BOOK10R 4424 on bottom edge

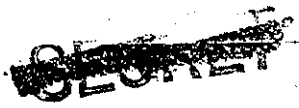
Notes:

CA-25 APPR Book I on front cover.

Blank pages: inside opposite page 1, 1, 2, 4-14, 220-222, 243, 280-300, inside back cover

-pages 42, 74, 77, 89, 95, 98, 101, 125, 127 (big), 171, 175, 210 (had to tape down), and 242 has 1 graph sheet glued to each page.
-pages 60, 80, and 214 (had to tape down) has 2 graph sheets glued to each page.
-page 139 has 6 graph sheets glued to it.

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
July 28, 1999



Period Measurements — 21.72
Mass per full element — 33.42 gm.

SOME INSTRUCTIONS FOR USE OF THIS NOTEBOOK

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

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

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

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

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

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.

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.

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.

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.

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

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

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.

~~SECRET~~

10-9-21

C-13

OAK RIDGE NATIONAL LABORATORY

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5-25-60

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OAK RIDGE, TENNESSEE

NOTEBOOK NO. 4424

Assigned to: A. D. Callihan

Department: Physics Div.

Location: Bldg. 9213, 4-12

Date: March 1, 1951

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Be sure to record all personal conf[illegible]

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RESTRICTED DATA

This document contains [illegible]

Subject

CLASSIFICATION CANCELLED

DATE 6/3/60

For the Atomic Energy Commission

Jack H. Kahn for the

Chief, Declassification Branch

"This document consists of 30 pages. No. 1 of 1 copies, Series A."

~~SECRET~~

Exp 11 Fuel Worth p-129

Expr: 1-1 Time ____ AM PM Date 9-27 1955 15
Purpose Background 7×7
Personnel:

September 27, 1955.

4:15 PM. Tested counting rate with empty core (no fuel or steel plates)
Water level-up. (96.4 cm.)

	counter #1	#3	#5
source out	61 c/2min	69 c/2min	15 c/2min
source in	29 c/2min	5 c/2min	3 c/2min

is low counting rate – must see more of source than this.

7:30 P.M. Installed new source – PN-123
Water level-up (96.46cm) Empty core. #1 #3 #5
source in. 43 c/2min 15 c/2min 7 c/2min

retaking data – all control & safety rods were in. – pulled out.

	#1	#3	#4	#5
source in.	135 c/5min.	101 c/5min.	154 c/5min.	62 c/5min
check count.	137 c/5min.	65 c/5min.	195 c/5min.	65 c/5min
new gain setting.	144 c/5min.	185 c/5min.		

Water gage indicator. –
15 cm. on chart – bottom of skirt.
96.4 cm. on chart – top of box

M. L. Batch

9-27
1-2 16

Expr. 1-2 8:30 PM. 9-27 1955
Purpose Multiplication
7x7

Personnel:

INSTRUMENT CHECK

Date 9-27 1955 Time 8:30 ~~AM~~ (PM) Source No. ____ Source

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale	
DC-1					Radium
DC-2	85 ~~80~~	200	~~10~~ 6"	10x1	Radium
~~DC-3~~	69	200		20x1	Radium
Log N	10	—			PB-267
R-1	6	Conv.	5"		
R-2					
P. M.	—	—	4"		Polium

START-UP CHECK LIST

Equipment Checked by Thic Perm Check by DW
~~Instrument and Safeties Checked~~ DW
"Source In" Checked by DW PM 123
~~Emergency Equipment in Control~~ MB DW
Red Light On by MB
~~Start-Up OK'd by~~ DW Time 9:45 PM Date 9-27 1955

Loading – Series 1 (45) in slot 6 ~~9793~~
2 (45) in slot 13 ~~9792~~
~~1-30 replaced by #75 (75)~~ —

Water level 108.9 cm.

M.B.

9-27
1-2

9-27
1-2

MULTIPLICATION

Expr. 1-2 Time 9:45 (AM) (PM) Date 9-25 1955

Settings

	Scalar	H. V.	Disc.	B. G. c/(5) min.
C(1)		4-50	3 00	140
C(3)		760v.	4-11	185
C(4)		2000v	8-25	174
C(5)		2000v	8-30	163

Temperature 83° Height 1089m or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M_{(1)}^{-1}$	C(3)	$M_{(3)}^{-1}$	C(4)	$M_{(4)}^{-1}$	C(5)	$m_{(5)}^{-1}$
4 min count.		Water		Water	139	.807	313	.493	111	1.39	54	~~.945~~ .97

Notes- both rods out

M. Batch

9-27
1-3 18

Expr. 1-3 Time 10:30 AM (PM) Date 9-27 1955
Purpose Multiplication 7x7
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Check by MB
Instrument and Safeties Checked and Reset by MB DW
"Source In" Checked by DW Source No. PW 123
Emergency Equipment in Control Room Checked by DW
Red Light On by MB
Start-Up OK'd by DW Time 10:30 AM (PM) Date 9-27 1955

MULTIPLICATION
Expr. 1-3 Time 10:30 AM (PM) Date 9-27 1955

Scalar	H. V. Settings	Disc.	B. G. c/(5) min.
C(1)	Same as 1-2		140
C(3)			185
C(4)			174
C(5)			63

Temperature 93° Height 108.8 M^{-1} or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M^{-1}_{(1)}$	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	$C_{(5)}$	m^{-1}_{5}
5 min count.					191	.785	148	.432	104	1.67	82	.77

Log N Reading 0.0013

Loading — 1 (1-45) in slot 6
2 (1-45) in slot 13
3 (1-45) in slot 2

Rod Positions:
Small 31.04
Large 30.68

M. Batch

9-27
19 1-4

Expr. 1-4 Time 11:15 AM (PM) Date 9-27 1955
Purpose Multiplication 7x7
Personnel:

START-UP CHECK LIST
Equipment Checked by DM Personnel Check by MB
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by DW Source No. PW-123
Emergency Equipment in Control Room Checked by DW
Red Light On by MB
Start-Up OK'd by DW Time 11:15 AM (PM) Date 9-27 1955

Loading 1 (1-45) in slot 6
2 (1-45) in slot 13
3 (1-45) in slot 2
4 (1-39) in slot 17
70 in box 40 #17
71 " 4 41 " "
72 " " 42 " "
73 " " 43 " "
74 " " 44 " "
75 " " 45 " "
5 (1-45) in slot 10 (half plates)

MULTIPLICATION
Expr. 1-4 Time 11:15 AM (PM) Date 9-27 1955

Scalar	H. V. Settings	Disc.	B. G. c/(5) min.
C(1)	Same as 1-2		120
C(3)			185
C(4)			174
C(5)			63

Temperature Height 109.0 M or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M^{-1}_{(1)}$	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	$C_{(5)}$	m^{-1}_{5}
5 min count.					878	.16	403	.46	157	1.11	84	.75

Log N Reading 0.00195
Rod Positions Small 31.04 Large 30.68

M. Batch

9-28-55.

Item. Many elements appear to be bowed. The reason is uncertain.

1. A check of all elements not in the 5 x 5 lattice was made.

Series 1 ~~- apparent O.K.~~ - 43, 33, 32, 25, 18, 11, 5, 4, 1 - slight

series 2 - 12, 18, 25, 26, 32, 33, 43, 44, 45 - slight.

Series 3 - 3, 12, 41 slight

- 25, 39, 43, 45 moderate

- 42 severe

series 4 - 4 slight

- moderate

- 25, 26, 35, 39 severe

- 32 extreme Ser

70, 72, 73, 74, slight

Thus out of 80 full plates, 36 have slight to extreme bowing: 26 slight, 4 moderate, 5 severe, 1 very severe.

Series 5 - the half plates - are especially bad. Thus whole series is checked:

slight	moderate	severe	very severe.
5-3	5-44	5-18	5-2
-6		-23	-5
-9		-39	-17
-10			-19
-11			-20
-14			-26
-16			-27
-21			-28
-25			-29
-33			-31
-34			-35
-36			-37
-40			-38
-42			

Item.

2. Thickness check with micrometer.

0.70 on 5-37

0.85 on 5-38

3. Out of 45 half-plates, 15 were slightly bowed, 3 were severely, & 13 were very severely

4. Note - after lowering water level ~~for last~~ each time last night, odor of solvent was noticed by D.M, I.D, + M.B.

5. We want to find out what is causing this bowing. There is a possibility of solvent of glue building up pressure. It is thought that puncturing with a scribe may relieve this. Soap was put over the plate to be punctured. Puncturing doesn't seem to work. Trying drilling. A definite escape of gas ensued and a strong odor of solvent noticed.

Element # 5-19 was used in this test.

M. Batch

9-28
1-522

Expr. 1-5 Time 12:15 (AM) (PM) Date 9-28 1955
Purpose Background - 5×5
Personnel:

Water level - 108.9 : Empty fuel boxes, rods out.

	c1	c2	c4	c5
5 min count.	72	271	89	37
5 min count:	146	291	100	47
5 min count:	156	207	92	50
Ave.	151	256	93	44

M. Batch

9-28
23 1-6

Expr. 1-6 Time 12:45 (AM) (PM) Date 9-28 1955
Purpose Multiplication - 5×5
Personnel:

INSTRUMENT CHECK

Date 9-28 1955 Time 12:45 (AM) (PM) Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	82	200	4"	5
DC-3	65	200	contact	5
Log N	15	5		
R-1	65	1000-100	8"	
R-2				
P. M.			8"	

Radium
Radium
Radium
PN 267
Radium

Loading -

START-UP CHECK LIST
Equipment Checked by DM. Personnel Check by D.M. DW
Instrument and Safeties Checked and Reset by
"Source In" Checked by DM. Source No. PN-123
Emergency Equipment in Control Room Checked by DW
Red Light On by MB
Start-Up OK'd by DW Time 1:15 (AM) (PM) Date 9-28 1955

Loading - 5×5 lattice: boxes # 6 thru 10
13 " 17
20 " 24
27 " 31
34 " 39.

Series 1 in slot 4: 1-6 in element 6, 1-7 in element 7 etc.
" 2 " " 8
" 3 " " 12
" 4 " " 16

Large control rod will be left out.
Total mass - approx. 3242 gm.
Log N - .0011

9-28
1-6 24

MULTIPLICATION

Expr. 1-6 Time 1:25 (AM) PM Date 9-28 1955

Settings

Scalar	H. V.	Disc.	B. G. c/(5) min.
C(1)	Same as 1-2		151
C(3)			256
C(4)			93
C(5)			44

Temperature 87°F Height 108.9 M^{-1} or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M^{-1}_{(1)}$	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	C_5	m_5^{-1}
5 min. count.					241	.625	264	1.01	111	.584	67	.46

9-28
25 1-7

Expr. 1-7 Time 3:00 (AM) PM Date 9-25 1955
Purpose multiplication - 5"x5"
Personnel:

Loading - 5"x5" series 1 in slot 4.

Elements # correspond to box number.

2 " " 8
3 " " 12
4 " " 16

filling slot 2 in order.
1-1, 2, 3, 4, 5,
1-11, 12, 18, 19, 25
1-26, 32, 33, 39, 40
1-41, 42, 43 44 45 2-1
2-1, 2-2, 2-3, 2-4, 2-5
filling slot 10 in order
2-11, 12, 18, 19, 25
2-26, 32 33 39, 40
2-41, 42, 43, 44, 45
3-1, 2, 3, 4, 5
3-11, 12, 18, 19, 25

Total - approx. 5.32

START-UP CHECK LIST

Equipment Checked by DM., Personnel Check by I.D.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Fuse No. PN-123
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 1:55 (AM) PM Date 9-28 1955

12-12-55

6 x 25 x 33.4 = 5.010 kg U

6 x 25 x 31.1 = 4.665 kg U-235

MULTIPLICATION

Expr. 1-7 Time 1:55 AM (PM) Date 2-28 1955

Scalar	Settings H. V.	Settings Disc.	B. G. c/(5) min.
C(1)	Same as 1-2		151
C(3)			256
C(4)			96
C5			44

Temperature 87 Height 109.1 M^{-1} or Remarks

Time	Refl.	Sol'n	~~Refl.~~	~~Sol'n~~	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$
			1356	0.111	399	.64	121	.79	57	.77

5 min count.

Log N - 0.0021

Rod Position. - Large 30.64 Small 31.04

After run it was noticed that large rod was not ~~come~~ in contact with drive.

Expr. 1-8 Time 2:30 AM (PM) Date 2-28 1955
Purpose Multiplication - 5x5.

Personnel:

Controls: Williams
Data: Batch

Loading - Same as 1-7 plus Slot 18 in order.

3-26, 32, 33, 39, 40
3-41, 42, 43, 44 45
4-1 2 3 4 5
4-11, 12, 18, 19, 25
4-26, 32, 33, 39, # MAC 70

12-12-55
7 x 25 x 33.4 = 5.845
31.1 = 5.44_{25}

Total - app 6 kg

START-UP CHECK LIST

Equipment Checked by m.B. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No. PN-123
Emergency Equipment in Control Room Checked by M.B.
Red Light On by m.B.
Start-Up OK'd by D.W. Time 2:35 AM (PM) Date 2-28 1955

MULTIPLICATION

Expr. 1-8 Time 2:35 AM (PM) Date 2-28 1955

Scalar	Settings H. V.	Settings Disc.	B. G. c/(5) min.
C(1)	Same as 1-2		151
C(3)			256
C(4)			96
C5			44

Temperature 81 Height M^{-1} or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M^{-1}_{(1)}$	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	c_5	m_5^{-1}

5 min count.

Log N. —

Rod Position. - Large 0.025 Small 0.00

9-28
1-8 28

~~Sub critical~~ 74.3 } ~~water height~~ (water height)
~~supercritic~~ 74.3 } critical condition.

both rods in: source out.

temp. - 88.

rod position. large .025 small 0.000

Time 3:10.

29 9-28
1-9

Expr. 1-9 Time AM PM Date 9-28 1955
Purpose Multiplication. 5 x 5
Personnel:

12-12-55

Loading: 1 in slot 4
2 " " 8
3 " " 12
4 " " 16.

6½ x 25 x 33.4 = 5.42₁₅
x 31.1 = 5.05₃₇₅

slot 2 filled according to page 25
slot 18 " " " " " 27

slot 10: in order:
5-1, 2, 3, 4, 5
5-6, 7, 8, 9, 10
5-11, 12, 13, 14, 15
5-16, 17, 18, 20, 21
5-22, 23, 24, 25, 26

Total - app 5.55 kg.
5.43

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.W.
Instrument and Safeties Checked and Tested by D.W.
"Source In" Checked by D.W. Source No. PH-123
Emergency Equipment and Room Checked by D.M.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 3:22 AM PM Date 9-28 1955

Water level
85.00.

Condition - supercritical Loading again.

9-28
1-10

Expr. 1-10 Time 3:45 AM (PM) Date 9-28 1955
Purpose Multiplication 5x5
Personnel:

Loading - same as 1-9 except all of ~~slot~~ slot 10 removed. (Total ~~5.13 kg.~~) 5.03

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset by D.W. Source No. PN 123
"Source In" Checked by D.W. Source No. I.D.
Emergency Equipment in Control Room Checked by
Red Light On by M.B.
Start-Up OK'd by D.W. Time 3:50 AM (PM) Date 9-28 1955

Water level. 109.2 cm.
Rod. positions. small 31.02 large 0.03
Source partly removed: sub-critical.
Log N - 0.02
Withdrawing the large rod.
Now 30.68
Still sub-critical.
Large Rod Replaced.

12-12-55
6x25x33.4 = 5.01
31.1 = 4.665

MULTIPLICATION
Expr. 1-10 Time 4:25 AM (PM) Date 9-28 1955

Settings	Scalar	H. V.	Disc.	B. G. c/(5) min.
C(1)		Same as		151
C(3)				256
C(4) c-5		1-2		96 / 44

Temperature 88. Height

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$M^{-1}_{(1)}$	C(3)	$M^{-1}_{(3)}$	C(4)	$M^{-1}_{(4)}$	C_5	M^{-1}_5

Period greater than 400 sec. ~~and~~. Dropped safety blade. (manually)
Almost critical.

9-29
1-11

Expr. 1-11 Time 8:45 AM (PM) Date 9-29 1955
Purpose Multiplication. 5x5
Personnel:

INSTRUMENT CHECK
Date 9-29 1955 Time 8:45 AM (PM) Course No.

Instrument	Volts	Scale	Source Distance	Start-Up Scale	
DC-1					
DC-2	82	200	6"	5	Radium
DC-3	65	200	contact.	5	Radium
Log N	15			15	Radium
R-1	7	1000-1000	18"	50-1000	267
R-2					
P. M.			4"		Radium

C-1, C-3, C-4, all ~~clicked~~ responded to a source.

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by I.D. Source No. PN 123
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.M.
Start-Up OK'd by Time 9:00 AM (PM) Date 9-29 1955

Loading - Same as 1-10.
Have no magnet current. A wire is pulled loose.
Thermal-couple to water storage tank appears in gross error.
Water height 109.0 ; Water Temperature - 87°F
Small Rod Posit. - 31.02, large - .02 } Rising on something longer than 400 sec period.
Source in.

Seems in good agreement with 1-10; perhaps different by a little bit but have no quantitative check
Large Rod to 30.67 - Log N. .012 - still sub-critical.
Very little change

9-29
1-11

Found one safety rod – the large one – no detectable effect. ~~Essentially~~. Very little change by small rod.
Of course, we are seeing more source scattering than multiplication.
There is a definite drop in power level with safety blade.

9-09
1-12

Expr: 1-12 Time 10:10 (AM) Date 9-29 195 5
Purpose Multiplication – 5x5.

Personnel:

Loading – same as 1-10 plus
5-1 in 7(10); 5-2 in 9(10); 5-3 in 13(10); 5-4 in 15(10)
5-5 in 17(10); 5-6 in 21(10); 5-7 in 23(10); 5-8 in 27(10)
5-9 in 29(10); 5-10 in 31(10); 5-11 in 35(10); 5-12 in 37(10)

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 10:15 (AM) PM Date 9-29 195 5

1. Both Rods in. Source out.
Water level – 88.72. super-critical.
– 88.40 sub.-critical.
– 88.55 critical.
2. Large Rod. 8.02 Small Rod 31.08
Water level. – app. 88.0 – sub-critical.

Thus, in this configuration, the rods are worth less than ½ cm. of water.

12-12-55 (DWM)

$\left.\begin{matrix} 6\times25 \\ +12\times0.5 \end{matrix}\right\} 156$ $\times 33.4 = 5.210$ kg
$\times 31.1 = 4.85_{16}$ kg

9-29
1-13 34

Expr. 1-13 Time 10:50 (AM) PM Date 9-29 1955
Purpose Multiplication - 5x5
Personnel:

Loading same as 1-12 except:
the ~~boxes~~ elements which contains the ~~Rod~~ Series 5 plates (7, 9, 13, etc): the plates in slot 8 are moved to 9 and the plates in 12 are moved to 11.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start Up Cleared by D.W. Time 11:00 (A) Date 9-29 1955

Thus in the boxes containing the half elements, the two full plates adjacent to the half plate were moved closer to the half plate. The boxes not containing the half plates were not changed.
Water level - 108.8cm.: completely up
critical at small rod 16.27 large rod 0.02
Water temp. 86.5°F
Log N - 0.0123: DC-2: 57 at 10x1
DC-2: 73 at 10x1
Running small rod out (31.06): extremly long period.
period approx. 1500 sec.
Thus the top half of the rod appears to be worth less than 1¢. Calculates out to be 0.84¢
(with this long of period, the accuracy is questionable since the critical position was not held for a very long time).
M. Betch

September 30, 1955

The following fuel elements were repaired by sqeuing an edge and heating on a hot plate to 150 – 180°F for a few minutes weighting down with 3 lead bricks. This procedure seemed to re stick the plates when reheated. This repair work done by Moffat J. M+C and all.

		wt in H_2O Before	After Repair.	
	5-16	187.7	188.6	
	-20	163.5	189.3	
	-22	189.8	189.1	No evidence of repair at corners.
✓	-23	172.5	189.1	
	-29	161.9	187.8	
✓	-33	189.9	189.2	
✓	-35	161.5	185.7	
	5-31		Not Weigh	
	5-42		" "	
	5-28		"	
	5-17		"	

9-30

36

No	Heated 80-90°c	Under Pressure	Coated under Pressure	Bonded	Rebotel	Bonded
110	~3'	Yes	Yes	No.	No.	
145	"	"	"	No.		
H-947	~15'	"	"	Yes	Yes	Yes
H-956	"	"	"	No		
H-910	"	"	"	No		
H-932	"	"	"	No		
H-949	"	"	Gas Relieved	No		
H 959	"	"	yes	No		
H 958	"	"	yes	Yes		
H 930	"	"	yes	Yes		
H 959	35	"	x	Yes		
H 949	35	"	x	No		
H 932	35 80 - 110°e	"	x	No		
86	35A	"	yes	No		
87	"	"				
93	"	"	Yes on ~~off~~ 20	No		

Expr. 1-14. Time 2:20 ~~9~~ AM (PM) Date 9-30 1955
Purpose To determine the effect of the bulging plates.
Personnel:

Fuel Loading — Essentially the same as 1-13 except built up a little. But elements which are excessively bowed and which are in the 9-10-or 11 positions (between which the ~~also~~ effect is to be tested) will be replaced.

5-2 in 9(10) was replaced by 5-26
5-5 " 17(10) " " " 5-13
2-27 " 27(9) " " " 3-11
2-35 " 35(9) " " " 3-19

plus -

2-39 was loaded into 8(10)
2-18 " " " 20(10)
3-4 " " " 24(10)
2-44 " " " 36(10)

12-12-55 DWM

6×25 150
12×0.5 6
4 4
160 ×33.4 = 5.334
×31.1 = 4.976

INSTRUMENT CHECK

Date 9-30 1955 Time 2:26 AM (PM) Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	65	20×10	contact	
Log N	15			
R-1	7	1000	contact	
R-2		100		
P.-M.			3	

Seems to be difficulty in getting water-dump safety to work. Safety blade does work.

Sight glass connection is checked, and should be checked from now on.

Not going up because of bad relay in water-dump safety system.

Installed new relay, coils in parallel and contacts in series with old one, on water dump circuit.

M. B[illegible]

Expr. 2-1 Time 9:50 (AM) Date 10-3 1955
Purpose To determine the effect of bulging plates. Calibration.
Personnel: [illegible]

INSTRUMENT CHECK

Date 10-3 1955 Time 9:50 (AM) Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	—			
DC-2	—			
DC-3	70	20x10	2"	
Log N	✓	65		15
R-1	7	1000-	contact.	
R-2	—	100		
P. M.	✓		2"	

Loading – Same as 1-14 — 5.334 kg U; 4.976 kg U-235

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by DM
Instruments and Safeties Checked and Reset by ID
"Source In" Checked by ID Source No.
Emergency Equipment in Control Room Checked by ID
Red Light On by ID
Start-Up OK'd by D.W. Time 10:00 (AM) Date 10-3 1955

Sight glass – O.K.

Source can be seen on instruments.

Rods are in.

R-1 is by-passed. (10:25)

Water level – 89.38: slightly super-critical.
Critical. 89.01

DC-3: 55 (50x1)

R-1: 3.2 (1000-100)

Log N: 0.016

Water height increased to 89.60 but dropped to 89.53 ~~before~~ at end of run.

DC-3 by-passed. M.L.R.

This 5.5 mm. change in water level causes a 156.8 sec period. (6.8¢)
or 1.24¢/mm at this level is the water worth.

10-3
2-2

40

Expr. 2-2 Time 11:00 (AM) PM Date 10-3 1955
Purpose Effect of buttages.
Personnel:

Loading - same fuel loading as 1-14.
Aluminum plates - 16 mil nominal - welded between slots 9 & 10 hanging on plate in 9 on all ~~elements~~ boxes containing the half plates. (boxes # 7, 9, 13, 15, 17 etc)

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Re[illegible] D.W.
"Source In" Checked by D.W. [illegible] No.
Emergency Equipment in Control Room [illegible]ked by D.W.
Red Light On by D.W.
Start-Up OR'd by D.W. Time 11:05 [illegible] 10-3 1955

Critical Positions (Readings)
Water Level. 89.60 cm.
DC-3 60 (50x1)
R-1 1.83 (200x1000)
Water level raised to ~~89.60~~ 90.2
Scramed on DC-3.
Was on positive period at 130.5 sec (7.85¢)
Thus the 0.6 cm. change in averages 1.31¢/mm at this level for water value. (or, within the accuracy of the reading, the same as was found in 2-1)

M. Bda

10-3
2-3

41

Expr. 2-3 Time 12:46 (AM) PM Date 10-3 1955
Purpose Effect of buttages
Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OR'd by D.W. Time 12:48 (PM) 10-3 1955

Fuel Loading same as 1-14
Aluminum loading - 18 mil plates hanging on plates 9 & 11 in boxes 7, 9, 13, 15, 17, 22, 24, 27, 29, 31, 35 & 37
H1 between 9 & 10 and 10 & 11.
DC-3 moved back approximately 3 ft. from former position
Temperature from thermal couples - 83°F
Critical Readings.
Water level 90.41
DC-3 46 (20x1)
R-1 3.7 (25x1000)
Positive period readings —
Water level 91.25 (average during run)
Back to critical.
Water level. 90.21
Log N. 0.098
DC-3 51 (50x10
R-1 3.0 (1000x100)
Safety blade manually scramed. High-speed record of power level made to determine

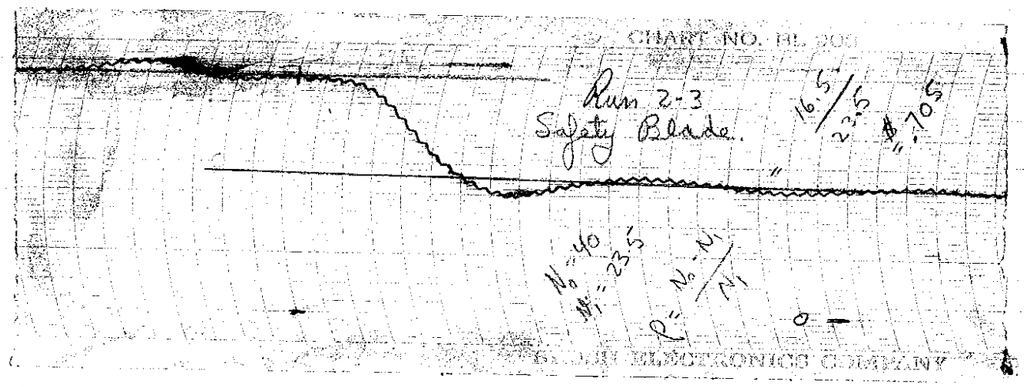
10-3
2-3

Positive period — 4 div x 22.72 = 87 sec. (10.5¢)
∴ Water worth = 10.5/8.4 = 1.25 ¢/mm.

The safety plate is worth:

$$\rho = \frac{N_0 - N_1}{N_1} = \$0.705$$

Water worth appears to be constant from 89-91 cm. at 1¼ ¢/mm.



10-3
2-4

Expr. 2-4 Time 1:40 AM (PM) Date 10-3 1965
Purpose Effect of bulges

Personnel:

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 1:40 AM (PM) Date 10-3 1965

Loading - fuel loading same as 1-14.
Al loading - one plate hanging on full plate # 9 between 9 & 10: second plate hanging on full plate # 10, 9 sp between 9 & 10. This is in elements 7, 9, 13, 15 etc.

Critical position
Water Temp. 83°F
Water level 90.55" (interpolated)
DC-3 63 (5x10)
R-1 3.5 (100x1000)
Log N 0.016

Rods pulled out.
Value probably less than 5¢ for both rods as evaluated against water level.

Expr. 2-5 Time 2:30 PM Date 10-3 1955
Purpose Effect of bulges
Personnel:

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by J.L.
Instrument D.M.
"Source In" D.W.
Emergency M.B.
Red Light D.M.
Start-Up OK'd by D.W. 2:30 PM Date 10-3 1955

Loading - Fuel loading same as 1-14.
Al. loading - 39 mil plates hung on #9 between 9 & 10 in boxes # 7, 9, 13, 15, 17 etc.

Critical Readings.

Water height	91.22
Log N.	0.015
DC-3	53 (5×10)
R-1	2.9 (100×1000)

3[30] P.M. Reactor Unloaded and inventory checked. All plates were accounted for. 13 new plates from MAC were added to inventory.

Inventory as of this date

4 groups full plates	= 4×45 =	180
1 " half "	= 1×45 =	45
7 extra trimmed full plates		7
7 " " "		7
6 " half "		6
		245

L E Dayton

Expr. 3-1 Time 9:00 AM Date 10-4 1955
Purpose Multiplication - 7x7 & criticality
Personnel:

INSTRUMENT CHECK
Date 10-4 1955 Time 9:25 AM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	—			
DC-2	—			
DC-3	65		contact.	
Log N	✓	13		
R-1	7	1000	contact.	
R-2				
P. M.	✓		3"	

12-12-55 [illegible]
4×45 × 33.4 = 6.012
×31.1 = 5.598

Loading - series 1 in slot #2 ; 36 & 34 interchanged.
series 2 in slot #6 ; 22 & 23 interchanged.
series 3 in slot #4
series 4 in slot #18. 6.02 kg

In air, thermometer reads 79, thermocouple read 80.
Small external rod changed from "small" to "medium" diameter.
Water level gage checked.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by R.W.
"Source In" Checked by Source No.
Emergency Equipment in Control Room Checked by D.M.
Red Light On by D.M.
Start-Up OK'd by R.W. Time 9:30 AM Date 1955

MULTIPLICATION
Expr. 3-1 Time 9:30 AM Date 10-4 1955

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$C_{(1)}^{-1}$	C(2)	$C_{(2)}^{-1}$	C(3)	$C_{(3)}^{-1}$	C_4	C_4^{-1}	C_5	C_5^{-1}
10 min					~~1240~~ 1262	.00080	4122	.000243	932	.00107	352	.00284	58	.0172

Water - full height 109.57
Rods - Large 30.67 Small 31.02
Log N - 0.0009

10-4
3-2 46

Expr. 3-2 Time 10:20 AM PM Date 10-4 1955
Purpose 7x7 multiplication
of criticality
Personnel:

Loading: - same as 3-1 plus:

box 3 (10) MAC 69
5 (10) MAC 70
8 (10) 71
10 (10) 72
12 (10) 73
14 (10) 74

box 16 (10) MAC 75
18 (10) 255
20 (10) 256
22 (10) 257
24 (10) 258
26 (10) 259

box 2 (10) MAC. 61
4 (10) 70
7 (10) 71
13 (10) 72
15 (10) 73
17 (10) 74
19 (10) 75

box 27 (10) MAC 255
29 (10) 256
31 (10) 257
33 (10) 258
39 (10) 259
42 (10) 260
44 (10) 261

1 (10) 5-1
6 (10) 5-2
9 (10) 5-3
11 (10) 5-4
21 (10) 5-5
23 (10) 5-6
25 (10) 5-7
35 (10) 5-8
37 (10) 5-9
40 (10) 5-10
45 (10) 5-11

Total — 6.67 kg.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset by D.W.
"Source in" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 10:20 AM Date 10-4 1955

12-12-55
4x45 = 180
11x0.5 14
5.5
199.5 x 33.4 = 6.663 kg U
31.1 = 6.204

47 10-4 3-2

MULTIPLICATION
Expr. 3-2 Time 10:30 AM PM Date 10-4 1955

Scalar Settings	H. V.	Disc.	B. G. c/( ) min.
C( )			
C( )			
C( )			

Temperature Height

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$c_{(1)}^{-1}$	C(2)	$c_{(2)}^{-1}$	C(3)	$c_{(3)}^{-1}$	c_4	c_4^{-1}	c_5	c_5^{-1}
10 min.					3304		4109		1013		392		66	
					~~.000232~~ .000435		.000243			.00098		.00256		.015

Water temp. ~ 82.5°F
Log M. 0.0011

10-4
3-3

Expr. 3-3 Time 11:15 AM PM Date 10-4 1955
Purpose 7x7 Multiplication of criticality
Personnel:

New shipment from MTR of fuel plates enabling us to go to full 5 plates per element.

Fuel loading: series #1 in slot 2
series #2 " " 6
series #6 " " 10
series #3 " " 14
series #4 " " 18 Total - 7.52kg.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start Up OK'd by D.W. Time 11:25 AM PM Date 10-4 1955

Rods out.
Critical at water level 79.00 cm.

12-12-55

5x45 x 33.4 = 7.515 kg U
x 31.1 6.998 kg U-235

10-4
3-4

Expr. 3-4 Time 12:30 AM PM Date 10-4 1955
Purpose 7x7 multiplication of criticality
Personnel:

Loading: slots 2, 6, 14, 18 same as 3-3.
in slot ten, series six plates are in boxes: 1, 3, 5, 6, 8, 10
12, 14, 16, 11, 20, 22, ... 40, 41, 43,
, series five plates are in boxes: 2, 4, 7, 9, 11
13, 15, ... 39, 42, 44 Total - 7.16kg, 7.17kg

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start Up OK'd by D.W. Time 12:40 AM PM Date 10-4 1955

Critical water level - 92.61 cm.
Rods are out.

12-12-55 Dwdm

4x45 = 180
21x0.5 24 10.5
214.5 x 33.4 = 7.164
31.1 = 6.671

Expr. 3-5 Time 1:20 AM/(PM) Date 10-4 1955
Purpose 7×7 multiplication + criticality
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Check by MB
Instrument and Safeties Checked and [illegible] by D.W.
"Source In" Checked by M.B. [illegible]
Emergency Equipment in Control Room [illegible] by MB.
Red Light On by M.B.
Start Up O.K'd by D.W. Time 1:20 (PM) Date 10-4 1955

Loading – slots 2, 6, 14, 18 same as 3-3.
slot ten: series six in boxes: 1, 3, 5, 14, 16, 18, 28, 30, 32, 41, 43, 45.
series five in the other slot tens.
All plates are in respective boxes.
Total – 6.96

Rods are out
Water level – 109.2 : 84 on the "outside" + "inside"
(thermocouple hung in center of box #23)

MULTIPLICATION
Expr. 3-5 Time 1:35 AM/(PM) Date 10-4 1955
Settings: Scalar, H. V., Disc., E. C.
C( )
C( )
C( )
Temperature, Height, M^{-1} or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(1)	$C^{-1}_{(1)}$	C(2)	$C^{-1}_{(2)}$	C(3)	$C^{-1}_{(3)}$	C_4	C_4^{-1}	C_5	C_5^{-1}
5 min count.					~~2482~~ 2471	.000202	1515	.00033	544	.00184				

Log N 0.0016
DC-3 28.5 (10×1)

There is a deflection in instrument readings as we raise water level. The reason for this is not certain. Draining out water to deflection point.
Water level 92 cm.

	C_1	C_2	C_3
5 min count.	2580	2702	1063

Thus: C_1 stayed about the same but C_2 + C_3 almost doubled. D.M. assured that the C_2 + C_3 were reset before the count was taken.

12-12-55 DWM
4×45 = 180
12
33×0.5 16.5
208.5 × 33.4 = 6.964 kg U
31.1 = 6.484 kg U-235

10-4
3-1
52

Expr. 3-6 Time 2:00 AM (PM) Date 10-4 195
Purpose 7x7 Multiplication and criticality
Personnel:

Loading same as 3-5 except in boxes: 6, 12, 22, 24, 34, +40, series 5 was taken out of slot 10 and series 6 inserted. Total 7,06 kg.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 2:05 (AM) PM Date 10-4 1955

Rods up.
Log. N. 0.002+
Water height 109.2
DC-3 35 (20x1)

Not critical.
Max. Reactivity for last two runs occurred at a water height of ~92 cm.

