Count with tables loaded with
 four slugs (each); C.R. in - purpose to check
 count under conditions as of $\frac{2}{3}$ shut down and,
 hence, the background. 2x2 ~~is~~ loaded plug array each
 containing 24 discs
 Date of $\frac{2}{3}$ -

MULTIPLICATION				
Scaler	c/ <u>5</u> min.	BG/ <u>5</u> min.	Mult. <u>1/M</u>	
<u>1</u>	<u>102</u>	<u>41.4</u>	<u>2.47</u>	<u>0.41</u>
<u>2</u>	<u>108</u>	<u>40.2</u>	<u>2.68</u>	<u>0.37</u>
<u>3</u>				

Scale of 16 -

$\frac{1}{3}$ 5/22/54 → This must have been
 L, M, L', M', 12 & 13. 2x2
 to work

1/4/51 75
D.C.

7/4

MULTIPLICATION			
Scaler	c/ <u>5</u> min.	BG/ <u>5</u> min.	Mult. 1/M
1	<u>103⁶</u>	<u> </u>	<u> </u>
2	<u>104⁴</u>	<u> </u>	<u> </u>
3	<u>15⁰</u>	<u> </u>	<u> </u>

Scale of 16

These counts agree with 73 data - emptying instrument back found still ok.

Added fuel to slugs 29, 35, 84 & 90 in positions N-14, N-13, N-12 & N-13 respectively.

Now have 2 x 3 array 24" long - 3 dimension horizontal.

MULTIPLICATION			
Scaler	c/ <u>5</u> min.	BG/ <u>5</u> min.	Mult. 1/M
1	<u>166⁸</u>	<u>41.4</u>	<u>4.04 .25</u>
2	<u>175⁷</u>	<u>40.2</u>	<u>4.36 .23</u>
3	<u>17³</u>	<u>19.6</u>	<u> </u>

Scale of 16

MULTIPLICATION			
Scaler	c/ <u>5</u> min.	BG/ <u>5</u> min.	Mult. 1/M
1	<u>171⁶</u>	<u>41.4</u>	<u>4.14 .24</u>
2	<u>170¹</u>	<u>40.2</u>	<u>4.23 .24</u>
3	<u>14¹⁰</u>	<u> </u>	<u> </u>

Signed

76

2/4/51

3:10P Loaded slugs. 41, 42, 43, 97, 98 & 99 in positions.
L-14, M-14, N-14, ^{M'}Z-14, M'-14 or ^{L'}N'-14 -
Now have 3x3 array -

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	356 ⁰	41.4	86	.12
2	356 ¹²	40.2	8.9	.11
3				

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	364 ²	41.4	8.8	.11
2	360 ⁸	40.2	9.0	.11
3				

4:35P Loaded slug: 122, 33, 40, 128, 93, 100 in position
K-12, K-13, K-14, K'-12, K'-13 & K'-14 respectively
Now have a 4x3 array -

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	876	41.4	21.3	.047
2	883	42.2	22	.046
3				

Scale of 16

This is probably Row 15
rather than 14

Row 14 is already loaded

See page 5b (ie small page 76)

5/22/54

2/4/51
DC3
Run #7

79

7:45P

Removed BE reflector from Rows I & I' } Stand in
Rows 9 & Columns I & I' } Rack 30-59 inc.

Insert fuel in K-11 (Slug 22)
and K'-11 (Slug 76).

Now have 4 x 4 ^{16 deep} array with 6" BE
reflector on two sides & 3" BE reflector
on two sides -

MULTIPLICATION		Scale 64	
Scaler	c/ <u>5</u> min. BG/ <u>5</u> min.	Mult.	1/M
1	<u>175.5</u>	<u>10.4</u>	<u>16.9</u> <u>0.06</u>
2	<u>174</u>	<u>10.1</u>	<u>17.2</u> <u>0.06</u>
3	<u> </u>	<u> </u>	<u> </u> <u> </u>

9:28P

Added 4 fuel slugs on each half.
4 wide & 5 deep -

Replaced K thru N-14 & K' thru N'-14 with fuel.
6" Be refl. on one side & 3" Be refl. on 3 sides

MULTIPLICATION			
Scaler	c/ <u>5</u> min. BG/ <u>5</u> min.	Mult.	1/M
1	<u>449</u>	<u>10.4</u> 450	<u>43</u> <u>.023</u>
2	<u>450</u>	<u>10.1</u>	<u>44</u> <u>.023</u>
3	<u>30</u>	<u> </u>	<u> </u> <u> </u>

Signed

80

2/4/51
10:55 pm

Changed 5 slugs in rows 0 & 0' to give a 5x5 fuel pattern with a 3" reflector all the way round.

CRITICAL POSITIONS

C.A. 1 Expr. 2 Run 1 ~~3A~~⁴
 Table Pos. .055" L T R

Control Rod

Channel

1 ~~0.01"~~ (.01" / In) A _____
 2 99.975" (In) B _____
 3 99.70" (In) C _____
 4 003.658" D _____
 E _____

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

CRITICAL POSITIONS

C.A. 1 Expr. 2 Run 2 ~~3B~~⁴
 Table Pos. .055" L T R

Control Rod

Channel

1 2.853 A _____
 2 99.975" (In) B _____
 3 99.70" (In) C _____
 4 .02" (In) D _____
 E _____

Tim Crit. 11:28 ~~AM~~ PM Duration _____ min.

81

Super critical 2.825
 Sub critical 2.88
 2/5/51

Date Feb. 5 1951 Chief Callihan
 Recorder Atake Crew Pressey, Bly, Mooneyham

C.A. 1 Expr. 2 Run 7
 Sheet 1 Date 2-5 1951 Time 4:15 PM
 Purpose _____

Scale 64

MULTIPLICATION
assumed

Scaler	c/ <u>2</u> min.	EG/ <u>2</u> min.	Mult.	1/M
1	<u>124+52</u>	<u>4.1</u>	<u>30.4</u>	<u>.033</u>
2	<u>123+62</u>	<u>4.0</u>	<u>31.0</u>	<u>.032</u>
3	<u>2+45</u>	_____	_____	_____

Removed reflector from col's P and P' and inserted
 fuel in J 11, 12, 13, 14, 15 and in
 J' 11, 12, 13, 14, 15
 replacing a 6x6 assembly with 3" refl.
 top and bottom.

82

Row 16 in both halves now load

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

.055 table position "Inboard Scale"

Row 10 in both halves now loaded
Table in .055

MULTIPLICATION			Scale of 64
Scaler	c/ 2 min. BG/ 2 min.	Mult.	1/M
1	163.3	4.1	39.8 .025
2	168.1	4.0	42.0 .024
3	_____	_____	_____

~~In movable half all type A ^{elements} were changed to type B elements in column P and P' rows 10. Three type B elements were added.~~

Signed

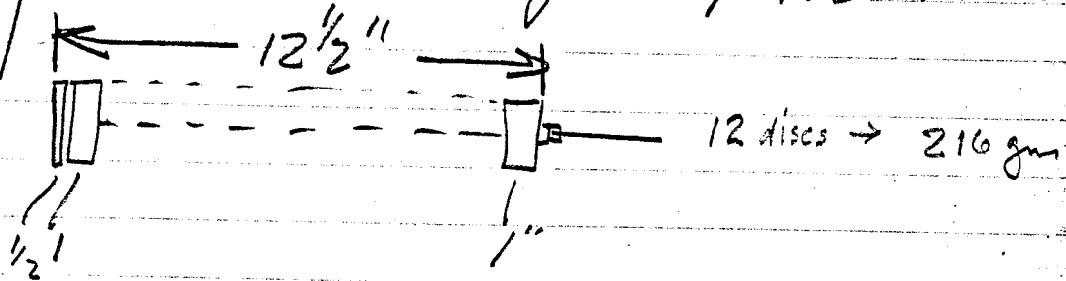
27/7/51

Type A elements in movable half replaced by type B elements -
 Also in column P ~~and~~ ^{or} P' , rows 10 through 16 Type B elements were added.

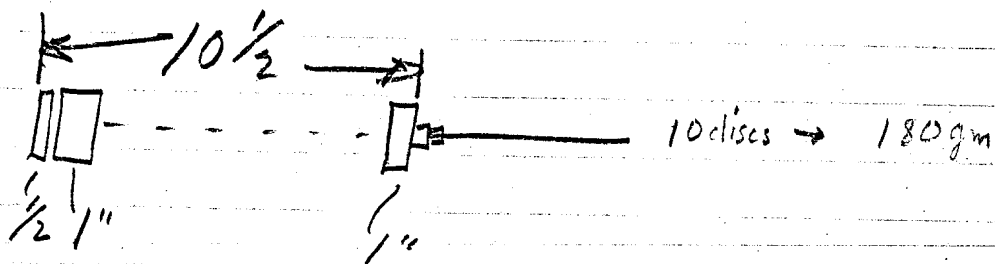
Some questions as to what is meant by type A & B.

Initial assembly was $24 \times 24 \times 25''$ 387 5/22/54

Probably those shown on p 5 Y-NB-1320.

A₁

B



Scram when control rod A switch
 was thrown. No instrument near scram
 level. Motor on GE recorder #2 in operation
 GE amplifier #2 not operating properly
 (check VR² in power supply.)

Quit operations 5:17 P.M.

Exp. No.	2-7-51	195	Chief	Callahan
Operator	Hunter		Crew	Perry
	Bly	Wemyer		Thibon

CA	1	Exp.	T ³	Run	X
Sheet	3	Date	2-7-51	Time	5:00 PM
Purp.	Thry check reactor				

14 Date

7/8/51

PRESTON
MONEYMAN
HUNTER
SCHWARTZ
HARRIS
CALLAHAN

Repeat of assembly test of 7/7 after
re-wiring low dep circuit + installing
new G.E. meters —

TRIP LEVELS: P.M. — 80 on scale
HYDC. 3.2 x full scale.

C.A.	1	Exp:	X ³	Run	1-4A
Sheet		Date	7/8/51	Time	7:15 AM PM
Purpose	Theory check — attempt to get low meter critical —				

CRITICAL POSITIONS	
C.A.	1
Exp:	X ³
Run	5A
Value	.05
Control Post	Channel
.085	9m
999.955	9m
0	9m
1.434"	
999.914 ~ "zero"	
Time	2:50
Duration	4 min.

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 31 Run ~~5B~~ 2

Table Pos. .05" L T R

Control Rod	Channel
1 <u>1.52</u>	A
2 <u>999.955 9m</u>	B
3 <u>0 9m</u>	C
4 <u>999.914 9m</u>	D
	E

Tim Crit. 3:00 ~~AM~~ PM Duration 2 min.

CRITICAL POSITIONS

C.A. 1 Expr. 31 Run ~~5C~~ 3

Table Pos. .05 L T R

Control Rod	Channel
1 <u>.07 9m</u>	A
2 <u>999.955 9m</u>	B
3 <u>1.625</u>	C
4 <u>999.914 9m</u>	D
	E

Tim Crit. 3:09 ~~AM~~ PM Duration min.

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 31 Run 6

Table Pos. .055 L T

Control Rod	Channel
1 <u>.0975"</u>	A
2 <u>999.948"</u>	D
3 <u>1.67"</u>	C
4 <u>0.020"</u>	D
	E

Tim Crit. 10:45 AM
PM Duration _____ min.

sk: - 1.665
: + 1.650

CRITICAL POSITIONS

C.A. 1 Expr. 31 Run 67

Table Pos. .055 L T

Control Rod	Channel
1 <u>.078"</u>	A
2 <u>999.945"</u>	D
3 <u>1.73"</u>	C
4 <u>.02"</u>	D
	E

Tim Crit. _____ AM
PM Duration _____ min.

TEMPORARY LOADING CHANGE

Slugs P10-16 Add _____ Pos _____
interchanged with Remove _____ Pos _____

Slugs N10-16 Add _____ Pos _____
Remove _____ Pos _____

Slug _____ Pos _____
Add _____ Pos _____
Remove _____ Pos _____

Signed

Date

Sub CRITICAL POSITIONS

C.A. 1 Expr. 31 Run 8/6

Table Pos. .058 L T R

Control Rod	Channel
1 <u>.08 1/4</u>	A
2 <u>999.95</u>	B
3 <u>999.995</u> <u>.02</u>	C
4 <u>.02</u>	D
	E

Tim Crit. AM Duration min.

