BOOK 8R 3275 on bottom edge

CA-19-20 wrote on front of book

Notes:
Blank pages: inside opposite page 1, 8, 9, 168-171, 173-174, 218-219, 298, inside back cover opposite page 298

-page 47 has long graph sheet taped to it (named SR#5)
-page 209 has 11 long graph sheets stapled to it

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

SECRET

SOME INSTRUCTIONS FOR USE OF THIS NOTEBOOK

SECURITY INFORMATION

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

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

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

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

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

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

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

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

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

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

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

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

C-11

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE and CARBON CHEMICALS CORPORATION
FOR THE
ATOMIC ENERGY COMMISSION
POST OFFICE BOX P
OAK RIDGE, TENNESSEE

SECRET
SECURITY INFORMATION

LABORATORY RECORDS
1954

10-9-21

CLASSIFICATION CANCELLED
DATE 6-3-60
CO-ORDINATING ORGANIZATION DIRECTOR
OAK RIDGE NATIONAL LABORATORY
AUTHORITY DELEGATED BY AEC 9-18-57

NOTEBOOK NO. 3275
Assigned to R. D. Callihan
Department Physics Div
Location Bldg 9213
Date Nov 12, 1953

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

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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Do not use scrap paper.

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RESTRICTED DATA
This document contains restricted data as defined in the Atomic Energy Act of 1946. Its transmittal or the disclosure of its contents in any manner to an unauthorized person is prohibited.

Subject

CA-20 Page 182

Index (Pages 1-5)

Page 1 Critical Mass CA19

Exp #1 [redacted] Run #	Page #	Exp # Run #	Page #	CA 20 Run	Page
1	13	11	41	1	175
2	14	12	43		
3	15	13	45		
4	16	14	46		
5	18	15	48		
6	19	16	49		
7	20	Exp 3			
8	21	1	50		
9	23	2	52		
10	25	3	54		
11	27	4	58		
12	28	5	61		
13	29	6	68		
Exp 2		7	89		
1	33	8	90		
2	34				
3	34				
4	35				
5	36				
6	37				
7	38				
8	39				
9	40				
10	40				

Neutron Flux Measurements

Power Distributions

Reactivity Coefficients

TEMPERATURE Coefficient :-

Exp.	Run	Page
6	6	81
	7	83
	11	99

Fuel in Core & Reflector :-

8	1 → 10	103 → 113

Cd in Core & Reflector :-

9	1 → 10	116 → 126

Inconel in Core & Reflector :-

10	1 → 12	127 → 138

Ni in Core & Reflector :-

11	1 →	139 →

Special Experiments

Film Exposure

Exp	Run	Page
4	1	56
	2	58
	3	95

7/14/54 PB 267 Removed from SCW and mounted in the tables. Strength ~ .7 X 10^6 on 6/9/54

7/14/54 Magnet Current set at 100 milli-amps

7/15/54 Selsyns on Rods A, B, C have been set to read zero when the rod is out and approx 22 inches for the ~~load~~ position

7/17/54 $\frac{\text{wt of U per sheet}}{\text{total weight of sheet}} = 0.990686$ (avg for 670 sheets of first two shipments from M+C.)

11/3/54 PB 267 Removed from Tables
PN 58 Mounted in tables (3.7×10^7) 6/8/54

11/4/54 PN 58 Removed from Tables (Placed IN 109)
PN 15 Mounted in tables (5×10^6)
PB 267 To J.T. Thomas

CA-20 1st Loading (20.1,23) page 175
2nd " (20.4) 220
3rd " 20.5 245

Exp	Run	Page	Purpose
5	1 → 11	245 → 258	Loading
6	1 → 3	259 → 263	Calibration Rod C
7	1 → 5	264 → 269	Danger Coef. of Gd.
8	1 → 7	270 → 276	In Foil Calibrations
7	6 → 8	277 → 279	Gd_2O_3 Danger Coef.
8	8	280	In Foil Calibrations
7	9 → 14	281 → 287	Inonel Danger Coef.
9	1 → 6	288 → 293	Hastelloy B Danger Coef.
10	1 → 3	294 → 296	Boral Danger Coef.

Scotch Tape Weight (gms)

1FS	2FS	3FS	1TS	1TE	1CS	2TE
16.375	12.311	4.905	30.51	10.601	15.659	9.566

Total = 99.436 gms

Foil Wt. (Includes Coating) gms

	1FS	2FS	3FS	1TS	1TE	1CS	2TE
1	297.0794	357.3500	177.6967	108.5732	16.3398	47.9244	8.0770
2	297.2998	353.6395	179.1238	108.1118	15.9916	49.0154	7.9525
3	296.5463	354.5375	177.0688	108.5256	16.2150	48.2436	7.9914
4	296.1451	356.4486	~~356~~ 176.9093	109.1305	16.1717	48.4132	8.0629
5	295.4498	355.1558		108.3534	16.1513	48.5890	7.9619
6	295.6137	356.1404		108.2685	16.1241	48.9476	8.0075
7	296.7157			108.3404	16.1979	48.9242	8.1169
8	296.3012			109.8475	16.0081	49.0033	7.9195
9				108.5594	16.1780		8.1149
10				108.5981	16.2840		7.9309
11				108.9263	16.1624		8.0730
12				108.0653	16.3009		7.8911
13				108.3727			8.0967
14				108.7183			7.9800
15				108.1851			8.0900
16				108.7920			8.0578
17				108.4903			7.3474
18				108.6627			7.4464
19				107.9021			7.4685
20				108.9788			7.4465
21				107.~~4~~ 2747			7.4232
22				108.8914			7.6028
23				107.7133			7.4349
24				108.6580			7.4506

Teflon Weights (Gms)

	2TE	1FS	2FS	3FS	1TS	1TE	1CS
1	49.5	1993.56	2400.60	1206.5	740.0	96.8	437.5
2	49.0	1998.52	2380.73	1204.0	735.5	95.5	431.5
3	48.0	1979.86	2391.75	1215.0	759.0	98.1	428.5
4	48.5	1989.02	2380.00	1194.5	776.5	96.8	461.0
5	48.0	1988.58	2387.50		741.5	95.4	454.5
6	49.5	1981.39	2386.50		745.0	95.2	458.5
7	49.0	1997.87			736.0	96.6	454.5
8	48.0	1992.57			749.0	95.5	451.0
9	49.0				748.0	95.6	
10	48.0				730.5	95.7	
11	48.0			742.0	~~742.0~~ 743.0	96.1	
12	48.5				748.0	95.1	
13	48.5				736.5		
14	48.5				722.0		
15	49.0				750.0		
16	48.5				729.0		
17	59.0				737.5		
18	58.0				760.0		
19	58.5				738.5		
20	58.5				750.0		
21	59.0				735.0		
22	58.5				746.5		
23	58.0				737.5		
24	58.0				745.0		
Totals	1295.5	16,923.34	14,327.08	4,820.0	17,838.5	1,152.4	3572.0

Total Teflon = 58,883.82 gms

INSTRUMENT CHECK

Time 9:15 ~~PM~~ AM Source PB #58

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30	.05"	20	40	2"
% F.S. Trip	85		60	80	100+

C.A. 19 Expr. 1 Run 1

Sheet ____ Date 7-16-1954 Time 9:15 ~~PM~~ AM

Purpose Background Count. [Before beginning fuel loading].

MULTIPLICATION

Scaler	5" min.	5" min.	Mult.	1/M
1	45/32	39		1.00
2	55/40	58		1.00
3	257/251	254		1.00

Discriminator Settings

ctr # 1 - 30 ctr # 3 - 35

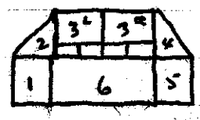
" # 2 - 18

(Above made with Control Rods In)

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	49 52	51		1.00
2	~~73~~ 72	72		1.00
3	325 336	306		1.00

C.A. 19 Expr. 1 Run 2
Sheet ____ Date 7-16 1954 Time 10:25 AM PM
Purpose Multiplication Count, 1st fuel addition.
2FS-1 in M6 - 357.35 gm Total 713.7986 gm
2FS-~~9~~ in S6 - 356.4486 "



Fuel Positions (Layer 1)

Layer 2 - 11, etc M - Movable Table S - Stationary Table
" 3 - 21, " 6 - Position 6
" 4 - 31, "

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	63	51 ~~54~~		.81
2	94	72 ~~80~~		.77
3	454	306		.68

C.A. 19 Expr. 2 Run 3
Sheet ____ Date 7-16 1954 Time 11:15 AM ~~PM~~
Purpose Multiplication Count, 2nd Fuel Addition.
gm added - 692.5670
Total - 1406.3656 gms

1TS-1 - 108.5732 gm - M3
2TE-1 - 8.0770 " - "
" -2 - 7.9525 " - "
1TS-2 - 108.1118 " - "
2TE-3 - 7.9914 " - "
" -4 - 8.0629 " - "
1C$\overset{S}{X}$-1 - 47.9244 " - M2
" -2 - 49.0154 " - "

1TS-13 - 108.3727 gm - S3
2TE-13 - 8.0967 " - "
" -14 - 7.9810 " - "
1TS-14 - 108.7183 " - "
2TE-15 - 8.0900 " - "
" -16 - 8.0578 " - "
1C$\overset{S}{X}$-5 - 48.5890 " - S2
" -6 - 48.9476 " - "

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	66	51		.77 ~~.92~~
2	125	72		.58
3	603	306		.51

C.A. 19 Expr. 1 Run 4

Sheet ____ Date 7-16 1954 Time 11:45 AM ~~PM~~

Purpose Multiplication Count, 3rd fuel addition.

added 496.3468 gm

Total 1902.7124 gm

1TS - 3 - 108.5256 MS

1TS - 4 - 109.1305 M1

2TE - 5 - 7.9619 "

" - 6 - 8.0075 "

" - 7 - 8.1169 MS

" - 8 - 7.9185 "

1TS - 15 - 108.1851 - SS

" - 16 - 108.7920 - S1

2TE - 17 - 7.3474 - "

" - 18 - 7.4464 - "

" - 19 - 7.4685 - SS

" - 20 - 7.4465 - "

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	81	51		.63
2	138	72		.52
3	642	306		.48

C.A. 19 Expr. 1 Run 5
Sheet ____ Date 7-16 1954 Time 1:30 ~~AM~~ PM
Purpose Multiplication Count, 4th Fuel Addition.
Added 433.7749 gm
Total 2336.4873 gm

1TS - 5 - 108.3534 gm M 12
" - 6 - 108.2685 " M 14
" - 17 - 108.4903 " S 12
" - 18 - 108.6627 " S 14

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	92	51		.55
2	149	72		.48
3	714	306		.43

C.A. 19 Expr. 1 Run 6
Sheet ____ Date 7-16 1954 Time 2:00 ~~AM~~ PM
Purpose Multiplication Count, 5th Fuel Addition
Added 1185.4427 gm
Total 3521.9300 "

1FS - 1 - 297.0794 gm M $6^L 3^L$
" - 2 - 297.2998 " M $6^R 3^R$
" - 5 - 295.4498 " S $6^L 3^L$
" - 6 - 295.6137 " S $6^R 3^R$

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	126	51		.405
2	167	72		.430
3	906	306		.340

C.A. 19 Expr. 1 Run 7
Sheet ____ Date 7-16 1954 Time 2142 ~~AM~~ PM
Purpose Multiplication Count, 6th Fuel Addition
Added 1479.5153 gm
Total 5001.4453 gm

2FS-2	353.6395	gm	M25,35
3FS-1	177.6967	"	M21
" -2	177.1238	"	M31
2TE-9	8.1149	"	M21
" -10	7.9309	"	M21
" -11	8.0730	"	M41
" -12	7.8911	"	M41
2FS-5	355.1558	gm	S25,35
3FS-3	177.0688	"	S31
" -4	176.9093	"	S21
2TE-21	7.4232	"	S21
" -22	7.6028	"	S21
" -23	7.4349	"	S41
" -24	7.4506	"	S41

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	149	51		.340
2	282	72		.256
3	1222	306		.250

C.A. 19 Expr. 1 Run 8
Sheet ____ Date 7-16 1954 Time 3:20 ~~AM~~ PM
Purpose Multiplication Count, 7th Fuel Addition
Added 1684.3145 gm
Total 6685.7598 gm

1TS-7	108.3404	gm	M22
" -8	108.9475	"	M24
1TE-1	16.3398	"	M-22
" -2	15.9916	"	M-24
1FS-3	296.5463	"	M23,26^{L}
" -4	296.1451	"	M23,26^{R}

1TS -19	107.9021 gm	S 22
" -20	108.9788 "	S 24
1FS - 7	296.7157 "	S 23, 26 L
" - 8	296.3012 "	S 23, 26 R
1TE - 7	16.1979 "	S 22
" - 8	16.0081 "	S 24

MULTIPLICATION

Scaler	c/ 5 min.	DS/ 5 min.	Mult.	1/M
1	188	51		.27
2	369	72		.196
3	1710	306		.18

C.A. 19 Expr. 1 Run 9
Sheet _____ Date 7-16 195 4 Time 4:05 ~~AM~~ PM
Purpose Multiplication Count, 8th Fuel Addition
Added 1191.5542 gm
Total 7877.3140 gm

1CS - 3	48.2436	M 32
" - 4	48.4132	M 34
1TS - 9	108.5594	M 31
" -10	108.5981	M 33 L
" -11	108.9263	M 33 R
" -12	108.0653	M 35
1TE - 3	16.2150	M 31
" - 4	16.1717	M 33 L
" - 5	16.1513	M 33 R
" - 6	16.1241	M 35
1CS - 7	48.9242	S 32
" - 8	49.0033	S 34
1TS - 21	107.9747	S 31
" -22	108.8914	S 33 L
" -23	107.7133	S 33 R
" -24	108.6540	S 35
1TE - 9	16.1780	S 31
" -10	16.2840	S 33 L
" -11	16.1624	S 33 R
" -12	16.3009	S 35

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	365	51		.14
2	617	72		.118
3	2584	306		.118

C.A. 19 Expr. 1 Run 10

Sheet ____ Date 7-16 1954 Time 4:30 ~~AM~~ PM

Purpose Multiplication Count, 9th Fuel Addition.

Added 710.6779 gm

Total 8587.9919 gm.

2FS-3 354.5375 M-36

2FS-6 356.1404 S-36

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	460 (28x16)+12	51		.110
2	771 (48x16)+13	72		.093
3	3386 (201x16)+10	306		.091

26 92.304 gm 25 / gm sheet

Avg fraction of U / sheet = 0.990686

17.598 lbs

Total Sheet weight in core = 8587.9919 gm

U in Core = 8508.0033 gms

avg assay for two M+C shipment = 93.172

U-25 in core = 7927.1 gm or 17.48 lbs

Teflon in core 5888.88 gm

Volume for fuel 1.04 cu ft 29,449.68 cc

Volume of Al 344.08 cc

29,793.76 cc

Avg. Core density Teflon

5888.88 gm / 29,793.76 cc = 1.9758 gm/cc

C.A. 19 Expr. 1 Run 11

Sheet _____ Date 7-16 1954 Time 6:23 ~~AM~~ PM

Purpose ~~Placed Remaining Bc~~ Multiplication Count

Placed Remaining Bc In Upper Portion Of Region "B"

MULTIPLICATION

Scaler	c/ 5 m.n. 33 5 rnin.	Mult.	1/M
1	(32x16)+15 527	51	.096
2	(55x16)+7 887	72	.081
3	(265x16)+6 4246	306	.073

INSTRUMENT CHECK

Time 0920 AM PM Source Pb 58

	A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	900V
Source Dist.	30"	IX	24"	40"	2"
% F.S. Trip	80		90	75	100+

Discriminator Settings

Ctr 1 - 30 Ctr - 3 - 35

Ctr 2 - 18

C.A. 19 p 1 12

Shee Da 7-19 4 Time 0925 AM PM

Purp Multiplication Count

zero run for the day. Loading as per run 11

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(31x16)+11 507	51	9.95	.100
2	(57x16)+10 922	72	12.8	.078
3	(276x16)+13 4429	306	14.4	.069

C.A. 19 Expr. 1 Run 13

Sheet Date 7-19 1954 Time 1015 AM PM

Purpose Multiplication Count

Beryllium Added to outside Corners of Reflector

16 shishes Be - 17½" long

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(33x16)+3 531	51		.098
2	(58x16)+7 935	72		.077
3	(229x16)+2 3666	306		

Fission Chamber (ctr-3) withdrawn ~ 6" from previous position.

Observed by [illegible] 7-20-54

Foil Weights (includes coating)

area of midplane 169.44 sq in

	1FS	2FS	3FS	1TS	1TE	1CS	2TE
1	419.9655	494.8957	251.6124	152.1938	18.7152	70.1289	10.2408
2	420.5715	491.6977	251.0887	151.7255	18.2735	70.5880	10.1450
3	419.7754	492.4298	250.7677	153.3012	18.3821	70.0810	10.1514
4	419.5980	493.8534	250.9100	152.1850	18.4378	70.3793	10.2925
5	418.2953	492.2388		151.5756	18.3370	70.1932	10.0620
6	418.1517	493.9123		152.0103	18.4987	70.4387	9.9973
7	419.9680			151.6453	18.3642	70.3815	10.4879
8	419.6834			151.8059	18.1272	70.4174	10.0053
9				151.1810	18.3307		10.1195
10				151.7293	18.4384		10.1591
11				152.0141	18.4926		10.1217
12				151.9696	18.3464		10.2176
13				151.9541			10.1902
14				152.0758			10.1920
15				151.8649			10.1984
16				151.8768			10.1913
17				151.8294			9.8184
18				151.8704			9.8438
19				151.2023			9.8677
20				152.6801			9.9309
21				151.0745			10.0844
22				152.8660			9.9218
23				150.6394			9.9735
24				152.5075			9.9642
	3356.0088	2959.0277	1004.3788	3645.3772	220.7458	562.608	242.0767

Total 11990.223
V-25 = 11067.455
or 24.348 lb/V-21

Teflon Weights

	1FS	2FS	3FS	1TS	1TE	1CS	2TE	
							~~50.~~	
1	1976.0	2382.0	1190.4	748.5	94.0	416.0	50.0	
2	1983.5	2366.8	1188.0	742.5	93.0	427.0	50.0	
3	1970.3	2371.0	1198.8	759.0	94.5	419.0	49.0	
4	1967.9	2363.6	1183.6	761.0	94.0	428.5	49.0	
5	1968.2	2369.3		748.5	93.5	428.0	49.0	
6	1965.4	2373.0		736.0	93.5	430.5	50.0	
7	1977.0			755.5	94.0	429.5	50.0	
8	1970.3			746.0	93.0	424.5	49.0	
9				745.5	93.0		50.0	
10				728.5	93.0		49.5	
11				746.3	93.0		49.5	
12				743.5	93.0		49.5	
13				742.5			50.0	
14				733.0			49.5	
15				746.0			50.0	
16				744.0			49.5	
17				761.0			57.5	
18				747.0			58.0	
19				742.5			58.5	
20				754.8			58.5	
21				746.0			58.5	
22				744.5			58.5	
23				745.0			57.5	58463.7 gm
24				749.5			57.5	
	15778.6	14225.7	4760.8	17916.1	1121.5	3403.0	1258.0	1.9852 gm/cc

Scotch Tape Weight

1FS	2FS	3FS	1TS	1CS	1TE + 2TE
14.3920	8.6330	4.0996	24.9873	13.22	20.0752

Summary of Exp 2 Core	Direct weight	Calc. by areas
Total foil weight	11990.223 gm	
Total U weight	11878.5 gm	
Total U-235 weight	11067.455 gm 24.3486	

Total teflon weight 58463.7 gm

Avg density in Core teflon $\frac{58463.7\text{ gm}}{29,793.76\text{ cc}} = 1.962 \frac{\text{gm}}{\text{cc}}$

INSTRUMENT CHECK

Time 8 10 AM ~~PM~~ Source PB 58

	A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30"	OK		40"	2"
% F.S. Trip	80			80	100+

Counts 1, 2 + 3 OK

Channel C scaler circuit on the fritz (not in system)

E.A. 19 Expr. 2 Run 1

Sheet ____ Date 27 July 1954 Time 0830 AM ~~PM~~

Purpose Background Count
(No fuel present)

MULTIPLICATION

Scaler	c/ 5 min.	95/ 5 min.	Mult.	1/M
1		(2x16) + 6 = 38		1.00
2		(7x16) + 7 = 119		1.00
3		(13x16) + 12 = 220		1.00

Discriminator Settings

Ctr. #1 - 30

#2 - 18

#3 - 35

C.A. 19 Expr. 2 Run 2
Sheet ____ Date ____ 195__ Time 0850 AM PM
Purpose Multiplication Count
1st Fuel Addition
4 added ~~839.5634~~ 988.7481
Total ~~839.5634~~ "

2FS-1 M-6 2FS-4 S-6

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(3x16)+15 63	38		.603
2	(11x16)+11 187	119		.637
3	(23x16)+1 369	220		.597

C.A. 19 Expr. 2 Run 3
Sheet ____ Date ____ 195__ Time 0930 AM PM
Purpose Multiplication Count
2nd Fuel Addition
4 added 970.8996
Total ~~1810.4631~~ 1959.6477

1TS-1	M-3	1TS-13	S-3
2TE-1		2TE-13	
-2		-14	
1TS-2		1TS-14	
2TE-3		2TE-15	
-4		-16	
1CS-1	M-2	1CS-5	S-2
-2	M-2	-6	S-2

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(4x16)+15 79	38		.481
2	(15x16)+10 250	119		.476
3	(31x16)+13 509	220		.432

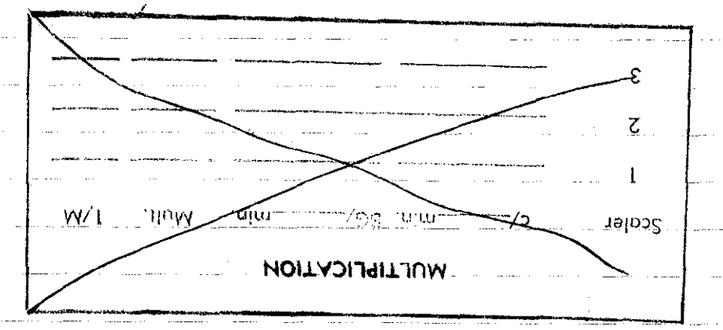
C.A. 19 Expr. 2 Run 4
Sheet ____ Date ____ 195__ Time 0955 AM PM
Purpose Multiplication Count
3rd Fuel Addition
4 added 689.2412
Total ~~2499.7043~~ 2648.8889

1TS - 3	M-5	1TS-15	S-5
-4	M-1	-16	S-1
2TE - 5	"	2TE-17	"
-6	"	-18	"
-7	M-5	-19	S-5
-8	"	-20	"

Scaler	c/ 5 min.	5 min.	T/M
1	(5 x 16) + 2 = 82	38	.463
2	(15 x 16) + 12 = 252	119	.472
3	(34 x 16) + 15 = 559	220	.394

C.A. 19 Expr. 2 Run 5
Sheet ____ Date ____ 195__ Time 1015 AM PM
Purpose Multiplication Count
4th Fuel Addition
U added 607.2857
Total ~~3106.9400~~ 3256.1746

1TS - 5	M-12
-6	M-14
-17	S-12
-18	S-14

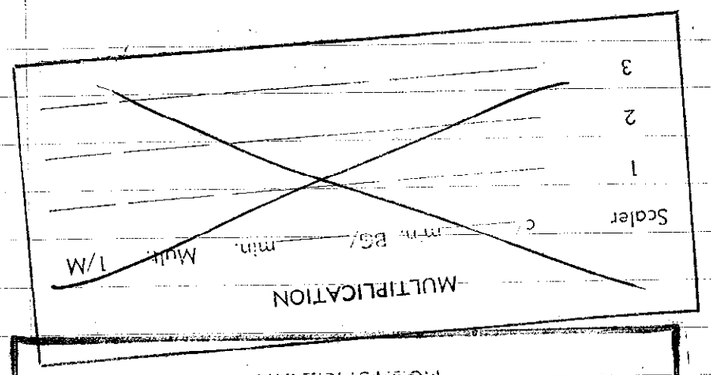


MULTIPLICATION

Scaler	c/ 5 min.	5 min.	Mult.	1/M
1	(5 x 16) + 15 = 95	38		.400
2	(22 x 16) + 2 = 354	119		.336
3	(42 x 16) + 4 = 676	220		.325

C.A. 19 Expr. 2 Run 6
Sheet ____ Date ____ 195__ Time 1035 AM PM
Purpose Multiplication Count
5th Fuel Addition
U added 1676.4840
Total ~~4783.9740~~ 4933.1586

1FS - 1	M - 6^L 3^L
-2	M - 6^R 3^R
-5	S - 6^L 3^L
-6	M - 6^R 3^R



MULTIPLICATION

Scaler	c/ 5 min. BG/ 5 min.	Mult.	1/M
1	(18 x 16)+2 = 114	38	.333
2	(24x16)+1 = 385	119	.309
3	(56 x16)+5 = 901	220	.244

C.A. 19 Expr. 2 Run 7
Sheet ____ Date ____ 195__ Time 1110 AM ~~PM~~
Purpose Multiplication Count
6th Fuel Addition
u added 2068.7771
Total ~~6852.75H~~ 7001.9357

2FS-2	M-25, 35	2FS-5	S-25, 35
3FS-1	M-25	3FS-3	S-25
-2	M-35	3FS-4	S-35
2TE-9	M-21	2TE-21	S-21
-10	M-21	-22	S-21
-11	M-41	-23	S-41
-12	M-41	-24	S-41

MULTIPLICATION

Scaler	c/ 5 min. BG/ 5 min.	Mult.	1/M
1	(10x16)+13 = 173	38	.220
2	(33x16)+8 = 536	119	.222
3	(78x16)+3 = 1251	220	.176

C.A. 19 Expr. 2 Run 8
Sheet ____ Date ____ 195__ Time 1140 AM ~~PM~~
Purpose Multiplication Count
7th Fuel Addition
u added 2359.8405
Total ~~9212.5846~~ 9361.7762

1TS-7	M-22	1TS-19	S-22
-8	M-24	-20	S-24
1TE-7	M-22	1TE-1	S-22
-8	M-24	-2	S-24
1FS-3	M-23, 26L	1FS-7	S-23, 26L
-4	M-23, 26R	-8	S-23, 26R

MULTIPLICATION

Scaler	c/ 5 min. BG/ 5 min.	Mult.	1/M
1	(18x16)+15 = 293	38	.130
2	(60x16)+6 = 966	119	.123
3	(132x16)+10 = 2112	220	.104

C.A. 19 Expr. 2 Run 9
Sheet ____ Date ____ 195 __ Time 1250 AM ~~PM~~
Purpose Multiplication Count
8th Fuel Addition
4 added 1667.2967
Total ~~10879.8883~~ 11029.0729

ITS-11	M-33 R	ITS-22	S-33 L
-10	M-33 L	-23	S-33 R
ITE-5	M-33 R	ITE-10	S-33 L
-4	M-33 L	-11	S-33 R
2FS-3	M-36	2FS-6	S-36

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(39x16)+2 = 626	38		.061
2	(128x16)+5 = 2053	119		.058
3	(295x16)+7 = 4743	220		.046

C.A. 19 Expr. 2 Run 10
Sheet ____ Date ____ 195 __ Time 1320 ~~AM~~ PM
Purpose Multiplication Count
9th Fuel Addition
4 added 961.1491
Total ~~11810379~~ 11990.2220

ICS-3	M-32	ICS-7	S-32
-4	M-34	-8	S-34
ITS-9	M-31	ITS-21	S-31
-12	M-35	-24	S-35
ITE-3	M-31	ITE-9	S-31
-6	M-35	-12	S-35

MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	(83x16)+2 = 1330	38		.028
2	(277x16)+12 = 4444	119		.027
3	(617x16)+12 = 9868	220		.022

C.A. 19 Expr. 2 Run 11
Sheet ____ Date 27 July 1954 Time 1515 AM ~~PM~~
Purpose Multiplication Count
Addition of Be above Fuel

7-30-54

Scott
Spencer
Lynn

CRITICAL POSITIONS

C.A. 19 Expr. 2 Run 11

Table Pos. 0.006 T. 6143 B. 1238

Control Rod	Channel	
A 0.004	A 83	100/50
B 0.035	B .005	
C 10.195	C 3.4	10^{-10}
4 ———	D 69	100/100
	E .4	900 V.

Tim Crit. 3:25 ~~AM~~ PM Duration ____ min.

INSTRUMENT CHECK

Time 900 AM ~~PM~~ Source PB 5-8

	Channel A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	900V
Source Dist.	30			40	
% F.S. Trip	70			75	

Counter 1, 2, 3

C.A. 19 Expr. 2 Run 12

Sheet ____ Date 30 July 1954 Time ____ AM ~~PM~~

Purpose zero run for day.
Same as 19.2.11

Rod readings for rods completely inserted

A - 22.095
B - 22.244
C - 22.017

Rod C = 8.68 12.2 div.
~ 265 Sec period
~ 4.3 ¢

Thermocouples installed 1 7/16" above core and on top aluminum support sheet - 1 7/16" above beryllium reflector.

CRITICAL POSITIONS

C.A. 19 Expr. 2 Run 12

Table Pos. 0.005 L T.5138 .1235

Control Rod		Channel		
A	0.004	A	80	100/100
B	0.035	B	.009	
C	9.848	C	5.5	10^{-10}
4		D	68	100/200
		E	20	900 v

Tim Crit. 0944 AM Duration 29 min.

Temp. 9:43 AM
center 0.9033
Edge 0.9083
~~73.34~~
73.05°

Position of Rod A moved to 9.845
" " " C " " 0.024
Power level remained the same.

With Reactor Clean and all poison Rod removed, Reactor was on ~ 152 Second Period. ~ 7.0¢

1 all plates not mounted

48 pocket chambers were placed along the outside of the Be for the above run. Gave ~ 150 mr (J W Noaks

C.A. 19 Expr. 2 Run 13

Sheet Date 7-30-1954 Time 11:05 AM

Purpose To check Reactivity change after having added Be to Corners of Reflector.

(2⅞" X 2⅞" X 17½)

Added 16 ~~16~~ - 17½" Be shishes to Corners of ~~or~~ Reflector.

CRITICAL POSITIONS

C.A. 19 Expr. 2 Run 13

Table Pos. 0.005 T.5137 B.1248

Control Rod		Channel		
A	0.003	A	95	100/100
B	0.040	B	.010	
C	15.018	C	9.8	10^{-10}
4		D	80	100/200
		E	1.0	900 V

Tim Crit. 11:18 AM Duration 19 min.

Temp 11:28 AM
C .8965 - 73.0°
E .8988 - 73.0°

When Rod C = 13.646 Reactor Was on ~ 47.8 Sec period. ~ 16.7¢.

C.A. 19 Expr. 2 Run 14
Sheet ____ Date 7-30 1954 Time 3:15 ~~AM~~ PM
Purpose To check Reactivity Change after adding additional Be to Reflector,

TEMP 3:40 PM

C- .9071 - 73.4°
E- .9071 - 73.4°

(2⅞ X 2⅜ X 17½)

Added 24 - 17½" ^Be shishes to Reflector. [6 center shishes each side]

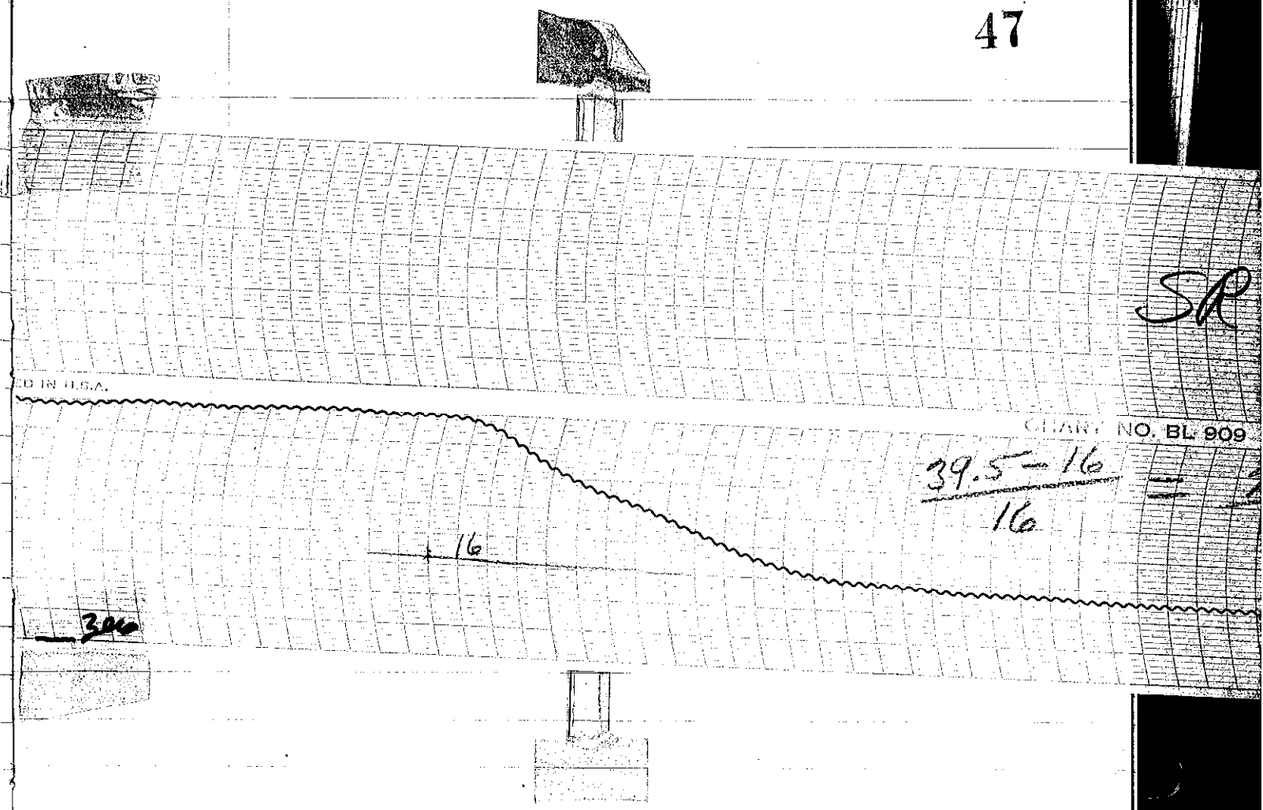
CRITICAL POSITIONS

C.A. ____ Expr. ____ Run ____
Table Pos. 0.005 T-5152 D-.1242

Control Rod	Chamber
A 0.005	A 85 100/100
B. 0.045	B .01
C 17.024	C
4	D 72 100/200
	E 1.4 900V

Tim Crit. 3:32 ~~AM~~ PM Duration ____ Min.

when Rod C=16.186, Reactor on 48.9 Sec period. ~ 16.3 ℓ



47

SR #5

CHART NO. BL 909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

$\frac{39.5-16}{16} = \frac{23.5}{16} = \$1.47$

8-2-54

INSTRUMENT CHECK

Time 950 AM ~~PM~~ PB58

	A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30"		OK	40	2"
% F.S. Trip	75			70*	100*

Counts 1420K Scaler Baclon #3

C.A. 19 Expr. 2 Run 15

Sheet Date 2/8 1954 Time 100 ~~AM~~ PM

Purpose Zero run for measurement of effect of al plate at center groove

Temp @ 130

Centr. 0.8965 72.88°F mvr.