12-12-55 DLW

4x45 = 180
18
27x.5 13.5
211.5 x33.4 = 7.064 kg U
x31.1 = 6.578 kg U-235

10-4
3-7
53

Expr. 3-7 Time 7:30 AM (PM) Date 10-4 1955
Purpose 7x7 multiplication + criticality
Personnel:

Loading. Same as 3-4 except: in boxes 20, +26 ~~8, +10~~, slot 10 contains series 5 instead of six.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by M.B. D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 2:35 AM (PM) Date 10-5 1955

Rods up.
~~Water~~ Water temperature 83°F
Water Height 109.3 cm.
With source in, we are rising on something greater than a 400 cm period.
Log N 0.016
DC-3. 61 (20x1)
Max. reactivity at 93.5 cm.: found by draining & watching DC-3
We were almost critical.
Reactivity did not rise again while re-raising the water. Coming down very slowly, the peak appeared at 95 on DC-3 but at about 96 or 97 on Log N.

12-12-55
4x45 = 180
22
.33x0.5 = 11.5
213.5 x33.4 = 7.131 kg U
31.1 = 6.640 kg U

10-4
3-8 54

Expr. 3-8 Time 3:25 AM PM Date 10-4 1955
Purpose 7×7 multiplication & criticality

Personnel:

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by DW
Red Light On by DM
Start-Up OK'd by D.W. Time 3:00 AM PM Date 10-5 1955

Loading - same as 3-4 except plate 10 in box 26 was changed from series 6 to 5.

Total 7.15 kg.

Water level was put up to 99.84, where we were super-critical. Water level was then let down. Period increased as we went down. Very dangerous situation. Dumped water to 94.7 where we were sub-critical. Back up to 95.39 where slightly super.
Rods tested - ~~both have~~ each has some effect.

Water level - 95.10 just critical
Water level lowered to 90.5.
Raised to 95.62 to check reproducibility, super, critical.
Dropped to 94.95 sub-critical.

12-12-55 DWM

4×45 = 180
23
22×.5 11
214 ×33.4 = 7,148
31.1 6.655

---

55 10-5 3A-1

Expr. 3A-1 Time 8:50 AM PM Date 10-5 1955
Purpose To determine the ~~effect~~ reason for period increase with decrease in water height.
Personnel:

INSTRUMENT CHECK

Date 10-5 1955 Time 8:50 AM PM Source No.

Instrument	Trip-Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	65	20×10	4"	
DC-3	63	20×10	contact	
Log N		15 cu.		
R-1	6.8	10,000-100	contact on top, tr. γ pnd.	
R-2				
P. M.	—		3"	

γ source

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 8:15 AM PM Date 10-5 1955

Fuel Loading - Same as 3-8.
DC-3: turned on side & covered "head" with paraffin.
LogN moved closer to core: position 9" from core in north-west corner.
There is bubbling in about every box
Water level at critical 95.85 (about 0.7 cm. higher than yesterday)
Water temp. 81°F on thermal couples.
Water level lowered to 95.50 - sub-critical.
" " raised " 96.35 - super "
" " lowered " 95.95 - just critical.
Maximum ~~instrument~~ "reactivity" readings - at about 94 cm. on DC-2 and DC-3 and R-1 when draining through large water valve. No change in

10-5
3A-256

Expr. 3A-2 Time 10:40 AM PM Date 10-5 195 5
Purpose Reason for unusual behavior

Personnel:

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by 2 people in critical room to watch
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by in critical room
Red Light On by M.B. AM
Start-Up OK'd by D.W. Time PM Date 195

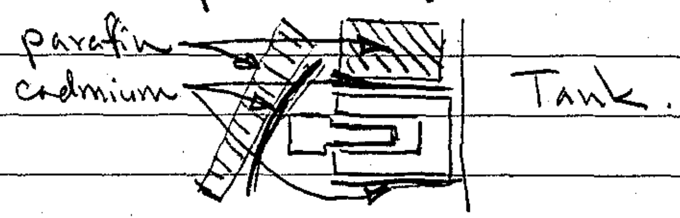
Final loading - same as 8-8 except 5-18 & 5-26 exchanged for 6-18 & 6-26.

~~Start~~ Instrument DC-2 was moved from Sid into Nell - thimble put 8" from element #26. DC-2 safety is bypassed. ~~Pass~~
Bubbles coming out of plates just put in before water over top.
DC-2 moved back 2 or 3 inches
Water up -
DC-2 and Log-N gave continuous rise with water level
DC-3 & R-1 reversed themselves at about 95 cm.
Bringing down water level, DC-2 showed no increase but DC-3 showed increased at 92 cm.

Expr. 3A-3 Time 12:20 AM/(PM) Date 10-5 1955
Purpose Reason for unusual behavior.
Also - preliminary rod calibration.
Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M. (DC-2 bypassed)
"Source In" Checked by D.W. Source No. ——
Emergency Equipment in Control Room Checked by M.J.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 12:25 AM/(PM) Date 10-5 1955

Fuel Loading - back to same as 3-B and 3A-1.
R-1 was repositioned - while kept in paraffin pig, was put against face of tank, cadmium surrounded except for face against tank, and then packed with paraffin.

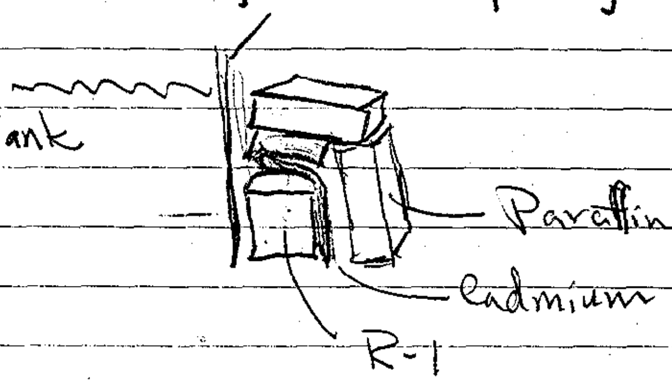


It is thought that the peaking around 95 cm. as seen by DC-3 + R-1 may be caused by sky-shine from the reactor - perhaps by the leaking of neutrons out the boxes.

At water height 97.90 cm. with source part way out.
DC-2 48 (50×10) + going up
DC-3 24 (5×10) level - perhaps going down slightly.
R-1 0.5 + going down slightly
At water height 101.45 cm. still not critical.
Time: 1.57 p.m. DC-3 36 + going down R-1 .2 decreasing.
Log N .023 + decreasing
DC-2 17. 5×10 decreas

Expr. ~~3A-2~~ Time AM PM Date 194
Purpose
Personnel

Opened large water valve & draining.
at 99 - instruments DC-3 + R-1 going up.
LogN + DC-2 still going down.
Rods were mistakenly left in.
R-1 was reading unsatisfactorily low. Its geometry was changed:



Rods pulled out.
R-1 still reading very low.
Critical conditions

Waterlevel	97.02 cm.
DC -2	51.5 (50x10)
DC -3	23.65 (5x10)
Log N	0.034
R-1	1.8 (25x1000)

Water raised to 109.1 cm. DC-2 only instrument going up. R-1 & DC-3 not acting properly in direction of motion.

II Inserting large external rod to critical.

Critical readings –

Water 109.05 Small rod 31.01

large 14.51 DC-2 39 (50×10)

Log N 0.026

large rod changed to 15.00 ; slightly super as seen on DC-2.

" " " 14.00 " sub " " " "

30.70

III large rod pulled out. little one inserted to 12.00 crit.

12.50 super.

critical at both 12.00 & 11.50

sub-critical : 11.00

IV Taking period measurement. Both rods all the way out.

water level 108.6

Large rod 30.70 small rod 31.02

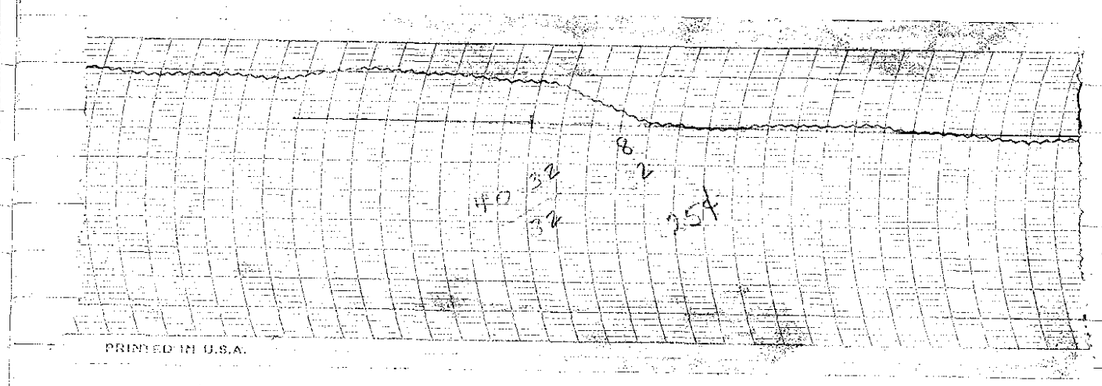
Thus measuring the effectiveness of 19.52 inches of the small rod, of 16.19 inches of the large rod and the excess reactivity of this loading.

V Safety blade drop –

Large rod 14.99: Small rod 31.62

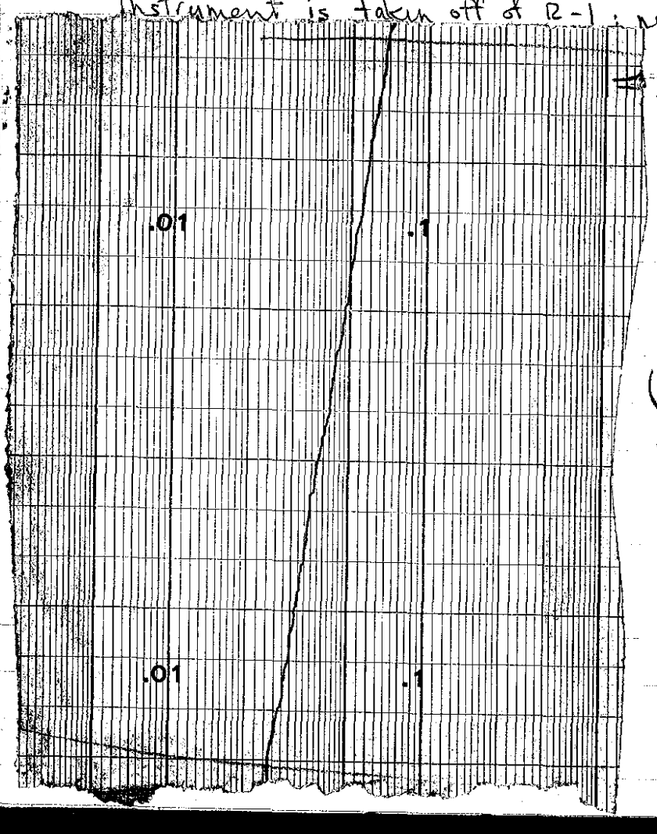
fast recorder

by rod drop method, it's worth ~~17.67¢~~ 25¢



Rod drop recording. 4

Instrument is taken off of R-1 ; noise level was high.



This is the period recording with both rods out @ loading of 7.15 kg.
The period is 695 sec.
@ the rods' worth to control this ~~dis~~ 1.77¢.
(Data corresponds to part IV of this experiment)

Expr. 4-1 Time 9:10 (AM) PM Date 10-6 1955
Purpose Background.
Personnel:

INSTRUMENT CHECK

Date 10-6 1955 Time 9:20 (AM) PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	X			
DC-2	X			
DC-3	✓	65	20×10 1"	
Log N	✓		15 sec.	
R-1	✓	7	1000×100 contact	
R-2	X			
P. M.	✓		2"	

Loading - S.S. series 1 in slot 2 | series 9 in slot 10

"	2 " 3	"	"
"	3 " 4	"	12
"	4 " 5	"	13
"	5 " 6	"	14
"	6 " 7	"	15
"	7 " 8	"	16
"	8 " 9	"	17

Tried putting R-1 in tank in plastic bag - bag developed leak & got instrument wet.
The manometer water-height gage was heretofore not vented to assembly room. This has now been done. Could be part of the explanation of ~~about~~ the irreproducibility.

Water Level - 109.35

~~Rods out~~: safety blade out.

At end of 10 min count:

LogN 0.00092 DC-3 ~21 (10×1)

Water Level 109.00

	C-4	C-5
Total ten minute count	376	3641

Rods out: large: 30.69, small 31.01

Expr. 4-2	Time 11:15 (AM) PM Date 10-6 1955
Purpose 7x7 with SS multiplication	
Personnel:	

Loading:

slot		
1	fuel	series 1
" 2	S.S.	" 1
" 3	S.S.	" 2
" 4	S.S.	" 3
" 5	SS.	" 4
" 6	SS.	" 5
" 7	fuel	series 2
" 8	SS	" 7
" 9	SS.	" 8
" 10	SS.	" 9
" 11	SS.	" 10
" 12	fuel	series 3
" 13	SS.	" 12
" 14	SS.	" 13
" 15	SS.	" 14
" 16	SS	" 15
" 17	SS	" 16
" 18.	fuel	series 4

START-UP CHECK LIST

Equipment Checked by M.B. Personnel Check by D.W.

Instrument and Safeties Checked and ... D.M.

"Source In" Checked by D.W. ...

Emergency Equipment in Control Room Checked by M.B.

Red Light On by M.B.

Start Up OK'd by D.W. Time 12:25 AM (PM) Date 10-6 1955

Rods out. safety up.

~~Post-Startup Checks~~:

12-12-55
DWM

4×45 = 180 × 33.4 = 6.012 kg U

31.1 = 5.598 kg U-235

MULTIPLICATION

Expr. 4-2 Time 1:60 AM (PM) Date 10-6 1955

Setting: L. G.

Scaler	H. V.	Disc.	c/(10) min.
C(4)			376
C(5)			3641
C( )			

Temperature Height M^{-1} or Remarks

Time	Ref	Sol'n	Ref	Sol'n	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$	C(1)	$C^{-1}_{(1)}$	C_2	C_2^{-1}	C_3	C_3^{-1}
10min.					378	1	5228	0.69	406		2653		977	
										.00246		.00875		.00102

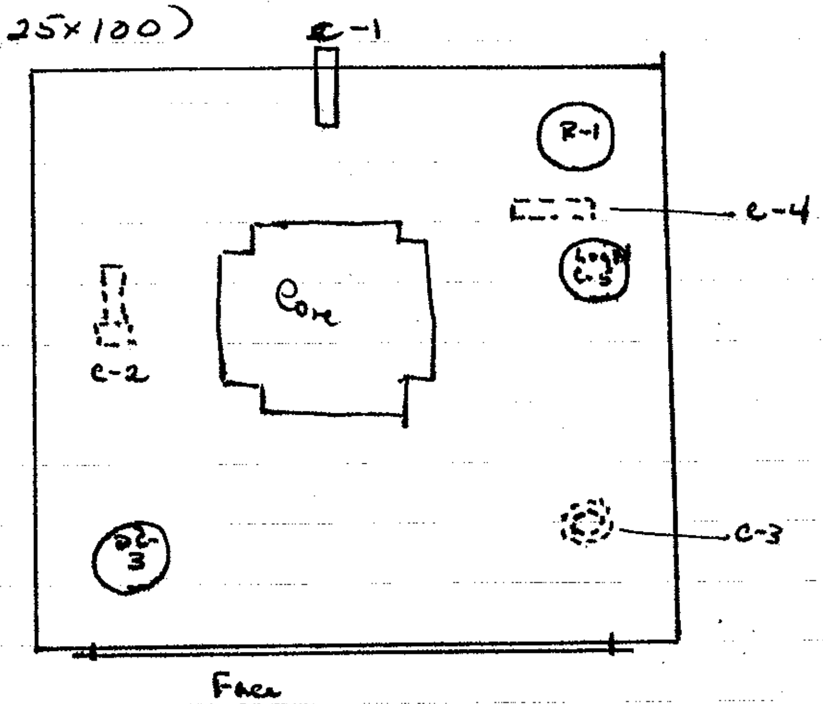
Water height 109.3 cm.

Water temp. 82°F

Log N 0.0011

DC-3 35 (10×1)

R-1 1 (25×100)



Expr. 4-3 Time 1:25 AM (PM) Date 10-6 1955

Purpose Multiplication

Personnel:

Loading:

Slot		Series
1	Fuel	1
2	SS.	1
3	SS	2
4	Fuel	6
5	SS.	4
6	SS	5
7	Fuel	2
8	SS.	7
9	SS.	8
10	SS	9
11	SS.	10
12	Fuel	3
13	SS.	12
14	SS.	13
15	Fuel	7
16	SS.	15
17	SS	16
18	Fuel	4

6-31 + 6-32 have been interchanged

12-12-55

Kg U

6×45×33.4 = 9,018

31.1 = 8,397 Kg U-235

(Total - 9kg)

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by J.L.

Instrument and Safeties Checked and Reset by D.W.

Source In Checked by D.W. Source No.

Emergency Equipment in Control Room Checked by M.B.

Red Light On by M.B. AM

Start Up OK'd by D.W. Time PM Date 195

Water level 109.1 cm.

Rods Out

Source in.

10-6
4-3 66

MULTIPLICATION

Expr. 4-3 Time 1:55 (AM) (PM) Date 10-6 1965

Settings

Scalar	H. V.	Disc.	D. C.
C(4)			376
C(5)			3641
C( )			

Temperature Height M^{-1} or Remarks

Time	Refl.	Soi'n	Refl.	Soi'n	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$	C(1)	$M^{-1}_{(1)}$	C_2	C_2^{-1}	C_8	C_2^{-1}
10					385	.98	7398	.495	601	.00166	2608	9.44	.00106	

Log N 0.0018

DC-3 23 (20x1)

R-1 0.7 (50x100)

10-6
67 4-4

Expr. 4-4 Time 2:15 (AM) (PM) Date 10-6 1965

Purpose Multiplication

Personnel:

Loading: same as 4-3 except the following exchanges:

MAC# 61 - ss 9-1		MAC# 260 - ss 9-24	
70 - => 9-3		261	9-26
71 - 9-5		262	9-28
72 - 9-6		263	9-30
73 - 9-8		264	9-32
74 - 9-10		265	9-34
255 - 9-14		266	9-36
256 - 9-16		267	9-38
75 - 9-12		269	9-40
257 - 9-18		270	9-41
258 - 9-20		271	9-43
259 - 9-22		347	9-45

24 full fuel plates were loaded in slot 10 in "checkerboard" fashion replacing the series 9 ss. plates formerly in that slot.

START-UP CHECK LIST

Equipment Checked by J.L. Personnel Checked by J.L.

Instrument and Safeties Checked and Reset by D.W.

"Source In" Checked by D.W. Source No.

Emergency Equipment in Control Room Checked by M.B.

Red Light On by M.B.

Start-Up OK'd by D.W. Time 2:30 (AM) (PM) Date 10-6 1965

Water level - 109.00 cm.

DC-3 is acting a little irratic - jumping every one-in-a-while.

6x45 = 270
24
294 x33.4 9.820 kg U
31.1 9.143 kg U-235

MULTIPLICATION

Expr. 4-4 Time 2:40 AM PM Date 10-4 195 5

Settings

Scalar	H. V.	Disc.	C( ) min.
C(4			376
C(5			3641
C( )			

Temperature Height M ' os Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(4)	$M_{(4)}^{-1}$	C(5)	$M_{(5)}^{-1}$	C( )	$C_{(1)}^{-1}$	C_2 C_2^{-1}	C_3 C_3^{-1}
10 min.					391		9675		763		2590	983

0.962 .375 0.00181

.00386

.00102

Log N 0.00145

DC-3 35(20×1)

R-1 0.6(100×100)

W

10-6
4-5

Expr. 4-5 Time 3:10 AM PM Date 10-6 195 5

Purpose Multiplication

Personnel:

Reading - same as 4-4 except the following exchanges:

slot 9	slot 10		slot 9	slot 10
S.S.			8-2	9-2 S.S.
5-1	5-2	put in in place of	~~8-9~~	~~8-10~~
5-3	5-4		8-4	9-4
5-5	5-6		8-7	9-7
5-7	5-8		8-9	9-9
9	10		8-11	9-11
11	12		8-13	9-13
13	14		8-15	9-15
15	16		8-17	9-17
17	18		8-19	9-19
19	20		8-21	9-21
21	22		8-23	9-23
23	24		8-25	9-25
25	26		8-27	9-27
27	28		8-29	9-29
29	30		8-31	9-31
31	32		8-33	9-33
33	34		8-35	9-35
35	36		8-37	9-37
37	38		8-39	9-39
39	40		8-42	9-42
41	42		8-44	9-44

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by D.M.

Instrument and Safeties Checked and Reset by D.W.

"Source In" Checked by D.W.

Emergency Equipment in Control Room Checked by J.L.

Red Light On by M.B.

Start-Up OK'd by D.W. Time 3:20 AM PM Date 195

Water 110.1 cm.

MULTIPLICATION

Expr. 4-5 Time 3:30 (AM) PM Date 10-6 195 5

Settings — B.G.

	Scalar	H. V.	Disc.	c/(10) min.
C(4)				376
C(5)				3641
C( )				

Temperature Height M^{-1} or Remarks

Time	Refl.	Sol'n	$C_{(4)}$	$M^{-1}_{(4)}$	$C_{(5)}$	$M^{-1}_{(5)}$	$C_{(1)}$	$M^{-1}_{(1)}$	$C_{(2)}$	$M^{-1}_{(2)}$	e_2	e_3^{-1}
Ten minutes.			425	.88	14,283	.256	1114	.00086	2659	.000376	1246	.000855

Log N 0.0018
DC-3 48 (20 x 1)
R-1 0.6 (100 x 100)
or 1.5 (50 x 100)

Expr. 4-6 Time 4:00 (PM) Date 10-6 195 5
Purpose multiplication
Personnel:

Loading - Same as 4-5 except the following exchanges:

MAC # 348 for S.S. 12-22
350 S.S. 12-24
half plates { 543, 544, 545 } our numbers. S.S. 5-15, S.S. 5-16, 5-17
H-951 5-22
H-950 5-23
H-958 5-24
H-959 5-29
H-961 5-30
H-960 5-31

START-UP CHECK LIST

Equipment Checked by _____ Personnel Check by _____
Instrument and Safeties Checked and Reset by _____
"Source In" Checked by _____ Source No. _____
Emergency Equipment in Control Room Checked by _____
Red Light On by _____ AM
Start-Up OK'd by _____ Time _____ PM Date _____ 195 ____

INSTRUMENT CHECK

Date 10-7 195 5 Time 8:30 (AM) PM Source No.

Instrument	Trip Value	Scale	Source Distance
DC-1	X		
DC-2	X		
DC-3	65	20x10	4" from thimble
Log N	✓	15 sec	
R-1	✓	1000 x100	Contact 4
R-2			
P. M.	✓		34

10-7
4-672

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M. + D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 8:45 AM PM Date 10-7 195 5

MULTIPLICATION

Expr. 4-6 Time 8:50 AM PM Date 10-7 195 5

Settings

Scalar	H. V.	Disc.	B.G. c/( ) min.
C( )			376
C( )			3641
C( )			

Temperature Height M^{-1} or Remarks

Time	Refl.	Sol'n	I_{0_4}	$I_{0_4}^{-1}$	C(5)	$M_{(5)}^{-1}$	C(1)	$C_{(1)}^{-1}$	C(2)	$C_{(2)}^{-1}$	$\frac{C_2}{C_5}$	$\frac{C_2^{-1}}{C_5^{-1}}$
10 min.			416	.9	21384	.17	1699		2697		972	

Log N 0.0022
DC-3 61 (20×1)
R-1 1.4 (25×1000)
Water level 109.4 cm.
Bubbling very seriously.
Re-calibration at water height (because of venting of manometer)
Table top — 15.3 cm.
Box top — 96.8 cm.
Water temp. 81°F.

10-7
4-7

Expr. 4-7 Time 9:45 AM PM Date 10-7 195 5
Purpose Multiplication
Personnel:

Loading - Same as ~~4-6~~ 4-5 except all S.S. series 5 (in slot 6) was removed

added:

5-43	in	1-6
5-44	in	3-6
5-45	in	5-6
H 950	in	14-6
348	in	16-6
H 951	in	18-6
H-968	in	28-6
350	in	30-6
H-959	in	32-6
H-960	in	42-6
H-961	in.	44-6

MULTIPLICATION

Expr. 4-7 Time 10:00 AM PM Date 10-7 195 5

Settings

Scalar	H. V.	Disc.	B.G. c/( ) min.
C( )			
C( )			
C( )			
C( )			

Temperature Height M^{-1} or Remarks

Time	Refl.	Sol'n	Refl.	Sol'n	C(0)	$M_{(\ )}^{-1}$	C(4)	$M_{(\ )}^{-1}$	C(5)	$M_{(\ )}^{-1}$
5 min.					1122		224		24334	

Log N 0.0026
DC-3 80 (20×1)
R-1 1.2 (25×1000)
Water Level 110.2

10-7
4-9 74

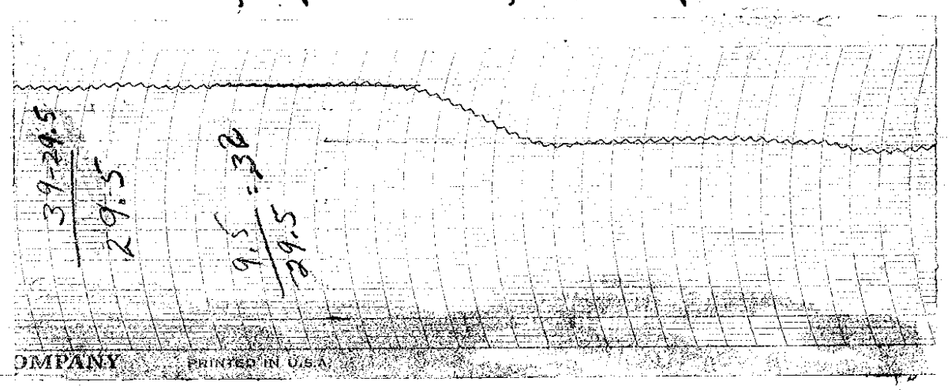
Expr: 4-8 Time 10:05 AM PM Date 10-7 1955
Purpose multiplication
Personnel:

Loading - same as 4-7 except all ss series 15
(slot 16 removed.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 10:10 AM PM Date 10-7 1955

Not quite critical.
Water up to 109. Rods out.
With source out, period ∿ - 400 sec. ~ 4¢

Power level recording: Exp. 4-9: safety blade drop.



10-7
4-9 75

Expr. 4-9 Time 10:40 AM PM Date 10-7 1955
Purpose multiplication
Personnel:

Loading - same as 4-8 except ss series 4 was removed from slot 5 in elements 1, 3, 5, 14, 16, 18, 28, 30, 32, 42, 44.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.M.
Start-Up OK'd by D.W. Time 10:50 AM PM Date 10-7 1955

DC-3 moved back away from core - reading too high.
Critical conditions.
Log N - 0.016 Rods out.
DC-3 70 (10 x 10)
R-1 3.25 (100 x 1000)
Water level 90.8 cm., temp. 81° F.
Water level raised to: 91.40 cm. (to raise power level)
Lowered to: 90.8.
Safety blade dropped & power level recorded on fast Brush recorder.
Value of blade calculates to be: 32¢
The period experienced with the water level at 91.40 cm. was 152 sec. which corresponds to 7.0¢
(or, roughly, the water in this region is worth 1.17 ¢/mm.)

Expr. 5-1 Time 17:30 AM (PM) Date 10-7 1955
Purpose Effect of bridging of plates on 7x7 with s.s.
Personnel:

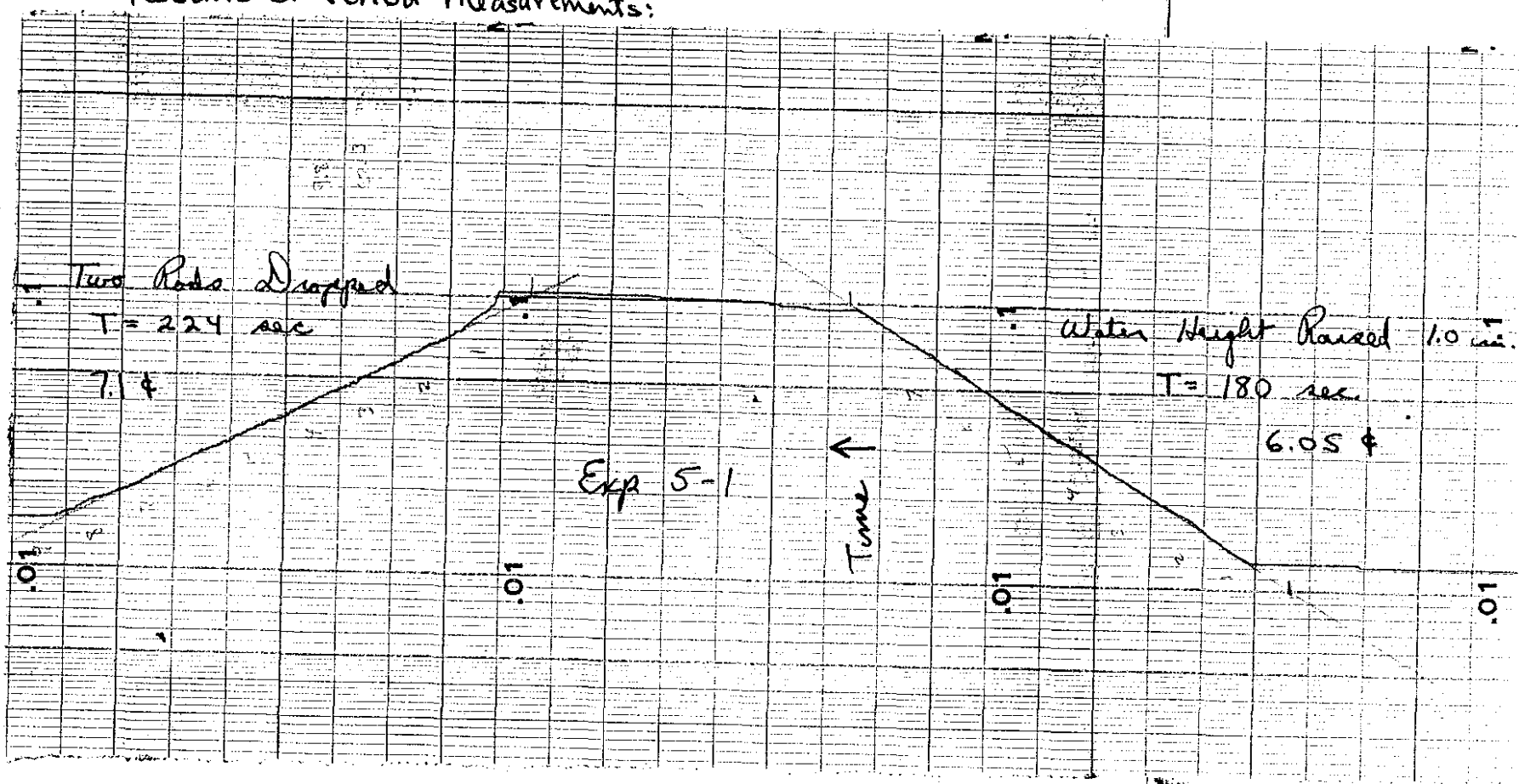
Loading - same as 4-9 except a 40 mil Al plate hung on fuel plate in slot 4 between 3+4; this plate was hung in checkerboard box pattern beginning with box 1 (1, 3, 5, 6, 8, 10, ... 38, 40, 41, 43, 45) Total of 24 plates hung.
In this position there are two s.s. plates between the artificial 40 mil void and the next fuel plate.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by D.M.
~~Instrument and Safeties Checked and Reset by~~ D.M.
"Source In" Checked by D.W. ~~Source No.~~
~~Emergency Equipment in Control Room Checked by~~ M.B.
Red Light On by D.W.
~~Start-Up OK'd by~~ D.W. Time 12:35 AM (PM) Date 10-7 1955

Critical conditions:
LogN 0.0125
DC-3 54 (10x10)
R-1 5.15 (50x1000)
Water level 92.54 Water temp. 81°F
Raised water to 93.53 for period measurement + water evaluati
Back to critical at.:
LogN 0.01
DC-3 58 (100x10)
R-1 5.2 (50x1000)
Water level 92.50

Dropped both control rods for period measurement.

Results of Period Measurements:

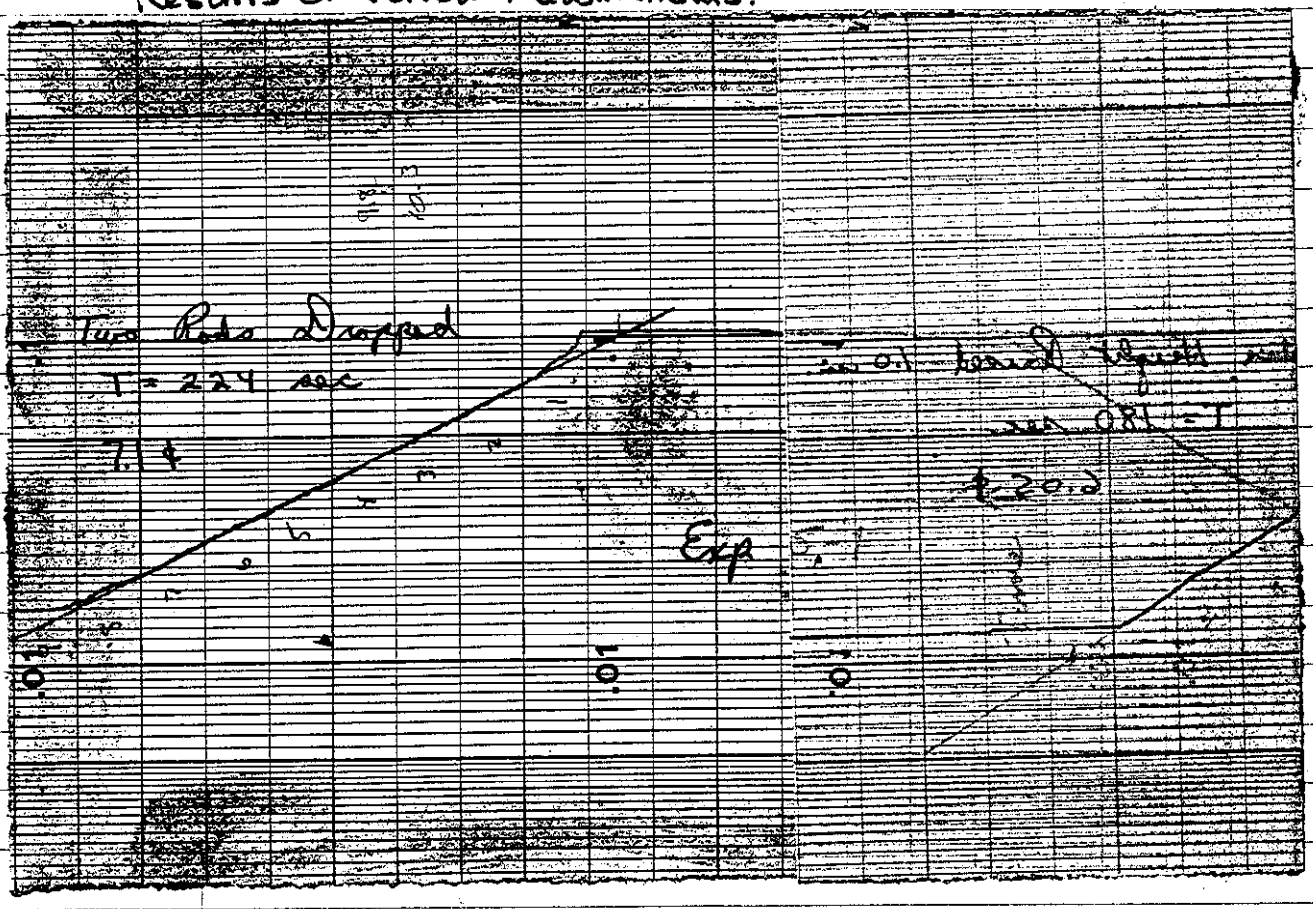


Water Height: Δh = 1.0 cm. ; period = 180 sec. (6.05¢)
water value: 0.60¢/mm.