Date 2/9 1951 Chief Callahan

Recorder Mannigham Crew Bly

Pruney Haake

C.A. 1 Expr. 31 Run 7-9-10

Sheet Date 2/9 1951 Time 2 AM
PM

Purpose Theory check assembly (improving geometry)
Solid block 21" x 21" x 23"
with no irregularities except controls

changes in assembly
 O Clements
 in P & N 10-16
 returned to
 pos. shown on loading sheet # III. Also all type "B" rods in
 fixed half with type "A" replaced

Replaced by
 (see loading sheet # II)
 1.8.3 9/26/54

CRITICAL POSITIONS

1 Expr. 31 Run 7A 9

Pos. .055 L T R

Control Rod	Channel
<u>.070</u>	A
<u>999.95</u>	B
<u>2.590</u>	C
<u>.025</u>	D
	E

Tim Crit. 2:13 AM
PM Duration min.

First
 Clean
 Assembly
 (28) 5/26/54

Signed

20

Date

7/9/51

CRITICAL POSITIONS

C.A. 1 Expr. K 3 Run ~~7B~~ 10

Table Pos. .055" L _____ T _____ R _____

	Control Rod	Channel
1	<u>3.325</u>	A
2	<u>-.050"</u>	T
3	<u>-.005"</u>	C
4	<u>.025"</u>	D
		E

Tim Crit. 2:30 ^{AM} PM _____ min.

7/12/51

Added C to Row 20 E F thru T and F' thru T'

added 2 3/4" Plexiglass with 17 mil Cd sheet, enclosed in 8 mil al sheet on top to Row 19 F thru T + F' thru T'

See Loading Sheet IV

Pursey
Hooke
Ply
Morse
Caelha

TEMPORARY LOADING CHANGE

See above.
Add _____ Pos _____

Slug _____ Pos _____ Remove _____ Pos _____

Add _____ Pos _____

Slug _____ Pos _____ Remove _____ Pos _____

Add _____ Pos _____

Slug _____ Pos _____ Remove _____ Pos _____

C.A. 1 Expr. K 3 Run 8 K 11

Sheet IV Date 7/12 1951 Time 2:30 ^{AM} PM

Purpose To investigate presence of reflected neutrons from floor & table -
See above for insertion of Cd, C + Plexiglass

Signed

2/12/51

CRITICAL POSITIONS

CA. 1 Expt. 43 Run 811

Table Pos. 0.057" L T R

Control Rod Channel

A 0.075" A

B 999.55" B

C 3.710" C

D 0.018" D

E E

Time Crit. AM Duration min.

3.63 mpa
374 amb

Conclusion: Cd + plexiglass + graphite adds to reactivity when placed 6" beneath the assembly.

2/13/51

Date Feb. 13 1951 Chief CALLIHAN

Recorder Crew PRESSEY

Mooneyhan Bly Hoake

Hunter

INSTRUMENT CHECK

Time 9:30 AM ~~PM~~ Source 2c

	Channel				
	A	B	C	D	E
Range	<u>X10</u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
Source Dist.	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
% F.S. Trip	<u>✓</u>	<u>✓</u>	<u>.85</u>	<u>✓</u>	<u>.8</u>

Boron placed in row 17, J → P ± J' → P'

CA. 1 Expt. 43 Run 912

IV 2-13 L T R

check effect of Boron-plexiglass neutron trap at assembly boundary

Signed

24 Date

Repeat of previous crit. pos. To check reproducibility.
Operator: M'ham Recorder: Bly

CRITICAL POSITIONS

C.A. 1 Expr. H 3 Run 6 15
~~100~~

Table Pos. .055"

Control Rod	Channel
A <u>.075"</u>	A
B <u>.060"</u>	B
C <u>2.755" 2.755"</u>	C
D <u>.035"</u>	D
	E

Tim Crit. _____ AM
PM Duration _____ min.

+ 2.737"
2.755"
- 2.760

Power level on
Reed 110 mw.

CRITICAL POSITIONS

C.A. 1 Expr. H 3 Run 7 16
~~100~~

Table Pos. .055"

Control Rod	Channel
1 <u>.075"</u>	A
2 <u>.060"</u>	B
3 <u>2.705"</u>	C
4 <u>.035"</u>	D
	E

Tim Crit. _____ AM
PM Duration _____ min.

2.685

Power level
on Reed 580 mw.

Signed

Date 16 Feb 1951 Chief Pruey
 Recorder Rhy Crew Hake

INSTRUMENT CHECK

Time 9:00 Source PB-174

Channel	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>10⁻¹⁰</u>	<u>10⁻¹⁰</u>	<u>10200</u>
Source Dist.			<u>18"</u>	<u>1'</u>	<u>1'</u>
% F.S. Trip			<u>.95</u>	<u>1.00+</u>	<u>.90</u>

(actual)

Loading change: Boral plates ^{now} placed adjacent to core in channels I-F', Q, Q' 10-16 and J-P 9 and J'-P' 9, parallel to nearest reactor face. All plates in row 16 are moved from bottom of channel to top of channel.

C.A. 1 Expt. 43 Run H 817
 Sheet V Date 16 Feb 1951 Time 9:15 ^{AM} ~~PM~~
 Purpose Determine effect of B jacket all around core.

No comment on Cd in Row 18
 Presumably still in place?
 TS7 5/22/54

Signed

CRITICAL POSITIONS

C.A. 1 Expt. H3 Run H 17

Table Pos. .055" L T R

Control Rod	Channel
A <u>.080"</u>	A _____
B <u>.060"</u>	B _____
C <u>5.262"</u>	C _____
D <u>.033"</u>	D _____
	E _____

Tim Crit. 9:40 ^{AM}/_{PM} Duration 15 min.

Concl: Effect of jacket is positive, possibly due to H in wrapping tape.

C.A. 1 Expt. H3 Run 12/8

Sheet V Date 16 Feb Time 10:20 ^{AM}/_{PM}

Purpose: Determine effect of boral layer 4X as thick

Loading Change: All Boral plates placed in J-P 17 and J'-P' 17, four plates per channel. No boral in other positions

CRITICAL POSITIONS

C.A. 1 Expt. H3 Run 12/8

Table Pos. .054" L T R

Control Rod	Channel
A <u>.079"</u>	A _____
B <u>.056"</u>	B _____
C <u>3.92"</u> (layer at -.01)	C _____
D <u>.027"</u>	D _____
	E _____

Tim Crit. 10:50 ^{AM}/_{PM} Duration 10 min.

Signed _____

Date

27

Loading change: all borax and cd removed.

C.A. 1 Expr. 13~~1~~ Run 13 19
 Sheet V Date 16 Oct 1951 Time 11 40 AM
 Purpose Recheck critical position
of system without B, cd, tel.
(See 1-1-7)

CRITICAL POSITIONS

C.A. 1 Expr. 13~~1~~ Run 13 19
 Table Pos. .055" L T R
 Control Rod Channel
 A .080" A _____
 B .049" B _____
 C 2.432" C _____
 D .029" D _____
 E _____
 Tim Grit. 12:01 ^{AM} PM Duration 10 min.

Signed

Date Feb. 19 1951 Chief Pressey
 Recorder HAARKE Crew Bly

INSTRUMENT CHECK

Time 2:05 ^{AM}/_{PM} 2 C

	Channel				
	A	B	C	D	E
Range	<u>1000mv. — HIGH HIGH 1040</u>				
Source Dist.	<u>5"</u>		<u>7"</u>		
% F.S. Trip	<u>✓ OK</u>	<u>1.1 OK</u>	<u>OK</u>	<u>.90</u>	

C.A. 1 Expr. 4B 3 Run 14 20
 Sheet V Date 2-19 1951 Time 2:05 ^{AM}/_{PM}
 Purpose Test effect of scotch tape
on one side of reactor - double
layer.

Double layer of scotch tape placed adjacent to row P & P' in ~~R & R'~~ Q and Q'

CRITICAL POSITIONS

C.A. 1 Expr. 4B Run 14 20
 Pos. .055"

Channel

A _____

B _____

C 2.595" (slightly super)

D _____

E _____

Tim Crit. _____ AM/PM Duration _____ min.

Signed

Check of control rod positioning:

Veeder-Rood (stopped by limit switch) Micrometer depth gage (arbitrary zero)

Rod A

0.078 .078 in.	.0092
.191	.1208
.294	.2223
.553	.4833
.725	.6532
.815	.7437
.921	.8503
1.008	.9368

Rod A (repeat) Withdrawing

.080 in (limit switch)	.0123 (arbitrary zero)
.153	.0822
.220	.1497
.350	.2890
.538	.4666
.656	.5866
.810	.7404
.966	.8950
1.043	.9711

Inserting

.961	.8926
.883	.8151
.796	.7285
.700	.6312
.580	.5116
.072	.0041

Note: Micrometer repositioned

Conclusion: When readings are plotted, it is apparent that the differences ^(in and out) are about .001 in. which is less than the accuracy of reading the Veeder-Rood.

Signed

30 Date 2-20-51

Date 2-20 1951 Chief Callahan
 Recorder Haske Crew Cressy
Coneybear, Bly, Hunter, Weinberg

INSTRUMENT CHECK

Time 2:15 ~~PM~~ ^{PM} Source PB 174

	A	B	C	D	E
Range			<u>10⁻⁹</u>		<u>1150v.</u>
Source Dist.					
% F.S. Trip	<u>✓</u>	<u>✓</u>	<u>9.5</u>	<u>✓</u>	<u>80</u>

C.A. 1 Expr. 4B³ Run 15 21
 Sheet V Date 2-20 1951 Time 2:15 ~~PM~~ ^{PM}
 Purpose Irradiation of discs at
hi power level (.01 on log
channel)

CRITICAL POSITIONS

C.A. 1 Expr. 4B³ Run 15 21
 Table Pos. .053" 1.205" P

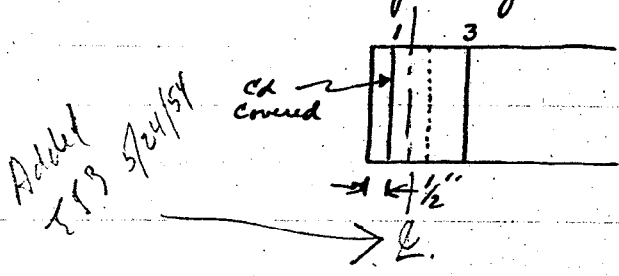
Control Rod	Channel
<u>.080"</u>	A
<u>.055"</u>	B
<u>.035"</u>	C
<u>.035"</u>	D
	E

Time Out 2:45 ~~PM~~ ^{PM} Duration _____ min.

"zero" on C
is 999.985

Signed

Fuel discs irradiated were in center of assembly, i.e. in positions 1 and 3 of slug 34, which is located in M-13. Disc in position 1 was covered with 20 mil layer of cadmium.



{ P 7 GM-2 }
{ P 7 GM-1 }

Calculation of Cadmium Fraction is given in p 6 GM-2. CF = .4627

Date 2/21 1951 Chief Prasay
 Recorder Mooneyham Crew Hake
 Bldg Hunter ^{Wist.} Williams Tool Weinberg Houten

INSTRUMENT CHECK

Time 10¹⁵ AM
 Source PB-174

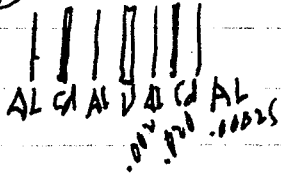
	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>2.10⁻¹⁰</u>	<u>5.10⁻¹⁰</u>	<u>1020v.</u>
Source Dist.			<u>1"</u>	<u>2"</u>	<u>4"</u>
% F.S. Trip			<u>100</u>	<u>100+</u>	<u>85</u>

C.A. 1 Expr. 4B³ Run 16 22
 Sheet V Date 2/21/1951 Time 1:05 ^{AM} PM
 Purpose Irradiation of Cd covered fuel disc.

note added 5/24/54 EF:3. This value is the only appropriate due to uncertainties in fuel disc background counts, standard counts and background counts. Also, no dead time correction is used. B.G. and D.T. should improve count of

Signed

Fuel disc #85 in position M-13-3 moved on both sides by $\sim .002$ " AL and $.020$ " CD. The CD has $.00025$ " AL to prevent contamination of the moderator. Exposure time to be 30 min.



CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>48</u> ³ Run <u>16 22</u>
Table Pos. <u>.051</u>	Micrometer reading <u>.6012</u>
Control Rod	Channel
A <u>.078</u> in.	A _____
B .050 <u>.050</u>	B _____
C <u>.234</u>	C _____
D <u>.022</u>	D _____
	E _____
Tim Crit. _____	AM PM Duration <u>30</u> min. at <u>.01</u> on log. n

1
 .204 Super
 .260 Sub
 .234 Very slightly sub

CONTROL ROD CALIBRATION	
C.A. <u>1</u>	Control Rod <u>5</u>
No <u>8</u>	Total: \$ <u>3.44</u>
Sheet <u>V</u>	N ₁ <u>1.8</u>

2/22/51 Examination of table closure, etc.