Edge 0.8975 72.92 mvr.

CRITICAL POSITIONS

C.A. 19 Expr 2 Run 15

0.005 TO.5150 BO.1243

Control Rod

A 0.010	A 54	100/25
B 0.045	B 0.0012	
C 17.088	C 6.5	5×10^{-11}
	D 41	100/50
	E 0.4	900

Tim Crit. 1:21 ~~AM~~ PM Duration 13 min.

The top fuel retaining plate(al) for the stationary tube mounted in place. (value ~ 10¢)

Temp @ 208 on

Centr. 0.8975 mvr

Edge 0.8975 mvr 72.92°F

CRITICAL POSITIONS

C.A. 19 Expr 2 Run 16

0.005 TO.5138 BO.1232

A 0.000	A 55	100/25
B 0.045	B 0.0012	
C 16.520	C 6.4	5×10^{-11}
	D 41	100/50
	E 0.4	900V

Tim Crit. 2:06 AM PM Duration min.

C.A. 19 Exp. 3 Run 1

Sheet Date 2/8 1954 Time 3:15 ~~AM~~ PM

Purp Test run for foil exposure.

CRITICAL POSITIONS

C.A. 19 Expr. 3 Run 1

Table Pos. 0.005 T 0.4132 B 0.1266

Control Rod	Channel	
1. A - .000	A 47	1000/25
2. B 0.045	B .01	
3. C 17.520	C 6.7	2.5×10^{-10}
4.	D 72	100/200
	E .9	900

Tim Crit. 3:35 14/60 ~~AM~~ PM Duration 20 min.

Exp. 3 Run 1 - Foil positions (In) (From Center of Reactor)

C-35	0,0, 1 3/4"
C-33	0,0 4 3/4
C-36	0,0, 8
C-4	0,0, 13
C-3	0,0, 19

Catcher foil position

10 mil disc 1291, 18 gms, shield 401 Al. catcher foil #1568 mounted in shield 401 at 1" from center surface, or at 1.0" - 1.5" + 15.5"

8-4-54

INSTRUMENT CHECK

Time 9 10 AM ~~PM~~ Source PB 5Y

Channel	A	B	C	D	E
Range	10/100	OK	10-10	10/100	900
Source Dist.	30"		15" ~~15"~~	40"	1"
% F.S. Trip	25		60	80	100+

Counter 142 – OK

C.A. 19 Expr. 3 Run 2

Sheet ____ Date 8 - 4 1957 Time 9:25 AM ~~PM~~

Purpose Bare Indium Traverse Vertically from Center of Reactor

		Pos. from Center of Reactor
In	C-29	¼ - ½ – 0.067
	C-18	" – 2.05
	C-13	" – ~~3.00~~ 3.00
	C-7	" – 5.20
	C-9	" – 6.41
	C-28	" – 7.25
	C-11	" – 8.00
	C-17	" – 9.40
	C-19	" – ~~12.93~~ 13.91
	C-21	" – 18.97
Al #	1569	1 – 1.5 – 15.5

Removed 6 1½" layers of Be from Top Reflector.

CRITICAL POSITIONS

C.A. 19 Expr 3 Run 2

Delta 0.010 T .4152 B .1240

Control		Channel	
A	0.004	A	80 1000/50
B	0.050	B	.85
C	17.104	C	3.6 2.5×10^{-9}
		D	69 1000/100
		E	1.8 810 V.

Tim Crit. 9:46 17/60 AM ~~PM~~ Duration 20 min.

C.A. 19 Expr. 3 Run 3

Sheet _____ Date 8-4 1954 Time 1:15 ~~AM~~ PM

Purpose Cadmium Covered Indium Traverse Vertically from Center of Reactr

Cd In	C-40	¼ - ¼	- 0.067
	C-24	"	- 2.05
	C-26	"	- 3.60
	C-39	"	- 5.20
	C-23	"	- 6.41
	C-34	"	- 7.25
	C-42	"	- 8.00
	C-17	"	- 9.40
	C-20	"	- 13.81 13.93
	C-14	"	- 18.97
Al	# 1570	1.0 - 1.5	- 15.5

CRITICAL POSITIONS

C.A. 19 Expr 3 Run 3

Table Pos. 0.010 T .4018 B .4238

Control Rod		Channel	
A 0.000	A	80	1000/50
B 0.050	B	.05	
C 16.710	C	3.7	2.5×10^{-9}
4	D	69	1000/100
	E	2.0	810 V

Tim Crit. 1:30 55/60 AM PM Duration 20 min.

8-5-54

INSTRUMENT CHECK

Time 9:50 AM Co PB. 58

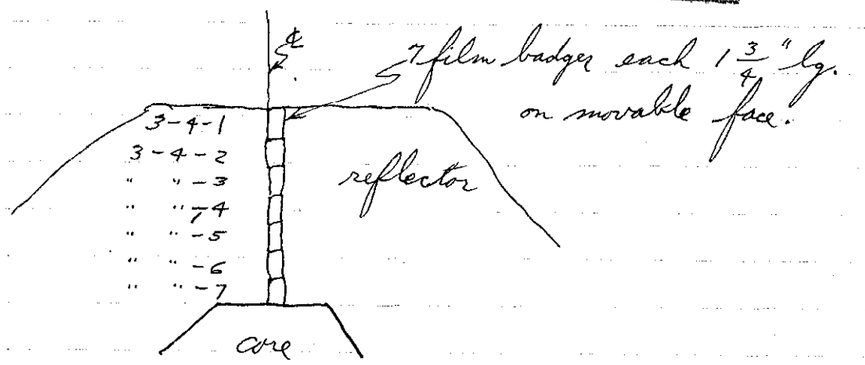
	Channel A	B	C	D	E
Range	1%/1000		10^{-10}	1%/100	900
Source Dist.	30"		10"	40"	1"
% F.S. Trip	85		90	80	100

counters 1 & 2 are OK.

C.A. 19 Expr. X 4 Run 1X

Sheet ____ Date 8-5 1954 Time 9:55 AM

Purpose Determine γ distribution in Be reflector.



catcher foil 1572 1.0 - 1.5 - 15.5

Removed 3/16" X 2 7/8" X 12.9" Be Vertically to Allow placement of Film.

CRITICAL POSITIONS

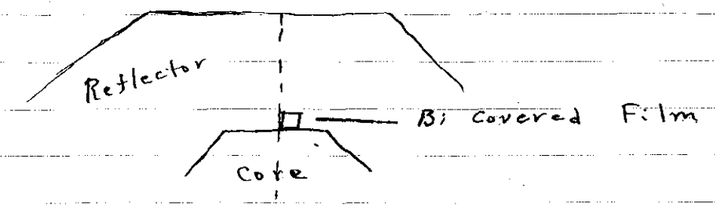
C.A. 19 Expr X 4 Run 1X

Table F.: 0.010 T- 0.1453 B- 0.1247

		Channel	
A	0.000	A 83	1%/50
B	0.050	B .005	
C	16.948	C 6.4	2×10^{-10}
		D 71	1%/100
		E .5	900v

Tim Crit. 10:14.5 AM Duration 20 min.

C.A. 19 Expr. 4 Run 2
Sheet ____ Date 8-5-1954 Time 10:40 ~~PM~~ AM
Purpose Run a Bismuth Covered Film.



al # 1573 1.0 - 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr. 4 Run 2
Table Pos. 0.010 To. 4153 T B 0.1285

Control Rod		Channel	
A	0.000	A	82 100/50
B	0.045	B	.005
C	16.955	C	7.8 2×10^{-10}
~~A~~		D	70 100/100
		E	.7 900 V.

Tim Crit. 10:59 ~~PM~~ 60 AM Duration 20 min.

C.A. 19 Expr. 3 Run 4
Sheet ____ Date 8-5 1954 Time 1:25 ~~PM~~ AM
Purpose Bare Indium Traverse Vertically from Center of Reactor.

Bare In	C-14	1/4 - 1/4	- 1.10
	C-17	"	- ~~3.75~~ 2.75
	C-24	"	- 4.25
	C-40	"	- 5.78
	C-23	"	- 7.12
	C-39	"	- 7.75
	C-34	"	- 8.62
	C-26	"	- 10.12
	C-20	"	- 12.29
	C-42	"	- 15.89
	C-35	"	- 20.20

Al # 1574 1.0 - 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr. 3 Run 4

Table Pos. 0.012 T 0.4168 B 0.1260

Control Rod		Channel	
A	0.000	A 83	1000/50
B	0.051	B .05+	
C	17.108	C 4.8	2.5×10^{-9}
4		D 73	1000/100
		E 5.7	900 V.

Tim Crit. 1:4 15/60 AM PM Duration 20 min.

8-6-54

INSTRUMENT CHECK

Time 905 AM PM Source PB 58

Channel	A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30		12	40	2"
% F.S. Trip	70		100	85	100

Counts 1+2 OK

8-6-54

C.A. 19 Expr. 3 Run 5

Sheet _____ Date 8-6- 1954 Time 9:10 AM PM

Purpose Cd covered Indium Traverse Vertically from Center of Reactor

Cd Covered In Foil Nos. and positions

Same as 19-3-4.

Al # 1575 1.0 - 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr 3 Run 5

Table Pos. 0.013 T 0.4175 B 0.1268

Control Rod		Channel	
A	0.005	A 80	1000/50
B	0.051	B .05	
C	16.624	C 8.8	10^{9}
4		D 70	1000/100
		E 2.3	810 V.

Tim Crit. 9:33 59/60 AM PM Duration 20 min.

Aug. 10, 54

INSTRUMENT CHECK

Time 10 45 AM PM Source PBS8

	Channel A	B	C	D	E
Range	10/1000	OK	10^10	10/1000	900V
Source Dist.	30"	|	14	35"	2"
% F.S. Trip	15	|	90	90	100+

Counts 42+3 OK

Fission chamber gas line repaired and reinstalled

C.A. 19 Expr. ~~4~~ 5 Run 1

Sheet _____ Date 8-10 -1954 Time 1:15 AM PM

Purpose Vertical Power distribution
(Al foils 1.25" in diameter)

①	Al #	1576	.75 - .75 - .036"
		1577	" - " - 2.000"
		1582	" - " - 3.100
		1581	" - " - 6.400
		1580	" - " - 6.405
		1579	" - " - 7,165
		1578	" - " - 7,120
		1583	1.5 - 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr. ~~4~~ 5 Run 1

Table Pos. 0.00 10.4184 B 0.1258

Control Rod		Channel	
A	0.003	A	79 1000/50
B	0.058	B	.05
C	17.135	C	3.6 2.5 x 10^-9
4		D	69 1000/100
		E	2.0 810 V.

Tim Crit. 1:31 1.8/60 AM PM Duration 20 min.

INSTRUMENT CHECK

Time 1:15 ~~AM~~ PM Source PR 58

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30"		10"	40"	2"
% F.S. Trip	85		100	90	100+

Counts 1 & 2 OK

C.A. 19 Expr. #5 Run 2.
Sheet ____ Date 8-11-1954 Time 1:20 ~~AM~~ PM
Purpose Power Distribution and
Run: Points on Indium traverse

③

al	# 1586	.75 - .75 - 5.2"	
	# 1585	" - " - 6.910"	25
	# 1584	" - " - 6.905"	
	# 1587	1.5 - 1.5 - 15.5	
Bare In	C-3	¼ - ¼ - 7.25	
	C-27	" - " - 8.00	
	C-21	" - " - 10.84	
	C-4	" - " - 15.89	

CRITICAL POSITIONS

C.A. 19 Expr #5 Run 2
Table Pos. 0.012 T. 0.4155 B 0.1248

Control Rod		Channel	
A	0.000	A	80 1000/50
B	0.053	B	.05
C	16.925	C	7.2 10^{-9}
4		D	70 1000/100
		E	1.8 810 V.

Tim Crit. 1:40 53/60 ~~AM~~ PM Duration 20 min.

1 pc fuel 2 7/8" X 2 7/8" X .004"
removed from position .031" from center
1 pc fuel 2 7/8" X 2 7/8" X.004
removed from position 2.000" from center

INSTRUMENT CHECK

Time 3^00 PM Source PB58

Channel

	A	B	C	D	E
Range	10/100		10^-10	10/1000	900V
Source Dist.	32"		12"	35"	4"
% F.S. Trip	90		75	90	100+

Counter 1 + 2

C.A. 19 Expr. ~~3~~ 5 Run 3

Sheet Date Aug 12 1954 Time 3:15 ~~AM~~ PM

Purpose Cd covered power distribution.

③ Al #1592 .75 x .75 x .036
1591 " x " x 3.100
1590 " x " x 5.2
1589 " x " x 7.115
1588 " x " x 7.120

#1593 1.5 x 1.5 x 15.5

CRITICAL POSITIONS

C.A. 19 Expr ~~3~~ 5 Run 3

Safety Rods 0.013 0.4178 — 0.1257

Control Rod	Channel
1 0.000	A 83 @ 1000/50
2 0.050	B .055
15.348	C 4.8 @ 2.5×10^{-9}
———	D 71 @ 1000/100
	E 2 @ 810V

Time Crit. 3:43.5 ~~AM~~ PM Duration 20 min.

Aug 16

INSTRUMENT CHECK

Time 1:45 ~~AM~~ PM Source PB58

Channel

	A	B	C	D	E
Range	10/100	OK	10^-10	10/1000	900V
Source Dist.	30"		14	40"	1"
% F.S. Trip	90		85	90	100+

Counter 1 + 2 ok

C.A. 19 Expr. 3 Run 6
Sheet ____ Date 8-16 1954 Time 2:00 ~~AM~~ PM
Purpose Rerun Bare Indium traverse points for Checking.

Bare In	C-35	1/4 - 1/4 - 6.41	
	C-43	" - 1/4 - 7.25	
	C-17	" - " - 8.00	
	C-23	" - " - 9.40	
	C-20	" - " - 10.89	
	C-29	" - " - 13.01	
	C-24	" - " - 15.89	
Al #	1594	1.5 - 1.5 - 15.5	

CRITICAL POSITIONS
C.A. 19 Expr. 3 Run 6
Table Pos. 0.012 T .424 B 1.253

Control Rod		Channel	
A	0.005	A	80 (1000/50)
B	0.054	B	.053
C	17.085	C	4.6 2.5×10^{-9}
		D	69 (1000/100)
		E	21 810 V.

Tim Crit. 2:18 (12/60) ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK
Time 950 AM ~~PM~~ Source PB58

	Channel A	B	C	D	E
Range	10/100	OK	10^{-6}	10/100	900V
Source Dist.	36"		18	40	~~40~~ 45"
% F.S. Trip	90		80	90	100×

Count 1+2 OK

1:00 PM Tripp rechecked after power failure

C.A. 19 Expr. 3 Run 4
Sheet ____ Date 8-19 1954 Time 2:00 ~~AM~~ PM
Purpose Comparison of Al Catcher foils and 2 mil Al disks for Power distribution in reactor

Al	1595	.75 - .75 - .067	U - 3666
	1596	.75 - .75 - 3.131	-3659
	1597	.75 - .75 - 5.231	-3658
	1599	.75 - .75 - 6.431	-3663
	1598	.75 - .75 - 6.436	
	1601	.75 - .75 - 6.936	-3669
	1600	.75 - .75 - 6.941	
	1603	.75 - .75 - 7.146	-3667
	1602	.75 - .75 - 7.151	
Std.	1604	1.5 - 1.5 - 15.5	

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 4

Table Pos. 0.010 L T 4218 R .1244

Control Rod		Channel	
A	0.010	A 80	1000/50
B	0.054	B .055	
C	17.165	C 4.5	2.5×10^{-9}
4		D 79	1000/100
		E 1.8	810 V

Tim Crit. 2:20 55/60 ~~AM~~ PM Duration 20 min.

Spencer
Lynn
Scott

INSTRUMENT CHECK

Time 1460 ~~AM~~ PM Source PB 59

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist.	30"		14	40"	1"
% F.S. Trip	45		100+	100	100+

Counts 1+2 OK

C.A. 19 Expr. 6 Run 1

Sheet ____ Date 24 Aug 1954 Time 1:55 ~~AM~~ PM

Purpose Calibration of ~16 in. of Rods A & C.

10 mil U disc, used for Normalizing Catcher Foil, removed from Reactor.

CRITICAL POSITIONS

19 Expr. 6 Run 1

L T. 4226 B .1242

Temp.
Center .895
Edge .895
72.8°F

Control Rod 0.010 Channel

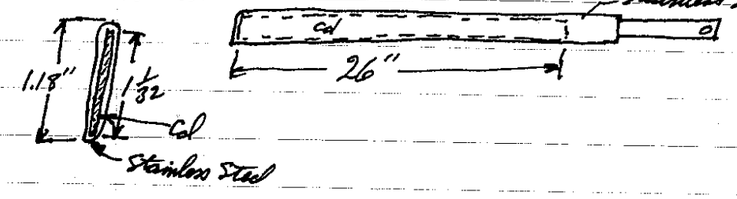
A	16.548	A	38	100/100
B	0.055	B	.005	
C	0.025	C	4.9	2.5×10^{-10}
		D	65	100/100
		E	.3	900 v

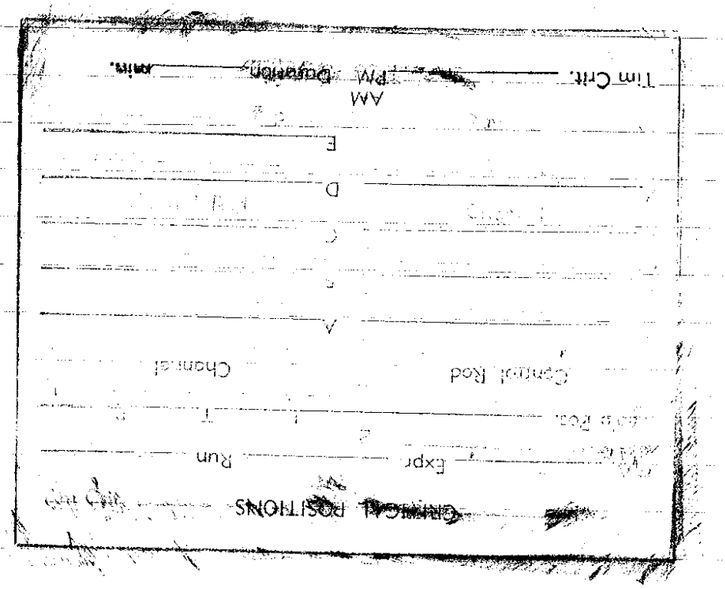
14:25 ~~AM~~ PM Duration 64 min.

Position	Rod A	Rod C
	16.542	0.025
	16.542	4.000
	16.532	6.005
	16.388	8.005
	16.082	10.000
	15.385	12.000
	13.996	14.006
	10.384	16.008
	0.005	16.586

The above rod position changes made with B, at .005.

Control Rod B (Boral) was replaced with a Cd-Stainless Steel blade.





CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 2

Table Pos. 0.010 T 0.4228 T B 0.1250

Control Rod	Channel
A 0.005	A 89 10/500
B 0.050	B .005
C 16.586	C 7.2 2.5×10^{-10}
4	D 82 100/100
	E 0.2 x 900V

Tim Crit. 1615 ~~AM~~ PM Duration 18 min.

Rod C
0.030

Rod B
19.40

Scott
Spencer
Lynn

INSTRUMENT CHECK

Time 9:35 ~~AM~~ PM Source P

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	1/1000	900V
Source Dist.	30"	|	12"	48"	1"
% F.S. Trip	85	|	90	95	100+

Counters 1 & 2 OK

Temp - 10:10 ~~AM~~
Edge - .893 - 72.7° F
Center - 896 - 72.9° F

C.A. 19 Expr. 6 Run 3

Sheet ____ Date 8-25-1954 Time ~~AM~~ PM

Purpose To Evaluate Rod B (cd) to determine its suitability as a Control.

CRITICAL POSITIONS

C.A. 19 Expr 6 Run 3

Table Pos. 0.012 T .4229 B .1299

Control Rod	Channel
A 0.004	A 75 10/500
B 19.450	B .005
C 0.035	C 6.4 2.5×10^{-10}
4	D 70 100/100
	E .4 900 V.

Tim Crit. 10100 AM ~~PM~~ Duration 90 min.

B.	Rod C	Rod B	Period ~~Rod B~~	¢	
	16.157	~~Ro~~ 0.05	~154 Sec	6.9	
.0065	16.157	11.085			
	15.597	11.085	~110.8	8.9	
	15.597	13.214			
.0065	14.993	13.216	~123.8	8.2	(19.6.4)
	14.993	14.579			
	14.400	14.579	~130.3	7.9	
	14.400	15.579			
	13.675 ~~13.765~~	15.579	119.5 ~~~126~~	8.4 ~~8.1~~	
	13.675	16.462			
	12.774	16.462	119.5	8.4	
	12.774	17.245			
	11.235	17.245	84.7	11.0	
	11.235	18.266			
	8.775	18.266	108.6	9.0	68.7
	8.775	19.095			
	0.035	19.095	247.6	4.6	73.3
	0.035	19.466			

80.4

92.2

Temp 1:50
C - .894
E - .894
72.9°F

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 4

[illegible] 0.010 ~~0.42303~~ 0.1270

Control Rod	Channel	
A 99.997	A 56	100/100
B 14.579	B .0065	
C 14.993	C 6.9	2.5×10^{-10}
4	D 49	100/200
	E .6	9000

Tim Crit. 1:18 AM PM Dur[illegible] 100 min.

Temp 4:06
C .893
E .893
72.72°F

8-26-54

INSTRUMENT CHECK

Time 11:10 ~~AM~~ PM Source PB-58

	Channel A	B	C	D	E
Range	10/1000		10^{-10}	10/1000	900 V.
Source Dist.	30"	9	14"	40"	1"
% F.S. Trip	95		100	95	100

Ch. 1+2 oc

C.A. 19 Expr. 5 Run 5

Sheet " Date 8-26 1954 Time 12:30 ~~AM~~ PM

Purpose Comparison of Al foils and U disc (2 mil) for Power Distribution in Reactor

Al #1605	.75 - .75 - ~~3.2~~ 3.13	u	3657
#1607	-6.431		3671
#1606	-6.436		
#1609	-6.936		3661
#1608	-6.941		
#1612	7.		3662
#1611	7.		3665
#1610	7.		

Std #1613 1.5 - 1.5 - 15.5

Added 1 10-mil (2.75") U disc for Normalizing Catcher
5 2-mil (1 7/16" dia) U discs for catchers.

Lynn
Spencer

Temp
1:05
C - .825 69.8° ~~70.3°~~
E - .840 70.4°F

CRITICAL POSITIONS

C.A. 19 Expr 5 Run 5

Temp. Cor. 0.010 T 0.3228 0.1249

Control Rod		Channel		
A	0.014	A	40	1000/100
B	0.055	B	.05	
C	17.180	C	3.6	2.5×10^{-9}
		D	70	100/100
		E	2.1	810 V

Time Crit. 1:51 43/60 ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK

Time 1:30 ~~AM~~ PM Source PN 58

	Channel A	B	C	D	E
Range	10/1000	D/C	10^{-10}	10/1000	900V
Source Dist.	30"	/	6"	40"	½"
% F.S. Trip	95	/	100+	95	100+
Counters	1	2	7		

Temp. 3:17 P
Center 0.891 - 72.7
Edge 0.894 - 72.8

C.A. 19 Expr. 6 Run 5 & 6
Sheet _____ Date 27 Aug 1954 Time 2:45 ~~AM~~ PM
Purpose Rod B. Calibration (0-11 inches)
Temp coefficient Run for ~ 73°F

Rod B placed at 5.000 for run-up, and reactor leveled with same rod. (102.3 sec. period - 9.7 ¢)
See B chart

Rod C set on 16.624 and reactor leveled with Rod B for reproducibility check with 19-6-5 — Rod B - 11.985 →

Lynn Spencer

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 5
Rod Pos. 0.008 T.O. 2215 B.O. 1242

Control Rod		Channel	
A	0.010	A 44	1000/100
B	11.945	B .055	
C	16.624	C 3.2	2.5×10^{-9}
		D 78	1000/100
		E 2.1	810 V

Tim Crit. 3:01 ~~AM~~ PM Duration 20 min.

Rod placed at 5.498 for run-up and reactor leveled with same rod. (11.570 121.0 Sec - 8.4 ¢)

Temp 4:05 P
Center .893
Edge .893
72.7°F

CRITICAL POSITIONS

19 Expr 6 Run 6
0.009 T. 2218 B .1238

Control Rod		Channel	
A	0.006	A 45	1000/100
B	20.328	B .056	
C	0.037	C 5.4	2.5×10^{-9}
		D 79	1000/100
		E 2.2	810 V

Tim Crit. 3:50 ~~AM~~ PM Duration 35 min.

8/21 SP Lowered control temp Rm 108 from 73°F to 60°F

8/21/54

9:40A Temperature of tables.

Center 0.783 mv 67.8°F

Edge 0.783 ✓ ✓

These values agree with the Electromax; the heaters did not come on during an observed period so probably this is minimum attainable temperature with present system of current ambient (external) temperature.

1:20P Center ~~0.~~ 0.783 mv

Edge 0.783 ✓

8-30-54

INSTRUMENT CHECK

Time 8:35 AM ~~PM~~ Source Pb 5-8

	Channel A	B	C	D	E
Range	10/1000 ✓		10^{-10}	10/1000	900V
Source Dist.	30"		30"	32	½"
% F.S. Trip	95		100+	95	105

The id 2 ✓

C.A. 19 Expr. 6 Run 7

Sheet _____ Date 9-30-1954 Time 8:30 AM ~~PM~~

Purpose Temperature coefficient for demand setting of 60°F.

Temp 9:24A

Center .765

Edge .766

67.2°F

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 7

Table Pos. 0.008 L T. 2220 .1249

Control Rod		Channel	
A	0.016	A	49 1000/100
B	19.944	B	.05
C	0.035	C	4.5 2.5×10^{-9}
4		D	68 1000/100
		E	1.9 810 V

Tim Crit. 8:03 AM ~~PM~~ Duration 23 min.

C.A. 19 Expr. 7 Run 1
Sheet ____ Date 30 Aug 1954 Time 1:35 AM PM
Purpose Bare Gold Traverse Vertically from center of Reactor

Gold Foil #	Position
26	.25 - .25 - .067
25	-2.05
12	-5.20
14	-6.41
10	-7.25
17	-8.00
29	-8.62
21	-10.12
31	-10.84
20	-13.01
11	-18.77
Al catcher #1614	1.0 - 1.5 - 15.5

Lynn
Spencer

Temp 2:02
center .785
Edge .787

CRITICAL POSITIONS
C.A. 19 Expr 7 Run 1
Date 0.008 L T .2220 .1258

	Control Rod		Channel	
A	0.010	A	42.5	100%/100
B	0.055	B	.05	
C	16.939	C	4.8	2.5×10^{-9}
		D	74.5	1000/100
		E	2.2	8100

Crit. 2:56 11/60 AM PM Duration 20 min.

8/30/54
3:50 PM ~~Low~~ Raised Temp. demand setting to 80°F

8-31-54

Greenstreet
Spencer
Lynn
Crudele

INSTRUMENT CHECK

Time 8:35 AM ~~PM~~ Source PB 58

	Channel A	B	C	D	E
Range	~~1/1000~~	5	~~1/1000~~	~~1/1000~~	900 V.
Source Dist.	30"		18"	36"	½"
% F.S. Trip	95		100+	95	100+

CIC 102 OK

C.A. 19 Expr. 7 Run 2

Sheet ____ Date 8-31-1954 Time ____ AM ~~PM~~

Purpose Cd covered Gold Traverse vertically from center of reactor.

Foil #	Position
30	.25 - .25 - .067
33	2.05
13	5.20
19	6.41
16	7.25
28	8.00
32	8.62
22	10.12
34	10.84
24	13.01
36	18.77

Al catcher foil # 1615

1.0 - 1.5 - 15.5

Temp 9:25 A
center .981 76.6 ~~76.8~~°F
Edge .977 76.4°F

CRITICAL POSITIONS

C.A. 19 Expr. 7 Run 2

Table Pos. 0.008 T 0.221 B 0.1250

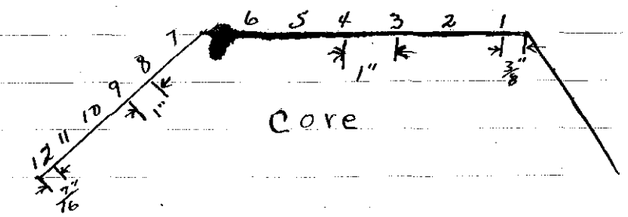
	Control Rod		Channel	
A	0.000	A	43	1000/100
B	0.039	B	1053	
C	16.688	C	30	2.5×10^{-9}
A		D	74.5	1000/100
		E	1.2	810 V

Tim Crit. 9:18 33/60 AM ~~PM~~ Duration 20 min.

C.A. 19 Expr. 3 Run 4

Sheet ____ Date ____ 195__ Time ____ AM PM

Purpose Bare Indium Along flat of Core (outside)



Pos	Foil No.
1	C-39
2	C-31
3	C-14
4	C-19
5	C-7
6	C-36
8	C-33
9	C-11
10	C-6
11	~~C-38~~ C-15
12	C-28

al #1616 1.5 - 1.5 - 15.5

Temp. 2:53 PM

Edge .9922 -77.05°F
Center .9897-76.96°F

CRITICAL POSITIONS

C.A. 19 Expr. 3 Run 7

Table Pos. 0.007 T .2215 BR .1256

Control Rod		Channel	
A	0.005	A	40.5 1.000/100
B	0.049	B	.05 3.6 2.5 ×10⁻⁹
C	17.232	C	~~70.5~~ 1.000/100
4		D	70.5
		E	1.0 810 V₁

Tim Crit. 2:42 50 ~~AM~~ PM Duration 20 min.

9-1-54

Spencer
Lynn

INSTRUMENT CHECK

Time 1:20 ~~AM~~ PM Source PB 5-8

	Channel A	B	C	D	E
Range	1%000 Q		10^10	1%000	900v
Source Dist.	30"		15"	40"	1"
% F.S. Trip	95 Thr 1+2 Q		100+	95	100

C.A. 19 Expr. 3 Run 8

Sheet ____ Date 1 Sept 1954 Time 1:15 ~~AM~~ PM

Purpose Cd covered Indium Traverse across the flat

Pos	Foil No.
1	C-18
2	C-10
3	C-30
4	C-42
5	C-26
6	C-40
8	C-39
9	C-6
10	C-28
11	C-12
12	C-7

al #1617 1.5-1.5-1.5.5

Temp 1:50 PM

CRITICAL POSITIONS

C.A. 19 Expr. 3 Run 8

Tube Pos. 0.008 T .2211 B .1248

Edge 1.0203 – 78.25°F Control Rod Channel

Center 1.0200 – 78.25°F

A.	0.007	A	40.5' (10000/100)
B.	0.044	B	.049
C.	16.575'	C	3.725 X 10^-9
4		D	70.5' (1000/10)
		E	.9 800 V

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

~~Source In For 1~~

C.A. 19 Expr. 6 Run 7

Sheet ____ Date 1 Sept 1954 Time 3:30 ~~AM~~ PM

Purpose Temp Coefficient Run for ~ 79°F

Reactor in same condition as in 19-6-5 and 19-6-7

Lynn
Spencer

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 7

Temp 4:10 Source Pos. 0.009 L T.1214 B.1249

Control Rod		Channel	
A	0.009	A 41	100/100
B	20.557	B .05	
C	0.020	C 3.8	2.5×10^{-9}
		D 70	100/100
		E 1.3	810 V

Tim Crit. 3:50 AM PM Duration 24 min.

center 1.018
Edge 1.016
C - 78.3°F
E - 78.2°F

Rod B set at 6.000 for run-up and reactor leveled with same rod. Rod B - 12.085
~ 89 sec period
10.6 cents

Rod B set at 5.500 for run-up and reactor leveled with same rod. Rod B — 11.071
~ 151 sec period
6.9 cents

9-2-54

INSTRUMENT CHECK

Time 9:00 AM PM Source PB 58

	Channel A	B	C	D	E
Range	10/1000	ok	10^{-10}	10/1000	900V
Source Dist.	30"		18"	40"	½"
% F.S. Trip	95			90	100+

Counts 1 & 2 OK

C.A. 19 Expr. 6 Run 8

Sheet Date 2 Sept 1954 Time 9:05 AM PM

Purpose check Temp. Coef. at ~78°F

Rod C set at 16.624
releveled with Rod B at 12.785

CRITICAL POSITIONS

C.A. 19 Expr 6 Run 8

Temp 9:33A Source Pos. 0.009 L T.1209 B.1250

Control Rod		Channel	
A	0.006	A 72	100/100
B	20.578	B .01	
C	0.022	C 2.8	5×10^{-10}
		D 62.5	100/200
		E 1.0	900 V

Tim Crit. 9:25 AM PM Duration 43 min.

center 1.0335
Edge 1.0335

78.8°F

C.A. 19 Expr. 6 Run 9
Sheet ______ Date 9-2- 1954 Time 1:40 ~~AM~~ PM
Purpose To Evaluate upper and lower points of Rod B.

Withdrew Rod B to 9.00 Rod C at 17.~~120~~ 119
Levelled with Rod B.

Added 6 - 1¼" shishes of Be Reflector to Top Center 6 shishes.

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 9
Source Pos. 0.008 T .1216 B .1249

Control Rod	Channel		
A. 0.005	A	76	100/100
B. 12.234	B	.011	
C. 17.119	C	2.9	5×10^{-10}
	D	67	~~100~~ 200
	E	1.4	900 V.

Tim Crit. 1:55 ~~AM~~ PM Duration 20 min.

5.4 div 117 sec period ~8.6 ¢

Rod C	Rod B		Period	¢
11.169	19.466	(Seep. 76)	148 Sec	7.1 ¢
11.169	20.086			
6.955	20.086		76 "	11.9 ¢
6.955	21.094			

3:35 PM Demand setting for temp. control of Room
2 Sept 108 lowered from 80°F to 73°F.

