BOOK34R

Notes:
"HFIR #1" on spine

Blank pages: inside cover page, inside cover page opposite page 1, 1, 6, 8, 20, 26, 28, 30, 32, 36, 38, 40, 42, 44, 50, 144, 145, 150-152, inside back covers

-2 pieces of paper clipped to page 114

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
August 7, 1999

HFIR Log No. 1

7/10/63 (south) → 6/9/66 (west)

THE PAPER USED IN THIS BOOK WILL GIVE COMPLETE WRITING SATISFACTION. IT WAS SELECTED FROM MANY PAPERS FOR ITS FINE WRITING LEDGER SURFACE

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No. 168 BLANK BOOK

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First Boron concentration { 1.18 mg B/gedi
1.1788 mg B/cc

Exp 131 W/T

Instrument Check on 7-13-63 Source 10 mc Ra

PM-1		Low Trip	OK	Alarm Trip	OK
PM-2				Alarm Trip	OK
IC-1	$>3\times10^{-4}$	Meter Trip	OK	Fast Trip	OK
IC-2	$>3\times10^{-4}$	Meter Trip	OK		
IC-3	Responds	Calibration	JH		
IC-4	Responds	Calibration	JH		
CRM		Meter Trip			

Preliminary Check on 7-13-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JH C.C.

Scrams and Bldg. Alarm Reset JH

Source Inserted C.C.

Safety Withdrawn 26.00

Controls Set Inner 15.0 Outer 0.0

Reflector Water 6" above Be

Moderator Water 25.88

Condition	Inner	Outer	Safety
k>1	19.70	19.80	26.00
k=1		19.54	26.00
k=1	19.62	19.62	26.00
k=1	19.63	19.63	20.77

3PN-97

Bkg	8	cpm 30	145 KV
Delay	16	Burst 10^3	0.9 ma
ch. wd.	160	Beam 7 μa	

1.18 mg/cc Expr 131 A w/Target

Instrument Check on 7-14-64 Source covered

PM-1 Low Trip OK Alarm Trip OK

PM-2 Alarm Trip OK

IC-1 $>3\times10^{-11}$ Meter Trip OK Fast Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip OK

IC-3 Responds Calibration JH

IC-4 Responds Calibration JH

CRM Meter Trip

Preliminary Check on 7-14-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JH c.c.

Scrams and Bldg. Alarm Reset JH

Source Inserted JH

Safety Withdrawn 26.00

Controls Set Inner 19.62 Outer 10.00

Reflector Water 6" above Be.

Moderator Water

Condition	Inner	Outer	Safety
K > 1	19.62	19.85	26.0
K = 1	19.62	19.60	26.0
K = 1	19.61	19.61	26.0
K = 1	19.63	19.63	20.77

"Note" Shut Down to Repair Safety Drive

Cont Exp #131 (B)

12 3-6 PM

Condition	Inner	Outer	Safety
K > 1	19.63	19.86	20.77
K = 1	19.61	19.61	20.77

Expt. 132 W/T

Instrument Check on 7-15-64 Source 10 mc-Y

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ Alarm Trip OK

IC-1 $>3\times10^{-11}$ Meter Trip OK Fast Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip OK

IC-3 Responds Calibration JII

IC-4 Responds Calibration JII

CRM _____ Meter Trip _____

Preliminary Check on 7-15-64

Room 113 Pressure Differential 6.4"

Red Light On and Personnel Check JII C.C.

Scrams and Bldg, Alarm Reset JII

Source Inserted JII Acc.

Safety Withdrawn 26.00

Controls Set Inner 18.00 Outer 18.00

Reflector Water 6" above Be.

Moderator Water 25.82 in.

Expt.	Condition	Inner	outer	3PH # see p. 146
132	K<1	19.00	19.00	98
133	"	18.00	18.00	99
4	"	17.00	17.00	100
5	"	15.00	15.00	101
6	"	13.63	13.63	102
7	"	13.63	19.63	103
8	"	19.63	13.63	104
9	"	19.63	15.00	105
140	K>1	19.63	19.85	
	K=1	19.63	19.61	Rotte -19.1 Control Cyl. Calib.
		19.00	20.35 (24)	
		18.57	21.00	
		18.07	22.00	

Eqn. 140 cont'd

Condition	Inner	Outer	W/T safety
R = 1	17.71	23.00	26.00
	17.45	24.00	
	17.296	25.00	
	17.225	26.00	
	17.20	26.09	
	20.00	19.25	
	21.00	18.48	
	22.00	17.85	
	23.00	17.56	
	24.00	17.29	
	24.70	17.165	

	Condition	Inner	Outer	ϕ/m outer	ϕ/m inner
14	k<1	20.49	18.69 .285 1883		.441
15	k>1	20.49	18.98⁵	.785	
16	k<1	2032 .39 20.10	18.98⁵		.609
17	k>1	20.10	19.14 .325 19.31	.786	
18	k<1	19.82 .56 19.54	19.31		
19	k>1	19.54	1956 .615 19.92⁵		
20	k<1	.35 19.19	19.92⁵		.706
21	k>1	19.19	2019.345 20.27	.596	
22	k<1	1972.27 18.92	20.27		.757
23	k>1	18.92	2026.49 20.66	.416	
24	k<1	1979.27 18.65	20.66		.836
25	k>1	18.65	2087 .425 21.08⁵	.515	
26	k<1	1951.29 18.36	21.08⁵		.907
27	k>1	18.36	2131 .545 21.63	.491	
28	k<1	1925.23 18.13	21.63		.875
29	k>1	18.13	2188 .49 22.12	.341	
30	k<1	1902.23 17.90	22.12		.910
31	R>1	17.90	2245 .65 22.77	.349	
32	k<1	1877.25 17.65	22.77		.966
33	k>1	17.65	2218 .815 23.58⁵	.273	
34	k<1	1854.22 17.43	23.58⁵		.957
35	R>1	17.43	2417 1.185 24.76⁵	1807	
36	k<1	1852.23 17.20	24.76⁵		1.03
37	R>1	17.20	2542 1.325 26.09	.100	

Control Calibration

Expt 141 W/T

Instrument Check on 7-16-64 Source 10 mcf

PM-1		Low Trip	OK	Alarm Trip	OK
PM-2				Alarm Trip	OK
IC-1	$>3\times10^{-11}$	Meter Trip	OK	Fast Trip	OK
IC-2	$>3\times10^{-11}$	Meter Trip	OK		
IC-3	Responds	Calibration	JII		
IC-4	Responds	Calibration	JII		
CRM		Meter Trip			

Preliminary Check on 7-16-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JII C.C.

Scrams and Bldg. Alarm Reset JII

Source Inserted JII

Safety Withdrawn 26.00

Controls Set In: 24.70 Out: 0.0

Reflector Water 6" above Be.

Moderator Water 25.74

	Condition	Inner	Outer	$ / in Outer	$ / in Inner
1.	K>1	24.70	17.40	~~.915~~	
2.	K<1	24.70	17.05 (35) 17.22	.965	
3	K>1	24.70	17.40 (35)		
4	K<1	23171.46 23.24	17.40		.19.92 ~~25.57~~
5	K>1	23.24	17.62 (22) 17.51	.873	
6	K<1	2296.73.5 22.48	17.62 17.25		.317
7	K>1	22.48	17.88 (26)	.919	
8	K<1	21,620 21.86	17.88 17.62		.389
9	K>1	21.86	18.15 (29)	.879	~~.447~~
10	K<1	21,520 21.34	18.15		.447
11	K>1	21.34	18.41 (26.5) 18.28	.866	~~.44~~
12	K<1	21124.45 20.90	18.41 18.55		.452
13	K>1	20.90	18.69 (27.5)	.772	

Foils:

Inner IE-3E location: 37a

Outer OE-96 location: 78b

Norm foil 5 of IE-3G in #4 slot of IE 10F location: 17th slot from 37a

Target ID of IE-3G location 23/32" from ℄

IC of IE-3G location on Surface of Target assembly

Begin Exposure at 8:57 AM Expose 30 min at 1 $\times 10^{-8}$ IC-3

7 $\times 10^{-8}$ IC4

1.8 3.0×10^{-8} IC1

4.7 3×10^{-8} IC2

Foil Exposure Expt. 142 W/T

Instrument Check on 7-17-64 Source 10 mc 8

PM-1		Low Trip	OK	Alarm Trip	OK
PM-2				Alarm Trip	OK
IC-1	$>3\times10^{-11}$	Meter Trip	OK	Fast Trip	OK
IC-2	$>3\times10^{-11}$	Meter Trip	OK		
IC-3	Responds	Calibration	JTT		
IC-4	Responds	Calibration	JTT		
CRM		Meter Trip			

Preliminary Check on 7-17-64

Room 113 Pressure Differential 1.4"
Red Light On and Personnel Check JTT (East on)
Scrams and Bldg. Alarm Reset JTT
Source Inserted JTT
Safety Withdrawn 26.00
Controls Set Inner 19.00 Outer 10
Reflector Water 6" above Be
Moderator Water 2570

Condition	Inner	Outer	
k>1	19.61	19.80	Rhoette 14.4 ϕ
k=1	18.61	19.65	

foils

Inner 1E 15E location 37a

Outer OE 4F " 78b

Norm foil 4 of IE 36 " slot 17 from 37a

Begin Exposure at 8^{52}/AM Expose 30 min.: 1.8 10×10^{-8} IC 1

5.3 3×10^{-8} IC 2

End Exposure at 9^{22}/AM .9 10^{-8} IC 3

5.5 10^{-8} IC 4

foil Expos. Expr. 143 w/T

Instrument Check on 7-20-64 Source 10 mc Ra

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ _____ Alarm Trip OK

IC-1 $>3\times10^{-11}$ Meter Trip OK Fast Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip OK

IC-3 Responds Calibration JN

IC-4 Responds Calibration JN

CRM _____ Meter Trip _____

Preliminary Check on 7-20-64

Room 113 Pressure Differential 64"

Red Light On and Personnel Check JH c.c.

Scrams and Bldg. Alarm Reset JH

Source Inserted JH

Safety Withdrawn 26.00

Controls Set Inner 14.0 Outer 26.09

Reflector Water 6" above Be

Moderator Water 25.24

Condition	Inner	Outer		
k>1	17.44	26.09	Rhoette (18.24)	.83 $/in
k=1	17.22	26.09		

Inter. mag. current.

Have dissolved 72.4 gms of dried $Na_2B_4O_7$ in 2 liters of H_2O.

Expt 144 - add 500 cc of above solution.

Expt 145 " 1000 cc " " " .

Expt 147 " 500 cc " " "

Expt 144 W/T

Instrument Check on 8-21-64 Source 10 mc Be

PM-1 Low Trip OK Alarm Trip OK

PM-2 Alarm Trip OK

IC-1 $> 3 \times 10^{-4}$ Meter Trip OK Fast Trip OK

IC-2 $> 3 \times 10^{-4}$ Meter Trip OK

IC-3 Responds Calibration JH

IC-4 Responds Calibration JH

CRM Preliminary Check on Meter Trip

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JH (east)

Scrams and Bldg. Alarm Reset JH

Source Inserted JH

Safety Withdrawn 26.00

Controls Set Inner 20.00 : Outer

Reflector Water 6" above Be

Moderator Water 25.74

+500 cc

	Condition	Inner	Outer
Expt 144	$k > 1$	20.17	20.17
	$k = 1$	20.17	19.85
+1000 cc			
Expt 145	$k > 1$	21.00	21.15
	$k = 1$	21.00	20.77
Repeat:			
Expt 146	$k > 1$	21.00	21.15
	$k = 1$	21.00	20.77
Add 500cc.			
Expt 147	$k > 1$	21.00	22.31
	$k = 1$	21.00	21.82
	$k = 1$	21.38	21.38

Expt 148

Dissolved 72.4 gms of dried $Na_2B_4O_7$ in 2 liters of H_2O

Expr 148

add 1000 Rc.

	Condition	Inner	Outer
Expr 148	K>1	22.90	23.00
	K=1	22.68	22.68

Add 1000 cc

Expr 149	K=1	24.70	26.09

Removed 1 liter of moderator & added 1 liter of H_2O

	K>1	24.70	25.80
Expr 150	K=1	24.27	24.27

added 300 cc of the removed 1 liter of moderator. (Expr 149)

Expr 151	K=1	24.29	24.29

added 500 cc of the removed 1 liter of moderator (Expr 149)

	K>1	24.70	25.75
	K=1	24.30	24.30

Added 100 cc Boron Sol'n

~~Exp # 152 24.70 26.085~~

	K>1	24.70	26.085	26.00
	K=1	24.70	25.05	26.00

9 40 AM Drain fuel H_2O

10 17

	K>1	24.70	26.085	26.00
	K=1	24.70	25.10	

Expt. 152 W/T

Instrument Check on 7-22-64 Source 10 mc 8

PM-1 — Low Trip OK Alarm Trip OK

PM-2 — Alarm Trip OK

IC-1 $>3\times10^{-11}$ Meter Trip OK Fast Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip OK

IC-3 Responds Calibration JII

IC-4 Responds Calibration JII

GRM — Meter Trip

Preliminary Check on 7-22-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JII cc.

Scrams and Bldg. Alarm Reset JII

Source Inserted JII

Safety Withdrawn 26.00

Controls Set Jn: 24.70 0:20

Reflector Water 6" above Bc

Moderator Water ~26"

Condition	Inner	Outer	
K=1	24.70	26.09	
K=1	24.52	24.52	
Expt 153	Add 100 cc Boron Soln		
	K>1	24.70	26.085	26.00
	K=1	24.70	25.05	26.00
9 40 AM	Drain fuel H_2O		
10 17	K>1	24.70	26.085	26.00
Expt 154	K=1	24.70	25.10	26.00
	Add 100 cc H_2O		
Expt 155	K>1	24.70	26.085	26.0
	K=1	24.70	24.94	26.0
11 10	Add 100 cc H_2O		

Ex1

Foils

Inner: IE 13 A in 37a

Outer: OE 13 F in 78b

Norm 4F of IE 36 - slot 17 from 37a

target 1 2/32 from ℄

1B edge

Reflector 4B on Be

4C 2"

4D 4"

4E 6"

} foils from Plate IE-36

Begin Exposure at 9^45 AM, Expose 30 min

2.1	10×10^{-8}	IC 1
4.9	3×10^{-8}	IC2
1.05	10^{-8}	Ic-3
6.5	10^{-8}	Ic-4

	Condition	Inner	Outer	
Exp. 155	k = 1	24.67	24.67	7.6 #/in.
	k > 1	24.67	26.09	13.5 #/in
	k = 1	23.87	26.09	13.7 #/in
	k < 1	23.37	26.09	

Foil Exposure Expt. 156 w/T

Instrument Check on 7-23-64 Source _____

PM-1 _____ Low Trip ok Alarm Trip ok

PM-2 _____ Alarm Trip ok

IC-1 $>3\times10^{-4}$ Meter Trip OK Fast Trip ok

IC-2 $>3\times10^{-4}$ Meter Trip ok

IC-3 Responds Calibration JH

IC-4 Responds Calibration JH

CRM _____ Meter Trip _____

Preliminary Check on 7-23-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JH E.C. (East)

Scrams and Bldg. Alarm Reset JH

Source Inserted E.C.

Safety Withdrawn 26.00

Controls Set In: 2467 out: 0.0

Reflector Water 6" above Re.

Moderator Water ~26.5"

Condition	Inner	Outer	
k > 1	24.70	26.09	5.15 in/sec ⇒ 124.9 μc ⇒ 8,274
k = 1	24.70	24.93	7.1 #/in

Moderator water sampled has 1.48 #B/l.

Foils:

~~[redacted]~~

Outer plates only

0E 2I in 78b

6G in 155b

7F in 207b

15G in 258b

16F in 315b

16G in 1b

Norm. foil 2 of IE-36 in slot 17 from 37a.

Begin Exposure 92'/Am Expose 30 min. 1.9 10×10^{-8} Ic1

51 3×10^{-8} Ic2

1.05 10^{-8} Ic3

1.5 10^{-8} Ic4

Forks Expt 157 W/T

Instrument Check on 7-24-64 Source 10 mc

PM-1		Low Trip	OK	Alarm Trip	OK
PM-2				Alarm Trip	OK
IC-1	$>3\times10^{-11}$	Meter Trip	OK	Fast Trip	OK
IC-2	$>3\times10^{-11}$	Meter Trip	OK		
IC-3	Responds	Calibration	JH		
IC-4	Responds	Calibration	JH		
GRM		Meter Trip			

Preliminary Check on 7-24-64

Room 113 Pressure Differential 14

Red Light On and Personnel Check JH C.C.

