

## BOOK47R

*Notes:*

"Pulse Neutron Solution" & "SPERT D #1" on spine

"Pulse Neutron Solution Expt page 1-188" and "Spert Expt 189-" on cover

Blank pages: inside cover sheet, page opposite page 1, 1, 8-10, 14, 17, 20, 26, 96, 108, 112, 122,  
page opposite page 300, inside back cover sheets

-1 (8.5x11) sheet between inside cover sheets

-pages 8, 45, 67, 71, 74, 117, 125 have 1 graph sheet attached

-between pages 88/89: 2 (8.5x17) sheets, with one of them having a (8.5x11) sheet stapled to it. All are folded together. Also 4 (8.5x11) sheets folded together.

-pages 111, 121, 128, 145, 153, 167, 187 have 1 (8.5x17) sheet and 1 (8.5x11) sheet stapled to each page

-page 126 has (8.5x11) sheet of paper clipped to it

-page 173 has piece of paper clipped to it

-pages 178/179 has 1 (8.5x17) sheet and 1 (8.5x11) sheet stapled together between the pages

-pages 186/187 also has 2 other sheets of paper between the pages

-page 189 has small post-it-note at top of page

*Scanned by:*

*Sheila Finch*

*RSICC /Oak Ridge National Lab.*

*August 12, 1999*

3 x 3 array's : 9.5" I.D. al cylinders  
24.00" solution ht.

0.19 cm/oz

5.084/oz

0.5 in. separation

Page	Separation (in)	H <sub>2</sub> (cm) (Temp. Com. 24.2°C)		Cl <sub>2</sub> (cm)	D <sub>h</sub>	V <sub>com.</sub>	Conv. %
56	.50"		array on 4" al channel + having latter space (1/2" x 5/8" x 4") in array.	58.55 <u>58.57</u>	.25	28.40	??
57-58	.50		array on 4" al channel with out space in.	59.10	.40	23.25	?
58	.50		Drain solution then back to critical	59.20	.30	32.3	?
59	2.50		Build up floor (wood)	58.65	0.25	32.4	
60-61	.50	58.40	array on 4" al channel + built up of floor (added Al to wood)	58.40	.40	28.50	24.0°C
Omit 3.0"	"	58.41	" " " " " "	58.45	.35	30.89	24.2°C
62-63	.50	?	array now on al cans.	58.45	.35	25.85	?(out)
64-65	.50	58.91	" " " " " "	59.00	.25	28.40	24.5°C
"	"	58.91	Drain 2.0" of solution i.e. Al cans decrease reactivity 14%	59.00	.40	24.00	24.5°C
			2 x 3 array : 9.5" I.D. al cylinders. 56.00" solution ht. 2.2 in. separation			28.18	
		1.4 cm/oz					
67	2.2"	140.82 (140.94)	array on 4" al channel + built up of floor	143.00	1.40	3.7	25.5°C
68	2.2"	141.05	Repeat of 67	142.50	1.25	3.5	25.0°C
69-70	2.2"	139.25	array now on al cans. i.e. Al cans increased reactivity 6.6%	140.50	1.20	3.9	25.0°C
94	2.2"					3.59 km	
p. 100-101	2.2"		Channel + top consistent with 710.6 g				

12" S.S. vessel bottom =  $\frac{3}{8}$ "  
20" S.S. vessel bottom =  $\frac{1}{2}$ "

12

10  
10  
16

Pulsed neutron solution  
Experiments

12/18/62

Set up 12" and 20" SS cylinders and  
14 7/8" and 22" spheres in persistent frame-  
work for pulsing. Feed & drain lines  
normal; can move from one vessel to  
another as needed.

Repaired leak in old (3-place) manometer  
line.

20" zero on 2-place manometer = 0.00<sup>16</sup> in.  
will use ~~2~~ 3-place with telescope.

Expt 1

Bottom completely flooded	0.20
" not completely "	0.17
Bottom flooded to ~10" diam circle	0.14
Edge of 3" drain	0.10
Average zero is ~	0.16
for 20" S.S. Cylinder	
H/x of U( <sup>235</sup> U) ≈ 440	

START-UP CHECK-LIST	
Equipment Checked by <u>RKR</u>	Personnel Check by <u>IOC</u>
Instrument and Safety Record and Notes	<u>RKR</u>
"Source In" checked by <u>DWM</u>	Source No. <u>Accelerator</u>
Emergency Equipment in Control Room checked by	<u>IOC</u>
Red Light On by <u>RKR</u>	AM
Start Up OK'd by <u>RKR</u>	Pat Date <u>12/18/62</u>

20" dia SS cylinder.

PM-1 required 800 V to trip; PM-2 ≈ 1200. K-1 & K-2  
checked on 10 x 10" K-1, K-2, PM-1, PM-2 in trip.

16.05	Spheres 7.82" ; telescope 21.1 cm fixed + period.
16.10	" 7.82" " 21.1" sub-
16.13	Drain



12/19/62

PM-2 max voltage 1160, will not trip.  
 PM-1 required 800 V to trip. set 500.  
 K-1 tripped at  $10 \times 10^{-12}$  @  $\frac{1}{2}$ "  
 K-2 tripped at  $10 \times 10^{-12}$  @ 4"  
 R.R. replaced tube in PM-2 power supply.  
 now trips @ 1240. set 1000.

START-UP CHECK LIST	
Equipment Checked by	RKR Personnel Check by IDC
Instrument and Safeties	Checked and Reset by RKR
"Source In" Checked	
Emergency Equipment	Checked by IDC
Red Light On by	RKR AM
Start Up OK'd by	RKR 0900 Date 12/19/1962

1130 Zero: transducer selyn:  $0.16 \text{ in}^5$ ; telescope 1.80 cm  
 Dump & soln. Trouble with decelerated 4.0.

12/20/62 BF<sub>3</sub> #763 centered in 20" SS cyl 219 pre 204 amp X64  
 0.2  $\mu$ s Rise Time PHS 5 (just above noise) pulses ~10-25 v  
 on C-1 channel  
 1" o.d. bare BF<sub>3</sub> mounted on pipe ~6" below cyl.  
 219 pre 204 amp X4 PHS X10 on C-2  
 pulses 10-40 v with some ~80-100.

Expt. 2

12-20-62

START-UP CHECK LIST	
Equipment Checked by	RKR Personnel Check by IDC
Instrument and Safeties	Checked and Reset by RKR
"Source In" Checked by	Source No. Accelerator
Emergency Equipment in Control Room	Checked by IDC
Red Light On by	RKR AM
Start Up OK'd by	RKR Time 0830 PM Date 12/20/1962

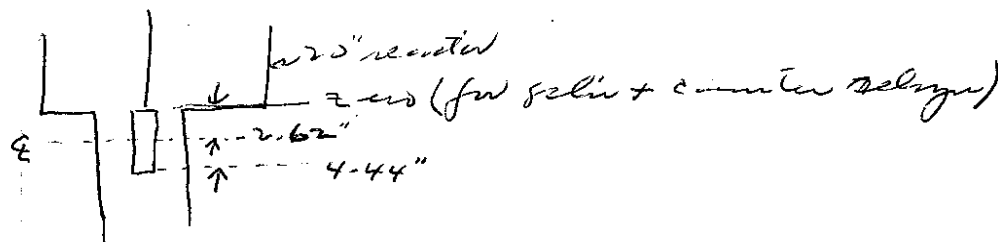
Instrument Check:

K-1 at  $10 \times 10^{-12}$ ;  $\text{current} = \frac{1}{2}$ " away  
 K-2 " " " " 4" "

PM-1 tripped @ 750 V  
 PM-2 " " 1240 V

Probe light OK

Travelling Counter is located "on axis"  
 of 20" vessel. Selyn zero set as below



Selyn zero's - selyn 0.11 in; telescope 1.70 cm  
 Critical 7.81 in. (center cent of geom)

Reactor on a pos. period, no soln. changes but both log N and  
 2' counts every 3' show that period was not constant, i.e.  
 we have reactor stability problems. Reactor on a  
 neg. period and the inst. show the same  
 behavior - counting data and log N chart discarded.

6  
12/20/62

SOLUTION HT. = 7.80"  
SCOPE READING = 21.1 cm

TIME	C-1	C-2	COUNTER
3.79	32640	100,000	10.0"
3.48	53141	100,000	9.75"
3.75	78427	100,000	9.50"
4.63	108761	100,000	9.25"
6.37	137174	100,000	8.99"
12.52	173084	100,000	8.61"

K-1 tripped when adding neutrons with acc. source.

Sol HT = 7.795 in. Scope = 21.1 cm

			8.61"
8.90	173832	100,000	8.61
9.07	200760	100,000	8.31"
9.67	223516	100,000	8.00"
13.80	252898	100,000	7.50"
16.49	274616	100,000	7.00"
10.11	294670	100,000	6.50"
4.94	303537	100,000	<del>5.50"</del>
6.80	137481	100,000	2.00"
10.91	115658	100,000	6.65"
7.24	97366	100,000	1.33"
5.89	173116	100,000	2.50"
7.30	204626	100,000	3.00"
11.37	233460	100,000	3.50"
8.07	261572	100,000	4.00"
5.68	286162	100,000	4.50"
6.39	297786	100,000	5.00"
7.27	<del>300300</del> 303304	100,000	6.00"

1600 Drain

7

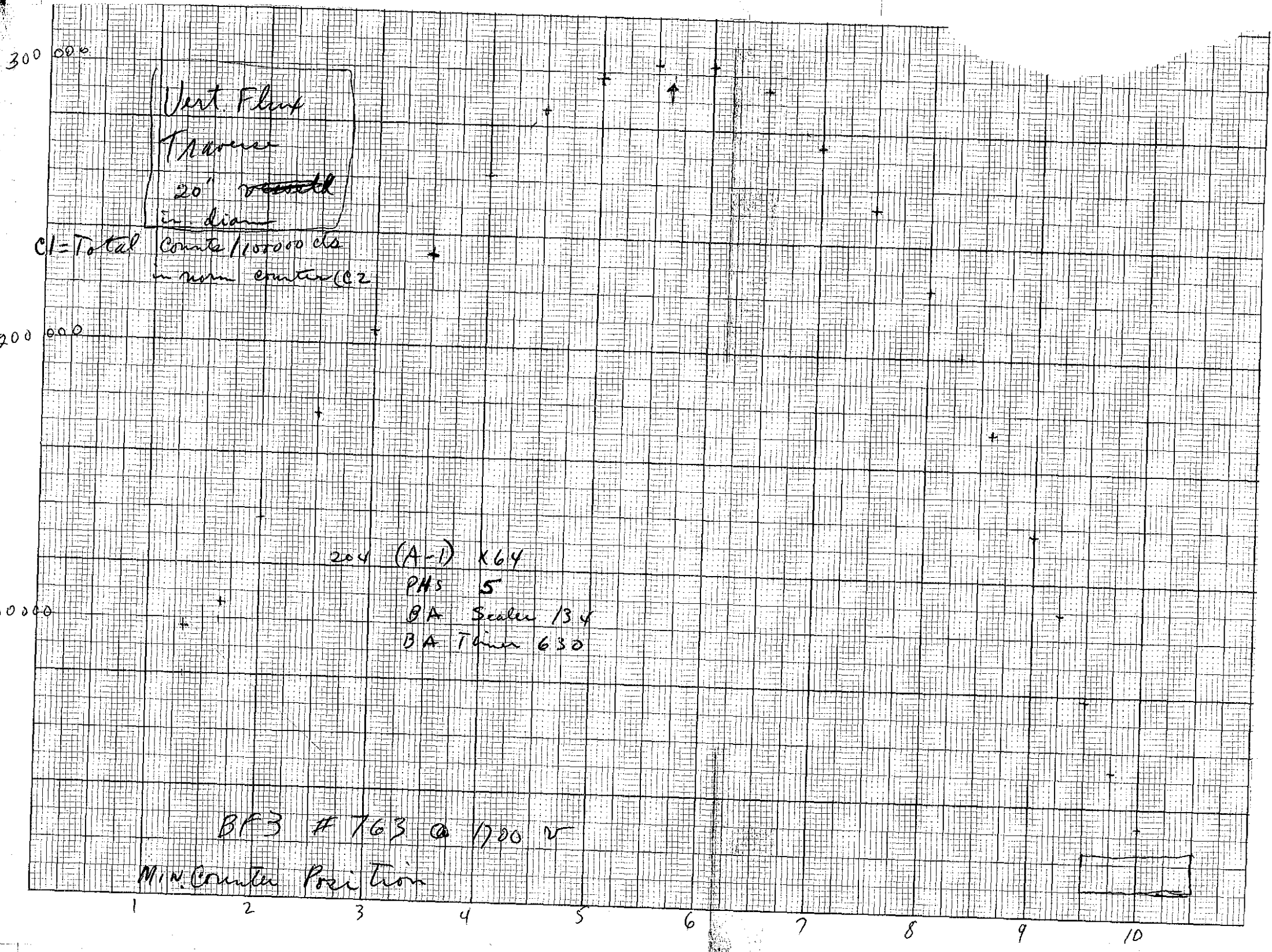
Average height during the flux traverse = 7.80 - 0.16  
= 7.64 in. of soln

Buckling from fitting data to  $y = B_1 \cos B_2(x + B_3)$

$B_2 =$  (data from 2-9)  
= ( " " 2.5-8.6)  
= ( " " 3.0-8.3)

EUBENE DIETZEN CO.  
MADE IN U.S.A.

NO. 3400-20 DIETZEN GRAPH PAPER  
20 X 20 PER INCH



for  
PNS-4  
thru  
PNS-19

START-UP CHECK LIST	
Equipment Checked by	RKR Personnel Check by RKR
Instrument and Safeties Checked and Reset by	RKR
"Source In" Checked by	Source No. <u>all elements</u>
Emergency Equipment in Control Room Checked by	RKR
Red Light On by	AM
Start-Up OK'd by	RKR time 9:30 PM Date 12-21 1962

K-1 on 3x10" tripped  
 K-2 " " "  
 PM-1 tripped at 8000  
 PM-2 " " 12000 ✓

Probe light ab.

8:50 AM

Pulsing at:

1st Solution ht is 20" S.S. cylinder = 4.02" with manometer  
 and 11.4 cm with scope.

2nd Liquid Level:

Scope:

	4.54"	12.75 cm
3rd	4.93"	13.80 cm
4th	5.425"	15.05 cm
5th	5.71"	15.70 cm
6th	6.03"	16.60 cm
7th	6.31"	17.25 cm
8th	6.61"	18.00 cm
9th	6.89"	18.70 cm
request	"	"
10th	7.17"	19.40 cm
11th	7.50"	20.30 cm
12th	7.61"	20.50 cm
13th	7.71	20.80 cm.
first coil	7.775"	20.90 cm
check points.	4.00"	11.30 cm
	5.05"	??
1:30 PM	6.01"	?? shut down

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	START-UP RANGE
K-1	$10 \times 10^{-12}$	Meter	3"	
		Fast	3"	$10 \times 10^{-12}$
K-2	$10 \times 10^{-12}$	Meter	4"	
	Noisy on $10 \times 10^{-12}$	Fast	4"	$3 \times 10^{-11}$
R-1	Not in Use			
R-2	Not in Use			
PM-1	800V	Alarm		500
PM-2	1200V	Low	12"	500 → 850
		Alarm	3"	

BECK LOG N CALIBRATE DWM  
 OKNE-LOG-N CALIBRATE DWM OPERATE OK SOURCE No. Smc Ra  
 DUMP WELL PROBE LIGHT OK RKR 8 source

START-UP CHECK LIST

Equipment checked by RKR <sup>DWM</sup> Personnel check by RKR  
 Instruments and safeties checked and reset by DWM RKR  
Accelerator Same ON  
 Source in checked by \_\_\_\_\_ Source No. \_\_\_\_\_  
 Emergency equipment in cont of room checked by RKR  
 Instruments in trip circuit: DWM  
 Red light on by RKR Time 1:50 P.M.  
 Start-up OK'd by RKR & DWM Date 11/4/63

Purpose of EXP #4  
 To check Reactor Stability on + and -  
 periods after blocking upper air duct  
 and deflecting air stream from  
 middle lower duct.