9-3-54

INSTRUMENT CHECK

Time 9:06 AM ~~PM~~ Source Pb 5-8

	A	B	C	D	E
Range	10/1000	α	10^{-10}	10/1000	900v
Source Dist.	30"		30"	36"	½"
% F.S. Trip	95		100+	95	100

Ctrs 142 α

C.A. 19 Expr. 4 Run 3
Sheet ______ Date 3 Sept 1954 Time 9:10 AM ~~PM~~
Purpose Same as 19-7-1 (γ distribution)

7 Film badges placed as in 19-4-1.
removed 3/16" x 2 7/8" x 12.9" Be vertically in mid-plane of reactor to allow placement of film.

Al catcher # 1618 1.0 - 1.5 - 15.5

Remored 6 1/4" shishes of Be Added for 19.6.9

CRITICAL POSITIONS

C.A. 19 Expr. 4 Run 3

Table Pos. 0.008 T. 0.1220 0.1250

Control Rod		Channel	
A	0.010	A 83	100/50
B	0.050	B 0.005	
C	16.975	C 0.8 10^{-9}	
4		D 71	100/100
		E 1.1	900 V

Tim Crit. 9:36 34/60 AM ~~PM~~ Duration 20 min.

Temp. 9:40A
Center .930
Edge .936
74.3° F

C.A. 19 Expr. 6 Run 10

Sheet ____ Date 9-3 1954 Time 10:15 ~~7:15~~ AM PM

Purpose To check Rod Evaluation in 19.6.9. with fuel (10 mil) disc for Cather foil remored

Add 6 1/4" shishes of Be to Top center shishes of Reflector

Run-up accomplished with Rod B at 9.000 Leveled with B. ~106.4 sec period

CRITICAL POSITIONS

C.A. 19 Expr. 6 Run 10

Table Pos. 0.008 T. .1214 B. .1246

Control Rod		Channel	
A	0.005	A ~~80~~ 21.5	100/100
B	12.394	B .01	
C	16.265	C 1.3	10^{-9}
4		D 71	100/200
		E 1.5	900V.

Tim Crit. 10:30 AM ~~PM~~ Duration 17 min.

Rod B driven to 19.466
" C = 0.029 to give Positive period
Leveled with Rod B.

Rod C	Rod B	Period	¢
0.029	19.466	163	~
0.029	20.060		

INSTRUMENT CHECK

Time 8:35 AM ~~PM~~ Source PB-58

	Channel A	B	C	D	E
Range	10^{3} 1000	OK	10^{-10}	10^{3} 1000	100V
Source Dist.	30"		24"	36"	½"
% F.S. Trip	~95		100+	90	100+

C.A. 19 Expr. 6 Run 11

Sheet ____ Date 7 Sept 1954 Time 9:00 AM ~~PM~~

Purpose Temp Coef. ~ 73°F

U disc (10 mil) placed in catcher

Coil position 1.0 - 1.5 - 15.5

Temp	9:25	AM	
Center	.897		72.9°F
Edge	.897		

CRITICAL POSITIONS

19 Expr 6 Run 11

0.008 .9214 .02 .1234

Channel

A	0.009	A 77	100/100
B	20.161	B .01	
C	0.025	C 2.2	10^{-9}
		D 68	100/200
		E .9	900 v

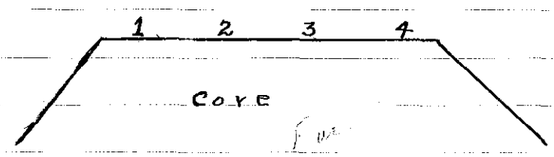
Tau Crit. 9:11 AM PM Duration ____ min.

Rod C set at 16.624
releveled with Rod B - 11.439

C.A. 19 Expr. 5 Run 6

Sheet ____ Date 9-7-1959 Time 1:30 ~~AM~~ PM

Purpose Power Distribution along Floor of Core-Reflector Interface and Super Q Points



Al #	1619	Pos 1	3/4 - 3/8 - ~~6.9~~ 7.1
	1620	2	" - 2 1/4 - "
	1621	3	" - 3 11/16 - "
	1622	4	" - 5 1/16 - "

(Norm) # 1623 1.5" - 1.5" - 15.5"

Super Q with 1/2" dia Al cather foil.

~~Lightest~~ Piece	Al # ~~449~~ 449	~~1/2~~ - 1/2 - 1/8
Medium "	459	1/2 - 1/2 - 5.2
Heavy "	460	1/2 - 1/2 - 7.0

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 6

Tank Pos. 0.008 T. 9210 B. 1243

	Control Rod		Channel	
A	0.005	A	40	1000/100
B	0.061	B	.05	
C	17.066	C	2.9	5×10^{-9}
		D	69	1000/100
		E	2.1	810 V

Tim Crit. 1:54 40/60 AM PM Duration 20 min.

INSTRUMENT CHECK

Time 9:30 AM PM Source PB 5-8

	Channel A	B	C	D	E
Range	1/1000	cfc	10^{-10}	1/1000	900 V.
Source Dist.	30"		8"	40"	½"
% F.S. Trip	90		100+	90	100+

Counters 1 & 2 OK

C.A. 19 Expr. 8 Run 1

Sheet _____ Date 8 Sept 195 4 Time 9:45 AM PM

Purpose Zero run for reactivity measurements of fuel in the core

Temp 10:14 A
Center .896
Edge .894
72.8°F

CRITICAL POSITIONS

C.A. 19 Expr. 8 Run 1

Tank Pos. 0.008 T. 9208 B. 1245

	Control Rod		Channel	
A	0.010	A	82	10%50
B	16.599	B	.0049	
C	16.624	C	3.9	10^{-10}
		D	70	10%100
		E	0.5	900 V

Tim Crit. 10:04 AM PM Duration 14 min.

C.A. 19 Expr. 8 Run 2
Sheet ____ Date 8 Sept. 1954 Time 10:40 AM PM
Purpose Reactivity measurement of fuel in core

1 piece of fuel (5 3/4" x 2 7/8" x .004") placed

Back	over	up
0 → 2 7/8	-2 7/8 → +2 7/8	1/8

Uranium wt — 19.60 gms

CRITICAL POSITIONS

C.A. 19 Expr 8 Run 2

0.008 .9218 .1250

Temp. 10:55A
Center .8955
Edge .894

Control Rod		Channel	
A	999.995	A 82	100/50
B	12.150	B .0049	
C	16.624	C 3.9	x 10^-10
4	~~12.150~~	D 70	100/100
		E .4	900 V

Tim Crit. 10:51 AM PM Duration 14 min.

C.A. 19 Expr. 8 Run 3
Sheet ____ Date 8 Sept 1954 Time 11:25 AM PM
Purpose Reactivity measurement of fuel in core

Piece of fuel moved to

0 → 2 7/8	-2 7/8 → +2 7/8	3.0

CRITICAL POSITIONS

C.A. 19 Expr 8 Run 3

Table Pos. 0.010 .8227 8.1248

Temp 11:40A
Center .8945
Edge .8925

Control Rod		Channel	
A	999.995	A 81	100/50
B	12.255	B .005	
C	16.625	C 3.9	10^-10
4		D 69.5	100/100
		E .4	900 V

Tim Crit. 11:43 AM PM Duration 12 min.

C.A. 19 Expr 8 Run 4
Sheet ____ Date 8 Sept 1954 Time 1:25 ~~AM~~ PM
Purpose Reactivity measurement of fuel in reactor

Piece of fuel moved to:-

0 - 2 7/8" -2 7/8" to + 2 7/8" 5.2"

Temp. 1:
center:- .8950
edge :- .8935

CRITICAL POSITIONS

C A 19 Expr 8 Run 4
Table Pos. .008 ~~.8246~~ .8219 B .1296

Control Rod		Channel	
A.	.0000	A 79.5	100/50
B.	12.203 11.04	B .0049	
C.	16.624	C 3.0	10^{-10}
4		D 68	100/100
		E 0.4	900

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

11.0
5.6
7.2

C.A. 19 Expr. 8 Run 5
Sheet ____ Date 9-8-1954 Time 2:15 ~~AM~~ PM
Purpose Reactivity Measurement of fuel in Core.

Piece of fuel Moved to:-

0 → 2 7/8", -2 7/8" → +2 7/8", [redacted] 7.0"

Temp · 245 PM
center:- .8943
Edge :- .8932

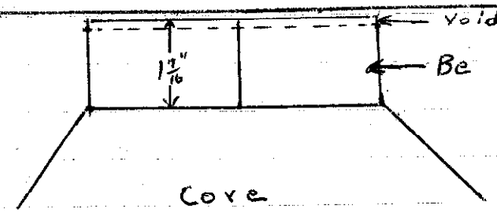
CRITICAL POSITIONS

C A 19 Expr. 8 Run 5
Table Pos. 0.008 T .8216 B .1259

Control Rod		Channel	
A	0.004	A	80 100/50
B	12.536 12.44	B	.0049
C	16.624	C	3.0 ~~68.5~~ 10^{-10} ~~100/100~~
4		D	68.5 100/100
		E	.45 900V

Tim Crit. 2:32 ~~AM~~ PM Duration ____ min.

C.A. 19 Expr. 8 Run 6
Sheet ____ Date 9-8-1954 Time 3:30 ~~AM~~ PM
Purpose Zero Run to check effect of Removing Be. (5¾" x 2⅞" x ⅛") at ~1.4" above Core as shown.



Temp 3:55 pm

Center :- .8940
Edge :- .8933

CRITICAL POSITIONS

C.A. 19 Expr. 8 Run 6
Table Pos. 0.008 T .8210 B .1256

Control Rod		Channel		
A	0.004	A	79.5	100/50
B	12.508	B	.005	
C	16.624	C	3.0	10^{-10}
4		D	68	100/100
		E	.45	900 V

Tim Crit. 3:50 ~~AM~~ PM Duration ____ min.

INSTRUMENT CHECK

Time 8:40 AM ~~PM~~ Source PB 5-8

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900 V
Source Dist.	38"		24"	36"	½"
% F.S. Trip	95		90	90	100+

Counters 142 OK

C.A. ____ Expr. ____ Run ____
Sheet ____ Date ____ 195__ Time ____ AM PM
Purpose ____

C.A. 19 Expr. 8 Run 7
Sheet ____ Date 9-9-1954 Time ____ AM ~~PM~~
Purpose Zero Run
Same as 19.8.6

CRITICAL POSITIONS

C.A. 19 Expr. 8 Run 7

Table Pos. 0.008 T 0.9208 B. 0.1251

Control Rod		Channel	
A	0.010	A	84 100/50
B	12.580 - 12.41	B	0.0049
C	16.624	C	5.0 x 10^-10
D		D	71 100/100
		E	0.40 900V

Time Critl. 10:45 AM PM Duration 15 min.

Temp. 10:55 AM
Center .8926
Edge .8926

Temp. 72.9

C.A. 19 Expr. 8 Run 8

Sheet _____ Date 9-9 1954 Time 11:20 AM PM

Purpose Reactivity Measurement Of Fuel In Reactor.

Piece Of Fuel Moved To:
0 - 2 7/8 -2 7/8 to +2 7/8 8.18"

Temp. 11:50
Center .8928
Edge .8928

CRITICAL POSITIONS

19 Expr 8 Run 8

0.008 T .8260 B .1259

Control Rod		Channel	
A.	0.007	A	84 100/50
B.	16.310 - 15 38.6	B	.0049
C.	16.625	C	5.0 10-10
D		D	71 100/100
		E	.040 900V

Time Critl. 11:40 AM PM Duration 10 min.

58.6
12.4
3.2
3.8
52.0

C.A. 19 Expr. 8 Run 9
Sheet Date 9 Sept 1954 Time 1:20 ~~AM~~ PM
Purpose Reactivity measurement of fuel in reactor

Piece of fuel placed at core-reflector interfa

0→2 7/8 −2 7/8 → +2 7/8 7.12

CRITICAL POSITIONS
C.A. 19 Expr. 8 Run 9
Pos. 0.009 L T. 8221 .1268

Temp 1:40P

Center .893
Edge .893

Control Rod
A 0.008
B 12.852
C 16.625
4 ~~12.852~~

Channel
A 83 100/50
B .0049
C 5.1 10⁻⁵⁰
D 70.5 100/100
E .4 900 V

Tim Crit. 1:38 ~~AM~~ PM Duration 11 min.

C.A. 19 Expr. 8 Run 10
Sheet Date 9 Sept 1954 Time 2:05 ~~AM~~ PM
Purpose Reactivity measurement of fuel in reactor

Piece of fuel placed at
0→2 7/8 −2 7/8 → +2 7/8 7.37

CRITICAL POSITIONS
C.A. 19 Expr. 8 Run 10
Pos. 0.010 L T. 5222 .1258

Temp 2:21
Center .893
Edge .893

Control Rod
A 999.995
B 13.870
C 16.625
4

Channel
A 84 100/50
B .0049
C 5.1 10⁻¹⁰
D 71 100/100
E .5 900 V

Tim Crit. 2:12 ~~AM~~ PM Duration 15 min.

C.A. 19 Expr. 5 Run 7
Sheet ____ Date 9 Sept 195 4 Time 3:05 ~~AM~~ PM
Purpose Super Q in reflector

Placed 3 Super Q foils and associated ½" a/ catcher foils at

465 — 3/8 - 3/8 - 7.12
Small "Q"

466 — 3/8 - 3/8 - 7.68
medium "Q"

467 — 3/8 - 3/8 - 8.49
Large "Q"

normalizer # 1624 — 1.0 - 1.5 - 15.5

Fuel Sheet used for Reactivity Measurements Removed from Reactor.

Be replaced.

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 7
Table Pos. 0.010 I. T. 530 R. 1263

Control Rod	Channel
A 0.006	A 81.5 1000/50
B 0.048	B .05
C 17.129	C 5.2 2.5×10^{-9}
4	D 71 1000/100
	E 2.1 810 ~~U~~

Tim Crit. 3:20 57/60 ~~AM~~ PM Duration 20 min.

INSTRUMENT CHECK

Time 9:35 AM ~~PM~~ Source PB 58

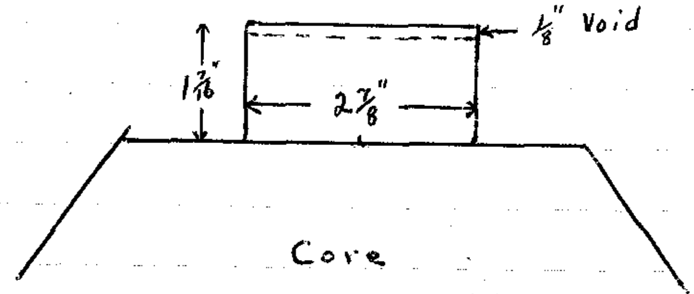
	Channel A	B	C	D	E
Range	10/1000 α		10^-10	10/1000	900v
Source Dist.	30"		6"	35"	1"
% F.S. Trip	95		100+	95	100

this 1+2 α

C.A. 19 Expr. ~~8~~ 9 Run ~~X~~ 1

Sheet ______ Date 9-10 1954 Time 10:10 AM ~~PM~~

Purpose Zero Run



Removed 2 7/8" X 1 7/16" X 1/8" Be as shown.

Temp 10:32 AM
Center .8935
Edge .8928
Temp. 72.9

CRITICAL POSITIONS

C.A. 19 Expr. 9 Run 1

Table Pos. .010 T .03224 B .1256

Control Rod		Channel		
A 0.003	A	~~0.003~~ 78	100/50	
B 20.226 82.3¢	B	.005		
C 0.025	C	3.0	10^-10	
4	D	6.6	100/100	
	E	.50	900 V.	

Tim Crit. 10:25 AM ~~PM~~ Duration 15 min.

C.A. 19 Expr. 9 2
Sheet ____ Date 9-10 1954 Time 10:45 AM PM
Purpose Reactivity Measurement Of Cd In The Reactor.

cd Placed In Reflector.
0 → 1 7/16 ~~- 2 7/8~~ - 1 7/16 → +1 7/16 6.43

cd. Piece 1
1 7/16" x 2 7/8"
Thickness = .020"
Wt. = ~~11.3873 gm.~~ 11.383 gms

Temp. 11:04 AM
Center .8916
Edge .8917
Temp. 72.9°F

CRITICAL POSITIONS
C.A. 19 Expr 9 Run 1
Table Pos. 0.010 T. 2228 T B. 1253

Control Rod		Channel	
A 0.002		A 77.5	100/50
B 15.425	30.7 %	C .005	
C 0.024		C 3.0	10^{-10}
4		D 66	100/100
		E .60	900 V

Tim Crit. 11:03 AM PM Duration 11

C.A. 19 Expr. 9 Run 3
Sheet ____ Date 9-10 1954 Time 10:45 AM PM
Purpose Reactivity Measurement Of Cd In The Reactor

Cd Placed In Reflector
0 → 1 7/16 - 1 7/16 → +1 7/16 7.37

Temp. 11:32 AM
Center .8918
Edge .8918

CRITICAL POSITIONS
19 Expr 9 Run 3
.010 T. 12229 B. 1245

Control Rod		Channel	
A 0.003		A 77.5	100/50
B 16.554	41.2 %	B .0049	
C 0.021		C 3.0	10^{-10}
		D 65.5	100/100
		E .5	900 V

Tim Crit. 11:37 AM PM Duration 12 min.

C.A. 19 Expr. 9 Run 4
Sheet _____ Date 10 Sept 1954 Time 1:10 ~~AM~~ PM
Purpose Reactivity measurement of cd in Reactor

cd placed at
0 → 1 7/16 −1 7/16 → +1 7/16 7.12

CRITICAL POSITIONS
C.A. 19 Expr. 9 Run 4
0.010 T. .2233 .1258

Temp 1:30
Center .8930
Edge .8925

		Channel		
A	0.009	A	78	100/50
B	16.999	B	.005	
C	0.024	C	3.1	10^{-10}
		D	66	100/100
		E	.5	900 V

Tim Crit. 1:25 ~~AM~~ PM Duration 9 min.

C.A. 19 Expr. 9 Run 5
Sheet _____ Date 10 Sept 1954 Time 1:55 ~~AM~~ PM
Purpose Reactivity measurement of cd in reactor

cd placed at
0 → 1 7/16 −1 7/16 → +1 7/16 5.2

CRITICAL POSITIONS
C.A. 19 Expr. 9 Run 5
0.010 T. .2232 .1255

		Channel		
A	0.006	A	77	100/50
B	19.752	B	.0049	
C	0.025	C	3.1	10^{-10}
		D	65.5	100/100
		E	.4	900 V

Tim Crit. 2:09 ~~AM~~ PM Duration 9 min.

Power failure at 2:30 PM
" off for ~ 8 minutes

C.A. 19 Expr. 9 Run 6
Sheet ____ Date 10 Sept. 1954 Time 2:50 ~~AM~~ PM
Purpose Reactivity measurement of cd in reactor

cd placed at
0 → 1 7/16 -1 7/16 → +1 7/16 7.0

CRITICAL POSITIONS
C.A. 19 Expr 9 Run 6
0.010 .2239 .1263

Temp 3:14p
Center .8915
Edge .8915

A	0.008	A	72 100/50
B	17.859	B	.005
C	0.025	C	2.9 10^{-10}
4		D	60 100/100
		E	.4 900 v

Tim Crit. 3:06 ~~AM~~ PM Duration ____

C.A. 19 Expr. 9 Run 7
Sheet ____ Date 10 Sept 1954 Time 3:30 ~~AM~~ PM
Purpose Reactivity measurement of cd in reactor

cd placed at
0 → 1 7/16 -1 7/16 → +1 7/16 .12

CRITICAL POSITIONS
C.A. 19 Expr 9 Run 7
0.010 .2239 .1261

Temp 3:50
~~Center .9395~~
Center .9025
Edge .9395

A	999.996	A	~~72~~ 71 100/50
B	20.008	B	.005
C	0.020	C	2.8 10^{-10}
4		D	60 100/100
		E	.3 900 v

Tim Crit. 3:44 AM PM Duration 13 min.

Air Temperature in 108 at the conclusion of this run was ~ 78°F (air conditioning went off)

INSTRUMENT CHECK

Source PIS 55

Time 10:00 AM PM

	Channel A	B	C	D	E
Range	19 (1500)	OK	10^{-10}	10 (100)	900
Source Dist.	30"		6"	90"	1/4"
% F.S. Trip	95		100+	95	100+

Counters 1+2 OK

C.A. 19 Expr. 9 Run 8

Sheet ____ Date 13 Sept. 95 4 Time 10:10 AM PM

Purpose Repeat of 19.9.7.

Piece of Cd as per 19.9.78

CRITICAL POSITIONS

19 Expr 9 Run 8

0.010 .0242 .1256

Channel

A	0.009	A 78	100/50
B	19.980	B .005	
C	0.025	C 3.1	10^{-10}
		D 65.5	100/100
		E .4	900 v

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

Temp 10:35 A

Center .8895

Edge .8897

C.A. 19 Expr. 9 Run 9

Sheet — Date 13 Sept. 95 4 Time 10:55 AM PM

Purpose Reactivity measurement of Cd in Reactor

Cd placed at:-

$0 \rightarrow 1\frac{7}{16}$ $-1\frac{7}{16}$ to $+1\frac{7}{16}$ 6.475

TEMP 11:10

center 0.8892

edge 0.8894

72.9 F

CRITICAL POSITIONS

19 Expr 9 Run 9

0.010 .9229 .1272

Channel

A	999.998	A 78	100/50
B	19.125	B .005	
C	0.021	C 3.1	10^{-10}
		D 65.5	100/100
		E .5	900 v

Tim Crit. 11:15 AM PM Duration 10 min.

C.A. 19 Expr. 9 Run 10
Sheet — Date 13 Sept 1954 Time 11:33 AM ~~PM~~
Purpose Reactivity measurement of Cd in Reactor. Zero Run — no Cd.

Cd removed from reactor

TEMP 11.
Center:- 0.8886
edge :- 0.8885

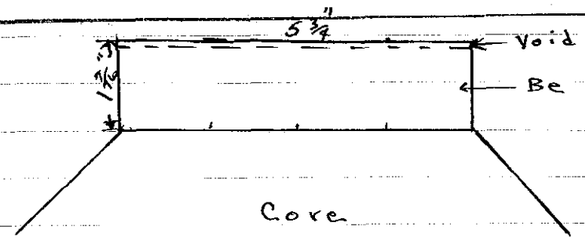
CRITICAL POSITIONS

19 Expr 9 Run 10
Table Pos. 0.010 T .9231 B .1260

Control Rod		Channel		
R	999.995	A	78	100/50
B	20.120 81.21	B	.005	
C	0.025	C	3.2	10^{-10}
4		D	65.5	100/100
		E	.5	900 V

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

C.A. 19 Expr. 10 Run 1
Sheet — Date 9-13 1954 Time 1:45 AM ~~PM~~
Purpose Zero Run before making Inconel reactivity Measurements



Removed $5\frac{3}{4}" \times 2\frac{7}{8}" \times \frac{3}{16}"$ of Be from reflector as shown

Temp 2:05 PM

Center .8891
Edge .8891

CRITICAL POSITIONS

C.A. 19 Expr. 10 Run 1
Table Pos. 0.008 T .9229 B .1255

Control Rod		Channel		
A	0.003	A	77.5	100/50
B	20.010 77.7	B	.005	
C	0.025	C	3.1	10^{-10}
4		D	65	100/100
		E	.6	900V.

Tim Crit. 1:55 ~~AM~~ PM Duration 16 min.

C.A. 19 Expr. 10 Run 2
Sheet ____ Date 13 Sept 1954 Time 2:15 ~~AM~~ PM
Purpose Reactivity measurement of inconel in reactor

1 pc. inconel (4.40" x 2.94" X 0.064")
112.23 gms

placed at

0 → 2.94 -2.2 → + 2.2 8.40

Temp. 2:29 PM
Center .8889
Edge .8890

CRITICAL POSITIONS
C.A. 19 Expr 10 Run 2
Table Pos. 0.010 T .0238 B .1261

Control Rod		Channel	
A	0.009	A 78	100/50
B	18.139	E .005	
C	0.025	C 3.1	10^{-10}
4		D 66	100/100
		E .6	900 ✓

Tim Crit. 2:29 ~~AM~~ PM Duration 12

C.A. 19 Expr. 10 Run 3
Sheet ____ Date 9-13 1954 Time 3:00 ~~AM~~ PM
Purpose Reactivity Measurement of Inconel.

Inconel placed at:-
0 → 2.94 -2.2 → +2.2 7.12

CRITICAL POSITIONS
C.A. 19 Expr. 10 Run 3
Table Pos. 0.010 T .9232 B .1251

Control Rod		Channel	
A	999.997	A 78	100/50
B	18.800	B .005	
C	0.024	C 3.1	10^{-10}
4		D 66.5	100/100
		E .6	900 ✓

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

9-14-54

Spencer
Lynn

INSTRUMENT CHECK

Time 8:30 AM ~~PM~~ Source Pb 5-8

	Channel A	B	C	D	E
Range	10/1000 ok		10^{-10}	10/1000	900v
Source Dist.	30"		6"	36"	½"
% F.S. Trip	95		100	95	100

Tim 142 ok

C.A. 19 Expr. 10 Run 4
Sheet ____ Date 9-14-1954 Time 9:00 AM ~~PM~~
Purpose Zero Run, Same as 19.10.1

Temp 9:25 AM

Center:- .8935
Edge :- .8935

CRITICAL POSITIONS

C.A. 19 Expr. 10 Run 4
Table Pos. 0.010 T .8238 B .1254

Control Rod		Channel	
A	0.000	A 77	100/50
B	20.130 8/1	B .005	
C	0.026	C 3.1	10^{-10}
4		D 65	100/100
		E .5	900V

Tim Crit. 9:18 AM ~~PM~~ Duration 12 min.

C.A. 19 Expr. 10 Run 5
Sheet ____ Date 9-14 1954 Time 9:40 AM ~~PM~~
Purpose Reactivity measurement of Inconel in reactor

Inconel placed at

0 → 2.94 −2.2 → +2.2 7.37

CRITICAL POSITIONS

C.A. 19 Expr. 10 Run 5
Table Pos. 0.010 T .8234 .1262

Control Rod		Channel	
A	0.009	A 78	100/50
B	18.569 6/5	B .005	
C	0.031	C 3.1	10^{-10}
4		D 66	100/100
		E .5	900 V

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

C.A. 19 Expr. 10 Run 6
Sheet ____ Date 9-14 1954 Time 10:05 AM ~~PM~~
Purpose Reactivity Measurement of Inconel

Inconel at:-

0 → 2.94 -2.2 → +2.2 7.62

CRITICAL POSITIONS

C.A. 19 Expr. 10 Run 6
Table Pos. 2,010 T .4250 BR.1271

Temp
Center .8912
Edge .8902

Control Rod		Channel	
A	999.998	A	72.5 100/50
B	18.418	B	.005
C	0.020	C	3.0 10^{-10}
		D	63.5 100/100
		E	1.5 900 V

Tim Crit. 10:25 AM ~~PM~~ Duration 12 min.

C.A. 19 Expr. 10 Run 7
Sheet ____ Date 9-14 1954 Time 10:40 AM ~~PM~~
Purpose Reactivity measurement of Inconel

Inconel placed at

0 → 2.94 -2.2 → 2.2 7.87

CRITICAL POSITIONS

C.A. 19 Exp 10 Run 7
0.010 T .4232 .1270

Temp 10:57
Center .8908
Edge .8890

Control Rod		Channel	
A	999.988	A	78 100/50
B	18.314	B	.0051
C	0.026	C	3.1 10^{-10}
		D	66 100/100
		E	1.5 900 V

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

C.A. 19 Expr. 10 Run 8
Sheet ____ Date 9-14- 1954 Time 12:45 ~~AM~~ PM
Purpose Reactivity Measurement of Inconel.

Inconel at :-
0 → 2.94 -2.2 → +2.2 6.9

Temp 12:58 pm

Center :- .8912
Edge :- .8890

CRITICAL POSITIONS
C.A. 19 Expr. 10 Run 8
Table Pos. 0.009 T .4229 B .1278

	Control Rod		Channel	
A	999.996	A	77	100/50
B	19.586 ~~0.03~~ 79.7	B	.0051	
C	0.032	C	3.1	10^{-10}
		D	65	100/100
		E	.5	900 V.

Tim Crit. 1:00 ~~AM~~ PM Duration 10 min.

C.A. 19 Expr. 10 Run 9
Sheet ____ Date 9-14 1954 Time 1:20 ~~AM~~ PM
Purpose Reactivity measurement of Inconel

Inconel 4T
0 → 2.94 -2.2 → +2.2 6.47

CRITICAL POSITIONS
C.A. 19 Expr 10 Run 9
Q.010 T.3224 .1282

Temp 1:35
Center .8912
Edge .8909

	Control Rod		Channel	
A	999.998	A	78	100/50
B	19.795 72.2	B	.0052	
C	0.040	C	3.0	10^{-10}
		D	65.5	100/100
		E	.4	900 V

Tim Crit. 1:42 AM PM Duration 14 min.

C.A. 1970 Expr. 10 Run 10
Sheet ____ Date 9-14- 1954 Time 2:05 ~~AM~~ PM
Purpose Reactivity Measurement of Inconel

Inconel at:—
0 → 2,94 −2.2 → +2.2 3.0

Temp 218 pm

center: .8905
Edge: .8905

CRITICAL POSITIONS
C.A. 19 Expr. 10 Run 10
Table Pos. 0.010 T .2229 B .1271

Control Rod		Channel	
A	999.998	A 77	100/50
B	20.054 79.94	B .0051	
C	0.025	C 3.0	10^{-10}
4		D ~~66~~ 65	100/100
		E .5	900 V.

Tim Crit. 2:20 ~~AM~~ PM Duration 12 min.

C.A. 19 Expr. 10 Run 11
Sheet ____ Date 9-14 1954 Time 2:40 ~~AM~~ PM
Purpose Reactivity measurement of Inconel

Inconel at
0 → 2.94 −2.2 → +2.2 0.12

Temp 3:00?
center .8895
Edge .8891

CRITICAL POSITIONS
C.A. 19 Expr. 10 Run 11
Table Pos. 0.010 T ~~.2229~~ .1220 .1265

Control Rod		Channel	
A	0.000	A	78 100/50
B	20.070 20%	B	.0052
C	0.016	C	3.1 10^{-10}
4		D	66 100/100
		E	.5 900 V

Tim Crit. 2:56 ~~AM~~ PM Duration 10 min.

C.A. 19 Expr. 10 Run 12
Sheet _____ Date 9-14-1954 Time 3:25 ~~AM~~ PM
Purpose Same as 19.10.3

Note:-

Tape on 2FS Fuel Assembly had been cut Allowing it to possibly expand.

CRITICAL POSITIONS

C.A. 19 Expr. 10 Run 12
Table Pos. 0.608 T .1210 B .1275

Control Rod		Channel	
A	999.998	A 77.5	100/50
B	18.789	B .0051	
C	0.015	C 3.0	10^{-10}
4		D 66.5	100/100
		E .5	900V

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

INSTRUMENT CHECK

Time 8:35 ~~AM~~ PM Source Co 58

	Channel A	B	C	D	E
Range	10/1000 ~~30~~	∝	10^{-10}	10/1000	900V
Source Dist.	30"		8"	36"	1"
% F.S. Trip	95		100	95	100
	Etc 142 ∝				

C.A. 19 Expr. 11 Run 1
Sheet _____ Date 9-15 1954 Time 9:10 AM ~~PM~~
Purpose Zero Run before making reacitivity Measurement of Ni. Fuel retaped (2FS). Be same as 19.10.-

Temp 9:20 ~~AM~~
Edge:- .8890
Center:- .8891

CRITICAL POSITIONS

C.A. 19 Expr. 11 Run 1
Table Pos. 0.007 T .0278 B .1254

Control Rod		Channel	
A	0.005	A 77.5	100/50
B	20.099 80.81	B .0049	
C	0.020	C 3.2	10^{-10}
4		D 66	100/100
		E .4	900V.

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

C.A. 19 Expr. 11 Run 2
Sheet ____ Date 9-15 1954 Time 9:40 AM PM
Purpose Reactivity measurement of nickel

6 sheets of nickel (4.4" x 2.8" x .010") stacked to make a sandwich ~.060" thick.
weight of 6 nickel sheets - 111.729 gms.

nickel placed at

0 → 2.8 −2.2 → +2.2 8.4 ~~8.6~~

CRITICAL POSITIONS

C.A. 19 Expr. 11 Run 2
Table Pos. 0.008 L T.0201 .1272

Control Rod		Channel	
A	0.008	A 78	100/50
B	18.149	B .0049	
C	0.018	C 3.2	10^{-10}
4		D 66	100/100
		E .4	900 V

Tim Crit. 9:58 AM PM Duration 11 min.

C.A. 19 Expr. 11 Run 3
Sheet ____ Date 9-15-1954 Time 10:15 AM ~~PM~~
Purpose ~~Interval~~ Reactivity measurement of Ni.

Ni at:-

0 → 2.8 −2.2 → +2.2 8.12 ~~8.25~~

Temp. 10:34 AM
Edge .8891
Center .8891

CRITICAL POSITIONS

C.A. 19 Expr. 11 Run 3
Table Pos. +.007 T 0.0203 B 0.1272

Control Rod		Channel	
A	9999.995	A 78	100/50
B	18.245	B .005	
C	0.020	C 3.1	10^{-10}
4		D 66	100/100
		E .50	900 V.

Tim Crit. 10:33 AM ~~PM~~ Duration 10 min.

C.A. 19 Expr. 11 Run 4
Sheet ____ Date 9-15 195 4 Time 11:00 AM ~~PM~~
Purpose Reactivity Measurement of Ni

Ni At:
0 → 2.8 - 2.2 → + 2.2 7.37 ~~7.75~~

Source stuck part of the way out for entire run.

CRITICAL POSITIONS
C.A. 19 Expr 11 Run 4
Table Pos. 0.001 T .9199 .1278

Control Rod		Channel		
A	999.995	A	45	100/100
B	18.581	B	.006	
C	0.015	C	3.6	10^{-10}
4		D	76	100/100
		E	.7	900 V

Tim Crit. 11:14 ~~AM~~ PM Duration 11 min.

C.A. 19 Expr. 11 Run 5
Sheet ____ Date 9-15 195 4 Time 1:05 ~~AM~~ PM
Purpose Reactivity Measurement of Ni.