Scrams and Bldg. Alarm Reset JH

Source Inserted JH

Safety Withdrawn 26.00

Controls Set Inner 24.70 Outer 20.00

Reflector Water 6" above Be

Moderator Water ~26.5"

Condition	Inner	Outer	
$k>1$	24.70	26.09	
$k=1$	24.70	25.35	

Expt 158 Added 100cc H_2O

$k>1$	24.70	26.09	W/source
$k=1$	24.70	24.96	

Expt. 15-9

Instrument Check on 7-31-69 Source 10 mc Ra

PM-1 _____ Low Trip OK ~~Alarm~~ Trip OK

PM-2 _____ ~~Alarm~~ Trip OK

IC-1 $>3\times10^{-4}$ Meter Trip OK Fast Trip OK

IC-2 $>3\times10^{-4}$ Meter Trip OK

IC-3 Responds Calibration JH

IC-4 Responds Calibration JH

CRM _____ Meter Trip _____

Preliminary Check on 7-31-69

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check _____

Scrams and ~~Bldg. Alarm~~ Reset JH

Source Inserted Source Acc.

Safety Withdrawn 20.27

Controls Set Same 24.70

Reflector Water ~6" above Be

Moderator Water ~27"

Condition	Inner	Outer	Safety	
k>1	24.70	26.09	26.01	
k=1	24.70	26.34	26.01	
k=1	24.70	25.54	20.76	
k<1	24.70	25.34	26.01	
k<1	19.61	19.61	26.01	3PN-107

add 125 cc H_2O mixed for ½ hr.

Expt. 163

Instrument Check on 8-3-64 Source 10 mc Ra.

N-1		Low Trip	OK	~~Alarm~~ Trip	OK
N-2				~~Alarm~~ Trip	OK
C-1	$> 3 \times 10^{-11}$	Meter Trip	OK	Test Trip	OK
C-2	$> 3 \times 10^{-11}$	Meter Trip	OK		
C-3	Check	Calibration			
C-4	Response	Calibration	III		
TM		Meter Trip			

Preliminary Check on 8-3-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JII - C.C.

Scrams and ~~Bldg. Alarm~~ Reset JII

Source Inserted C.C.

Safety Withdrawn 26.00

Controls Set Inner 24.70 Outer 0.0

Reflector Water 6" above Bc.

Moderator Water ~27"

Condition	Inner	Outer	Safety
k=1	24.70	26.09	26.00
k=1	24.70	25.30	26.00
k=1	24.70	25.47	26.76
added 100 cc H_2O			
k=1	24.20	25.12	26.00
added 100 cc H_2O			
k=1	24.70	24.85	26.00

take sample of (B.) moderator

Sample 5 A. 1.49 g/l B.

Expt 164 W/T

Instrument Check on 8-4-64 Source 10 mcf

PM-1 _____ Low Trip OK ~~Alarm~~ Trip OK

PM-2 _____ ~~Alarm~~ Trip OK

IC-1 $> 3 \times 10^{-11}$ Meter Trip OK Fast Trip OK

IC-2 $> 3 \times 10^{-11}$ Meter Trip OK

IC-3 — Calibration — alarm ✓

IC-4 Responds Calibration JTT

CRM _____ Meter Trip _____

Preliminary Check on 8-4-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JTT cc.

~~Scrams and Bldg, Alarm~~ Reset JTT

Source Inserted JTT

Safety Withdrawn 26.00

Controls Set Inner 24.70; Outer 00

~~Reflector~~ Water 6" above Be.

Moderator Water ~ 26.00

Condition	Inner	outer	Rhotte
$k>1$	24.70	26.09	6.48 ¢
$k=1$	24.70	24.94	
$k<1$	24.70	24.31	-7.73
$k=1$	24.70	25.09	

Out of D^2

Expt 165 w/T

Instrument Check on 8-5-64 Source Cs mc V

PM-1 _____ Low Trip OK Alarm Trip ✓

PM-2 _____ _____ ~~Alarm~~ Trip ✓

IC-1 $>3\times10^{-4}$ Meter Trip ✓ Test Trip ✓

IC-2 $>3\times10^{-4}$ Meter Trip OK _____

IC-3 ✓ Calibration JII _____

IC-4 ✓ Calibration JII _____

CRM _____ Meter Trip _____ _____

Preliminary Check on 8-5-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check C.C.

Scrams and ~~Bldg. Alarm~~ Reset JII

Source Inserted JII

Safety Withdrawn

Controls Set

Reflector Water

Moderator Water

Condition	Inner	Outer	Safety	
K=1	24.70	25.42.5	26.00	
k=1	24.70	25.59	20.76	3PN-111 see p146.
k<1	24.70	25.59	20.76	

neg period 126 div/sec. 2738 sec ⇒ ℓ = -.4724

k ≅ .99968

dw/sec	T	P
11.5	248.9	4.59
13.35	290.1	-5.18
10.9	236.8	4.81
14.05	305.3	-4.88

Expt 166 W/T

Instrument Check on 8-6-64 Source 10 mc Ra

PM-1		Low Trip ✓	~~Alarm~~ Trip ✓
PM-2			~~Alarm~~ Trip ✓
IC-1	$> 3\times10^{-11}$	Meter Trip ✓	Fast Trip ✓
IC-2	$> 3\times10^{-11}$	Meter Trip ✓	
IC-3	~~Responds~~	Calibration JH	
IC-4	Responds	Calibration JH	
CRM		Meter Trip	

Preliminary Check on 8-6-64

Room 113 Pressure Differential 1.4"

~~Red Light On and Personnel Check~~ JH

Scrams and ~~Bldg. Alarm~~ Reset JH

Source Inserted JH - Acc.

Safety Withdrawn 26.00

Controls Set Inner 24.70 Outer 23.00

Reflector Water 6" above Be

Moderator Water ~26"

Condition	Inner	Outer	
$K \simeq 1$	24.70	26.09	slight positive period ~1¢
added 150 cc H_2O to Moderator		¢	Rhoette
$K > 1$	24.70	26.09	+4.59
$K = 1$	24.70	25.27	-5.18
$K < 1$	24.70	24.72	+4.81
$K > 1$	24.70	26.09	+4.88

Expr. 256 W/T Eu_2O_3 Cylinders.

2^{43} PM.

Moderator water contains ~1.48 gB/l.

Condition	Inner	Outer	Safety
			26.00
k>1	25.00	23.65	26.00
R=1	24.09	23.65	26.00

Add 150 cc of Borated? Water. Expr. 257

R>1	25.00	24.12	26.00
R=1	24.12	24.12	

Add 200 cc of Borated? Water Expr. 258

Expt 258

Instrument Check on 11-25-64 Source 10 mc Ra

PM-1 Low Trip OK ~~Alarm~~ Trip OK

PM-2 ~~Alarm~~ Trip OK

IC-1 > 10 x 10^-12 Meter Trip Fast Trip

IC-2 — Meter Trip out

IC-3 Responds Calibration JII

IC-4 Responds Calibration JII

CRM Meter Trip

Preliminary Check on 11-25-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check JII CC

Scrams and Bldg. Alarm Reset JII

Source Inserted JII

Safety Withdrawn 26.00

Controls Set Inner 0.0 Outer 0.0

Reflector Water 6" above Be

Moderator Water ~ 25"

Expt.	Condition	Inner	Outer	Safety	
258	k>1	25.00	24.80	26.00	2.317 div/sec
	k=1	24.17	24.80	26.00	
	Add 200 cc of Borated? Solution				
259	k>1	25.00	25.71	26.00	2.983 div/sec.
	k=1	25.00	24.61	26.00	
	Add 200cc of Borated? Solution				
260	k>1	26.00	25.69	26.00	13.35 ¢ 3.083 div/sec.
	k=1	26.00	24.63	26.00	12.6 ¢/in
	k=1	24.73	25.69	26.00	
	k=1	25.16	25.16	26.00	
	k=1	25.23	25.23	20.88	3PN-184
	k=1 at end of 3PN-184				

12/9/64 → 1.388 $/l

1.39 gal/l.

Expr.	Condition	Inner	Outer	Safety	3PN #
261	$k<1$	25.16	24.00	26.00	185
262	$k<1$	25.16	23.00	26.00	186
263	$k<1$	25.16	22.00	26.00	187
264	$k<1$	25.16	21.00	26.00	188
265	$k<1$	25.16	20.00	26.00	189
266	$k<1$	25.16	19.00	26.00	190
267	$k<1$	25.16	18.00	26.00	191
268	$k<1$	25.16	17.00	26.00	192
269	$k<1$	24.00	25.16	26.00	193
270	$k<1$	23.00	25.16	26.00	194

Exp 271

Instrument Check on 11-27-64 Source 10 mc Ra

PM-1		Low Trip OK	~~Alarm~~ Trip OK
PM-2			~~Alarm~~ Trip OK
IC-1	7×10^{-12}	Meter Trip	Fast Trip
IC-2	—	Meter Trip —	Out
IC-3	Responds	Calibration S & R	
IC-4	Responds	Calibration S & R.	
RM		Meter Trip	

Preliminary Check on 11-27-64

Room 113 Pressure Differential 1.4"

Red Light On and Personnel Check S & R. CC.

Scrams and Bldg. Alarm Reset S & R.

Source Inserted S & R.

Safety-Withdrawn 26.00

Controls Set Inner 25.16 Outer 0.0

Reflector Water 6" above Be

Moderator Water ~ 25"

Exp.	Condition	Inner	Outer	Safety	3PN #
271	$k=1$	25.30	25.69	26.00	
	Add 100 cc of H_2O				
272	$k>1$	26.89	25.71	26.00	
	$k=1$	25.275	25.71	26.00	
	Add 400 cc of H_2O				
273	$k>1$	25.75	25.71	26.00	3.267 div/sec.
	$k=1$	25.08	25.09	26.00	
	Add 10 cc of Borated? Solution				
274	$k>1$	26.89	25.69	26.00	1.975 div/sec
	$k=1$	25.11	25.11	26.00	
275	$k<1$	22.00	25.11	26.00	195
276	$k<1$	21.00	25.11	26.00	196

1.38 $ / ℓ.

Exp 277

Instrument Check on 12-1-64 Source 10 mc Ra

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ _____ Alarm Trip OK

IC-1 > 3x10" Meter Trip _____ Fast Trip _____

IC-2 _____ Meter Trip _____ Out

IC-3 Responds Calibration S.J.R. _____

IC-4 Responds Calibration S.J.R. _____

CRM _____ Meter Trip _____ _____

Preliminary Check on 12-1-64

Room 113 Pressure Differential 1.6"

Light On and Personnel Check S.J.R. C.C.

Alarms and Bldg. Alarm Reset S.J.R. C.C.

Source Inserted _____

Safety Withdrawn 26.00

Controls Set Inner 24.48 Outer 0.0

Collector Water 6" above Be

Aerator Water ~ 25"

Exp	Condition	Inner	Outer	Safety	3PN #
277	$k > 1$	26.89	25.72	26.00	3433 div/sec
	$k = 1$	25.16	25.68	26.00	
~~278~~	add 200 cc of H_2O				
278	$k > 1$	26.58	25.72	26.00	2.867 div/sec
	$k = 1$	25.28	25.28	26.00	
	add 150 cc of H_2O				
279	$k > 1$	26.70	25.72	26.00	2.5 div/sec
	$k = 1$	25.14	25.14	26.00	
					1.387 g/l

280 – 283 on page 148

12/14/64

10 am Removed 18 Liters of Moderator H_2O
added 20 " " Distilled H_2O.

Sample 8A taken 3:45 PM

Results on 12/21/64 0.28 gB/l.

Expr 284 w/T

Instrument Check on 12-14-64 Source 10 mc Ra

PM-1		Low Trip	OK	~~Alarm~~ Trip	OK
PM-2				~~Alarm~~ Trip	OK
IC-1	$> 3 \times 10^{-11}$	Meter Trip	OK	Fast Trip	OK
IC-2	$> 10 \times 10^{-12}$	Meter Trip	OK		
IC-3	Responds	Calibration	SR		
IC-4	Responds	Calibration	JTT		
CRM		Meter Trip			

Preliminary Check on 12-14-64

Room 113 Pressure Differential 1.4 in.

Red Light On and Personnel Check ✓ (east)

Scrams and Bldg. Alarm Reset ✓

Source Inserted ✓

Safety Withdrawn 26.00

Controls Set Inner 0.0 : Outer 0.0

Reflector Water 6"-above-Be

Moderator Water

Condition	Inner	Outer	Safety	
$k>1$	20.05	20.14	26.00	no period.
$k>1$	20.05	20.20	26.00	2.7 hr/dec.
$k=1$	20.05	20.00	26.00	
$k=1$	20.02	20.02	26.00	
$k=1$	20.045	20.045	20.88	3PN-204
$k=1$	at end of 3PN.			

Expr. 285 - 294 3PN see p. 147.

Drained, Flushed with Dilute HNO_3 and Rinsed.

Experiment 297

Instrument Check on 1-19-65 Source 10 mc Ra

PM-1		Low Trip	OK	~~Alarm~~ Trip	OK
PM-2				Alarm Trip	OK
IC-1	$> 3 \times 10^{-11}$	Meter Trip	OK	Fast Trip	OK
IC-2	$> 3 \times 10^{-11}$	Meter Trip	OK		
IC-3	Responds	Calibration	JH		
IC-4	Responds	Calibration	JH		
CRM		Meter Trip			

Preliminary Check on 1-19-65

Room 113 Pressure Differential 1.4"

~~Red Light On and Personnel Check~~ JH - C.C.

~~Scrams and Bldg. Alarm Reset~~ JH

Source Inserted JH

Safety Withdrawn ~~26.00~~

Controls Set Inner 0.0 Outer 0.0

Reflector Water 6" above Be

Moderator Water ~26

Condition	Inner	Outer	Safety	
$k>1$	20.00	21.10	26.00	2.5 div/sec.
$k=1$	20.00	20.85	26.00	Mod. Water
$k=1$	20.00	20.81	26.00	23.17
$k\leq 1$	20.00	20.81	26.00	21.42

N.B. linear instr. shows increase then decrease.

ln N - very slightly negative.

$k=1$	20.01	20.81	26.00	21.42
$k<1$	20.01	20.81	26.00	18.92

N.B. All instrs. show decrease

$k=1$	20.64	20.81	26.00	18.92
$k\leq 1$	26.83	25.80	26.00	12.38
$k=1$	26.83	25.80	26.00	14.85

1-19-65 Expt 298

added 200cc of conc. B-solution to moderator.
Mixed in moderator storage tank ~8 min.

Condition	Inner	Outer	Safety	Mod. H_2O	
$R>1$	20.00	21.20	26.00	26.81	2 div/sec
$k=1$	20.00	20.91	26.00	26.81	
$k=1$	20.45^5	20.45^5	26.00	26.81	
$k<1$	20.45^5	20.45^5	26.00	20.0	
N.B	In. H shows only decrease				
$k=1$	21.26	21.26	26.00	20.0	
$k<1$	21.26	21.26	26.00	19.5	
$k=1$	21.43^5	21.43^5	26.00	19.5	
$k<1$	21.43^5	21.43^5	26.00	17.0	
$k=1$	23.39^5	23.39^5	26.00	17.0	
$k<1$	25.00	25.00	26.00	16.00	

Continued draining showed no change in normal neutron decay for shutdown condition

Expt. 299

Added ~1 liter conc. B-solution mixed ~7 min.

Cond.	Inner	Outer	Safety	Mod. H_2O	
$R>1$	21.76	20.27	26.00	~27.0	1.834 div/sec
$k=1$	21.39	20.27	26.00	~27.0	
$k=1$	20.80^5	20.80^5	26.00	~27.0	
$k<1$	20.80^5	20.80^5	26.00	23.5	
$k=1$	20.85	2085	26.00	23.5	
$k<1$	20.85	20.85	26.00	22.0	
$k=1$	21.72	21.72	26.00	19.5	
$k=1$	25.00	25.00	26.00	17.0	

1-19-65 Put 0.883 B/l moderator into system again.

25.91

N.B.

Comparison of results observed in Expt 297 with those of Expt 298 casts doubts on 297.

Since additional Boron was small in quantity & effect the experimental conditions may be considered v same.

Seems to suggest moderator for Expt 297 may not have been well mixed.

May also suggest that effect would be more manifested in dilute Boron solutions rather than more concentrated.