## Solution Height

1:05	7.815	Pos Per A
1:14	7.80	Neg Per B
	7.815	Level

Above periods were not stable.

2:15 PM drain H<sub>2</sub>O to 3.0, covered 20 in diam vessel with plastic on top.

2:25 PM 7.815 Pos Per C Seems quite stable

2:50 7.81 + Neg Per D

4:00 PM shut down by draining soap.

There is an apparent increase in stability when the vessel is covered, and the drift may be attributed to evaporation.

INSTRUMENT CHECK

1/5/63

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x15 <sup>1/2</sup> ✓	Meter ✓	4"	✓	
		Feet ✓	4"	✓	
K-2	10x15 <sup>1/2</sup> ✓	Meter ✓	4"	✓	3x15"
	Noisy !!	Feet ✓	4"	✓	
P-1	760	Alarm ✓	Contact	✓	500
P-2	1150	Low ✓	4"	✓	90

Beckman Log N-Galib ok  
 LOG IN CALIBRATE \_\_\_\_\_ OPERATE ✓ SOURCE No. 5 mckay  
 DUMP WELL PROBE LIGHT OK RKR

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by RKR

Source in checked by acceleration Source No. \_\_\_\_\_

Emergency equipment in control room checked by EJ

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

Red light on by DWM Time 0830

Start-up OK'd by RKR-EJ Date 1/5/63

Expt. 5 - Pulse as in Expt. 3 (p. 11)

Time	Sublevel	Scope	Paint
1105			
1120	4.04 in.	no light	1
	5.04 "		2
	6.04 "		3

Solution ht	→ Liquid Level	Point
6.59"		4
"		5
"		6
7.04"		7
"		8
7.40"		9
7.58"		10
7.66"		11
7.72		12

3:30 PM 7.77 pos per:

7.76 Neg Per:

4:09 PM Shut down:



4/7/63

Expt # 6

START UP	
Equipment Checked by RKR	by IDE
Instrument and Safety	RKR
"Source In" Check	
Emergency Equipment	
Red Light On by RKR	
Start Up OK'd by RKR-EP 1035	4/7 1963

Inst. Check

Inst.	Range	Trip	Source Pt.	Set	Startup Range
K-1	10x10 <sup>-11</sup>	Motor	(Gen) Contact	✓	10x10 <sup>-12</sup>
		Fast			
K-2	10x10 <sup>-11</sup>	Motor	6"	✓	3x10 <sup>-11</sup>
		Using!!	Fast		
PM-1	780	Alarm	Contact	✓	500
PM-2	1180	Low	Contact	✓	1000
		Alarm			

Bedman Jey Responds; Calib ✓

Log N - Calib ✓; Operate ✓

In Trip: K-1, K-2, PM-1, PM-2

Temp will probe OK R.K.P.

1135 Start feed above yard.

RSN75 Counter suspended from #3 Drive

980.43 = counter trip 1/4 in below bottom of vessel  
(active volume even with bottom)

"Counter is in vessel." Reading at different hts.

Liquid Level (in)

Seape (cm)

Point

4.065 "	11.6 10.16 cm	1
"	"	2
5.005 in.	13.9 cm	3
5.985 in.	16.5 cm	4
6.54 in.	17.9 cm	5
7.015 in.	19.0 cm	6
7.285 in.	19.8 cm	7
7.49 in.	20.2 cm	8
7.63 in.	20.6 cm	9
7.585 in.	20.5 cm	
Heavy on drop	19.8 cm	
1455 Drain		

Transter

~~START-UP CHECK LIST~~

Equipment Checked by RRR Personnel check by I.P.C  
 Instruments and safeties checked and reset by RRR  
 Source in checked by RRR Source No. accel  
 Emergency equipment in control room checked by I.P.C  
 Instruments in trip circuit: K-1 - K-2, PM-1 PM-2  
 Red light on by RRR Time 8.30 AM  
 Start-up OK'd by L.B.V. RRR Date 1-8-63

4/8763

EXPT. 7 - repeat of Expt # 6  
**START-UP CHECK LIST**

Equipment checked by RRR Personnel check by I.P.C  
 Instruments and safeties checked and reset by RRR  
 Source in checked by RRR Source No. accel  
 Emergency equipment in control room checked by I.P.C  
 Instruments in trip circuit: K-1 - K-2, PM-1 PM-2  
 Red light on by RRR Time 8.30 AM  
 Start-up OK'd by L.B.V. RRR Date 1-8-63

Dump well - OK. RRR

**INSTRUMENT CHECK**

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$10 \times 10^{-12}$	Meter <input checked="" type="checkbox"/> Fast <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	$10 \times 10^{-12}$
K-2	$10 \times 10^{-12}$	Meter <input checked="" type="checkbox"/> Fast <input checked="" type="checkbox"/>	4"	<input checked="" type="checkbox"/>	$3 \times 10^{-11}$
R-1					
R-2					
PM-1	800	Alarm <input checked="" type="checkbox"/>	Contact	<input checked="" type="checkbox"/>	500
PM-2	1200	Low <input checked="" type="checkbox"/> Alarm <input checked="" type="checkbox"/>	12" 2"		920

Bedman OK  
 LCG N CALIBRATE  OPERATE  SOURCE No. accel

DUMP WELL PROBE LIGHT RRR

Counter on cap. 18

Liquid Level (in)

0.42" 0.39"

4.08 in

7.01"

7.51"

7.61 in

7.71"

7.795"

7.895"

(circ)

1.00 PM

Shut down.

Depth (cm)

2.2 cm

11.6 cm

19.0 cm

20.2 cm

20.5 cm

20.8 cm

21.1 cm

21.3 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		Meter			
		Foot			
K-2		Meter			
		Foot			
R-1					
R-2					
PM-1		Alarm			
PM-2		Low			
		Alarm			
LOG N CALIBRATE		OPERATE	SOURCE No.		
DUMP WELL PROBE LIGHT					

COUNTERS

Date \_\_\_\_\_

Channel	Detector	Amplifier	Gain	Rise Time	FHS	HV
C-1						
C-2						
C-3						
C-4						

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	STJ	START-UP
K-1	10X10 <sup>-12</sup>	Meter ✓	2"	✓	10X10 <sup>-12</sup>
		Fast ✓	2"	✓	
K-2	10X10 <sup>-12</sup>	Meter ✓	3"	✓	10X10 <sup>-12</sup>
		Fast ✓	3"	✓	
R-1					
R-2					
PM-1	800V	Alarm ✓	cont	✓	500V
PM-2	1200V	Alarm ✓	6"	✓	920V
		Alarm ✓	2"	✓	

Subman OK  
LOG N CALIBRATE OK

DUMP WELL PROBE LIGHT OK RKR

Effpt of

START-UP CHECK LIST

Equipment checked by RKR Personnel check by F.D.C.  
 Instruments and safeties checked and reset by RKR  
 Source in checked by RKR See of No. seed  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip checked K-1-K-2 PM-1-PM-2  
 Red light on by RKR Time 2:00 PM  
 Start-up OK'd by D.W.M. RKR Date 1-10-62

1-10-62 Checking crit. lit, after putting in control rod and guide. Control rod in when selcym reads 000.06 in.  
 Liquid Level (in) Scope (cm)  
 0.19" 1.8 cm  
 5.62" 15.5 cm

1/10/62 ✓ liquid level Scope  
 Critical 8.39" Black out .225 cm  
 Indication of + period @ 12.70 in (fully inserted 0.06 in). Slope steepen @ 10.29 in. At 7.20 in. still adding reactivity. Drain to 8.37 in with rod at 6.78 in. Result: slight down drift.  
 at 6.28, rod became effective or period.  
 → Liquid level 8.37 in, slope 22.5. Rod 6.60 in. just critical.  
 moved rod to 6.78 in. slightly +  
 Trained - @ 6.87 in. Ran rod all in. Quite long.  
 Returned to 6.60 in. (read). just critical.  
 1550 down.

INSTRUMENT CHECK

27

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	4"		10 X 10 <sup>-12</sup>
		Fast ✓	"		
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4"		3 X 10 <sup>-11</sup>
		Fast ✓	"		
PM-1	750 v	Alarm ✓	cont		500 v
PM-2	1200 v	Low ✓	10"		920 v
		Alarm ✓	2"		

Recheck log N OK  
ICG N CALIBRATE OK

OPERATE ✓

SOURCE No. acid

DUMP-WELL PROBE LIGHT OK B.K.R.J.

Sept 9.

START-UP CHECK LIST

Equipment checked by B.K.R.J. Personnel check by T.D.C.

Instruments and safeties checked and reset by B.K.R.J.

Source in checked by AKR Source No. acid

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

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

Red light on by B.K.R.J. Time 9:30 AM

Start-up OK'd by D.W.M. B.K.R.J. Date 1-11-63

Purpose of Exp. is to pulse at Critical  
Just Critical at 833" with liquid level indicator  
scope reading 22.5 cm.

11 <sup>27</sup>/<sub>1219</sub>

shut down. Counter trouble.

1/11/63

Start up time 12:30

~~Critical (Blade out) 7.83 in.~~

Critical Ht. 8.335 in. on liquid level indicator  
Scope reading 22.45 cm, Control rod =  
6.61 in. ~~rod out.~~

2:40 PM Finished pulsing.

2:50 Just critical, Control Rod <sup>6.585 in.</sup> 6.585 in.

Critical Ht. 8.34 in. on liquid level indicator  
Scope reading 22.45 cm.

3:00 PM Solution level 8.215 in. Scope reading 22.0 cm.  
Control rod 6.45 in. Pulsing at sub-critical

3:07 PM Solution level 8.12 in. Scope reading 21.8 cm.  
Control rod 6.35 in. Pulsing at sub-critical

3:20 PM Solution level 8.04 in. Scope reading 21.5 cm.  
Control rod 6.24 in. Pulsing at sub-critical.

3:40 PM Solution level 7.80 in. Scope reading 21.0 cm.  
Control rod 6.03 in. Pulsing at sub-critical.

3:53 PM Solution level 7.30 in. Scope reading 19.7 cm.  
Control rod 5.53 in. Pulsing at sub-critical.

4:07 PM Shut down.

ITEM	RANGE	TEST	STATUS	REMARKS
10 X 10 <sup>-12</sup>		✓	3"	10 X 10 <sup>-12</sup>
"		✓		
10 X 10 <sup>-12</sup>		✓	5"	3 X 10 <sup>-11</sup>
"		✓		

750 V	✓	cont	500 V
1200 V	✓	10"	920 V
	✓	cont	

Reckman OK  
OK

OK R.K.R.

Egypt #10

START-UP CHECK LIST

Equipment checked by R.K.R. Personnel check by F.D.S.

Instruments and safeties checked and reset by R.K.R.

Source in checked by R.K.R. Source No. acc

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

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

Red light on by R.K.R. Time 8:30 AM

Start-up OK'd by D.W.M. R.K.R. Date 1-14-63

8:30 AM Start up time

9:20 " Just critical, Control rod 6.60 in. liquid  
level indicator 8.34 in. Scope reading 22.4 cm.  
Pulsing at critical.

10:32 Control Rod 5.53 in. liquid level indicator  
7.30 in. Scope reading 19.7 cm. Pulsing at crit.

10:50 Control rod 5.03 in. liquid level indicator  
6.805 in. Scope reading 18.5 cm Pulsing at critical

11:07 Control rod 4.53 in. liquid level indicator 6.29 in.

Solution level 17.2 cm. Pulsing at critical

11:45 Control rod = 3.53" Liquid Level = 5.295"

scope = 70 19.7 cm. Pulsing.

12:20 Control rod = 2.53 in. Liquid level = 4.30 cm.

scope = 12.1 cm. Pulsing

12:55 shut down.

1/14/63 solution sample to X-10 Reg # A-924

sample #1

G - 84.5  
T - 19.1  
N - 65.4

181  
corrected  $\rho = 59.325$   
density = 1.0830 @ 24°C  
sp. gr. = 1.0859  
H<sub>2</sub>O = 424.0

12 in. diameter S.S. vessel

1/15/63

Selsyn Reading

Solution

999.91

at lower lip of drain

000.00

solution makes a 6-7 in. diam

circle in bottom of vessel

Use 000.00 as selsyn reading for zero point.

RK R, IDC, Neutron

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		High			
K-2		High			
PM-1		Alarm			
PM-2		Low			
		Alarm			

LOG IN CALIBRATE OPERATE SOURCE No.

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	4"	-	10 X 10 <sup>-12</sup>
"	"	Fast ✓	4"	-	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	3"	-	3 X 10 <sup>-11</sup>
"	"	Fast ✓	3"	-	"
PM-1	7500	Alarm	Cont	-	5000
PM-2	1200	Low	12"	-	9200
		Alarm	5"	-	

LOG IN CALIBRATE OPERATE SOURCE No.

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by R.K.R  
 Source in checked by AMR Source No. accd  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip checked K-1 K-2 PM-1 PM-2  
 Red light on by R.K.R. time 2:50 PM  
 Start-up OK'd by D.W.M. RKR Date 1/15/63

Person to check critical ht in 12" S.S. vessel:

3:15 PM Shut down: no ht was checked:



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Meter ✓	4"	✓	10x10 <sup>-12</sup>
"	"	Fast ✓	4"	✓	"
K-2	10x10 <sup>-12</sup>	Meter ✓	4"	✓	3x10 <sup>-11</sup>
"	"	Fast ✓	4"	✓	"
R-1					
R-2					
PM-1	750 ✓	Alarm ✓	cont	✓	500 ✓
PM-2	1200 ✓	Low ✓	12"	✓	900 ✓
		Alarm ✓	1"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mc Ra &  
 DUMP WELL PROBE LIGHT OK - RKR

Expt # 12  
 START-UP CHECK LIST

Equipment checked by RKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by RKR  
 Source in checked by RKR Source No. accid  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKR Time 10<sup>10</sup> AM  
 Start-up by RKR, Lof Date 1/16/63

10<sup>30</sup> AM Report of Expt # 11.  
 Flow rate set at 1.49" per min.  
 11:40 Just critical, No Central rod, Solution level 16.305"  
 Scope: 42.6 cm.  
 Drain (Half inch line) Rate = 8.8" per min.  
 11:45 Shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Meter -	2"	✓	10x10 <sup>-12</sup>
"	"	Fast ✓	2"	✓	"
K-2	10x10 <sup>-12</sup>	Meter ✓	5"	✓	3x10 <sup>-11</sup>
"	"	Fast ✓	5"	✓	"
R-1					
R-2					
PM-1	750 ✓	Alarm ✓	cont	✓	500
PM-2	1200 ✓	Low ✓	14"	✓	900
		Alarm ✓	1"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mc Ra &  
 DUMP WELL PROBE LIGHT OK - RKR

Expt # 13  
 START-UP CHECK LIST

Equipment checked by RKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by RKR  
 Source in checked by RKR Source No. accid  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKR Time 9<sup>00</sup> AM  
 Start-up OK'd by RKR, F.D.C Date 1-18-63

Start up at 9:22 A.M. Purpose of run is to pulse in 12" SS Cal, unoped reactor at various heights.