Ni at
0 → 2.8 - 2.2 → + 2.2 7.12

CRITICAL POSITIONS
C.A. 19 Expr 11 Run 5
Table Pos. 0.000 T .9201 .1258

Temp 1:30 P
center .8907
Edge .8906

Control Rod		Channel		
A	999.995	A	79	100/50
B	18.775	B	.005	
C	0.025	C	3.2	10^{-10}
4		D	67	100/100
		E	.4	900 V

Tim Crit. 1:31 ~~AM~~ PM Duration ____ min.

C.A. 19 Expr. 11 Run 6
Sheet ____ Date 9-15-1954 Time 1:53 AM PM
Purpose Resistivity Measurement of Ni

Ni at:—
0 → 2.8 −2.2 → +2.2 7.87

Temp 2110 PM

Center:— .8906
Edge:— .8906

CRITICAL POSITIONS
C.A. 19 Expr. 11 Run 6
Table Pos. 0.000 T .9196 B .1252

Control Rod		Channel		
A	999.996	A	77.5	100/50
B	18.286 59.8	B	.0049	
C	0.024	C	3.0	10^{-10}
4		D	66.5	100/100
		E	.35	900V.

Tim Crit. 2:08 AM PM Duration 13 min.

C.A. 19 Expr. 11 Run 7
Sheet ____ Date 9-15 1954 Time 2:35 AM PM
Purpose Reactivity measurement of Ni.

Ni at:
0 → 2.8 −2.2 → +2.2 6.9

Temp 3:00
Center .8903
Edge .8903

CRITICAL POSITIONS
C.A. 19 Expr. 11 Run 7
Table Pos. .009 T .9208 .1268

Control Rod		Channel		
A	000.000	A	77	100/50
B	19.628	B	.0049	
C	0.024	C	3.1	10^{-10}
4		D	65	100/100
		E	.3	900 V

Tim Crit. 2:50 AM PM Duration ____ min.

C.A. 19 Expr. 11 Run 8
Sheet ____ Date 9-15 1954 Time 3:10 AM-PM
Purpose Reactivity Measurement of Ni.

Ni at: —

0 → 2.8 -2.2 → +2.2 6.47

Temp : 3:35 PM

Center : .890
Edge : .890

CRITICAL POSITIONS

C.A. 19 Expr. 11 Run 8
Table Pos. 0.007 T .8291 B .1270

Control Rod		Channel	
A	999.994	A 77.5	100/50
B	19.835 21.79	B .0049	
C	0.015	C 3.1	10^{-10}
4		D 65.5	-100/100
		E .3	900 V.

Tim Crit. 3:25 AM PM Duration 12 min.

C.A. 19 Expr. 11 Run 9
Sheet ____ Date 9-15 1954 Time 3:40 AM PM
Purpose REACTIVITY measurement of Ni

Ni at

0 → 2.8 -2.2 → +2.2 .12

Temp 4:05 P
Center .8903
Edge .8902

CRITICAL POSITIONS

C.A. 19 Expr. 11 Run 9
Table Pos. 0.007 T .5214 .1272

Control Rod		Channel	
A	0.000	A 78	100/50/100
B	20.125 81.0	B .0054	
C	6.018	C 3.1	10^{-10}
4		D 66	10%00
		E .4	900 V

Tim Crit. 4:00 AM PM Duration 9 min.

INSTRUMENT CHECK

Time 9:50 AM ~~PM~~ Source PB 58

	Channel A	B	C	D	E
Range	~~10~~ 1000	OK	10^{-10}	~~10~~ 100	900V
Source Dist.	30"		6"	36"	½"
% F.S. Trip	95		100+	85	100+

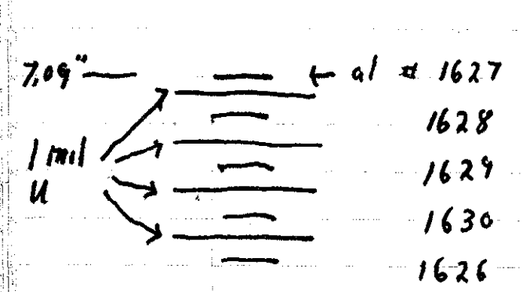
Obs #1 & 2 OK

C.A. 19 Expr. 5 Run 8

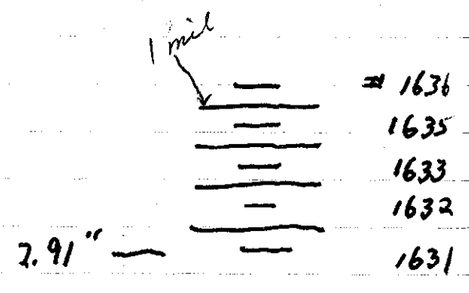
Sheet _____ Date 16 Sept 1954 Time 10:20 AM ~~PM~~

Purpose Self shielding in 4 mil U foil

4 mil uranium sheets at 7.09" and 2.91" replaced by (4) 1 mil uranium sheets and alum. Catcher foils as shown below:



norm. # 1637



1.0 – 1.5 – 15.5

CRITICAL POSITIONS

C.A. 19 Expr 5 Run 8

Table Pos. 0.007 L .7215 .1251

	Control Rod		Channel	
A	999.975	A	59.5	1000/100
B	0.045	B	.077	
C	17.075	C	3.6	5×10^{-9}
		D	52.5	1000/200
		E	2.3	780 V

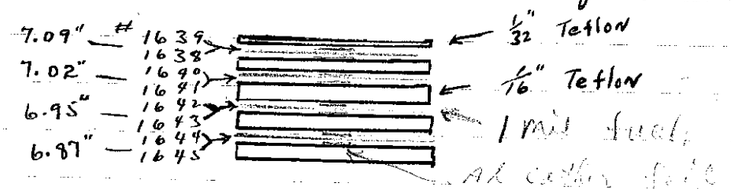
Tim Crit. 10:42 ~~PM~~ AM Duration 20 min.

C.A. 19 Expr. 5 Run 9

Sheet _____ Date 9-16-1959 Time 1:50 ~~AM~~ PM

Purpose Power Distribution by replacing 4 mil u sheets with 1 mil u sheets.

Removed 2 - 4 mil u sheets, at 7.09" + 6.91"
Placed 1 mil u sheet between teflon as shown with al catcher foils: —



Placed uncoated 4 mil u sheet at 6.4" with al catcher on Reflector side and 1/16" teflon disc on Core side (bottom) (Teflon disc ~ 1.25" in diameter)
al # 1647 at 6.4"

al # 1646 1.0 — 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 9

Table Pos. 1007 T .4213 B .1252

Control Rod		Channel	
A	999.977	A	58.5 (1000/100)
B	0.055	B	.076
C	16.843	C	2.8 7.
4		D	57.8 (1000/200)
		E	2.5 780 V.

Tim Crit. 2:05 (30/60) AM PM Duration 20 min.

INSTRUMENT CHECK

Time 12:10 ~~AM~~ PM — Pb 58

	A	B	C	D	E
Range	10/1000	Of	10^{-10} ~~10~~/1000	10/1000	900 v
Source Dist.	30"		6"	30"	0
% F.S. Trip	95		100	90	100

Ctrs 1 + 2 Of

C.A. 19 Expr. 5 Run 10

Sheet ______ Date 17 Sept 954 Time 12:25 ~~AM~~ PM

Purpose Irradiation of Super Q for decay curve, and Al catcher foil for decay curve in Scintillation Counter

Foils placed at:

Super Q "Large"	1/2	1/4	7.37
al # 473	"	"	"
al # 1650	1	1	7.1
al # ~~1648~~ 1649	1	1	3.0
al # 1648 (norm)	1.0	1.5	15.5

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 10

Table Pos. 0.007 — .2215 - .1248

Control Rod		Channel		
A	999.986	A	74.5	1000/100
B	0.050	B	.1	
C	16.875	C	4.6	?
4		D	66.5	1000/200
		E	2.1	750 v

Tim Crit. 12:46 17/60 ~~AM~~ PM Duration 20 min.

9-20-54

INSTRUMENT CHECK

Time 8:55 AM PM Source Pu-Be-8

	Channel A	B	C	D	E
Range	10/1000		10-10	10/1000	900v
Source Dist.	30"		24"	36"	¼"
% F.S. Trip	95		100	95	100

Chas 1 & 2 OK

C.A. 19 Expr. 5 Run 11

Sheet ____ Date 9-20-1954 Time 9:05 AM PM

Purpose Irradiation of Al catcher foil and teflon foil for decay curve

Teflon foil 1.25" diameter, ½" Thick at 7.0" in Reactor.

Al catcher (1.25") at 1.0 – 1.5 – 15.5

#16,51

CRITICAL POSITIONS

C.A. 19 Expr. 5 Run 11

Table Pos. 0.006 T .2217 B .1248

Control Rod		Channel	
A ~~0~~ 799.992		A 82	1000/50
B 0.45		B .05	
C 17.078		C 3.0	?
4		D 71	~~1000~~/100
		E 2.0	810 √

Tim Crit. 9:26 42/60 AM PM Duration 20 min.

9-21-54

INSTRUCTIONS CHECK

INSTRUMENT CHECK

Time 9:45 AM PM Source PB 58

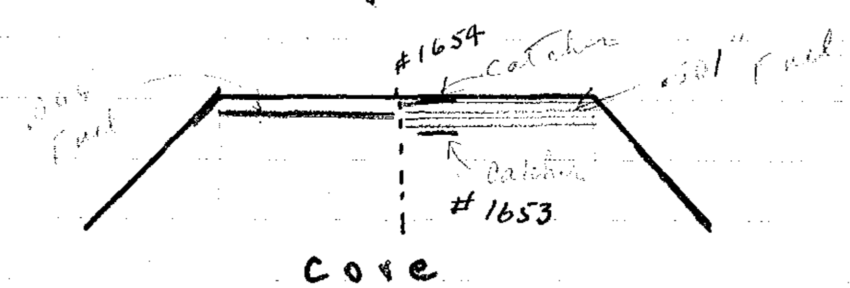
	Channel A	B	C	D	E
Range	~~1000~~ 1	1K	?	~~1000~~ 10	900V.
Source Dist.	24"	|	8"	30"	1½"
% F.S. Trip	95	|	80	90	100+

C.A. 19 Expr. 5 Run 12

Sheet ______ Date 9-21 1954 Time 9:55 AM ~~PM~~

Purpose Self shielding in 4 mil U.

Placed 4 - 1 mil U sheets (2⅞" x 2⅞" x.001") with catcher foils as shown and placed 1 4 mil (2⅞" x 2⅞" x.004") in other half of 2 FS assembly at 7.09"



(Norm) at #1655 1.0 - 1.5 - 15.5

CRITICAL POSITIONS

C.A. 19 Expr 5 Run 12

Table Pos. 0.000 T .1207 B .1250

Control Rod		Channel		
A	999.983	A	80.5	1000/50
B	0.046	B	.05	
C	17.109	C	4.4	?
4		D	69.5	1000/100
		E	2.6	810 V.

Tim Crit. 10:17 53/60 AM ~~PM~~ Duration 20 min.

INSTRUMENT CHECK

Time 8:45 AM ~~PM~~ Source PB 5-8

	Channel A	B	C	D	E
Range	10/1000	OK	?	10/1000	900V.
Source Dist.	29"		3"	30"	3"
% E.S. Trip	95		100+	90	100+

C.A. 19 Expr. 12 Run 1

Sheet _____ Date Sept 22 1954 Time 8:50 AM ~~PM~~

Purpose "Zero run" to check effect of Al in supporting structure.

CRITICAL POSITIONS

C.A. 19 Expr. 12 Run 1

Table Pos. 0.000 T .1172 B.1262

Channel

1 A 99.9994 B 80 100/50

2 18.327 60.4 D .005

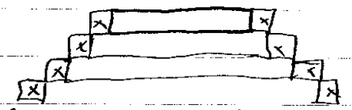
3 C .010 C .32

4 _____ D 67 100/100

E .6 900 v

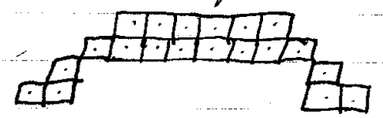
Tim Crit. 9:20 AM ~~PM~~ Duration _____ min.

19:12:1 Removed four slides from both upper slant surfaces of the movable table.



Removed the 10 mil foil disc used for the normalizing catcher foil.

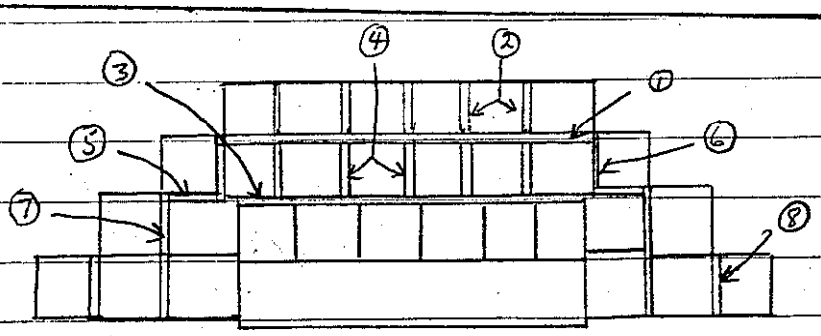
Removed skewers from twenty of the slides in the upper portion of the movable assembly.



C.A. 19 Expr. 12 Run 2

Sheet ___ Date Sept 22 95 Time 9:50 AM

Purpose Check effect of Al in supporting structure.



Placed 1/8" Thick al between shims as shown: - Back 1/2" → 8 1/2" on movable table.

①	1 pcs - 17.875"	⑤	2 pcs - 2.563"
②	5 pcs - 2.875"	⑥	2 pcs - 2.875"
③	1 pc - 17.250"	⑦	2 pcs - 5.750"
④	5 pcs - 2.875"	⑧	2 pcs - 2.875"

Wt = 4108 gms, ~ 92.[redacted] in^3

CRITICAL POSITIONS

C A. 19 Expr. 12 Run 2

Table Pos. 0.006 T .722 B .126

Control Rod		Channel	
A 999.988	A	80	100/50
B 17,570 52.1 ¢	B	.005	
C 0.014	C	3.2	?
4	D	67	100/100
	E	.8	

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

60.4 ¢

52.1 ¢

8.3 ¢ Loss in Reactivity

CA-20, (1st Loading 7.3 Kg)

Scotch Tape used

1FL - 15.385 g.
2FL - 6.817
1TL - 28.520
2TL - 14.329
3TL - 6.164
4TL - 3.759
1CL - 20.634
2C - 14.778
Total - 110.386 g.

Assembly	U-Foil (weighed)	U-Foil (calc.)	Teflon
1TL - 1	95.9900 g	96.7457 g.	1188.0 g.
- 2	96.6998	96.4543	1236.0
- 3	97.6698	96.7839	1202.7
- 4	97.7255	96.8936	1258.5
- 5	96.6401	96.5471	1169.0
- 6	97.6304	96.8616	1255.0
- 7	96.4275	96.6549	1203.9
- 8	97.6823	96.7704	1234.0
- 9	96.3844	96.7367	1206.0
-10	97.2902	96.7582	1217.5
-11	97.6391	96.7886	1230.0
-12	97.4596	96.7534	1221.5
-13	97.5071	96.7376	1253.0
-14	97.5918	96.8954	1209.0
-15	97.5961	96.7106	1237.5
-16	97.4164	96.7033	1203.5
-17	97.5144	96.7914	1219.5
-18	97.7716	96.8459	1252.0
-19	97.7671	96.9493	1214.0
-20	97.8656	96.8300	1241.5
-21	97.5370	96.7637	1240.5
-22	97.4675	96.7618	1232.5
-23	96.5894	96.7480	1225.5
-24	97.3377	96.7211	1239.0
Total	2335.1994 g.	2322.2265 g.	29389.6 g.

Assembly	U-Foil (Weighed)	U-Foil (Calc)	Teflon
2TL - 1	48.4330	48.3499	615.5'
-2	48.8724	48.2939	628.5'
-3	48.8802	48.4171	611.5'
-4	48.5591	48.3658	617.0
-5	48.4757	48.3500	613.0
-6	48.6736	48.3198	617.0
-7	48.5490	48.2988	619.5'
-8	48.9913	48.3608	620.5'
-9	48.5590	48.3825'	615.5'
-10	48.6862	48.3045'	607.5'
-11	48.8280	48.4165'	615.0
-12	48.5735'	48.4101	622.6'
Total	584.0830	580.2697	7403.0
1CL -1	69.3003	68.7653	897.5'
-2	69.2587	68.9870	903.0
-3	67.9680	67.1321	873.5'
-4	67.8480	66.9752	880.0
-5	68.6855	68.7578	902.5'
-6	69.6210	68.9421	898.0
-7	68.3506	67.2239	885.0
-8	69.6290	69.0712	899.0
Total	550.6611	545.8546	7138.5'

Assembly	U-Foil (Weighed)	U-Foil (Calc.)	Teflon
1FL - 1	246.3297	244.4165'	2902.5'
-2	245.7060	244.1944	2912.5'
-3	245.8897	244.2123	2896.5'
-4	246.9058	244.1994	2907.5'
-5	246.1684	244.1549	2917.0
-6	245.5229	244.2223	2910.0
-7	246.7186	244.1279	2910.0
-8	246.4996	244.0536	2901.5'
-9	246.8270	244.2862	2924.0
-10	246.4593	243.5238	2928.0
-11	246.1326	244.2833	2907.5'
-12	246.8230	243.7747	2907.0
Total	2955.9826	2929.4493	34924.0
2FL -1	122.9225'	121.8776	1433.5'
-2	122.7532	122.2094	1431.5'
-3	123.6619	121.8758	1430.0
-4	122.8653	122.1398	1442.5'
-5	123.5913	122.3068	1440.0
-6	123.1484	121.9172	1428.5'
Total	738.9426	732.3266	9606.0

CA-20

Assembly	U-Foil (Weighed)	U-Foil (Calc.)	Teflon
3TL - 1	15.9272	15.3429	150.5
-2	15.9053	15.3394	151.5
-3	16.0644	15.8273	151.5
-4	15.8536	15.8369	149.5
-5	15.9497	15.3449	153.0
-6	15.7850	15.3337	153.0
-7	15.7227	15.3759	150.0
-8	16.0882	15.3647	150.0
-9	15.8556	15.3897	151.0
-10	16.0399	15.3786	150.0
-11	16.2677	15.4083	149.5
-12	15.8554	15.3972	151.5
-13	16.0959	15.3792	152.0
-14	15.8552	15.3681	150.0
-15	15.8469	15.3877	150.0
-16	15.8381	15.3765	150.5
-17	15.8227	15.3307	150.5
-18	15.7608	15.3196	153.5
-19	15.8618	15.8765	150.0
-20	16.2426	15.8651	153.0
Total	318.6459	309.2429	3020.5

Assembly	U-Foil (Weighed)	U-Foil (Calc.)	Teflon
4TL-1			
-2			
-3			
-4			
-5			
-6			
-7			
-8			
Total			
2C - 1			
-2			
-3			
-4			
-5			
-6			
-7			
-8			
Total			

CA-20, (Final loading 4662 kg.)

Epr	Run	Page	
5	1→11	245→258	Loading
6	1→3	259→263	Calibration Rod C
7	1→	264→	

CA-20 Oct. 21, 1954

INSTRUMENT CHECK

Time 10:05 AM PM Source PN 58

	Channel A	B	C	D	E
Range	1%000 30"	OK 30"	10^{10}	1%000 30	900V ¼
Source Dist.	30"	OK	8	30	¼
% F.S. Trip	95	OK	90	90	100+

C.A. 20 Expr. 1 Run 1

Sheet Date 10/21 1954 Time 1:45 AM PM

Purpose Initial Loading

Ref: CF 54-4-153
CF 54-10-119

MULTIPLICATION

Scaler c/ min. Mult. 1/M

1

2

3

CA 20 Expt Run 1

10/21

MULTIPLICATION Source PB-267

Scaler	c/ 5 min.	c/ 5 min.	Mult.	1/M
1	4×16+1=65 3×16+5=53	59		
2	2×16+4=36 2×16+2=34	35		
3	10×16+8=168 9×16+14=158	163		

Discriminator Settings 1) 30.0 2) 18.0 3) 30.0

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 1 Run 1

Table Pos. 0.008 T 0.7328 R 0.7091

Control Rod		Channel
A	999.986	A.
B	0.078 (Servo).	B.
C.	999.994	C.
D	out	D.
		E.

No fuel. B.G. Count.

Tim Crit. ______ AM PM Duration ______ min.

Island supported by wooden blocks.

C.A. 20 Expr. 1 Run 2

Sheet ______ Date 10/21 1954 Time 7:20 PM

Purpose First fuel loading.

1.47 kg 25

Loading:

Assembly		Mass U ~~235~~ Foil	Position
Fixed Table			
1FL	– ~~#~~ #12	246.8230 gm	
1TL	– #24	97.3377	
	#23	96.5884	
	#22	97.4675	
	#20	97.8656	
2TL	– #12	48.5735	
Movable Table (~~Mass~~ ~~Movable~~)			
1FL	#1	246.3297	
2FL	#1	122.9225	
1TL	#1	95.9900	
1TL	#2	96.6998	
1TL	#3	97.6698	
1TL	#4	97.7255	
2TL	#1	48.4350	
2TL	#2	48.8724	
2TL	#3	48.8802	

Total 1588.1806 = 1466.4 gm 25

Some wood shims in.

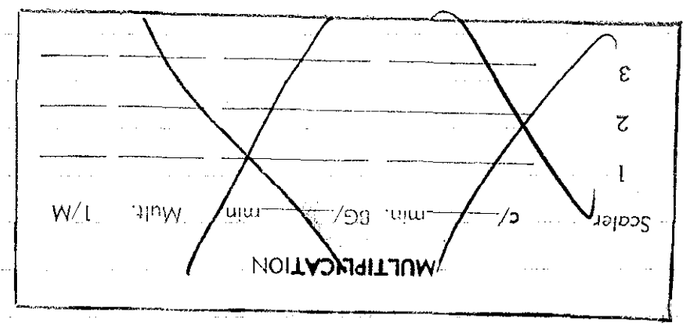
CRITICAL POSITIONS

C.A. 20 Expr. 1 Run 2

Table Pos. 0.008 T 0.7330 B 0.7091

	Control Rod	Channel
A	999.965	A
B	pone	B
C	999.982	C
D	aut	D
		E

Tim Crit: ____ AM PM Duration____min.



MULTIPLICATION

Scaler	c/ 5 min.	BG/ 5 min.	Mult.	1/M
1	5×16+3=83	59		0.71
2	3×16+5=53	35		0.66
3	13×16+6=214	163		0.76

M=1.47 Bg 25

C.A. 20 Expr. 1 Run 3

Sheet ____ Date 10/21 1954 Time 3:05 AM PM

Purpose 2nd Fuel Loading

Loading Addition:

Assembly	Fuel mass gm	Position.
	Fixed Table	
1CL-8	69.6290	
1CL-7	68.3506	
2C-8	32.6575	
2C-7	32.5175	
4TL-22	32.0449	
3TL-20	16.2426	
3TL-19	15.8618	
3TL-18	15.7680	
1FL-11	246.1326	
	Movable Table	
1CL-1	69.3003	
1CL-2	69.2587	
2C-1	33.1920	
2C-2	32.0712	
4TL-1	32.1347	
4TL-2	32.0044	
4TL-3	31.5890	

Assembly	Foil Mass gms	Position
3TL-1	15.9272	
1FL-2	245.7060	

Total added 561.1835

All wood out — Total in Reactor 2473.2 - 235

CRITICAL POSITIONS

C.A. 20 Expr 1 Run 3

.008 T .7329 .7090

Control Rod — Channel

A 999.960 — A
B Same — B
C 999.990 — C
D
E

Tim Crit. ____ AM/PM Duration ____ min.

MULTIPLICATION

Scaler	5 min.	5 min.	Mult.	1/M
1	6×16 + 13 109	59		.54
2	5×16 + 5 85	35		.41
3	17×16 + 9 281	163		.58

M = 2.47 Kg. 235

C.A. 20 Expr. 1 Run 4

Sheet ____ Date 10/21 1954 Time 4.00 PM

Purpose 3rd Fuel Loading

Loading Addition

Fixed Table

Assembly	Foil Mass gms	Position
1FL-10	246.4593	
2FL-6	123.1484	
Movable Table		
1FL-3	245.8897	
2FL-2	122.7532	

Total added 738.2506 gms

Total in Reactor 3154.8 - 235

CRITICAL POSITIONS

C.A. 20 Expr 1 Run 4

0.000 T .7318 .7095

Control Rod — Channel

A 999.980 — A
B Same — B
C 999.995 — C
D
E

Tim Crit. ____ AM/PM Duration ____ min.

MULTIPLICATION

Scaler	c 5 min. BG 5 min.	Mult.	1/M
1	9x16+5 159 / 59		.37
2	6x16+3 99 / 35		.35
3	23x16+2 370 / 163		.44

M = 3.15 Kg 235

C.A. V0 Expr. 1 Run 5

Sheet ____ Date 10/21 1954 Time 4:25 AM

Purpose 4" Fuel Loading -

Loading Additions:

Assembly	Fuel weight	Position
	Fixed Table	
ITL-21	97.5370	
ITL-19	97.7671	
ITL-18	97.7716	
ITL-17	97.5144	
	Movable Table	
ITL-5	96.6401	
ITL-6	97.6304	
ITL-7	96.4275	
ITL-8	97.6823	
	Fuel added	778.9704 gms

Total Fuel in Reactor 3874.0 gms 235

CRITICAL POSITIONS

20 Expr. 1 Run 5

0.000 T. 7318 .6097

	Fuel	Channel
A	999.874	A
B	Same	B
C	999.986	C
4	-	D
		E

Tim Crit. ____ AM PM Duration ____ min.

8 pcs of Teflon (7 3/16" x 2 5/8 x 1/16") added. 1 pc behind each of the ITL's added for this run

MULTIPLICATION

Scaler	c 5 3 min.	Mult.	1/M
1	21x16+3 339 / 59		.17
2	11x16+11 187 / 35		.19
3	27x16+8 440 / 163		.37

M = 3.87 Kg 235

C.A. V0 Expr. 1 Run 6
Sheet ____ Date 10/21 1954 Time 500 AM (PM)
Purpose 5" Fuel Loading

Loading Additions:

Fixed Table

Assembly	Foil mass	Position.
2TL-9	48.5590	
2TL-10	48.6862	
4TL-7	31.9452	
3TL-17	15.8227	
3TL-16	15.8381	
3TL-15	15.8469	
3TL-13	16.0959	
Movable Table		
2TL-4	48.5591	
2TL-5	48.4757	
4TL-4	32.2330	
4TL-5	31.6928	
3TL-2	15.9053	
3TL-3	16.0644	
Total added	385.7243 gms	
Total in reactor	4230.1 gms - 235	

CRITICAL POSITIONS

C.A. 20 Expr. 1 Run 6
Temp. Pu 0.060 T .7312 R .6098

	Channel
A 999.985	A
B same	B
C 999.980	C
4 —	D
	E

Tim Crit. ____ AM PM Duration ____ min.

MULTIPLICATION

Scaler	c 5 min. 3 min.	Mult.	1/M
1	24X16+80394 59		.15
2	14X16+0 224 35		.16
3	34X16+5 549 163		.30

19 = 4.23 Kg 235

C.A. V0 Expr. 1 Run 7
Sheet ____ Date 10/V1 195 4 Time 5 30 AM PM
Purpose 6" Fuel Loading

Fuel Addition:

Assembly	Fuel mass	Position
1 FL - 9	246.8270	Fixed Table
1 FL - 8	246.4996	
		Movable Table
2 FL - 3	123.6619	

Total added 616.9885 gms
Total in reactor 4799.8 gms-235

CRITICAL POSITIONS

C.A. 20 Expr. 1 Run 7
Table P. 999.980 .7249 .6081

Channel	
A	999.966
B	Same
C	999.981
D	
E	

Tim Crit. ____ AM PM Duration ____ min.

MULTIPLICATION

Scaler		min.	Mult.	1/M
1	31X16+2498	5		
		54		.12
2	22X16+5-357			
		35		.10
3	48X16+5-783			
		163		.21

14 - 4.80 kg-235

C.A. V0 Expr. 1 Run 8
Sheet ____ Date 10/V1 195 4 Time 6 30 AM PM
Purpose 7" Fuel Loading

Fuel Addition:

Assembly	Fuel Mass	Position
	~~Fixed Table~~ Movable Table	
1 FL - 4	246.9058	
1 FL - 5	246.1684	
2 FL - 4	122.8653	
2 C - 3	32.0722	
2 C - 4	32.6378	
	~~Movable~~ Fixed Table	
2 C - 5	32.6175	
2 C - 6	32.3669	

CRITICAL POSITIONS

20 Expr. 1 Run 8

ϕ 999.994 I .7285 R .6095

	Rod	Channel
A	999.981	A
B	Same	B
C	999.975	C
	—	D
		E

Crit. AM PM Duration min.

MULTIPLICATION

Scaler	c/ 5 min.	5 min.	Mult.	1/M
1	89X16+14 1438	59		.04
2	59X16+9 953	33		.04
3	123X16+8 1976	163		.08

1M = 5.49 kg.

C.A. 20 Expr. 1 Run 9

Sheet Date 10/VI 1954 Time 7.00 AM PM

Purpose 8" Fuel Loading –

Fuel addition Assembly	Foil Mass	Position
	Fixed Table.	
1	1CL – 6	69.6210
	1CL – 5	68.6855
	3TL – 14	15.8552
	3TL – 12	15.8554
	3TL – 11	16.2677
	3TL – 10	16.0399
	3TL – 9	15.8556
	2TL – 8	48.9913
	Movable Table	
	1CL – 3	67.9680
	1CL – 4	67.8480
	4TL – 6	31.7843
	3TL – 4	15.8536
	3TL – 5	15.8497
	3TL – 6	15.7850
	3TL – 7	15.7227
	3TL – 8	16.0882
	2TL 6	48.6736

Total added 562.8447

Total Fuel in Reactor 6.0079 Kg - 235

CRITICAL POSITIONS

20 Expr 1 Run 9

Do 999.996 T .7285 P .6096

		Channel		
A	14.585	A	55	10/100
B	Same 0.078 (OUT)	B	.00052	
C	24.186 (IN)	C	2.6	2.5×10^{-11}
	—	D	48	10/200
		E	0.0	900 v

Time Crit. 7:29 ~~AM~~ PM Duration 6 min.

1st Time Critical

INSTRUMENT CHECK

Time 8:30 AM ~~PM~~ Source PN 58

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900 v
Source Dist.	30"		10"	30"	0"
% F.S. Trip	90		98	95	100+

C.A. 20 Expr. 1 Run 10

Sheet Date 10/22 1954 Time 8:50 (AM) PM

Purpose 9" Fuel Loading, attempt to evaluate excess δK when fully loaded.

Loading addition:	assembly	foil mass	position
Fixed Table	1TL-16	97.4164	

Total Fuel in reactor 6097.8 gms 235

3 Teflon shims added behind 1TL-16 (1) and 2TL- (2)

(1) - 2 7/8" x 7 3/16 x 1/16" (2) - 1 1/16" x 7 3/16" x 1/16"

CRITICAL POSITIONS

20 Expr. 1 Run 10

999.994 L .6260 R .6047

Control Rod		Channel		
A	18.785	A	53	10/100
B	0.078 (OUT)	B	.0005	
C	24.187 (IN)	C	6.4	10^{-11}
—		D	42	10/200
		E	0	800 v

Tim Crit. 9:06 AM ~~PM~~ Duration 40 min.

Rod B (servo) drivin in TO - 10.003
releveled with A - 18.372

Rod B	Rod A	Rod C
~~10~~ 0.078 (out)	18.785	—
10.003	18.372	—
13.368	16.720	—
14.990	14.610	—
16.27	0.00 (out)	—
17.25	~~12.59~~	22.59
19.2	—	20.5
20.8	—	18.6
22.9	—	16.1
24.15 (in)		0.0 out (neg. Period)

Rod B	C	A
23.4	999.983	999.987

Safety Rod #5 Fired (see chart)

C.A. 20 Expt. 1 Run 11

Sheet Date 10/27 1954 Time AM PM

Purpose 10th Fuel Loading; attempt to evaluate excess Δk when fully loaded

Loading additions: assembly foil mass position

1FL-6 245.5229

Total fuel in reactor 6324.5 gms - 235

CRITICAL POSITIONS

C.A. 20 Expt. 1 Run 11

999.995 L T.6254 R .6090

Control Rod		Channel		
A	999.980 (out)	A	52.0	10/100
B	24.15 (IN)	B	.0005	
C	23.572	C	2.5	2.5×10^{-11}
—		D	42	10/200
		E	.3	900 v

Tim Crit. 10:35 AM ~~PM~~ Duration 25 min.

Safety Rod #5 fired (see chart)

#5 safety ≅ @ 2.1

C.A. 20 Expr. 1 Run 12
Sheet ____ Date 10/22 1954 Time 11:20 AM PM
Purpose 11th fuel loading.
Evaluate excess ρ –

Safety #5 in – Limit switch by passed –

Fuel loading addition:	assembly	foil mass	position
Fixed Table	1FL-	246.7186	
Movable "	2TL-7	48.5490	
Total fuel added		295.2676	
Total fuel in reactor		6597.1 gms -235	

CRITICAL CONDITIONS
20 1 Run 12
999.994 T.6252 R.6091

			Channel	
A	999.978	out	A 59	10/100
B	24.15	in	.0006	
C	23.210		6.0	10^{-11}
4			D 50	10/200
			E .3	9000

Run Crit. 11:33 AM PM Duration 12 min.

Safety Rod #3 fired
Rod #3 ≅ #1.8

C.A. 20 Expr. 1 Run 13
Sheet ____ Date 10/22 1954 Time 1:00 AM PM
Purpose 12th fuel loading: evaluate excess ρk etc.

Safety Rods #3 #5 in Limit switches by passed.

Fuel Addition	assembly	foil mass	position
Fixed Table	1TL-15	97.5961	
Movable "	1TL-9	96.3844	
" "	1TL-10	97.2902	

Total fuel added 291.2707 gms U
Total fuel in reactor 6866.0 gms -235

CRITICAL POSITIONS

20 Expr. 1 Run 13

999.992 .5242 .6092

Rod

A	999.975 (out)	A	55	10/100
B	24.15 (in)	B	.00058	
C	20.781	C	7.2	10^{-11}
	—	D	50	10/200
		E	.4	900 v

Tim Crit. 1:16 ~~AM~~ PM Duration 4 min.