Spent element D-24 centered in island of CE-3

Expt 518 Spent Plate D 3224 in slot 1 of D24.
D 5495 " " 22 " " .532 (N)

1.78 div/sec → ~~1.90~~ 38.65 sec → 19.40 ¢ → 36.47 ¢/in (16.484)

Expt 514 added Spent Plate D 3242 in slot 2 of D24
D 2870 " " 21 " D24 .122 (N)

2.87 div/sec → 62.31 sec → 14.07 ¢ → 63.95 ¢/in (13.52)

Expt 520 added Spent Plate D-3252 in slot 20 of D24
D 3228 in slot 3 .176 of D24

3.52 div/sec → 76.42 sec → 12.13 ¢ → 75.81 ¢/in (11.79)

Expt. 518

Instrument Check on 3-15-65 Source 10 mc Ra

PM-1 _____ Low Trip _____ ~~Alarm~~ Trip OK

PM-2 _____ ~~Alarm~~ Trip _____

IC-1 $>3\times10^{-11}$ Meter Trip OK Test Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip OK

IC-3 Responds Calibration JN

IC-4 Responds Calibration JN

CRM _____ Meter Trip _____

Preliminary Check on 3-15-65

Room 113 Pressure Differential 1.5"

Red Light On and Personnel Check JN c.c

Scrams and Bldg. Alarm Reset JN A trips but does not stay on

Source Inserted JN

Safety Withdrawn 0

Controls Set

Reflector Water } combined

Moderator Water

Expt.	Condition	Safety	H_2O	Island
518	$k>1$	16.75	26.26	2 spent plates
	$k=1$	16.218	26.26	" "
519	$k>1$	13.63	26.26	4 " "
	$k=1$	13.41	"	" " "
520	$k>1$	11.87	26.32	6 " "
	$k=1$	11.71	"	" " "
~~52~~	~~$k>1$~~	~~14.61~~ 3	~~26.07~~	

Expr. 521 Spect plate D3243 in slot 19 of D24
D3261 " " 4 of " .234
1.7 div/sec → 36.9 sec → 19.98 ¢ → 85.38 ¢/in (10.585)

Expr. 522 Spect plate D3230 in slot 5 of D24
D3259 " " 18 " " .134
3.76 div/sec → 81.63 sec → 11.54 ¢ → 86.12 ¢/in 9.497)

Expr. 523 Spect plate D3219 in slot 6 of D-24
" " D3223 " " 17 of D-24 .115
2.88 div/sec → 62.53 sec → 14.03 ¢ → 93.53 ¢/in (8.645

Expr. 524 Spect plate D3241 in slot 7 of D-24
D3246 " " 16 " " .247
1.61 div/sec → 34.95 sec → 20.67 ¢ → 83.68 ¢/in (7.937)

Expr 526 3 B'° strips in I.A. ; 22 B'° strips in O.A. .715
1.78 div/sec → 38.65 sec → 19.40 ¢ → 27.13 ¢/in (18.863)

Expr. 527 5 B'° Strips in I.A. ; 22 B'° Strips in O.A. k<<1

Instrument Check on 3-16-65 Source 10 mc

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ Alarm Trip _____

IC-1 >3×10⁻¹¹ Meter Trip OK Test Trip OK

IC-2 >3×10⁻¹¹ Meter Trip OK

IC-3 Responds. JH

IC-4 Responds JH

CRM _____ Meter Trip _____

Preliminary Check on 3-16-65

Room 113 Pressure Differential 1.5"

Red Light On and Personnel Check (East) JH

Scrams and Bldg. Alarm ~~Reset~~ JH all OK

Source Inserted JH

Safety Withdrawn 0.

Controls Set

Reflector Water } 26.26

Moderator Water

Expt.	Condition	Safety	H_2O	Island	
521	k>1	10.70	26.26	8 plates	
	k=1	10.46	26.26	8 plates	
522	k>1	9.56	26.26	10 plates	
	k=1	9.43	26.26	10 plates	
523	k>1	8.72	26.26	12 plates	
	k=1	8.57	26.26	12 plates	
524	k>1	8.06	26.29	14 plates	
	k=1	2.81 (8 2)	26.29	14 plates	
525	k≪1	26.00	26.29	14 plates	6 B¹⁰ strips inner annulus; 22 B¹⁰ " outer "
526	k>1	18.42	26.29	14 plates	3 B¹⁰ " inner "; 22 B¹⁰ " outer "
	k=1	17.70 (5 2 3 8)	26.29	14 plates	
527	k≪1	26.00	26.29	14 plates	5 B¹⁰ strips inner annulus; 22 B¹⁰ Strips Outer "

0.585)

9.497)

8.645

(7.937)

:863)

Expr 528 52.2 div/sec.

529 3 B^{10} I.A + 23 B^{10} O.A

2.83 div/sec. → 61.44 sec → 14.21 ¢ → 23.57 ¢/in (18.53)

530 2 B^{10} I.A + 23 B^{10} O.A.

6.53 div/sec → 141.77 sec → 7.46 ¢ → 38.26 ¢/in (16.863)

531 1 B^{10} I.A. + 23 B^{10} O.A.

4.36 div/sec. → 94.66 sec → 10.31 ¢ → 49.81 ¢/in (15.637)

532 23 B^{10} O.A.

2.6 div/sec → 56.45 sec → 15.08 ¢ → 59.14 ¢/in (14.753)

533 29 B^{10} O.A.

0.94 div/sec. → 20.41 sec → 28.20 ¢ → 30.00 ¢/in (17.88)

534 33 B^{10} O.A.

48 div/sec → 1042 sec → 1.21 ¢

535 31 B^{10} O.A.

2.04 div/sec → 44.29 sec → 17.77 ¢ → 17.97 ¢/in (19.32)

Expr	Condition	Safety	H_2O	Island	
					48 B¹⁰ strips inner annulus.
528	K = 1	26.00	26.30	14 plates	23 B¹⁰ " Outer " .
529	k > 1	18.88	"	"	3 B¹⁰ I.A. + 23 B¹⁰ O.A.
3)	k = 1	18.27⁷ (201)	"	"	" "
530	k > 1	16.96	"	"	2 B¹⁰ I.A + 23 B¹⁰ O.A.
63	k = 1	16.76⁵ (65)	"	"	" "
531	k > 1	15.74	"	"	1 B¹⁰ I.A + 23 B¹⁰ O.A.
17)	k = 1	15.53³ (069)	"	"	" "
532	k > 1	14.88	"	"	23 B¹⁰ O.A
5)	k = 1	14.62⁵ (092)	"	"	"
533	K > 1	18.35	"	"	29 B¹⁰ O A
8)	k = 1	17.41 (31)	"	"	"
534	k ~ 1	26.03	"	"	33 B¹⁰ O.A.
535	k > 1	19.87⁹	"	"	31 B¹⁰ O.A.
	k = 1	18.89 (33)	"	"	"

2)

Instrument Check on 17 Mar 65 Source 10 mcV

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ Alarm Trip _____

IC-1 > 3 x 10⁻¹¹ Meter Trip OK Fast Trip OK

IC-2 > 3 x 10⁻¹¹ Meter Trip OK

IC-3 Responds Calibration J. T.T.

IC-4 Responds Calibration J. T.T

CRM _____ Meter Trip _____

Preliminary Check on 3-17-65

Room 113 Pressure Differential 1.5"

Red Light On and Personnel Check SJR & TT

Scrams and Bldg, Alarm Reset J.T.T.

Source Inserted SJR

Safety Withdrawn O

Controls Set _____

Reflector Water } Combined

Moderator Water }

536 33 B^{10} Strips O.A. .303

.81 div/sec ⇒ 1324 sec ⇒ .958 ¢ → .324 ¢/in (23.98)

537 32 B^{10} Strips O.A 1.37

2.72 div/sec ⇒ 59.05 sec ⇒ 14.612 ¢ → 10.67 ¢/in (20.52)

538 28 B^{10} Strips O.A .435

2.06 div/sec ⇒ 44.72 sec ⇒ 17.655 ¢ → 40.59 ¢/in (17.003)

539 24 B^{10} Strips O.A. .25

3.06 div/sec ⇒ 66.43 sec ⇒ 13.437 ¢ → 53.75 ¢/in (15.115

540 20 B^{10} Strips O.A. .375

1.48 div/sec ⇒ 32.13 sec ⇒ 21.761 ¢ → 63.08 ¢/in (13.743

541 16 B^{10} Strips O.A. .252

2.02 div/sec ⇒ 43.85 sec ⇒ 17.884 ¢ → 70.97 ¢/in (12.434)

542 12 B^{10} Strips O.A. .084

6.634 div/sec ⇒ 144.02 sec → 7.370 ¢ → 87.74 ¢/in 18.196)

543 8 B^{10} Strips O.A. .210

2.24 div/sec → 48.63 → 16.70¢ → 79.52 10.115

544 4 B^{10} Strips O.A. .121

3.96 div/sec → 85.97 → 11.10¢ → 91.74 9.600

545 Removed Spent plates: 3241 from slot 7 and 3246 from slot 16

4 B^{10} Strips in O.A.; 12 plates in D-24 .245

1.37 div/sec ⇒ 29.74 sec ⇒ 22.796¢ ⇒ 93.04 ¢/in 9.878

546 12 B^{10} strips in O.A. .262

1.53 div/sec ⇒ 33.22 sec. ⇒ 21.323 ¢ 81.39 ¢/in (12.199)

547 20 B^{10} strips in O.A. .264

2.81 div/sec → 61.01 sec → 14.28 ¢ → 54.09 ¢/in (14.948)

548 ~~28 B^{10} Strips in O.A. Removed Spent plates 3219 and 3223~~ 5.91

1.74 div/sec → 37.78 sec → 19.68¢ 3.33 ¢/in 22.06

549 Removed Spent plate 3219 and 3223 5.534

2.75 div/sec → 59.70 sec → 14.50¢ 2.62 ¢/in (22.31)

.958 2.504

13.542 5.41 ¢/in 21.50

Expt	Condition	Safety	H_2O	Island	Comments
536	$k>1$	26.00	26.28	14 plates	33 B^{10} strips in O.A.
	$k=1$	22.97	26.28	"	" " " "
537	$k>1$	21.33	26.28	"	32 B^{10} strips " "
	$k=1$	19.96	" "	"	" " " " "
538	$k>1$	17.22	" "	"	28 B^{10} strips " "
	$k=1$	16.78[5]	"	"	"
539	$k>1$	15.24	"	"	24 B^{10} strips O.A.
	$k=1$	14.99	"	"	" "
540	$k>1$	13.91[5]	"	"	20 B^{10} strips "
	$k=1$	13.57[13]	"	"	" "
541	$k>1$	12.56	"	"	16 B^{10} " "
	$k=1$	12.30[58]	"	"	" " " "
542	$k>1$	11.23[8]	"	"	12 B^{10} " "
	$k=1$	11.15[4]	"	"	" " " "
543	$k>1$	10.22	"	"	8 B^{10} " "
	$k=1$	10.01	"	"	" " " "
544	$k>1$	9.oc	"	"	4 B^{10} " "
	$k=1$	8.93[5]/40	"	"	" " " "
545	$k>1$	9.94	26.27	12 plates	4 B^{10} " "
	$k=1$	9.69[5]	"	"	4 B^{10} " "
546	$k>1$	12.33	26.27	"	12 B^{10} " "
	$k=1$	12.06[8]/262	"	"	" " " "
547	$k>1$	15.08	"	"	20 B^{10} " "
	$k=1$	14.81[6]/88	"	"	" " " "
548	$k>1$	26.00	"	"	28 " " "
	$k=1$	20.09/197	"	"	" " " "
549	$k>1$	26.00	"	10 plates	24 " " "
	$k=1$	20.46[6]/833	"	"	" " " "

550 20 B^{10} Strips O.A. .43
2.34 div/sec → 50.80 sec → 16.21¢ → 37.70 ¢/in (16.885

551 12 B^{10} Strips O.A. →
2.52 div/sec → 54.71 sec → 15.41¢ → 70.05 ¢/in (13.31) .22

552 4 B^{10} Strips O.A .155
3.25 div/sec → 70.56 sec → 12.86¢ → 82.97 ¢/in (10.673)

Expt. 553 4 B^{10} Strips; 10 Spent plates. 12.394¢ .73
10.1 div/sec ⇒ 219.28 sec ⇒ 5.15¢ } ⇒ 86.64 ¢/in (10.732
2.08 div/sec ⇒ 45.16 sec ⇒ 17.54¢
5.15 ¢/in ⇒ 85.83 ¢/in (10.63)
17.54 ¢/in ⇒ 86.40 ¢/in (10.702)

Expt 554 No B^{10} Strips; 10 Spent plates .10
2.48 div/sec → 53.84 sec → 15.58¢ } = 8.91¢ → 79.10 ¢/in (9.55¢
7.47 div/sec → 162.18 sec → 6.67¢ }

Removed Spent plates 3230 from Slot 5 and 3259 from Slot 18.

Expt 555 No B^{10} Strips; 8 Spent plates. .157
2.96 div/sec → 64.26 sec → 13.76¢ → 87.64 ¢/in 10.534

Expt.	Condition	Safety	H_2O	Island	Comments		
550	$k>1$	17.10	26.27	10 plates	20 B^{10} Strips		O.A.
	$k=1$	16.67 (14)	"	"	"	"	"
551	$k>1$	13.42	"	"	12	"	"
	$k=1$	13.20 (7)	"	"	"	"	"
552	$k>1$	10.75	"	"	4	"	"
	$k=1$	10.59 (5) (52)	"	"	"	"	"

Instrument Check on 3-18-65 Source 10 mcY

PM-1 _____ Low Trip OK ~~Alarm~~ Trip OK

PM-2 _____ Alarm Trip _____

IC-1 $>3\times10^{-11}$ Meter Trip OK ~~Fast~~ Trip OK

IC-2 $>3\times10^{-11}$ Meter Trip J.T.T. OK

IC-3 Responds Calibration J.T.T.

IC-4 Responds Calibration J.T.T.

CRM _____ Meter Trip _____

Preliminary Check on 3-18-65

~~Room~~ II3 Pressure Differential 1.5"

Red Light On and Personnel Check S & R., J.T.T.

Scrams and Bldg. Alarm Reset OK J.T.T.

Source Inserted S & R.

~~Safety~~ Withdrawn C

Controls Set

Reflector Water } Combined

Moderator Water }

Expt.	Condition	Safety	H_2O	Island	Comments		
553	$k>1$	10.66 (7)	26.45	10 plates	4 B^{10} Strips		O.A.
	$k>1$	10.80 (3)	"	"	"	"	"
	$k=1$	10.60 (14-3)	"	"	"	"	"
554	$k>1$	9.50	"	10 plates	No B^{10} Strips		O.A.
	$k>1$	9.60	"	"	"	"	"
555	$k>1$	10.61 (2)	"	8 plates	No B^{10} Strips		O.A.
	$k=1$	10.45 (5) (52)	"	"	"	"	"

556 2.28 div/sec → 49.50 sec → 16.50¢ } 10.33¢ → 79.46 ¢/in (11.825)
8.89 div/sec → 177.81 sec → 6.17¢ }

557 2.35 div/sec → 51.02 sec → 16.16¢ → 60.52 ¢/in (14.049)

558 3.00 div/sec → 65.13 sec → 13.63¢ } 4.48¢ → 37.02 ¢/in (17.20)
5.08 div/sec → 110.29 sec → 9.15¢ }

559 20 B¹⁰ Strips ; 8 Spent Plates
18.7 div/sec → 405.99 sec → 2.957¢ → 0.78 ¢/in (23.48)

560 Removed Spent plates 3261 from Slot 4 and 3243 from slot 19.
6 spent plates + 16 B¹⁰ strips.
5.48 div/sec → 118.98 sec → 8.61¢ → 1.75 ¢/in (22.73)

561 11 B¹⁰ Strips ; 6 Spent plates
2.33 div/sec → 50.59 sec → 16.26¢ → 37.99 ¢/in (16.246)

562 1.9 div/sec → 41.25 sec → 18.61¢ } 7.59¢ → 54.21 ¢/in (14.67)
4.00 div/sec → 86.84 sec → 16.02¢ } 56.39 ¢/in (14.575)
58.00 ¢/in (14.505)

563 3 B¹⁰ Strips ; 6 Spent plates
2.17 div/sec → 47.11 sec → 17.06¢ → 69.35 ¢/in (12.857)

564 No B¹⁰ Strips ; 6 Spent plates
4.44 div/sec → 96.40 sec → 10.17¢ → 78.23 ¢/in (11.765)

565 No B¹⁰ Strips ; 4 Spent plates
1.81 div/sec → 39.30 sec → 19.20¢ → 62.95 ¢/in (13.537)

566 3 B¹⁰ Strips ; 4 Spent plates
2.04 div/sec → 44.29 sec → 17.77¢ → 50.20 ¢/in (14.913)