Rod drop: period = 224 sec. (7.1¢)

Dropped both control rods for period measurement.

Results of Period Measurements:



Water height: $\Delta h = 1.0$ cm. ; period = 180 sec (6.05¢)
water value: 0.60¢/mm.

Rod drop: period = 22.4 sec. (7.1¢)

The total value of the ftl calculates out to be by straight-line interpolation to be 16.35¢. Or ~2/3¢ per plate

10-7
5-278

Expr. 5-2 Time 1:45 AM (PM) Date 10-7 1955
Purpose Bulges.
Personnel:

Loading — same as 4-9 except,
16 mil plates of Al were hung on fuel plate in slots 1, 4, 7, 10, 12, 15, 418 in boxes 10, 14, 32, and 36

Equipment Checked by	D.W.		P.M.
Instrument			D.M.
"Source In"		P.W.	
Emergency			M.B.
Red Light		M.B.	
Start-Up	D.W.	1:50	10-7 1955

Critical conditions:
Rods out
Water height 91.73
Log N 0.0155
DC-3 62 (1x100)
DC-2 51 (1x50)
R-1 2.8 (100x1000)
Water raised to 92.57

DC-3 scrammed accidentally.
All Plates worth 10.8¢ taking 1.17¢/mm as water worth
or 0.0253 ¢/mil/fuel ~~element~~ plate.
or 2.7 ¢/~~fuel element~~ box for 7 - 16mil plates
or 7.5¢/mil/box/reactor.

79

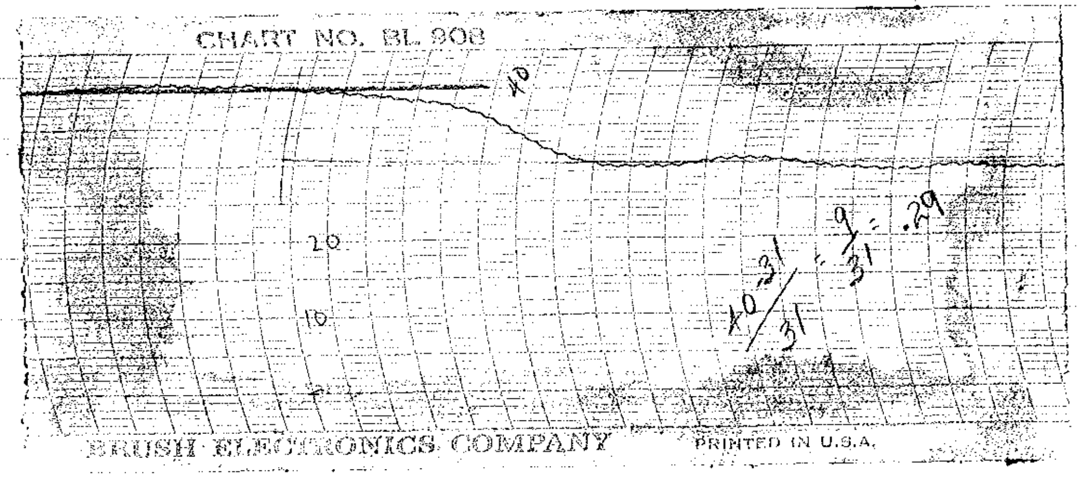
Expr. 5-3 Time 2:55 AM (PM) Date 10-7 1955
Purpose Bulges — fuel evaluation.
Personnel:

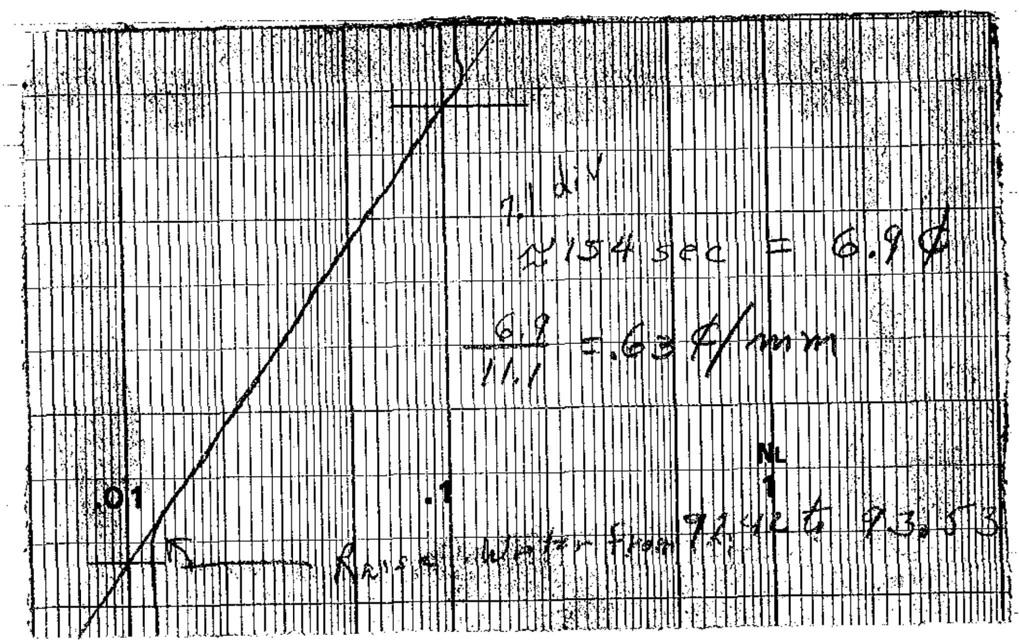
Loading — same as 4-9 except:
fuel in slots 14(6) and 32(6) were exchanged for ss. 5(14) & 5(32) respectively.
Amount of fuel taken out = 33.4 gm.
Water height at critical = 92.42 cm.
7 Dec 1980 — Total value of water @ ¢/mm = 16.5 ¢
Fuel worth = 16.5 ¢/33.4 gm. = 0.495 ¢/gm.

Assuming an average of 10 mil bulge per fuel plate and 7 plates per box, total reactivity tied up in voids @ 0.0253 ¢/mil/fuel plate is 79.8 ¢.

Log N 0.0125
DC-2 411 (50x1)
DC-3 51 (100x1)

Water raised to 93.53 cm to go up in power
Rod positron: large 30.70 small 31.02
Back to 92.24
Log N 0.180
R-1 4.9 (1000x1000)
Safety blade drop.





Expr. 6-1 Time 10:25 (AM) Date 10-10 1955
Purpose To determine the effect internal Cd for possible new safety ~~[illegible]~~ blade.
Personnel:

INSTRUMENT CHECK

Date ______ 195__ Time ______ AM/PM Source No. ______

Instrument	Trip Value	Set'g	[illegible]	[illegible]
DC-1				
DC-2	✓		20x10	
DC-3	✓	20x10	2½"	
Log N		15 sec.		13 sec.
R-1	✓	.7	contact 1000x / 100	
R-2				
P. M.	✓			

Loading – same as 4-9 except all s.s. in slot 11 removed.
(ss. series 10 removed).
3 - 1/32" x 2½" x 23" cadmium plates were put between slot 18 + box in elements 29, 30, 31.

START-UP CHECK LIST

Equipment Checked by D.M. Personnel Check by D.W.
Instrument and Safeties Checked and [illegible] D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.M.
Start-Up OK'd by DW Time 10:35 (AM) Date 10-10 1955

Sight glass O.K.
Not critical.
LogN. 0.004
DC-3 84 (20x1)
Water – 109 cm.
Rods out.

Expr: 6-2 Time 11:05 (AM) PM Date 10-10 1955
Purpose Safety blade proposal.

Personnel:

STARTUP CHECK LIST
Equipment Checked by D.M. Checked by D.M.
Instrument Checked by D.W.
"Source In" Checked by DW
Emergency Shut Down Rod Checked by
Red Light On by M.B AM
Start Up OK'd by Time PM Date 195

Loading: same as 6-1 but with 21 more stainless steel plates removed: slot 2 (series 1) removed in "checker board" boxes 2, 4, 7, 9 ..... 39, 42, 44.

Log N -
Sub-critical - going on negative 1 300-hour period.
Water height 109 cm.
Rods out
Source out.

Fuel Plate MAC 116 opened. Returned to salvage ?
" " MAC 435

Expr. 7-1 Time 2:15 AM (PM) Date 10-18 1955
Purpose 7x7 Multiplication with S.S.

Personnel:

Loading: slot 1 fuel series 1

Slot	Type	Series
1	fuel series	1
2	S.S. series	2
3	~~S.S.~~ fuel series	4 ~ 4-30 + 4-31 interchanged
4	S.S. series	4
5	S.S. series	5
6	fuel series	6
7	SS. series	7
8	SS series	8
9	SS. series	9
10	fuel series	7
11	SS. series	11
12	SS series	12
13	fuel series	8
14	SS series	~~14~~
15	SS. series	15
16	fuel series	9
17	S.S. series	1
18	fuel series	10

Log N raised in its tube from sitting on the bottom to 42" above bottom or about on the centerline of core.

INSTRUMENT CHECK

Date 10-18 1955 Time AM PM Source No.

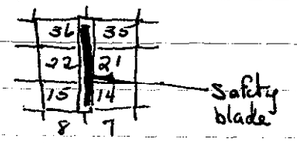
Instrument ... Hg Scale

20x10
✓ 65 20x10 6"
contact.
P. M. ✓ 3"

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M. D.W.
Instrument and Safeties Checked and Tested by
"Source In" Checked by D.W. Source Out
Emergency Equipment in Control Room Checked by M.B
Red Light On by D.W.
Start-Up OK'd by D.W. Time 7:25 AM PM Date 10-18 195 5

Changes made in apparatus since last run (6-2)

1. New safety blade installed. internal to core



2. Old safety blade now used for control blade. Motorized & limited switches installed.
3. Medium control rod removed entirely.

The 'zero' position of the new safety blade:

Bottom of fuel
Bottom of blade — Bottom of Ld.
1/2" 1/8"

Reset manometer scale – 15.0 to top of skirt.

Water height- 109.17 cm.

Log N = 0.015
DC-3 = 32 (1×20)
R-1 = 0.65 (500×100)
Blade = 28.28
Rod = 28.97
Temp = 73.5 °F

Expr. 7-2 Time 3:00 AM PM Date 10-18 195 5
Purpose multiplication.
Personnel:

Loading same as 7-1 except: (24 total)
in these boxes, 1, 3, 5, 6, 8 ··· 38, 40, 41, 43, 45,
35. series 8 in slots 8 has been removed & replaced by ½a fuel plate series 5.
Total fuel = ~~11.3~~ 10.9 kg.

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by R.J. D.W.
Instrument and Safeties Checked and
"Source In" Checked by D.W.
Emergency Equipment in Control Room M.B.
Red Light On by J.L.
Start-Up OK'd by D.W. Time 3:10 AM PM Date 10-18 195 5

Log N. = 0.018
DC 3 = 28 (1×20)
R-1 = 0.75 (500×100)
water height = 109.5
Blade 28.28
Rod 28.95

88

Expr. 7k3 Time 3:35 AM (PM) Date 10-18 1955
Purpose Multiplication.

Personnel:

loading:

slot.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
material & serial	f u 1	s. s. 1	f u 1	s. s.	s. s.	f u 1	s. s.	f u 1	s. s.	f u 1	s. s.	s. s.	f u 1	s. s.	s. s.	f u 1	s. s.	f u 1

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Check by J.L.
Instrument and Safeties Checked and [illegible] I.D.
"Source In" Checked by D.W. [illegible] No.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start-Up OK'd by D.W. Time AM PM Date 195

Water height

96.70 - slightly super. fuel - 11.25?

96.4 - just about critical.

96.2 - slightly sub

Temp. 74.0° F.

Log N = 0.13

DC-3: 51.8 (5×10)

Water level - 109 to increase power level.

Rod position. 0.01 Blade 28.99. Rod.

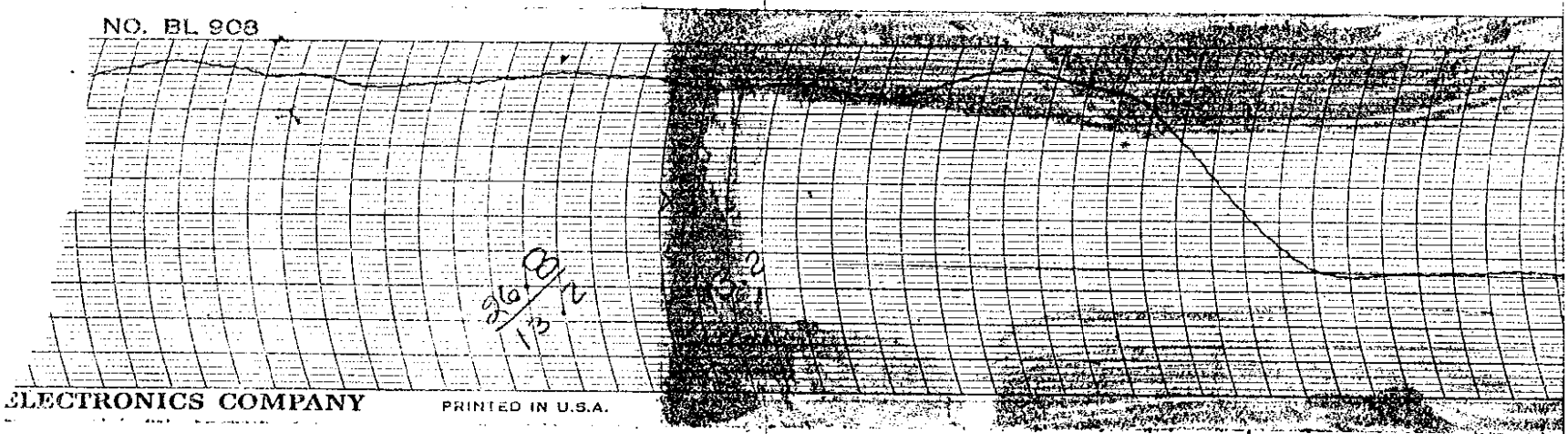
water level returned to 96.4

DC-3 50 (5×10)

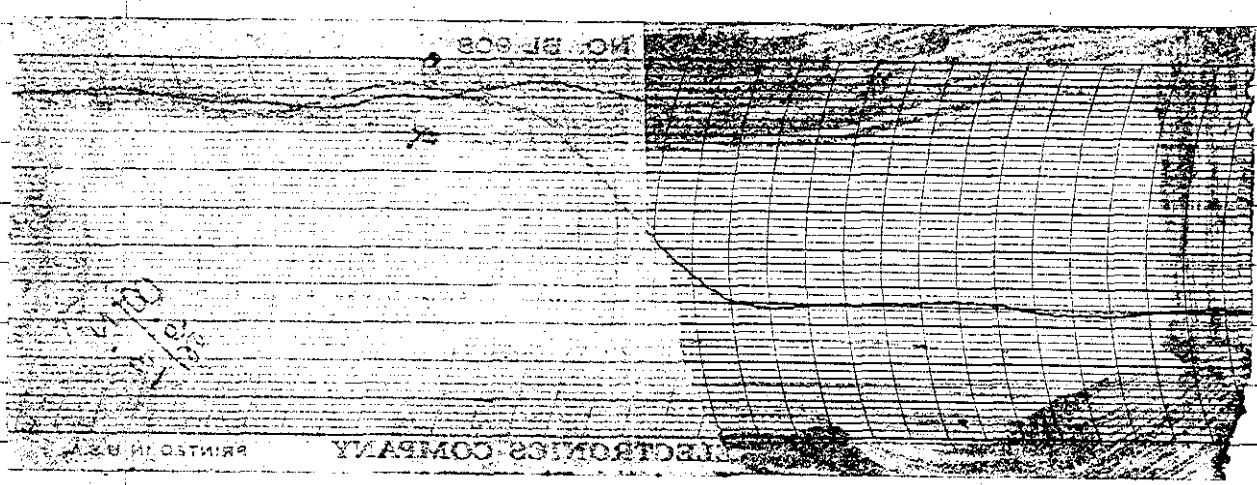
log N 0.155

[redacted]

Safety blade drop: worth ~~$~~ 2.1



Safety blade drop: worth = 2.1



Expr. 7-4 Time 9:00 (AM) PM Date 10-19 1955
Purpose Recheck on 7-3.

Personnel:

INSTRUMENT CHECK

Date 10-19 1955 Time 9:00 (AM) PM Source No.

Instrument	Value	Scale		Startup Scale
DC-1				
DC-2	~~5~~			
DC-3	65	20×10		
Log N	✓	15 sec		
R-1	5	.8×1000 ×100		
R-2				
P. M.	✓			

Loading - exactly the same as 7-3

START-UP CHECK LIST

Equipment Checked by R.J. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by M.B. D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.W.
Start-Up OK'd by D.W. Time AM PM Date 195

Critical conditions:

Water temp. 74.5°

Water height 96.4

Blade 9.14 Rod 28.99

Yesterday blade was at 0.01 for critical conditions.

Log N = 0.061

Source may be appreciably interfering with reactor at this low power level. Going up in power.

New Critical Cond.

Blade Pos.	8.85
Waterheight	96.4
Log N	0.38
DC-3	48.5 (50×10)

Magnet current zero - wire loose. Fixed.

Drop of control blade also gears loose safety blade.

Expr. 7-5 Time 11:15 AM PM Date [illegible] 195 5
Purpose multiplication.
Personnel:

Loading - same as 7-3 except 9 half fuel plates removed & replaced by S.S.
5-7, 5-9, 5-11, 5-21, 5-23, 5-25, 5-35, 5-37, 5-39 were replaced by the corresponding S.S. series F.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Checked by D.W. D.W.
Instrument and Safeties Checked and
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by R.J. AM
Start-Up OK'd by D.W. Time PM Date 195

Water level = 109.2
Control Blade 28.28 Control Rod 28.99
Log N = 0.030
Source in.

Not critical.

Expr. 7-6 Time 12:20 AM PM Date 10-19 195 5
Purpose multiplication. - critical mass.
Personnel:

Loading - Same as 7-3 except 5 half fuel plates removed & replaced by S.S.
5-9, 5-21, 5-23, 5-25, 5-37 were replaced by the corresponding S.S. series F.

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Checked by R.J. D.W.
Instrument and Safeties Checked and
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by B.M. AM
Start-Up OK'd by D.W. Time 12:20 PM Date 10-18 195 5

Control Blade 28.28 Control Rod 29.00
Water - 109.1, Water Temp 74.5°
Log N. 0.1
PC-3 35 (10x20)
Not critical.

∴ Clean, cold, critical mass is between 11.25+ 11.17 kg.

Expr. 7-7 Time 1:10 AM (PM) Date 10-19 1955
Purpose Re-check of 7-3 & 7-7.
Tie down determining critical mass.
Personnel:

Loading - Same as 7-3. (& 7-4)

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by R.J.
~~Instrument and Safeties Checked~~ and Reset by D.W.
"Source In" Checked by D.W. Source No.
~~Emergency Equipment in Control Room Checked by~~ D.W.
Red Light On by D.W.
Start Up OK'd by D.W. Time 1:10 (AM) PM Date 10-19 1955

Critical.

Blade	8.92	Rod	29.00
Water height	109.2	Log N	0.085
DC-3	58 (10×10)	Temp.	74.5°F

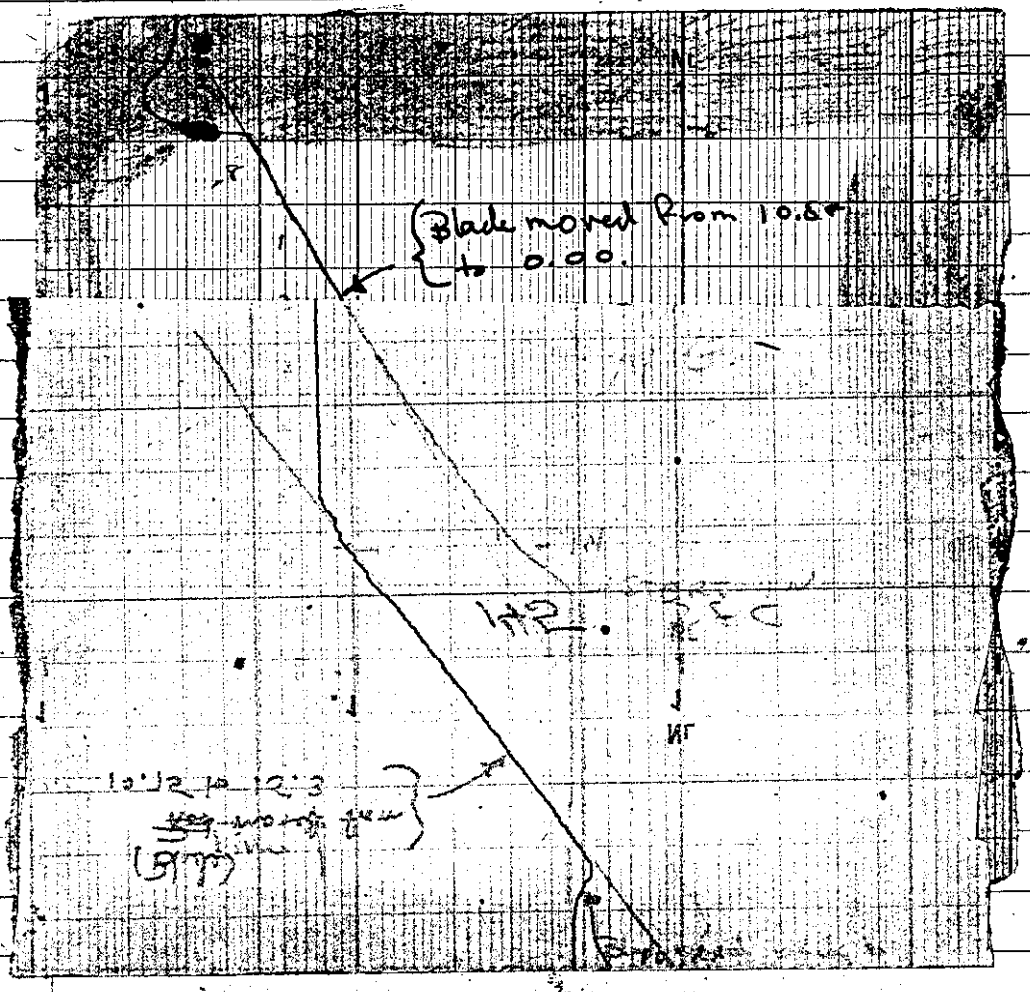
Water height lowered to 96.4

Control blade	10.75	Rod	29.00
DC-3	43(10×10)	Log N	0.085

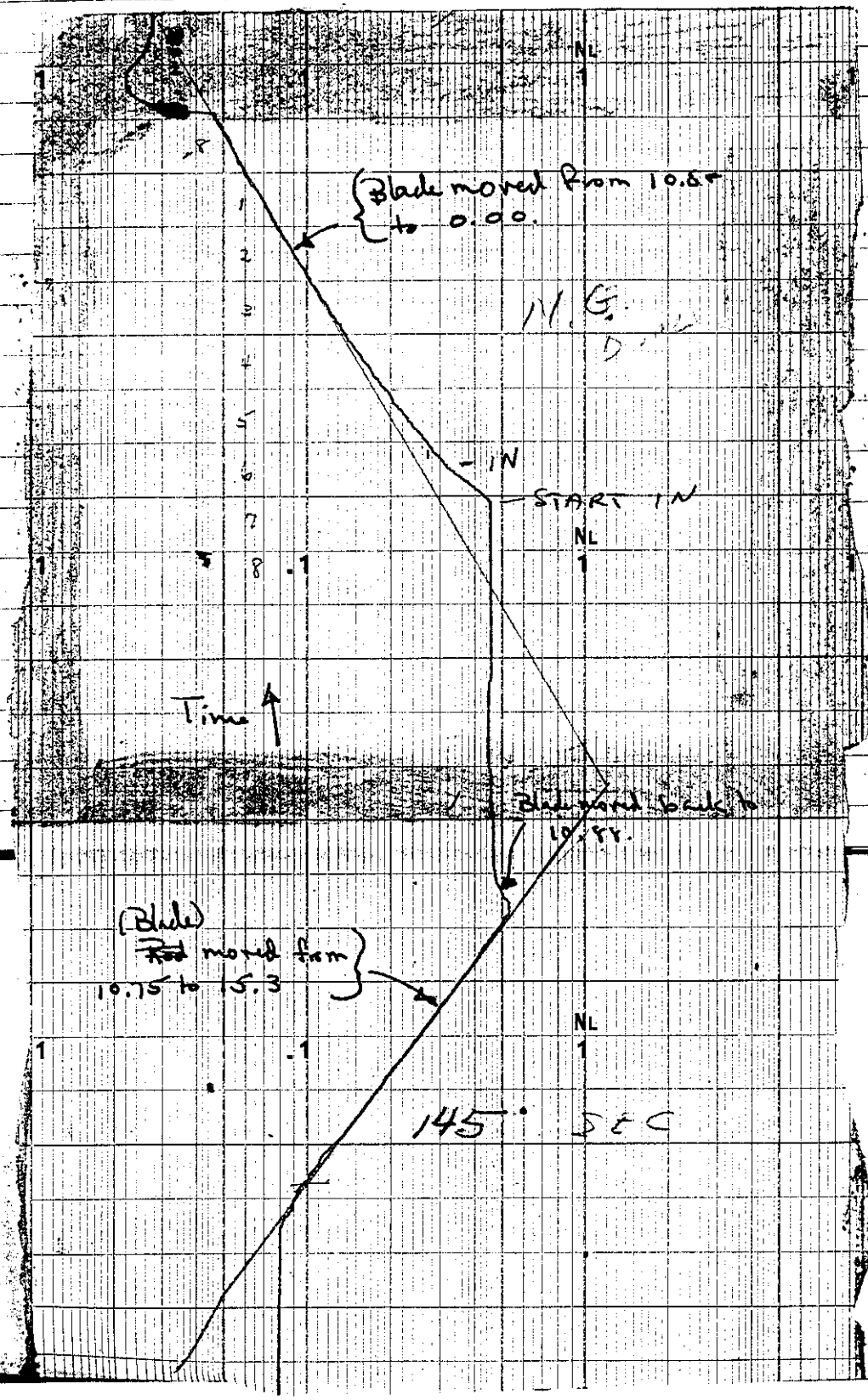
Power raised:
new
blade position 10.3 : period measurement made.
Back to critical:
Water level 96.4 Blade position 10.88
Log N 0.47 DC-3 62.5 (50×10)

External blade inverted to 0.00 for negative period measurement.

The positive period between rod positions 10.75 + 15.3 is 145 sec. (6 2/3 div. on Log N per decade)
∴ 7.25¢ is the worth of this 46 inches of blade.
The negative period between 10.88 & 0 is
191 sec (8.8 div. on Log N per decade).
∴ 8.55¢ is the worth of this 10.88 inches of blade.



The negative period between 10.88 & 0 is
191 cm (8.8 div. on Log N per decade).
∴ 8.55¢ is the worth of this 10.88 inches of blade.



Expt. 7-8 Time 11 AM ~~PM~~ Date 10-20 1955
Purpose To check reactivity of Assembly due to fuel plate changes overnight.
Recheck 7-3 & 7-8
Personnel:

Fuel Loading Same as 7-3 & 7-7

INSTRUMENT CHECK

Date 10-21 1955 Time 11 ~~AM~~ PM Source No.

DC³ -60
Log N - 15 sec
RI - 4.5 .8 X1000
X 100
P. M. ✓

START-UP CHECK LIST

Equipment Checked by DW-RS Personnel Check by DW
Instrument and ... Checked and ... DW - PJ
Source ...
Emergency ... J.L.
Red ... DL
Start ... DW 11.10 10-21 1955

Fuel Plates were weighed after Run 7-7 and a total weight loss since their last weighing before ~~s~~tart of experiment 7 was 575 gms. This gives an average void of ~1.6 mil/plate in the assembly.

Plates were weighed on 10-20, just prior to 7-8 and a the weight Change since the weighing after 7-7 was + 66 gms, representing a decrease in void of .18 mil/plate.

Fuel Plate Series Weight Record

Total Weight in 4.0 + 769 gms

Series (Used in Exp)	10-17 Before Exp 7	10-19 Right after 7-7	Δm /series (19-17)	10-20 Just Before 7-8	Δm/series (20-19)
1	8936.8	8803.9	-128	8865.	+ 61
4	8917.8	8786.0	-127	8817.0	+ 31
5 (½ plt)	8247	8202.0	-40	8186	-21
6	9003.	8925.0	- 78	8903.5	-21.5
7	8923.	8903.0	- 70	8889.0	-14
8	9040.5	8981.0	-58.5	9012.0	+ 30
9	9114.8	9082.3	- 32.5	9081.0	-1.3
10	9058.1	9017.0	- 41.1	9017.5	+ .5
	Total Δm		-525.1		+ 66.7

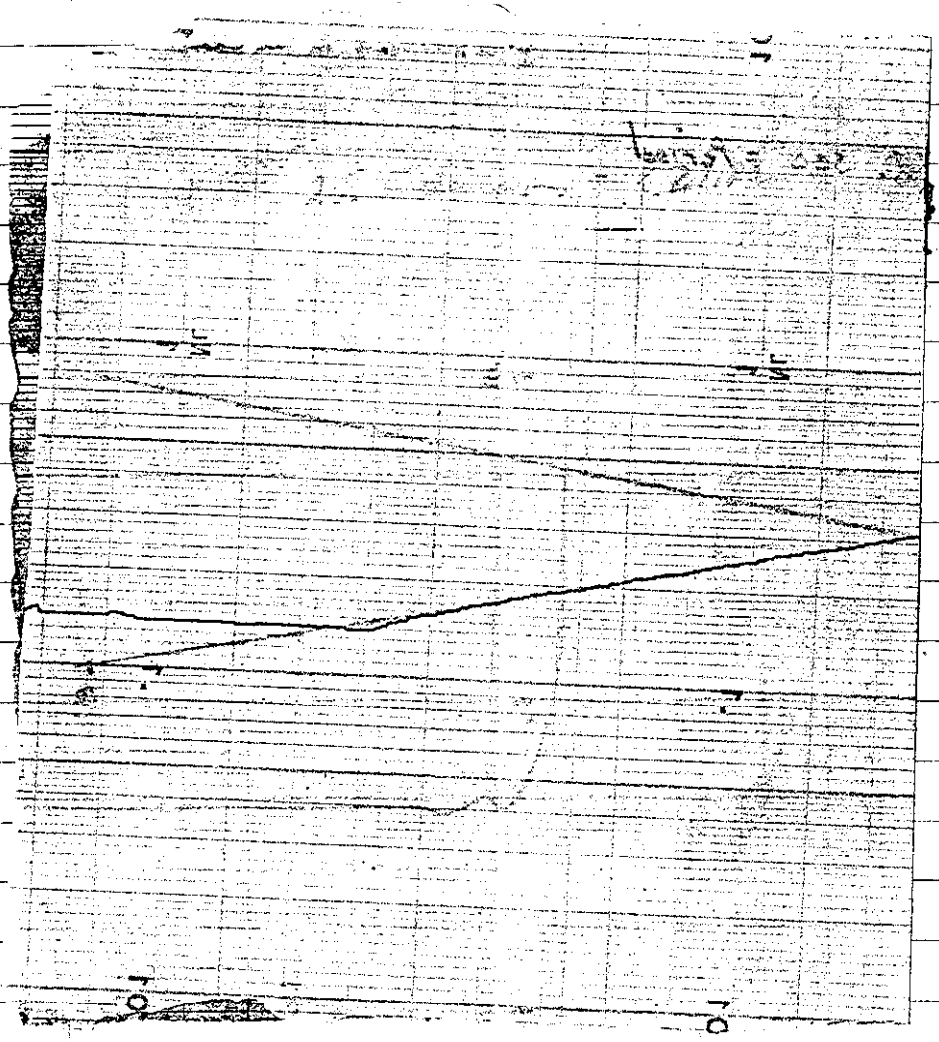
[Note, 1 gm/plate of wt. change ≙ 1 mil/plate of void change over entire plate surface]

Critical
Blade ~~7.32~~ 7.32 Rod 19.00
Water Height 109.0
DC.3 56.8 -20x10 Log N .143
Temp 73.5

External blade raised to 8.93 (critical position of Exp 2-7) and the assemblg placed on a positive period.

The period was meesared as 552. sec.

This is equivalent to 2.2¢ of reactivitg



Expr. 7-9 Time

Purpose

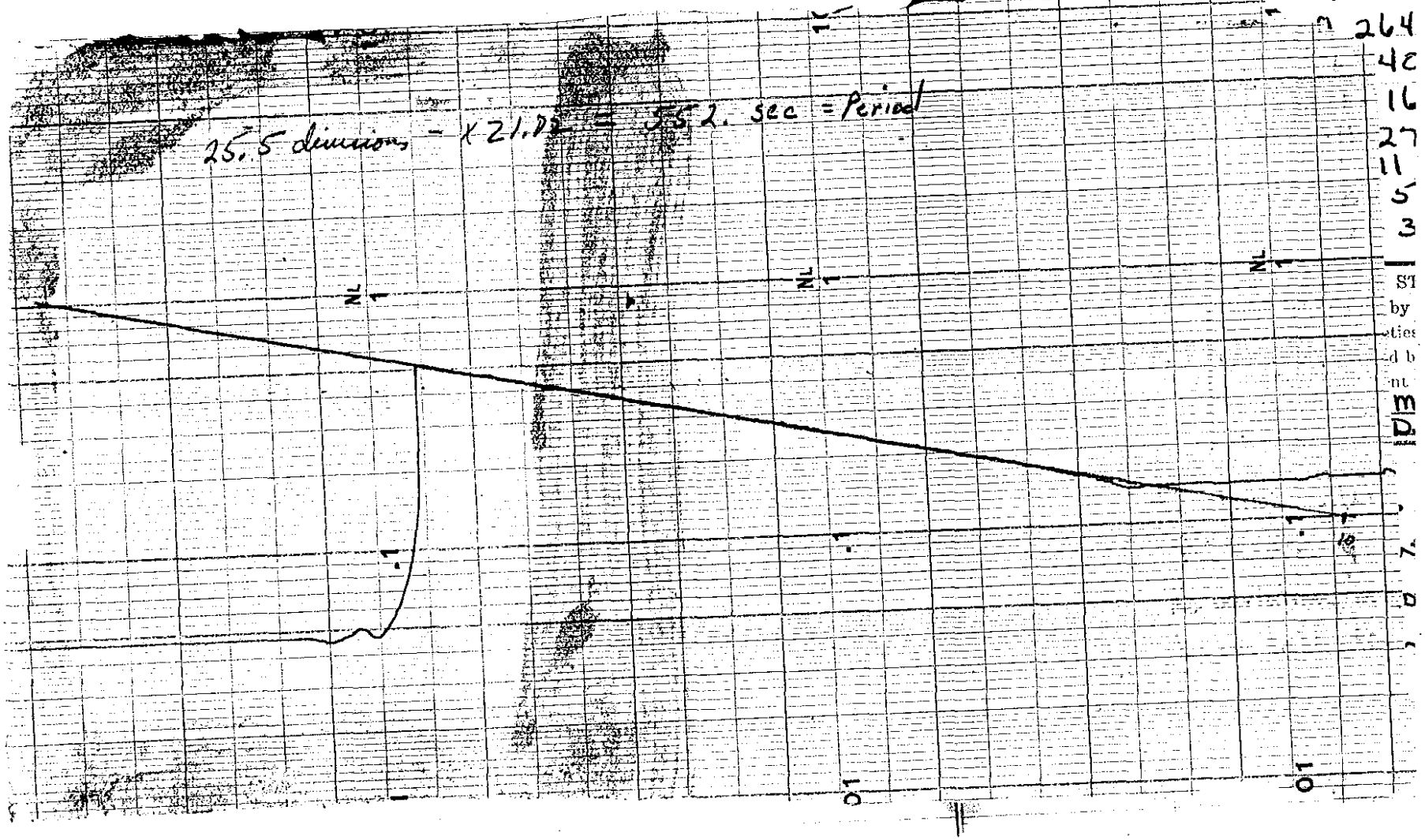
Personnel:

External blade raised to 8.93 (critical position of Exp 7-7) and the assembly placed on a positive period.