Fired Safety Rod #7
Rod #7 value ≅ $1.7

C.A. 20 Expr. 1 Run 14
Sheet Date 10/ 1954 Time 1:35 AM (PM)
Purpose 13th fuel loading —
evaluate excess R —

Fuel addition:

Movable Table	2FL-5	123.5913
" "	1TL-11	97.6391
" "	1TL-12	97.4596

Total added 318.6900 gms
Total in reactor 7160.7 gms -235

Safety Rods #5, 3, & 7 in. Limit Switches bypassed

CRITICAL POSITIONS

20 Expr 1 Run 14

999.994 T .5235 R .6072

Rod Channel

A	999.972 (out)	A	51	10/100
B	24.15 (in)	B	.00058	
C	21.756	C	3.0	2.5×10^{-11}
	—	D	51	10/200
		E	.2	900 v

1:59 ~~AM~~ PM Duration 13 min.

Safety Rod # 4 fired
Rod # 4 ≅ ¢1.2

10-25-54

INSTRUMENT CHECK

Time 10:00 AM   Source PN 5-8

	A	B	C	D	E
Range	1%/1000	α	10^{-10}	1%/1000	900v
Source Dist.	30"		~~30"~~ 12"	30"	1/2"
% F.S. Trip	95		~~95~~ 180	95	100

Trs 1,203 α

C.A. 20 Expr. 2 Run 1
Sheet ____ Date 10/25 1954 Time 10:45 AM
Purpose Attempt to evaluate reactivity effect of 1/16" Inconel core shell

3173 gms inconel added which is approx. 23 % of total

13827 gms inconel in core shells

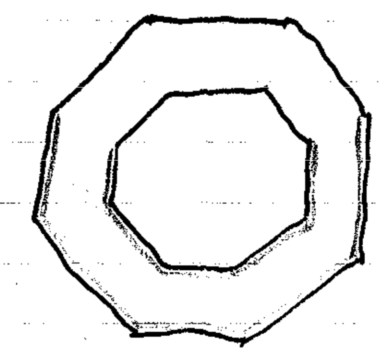
all safety rods cocked, no bypasses.

Fuel loading same as ~~[illegible]~~ 20-1-14 with following pieces removed.

Fixed table		Movable table	
1FL-7	246.7186	1FL-6	245.5229
3TL-9	15.8556	2FL-5	112.5913
3TL-14	15.8552	2FL-4	122.8653
		2FL-3	123.6619
		1TL-11	97.6391
		1TL-12	97.4596
		2TL-7	48.5490
		3TL-7	15.7227
		3TL-8	16.0882
		4TL-6	31.7843

Removed 2187.7145 gms U foil

Total U in reactor is 6,050.9 gm U^{235}



Added inconel to both halves as indicated in one half by 2 red lines above. on flat surfaces only.

not CRITICAL ~~POSITIONS~~

C.A. 20 Expr 2 Run 1

Movable Pos. [illegible] T

Control Rod		Channel
1	A - 999.973 out	A
2	B - 999.989 "	B
3	C - 000.000 "	C
4		D
		E

Sub Critical

Tim ~~Crit.~~ [illegible] AM ~~PM~~ Duration min.

C.A. 20 Expr. 2 Run 2

Sheet Date 10/25 195 4 Time AM PM

Purpose attempt to evaluate effect of 1/16 inconel core shells on reactivity.

added to movable table:

2FL - 4	122.8653
2FL - 3	123.6619
	246.5272

Total U^{235} in Reactor 6,278.5 gms

Inconel same as for 20.2.1.

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 2 Run 2

Movable Pos. 999.995 T 3240 B 6090

Control Rod		Channel
1	999.978 out	A
2	999.986 "	D
3	999.989 "	C
4		E

Sub Critical

Tim Crit. AM PM Duration min.

C.A. 20 Expr. 2 Run 3

Sheet Date 10/25 195 4 Time 1:25 ~~AM~~ PM

Purpose attempt to evaluate effect of 1/16 inconel core shells on reactivity

Inconel same as for 20.2.1 added to movable tables

Assembly	Foil mass	Position
4TL - 6	31.7843	
1TL - 12	97.4596	

∴ Total Fuel added 129.2439

Total U^{235} in reactor 6,397.8 gms U^{235}

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 2 Run 3

Table Pos. 999.992 L T.12 38 B-6091

Control Rod		Channel	
1	A - 999970	A	
2	C 999.985	B	.00024 Source in
3	B - 999.989	C	
4		D	Supercritical
		E	

~~Tim Crit~~ ~~Duration~~ min.

C.A. 20 Expr. 2 Run 4

Sheet Date 10/25 .95 X Time 1.55 AM PM

Purpose Attempt to evaluate effect of 1/16 inconel core shell on reactivity

Inconel same as 20-2-1

Fuel added to Moveable table

assembly	Foil mass
3TL 8	16.0882
1TL 11	97.6391

Total fuel added 113.7273

Total fuel in reactor 6,502.9 gms U^{235}

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 4

Table Pos. 999.995 T. 1238 B. 6093

	Control Rod		Channel
A	999.960	A	47 10/100
B	999.984	D	45 10/200
C	17.683	C	~~.00049~~ 4.9 10^{-11}
4	—	B	.00049
		E	0 900

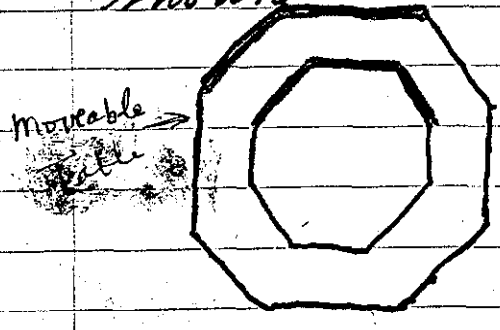
Tim Crit. 2:05 ~~AM~~ PM Duration 6 min.

C.A. 20 Expr. 2 Run 3

Sheet ____ Date 10/25/1954 Time ____ AM PM

Purpose Attempt to evaluate ~~the~~ effect of 6 inconel core shell on reactivity.

added inconel to surfaces as shown ~ 1440 gms



Total inconel
~ 4613 gms
~ 33% of total 6

added fuel:

		Pos.
1 FL - 7	246.7186 gms	7S1
2 FL - 5	123.5913 "	7M2
	370.3099 "	

Total U^{235} in Reactor 6,844.7 gms

CRITICAL POSITIONS

20 Expr. 2 Run 5

Table Pos. 999.985 7.1272 R.6089

Control Rod		Channel	
A	999.980 out	A	5.2 19/100
B	999.989 "	B	.0005
C	18.670	C	~~48~~ 5.4 ~~19/200~~ 10
4		D	48 19/200
		E	0 -9.00 V

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

10/26/54

INSTRUMENT CHECK

PN 58

Time 8:45 AM ~~PM~~

	Channel A	B	C	D	E
Range	1x/1000	OFS	10^{-10}	1x/1000	900V
Source Dist.	30"	/	12"	30"	0"
% F.S. Trip	90		100+	90'	100+

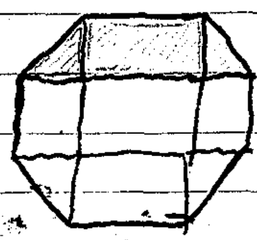
Counters 1,2 & 3 O.K.

C.A. 20 Expr. 2 Run 6

Sheet ____ Date 10/26 1954 Time 9:15 AM ~~PM~~

Purpose Attempt to evaluate 1/16" Inconel Core shell.

Added Inconel to sloping surface as shown to island and reflector surfaces.



~ 2529 gms

Total Inconel ~ 7142 gms or ~ 51% of total 1/16

Fuel added:

To Stationary Table

Assembly	Foil mass	Position
3TL 14	15.8552	
3TL 9	15.8556	
1TL 13	97.5071	
1TL 14	97.5918	

To Moveable Table

1FL 6	245.5229	
3TL 7	15.7227	
2TL 7	48.5490	
2TL 11	48.8280	

Total U Foil added 585.4323

Total Fuel in Reactor 7385.4 gms U^{235}

Rods out for run up giving ~ 300sec period ~ 3.8 ϕ

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 6

999.985 .1218 .6026

Control Rod Channel

A 999.966 (out) 89 1%00

B 999.999 (out) .0021

C 10.680 3.8 5.0 5×10^{-11}

D 61 100/50

E .1 900 v

Tim Crit. 9:48 AM PM Duration 12 min.

Fired S.R. ± 7 (Symmetrical with Rod C)

S.R. ± 7 ≈ ϕ 1.7

C.A. 20 Expr. 2 Run 7

Sheet Date 10/26 1954 Time 10:35 AM PM

Purpose Evaluation of Inconel

1 piece of Inconel (8.0" x 4 5/16" x 1/16") removed as shown in Figure on Movable table only

Wt of Inconel 303 gms

reactor rising with C at 16.245~
124 sec period ≅ 8.2 ¢

CRITICAL POSITIONS

20 Expr. 2 Run 7

999.988 L T1224 P .6088

	Rod		Channel	
A	999.970 (out)	A	44	100/100
B	999.988 (out)	B	.0048	
C	17.300	C	3.7	4×10^{-11}
		D	72	100/100
		E	.2	900 ~

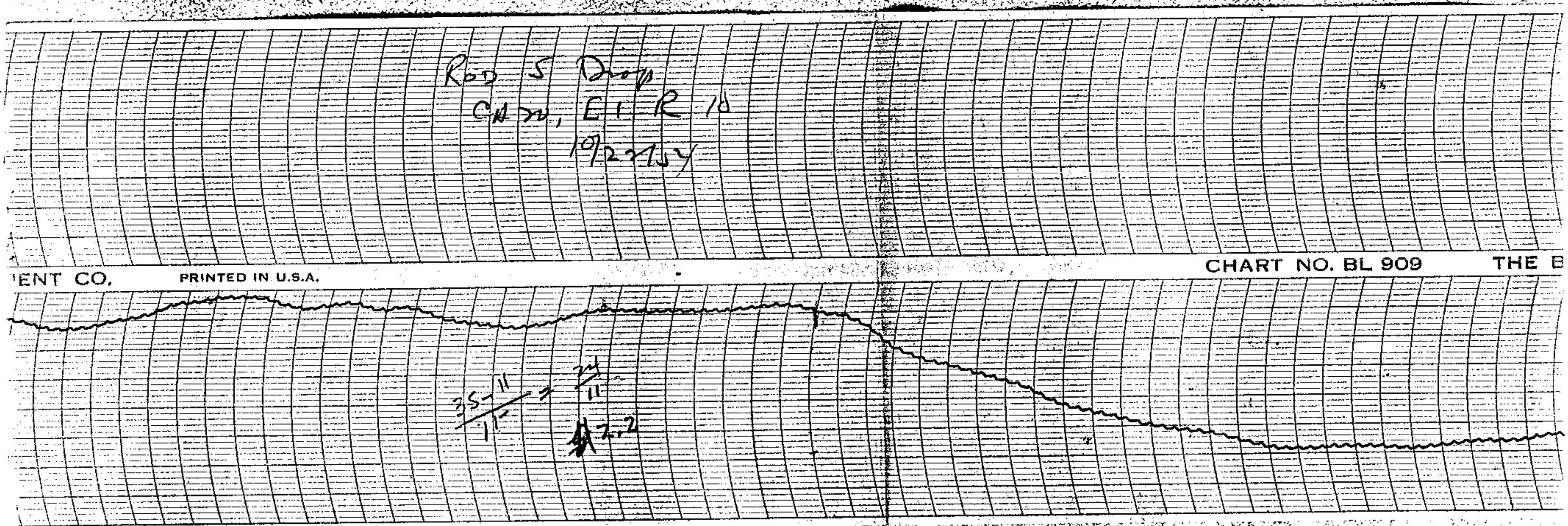
Tim Crit. 10:53 ~~AM~~ PM Duration _____ min.

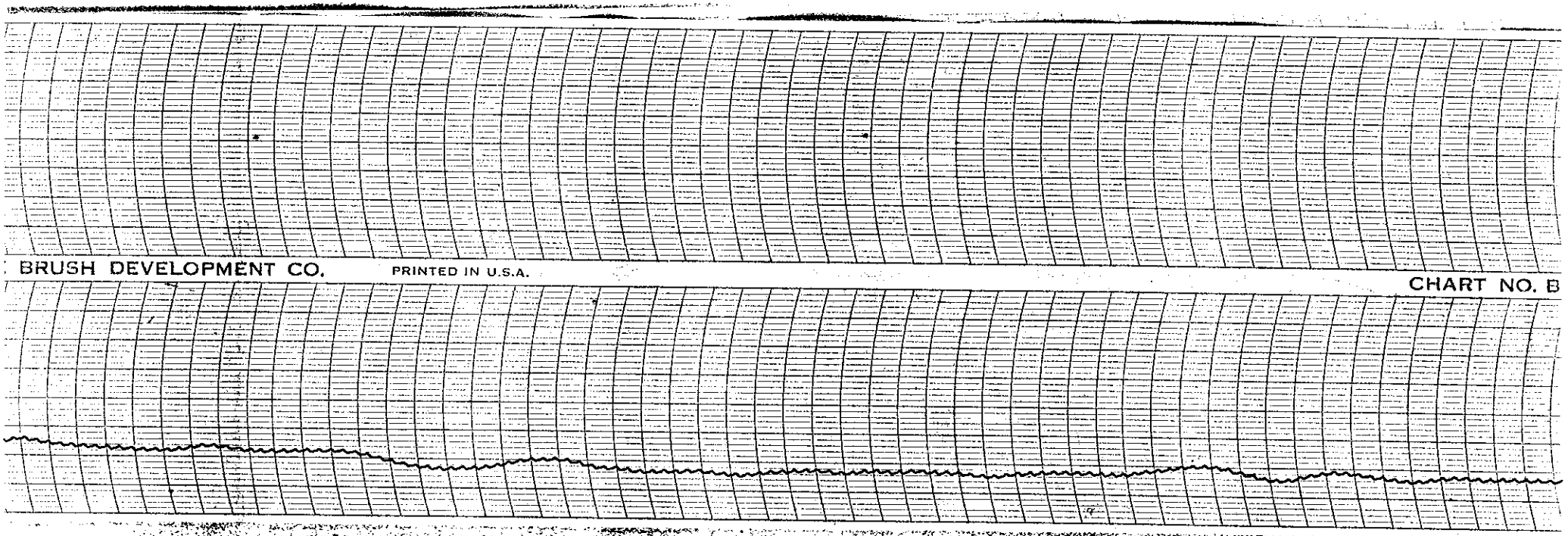
reactor placed on neg. period with rod A.
relevelled at B,=.0005

Rod A	Rod C	
13,190	16.245~	level
13.190	14.580	107 sec ~ 9.2¢
15.47	14.580	level
15.47	10.680	100 sec ~ 9.6¢

∴ 303 gms Inconel ≅ 9.6 + 9.2 + 8.2 ≅ 27¢

Graph #1 (3 pg)
Sheet


ENT CO.
PRINTED IN U.S.A.
CHART NO. BL 909
THE B


BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.
CHART NO. B

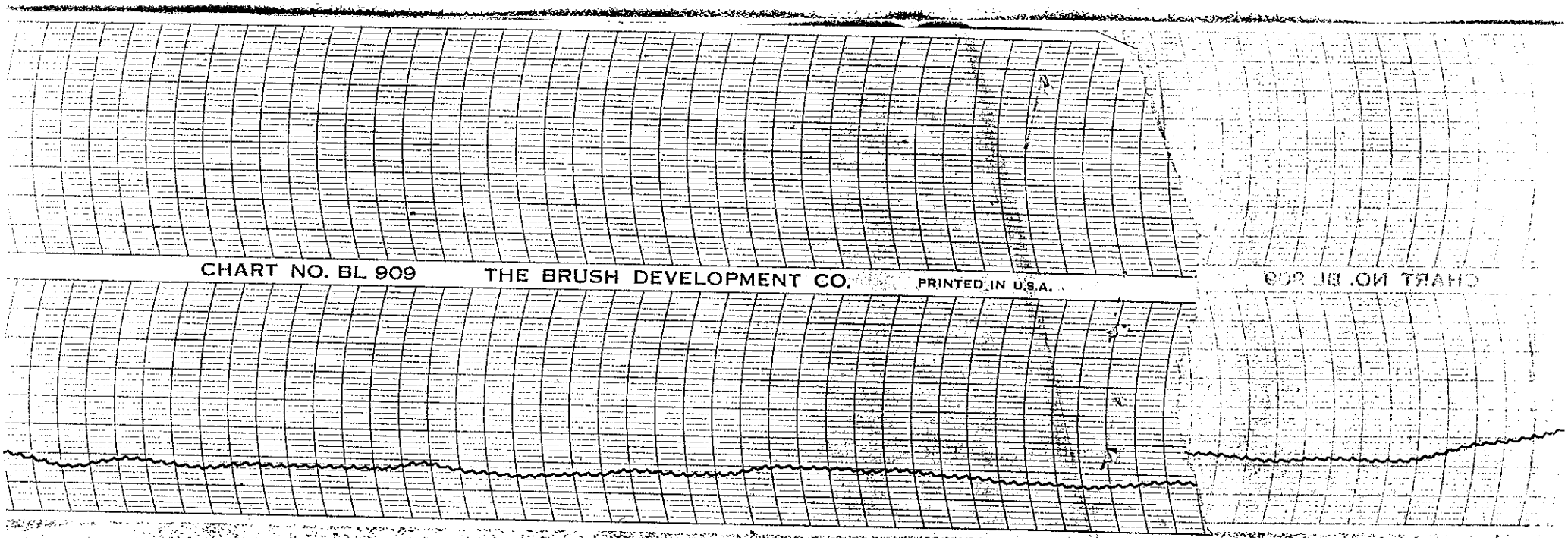


CHART NO. BL 909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

Graph
Sheet #2 (2 pgs)

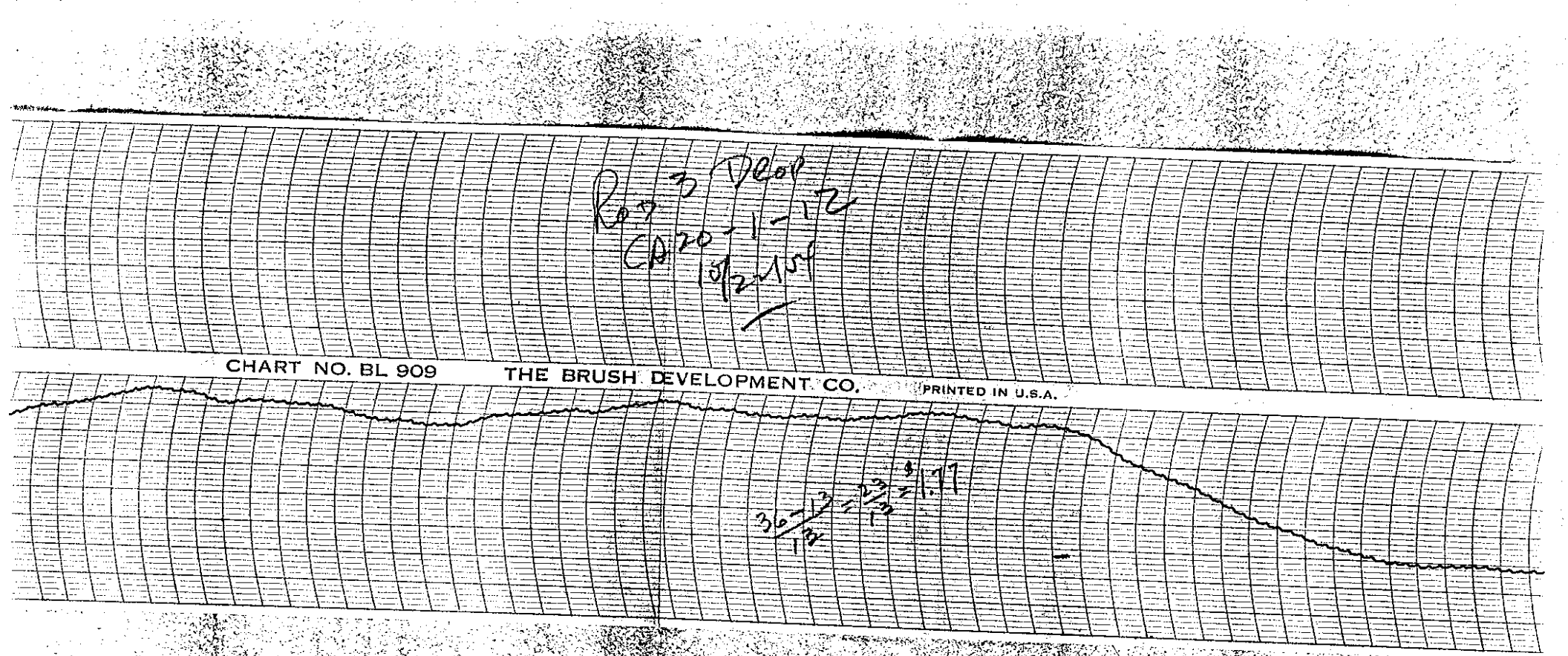


CHART NO. BL 909
THE BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.

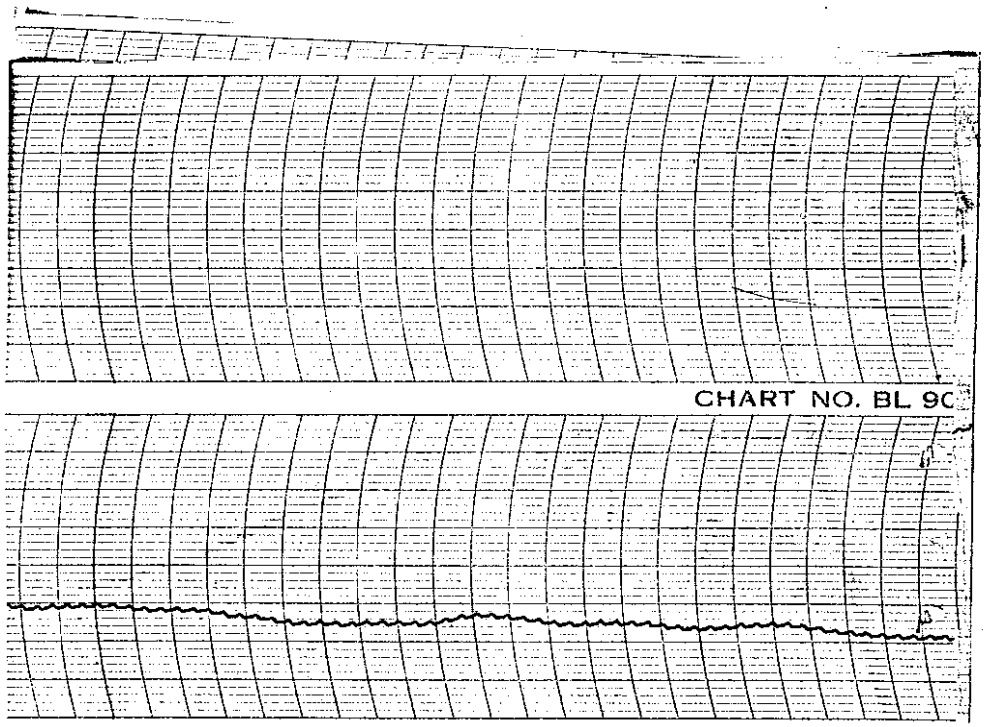
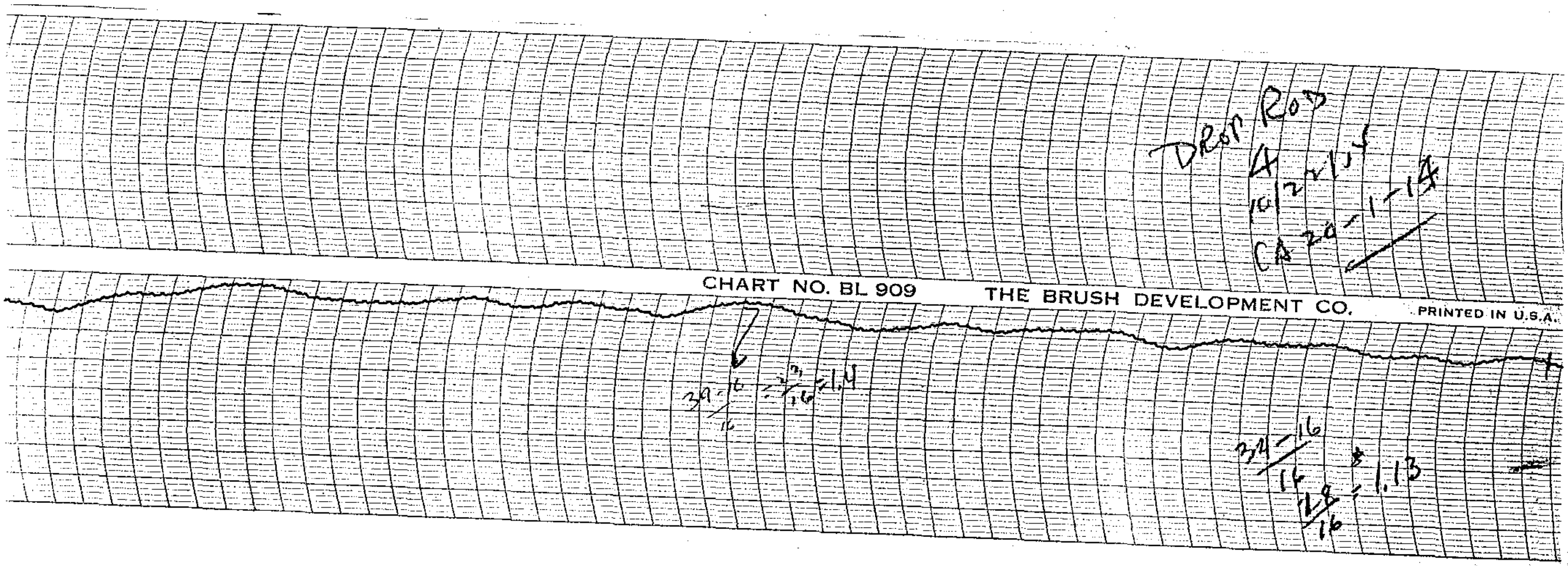
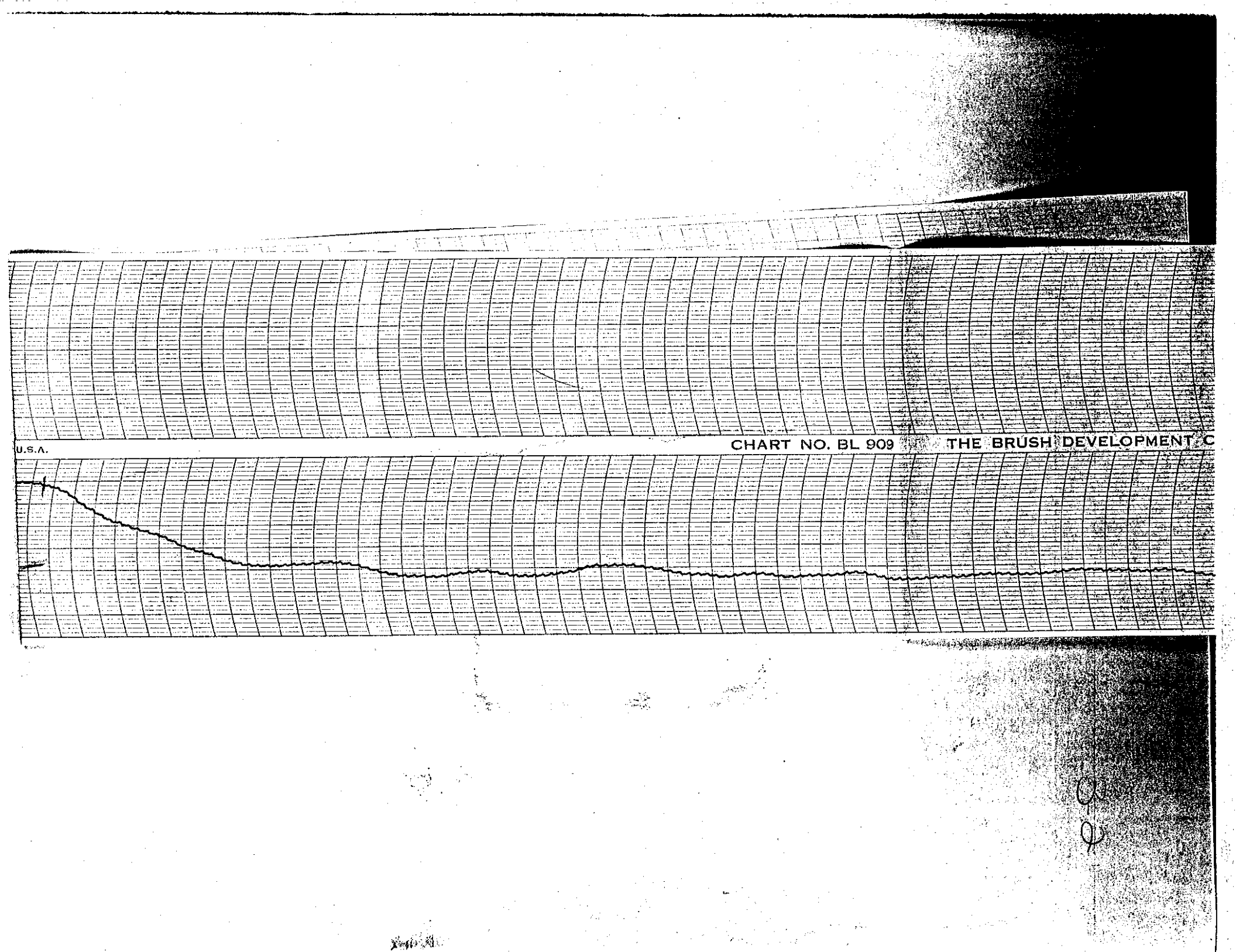
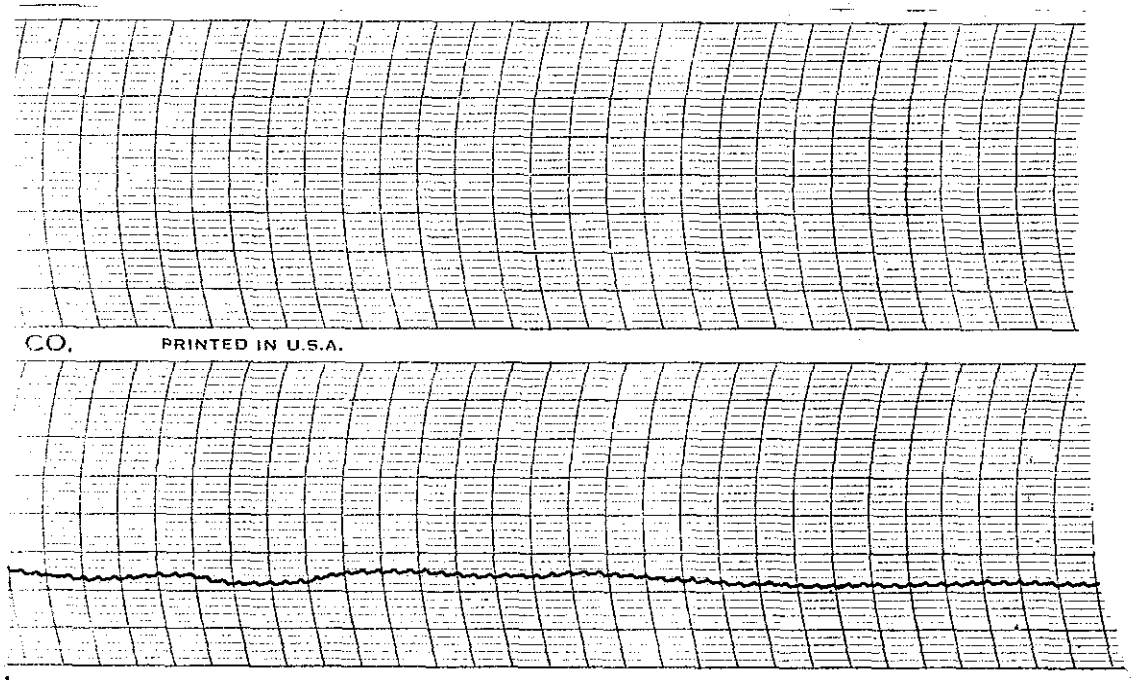


CHART NO. BL 9C

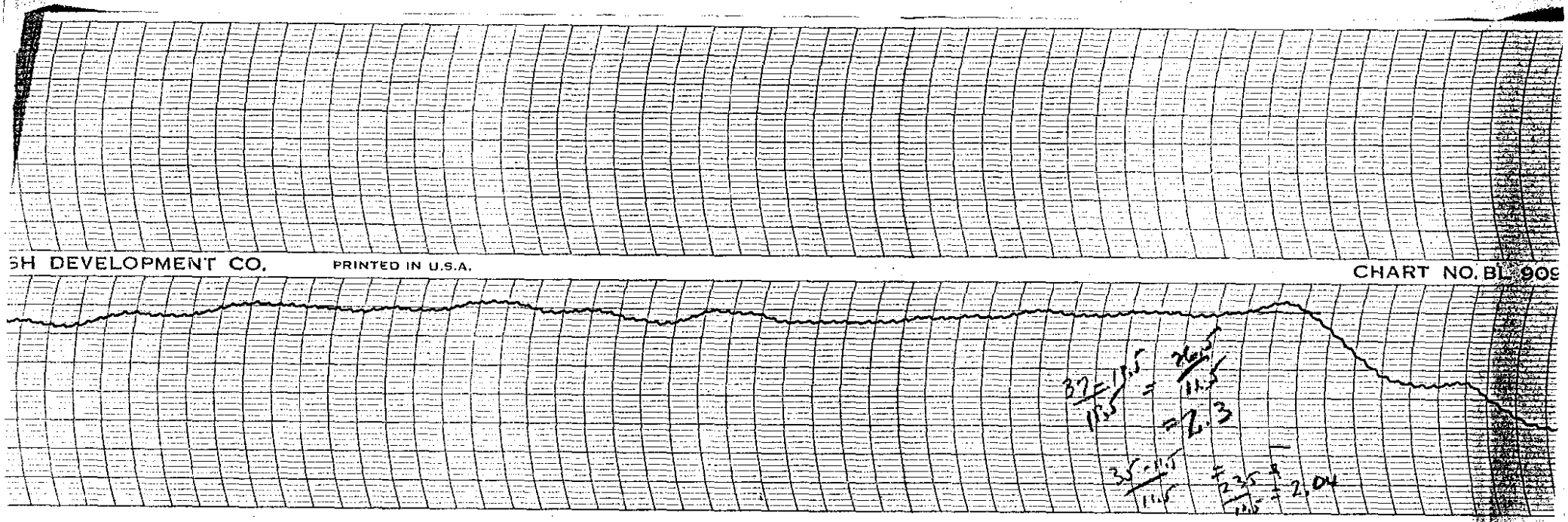
Graph Sheet #3 (3 pgs)


DROP ROD
CA 20-1-14
CHART NO. BL 909
THE BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.
=1.4
1.13

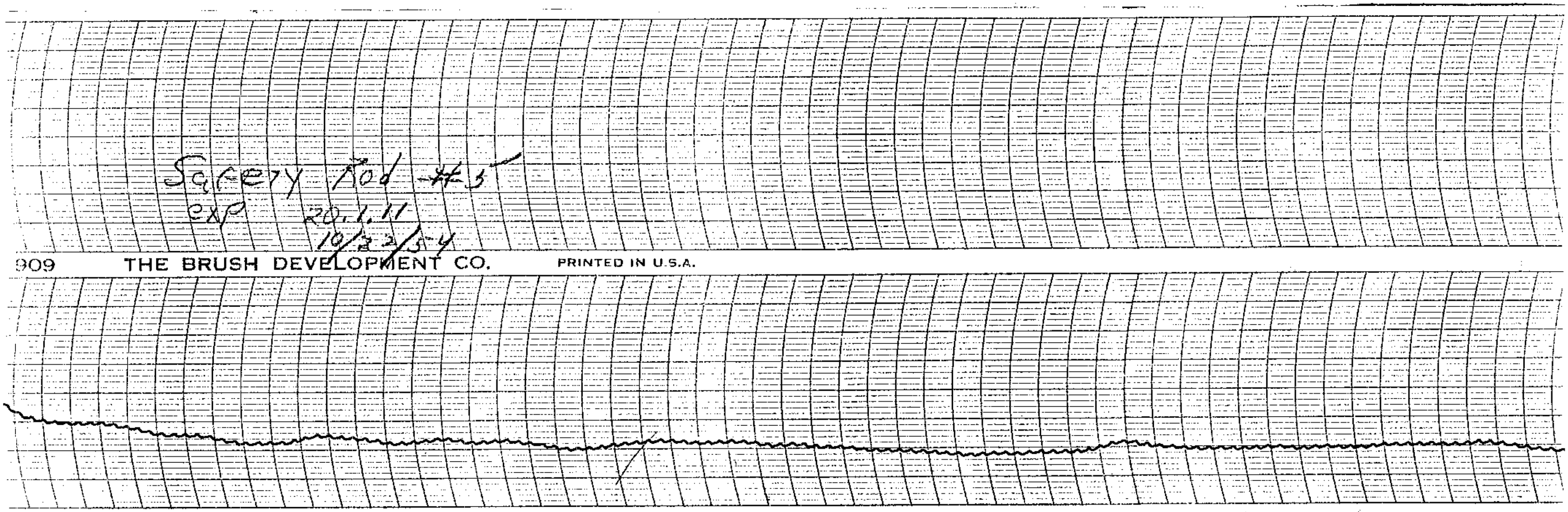

U.S.A.
CHART NO. BL 909
THE BRUSH DEVELOPMENT C


CO,
PRINTED IN U.S.A.