567 7 B¹⁰ Strips ; 4 Spent plates
3.82 div/sec → 82.94 sec → 11.41¢ → 31.09 ¢/in (17.392)

	Expn.	Condition	Safety	H2O	Ballast	Comments	
8.25	556	$h>1$	11.81	26.45	8 plates	4 B'10 Strip	O.A.
		$h>1$	11.94	"	"	" "	"
19)	557	$h>1$	14.18^{2}	"	"	10 "	"
		$h=1$	13.91$^{5}_{89}$	"	"	" "	"
20)	558	$h>1$	17.13$^{9}_{4.07}$	"	"	16 "	"
		$h>1$	17.26	"	"	" "	"
5)	559	$h>1$	26.00	"	"	20 "	"
		$h=1$	22.22$_{1.26}$	"	"	" "	"
	560	$h>1$	26.00	26.35	6 plates	15 "	"
3)		$h=1$	21.09$_{1.64}$	"	"	" "	"
	561	$h>1$	16.96	"	"	11 "	"
16)		$h=1$	16.53^{2}	"	"	" "	"
7)	562	$h>1$	14.60	"	"	7 "	"
25)		$h>1$	14.74	"	"	" "	"
15)		$h=1$	14.41	"	"	" "	"
	563	$h>1$	13.04^{1}	"	"	3 "	"
8))		$h=1$	12.77^{5}	"	"	" "	"
	564	$K>1$	11.83	"	"	0 "	"
5)		$h=1$	11.70				
	565	$h>1$	13.69	"	4 @ plates	0 "	"
)		$h=1$	13.38^{5}	"	"		
	566	$h>1$	15.09	"	"	3 "	"
)		$h=1$	14.73$^{6}_{1.18}$	"	"	" "	"
	567	$h>1$	17.57^{5}	"	"	7 "	"
)		$h=1$	17.20$^{8}_{1.22}$	"	"	" "	"

568 10 B^{10} Strips in O.A. ; 4 Spent Plates 4.00
18.38 div/sec → 399.04 sec → 3.01¢ → 0.75 ¢/in (23.33)

570 Have removed Spent plates 2870 from slot 21 and 3242 from slot 2.
4 B^{10} Strips ; 2 Spent Plates 4.82
7.25 div/sec → 157.40 sec → 6.84¢ → 1.42 ¢/in (22.79)

571 2 B^{10} Strips ; 2 Spent Plates .669
2.25 div/sec → 48.85 sec → 16.65¢ → 24.89 ¢/in (18.075)

572 No B^{10} Strips ; 2 Spent Plates .54
1.69 div/sec → 36.69 sec → 20.05¢ → 37.13 ¢/in (16.45)

573 Have moved Spent plates D-3224 + D-5495 to Hlty 2 & 21.
3.98 div/sec → 86.41 sec → 11.06¢ → 40.96 ¢/in (16.075)

574 Have moved Spent plates D-3224 & D-5495 to Slots 3 & 20.
2.26 div/sec → 49.07 sec → 16.60¢ → 39.65 ¢/in 4.05 (15.958)

33)

Instrument Check on 3-19-65 Source comes

PM-1 _____ Low Trip ok Alarm Trip ok

PM-2 _____ _____ Alarm Trip _____

IC-1 $>3\times10^{-11}$ Meter Trip ok Fast Trip ok

.79) IC-2 $>3\times10^{-4}$ Meter Trip ok _____

IC-3 Responds Calibration JH _____

IC-4 Responds Calibration JH _____

CRM _____ Meter Trip _____ _____

075) Preliminary Check on 3-19-65

Room 113 Pressure Differential 1.5"

Red Light—On and Personnel Check S/B. + JH

Scrams and Bldg. Alarm Reset all ok JH

45) Source Inserted S/B.

Safety Withdrawn O

Controls Set

Reflector Water } Combine

073) Moderator Water

Expt.	Condition	Safety	H_2O	Island	Comments
568	$k>1$	26.00	26.36	4 plates	10 B^{10} strips in O.A.
958	$k=1$	22.00	"	"	4 " "
569	$k<<1$	26.00	"	2 plates	5 B^{10} Strips in O.A.
570	$k>1$	26.00	"	"	4 " "
	$k=1$	21.18	"	"	" " "
571	$k>1$	18.409 (1.61)	"	"	2 " "
	$k=1$	17.74	"	"	" " "
572	$k>1$	16.72	"	"	No " "
	$k=1$	16.18	"	"	" "
573	$k>1$	16.21	"	"	No B^{10} Strips
	$k=1$	15.94	"	"	" "
574	$k>1$	16.16	"	"	" "
	$k=1$	15.75 (1.35)	"	"	" "

575 Moved Plate D-3224 & D-5495 to Slot 4 & 19. .425
1.98 div/sec → 42.99 sec → 18.12¢ → 42.64 ¢/in (15.818)

576 Moved plates D-3224 & D-5495 to Slots 5 & 18. .428
1.92 div/sec → 41.68 sec → 18.49¢ → 43.20 ¢/in (15.726)

577 Moved plates D-3224 & D-5495 to Slots 6 & 17. .345
2.5 div/sec → 54.28 sec → 15.49¢ → 44.90 ¢/in (15.683

578 Moved Plates D-3224 & D-5495 to Slots 7 & 16 .44
1.84 div/sec → 39.95 sec → 19.00¢ → 43.18 ¢/in (15.67)

579 Replaced all 14 Spent plates in original slots. .19
2.04 div/sec → 44.29 sec → 17.77¢ → 93.53 ¢/in (7.915)

580 Removed Spent element, took centering rod out, replaced and replaced element in reactor. Side that was south is now north. .181
2.22 div/sec → 48.20 sec → 16.80¢ → 92.82 ¢/in (7.92)

581 Removed Spent plates D-3241 & D-3246 from Slots 7 & 16 .153
2.53 div/sec → 54.93 sec → 15.37¢ → 100.46 ¢/in (8.634)

582 Placed Spent plates D-3241 in Slot 7, D-3246 in 16, D-3260 in 8, D-3253 in 1 .175
2.27 div/sec → 49.28 sec → 16.55¢ → 94.57 ¢/in (7.383)

583 3 B¹⁰ Strips in O.A ; 16 Spent Plates .155
2.59 div/sec → 56.23 sec → 15.12¢ → 97.56 ¢/in (8.163)

584 6 B¹⁰ Strips in O.A. ; 16 Spent Plates .115
3.66 div/sec → 79.46 sec → 11.78¢ → 102.43 ¢/in (8.944)

585 36 B¹⁰ Strips in O.A. ; 16 Spent Plates
-44 div/sec → 955.28 sec → - 1.42¢

Expt.	Condition	Safety	H_2O	Island	Comment
575	$k>1$	16.03	26.36	2 Plates	No B^{10}
	$k=1$	15.605	"	"	"
576	$k>1$	15.94	"	"	"
	$k=1$	15.51	"	"	"
577	$k>1$	15.805	"	"	"
	$k=1$	15.46	"	"	"
578	$k>1$	15.89	"	"	"
	$k=1$	15.45	"	"	"
579	$k>1$	8.01	"	14 Plates	"
	$k=1$	7.82	"	"	"
580	$k>1$	8.01	"	"	"
	$k=1$	7.82	"	"	"
581	$k>1$	8.71	"	12 Plates	"
	$k=1$	8.55	"	"	"
582	$k>1$	7.42	"	16 Plates	"
	$k=1$	7.24	"	"	"
583	$k>1$	8.24	"	"	3 B^{10} Strips O.A.
	$k=1$	8.085	"	"	"
584	$k>1$	9.00 ?	"	"	6 B^{10} "
	$k=1$	7.88	"	"	"
585	$k \leq 1$	26.00	"	"	36 B^{10} "

Have removed CE-3 and placed CE-2 on pedestal in tank.

586 Spent plates D-3224 and D-5495 in slots 7 & 16

587 added Spent plates D-3242 in slot 2
and D-2770 in slot 21
4 B^{10} Strips in O.A.

588 4 Spent plates ; 3 B" Strips. 5.314
4.32 div/sec → 93.79 sec → 10.39 ¢ → 1.96 ¢/in (22.46)

589 6 Spent plates ; 9 B" Strips .328
1.86 div/sec → 40.38 sec → 18.87 ¢ → 57.53 ¢/in (14.449)

CE-2

Instrument Check on 22 Mar 65 Source 10 mcy

PM-1 _____ Low Trip OK ~~Alarm~~ Trip OK

PM-2 _____ _____ Alarm Trip _____

IC-1 > 3×10^{-11} Meter Trip OK ~~Test~~ Trip OK

IC-2 > 3×10^{-11} Meter Trip OK _____

IC-3 Responds Calibration S f R. _____

IC-4 Responds Calibration S f R. _____

CRM _____ Meter Trip _____ _____

Preliminary Check on 3-22-65

Room 113 Pressure Differential 1.5"

Red Light On and Personnel Check S f R. & C.C.

Scrams and Bldg. Alarm Reset OK S f R.

Source Inserted S f R.

Safety Withdrawn 0.0

Controls Set

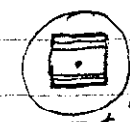
Reflector Water } Combined.

Moderator Water

Expr.	Condition	Safety	H_2O	Loaded	Comment
586	$k<1$	26.00	26.07	2 Spent Plates	
587	$k<1$	26.00	26.07	4 " "	4 B^{10} Strips O.A.
588	$k>1$	26.00	26.08	4 " "	3 B^{10} " " "
	$k=1$	20.68^{6}_{177}	"	4 " "	" " "
589	$k>1$	14.61^{3}	26.08	6 " "	No B^{10} Strips
	$k=1$	14.28^{5}_{164}	"	4 " "	" " "

590 4 Spent Plates in Island .469
2.4 div/sec → 52.11 sec → 15.93¢ → 33.97 ¢/in (17.096)

591 4 Spent Plates ; 3 B^{10} Strips in O.A. 1.69
6.17 div/sec → 133.96 sec → 7.82¢ → 4.63 ¢/in (21.40)

592 Have moved Spent element off center ~ 5/16"
Had to raise it 1/4" by placing a 1/4" plexiglass spacer under it.
2 B^{10} Strips

↑ off center
1.02
3.1 div/sec. → 67.30 sec → 13.31¢ → 13.05 ¢/in (19.85)

593 Spent element same as 592. No B^{10} Strips 3.7
3.64 div/sec → 79.03 → 11.83¢ → 31.97 ¢/in (17.32)

594 Replaced Spent element in center of Island but with 1/4" Plexiglass spacer on bottom. .471
2.43 div/sec → 52.76 sec → 15.80¢ → 33.55 (17.184)

595 Same as 594 ; 2 B^{10} Strips in O.A. 1.43
1.64 div/sec → 35.6 sec → 20.43¢ → 14.29 ¢/in (19.63)

CE-2

Instrument Check on 3-26-65 Source 10 mcr

PM-1 _____ Low Trip OK Alarm Trip OK

PM-2 _____ Alarm Trip _____

IC-1 >3x10⁻¹¹ Meter Trip OK Fast Trip OK

IC-2 >3x10⁻¹¹ Meter Trip OK _____

IC-3 Responds Calibration S & R. _____

IC-4 Responds Calibration S & R. _____

CRM _____ Meter Trip _____ _____

Preliminary Check on 3-26-65

Room 113 Pressure Differential 1.5"

Red Light On and Personnel Check S & R. C.C.

Scrams and Bldg. Alarm Reset S & R. OK.

Source Inserted S & R.

Safety Withdrawn 0.0

Controls Set 0

Reflector Water } combined.

Moderator Water }

Expr.	Condition	Safety	H_2O	Island	Comment.
590	$k>1$	17.33	25.98	4 Spent Plate	
	$k=1$	16.86 (2.5)	"	"	
591	$k>1$	22.50	"	"	3 B^{10} Strips in O.A.
	$k=1$	20.81 (.59)	"	"	" " "
592	$k>1$	20.36	26.00	"	2 B^{10} Strips in O.A.
	$k=1$	19.34	"	"	" " "
593	$k>1$	17.51	"	"	9 B^{10} Strips
	$k=1$	17.14	"	"	" "
594	$k>1$	17.42	"	"	" "
	$k=1$	16.949 (2.5)	"	"	" "
595	$k>1$	20.365	"	"	2 B^{10} Strips in O.A.
	$k=1$	18.935 (.70)	"	"	" " "

7-27-65

1st production core (ORNL) - Reactivity measurement in west assembly area. Outer Element is described in Dwg. D42126 Rev A. and Inner Element D-42118 Rev. E 1/14/65 EJ

Mass of Inner HFIR fuel element = 2.611 Kg U235
Mass of Outer HFIR fuel element = 6.816 Kg U235
Total 9.427 Kg U235

1-6-65 SS. Net = 10.119 Kg Inner & outer core. RKM.

7-27-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	10×10^{-12}
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	14"	✓	500 V
PM-2	1200 V	Low ✓	14"	✓	900 V
	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT X

HFIR: Inner and outer fuel elements only.

Core support stand 13.30 in. high
Element (to top of side plates) 25.5"

START-UP CHECK LIST

Equipment checked by RKA Personnel check by F.D.C

Instruments and safeties checked and reset by RKA

Source in checked by RKA Source No. M-43

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 PM-2

Red light on by RKA Time 1005

Start-up OK'd by J.T.T., F.D.C RKA Date 7-27-65

When H_2O at top of table, scale reads 0.0 cm.
Feed rate = 5.75 cm/min. {Feed rate reset at 3.80 cm/min
Dump rate = 7.40 cm/min. {1230.

1100 Water ht = 124.85 cm.
System sub critical. Drain!

aw.

7-27-65

1230 added spent fuel element in center of inner core: spent element has 2 fuel plates. (mass of 2 fuel plate = 28.1 gm U235).

1344 Water ht = 117.90 cm. System very sub critical. Drain: Log n = .005

1402 added two more spent fuel plates to element. (mass of 2 fuel plate = 27.8 gm U235.) Total mass of spent fuel now = 55.9 gm U235

1438 Water ht = 107.00 cm. System sub critical: Drain: Log n = .012.

1454 added two more spent fuel plates to element. (mass of 2 fuel plate = 28.3 gm U235. Total mass of spent fuel now = 84.2 gm U235. Total mass of 2 HFIR element + spent element = 9.5112 Kg U235.

1527 +Per Water ht = 96.00 cm. Δh = .55 cm
τ = 144.5 sec = 7.4 ¢ = 13.32 ¢/cm.

1535 Water ht = 95.45 cm. System just critical. Drain: "2.1 in. above top of fuel plates.

7-28-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	~	10×10^{-12}
	"	Fast ✓	"	~	"
K-2	"	Meter	1"	~	"
	"	Fast	"	~	"
PM-1					
PM-2					
PM-1	700 V	Alarm ✓	Contact	~	500 V
PM-2	1200 V	Low ✓	14"	~	800 V
	"	Alarm ✓	1"	~	"

LOG N CALIBRATE ~ OPERATE ~ SOURCE No. B-80

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

Equipment checked by BKA JTT Personnel check by BKA

Instruments and safeties checked and reset by BKA

Source in checked by BKA JTT Source No. M-43

Emergency equipment in control room checked by BKA

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by JTT Time 0750

Start-up OK'd by JTT BKA Date 7-28-65

added 4 .031" x 5/8" x 29" Natural Boron Stainless steel strip. 0.92 weight per unit length. (#/ft)

over:

7-28-65

Water ht = 107.00 cm. System slightly sub critical
-Per: τ = 136.9 sec = 14.1 ¢

0900 Remove two of the .031" x 5/8" x 29" Natural Boron strips and added 10 .031" x 5/8" x 24" stainless steel strips

0920 Water ht = 104.70 cm: System slightly sub critical
-Per: 367.23 sec = ~~4.0~~ 3.96 ¢.

0925 Added H_2O to ~ 111.0 cm no change in -Per:

0928 Drain to ~ 75.0 cm,

0943 Removed three .031" x 5/8" x 24" Stainless steel strips.

0956 (1) +Per: Water ht = 106.~~70~~15 cm: Δh = 2.50 cm Critical ~~ht~~ Water ht not check:
τ = 962.64 sec = 1.3 ¢ Water temp = 24.5 °C (Measured with °C thermometer)

1001 Drain: ~ 0.0 cm:

1101 Water ht = 103.65 cm: System just critical.
Drain.

1215 Removed remaining (Natural Boron + stainless steel strip). Now have inner + outer cores, + spent fuel element with 6 fuel plates. Moved the BF_3 chamber as close as ~~possible to~~ possible into core. (BF_3 chamber supplied by D.M. Fry I+C Div.)