1st	Liquid Level (in)	Scope (cm)
	8.00"	21.2 cm
10:20 2nd	8.99"	23.7 cm.
3rd	10.005"	26.9 cm.

	Liquid Level (in)	Slope (cm)
7 <sup>th</sup>	11.005"	28.8 cm.
5 <sup>th</sup>	12.00"	31.4 cm
6 <sup>th</sup>	"	" "
7 <sup>th</sup>	13.01"	33.9 cm
8 <sup>th</sup>	14.01"	36.5 cm.
9 <sup>th</sup>	15.00"	39.0 cm.
10 <sup>th</sup>	15.25"	39.9 cm.
11 <sup>th</sup>	15.505"	40.3 cm
2 <sup>04</sup> PM	System screen by accel. Trip by K-1.	
2 <sup>39</sup> PM (12 <sup>th</sup> )	15.76"	41.0 cm
13 <sup>th</sup>	16.005"	41.5 cm
14 <sup>th</sup>	16.15"	41.9 cm

Just Crit: Liquid Level = 16.365". Slope = 42.5 cm.

Check zero on big level		
	.07	~ 5-6 in circle
	.10	~ 8 in circle
	.04	~ 4 in tank in circle

Use for last series on 1/18/63, a zero of .060 on liquid level manometer. D.W.M.

3<sup>50</sup> PM Shut down:

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	6"	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	6"	"	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4"		3 X 10 <sup>-11</sup>
"	"	Fast ✓	4"	"	"
R-1					
R-2					
PM-1	750 V	Alarm ✓	cont		500 V
PM-2	1200 V	Low ✓	5"		900 V
		Alarm ✓	1.5"		

LOG N CALIBRATE \_\_\_\_\_ OPERATE ✓ SOURCE No. 5<sup>me</sup> Bart

DUMP WELL PROBE LIGHT OK-RKRJ

Sept 19  
START-UP CHECK LIST

Equipment checked by R.K.R.J. Personnel check by R.K.R.J.

Instruments and safeties checked and reset by R.K.R.J.

Source in checked by R.K.R.J. Source No. accel

Emergency equipment in control room checked by R.K.R.J.

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

Red light on by R.K.R.J. Time 12<sup>30</sup> PM

Start-up OK'd by D.W.M. R.K.R.J. Date 1-21-63

Purpose of Exp: To try peeling with RSN-75 counter on side of 12" S.S. vessel. @ eruption on outside of counter.

	Solution Level at	
12 <sup>50</sup> PM	8.03" (in)	
1 <sup>42</sup> PM	" " "	10.05" "
2 <sup>14</sup> PM	" " "	12.04" "
2 <sup>45</sup> PM	" " "	14.06" "
3 <sup>05</sup> PM	" " "	15.56" "

3:31 PM Solution ht at 15.855" (in)  
 3:52 PM " " " 16.14" (in)  
 4:20 PM Shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	3"	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	10 X 10 <sup>-12</sup>
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4"	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	4"	✓	10 X 10 <sup>-12</sup>
R-1					
R-2					
PM-1	750V	Alarm ✓	Cont		500V
PM-2	1200V	Low ✓	12"		900V
		Alarm ✓	3"		

Check OK  
 ECG N CALIBRATE OK OPERATE ✓ SOURCE No. 5<sup>th</sup> Part

DUMP WELL PROBE LIGHT OK - RKR

START-UP CHECK LIST

Equipment checked by RKR Personnel check by F.D.C.  
 Instruments and safeties checked and reset by RKR.  
 Source in checked by RKR Source No. Reel  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKR Time 12:45 PM  
 Start-up OK'd by RKR F.D.C. Date 1-22-63

Purpose to place a crit:  
 1:50 PM Positive period - Solution level 16.36"  
 2:10 PM Just Critical 16.350". After running control rod in and out, Control rod reads 16.33"  
 2:15 PM PM-2 low level dumped. Recorder saw nothing.  
 2:45 PM Positive period, Solution level 16.36"

3:10 PM Run ~~rod~~ central rod in and out -  
now on positive period.

3:35 PM Central rod in.

3:48 PM Run central rod in and out -  
now on positive period.

4:12 PM Shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	1"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	1"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	3"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	3"	✓	"
R-1					
R-2					
PM-1	750V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
		Alarm ✓	3"	✓	

Reckman ✓  
LOG N CALIBRATE ✓ \* OPERATE ✓ SOURCE No. 5000 Part

DUMP WELL PROBE LIGHT OK, RKRJ.

Sept 16  
START-UP CHECK LIST

- Equipment checked by RKRJ Personnel check by F.D.C.
- Instruments and safeties checked and reset by RKRJ.
- Source in checked by RKRJ Source No. accel
- Emergency equipment in control room checked by F.D.C.
- Instruments in trip circuit: K-1 K-2 PM-1 PM-2
- Red light on by RKRJ. Time 8:25 AM
- Start-up OK'd by RKRJ F.D.C. Date 1-29-63

9:15 AM Start up - Purpose to pulse at critical.  
9:45 AM Just critical - solution level ~~16.295"~~ 16.295".  
Central rod out.

Accelerator beam triggered to be on target by  
noise! Scram med system! (by K-1.)

10:05 Start up -  
10:40 Just critical - solution level 16.30"

12<sup>10</sup> PM System Pos at 16.30" after pulsing.  
 12<sup>15</sup> PM System now level.

12<sup>20</sup> PM Drain to 16.15". "Releasing at sub exit"  
 12<sup>45</sup> PM " " 16.00"  
 1<sup>05</sup> PM " " 15.85"  
 1<sup>22</sup> PM " " 15.70"  
 1<sup>30</sup> PM Shut down.

1-24-63 Check of zero on liquid level:  
 .015" = 3" circle  
 .080" = 6" to 6.5" circle  
 .070" = Zero!

1-25-63 Sample #2 sent to Y-12; Reg-593193  
 G = 104.0 g  $g/g = .05950$   
 T = 18.8 g  $sp. gr. = 1.0853$   
 H = 85.2 g Free nitric = .138% free  $HNO_3$   
 Fe = .0000208

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	3"	✓	10 X 10 <sup>-12</sup>
"	"	Foot ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4"	✓	10 X 10 <sup>-12</sup>
"	"	Foot ✓	"	✓	"
R-1					
R-2					
PM-1	7500	Alarm ✓	cont	✓	5000
PM-2	12000	Low ✓	20"	✓	9000
		Alarm ✓	2"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mg Ra-2  
 DUMP WELL PROBE LIGHT OK RKRJ

E-apt. # 17  
 START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKRJ

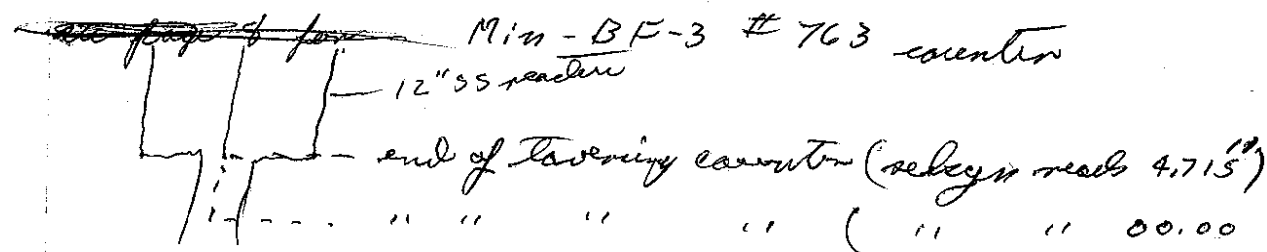
Source in checked by RKRJ Source No. accel

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

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

Test done by RKRJ Time 10<sup>55</sup> AM

Start-up checked by RKR, F.D.C Date 1-25-63



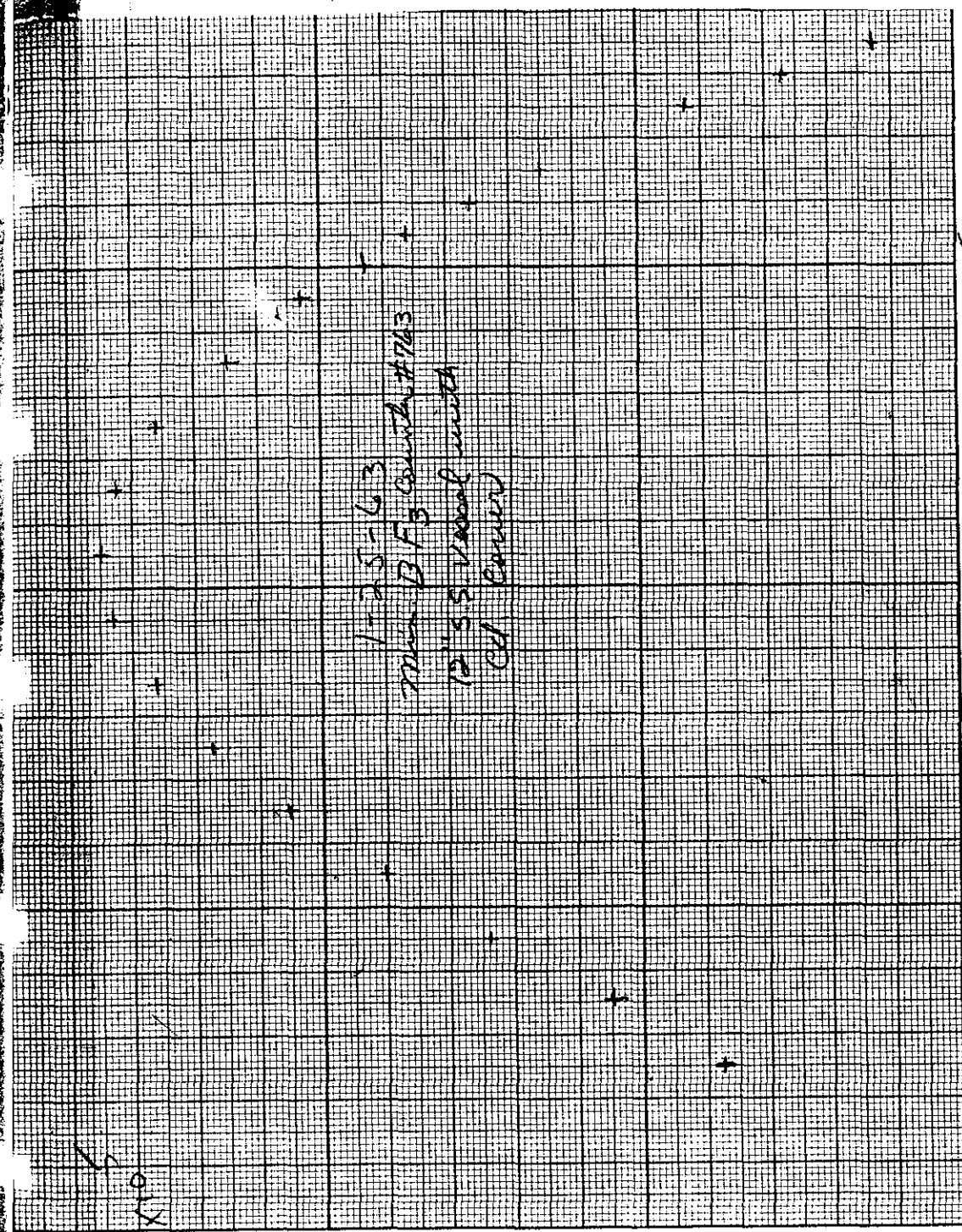
12:05 PM Start up - ~~From~~ Purpose of run is to traverse in 12" SS. reactor.  
 12:20 Just critical - Solution level 16.295"

Solution HT. = 16.295"

Issues

TIME	SOLUTION HT	C-1	C-2	C-1 COUNTER POS
1.22	16.295"	51374	100004	18.50"
2	"	51434	100001	18.50"
1.50	"	107552	100002	18.00"
1.87	"	168816	100000	17.50"
2.70	"	259296	100001	16.50"
4.72	16.30"	344957	100001	15.50"
6.85	16.35"	410242	100000	14.50"
7.41	16.385"	458290	100000	13.50"
6.24	<del>16.395"</del>	502134	100001	12.50"
<del>7.10</del>	16.395"	531162	100000	11.50"
6.82	16.42"	539224	100,002	10.50"
—	"	531176	100,001	9.50"
4.02	"	504570	100,001	8.50"
3.35	"	470037	100,001	7.50"
.05 x 2.03	16.40"	422432	100,002	6.50"
1.87	"	361181	100,003	5.50"
<del>1.60</del>	16.39"	<del>395221</del>	100,002	4.50"
1.38	"	218976	100,000	3.50"
1.22	16.37"	150704	100,002	2.50"
3.40	16.365"	370162	100,001	15.00"
2.65	"	303108	100,001	16.00"
14:27	Shut down			

C-1 M.W BF3 763 @ 1730v LA 204B X1.0X64, RT 0.2  
 PHS-5 C-2 1" BF3 under 12" assembly @ 1500v  
 LA 204B 1.0X4.0 RT 0.2us PHS 10.  
 C-1 pulses ~ 10v max  
 C-2 pulses ~ 50v max



1725-63  
 Thin BF3 counter #763  
 12" SS vessel with  
 Cd cover

Count



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SCALE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	1"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	1"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	2"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	2"	✓	"
PM-1	750 V	Alarm ✓	cont	✓	500 V
PM-2	1200 V	Low ✓	18"	✓	1200 V
		Alarm ✓	1'	✓	"

LOG IN CALIBRATE ✓ OPERATE ✓ SOURCE No. Eng heat

DUMP WELL FROBE LIGHT OK RKRJ.

Expt. #18

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKRJ

Source in checked by AKK Source No. acid

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

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

Red light on by RKRJ Time 10<sup>05</sup> AM

Start-up OK'd by AKK, I.D.C Date 1-29-63

Purpose of expt. to radiate foils, and to determine power level.

Start up -

Positive period - Solution level 16.405"

Scope reading = 42.7 cm.

10:30 AM  
10:30 →  
10:48

$K-1 = 5.1 \times 10^{-9}$

$K-2 = 3.5 \times 10^{-9}$

ORNL LOG =  $9.6 \times 10^{-9}$

PM-2 = 16.5 Recorder Val. = 690

11 AM just critical - solution level = 16.31" level

11:22 Shut down:

12:34 Start up - Purpose - expose foils to determine Cd. ratio in U-235.

Solution zero on Manometer 0.21

~ Crit Ht. at low Power 16.515

⊥ Foils at zero solution Ht 997.25

" " " Crit Ht Centurins 5.40

12:54 Positive period - solution level = 16.655

scope reading = 43.0 cm.

1:08 PM just critical - solution level 16.54" + level. at high power.

1:27 Shut down

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	Cont.	✓	3X10 <sup>-11</sup>
	10X10 <sup>-12</sup>	Fast ✓	Cont.	✓	3X10 <sup>-11</sup>
K-2	10X10 <sup>-12</sup>	Meter ✓	3"	✓	10X10 <sup>-12</sup>
	10X10 <sup>-12</sup>	Fast ✓	3"	✓	10X10 <sup>-12</sup>
R-1					
R-2					
PM-1	750V.	Alarm ✓	Cont.	✓	500V
PM-2	1200V.	Low ✓	18"	✓	900V
		Alarm ✓	2"	✓	

LOG N CALIBRATE  OPERATE  SOURCE No. 5 mg. Ra  
 DUMP WELL PROBE LIGHT OK-NKR

Expt. #19

START-UP CHECK LIST

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

Instruments and safeties checked and reset by NKR

Source in checked by NKR Source No. Neel

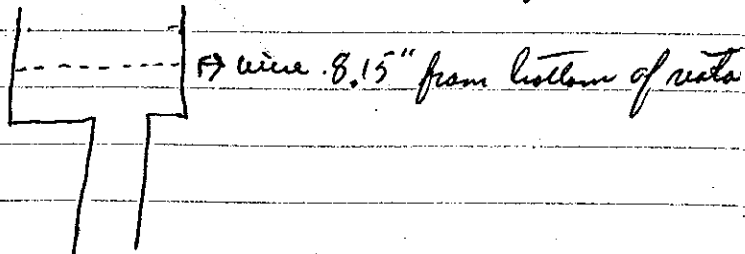
Emergency equipment in control room checked by F.D.C.