Graph Sheet #4 (3 pgs)


SH DEVELOPMENT CO.
PRINTED IN U.S.A.
CHART NO. BL 909
$\frac{32}{11.5} = \frac{24}{11.5} = 2.3$
$\frac{35 - 11.5}{11.5} = \frac{23.5}{11.5} = 2.04$

4
1


Safety Rod #3
exp 20.1.11
10/22/54
909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

24

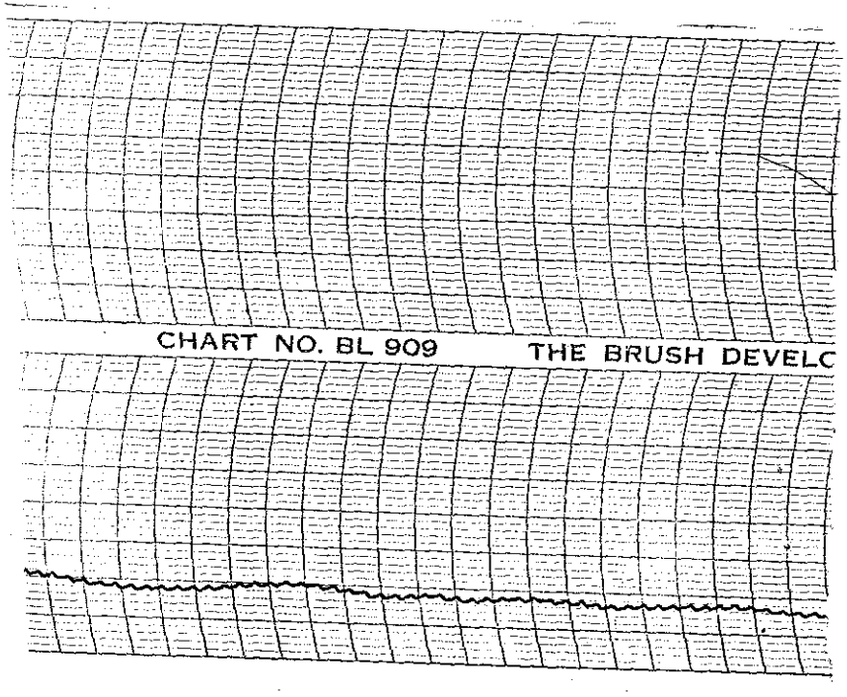
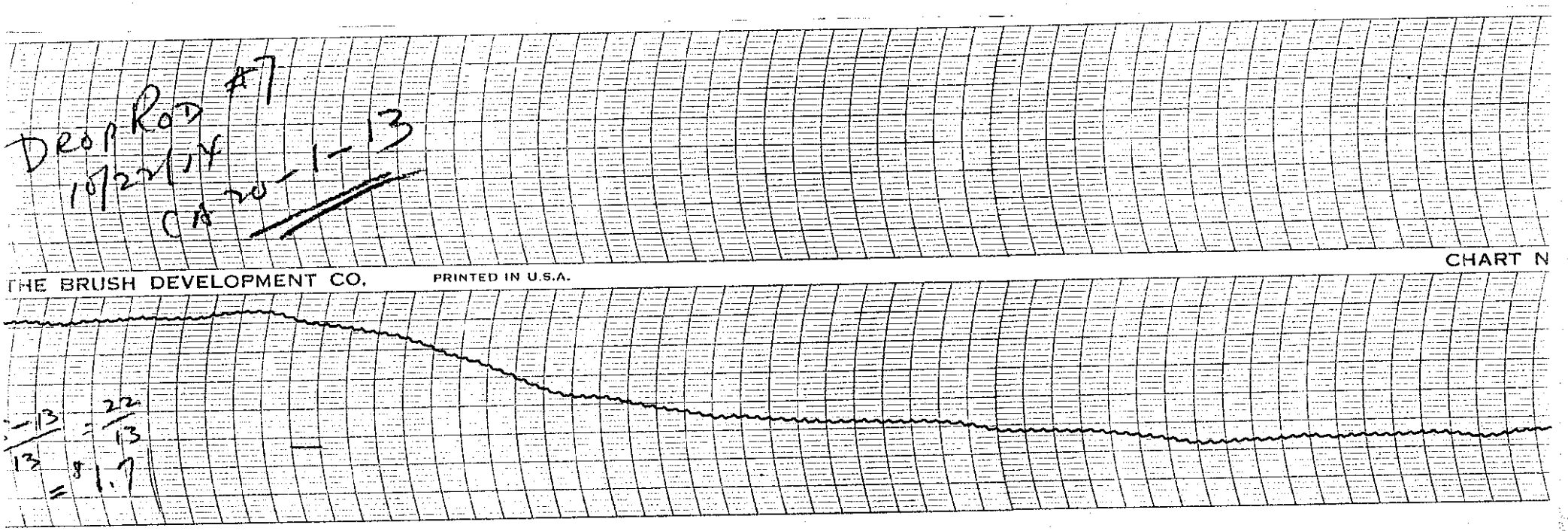


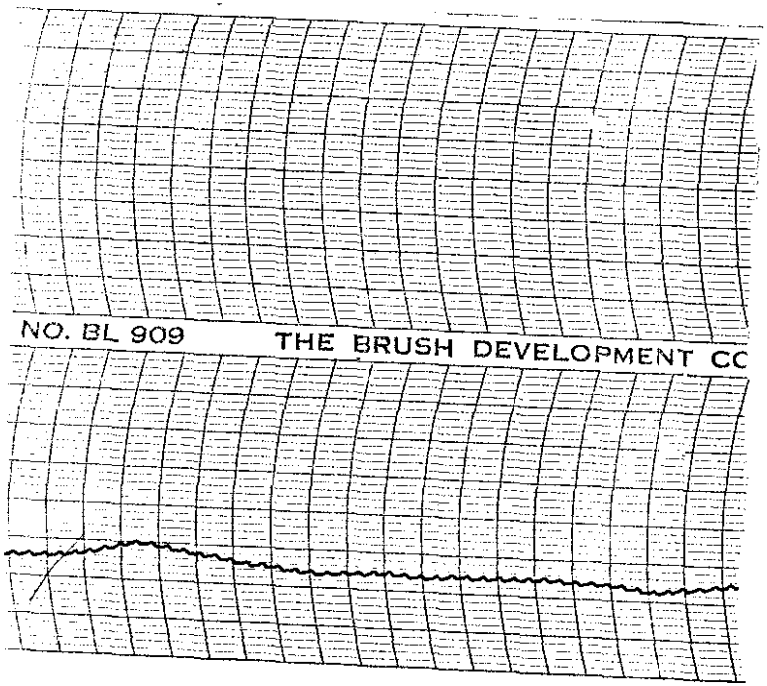
CHART NO. BL 909
THE BRUSH DEVELC

Graph Sheet #5 (3 pgs)

9


Drop Rod #7
10/22/14
Ch no - 1-13
CHART N
THE BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.
-13 = 22/13
13 = 1.7

5-2


NO. BL 909
THE BRUSH DEVELOPMENT CC

Graph Sheet #6 (2 pages)

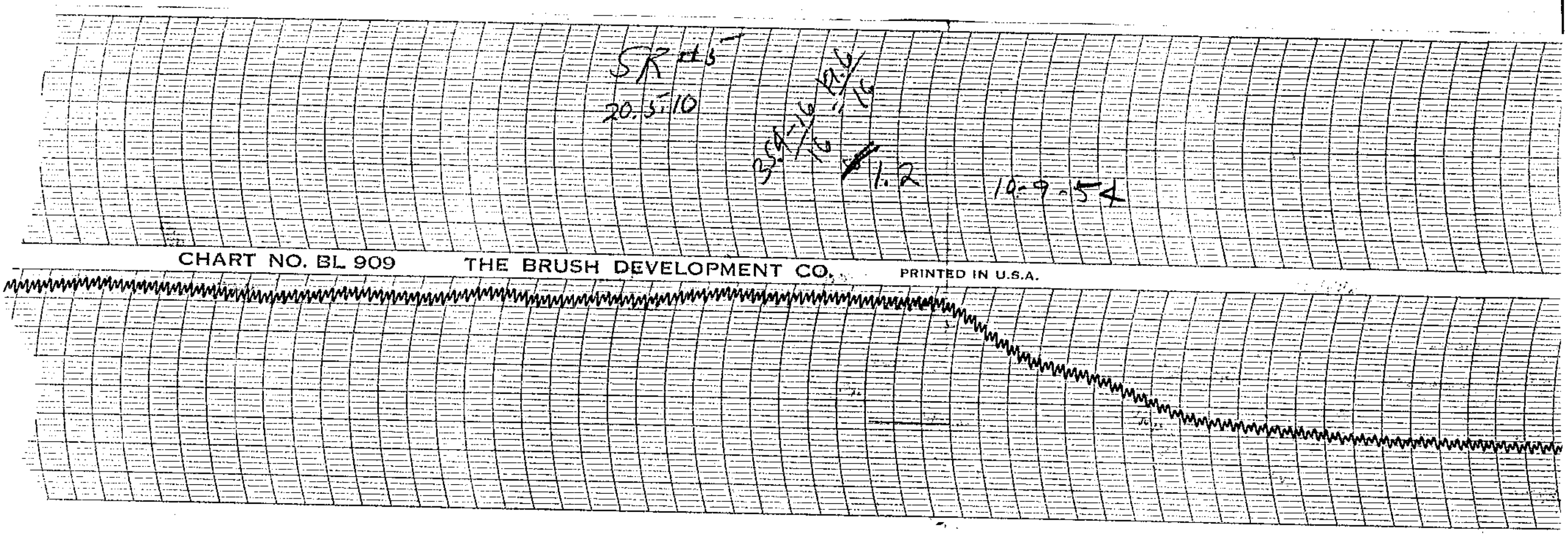

20.5.10
1.2
10-9-54
CHART NO. BL 909
THE BRUSH DEVELOPMENT CO.
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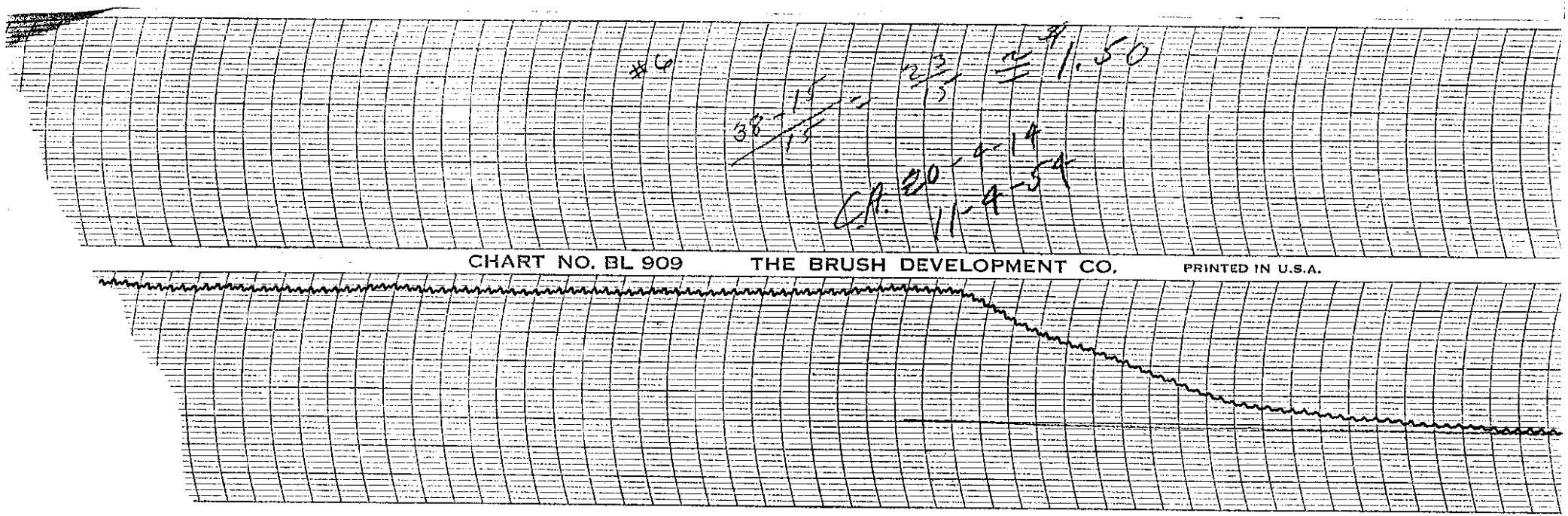
CHART NO. BL 909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

3-9

Graph Sheet #7 (2 pgs)


#6
CHART NO. BL 909
THE BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.

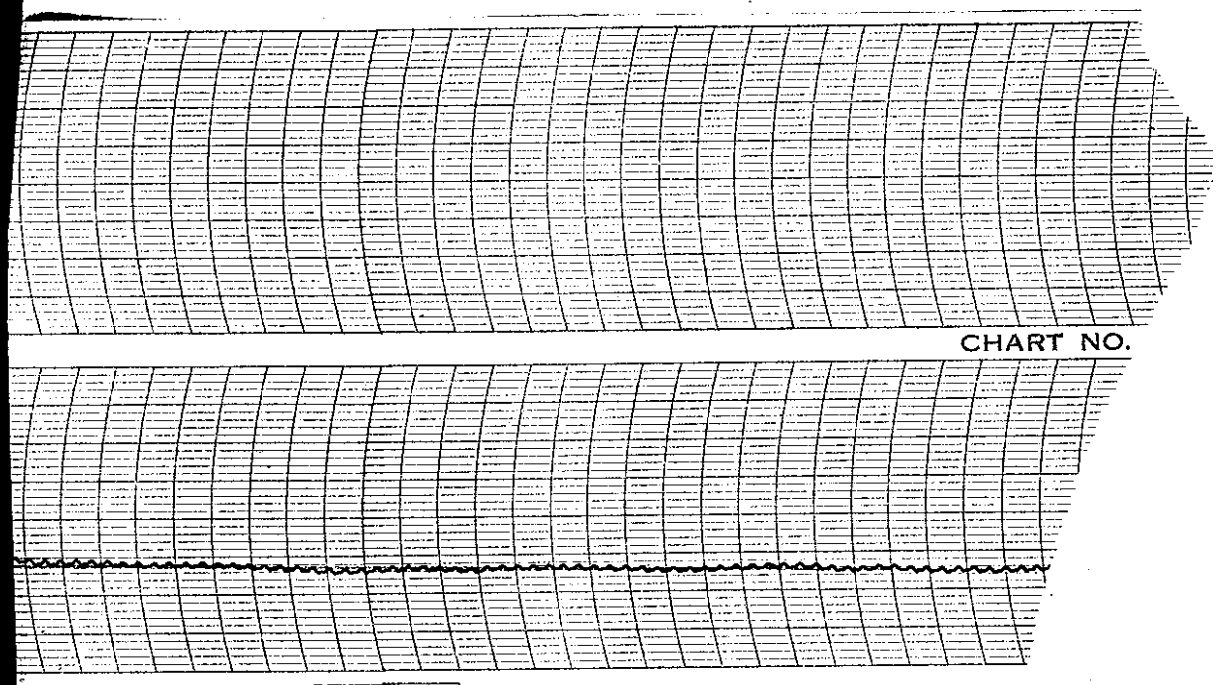
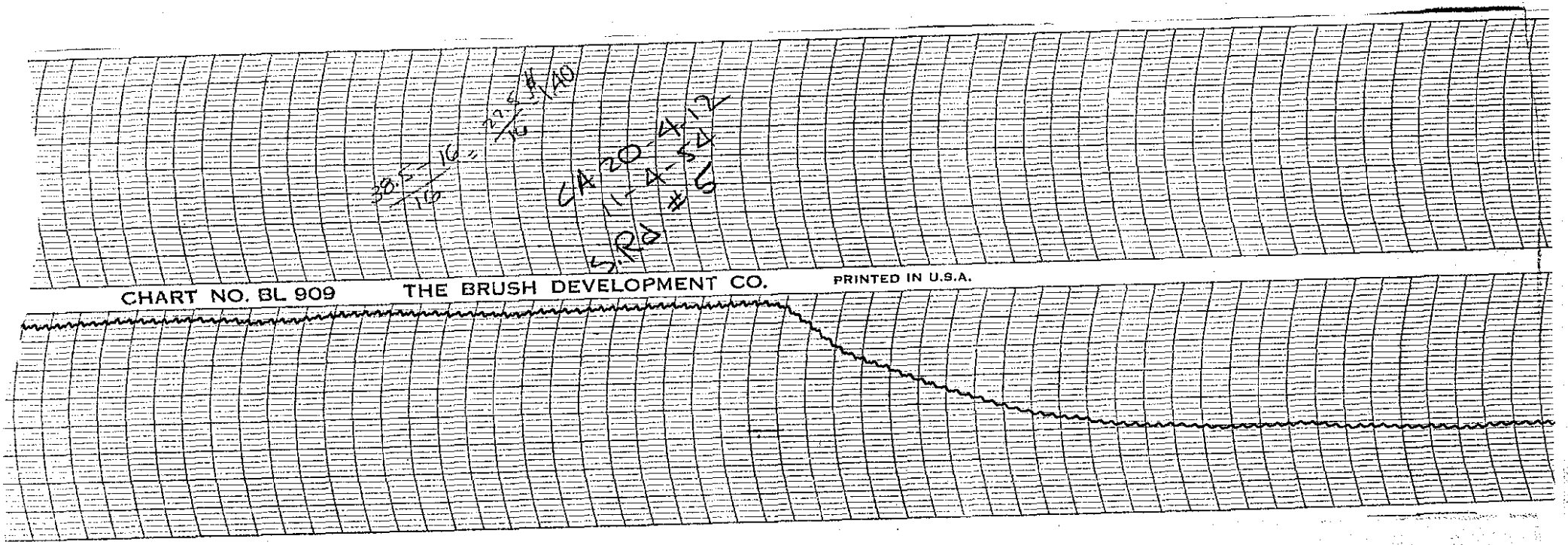


CHART NO.

Graph sheet #8 (2 pages)



8
1

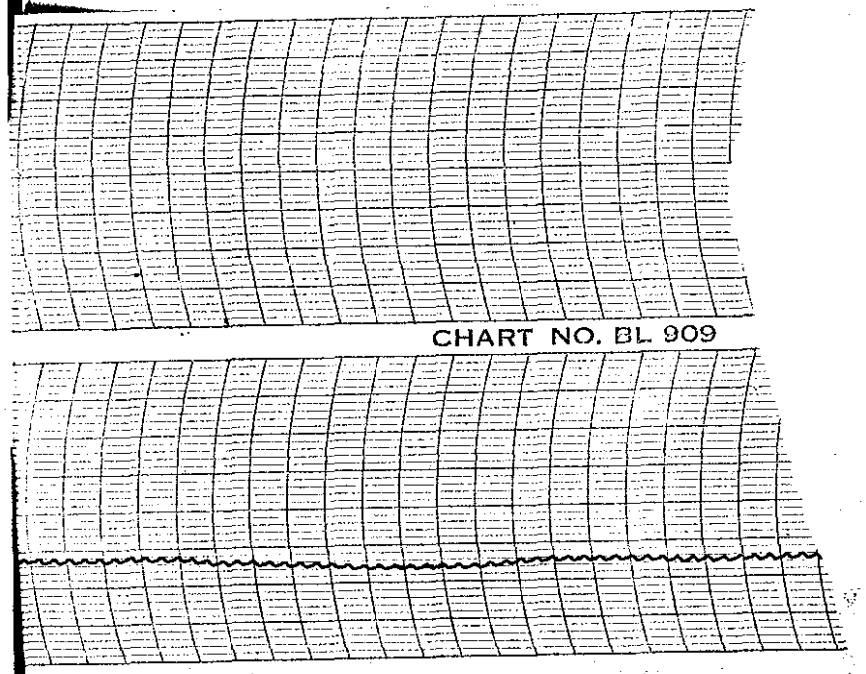


CHART NO. BL 909

Graph #9
Sheet

CHART NO. BL 909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

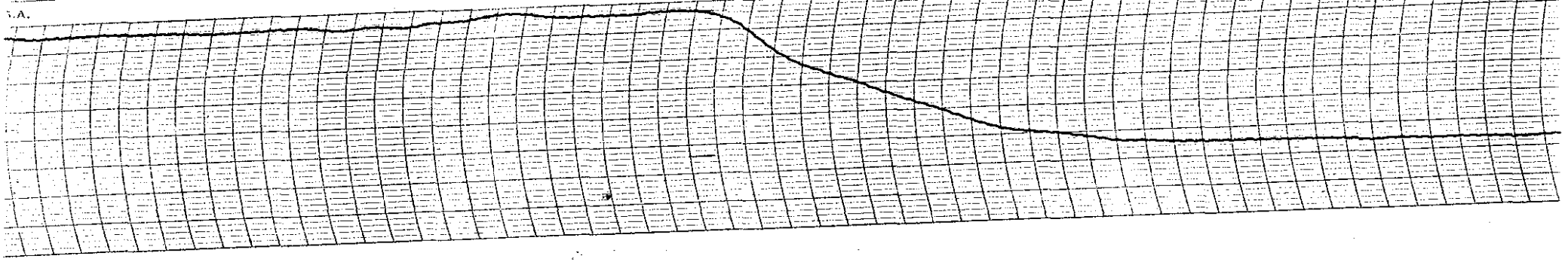
Q-1

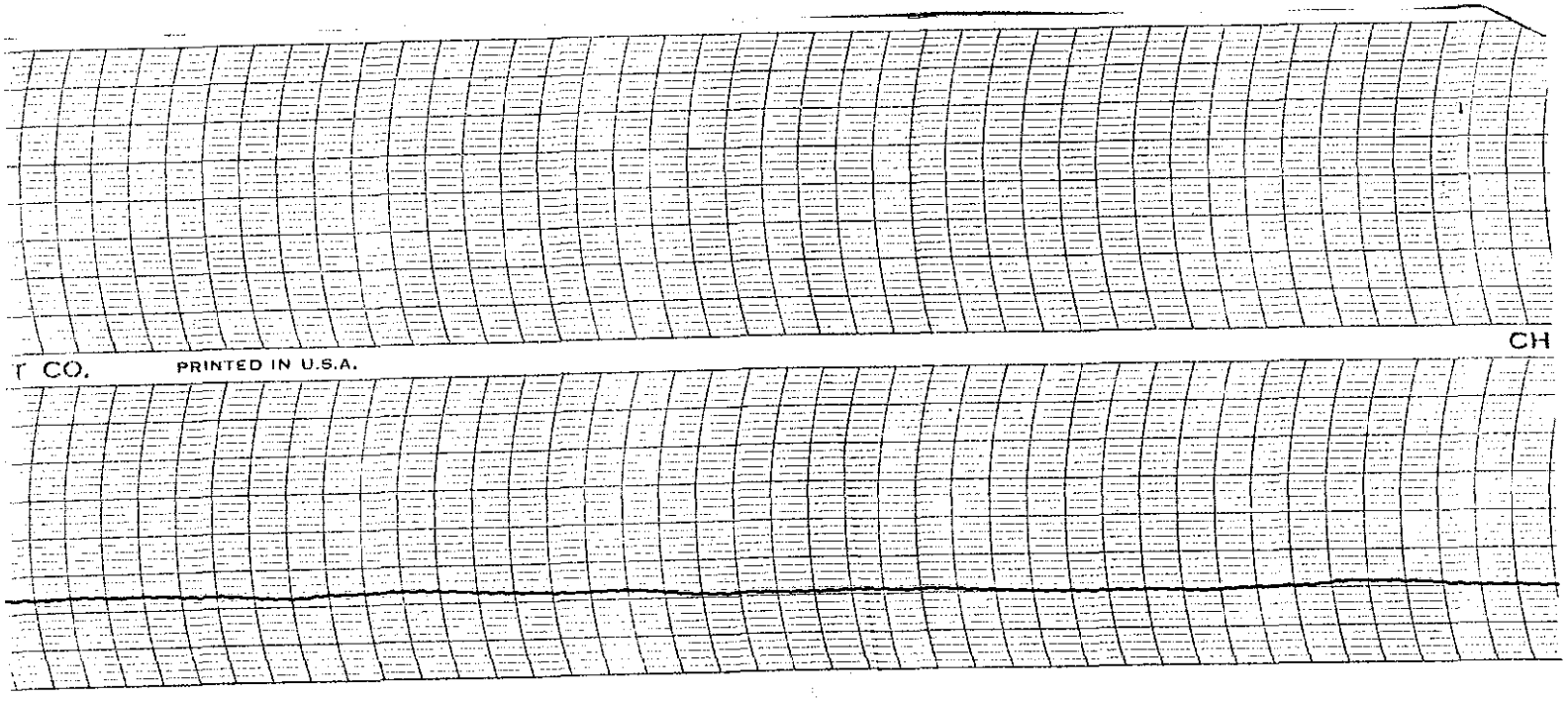
SR #6

20.2.8

$\frac{38 - 13.2}{13.6} = 1.8$

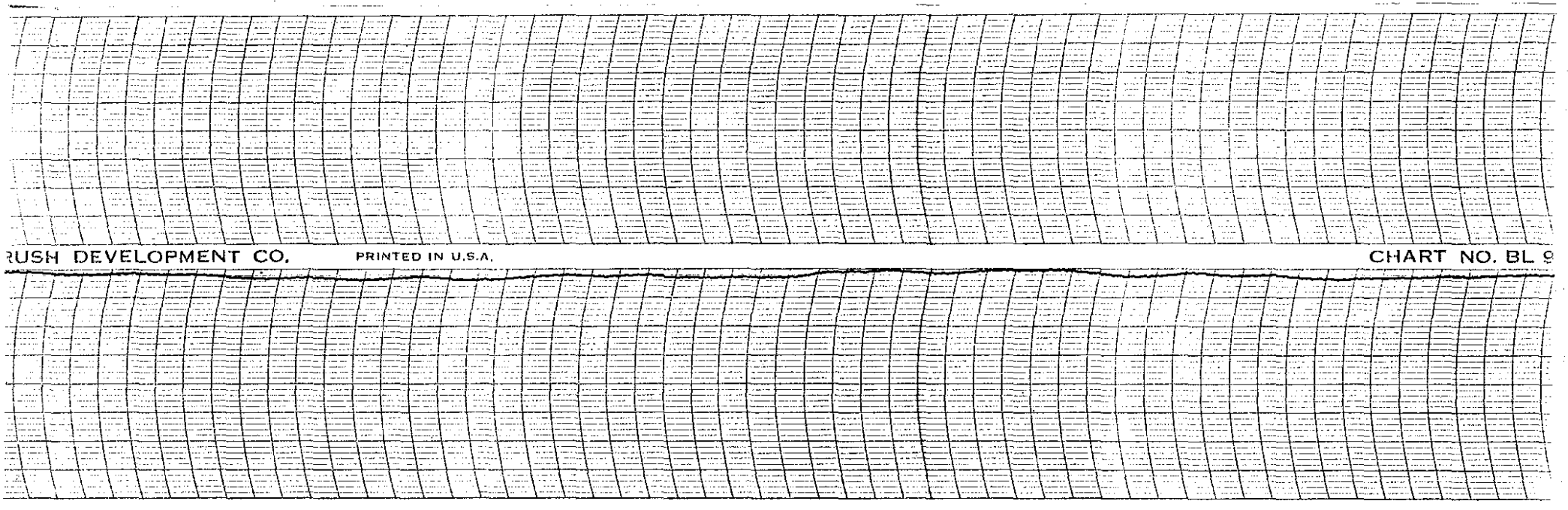
CHART NO. BL 909 THE BRUSH DEVELOPMENT CO.





3-b

Graph Sheet #10 (pages)

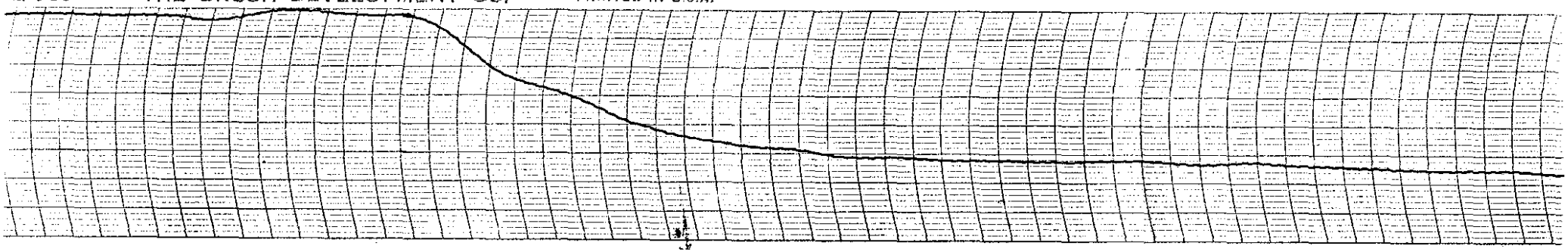

RUSH DEVELOPMENT CO.
PRINTED IN U.S.A.
CHART NO. BL 9

SR #57

20.2.8

$\frac{39-15}{16} = \frac{24}{15} = 1.6$

L. 909 THE BRUSH DEVELOPMENT CO. PRINTED IN U.S.A.

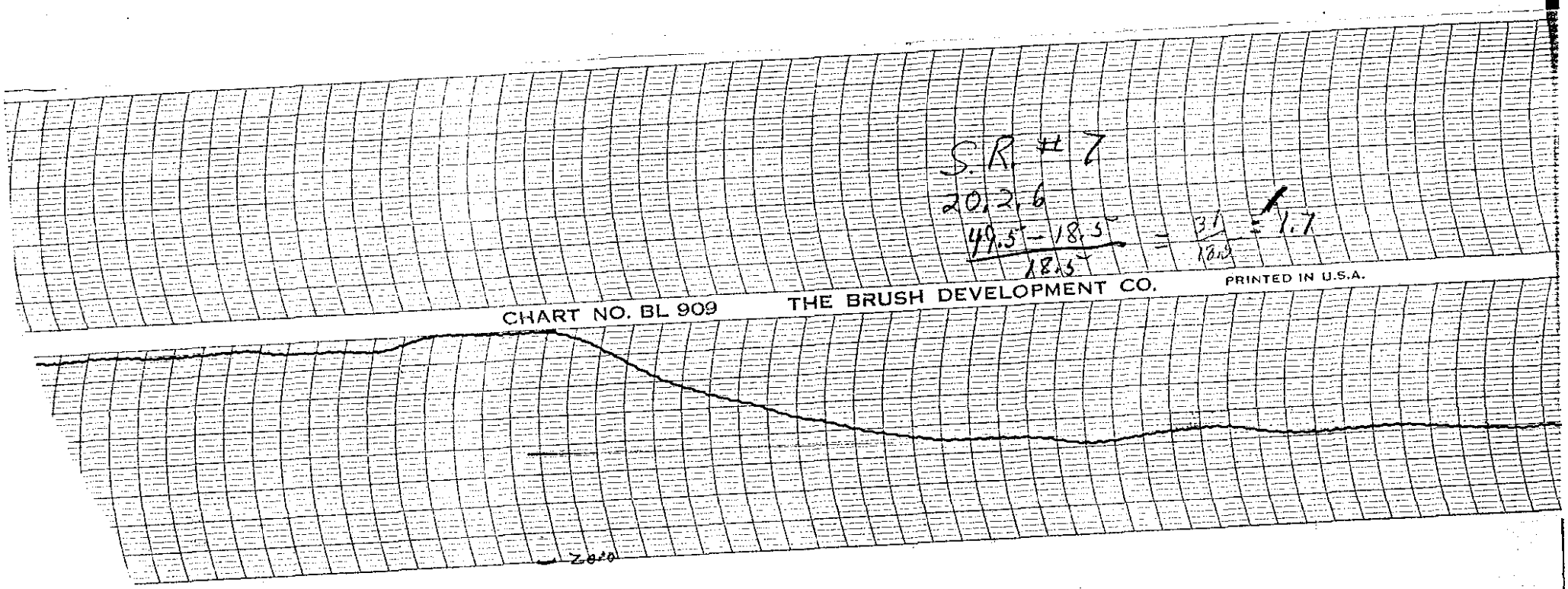


C.9

10.3

Graph Sheet

#11


S.R. # 7
20,2,6
49.5' - 18.5'
18.5'
= 31/18 = 1.7
CHART NO. BL 909
THE BRUSH DEVELOPMENT CO.
PRINTED IN U.S.A.
2010

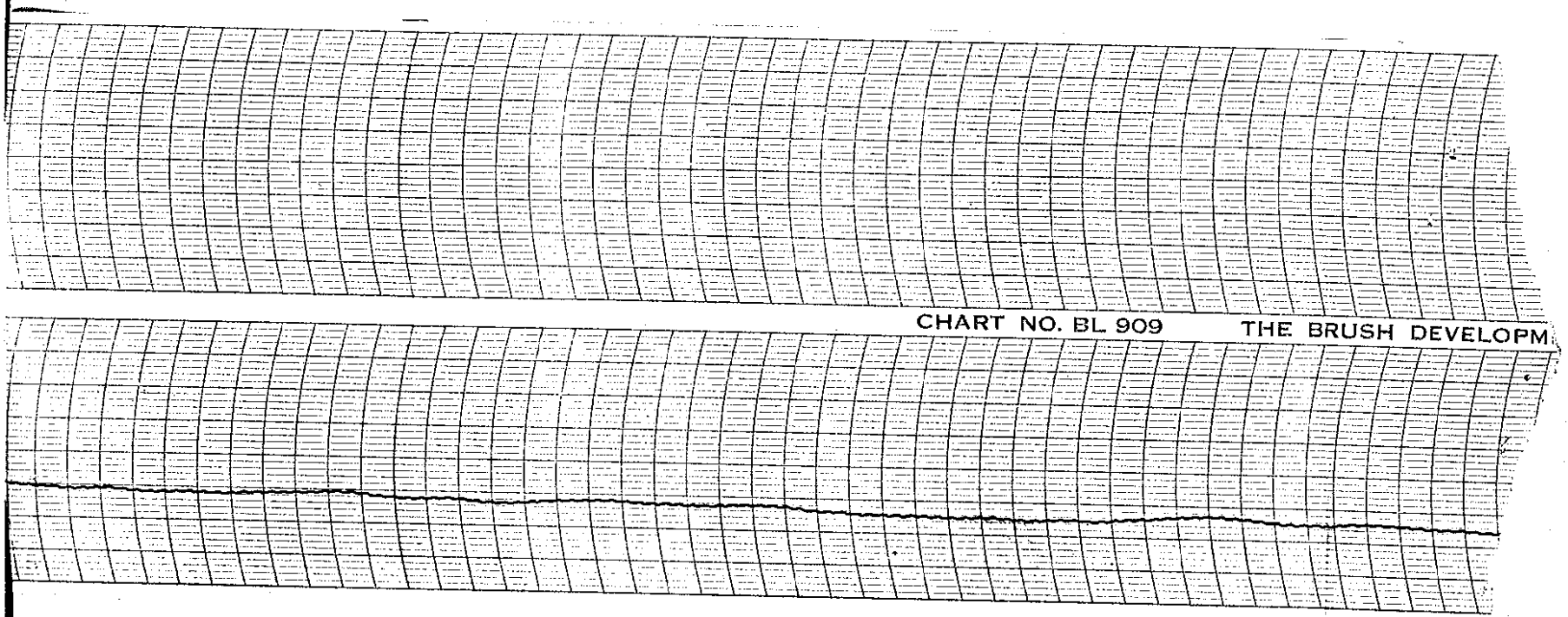


CHART NO. BL 909
THE BRUSH DEVELOPM

C.A. 20 Expr. 2 Run 8

Sheet ____ Date 10-26-1954 Time 1:20 ~~AM~~ PM

Purpose Evaluation of Inconel

Added 1 piece of Inconel, 154 gms as indicated -

moveable Table only → 

Reactor level with Rod A = 999.96~~8~~

C = 14.019

Inserted Rod C to produce positive period levelled with Rod C.