1259 (2) +Per: Water ht = 105.45 cm Δh = 4.9
τ = 239.03 sec = 4.8 ¢

7-28-65

1311 Water ht = 100.55 cm: system just critical; Log n = 4.1
Drain to ~ 69.5 cm.

1348 (3) + Per; Water ht = 105.00 cm:
T = 251.84 sec ⇒ ρ = 4.564

1427 Water ht = 100.80 cm. System very very slightly + Re.
Log n = 3.5 Start of power run for D.M. Fay's
BF_3 chamber. BF_3 Chamber work - 374 ≤ 9.4/cc

1431 Water ht = 100.70 cm. System very very slightly - Neg.
Log n = 3.5 PM-2 = 17 at 760 volts

1502 Water ht = 100.70 cm: System just critical. Log = 3.5
PM-2 = 17 at 760 volts.

1505 Drain:

1510 Drain H_2O to ~ 79.0 cm: Core reading ~ 6.0" away
from top of fuel = 440 MR/HR. at ~ center of outer
core at contact ~ 1 R/H.

Drain:

78

7-29-65

INSTRUMENT CHECK

IINSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast —	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont	✓	500 V
PM-2	1200 V	Low ✓	19"	✓	900 V
"	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE — ✓ OPERATE — ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by BKH Personnel check by E.D.C

Instruments and safeties checked and reset by BKH

Source in checked by BKH Source No. M-93

Emergency equipment in control room checked by E.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by BKH Time 0800

Start-up OK'd by E.D.C BKH Date 7-29-65

0750 Outer core reading at center of core = 18 MR/HR.

SPERT element with 6 plates still in. Critical at 100.72 with D.P. standard in position. S-4-77
Installed 8 (#S 1-8) Enriched Boron Stainless ~~Steel~~ Steel (Type 304) Strips .031" x 5/8" x 29" which is equal to ~$2.10 (Equal spaced in outer element.)
-$2.13
39 4/66

0920 Water ht = 100.70 cm. System sub critical. Log N = .012

Added source #M-227 with M-43. Log n = .075
K-1 = 57.5% x 10^{-11}. PM-2 = 1.5 - 900v. For 20 min run D.M. Fry.

1023 Removed both sources. For run for D.M. Fry.

1248 Added 8 .031" x 5/8" x 29" Stainless Steel Strips to outer element. = to ~10.7¢. Also source M-43 & M-227. For run for D.M. Fry. Total poison added = ~$2.207.
-$2.24
39 4/66
Water ht = 100.70 cm. Temp = 24.5°C
Log n = .075. K-1 = 54.5% 10 x 10^{-11}. PM-2 = 1.5 - 900v

1920 Added two more Enriched Boron Stainless Steel (Type 304) Strips .031 x 5/8" x 29". And 5 Natural Boron Stainless Steel (.031 x 5/8" x 29") strips to outer element. Water ht still 100.70 cm. Total poison now = $3.41 (3.46 $ 39 4/66) Run for D.M. Fry.
Log N = .05 K-1 = 32.5 - 10 x 10^{-11} PM-2 = 1.0 - 900v.

OEY.

7-29-65

1454 Drain H_2O to ~ 75.0 cm. Removed all strips added, except 4 Enriched Boron Stainless Steel. (which are equal divided in outer core: ~~[illegible]~~ poison now in core ≈ $.05.
-$1.566

1520 Water ht = 100.70 cm: Sources M-43, M-227 in same pos. with contention as above. Run for D.H. Fry:
Log n = .115 K-1 = ~~3~~ 38% 3×10^{-11} PM-2 = 3 - 900 V

1600 Drain.

NB: Since (core + 6 spent plates + BF_3 chamber) was critical flooded, the amount of poison installed represents the subcriticality of the flooded core.

7-30-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ~	1"	~	10×10^{-12}
	"	Fast —	"	—	"
K-2	"	Meter ~	2"	~	"
	"	Fast —	"	~	"
R-1					
R-2					
PM-1	700 V	Alarm ~	Cent.	~	500 V
PM-2	1900 V	Low ~	1 & 1"	~	900 V
	"	Alarm —	1"	~	"

LOG N CALIBRATE ~ OPERATE ~ SOURCE No. B-80

DUMP WELL PROBE LIGHT X

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-43

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKM Time 0855

Start-up OK'd by F.D.C AKM Date 7-30-65

Removed spent fuel element + the 4 enriched boron stainless steel strips. Added the aluminum styrofoam void to inner fuel element. dia of styrofoam = 4.1875" + 20.250" long. Also removed D. M. Frey's instrument and ect.

over

~~636~~ 7-30-65

1011 Water ht = 106.00 cm: System sub critical.
Drain.

1100 Removed inner cone: Put in optimum styrofoam void in outter cone: Styrofoam is 10.500" O.D X 25.4375" long.

1217 Water ht = 106.00 cm; System sub critical. Log N = .0055
Drain:

1300 Reduced the O.D. of styrofoam to 10.125."

1334 Water ht = 106.30 cm; System sub critical. Log N = .0054
Drain:

1425 Now have inner fuel element as close as possible (9/16") to outer fuel element. Fuel plates (right) matched to within ~~[illegible]~~ 1/8" ~~of~~. Both elements have styrofoam voids. Outer element void = 10.125."
Inner element void = 4.1875."

1500 Water ht = 107.60 cm. System sub critical. Log N = .0055
Drain.

Production Core # 2
(made by M&C) (M&C #1)

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
"	"	Test ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Test ✓	"	✓	"
R-1					
R-2					
PM-1	700 V ✓	Alarm ✓	Cont	✓	500 ✓
PM-2	1200 V ✓	Low ✓	12"	✓	900 ✓
"	"	Alarm ✓	1"	✓	900 ✓

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKH Personnel check by I.D.C

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKH Time 1500

Start-up OK'd by I.D.C. AKH Date 1-6-65

Now have outer & inner H.E.I.R. Core assembly.

avg.

When water ht = 21.05 cm on glow scale. We have 6.5" top reflector.

Feed rate = 2.9 cm/min.
3/4" drain rate = 8.3 cm/min.
3" dump rate = 38 cm/15 sec

When water ht = 9.20 cm on glow scale. Water ht is at top of fuel elements. (Top of plates)

⇒ An eighth-in. spacer was placed in the outer annulus to support the inner annulus at its correct height. This was necessary because we are supporting only the outer annulus at the bottom.

1545 Water ht = 21.05 cm
System sub critical. Log n = .003

This element is the second production core and the first made by Metals & Controls. It contains 9.40268 Kg of ^{235}U, of which 2.05528 Kg is in the inner annulus and 6.80640 Kg is in the outer annulus. The inner annulus contains 2152.805 g ^{10}B. These numbers from telecon w. R. McCord who quotes inspection certification reports from M&C; they do not agree with the transfer weights because of an error made by M&C in the 101 form. Eg 11/66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cont	✓	500 V
PM-2	1200 V	Low ✓	12"		900 V
"	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKH Personnel check by F.H.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-93

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by RKH Time 1215

Start-up OK'd by F.D.C RKH Date 1-7-66

added Spent fuel element in center of Core. Spent element has 4 fuel plate. #'s D-3224, D-5495, D-3242, D-2870. Increase in mass = 55.97 0235.

over.

$\Delta h = .20$ cm

1255 Water ht = 6.30 cm.
(1) + Per.
$\tau = 390.05$ sec = 3.1 ¢ = 15.5 ¢/cm.

1304 Water ht = 6.10 cm
Lyster just critical
Drain.

1330 added 2 (.031" x .625" x 29.0" enriched boron stainless steel strips) in outer element. = 53.32 ¢. ±5¼2

$\Delta h = .80$ cm

1415 Water ht = 9.20 cm
(2) + Per:
$\tau = 191.22$ sec = 5.8 ¢ = 7.3 ¢/cm.

1425 Water ht = 8.40 cm
Lyster just critical
Drain.

1438 added 2(.031" x .625 x 29.0" Natural Boron strips) in ±3¼4
outer element. = 27.50 ¢

$\Delta h = .35$ cm

1508 Water ht = 10.60 cm
(3) + Per
$\tau = 126.03$ sec = 8.24 = 23.4 ¢/cm.

1520 Water ht = 10.25 cm
Lyster just critical

see page 89

1521 Drain H_2O below center of core.

1525 Removed the two (2) natural boron strips and added two (2) .031" x .625" x 29.0" enriched boron strips. #8 & 10 = 53.32 ¢. Now have 4 enriched strips.

$\Delta\rho = .60$ cm.

1540 (4) Water ht = 12.30 cm
+ Per:
τ = 182.53 sec = 6.0 ¢ = 9.9 ¢/cm.

1548 Water ht = 11.70 cm
Lupton just critical

1608 (5) Water ht = 13.10 cm $\Delta\rho = 1.4$ cm
+ Per:
τ = 81.49 sec = 11.6 ¢ = 8.3 ¢/cm

1613 Water ht = 11.70 cm
Lupton just critical
Drain.

88

1-10-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ~	1"	~	3 X 10 -12
	"	Fast ~	"	~	"
K-2	"	Meter ~	1"	~	"
	"	Fast ~	"	~	"
R-1					
R-2					
PM-1	700 V	Alarm ~	cont	~	500 V
PM-2	1200 V	Low ~	12"	~	900 V
	"	Alarm ~	1"	~	"

LOG N CALIBRATE ~ OPERATE ~ SOURCE No. B-80

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

Equipment checked by RKH Personnel check by F.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-23

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by RKH Time 0405

Start-up OK'd by F.D.C RKH Date 1-10-66

#304

added two (2) natural boron strips. Now have four (4) enriched strips and two (2) natural strips. Total of six (6). Total watts = 134.14 f

1-10-66

(1) $\Delta h = 3.05$ cm.

0839 Water ht = 21.05 cm
+ Per.
$\tau = 597.58$ sec = 2.1 ℓ = .69 ℓ/cm.

0900 Water ht = 18.00 cm
Lupton just critical
Drain.

0950 Removed two (2) enriched boron strips.
Now have two (2) natural and two (2)
enriched boron strips. Purpose is to
repeat + Per #3 and Critical ht on
page 86.

1015 $\Delta h = .50$ cm.
~~0945~~ (2) Water ht = 11.30 cm
+ Per.
$\tau = 151.02$ sec = 7.1 ℓ = 14.2 ℓ/cm

1023
~~0923~~ Water ht = 10.80 cm
Lupton just critical
Drain to 0.0 cm in order to repeat
Critical ht.

$\Delta h = .80$ cm
1032 (3) Water ht = 11.60 cm
+ Per
$\tau = 89.09$ sec = 10.8 ℓ = 13.5 ℓ/cm
Water Temp = 23.3°C
Water ht = 10.80 cm
Lupton just critical.

1-10-66

1255 Removed spent fuel element and natural and enriched boron strips: Installed the 4.18 x 26.0" styrofoam void in inner element. Top of void is .750" above top of fuel plates.
void = (~69%)

water temp - 24.°C

1324 Water ht = 7.10 cm: Δh = .50 cm
+ Per:
τ = 156.45 sec = 6.94¢ = 13.87¢/cm.

1330 Water ht = 6.60 cm
System just critical
Drain.

1430 Removed the 4.18" x 26.0" styrofoam: and replaced it with the 2.875" x 24 1/16" ~~24.0" void~~ styrofoam ~~soft~~ void. (~31.5% void). Top of styrofoam is even with top of fuel plates.

1512 Water ht = 17.20 cm
System just critical.
Drain.

1-11-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	1"	✓	3 X 10 -12
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cent	✓	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by AKH Personnel check by F.D.C

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKH Time 0819

Start-up OK'd by F.D.C AKH Date 1-11-66

Purpose to repeat experiment with the 2.875" X 24.0" styrofoam void, (see bottom of page 90). The void now is centered with a .50" X 5.0" plexiglass disk at top of void.

over

1-11-66

0911 (1) Water ht = 21.10 cm Δh = 3.30 cm
+ Per.
τ = 478.06 sec = 2.5¢ = .76 ¢/cm

Water temp:
Recorder:
#3 = 25.5°C
#4 = "

0937 Water ht = 17.80 cm
system just critical
Drain.

Temp measured with thermometer = 24.0°C

difference of .60 cm in critical ht (page 91)

Installed the 3.250" x 24.437" styrofoam void.
= 41% void.

10 33 (2) Water ht = 10.90 cm Δh = .65 cm
+ Per
τ = 112.26 sec = 9.0¢ = 13.9 ¢/cm

1043 Water ht = 10.25 cm
system just critical
Drain.

Water temp. = 24.0°C

1050 added 2 enriched boron strips. #1+2 = 53.32¢

(3) Water ht = 16.00 cm. Δh = 1.85 cm
+ Per.
τ = 165.80 sec = 6.6¢ = 3.6 ¢/cm

1118. Water ht = 14.15 cm
system just critical
Drain.

Water Temp. = 24.0°C

1-11-60

1225 Removed enriched boron strip #s 1 + 2, and replaced them with enriched boron strip #s 8 + 10. in same position in outer core:

1249 Water ht = 16.00 cm $\Delta h = 1.8$ cm
4 + Per. τ = 172.75 sec = 6.3¢ = 3.5 ¢/cm

1300 Water ht = 14.20 cm Water temp. = 24.0°C
system just critical
Drain.

added natural boron strip #3. now have 2 enriched and 1 natural boron strip. Total worth = 67.10¢

1330 Water ht = 21.00 cm. system very slightly - neg.
5 - Per.
τ = -1412.45 sec = -.09¢

1345 Increased H_2O to 22.00 cm. No change in reactivity.
Drain.

94

1-22-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3X10-12	Meter ✓	cont	✓	3X10-12
	"	Rate ✓	"	✓	"
K-2	"	Meter ✓	1/2"	✓	"
	"	Rate ✓	1"	✓	"
R-1					
R-2					
PM-1	700 V	Meter ✓	cont	✓	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
		Rate ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by RKH Personnel check by I.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-93

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by RKH Time 0915

Start-up OK'd by F.D.C RKH Date 1-12-66

1-12-66

Now have the 4.18 x 24.5" styrofoam void plus 2 natural boron strips, and 4 enriched boron strips. (all strip in outer element)
void = 400.00 ¢. strip = 134.00 ¢

0950 Water ht = 12.55 cm $\Delta h = .65$
(1) +Per
ρ = 136.90 mm = 7.7 ¢ = 111.8 ¢/cm.
Water temp. 24.0 C

1000 Water ht = 11.90 cm
keyten just critical
Drain.

1005 added 2 more enriched strips. Now have 6 enriched (two strip) and 2 natural boron strip
void = 400.00 ¢, strip = 187.52 ¢

1030 Water ht = 21.10 cm, keyten sub critical
(2) -per.
ρ = -137.73 mm = -14.5 ¢
Water temp = 24.0°C

1043 Removed 1 enriched boron strip, and added 1 natural born strip. Now have 5 enriched boron strips and 3 natural strips.
void = 400.00 ¢. strip = 174.64 ¢

over.

1-

1104 (3) Water ht = 21.10 cm: System slightly sub Critical
− Per:
τ = −484.58 sec = −2.9 ¢

Water temp
= 24 °C

1225. Now have spent fuel element in. With 2 fuel plates. # D-3224, & D-5495. all poison strip removed. (Top of spent fuel plates even with top of core fuel plates.
Spent plates (2) = 240.00 ¢ [illegible]

1300 Water ht = 21.10 cm: System sub critical.
(4) − Per
τ = −173.84 sec = −9.9 ¢

Water Temp
=

1330 Now have 6 fuel plates in spent element,
D-3224, D-5495, D-3242, D-2870, D-3228, and D-3252. also have 8 enriched boron strips and 2 natural boron strips.
Spent plate = 515.00 ¢ Strip = 240.84 ¢

Δh = .70 cm

1403 (5) Water ht = 12.00 cm
+ Per
τ = 145.59 sec = 7.3 ¢ = 10.4 ¢/cm

1414 Water ht = 11.30 cm — Water temp = 24.°C
Lupton just critical.
Drain.

added 1 enriched boron strip and 1 natural boron strip. Now have 9 enriched, and 3 natural boron strip.
Spent plate = 515.00 ¢ Strips = 281.25 ¢

1450 (6) Water ht = 21.10 cm. Lupton sub critical
-per
τ = -275.97 sec = -5.5 ¢ — Water temp = 24°C
sub critical = 239.22 ¢

1508 Now have 4 fuel plates in spent element. #D-3224 D-5495, D-3242, and D-2870. Also have 4 enriched boron strip and 2 natural boron strip, Repeat of exp on pages 88 and top of 89.)
Spent plate = 391.00 ¢ Strip = 134.10 ¢

1539 Water ht = 21.10 cm — Δh = 5.9 cm
(7) + per.
τ = 162.24 sec = 6.7 ¢ = 1.1 ¢/cm

1550 Water ht = 15.20 cm — Water temp = 24.0°C
Lupton just critical.
Drain.
diff in critical ht (page 88 + 89) = 2.08 ¢.

15.00
-12.20
2.80 = Δh

98

1-13-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X10 -12	Meter ✓	1/2"	✓	3 X10 -12
	"	Fast ✓	"	—	"
K-2	"	Meter ✓	"	—	"
	"	Fast ✓	"	—	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	out	—	500 V
PM-2	1200 V	Low ✓	10"	—	900 V
	1"	Alarm ✓	2"	—	1"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by BKK Personnel check by I.D.C

Instruments and safeties checked and reset by BKK

Source in checked by BKK Source No. M-43

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by BKK Time 0810

Start-up OK'd by I.D.C BKK Date 1-13-66

Purpose is to repeat test described on bottom of page 97.