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

Red light on by NKR Time 8:30 AM

Start-up OK'd by F.D.C. NKR Date 1-30-63

Purpose of expt. - to irradiate 40 mil gold wire



8:55 AM Start up -  
 9:04 Positive period, crit. ht. 16.56" scope = 428 cm  
 9:14 Just crit. Level at 16.465" on solution level indicator. Crit Height = 16.255 (of zero = .21)  
 10:13 Shut down. Solution reading at contact 1 R. With a 2010K instrument in control room the reading above manifold was about 5mm.

3:45 PM Set small .060 SS tube with tip at bottom @ 994.91 Set at 2 in below bottom @ 992.90 for foil irradiation @ ORNL log N = 0.1 or 10<sup>-8</sup> amp for 1hr!

NKR



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	cont	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Feet ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	3"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Feet ✓	"	✓	"
R-1					
R-2					
PM-1	7500	Alarm ✓	cont	✓	5000
PM-2	12000	Low ✓	18"	✓	9000
		Alarm ✓	3"	✓	

LOG IN CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mg Ra-226

DUMP WELL PROBE LIGHT OK AKRQ

Expt. #20

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKR.

Source in checked by AKR Source No. M-43

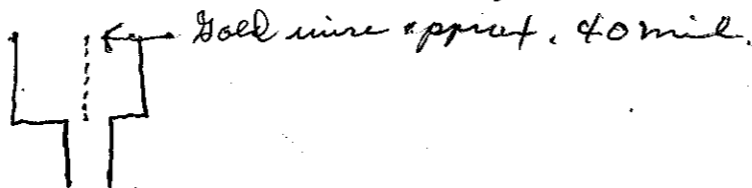
Emergency equipment in control room checked by E.D.C.

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

Red light on by AKR Time 2:35 PM

Start-up OK'd by AKR, E.D.C. Date 1-31-63

Purpose of expt. to irradiate gold wire



2:40 PM Start up.

2:53 Positive period. Solution level = 16.57"  
Scope = 42.8 cm.

3:16 just critical. Solution ind. 16.50" level.  
Scope = 42.5 cm.

4:00 PM Shut-down:

4:05 PM Solution reading at contact in 102 storage manifold = 1.8 R.

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	0.5"	✓	10X10 <sup>-12</sup>
		Fast ✓		✓	
K-2	10X10 <sup>-12</sup>	Meter ✓	3"	✓	10X10 <sup>-12</sup>
		Fast ✓			
R-1					
R-2					
PM-1	750 V	Alarm ✓	Cont.	✓	500 V
PM-2	1200 V	Low ✓	18"	✓	900 V
		Alarm ✓	2"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. Eng Part  
 DUMP WELL PROBE LIGHT OK-OKR

Ept. # 21

START-UP CHECK LIST

Equipment checked by OKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by OKR  
 Source in checked by OKR Source No. M-43  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by OKR Time 1:30 PM  
 Start-up OK'd by F.D.C. OKR Date 2-1-63

Purpose: to check crit. pt. of 12" S.S. reactor with Cd. covered.  $H/x = 440$  Zero = 0.21"

- ~~2:00 PM~~ Start up. Cd. 32 mil. ~~46 1/4~~ 46 1/4" from floor to reactor bottom
- 2:12 Just critical. Solution ind. 16.41" Scope = 42.4 cm.
- 2:13 Drain system.
- 2:23 Start up - Configuration same as above, except without Cd.
- 2:42 Just crit. Solution ind. 16.585"

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	Cont.	✓	10X10 <sup>-12</sup>
		Fast ✓	"	✓	"
K-2	10X10 <sup>-12</sup>	Meter ✓	3"	✓	10X10 <sup>-12</sup>
		Fast ✓	3"	✓	"
R-1					
R-2					
PM-1	750 V	Alarm ✓	Cont.	✓	500 V
PM-2	1200 V	Low ✓	18"	✓	900 V
		Alarm ✓	3"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. Eng Part  
 DUMP WELL PROBE LIGHT OK-OKR

Ept # 22

START-UP CHECK LIST

Equipment checked by OKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by OKR  
 Source in checked by OKR Source No. Acad  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by OKR Time 10 AM  
 Start-up OK'd by OKR F.D.C Date 2-9-63

Zero = 0.36" (adjusted 20" void)

Purpose of Ept. to radiate gold foils in 20" S.S. reactor with 32 mil Cd. around bottom of reactor. 46 1/4" from floor surface to reactor. Feed rate set at .84" per min.

- 10:50<sup>AM</sup> Start up.
- 11:10 Positive period. Solution ind. 8.07" Scope = 21.1 cm.

axial flux using .0640, d in .100 X .007 wall S.S. Tubing

11:35 just critical solution ind. = 8.05" Scope = 21.1 Cm.  
 12:16 shut-down

$8.05 - .36 = 7.69$  in. Crit Ht.

#

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	5"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	✓	5"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	2"	✓	10 X 12 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	✓	2"	✓	"
K-1					
K-2					
PM-1	750 V	Alarm ✓	Cont	✓	500 V
PM-2	1200 V	Low ✓	18"	✓	1200 V
		Alarm ✓	2"	✓	1200 V

LOG IN CALIBRATE ✓ OPERATE ✓ SOURCE No. 5 mg Ra-228  
 DUMP WELL PROBE LIGHT OK AKR/

Expt 23

START-UP CHECK LIST

Equipment checked by AKR/ Personnel check by F.D.C

Instruments and safeties checked and reset by AKR/

Source in checked by AKR/ Source No. accel

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

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

Red light on by AKR/ Time 8:35 AM

Start-up OK'd by D.W.M I.D.C AKR/ Date 2-5-63

Zero = 0.36" from Expt # 22

Purpose of expt. Pulsing at critical in 20" SS. reactor with 32 mil cd. around bottom of reactor. 46 1/4" from surface of floor to bottom of reactor.

8:45 AM Start up.

9:25 AM just critical. solution ind. = 7.97" Scope = 21.0 cm.

11<sup>14</sup> AM System sub crit - solution level reads 7.985  
 Slope = 21.0 cm

11<sup>25</sup> AM Recheck of Zero - solution level reads 0.355  
 Slope = 1.6 cm  
 19.4 cm Crit Ht = 7.63 x 2.54 = 19.4 cm

2<sup>30</sup> Increased gain on Brown Amp of big level  
 Placed small piece of electrician tape for lower  
 limit @ reading of 0.21  
 Solution zero with ~12" diam puddle in dished bottom 0.30  
 DWM RKR

Checked the dished bottom on 20" cyl

- .35 bottom all wet
- .30 solution zero for ~12" diam
- .27 just above 3"
- .22 below 3"
- .11 tape zero

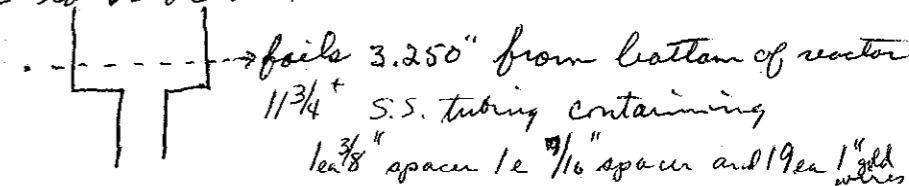
INSTRUMENT	RANGE	TRIP	SOURCE DR. SOURCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	1000 ✓	.5"	✓	10 X 10 <sup>-12</sup>
"	"	" ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	1000 ✓	3"	✓	10 X 10 <sup>-12</sup>
"	"	" ✓	"	✓	"
PM-1	750 V	100 ✓	Cont	✓	500 V
PM-2	1200 V	100 ✓	18"	✓	<del>900 V</del>
		1000 ✓	3"	✓	900 V

LOG II CALIBRATE ✓ OPERATE ✓ SOURCE NO. 5mg hat  
 DUMP WELL PROBE LIGHT OK AKR

Sept 24  
 START-UP CHECK LIST

Equipment checked by AKR Personnel check by F.D.C  
 Instruments and safeties checked and reset by AKR  
 Source list checked by AKR Source No. acid  
 Emergency equipment in control room checked by F.D.C  
 Instruments for trip checked K-1 K-2 PM-1 PM-2  
 Red LIGHT on by AKR Time 10<sup>30</sup> AM  
 Start-up OK'd by AKR D.W.M. D.C. 7-6-63

Before adding solutions - Liquid Level read 0.135"  
 Purpose of expt. Radiate gold foils in 20" SS  
 reactor, with 32 mil cd. around bottom. 46 1/2" from  
 floor surface to reactor.



9:45 AM Start-up.  
11:00 Positive period. Solution ind. = 8.02" Scope = 21.0 cm.  
+ 53.0 sec → +15.8 f

12:06 Shut down.  
Note: System was just crit at 7.995." (For about 11.5 min)  
There was a change of solution ht of .025" in about  
~~30 mins~~ 30 mins. Think there might be a slight leak  
in a valve.

1:20 PM Solution level = 3.00" : purpose to check for leaks  
in valves.

3:35 PM Solution level = 3.00" There is no leak after 2.25 hrs.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	START-UP RANGE	SET
K-1	10 X 10 <sup>-12</sup>	1000 ✓	.5"	10 X 10 <sup>-12</sup>
"	"	" -	"	"
K-2	10 X 10 <sup>-12</sup>	1000 ✓	2"	10 X 10 <sup>-12</sup>
"	"	" -	"	"
PM-1	750 v	1000 -	cont	500 v
PM-2	1200 v	1000 -	18"	900 v
"	"	1000 -	3"	"

LEAK CHECKED ✓ CRATE 4 FOUNDING 5 sigfact  
BUMP WILL PROCEED LIGHT OK RKRf

Sept 25

START-UP CHECK LIST

Equipment checked by RKRf Personnel check by I.D.C. - 0.300  
 Instruments and cables checked and reset by RKRf. crit. ht. 7.660  
 Control room checked by RKRf. Status OK, accel  
 Emergency equipment checked and reset by I.D.C.  
 Reactor status in log checked K-1 K-2 - PM-1 PM-2  
 and status OK by RKRf. 10:20 AM  
 Start-up time by RKRf. D.W.M. IDO 2-7-63

Zero = 0.30"  
Purpose of expt. to check crit. ht. of 20" 5.5.  
reactor with Cd. (32 mil) ~~around~~ around  
fraction of reactor. 46 1/4" from surface of  
floor to reactor.

10:30 AM Start up.  
10:55 AM Just crit. Solution ind. = 7.960" Scope = 20.9 cm.

Zero = 0.30"

12:55 Start up - Purpose of expt. to check Crit. Ht. of 20" S.S. reactor. (Bare, no cd.) 46 1/4" from floor surface to reactor.

1:25 Just Crit. Solution ind. = 7.98" Scope = 20.9 cm.

1:28 Positive period - Solution ind. = 7.98" <sup>19.50</sup> <sub>5.94</sub>

1:40 Shut. down.

1:50 Start up - Purpose, to check Bare Crit. Ht. again to get samples from reactor.

2:15 Positive period - Solution ind. = 7.98" Scope = 20.9 cm.

2:30 Just Critical - Solution ind. = 7.98" Scope = 20.9 cm.

2:32 Drain

Expt # 25

3:00 Samples #1 and #2 sent to X-10 for analysis: Control No S.F. A-927.

Sample #1 taken from bottom of vessel  
Sample #2 taken from storage system.

	#1	#2
E	83.3 g	86.2 g
T	17.8 g	18.9 g
N	64.5 g	67.3 g

X-10 report

	#1	#2
mg/g	59.95	58.65
sp. g	1.0864	1.0864
density	1.0831	1.0831
Rechner	#1 mg/g = 59.90	#2 mg/g = 60.03

10 X 10 <sup>-12</sup>	✓	.5"	✓	10 X 10 <sup>-12</sup>
"	✓	"	✓	"
10 X 10 <sup>-12</sup>	✓	3"	✓	10 X 10 <sup>-12</sup>
"	✓	3"	✓	"
7500	✓	cont	✓	5000
12000	✓	18"	✓	12000
	✓	cont	✓	"

5 mg Bat

OK AKRf.

Expt # 26

START-UP CHECK LIST

Equipment checked by AKRf. Personnel check by F.P.C.

Instrumentation checked by AKRf.

Source in place by AKRf. accel

Emergency contact by F.P.C.

Instrumentation in place: K-1 K-2 PM-1-PM-2

Red start by AKRf. 2:00 PM

Start-up check by F.P.C. 2-12-63

Before adding sol. liquid level reads = 0.11"  
12" S.S. Cd covered vessel. 32 mil cd. 46 1/4" from floor surface.  
Zero = 0.31" Tip of counter = 8.41" when sol. Ht reads .19"  
Purpose is to check counters, preliminary to pulsing.

2:20 Start up.

2:30 Solution Ht. 8.31" Scope = 21.8 cm.

INSTRUMENT	RANGE	TRIP	SOURCE D. RANGE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	5"	10 X 10 <sup>-12</sup>	12
"	"	Fast ✓	"	"	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	2"	10 X 10 <sup>-12</sup>	12
"	"	Fast ✓	"	"	"
R-1					
R-2					
PM-1	750 V	Alarm ✓	Cont ✓	500 V	
PM-2	1200 V	Low ✓	18" ✓	900 V	
		Alarm ✓	2" ✓		

LOG N CALIBRATE  CONTROL  SOURCE No. 5mg Ra 244  
 DUMP WELL FROZE L.G. OK-OKRP.

Sept 27  
**START-UP CHECK LIST**

- Equipment checked by OKRP Personnel check by F.D.C.
- Instruments and safeties checked and reset by OKRP
- Source in checked by OKRP Source No. accel
- Emergency equipment in control room checked by F.D.C.
- Instruments in trip circuit: K-1 K-2 PM-1 PM-2
- Red light on by OKRP Time 9:20 AM
- Start-up OK'd by D.W.M. OKRP Date 2-13-63  
I.D.C.

Zero = 0.31" Before adding solution liquid level reads 0.14"

Purpose: Pulsing system with small counter of various actual positions, counter # RSM-105 S 5/16 dia. SS.

8:30 Start up.

8:40 Solution ht = 8.31"

1st counter pos Solution ht  
 1st 10.80" 8.31"  
 2nd 12.80" 8.31"  
 3rd 8.5" 8.31"

0918 Accelerator dumped K-1 + K-2 and range

9:40 AM  
 10.80" 8.315"  
 8.50" 8.315"  
 8.90" 8.315"  
 9.30" 8.315"  
 9.80" 8.315"  
 10.30" 8.315"  
 11.30" 8.315"  
 11.80" 8.315"  
 12.30" 8.315"  
 13.30" 8.310"  
 13.80" 8.310"  
 14.30" 8.310"  
 12.80" 8.310"  
 8.80" 8.310"  
 10.80" 8.310"

2:15 PM Shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP ✓	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	5"	✓	10X10 <sup>-12</sup>
		Fast ✓	"	✓	✓
K-2	10X10 <sup>-12</sup>	Meter ✓	2"	✓	10X10 <sup>-12</sup>
		Fast ✓	"	✓	✓
R-1					
R-2					
PM-1	750V	Alarm ✓	Cont'	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
		Alarm ✓	2"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mg Ra<sup>226</sup>  
 DUMP WELL FROBE LIGHT OK - AKR/j

Expt. # 28

START-UP CHECK LIST

Equipment checked by RKR/j. Personnel check by T.D.C.