The period was measured as 552. sec.

This is equivalent to 2.2¢ of reactivity

Loading same as 7-
fuel 1-15
MAE 259
4-27
4-28
n 264
46
16
27
11
5
3



Expr. 7-9 Time 4:00 AM PM Date 10-20 1955
Purpose
Personnel:

Loading same as 7-3 except for the following exchanges.
Put 1-15 exchanged for 9-1 in slot 16 of corresponding boxes.

MAE 259	9-3
4-27	9-5
4-28	9-14
A 264	9-16
6-40	9-18
1-16	9-28
A 271	9-43 (box 30)
1-11	9-32
3-5	9-42
2-33	9-44

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by V.L.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W Source No. 1
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 4:00 AM PM Date 10-20 1955

The eleven plates inserted were particularly fat samples. The series 9 withdrew were quite good. The variation in control rod position of 7-8 & 7-9 should be an indication of value of the bulging.

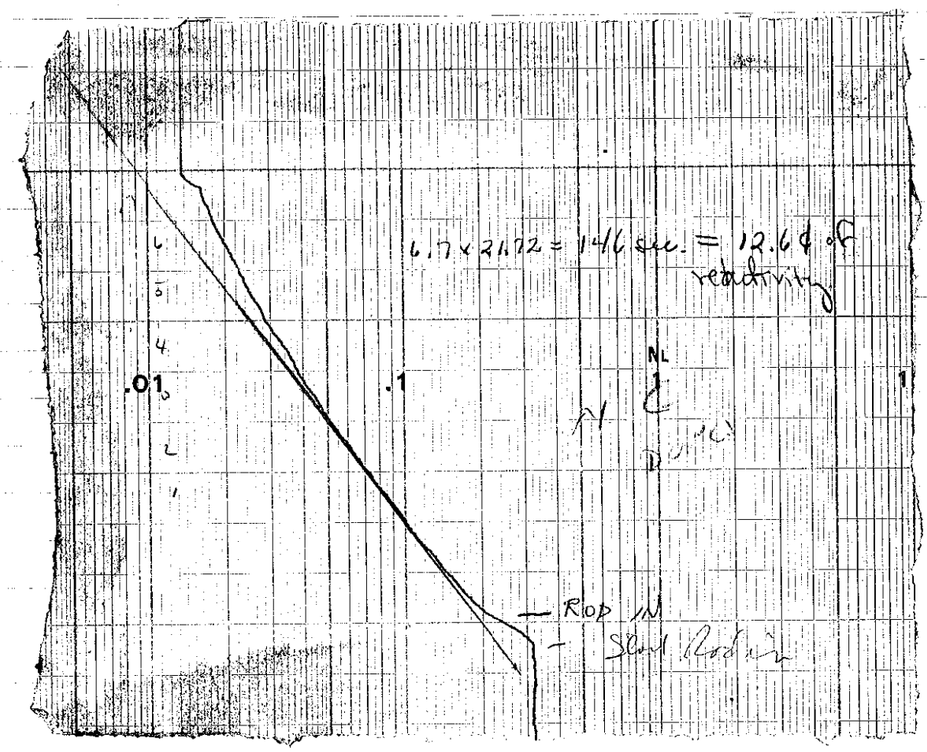
Weights & volumes of exchanged plates.

	Weight in water	exchanged by	Weight in water	Δ void volume.
9-1	183.4	1-15	174.6	8.8
9-3	179.7	MAC259	161.8	17.9
9-5	187.0	4-27	163.85	23.15
9-14	185.6	4-28	166.2	19.4
9-16	187.6	A1-264	158.3	29.3
9-18	187.9	6-40	162.2	25.7
9-28	184.6	1-16	174.2	10.4
9-43	185.4	A-271	162.6	22.8
9-32	182.8	1-11	146.7	36.1
9-42	183.0	3-5	171.5	11.5
9-44	181.7	2-33	171.7	10.0
				215.05

Critical conditions:

Water temp	76.75°F
Water height	109.1
Blade	16.72
Rod	28.99
Log N	0.34
DC-3	51.5 (10x50)

Blade returned to position of run 7-8 : 7.32"
Period measurement made.



Expr. 8-1 Time 9:00 (AM) PM Date 10-21 1965
Purpose Initial Foil Run.
Personnel:

INSTRUMENT LOG CHECK

Date 10-21 1965 Time 9:00 (O)

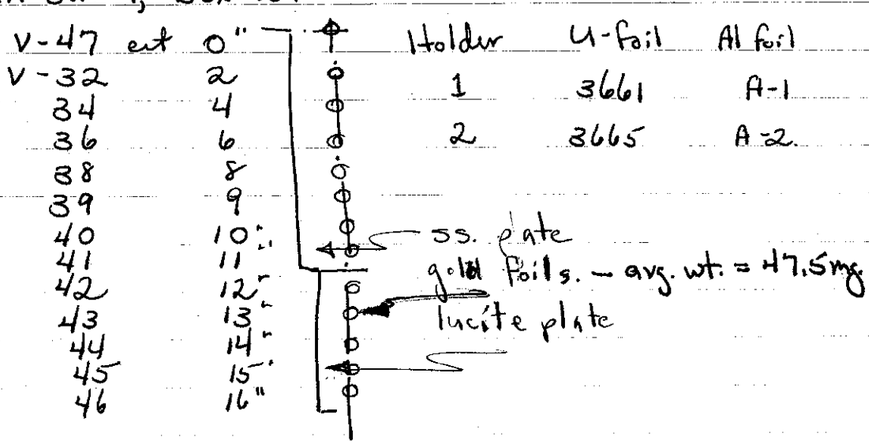
Instrument		Log Scale
DC-1		
DC-2		
DC-3	60 20x10	contact.
Log N ✓	15 sec.	
R-1	4.8 .8<1000	contact
R-2	x100	"
P. M. ✓		

START-UP CHECK LIST

Equipment Checked by R.D. Personnel Check by D.W.
Instrument and Safeties Checked by D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start Up OK'd by D.W. Time 9:30 (PM) Date 10-21 1965

Fuel loading same as 7-9.
~~Log N has been moved~~.
The following foils have been placed in the core.
s.s plate 9-23 has been replaced by another s.s. plate to which has been taped a series of gold foils.
a catcher foil assembly has placed along the outside skirt of the assembly at core centerline along box 26.
another assembly has been placed at the top of the 5-11-12 corner

Timing started at Log N chart position 1.8 at roughly 9:45am.
Running ~~Critical~~ Conditron: (sub-critical)
Temp. 73.5°F DC-3 37.5 (10x50)
Log N 0.35
~~Rods~~ Rods all out, source in.
Detailed foil position:
in slot 9, Box 23:



Safety blade dropped at approx. 20 min of exposure.

Expr. 7-10 Time 10:20 AM PM Date 10-21 1955
Purpose 1. To determine over-night bulging.
2. To determine the effect of the gold foils at 8-1 on criticality
Personnel:

START-UP CHECK LIST
Equipment Checked by J.L. Personnel Check by J.L.
Instrument and Safeties Checked and Reset by R.J.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 10:25 AM PM Date 10-21 1955

Loading - exactly the same as 7-9.
Water Height 109.3
Rods out
Water temp. 74.5°F
Not critical (almost critical.)
Log N 0.11 — source out part way.

∴ The gold foils were not the sole contributors to the loss in reactivity but their value is indeterminate.

Expr. 7-11 Time 11:15 AM PM Date 10-21 1955
Purpose Bulging.
Personnel:

Loading same as 7-9 & 7-10 except for the following 4 plates:

9-1 was inserted in place of	1-15
9-16	A-264
9-32	1-11
9-42	3-5

Weights & volumes of exchanged plates:

1-15 →	150.0 gm.	9-1 →	179.85 ΔV = 29.85
A-264 →	157.0 gm.	9-16 →	187.25 ΔV = 30.25
1-11 →	160.7 gm.	9-32 →	184.65 ΔV = 23.95
3-5 →	178.15	9-42 →	183.35 ΔV = 5.20

Total void volume removed → 89.25 cm³

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 11:30 AM PM Date 10-21 1955

Not critical.
Rods out
Water up
Water temp. 75°F

Expr. 7-12 Time 12:45 AM (PM) Date 10-21 1955
Purpose Bulging.
Personnel:

Loading – back to same as 7-7.

START-UP CHECK LIST
Equipment Checked by R.J. by R.J.
Instrument and [illegible] M.B.
"Source In" [illegible] D.W.
Emergency [illegible] M.B.
Red Light On by D.W.
Start-Up O.K'd by D.W. [illegible] Date 195

From 7-11, the following exchanges were made:

				ΔV
259	(161.5 gm) was replaced by	9-3	(182.0)	20.5
4-27	(168.2)	9-5	(186.2)	18.0
4-28	(171.5)	9-14	(183.8)	12.3
6-40	(161.1)	9-18	(188.1)	27.0
1-16	(175 – bad bubbler)	9-28	(184.8)	9.2
A-271	(162.5)	9-43	(184.9 ~~bubbler~~)	22.4
2-33	(165.5)	9-44	(184.6 bubbler)	19.7
				129.1

Not critical.

Oct. 24, 1955

Estimated arrival dates for fuel plates

Box 1	85	Sept 26
2	99 ~~85~~	"
3	45	"
4	13	Oct 3
5	9	Oct 9
6	93	Oct 4
7	63	Oct 14
8	65	Oct 17
9	8 plates	Oct 19
	483 total	

Group Weights on groups of 45 plates (weighed 10/20/55

~~I~~	1 -	9659.5
~~II~~	2 -	9632.5
~~III~~	3 -	9636.5
	4 -	9668.5
	5 -	8868.5
	6 -	9646.7
	7 -	9629.5
	8 -	9640.5
	9 -	9660.5
	10 -	9681.5

18 extra plates 1626.0 (Special plate Box 9)

23 extra plates 4829.5

481 plates 102,179.7

483

Total of all plates MAC weighings 102,546.3

Less 116 212.8

333.5

Less 435 214.3

102,119.2

Wt (~~MAC~~) DOW 102,179.7

Δ 60.5 g

Expr. 9-1 Time 3:20 AM (PM) Date 10-24 1955

Purpose Zero Run - Control Rod evaluation.

Personnel:

INSTRUMENT CHECK

Date 10-24 1955 Time 8:20 (AM) PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	✓	60	20×10	
Log N	✓	15sec	13 sec.	
R-1	✓	6	1000< 100	
R-2			1-0.93	1/4
P. M.	✓			

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W. D.W

Instrument and Safeties Checked and Rec[illegible]

"Source In" Checked by

Emergency Equipment in Control Room Checked by M.B.

Red Light On by D.W.

Start-Up OK'd by D.W. Time 6:25 (AM) PM Date 10-24 1955

Loading - "zero" loading - same as 7-7

All plates have been weighed in water in series order.

Loading changed: same as 7-7 except in slot 8

Series 3 has replaced series 5 in checkerboard

boxes 1,3,5,6,8,10 ----- 38,40,41,43,45.

critical conditions.

Log N 1,3

DC-3 60 (50×1).

Water height 85.1.

Condition - slightly super

~~rod~~ - 29.00 blade 0.03

Too much reactivity

Expr. 9-2 Time 7:00 AM (PM) Date 10-24 1955
Purpose Zero run - control rod evaluation.
Personnel:

Loading: same as 7-7 except:
series 5 in the following boxes has been exchanged by the corresponding series 3: 111.45kg
1, 3, 5, 14, 16, 18, 28, 30, 32, 41, 43, 45.

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by D.M. D.W.
Instrument and Safeties Checked by
"Source In" Checked by D.W. D.M
Emergency Equipment in Control Room
Red Light On by D.W.
Start-Up OK'd by D.W. Time AM PM Date 195

Critical condition.
Water 89.7 cm. Water temp 75.6
Log N 1.3
DC-3 60 (60×1)

Still too much reactivity.

Expr. 9-3 Time 7:25 AM (PM) Date 10:24 1955
Purpose Zero run - control rod evaluation.
Personnel:

Loading - same as 7-7 except:
series 5 in the following boxes has been exchanged by the corresponding series 3:
~~3, 11, 18,~~ 1, 5, 16, 28, 32, 43.

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by D.M. D.W.
Instrument and Safeties Checked by
"Source In" Checked by D.W. Source No. D.M.
Emergency Equipment in Control Room Checked by
Red Light On by D.M.
Start-Up OK'd by D.W. Time 7:25 AM (PM) Date 10:24 1955

Critical conditions:
Water height 95.4 cm.
Log N. 0.078
DC 3 58 (1×50)
Water temp. 75.5
Rods: rod 29.00; blade: 0.03.

Too much reactivity.

Expr. 9-4 Time 7:45 (A.M.) Date 10-24 1955

Purpose zero run - control rod evaluation

Personnel:

Loading - same as 7-1 except: (+7[illegible]) (p 88)
series 5 in the following boxes has been exchanged
by the corresponding series 3
16, 28, 32.

Equipment Chec[illegible]	R.J.	R.J. D.W.
Instrument[illegible]	DW.	
"Source In[illegible]"		R.J.
Emergency [illegible]		
Red Light On [illegible]	DW	
Start-Up OK'd [illegible]	DW.	7:45 (A.M.) 10-24 1955

Log N 0.220 DC-3 : 59 (10×20)
Water ht 109.2 Temp 76°F.
Rod 29.00 Blade 4.56

A satisfactory zero run.

11,323 g of U
10.54 Kg U-235

7.5×45 + 1.5 = 337.5 + 1.5 = 339 plates
= 10.54 Kg U-235
blade correction −.05
Critical Mass 10.49 Kg U-235

MB

Expr. 9-5 Time 8:25 AM PM Date 10-24-65
Purpose Control rod evaluation.
Personnel:

slot				
	1	fuel	series	1
	2	S.S.	series	2
	3	fuel	series	4
	4	S.S.	series	4
	5	S.S.	series	5
	6	fuel	series	6
	7	S S	series	7
	8	fuel	series	3
	9	S.S.	series	9
	10	fuel	series	7
	11	SS.	series	11
	12	fuel	Series	8
	13	SS.	series	13
	14	fuel	Series	2
	15	SS.	series	15
	16	fuel	series	9
	17	SS.	series	1
	18	fuel.	series	18

APPR rod installed in box position 37. #5 A.d

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by M.B.
Instrument [illegible] Checked by D.W.
"Source In" Checked by D.W. [illegible] by
Emergency Equipment Connected Checked by R.J.
Red Light On by M.B.
Start-Up Cleared by Time 9:30 AM Date 10-24-65

Water up to 73 cm. – obviously going critical.

Expr. 9-6 Time 10:20 AM PM Date 10-24 195 5
Purpose Control Rod Evaluation.
Personnel:

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Checked by D.C.
Instrument and Safeties Checked and Set by R.J.
"Source In" Checked by D.W. Rods Withdrawn by
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 10:20 AM PM Date 10-24 195 5

Loading: same as 9-5 except APPR control rod and box # 23 (as loaded) interchanged.
APPR rod inserted full. (4 is in center position)

Critical conditions.
Dc -3 63 (10x5)
Log N 0.15
Water Height 85.4
Temp. 76.5°

Control Rod and Block in

Expr. 9-7 Time 10:45 AM PM Date 10-24 195 5
Purpose Control Rod Evaluation.

Personnel:

Loading: same as 9-6 except series 7 in the following boxes (in slot 10) is exchanged by series 5:
1, 3, 5, 6, 8, 10, ... 38, 40, 41, 43, 45.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked and Reset by D.M.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by R.J.
Red Light On by R.J.
Start-Up OK'd by D.W. Time 10:50 AM PM Date 10-24 195 5

Critical Conditions:
Water height - 109.3
Water temp. - 76.5
DC-3 - 63.5 (10×10)
Log N - 0.145(
Blade position 8.25 ~~Rod~~ Position 29.00
APPR rod full in. in position #23

U^{235} in entire core = 11.94 kg.
∴ central APPR rod is worth 1.40 kg.

$8 \times 44 = 352$
$24 \times .5 = \frac{12}{384} \times 31.13 = 11.95_4$ kg in core

DWM ✓ MB

$11.95 \times \frac{45}{44} = 12.22$ Kg-u^{235} ✓ MB

Rule correction = − 0.04 ~~12.16~~ 12.18

Expr. 9-8 Time 11:30 AM (PM) Date 10-24 1955
Purpose Control Rod Evaluation
Personnel:

Loading:

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
series	1	2	4	4	5	6	7	3	9	5	11	8	13	2	15	9
	fuel	s.	fuel	s.	s.	fuel	s.	fuel	s.	fuel	s.	fuel	s.	fuel	s.	fuel

17	18.
1	10
s.	fuel
s.	

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 11:35 AM (PM) Date 10-24 1955

Conditions of slightly super.
Water height - 81 cm.
Source out -
APPR rod back in box position 37 + box 23 back in position 23.
Conditions reported with APPR rod full in.

Expr. 9-9 Time 12:10 (AM) PM Date 10-25 195 5
Purpose Control Rod Evaluation.

Personnel:

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Relet by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by D.C.
Red Light On by [illegible] Time [illegible] (AM) PM Date 10-25 195 5
Start-Up OK'd by [illegible]

family #1 { loading: in boxes 2, 4, 7, 9, 11, ... 39, 42, & 44
same as 9-8 (8½ fuel plates per box)

family #2 { : in boxes 1, 3, 5, 6, 8, ... 38, 40, 41, 43, 45

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	2	4	4	5	6	7	3	9	10	8	12	13	2	15	9	1	10
fuel	sub	fuel	sub	sub	fuel	sub	fuel	sub	sub	fuel	sub	sub	fuel	sub	fuel	sub	fuel

(8 fuel plates per box)

APPR rod in box 37, fully inserted.
Slightly positive period.
Water Height 86.3
Log N 0.22

Expr. 9-10 Time 12:30 (AM) PM Date 10-25 1955
Purpose Rod Evaluation.
Personnel:

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Check by D.M.
Instrument and Safeties Checked by D.M.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by DW Time 12:40 (P) PM Date 10-25 1955

Loading: referring to [redacted] 9-9:
family 1 loading in boxes: 7, 9, 11, 21, 23, 25, 35, [redacted], 439 (8½ fuel plates per box)
family 2 loading in all others. (8 fuel plates per box)

APPR rod in box position 37 fully inserted.
Critical conditions —
water height 89.65" am.
Log N 0.2
DC-3 56 (10 x 10)

Expr. 9-11 Time 1:00 (AM) PM Date 10-25 1955
Purpose Rod Evaluation.

Personnel:

Loading: completely loaded to 8 plates per box: according to family 2 of 9-9.
except for the fuel box on the bottom of the APPR control rod which has 8½ plates but which is below the core.

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Check by D.M.
Instrument and Safety ... and Recorder by D.M.
Source In" Checked by D.W.
Emergency Equipment ... Control Room Checked by M.B.
Red Light On by J.L.
Start-Up OK'd by D.W. Time 1:10 (AM) Date 10-25 -5

Mass in core:
U 11.76 kg
U^{235} 10.946

APPR rod in box 37 fully incerted

Critical Conditions.

$10.95 \times \frac{45}{44} = 11.20$ Kg

Blade corr. = −.03

11.17

Log N 0.09
DC 3 47 (10x10)
R-1 2.4 (50x1000)
Temp. 76°F
Water Level 109.1
Blade 9.8 Rod 29.00
APPR rod fully incerted.
∴ From 9-4, eccentric rod worth 0.403 kg U^{235}

Expr. 9-12 Time 1:40 (AM) PM Date 10-25 1955
Purpose Check zero point.
Personnel:

Loading - exactly the same as 9-4.

START-UP CHECK LIST
Equipment Checked by D.M. Personnel Checked by D.M.
Instrument and Safeties Checked and Zeroed by D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by D.M.
Red Light On by J.L.
Start-Up OK'd by D.W. Time 2:10 (AM) PM Date 10-25 1955

APPR rod removed & box # 37 re-inserted.
Critical condition
Water level 109.0°
Water temp. 76°F
Log N 0.10
DC - 3 48 (10x10)
Blade ~~6.70~~ 5.75 Rod 29.00
Some bubbling.

Quite good agreement.

M. Batch

Expr. 8-2 Time 1:00 (AM) PM Date 10-26 1955
Purpose Initial Power Distribution "Zero Run"
Personnel:

INSTRUCTOR'S DESK
Date 8-2 1955 1:00 (AM) PM
Instrument
1
2
3
N ✓ 65 10x20 3"
15
1 4 1000x100
2 x0.9
P.M. ✓ 4"

Equipment Check D.W. I.D.
Instrument and Safeties Checked and Zeroed D.W. I.D.
"Source In" Checked by M.B.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by AM
Start-Up OK'd by D.W. Time 1:10 (AM) PM Date 10-26 1955

Loading - unchanged from 9-12
Water temp. - 74.7°F
Critical conditions:
Water height 109.4 cm
Blade 5.3" Rod 0.00 (in)
Log N 0.37

Expr. 8-3 Time 2:30 AM 10-26 1955
Purpose Power distribution - vertical - center
Personnel:

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Ready M.B.
Red Light On by M.B. AM
Start-Up OK'd by D.W. Time PM Date 195

Fuel loading same as 8-2 except for slot 10, box 23.
Foil Position:

Foil-fuel plate in slot 10 of box 23, between 9 & 10.
(Normalizing)
Standardizing foils - top, flat horizontal, position A-7.
foil holder 1, foil ~~#~~ - # A-5
- on south face, centered E-W,
20 3/4" up from table top. : holder #2, foil # A-4.

Position of Al disks on foil-fuel plate:

Position	Al foil #	
1	B 107	Top
2	B 109	
3	B 97	
4	B 105	
5	B 143	
6	B 114	— Center.
7	B 103	
8	B 101	
9	B 98	
10	B 113	
11	B 186	Bottom

Critical conditions of ~~expos~~ exposure data

2:48:15 — time at 1/e final power.

Waterlight	109.2
Log N	1.0
DC-3	60 (10x100)
Water Temp.	74.8°F.
Blade	6.6
Rod	0.10 in

20 minute exposure:

10-1

Expr. ~~9~~ Time 9:30 (AM) PM Date 10-27 1955

Purpose Zero Run – ~~Control Rod Evaluation~~ End Box-evaluation

Personnel:

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Trip

Instrument	Value	Scale	Source Distance	Pulse Scale
DC-1				
DC-2				
DC-3 ✓	60	10×20	3'	
Log N ✓		15cm.		
R-1 ✓	6	1000×	1000×	
R-2		100×0.9	1000✓	
P. M. ✓				

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W.

Instrument and Safeties Checked and Set by M.B

"Source In" Checked by D.W.

Emergency Equipment & Control Room Clear by

Red Light On by D.W.

Start-Up OK'd by D.W. Time 9:35 (AM) PM Date 10-27 195 5

Loading – exactly the same as 9-12 (+ 9-4)

Critical Conditions:

~~R-1~~ Log N 0.18

DC-3 50 (20×10)

Water Height 108.4

Water Temp. 75.5

Blade 9.25 Rod 0.10

Rod pulled full out. Period measurement made. Reactor Brought back to critical with blade.

Critical Conditions.

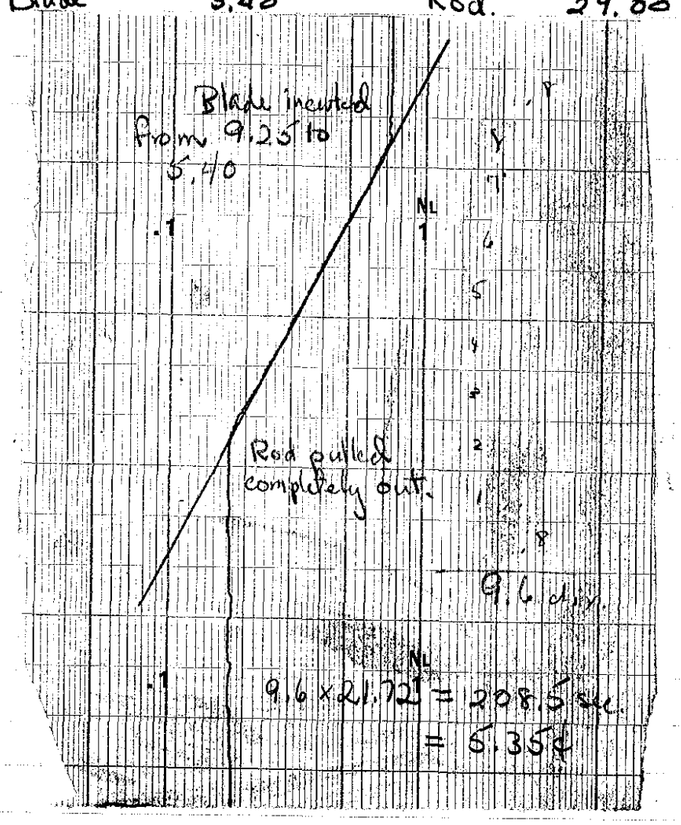
DC-3 45 (100×10)

Log N .75.

R-1 2.5 (500×1000)

Water Height 107.5

Blade 5.40 Rod. 29.00



Expr. 10-2 Time 12:20 (PM) Date 10-25 1955
Purpose End Box evaluation.

Personnel:

START-UP CHECK LIST
Equipment Checked by D.W. Personnel Checked by D.W.
Instrument and Safeties Checked and Set by M.B.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 12:25 (PM) Date 10-25 1955

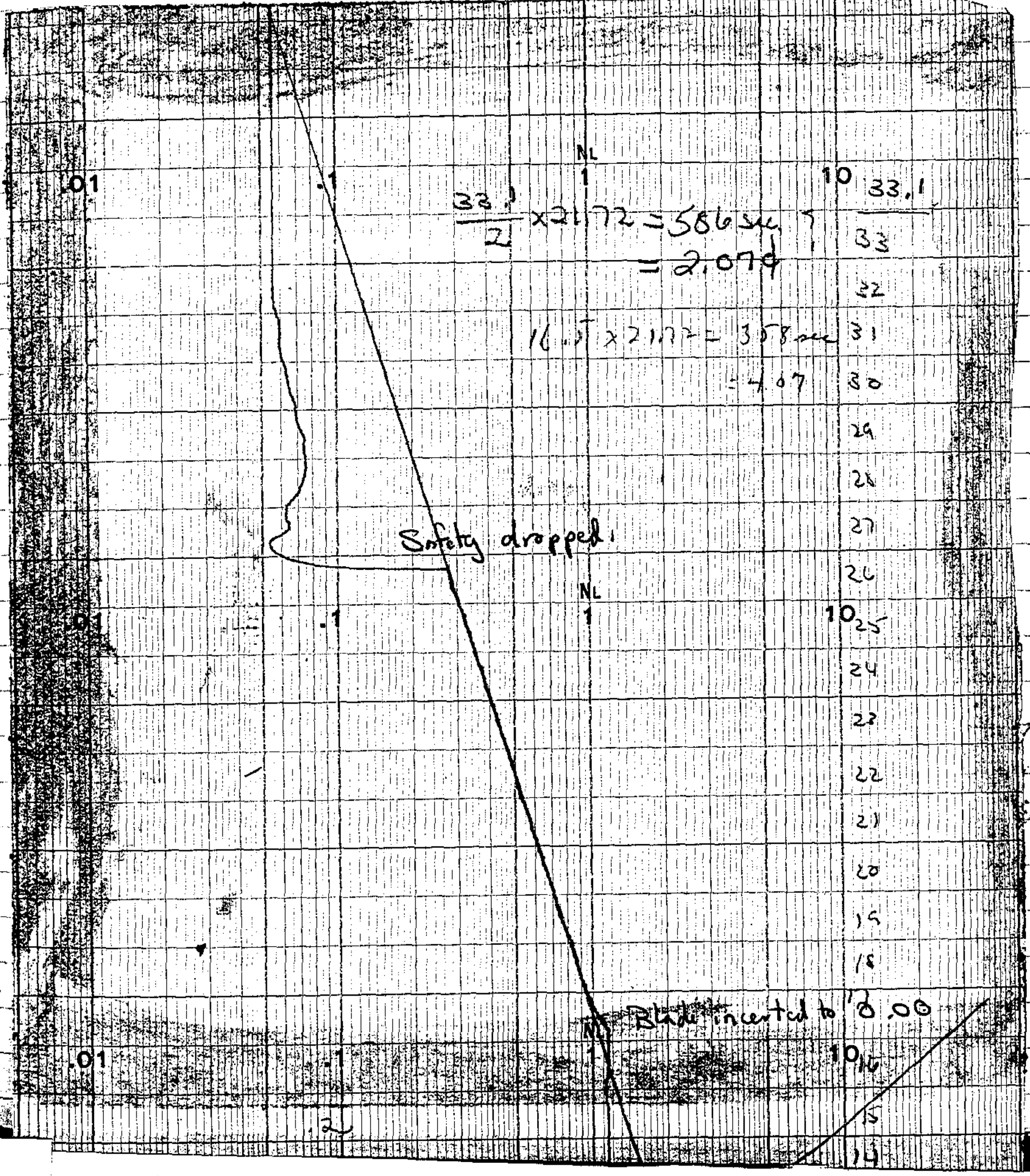
Loading - same as 10-1 (9-4)
End box mock-up, both top + bottom, put on except top of box 22 (because of safety blade)

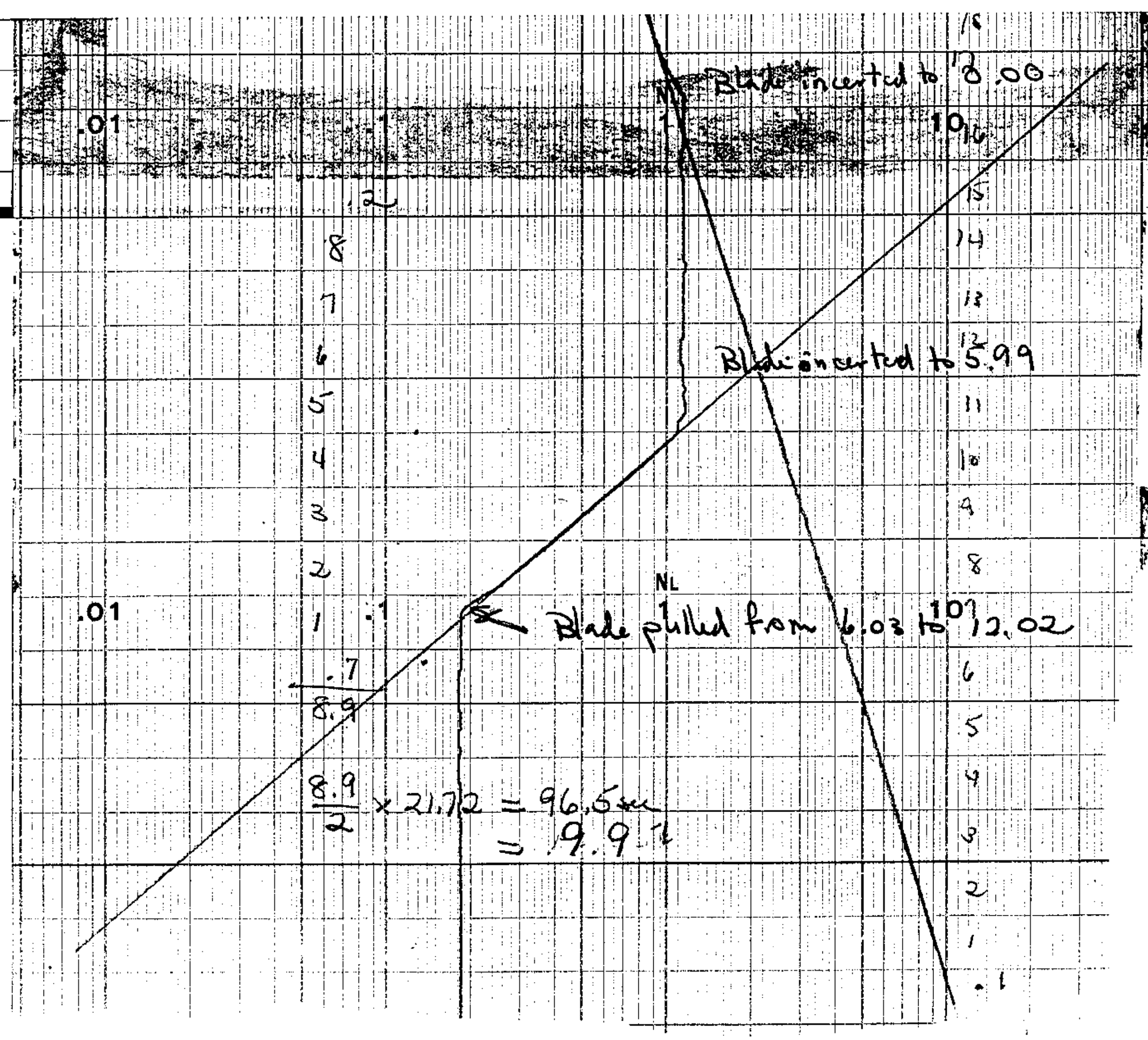
Critical Condition
Blade 6.03
Rod 29.00
Water 108.4
DC-3 49 (20x10)
R-1 2.6 (100x100)

Blade brought up to
12.02 & period measurement made.

Return to critical. 5.99 on blade.
Log N = 1.2

~~Rod~~ Blade put in to 0.000; period measurement made




.01
.1
1
10
NL
Blade incerted to 8.00
Blade incerted to 5.99
Blade pulled from 6.03 to 12.02
.7
8.9
8.9/2 × 21.72 = 96.5 sec
= 9.9

Expr. 10-3 Time 3:20 PM Date 10-28 1955
Purpose Zero Check - end box mock-up.

Personnel:

START-UP CHECK LIST

Equipment Checked by I.P. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by m.B.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by m.B.
Red Light On by m.B.
Start-Up OK'd by D.W. Time 3:20 PM Date 10-28 1955

Loading - exactly the same 10-1 (9-4)

Critical Condition:

Height 109.3 Temp. 76.4

Log N .18

R-1 5.4 (50×1000)

DC-3 47 (10×20)

Blade 10.26 Rod 29.00

Expr. 11-1 Time 8:45 AM Date [illegible] 1955
Purpose Zero Check - Mass Evaluation (Fuel Worth)

Personnel:

INSTRUMENT CHECK

Date 10-28 1955 Time 8:45 AM Source No.

Instrument		Trip Value	Scale	Source Distance	Start-Up Scale
DC-1					
DC-2					
DC-3	✓	65	20×10		
Log N	✓		15 sec.		
R-1	✓	6	1000×100		
R-2			×0.9		
P. M.	✓			4"	

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by m.B.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by -
Red Light On by D.W.
Start-Up OK'd by D.W. Time 8:45 AM Date 10-28 1955

"Zero Loading" - same as 9-4 (see pages 88 & 112)

Critical Positions -

Temp 74.5

Log N 0.18

DC-3 109.3 cm.