- ① Upon closing tables, "straight edge" at top of AL metering comes in contact when position indicator is at 0.15 "
- ② Table motion stopped (by limit switch plus contact of table tops) at position indicator equal to 0.05 ". Table faces are out of parallel by 0.10 " in 6'.
- ③ ~~At the tables "closed" it was in closed position~~ In closed position, both sides of tables are in contact (less than 0.001 " apart).
- ④ At 0.020 " separation, table tops are parallel (as indicated by measurements at both signed edges) to ± 0.001 ".

Date 2-23 1951 Chief Callahan
 Recorder Bly Crew Pressey
Wade

INSTRUMENT CHECK

Time 9:30 ^{AM}/_{PM} Source PB-174

Range	Channel				
	A	B	C	D	E
	OK	OK	HIGH 2.5-10 ⁻⁹	LOW 5.10 ⁻¹⁰	10200
Source Dist.			3"		4"
% F.S. Trip			80	100+	90

TEMPORARY LOADING CHANGE

Slug <u>34</u>	Pos <u>M-13</u>	Add <u>500</u>	Pos <u>3</u>
		Remove <u>85</u>	Pos <u>3</u>
	Pos _____	Add _____	Pos _____
		Remove _____	Pos _____
Slug <u>61.0-0'</u>	Pos _____	Add _____	Pos _____
		Remove <u>Scotch tape</u>	Pos _____

Note: This is a repeat run

C.A. 1 Expr. 1 3¢ Run 1712-23-24
 Sheet V Date 2-23 1951 Time 9:45 ^{AM}/_{PM}
 Purpose Recheck crit. pos. of Runs
(1-1-13) and 1-1-7

*probably 1-3-19
DE-14612*

Signed

34 Date 7/2/79

CRITICAL POSITIONS 23

C.A. 1 Expr. 134 Run 17A
.6029

Table Pos. .051

Control Rod	Channel
A <u>.081"</u>	A _____
B <u>.049"</u>	B _____
C <u>2.674</u>	C _____
D <u>.035"</u>	D _____
	E _____

Tim Crit. 10¹⁵ ~~AM~~ PM Duration 15 min.

CONTROL ROD CALIBRATION

C.A. 1 Sheet V Safety Control Rod 7

N₀ 7.80 N₁ 1.98 Total: \$ 2.84
~~2.92~~

CONTROL ROD CALIBRATION

C.A. 1 Sheet V 5 Control Rod 7-8

N₀ 3.2 N₁ 1.02 Total: \$ 6.3
6.2
5.73

CRITICAL POSITIONS 24

C.A. 1 Expr. 134 Run 17B+3
.6020"

Table Pos. .050"

Control Rod	Channel
A <u>.081"</u>	A _____
B <u>.046"</u>	B <u>0.1</u>
C <u>2.665"</u> <u>2.680"</u>	C _____
D <u>.035"</u>	D _____
	E _____

Tim Crit. 1:30 ~~AM~~ PM Duration 1 3/4 hr.
 Signed _____

See memo 8/85

Note: our best to date
 2.665+
 2.680
 2.68"

See Hassel for survey of levels in bldg.

Date

2/23

CONTROL ROD CALIBRATION

C.A. 1 Sheet V Control Rod 5

No 8.05 N₁ 1.35 Total: \$ 4.95

CONTROL ROD CALIBRATION

C.A. 1 Sheet V Control Rod 8

No 7.84 N₁ 2.04 Total: \$ 2.8

2/24 Power to lvs 107 & 108 off for about 1.14 hrs - Read Lead grounded + photomultiplier HV off before power back on. ~~With~~ power back on all instrument responded to manual, C.R., + safety rods + source mechanism OK except unable to get any neutron current, probably attributable to operator rather than to mechanism etc.
 Photomultiplier HV tripped & needed resetting. etc.

Date 26 Feb 1951 Chief Pressey

Recorder Bly Crew Callihan

INSTRUMENT CHECK

Time 2:55 PM Source PB-174

Channel

	A	B	C	DOX	E
Range	OK	OK	High	Low	10200
Source Dist.			2"	3"	
% F.S. Trip			9.5	90	

Signed

Loading & Changes:

- (1) All Shish-kabobs in same relative position as on Sheet V (except as noted in changes 2 & 3) and are raised 9 tubes higher in the honeycomb.
- (2) Shish 122 interchanged with 40 and 123 interchanged with 42 and 126 interchanged with 121.
- (3) Only safety rods 5 (M-5) and 8 (K-5) and control rod C (O-5) connected and ready for action.

CRITICAL POSITIONS		25
C.A. <u>1</u>	Expr. <u>134</u>	Run <u>181414</u>
Table Pos. <u>.050"</u>		<u>.6023"</u>
Control Rod		Channel
1	-	A
2	-	.031 (ln m)
C	<u>5.350"</u>	-
4	-	D
		E
Tim Crit. <u>3:50</u>	PM	Duration <u>15</u> min.

C.A. <u>1</u>	Expr. <u>134</u>	Run <u>181414</u>	25
Sheet <u>V</u>	Date <u>26 Feb. 55</u>	Time <u>3:30 PM</u>	
P.U.P. C. Gain insight into effect of reducing honeycomb thickness on one face			

Conclusion: This greater reactivity may be due to one or more of the following:

1. Closer to I beams of honeycomb frame.
2. " " paraffin source shield.
3. Interchange of 7 pairs of shishes.
4. Difficulty in exact positioning of shishes.
5. Decreased shadow shielding of floor by table.

Signed

Date

27 Feb 51 :

Expt. & Run numbers (pp. 2-36) revised on this date - fl.

37

Date 27 Feb 1951 Chief Pressy
 Recorder Haake AM 7 PM Crew Bly
Morneyham Thornton

INSTRUMENT CHECK

Time 8:55 ^{AM} ~~PM~~ Source PB-172

	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>OK</u>	<u>10500</u>
Source Dist.			<u>5.10¹⁰ 6"</u>	<u>2.10⁹</u>	<u>1'</u>
% F.S. Trip			<u>95</u>	<u>-</u>	<u>95</u>

Loading change: Shish 29 interchanged with 43 and 48 with 49.
 also 126 with 121 (returned to sheet V ^{relative} positions).

C.A. 1 Expt. 34 Run 15 ²⁶
 Sheet V Date 27 Feb 1951 Time AM ~~PM~~
 Purpose Determine effect of interchanging 3 pairs of shishes

CRITICAL POSITIONS

C.A. 1 Expt. 34 Run 15 ²⁶
 Table Pos. .050" L6021 T R

	Control Rod	Channel
1	<u>_____</u>	A <u>860 mv.</u>
2	<u>_____</u>	B <u>.037 log m</u>
3	<u>5.127"</u>	C <u>_____</u>
4	<u>_____</u>	D <u>_____</u>
		E <u>_____</u>

Tim Crit. 9:45 ^{AM} Signed _____

5.109 super
 5.124
 5.132
 5.130

38 Date

Feb 27, 1950

C.A. 1 Expr. 3¢ Run 27
 Sheet 5 Date 2/27/1951 Time 1:45 ^{AM} _{PM}
 Purpose To obtain critical conditions with
loading as shown on sheet #5
(same loading as used in center of honeycomb)

Loading changes: All shish-kabals returned to relative positions shown on sheet V, but nine tubes higher. Safety rods are now 40 and 42, control rod 118.

CRITICAL POSITIONS

C.A. 1 Expr. 3¢ Run 27
(.6021) fine
 Table Pos. .050 L T R
 Control Rod Channel
 1 _____ A _____
 2 _____ B _____
 C 5.161 in. C _____
 4 _____ D _____
 _____ E _____
 Tim Crit. 2:15 ^{AM} _{PM} Duration _____ min.

5.139 shish kabal
 5.169 sub
 5.159 shish kabal
 5.170 sub
 5.161 - 5.162

C.A. 1 Expr. 3¢ Run 28
 Sheet 5 Date 2/27/1951 Time 2:35 ^{AM} _{PM}
 Purpose To obtain danger coefficient
for fuel disc.

Loading change: Replaced large fuel disc # 498 with small disc # 1813 in position 1 of slug # 34.

Signed

Date

39

CRITICAL POSITIONS

Run 28
 Expr. 34
 Pos. .050 " L T R
 Control Rod Channel
 A
 B
 C 5.019"
 D
 E
 Tim Crit. 3:00 ~~AM~~ PM Duration 15 min.

4.990 sl. sup. 86

Value of Rod C
 in terms of
 fuel at center
 of core:
 Change in mass
 = mass (4498 - 1813)
 = 17.985 - 4.475
 = 13.510 gm.
 Change in rod
 position:
 5.161 - 5.019
 = 0.142"
 $\frac{\Delta R}{\Delta m} = \frac{0.142}{13.51}$
 $= 10.5 \times 10^{-3} \text{ "/gm}$
 $= 0.01 \text{ "/gm}$

Date 2-28 1951 Chief Pressley
 Recorder Bly Crew Harkle (op)
Mooneyham

INSTRUMENT CHECK
 Time 9:15 ~~PM~~ ^{AM} Source PB-172
 Range OK OK 5.10⁻⁹ OK 1020N.
 Source Dist. 8" 12"
 % F.S. Trip 100 95

TEMPORARY LOADING CHANGE
 Add 498 1
34 M-4 1813 1
 Remove _____ Pos _____
 Signed _____

CRITICAL POSITIONS

C.A. 1 Expr. 34 Run 29
18

Table Pos. .050" L T R

Control Rod	Channel
1 _____	A _____
2 _____	B _____
C. <u>5.160"</u>	C _____
4 _____	D _____
	E _____

Tim Crit. 10:40 ^{AM} / _{PM} Duration 12 min.

²⁹
Run 18

C.A. 1 Expr. 34 Run _____

Sheet V Date 2-28-1951 Time 9:15 ^{AM} / _{PM}

Purpose Check zero position after fuel danger coeff

DANGER COEFFICIENT

Replace Disc 498 by 1813

Sample 1813 Weight _____ M. _____

Spacers 10 mil Pieces 1 Comp. _____ 25

_____ PM Sample Pos. M-4, 1 CR C

Yes No

Control 5.161" _____

Sample 5.019" _____

Control 5.160" _____

C.A. 1 Expr. 34 Run 30-32
19

Sheet V Date 2-28-55 Time 10:10 ^{AM} / _{PM}

Purpose Be danger coeff. & check on steel I beam effect

loading change: one 1" Be block removed from shish 34 between pos. 1 & 2. (replaced by A. spacer)

Signed

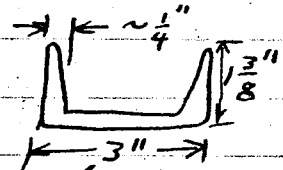
CRITICAL POSITIONS

C.A. 1 Expr. 34 Run 30
6021

Table Pos. .051" L T R

Control Rod	Channel
1 <u>-</u>	A <u>_____</u>
2 <u>-</u>	B <u>_____</u>
C <u>3.484"</u>	C <u>_____</u>
4 <u>-</u>	D <u>_____</u>
	E <u>_____</u>

Tim Crit. 10:25 ^{AM}/_{PM} Duration 17 min.



Loading Change: Be block returned and spacers removed in shish 34, pos 1-2.
Two steel channels placed on top of honeycomb. One between inner steps on fixed half. Other just inside on gap side of inner channel on movable half. These additional channels are less than half the wt. of steel of that always present.

CRITICAL POSITIONS

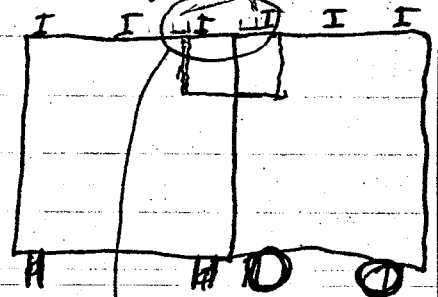
C.A. 1 Expr. 34 Run 31
6020

Table Pos. .054" L T R

Control Rod	Channel
1 <u>-</u>	A <u>_____</u>
2 <u>-</u>	B <u>_____</u>
C <u>5.918</u>	C <u>_____</u>
4 <u>-</u>	D <u>_____</u>
	E <u>_____</u>

Tim Crit. 11:28 ^{AM}/_{PM} Duration 13 min.

just inside on gap side of inner channel on movable half. These additional channels are less than half the wt. of steel of that always present.