Instruments and safeties checked and reset by RKR/j

Source in checked by RKR/j. Serial No. accal

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

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

Red light on by RKR/j. Time 4:30

Start-up OK'd by DWM, RKR/j, T.D.C. Date 2/14/63

Zero = 0.31" Before adding solution liquid level reads 0.11"  
 Purpose of expt. is to repeat expt. # 27 at different solutions levels + different ht's

8:45

9:00

Start up.  
 Solution ht, 6.31" Scope = 16.8 Cm.

Counter Pos.

Solution Ht.

8.5"	6.31"
<del>8.9"</del>	<del>6.31"</del>
10.5	6.31
10.9	6.31
11.3	6.31
11.7	6.31
12.1	6.31
12.5	6.31
8.9	6.31
9.3	6.31
9.7	6.31
10.1	6.31
8.9	6.31
12.1	6.31

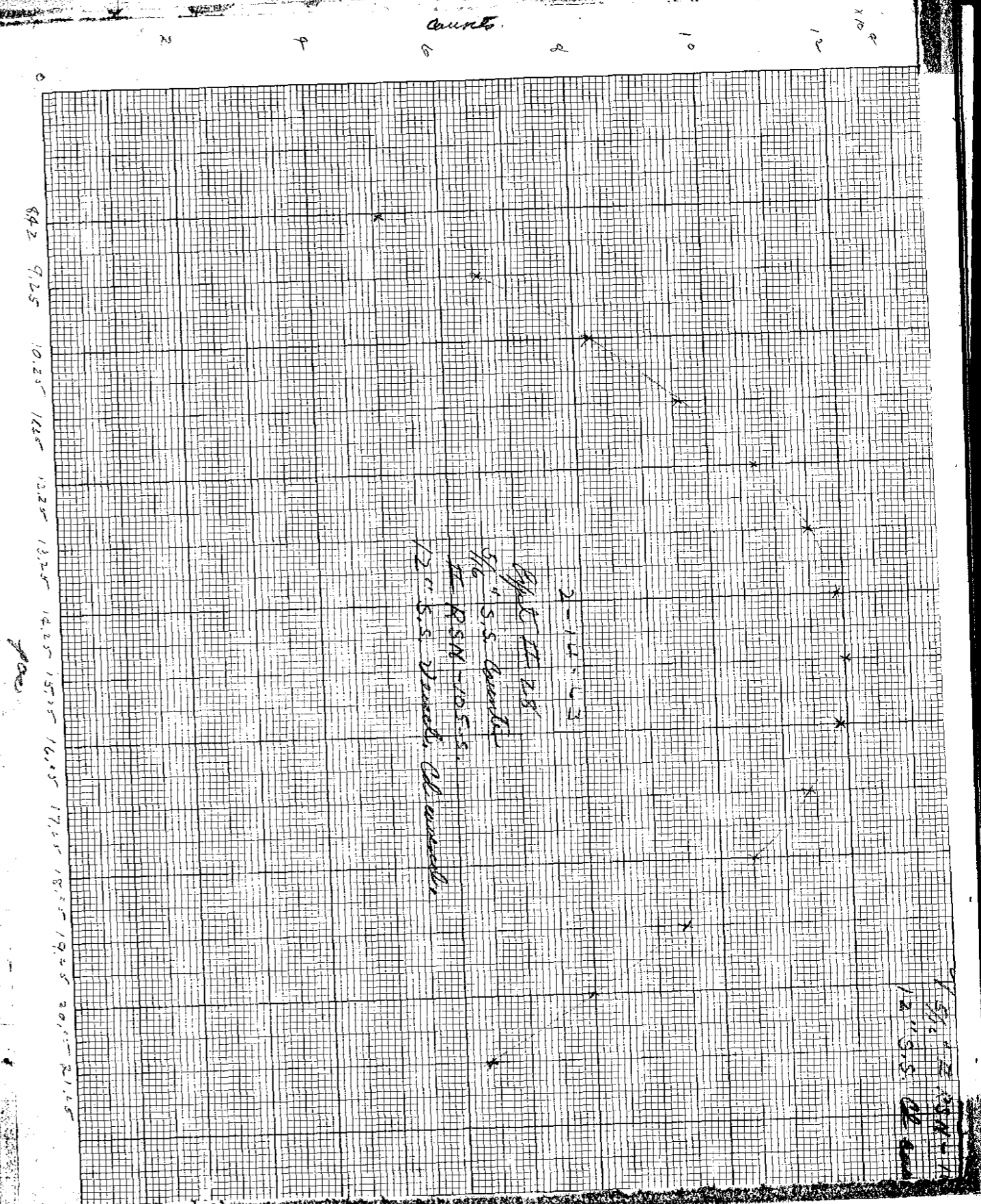
11:34 shut down

11:33 Start up - Purpose of expt. Vertical traverse with small counter # RSN-105 S 5/16" dia. SS. in 12" cd covered Reactor SS. 32 mil cd.

TIME	NORMALIZER	TRAVERSE	COUNTER POS	SOL. HT
0.99 MIN.	50002	120496	15.25"	16.58"
0.81 "	50000	115475	13.25"	16.58"
0.94 "	50000	107562	12.24"	16.58"
1.09 "	50001	96198	11.25"	16.58"
1.12 "	50001	119611	14.25"	16.58"
.71 "	50002	120432	16.25"	16.58"
.86 "	50000	82985	10.25"	16.58"
1.04 "	50001	65939	9.25"	16.58"



TIME	NORMALIZER	TRAVERSE	COUNTER Pos	SOL. HT.
1.28 MIN.	50,000	51452	8.42"	16.58"
.58 "	50,001	106157	18.26"	16.58"
1.00 "	50001	51596	8.42"	16.52"
.67 "	50002	94223	19.26" ✓	16.52"
1.10 "	50000	65848	9.25	16.52"
2.26 "	50001	114947	13.25	16.52"
3.12 "	50000	120466	15.25	16.52"
1.82 "	50001	104915	18.25	16.52"
3.20 "	50000	082050	10.25	16.52"
1.34 "	50001	079685	20.25	16.52"
3.15 "	50000	095778	11.25	16.52"
2.79 "	50001	113607	17.25	16.52"
6.33 "	50000	106657	12.25	16.52"
1.93 "	50001	063275	21.25	16.52"
1.34 "	50001	119124	14.25	16.52"
1.43 "	50002	119459	16.25	16.52"



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$10 \times 10^{-12}$	Meter ✓	.5"	✓	$10 \times 10^{-12}$
		Fast ✓		✓	
K-2	$10 \times 10^{-12}$	Meter ✓	2"	✓	$10 \times 10^{-12}$
		Fast ✓			
R-1					
R-2					
PM-1	750V	Alarm ✓	Cont.	✓	500V
PM-2	1200V	Low -	18"	✓	900V
		Alarm ✓	2"	✓	

LOG N CALIBRATE  OPERATE  SOURCE No. 5 mg Ra<sup>228</sup>

DUMP WELL PROBE LIGHT OK - RKRj

Expt. # 29

START-UP CHECK LIST

Equipment checked by RKRj. Personnel check by F.D.e. = .46" Per min.

Instruments and safeties checked and reset by RKRj.

Source in checked by RKRj. Source No. accel

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

Instruments in trip circuit: K-1, K-2, PM1, PM2

Red light on by RKRj. Time 12:45

Start-up OK'd by DWM, RKRj, F.D.e. Date 2/18/63

zero = .62" Sol. level at start = 0.14"

Purpose of expt. Check lit. Ht. in 30" alum. angular type reactor. Base.

46 1/4" from floor surface to reactor.

Start up.

Crit Ht. = 7.45" Shut down 1142

1:00

1:35

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$10 \times 10^{-12}$	Meter ✓	.5"	✓	$10 \times 10^{-12}$
		Fast ✓		✓	
K-2	$10 \times 10^{-12}$	Meter ✓	2"	✓	$10 \times 10^{-12}$
		Fast ✓			
R-1					
R-2					
PM-1	750V	Alarm ✓	Cont.	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
		Alarm ✓	2"	✓	

LOG N CALIBRATE  OPERATE  SOURCE No. 5 mg Ra<sup>228</sup>

DUMP WELL PROBE LIGHT OK - RKRj

Expt. # 30

START-UP CHECK LIST

Equipment checked by RKRj. Personnel check by F.D.e.

Instruments and safeties checked and reset by RKRj.

Source in checked by RKRj. Source No. accel

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

Instruments in trip circuit: K-1, K-2, PM1, PM2

Red light on by RKRj. Time 9:05

Start-up OK'd by DWM, RKRj, F.D.e. Date 2/21/63

zero = .62" Sol. level reading at start 0.13"

Purpose of expt. to run vertical traverse using counter # RSN-105 S 5" dia. SS.

Reactor 30" alum. angular type, Base.

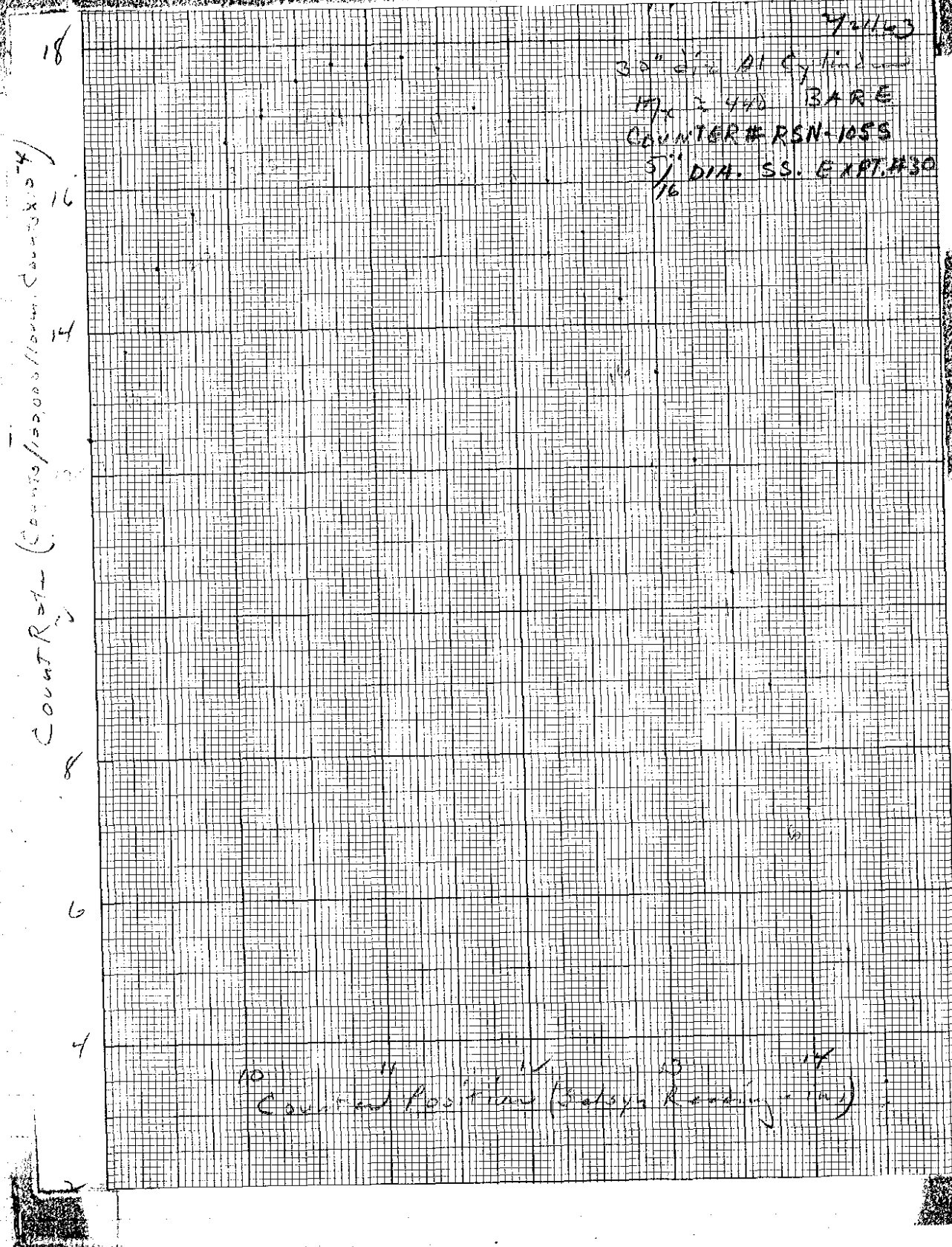
Start up.

Reactor 46 1/4" from floor surface.

9:05

9:40 Drain to change position of normalizing counter.  
 9:45 Start up.  
 11:25 Shut down

TIME	NORMLIZER	TRAVERSE	COUNTER Pos.	SOL. HT.
1.07 MIN.	100,000	124956	9.07"	7.43"
1.33 "	"	148743	9.57"	7.43"
1.68 "	"	166528	10.07"	7.43"
2.10 "	"	174956	10.57"	7.43"
1.82 "	"	033234	14.57"	7.43"
1.48 "	"	071822	14.07"	7.43"
1.25 "	"	105466	13.57"	7.43"
1.21 "	"	133397	13.07"	7.43"
1.22 "	"	153259	12.57"	7.43"
1.32 "	"	168895	12.07"	7.43"
1.67 "	"	176481	11.57"	7.43"
2.13 "	"	177188	11.07"	7.43"
1.88 "	"	051857	14.32"	7.43"
1.51 "	"	089168	13.82"	7.43"
1.37 "	"	120924	13.32"	7.43"
1.37 "	"	143798	12.82"	7.43"
1.48 "	"	160307	12.32"	7.43"
1.56 "	"	137289	9.32"	7.43"
2.13 "	"	177354	10.82"	7.43"
1.99 "	"	156546	9.82"	7.43"
3.03 "	"	178083	11.32"	7.43"
1.25 "	"	171003	10.32"	7.43"
1.88 "	"	169908	10.32"	7.43"
1.92 "	"	170890	11.82"	7.43"



2-21-63 - Determining bottom correction for 30 in Cyl.  
 Added solution to reading of 0.62  
 used tubing as probe surface @ 5.25  
 Bottom @ 5.11

$\therefore$  Assume bottom correction is .14  
 $\therefore$  True zero @ 0.55 selsyn reading  
 Sol. Ht.  $7.43 - .55 = 6.88$  in.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K1	$10 \times 10^{-12}$	Alarm <input checked="" type="checkbox"/>	Count'	<input checked="" type="checkbox"/>	$10 \times 10^{-12}$
		Fail <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
K2	$10 \times 10^{-12}$	Alarm <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	$10 \times 10^{-12}$
		Fail <input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
PM1	840V	Alarm <input checked="" type="checkbox"/>	Count	<input checked="" type="checkbox"/>	500V
PM2		Low <input checked="" type="checkbox"/>			
		Alarm <input checked="" type="checkbox"/>			

LOG IN CALIBRATE  OPERATE  SOURCE No. 5 mg Ra<sup>226</sup>

DUMP WELL PROBE LIGHT OK RKR

Cypt. #31  
 START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKR.