1-13-60

0845 Water ht = 21.19 cm. $\Delta h = 5.90$ cm
(1) + Per
τ = 167.32 sec = 6.54 = 1.1 ¢/cm Water temp. 24.0°C

0856 Water ht = ~~15.20~~ 15.20
System just critical
Drain.

0915 Removed the .125" plexiglass spacer (or shim) from inner cone. Inner cone now .125" below outer cone. other condition ~~same~~ as above. 4 fuel plates, 4 enriched strips, and 2 natural strips.

0932 Water ht = 21.30 cm. − .125"
System very sub critical. > 6.54
Drain.

0938 Installed .250" plexiglass spacer (or shim) in inner cone. other conditions the same as above.
+ .125"

0954 Water ht = 17.40 cm $\Delta h = 2.30$ 7.54 sep.
(2) + Per
τ = 244.68 sec = 4.7¢ = 2.04 ¢/cm. Water temp. = 24.0°C

1010 Water ht = 15.10 cm
System just critical
Drain.

[illegible]

100

1-13-66

1025 Installed .500" plexiglass spacer or shim in inner core. other condition the same. ±.375"

1046 (3) Water ht = 22.40 cm. $\Delta L = 6.60$ cm
+Per
$\tau = 178.19$ sec = 6.24 = .93 ¢/sec
Water Temp = 29.0°C

1157 Water ht = 15.80 cm
Kyotes just critical.
Drain.

1118 Installed 1.00" plexiglass spacer or shim in inner core. Also removed 1 natural boron strip. other conditions the same. ±.875"

1134 (4) Water ht = 14.90 cm $\Delta L = 1.15$ cm
+Per
$\tau = 201.35$ sec = 5.5 ¢ = 4.78 ¢/sec
Water temp = 29.0°C

1147 Water ht = 13.75 cm
Kyotes just critical
Drain.

1235 Installed 1.50" plexiglass spacer or shim in inner core. Conditions same as above. (4 fuel plates, 4 enriched boron strips and 1 natural boron strip.)
±1.275"

1-13-66

Δh = 3.50 cm

1305 Water ht = 19.40 cm
(5) + Per
ε = 145.59 cm = 7.3 ¢

Water Temp.
24.0°C

1315 Water ht = 15.90 cm
Systm just critical
Drain.

Installed 1.75" plexiglass spacer or shim in inner core. Conditions same as above.

+ 1.625"

1352 Water ht = 24.60 cm Δh = 7.30 cm.
(6) + Per
ε = 176.01 cm = 6.2 ¢

1403 Water ht = ~~17.40~~ 17.30 cm
Systm just critical
Drain.

Water Temp.
24.2°C

1430 "Removed" the 1.75" plexiglass spacer or shim in inner core. Inner core now .125" below outer core. Have 4 fuel plates, 4 enriched boron strip and 1 natural strip. - .125"

Δh = 5.20 cm.

1515 (7) Water ht = 21.10 cm
+ Per
ε = 134.73 cm = 7.8 ¢

ders.

102
1-13-66

1530

~~1530~~ Water ht = 15.90 cm Temp = 24.2°C

System just critical

Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE UP
K-1	3X10-12	Meter ~	1/2"	✓	3X10-12
"	"	Fast ✓	"	~	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ~	"	~	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cont	~	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
"	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

1-14-66

START-UP CHECK LIST

Equipment checked by _____ Personnel check by _____

Instruments and safeties checked and reset by _____

Source in checked by _____ Source No. _____

Emergency equipment in control room checked by _____

Instruments in trip circuit: _____

Red light on by _____ Time _____

Start-up OK'd by _____ Date _____

START-UP CHECK LIST

Equipment checked by BKH Personnel check by F.U.C

Instruments and safeties checked and reset by BKH

Source in checked by BKH Source No. M-43

Emergency equipment in control room checked by F.U.C

Instruments in trip circuit: K-1-2 P17-1-2

Red light on by BKH Time 0805

Start-up OK'd by F.U.C BKH Date 1-14-66

Removed spent fuel element and the 4 fuel plates. Purpose is to see if any air is trapped between inner & outer core.

Water ht = 21,50 cm
Systems sub critical.

Rained the inner core and did not find any sufficient amounts of air trapped between cores.

1-14-66

Now have inner core raised 2.0" (with plexiglass shim) above outer core. Also raised the spent fuel element 1.875" (limit.) Lystem box: 4 fuel plates, 4 enriched boron strips, and 1 natural boron strip.

1010 Water ht = 24.90 cm — Water Temp = 24.2°C

Lystem just critical Onaish.

1-14-66

H.F.I.R. CE-2
West End.

1320 Now have CE-2 installed in test tank, same conditions as with production core # 2

When water ht = 8.85 cm on glow scale outer core plates are just covered. and when water ht = 9.10cm inner core plates are just covered.

1345 Water ht = 22.00 cm: CE-2 Flooded. System sub critical

1500 Now have 3.25" x 26.75" Styrofoam void in plenum 1 natural boron strip. The void extends 1.18" above top of fuel plates.

1550 Water ht = 21.0 cm
+ Pen
ζ = 543.25 cm = 2.3 ¢

Water temp. = 24.5°C

1603 Water ht = 16.60 cm
System just critical
Drain.

106

1/17/66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10⁻¹²	Meter ✓	1/2"	✓	3 X 10⁻¹²
	"	Test ✓		✓	"
K-2	"	Meter ✓	1"	✓	"
	"	Test ✓		✓	"
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	Contact	✓	500 ✓
PM-2	1200 ✓	Low ✓	10"	✓	900 ✓
	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH

Instruments and safetics checked and reset by E.B.V

Source in checked by AKH Source No. M-93

Emergency equipment in control room checked by AKH

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKH Time 0830

Start-up OK'd by EBV AKH Date 1-17-66

0830 Now have spent fuel element in. with fuel plates # D-3229, D-5495, D-3242, & D-2870. The spent fuel plates are .125" below H.E.U. fuel plates. Also have 3 enriched boron strips in.

0907 (1) Water ht = 12.20 cm $D_{0.75}$
+ Per
τ = 166.45 sec = 6.5 ¢ = 8.7 ¢/cm.

0918 Water ht = 11.45 cm
keyton just critical

0923 added 1 more enriched boron strip. Now have 4 spent plates, and 4 enriched strip.

0944 (2) Water ht = 21.05 cm; keyton sub critical
-Per.
τ = -225.99 sec = -7.0 ¢

1004 Removed 1 enriched boron strip, and replaced it with 1 natural boron strip. Now have 3 enriched + 1 natural strip, + 4 spent fuel plates.

D_4 = 6.35

1031 (3) Water ht = 21.05 cm
+ Per. τ = 321.60 sec = 3.7 ¢

ave.

10 49 Water ht = 14.70 cm
System just critical.
Drain.

Plates = -3.91

Strips = 3(26.66) + 13.78 = 53.76¢

Excess = 3.74¢

Core = -3.91 + 0.04 + 0.94 = -2.93 ± 17¢ ≥ 9 ¼¢

3-14-66

3-14-66 M + C "No 2"

Outer Element # 2-0 S.S. net = 7305.01 U235 6806.08

Inner Element # 3-I S.S. net = 2787.18 U235 2596.81

+ 2.805 g B^{10} in inner element. T = 9402.89 g U235

The inner core fuel plates are .125" below the outer core fuel plates.

Feed rate = 2.7 cm/min

3/4" Drain rate = 4.80 cm/30 sec

30" " " = 38.1 cm/15 sec.

3-14-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 v ✓	Alarm ✓	Cont	✓	600 v ✓
PM-2	1200 v ✓	Low ✓	14"	✓	900 v ✓
	"	Alarm ✓	8"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by BKH Personnel check by E.D.C

Instruments and safeties checked and reset by BKH

Source in checked by BKH Source No. M-43

Emergency equipment in control room checked by E.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by BKH Time 1023

Start-up OK'd by E.D.C BKH Date 3-14-66

9.2 cm on glass scale water lvl even with top of plates (outer core)

1030 Now have Outer + Inner H.F.I.R Core assemble.

1120 Water lvl = 21.50 cm. Water temp. #1 = 23.0°C #2 = 23.5°C

System sub critical.

over.

3-14-66

1355 Added spent fuel element in center of core c. Element box + fuel plates: #s D-3224, D-5495, D-3242 and D-2870. Mass inserted = 55.9 g ^{U235}. Top of spent fuel plates are even with top of outer element fuel plates.

1426 Water ht = ?
(1) + Pwr
Drain to minimum + Pwr.

1438 Water ht = 4.50 cm $\Delta h = .10$ cm
(2) + Pwr
$\tau = 415.04$ sec = 2.9 ¢

Water temps.
#1 = 23.5 °C
2 = 24.0 °C

1445 Water ht = 4.40 cm
Leptos just critical.
Drain.

1515 added 4 enriched boron strips #s 7, 8, 9, & 10. and 2 natural boron strips #s 3 & 4. worth = 134.2 ¢ all strips are placed equal distance in outer core.

1537 Water ht = 10.10 cm $\Delta h = .30$ cm.
(3) + Pwr
$\tau = 212.95$ sec. = 5.3 ¢ = 17.7 ¢/cm.

Water temps. °C
#1 = 23.7
2 = 24.0

3-14-66

1548 Water ht = 9.80 cm
System just critical.
Drain

Core = 58.58 excess + 134.20 $^{\pm 3.44}$ (strips) + 3.91 $^{\pm 154}$ (plates) = 196.30 ± 18

3-15-66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	—	2"	✓	3×10^{-12}
	"	Fast	✓	"	✓	"
K-2	"	Meter	✓	"	✓	"
	"	Fast	✓	"	✓	"
R-1						
R-2						
PM-1	700 v	Alarm	✓	Cont	✓	5000 v
PM-2	1200 v	Low	✓	14"	✓	900 v
	"	Alarm		3"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKJ Personnel check by I.D.C

Instruments and safeties checked and reset by AKJ

Source in checked by AKJ Source No. M-43

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKJ. Time 0800

Start-up OK'd by I.D.C AKJ Date 3-15-66

over.

3-15-66

Purpose is to repeat last experiment:

0841 Water ht = 10.30 cm. Water Temp: °C
(1) + Per #1 = 24.0
τ = 160.80 sec = 6.7¢ 2 = 24.2

0851 Water ht = 9.90 cm
System just critical
Drain.

0900 added two more enriched boron strips #s 4 & 5.
Now have 6 enriched boron strips #s 4, 5, 7, 8, 9 & 10.
and 2 natural boron strips #s 3 & 4. Total of 8
strips. Total worth = ~187.52¢

0933 Water ht = 18.35 cm
System just critical.
Drain.

0945 added .125" plastic spacers to raise inner core
even with outer core. Other conditions the same as
above.

1008 Water ht = 21.20 cm. Water Temp. °C
(2) + Per #1 = 24.2
C = 673.63 cm = 1.8 ¢ 2 = 24.3

1030 Water ht = 18.25 cm Water Temp
Lysten just critical #1 = 24.2
Drain. 2 = 24.5
391.00 ¢ ± 1.5 ¢ − 187.52 ¢ ± 4.49 − 1.8 ¢ ± 1.9.4 ¢
= 201.68 ¢ sub critical (4 fuel plates in target region)

1105 Removed fuel plates #s D-3242, & D-2870 from spent fuel element. Also removed 4 enriched boron strips, #s 4, 5, 8, & 10. #s 7 & 9
Now have 2 enriched boron strips, and 2 natural boron #s 3 & 4 strips. and fuel plates #s D-3224, & D-5995.

1128 Water ht = 21.40 cm Water Temp. °C
Lysten sub critical #1 = 24.5
Drain. 2 = 24.7

1230 Removed 1 enriched boron #7 strip, and 1 natural boron #4 strip. Now have two fuel plates, and 1 enriched #9 strip, and 1 natural #3 strip. Strip = 20.00 ¢
Water ht = 21.40 cm Temp °C
Lysten slightly - Neg. 1 = 24.3
(3) - Per 2 = 24.5
t = −543.3 cm = −2.6 ¢ aver.

24 + 2.6 − 40.44 = −13.84 ¢

Removed enriched boron strip #9 and added natural boron strip #4 in its place. Also added 6 stainless steel strip.
Now have 2 spent fuel plate. 2 natural boron strips #s 3 & 4. And 6 stainless steel strips. Total worth of strip = 35.60 ¢

1348 Water ht = 21.40 cm
+ Per
τ = 1,052 sec = 1.2 ¢

1405 Water ht = 18.90 cm — Water temp. °C
System just critical — #1 = 24.5
Drain. — 2 = 24.5
240.00 ¢ (±7) − 35.60 ¢ (±1.5) − 1.2 ¢
= 203.20 ¢ (±8.54) sub critical (2 fuel plates in target region)

Average: (203.20 ± 8.5) + (202.16 ± 8) + (201.68 ± 15.4) = 202.35 ± 12.6

Reflector water sample taken after run.
Req # 68 4496.
asks for.
1. Total solids

2. Spec.

684496
-BO Sent
65

Pdh
SPL

REPORT TO RK Reely
BUILDING NO. 9213
PHONE NO. 3-5237

SPECTROGRAHIC REPORT

MATERIAL TYPE	DATE	BATCH NUMBER	PLATE SHEET NO.	REQUISITION NO.
[illegible]	3-24 [illegible]	Refluxate [illegible]	07368	684496

TYPE SPEC.
- [ ] N. C.
- [x] PYRO

REPORTING BASIS
- [x] ppm as received
- [ ] ppm - U_3O_8 basis
- [ ] ppm metal basis
- [ ] % metal basis
- [ ] µg/ml as received
- [ ] other

1	Ag		Al	.3	B	.05	Ba	<.2		
	Be	<.001	Ca	<1	Cd	<.01	Co	<.1		
	Cr	<.2	Cu	.1	Fe	<1	K	<.6		
2	Li	<.02	Mg	<.2	Mn	<.1	Na	1		
	Ni	<.1	P	<10	Pb	<.1	Si	1		
	Sn	<.1	Ti	<.4	V	<.2				
3	As	<1	Au	<.1	Bi	<.1	Cs	<10	Hg	
	Ga	<.1	Ge	<.04	Hf	<10	In	<.2	Re	
			Nb	<.4	Pd	<.1	Rb	<2	Ta	
4	Sb	<.2	Sr	<.2	Th		Tl	<.4	U	
	W	<10	Zn	<.1	Zr	<.2				
5	C*		Mo	.4	F*		O*			
	C/Q		Mo*							

UCN-260 (2 6-63)

*ppm as received basis
factor, not actual analysis

0000000012	g U/g
	g Ay/g
	g D/g
	g H/g
	g Mo/g
	g F/g
	SPEC.
	ASSAY
2 9ppm Tetrahalide	

	REPT. BY
3-24-66	DATE
	DEPT.

7

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 $^{-12}$	Meter ✓	1"	✓	3 X 10 $^{-12}$
	"	✓	"	✓	"
	"		"	✓	"
K-2	"	Meter ✓		✓	"
	"		1"	✓	"
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	Out	✓	500 ✓
PM-2	1200 ✓	Low ✓	10"	✓	900 ✓
	1'	Alarm ✓	2"	✓	1'

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 13-60

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKH Personnel check by E.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

Emergency equipment in control room checked by E.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by RKH Time 1410

Start-up OK'd by E.D.C RKH Date 5-26-66

116

Fuel rate = 2.90 cm/min. "water ht on narrow rack" = 8.85 cm outer element covered
3/4" drain rate = 10.1 cm/min " " = 9.10 cm inner element covered.
3" dump rate = 38.0 cm/15 sec.