DANGER COEFFICIENT

Sample Be block Weight 348.885g Moles _____

Thickness 1" Pieces 1 Composition _____

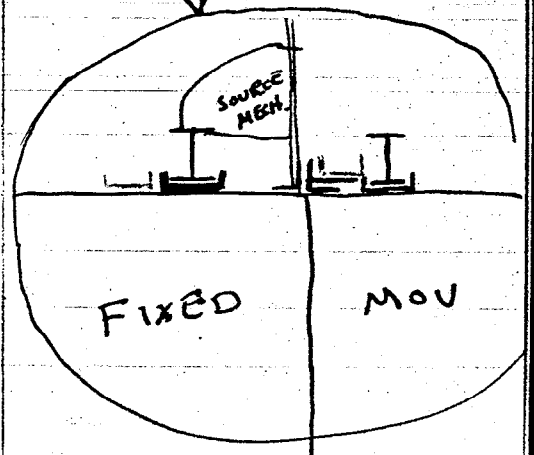
Time _____ ^{AM}/_{PM} Sample Pos. M4 ; 1-2 C.R. C

yes: Can no: C.R. Pos. c c c/M

Control: 5.160"

Sample: 3.484" Signed _____

Control: 5.118"



Conclusion: The I beams of the honeycomb supporting structure can well account for the result obtained in moving core to top of honeycomb.

Loading change: Steel channels removed from top of honeycomb.

Purpose: Zero for Be Danger Coeff.

CRITICAL POSITIONS		
CA	1	Exp. 34 Run 32
Table	.055"	.6020"
	Control Rod	Channel
1	-	A 57 X 1000
2	-	B .018
3	5.118"	C
4	-	D
		E
Tim Crit.	2:30	PM Duration 22 min.

Signed

Date 3-1- 1951 Chief Pressay
 Recorder Haake Crew Bly (p) **
Mooneyham

INSTRUMENT CHECK

Time 2:00 ~~AM~~ PM Source PB-172

	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>Hi</u> 10" ¹⁰	<u>Lo</u> 10" ¹¹	<u>1020v.</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>	<u>-</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>10+</u>	<u>10+</u>	<u>90</u>

C.A. 1 Expr. 3 Run 33
 Sheet 1 Date 3-1 1951 Time 2:15 ~~AM~~ PM
 Purpose To re-zero with assembly
moved down to central
position. (cf. 1-3-9)

All shish-kabobs returned to central pos'n in honeycomb, i.e. Powered 9 tubes but kept in same relative positions.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 33-36
 Well Pos. .056" .6024"
 Control Rod Channel

<u>1</u> <u>.078</u>	<u>A</u> <u>245 mm.</u>
<u>2</u> <u>999962</u>	<u>B</u> <u>.034 on log</u>
<u>3</u> <u>2.795"</u>	<u>C</u> <u>4.3 on 2:10⁻⁸ Hi.</u>
<u>4</u> <u>.010"</u>	<u>D</u> <u>5.6 on 5:10⁻⁹ Hi.</u>
	<u>E</u> <u>50 on 900 v.</u>

Tim Crit. 3:00 ~~AM~~ PM Duration _____ min.

2789
2800

Signed

	<u>Count 1</u>	<u>Count 2</u>	<u>Count 3</u>	<u>Time</u>
scale of 256	469.5	427.4	439.25	1m

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u> Run <u>34</u>
Table Pos.	<u>.056"</u>		<u>.6024</u>
	Control Rod		Channel
1	<u>.078</u>	A	<u>155 m.v.</u> .633
2	<u>999.962</u>	B	<u>.022</u> .647
3	<u>2.809</u>	C	<u>2.65 on $2 \cdot 10^{-8}$ Hi</u> .616
4	<u>.010"</u>	D	<u>3.35 on $5 \cdot 10^{-9}$ Hi</u> .599
		E	<u>31 on 900 v.</u> .620
Tim Crit.	<u>3:25</u>	AM PM	Duration _____ min.

	<u>Count 1</u>	<u>Count 2</u>	<u>Count 3</u>	<u>Time</u>
scale of 256	288.1 .615	266.8 .625	264.6 .604	1m

Scale Change on A, C, and D.

New Readings -

- A 77.5 on 200 (x 5.00)
- C 5.3 on 10^{-8} Hi (x 2.00)
- D 8.35 on $2 \cdot 10^{-9}$ Hi (x 2.49)

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u> Run <u>35</u>
Table Pos.	<u>.056</u>		<u>.6024</u>
	Control Rod		Channel
1	<u>.078</u>	A	<u>41 on 200</u> .334
2	<u>999.962</u>	B	<u>.0125</u> .368
3	<u>2.830</u>	C	<u>2.75 on 10^{-8} Hi</u> .320
4	<u>.010</u>	D	<u>4.3 on $2 \cdot 10^{-9}$ Hi</u> .308
		E	<u>15 on 900 v.</u> .300
Tim Crit.	<u>3:50</u>	AM PM	Signed _____ Duration _____ min.

<u>1 min. Count</u>	#1	149.1	} Scale of 256	.318
	#2	146.9		.342
	#3	136.4		.311

Scale Change on A, C, and D.

New Readings.

A	89	on 100	2.17
C	5.45	on $5 \cdot 10^{-9}$ Hi	1.98
D	8.3	on 10^{-9} Hi	1.93

CRITICAL POSITIONS			
CA	1	Expr.	3
		Run	36
Scale Pos.	.056		.6024
Control Rod		Channel	
	.078	A	44 on 100 .166
	999.962	B	.0062 .182
	2.861	C	2.6 on $5 \cdot 10^{-9}$ Hi .153
	.010	D	3.65 on 10^{-9} Hi .136
		E	6 on 900 v. .120
Tim Crit.	4:05	PM PM	Duration _____ min.

<u>1 min. Count</u>	#1	68.4	} Scale of 256	.146
	#2	70.2		.164
	#3	64.6		.147

Signed

46 Date
 7/15/51
 Coverless
 Hook
 Callahan
 T.S.P.

To measure plateau of GE chamber #1 (D) at high level -
 Variable power supply replaced battery -
 Also to compare Rd (position, at critical, at several power levels with levels
 increasing in time -

Date 3-2 1951 Chief _____
 Recorder _____ Crew _____

INSTRUMENT CHECK

Time 10:00 AM PM Source PB 172

	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>10⁻⁹</u>	<u>2·10⁻¹¹</u>	<u>1020v</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>5'</u>		
% F.S. Trip	<u>-</u>	<u>-</u>	<u>10⁺</u>	<u>10⁺</u>	<u>95</u>

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 37
 Table Pos. 0.056" L 0.6018 T R

Control Rod	Channel
<u>A 0.078"</u>	<u>A 48 x 200</u>
<u>B 949.962"</u>	<u>B 0.016</u>
<u>C 2.789'</u>	<u>C 1.6 - (2 x 10⁻⁸)</u>
<u>D 0.010"</u>	<u>D 5.0 (2 x 10⁻⁹)</u>
	<u>E 10 @ 870v.</u>

Time Crit. 10.45 10:50 AM PM Duration 15 min.

Signed

31/451

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u> Run <u>38</u>
Table Pos.	<u>0.056</u>		<u>0.6018</u> T R
	Control Rod		Channel
A	<u>0.078</u>	A	<u>73.5 x 200</u>
B	<u>999.96v</u>	B	<u>0.025</u>
C	<u>2.800</u>	C	<u>2.5 (2x10⁻⁸)</u>
D	<u>0.010</u>	D	<u>7.9 (2x10⁻⁹)</u>
		E	<u>18.5 @ 870v.</u>
Tim Crit.	<u>11:10</u>	AM PM	Duration <u>5</u> min.

After
Scale chg.

29.5 x 500

3.2 (5x10⁻⁹)

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u> Run <u>39</u>
Table Pos.	<u>0.056</u>		<u>0.6018</u> L T R
	Control Rod		Channel
A	<u>0.078</u>	A	<u>42.5 x 500</u>
B	<u>999.96v</u>	B	<u>0.036</u>
C	<u>2.796</u>	C	<u>3.6 (2x10⁻⁸)</u>
D	<u>0.010</u>	D	<u>4.6 (5x10⁻⁹)</u>
		E	<u>28.5 (870v.)</u>
Tim Crit.	<u>11:26</u>	AM PM	Duration <u>70</u> min.

Counter #2 (374⁺²²³) x 256/min voltage 1500
 #3 (141⁺⁹⁶) x 256/min

For measurements on GE #1 See Inst. Data Bk #1 p 103

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 40
 Table Pos. 0.056 L T R

Control Rod	Channel
A <u>0.078</u>	A <u>31.5 x 500</u>
B <u>999.962</u>	B <u>0.026</u>
C <u>2.805</u>	C <u>2.6 (2 x 10⁻⁸)</u>
D <u>0.010</u>	D <u>3.3 (5 x 10⁻⁹)</u>
	E <u>20.0 (870V)</u>

Tim Crit. 11:55 ^{AM} ~~PM~~ Duration 4 min.

Counter #2 (282⁺¹⁹⁹) x 256 / min
 - #3 (108⁺⁴³) x 256 / min

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 41
 Table Pos. 0.056 L T R

Control Rod	Channel
A <u>0.078</u>	A <u>21.0 x 500</u>
B <u>999.962</u>	B <u>0.019</u>
C <u>2.819</u>	C <u>1.8 (2 x 10⁻⁸)</u>
D <u>0.010</u>	D <u>2.2 (5 x 10⁻⁹)</u>
	E <u>12.5 @ 870V.</u>

Tim Crit. 12:09 ^{AM} ~~PM~~ Duration 6 min.

New scale
 54 x 200
 3.6 (2 x 10⁻⁸)
 5.8 (2 x 10⁻⁹)

Counter #2 (182⁺⁷¹) x 256 / min
 - #3 (65⁺²³) x 256 / min

Date 3/2/51

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 42
0.604

Table Pos. 0.056 I T R

	Control Rod	Channel
A	<u>0.078</u>	<u>23 X200</u>
B	<u>999.962</u>	<u>0.0085</u>
C	<u>2.868</u>	<u>1.5 (10⁻⁸)</u>
D	<u>0.010</u>	<u>2.3 (2 x 10⁻⁹)</u>
E		<u>4.0 (870v)</u>

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

Counter 2 - $(77^{+173}) \times 256 / \text{min}$
 Count 3 - $(25^{+100}) \times 256 / \text{min}$

Signed

50 Date

3/5/51

Date 3-5 1951 Chief Pressey
 Recorder Rhy Crew Waski

INSTRUMENT CHECK

Time 10⁰⁰ Source PB-172

	Channel				
	A	B	C	D	E
Range	OK	OK	10^{-9}	$2 \cdot 10^{-9}$	1020v.
Source Dist.	-	-	4"	0"	6"
% F.S. Trip	-	-	1.0	1.0	95

C.A. 1 Expr. 3 Run 43
 Sheet V Date 3-5 1951 Time 10¹⁵ AM
 Purpose Determine crit pos of function
power level, level rising (also
check chamber calibration)

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 43A
 Table Pos. 057 T R

Control	Channel
A .076	A 47.5 (x25)
B 999.963	B .0011
C 0.11 ^{2.910} 2.907 +	C $2.5 (x 10^{-9})$ HI
D .009	D $9.5 (x 10^{-10})$ LO
	E $3.5 x 1110 v.$

Tim Crit. 10⁴⁰ ^{AM} Duration 45 min.

Count:
 Std. settings.
 Scale: 1 min. count.
 Counter: 1 2 3
 Scale: 256 256 16
 Count: 57 30 152
 + + +
 140 4 5

Signed

Source lowered 6-8" ; positive period obtained

1 min Counton #3
64 scale

49+2 49+44

48+51 49+12

No good, due to

Control C : 2.922"

" : 2.931"

statistical fluctuation

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>43B</u>
Table Pos. <u>.057</u>	
Control Rod	Channel
<u>.076</u>	A <u>56 (x25)</u>
<u>999.963</u>	B <u>.0014</u>
C. <u>2.931</u>	C <u>3.1 (x10⁻⁹) Hi</u>
<u>.009</u>	D <u>2.4 (x5x10⁻¹⁰) Lo</u>
	E <u>5 x 1110 N</u>
Tim Crit. <u>11²⁵</u>	AM PM Duration <u>25</u> min.