Source is checked by RKR. Source No. M-43

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

Instruments in trip circuit: K1, K2, PM1

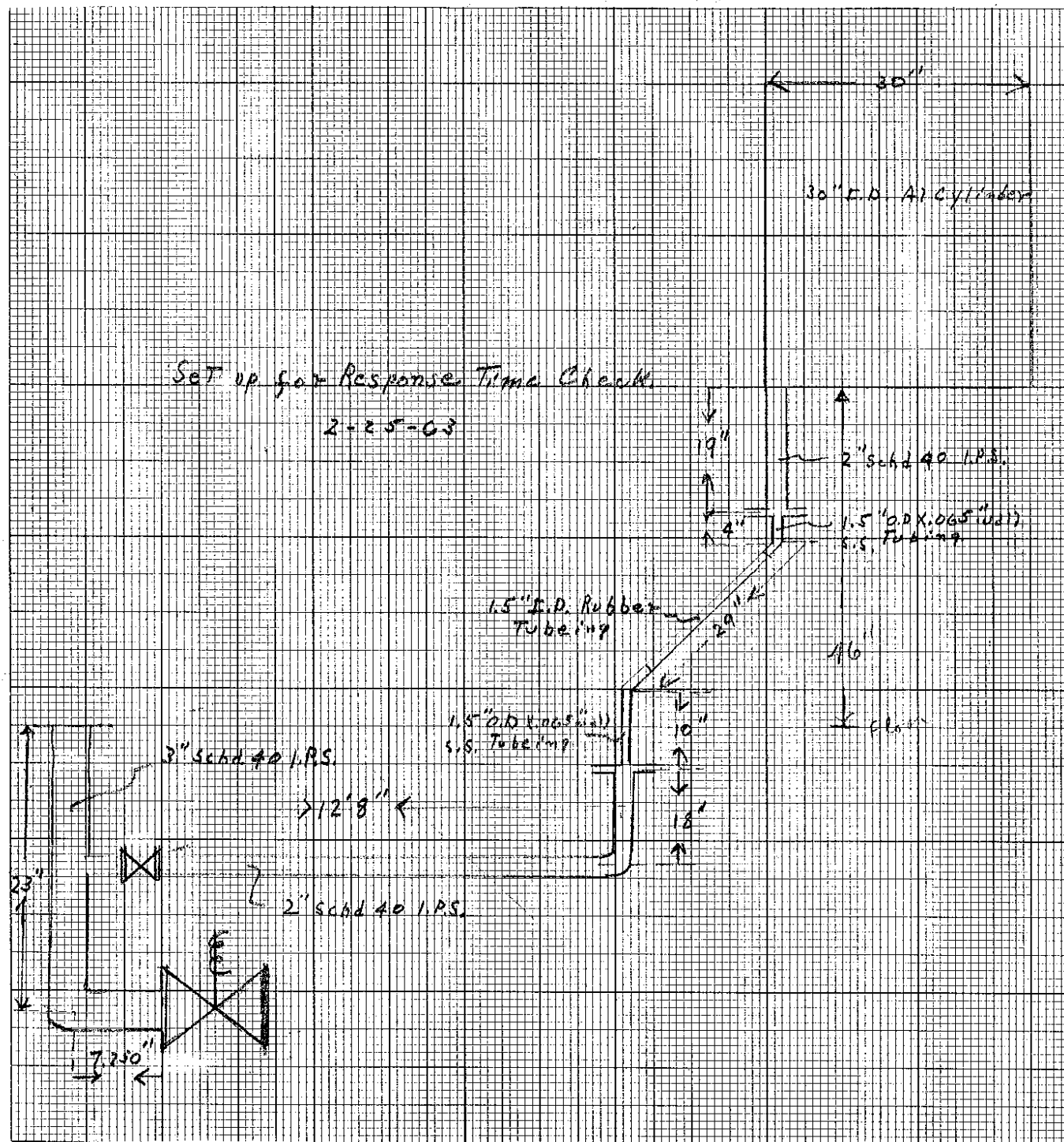
Red Light on by I.D.C. RKR, time 12:30

Start-up OK'd by F.R.R. RKR, I.D.C. Date 2-25-63

True zero = 0.55 selsyn      30" Alum. Angular  
 when sol. level = .62" Probe = 10.95"      Type reactor.

12:30 Start up. Purpose - Response time check.  
 1:12 just crit. Sol level = 7.44"  
 4:10 Shut-down

over



1<sup>12</sup>/<sub>PM</sub>

1<sup>33</sup>/<sub>PM</sub>

Ross-3 way in-line Pilot controlled solenoid operated valve. 2-25-63

A.

Scram signal - PM-2  
system critical

Liquid Level ht:	Probe (contact)	Probe (set)	Time (sec)
7.44"	17.80"	17.82"	.41287

system subcritical

6.98"	17.32"	17.34"	.52700
6.98"	17.32"	17.34"	.56098
6.98"	17.33"	17.35"	.48108
6.98"	17.33"	17.35"	.54570
			avg = .52869

6.98"	17.33"	17.35"	.53516
6.98"	17.33"	17.35"	check off.
6.98"	17.33"	17.35"	.53416
			avg = .53466

6.98"	17.33"	17.35"	.53672
-------	--------	--------	--------

.10" solution displacement.

6.98"	17.33"	17.25"	1.12522
6.98"	17.35"	17.27"	1.10527
			avg = 1.11524

over!

2/26/63

Liquid Level ht	Probe (Cont.)	Probe (Set)	Time (sec)
.05" solution displacement			
6.98"	17.34"	17.31"	.80202
6.98"	17.34"	17.31"	.78696
			avg = .79449

.20" solution displacement			
6.98"	17.345"	17.165"	1.60638
6.98"	17.345"	17.165"	1.59414
			avg = 1.60026

B

Dump Valve.

Clock starts when dump valve switch is energized.

6.975"	17.33"	17.35"	.48841
6.99"	17.35"	17.37"	.48346
6.97"	17.31"	17.33"	.54345
6.97"	17.33"	17.35"	.46051
			avg = .49396

C

Soram Bar.

Clock starts when soram bar is energized.

6.98"	17.33"	17.35"	.45929
6.98"	17.34"	17.36"	.45644
6.98"	17.33"	17.35"	.46571
6.98"	17.33"	17.35"	.52883
			avg = .47757

4-10

Shut down:

2-26-63 air pressure at dump valve = 85 p.s.i. ± 2 p.s.i.

Pass. 3 way in line pilot controlled 2/26/63 77  
 solenoid operated valve. Pressure = ~ 85 lbs.

Soram signal thro' PM-2

Liquid Level HT.	PROBE (CONT.)	PROBE (SET)	TIME (SEC)
1.56"	11.93"	11.95"	.86419
1.55"	11.90"	11.92"	.95051
1.555"	11.91"	11.93"	.94592
			AVG = .92021

Signal thro' soram bar

1.55"	11.91"	11.93"	.82866
1.56"	11.91"	11.93"	.62252*
1.555"	11.905"	11.925"	.44472*
1.56"	11.915"	11.935"	.89760
1.55"	11.905"	11.925"	.89743
1.555"	11.905"	11.925"	.96671

\* soram bar released too soon AVG = .89960

6.985"	17.33"	17.35"	.47348
6.99"	17.325"	17.345"	.47586
			AVG = .47467

Shut 1:45 Shut down

Asco three-way normally closed, 1/2" solenoid valve # 830076 Pressure = 40 lbs.

2/27/63

Scream signal thro' scream horn

LIQUID LEVEL HT.	PROBE (CONT.)	PROBE (SET)	TIME (SEC.)
1.555"	11.91"	11.93"	1.03958
1.56"	11.915"	11.935"	1.31326*
1.555"	11.905"	11.925"	1.05427
1.555"	11.905"	11.925"	1.02882
1.55"	11.90"	11.92"	1.04261

\* Did not clear timer AVG = 1.04132

PRESSURE = 34 lbs.

1.58"	11.93"	11.95"	1.05479
1.56"	11.905"	11.925"	1.01584
1.56"	11.90"	11.92"	1.09307
1.555"	11.90"	11.92"	.99280

PRESSURE = 34 lbs. AVG = 1.03913

6.99"	17.33"	17.35"	.67777
6.99"	17.33"	17.35"	.68908
6.99"	17.33"	17.35"	.71714
6.99"	17.34"	17.36"	.70498

AVG = .69724

3:15 Shut down

Scream signal thro' P77-2

Asco solenoid valve Norm. closed, three way 1/2" # 830076 Pressure = 34 lbs.

3/1/63

Sol. HT.	Probe (Cont.)	Probe (set)	Time (sec.)
1.555"	11.915"	11.935"	1.02400
1.55"	11.915"	11.935"	1.00800
1.55"	11.915"	11.935"	1.08800
1.555"	11.915"	11.935"	1.00800
1.55"	11.905"	11.925"	1.02400

AVG = 1.01330

Scream signal thro' scream horn

Pressure 34 lbs. The following measurements were made with a hose fixed to top of dump well manifold, to eliminate air in system. The vessel is filled to ~ 1.0" of solution and hose was clamped off.

7.56"	11.935"	11.955"	.90256
1.55"	11.92"	11.94"	.88436
1.55"	11.92"	11.94"	.94502
			.91065

The following measurements made with the hose open.

1.55"	11.925"	11.945"	.91672
1.55"	11.925"	11.945"	.97394
			AVG = .94533



Asco Valve norm. closed three way  
1/2" solenoid Valve # 830076.

3/4/63

Pressure: 32 lbs ± 2 lbs. - Scram signal thro' scram hov.

Sol. Ht.	Probe (Cont)	Probe (set)	Time (sec)
1.545"	11.92"	11.94"	.91107
1.545"	11.93"	11.95"	.89919
1.545"	11.92"	11.94"	.86608
1.545"	11.925"	11.945"	.90308
			AVG .89485

6.99"	17.355"	17.375"	.56808
6.99"	17.365"	17.385"	.57082
6.99"	17.365"	17.385"	.56295
6.99"	17.365"	17.385"	.56915
			AVG .56775

All measurements on this page were made a hose fitted to top of dump well manifold, to eliminate air in system. The vessel was filled to ~ 1.0" and hose then clamped off.

Ross valve ~ 32 lbs. pressure ± 2 lbs.  
Pilot section has full line pressure  
(line pressure varies from 82 PSI - 100 PSI)  
10" vessel with 3" pipe in center.

3/5/63

Zero = 000.06 Scram signal thro' scram hov.

Probe (Cont)	Probe (set)	Time (sec)
000.06"	000.08"	.31862
1.065"	1.085"	.08872
1.07"	1.09"	.31145
1.07"	1.09"	.31172
1.05"	1.07"	.32615
		AVG .31644

The following measurements were made with pilot section of Ross valve disconnected\*

Pressure = 58 lbs. on valve ± 2 lbs.

1.075"	1.095"	.29394
1.055"	1.075"	.27568
1.08"	1.10"	.29344
1.065"	1.085"	.27868
		AVG .28544

Pressure = 65 lbs ± 2 lbs on valve

1.055"	1.075"	.27294
1.055"	1.075"	.26006
1.07"	1.09"	.26440
		AVG .26580

(over)

\* Pilot section has no direct line pressure, but has pressure fed "backward" from valve. "NO pilot" on following pages refers to this condition.



3/5/63 Same as previous page except: Reversed the spring in pilot section, and changed pressure to 80 lbs. on Ross Valve.

Probe (cont)	Probe (set)	Time (sec)
1.085"	1.105"	.07764
1.07"	1.09"	.12462
1.06"	1.08"	.09673
1.065"	1.085"	.09858
1.09"	1.11"	.09838
AVG: .09919		

Pilot section has full line pressure 82 lbs. to 100 lbs. 35 lbs. Ross valve.

1.085"	1.105"	.11802
1.08"	1.10"	.12597
1.075"	1.095"	.13318
1.085"	1.105"	.10216
AVG: .11983		

2 Asco valves in parallel, norm. closed, three way, 1/2" solenoid valve # 830076  
Pressure 34 lbs. ± 2 lbs.

3/6/63

Scram signal thro' scram bar.

Probe (cont)	Probe (set)	Time (sec)
1.055"	1.075"	.13246
1.055"	1.075"	.15634
1.055"	1.075"	.12662
1.04"	1.06"	.14334
1.045"	1.065"	.15896
AVG: .14354		

Asco and Ross valves in parallel, Asco closing hendix with full line pressure to pilot only. Ross and Asco provides exhaust.  
Pressure = 34 lbs. Scram signal thro' scram bar.

1.075"	1.095"	.12608
1.085"	1.105"	.13513
1.09"	1.11"	.13832
1.08"	1.10"	.12532
1.075"	1.095"	.14000
AVG: .13297		

Same as above except pressure on Asco increased to 45 lbs ± 2 lbs.

1.085"	1.105"	
1.04"	1.06"	.10942
1.06"	1.08"	.11684
1.07"	1.09"	.12360
1.06"	1.08"	.12980
1.05"	1.07"	.13704
AVG: .12334		

3/6/63 Same as previous page except, increased pressure on Arco to 55 lbs. ± 2 lbs.

Probe (Cont)	Probe (set)	Time (sec)
1.09"	1.11"	.13678

3/6/63 Ross value with 65 lbs. ± 2 lbs. air; No pilot. (min. pressure).

1.08"	1.10"	0.08928
1.075"	1.095"	0.08149
1.07"	1.09"	0.04944 ? ?
1.07"	1.09"	0.09752
1.07"	1.09"	0.09174
1.07"	1.09"	0.09081
AVG = 0.09017		

36.065"	36.085"	0.08310
36.06"	36.08"	0.10314
36.07"	36.09"	0.12259
36.07"	36.09"	0.10977
36.05"	36.07"	0.11182
AVG = 0.10608		

36.095"	35.095"	0.57382
36.10"	35.10"	0.56836
36.085"	35.085"	0.57644
100# line → 36.105"	35.105"	0.57004
93# line → 36.065"	35.068"	0.58544
65# Ross → 36.11"	35.11"	0.54950

AVG = 0.57062

100# line →  
67# Ross →  
93# line →  
65# Ross →  
93# line →  
65# Ross →

Scram signal thro' scram bar

3/6/63 Ross value 65 lbs ± 2 lbs air, No pilot line pressure

Probe (Cont)	Probe (set)	Time (sec)
1.065"	1.085"	.08940
1.055"	1.075"	.08546
1.08"	1.10"	.07361
1.075"	1.095"	.08002
1.06"	1.08"	.08242

AVG = .08218

Press value 65 lbs. ± 2 lbs.

3/7/63

Scram signal thro' scram bar.

Probe (Cont')	Probe (set)	Time (sec.)
1.05"	1.07"	
1.06"	1.08"	.07844
1.06"	1.08"	.10248
1.065"	1.085"	.10337
1.07"	1.09"	.08812
1.075"	1.095"	.11322
		AVG. 0.09713

Scram signal thro' PM-2 Pressure 65 lbs ± 2 lbs.

1.065"	1.085"	.13882
1.075"	1.095"	.16168
1.045"	1.065"	.16089
1.055"	1.075"	.16250
1.07"	1.09"	.15439
		AVG. 0.15566

Press value 65 lbs. ± 2 lbs.

Scram signal thro' PM-2

Using visicorder

3/7/63

Probe (Cont')	Probe (set)	Visicorder	Time (sec.)
1.06"	1.08"	.158	.16081
1.075"	1.095"	.141	.14447
1.065"	1.085"	.156	.16015
1.07"	1.09"	.148	.15287
		AVG. 0.151	AVG. 0.15458

Scram signal thro' scram bar

1.09"	1.11"	.115?	.09835
1.09"	1.11"	.136	.11008
1.03"	1.05"	.145	.11969
			AVG. 0.10937

Scram signal thro' PM-2 - Pressure 65 lbs ± 2 lbs.