5-26-66 Repeat of critical conditions with CE-2 Core. (See pages 105, 106, 107, 108.)

Now have CE-2 core in reflector tank: Inner and outer core only.

1456 Water ht = 20.9 cm:
System sub critical

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE TRIPPED	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	✓	1"	✓	3×10^{-12}
	"	Fast	—	"	✓	"
K-2	"	Meter	—	"	✓	"
	"	Fast	✓	"	✓	"
R-1						
R-2						
PM-1	700 V	Alarm	✓	cont	✓	500 V
PM-2	1200 V	Low	✓	18"	✓	900 V
	"	Alarm	—	3"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

H.F.I.R – C E - 2

START-UP CHECK LIST

Equipment checked by RKH Personnel check-by I.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by RKH Time 0805

Start-up OK'd by I.D.C RKH Date 5-27-66

Now have spent fuel element installed. 4 fuel plates. #'s D-3228, D-5495, D-3242, D-2870. Also have three (3) enriched boron strips #'s 10, 8, 4. and one natural strip # 2.

Water Temp °C
#1 = 23.5
2 = 23.7

0855 Water ht = 21.00 cm D_4 = 5.7 cm
+ Per.
τ = 495.44 sec = 2.4 ¢ = .4 ¢/cm

0917 Water ht = 15.30 cm
System just critical
Drain.
C_{xe} = 290.74 ¢
Production Cores: # 3-0 & 2-1

1025 Now have production cores # 3-0 (outer element) and # 2-1 (inner element) assemble. Inner element fuel plate .125" is below top of outer element fuel plate.

ours.

When water ht = 9.25 cm on mirror scale: Water even with top of fuel plates in outer element.

1055 Water ht = 21.10 cm Log n = .0009 with source in. Temp °C
System sub critical #1 = 23.7
#2 = 24.0

1230 added spent fuel element with 2 fuel plates #s D-5495 and D-3224. Also added 2 natural boron strips #s 3 & 4. plus 6 stainless steel strip.
2 fuel plates = 240.0 ¢
poison strips = 35.6 ¢

1345 Water ht = 21.10 cm Log n = .0011 Water temp °C
System sub critical #1 = 24.2
Drain. 2 = 24.2

1350 Removed the 2 natural boron strip. #s 3 & 4. Now have 2 fuel plate plus 6 stainless steel strips.
2 fuel plates = 240.0 ¢
poison strips = 8.04 ¢

Temp °C
1427 Water ht = 21.00 cm Log n = .0942 #1 = 24.2
System sub critical 2 = 24.3
Drain

1450 added 2 more fuel plates.
Now have 4 fuel plates in Spent element.
Plus 4 enriched boron strips #s 7, 8, 9, & 10.
4 fuel plates = 391.00 ¢
4 poison strips = 106.00 ¢

1515 Water ht = 21.00 cm. $\Delta h = 7.2$ cm
+ Per
$\tau = 52.15$ sec = 15.9 ¢ = 2.2 ¢/cm,

Temp °C
#1 = 24.5
#2 = 24.5

1524 Water ht = 13.80 cm.
Lysters just critical
Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SHUNT	SET	START UP RANGE
K-1		Meter			
		Test			
K-2		Meter			
		Test			
R-1					
R-2					
PM-1		Alarm			
PM-2		Low			
		Alarm			

LOG N CALIBRATE _____ OPERATE _____ SOURCE No. _____

DUMP WELL PROBE LIGHT _____

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3X10^{-12}$	Meter ✓	5"	✓	$3X10^{-12}$
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cant	✓ 500V	
PM-2	1200V	Low ✓	18"	✓ 900V	
	"	Alarm ✓	3"	✓ "	

LOG N-CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by DC Personnel check by DC.

Instruments and safeties checked and reset by DC.

Source in checked by DC Source No. M-43

Emergency equipment in control room checked by DC

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by IDC Time 0820

Start-up OK'd by IDC DC Date 5/31/66

Log N blew a fuse. Bad rectifier tube. Replaced.

Repeat of last run of 5/27/66

0924 H_2O at 8.40 cm, T period #1 ch=.90ms Temp #1: 24.2°C

0935 H_2O at 7.50 cm. Level. #2: 24.3°C

Drain $E = 135.81 = 7.7\%$

7/31/64

1037 H_2O at 8.40 cm. + period #2 — #1: 24.5°C
ζ = 144.50 sec = 7.3 ¢ — #2: 24.5°C

1049 H_2O at 7.60 cm. Level.
Drain
Added #1 & 2 enriched boron, #2 natural boron.
Now have 6 enriched boron and 1 natural boron.
+4 SPERT plates. Fuel = 39¢, strips = 173.7¢
ζ = 164.06 sec = 6.6 ¢

1047 H_2O at 12.70 cm, + period #3 — #1: 24.5°C
#2: 24.5°C

1053 H_2O at 11.8 cm, Level.
Drain. Core = -39.0 + 173.7 + 25.5 = 186.8¢

Added #3 enriched boron strip. Now have 7 enriched strips and 1 natural strip. Strips = 200.5¢, fuel = 39¢
Tot 189.5¢

1055 H_2O at 21.7 cm. Slightly subcritical
Put source back in to increase power level.

1413 Removed source for long period #4 — #1: 24.5
Drain — $\rho = -671.46$ sec = -2.1¢ — #2: 24.7
Core + fuel + poison = Key
Core + 39 - 200.5 = -2.1
Core = 200.5 - 2.1 - 39 = 192.6¢

Removed 2 plates from SPERT element. Now have 2 fuel plates, enriched strip #7, natural strip #2, and 4 stainless steps. Total 45.8¢ in poison, 24.0¢ in fuel

1522 H_2O at 21.5 cm. Subcritical.
Drain

5/31/66

Removed enriched strip #3. Now have 1 natural #2 and 4 stainless strips.

1553 H_2O at 21.5 cm. Subcritical #1: 25.0

Drain. #2: 25.0

Removed all strips. Now have only 2 fuel plates.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	✓	1"	✓	3×10^{-12}
	"	Fast	✓	"	✓	"
K-2	"	Meter	✓	"	✓	"
	"	Fast	✓	"	✓	"
R-1						
R-2						
PM-1	700 V	Alarm	✓	Cont	✓	500 V
PM-2	1200 V	Low	✓	18"	✓	900 V
	"	Alarm	✓	3"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ______

6-1-66

START-UP CHECK LIST

Equipment checked by AKH Personnel check by I.D.C

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

Emergency equipment in control room checked by I.D.C

Instruments in trip circuit: K-1-2 PM-1-2

Red light on by AKH Time 0820

Start-up OK'd by I.D.C AKH Date 6-1-66

0820 all poison strips removed. Have 2 fuel plate in spent element. #s D-3229 and D-5495.
plates = 240.0 ¢

0911 Water ht = 11.60 cm. $\Delta h = 1.2$ cm
+ Per:
$\tau = 58.67$ sec = 14.7 ¢ =

Temp °C
#1 = 24.5
#2 = 24.7

0921 Water ht = +10.40 cm (−10.35 = avg = 10.375)
System just critical
Poison

0945 added .125" plastic spacers to raise inner core even with outer core: other conditions same as above:

1050 Water ht = 10.80 cm. Δh = .475 — Water Temp °C
2 + Per. — #1 = 24.7
τ = 139.07 = 7.6¢ = 15.96 ¢/cm (16.0) — 2 = 25.0

1101 Water ht = -10.30 +10.35 avg = 10.325
System just critical.

1105 Drain to ~ 0.0 cm on narrow scale;
to repeat + Per.

1112 Water ht = 11.30 cm Δh = .975 cm — Water Temp °C
3 + Per. — #1 = 24.7
τ = 67.36 sec = 13.3¢ = 13.96 ¢/cm (14.0) — #2 = 25.0

1120 Water ht = -10.30 10.35 avg = 10.325
System just critical
Drain

1340 Now have 2 spent fuel plates: 4 stainless steel strips and 1 natural boron strip #2.
plates = 240.0¢ (Core inner raised .125").
poison strip = 19.14¢

1410 Water ht = 12.25 cm Δh = .55 cm — Temp °C
4 + Per — #1 = 24.7
τ = 264.02 sec = 4.4¢ = 8.0 ¢/cm — 2 = 25.0
allen

1428 Water ht = 11.70 cm. Fuel = 240, steps = 15.1
System just critical Core = -240 + 15.1 + 30.9 = -194.0 ¢
Drain.

1500 - Removed Agent element. Flooded core to check for air; could not find any air bubbles on core fuel plate. Raised inner core up, and found some small air bubbles; Drain water. Removed .125" spacers and flooded core again; When inner core was raised, had a large release of air bubbles,

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	1"	✓	3 X 10 -12
	"	Rate ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Rate ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cent	✓	500 V
PM-2	1200 V	Low ✓	12"	✓	900 V
	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKH Personnel check by F.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-93

Emergency equipment in control room checked by F.D.C

Instruments in trip circuit: K-1-2 M-1-2

Red light on by RKH Time 0808

Start-up OK'd by F.D.C RKH Date 6-2-66

0800 Have inner core raised .125" with plastic spacers. Also have 2 spent fuel plates #s D-3229 and D-5495. With 4 stainless steel strips plus natural boron strip # 2. (See bottom of page 125)

0840 Water ht = 13.00 cm. $\Delta h = .30$ cm Water temp °c

(1) + Per. #1 = 24.5

$\tau = 706.23$ sec = 1.6 ¢ = 5.3 ¢/cm 2 = 24.7

0925 Water ht = 12.70 cm

System just critical

Drain — ½ way down with 3" dump valve.

0945 Water ht = 12.90 cm $\Delta h = 1.10$ cm Water temp °c

(2) + Per #1 = 24.5

$\tau = 123.86$ sec = 8.3 ¢ = 7.5 ¢/cm 2 = 24.7

0955 Water ht = 11.80 cm

System just critical

Drain.

In order to vent air trapped between outer and inner core.

1030 Now have inner core raised .375". Top of inner core fuel plates now .250" above top of outter core fuel plates. Top of inner core fuel plate also .250" above top of spent fuel plates. Same fuel and poison loading as discribed on page 127.

Fuel = 240.0 ℓ.

poison = 19.1 ℓ.

1118 Water ht = 13.10 cm $\Delta h = 1.0$ Water Temp °c

③ + Per #1 = 24.5

C = 132.55 cm = 7.9 ℓ = 7.7 ℓ/cm #2 = 24.7

+12.10 cm = 12.075

1130 Water ht = 12.05 cm

System just critical

Drain.

1230 Repeat of above:

1255 Water ht = 13.10 cm Δh 1.05 Water Temp °c

④ + Per #1 = 24.7

C = 135.81 cm = 7.9 ℓ = 7.5 ℓ/cm. 2 = 25.0

+12.10

1305 Water ht = 12.00

System just critical

Drain.

1330 added natural boron strip #3. Now have spent fuel element with 2 fuel plats #s D-3224 and D-5495. Two (2) natural boron strips #s 2 and 3. and 4 stainless steel strips.

Fuel = 240.0 ¢

poison strip = 32.92 ¢

1400 Water ht = 18.70 cm $\Delta h = 4.70$ cm Water Temp °C

(5) + Rx #1 = 24.7

E = 99.96 mv = 9.9 ¢ = 2.1 ¢/cm #2 = 25.0

+14.10 cm = 14.00 cm

1410 Water ht = -13.90 cm

Lyden just critical

Drain to — 0.0 cm on meniscus scale: repeat + Rx.

1420 Water ht = 21.20 cm $\Delta h = 7.20$ cm Water Temp °C

(6) + Rx #1 = 25.0

C = 83.66 mv = 11.3 ¢ = 1.56 ¢/cm. #2 = 25.1

1427 Water ht = 14.00 cm

Lyden just critical.

Drain!

∴ Core + fuel + strips = Kx

Core = Kx - fuel - strips

= 11.3 - 240 + 32.5 = -195.8 ¢

Now have 4 fuel plates in spent element. # D-3228, D-5495, D-3242 and D-2870. Also have 4 enriched boron strips. #s 7, 8, 9, & 10. evenly spaced in outer fuel element.

plate = 391.307
[illegible] = 106.644

1515 Water ht = 8.70 cm. Δh = .90 cm. | Water temp °C
(7) + Per
[illegible] = 12.37 = 13.7 | #1 = 25.0
| 2 = 25.2

1530 Water ht = −7.80 / +7.80 = 7.80
System just critical.
Drain to ~ 0.0 cm on narrow scale; repeat + Per.

1338 Water ht = 8.60 cm Δh = .80 cm. | Water temp °C
(8) + Per | #1 = 25.0
τ = 97.19 = 10.7 = 12.64/cm | 2 = 25.2

1545 Water ht = 7.80 cm ✓
System just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	1"	✓	3 X 10 -12
	"	✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fail ✓	"	✓	"
R-1					
R-2					
PM-1	700 ✓ 500 ✓	Alarm ✓	Cent	✓	5000 ✓
PM-2	1200 ✓	Low ✓	18"	✓	900 ✓
	"	Alarm ✓	3"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ———

START-UP CHECK LIST

Equipment checked by RKH Personnel check by F.D.C

Instruments and safeties checked and reset by RKH.

Source in checked by RKH Source No. M-43

Emergency equipment in control room checked by F.D.C

~~Instruments in trip circuit:~~ K-1-2 PM-1-2

Red light on by RKH Time 0815

Start-up OK'd by F.D.C RKH Date 6-3-66

Same conditions as described on top of page 130. 4 fuel plates in spent element #s D-3224, D-5495, D-3242 and D-2870. 4 enriched burner strips #s 7, 8, 9, & 10.

over

6-3-66

[illegible] = 3?? [illegible]

poison = 103.64¢

0935 Water ht = 8.60 cm. ΔL = .80 cm — Water temp °C
(1) + Per — #1 = 24.7
T = 157.5? sec = 0.3¢ = 0.5? cm !? — #2 = 24.7

0947 Water ht = 7.80 cm
System just critical
Drain.

1000 Now have 4 fuel plates in spent element. Place
7 Enriched boron strips #s 1, 2, 3, 7, 8, 9 & 10. place
natural boron strips # 2. Total of 4 fuel plates
plus 8 strips.

Fuel = 391.00¢
poison = 200.40¢
fuel − strips − −K = −K
391.00 − 200.40 + 1.6 = 192.2 ¢ ± 19.2¢

1038 Water ht = 21.10 cm — Water temp °C
(2) − Per — #1 = 24.5
T = −540.95 sec = −1.6¢ — #2 = 25.0

1048 added water; ht = 23.90 cm, no change
in − Per.
Drain.

1100 Removed natural boron strip # 2. added 5 stainless steel strips.

Now have:

4 fuel plates.

7 enriched strips (1, 2, 3, 7, 8, 9 & 10.)

5 stainless steel strips.

fuel = 391.00 ¢

poison = 193.32 ¢

391.0 − 193.32 − 3.9 = 193.78 ± 15.2 ¢

1130 water ht = 21.10 cm $\Delta h = 4.80$ cm. Water temp °C

(3) + Rho $T_1 = 25.0$

$\tau = 297.70$ sec = 3.9 ¢ = .81 ¢/cm $T_2 = 25.0$

1146 Water ht = 16.30 cm

Reactor just critical

Danais.

1240 Now have:

2 fuel plates (D-3229 & D-5498.)

2 natural boron strips # 2 & 3

4 stainless steel strips.

See page 129.

Fuel = 240.00 ¢

poison = 32.92 ¢

11.4 − 240.0 + 32.9 = 195.64 ¢ ± 7.8 ¢

1315 Water ht = 21.10 cm $\Delta h = 7.1$ cm Water temp °C

(4) + Rho $T_1 = 25.0$

$\tau = 83.23$ sec = 11.4 ¢ = .62 ¢/cm. ave. $T_2 = 25.2$

1322 Water ht = 14.00 cm.
System just critical
Drain.

Outer cone # 3-0 Inner cone # 4-1

Now have Inner core 4-1 in place of 2-1.
~~Outer~~ Cone # 3-0. No plastic spacers or
poison strips.

1420 Water ht = 22.00 cm.
System sub critical.

1423 ~~Water~~ Raised inner cone and found a large release of
air bubbles. Could also ~~[illegible]~~ see air ~~escaping~~
as if under pressure from at the ~~escaping~~
joint. before raising inner cone. System still sub critical.
Drain.