Source ~1' from out position

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>43C</u>
Table Pos. <u>.057</u>	
Control Rod	Channel
<u>.076</u>	A <u>51.5 (x25)</u>
<u>999.963</u>	B <u>.0012</u>
<u>3.025</u>	C <u>2.7 (x10⁻⁹) Hi</u>
<u>.009</u>	D <u>5.4 (x2x10⁻¹⁰) Lo</u>
	E <u>4 x 1110 N</u>
Tim Crit. <u>11⁵⁰</u>	AM PM Duration <u>25</u> min.
Signed	

*Source at top
 End of source rod at top of center bracket.*

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>43D</u>
Table Pos. <u>.057</u>	I <u> </u> T <u> </u> R <u> </u>
Control Rod	45.5 Channel
1 <u>.076</u>	A <u>7B (X10⁻²⁵)</u>
<u>999.963</u>	B <u>.0011</u>
3 <u>3.370</u>	C <u>2.25 (10⁻⁹) Hi</u>
4 <u>.009</u>	D <u>4.3 (2X10⁻¹⁰) Lo</u>
	E <u>3.5 7A (1/10.5)</u>
Tim Crit. <u> </u>	AM <u> </u> PM <u> </u> Duration <u> </u> min.

Conclusion: The source is affecting the critical positions somewhat, even when withdrawn into the shield

Date <u> </u> 19 <u>5</u>	Chief <u> </u>
Recorder <u> </u>	Crew <u> </u>

C.A. <u>1</u>	Expr. <u>3</u>	Run <u>44A</u>
Sheet <u>V</u>	Date <u>3-5</u> 19 <u>51</u>	Time <u>2¹⁵</u> PM
Purpose	<i>Determine effect on Crit. Pos. of completely removing source from vicinity of assembly - and effect on crit. pos. of power level.</i>	

The source was removed from the source drive mechanism, and placed adjacent to the shield at approximately the same height above the honeycomb ^{Signed} as it would be when normally withdrawn into the shield

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u>
		Run	<u>44A</u>
Table Pos.	<u>.061</u>	L	T
			R
Control Rod	Channel		
A	<u>.075"</u>	A	<u>45.5 (X25)</u>
B	<u>999.962"</u>	B	<u>.0011</u>
C	<u>2.852</u>	C	<u>2.4 (10⁻⁹) Hi</u>
D	<u>.009"</u>	D	<u>9.0 (10⁻¹⁰) Lo</u>
		E	<u>3.2 (11100)</u>
Tim Crit.	<u>2³⁵</u>	AM PM	Duration <u>40</u> min.

Source remove to ∞

CRITICAL POSITIONS			
C.A.	<u>1</u>	Expr.	<u>3</u>
		Run	<u>44B</u>
Table Pos.	<u>.061</u>	L	T
			R
Control Rod	Channel		
A	<u>.075</u>	A	<u>45 (X25) 10.5 (X100)</u>
B	<u>999.962</u>	B	<u>.00105</u>
C	<u>2.7705</u>	C	<u>2.3 (X10⁻⁹) Hi 0.5 (X5X10⁻⁹) Hi</u>
D	<u>.009</u>	D	<u>4.4 (2X10⁻¹⁰) Lo 1.1 (X5X10⁻¹⁰) Hi</u>
		E	<u>2.5 (11100)</u>
Tim Crit.	<u>3¹⁵</u>	AM PM	Duration <u>30</u> min.

Power level to be raised

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 44C
 Table Pos. .061 .6021

Control Rod	Channel
A <u>.075"</u>	A <u>42 X 100</u>
B <u>999.962"</u>	B <u>0.0065</u>
C <u>2.748</u>	C <u>2.4 (5x10⁻⁹) Hi</u>
D <u>.009</u>	D <u>8.2 (5x10⁻¹⁰) Hi</u>
	E <u>29 at 1110V</u>

Tim Crit. 3⁵⁰ ~~AM~~ PM Duration 27 min.

Source at ∞ (Emlog).

New Scales
19 X 200

0.7 (2x10⁻⁸)
1.8 (2x10⁻⁹)
12.5 @ 1000V

Raise power level

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 44D
 Table Pos. 0.061" 0.6021"

Control Rod	Channel
A <u>0.075"</u>	A <u>56 (X200)</u>
B <u>999.962"</u>	B <u>.020</u>
C <u>2.749</u>	C <u>1.9 (2x10⁻⁸) Hi</u>
D <u>0.009"</u>	D <u>5.9 (2x10⁻⁹) Hi</u>
	E <u>43 (1000)</u>

Tim Crit. 4¹⁷ ~~AM~~ PM Duration 40 min.

New scale.

11 (X1000)

1.0 (5x10⁻⁸) Hi

1.1 (10⁻⁸) Hi

6 (800V)

Raise Power level

Date

" 55.

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>44E</u>
Table Pos. <u>.061</u>	<u>.6021</u> L T R
Control Rod	Channel
A <u>.075"</u>	A <u>66 (X1000)</u>
B <u>999.962"</u>	B <u>.100</u>
C <u>2.739</u>	C <u>5.7 (5X10⁻⁸) Hi</u>
D <u>.009"</u>	D <u>7.3 (10⁻⁸) Hi</u>
	E <u>55.5 (800 N.)</u>
Tim Crit. <u>4²⁷</u>	AM PM Duration <u>30</u> min.

Lower Power Level

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>44F</u>
Table Pos. <u>.061</u>	<u>.6021</u> L T R
Control Rod	Channel
A <u>.075"</u>	A <u>38 (X 100)</u>
B <u>999.962"</u>	B <u>.0055</u>
C <u>2.86</u>	C <u>2.1 (5X10⁻⁹) Hi</u>
D <u>.009"</u>	D <u>7.0 (5X10⁻¹⁰) Hi</u>
	E <u>14 (1000 N.)</u>
Tim Crit. <u>5²⁷</u>	AM PM Duration <u>33</u> min.

C rod pos 2.17 ; period was ~ 50 sec

Signed

Date 3-7 1951 Chief CALLIHAN
 Recorder PRESEY Crew CALLIHAN
Bly (t:16)

INSTRUMENT CHECK

Time 3:45 ^{AM} PM Source PB 172
PB 174

	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>2.10⁹</u>	<u>2.10⁹</u>	<u>1020v.</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>2'</u>	<u>6"</u>	<u>4"</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>10⁺</u>	<u>8</u>	<u>90</u>

C.A. 1 Expr. 3 Run 45
 Sheet V Date 3-7 1951 Time 4:30 ^{AM} PM
 Purpose To check RUN 44 USING
a COUNT-RATE METER ON Fission chamber
to determine crit. point. To eliminate possible
effect of γ sensitivity of BF₃ chambers.
SOURCE IN ROOM 109

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 45 A
 Table Pos. .060

Control Rcd	Channel
A <u>.075</u>	A <u>52 (x25)</u>
B <u>.020</u>	B <u>.00105</u>
C <u>2.830</u>	C <u>2.8 (10⁹) Hi</u>
D <u>.009</u>	D <u>6.7 (2x10⁹) Ld</u>
	E <u>3.5 (1020V)</u>
	F <u>7.4 (5000)</u>

Tim Crit. 4:30 ^{AM} PM Duration 30 min.
45

5.5 (x200)
 .3 (10⁻⁸) Hi
 .3 (2x10⁻⁹) Hi
 3.8 (10000)

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 45 B

Table Pos. .060 " L T R

Control Rod	Channel	
1 "	A <u>21</u> (<u>x200</u>)	<u>4.5</u> (<u>1000</u>)
2 "	B <u>.0058</u>	
3 <u>2.813</u>	C <u>1.35</u> (<u>10⁻⁸</u>) H	<u>.4</u> (<u>5x10⁻⁸</u>)
4 "	D <u>9.10</u> (<u>5x10⁻¹⁰</u>) H	<u>2.0</u> (<u>2x10⁻⁹</u>) <u>.4</u> (<u>10⁻⁸</u>)
	E <u>18</u> (<u>1020</u>)	<u>3</u> (<u>800</u>)
	F <u>9.8</u> (<u>20000</u>) <u>.4</u> (<u>50000</u>)	<u>.045</u> (<u>50000</u>)

Tim. Crit. 5:20 AM PM Duration 15 min. Disc. 35

20
30

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 45 C

Table Pos. " L T R

Control Rod	Channel	
1 "	A <u>81</u> (<u>1000</u>)	
2 "	B <u>.105</u>	
3 <u>2.815</u>	C <u>7.2</u> (<u>5x10⁻⁸</u>) H	
4 "	D <u>9.15</u> (<u>10⁻⁸</u>) H	
	E <u>70</u> (<u>800</u>)	
	F <u>9.2</u> (<u>50000 - DISC 66</u>)	

Tim. Crit. 5:40 AM PM Duration 75 min.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 45 D

Table Pos. " L T R

Control Rod	Channel	
1 <u>in</u>	A	
2 <u>in</u>	B <u>.007</u>	
3 <u>2.913</u>	C	
4 <u>in</u>	D	
	E <u>37</u> (<u>1080</u>)	
	F <u>.43</u> (<u>50000</u>) DISC <u>35</u>	

Tim. Crit. 6:45 Signed Duration 40 min.

58 Date

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 45E

Table Pos. _____ L _____ T _____ R _____

Control Rod	Channel
1 _____	A <u>80 (1000)</u>
2 _____	B <u>.1</u>
3 <u>2.815</u>	C <u>6.9 (5x10⁻⁸)</u>
4 _____	D <u>8.8 (10⁻⁸)</u>
	E <u>59 (800)</u>
	<u>7.9 (50000) - Disc 66</u>

Tim Crit. 8:00 ~~AM~~ PM Duration _____ min.
7:25

Date 3-8 1951 Chief Pressey

Recorder Hacker Crew Hunter

Bly Mooneyham

INSTRUMENT CHECK

Time 10:10 ^{AM}/_{PM} Source PB 172

Range	Channel				
	A	B	C	D	E
	<u>OK</u>	<u>OK</u>	<u>5.10⁻⁹</u>	<u>2.10⁻¹⁰</u>	<u>1020v.</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>1'</u>	<u>15"</u>	<u>6"</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>7</u>	<u>10</u>	<u>90</u>

Signed

C.A. 1 Expr. 3 Run 46
 Sheet 1 Date 3-8 1951 Time 10:30 ^{AM}~~PM~~
 Purpose To check reproducibility of
data of 3-7. To note if past
history has effect on critical
position of rod at 1 watt.

Note: 20 mil tin foil inserted above slug 24.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 46~~B~~
 Table Pos. .065" L T F
 Control Rod Channel
 1 .076" A 85 on 1000
 2 .022" B .11
 3 2.866" C 5.85 on 5·10⁻⁸ Hi
 4 .008" D 4.85 on 2·10⁻⁸ Hi
 E 33.5 on 720 v.
 Tim. Crit. 11:10 ^{AM}~~PM~~ Duration 32 min.

← ^{S₂} Foil removed

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 47
~~46 B~~
 Table Pos. .068" L T R
 Control Rod Channel
 1 .076" A 76.5 on 1000
 2 .020" B .10
 3 2.843" C 5.25 on 5·10⁻⁸ Hi
 4 .008" D 4.2 on 2·10⁻⁸ Hi
 E 30.5 on 720 v.
 Tim. Crit. 12:17 ^{AM}~~PM~~ Duration 27 min.

Signed

Date 3-12 1951 Chief Bussay
 Recorder Haake Crew Bly (op.)
Mooningham

INSTRUMENT CHECK

Time 9:15 ^{AM}~~PM~~ Source PB 172

Range	Channel				
	A	B	C	D	E
	<u>OK</u>	<u>OK</u>	<u>2.10⁻⁹</u>	<u>10⁻¹⁰</u>	<u>1020v</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>0"</u>	<u>18"</u>	<u>4"</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>10⁺</u>	<u>10⁺</u>	<u>95</u>

C.A. 1 Expr. 3 Run 48

Sheet 1 Date 3-12 1951 Time 9:30 ^{AM}~~PM~~

Purpose To check zero on critical pos'n.
(Source in an upper tube of movable half)

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 48

Table Pos. .064"

Control Rod	Channel
<u>.071"</u>	<u>A 78 on 1000</u>
<u>.020"</u>	<u>B .11</u>
<u>2.828"</u>	<u>C 6.85 on 5.10⁻⁸ Hi</u>
<u>.008"</u>	<u>D 8.75 on 10⁻⁸ Hi</u>
	<u>E</u>

Tim Crit. 10:02 ^{AM}~~PM~~ Duration 31 min.