137 Sec. period

~7.6 ¢

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 8

Fired SR #'s ~~157~~ ~#1.6

999.989 T .0210 B .6099

Control Rod		Channel	
A. 999.965 out	A	45	100/100
B. 999.988 "	B	.0052	
C. 15.415 = 18.6	C	7.4	4×10^{-11}
	D	74	100/150
	E	.2	200 V.

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

C.A. 20 Expr. 2 Run 9
Sheet ____ Date 10-26 195 4 Time 2:30 ~~AM~~ PM
Purpose Evaluation of Inconel

Removed Inconel, 154 gms, used for 20.2.8.
Replaced Inconel, 303 gms, that was removed for 20.2.7.

Removed Inconel, 177 gms, 2⅞" X 7 3/16" X 1/16" from fixed Table as shown:-

Fixed SR #5 ~ #1.8

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 9

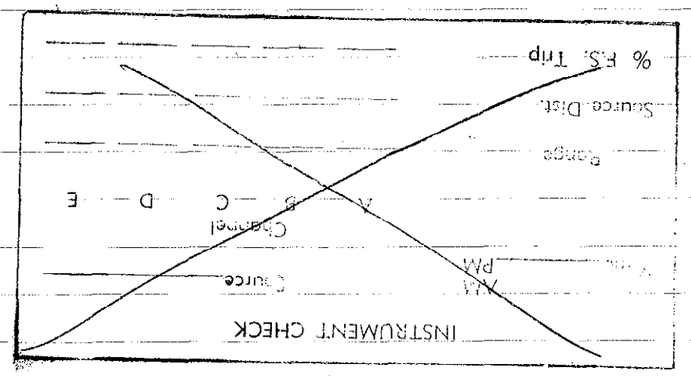
999.988 T .9215 B .6090

		Channel	
A. 999.955 ext	A	45	100/100
B. 999.988 "	B	.0049	
C 16.180 22.5¢	C	7.3	4×10^{-11}
	D	74	100/100
	E	.2	900 V.

Tim Crit. ____ AM PM Duration ____ min.

22.5¢
- 3.8
18.7¢
= .156 ¢/gm

10/27/54



INSTRUMENT CHECK

Time 8:40 AM PM Source PN-3-8

	Channel A	B	C	D	E
Range	1/1000 α		10^{-10}	1/1000	900V
Source Dist.	30"		12"	30"	0
% F.S. Trip	95		100	95	100

Ctrs 1,243 α

C.A. 20 Expr. 2 Run 9
Sheet ____ Date 10-27 195 4 Time 10:15 ~~PM~~ AM
Purpose Zero Run
Same as 20.2.6

Replaced 177 gms (2⅞" x 7 3/16" x 1/16") Inconel on fixed Table.

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 9

Tables 999.989 T. .8211 B = .6079

A 999.995' out x4 100/50

B 999.168 " .0019

C 8.225" 0.5¢ 4.9 5X10⁻¹¹

D 60 100/50

E .3 500 V.

Tim Crit. 10:35 AM ~~PM~~ Duration 15' min.

with Rod C at 0.0 (out) Reactor rising slightly.

C.A. 20 Expr. 2 Run 10

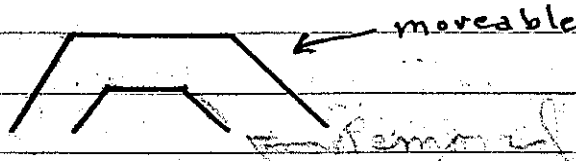
Sheet _____ Date 10-27-1954 Time 11:10 AM ~~PM~~

Purpose Evaluation of Inconel on B Island.

Removed 156.5 gms Inconel

1 piece 2 7/8" X 4 1/16" X 1/16" from Moveable Tab

1 piece ~~E 7/8~~ 1 7/16" X 4 1/16" X 1/16" from fixed Tab



CRITICAL POSITIONS

Run 20 2 Run 10

Table Pos. 999.988 T.7212 B .6086

	Control Rod		Channel	
A	999.970 out	A	46	100/50
B	999.988 out	B	.002	
C	14.215" 1.5¢	C	5.3	5 X 10⁻¹¹
4		D	16.5"	100/50
		E	0.0	900 V

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

11.5" ¢
− 0.5"
11.0 ¢
~ .07 ¢/gm

Raised power level to .005" with Rod C
levelled with Rod C = 14.245"

214

C.A. 20 Expr. 2 Run 11

Sheet ____ Date 10-27-1954 Time 1:05 ~~AM~~ PM

Purpose Evaluate Inconel (Island)

Replaced 156.5 gms Removed for 20.2.10

Removed 169 gms Inconel

1 pc 4 3/16" X 2 3/8" X 1/16" from Moveable Tabl

1 pc 4 3/16" X 1 7/16" X 1/16" from fixed Tabl

CRITICAL POSITIONS

C.A. 20 Expr. 2 Run 11

Table Pos. 999.988 T 1. T.7219 B.6083

Control Rod		Channel	
A 999.965 Out	A	44	100/50
B 999.988 "	B	1.002	
C 14.845 14.54	C	3.2	10^{-10}
4	D	62	100/50
	E	.1	900 ✓

14.54
0.5¢
14.04

~ .08¢/gm

Tim Crit. 1:20 ~~AM~~ PM Duration 12 min.

C.A. 20 Expr. 3 Run 1

Sheet ____ Da 10/27 65 4 Time 2:05 ~~AM~~ PM

Purpose Evaluate void and teflon in fuel region

Removed 624 gms Inconel from movable table.

Removed uranium from 2FL-5 (123.5-9 gms 4) on movable table. 114 U^{235}

CRITICAL POSITIONS

20 Expr 3 Run 1

999.993 T. 6229 .6085

	Control Rod		Channel	
A	999.971	A	42	100/50
B	999.888	B	.0019	
C	20.685 ~884	C	3.0	10^{-16}
4		D	61	100/50
		E	.5	900

Tim Crit. 2:25 ~~AM~~ PM Duration 10 min.

C.A. 20 Expr. 3 Run 2
Sheet ____ Date 10/27 1954 Time 2:40 ~~AM~~ PM
Purpose Evaluate void & teflon - - -

2FL-5 (minus uranium) removed from reactor
Teflon wt of 2FL-5 - 1370 gms

CRITICAL POSITIONS

20 Expr. 3 Run 2

999.992 | .5231 .6092

Control Rod		Chamber	
A 999.978	A	47	100/50
B 999.988	B	.002	
C 19.165 ~ 574	C	3.4	10^{-10}
—	D	67	100/50
	E	.6	900 V

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

C. 20 Expr. 3 Run 3
Sheet ____ Date 10/27 1954 Time 3:25 ~~AM~~ PM
Purpose Evaluate void & teflon - ~ ~

2FL-5 (with uranium) replaced on movable table

CRITICAL POSITIONS

C.A. 20 Expr. 3 Run 3

999.990 | .3226 .6085

Control Rod		Chamber	
A 999.975	A	49	100/50
B 999.988	B	.0021	
C 22.800 ~ 1.37	C	3.4	10^{-10}
—	D	67	100/50
	E	.3	900 V

Tim Crit. 3:32 ~~AM~~ PM Duration 10 min.

3 Nov 54

INSTRUMENT CHECK

Time 8:40 AM PM Source PN 58

	Channel A	B	C	D	E
Range	1%/1000	ox	10^{-10}	1%/1000	900v
Source Dist.	24"		12"	30"	
% F.S. Trip	90		90	100	

Ctrs 1, 2, 3 ox

Pb 267 removed from tables, placed in vault 109

PN 58 placed in tables 3.7×10^7 n/cm²/sec 6/8/54

C.A. 20 Expr. 4 Run 1

Sheet ____ Date 11-3-1954 Time 8:30 AM PM

Purpose Background Count for multiplication Curve. No fuel. Island supported by Wooden Blocks.

Discriminator Settings:

Counter 1) 30.0 3) 30.0

2) 18.0

Ref. [20.4]

CF 54-4-153

CF 54-10-119

Channel E inoperative. Taken out of the scram circuit.

MULTIPLICATION

Scaler	c/ 5 min.	5 min.	Mult.	1/M
1	130 X 16 + 12	2092		1.0
2	93 X 16 + 13	1501		1.0
3	215 X 16 + 15	3453		1.0

C.A. 20 Expr. 4 Run 2

Sheet ____ Date 11-3-1954 Time ____ AM PM

Purpose 1st fuel Loading.

All wooden blocks removed.

Loading: Fixed Tables

Assembly	Mass U-Foil	Position
1FL - #12	172.7530 g.	151
1TL - 24	81.8882	152
1CL - 8	51.5658	153
1TL - 20	81.9070	154
- 22	82.3687	156
- 23	77.8203	158
2TL - 12	41.6580	155
3TL - 19	10.7833	251
- 20	10.3102	255

1CL - #7	50.3804	157
2C - 7	24.5140	252
- 8	24.6716	256
3TL - 18	10.6003	257
4TL - 8	21.4464	253+4

Moveable Table

1FL - #1	172.5453	1M2
2FL - 1	98.5150	1M1
1TL - 1	78.7288	1M3
- 2	81.5445	1M6
- 3	79.5220	1M1
- 4	82.2888	1M8
2TL - 1	41.7619	1M4
- 2	41.8263	1M7
- 3	41.8078	1M10
3TL - 1	10.8848	2M6
4TL - 1	21.1488	2M1+2
- 2	21.6157	2M4+5
- 3	21.2935	2M8+9
1CL - 1	51.0783	1M5
- 2	51.2275	1M9
2C - 1	23.5803	2M3
- 2	24.4080	2M7

U-Foil added = 1686.4445 g.
U^{235} in Reactor = 1557.1026 g.

MULTIPLICATION

Scaler	5	5 min.	Mult.	1/M
1	17 X 256 + 94	4454		0.47
2	202 X 16 + 9	3241		0.46
3	591 X 16 + 1	9456		0.37

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 2

Table Pos. 999.998 T.9242 B.6093

Control Rod		Channel	
1	999.973 out	A	
2	999.988 "	B	.000125
3	999.981 "	C	
4		D	
		E	

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

C.A. 20 Expr. 4 Run 3
Sheet ____ Date 11-3 1954 Time 10:53 AM PM
Purpose 2nd Fuel Loading.

~~Moveable~~ Fixed Table

1 FL - # 11	172.6185	353
2 FL - 6	98.3930	453

Moveable Table

1 FL - 2	172.0362	3M4
2 FL - 2	98.1964	4M4

U-Foil Added = 541.2441 g.
U^{235} Added = 499.7334
U^{235} in Reactor = 2056.8360

MULTIPLICATION

Scaler	c/ 5 min. BG/ 5 min.	Mult.	1/M
1	22 X 256 + 202 5832		0.36
2	16 X 256 + 56 4146		0.36
3	47 X 256 + 176 12176		0.28

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 3
Table Pos. 999.997 T .8232 B .6095
Control Rod Channel

A 998.970 out — A
B Some " — B .000155
C 999.983 " — C
A ____ — D
E

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

C.A. 20 Expr. 4 Run 4
Sheet ____ Date 11-3 1954 Time 12:15 ~~AM~~ PM
Purpose 3rd Fuel Loading

Channel E in operation. Replaced in scram circuit.
Trips at 100% of full scale

	Fixed Table	
1TL-#21	78.7314	352
3TL-17	10.6916	356
4TL-7	21.4960	357
1FL-10	172.9008	553
3TL-16	10.6357	456
3TL-15	10.6297	556
3TL-13	10.6500	557
2TL-10	42.0749	452
2TL-9	41.9405	354
	Moveable	
1TL-5	78.3293	3M3
~~4TL~~ 4TL-4	21.1625	3M8
4TL-5	21.2172	3M9
~~3TL~~ 3TL-2	10.4331	4M8
3TL-3	10.6354	4M9
2TL-4	42.1737	4M3
2TL-5	41.4670	3M5
1FL-3	172.3376	4M4

MULTIPLICATION

Scaler	c/ 5 min. ~~60~~/ 5 min.		Mult.	1/M
1	35 x 256 + 110	9,070		0.23
2	25 x 256 + 149	6,549		0.23
3	72 x 256 + 65	18,500		0.187

~~CRITICAL~~ POSITIONS

C.A. 20 ~~999.998~~ 4 Run 4

Table For 999.998 T. 1.6235 B. 6093

	Channel
1 999.995 ~~one~~	A
2 Same "	B .00025
3 999.983 "	C
4 "	D
	E

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

U-Foil Added = 797.5064 g.
U^{235} Added = 736.3416 g.
U^{235} in Reactor = 2793.1776 g

C.A. 20 Expr. 4 Run 5'
Sheet _____ Date 11-3-1954 Time _____ AM PM
Purpose 4th Fuel Loading

Fixed Table

ITL - # 18	81.8806	454
- 19	79.3568	552
- 17	78.6687	554

Moveable Table

ITL - 7	78.1992	4M5'
IFL - 4	172.9919	4M2
ITL - 6	81.7487	5M3
ITL - 8	82.0115'	5M5'

U-Foil Added = 654.8544 g.
U^{235} Added = 604.6303 g.
U^{235} in Reactor = 3397.8079 g.

MULTIPLICATION

Scaler	c/ 5' min.	BG/ 5' min.	Mult.	1/M
1	53X256+3	13,580		0.155'
2	36X256+153'	9,380		0.160
3	107X256+175'	27,580		0.125'

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 5'
Rod Pos. 999.997 ; 1.7235 ; 8.6092

	Control Rod	Channel
1	999.971 out	A
2	Same "	B 1.0003'
3	999.976 "	C
4		D
		E

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

C.A. 20 Expr. 4 Run 6
Sheet _____ Date 11-3-1954 Time 1:40 ~~AM~~ PM
Purpose 5th fuel loading.

Fixed Table

1FL - #9	172.4195	451

Moveable Table

2FL - #4	98.2863	4M1
- 3	98.9132	4M6
1FL - 5	172.3653	4M7

U-Foil Added = 541.9843 g.
U^{235} Added = 500.4168 g.
U^{235} in Reactor = 3898.2247 g.

MULTIPLICATION

Scaler c/ 5 m. BG/ 5 min. Mult. I/M

1	76 X 256 + 253 = 19,720	0.106
2	53 X 256 + 17 = 13,600	0.110
3	165 X 256 + 63 = 42,260	0.082

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 6
05 999.997 L 1231 BF. 6693

Control Rod	Channel
1 999.970 out	A
2 Same "	B .00053
3 999.984 "	C
4	D
	E

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

C.A. 20 Expr. 4 Run 7

Sheet ____ Date ____ 195__ Time 2:10 AM PM

Purpose 6th Fuel Loading

Fixed Table

IFL - #8	172.4331	4 S 5
2C - 5	24.8528	6 S 2
2C - 6	24.4147	6 S 6

Moveable Table

2C - #3	24.2361	6 M 3
2C - 4	24.5992	6 M 7

U-Foil Added = 270.5359 g.
U^{235} Added = 249.7871 g.
U^{235} in Reactor = 4148.0118 g.

MULTIPLICATION

Scaler	c/ 5	5 min.	Mult.	1/M
1	108 x256+ 81	27,700		0.0055
2	69 x256+ 123	17,700		0.085
3	224 x256+ 40	57,340		0.060

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 7

Table 999998 T 09232 B. D. 6092

Control Rod	Channel
A 999.970 (out)	A
B Same (out)	B 0.0007
C 999.978 (out)	C
4	D
	E

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

C.A. 20 Expr. 4 Run 8
Sheet ____ Date 3-Nov 1954 Time 2:55 ~~AM~~ PM
Purpose 7th Fuel Loading

Fixed Table

3TL -	# 14	10.5249	6S1
	- 12	10.6797	6S3
	- 11	10.6864	6S4
	- 10	10.6767	6S5
	- 9	10.7302	6S7
1CL	- 6	51.0771	7S3
	- 5	51.4448	7S7

Moveable Table

3TL -	7	10.7600	6M1
	- 8	10.6932	6M2
	- 4	10.7844	6M4
	- 5	10.7254	6M5
	- 6	10.7436	6M6
4TL	- 6	21.0890	6M8
1CL	- 3	51.3911	7M5
	- 4	51.1966	7M9

U-Foil Added = 333.2031 g.
U^{235} Added = 307.6481 g.
U^{235} in Reactor: 4455.6599 g.

MULTIPLICATION

Scaler	c/ 5 min.	c/ 5 min.	Mult.	ΔM
1	225 X 256 + 90	57,700		0.036
2	143 X 256 + 170	36,800		0.041
3	489 X 256 + 170	125,500		0.028

~~CRITICAL~~ POSITIONS

C.A. 20 Expr. 4 Run 8
Pos. 999.997 T .7246 B .6098

	Pos.	Channel
1	999.971 out	A
2	Some "	B .0015
3	999.980 "	C
4		D
		E

Time ~~Crit.~~ AM PM Duration ____ min.

C.A. 20 Expr. 4 Run 9
Sheet ____ Date 11-3-1954 Time 3:40 ~~AM~~ PM
Purpose 8th Fuel Loading

Fixed Table

2TL - #8	41.7785"	7S4

Moveable Table

2TL - #6	42.1026	7M6
1TL - 9	78.3995"	7M7
-10	81.7175"	7M8

U-Foil Added = ~~200~~ 243.9981 gr
U^{235} Added = 225.2847 gr
U^{235} in Reator = 4680.9446 g.

MULTIPLICATION

Scaler	c/ 5	S/ 5" min.	1/M
1	425 X 256 + 147	121,747	.017
2	297 X 256 + 181	76,213	.020
3	1105 X 256 + 102	282,982	.012

~~CRITICAL~~ POSITIONS

C.A. 20 Expr 4 Run 9
Table Pos. 999.999 T .7249 B. .6099

Control Rod	Channel
1 999.971 out	A
2 Some "	B .0035"
3 999.981 "	C
4	D
	E

Time ~~Crit.~~ ~~AM~~ PM Duration ____ min.

11-4-54

INSTRUMENT CHECK

Time 8:25 AM ~~PM~~ Source PN-58

	Channel A	B	C	D	E
Range	10/1000	OFF	10^{-10}	1/1000	900V
Source Dist.	24		12	30	0
% F.S. Trip	92		95	100	100

Counters 1, 2, 4 3 O.K.

C.A. 20 Expr. 4 Run 10

Sheet ____ Date 11-4 1954 Time 8:30 AM ~~PM~~

Purpose 9 ch. fuel loading.

Fixed Table

1TL - #16	81.8163	755
- 15	78.6387	756
Moveable Table		
2TL - 11	41.7234	7M4

U-Foil Added = 202.1784 g.
U^{235} Added = 186.6723 g
U^{235} in Reactor = 4867.6169 g.

CRITICAL POSITIONS

C.A. 20 Expr. 4 Run 10

999.997 T .5250 B .6086

		Channel	
A	999.781 out	A 88	100/50
B	Same "	B .0046	
C	10.445"	C 7.2	10^{-10}
4		D 69	100/100
		E .4	900V

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

Fired SR #5 - No value obtained
Brush Recorder out.

Mass = 4.867 Kg U^{235}

C.A. 20 Expr. 4 Run 11
Sheet ____ Date 11-4 195 4 Time 9:50 AM ~~PM~~
Purpose To determine effect of Source

Removed Source (PN 58) from Source track and placed in al extrusion on fixed table.

After reaching sufficient power ~~was reached~~, the source Completed removed.

CRITICAL POSITIONS

C.A. 20 Expr 4 Run 11
Tab 999.999 T. 5252 B. 6098

		Channel	
A	999.995 out	A 63	100/25
B	Same "	D .001	
C	10.440	C 5.0	2.5×10^{-7}
		D 87	1/200
		E 0.0	900 V.

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

R.d C out : ~ 725" τ period = 1.7 ¢

C.A. 20 Expr. 4 Run 12
Sheet ____ Date 11-4 195 54 Time 12:40 ~~AM~~ PM
Purpose 10th Fuel Loading
To Complete Loading Endure
Amt Of Fuel

PN 58 Removed From Tables, Placed in Vault 10⁹
PN 15 Placed In Tables 5×10^6 n/cm²/sec

Fixed Table

ITL-14	81.8988	752
IFL-7	172.5752	751

Movable Table

ITL-11	78.6888	7M3
IFL-6	172.2172	7M2

U-Foil Added = 505.3800 gm
U-235 Added = 466.6199
U-235 In Reactor = ~~4867.6169~~ 5334.2368

CRITICAL POSITIONS

C.A. 20 Expr. 4 Run 12

999.999 T. 0.5280 B 0.6080

	Control Rod		Channel	
A	999.981 (out)	A	49	100/100
B	24.152 (in)	B	.0049	
C	20.845	C	8.0	10^{-10}
		D	83	100/100
		E	0.4	900 y

Tim Crit. 1:05 AM PM Duration ____ min.

Fired S/Rod #5 Opposite C. Rod "B"

S.R. #5 ≅ #1.40

C.A. 20 Expr. 4 Run 13

Sheet — Date 11/4 1954 Time 1:35 PM

Purpose 11th fuel loading

fuel region completely loaded.

Fixed table

1TL-13	78.7589	7 S 8

Movable table

1TL-12	82.0934	7M-11
2TL-7	41.8059	7M-10
2FL-5	99.0404	7M-1

U fuel added 301.6986

U-235 added 278.5598

total U-235 in reactor 5612.7966

CRITICAL POSITIONS

C.A. 20 Expr. 4 Run 13

Trial Run 00.0002 T .5295 T B .6098 R

	Control Rod		Channel	
1	A. 20.628	A	44	10/100
2	B 24.152 (IN)	B	.005	
3	C) 24.195 (IN)	C	8.0	10^{-10}
4		D	81	10/100
		E	0.1	900 y

Tim Crit. 2:00 PM Duration 7 min.

Fired rod #3

S.R. #3 ≅ #1.25

C.A. 20 Expr. 4 Run 14

Sheet ____ Date 11-4 1954 Time 2:25 ~~PM~~

Purpose To study effect of gadolinium oxide disc. 1" diameter by 50 mils thick.

Gadolinium oxide disc placed at center of Island.

CRITICAL POSITIONS

C.A. 20 Expr. 4 Run 14

Table Pos. ~~0~~ 0.002 T 25.88 B 46.00

Control Rod		Channel	
1 A	18.615	A 49	100/100
2 B	24.152 (IN)	B .0048	
3 C	24.195 (IN)	C 6.0	4×10^{-11}
4		D 81	100/100
		E .2	900V

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

Fired S.R. #6

S.R. 6 = $1.50

INSTRUMENT CHECK

Time 8:20 ~~PM~~ AM Source PN-58

	Channel A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V
Source Dist:	20"		10"	30"	0"
% F.S. Trip	95		100+	95	100+

Counters 1,2,+3 OK

Disc. Settings: Ctr 1 - 30
2 - 18
3 - 30

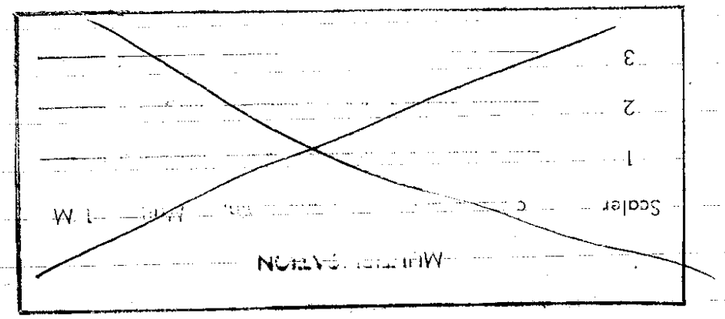
C.A. 20 Expr. 5 Run 1

Sheet ____ Date 11/9 1954 Time 9:10 ~~PM~~ AM

Purpose Background for third loading of CA-20 (change in fuel concentration)

See CF 54-

Island supported by wooden blocks (No fuel in Assembly)



MULTIPLICATION

Scaler	c/ 5 min. Bg	5 min.	Mult.	T M
1	30x16+4 484 34x16+6 550	518		1.0
2	24x16+12 396 25x16+3 403	400		1.0
3	49x16+2 786 50x16+14 814	800		1.0

CRITICAL POSITIONS

20 Expr 5 Run 1

0.002 .5301 .6098

A	999.965	A	
B	0.001	B	
C	999.980	C	
		D	
		E	

Crit. ____ AM PM Duration ____ min.

C.A. 20 Expr. 5 Run 2

Sheet ____ Date 11/9 1954 Time 9:55 AM PM

Purpose 1ST Fuel Loading

All wooden Blocks removed

Loading: Fixed Tables

Assembly	Mass U-Foil (gms)	Position
1FL - 12	172.7530	151
1TL - 24	66.3753	152
1TL - 23	65.9577	158
1TL - 22	65.8687	156
1TL - 21	66.2797	154
1CL - 8	42.9485	153
1CL - 7	42.7281	157
2C - 8	20.5146	256
2C - 7	20.3693	252
3TL - 20	9.6966	255
3TL - 19	9.8658	251
3TL - 18	9.5281	257
4TL - 8	19.2926	253+4
2TL - 12	32.6463	155

Movable Table

1FL-1	172.5453	1M2
2FL-1	73.9768	1M1
1TL-1	66.4865	1M3
-2	65.9085	1M6
-3	65.4678	1M1
-4	65.6527	1M8
2TL-1	32.9733	1M4
-2	33.0325	1M7
-3	33.1849	1M10
1CL-1	42.5274	1M5
-2	42.7718	1M9

2C-1	20.5175	2M3
-2	20.0933	2M7
3TL-1	9.5605	2M6
4TL-1	19.2696	2M1+2
-2	19.6081	2M4&5
-3	19.3773	2M8+9
U-foil added	1447.8721 gms	
U-235 in reactor	1.336 kg	

MULTIPLICATION

Scaler	c/ 5 min. Bk 5 min.	Mult.	1/M
1	65X16+10 1050		.49
2	51X16+2 818		.49
3	122X16+13 1965		.41

C.A. 20 Expr. 5 Run 3
Sheet ____ Date 11/9 1954 Time 10:40 AM PM
Purpose 2nd Fuel Loading

Loading: Fixed

1FL-10	172.6185	353
1FL-10	172.9008	453

Movable

1FL-2	172.0362	3M4
2TL-4	33.1102	3M3
4 foil added	550.6657 gms	
U-235 in reactor	1.845 kg	

MULTIPLICATION

Scaler	c/ min.	Mult.	1/M
1	84X16+10 1354		.38
2	67X16+15 1087		.37
3	168X16+6 2694		.30

C.A. 20 Expr. 5 Run 4
Sheet ____ Date 11/9 1954 Time 11:15 AM PM
Purpose 3rd Fuel Loading

Loading Fixed Table

1TL-20	66.1433	452
3TL-17	9.5374	357
-16	9.6766	456
-15	9.6810	556
-14	9.8565	557

4TL - 7	19.0859	358
2TL - 11	33.0776	352
2FL - 6	73.9102	553
2TL - 10	33.0613	354

Moveable Table

1TL - 5	65.0299	4m3
- 7	65.1217	4m5
4TL - 4	19.1880	3m8
- 5	19.3037	3m9
1FL - 3	172.3376	4m4
3TL - 2	9.6384	4m8
- 3	9.4313	4m9
2FL - 2	73.4565	5m4
2TL - 5	32.7593	3m5

U Foil Added 730.2962 g.
U^{235} in Reactor 2.52 Kg

MULTIPLICATION

Scaler	c/ 5 min.	D/ 5 min.	Mult.	1/M
1	128 X 16 + 4 = 2052			0.25
2	103 X 16 + 5 = 1653			0.24
3	245 X 16 + 10 = 4090			0.20

C.A. 20 Expr. 5 Run 5
Sheet ____ Date 11-9-54 Time 12:30 ~~AM~~ PM
Purpose 4th fuel loading.

Fixed Table

1TL - 18	65.7525	554
- 19	66.5149	552
- 17	66.2628	454
3TL - 12	9.9788	653
1FL - 9	172.4195	451

Moveable Table

1FL - 4	172.9919	4m2
1TL - 6	66.3037	5m3
1TL - 8	65.9079	5m5
3TL - 4	9.7532	6m4
3TL - 5	9.6615	6m5

U-Foil Added 705.5467 g.
U^{235} in Reactor 3.17 Kg.

MULTIPLICATION

Scaler	c/ 5 min.	D/ 5 min.	Mult.	1/M
1	226 X 16 + 2 = 3618			0.14
2	161 X 16 + 14 = 2590			0.15
3	418 X 16 + 3 = 6691			0.12

C.A. 20 Expr. 5 Run 6
Sheet Date 11/9 1954 Time AM PM
Purpose 5TH Fuel Loading

	Fixed Table	
1FL-8	172.4331	455
3TL-11	9.6606	654
3TL-10	9.7032	655
	Movable Table	
2FL-3	74.0929	4M7
1FL-5	172.3653	4M6
3TL-6	9.6108	6M6
4 foil added	447.8659	
U-235 in reactor	3.58 kg	

MULTIPLICATION

Scaler		min.	Mult.	1/M
1	301 x16 + 5	4821		0.11
2	241 x16 + 5	3861		0.10
3	601 x16 + 3	9619		0.08

$B_1 = .00013$

C.A. 20 Expr. 5 Run 7
Sheet Date 11/9 1954 Time AM PM
Purpose 6TH Fuel Loading

	Fixed Table			
1CL-6	42.6515	753		
-5	42.1587	757		
3TL-13	9.6418	651		
2C-6	20.4016	652		
2C-5	20.5314	656		
3TL-9	9.4174	657		
	← Moveable Table			
2FL-4	73.7588	4M2		
1CL-3	42.7128	7M5	4 foil added	383.8784 gms
1CL-4	42.7133	7M9	U-235 in reactor	3.938 Kg
3TL-7	9.6746	6M1		
3TL-8	9.9345	6M2		
2C-3	20.4260	6M3		
2C-4	20.5828	6M7		
4TL-6	19.2732	6M8		

MULTIPLICATION

Scaler	5	min. 5	Mult.	1/M
1	526 x16 + 15 =	8,431		0.061
2	404 x16 + 0 =	6,464		0.060
3	1069 x16 + 2 =	17,104		0.047

$B_1 = .00023$

C.A. 20 Expr. 5 Run 7
Sheet ____ Date 11/9 195 4 Time 2:15 ~~AM~~ PM
Purpose 7th Fuel Loading

Loading: Fixed Table

2TL-9	32.6499	7S5
1TL-14	65.9057	7S2
-15	66.5261	7S6
-16	65.7422	7S4
	Movable Table	
2TL-6	32.9200	7M6
1TL-9	65.7578	7M7
-10	66.0088	7M8
-11	65.9050	7M9
U foil added	461.4155 gms	
U-235 in reactor	4,365 Kg	

MULTIPLICATION

Scaler	c/ min. 3.3 min.	Mult.	1/M
1	515 x64+22 32,960		0.016
2	372 x64+29 23,800		0.017
3	1050 x64+4 67,200		0.012

.00082

C.A. 20 Expr. 5 Run 8 9
Sheet ____ Da. 11/9 195 4 Time ____ AM PM
Purpose 8th Fuel Loading

Fixed Table

1TL-13	66.4197	7S8
	Moveable Table	
1TL-12	65.8571	7M10
2TL-7	32.3897	7M1
2TL-8	33.2700	7M11

U-Foil Added 197.9365 g.
U^{235} in Reactor 4.547 Kg.