1445 Now have: Inner cone raised .375"
2 fuel plates (#s D-3224 + D 5494)
2 natural boron strips (# 2 & 3)
4 stainless steel strips.
Fuel = 240.00 ¢
poison = 32.92 ¢

1520 (5) Water ht = 16.80 cm $\Delta h = 3.10$ cm Water temp °C
+ Per #1 = 25.2
T = 114.08 sec = 8.94 = 2.9 ¢/cm 2 = 25.5

1530 Water ht = 13.70 cm.
System just critical
Drain.

Cr = 13.3 + 32.5 − 243 = −193.84 ± 8.59

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4'	✓	3×10^{-12}
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	5'	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont.	✓	500 V
PM-2	1200 V	Low ✓	12"	✓	900 V
		Alarm ✓	2	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

~~Equipment checked by~~ DC Personnel check by DC.

~~Instruments and safeties checked and reset by~~ DC

Source in checked by DC Source No. M-43

Emergency equipment in control room checked by DC

Instruments in trip circuit: K1-2 PM 1-2

Red light on by DC. Time 0810

Start-up OK'd by D.C. DC Date 6/6/66

Repeat of last experiment 6/3/66 (OVER)

4/6/66

0906 H_2O at 16.70 cm. + period #1 — #1: 24.0°C, #2: 24.2°C

T = 176.4 sec = 6.2¢

0920 H_2O at 14.30 cm. Critical and level.

Drain partway back to bottom of manometer.

0942 H_2O at 17.1 cm. + period #2 — #1: 24.2°C, #2: 24.2°C

T = 157.5 sec = 6.8¢

0954 H_2O at 14.30 cm. Level.

Drain

Core = 240 + 32.9 + 10 = -197.1¢ ± 8.5¢

Removed 3-D and 4-F, replaced with <u>4-D and 4-F</u>.

No SPERT element or poison strips. Thru annulus spaced 0.375

1220 H_2O at 21.2 cm. Subcritical.

Installed SPERT element with 2 fuel plates, #2 & 3 natural B strips and 4 SS strips.

Fuel = 240¢, Poison = 32.92¢

1305 Apparently critical at low neutron level. Put source back in to raise power. H_2O at 21.20 cm. — #1: 24.5°C, #2: 24.5°C

1320 Removed source.

1325 H_2O at 17.1 cm. Level

Core = -240 + 32.9 + 3.2 = -203.9¢ ± 8.5¢

4/6/66

Removed 4 SS Strips. Now have 2 SPERT plates, and 2 natural boron strips.
Fuel = 240 #, Poison = 27.56 #

1404 H_2O at 21.2 cm. + Period #3 — #1: 24.5 °C, #2: 25.0 °C
T = 109.2 sec = 5.2 #

1410 H_2O at 14.6 cm. Level.
Drain Core = -240 + 27.6 + 5.1 = -207.2 #

Added 2 plates to SPERT element, have enriched B° strips 2, 3, 7, 8, 9, 10 (total 6) and natural strip #3.
Fuel = 351, Poison = 170.7 #

1515 H_2O at 15.0 cm. + Period #4 — #1: 25.0 °C, #2: 25.0 °C
T = 126.4 sec = 8.2 #

1525 H_2O at 12.95 cm. Level
Drain
Core = -391 + 173.7 + 19.0 = -198.3 # ± 16.7 #

6/7/66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE POSITION	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
		Rate ✓		✓	
K-2	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
		Rate ✓		✓	
P-1	—				
P-2	—				
PM-1	700 V	Alarm ✓	Contact	✓	500 V
PM-2	1200 V	Low ✓	14"	✓	900 V
		Alarm ✓	3"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by EJ, IDC Personnel check by IDC

Instruments and safeties checked and reset by EJ

Source in checked by IDC Source No. M-40

Emergency equipment in control room checked by IDC

Instruments in trip circuit: K-1, K-2, PM-1, PM-2

Red light on by DC Time 1210

Start-up OK'd by DC, IDC Date 6/7/66

1240 Installed 5-I in 4-D with 0.375 in. spacer. H_2O at 22.9 cm. Subcritical.

6/7/66

Added SPERT element with 2 fuel plates and #2 & #3 natural boron strips and 4 SS strips.
Fuel = 240 g, Poison = 32.52 g
K-2 noisy. Replaced HV batteries. Temporary improvement
Unit still noisy. Out of Imp.

1330 H_2O at 21.25 cm. Source Rack in to raise power.
#1: 24.5°C
#2: 24.7°C

1341 Source cnt. Log period #1
T = 1715 sec = 0.76 g
Core = 240 - 32.9 + 0.76 = 207.9 g ± 8.5 g

Removed 4 SS strips. Now have 2 fuel plates and 2 natural boron strips. Poison = 27.56 g

#1: 24.7°C
#2: 25.0°C

1414 H_2O at 21.20 cm. + Period #2
T = 215.7 sec = 5.2 g
Core = 240 - 27.56 - 5.2 = 207.2 g ± 8.4 g

1422 H_2O at 15.95 cm. Critical.
Drain

Installed 5-I and 5-O with 0.375-in spacers.

1600 H_2O at 21.25. Subcritical
Drain

Added 2 fuel plates (= 0.8 g) and #2 & #3 natural boron strips.
Poison = 27.56 g

6/8/66

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3"	✓	3×10^{-12}
	"	Fast ✓		✓	"
K-2	3×10^{-12}	Meter ✓	3"	✓	3×10^{-12}
	"	Fast ✓		✓	"
R-1	—				
R-2	—				
PM-1	700 V	Alarm ✓		✓	500 V
PM-2	1200 V	Low ✓	12"	✓	900 V
		Alarm ✓	1"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

~~Equipment checked by~~ EJ IDC ~~Personnel check by~~ IDC

~~Instruments and safeties checked and reset by~~ EJ

Source in checked by EJ Source No. M-43

Emergency equipment in control room checked by IDC

Instruments in trip circuit: K-1, K-2, PM-1, PM-2

Red light on by IDC Time 0815

Start-up OK'd by EJ, IDC Date 6/8/66

Condition as of end of p. 135.

0900 H_2O at 21.2 cm. + Period #1 #1: 24.5

$T = 154.4$ sec 4.94 #2: 24.5

0910 H_2O at 15.25 cm. Critical.

Drain.

Corr. = −240 + 27.56 + 6.7 = −205.74 ± 84

9/18/66

Added 2 fuel plates and finished strips #2, 3, 7, 8, 9, 11, and #3 natural strip. Now have 4 fuel plates, 6 finished strips and 1 natural strip.
Changed amplifier on K-2. Going. Part of Trip

1305 H_2O at 15.65 cm. + period #2 #1: 24.7°C
T = 144.9 sec 7.3¢ #2: 25.0°C

1316 H_2O at 13.45 cm. Critical.
Core = -391 + 173.7¢ + 5.4¢ = -201.9¢ ± 18.7¢
Drain part way back.

1347 H_2O at 16.5 cm + Period #3 #1: 24.7°C
T = 104.5 sec 9.5¢ #2: 25.0°C

1355 H_2O at 13.35 cm. Critical
Drain

Installed 6-I in 5-0 with 0.375-in. spacers. Power as above; i.e., 6 finished strips, one natural strip, and 4 SPERT plates.

1505 H_2O at 14.5 cm. + Period #4 #1: 24.7°C
T = 145.3 sec 7.3¢ #2: 25.0°C

1515 H_2O at 12.5 cm. Critical.
Drain.
Core = 391 - 173.4 - 16.8 = 200.8¢ ± 18.7¢
Now have 2 plates in SPERT element and natural. Have strips #2 & 3.

4/8/66

1603 H_2O at 21.2 cm. + Period #5 | #1: 25.0°C

$T = 87.5$ sec 10.5¢ #2: 25.0°C

1610 H_2O at 14.20 cm. Critical.

Drain

Core = 240 + 27.56 + 10.9 = 201.5 ± 8.4¢

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
R-1	—				
R-2	—				
PM-1	700 V	Alarm ✓	1"	✓	500 V
PM-2	1200 V	Low ✓	1"	✓	900 V
		Alarm ✓	✓	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by D.D.C Personnel check by D.D.C.

Instruments and safeties checked and reset by D.D.C

Source in checked by D.C Source No. M-43

Emergency equipment in control room checked by D.D.C

Instruments in trip circuit: K1-2 PM1-2

Red light on by D.C Time 0810

Start-up OK'd by D.D.C D.D.C. Date 6/9/66

Repeat of last experiment on 6/8.

0849 Water at 18.75 cm. + Period #1 — #1: 24.5°C, #2: 24.7°C

T = 118.8 sec - 8.6 sec

0858 Water at 14.35 cm. Critical.

Drain. Corr = 240 - 27.52 - 9.7 = 202.7 ± 8.4¢

Expr	page	3-PW #	Inner	Outer	Safety	Island	R	Chan. μs.	Bkg	Delay	Disc	Mem.	Burst width μs	Beam I μa	Cp
131	5	97	19.61	19.61	20.77	T	R=1	160	8	16	4	1/2	1000	7.0	3
132	7	98	19.00	19.00	26.00	T	R<1	80	4	8	4	1/2	400	4.0	7
133	7	99	18.00	18.00	26.00	T	R<1	80	4	8	4	1/2	600	10.0	7
134	7	100	17.00	17.00	26.00	T	R<1	80	4	8	4	1/2	600	10.0	7
135	7	101	15.00	15.00	26.00	T	R<1	40	4	16	4	1/2	800	20.0	11
136	7	102	13.63	13.63	26.00	T	R<1	40	4	16	4	1/2	800	20.0	11
137	7	103	13.63	19.63	26.00	T	R<1	40	4	16	4	1/2	800	20.0	11
138	7	104	19.63	13.63	26.00	T	R<1	40	4	16	4	1/2	800	20.0	1
139	7	105	19.63	15.00	26.00	T	R<1	40	4	16	4	1/2	800	22.0	1
140		106	16.63	16.63	26.00	T	R<1	40	8	16	4	1/2	600	7.0	1
159	27	107	19.61	19.61	26.01	T	R<1	160	4	8	4	1/2	1000	6.0	3
160	27	108	19.61	19.61	26.01	T	R<1	80	4	16	4	1/2	1000	14.0	6
161	27	109	23.00	23.00	26.01	T	R<1	160	4	16	4	1/2	1000	6.0	5
162	27	110	24.00	24.00	26.01	T	R<1	160	4	16	4	1/2	1000	7.0	3
165	33	111	24.70	25.59	20.76	T	R=1	160	4	4	4	1/2	800	4.0	3
167	35	112	2300	2300	26.00	T	R<1	160	4	8	4	1/2	600	3.0	3
168	35	113	19.61	19.61	26.00	T	R<1	80	4	8	4	1/2	600	6.0	6
260	39	184	25.23	25.23	20.88	T	R=1	160	8	8	4	1/2	1280	9.0	3
261	39	185	25.16	24.00	26.00	T	R<1	160	8	8	4	1/2	800	8.0	3
262	41	186	25.16	23.00	26.00	T	R<1	160	4	8	4	1/2	800	8.0	3
263	41	187	25.16	22.00	26.00	T	R<1	160	4	8	4	1/2	800	8.0	3
264	41	188	25.16	21.00	26.00	T	R<1	160	2	8	4	1/2	800	8.0	3
265	41	189	25.16	20.00	26.00	T	R<1	160	2	8	4	1/2	800	8.0	3
266	41	190	25.16	19.00	26.00	T	R<1	80	2	8	4	1/2	630	12	
267	41	191	25.16	18.00	26.00	T	R<1	80	2	8	4	1/2	630	10	
268	41	192	25.16	17.00	26.00	T	R<1	80	2	8	4	1/2	630	12	
269	41	193	24.00	25.16	26.00	T	R<1	160	2	8	4	1/2	800	8.0	3
270	41	194	23.00	25.16	26.00	T	R<1	160	2	8	4	1/2	800	8.0	3
275	43	195	22.00	25.11	26.00	T	R<1	160	2	8	4	1/2	800	8.0	3

um I ua	cps	KV	I ma	cycles	λ est	λ cal.	R. Beg	
2.0	30.	145	0.9	53208		158±1	~3	Ag-Cu-Al cylinders.
4.0	70	145	0.95	224188	281	256±10	~3	
0.0	70	145	1.1	108861	518	490±10	20	
0.0	70	145	1.05	118938	757	740±50	53	
0.0	115	145	1.05	240814	1626	696±6	89	
0.0	115	145	1.01	335381	1444	1235±50	128	3300±200
0.0	115	145	1.00	239032	1001	850±25	54	3000±200
0.0	115	145	1.00	201901	942	850±10	54	3000±120
2.0	115	145	1.02	176374	777	735±15	32	3000±240
7.0	110	147	.93	968408	886	860±40	32	↑ 1.118 gB/l. ↓ 1.488 gB/l.
6.0	36	146	1.01	57396	519	500±5	40	
4.0	69	147	1.05	104868	519	500±3	24	
6.0	35	148	1.05	39988	207	200±10	5	
2.0	35	145	1.01	18532	159	154±3	~2	
4.0	35	145	.9	28510	132	115±2	~4	
3.0	30	145	1.0	43006	183	165±3	4	
6.0	60	145	.99	8000	516	508±10		
9.0	30	150	1.06	14,110	121.5	110±1		Eu_2O_3 cylinders 4/4 - Slots ulligned
8.0	35	150	1.20	10000	147	133±2		+ 1.38 gB/l.
8.0	35	150	1.20	15504	170	163±2		
8.0	35	150	1.20	20000	214	202±2		
8.0	35	150	1.21	24209	258	252±2		
8.0	35	150	1.21	30000	320	319±2		
12	75	150	1.26	40838	409	401±3		
10	75	150	1.06	90000	493	490±5		
12	75	150	1.13	70000	596	577±10		
8.0	35	150	1.13	15988	154	134±2		
8.0	35	150	1.14	20000	176	162±2		
8.0	35	150	1.13	30000	211	202±2		

Expr	Page	3PN #	Inner	Outer	Safety	Island	K	Chan μs	BKg	Delay	Disc	Mem	Burst Width μs	Beam I μa
276	43	196	21.00	25.11	26.0	+	k<1	160	2	8	4	½	800	10.0
280	45	197	22.00	25.14	26.0	T	k<1	160	2	8	4	½	800	6.0
281	45	198	21.00	25.14	26.0	T	k<1	160	2	8	4	½	800	6.0
282	45	199	20.00	25.14	26.0	T	k<1	160	2	8	4	½	800	6.0
283	45	200	19.00	25.14	26.0	T	k<1	80	2	8	4	½	630	8.0
284	47	201	20.045	20.045	20.88	T	k=1	160	4	8	4	½	1000	4.0
285	47	202	20.02	17.00	26.00	T	k<1	80	4	8	4	½	630	8.0
286	47	203	20.02	18.00	26.00	T	k<1	160	4	4	4	½	630	20
287	47	204	20.02	18.50	26.00	T	k<1	160	4	4	4	½	630	2.0
288	47	205	20.02	19.00	26.00	T	k<1	160	4	4	4	½	630	2.0
289	47	206	20.02	19.50	26.00	T	k<1	160	4	4	4	½	630	2.0
290	47	207	19.50	20.02	26.00	T	k<1	160	4	4	4	½	630	2.0
291	47	208	19.00	20.02	26.00	T	k<1	160	4	4	4	½	630	2.0
292	47	209	18.50	20.02	26.00	T	k<1	160	4	4	4	½	630	2.0
293	47	210	18.00	20.02	26.00	T	k<1	80	4	8	4	½	630	4.0
294	47	211	17.00	20.02	26.00	T	k<1	80	4	8	4	½	630	6.0

am I	CPS	KV	MA	Cycles	λ est	λ cal	λ/λc ~~R~~	
9.0	35	150	1.19	28,551	257	257±2		1.38 gβ/ℓ
5.0	35	150	1.07	15,016		199±1		
5.0	35	150	1.07	20,000		253±1		
.0	35	150	1.09	20,000		317±1		
.0	75	150	1.29					High Voltage Filter broke down
.0	35	150	.93	10500	-141	123.5±1	1	0.98 gβ/ℓ
:0	75	150	1.04	30000	-518	498±5	4.03	
20	35	150	.93	30000	-360	359±3	2.91	
2.0	35	150	.93	30000	-288	293±5	2.37	
2.0	35	150	.93	19894	-242	237±2	1.92	
1.0	35	150	.93	20000	-189	180±2	1.46	
1.0	35	150	.93	20000	-191	186±2	1.51	
1.0	35	150	.93	20000	-246	240±2	1.94	
1.0	35	150	.93	30000	-296	302±1	2.45	
.0	75	150	.93	60000	-391	378±2	3.06	
.0	75	150	.97	50000	-523	512±3	4.15	