Source removed at .0008 on B

Signed

Date

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 49

Table Pos. .064 L T R

Control Rod	Channel
1 <u>.075</u>	A <u>66.5m 1000</u>
2 <u>.023.023</u>	B <u>.095</u>
3 <u>2.800</u>	C <u>$5.85 \times 5 \cdot 10^{-8}$ H.</u>
4 <u>.006</u>	D <u>$7.45 \times 1 \cdot 10^{-8}$</u>
	E <u>25.5 \pm 720V</u>

Tim Crit. 11:10 ~~AM~~ ^{PM} Duration 37.5 min.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 50

Table Pos. .067 L T R

Control Rod	Channel
A <u>.076</u>	A <u>64 (1000)</u>
2 <u>.023</u>	B <u>.1</u>
3 <u>2.817</u>	C <u>$5.6 (5 \times 10^{-8})$</u>
4 <u>.005</u>	D <u>$7.2 (10^{-8})$</u>
	E <u>25 (770) (730)</u>

Tim Crit. 12:20 ~~AM~~ ^{PM} Duration 33 min.

Table left together but CONTROL RODS RUN OUT.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 50 A

Table Pos. .067 L T R

Control Rod	Channel
1 <u>.074</u>	A <u>60 (4000)</u>
2 <u>.021</u>	B <u>.095</u>
3 <u>2.813</u>	C <u>$4.2 (5 \times 10^{-8})$</u>
4 <u>.009</u>	D <u>$3.4 (2 \times 10^{-8})$</u>
	E <u>32 (760)</u>

Tim Crit. 1:25 ~~AM~~ ^{PM} Duration 34 min.

Signed _____

62

Date

Table not separated. - control rods out.

CRITICAL POSITIONS		
C.A.	1	Expr. 3 Run 50 B
Table Pos.	Same	L T R
	Control Rod	Channel
1	.074	A 66 $\times 1000$
2	.026	B .10
3	2.805	C 4.55 (5×10^{-8})
4	.006	D 7.45 (10^{-8})
		E 24.5 (720)
Tim Crit.	2:30	PM Duration 35 min.

CRITICAL POSITIONS		
C.A.	1	Expr. 3 Run 50 C
Table Pos.	Same	L T R
	Control Rod	Channel
1	.076	A 66.2 $\times 1000$
2	.023	B .09
3	2.810	C 5.85 (5×10^{-8})
4	.006	D 3.7 (2×10^{-8})
		E 24.4 (720)
Tim Crit.	3:35	PM Duration 25 min.

← Table not separated
Control rods out.
Repeat of 50, A, B, B

CRITICAL POSITIONS		
C.A.	1	Expr. 3 Run 50 D
Table Pos.	Same	L T R
	Control Rod	Channel
1	Same	A 67 $\times 1000$
2	Same	B .10
3	2.817	C 5.95 (5×10^{-8})
4	Same	D 3.80 (2×10^{-8})
		E 25 (720)
Tim Crit.	4:10	PM Duration 27 min. Signed

Source put on top of Assembly. Near source pot.

Date
3/13

Date Mar. 13, 1951 Chief Prassey
 Recorder Mooneyham Crew Hunter
Shanton

INSTRUMENT CHECK

Time 3:25 ~~AM~~ PM Source PB-172
 Channel
 A B C D E
 Range OK OK OK OK OK
 Source Dist. _____
 % F.S. Trip _____ 95

C.A. 1 Expr. 3 Run 51
 Sheet _____ Date 3/13 1951 Time 3:25 ~~AM~~ PM
 Purpose To find effect of thin Al reflector.
on two sides of the assembly.

Same loading.

1" thick, 18" long 35 Al bars placed just above and next to control room side of assembly

bars are
2 7/8" wide

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 51
 Tube Pos. 064 I T R
 Control Rod Channel
 A .077 A _____
 B .028 B .10
 C 7.810 C _____
 D .006 D _____
 E _____
 Tim Crit. 3:45 ~~AM~~ PM Duration _____ min.

Conclusion: Rod C moved out 5.0 in. to compensate for aluminum.


Signed

Date 3-15 1951 Chief Perry
 Recorder Hunter Crew Hanks

INSTRUMENT CHECK

Time 9:00 ^{AM}/_{PM} Source PB 172

	Channel				
	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>2.10⁻⁹</u>	<u>10⁻¹⁰</u>	<u>1020v.</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>1 1/2"</u>	<u>24"</u>	<u>4"</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>10</u>	<u>10</u>	<u>90</u>

C.A. 1 Expr. 3 Run 52
 Sheet _____ Date 3-15 1951 Time 9:30 
 Purpose To find effect of 1" Al reflector (2 sides ^{and top} only) at all distances of 6" from core.

For fixed half
 Al in tubes
 8P → 8J
 10R → 16R and
 for movable
 half: 8P' → 8J'
 and 10R' → 16R'

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 52
 Tube Pos. .066 L T R

Control Rod	Channel
<u>.074</u>	A <u>74.5 X 1000</u>
<u>.028</u>	B <u>.106</u>
<u>3.759</u>	C <u>6.4 X 5.10⁻⁸</u>
<u>.003</u>	D <u>4.3 X 2.10⁻⁸</u>
	E <u>23.0 at 720V</u>

Tim Crit. 9:40 ^{AM}/_{PM} Duration _____ min.

Signed

Rod C was run out 2" for ≈ 2 min, then back & readjusted to original power level.

CRITICAL POSITIONS		
C.A.	1	Expr. 3 Run 52A
Table Pos.	same	L T R
Control Rod		Channel
1	same	A 78.5×1000
2	same	B .12
3	3.761	C $6.65 \times 5 \cdot 10^{-8}$
4	same	D $4.6 \times 2 \cdot 10^{-8}$
		E 25. at 720V
		F 9.8×50000 (Disc. = 71)
Tim Crit.	1037	AM PM Duration 25 min.

Rod C run out 2" for 30 sec, then run back & readjusted to original power level.

CRITICAL POSITIONS		
C.A.	1	Expr. 3 Run 52B
Table Pos.	same	L T R
Control Rod		Channel
1	same	A 77×1000
2	same	B .115
3	3.761	C $6.5 \times 5 \times 10^{-8}$
4	same	D $4.4 \times 2 \cdot 10^{-8}$
		E 24 at 720V
		F 9×50000 (Disc. = 71)
Tim Crit.	1103	AM PM Duration 20 min.

Signed

66 Date 3/15/51

Removed rod C all the way
Allowed assembly to remain over period from 11:25
to 12:29 in this condition. Then ran rod C
back in and regained former level.

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>52 C</u>
Table Pos. <u>Same</u>	L T P
Control Rod	Channel
<u>Same</u>	A <u>65</u> (1000)
<u>Same</u>	B <u>.10</u>
<u>3.765"</u>	C <u>5.55</u> (5×10^{-8})
<u>Same</u>	D <u>$\frac{7.5}{7.5}$</u> (10^{-8})
	E <u>193</u> (720v)
	F <u>.71</u> (20000) Disc <u>75.5</u>
Tim Crit. <u>12:40</u> AM PM	Duration <u>52</u> min.

Removed Rod C - level down - Remained out
~ 20 min - C replaced - (B meter dropped to 0.0004)

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>52 52 D</u>
Table Pos. <u>Same</u>	L T R
Control Rod	Channel
A <u>Same</u>	A <u>60.5</u> x 1000
B <u>Same</u>	B <u>0.0995</u>
C <u>3.759</u>	C <u>5.2</u> (5×10^{-8})
D <u>Same</u>	D <u>7.0</u> x 10^{-8}
	E <u>18.0</u> (720v)
	F <u>0.57</u> (20000) Disc <u>75.5</u>
Tim Crit. <u>2:07</u> AM PM	Duration <u>35</u> min.

A.P. monitoring done by House during 52 D.
Signed

Removed Rod A 2" - immediately replaced it to 4.2
 stopped by limit switch - level on B fell to 0.034
 (operation required = 3 min). A returned to 0.070"
 (compare with 0.074 at start-up today).
 Brought back to B = 0.1 with C -

CRITICAL POSITIONS

CA 1 Expr. 3 Run S2 E

Tube Pos. Same I T R

Control Rod	Channel
A <u>0.070"</u>	A <u>62 x 1000</u>
B <u>Same</u>	B <u>0.10</u>
C <u>3.780"</u>	C <u>5.2 (5 x 10⁻²)</u>
D <u>same</u>	D <u>7.1 (10⁻²)</u>
	E <u>18.5 @ 720v</u>
	F <u>0.52 (20000) (75.5)</u>

Tim Crit. 2:45 ~~AM~~ PM Duration 27 min.

Removed Rod B 2.15" - B returned to 0.025"
 (formerly at 0.028) (time required = 2').
 Brought back to B = 0.1 with Rod C

CRITICAL POSITIONS

CA 1 Expr. 3 Run S2 F

Tube Pos. Same I T R

Control Rod	Channel
A <u>same</u>	A <u>62 x 1000</u>
B <u>0.025"</u>	B <u>0.10</u>
C <u>3.785</u>	C <u>5.2 - 5 x 10⁻²</u>
D <u>same</u>	D <u>7.1 - 10⁻²</u>
	E <u>18.5 @ 720v</u>
	F <u>0.51 (20000) 75.5</u>

Tim Crit. 3:14 ~~AM~~ PM Duration 29 min.

Signed

68

Date

3/15

Removed Rod D 2.14", replaced to 0.002"
 (formerly at 0.003")
 Brought back to B = 0.1 with C.

CRITICAL POSITIONS					
CA	1	Expr.	3	Run	529
Core Pos.	Dane E		L	T	R
	Control Rod		Channel		
A	Dane	A	60 x 1000		
B	Dane	B	0.09 0.097		
C	3.778	C	5.1	5×10^{-8}	
D	0.002"	D	6.9	10^{-8}	
		E	18	@ 720v	
		F	0.45	(2000)(75.5)	
Tim Crit.	3:46	AM PM	Duration	39	min.

Signed

Date 3-19 1951 Chief Pressey
 Recorder _____ Crew Bly

INSTRUMENT CHECK

Time 9:30 ^{AM}/_{PM} Source PB 172
 Channel
 A B C D E
 Range OK OK 2-10⁹ 10¹⁰ 1020V
 Source Dist. - - 1" No 3"
 % F.S. Trip - - 9.5 TRIP 100

C.A. 1 Expr. 3 Run 53
 Sheet 5 Date 3-19 1951 Time 10⁴⁰ ^{AM}/_{PM}
 Purpose To find effect on reactivity of triple Indium foil located over slug # 24

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 53
 Table Pos. .067" L T F
 Control Rod Channel
 1 .074 A 56 on 1000
 " .025 B .082
 " 1.826 C 5.05 on 510⁻⁸
 " .007 D 3.2 on 2-10⁻⁸
 E 21.8 on 720V.
 F .63 on 50000 (60 disc.)
 Tim. Crit. 11:08 ^{AM}/_{PM} Duration 37 min.

Signed

Date 29 March 1951 Ch. Pressey
 Recorder Bly Crew Haake (op)

INSTRUMENT CHECK

Time 8⁴⁵ ATA 8:45 Source PB 172
 Channel
 A B C D E
 Range OK OK X 2.10⁺¹⁰ 1080^v
 Source Dist. X 8" 4"
 % F.S. Trip X 10⁺ 95

C.A. 1 Expt. 3 Run 54
 Sheet 5 Date 29 Mar 1951 Time 9¹⁵ AM PM
 Purpose check effect of table half displacements on reactivity (rod position)

~~CRITICAL POSITIONS~~

~~C.A. 1 Expt. 3 Run 54A~~
~~Table Pos. .066 LT .0005" RT .0001~~
~~Control Rod LB .0000" RB .0005~~
~~Channel~~
~~A .076 A off scale~~
~~B .027 B .12~~
~~C 2.632 C out of order~~
~~D .006 D 6.85 (2x10⁻⁸)~~
~~E 51.5 (720^v)~~
~~F 1.0 (x50,000 - disc 70)~~
~~Tim Crit. 9⁵⁰ AM PM Duration 40 min.~~

slightly super

Power level reduced, using rod C only

Signed

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 54B

Table Pos. .066 | same as A

Control Rod	Channel
A "	A <u>92 (X1000)</u>
B "	B <u>.095</u>
C <u>2.645</u>	C <u>out</u>
D "	D <u>4.45 (2X10⁻⁸)</u>
	E <u>35.5 (720V)</u>
	F <u>0.8 (X50,000 - disc 70)</u>

Tim Crit. 10 30 ^{AM}/_{PM} Duration 35 min.