Water height 50 (10×20)

R-1 4.9 (500×100)

Rod 29.00 Blade 8.07

9:30

Expr: 11-2 Time ~~P.M.~~ (AM) Date 10-28 195
Purpose Fuel Worth

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by M.B.
"Source-In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 9:30 AM PM Date 10-28 195 5

Loading - same as 11-1 except fuel plate 4-3 in slot 3 of box 3 was removed & replaced with a s.s. plate (6-1)

Critical Conditions

Log N.	0.19
DC-3	53 (10×20)
R-1	5.2 (500×1000)
Temp.	74.5°F
Height	109.5 cm.

Blade 12.05 Rod 29.00

Blade inserted to 8.03 & period measurement.

Blade from 12.05 to 8.03 worth ~~6.0~~ 6.7 ¢

Expr: 11-3 Time 10:00 (AM) PM Date 10-28 195 5
Purpose Fuel Worth.

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by M.B.
"Source-In" Checked by Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.W.
Start-Up OK'd by D.W. Time AM PM Date 10-28 195 5

Loading - same as 11-1 except fuel plate 9-3 in slot 16 of box 3 was removed & replaced with a s.s. plate (16-1)

Critical Conditions

Log N.	4.6
DC-3	53 (10×50)
R-1	3.5 (200×100)
Temp.	74.5°F
Blade	16.18 Rod 29.00
Height.	109.3

Blade inserted to 12.05 & period measurement made.

Blade from 16.18 to 12.05 worth ~~4.8~~ 6.6 ¢

Expr. 11-4 Time 10:55 AM PM Date 10-28 1955
Purpose Fuel Worth

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by P.W
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by M.B.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 10:50 AM PM Date 10-28 1955

Loading - same as 11-1 except. Fuel plate 7-18 in slot 10 of plate 18 removed + replaced by s.s. (6-1)
Didn't go critical.
Re-loaded - same as 11-1 except half plate 5-9 in slot 8 of box 9 removed + replaced by s.s. (6-1)

Source out: blade withdrawn to 24.03".
Positive period measured.
Critical conditions.

Log N	0.95		
DC-3	58 (10×100)		
R-1	3.4 (500×1000)		
Water height	109.2	Temp.	74°F
Blade	15.40	Rod.	29.00

Blade from 24.0 to 15.40 worth 5.93 ϕ

Expr. 11-5 Time 12:40 AM PM Date 10-28 1955
Purpose Fuel Worth

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Check by D.W.
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 12:40 AM PM Date 10-28 1955

Loading - same as 11-1 except:
slot 8 of box 9 contains s.s. 6-1.
slot 8 of box 21 contains fuel H-20 (instead of half plate)
" " " 25 " " 6-32 (" " ")
We thus have added 33.4 gm.
Critical conditions.

Log N	0.15		
DC-3	4.0 (10×20)		
R-1	4.6 (50×1000)		
Height	109.4	Temp.	74°F
Blade	0.41	Rod	29.00

Expr. 11-6 Time 1:45 (AM) PM Date 10-25 1955
Purpose Fuel Worth

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Checked by D.W.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start-Up O[illegible] by D.W. Time 100 Date 10-25 1955

Loading - same as ~~11-5~~ 11-1 except:

~~slot 8 box~~

box 21 contains 4-20 instead of 5-21 in slot 8.
" 25 " 6-32 " " 5-25 " " "
" 16 " 5-21 " " 3-16 " " "

rod at 12.98, source out, positive period measurement.

DC-3	56(10x50)		
Log N	0.1.95		
R-1	3.2 (500x1000)		
Height	109.4 (~~500x1000~~)	Temp	74
Blade	7.72	Rod	29.00

Blade from 12.98 to 7.72 worth 9.0¢

Expr. 11-7 Time 1:30 (AM) PM Date 10-26 1955
Purpose Fuel Worth

Personnel:

START-UP CHECK LIST

Equipment Checked by D.W. Personnel Checked by D.W.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 1:30 (AM) PM Date 10-26 1955

Loading - same as 11-1 except.
box 21 contains 4-20 instead of 5-21 in slot 8.
" 23 " ss 6-1 " " 5-23 " " "
" 25 " 6-32 " " 5-25 " " "

~~Rod~~ Blade at 16.53; source out; positive period taken.
Critical Conditions:

Log N	1.2		
DC-3	56 (10x100)		
R-1	3.2 (500x1000)		
Height	109.4	Temp	76°F
Blade	10.29	Rod	29.00

blade inverted to 0.00 + negative period measured.

Blade 16.53 to 10.29 worth 10.4¢
Blade 10.29 to 0.00 worth ~~9.2¢~~ 10.2¢

Expr. 11-8 Time 9:10 AM (PM) Date 10-28 195 5
Purpose Zero Run.
Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by D.W. M.B.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Serial No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 2:10 AM (PM) Date 10-28 195 5

Loading - same as 11-1 (9-4)

Log N ~~2.16~~ 0.22
DC- 3 43 (10 x 20)

Waterlight 109.4 Temp. 74°F
~~Rode~~ Rod 11.64 Rod. 29.00

Expr. 8-4 Time 2:25 AM (PM) Date 10-28 195 5
Purpose Power Distribution - center line south
Personnel:

START-UP CHECK LIST
Equipment Checked by D.L. Personnel Check by J.L.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by D.W. Serial No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time AM PM Date 195

Loading - same as 9-4.
Foil location:
the middle port in each of the following plates filled with corresponding foils:
Special fuel element put in place of fuel in slot, box and contains foils:

507	" " "	7-23	10, 23	" "	B-94
512	" " "	7-24	10, 24	" "	B-91 L, B-188 R
A 506	" " "	7-25	10, 25	" "	B-104 L, B-102 R
A 505	" " "	7-26	10, 26	" "	B-92 L, B-99 R

Standardizing foils put in same location as 8-3 (page 122)
Assembly #1 contains foil A-6 + is on South skirt.
" #2 " " " A-7 L " " in top corner.

Critical conditions

DC-2 92 (1 x 50)

Log N 1.5

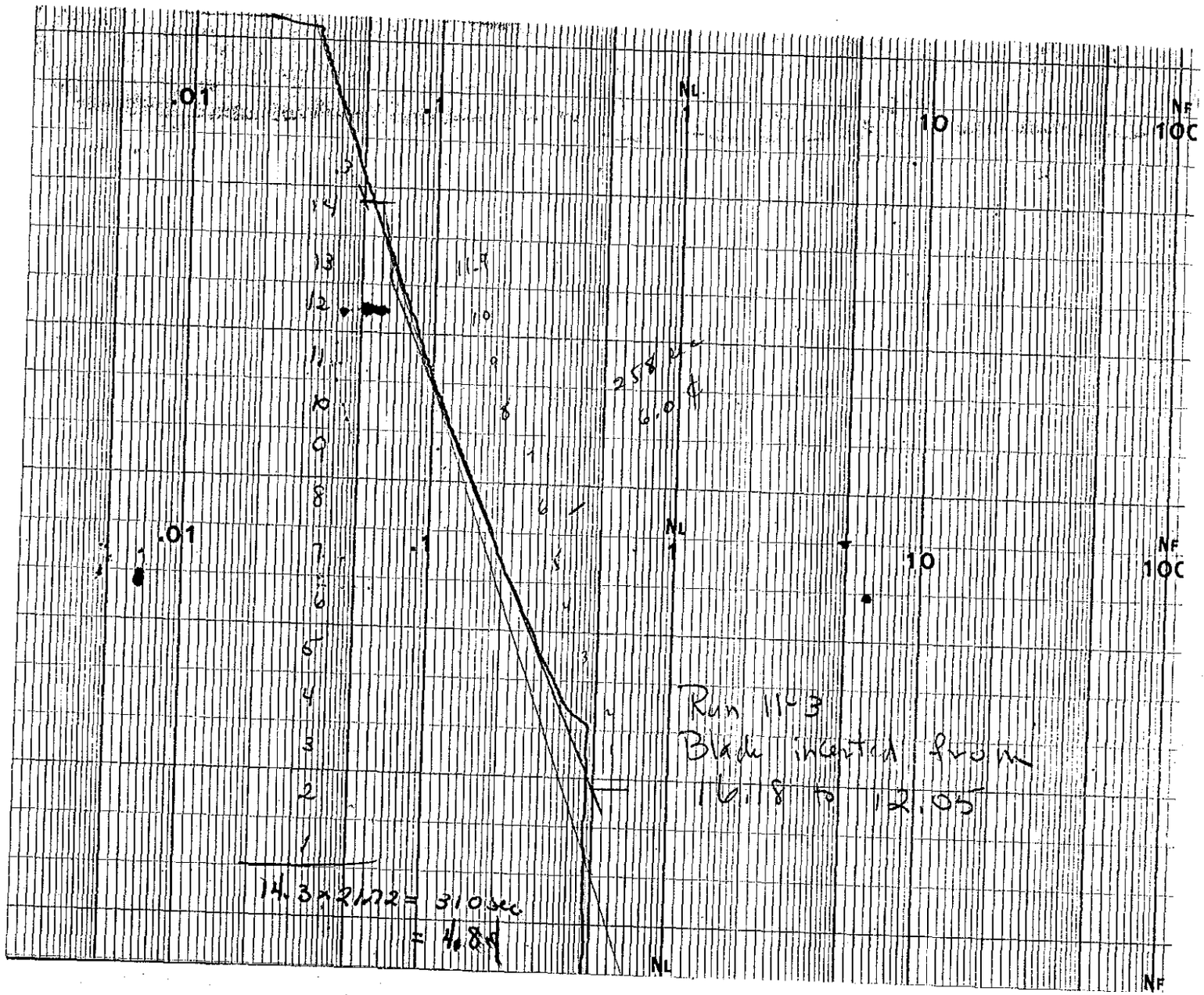
R-1 3.6 (500 x 1000)

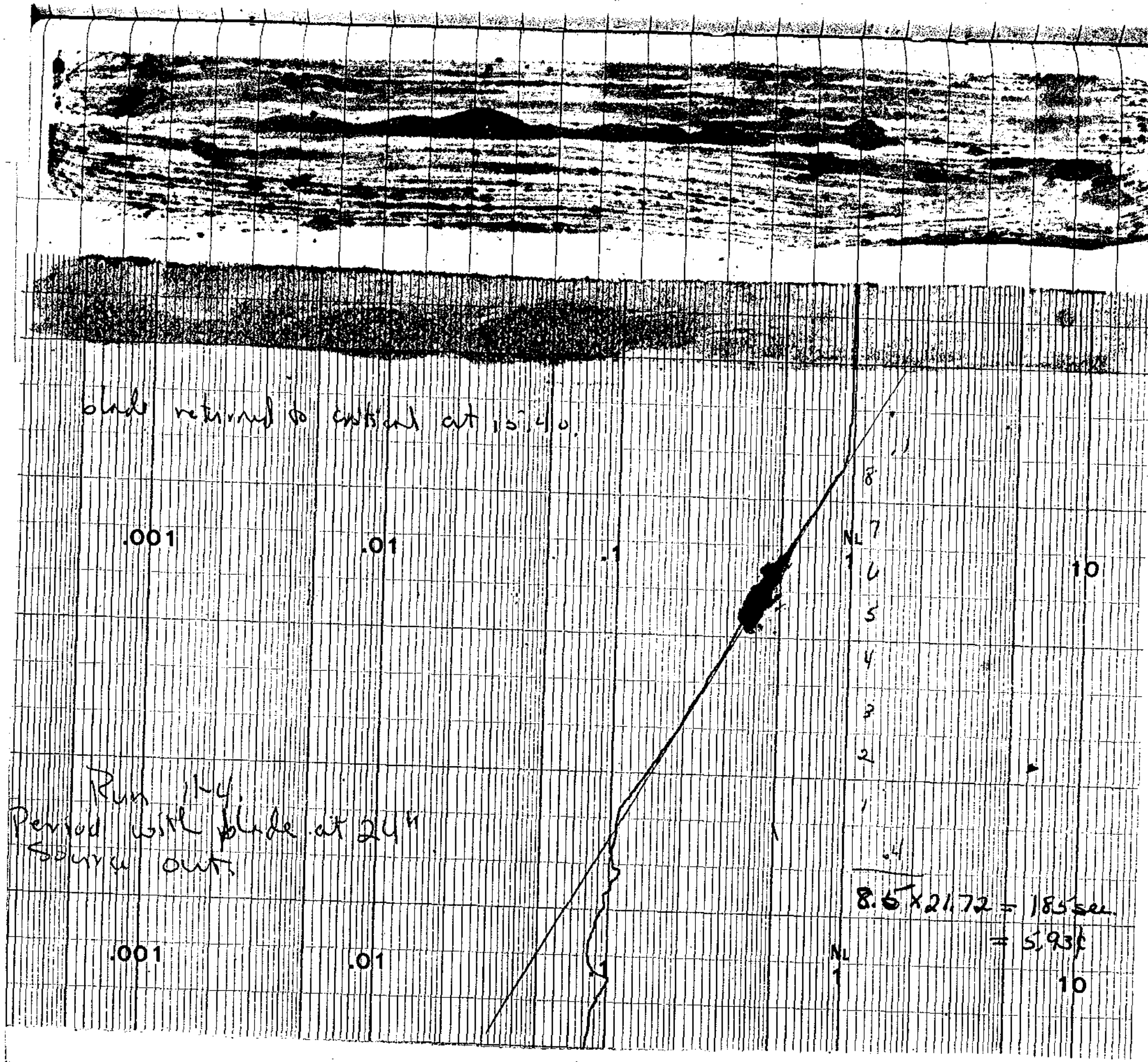
Height 109.4 Temp. 74°F

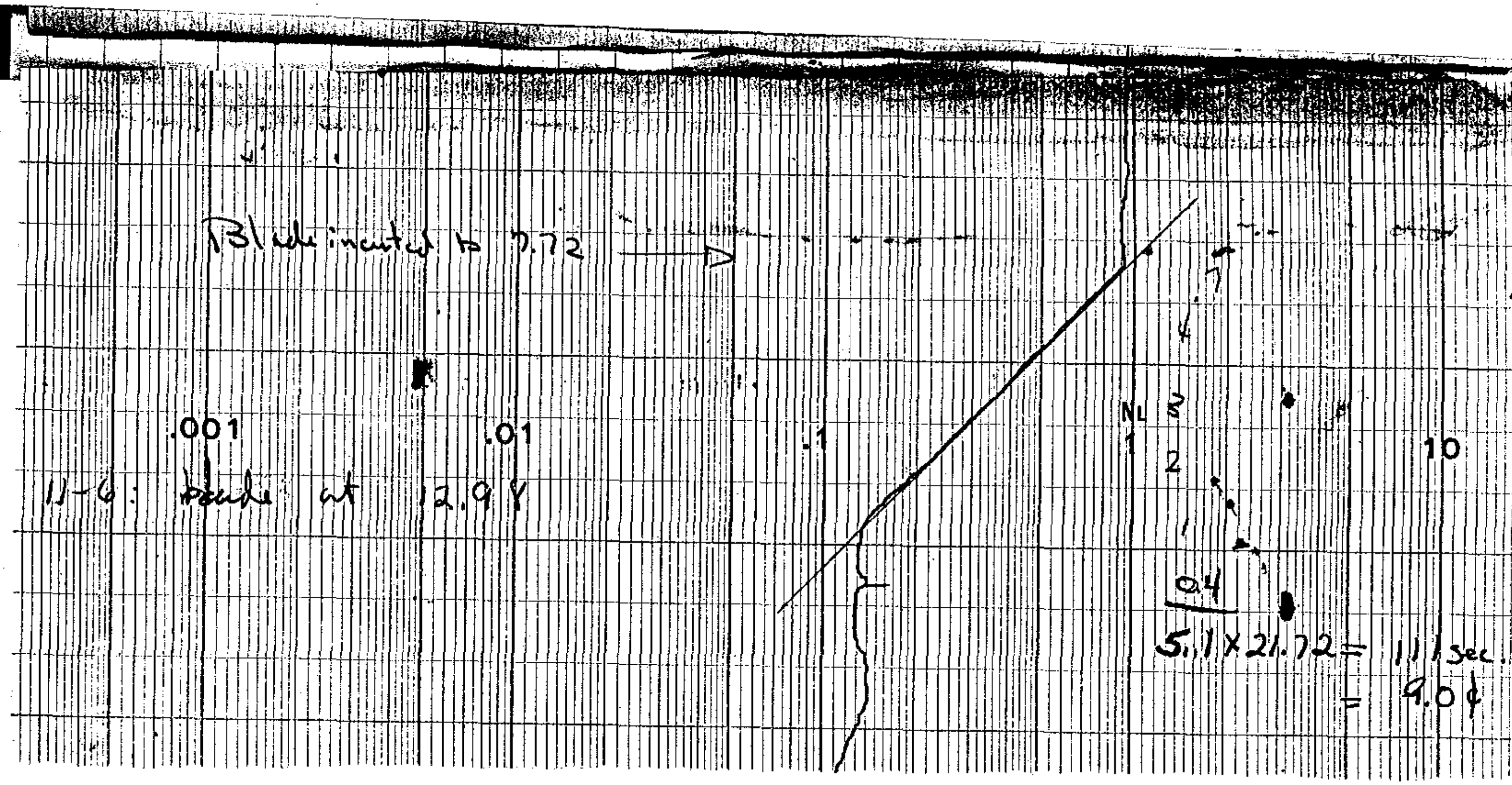
Blade 11.97 Rod 29.00

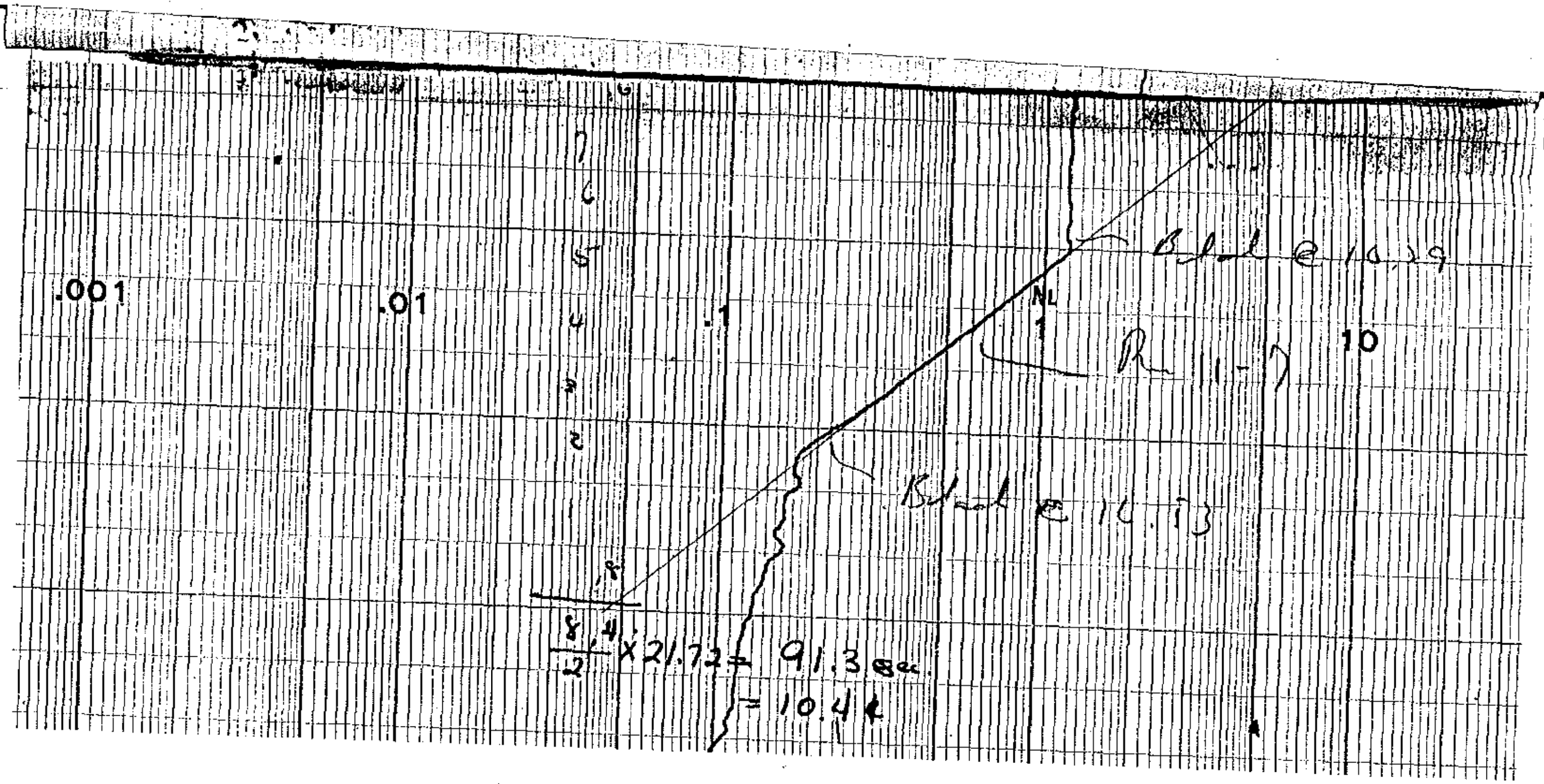
20 minute exposure.

Record of period measurements made during ~~non~~ experiment 11.


.01
.1
1
10
100
NL
NF
Run 11C3
Blade inertia from
16.18 to 12.05
14.3 x 2172 = 31.0 sec
= 1.89


blade returned to critical at 15:40.
Run 14.
Period with blade at 24"
Source out.
8.6 x 21.72 = 185 sec
= 5.93¢
.001
.01
.1
NL
1
10


Blade inserted to 7.72
.001
.01
.1
1
10
NL
11-6: [illegible] at 12.9
.04
5.1 x 21.72 = 111 sec.
= 9.0


.001
.01
.1
1
10
NL

100
10
1
.01
NF
NL

Expr. 9-13 Time 4:40 (PM) Date 11-2 1955
Purpose Rod Evaluation - Zero Run

Personnel:

INSTRUMENT CHECK

Date 11-1 1955 Time 4:40 (PM)

15 20x10 15 sh contact
5 1000x100 2"
x.8
4"

START-UP CHECK LIST
Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by R.J.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 4:50 (PM) Date 11-2 1955

Loading - same as 9-4. - "zero loading".
Critical ~~[illegible]~~ readings
Water temp. 78°F
Water height 109.2
Blade 4.22 Rod 29.0
DC-3 61 (10x20)
R-1 3.4 (100x1000)
Log N 0.21

from 9-4: Critical mass = 10.54 kg U235
blade correction = - .05
10.49

Expr. 9-14 Time 5:45 AM (PM) Date 11-1 195 5
Purpose Rod Evaluation.

Personnel:

START-UP CHECK LIST

Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Safeties Checked and Reset by R.J.
"Source In" Checked by D.W. No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up OK'd by D.W. Time 1105 AM (PM) Date 11-1 195 5

Loading - a complete loading of 9 1/2 in all boxes except #23 & #37 which contain APPR rods #5 & #1 respectively without the fuel on the bottoms Rods all the way in.

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Series	1	2	4	5	5	6	7	3	9	7	4	8	13	2	15	9	1	10
Material	f	s	f	f	s	f	s	f	s	f	s	f	s	f	s	f	s	f
	a	s	u	u	s	u	s	u	s	u	s	u	s	u		u	s	u
	l		l	l		l		l		l		l		l		l		l

Water height

89.3 slightly super.
89.2 " " } didn't wait for delays from ea water increase & over shoot.
89.0 "
88.8 Sub
89.0 Sub.
89.2 slightly super.

Log N 0.16

Expr. 9-15 Time 8:45 AM PM Date 11-1 1955
Purpose Control Rod Evaluation.
boxes 31 & 23

Personnel:

START-UP CHECK LIST

Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Controls Checked and Set by M.B.
"Source In" Checked by M.B. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B.
Start-Up O.K.'d by D.W. Time 8:45 AM PM Date 11-1 1955

Loading - same as 9.14 except box 31 was put in position 37 & the APPR control rod which was in position 37 put into position 31.

Mass = 12.7 kg U^{235}

Critical conditions -

Log N	0.12		
R-1	3.5 (50 x 100)		
DC-3	5.8 (10 x 10)		
Height	109.3	Temp.	76.5°F
Blade	8.6	Rod	29.01

9½ x 43 = 408.5 plates

408.5 x 31.1 = 12,70 kg U-235

$12.70 \times \frac{45}{43} = 13.29$ kg

blade correction = - .04

13.25 kg.

~~$\frac{13.25 \times 45}{43}$ = 13.87~~

Expr. 9-16 Time 9:15 AM (PM) Date 11-1 1955
Purpose Control Rod Evaluation

Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by R.J.
Instrument and Safeguards Checked and Tested by D.W.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by D.W.
Red Light On by DC
Start-Up OK'd by D.W. Time 9:30 AM (PM) Date 11-1 1955

Loading — same as 9-14 except series five fuel in slot #4 exchanged for the corresponding # series s.s. in the following boxes: 1, 3, 5, 6, 8, ... 38, 40, 41, 43, 45.
Mass = [redacted] kg U^{235}

Sub-critical —
Log N. 0.14
Rods out; source in.; water up.

Expr. 9-17 Time 10:10 AM (PM) Date 11-1 1955
Purpose Control Rod Evaluation
~~23~~ 37
Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Personnel Check by D.C.
Instrument and Safeties Checked and Reset by D.W.
"Source In" Checked by R.J. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.C.
Start-Up OK'd by D.W. Time 10:10 AM (PM) Date 11-1 1955

Loading - same as 9-14 except series 5 fuel in slot #1 of the following boxes has been exchange by the corresponding s.s. series 4: 1, 3, 5, 14, 16, 18, ~~20, 22, 24, 26,~~ 28, 30, 32, 41, 43, 45

12.51
~~12~~ kg U^{235}

Critical conditions.

DC-3 83 (10x10)

Log N. 0.12

Height 109.3 Temp. 76° F

Rod 29.00 Blade 2.55

$9\frac{1}{2} \times 43 - 6 = 408.5 - 6 = 402.5$ plates

$= 12.52$ kg U^{235}

Blade correction $-.05$

12.47

$12.47 \times \frac{45}{43} = 13.05$

Expr. 9-15 Time 11:10 A.M. Date 11-1 1955
Purpose Control Rod Evaluation.

Personnel:

START-UP CHECK LIST

Equipment Checked by D.U.PW Personnel Check by M.B.
Instrument and Safeties Checked and Reset by DUPW
"Source In" Checked by DUPW
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DUPW Time 11:10 A.M. Date 11-1 1955

Loading — a complete loading at 9: same as 9-14 except all slot 4 containing [ss 4] instead of [Fuel 5]. APPR rods in positions 37 & 25; fully inserted with natural Box 25 in position 23.

All water light at 83 — super-critical.

Expr. 9-19 Time 11:40 (A) (P) Date 11-1 1955
Purpose Control Rod Evaluation.

Personnel:

START-UP CHECK LIST

Equipment Checked by DW Personnel Check by DW
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by DW Source No.
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DW Time 11:40 (A) (M) Date 11-1 1955

Loading- complete loading of 8 1/2 with APPR rods in position. 25 & 37 & box 25 in position 23.

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1	2	4	4	5	6	7	5	9	7	11	8	13	2	15	9	1	10
	f	SS	f	SS	SS	f	SS	f	SS	f	SS	f	SS	f	SS	f	SS	f
	#9		#1			#9		#1		#1		#1		#1		#9		#1

Not critical
Log N. 0.06
Blade & rod out.
Water up

Expr: 9-20 Time 12:05 (AM) Date 11-2 195

Purpose Control Rod Evaluation

boxes 25 + 37

Personnel:

START-UP CHECK LIST

Equipment Checked by DW Personnel Check by DW

Instrument and Safeties Checked and Reset by DW

~~"Source In" Checked by~~ DW Source No.

Emergency Equipment in Control Room Checked by MB

~~Red Light On by~~ RJ

Start-Up OK'd by DW Time 12:05 (AM) PM Date 11-2 1953

Loading - same as 9-19 except series 3 fuel was exchanged for series 5 (slot 8) in the following boxes: 6, 8, 10, 12, 20, 22, 24, 26, 34, 36, 38 + 40.

DC-3 70 (10×10)

Log N 0.17 R1 4.8 (50×1000)

Temp 75° Height 109.5

Rod 29.0 Blade 12.35

The blade position indicated that the critical mass (what mass?) should be corrected by 16.7 gms. to get back to a blade position corresponding to the zero run. (9-13)

8.5 × 43 = 365.5 plates

365.5 + 6 = 371.5 plates = 11.55 Kg.

16.7/4 = 4 gm/in blade? - yes.

$11.55 \times \frac{45}{43} = 12.09$ Kg

(11.55 Kg) blade correction = −.02

12.07

148

Expr. 9-21 Time 1:10 (AM) PM Date 1-12 1955
Purpose Zero Chuda - control rod evaluation
Personnel:

START-UP CHECK LIST
Equipment Checked by DW Personnel Check by RJ
Instrument and Safeties Checked and Recorded MB
"Source In" Checked by MB
Emergency Equipment in Control Room Checked by MB
Red Light On by MB (AM)
Start-Up OK'd by DW Time 0100 PM Date 11-2 1955

Loading - zero loading - same as 9-4

Critical:

Water height	109.4	Log N	.17
Control Blade	6.17"	OC-3	46 #10x20
Control Rod	29.00 (Out)	R-1	56 #50 #1000

T = 76° F

This zero run compares with run 9-13, 11-2, when the blade was at 4.22, and all other controlled variables were the same.

Expr. 9-22 Time 2:00 (PM) Date ~~11-1~~ 11-2 1955
Purpose Zero check with ~~same~~ different plates.
Personnel:

START-UP CHECK LIST
Equipment Checked by M.B. Clerk by M.B. M.B.
Instrument and S... R.J.
"Source In" Che... ...by R.J.
Emergency Equ...
Red Light On by RJ.
Start-Up OK'd by RJ. Time 2:00 (PM) Date 11-2 1955

Loading - same as 9-21 except: series 4 in slot 3 exchanged by series 3 except in ~~slot~~ boxes 16, 28, & 32 in which 1-9, 1-19, MAC 378 were placed respectively.

The series 3 inserts were in general good - the stack of 42 was 1 3/4" high (approx. 1 13/16" for 45 plates)
The series 4 removes were in general poor - the stack of 45 was 2 3/8" high.

Critical Conditions:

LogN	0.21		
DC-3	64 (10×20)		
Height.	169.3	Temp.	76°F
Blade	5.5	Rod	0.01 (in)

M. Patel

Expr. 8-5. Time 7:45 AM Date 11-2 1955
Purpose Centerline - ~~East~~ West flux distribution.
Bay Bird
Personnel:

INSTRUMENT CHECK

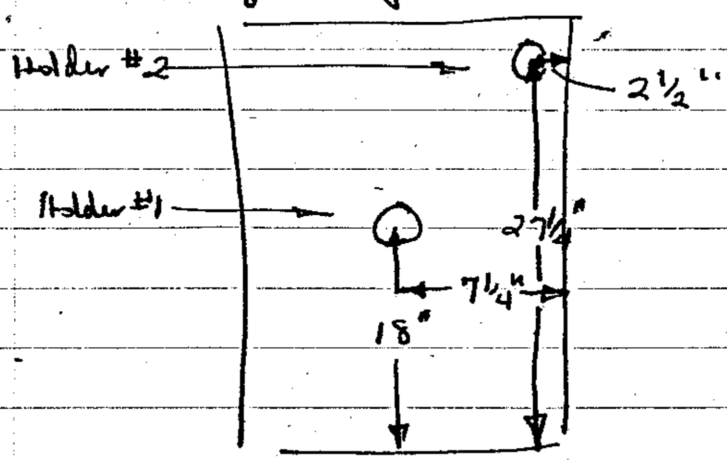
Date 11-2 1955 Time 7:45 AM Source No.

Instrument	Trip Value	Scale	Source Distance	Standby Scale
DC-1				
DC-2				
DC-3	✓	45	20×10	contact
Leg N	✓		15 sec	
R-1	✓	35	.8×1000	
R-2			×100	
P. M.	✓			4'

Loading*:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 fuel	2 ss	3 fuel	4 ss	5 ss	6 fuel	7 ss	5 fuel	9 ss	7 fuel	11 ss	12 ss	8 fuel	14 ss	15 ss	9 fuel	1 ss	10 fuel

Standardizing foil position



* Loading - for all boxes except 21 + 25 which contain 1-9 + 1-19 in slot 8 (instead of series 5 fuel) respectively.)

Center → East flux distribution: (foils on east thermal plates)

Location of foils:

Standardizing foils - holder #1 - A-9.
holder #2 - A-10.

Gold foils on plates	foil #	reading	r - inches
7-23	D35	-.2 from	.079
8-23	D34	2.6	
8-16	D49	6.3	1.024
3-16	D39	10.0	2.48 3.194
8-9	D43	13.7	5.09
6-9	D36	16.4	6.46
10-3	D45	19.3	7.60
7-3	D50	22.4	8.82
1-3	D33	25.9	10.19
reflector		26.5	
1"	D48	29.04	
2"	D38	31.58	
3	D44	34.12	
4	D37	36.66	
6	D47	41.74	
8	D41	46.42	
10	D31	51.9	

START-UP CHECK LIST

Equipment Checked by R.J. Personnel Check by R.J.
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by R.J.
Start-Up OK'd by D.W. Time 7:45 (PM) AM Date 11-2 1955

Scalers started at water height = 60 cm.

Watch started at 0.74 on log N.

Critical at 8:00 PM.: Log N 2.0 DC-2 4/8 (10×20)

R-1 4 (1000×1000); Height 109.2 cm. Temp 75.5°F.

Blade 10.1 Rod 29.00

20 minute exposure.

C-3 - 717 × 64 : C-2 1095 × 64

Expr. 8-6 Time 9:45 (AM) PM Date 11-3 1955

Purpose Centerline - East flux distribution.
Cd-covered gold

Personnel:

START-UP CHECK LIST

Equipment Checked by M.B. Personnel Check by M.B.
Instrument and Safeties Checked and Reset D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by M.B. AM
Start-Up OK'd by D.W. Time PM Date 195

Loading - exactly the same as 8-5.
Foil location - all foils Cd covered; on centerline of reactor; foils on east face of plates

Plate	Foil #		Standardizing foils:
7-23	E-47	-.2	0.4 in #1
3-23	E-40	2.6	0.16 in #2
8-16	E-44	6.3	
3-16	E-32	10.0	
8-9	E-48	13.7	
6 3-9	E-39	16.4	
10-7	E-37	19.3	
7-3	E-35	22.4	
1-3	E-51	25.9	
Reflector	Foil #	26.5	
Position			
1"	E-38	29.0	
2"	E-42	31.6	
3	E-43	34.1	
4	E-41	36.7	
6	E-34	41.7	
8	E-53	46.8	
10	E-52	51.9	

He power: 9:56:20 pm.

Running conditions:

Temp. 76.5

LogN 2.0

DC-2 46 (16×30)

R-1 41 (1000×1000)

Height 109.4

Rod 29.00 Blade 13.87

C-2: 1090×64 C-3: 726×64

Expr. 8-7 Time 5:25 AM (PM) Date 11-3 1955
Purpose Centerline - Vertical flux - bare gold foils.
Personnel:

INSTRUMENT CHECK

Date 11-3 1955 Time 5:25 AM (PM) Source No.