Rod C = 0.0 out
Reactor on positive period
$\tau \sim 137$ sec period

~ 7.6 ¢

CRITICAL POSITIONS

C.A. 20 Expr. 5 Run 8
Table Pos. ~~000~~ 999.999 T .3260 B .4100

Control Rod		Channel	
A 999.983 out	A	67	100/200
B 0.002 "	B	.014	
C 13.000	C	3.0	5×10^{-10}
4	D	47	100/500
	E	.9	900 V.

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

C.A. 20 Expr. 5 Run 9 10
Sheet Date 11/9 1954 Time 3:45 AM PM
Purpose 9th Fuel Loading

Loading:

	Fixed Table	
1FL-7	172.5752	7S1
	Movable	
2FL-5	74.1340	7M2
1FL-6	172.2172	7M1

U foil added 418.9264 gms
U-235 in reactor 4.935 Kg

All fuel assemblies are in reactor

CRITICAL POSITIONS

C.A. 20 Expr 5 Run 10
Tube Pos. 999.999 L T.3252 .4101

Control Rod		Channel	
A	999.985 (OUT)	A	49 100/100
B	24.149 (IN)	B	.005
C	19.050	C	7.8 +0 -10
4		D	78 100/100
		E	.6 900V

Tim Crit. 4:03 AM PM Duration 14 min.

Fired S.R. #5 Value $ 1.2 20-5-10

C.A. 20 Expr 5 Run 11
Sheet Date 11/10 1954 Time 1:00 PM
Purpose 10th fuel loading

INSTRUMENT CHECK

Time 1: — PM Source PN-58

	Channel A	B	C	D	E
Range	1%/1000 Cx		10^{-10}	1%/1000	900V
Source Dist.	30"		12"	30"	0
% F.S. Trip	90		95	85	100

Ctrs 1,243 Cx

Removed one sheet of uranium from each of the twelve 1FL assemblies.

295.6246 gms - total (U foil + coating) removed.
4.662 Kg. U-235 in reactor

All fuel assemblies in reactor

Changed position of selsyns

A in at 20.015
C in at 18.992
B in at 20.050

Placed Large (19⅜" Dia.) Al-In Foil In Reactor At Core - Reflector Interface

CRITICAL POSITIONS

C.A. 20 Expr. 5 Run 11

Tim. 999.999 T. .3267 B. .4093

Control Rod		Channel	
A	0.005	A 37	100/100
B	~~16.525~~ ~~999.975~~	B 0.0037	
C	999.975	C 5.Y	10^{-10}
4		D 57	100/100
		E 0.7	900 V

Tim Crit. 2:07 ~~AM~~ PM Duration 17 min.

C.A. 20 Expr. 6 Run 1

Sheet ____ Date 11-10-1954 Time 2:50 ~~AM~~ PM

Purpose Rod Comparisons in preparation for Rod Calibrations.

CRITICAL POSITIONS

C.A. 20 Expr. 6 Run 1

Tim. 999.999 T. .2258 B. .4098

Rod		Channel	
A.	0.000 ~~out~~	A 49	100/100
B.	0.000 "	B .0049	
C.	18.731	C 7.5	10^{-10}
4		D 83	100/100
		E .6	900 V.

Tim Crit. 3:15 ~~AM~~ PM Duration 70 min.

Inserted Rod A to produce Negative Period.
Withdrew Rod A to produce Positive Period.
Levelled with Rod C.

	~~Rod A~~:	~~Rod C~~:		
	Rod A:	Rod C:	Period	¢
20.6.1	18.665	999.970 out		
	17.915	7.405	158 Sec	6.8¢
	17.470	7.405		
		9.158	139 Sec	7.5¢
	16.914	9.158		
	16.914	10.555	124	8.2
	16.268	10.555		
	16.268	11.753	102	9.8
	15.790	11.753		
	15.790	12.505	152	7.0
	15.205	12.505		
	15.205	13.256	115	8.9
	14.725	13.256	156 ~~154~~	~~6.9~~ ~~6.8~~
	14.725	13.844		
	14.122	13.844		
	14.122	14.504	143	7.3
	13.425	14.504		
	13.425	15.146	126	8.1
	12.715	15.146		
	12.715	15.752	113	8.9
	11.654			

INSTRUMENT CHECK

Time 8:20 AM ~~PM~~ PN-58

	A	B	C	D	E
Range	$\frac{10}{100}$	OK	10^{-10}	$\frac{10}{100}$	900 V
Source Dist.	24"	|	8"	30"	0"
% F.S. Trip	100		100+	95	102+

Ctr 1, 2 + 7 OK

C.A. 20 Expr. 6 Run 2
Sheet _____ Date 11-11-1954 Time _____ AM PM
Purpose Continued Calibration of Rod C

CRITICAL POSITIONS

C.A. 20 Expr. 6 Run 2
Table Pos. 0.000 L .2272 - .4092

Temp 9:14A 72.7
Center .892
Edge .892

	Critical	
A ~~16.194~~ 16.914	41	100/100
B 999.998 (out)	.005	
C 10.555	7.6	10^{-10}
	D 73	100/100
	E .2	900 V

Time Out 8:58 ~~PM~~ AM Duration _____ min.

C.A. 20 Expr. 6 Run 3
Sheet Date 11/11 1954 Time 1:05 PM
Purpose Continue calibration of rod "C"

CRITICAL POSITIONS

C.A. 20 Expr. 6 Run 3

999999 T. 2252 B.4085

Rod		Channel	
A 11.654	A 48	100/100
B 999.998 (OUT)	B .001	
C 16.506	C 7.7	10^{-10}
	D 75	100/100
	E 3	960

Tim Crit. AM PM Duration min.

~~Rod A~~	~~Rod C~~	~~Period~~	~~φ~~
~~11.654~~	~~15.752~~	~~[illegible]~~	
~~10.462~~	~~16.506~~	~~91.3~~	~~10.3~~
~~10.462~~	~~17.191~~	~~[illegible]~~	~~[illegible]~~
	~~17.191~~	~~91.3~~	~~10.3~~

	Rod A	Rod C	Period	φ
	~~11.654~~	~~15.752~~		
	~~10.462~~	~~15.752~~		
	~~10.462~~	~~16.506~~	~~91.3~~	~~10.3~~
rising period	11.654	15.752		
critical ~~rising period~~	11.654	16.506	91.3	10.3
	10.462	16.506		
	10.462	17.191	91.3	10.3
	8.965	17.191		
	8.965	17.820	97.5	9.8
	7.232	17.820		
	7.232	18.294	141	7.4
	999.994	18.294		
		18.712	163	6.6

Critical A out B out C 18.712

INSTRUMENT CHECK

Time 8:30 AM ~~PM~~ Source PN-58

	Channel A	B	C	D	E
Range	1%/1000	OK	10^{-10}	1%/1000	900V
Source Dist.	24	〃	10	30	0
% F.S. Trip	95	〃	100	90	100

Temp. 9:22 AM 72.2

center .880

Edge .880

CRITICAL POSITIONS

C.A. 20 Expr. 7 Run 1

000.000 T .2255 B .4092

	Coarse	Fine
A 899.994	A	62 200/50
B 0.00 〃	B	.003
C 16.810 〃	C	4.6 10^{-10}
4	D ~~89~~ 89	100/50
	E	.4 900V

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

C.A. 20 Expr. 7 Run 1

Sheet Date 15 Nov 1954 Time AM PM

Purpose Danger Coefficient of Gd in Island

1 piece of Gd_2O_3 $1\frac{5}{16}$" X" dia .04 .05" thick placed

$\frac{3}{4}$" – 0 – 0

1 piece of Be ($1\frac{7}{16}$" x $1\frac{7}{16}$" x $\frac{1}{8}$") removed to make space for the Gd.

C.A. 20 Expr. 7 Run 2
Sheet ____ Date 11-15 1954 Time 9:40 AM PM
Purpose Gd in Island.

Gd : - ¾" - 0" - 2½"

Temp. 10:10
.890 Center
.889 Edge

CRITICAL POSITIONS
C.A. 20 Expr. 7 Run 2
Safe for 000. T. 2259 B. 4090

	Control Rod		Channel
A	999.990	A	60 100/50
B	0.0 0	B	.003
C	17.146 (99.5)	C	4.5 x 10⁻¹⁰
4		D	85 100/50
		E	.3 900

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

C.A. 20 Expr. 7 3
Sheet ____ Date 11-15 1955 Time 10:20 AM PM
Purpose Gd. in Island

Gd ¾" - 0 - 5" (Interface)

CRITICAL POSITIONS
20 Exp. 7 Run 3
999.998 .2255 .4100

Temp 10:30
center .890
Edge .889

	Control Rod		Channel
A	999.988	A	62 100/50
B	Same	B	.003
C	17,989 (112.5¢)	C	4.6 10⁻¹⁰
		D	89 100/50
		E	.4 900V

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

C.A. 20 Expr. 7 Run 4
Sheet _____ Date 11-15 1954 Time 10:15 ~~PM~~ AM
Purpose Zero Run for Gd
measurements.
(1 7/16" X 1 7/16" X 1/8" Void in Island
where Ba was removed)

Temp 11:10 AM

Edge .892
Center .892
72.8°F

CRITICAL POSITIONS
C.A. 20 Expr. 7 Run 4
Table Pos. 999.998 T. 1248 B. 4099

Control Rod		Channel	
A. 999.990	A	63	100/50
B. Same	B	.0031	
C. 18.684 123.0¢	C	47	10-10
4.	D	92	100/50
	E	4	900 V.

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

C.A. 20 Expr. 7 Run 5
Sheet _____ Date 11-15 1954 Time 11:30 AM
Purpose Gd in Island

2 pieces Gd placed together to form sandwich
1" dia .1" Thick
3/4"-0-0

Temp 11:45 A
Edge .892
Center .892

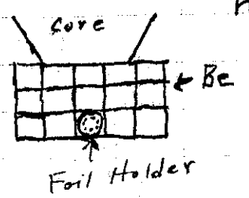
CRITICAL POSITIONS
C.A. 20 Expr. 7 Run 5
Table Pos. 999.998 T. .9248 .4102

Control Rod		Channel	
A 999.985	A	62	100/50
B Same	B	.003	
C 16.450 82.0	C	4.7	10-10
4.	D	89	100/50
	E	.2	900 V

Tim Crit. 11:52 AM ~~PM~~ Duration _____ min.

C.A. 20 Expr. 8 Run 1
Sheet ____ Date 11-15 1954 Time 1:20 ~~AM~~ PM
Purpose Foil exposure in preparation for Indium foil calibration.

Small motor (12 RPM) mounted on ~~base~~ al extrusion at rear of Movable table with 3/16" skew through holes in Be extending to interface of tables on which is mounted a plexiglas foil holder. Holes on ~ 1" radius of holder.



Center of holder — 7.5" in Reflector
3 In foils in holder
Gold foil #98 ¼" – 0" – ¼"
#44 ¼ – 2½" 5"

CRITICAL POSITIONS
C.A. 20 Expr. 8 Run 1
Time Per 999.998 T .9239 B .4092

		Channel	
A.	999.988	A	88.5 100/100
B.	0.00	B	.1
C.	18.552	C	7.1 10^{-9}
		D	76.5 1000/200
		E	3.2 810V

Tim Crit. 1138 38/60 AM PM Duration 20 min.

INSTRUMENT
Time 8:10 ~~AM~~ ~~PM~~ PN-S8

	A	B	C	D	E
Range	10/1000	OK	10^{-10}	10/1000	900V Hold
Source Dist.	24		10	30	0
% F.S. Trip	95	OK	100	90	100
			counter 1,2,3		OK

C.A. 20 Expr. 8 Run 2
Sheet ____ Date 11-16 1954 Time 8:25 AM ~~PM~~
Purpose Foil exposure for Indium foil calibration

Gold Foils: #38 ¾ – 0 – 0
~~#44~~ #52 ¾ – 0 – 5

Indium Foils ½ – 0 – (–16 7/8)
No. H-1 Thru H-10 Loaded Consec. Running
From About 8 O'clock To 4 O'clock

CRITICAL POSITIONS

C.A. 20 Expr 8 Run 2

Table Pos. 999.993 T.6235 T B, 4075

	Control Rod		Channel	
A	999.988	A	57	1000/100
B	out	B	.05	
C	18.550	C	6.0	10^{-9}?
4		D	83	1000/100
		E	1.6	810 v

Tim Crit. 8:43 3/60 AM ~~PM~~ Duration 20 min.

Gold Foils #65 3/4 - 0 - 0
#80 3/4 - 0 - 5

Indium Foils
Nos H-11 Thru 20

C.A. 20 Expr. 8 Run 3

Sheet ____ Date 11-16 195X Time 9:35 AM ~~PM~~

Purpose In foil exposure for Calibration.

CRITICAL POSITIONS

C.A. 20 Expr. 8 Run 3

9.996 T .3235 B 4093

	Control Rod		Channel	
A	999.987	A	48	1000/100
B	0.00	B	0.049	
C	18.550	C	4.3	10^{-9}
4		D	85	1000/100
		E	1.5	810 V

Tim Crit. 9:49 24/60 AM ~~PM~~ Duration 20 min.

Gold Foils: #45 3/4 - 0 - 0
#82 3/4 - 0 - 5

Indium Foils: Nos H-21 Thru 30

CRITICAL POSITIONS

C.A. 20 Expr 8 Run 4

Table Pos. 999.995 .2232 4092

	Control Rod		Channel	
A	999.995	A	48.5	100%/100
B	out	B	.049	
C	18.555	C	4.5	10^{-9}
		D	86.5	1000/100
		E	1.4	810 v

Tim Crit. 11:00 24/60 Duration 20 min.

Gold Foils # 69 3/4-0-0
51 3/4-0-5

Indium Foils Nos H58 Thru 67

CRITICAL POSITIONS

20 Expr. 8 Run 5

999.996 T 2230 .4097

	Control Rod	Channel
1	999.991	A 49.5 × 1000/100
2	0.00 (out)	B .05
3	18.556	C 4.6 × 10^{-9}
4	—	D 80.5 × 1000/100
		E 1.5 at 810 V

Tim Crit. 12:05 AM PM Duration 20 min.

Gold Foils # 76 3/4-0-0
46 3/4-0-5

Indium Foils Nos H-31 thru 40

CRITICAL POSITIONS

20 Expr. 8 Run 6

Table Pos. 999.995 T .2228 B .4098

	Control Rod	Channel
1	A 999.985	A 49.5 1000/100
2	B 0.00 (out)	B .05
3	B 18.575	C 4.5 10^{-9}
4	—	D 80.5 1000/100
		E 1.5 810 V

Tim Crit. 1:15 6/60 AM PM Duration 20 min.

10 samples of UO_2F_2 in solution
8 with ~ 50 mg U^{235}
2 with ~ 30 mg U^{235}

CRITICAL POSITIONS

C.A.	20	Expr	8	Run	7
	999.995			T. 2224	.4096

	Channel		
1 A. 999.991	A	50	1000/100
2 B. 00.0 (out)	B	.05	
3 C 18.586	C	5.0	10^{-9}
4	D	81	1000/100
	E	1.3	810 V

Tim Crit. 3:23 27/60 AM PM Duration 20 min.

INSTRUMENT

Time 9:00 AM ~~PM~~ PN-56

	A			E
	10/1000	10^{-10}	10/1000	900V
Source D.F.	24"	10"	30"	0
% F.S. Trip	98	100	95	100

C.A. 20 Expr. 7 6

Sheet Date 11-17 4 9:20 AM ~~PM~~

Purpose Zero Run For Gd Measurements (1 7/16" x 1 7/16" x 1/8" Void In Island Where Be Was Removed)

Temp. 9:32
cent. .890
edge .890

CRITICAL POSITIONS

C.A.	20	Expr	7		6
Table	999.996	T. 2231		B	.4091

A 999.990	A	64	10/50
B 00.00 (out)	B	.0031	
C 18.667	C	4.8	10^{-10}
	D	91	10/50
	E	.3	900V

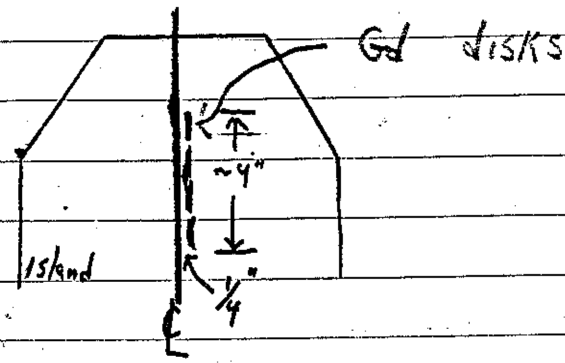
Crit. 9:30 AM ~~PM~~ Duration 10 min.

C.A. 20 Expr. 7 Run 7

Sheet ______ Date 17 Nov 1954 Time 10:10 AM

Purpose Danger Coef. Gd.

4 Gd_2O_3 disks ~15/16" dia .05" Thick placed as shown:



CRITICAL POSITIONS

C.A. 20 Expr 7 Run 7

Table P... 999.997 ... 1.2228 T ... 3.9096

Temp. 10:35 A
.890 Center
.890 Edge

Rod			Channel		
A	999.990		A	62	100/50
B	OUT		B	.003	
C	12.242	36.5	C	4.7	10^{-10}
4			D	89	100/50
			E	0.2	900v

Tim Crit. 10:45 AM Duration 10 min.

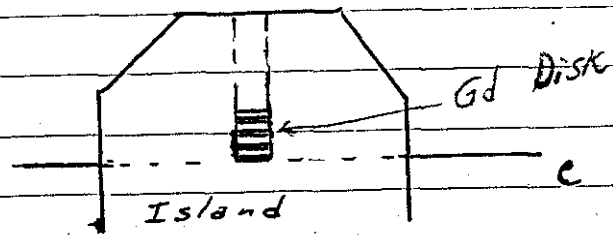
~~Change from ... Run~~ = −86.4¢

C.A. 20 Expr. 7 Run 8

Sheet _____ Date 11-17 1959 11:15 AM ~~PM~~

Purpose Danger Coef. of Gd.

Four (4) Gd_2O_3 Disk placed as shown :-
Disk Separated by ¼" Be.



CRITICAL POSITIONS

C.A. 20 Expr. 7 Run 8

Table Pos. 999.997 T .2220 B .4100

	Control Rod		Channel	
A	999.985	A	64	100/50
B	out	B	.003	
C	13.584 51.2 ¢c	C	48	10 -10
4		D	90	100/50
		E	.2	900 V.

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

Change from Zero Run = 71.7 ¢

C.A. 20 Expr. 8 Run 8

Sheet _____ Date 11/17 1954 Time 2:25 ~~AM~~ PM

Purpose In foil ~~calibration~~ exposure for calibration check

10 In foils in rotating foil holder
B series foils # 1, 2, 5, 6, 7, 8, 9, 10, 11, 13

CRITICAL POSITIONS

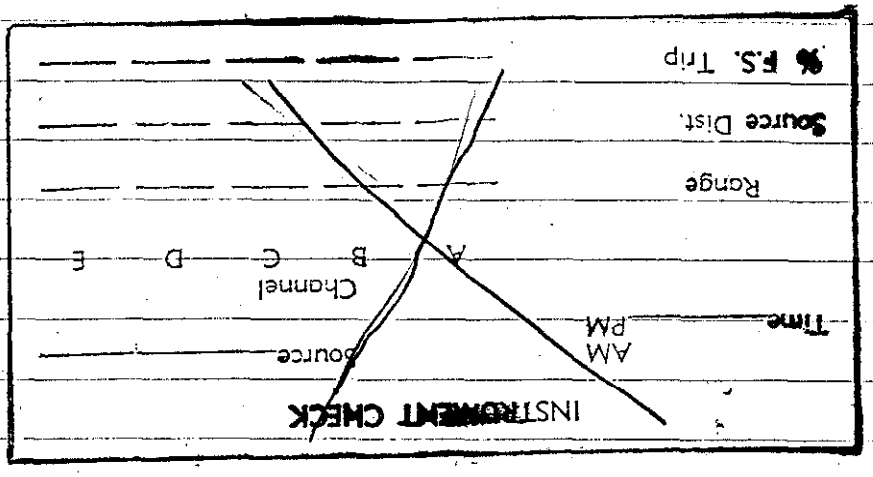
C.A. 20 Expr 8 Run 8

Table Pos. 999.995 T .2222 R.P. 4098

	Control R...		Channel
A	99.9984	A 48	1000/100
B	15.74 ↔ 15.81	B 0.05	
C	8.790	C 5.0	10^{-9}
4		D 42	1000/200
		E 3.7	900 V

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

11-18-54



INSTRUMENT CHECK

Time 8:15 AM ~~PM~~ Source PN-58

Channel	A	B	C	D	E
Range	1/100	OK	10^0	1/1000	900 V
Source Dist.	24	|	8	30	0
% F.S. Trip	90	|	100+	80	100+

ctr #1, 2, 3 OK

C.A. 20 Expr. 7 Run 9

Sheet _____ Date 18 Nov 1954 Time 8:20 AM ~~PM~~

Purpose Zero Run for Danger Coefficients

Beryllium in island and reflector has been rearranged (with va
accomodate samples of Inconel and Hastelloy B.

CRITICAL POSITIONS

C.A. 20 Expr. 7 Run 9

Table Pos. 999.993 T. 2232 B. 4082

temp

C - 0.890 enter
E - 0.890 edge

	Control Rod		Channel	
1	A 99.99	A	64	100/50
2	B 00.002	B	.003	
3	C 18.578 12L3¢	C	4.8	10-10
4		D	51	100/100
		E	.4	909V

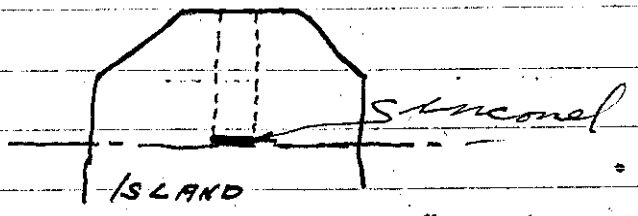
Tim Crit. 8:45 AM Duration 20 min.

C.A. 20 Expr. 7 Run 10

Sheet _____ Date 11/18 1955 Time 9:20 AM

Purpose Danger coef. of inconel in island.

$1\frac{7}{16}" \times 1\frac{7}{16}" \times \frac{3}{32}"$



$0 \rightarrow 1\frac{7}{16}"$, $-\frac{23}{32}" \rightarrow +\frac{23}{32}"$, $\frac{1}{8}"$

CRITICAL POSITIONS

20 Exp. 7 Run 10

999.995 T-.1250 B-.4096

temp.

		Channel
C - 0.890 center	A 999.986	A 64 100/50
E - 0.890 edge	B .00002 out	B .0031
	C 17.910 111.1¢	C 4.8 10^{-10}
		D 51 100/100
		E .3 900 v

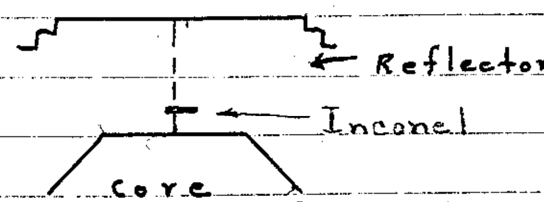
Fin Crit. 9:35 AM ~~PM~~ Duration 5 min.

Loss in Reactivity from zero (20.7.9) = 10.4 ¢

C.A. 20 Expr. 7 Run 11

Sheet ____ Date 11-18-1954 Time 9:45 AM

Purpose Danger Coef. of Inconel in Reflector.



(Inconel ($2\frac{7}{8}'' \times 1\frac{7}{16}'' \times \frac{3}{32}''$) 2" in reflector.

Back $0 \rightarrow 1\frac{7}{16}''$, $-\frac{23}{32}'' \rightarrow +2\frac{9}{32}''$, $11\frac{3}{8}''$

CRITICAL POSITIONS

C.A. 20 Expr. 7 Run 11

Table Pos. 999.995 T .1238 B .4090

Control Rod		Channel	
A 999.982 out	A	63	100/50
B 0.00 out	B	.003	
C 18.080	113.8 ¢ C	4.9	10^{-10}
4	D	50.5	100/100
	E	.3	900 V.

Tim Crit. 10:00 AM Duration 10 min.

Loss in Reactivity from zero = 7.5 ¢

C. 20 7 12

Sh 11-18-57 AM 10:10 ~~PM~~

Pur: Danger Coef. of Inconel in Reflector

Inconel placed at:

0 – 1 7/16" – 23/32" → + 2 5/32, 10 7/8"

Temp 10:45 ~~AM~~

Center .890

Edge .890

CRITICAL POSITIONS

CA 20 Expr 7 Run 12

Table 999.997 T 9233 B .4093

		Channel	
A 999.986 out	A	66	100/50
B 0.00 out	B	.0031	
C 18.065 113.4¢	C	4.9	10^{-10}
4	D	52	100/100
	E	.3	900 V.

Time 10:30 AM ~~PM~~ Duration 13 min.

Loss in Reactivity from zero Run = 7.9 ¢

C.A. 20 Expr. 7 Run 13
Sheet ____ Date 11/18/ 1954 Time 11:05 AM ~~PM~~
Purpose Danger coef. of Inconel in reflector

Inconel placed at
$0 - 1\frac{7}{16}" - \frac{23}{32}" \rightarrow + 2\frac{5}{32}$, 18"

Temp 11:25
Edge .891
Center .891

CRITICAL POSITIONS
C.A. 20 Expr. 7 Run 13
Table Pos. 999.995 T. .9235 B. .4099

	Control Rod		Channel	
1	A. 999.990	A	65	100/50
2	B. 0.002 out	B	.003	
3	C 18.570 121.2	C	4.8	10^{-10}
4		D	51	100/100
		E	.1	900V

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

C.A. 20 Expr. 7 Run 14
Sheet ____ Date 11-18 1954 Time 12:30 ~~AM~~ PM
Purpose Inconel in Reflector
1

Inconel placed at :-
$0 \rightarrow 1\frac{7}{16}"$, $-\frac{23}{32} \rightarrow +2\frac{5}{32}$, $15\frac{1}{8}"$

Temp 12:50 pm
Edge .891
Center .891

CRITICAL POSITIONS
C.A. 20 Expr. 7 Run 14
Table Pos. 999.997 T .9232 B .4091

	Control Rod		Channel	
1	A 999.990 out	A	65	100/50
2	B 0.00 out	B	.003	
3	C 18.441	C	4.7	10^{-10}
4		D	51	100/100
		E	0.0	900V

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

Loss in Reactivity from 3 rods = 2.1¢

C.A. 20 Expr. 9 Run 1
Sheet ____ Date 11-18 1954 Time 1:15 ~~AM~~ PM
Purpose Reactivity Coef. of Hastelloy B in Island.
1 7/16" X 1 7/16" X 3/32"

Hastelloy B placed at:—
0 → 1 7/16", $-\frac{23}{32}$" → $+\frac{23}{32}$", 1/8"

CRITICAL POSITIONS

C.A. 20 Expr. 9 Run 1
Table Pos. 999.999 T. .9225" B. .4085"

Control Rod		Channel		
A	999.994 out	A	63	100/50
B	0.00 "	B	.003	
C	17.950 in. ?	C	4.4	10^{10}
D		D	51	100/100
		E	12	900 V

Tim Crit. 1135 ~~AM~~ PM Duration ____ min.

Temp. 2:35
Edge .892
Center .892

Reactivity loss from Zero Run (20-1-1) = 9.64

C.A. 20 Expr. 9 Run 2
Sheet ____ Date ____ 95 Time 2:15 ~~AM~~ PM
Purpose Reactivity Coef. Of Hastelloy B In Reflector
1 7/16 x 2 7/8 x 3/32

Hastelloy B Placed At:
0 → 1 7/16, $-\frac{23}{32}$ → +2 5/32, 10 7/8"

CRITICAL POSITIONS

C.A. 20 Expr. 9 ~~Run 22~~ Run 2
Table Pos. 999.988 T. ~~.9~~ 6220 B. .4095

Control Rod		Channel		
A	99.993 out	A	65	100/50
B	0.00 out	B	.003	
C	18.134 in. ?	C	4.5	10^{-10}
D		D	50	100/100
		E	0.20	900 V

Tim Crit. 2:25 AM PM Duration 18 min.

Reactivity Loss from Zero Run (20-1-1) = 6.8 ¢

C.A. 20 Expr. 9 Run 3

Sheet _____ Date 11/18 1954 Time 3:20 ~~AM~~ PM

Purpose Reactivity coef. of Hastelay B in Reflector
1 7/16 x 2 7/8 x 3/32

Hastelay B placed at
$0 \rightarrow 1\ 7/16"$, $-\frac{23}{32}" \rightarrow +2\ \frac{5}{32}"$, $15/8"$

CRITICAL POSITIONS

C.A. 20 Expr. 9 Run 3

Table Pos. 999.992 T. 6230 B. 4100

Control Rod		Channel	
A	999.992	A 65	100/50
B	00.00 Out	B .003	
C	18.4~~75~~ 115.8	C 4.8	10^{-10}
		D 51	100/100
		E .3	900V

Tim Crit. 3:10 ~~AM~~ PM Duration 17 min.

Reactivity Loss from Temp Run 20.7.9
= 1.5 ¢

19 Nov 54

INSTRUMENT CHECK

T= 8:30 ~~AM~~ PM Source PN-58

	A	B	C	D
	10/1000	α	10^{-10}	10/1000 900V
Source	24"		8"	30" 0
% F.S. Trip	90		100	90 100

ctrs 1, 2, & 3 α

C.A. 20 Expr. 9 Run 4

Sheet _____ Date 11-19-1954 Time 8:45 AM ~~PM~~

Purpose Zero Run for danger Coef. Be arranged (with void) to make room for samples.

CRITICAL POSITIONS

20 Expr. 9 Run 4

999.995 T .6238 B .4098

Control Rod		Channel	
A	999.994 out	A 68	100/50
B	0.00 "	B .003	
C	18.566 121.0¢	C ——	
		D 53	100/100
		E .3	900 V.

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

Temp 9:20 A.

Edge .890
Center .890

C.A. 20 Expr. 9 Run ~~63~~

Sheet _____ Date 19 Nov 1954 Time 9:40 ~~AM~~ PM

Purpose Danger Coef — Hastelloy B
(Two Samples)

Hastelloy B Samples A+C placed
0 → 1 1/16 — 3 29/32 → + 2 5/32 15 1/8

CRITICAL POSITIONS

C.A. 20 Expr. 9 Run 5

999.997 .6238 .4100

Temp 9:55
Center .891
Edge .891

	Control Rod	Channel	
A	999.991	A 70	100/50
B	out	B .0031	
C	18.286	C 4.6	10^{-10}
	—	D 55	100/100
		E .2	900 V

Tim Crit. 10:59 ~~AM~~ ~~PM~~ Duration 11 min.

C.A 20 9 Run 6

Sh 19 Nov 54 10:20 ~~AM~~ ~~PM~~

Purp Danger Coef — Inconel
(Two Samples)

Inconel Samples 3 & 5 placed
0 → 1 1/16 — 3 29/32 → + 2 5/32 15 1/8

CRITICAL POSITIONS

C.A. 20 Expr 9 Run 6

999.995 1.5248 .4102

Temp 10:40A
Center .892
Edge .891

	Control Rod	Channel	
A	999.987	A 68	100/50
B	out	B .003	
C	18.242	C —	
		D 54	100/100
		E .3	900 V

Tim Crit. 10:33 Duration 12 min.

C.A. 20 Expr. 10 Run 1
Sheet ____ Date 11/19 1954 Time 11:03 ~~PM~~ AM
Purpose Zero run for reactivity coefficient of Boral with Be arranged (with void) to make room for sample.

Temp. 11:23
.892 edge
.892 center

CRITICAL POSITIONS
C.A. 20 Expr. 10 Run 1
Table Pos. 999.995 T.5263 B4100

Control Rod		Channel	
A	99.9984	A 75	10/50
B	00.0 out	B .0033	
C	18.555 12.104	C 5	10^{-10}
4		D 59	100/100
		E .3	900 V

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

C.A. 20 Expr. 10 Run 2 AM PM
Sheet ____ Date 11/19 1954 Time 11:03 AM PM
Purpose Danger Coeff - Boral
1 7/16 x 2 7/8 x ~ 1/4

Boral Sample Placed:
$0 \rightarrow 1\frac{7}{16}$, $-\frac{23}{32} \rightarrow +2\frac{5}{32}$, ~~2 1/2~~ 11 7/8

CRITICAL POSITIONS
C.A. 20 Expr. 10 Run 2
999.995 T .5258 B 4100

		Channel	
A	999.985 out	A 68	100/50
B	out 72.74	B .0031	
C	15.295 ~~out~~	C 4.6	10^{-10}
4		D 54	100/100
		E .3	900 V.

Tim AM PM Duration ____ min.

Reactivity Loss from Void Run 20.10.1
= 48.3 ¢

C.A. 20 Expr. 10 Run 3

Sheet ____ Date 19 Nov 195 4 Time 12:25 AM PM

Purpose Danger Coefficient Boral

Boral Sample placed:

0 → 1 7/16 $-\frac{23}{32}$ → + 2 5/32 15/16"

CRITICAL POSITIONS

C.A. 20 Expr. 10 Run 3

Date ____ 999.998 1.5250 T ____ .409 4

Temp 12:55A

Center .892

Edge .892

Control Rod		Channel	
A	999.985	A 67	10%-0
B	out	B .003	
C	17.556	C 5.1	10^{-10}
4		D 53	10%100
		E .3	9005

Tim Crit. 12:50 AM PM Duration ____ min.

Core Shell Wts.

I Outer Rhombicuboctohedron

Al 3,482.5 gm.

Inconel 10,437 gm

1/16" Coat 10,666 gm

1/32" " 5,171 "

II Inner Rhombicuboctohedron

Al 1,073.0 gm.

Inconel 3,236.0 "

1/16" Coat 3,389.5 "

1/32" " 1,685.0 "

CA-20 Continued in Notebook No. 3276.