The table withdrawn to .186 and then run together again without moving any control rods; then Rod C used to level off.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 54C

Table Pos. .066 | LT +0.0008 RT .00135⁵?
 LB .0000 RB .00085

Control Rod	Channel
A "	A <u>95 (X1000)</u>
B "	B <u>.095</u>
C <u>2.658</u>	C <u>4.6 (2X10⁻⁸) out</u>
D "	D <u>4.6 (2X10⁻⁸)</u>
	E <u>36 (720 V)</u>
	F <u>0.9 (X50,000 - disc 70)</u>

Tim Crit. 11 15 ^{AM}/_{PM} Duration 40 min.

Rod C withdrawn - zero power for about ~1 hr. - table withdrawn to .1", run in, & system brought crit with C.

Hunter operatr.
Haake in inst. shop.

CRITICAL POSITIONS			
C.A.	1	Expr.	3
		Run	54D
Table Pos.	.066	LT	+ .0008
		RT	.0014
		RB	.0000
		RB	-.0003
	Control Rod		Channel
A	"	A	96 (X1000)
B	"	B	.10
C	2.653	C	out
D	"	D	4.7 (2X10 ⁻⁸)
		E	36 (720 v.)
		F	.91 (X50,000 - disc 70)
Tim Crit.	1 40	AM	Duration 65 min.
		PM	65

All safeties fired with halves together; halves separated and C rod withdrawn (several loose elements apparently sucked in by safeties); halves together; C inserted; up to power.

CRITICAL POSITIONS			
C.A.	1	Expr.	3
		Run	54E
Table Pos.	.066	LT	-.0009
		RT	+ .0010
		LB	.0006
		RB	-.0027
	Control Rod		Channel
A	"	A	98 (X1000)
B	"	B	.10
C	~ 2.883	C	out
D	"	D	4.7 (2X10 ⁻⁸)
		E	36 (720 v.)
		F	.83 (X50,000 - disc 70)
Tim Crit.	3 18	AM	Duration 22 min.
		PM	

Date March 30 1951 Chief Pussy
 Recorder Haake Crew Bly

INSTRUMENT CHECK

Time 8:45 ^{AM} Source PB 172

Channel

	A	B	C	D	E
Range	<u>OK</u>	<u>OK</u>	<u>OUT</u>	<u>8-10"</u>	<u>1020v.</u>
Source Dist.	<u>-</u>	<u>-</u>	<u>-</u>	<u>18"</u>	<u>4"</u>
% F.S. Trip	<u>-</u>	<u>-</u>	<u>-</u>	<u>10+</u>	<u>95</u>

C.A. 1 Expr. 3 Run 55

Sheet V Date 3-30 1951 Time 9:00 ^{AM} ~~PM~~

Purpose To obtain danger coefficients for hi and lo density graphite.

DANGER COEFFICIENT

Sample _____ Weight _____ Moles _____

Thickness _____ Pieces _____ Composition _____

Time _____ ^{AM} ~~PM~~ Sample Pos. _____ C.R. _____

yes

no C.R. Pos. _____ c _____ c _____ c _____

Control _____

Sample _____

Control _____

Signed

zero position with Be only ↓

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>55</u>
Table Pos. <u>.065"</u>	TL:0003 LL:0003 TR:0009 LR:0000*
Control Rod	Channel
1 <u>.075</u>	A <u>93 on 1000</u>
2 <u>.026</u>	B <u>.093</u>
3 <u>2.667</u>	C <u>out</u>
4 <u>.002</u>	D <u>9.0 on 10⁻⁸</u>
	E <u>36 on 720 v.</u>
	G <u>.85 on 50,000, DISC. 50</u>
Tim Crit. <u>9:18</u>	AM PM Duration <u>42</u> min.

*LR reads -.0038 originally but was re-zeroed.

1" Al spacer tube now placed in position 1 of slug 134, replacing 1" Be block.
 Slug 134 same as slug 34 with new end piece. ✓

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>3</u> Run <u>56</u>
Table Pos. <u>.064"</u>	LT -0.0008 RT -0.0008 LB +0.0004 RB -0.0008
Control Rod	Channel
<u>Same</u>	A <u>88 on 1000</u>
<u>Same</u>	B <u>.095</u>
<u>1.325</u>	C <u>out</u>
<u>Same</u>	D <u>8.3 on 10⁻⁸</u>
	E <u>35 on 720 v.</u>
	G <u>.63 on 50000 (DISC. 5 - thru pre-scaler) of 32</u>
Tim Crit. <u>10:46</u>	AM PM Duration <u>44</u> min.

1" block of hi-density graphite now placed in position 1 of slug 134, replacing void with Al spacer.

CRITICAL POSITIONS	
CA <u>1</u>	Expr. <u>3</u> Run <u>57</u>
Table Pos. <u>.064</u>	LT <u>-0.007</u> RT <u>-0.015</u>
<u>.063</u>	LB <u>+0.002</u> RB <u>-0.012</u>
Control Rod	Channel
1 <u>Same</u>	A <u>82 on 1000</u>
2 <u>Same</u>	B <u>.091</u>
3 <u>1.914 1.916</u>	C <u>out</u>
4 <u>Same</u>	D <u>7.8 on 10⁻⁸</u>
	E <u>33 on 720v.</u>
	G <u>.59 on 50000 (DISC. 5 thru scale of 32)</u>
Tim Crit. <u>12:45</u> AM	Duration <u>39</u> min.
	PM

1" block of lo-density graphite now placed in position 1 of slug 134, replacing block of hi-density graphite.

CRITICAL POSITIONS	
CA <u>1</u>	Expr. <u>3</u> Run <u>58</u>
Table Pos. <u>.064</u>	LT <u>-0.008</u> RT <u>-0.015</u>
	LB <u>+0.002</u> RB <u>-0.013</u>
Control Rod	Channel
1 <u>Same</u>	A <u>84 on 1000</u>
2 <u>Same</u>	B <u>.094</u>
3 <u>1.833 1.832</u>	C <u>out</u>
4 <u>Same</u>	D <u>8.05 on 10⁻⁸</u>
	E <u>34.5 on 720v.</u>
	G <u>.61 on 50000 (DISC. 5 thru scale of 32)</u>
Tim Crit. <u>1:51</u> AM	Duration <u>39</u> min.
	PM

Signed

Replaced 1" block of low density graphite in pos. 1 of slug 134 with 1" Be block

CRITICAL POSITIONS	
C.A. <u>1</u>	Expr. <u>X 3</u> Run <u>59</u>
Table Pos. <u>.064</u>	LT ^{-.0008} <u>+.0001</u> RT <u>-.0019</u> LB -.0019 TRB <u>-.0015</u>
Control Rod	Channel
<u>Same</u>	A <u>92 on 1000</u>
<u>Same</u>	B <u>.099</u>
<u>2.724</u>	C <u>out</u>
<u>Same</u>	D <u>8.7 on 10⁻⁸</u>
	E <u>36.4 on 720 v.</u>
	G <u>.665 on 50000 disc. 5</u>
Tim Crit. <u>3:07</u> PM PM	Duration <u>51</u> min. <u>Thru scale of 32</u>

Date 10 Apr 1951 Chief Hunter
 Recorder Bly Crew Haski (op)

INSTRUMENT CHECK

Time 2¹⁰ ~~PM~~ PM Source P13-174

Channel
 A X25 B SD C PC E E
 Range OK Y10" X2.10⁻¹⁰ 1020N OK

Source Dist. 1' 3 1/2' 8" 2"

% F.S. Trip 100 100+ 100+ 95
 (no trip) (no sum)

TEMPORARY LOADING CHANGE

Slug 134 Pos M-13 Add _____ Pos 2
 Remove _____ Pos 4
 Slug 134 Pos M-13 Add _____ Pos 9, 10, 11, 12
 Remove _____ Pos 9, 10, 11, 12
 Slug 35 Pos N-13 Add _____ Pos 2
 Remove _____ Pos 2

TEMPORARY LOADING CHANGE

Slug 36 Pos O-13 Add _____ Pos 2
 Remove _____ Pos 2
 Slug 13 Pos P-16 Add _____ Pos 11
~~37~~ ~~P-13~~ Remove _____ Pos 12
 Slug 43 Pos N-14 Add _____ Pos 4
 Remove _____ Pos 6

TEMPORARY LOADING CHANGE

Slug 47 Pos O-15 Add _____ Pos 8, 9, 10
 Remove _____ Pos 8, 9, 10
 Slug 685 Pos P-13a Add _____ Pos 2
 Remove _____ Pos 2

Signed _____

TEMPORARY LOADING CHANGE

Slug 687 Pos P-13b Add _____ Pos 2
 Remove _____ Pos 2
 Slug 695 Pos P-13c Add _____ Pos 2
 Remove _____ Pos 2
 Slug 739 Pos P-13d Add _____ Pos 2
 Remove _____ Pos 2

chn tube P-13,
 Slug 37 was replaced
 by slugs 685,
 687, 695, 739

C.A. 1 Expr. 3 Run 59
 Sheet V Date 10 Apr 1951 Time 2³⁰ ~~PM~~
 Purpose Obtain power distribution from counting fuel discs.

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 59 60
 Table Pos. _____ J _____ T _____ R _____
 Control Red _____ Channel _____

1	A	<u>out of scale</u>
2	B	<u>.115</u>
<u>C</u>	<u>C</u>	<u>7.6 (X 5 X 10⁻⁸)</u>
4	D	<u>6.2 (X 2 X 10⁻⁸)</u>
	E	<u>51.7 (750 v)</u>
	G	<u>.92 (X 50,000 X scale of 32, disc 5)</u>

Tim Crit. 2⁵³ ~~AM~~ PM Duration 30.0 min.

Note: Power was held level, but no attempt was made to find crit. pos.

Ref: Book GM-1, p. 16 } for foil counts
 GM-2, " 19 }
 3, " 5 }
 4, " 5 }

5/9/57
 DC

Counting rates obtained in these experiments are suspect because of background interference of active discs and counters - Data discarded -

Date May 3 1951 Chief Callihan
 Recorder K Downes Crew Rohrer

CRITICAL POSITIONS

CA _____ Expt. 3 Run 60

59.772 L - T - - -

Control Point Channel

0.071 A 0.071

0.030 B 0.030

≤ 2.767 < 2.778 C ≤ 2.767 < 2.767

0.004 D 0.004

E _____

Start 2.00 ^{AM} PM Duration 10 min.

Above done to check operations following
 shut down for ~ a month

5/7/51 Repeat of power distribution
 measurements _____
 (Cont).

Signed

80 Date 5/7/51

TEMPORARY LOADING CHANGE

Slug <u>116</u> Pos <u>J'16</u>	Add <u>14</u> Pos <u>11</u>
	Remove <u>80</u> Pos <u>11</u>
Slug <u>116</u> Pos <u>J'16</u>	Add <u>53</u> Pos <u>2</u>
	Remove <u>71</u> Pos <u>2</u>
Slug <u>116</u> Pos <u>M'14</u>	Add <u>139</u> Pos <u>2</u>
	Remove <u>22</u> Pos <u>2</u>

TEMPORARY LOADING CHANGE

Slug <u>91</u> Pos <u>M'13</u>	Add <u>85</u> Pos <u>11</u>
	Remove <u>520</u> Pos <u>11</u>
Slug <u>94</u> Pos <u>J'13</u>	Add <u>476</u> Pos <u>2</u>
	Remove <u>1078</u> Pos <u>2</u>
Slug <u>107</u> Pos <u>K'15</u>	Add <u>192</u> Pos <u>8</u>
	Remove <u>866</u> Pos <u>8</u>

TEMPORARY LOADING CHANGE

Slug <u>104</u> Pos <u>L'15</u>	Add <u>169</u> Pos <u>2</u>
	Remove <u>848</u> Pos <u>2</u>
Slug <u>93</u> Pos <u>K'13</u>	Add <u>178</u> Pos <u>2</u>
	Remove <u>680</u> Pos <u>2</u>
Slug <u>91</u> Pos <u>M'13</u>	Add <u>877</u> Pos <u>8</u>
	Remove <u>517</u> Pos <u>8</u>

TEMPORARY LOADING CHANGE

Slug <u>107</u> Pos <u>K'15</u>	Add <u>1113</u> Pos <u>2</u>
	Remove <u>860</u> Pos <u>2</u>
Slug <u>99</u> Pos <u>L'14</u>	Add <u>513</u> Pos <u>5</u>
	Remove <u>598</u> Pos <u>5</u>
Slug <u>99</u> Pos <u>L'14</u>	Add <u>650</u> Pos <u>2</u>
	Remove <u>595</u> Pos <u>2</u>

Signed

Date

5/25/81

TEMPORARY LOADING CHANGE

Slug 91 Pos 17'13 Add 1127 Pos 5
 Remove 514 Pos 5

Slug 98 Pos 14'14 Add 1218 Pos 2
 Remove 607 Pos 2

Slug 92 Pos 2'13 Add 875 Pos 2
 Remove 535 Pos 2

TEMPORARY LOADING CHANGE

Slug 91 Pos 17'13 Add 1184 Pos 2
 Remove 510 Pos 2

Slug _____ Pos _____ Add _____ Pos _____
 Remove _____ Pos _____

Slug _____ Pos _____ Add _____ Pos _____
 Remove _____ Pos _____

Removed Disks stored on pin 261

Have
cell

C.A. 1 Expr. 3 Run 61
 Sheet V Date 5/8 1951 Time _____ AM
 PM
 Purpose To obtain power distribution
from fuel disks placed as
shown above -

Read electrometer
moved with to ~12'
from table drive motor.