Instrument	Trip Value	Scale	
DC-1			
DC-2			
DC-5	✓	70	20x10 contact
Log-N	✓		15 sec.
R-1	✓	6	1000x100 x0.8
R-2			
P. M.	✓		2"

START-UP CHECK LIST

Equipment Checked by MB. Personnel Check by RL
Instrument and Safeties Checked and Reset by M.B.
"Source In" Checked by D.W. Source No.
Emergency Equipment in Control Room Checked by M.B.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 6:10 AM (PM) Date 11-3 1955

Loading - Same as 8-5 fuel P

Foil positions: on east side of plate 7-23 in slot 20, box 23.

distance from center	correction HGB	DWM foil
0 inches	F-39	~~F-39~~
1.5	F-59	~~F-59~~
3.0	F 56	~~✓F-56~~
4.5	F 51	~~✓F-37~~
6.0	F 37	~~✓F-36~~
7.5	F-36	~~✓F-44~~
9.0	F 44	~~✓F-33~~
10.0	F 33	~~✓F-47~~
10.875	(11.175) 47 50	~~✓F-50~~
Reflector 11.850		✓F-53
taped on lucite 12.5		✓F-42
13.5		F-40
15.0		F-43
16.5		✓F-38
18.5		✓F-61

DWM

F-40 and F-43: {51, 40} Dropped off and not counted!

Standardizing foils:
holder #1 - 27
holder #2 - 28

½ power out ——— 6:33:00
counters started at water height ~ 60 cm.

Run conditions:

Hight	109.0		
Blank	10.15	Rod	29.00
2-1	4.1 (1000 x 1000)		
Log N	2.0		
PC-2	48 (10 x 20)		
temp.	74°		

Expr. 8-8 Time 8:40 AM Date 11-3 1955
Purpose Centerline - vertical flux - Cd covered gold
Personnel:

START-UP CHECK LIST

Equipment Checked by H.G. D.W.
Instrument and Selector Checked by D.W.
"Source In" Checked by D.W.
Emergency Equipment in Control Room M.B.
Red Light On by D.W.
Start-Up OK'd by D.W. Time 8:40 AM Date 11-3 1955

Loading - same as 8-5.
Foil data - all Cd covered gold.

Location:	Foil
0 inches	F-31
1.5	F-32
3	F-34
4.5	F-41
6	F-45
7.5	F-46
9.0	F-48
10.0	F-49
10.875	F-52
~~11.350~~ (~~illegible~~)	F-54
11.850	F-55
12.5	F-57
13.5	F-58
15.0	F-60
16.5	F-62
18.5	F-63

standardizing foils:
Holder #1 A-14
Holder #2 A-15.

½ power: 9:03:15
Run Conditions
Blade 14.0 Rod 29.00
Log N = 2.0+ DC-2 4.8 (10×20)
R-1 = 4.2 (1000×1000)
Height = 109.3
20 minute exposure.

Expr. 12-1 Time 11:26 ~~AM~~ PM Date 11-3 1955
Purpose Importance of homogenity within boxes — zero run.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Checked by MB
Instrument and Safeties Checked and Set by DW
"Source In" Checked by DW
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DW Time 11:25 ~~AM~~ PM Date 11-2 1955

Loading — a "7½ plate loading": just like 8-5; with the following changes in slots 8:

box	contains	instead of
2	fuel 2-1	fuel 5-2
4	ss 8-4	5-4
13	~~fuel~~ ss 8-13	5-13
19	fuel 2-2	5-19
27	fuel 2-3	5-27
33	ss 8-33	5-33
42	~~fuel 2-4~~ ss 8-42	5-42
44	fuel 2-4	5-44

Mass — same as 8-5
Critical Conditions.

Log N	0.13		
Dc-3	74 (10×10)		
Temp.	74.1		
Black	12.77	Rod	29.01
Hazl	109.2.		

Lost current to blade magnet — shut down for evening. (turned out the pin 12 of the Jones plug was open)

Expr. 12-2 Time 5:30 ~~AM~~ PM Date 11-4 1955
Purpose Importance of homogenity within boxes.
Personnel:

START-UP CHECK LIST
Equipment Checked by DW Personnel Checked by D.W.
Instrument and Safeties Checked and Set by DW.
"Source In" Checked by DW
Emergency Equipment in Control Room Checked by DW.
Red Light On by DW.
Start-Up OK'd by D.W. Time 5:20 ~~AM~~ PM Date 11-3 1955

INSTRUMENT CHECK
Date 11-3 1955 Time 5:30 ~~AM~~ PM Source No.

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	✓	70	20×10	1"
Log N	✓		15 sec	
R-1	✓	[illegible]	1000 ×100	1"
R-2				
F. M.	✓			4"

Loading: exactly the same as 12-1 except for Box 23. In this box, instead of having 7 full plates, 1 half plate, + 8 ss plates as in 12-1, we now have 15 half plates + one ss plate.
exact order:

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
#	5	H	H	4	H	H	H	5	9	5	5	5	5	~~14~~ 5	5	5	5	5
material	26 8 f	9 6 0 f	9 6 1 f	23 ss	9 5 9 f	9 5 8 f	9 3 0 f	2 3 f	2 3 ss	2 3 f	2 1 f	4 f	19 f	2 3 ss	33 f	13 f	42 f	44 f

∴ We have changed the loading only by one homogenious box — total mass has not changed.

New safety has been installed (thinner clevis)
Didn't go critical.

Log N with source in -0.046 — still on positive period.
Withdrew source - killed the reactor.

Expr. 12-3 Time 6:20 AM PM Date 11-4 195-
Purpose Homogenity importance.

Personnel:

START UP CHECK LIST
Equipment Checked by MB
Instrument and Safeties Checked MB DW
"Source In" Checked DW
Emergency Equipment Checked by MB
Red Light On by MB
Start-Up OK'd by DW Time 6:20 AM PM Date 11-3 195 5

Loading - same as 12-2 except fuel plates 2-7, 11, 35+39 have been inserted in slot 12 of the corresponding boxes in place of the S.S.
Not critical.
Log N with source in 0.1
Water temp 75°F

Expr. 12-4 Time 6:45 AM (PM) Date 11-4 1955
Purpose Homogenity importance

Personnel:

START-UP CHECK LIST

Equipment Checked by DW RJ RJ-
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by mB
Emergency Equipment in Control Room Checked by
Red Light On by mB DW
Start-Up OK'd by 6:45 AM (PM) Date 11-3 1955

Loading - same as 12-2 with the following exchanges for slot 12. :
2-7, 11, 21, 25, 35 & 39 exchanged for the corresponding ss series 12.

critical conditions:
LogN 0.19
DC-3 50 (10×20)
Temp 74.5°F Height 109.3 cm.
Rod 29.01 in Blade 12.17 in

Expr. 12-5 Time 7:15 AM (PM) Date 11-3 1955
Purpose Homogenity importance

Personnel:

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by JL DW
Instrument and Safeties Checked and Reset by
"Source In" Checked by DW Source No.
Emergency Equipment in Control Room Checked by mB
Red Light On by mB
Start-Up OK'd by DW Time 7:15 AM (PM) Date 11-3 1955

Loading — Same as 12-1 with the changes mentioned in 12-4: Fuel 2-7, 11, 21, 25, 35 & 39 exchanged for the corresponding ss series 12.

Critical Cond.
height 89.8 cm.
temp 75°F
logN 0.16
Blade + Rod in

Expr. 12-6 Time 7:40 AM (PM) Date 11-4 1965
Purpose Homogenity Importance.
Personnel:

START-UP CHECK LIST
Equipment Checked by RJ Personnel Check by DW
Instrument and Safeties Checked and Reset by DW
"Source-In" Checked by MB
Emergency Equipment in Control Room Checked by
Red Light On by MB
Start-Up OK'd by DW Time 9:40 AM (PM) Date 11-3 1965

Loading - Same as 12-1.
Critical Conditions.

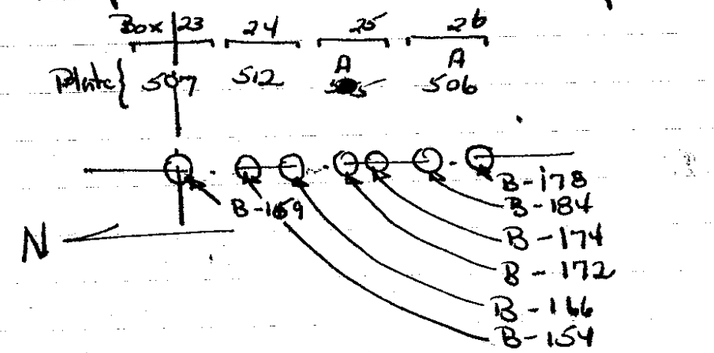
DC-3 45 (10×20)
LogN 0.181
Temp. 75.5°F Height 109.3 cm.
Rod. 29.01 in. Blade 13.57 in

This checks very well with 12-1.

Expr. 8-9 Time 9:20 AM (PM) Date 11-4 1965
Purpose Centerline - South power distribution.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Check by MB
Instrument and Safeties Checked and Reset by DW
"Source-In" Checked by DW
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DW Time 9:20 AM (PM) Date 11-3 1965

Loading - same as 8-5.
Foil positions: - slot 10 in each box.



Strain Foils: Holder #1 ; A-11 ;;; Holder #2. ; A-12
Run conditions:
Temp. 75.5°F
Height. 109.1 cm.
Blade. 16.99 Rod. 29.01 in.
DC-[redacted]2 48 (10×20) LogN 2.05
20 minute exposure

Expr. 8-10 Time 4:30 AM/PM Date 11-7 1955
Purpose Zero check

Personnel:

INSTRUMENT CHECK

Date 11-7 1955 Time 4:30 AM/PM Source No.

Instrument

✓ 5 20×10 contact
✓ 5.5 .8×1000
✓ ×100
✓ 3″

Expr. 8-10 Time 5:40 AM/PM Date 11-7 1955
Purpose
Personnel:

START-UP CHECK LIST

Equipment Checked by MB Procedure Checked by DW
Instrument DM
Source DM.
Emergency ... Checked by MB
Red Light On by DW
Start-Up Ch'd by DW Time 5:40 AM/PM Date 11-7 1955

Loading – same as 8-5 with the following exchanges:

fuel plate #378 Res replaced 5-11
6-40 " " 5-39
4-20 " " 5-35
3-41 " " 5-7

Note: while loading the reactor – it was noticed that slot 8, box 2 was empty (should contain half-plate). How long this has been empty is not known.

Water height 95.7 cm log N = 0.1 Slightly super.

Expr. 8-11 Time 6:15 AM (PM) Date 11-7 1955
Purpose Zero check

Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Check by DW
Instrument and Safeties Checked by DM
"Source In" Checked by DM Source No.
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DM Time 6:15 AM (PM) Date 11-7 1955

Loading: complete loading of 7½ plus four exchanges:

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Series	1	2	3	4	5	6	7	5	9	7	11	12	8	14	15	9	1	10
material	fuel	S	fuel	S	S	fuel	S	fuel	S	fuel	S	S	fuel	S	S	fuel	S	fuel

plus the following exchanges:
box 11 contains #378 instead of 5-11.
7 3-41 " " 5-7.
35 4-20 " " 5-35.
39 6-40 " " 5-39.

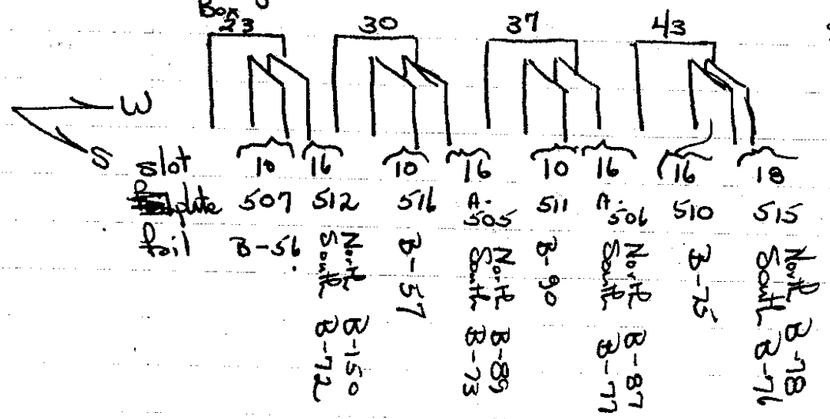
Critical Conds:
DC-3 # 52 (10×20)
Log N ~~RET~~ 0.20
R-1 3 (100×1000)
Water 109.1 cm Temp. 77.6°F
Blade 11.79 in Rod 29.00 in

Mass U-235 in Reactor 10.558 Kg MB
- Blade correction .025
10.533 Kg U-235

Expr. 8-12 Time 8:15 AM Date 11-7 1965
Purpose Centerline West Power distribution
Bare Al foils
Personnel:

START-UP CHECK LIST
Equipment Checked by RJ Personnel Checked by MB
Instrument and Safeties Checked DW
"Source In" Checked DW
Emergency Equipment in Control Room MB
Red Light On by MB
Start-Up OK'd by DW Time 9:05 AM Date 11-7 1965

Loading —



Standardizing foils
#1 — A-3
#2 — A-17

Watch started: 9:18:35
Note: foils on East side of plates. center position.
Run conditions:
Water height 109.2 cm. Temp. 77.3°F
Rod 29.00 in Blade 13.85
DC-3 56 (10×100) DC-2 84 (1×50) R-1 3,3 (500×100) LogN 1.0
20 min exposure
Tape not on tight — water got on either foils.

Expr. 8-13 Time 11:20 AM Date 11-7 65
Purpose Flux measurement with end boxes — zero run — no foils.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Checked by DW.
Instrument and Safeties Checked J.L.
"Source In" Checked by J.L.
Emergency Equipment in Control MB
Red Light On by DW
Start-Up OK'd by J.L. Time 11:20 AM Date 11-7 1965

loadings — same as 8-11 except 2-23 in slot 10 box 23 instead of 7-23 (which is being made ready for the next run)

Critical Conditions.
DC-3 55 (100×1)
LogN 0.2
Blade 13.75 in. Rod 29.00 in.
Water 109.2 cm. Temp. 76.5°F

Expr. 8-14 Time 12:15 (AM) PM Date 11-8 1965
Purpose Centerline-vertical flux distribution with bare gold foils - with end boxes
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Check by MB
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by DW
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by DW Time 12:10 (AM) PM Date 11-8 1965

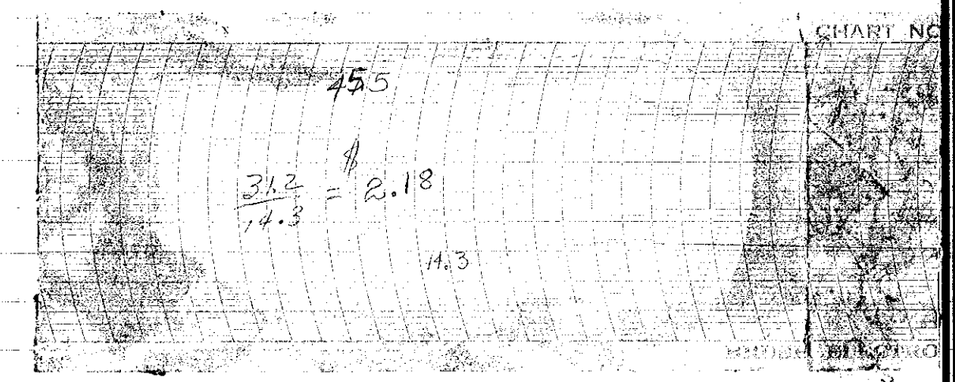
Loading - same as 8-11.

Distance from center	Foil	Standardizing foils
0	F-35	#1 ; A-33
1½"	E-81	#2 ; A-34
3"	E-33	
4½"	E-36	
6."	E-45	
7.5"	E-46	
9.0	E-49	
10.85"	E-50	
11.78"	D-32	
12.5"	D-40	
13.5"	D-42	
15.0"	D-46	
17.0"	G-41	

Run conditions —
"e powr at 12:30:46
Log N 4.0
DC-2 79(10x20)
Rod 29.00 Blade 13.91
Height 109.1 Temp. 76.5°
20 minute exposure.

Note: measured glue thickness — (measured by photo-micrograph)
0.08 mil D.M.

Rod dropped - power recorded on Brush fast recorder.



Value found for safety blade = $2.18.

Note:
Because of end box mockups, safety blade was unable to fall all the way into the core. The worth of this last "5 inches" is not known.

Expr. 8-15 Time 5:45 AM (circled) Date 11-8 1955

Purpose Centerline-vertical flux distribution - Cd-covered gold foils.

Personnel:

INSTRUMENT CHECK

Date 11-8 1955 Time AM/PM

Instrument	Trip Value	Range	Other	Start-Up Scale
DC-1				
DC-2				
DC-3	✓	65	20×10	
Log-N	✓	135 sec.		
R-1	✓	5	.8×1000	
R-2			×100	
P. M.	✓			3"

START-UP CHECK LIST

Equipment Checked by DW Personnel Checked by HB

Instrument and Safeties Checked and Reset by JL

"Source In" Checked by JL

Emergency Equipment in Control Room Checked by MB

Red Light On by HB

Start-Up OK'd by ______ Time ______ AM/PM Date ______ 195__

Loading - same as 8-11.

Foil Location:

Distance from center.	Foil #
0"	B-31
1.5"	-32
3.0	-33
4.5	-34
6.0	-35
7.5	-36
9.0	-37
10.85	-38
11.78	-39
12.5	-44
13.5	-40
15.0	-42
17.0	-43

Standardizing foils:

holder #1 - A-29

holder #2 - A-35

Counters started at water height of 89 cm.

1/e power at

Wasn't enough super-critical to go upon a good period.

Stopped ~~[illegible]~~ at Log N 0.5

Expr. 8-16 Time 6:30 AM PM Date 11-8 1955
Purpose Centerline-vertical flux distribution.
Cd-covered gold
Personnel:

START-UP CHECK LIST
Equipment Checked by DM Personnel Check by DM
Instrument and S... Checked by JL
"Source In" Check... JL
Emergency Equipment in Control Room ... by MB
Red Light On by MB
Start-Up OK'd by JL Time 6:30 AM PM Date 11-8 1955

Loading - Same as 8-11 except the following exchanges.
1-9 in slot 8 of box [redacted]21 instead of 8-[redacted]21
1-19 8 25 5-25

Foils not changed from 8-15.
Counters started at water height of 60 cm.

[redacted]

1/e power at 6:43:00

Running conditions:
Height 109.2 cm. Rod 29.01
Log N 2.05 Blade 6.1
DC-2 92(10x10)
R-1 4(1000x1000)
Temp. 75°F

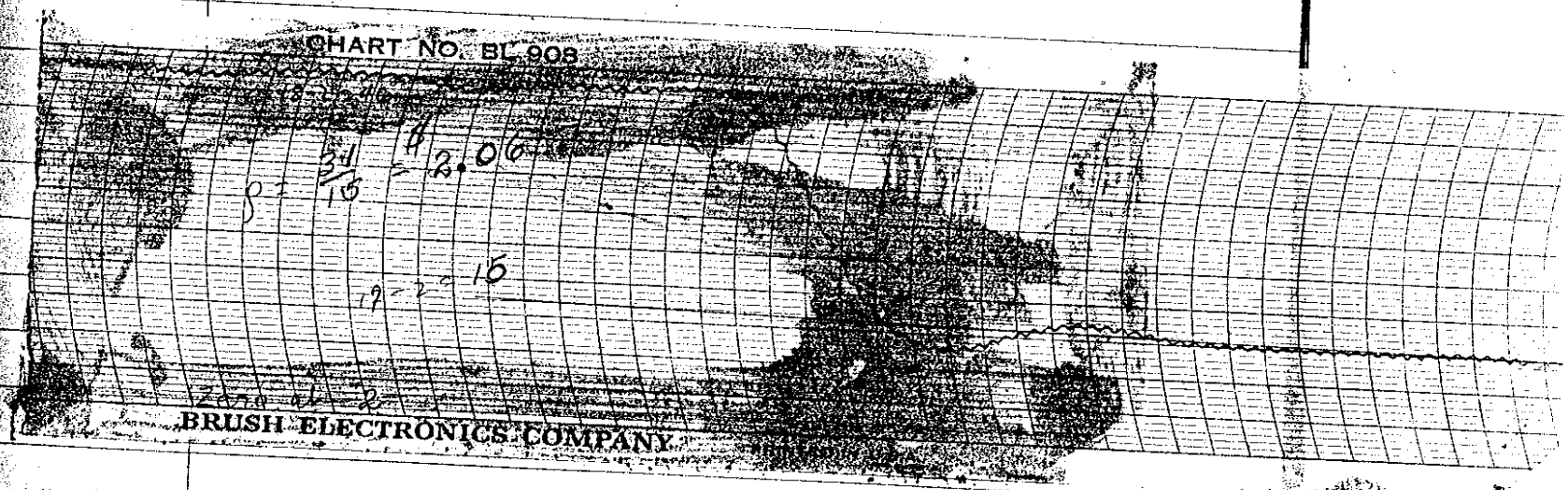
Blade drop recorded.

Counter registers:

C-1: 1764

C-2: 1397

C-3: 966

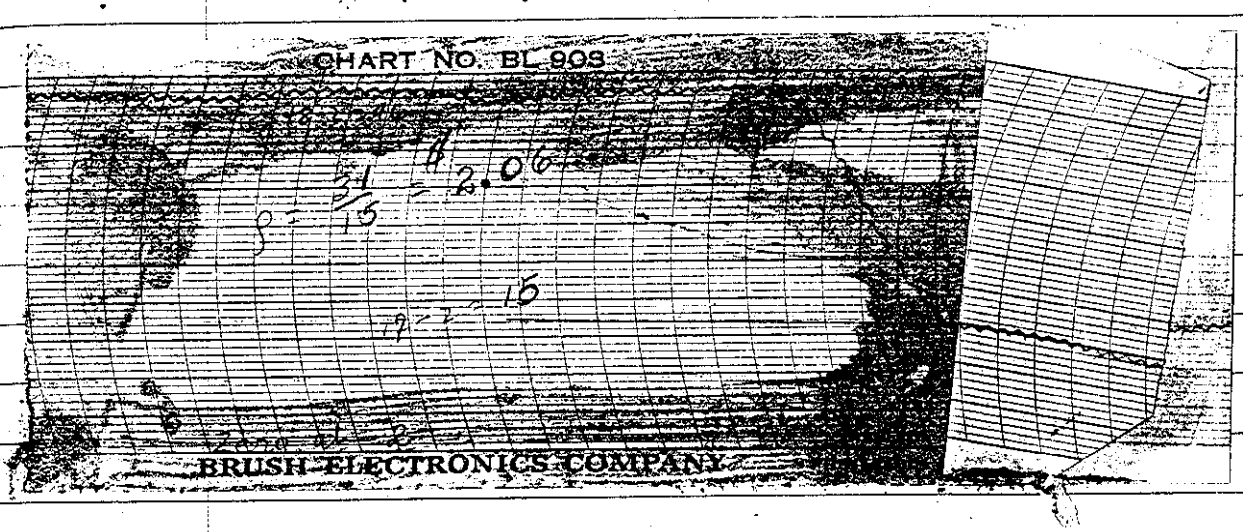


Counter registers:

C-1: 1764

C-2: 1397

C-3: 966



176

Expr. 9-23 Time 10:23 AM (PM) Date 11-8 195 5

Purpose APPR CONTROL ROD EVALUATION
RECHECK ROD VALUE WITH END BOXES

Personnel:

START-UP CHECK LIST

Equipment Checked by DW Personnel Check by DW

Instrument and Switches Checked and Reset by RJ

"Source In" Checked by R. J. Source No.

Emergency Equipment in Control Room Checked by R. J.

Red Light On by DW.

Start-Up OK'd by R.J. Time 10:25 AM (PM) Date 11-8 1955

~~LOADING SAME AS FOR EXP XF5 PAGE 183~~ NO. 5

APPR ABSORBER SECTION ONLY IN POS. 23
(no fuel element attached to APPR control rod)

RUNNING CONDITIONS

WATER HEIGHT 109.4 cm ROD 29.01 IN. OUT

LOG. N 0.2 BLADE 14.23 IN. OUT

DC 3 58 (10X20)

~~DC 2~~ R-7 3.2 (100)(1000) CONTROL APPR ROD NO. 5 0.02 IN

TEMP 75 °F

Loading—

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
series	1	2	3	4	5	6	7	5	9	7	11	8	13	2	15	9	1	4
material	fuel	5	fuel	5	5	fuel	5	fuel	5	fuel	5	fuel	5	fuel	5	fuel	5	fuel
																1		1

except, series 4 in the following boxes ~~except~~ instead of series 5,
2, 4, 7, 9, 11, ... 39, 42, 44

24

Expr. 9-22 Time 11:20 AM Date 11-8 1955

Purpose APPR Control Rod Value.
End Boxes On. — Fuel Box attached

Personnel:

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by RJ

Instrument and Safeties Checked and Reset by DM

"Source In" Checked by J.L. Source No.

Emergency Equipment in Control Room Checked by MB

Red Light On by MB

Start-Up OK'd by JL Time 11:20 AM Date 11-8 1955

Loading — same as 9-23 plus loaded fuel element box is now attached to APPR rod.

Rod is still in full.

Total mass U^{235} : 12.18 Kg.

Critical Conditions:

Height	109.3 cm.
Temp.	75°F
Log N	0.23
DC-3	55.5 (20×10) ; R-1 3.28 (100×1000)
Rod	29.01 in. Blade. 14.51 in.

Loading:

393 plates/45 boxes = 12.222 Kg. U-235

Blade content .016

12.206 Kg

Expr. 8-17 Time 6:20 AM Date 11-9 195 5

Purpose Close to center flux & power distribution (vertical) with end boxes & center APPR rod full in.

Personnel:

INSTRUMENT CHECK

Date 11-9 1955 Time 6:20 AM Source No.

Instrument	Make	Scale	Source Distance	Print Up scale
DC T				
DC-2				
DC-1	✓	L	20x10	3"
Log N	✓		15 sec.	
R-1	✓	L	1000x100 x0.8	
R-2				
P. M.	✓			3"

START UP CHECK LIST

Equipment Checked by JL Personnel Checked by JL MB

Instrument and Safeties Checked and Recorded by JL MB

"Source In" Checked by JL Source No.

Emergency Equipment in Control Room Checked by MB

Red Light On by JL

Start-Up O.K'd by JL Time 6:30 AM Date 11-9 195 5

Loading - same as 9-23 except special plate #507 is in box 16 slot 10 instead of 7-16 (fwd)

Foil location:

bare gold foils: on fwd plate 7-30, slot 10, box #30.

distance from center:

0" 2" 4" 6" 8" 10" 11 5/16" 12" 13" 15" 17 1/2"

G-45 -46 -47 -48 -49 -50 -51 -52 -53 -54 -55

Foil location - cont.

Al catcher foils (bare) on plate #507, slot 10, box 16.

Hole #	1	2	3	4	5	6	7	8	9	10	11
foil #	B-8	-79	-14	-177	-185	-68	bkg	-69	bkg	-30	bkg
distance from center.						0					
	Top										Bottom

Standardizing foils were inadvertantly left out.

1e power at 6:48:45 pm.

Run conditions:

Water Height 109.2 cm. temp 75°F

DC-2 81 (10x10) R-1 8.95 (1000x1000)

Log N 2.0 APPRod 0.02

Rod 29.01 Blade 14.5 (average)

20 minute exposure.

Expr. 8-18 Time 9:25 ☒ PM Date 11-9 1955
Purpose Vert Flux Traverse Cd Covered Au
Power Normalization Catcher Foils in
Box 16 Slot 10, Au in Box 30 Slot 10
Personnel:

START-UP CHECK LIST
Equipment Checked by J.L. Personnel Check by J.L.
Instruments and Safety Circuits Checked by J.L.
Source In" Chg. J.L. Source No.
Emergency Equipment in Control Room Checked by DWM
Red Light On by J.L.
Start Up OK'd by JLe Time 920 ☒ PM Date 11-9 1955

Loading: Added 4-20 & 4-26 } slot 8
Removed 5-20 & 5-26 }
(Added 1 full Plate to loading of Exp 8-17.

Foil Locations:

Au	Q 56	-- 0"
(Cd)	57	2"
in Box 30	58	4"
Slot 10	59	6"
	60	8"
	61	10"
	62	11 5/16
	63	12
	64	13
	65	15
	66	17½

Catcher Foils in Box 16

Position	Foil No.
3	B 46
6	B 47

½ Power (.74 Rdg) @ 9:48:15 PM 11-9-55

Run Conditions

Water ht 109.0 cm
Temp 75 °F
Control Blade {12.9 / 13.7
Rod 29.01

Log N = 2.0
DC-2 = 81 x 10 x 10
R-1 = 3.85 x 1000 x 1000

Run Terminated @ 10:08:15 PM

DWM and JKL

Expr. 8-19 Time 4:45 AM (PM) Date 11-10 1955
Purpose Centerline-East flux measurement. Bare Au foils: APPR rod in; end boxes on.
Personnel:

INSTRUMENT CHECK

Date 11-10 1955 Time 4:45 AM/PM Source No.

Instrument	Trip Value	Scale	Source Distance	
DC-1				
DC-2				
DC-3	✓	65	20×10	
Log N	✓		1.5 sec	
R-1	✓	5.5	.8×1000	
R-2			×100	
P. M.	✓			3"

START-UP CHECK LIST

Equipment Checked by DW Personnel Check by DW
Instrument and Safeties Checked by JL
"Source In" Checked by JL
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OK'd by JL Time 5:00 AM (PM) Date 11-10 1955

Loading: ~~Same~~ as 9-~~21~~ 23 except: fuel 4-20 & fuel 4-26 are in slot 8, boxes 20 & 26, instead of the corresponding series 5 fuel.

Standardizing foils: Holder #1 A-38
Holder #2 A-39.

Counters started at water height of 60 cm,
1/2 power at 5:24:50 PM.

Run conditions:

Water height	109.5	temp.	76.5
Blade	12.5	Rod	29.01
DC-2	80 (10×10)	Log N	2.0
R-1	3.8 (1000×1000)	APPR rod	0.02

Foil location: all centerline positions; all bare.

	Box	Slot	Plate	Foil	Foil Position:
	16	18	10-16	G-67	on side of plate facing rod
	16	14	2-16	G-68	"
	16	10	7-16	H-31	"
	16	6	6-16	H-32	"
	16	1	1-16A	H-33	"
	9	14	2-9	H-34	"
	9	10	7-9	H-35	"
	9	3	3-9	H-36	"
	3	16	9-3	H-37	"
	3	10	7-3	H-38	on side of plate facing reflector
reflector	3	1	1-3	H-39	"
		1"		H-41	
		2"		H-42	
		3"		H-43	
		5"		H-44.	

Registers after 20 minute exposure.

C-1: 1699 C-2: 1111
C-3: 799

Expr. 8-20 Time 6:50 AM/(PM) Date 11-10 1955
Purpose Power distribution – centerline-east APPR rod in – end boxes on: Bare Al catchers
Personnel:

START-UP CHECK LIST
Equipment Checked by JL [illegible] JL
Instrument and [illegible] JL
"Source In" [illegible] JL
Emergency [illegible] MB
Red Light On by MB
Start-Up OK'd by JL Time 7:00 AM/(PM) Date 11-10 1955

Loading – same as 8-19 except for the following special plates:

Box	Slot	Plate in	Plate ~~replaced~~ removed	Foil in special plate
16	18	507	10-16	B-151
16	10	512	7-16	B-112
16	1	511	1-16	B-167
9	14	A505	2-9	B-160
9	6	~~#~~510	6-9	B-118
3	18	516	10-3	B-96
3	10	A506	7-3	B-152
3	1	515 (toward control rod)	1-3	B-19

Foils are all on west side of plates except B-19 which is on reflector side of plate.
In plates containing two rows of holes, foil is in ~~south~~ north hole. (hole ~~away~~ toward from safety blade.)

Standardizing foils – Holder #1 - A-22
Holder #2 - A-23.

Counters started at water height of 60. cm.

Forgot to trip by pass DC-3: scrammed reactor.

Expr. 8-21 Time 9:05 AM (PM) Date 11-10 1965
Purpose Rerun of 8-20: centerline east power distribution: APPR rod in full; end boxes on.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB Personnel Checked by DW JL
Instrument and Safeties Checked and Set by
"Source In" Checked by JL
Emergency Equipment in Control Room Checked by MB
Red Light On by JL
Start-Up OK'd by JL Time 9:05 (AM) Date 11-10 1965

Loading - same as 8-19 except for the following special plates:

Distance from center	Box	Slot	Plate in	Plate removed	Foil in special plate:	Location of foil on plate
1.6875 inches	16	18	507	10-16	B-39	Center facing rod
2.875 "	16	10	512	7-16	B-93	North facing rod
~~4.1875~~ 4.1875 "	16	1	511	1-16	B-168	Center facing rod
5.1875 "	9	14	A505	2-9	B-156	North facing rod
6.375 "	9	6	510	6-9	B-171	Center facing rod
7.5625 "	3	18	516	10-3	B-139	Center facing rod
8.75 "	3	10	A506	7-3	B-10	North Hole facing rod
10.125 "	3	1	515	1-3	B-181	[redacted]
						South Hole facing reflector

The north hole in the special plates is the one nearest to the safety blade.

Standardizing foils: Holder #1 - A-30
Holder #2 - A-32

Counters started at water height of 60 cm.

Run conditions:

Water height 109.5cm (29.01) Water Temp. 75.5°F
Rod 28.01 Blade 14.3
APPR rod 0.02 DC-2 78 (10×10)
R-1 3.8 (1000×1000) LogN 2.0
20 minute exposure.

Counter resister readings

C-1 : 1650 C-3 : 932
C-2 : 1119

Expr. 8-22 Time 10:50 AM Date 11-10 1955
Purpose Flux distribution: centerline - east: APPR rod in full; end boxes on: Au foils - Cd covered.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB JL
Instrument and Safety Devices Checked by JL
"Source In" Checked by JL
Emergency Equipment Checked by MB+JL
Rod Light On by MB
Start Up Okd by JL Time 10:50 Date 11-10 1955

Loading - same as 8-19.

Distance from center	Box	Slot	Plate	Foil	Orientation
1.625	16	18	10-16	X-31	Toward Rod
2.25	16	14	2-16	X-32	" "
2.84	16	10	7-16	X-33	" "
3.4375	16	6	6-16	X-34	" "
4.1875	16	1	1-16A	X-35	" "
5.1875	9	14	2-9	X-36	" "
5.8125	9	10	7-9	X-37	" "
6.875	9	3	3-9	X-38	" "
7.8125	3	16	9-3	X-39	" "
8.75	3	10	7-3	X-40	Toward Reflector
10.125	3	1	1-3	V-31	" "
reflector		1"		V-33	
		2"		V-35	
		3"		V-37	
		5"		V-48	

We power at 11:12:20 PM
Counters started at Water Right = 60 cm.
Run conditions:
Water Right 109.1 Temp 75.5°F
Rod 29.01 Blade 17.0
APPR rod 0.02 DC-2 75 (10x10)
R-1 5.6 (100 cx/ma) Log N 2.0
20 minute exposure.
Counter Registers.
C-1 1595 C-3 871
C-2 1150

Nov 11, 1955 Plates arrived 11-10-55

ORNL	920-326	19	Total Wt 10,260.65 gm
	920-328	10	
	920-331	19	

MAC wts = DWM

Expr. B-23 Time 6:45 AM PM Date 11-15 195 5
Purpose Zero Run

Personnel:

INSTRUMENT CHECK

Date 11-15 195 5 Time AM PM Source No.

Instrument	Volts	Scale	Gauge Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	✓	45	10 x 20	4"
Log N	✓	.	1000	
R-1	✓	6	BK1000 x100	contact.
R-2				
P. M.	✓			3"

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by JL
Instrument and [illegible] JL
"Source In" Checked by JL ID
Emergency Equip. [illegible] and Room Clear by
Red Light On by JL AM
Start Up OK'd by JL Time 6:50 PM Date 11-15 195 5

Loading: same as 8-10:: every box contains:

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1	2	3	4	5	6	7	5	9	7	11	12	8	14	15	9	1	10
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5

except for slot 8 in the following boxes which contain the correspondingly listed plates.