0.0"	36.095"	36.11"	0.18342
	36.095"	36.11"	0.17590
	36.075"	36.09"	0.18115
			AVG. 0.18016

0.1"	36.115"	36.015"	0.24815
	36.11"	36.01"	0.24679
	36.115"	36.015"	0.24649
			AVG. 0.24714

0.25"	36.805"	35.835"	0.30548
	36.100"	35.850"	0.31487
	36.080"	35.830"	0.31759
			AVG. 0.31265

CONTINUE  
(NEXT PAGE)

0.50"	36.080"	35.58"	0.42040
	36.085"	35.585"	0.43407
	36.115"	35. <del>590</del> <sup>615</sup> "	0.43104
			AVG 0.42850
0.75"	36.090"	35.340"	0.53760
	36.105"	35.355"	0.53776
	36.110"	35.360"	0.53356
			AVG. 0.53631
1.00"	36.110"	35.110"	0.64312
	36.110"	35.110"	0.64568
	36.095"	35.095"	0.64030
			AVG. 0.64303

3/8/63  
 Rose value 65 lbs.  $\pm$  2 lbs. True zero = .55" for 89  
 30" Alum. annular Russell.  
 Scram signal thro' PM-2  
 when sol. ht. ind. reads 0.655" Probe reads 0.695"

Sol. ht.	Probe (cont)	Probe (set)	Time (sec.)
1.55"	1.61"	1.625"	.97277
1.55"	1.59"	1.605"	1.00620
1.545"	1.58"	1.595"	.99392
			AVG: 0.99096
0.0"	6.985"	7.035"	7.050"
	6.985"	7.025"	7.040"
	6.995"	7.045"	7.060"
			.55519
			.53126
			.55649
			AVG. 0.54765
.05"	6.98"	7.05"	7.015"
	6.98"	7.01"	6.975"
	6.99"	7.025"	6.990"
			.80317
			.81490
			.81061
			AVG: 0.80956
.10"	6.985"	7.02"	6.935"
	6.985"	7.01"	6.925"
	6.975"	7.01"	6.925"
			1.03364
			1.10877
			1.03314
			AVG: 1.0585
.25"	6.975"	7.015"	6.780"
	6.97"	7.005"	6.770"
	6.98"	7.02"	6.785"
			1.84685
			1.84656
			1.84900
			AVG: 1.84747

(CONTINUE NEXT PAGE)

X-494

CONTROL NO. S.F. A 187  
DATE 2-19-63

TO: R. K. Reedy

ANALYTICAL DATA REPORT SHEET

FROM: G. R. Wilson

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

SERIES NO.

Rechecks on samples reported on A-186

ANALYZED FOR: Uranium

METHOD OF ANALYSIS: Potentiometric

Lab No	Sample Code	mg/gc u																PRECISION OF ANALYTICAL METHOD	REMARKS
10927	#1	59.90																	
10928	#2	60.03																	

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_ % geometry

DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

*Samples and waste retained to be picked up by sender*

W.R. Ling / BJS  
Laboratory Supervisor

TO: R.K. Reedy  
 FROM: G.R. Wilson  
 SERIES NO.

CONTROL NO. S.F. A-186  
 DATE 2-8-63

ANALYTICAL DATA REPORT SHEET

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: Density & sp. g. METHOD OF ANALYSIS: Potentiometric U

LAB. NO	SAMPLE CODE	DENSITY	@25°C SP. G.	mg/g *	→ result (by phone)		PRECISION OF ANALYTICAL METHOD	REMARKS
10927	#1	1.0831	1.0864	59.95	59.90	about 2.2% off		
10928	#2	1.0831	1.0864	58.65	60.03	* corrected for enrichment.		

Activity in \_\_\_\_\_ REMARKS  
 Concentration \_\_\_\_\_  
 Sample Counted at \_\_\_\_\_ % geometry

- DISTRIBUTION: 1 (White) Requestor  
 2 (Canary) S. F. Accountability  
 3 (Blue) Analytical

*Samples + waste retained to be picked up by sender.*

W.R.L.H.  
 Laboratory Supervisor

## REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Reedy Jr 459213-1-12  
 SERIES NUMBER #1 - C = 2 By 4 2910-28  
 DATE SUBMITTED 2-4-63

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<u>I 1</u>	<u>1/17</u> <u>Density +</u> <u>sp. gr.</u>	<u>0.6009/R</u>			<u>43% (10%)</u> <u>reduction</u>	<u>69.5 gms</u>
<u>I 2</u>	<u>↓</u>	<u>0.6009/R</u>			<u>↓</u>	<u>67.3 gms</u>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Reedy Jr  
 Requestor

12/12

	9:03	9:04	9:10	9:15	9:20	9:24	10:53
2	21.5	21.5	21.0	21.0	21.0	21.0	22.0
7	21.5	21.7	21.7	21.7	22.0	21.7	22.0
8	22.5	23.0	23.0	23.0	23.0	23.0	22.7
9	21.5	21.2	21.5	21.5	21.5	22.0	21.7
13	25.5	26.0	25.5	24.0	25.5	25.5	24.5

	12:13	11:00	11:51
2	22.3	22.2	22.5
7	22.0	22.0	22.5
8	22.5	22.5	22.5
9	22.2	22.2	22.2
13	25.5	25.5	25.0

12/13

	8:35	8:54	9:15	9:23	9:32	9:55	10:25
2	21.5	21.5	21.5	21.7	21.5	21.7	22.0
7	21.5	21.5	21.5	22.0	21.5	21.7	21.7
8	21.5	22.0	22.2	22.5	22.2	22.2	22.2
9	21.0	21.2	21.0	21.0	22.0	22.0	21.5
13	24.5	24.5	25.0	24.0	24.5	25.0	23.5

	11:13
2	22.0
7	21.5
8	22.0
9	22.0
13	24.0

12-17-63

8.8" after

	11:12	11:17	12:28	13:11	14:53
2	20.5	19.7	19.7	20.7	21.0
7	21.5	21.2	21.8	21.8	21.5
8	21.5	21.5	22.5	22.2	22.0
9	21.5	21.0	21.0	21.0	21.2
13	26.2	25.5	25.5	26.0	26.0



12/10

9:12 9:17 9:20 9:23 9:30

#1	24	23.5	26	26.5	24.8
2	21	21	21	21	21.2
6	21.5	21.5	21.5	21.5	21.7
11	22.5	22.5	22.5	22.2	22.5
12	21	21.5	21	21.5	21.5
13					

12/18

12.4" sphere

10:20 10:30 10:55 12:15 12:45 14:10 14:45 15:35

2	20.5	20.8	21.0	21.2	21.2	21.5	21.5	21.5
7	21.5	21.3	21.5	21.5	21.5	21.5	21.5	21.5
8	22.0	22.0	22.0	22.0	22.0	21.8	21.8	21.8
9	20.7	21.0	21.0	21.5	21.0	21.2	21.2	21.5
13	25.5	24.5	25.5	24.0	26.0	24.0	25.5	24.5

12/19

10:40 11:20 12:57

2	20.0	20.5	21.0
7	21.5	21.5	21.5
8	21.7	21.7	21.7
9	20.7	20.5	20.7
13	25.5	24.0	24.0

12" SS cyl.

#2 outside of 3" pipe  
#7 in air on vessel  
#8 Taped to side of vessel

2	16:00	21.0
7	21.7	
8	22.5	
9	21.2	
13	25.5	

12/20/03 12" SS cyl

9:00 10:50 13:25

2	20.0	20.7	21.2
7	21.2	21.0	21.2
8	21.7	21.5	21.2
9	20.0	20.7	20.7
13	26.0	24.5	25.0

.20"	6.975"	7.015"	6.880" <sup>3</sup>	1.54834
	6.975"	7.015"	6.880" <sup>3</sup>	1.52868
	6.97"	7.015"	6.880" <sup>3</sup>	1.50758
				1.52886
				AVG = 1.52820
.15"	6.97"	7.015"	6.880"	1.26661
	6.97"	7.015"	6.880"	1.29148
	6.975"	7.015"	6.880"	1.29886
				AVG = 1.28565

Changed pressure to read 85 lbs  $\pm$  2 lbs.

0.0"	6.98"	7.035"	7.050"	0.53898
	6.98"	7.035"	7.050"	0.49161
	6.985"	7.035"	7.050"	0.56154
	6.985"	7.035"	7.050"	0.58774
				AVG = 0.54497
.15"	6.985"	7.035"	6.90"	1.31743
	6.985"	7.035"	6.90"	1.33014
	6.99"	7.04"	6.905"	1.33305
				AVG = 1.32687

3/8/63

mat feed rate with 1/2" manual valve fully open.

sol. Ht. at start	sol. Ht. at end	time
0.54" (note) Bypass	1.35" - .54 = .81"	1 MIN.
0.56" valve 3/4 of turn	.775" = .215"	15 sec.
0.56" from close	.995" = .435"	30 sec.
0.56"	1.185" = .625"	45 sec.
0.56"	1.375" = .815"	1 MIN.

mat feed rate with 1/2" manual valve fully open and 1" by-pass valve closed.

0.545"	0.895" = .350	15 sec.
"	1.210" = .665	30 sec.
"	1.515" = .976	45 sec.
"	1.820" = 1.275	60 sec.

mat. feed rate with 1/2" flow meter fully open, Bypass closed

0.565"	0.765" - .200"	15 sec.
"	0.925" - .360"	30 sec.
"	1.090" - .525"	45 sec.
"	1.250" - .685"	60 sec.

mat feed rate with 1/2" flow meter fully open and 1/2" manual valve fully open, Bypass closed.

0.570"	0.935" - .365"	15 sec.
"	1.265" - .695"	30 sec.
"	1.580" - 1.010"	45 sec.
"	1.910" - 1.340"	60 sec.

See folder marked, "Response time check" for curves on above data.

Press valve, 65 lbs #2 lbs.  
 True zero = 00.09" in 10" SS vessel mounted outside  
 of lug sid. Scram signal thro' PM-2

3/11/63

	Probe (cont)	Probe (set)	Time (sec)
0.0"	36.085"	36.10"	.30318
	36.095"	36.11"	.29743
	36.095"	36.11"	.28865
	36.075"	36.09"	.28567
	36.10"	36.115"	.27714
	36.07"	36.085"	.34560

The above ~~can~~ data taken during warm-up

0.0"	36.075"	36.09"	.27567
	36.055"	36.07"	.27982
	36.075"	36.09"	.27819
	36.080"	36.095"	.26976
			<u>.26976</u>
			AVG: .27580

0.10"	36.10"	36.015"	.40024
	36.10"	36.015"	.40798
	36.075"	35.985"	.41145
			<u>.41145</u>
			AVG: .40657

0.25"	36.095"	35.860"	.51415
	36.08"	35.845"	.51546
	36.115"	35.880"	.51628
			<u>.51628</u>
			AVG: .51530

0.500"	36.12"	35.635"	.65166
	36.095"	35.610"	.64968
	36.10"	35.615"	.65219
			<u>.65219</u>
			AVG: .65118

0.75"	36.115"	35.380"	.77617
	36.085"	35.350"	.78640
	36.115"	35.380"	.78436
			<u>.78436</u>
			AVG: .78231

0.100"	36.10"	35.115"	2.62689
	36.095"	35.110"	2.66869
	36.115"	35.130"	2.94011
			<u>2.94011</u>
			AVG: 2.7452

0.75"	36.08"	35.345"	.78624
-------	--------	---------	--------

94

Ross Value 65 lbs.  $\pm$  2 lbs.  
 True zero = 00.09" in 10" SS Vessel mounted out of big side.  
 Scram signal thro' PM-2

3/12/63

	Probe (cont)	Probe (set)	Time (sec)
.250"	36.09"	35.855"	.53013
	36.095"	35.860"	.52766
	36.08"	35.845"	<u>.52178</u>
			AVG. .52652

.750"	36.11"	35.375"	.80264
	36.095"	35.360"	.80246
	36.09"	35.355"	<u>.80144</u>
			AVG. .80218

.850"	36.100"	35.265"	2.48615
	36.085"	35.250"	2.23510
	36.09"	35.255"	<u>2.34127</u>
			AVG. 2.35417

.800"	36.11"	35.325"	2.34102
	36.09"	35.305"	2.43336
	36.10"	35.315"	<u>2.47828</u>
			AVG. 2.41755

.775"	36.105"	35.345"	.82328
	36.085"	35.325"	.86474
	36.08"	35.320"	<u>1.90136</u>
			AVG. 1.19646

95

Ross Value 65 lbs.  $\pm$  2 lbs.  
 True zero = 00.09" in 10" SS Vessel mounted outside  
 of big side.  
 Scram signal thro' PM-2 (Eliminated air pocket)

3/12/63

	Probe (cont)	Probe (set)	Time (sec)
.075"	36.09"	35.355"	.73682
	36.11"	35.375"	.74612
	36.095"	35.360"	<u>.74773</u>
			AVG. .74356

1.00"	36.10"	35.115"	2.63877
	36.07"	35.085"	<u>2.51922</u>
			AVG. 2.57899

Modified and taped probe

1.00"	36.105"	35.115"	.86338
	36.105"	35.115"	.86420
	36.085"	35.095"	<u>.86402</u>
			AVG. .86387

.075"	36.09"	35.350"	.74586
	36.10"	35.360"	<u>.75457</u>
			AVG. .75021

3/14/63

Fail Run in 30" dia Cylinder

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	3.5"	✓ 10 x 10 <sup>-12</sup>	
"	"	Fast ✓	"	"	"
K-2	10 x 10 <sup>-12</sup>	Meter ✓	3"	✓ 10 x 10 <sup>-12</sup>	
"	"	Fast ✓	3"	"	"
R-1					
R-2					
PM-1	840v	Alarm ✓	Conte	✓	
PM-2		Low			
		Alarm			

LOG IN CALIBRATE ✓ OPERATE ✓ SOURCE No. 5mg Red  
 DUMP WELL PROBE LIGHT OKAKR

Expt. 3 ✓

START-UP CHECK LIST

Equipment checked by AKR Personnel check by AKR  
 Instruments and safeties checked and reset by AKR  
 Source in checked by AKR Source No. M-4-3  
 Emergency equipment in control room checked by AKR  
 Instruments in trip circuit: K-1 K-2 PM-1  
 Red light on by AKR Time 9:20 AM  
 Start-up OK'd by D.W.M. AKR Date 3-14-63

30' al Annular

Zero 0.55

EXP. 32 March 14, 1963

Purpose: Gold wire, .49 x .064 (14ea) foil irradiation for axial flux ~~distribution~~ distribution

Wires in 0.100 o.d. S.S tube.

Level ~ 7.50" ~~7.50"~~ Level 7.50" ~~7.53"~~

10<sup>15</sup> AM shut down.

S.S. tube

3<sup>00</sup> PM Set lower limit on drive @ 15.58 when RSN-1055 counter tip touches solution in small hole in 30 in cyl.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	cont	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	10 x 10 <sup>-12</sup>	Meter ✓	3"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	940 v	Alarm ✓	1"	✓	500 v
PM-2	1220 v	Low ✓	12"	✓	900 v
		Alarm ✓	5"	✓	

LOG N CALIBRATE \_\_\_\_\_ OPERATE \_\_\_\_\_ SOURCE No. 5742 Part

DUMP WELL PROBE LIGHT OK AKR

EXP 33

START-UP CHECK LIST

Equipment checked by AKR Personnel check by AKR

Instruments and safeties checked and reset by AKR

Source in checked by AKR Source No. acid

Emergency equipment in control room checked by AKR

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

Red light on by AKR Time 8<sup>15</sup> AM

Start-up OK'd by D. W. AKR Date 3-15-63

9<sup>03</sup> AM

EXP #33 : Purpose, to measure decay constants (with pulsed neutron source) as a function of counter position in solution at a solution height of 5.00 in, select reading of 5.55 in 30" vessel.