INSTRUMENT CHECK

10:00 AM Source PB 172

Channel
 A B C D E
10⁻⁹ 10⁻¹⁰ 1020v.

Source Dist. _____
 % R.E. Trip OK OK OK OK OK

Signed

34 Date 5/11/51

CRITICAL POSITIONS

C.A. 1 Expr. 3 Run 63

Table Pos. Not Rewed.

Control Rod

Channel

A .076

A 39 X 100

B Replaced by 4
1/4 Slugs

B 0.060

C 1061

C 3.2 - 5×10^{-8}

D 2.224

D 8.5 5×10^{-9}

E 17.5 @ 750v.

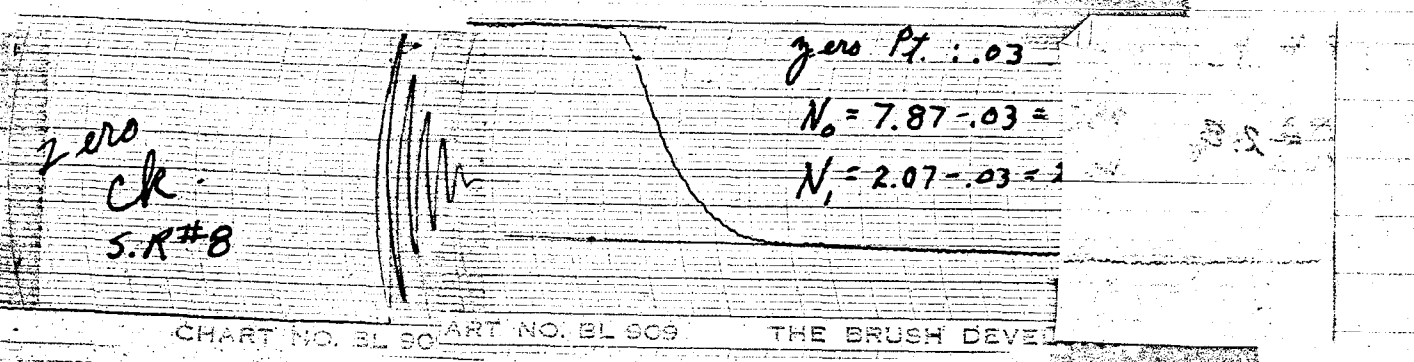
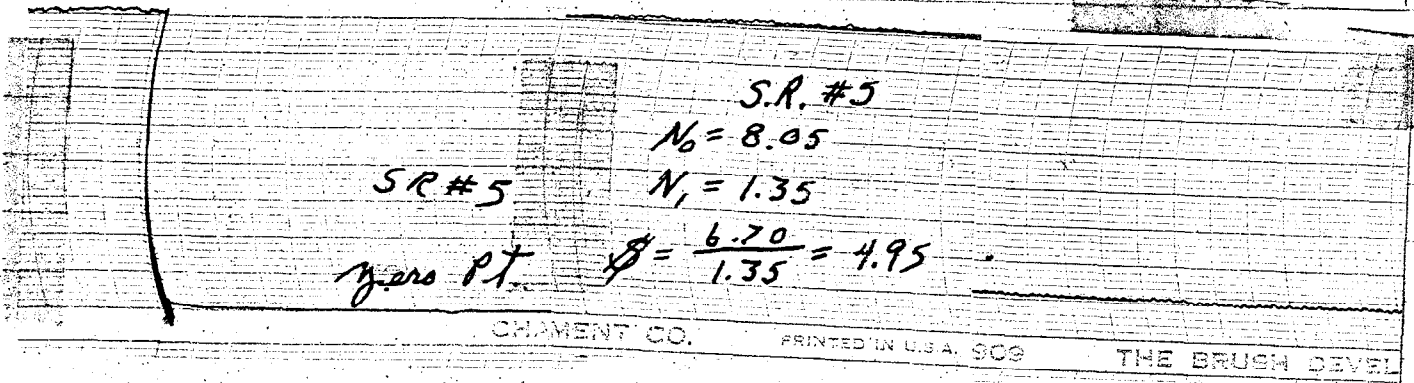
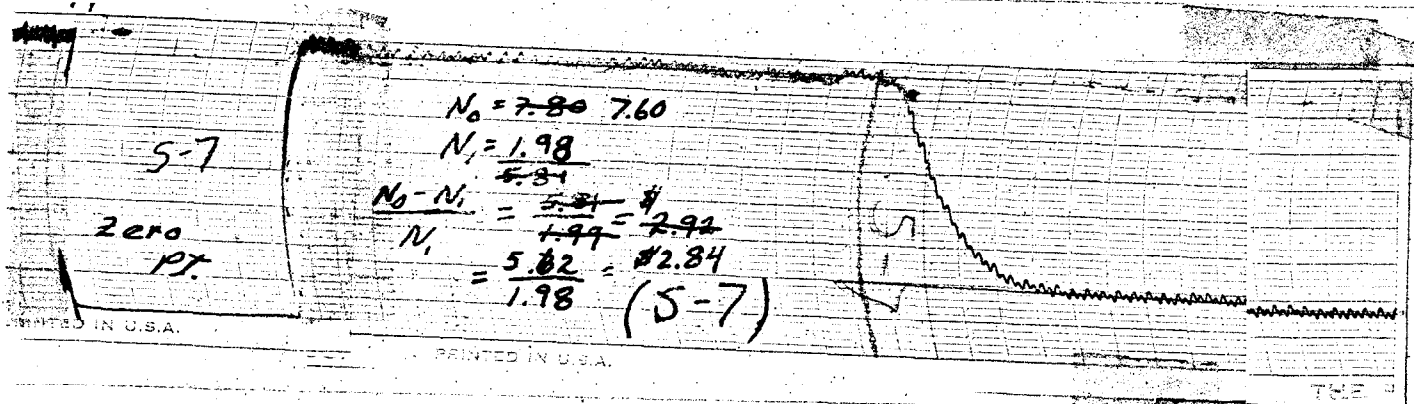
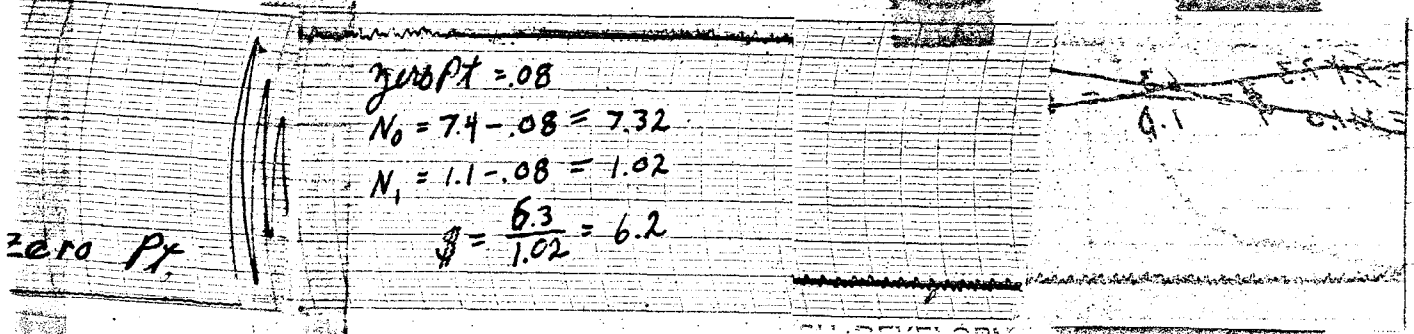
Tim Crit. 3:27 PM ^{AM}/_{PM}

Duration 30 min.

Signed

Page 32, 33, 34, 35

Date



Signed

time by rod-drops" - Bz reactor - Probably

32, 33, 34, 35

$\Delta = .08$
 $-.08 = 7.32$
 $-.08 = 1.02$
 $\frac{6.3}{1.02} = 6.2$

S. Rods
7-8

~~$N_0 = 7.175$
 $N_1 = 4.10$
 $\Delta = 1.0$
 $\frac{6.3}{1.0} = 6.3$
 $\frac{5.73}{1.0} = 5.73$~~

~~$= 7.80$
 $= 1.98$
 $\frac{5.81}{1.98} = 2.94$
 $\frac{5.82}{1.98} = 2.94$
 $\frac{5.82}{1.98} = 2.84$
 $(5-7)$~~

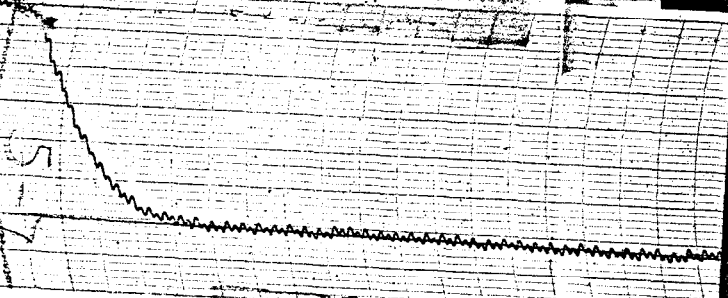


CHART NO. BL 909

S.R. #5
 $N_0 = 8.05$
 $N_1 = 1.35$
 $\Delta = \frac{6.70}{1.35} = 4.95$

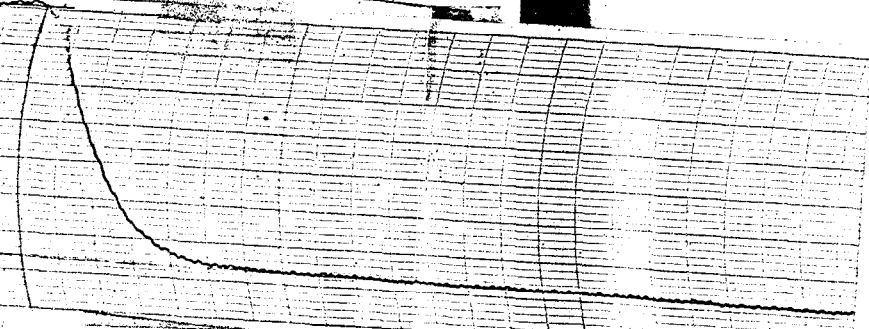
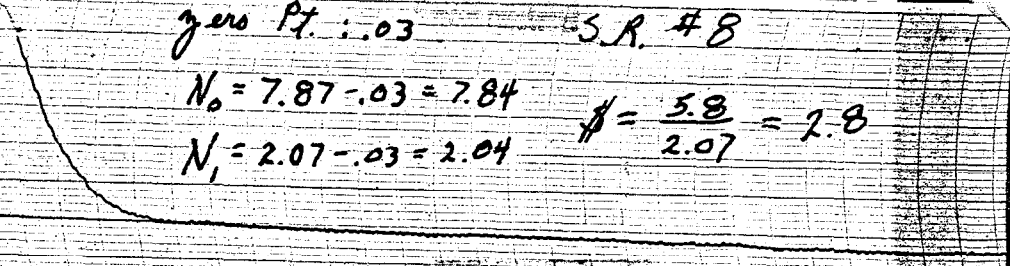


CHART NO. BL

zero Pt. : .03 S.R. #8
 $N_0 = 7.87 - .03 = 7.84$
 $N_1 = 2.07 - .03 = 2.04$
 $\Delta = \frac{5.8}{2.07} = 2.8$



THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

Signed

86

Date

11/15/54 SWH: CA-1 - 0.860143 = 1 on channel B-

Signed

~~SECRET~~

Classification Change to Decl. By

Authority of E.J.M. Date 5/27/60