7	(7)	3-41
11		#378
20	(21)	1-9
25	(25)	1-19
30		4-20
39		6-40

Conditions - slightly super.
R-1 5.6 (100x1000)
Log N 0.4
Water height 95.8 cm.
Water temp. 76°F
Rod positions: rod 29.01 blade 0.08

Put small rod in: - reactor brought critical.
Water height 96.3 cm.
Log 0.45
Rod 0.01 Blade 0.08

Expr. 8-24 Time 8:50 AM PM Date 11-15 1965
Purpose Centering - East Power Distribution
Base-Al catchers
Personnel:

START-UP CHECK LIST
Equipment Checked by MB. Personnel Check by JL
Instrument [illegible] JL
Emergency [illegible] MB
Red Light On by MB
Start-Up OK'd by JL Time 8:50 AM PM Date 11-15 1965

loading - same as 8-11 (page 167)
Except for the following slots.

slot	Box	Plate	Foil #	Distance from Cater.
10	23	A505	B-86	
18	16	515	B-145	
6	16	A506	B-128	
16	9	516	B-134	
3	9	512	B-183	
13	3	511	B-165	
3	3	507	B-58	
1	3	510	B-71	

Standardizing foils - #1, A-21; #2, A-47

Counters started at water height of 60cm.

All foils all facing west (control rod) side of core;
except those in 3-3 & 1-3 which are facing East.

We find power at 9:10:22

Run conditions:

Water hight. 109.3 cm. Temp. 76.5
Rod 29.01 in Blade 12.45 in
Log N 2.0 DC-2 52 (1 x 100)
R-1 3.6 (1000 x 1000)

Counter Registers

C-1 1651 C-3 2531
C-2 773

It appears that C-3 & C-2 have been moved.

~~Run 60~~

Expr. 8-25 Time 11:00 AM Date 11-15 1955
Purpose Centerline-vertical power distribution.
Al-catcher.
Personnel:

START-UP CHECK LIST
Equipment Checked by MB
Instrument and Safeting Ch... by MB
"Source In" Checked by JL
Emergency Equipment in Control R... by MB
Red Light On by MB
Start-Up OK'd by JL Time 11:00 AM Date 11-15 1955

Loading, same as 8-11 (page 167)
except plate #516 is in slot 10, box 23.
Foil location:

Position	Foil	Distance from center
1	2-9	Top
2	-129 (127.)	
3	-138	
4	-148	
5	-121	
6	-153	0
7	-111	
8	-49	
9	-124	
10	-120	
11	-63	Bottom

Standardizing Foils #1, A-44
#2, A-45
Foils facing ~~west (control station) side~~ control room side);

Counters started at water height of 60 cm.
1/e power at 11:33:57

Run Conditions:
Log N 2.0 DC-2 50(10×10)
R-1 3.4/(1000×1000)
Rod 29.01 Blade 11.7
Water 109.5 Temp. 76.8 °F

20 minute exposure.

C-1	1549
C-2	800
C-3	2709

Expr. 9-25 Time 5:00 (AM) Date 11-16 1955
Purpose APPR rod evaluation.
~~All 5 rods with end boxes with fuel sections) out~~ - zero run
Personnel:

INSTRUMENT CHECK

Date 11-16 1955 Time 5:00 AM Counter No.

Instrument				
DC-1				
DC-2				
DC-3	✓	55	10×30	2"
Log N	✓		155cm	
R-1	✓	5	.8×1000 ×100	1"
R-2				
P. M.	✓			3"

loading - fuel ss in exactly the same location as 8-11 (page 167)

~~APPR rods with fuel sections attached removed in out positions.~~

End boxes on - all bottom mock-ups ~~except for safety~~; all top mock-ups except ~~APPR rod~~ boxes 15, 22, 29 (because of safety blade)

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by JL
Instrument and Safety Circuits Checked and Tested by JL
"Source In" Checked by JL Source No.
Emergency Equipment in Control Room Checked by RJ
Red Light On by JL AM
Start-Up OK'd by JL Time 5:40 (PM) Date 11-16 1955

→ APPR ~~rod~~ fuel boxes in positions 9, 23, 25, & 37 loaded "correctly". Only fuel boxes in. Rods are out of core.

Critical conditions:
Blade 17.48 in. Rod 29.01 in
Water 109.1 cm. DC-3 67 (10×50)
Log N 0.165 Temp. 76°F

Mass (from page 167) = 10,559 kg
blade correction = -.01
10.55 kg U-235

Expr.______ Time______ AM PM Date______ 195__
Purpose______
Personnel:______

INSTRUMENT CHECK

Date 11-16 1955 Time 5:00 (PM) Source No.

Instrument	Trip Value	Scale		
DC-1				
DC-2				
DC-3	✓ 55	10 x 20	2"	
Log N	✓	1.5 sec		
R-1	✓ 5	.8 x 1000	"	
R-2		x 100		
P. M.	✓		3"	

Expr. 9.26 Time 6:20 (PM) Date 11-16 1955
Purpose APPR rod evaluation - zero run. end boxes on.
Personnel:

START-UP CHECK LIST
Equipment Checked by JL Personnel Checked by JL
Instrument and Safeties Checked and Recorded by MB
"Source In" Checked by MB
Emergency Equipment in Control Room Checked by MB
Red Light On by JL
Start-Up OK'd by DW Time 6 30 (PM) Date 11-16 1955

Loading - same as 9-25 (including APPR-rod fuel sections in core) except full plates inserted into slot 8 of boxes 18 & 28 in exchange for the half plates.

Box 18 now contains plate 1-11 in slot 8
" 28 " " " 1-17 " " 8

Critical Conditions:

Blade - 7.49 in. Rod - 29.01 in.
Water Ht. - 109.8 cm. DC-3 - 90 x10x20
Log N - .18 Temperature - 76.

Mass

10.58 kg U-235
- .04
10.54

Expr. 9-27 Time 7:20 AM/PM Date 11-16 1955

Purpose APPR Rod Evaluation — all five APPR rods attached but out of core.

Personnel:

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by RJ

Instrument and Safeties Checked and Recorded by DW

"Source In" Checked by RJ

Emergency Equipment in Control Room Checked by RJ

Red Light On by MB

Start-Up OK'd by DW Time 7:25 (AM) Date 11-16 1955

Loading — same as 8-11 (page 167) with the addition fuel 1-11 & fuel 1-17 in slot 8 of boxes 18 & 28 (in place of the corresponding series s fuel)

APPR rods attached but above core.

End box mockups on

Mass = 10.59 kg U^{235}

Critical Conditions:

Log N	0.18	DC-3	85 (10x20)
R-1	44 (100x100)	Water	109.1
Temp.	76°F		
Blade	~~8.40~~ 8.31	Rod	29.01

Expr. 9-28 Time 9:40 AM/PM Date 11-16 1956

Purpose APPR Rod Evaluation — all five rods inserted full. End Boxes on.

Personnel:

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by DW JL

Instrument and Safeties Checked and Recorded by DW

"Source In" Checked by

Emergency Equipment in Control Room Checked by JL

Red Light On by JL

Start-Up OK'd by DW Time 9:40 AM/PM Date 11-16 1955

Loading: boxes 2, 4, 7, 9, 11 ······ 39, 42, 44.

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1 fuel	2 ss	3 fuel	4 fuel	5 ss	6 fuel	2 fuel	n fuel	9 ss	7 fuel	12 fuel	12 ss	8 fuel	* fuel	15 ss	9 fuel	1 ss	10 fuel

in boxes 1, 3, 5, 6, 8, 10, ······ 38, 40, 41, 43, 45

slot 17 contains full fuel.

* box	slot 14	slot 17
1	1-9	10-9
2	-21	
3	-23	-21
4	-25	
5	-37	-23
6	2-9	
7	-21	-25
8	-23	-37
[illegible]	-25	
10	-37	11-9
11	3-9	
12	-21	-21
13	-23	
14	-25	-23
15	-37	
16	4-9	-25
17	-21	
18	-23	-37
19	-25	
20	-37	12-9
22	6-9	12-21
24	-21	12-23
26	-23	12-25
27	[illegible]	

box	slot 14	slot 17
28	6-25	12-37
29	-37	
30	7-9	1-9
31	7-21	
32	7-23	1-11
33	7-25	
34	7-37	1-15
35	8-9	
36	-21	1-16
38	-23	1-17
39	-25	
40	-37	1-19
41	9-9	2-12
42	-21	
43	-23	3-41
44	-25	
45	-37	4-20

Loading (cont.)-
All 5 rods in full; no fuel section below them.

Not critical.

Pulled eccentric rod all way out (22.0 inches) - still not critical. (remember - rod had no fuel section below it)

Pulled center rod out (24.0 inches) still not critical.

Log N 0.02.

Expr. 9-29 Time 12:45 AM PM Date 11-16 195-5
Purpose Approach Evaluation - all 5 rods in; end boxes on.
Personnel:

START-UP CHECK LIST
Equipment Checked by DM Personnel Cleared by DW DW
Instrument and Safeties Checked and Recorded by
"Source In" Checked by DW Period No.
Emergency Equipment in Control Room Checked by JL
Red Light On by JL
Start-Up OK'd by DW Time 1045 AM PM Date 11-16 195-5

Loading:

Slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Series	1	5	3	4	5	6	2	11	9	7	12	12*	8	*	15	9	*	10
material	f	f	f	f	s	f	f	ff	s	f	f	s	f	f	s	f	f	f
					s				s			s			s			

* slot 14 same as 9-28

	Box	Slot 17	Slot 12		Slot 17	Slot 12
	1	10-9	H-951	31	510	
	2	537		32	1-11	H-929
	3	10-21	11-960	33	511	
	4	435		34	1-15	
	5	10-23	H-952	35	507	
	6	10-25		36	1-16	
	7	259		37	Rod	
	8	10-3[illegible] (37)		38	1-17	
Rod				39	A-506	
	10	1[illegible]-9		40	1-19	
	11	A-264		41	2-12x	H-935
	12	11-21		42	545	
	13	378		43	8-41	H-913
	14	11-23	14-961	44	512	
	15	4-27		45	4-20	H-928
	16	11-25	A-505 (Hull)			
	17	4-28 (208)				
	18	11-87	14-958			
	19	6-32				
	20	12-9				
Rod						
	22	12-21				
Rod						
	24	12-23				
Rod						
	26	12-35				
	27	6-40				
	28	12-38	H-959			
	29	516				
	30	1-9	H-947			

13.5 x 40 + 6.5 = 546.5 plate
= 17.00 kg 25

Loading – (cont.)

All 5 rods in full; no fuel section below.

End boxes on.

Rod Positions: #1 in 9 ; #2 in 21; #3 in 23; #4 in 25; #5 in 39

Not critical.

Pulled central rod. To 19.5 – critical

Log N 0.18 DC-3 63 (10×20)

Temp. 76°F Height 109.4

Blade "out" Rod 29.01

Pulled central rod. to 24.01 – critical.

Log N 0.16 DC-3 57 (10×20)

Temp. 76.5°F Height 109.7 cm.

Blade 12.7 in. Rod 29.01 in.

18

Expr. 9-30 Time 12:01 PM Date 11-17 1955

Purpose APPR rod evaluation – 9 eccentric rods in; central rod partially removed

Personnel:

START-UP CHECK LIST

Equipment Checked by DM Personnel Check by DM

Instrument and Safeties Checked and Reset by DW

"Source In" Checked by DW Position No.

Emergency Equipment in Control Room Checked by MB

Red Light On by MB

Start-Up OK'd by DW Time 12:01 PM Date 11-17 1955

Loading – same as 9-29 except ~~[illegible]~~ fuel removed: 12-1 replaced by 1 ss 11-1

from 9-29:

in 40 boxes $17.00 \frac{kg}{42} \; 13.5 \times 31.1 \; gm = 16.58 \; kg$ -25

+ (in box 23) $13.5 \times 31.1 = 0.42 \; kg$ -25

17.00 kg in 41 boxes

$17.00 \times \frac{45}{41} = 18.66 \; kg$

1 blank correction = 0.00

-3	-3
-5	-5
-14	-14
-16	-16
-18	-18
-28	-28
-30	-30
-32	-32
-41	-41
-43	-43
-45	-45
A-505	12-16
(H-947) (5-30)	12-30

Fuel section below central rod loaded:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
12-1 fuel H-947 fuel	12-3 fuel	12-14 fuel	5-23 ss	12-16 fuel	12-18 fuel	12-28 fuel	9-23 ss	12-30 fuel	12-32 fuel	12-23 ss	12-41 fuel	12-43 fuel	15-23 ss	12-45 fuel	A-505 fuel	12-30 fuel	

Loading (cont.)

Eccentric rods in 9 do not contain fuel in bottom sections.

"Total core loading" (nominal) 18.68 kg. 41.25

Central Rod at 15 in. – ~~critical~~ slightly super.

PC-3 Log N

R-1 Height 82.5

Temp. Rod [redacted] out.

Blade in.

Central rod at 14 in. ; Height 85.5 , slightly super.

Central rod at 12.99 , Height 93.7 ; critical

Central rod at 12.78 Height, 109.4 ; critical
Blade 4.935 in. Rod [redacted] out

Central rod at 12.62 ; Height 109.4 ; critical
Blade 8.10 in. Rod out.

Central rod at 12.09 ; Height 109.4 ; critical
Blade 20.3 in. Rod out

Central rod at 12.065 ; height 109.4 slightly subs
Blade 28.29 in.

Expr. 9-31 Time 5.30 AM Date 11-18 19 58
Purpose Comparison of "worst possible rod sticking" – center rod "sticking."

Date 11-18 58 5.30

50 10×20 4"
5 16 sec. contact.
.8×1000 ×100
– 34

New water supply – in two interior storage tanks.
Initially tried filling tank with one storage tank –
the storage tank was emptied out a water height of 78 cm. – switched in second tank.
Filled reactor tank to 110 cm. & dumped. Had no difficulties dumping to 10 cm. on manometer.
Pump very slow.
Loading – exactly the same as 9.30

Critical Conditions:

Height 110.2 Temp. 67°F
APPR center rod 12.975 Log N 0.022
R-1 3.3 (500 × 1000) DC-2
Blade 2.47 in. Rod [redacted] 29.01 cm
APPR [redacted] eccentric rod : 0.03

#1-1

critical condition:
APPR central rod: 12.625" waterlight 110.4
APPR eccentric rod: 0.03 temp. 67°F
Blade 10.01 Control Rod 29.01

Loading — 9-32.
17.00 kg 25 in core
when APPR-X rod at 12.012, blade correction = -.01
Critical mass = 16.99
$16.99 \times \frac{45}{41} = 18.65$
when APPR-X rod at 12.835, blade correction = -.04
Critical mass = 16.96
$16.96 \times \frac{45}{41} = 18.61$

Expr. 9-32 Time 8:30 AM/PM Date 11-18 1965
Purpose Comparison of "worst possible rod sticking" — eccentric rod "sticking"
Personnel:

START-UP CHECK LIST
Equipment Checked by HB Personnel Check by HB
Instrument and Safeties Checked and Reset by DC
"Source In" Checked by DC
Emergency Equipment in Control Room Checked by
Red Light On by HB
Start-Up OK'd by DC Time 9:30 AM/PM Date 11-18 1965

Loading — exactly the same as 9-30 (page 205) except APPR control rod #3 (in position #23) and APPR rod #5 (in position #37) interchanged. APPR #3 has the loaded fuel section on it
First critical condition.
Height 76.5 APPR central rod 0.05 APPR eccentric rod 23.98
Blade 0.11 Control rod 29.01

Height 88.1 Blade 0.11 Control rod 29.01
APPR central rod 0.05 APPR eccentric. 14.015

Height 88.9 Blade 0.11 Control rod 29.01
APPR central rod 0.05 APPR eccentric 13.005

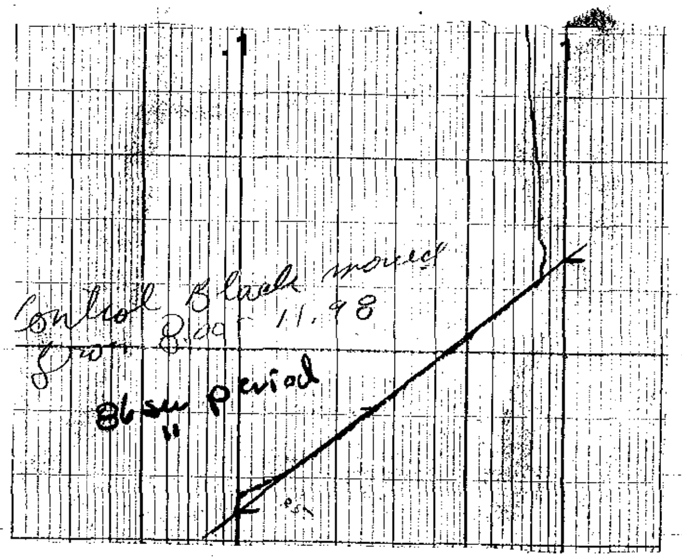
Height 109.3 Blade 0.11 Control rod 29.01
APPR central rod 0.05 APPR eccentric 12.568
Temp 67°F
Height 109.3 Blade 3.03 Control rod 29.01
APPR central 0.05 APPR eccentric 12.540

Height 1093 Blade 8.004 Control Rod 29.01
Central Rod 0.05 Eccentric APPR 12.375

Blade withdrawn to 11.977 – period measured.
~~[illegible]~~ back to critical with eccentric rod at 12.2

APPR rod at ~~[illegible]~~ 12.116
Blade withdrawn to 13.930 – critical.
(all other parameters the same)
Blade withdrawn to 17.112 – period measured
APPR Rod (Eccentric) 12.012 } critical
Blade at: 17.568

Blade withdrawn all the way (28.278)
Eccentric Rod 11.968 super
" " 11.919 very sub.
Call critical at 80% difference.



Expr. 9-33 Time 10:30 PM 11-18 1955
Purpose Critical mass – All rods but one eccentric in.

Personnel:

START-UP CHECK LIST

Equipment Checked by RJ Personnel Check by MB
Instrument and Safeties Checked and Reset by DC
"Source In" Checked by DW/PP.ll Source No.
Emergency Equipment in Control Room Checked by MB
Red Light On by DC
Start-Up OK'd by DW Time 10.30 AM/PM (PM circled) Date 11-18 1955

Loading – same as 9-32 except series 3 fuel throughout the reactor exchanged by series 3 S.S.

Critical Conditions:

Height 8_._ DC-3 60 (1×50)
Log N 0.22 Blade 0.04 (in)
Rod 29.00 (out) APPR { Central Rod 0.05 (in)
{ Eccentric Rod 24.03 (out)

Height 109.3 DC-3 83 (1×50)
Log N 0.14 Blade ~~[illegible]~~ 0.04
Rod 29.00 APPR { Central Rod 0.05
Temp 67°F { Eccentric Rod 18.01

17.00 – 31.1×4/10 – 15.76 kg.
blade correction – .05
15.71
$15.71 \times \frac{45}{41} = 17.24$

Expr. 9-34 Time ~~5:30~~ 6:00 PM Date 11-21 1955
Purpose Zero Run - check on 9-33
Personnel:

INSTRUMENT CHECK

Date 11-21 1955 Time 5:30 PM Source No.

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	✓	80	10 x 20	
Log N	✓	12 sec.	12 cm.	
R-1	✓	3	8K/1000 x100	
R-2				
P. M.	✓			3"

Loading - exactly the same as 9-33

START-UP CHECK LIST
Equipment Checked by HB Personnel Check by HB
Instrument and Safeties Checked and Recorded by MB
"Source In" Checked by MB Source No.
Emergency Equipment in Control Room Checked by
Red Light On by HB
Start-Up OK'd by DW Time 6:00 PM Date 11-21 1955

Critical Condition:

Height	109.1 cm.	Log N	.21
DC 3	71 (10x5)	Central Rod	0.06
Blade	14.365	Eccentric Rod	19.025
Rod	19.015	Temp.	83°F

(19.09)
Blade pulled to 19.09; period measurement made.
Back critical - Blade 14.41: LogN 2.4
Put Eccentric Rod into 18.82; negative period measured. (p. 214)
Inadvertently, the thermocouples were left in the water storage tank. ∴ The temp. above is not correct.

Expr. 9-35 Time 9:00 PM Date 11-21 1955
Purpose Critical Mass - All rods but on eccentric in.
Personnel:

START-UP CHECK LIST
Equipment Checked by RJ Personnel Check by RJ
Instrument and Safeties Checked and Recorded by DW
"Source In" Checked by MB Source No.
Emergency Equipment in Control Room Checked by
Red Light On by DW
Start-Up OK'd by DW Time 9:00 PM Date 11-21 1955

Loading:

slot	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
series	1	5	3	4	5	6	2	11	9	7	[redacted]		8		15	9		10
[redacted] mater.	f	f	s s	f	s s	f	f	f	s s	f	[redacted]		f	f	s s	f		f

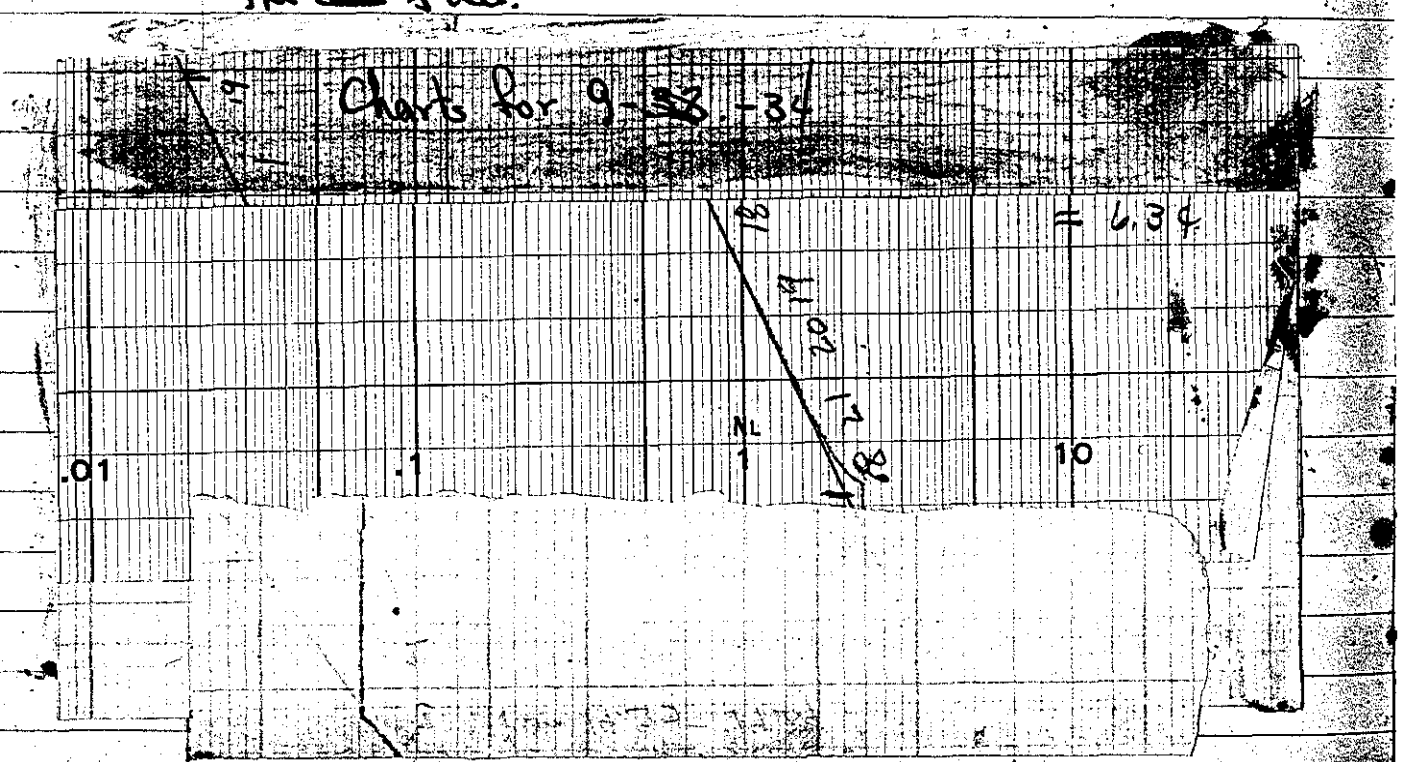
for fuel in slot 12, see page 203.
" " " " 14, " " 201.
" " " " 17, " " 208.

Box	slot 12	slot 17	slot 11	Box	slot 12	slot 17	slot 11
1	1/2 f	f	S	26	S	f	f
2	S	f	f	27	rod	—	
3	1/2 f	f	S	28	1/2 f	S	S
4	S	f	f	29	S	f	f
5	1/2 f	f	S	30	s [redacted]	S	S
6	S	f	f	31	S	f [redacted]	f
7	S	f	f	32	1/2 f	S	S
8	S	f	f	33	S	f	f
9	rod	—	—	34	S	f	f
10	S	f	f	35	S	f	f
11	S	f	f	36	S	—	f
12	S	f	f	37	rod	f	
13	S	f	f	38	S	f	f
14	1/2 f	S	s [redacted]	39	S	f	f
15	S	f	f	40	S	f	f
16	S	S	S	41	1/2 f	f	S
17	S	f	f	42	S	f	f
18	1/2 f	S	S [redacted]	43	1/2 f	f	S
19	s [redacted]	~~f~~	f	44	S	f	f
20	S	f	f	45	1/2 f		S
21	S	f	f				
22	S	f	f				
23	rod	—					
24	S	f	f				
25	rod	—					

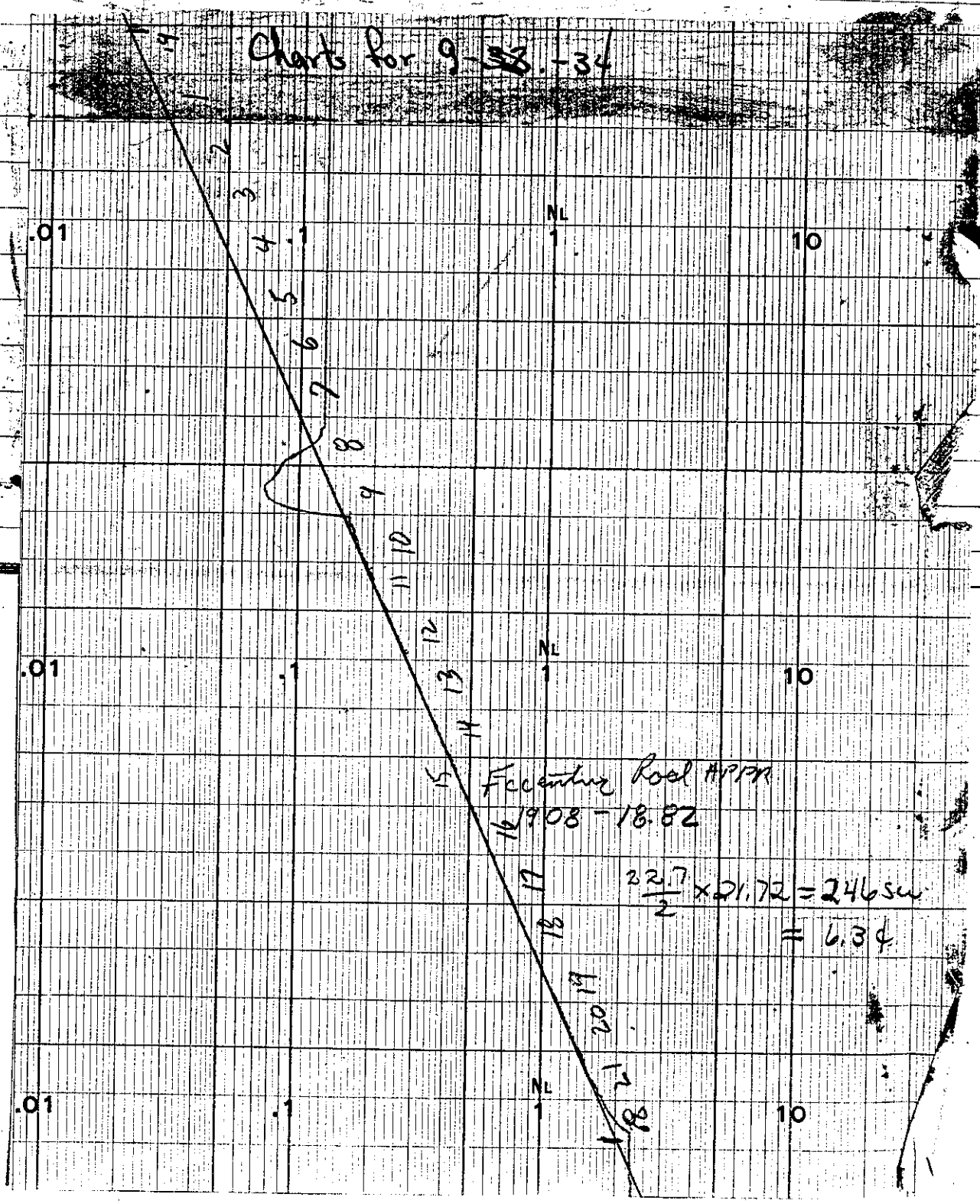
Loading (cont.)
for fuel in control rod see p205.
for fuel in slot 11 [redacted] is series 12.

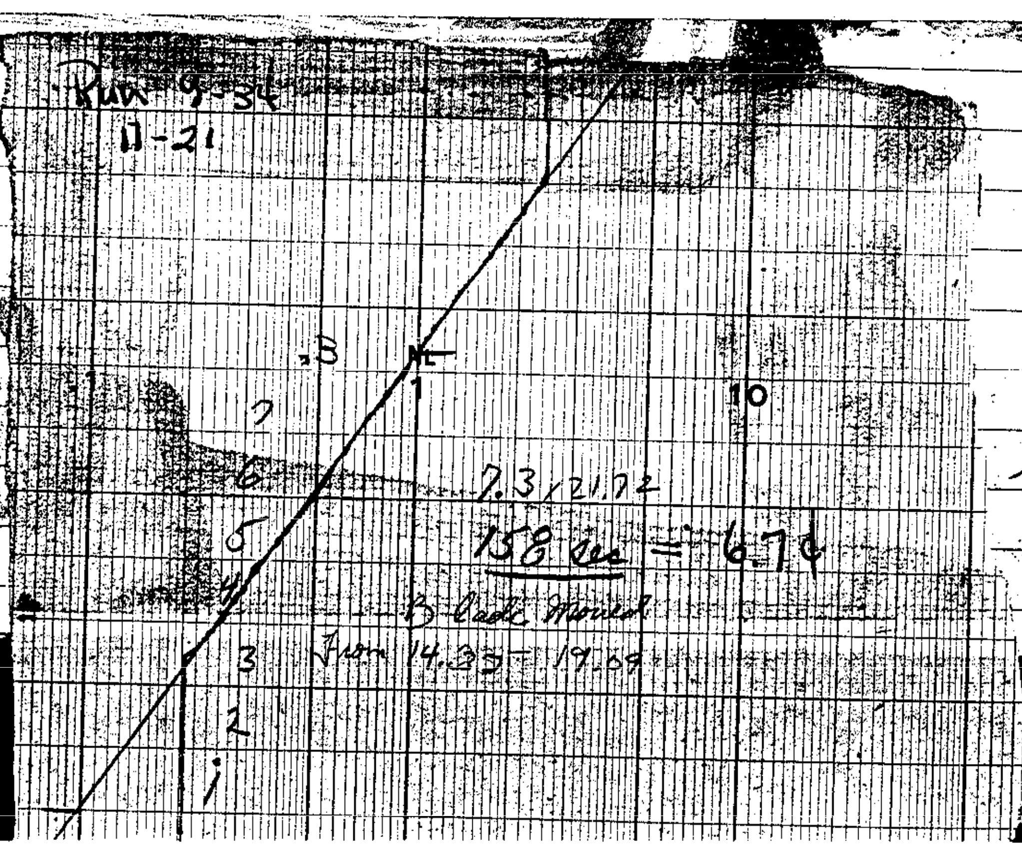
Not critical.
Very slightly sub-critical ~ 1200 neg. ρ

Zero checked on blade - is within ½" correct; at zero the Cd is within ½" of the bottom of the [redacted] fuel.



Zero checked on blade – is within 1/4" correct; at zero the Ed is within 1/4" of the bottom of the [redacted] fuel.




Run 9-34
11-21
7.3/21.72
158 sec = 6.74
B Cask Moved
from 14.33 - 19.09

Expr. 9-36 Time 10:35 AM Date 11-21, 1955
Purpose Critical mass — all rods but one eccentric rod in.

Personnel:

START-UP CHECK LIST

Equipment Checked by JL Personnel Check by JL
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by DW Source No.
Emergency Equipment in Control Room Checked by
Red Light On by MB
Start-Up OK'd by DW Time 10:35 AM Date 11-21 1955

Loading — mass-wise same as 9-35 (35); just rearranged + made more homogeneous

Slot:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Series	1	6	3	4	5	6	2	11	9	7	12	12	8		15	9	*	10
material	f (1)	f /	s s	f (2)	s s	f (3)	f (4)	f (5)	s s	f (6)	f (7)	s s	f (8)	f (9)	s s	f (10)		f (11)

for fuel in slot 14, see page 201

slot 17:

Box			
1	H-959	25	rod
2	537	26	ss
3	H-958	27	6-40
4	435	28	H-928
5	H-959	29	516
6	10-25	30	ss
7	1-ss	31	510
8	10-37	32	H-913
9	rod	33	511
10	11-9	34	1-15
11	1-ss	35	ss
12	11-21	36	1-16
13	378	37	rod
14	H-961	38	1-17
15	4-27	39	ss
16	~~ss~~ ss	40	1-19
17	4-28 (238)	41	H-960
18	H-961	42	515
19	6-32	43	H-935
20	ss	44	512
21	rod	45	H-952
22	12-21		
23	rod		
24	12-23		

10 half plates
22 full
8 ss
40

$11\frac{1}{2} \times 41$ 471.5
$10 \times .5$ 5
22 22
1
499.5

✓ MB

Loading = 15.53 Kg U-25

$15.53 \times \frac{45}{41} = 17.05$ kg.

Loading:

In central rod box #3. (in position #37)

slot: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

2-12x 5-37 ½ | SS | 259 | SS | 4506 | 183 | A264 | SS | 507 | 12-35 | SS | 12-37 | 11-23 | SS | 11-25 | 11-37 | 10-5

Critical Conditions:

DC-3 83(1x50) Log N 0.27

Rod 29.015 Blade 19.39

Water 109.2 cm. Temp 73¾ °F

Central Rod 0.06 Eccentric Rod, 24.065

This is considered the critical mass of the reactor with all APER rods but one eccentric rod in.

Total nominal loading - [redacted] kg. 4²⁵

16.93 R.J.

17.05 DVPW

Actual loading 15.549 = 1.09752 @ 31.13 g/plate

× 45/41 = 17.066

15.5344 @ 31.1 = 17.050 g

Expr. 9-37 Time 11:45 AM Date 11-21 1955

Purpose Critical mass — all eccentric rods in, central rod out.

Personnel:

START-UP CHECK LIST

Equipment Checked by HB Personnel Check by HB

Instrument and Safeties Checked and Reset by DW

"Source In" Checked by DW Source No.

Emergency Equipment in Control Room Checked by HB

Red Light On by HB

Start-Up OK'd by DW Time 11:45 AM Date 11-21 1955

Loading - Same as 9-36 except 1-9 & 1-11 fuel added in place of the ss. in slot 17 in boxes 20+26.

Didn't go critical.

~~All Rods Out~~

Central Rod 24.15

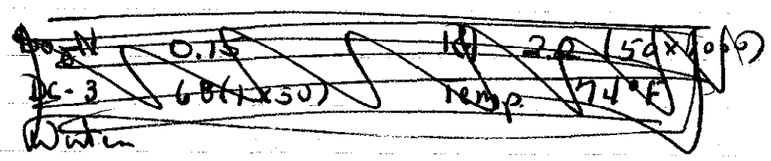
Eccentric Rod 0.01

Blade 28.29

Rod 29.01

Water 109.4

Temp 74°F



Expr. 9-38 Time 12:25 (AM) Date 11-22 1955
Purpose Determination of Critical Mass—
all [redacted] eccentricities in:
Personnel:

START-UP CHECK LIST
Equipment Checked by RJ Personnel Check by MB
Instrument and Safeties Checked and Reset by DW
"Source In" Checked by DW Source No.
Emergency Equipment in Control Room Checked by MB
Red Light On by MB
Start-Up OKtd by DW Time 12:25 (AM) PM Date 11-22 1955

Loading — same as 9-36 except in slot 17 of the following boxes, fuel has been added in place of s.s.

Box	fuel	Box	fuel
7	4-20	30	10½-23
11	#507	35	3-1
16	10½-21	39	505.
20	1-9		
26	1-11		

Critical Conditions:

Height	109.3 cm.	Log N	0.15
Central	24.15 in	R-1	2.2 (50×100)
Eccentric	0.01 in	Temp	74°F
Blade	15.255 in	DC-3	68 (1×50)
Rod	29.05 in		

Total nominal loading: [redacted] kg U^{25}
17.33 kg U^{25} DUPW
or 17.31 kg corrected for blade position. MB

11-22-55

Data continued in book # 5055.

Plan view of reactor, showing notation
Slots in boxes numbered 1 to 18 going from
East to West.

Date _____

C.A. _____ Exp. _____ Run _____

East

	1	2	3	4	5	6	7
A	Source ↓ X	1	2	3	4	5	
B	6	7	8	(9)	10	11	12
C	13	14	15	16	17	18	19
D	20	(21)	22	(23)	24	(25)	26
E	27	28	29	30	31	32	33
F	34	35	36	(37)	38	39	40
G	External Rod	41	42	43	44	45	External Rod

Safety Blade

West

Fuel Element Boxes

Box #	Wt	Box #	Wt.
1	2049	26	1983
2	2010	27	2020
3	2010	28	2005
4	2023	29	2017
5	2056	30	1993
6	2012	31	2017
7	1992	32	
8	2045	33	
9	1979	34	
10	1974	35	
11	1994	36	
12	1999	37	
13	2010	38	
14	2025	39	
15	2027	40	
16	1997	41	
17	2003	42	
18	2014	43	
19	2024	44	
20	2010	45	
21	1995	Total	
22	1976	Avg. 2016	
23	2017	Avg density 7.89 (Blosser)	
24	2011		
25	2024		

↑ Blosser

Stainless Steel Sheets

Serial #	Wt.	Serial #	Wt.
1-1		1-26	
1-2		1-27	
1-3		1-28	
1-4		1-29	
1-5		1-30	
1-6		1-31	
1-7		1-32	
1-8		1-33	
1-9		1-34	
1-10		1-35	
1-11		1-36	
1-12		1-37	
1-13		1-38	
1-14		1-39	
1-15		1-40	
1-16		1-41	
1-17		1-42	
1-18		1-43	
1-19		1-44	
1-20		1-45	
1-21			
1-22			
1-23		Total	9193 g
1-24			
1-25			

stainless, cont

Serial #	Wt.	Serial #	Wt.
2-1		2-26	
2-2		2-27	
2-3		2-28	
2-4		2-29	
2-5		2-30	
2-6		2-31	
2-7		2-32	
2-8		2-33	
2-9		2-34	
2-10		2-35	
2-11		2-36	
2-12		2-37	
2-13		2-38	
2-14		2-39	
2-15		2-40	
2-16		2-41	
2-17		2-42	
2-18		2-43	
2-19		2-44	
2-20		2-45	
2-21			
2-22			
2-23		Total	9,192
2-24			
2-25			

Serial #	Wt.	Serial #	Wt.
3-1	204.9	3-26	206.6
3-2	209.5	3-27	206.2
3-3	212.2	3-28	208.9
3-4	203.8	3-29	205.0
3-5	199.1	3-30	202.1
3-6	196.8	3-31	208.7
3-7	199.2	3-32	200.5
3-8	208.5	3-33	208.4
3-9	207.2	3-34	212.3
3-10	208.8	3-35	212.1
3-11	205.0	3-36	198.4
3-12	205.4	3-37	207.3
3-13	199.0	3-38	206.6
3-14	206.7	3-39	199.2
3-15	195.8	3-40	204.7
3-16	196.8	3-41	199.7
3-17	199.3	3-42	205.4
3-18	200.4	3-43	200.4
3-19	201.3	3-44	208.9
3-20	212.2	3-45	203.2
3-21	201.7	Total	9182.9
3-22	211.4		
3-23	195.2	Total	9191
3-24	203.6		
3-25	194.5		

stainless, cont

Serial #	Wt		Serial #	Wt.
4-1				
			Total	9 191 g

Serial #	Wt.		Serial #	Wt.
5-1	211.2		5-26	203.9
5-2	203.1		5-27	200.1
5-3	199.1		5-28	199.2
5-4	199.4		5-29	203.3
5-5	212.4		5-30	207.3
5-6	193.2		5-31	206.9
5-7	198.9		5-32	208.9
5-8	207.2		5-33	207.8
5-9	205.9		5-34	208.2
5-10	208.2		5-35	211.0
5-11	200.5		5-36	211.7
5-12	198.9		5-37	209.4
5-13	198.4		5-38	205.3
5-14	197.0		5-39	210.0
5-15	200.0		5-40	205.3
5-16	196.2		5-41	212.7
5-17	196.8		5-42	205.3
5-18	197.8		5-43	203.0
5-19	198.2		5-44	207.2
5-20	197.7		5-45	209.2
5-21	209.3		Total	9186.1
5-22	203.2			
5-23	205.8		Total	9 192
5-24	207.8			
5-25	204.2			

stainless, cont

Serial #	Wt.	Serial #	Wt.
6-1			

Serial #	Wt.	Serial #	Wt.
7-1			

stainless, cont.

Serial #	Wt.	Serial #	Wt.
8-1	204.4	8-26	
8-2	209.0		
8-3	210.0		
8-4	210.6		
8-5	210.8		
8-6	205.0		
8-7	205.1		
8-8	205.9		
8-9	200.8		
8-10	209.9		
8-11	211.2		
8-12	193.6		
8-13	194.2		
8-14	192.2		
8-15	202.2		
8-16			
8-17			
8-18			
8-19			
8-20			
8-21			
8-22			
8-23			
8-24			
8-25			

Serial #	Wt.	Serial #	Wt.
9-1	212.5		
9-2	203.9		
9-3	212.5		
9-4	204.8		
9-5	204.1		
9-6	194.1		
9-7	209.7		
9-8	204.9		
9-9	211.4		
9-10	209.5		
9-11	192.1		
9-12	202.3		
9-13	202.0		
9-14	202.0		
9-15	202.1		
9-16			

steinless, cont

Serial #	Wt	Serial #	Wt
10-1	202.8		
10-2	209.4		
10-3	208.3		
10-4	201.4		
10-5	200.6		
10-6	203.6		
10-7	202.9		
10-8	200.0		
10-9	200.5		
10-10	207.2		
10-11	210.8		
10-12	210.3		
10-13	204.6		
10-14	199.2		
10-15	208.1		
10-16			

Serial #	Wt.	Serial #	Wt.
11-1	196.0		
11-2	209.7		
11-3	202.1		
11-4	199.3		
11-5	199.2		
11-6	198.8		
11-7	199.8		
11-8	212.6		
11-9	202.4		
11-10	202.0		
11-11	195.7		
11-12	195.0		
11-13	201.7		
11-14	202.7		
11-15	193.9		
11-16			

stainless, cont

Serial #	Wt	Serial #	Wt
12-1	205.2		
12-2	203.9		
12-3	205.2		
12-4	205.9		
12-5	205.2		
12-6	209.0		
12-7	201.6		
12-8	201.7		
12-9	201.9		
12-10	207.6		
12-11	200.6		
12-12	211.9		
12-13	212.3		
12-14	205.1		
12-15	200.0		
12-16			

Serial #	Wt.		Serial #	Wt.
13-1				

stainless, cont.

Serial #	Wt.
14-1	199.9
14-2	207.5
14-3	208.8
14-4	203.9
14-5	202.0
14-6	203.9
14-7	203.8
14-8	206.5
14-9	210.4
14-10	204.4
14-11	201.5
14-12	205.8
14-13	203.6
14-14	207.3
14-15	210.8
14-16	

Serial #	Wt.

Serial #	Wt.
15-1	

Serial #	Wt.

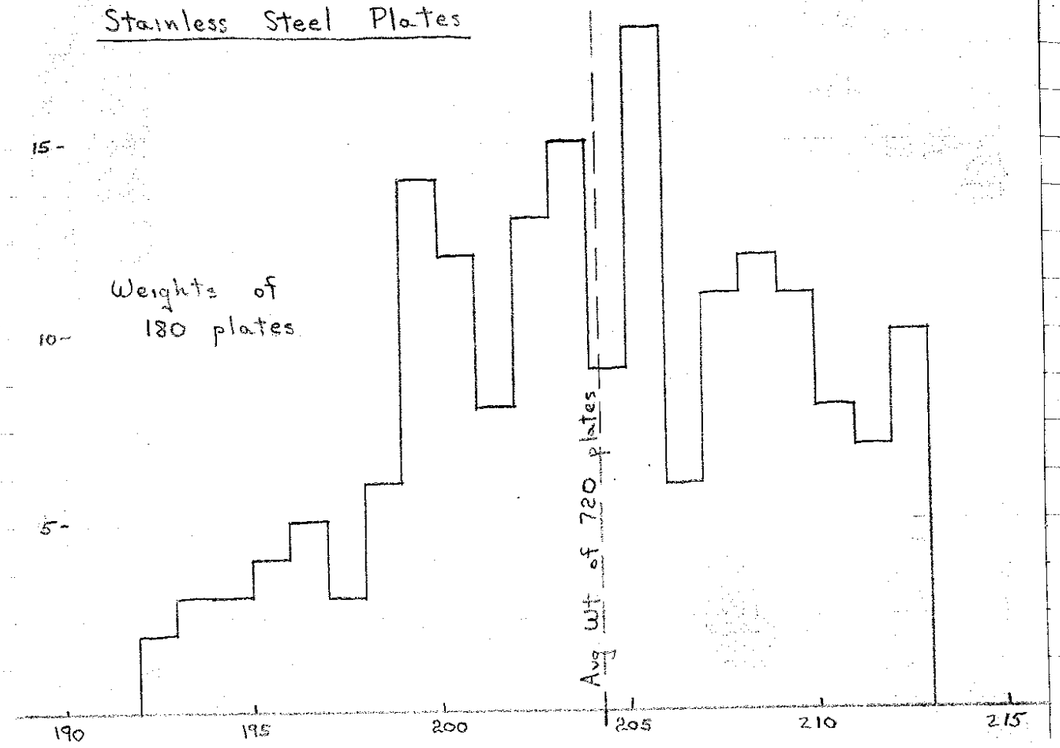
stainless, concluded

Serial #	Wt	Serial #	Wt.
16-1			

Stainless Steel Plates

Slot Group	Total Weight D. Magnusson	Total Wt. H. Blosser
1	9193 g	9197.5
2	2	7.6
3	1	7.3
4	1	7.4
5	2	7.5
6	3	6.9
7	2	7.5
8	4	7.4
9	5	7.6
10	1	7.3
11	2	7.1
12	4	7.1
13	0	7.8
14	2	7.6
15	2	7.4
16	2	7.2
Aver.	9192.25 g	9197.4
Plate Aver.	204.27_{22} g	204.4
Avg Density		7.92

Stainless Steel Plates



* Replaced 10/20/55

Fuel Plates

	Our #	MAC #	Gross Wt	U. Wt.
	1-1	123	212.7	33.3447
	1-2	124	214.7	33.5171
	1-3	125	215.2	33.5706
	1-4	126	213.3	33.5597
	1-5	127	215.5	33.3329
	1-6	128	212.9	33.4345
	1-7	129	215.9	33.5230
	1-8	130	215.0	33.3290
*	1-9	21	213.4	33.3944
	1-10	23	213.3	33.3233
*	1-11	24	212.9	33.5644
	1-12	25	212.3	33.2138
	1-13	26	213.8	33.4810
	1-14	28	213.8	33.4150
*	1-15	29	213.2	33.3423
*	1-16	30	213.2	33.2364
*	1-17	31	213.8	33.6000
	1-18	32	213.3	33.3754
*	1-19	34	212.7	33.5484
	1-20	1	214.9	33.329
	1-21	2	215.7	33.431
	1-22	3	213.3	33.470
	1-23	4	213.7	33.283
	1-24	5	213.7	33.270
	1-25	8	213.3	33.372

Our #	MAC #	Gross Wt.	U. Wt.
1-26	12	211.9	33.374
1-27	13	212.6	33.412
1-28	14	213.8	33.454
1-29	150	214.0	33.3600
1-30	151	214.6	33.5325
1-31	152	214.6	33.3677
1-32	154	214.8	33.4840
1-33	155	214.3	33.5144
1-34	156	213.3	33.4446
1-35	157	214.2	33.3329
1-36	158	213.7	33.3710
1-37	159	213.1	33.3862
1-38	160	214.7	33.5570
1-39	161	211.7	33.5238
1-40	162	215.0	33.4215
1-41	163	214.1	33.3844
1-42	164	213.0	33.2022
1-43	165	213.4	33.2284
1-44	166	214.1	33.3782
1-45	35	212.2	33.3372
		9618.6	1503.3269

Our #	MAC #	Gross Wt.	U. Wt.
2-1	36	212.5	33.4473
2-2	38	213.0	33.2893
2-3	40	212.6	33.3985
2-4	41	212.1	33.4098
2-5	42	212.5	33.3976
2-6	43	212.8	33.4887
2-7	44	213.1	33.5590
2-8	46	213.9	33.5324
2-9	47	212.0	33.4693
2-10	48	212.5	33.5873
2-11 *	49	212.2	33.3125
2-12	50	213.9	33.5860
2-13	51	214.0	33.4159
2-14	52	214.1	33.4221
2-15	53	213.3	33.3394
2-16	54	211.9	33.4046
2-17	55	213.7	33.3565
2-18	56	214.2	33.5758
2-19	57	214.1	33.3917
2-20	58	214.0	33.4940
2-21	59	214.1	33.4007
2-22	60	213.1	33.5747
2-23	76	213.6	33.3954
2-24	77	213.9	32.4033
2-25	78	214.0	32.2956

Our #	MAC #	Gross Wt.	U. Wt.
2-26	79	214.3	33.5273
2-27	80	213.3	33.4251
2-28	82	213.2	33.5161
2-29	83	214.1	33.4354
2-30	84	214.0	33.5380
2-31	85	213.3	33.5690
2-32	86	214.1	33.5322
2-33	87	214.3	33.4430
2-34	A-900	214.2	33.4350
2-35	A-905	213.8	33.5100
2-36	62	212.9	33.3140
2-37	63	214.5	33.4940
2-38	64	212.8	33.3845
2-39	65	213.0	33.5072
2-40	66	212.7	33.3895
2-41	67	214.7	33.4310
2-42	69	212.3	33.5643
2-43	110	212.8	33.2175
2-44	111	212.7	33.4918
2-45	113	213.7	33.4683
		9601.8	1505.1406

Our #	MAC #	Gross Wt.	U. Wt.	
3-1	115	213.2	33.2010	Salvaged Y-12 4-19-56
* 3-2	116	212.4	33.4862	Destroyed 10-17
3-3	117	212.8	33.4350	
3-4	A-904	214.0	33.5190	
3-5	118	212.5	33.2615	
3-6	120	212.7	33.5358	
3-7	A-122	212.5	33.4920	
3-8	89	213.8	33.247	
3-9	90	213.9	33.356	
3-10	91	213.8	33.394	
3-11	92	213.9	33.540	
3-12	93	213.8	33.587	
3-13	94	214.3	33.311	
3-14	95	213.5	33.316	
3-15	96	212.2	33.221	
3-16	97	213.8	33.433	
3-17	99	213.6	33.370	
3-18	A-907	213.8	33.266	
3-19	100	213.9	33.3946	
3-20	101	214.9	33.4223	
3-21	102	215.2	33.4683	
3-22	103	213.8	33.5656	
3-23	104	212.2	33.4536	
3-24	105	212.4	33.4115	
3-25	106	215.9	33.8219	

Our #	MAC #	Gross Wt.	U. Wt.
3-26	107	212.5	33.3643
3-27	108	212.3	33.4880
3-28	109	212.9	33.4627
3-29	132	213.5	33.3650
3-30	134	212.8	33.4658
3-31	137	213.8	33.3332
3-32	138	212.8	33.2760
3-33	139	213.6	33.4340
3-34	141	213.9	33.5434
3-35	142	213.3	33.5650
3-36	143	213.6	33.3420
3-37	147	213.5	33.2612
3-38	172	213.5	33.451
3-39	173	213.6	33.235
* 3-40	182	214.2	33.510
3-41	183	215.5	33.502
3-42	A-189	216.5	33.452
3-43	A-190	214.9	33.402
3-44	191	215.6	33.504
3-45	192	215.6	33.409
		9616.7	1503.2749

Qur #	MAC #	Gross Wt.	N. Wt.
4-1	193	214.6	33.259
4-2	195	213.5	33.545
4-3	196	214.7	33.312
4-4	197	214.4	33.580
4-5	199	213.6	33.339
4-6	227	213.4	33.201
4-7	228	214.4	33.584
4-8	229	214.2	33.465
4-9	230	214.7	33.566
4-10	231	213.7	33.422
4-11	232	213.6	33.441
4-12	233	214.2	33.484
4-13	200	215.1	33.297
4-14	201	214.0	33.497
4-15	212	213.9	33.482
4-16	213	213.9	33.550
4-17	214	214.7	33.400
4-18	219	214.1	33.569
4-19	220	214.0	33.525
* 4-20	221	214.2	33.344
4-21	222	215.2	33.492
4-22	225	214.2	33.430
4-23	226	213.7	33.528
4-24	234	213.9	33.425
4-25	235	214.0	33.514

Qur #	MAC #	Gross Wt.	N. Wt.
4-26	236	214.2	33.448
* 4-27	237	215.0	33.371
4-28	238	214.0	33.293
4-29	239	214.1	33.283
4-30	240	213.7	33.294
4-31	241	215.0	33.536
4-32	242	215.8	33.509
4-33	243	214.1	33.563
4-34	244	214.1	33.457
4-35	245	213.8	33.578
4-36	246	214.4	33.379
4-37	247	214.5	33.370
4-38	248	214.3	33.484
4-39	A-908	214.4	33.295
4-40	249		33.369
4-41	250		33.432
4-42	251		33.550
4-43	252		33.501
4-44	253		33.202
4-45	A254		33.600
			1504.665

Our #	MAC #	Gross Wt.	U. Wt.
5-1	H-938	197.6	16.7812
5-2	H-939	197.2	16.7846
5-3	H-920	197.2	16.767
5-4	H-921	197.8	16.615
5-5	H-922	197.6	16.705
5-6	H-923	197.5	16.718
5-7	H-924	196.9	16.797
5-8	H-925	197.0	16.705
5-9	H-928	196.6	16.713
5-10	H-901	196.5	16.7216
5-11	H-902	196.3	16.7786
5-12	H-903	196.2	16.6711
5-13	H-904	196.1	16.7439
5-14	H-905	197.2	16.7810
5-15	H-906	196.7	16.7201
5-16	H-907	195.8	16.7510
5-17	H-909	197.5	16.6897
5-18	H-910	198.6	16.7465
5-19	H-911	198.2	16.7153
5-20	H-912	198.7	16.7198
5-21	H-913	198.0	16.7633
5-22	H-933	196.3	16.6190
5-23	H-935	196.8	16.6620
5-24	H-936	196.2	16.6960
5-25	H-929	196.3	16.7530

Our #	MAC #	Gross Wt.	U. Wt.
5-26	H-930	196.2	16.7610
5-27	H-932	196.3	16.7526
5-28	H-927	197.4	16.774
5-29	H-938	196.8	16.617
5-30	H-939	196.5	16.693
5-31	H-940	197.2	16.709
5-32	H-942	197.1	16.708
5-33	H-943	197.9	16.791
5-34	H-944	197.4	16.722
5-35	H-945	197.9	16.772
5-36	H-946	197.7	16.681
5-37	H-947	197.4	16.740
5-38	H-948	197.6	16.695
5-39	H-949	197.9	16.670
5-40	H-950	197.8	16.789
5-41	H-953	197.8	16.704
5-42	H-954	196.6	16.770
5-43	H-955	198.0	16.745
5-44	H-956	196.6	16.785
5-45	H-957	198.4	16.703
		8873.1	752.6973

Our #	MAC #		
6-1	319	33.443	
6-2	320	.233	
6-3	321	.338	
6-4	322	.289	
6-5	323	.384	
6-6	324	.256	
6-7	325	.465	
6-8	326	.222	
6-9	~~328-A~~ 327-A	.231	299.861
6-10	351	.288	
6-11	352	.522	
6-12	353	.310	
6-13	354	.250	
6-14	A-355	.551	
6-15	356	.567	
6-16	357	.296	
6-17	358	.322	
6-18	359	.304	
6-19	A-360	.540	
6-20	361	.540	
6-21	362	.567	
6-22	363	.516	
6-23	364	.565	
6-24	365	.595	
6-25	366	.596	

Our #	MAC #		
6-26	A-367	33.592	
~~6-27~~ 6-27	~~A-368~~ A-368	.330	
~~6-28~~ 6-28	A-369	.547	
6-29	A-370	.534	
6-30	A-371	.211	
6-31	A-372	.264	735.807
* 6-32	[redacted]329	33.375	
6-33	330	.373	
6-34	331	.379	
6-35	332	.363	
6-36	333	.405	
6-37	334	.520	
6-38	335	.526	
6-39	336	.562	
* 6-40	337	.437	
6-41	338	.477	
6-42	339	.488	
6-43	340	.510	
6-44	341	.442	
6-45	342	.338	468.195
		1503.863	

	MAC No.		
7-1	A 272	33.438	
7-2	A 273	.455	
7-3	274	.310	
7-4	275	.478	
7-5	~~276 277~~	.466	
7-6	277	.422	
7-7	A 279	.520	
7-8	A 280	.493	
7-9	A 281	.248	
7-10	A 282	.281	
7-11	A 283	.560	
7-12	A 284	.588	
7-13	A 285	.508	
7-14	A 286	.421	
7-15	A 287	.449	
7-16	A 288	.224	
7-17	290	.546	
7-18	291	.325	
7-19	A 292	.214	634.946
7-20	294	.540	
7-21	295	.508	
7-22	296	.568	
7-23	298	.431	
7-24	299	.580	
7-25	300	.429	

7-26	301	33.492	
7-27	302	.488	
7-28	A 303	.419	
7-29	304	.230	
7-30	A 305	.458	
7-31	306	.559	
7-32	307	.548	
7-33	A 308	.504	468.754
7-34	A 309	.546	
7-35	310	.542	
7-36	311	.487	
7-37	312	.424	133.999
7-38	A 314	.438	
7-39	315	.267	
7-40	A 316	.589	
7-41	A 317	.482	133.776
7-42	343	.385	
7-43	A 344	.412	
7-44	345	.339	
7-45	A 346	.385	133.521
		1504.996	

Replacement Plates 10/20/56

	Our #	MAC #	
12	1-9A	257	33.557
12	1-11A	350	.317
	1-15A	348	.384
	1-16A	347	.441
	1-17A	270	.451
	1-19A	~~35~~ 265	.540
12	2-12A	263	.347
	3-2A	266	.340
	3-41A	267	.550
	4-20A	74	.581
12	4-27A	73	.485
12	4-28A	71	.463
12	6-32A	261	.495
	6-40A	260	.579 ~~.473~~

Extra Half-Plates)

950
951
958
959
960
961

Extra Plates) (Not in series)

259
264

Our #	MAC #		
8-1	373	33.393	
8-2	374	.478	
~~8-4~~ 8-3	375	.432	
8-4	A 376	.589	
8-5	377	.377	
8-6	A-380	~~.586~~ .572	
8-7	381	.385	
8-8	382	~~.515~~ .572	
8-9	A-383	~~.585~~ .585	
8-10	384	~~.519~~ .519	
8-11	385	.352	
8-12	386	.575	
8-13	A387	.480	435.067
8-14	388	.463	
8-15	389	.530	
8-16	390	.527	
8-17	391	.450	
8-18	392	.526	
8-19	393	.413	
8-20	394	.423	
8-21	395	.373	
8-22	396	.442	
8-23	397	.428	
8-24	398	478	
8-25	399	510	
8-26	400	268	

8-27	401	.331	
8-28	402	.472	
8-29	403	.502	
8-30	404	.486	
8-31	405	.535	669.026
8-32	406	.359	
8-33	407	.510	
8-34	A-408	.591	
8-35	A-409	.520	
8-36	410	.509	
8-37	411	.490	
8-38	412	.461	
8-39	413	.200	
8-40	414	.593	
8-41	415	.565	
8-42	416	.438	
8-43	417	.345	
8-44	418	.208	
8-45	A419	.537	401.457
		1505.550	

Our #	MAC #		
9-1	A420	33.589	
9-2	A 421	.362	
9-3	422	.481	100.432
9-4	423	.527	
9-5	424	.402	
9-6	426	.559	
9-7	427	.371	
9-8	428	.280	
9-9	429	.372	
9-10	430	.477	
9-11	431	.399	
9-12	432	.530	
9-13	433	.596	
9-14	434*	.545	
9-15	436	.273	
9-16	437	.525	
9-17	439	.556	
9-18	438	.463	501.875
9-19	440	.495	
9-20	441	.588	
9-21	442	.538	
9-22	A443	.388	
9-23	444	.255	
9-24	445	.256	
9-25	446	.241	
9-26	447	.438	

9-27	448	33.538	
9-28	449	.600	
9-29	450	.423	
9-30	451	.391	
9-31	A452	.427	
9-32	453	.585	
9-33	454	.512	
9-34	455	.291	
9-35	456	.489	
9-36	457	.264	
9-37	458	.283	
9-38	A459	.555	
9-39	A461	.389	
9-40	A462	.526	735.472
9-41	463	.367	
9-42	464	.387	
9-43	465	.449	
9-44	466	.532	
9-45	467	.517	167.252
		1505.031	

* plate # 435 was cut open for inspection.

Our #	MAC #		
10-1	468	33.368	
10-2	469	.253	
10-3	470	.396	
10-4	471	.406	
10-5	472	.548	
10-6	473	.430	
10-7	474	.214	
10-8	A 475	.577	
10-9	476	.296	
10-10	477	.549	
10-11	478	.434	
10-12	479	.467	
10-13	A 480	.532	
10-14	481	.448	
10-15	A 482	.438	
10-16	483	.452	
10-17	A 484	.584	
10-18	A 485	.514	601.906
10-19	A 486	.448	
10-20	488	.452	
10-21	489	.523	
10-22	490	.501	
10-23	491	.450	
10-24	492	.368	
10-25	493	.292	

Our #	MAC #		
10-26	494	.515	
10-27	495	.341	
10-28	496	.377	
10-29	487	.447	
10-30	497	.388	
10-31	498	.342	
10-32	499	.567	
10-33	A 500	.587	
10-34	502	.432	
10-35	503	.475	
10-36	504	.430	601.935
10-37	61	.428	
10-38	70	.578	
10-39	72	.282	
10-40	75	.381	
10-41	255	.596	
10-42	256	.535	
10-43	258	.557	
10-44	262	.494	
10-45	A 269	.557	301.508
		1505.249	

11-1	A-518	33.	
11-2	A-519	.	
11-3	520	.	
11-4	521	.	
11-5	522	.	
11-6	523	.	
11-7	A-524	.	
11-8	A-525	.	
11-9	526	.	
11-10	527	.	
11-11	A-528	.	
11-12	529	.	
11-13	530	.	
11-14	531	.	
11-15	532	.	
11-16	A-533	.	
11-17	A-534	.	
11-18	A-535	.	
11-19	A-536	.	635.930
11-20	538		
11-21	539		
11-22	540		
11-23	541		
11-24	543		
11-25	544		
11-26	A 545		.
11-27	546		.
11-28	A 548		300.749
11-29	549		[illegible]
11-30	550		
11-31	551		
11-32	552		
11-33	A-553		
11-34	554		
11-35	555		
11-36	A-556		
11-37	557		
11-38	558		
11-39	A 559		
11-40	560		
11-41	A 561		
11-42	562		
11-43	563		
11-44	564		
11-45	A 565		568.921
			1505.600

Ourth

12-1	566
12-2	A567
12-3	612 FC
12-4	613 FC
12-5	614 FC
12-6	615 FC
12-7	616 FC
12-8	617 FC
12-9	618 FC
12-10	619 FC
12-11	620 FC
12-12	621 FC
12-13	622 FC
12-14	623 FC
12-15	624 FC
12-16	625 FC
12-17	626 FC
12-18	627 FC
12-19	628 FC
12-20	629 FC
12-21	630 FC
12-22	631 FC
12-23	663
12-24	664
12-25	665

33.513
.332 66.845

669.644

12-26	666
12-27	667
12-28	668
12-29	669
12-30	670
12-31	671
12-32	672
12-33	673
12-34	674
12-35	675
12-36	676
12-37	677
12-38	678
12-39	679
12-40	680
12-41	681
12-42	682
12-43	683
12-44	684
12-45	A-271

736.806
33.424

1506.719

This series made at Y-12

(21)	13-1	595	33.33
	2	594	33.33
	3	597	33.33
	4	611	33.33
	5	601	33.33
	6	608	33.33
	7	603	33.33
	8	609	33.33
	9	593	33.33
	10	600	33.33
	11	658	33.42
	12	656	33.42
	13	661	33.42
	14	655	33.42
	15	657	33.42
	16	654	33.42
	17	659	33.42
	18	662	33.42
	19	696	33.53
	20	691	33.53
	21	687	33.53
	22	693	33.53
	23	689	33.53
	24	688	33.53
	25	694	33.53

	13-26	690	33.53
	27	692	33.53
	28	686	33.53
	29	685	33.53
	30	633	33.47
	31	632	33.47
	32	640	33.47
	33	635	33.47
	34	650	33.47
	35	647	33.47
	36	648	33.47
	37	644	33.47
	38	651	33.47
	39	649	33.47
	40	642	33.47
	41	643	33.43
	42	636	33.43
	43	639	33.43
	44	646	33.43
	45	645	33.43
			1504.81

1002.96

(22)

This series Made at Y-12

		Y-12 on MAC wt	9213 wt	
(22) 14-1	638	33.43		
2	652	33.43		
3	637	33.43		
4	624?	33.43		
5	641	33.43		
not in bundle 6	435	(33.547)	33.123_2	Made at 9213
not in bundle 7	537	33.366	33.388_2	with Silicone Adh.
8	621 not 627	33.47		
9	628	33.47		
10	629	33.47		
with bundle of previous page 11	620	33.47		
12	624	33.47		
13	630	33.47		
14	631	33.47		
15	605	33.35	736.64	
16	592	33.35		
17	610	33.35		
18	591	33.35		
Bundle 16 #s 45 (23) 19	604	33.35		
20	606	33.35		
21	602	33.35		
22	598	33.35		
23	590	33.35		
24	599	33.35		

14-25	572	33.47	
26	575	32.56	
27	576	33.36	
28	578	33.12	
29	580	33.59	
30	581	33.58	
31	582	32.64	
32	585	32.99	
33	589	33.38	
34	625	33.47	
35	626	33.47	
36	568	33.28	
37	569	83.15	
38	570	33.30	
39	571	33.18	
40	573	32.75	
41	574	32.32	
42	577	33.48	
43	579	33.09	
44	583	33.41	
45	584	33.60	997.34
		1498.64	

{378
264
259

	15 - 1	586	33.39
(24)	2	587	32.91
	3	588	33.33
	4	695	33.49
	5	Y-111	33.77
	6	Y-112	33.21
	7	Y-113	33.91
	8	Y-114	33.58
	9	Y-115	33.71
	10	Y-116	33.39
	11	Y-117	33.86
	12	Y-118	34.00
	13	Y-119	33.75
	14	Y420	33.59
	15	Y-121	34.01
	16	Y-122	33.04
	17	Y-123	33.36
	18	Y-124	33.90
			604.20 av = 33.567
	10 special		334.08
			938.28

Summary

				Revised
1	1503.327	-200.686	+200.690	= 1503.331
2	1505.141	- 33.586 (3×2 33.486 Salvaged)	+ 33.347	= 1504.902
3	1503.275	- 66.988	+ 66.890	= 1503.177
4	1504.665	- 99.908	+100.529	= 1505.286
5	752.697			
6	1503.863	- 66.812	+ 67.074	= 1504.125
7	1504.996			
8	1505.550			
9	1505.031			
10	1505.249			
11	1505.600			
12	1506.719			
13	1504.81			
14	1498.64			
18 plates	15	604.20		467.980
8 special		266.567		33.486
10 special		334.08		434.494 (13)
6 halfplates		100.383		
13 Extra		434.494		
3 (378, 264, 259)		100.614		
Grand Total.		22,150.451		
		~~22,039.857~~		
Salvaged Plate		33.486		
		22,183.937		

g × 1/662.5 = 33.4346 / ~~33.4~~ g/plate

× 93.10% = (20,537.708)

× 93.10 20,569

51 halfplates 853.080 g or 16.727 g/plate ×2 = 33,454

Full plates 21,297.391 or × 1/677 = 33.4339 g/plate

EXTRA PLATES

~~#958 16.703~~

958 ✓	16.799	
959 ✓	16.728	
960 ✓	16.613	
961 ✓	16.794	
951 ✓	16.769	
952 ✓	16.680	100.383

507 ✓	33.451	
510 ✓	.339	
511 ✓	.208	
516 ✓	.388	133.386

505 ✓	.452	
506 ✓	.201	
512 ✓	.292	
515 ✓	.236	133.181

10 Foils for extra catcher plates 334.08 g

Scrap 82.7 g

378 ✓	33.586	
264 ✓	33.471	
259 ✓	33.557	
		100.614 g

Foil Plates Fabricated with Silicone Adhesive

Two 1" holes at center

613	✓
614	✓
615	✓
616	✓
617	✓
618	✓
619	✓
621	✓

Holes { 612, 623

Series 1		45	
	2	45	
	3	44	
	4	45	
	5	45	half plates
	6	45	
	7	45	
	8	45	
	9	45	
	10	45	
	11	45	
	12	45	
	13	45	
	14	45	
	15	18	
Replacement Plates		3413	14

No on Barrel	No of Plates	Total uranium	
(1)	30 pc.	~~1004.4~~ ~~903.0~~	
(2)	28	903.0	Hayline 84-73-4
(3)	30	1003.9	
(4)	32	951.9	
(5)	35	970.0	
(6)	29	886.0	Hayline 84-73-5
(7)	31	1036.4	
(8)	30	919.8	
(9)	30	1003.8	
(10)	30	1003.3	Hayline 84-73-6
(11)	30	1003.4	
(12)	23	769.2	
(13)	30	1002.9	
(14)	29	968.9	Hayline 84-73-7
(15)	30	935.6	
(16)	29	969.9	
(17)	35	919.3	
(18)	30	1004.1	
(19)	30	1003.1	Hayline 84-73-8
(X)	No Barrell		
(21)	30	1002.96	
(22)	28	936.64	
(23)	30	997.34	Hayline 84-73-9
(29)	28	938.28	
	689	22,134.12	

~~SECRET~~

Classification Changed to Decl.
Authority of J.H. Kahn Date 6/3/60

~~SECRET~~