9<sup>17</sup> AM

Drain solution back to 3.46" in order to ~~read~~ read close to vessel.

9 <sup>35</sup>/<sub>AM</sub> Moved target to 3.250" from bottom 30" al vessel

10 <sup>15</sup>/<sub>AM</sub> Solution ht = 6.18" Counter pos = 15.80"

10 <sup>28</sup>/<sub>AM</sub> " " = " " = 16.40"

10 <sup>00</sup>/<sub>AM</sub> " " = 6.195" " " = 17.00"

11 <sup>24</sup>/<sub>AM</sub> " " = " " " = 17.60"

11 <sup>28</sup>/<sub>AM</sub> " " = " " " = 18.10"

12 <sup>23</sup>/<sub>PM</sub> " " = " " " = 18.70"

12 <sup>48</sup>/<sub>PM</sub> " " = 6.20" " " = 19.03"

1 <sup>13</sup>/<sub>PM</sub> " " = " " " = 19.30"

1 <sup>39</sup>/<sub>PM</sub> " " = " " " = 18.40"

2 <sup>00</sup>/<sub>PM</sub> " " = " " " = 16.10"

2 <sup>25</sup>/<sub>PM</sub> Shut down

INSTRUMENT CHECK

3/20/63

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X15 <sup>-1</sup>	Meter ✓ Fst ✓	Contact	✓	10X15 <sup>-1</sup>
K-2	10X15 <sup>-1</sup>	Meter ✓ Fst ✓	3" Contact	✓	10X15 <sup>-1</sup>
R-1					
R-2					
PM-1	840	Alarm ✓	Contact		500
PM-2	1220	Low ✓ Alarm ✓	18" 3-4"		900

LOG IN CALIBRATE \_\_\_\_\_ OPERATE \_\_\_\_\_ SOURCE No. Accul

DUMP WELL PROBE LIGHT Not checked

Expt. 34  
START-UP CHECK LIST

Equipment checked by RKR, DUM Personnel check by RKR

Instruments and safeties checked and reset by EJ

Source in checked by DUM, RKR Source No. Accul

Emergency equipment in control room checked by EJ

Instruments in trip circuit: \_\_\_\_\_

Red light on by EJ Time 0915

Start-up OK'd by RKR, EJ Date 3/20/63

Purpose: to <sup>transfer</sup> ~~produce~~ the 9 1/2" ID al sphere with  
 Counter RSN-1055. Sphere = 8.784, I.D. = 5.822  
 Solution = 1.595 in. Sphere I.D. = 9.35"  
 Height for expt = 11.085" (into vessel)  
 Trip of counter at zero = 25.525 in.  
 Counter position = 25.00 in. at 27.  
 System sub crit. when full.

Date	Solu Height	Counter Pos.
3/20/63		
1007	13.13 m.	25.50 in.
<del>1035</del>	13.07095	26.00
1035	13.07	26.50
10 <sup>50</sup> AM	13.03	27.00
11 <sup>02</sup> AM	13.00	27.50
11 <sup>17</sup> AM	12.98	28.00
11 <sup>31</sup> AM	12.96	28.50
11 <sup>45</sup>	12.93	29.00
12 <sup>00</sup> PM	12.91	29.50
12 <sup>15</sup>	12.89	30.00
12 <sup>30</sup>	12.87	30.50
12 <sup>45</sup>	12.85	31.00
1 <sup>00</sup> PM	12.82	31.50
1 <sup>15</sup> PM	12.80	32.00
1 <sup>30</sup>	12.77	32.50
1 <sup>45</sup>	12.92	26.00
2 <sup>00</sup> PM	Shut down	

12.5" sphere  
Pulsing using H<sub>2</sub>O at room temp.  
Tip of counter = 23.00" when solution reads 0.0"  
3/25/63 Exp. #35

1 <sup>st</sup>	= 29.70"
2 <sup>nd</sup>	= 30.70"
3 <sup>rd</sup>	= 31.70"
4 <sup>th</sup>	= 32.70"
5 <sup>th</sup>	= 32.20"
6 <sup>th</sup>	= 28.70"
7 <sup>th</sup>	= 27.70"
8 <sup>th</sup>	= 26.70"
9 <sup>th</sup>	= 25.70"
10 <sup>th</sup>	= 24.70"
11 <sup>th</sup>	= 26.70"
12 <sup>th</sup>	= 32.20"
13 <sup>th</sup>	= 30.70"
14 <sup>th</sup>	= 23.70"
15 <sup>th</sup>	= 24.20"
16 <sup>th</sup>	= 25.70"
17 <sup>th</sup>	= 27.70"
18 <sup>th</sup>	= 28.70"
19 <sup>th</sup>	= 29.70"
20 <sup>th</sup>	= 31.70"



12.5" sphere

Pulsing using  $H_2O$  at room temp.

Tip of counter = 23.00" when solution reads 0.0"

3/26/63

Exp. #36.

1st = 27.70"  
 2 = 29.70"  
 3 = 31.70"  
 4 = 32.70"  
 5 = 30.70"  
 6 = 28.70"  
 7 = 26.70"  
 8 = 25.70"  
 9 = 24.70"  
 10 = 23.70"

2:00 PM Shut down. Trouble in accel.

3/27/63

Exp. #37. 12.5" sphere, pulsing using  $H_2O$  at room temp.  
Tip of counter = 23.00" when solution reads 0.0"

1st = 27.70"  
 2 = 28.70"  
 3 = 29.70"  
 4 = 30.70"  
 5 = 31.70"  
 6 = 32.70"  
 7 = 32.20"  
 8 = 26.70"  
 9 = 25.70"  
 10 = 24.70"  
 11 = 23.70"  
 12 = 23.20"  
 13 = 27.70"

1:15 Shut down

~~Exp. #37~~Filled sphere with  $H_2O$ .

Bottle G = 19.75 Kg

H = 2.65 Kg

N = 17.10 Kg

Upper spout holds = 5.82 g

Lower spout " = 2.17 g

∴ Sphere holds = 16.30 Kg  $H_2O$  @ 167

T = Now is 6.193 in. (This sphere was re-painted with 2 layers of glyptal.)

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Meter	1"		10x10 <sup>-12</sup>
"	"	"	"		"
K-2	10x10 <sup>-12</sup>	Meter	4"		10x10 <sup>-12</sup>
"	"	"	"		"
R-1					
R-2					
PM-1	900v	Alarm	cont		500v
PM-2	1220v	Alarm	2"		700v
		Alarm	4"		

LOG N CALIBRATE  OPERATE  SOURCE No. 5mg Al<sup>27</sup>  
 DUMP WELL PROBE LIGHT OK RKRJ.

Exp. # 38

START-UP CHECK LIST

Equipment checked by RKRJ Personnel check by RKRJ  
 Instruments and safeties checked and reset by RKRJ  
 Source in checked by RKRJ Source No. Acad  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKRJ Time 9:30  
 Start-up OK'd by D.W. RKRJ Date 3-28-63

Zero = 13.71"

Purpose of exp. to pulse 12,386" alum sphere, approx. 55" from bottom of sphere to floor.

9:30

10:15

Start-up

Sol. Mt. = 29.03 System is sub-crit.

Tip of counter reads: 23.00" when sol. reads 0.0"

- 1st = 27.70"
- 2 = 28.70"
- 3 = 29.70"
- 4 = 30.70"
- 5 = 31.70"
- 6 = 32.70"
- 7 = 32.20"
- 8 = 26.70"
- 9 = 25.70"
- 10 = 24.70"
- 11 = 23.70"
- 12 = 23.20"
- 13 = 27.20"
- 14 = 28.20"
- 15 = 29.20"
- 16 = 30.20"

INSTRUMENT CHECK

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INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	cont	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	2"	✓	10 X 10 <sup>-12</sup>
	10 X 10 <sup>-12</sup>	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	800 V	Alarm ✓	cont	✓	500 V
PM-2	1220 V	Low ✓	18"	✓	900 V
		Alarm ✓	6"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. Engbart

DUMP WELL PROBE LIGHT OK RKK/

Exp. #39

START-UP CHECK LIST

Equipment checked by RKK/ Personnel check by RKK/

Instruments and safeties checked and reset by RKK/

Source in checked by RKK/ Source No. M-43

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

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

Red light on by RKK/ Time 10<sup>15</sup> AM

Start-up OK'd by RKK/ T.D.C. Date 9-1-63

Solution Zero = 3.94"

Response to check crit. lev. of 14.375" at sphere; approx. 40" from bottom of sphere to floor.

10:20

11:04

11:05

Start up.  
Just crit. Sol. ind. = 17.38" - 3.94" = 13.44 in.  
Shot down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	5"	✓	10X12 <sup>-12</sup>
	10X10 <sup>-12</sup>	Fast ✓	"	✓	✓
K-2	10X10 <sup>-12</sup>	Meter ✓	4"	✓	10X12 <sup>-12</sup>
	10X10 <sup>-12</sup>	Fast ✓	✓	✓	✓
R-1					
R-2					
PM-1	800 V	Alarm ✓	Cont	✓	500V
PM-2	1220V	Low ✓	18"	✓	900V
		Alarm	4"	✓	

LOG IN CALIBRATION  OPERATE  SOURCE No. Sample 4  
 DUMP WELL PROBE LIGHT AKR

Exp. #40

START-UP CHECK LIST

Equipment checked by RKR. Personnel check by RKR.  
 Instruments and safeties checked and reset by RKR.  
 Source in checked by RKR, Source No. 14-43  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: RKR.  
 Red light on by RKR. Time 9:45  
 Start-up OK'd by RKR, IDC Date 4/2/63

Zero = 3.94"  
 Purpose of exp. to pulse at critical with 14.375" alum sphere, 40" from bottom of sphere to floor.

9:50 Start-up. Just crit = 17.32"

When control rod is out it is 1.2" in from top of sphere.

When control rod is in it is .84" from bottom of sphere.

End of control rod is .27" into solution when just crit.

11:10 Just slightly sub. crit. Sal Ht. ind. = 17.31"  
 Control rod out.

11:12 Shut down.

11:30 Sample #1 & 2 taken from 14.375" sphere.  
 Samples #3 & 4 taken from storage manifold.  
 No's 1 & 3 sent to X-10  
 No's 2 & 4 sent to Y-12

Exp 40-1	Control # A-928	Exp 40-2	<del>Control # A-928</del>
G = 84.9	Sp. gr.	G = 88.3	Reg # 593196
T = 16.8	Density	T = 18.5	Sp. gr. .061170
N = 68.1		M = 69.8	Sp. gr. 1.0890
			Assay W % = 1.00
			4 % = 92.43
			2 % = .56
			9 % = 6.01
Exp 40-3	Control # A-928	Exp 40-4	Reg # 593197
G = 84.2	Sp. gr. .060880	G = 95.2	Sp. gr. .060880
T = 21.3	Density	T = 17.5	Sp. gr. 1.0883
N = 62.9		N = 77.7	Assay W % = .98
			4 % = 92.45
			2 % = .55
			9 % = 6.02

X-494

TO: R. K. Reedy

FROM: G. R. Wilson

SERIES NO.

ANALYTICAL DATA REPORT SHEET

CONTROL NO. S.F. A-196

DATE 4-3-63

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: Uranium

METHOD OF ANALYSIS: Standard method

Lab. No.	Sample Code	Wt/g	Density	sp.g									PRECISION OF ANALYTICAL METHOD	REMARKS
		@250C												
11002	9440-1	60.83	1.0847	1.0880										
11003	9440-2	60.76	1.0846	1.0879										

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_% geometry

Samples & waste retained to be picked up by sender.

WRT & CB  
Laboratory Supervisor

DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. R... [Signature]  
 SERIES NUMBER 7 2111 1 2 3  
 DATE SUBMITTED 4-2-63

*Chg # 4410-28*

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>Sp 40-1</i>	<i>7/10 Density</i>	<i>~100%</i>			<i>~93% NO<sub>2</sub> (710<sub>3</sub>) solution</i>	<i>63.1g</i>
<i>Sp 40-3</i>	<i>Sp 3.0</i>	<i>~100%</i>			<i>↓</i>	<i>62.9g</i>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. R... [Signature] Requestor

INSTRUMENT CHECK

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INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	✓	1"	✓	10X10 <sup>-12</sup>
"	"	✓	1"	✓	" "
K-2	10X10 <sup>-12</sup>	✓	2"	✓	10X10 <sup>-12</sup>
"	"	✓	2"	✓	" "
B-1					
B-2					
PM-1	500V	✓	cont	✓	500V
PM-2	1200V	✓	24"	✓	<del>900V</del>
Beckman	✓	✓	4"	✓	
LOG N. CAMERA	✓	OPERATE	✓	SOURCE NO.	3740 Be
DUMP WELL FROZE LIGHT	AKR				

Exp. # 41

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKR

Sources in checked by AKR Source No. M-43

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

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

Red light on by AKR Time 11:10 PM

Start-up OK'd by AKR, F.D.C. Date 6-14-63

O = .370"

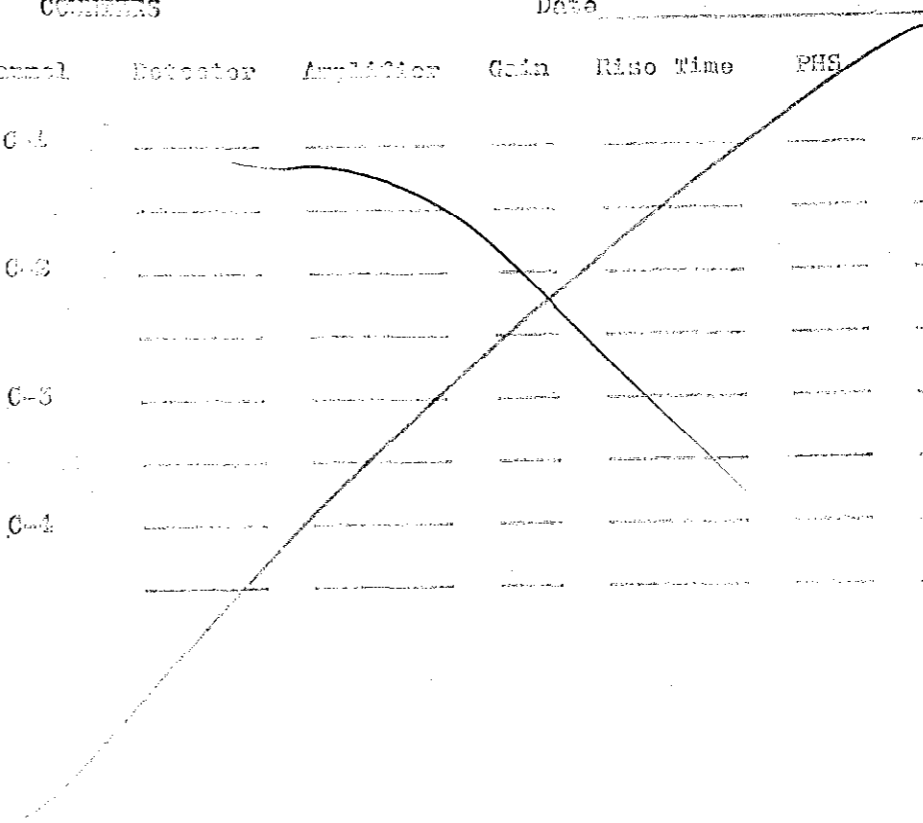
Purpose of exp. to check critical Ht. with 14.375" alum. sphere. 40" from bottom of sphere to floor level.

11:15 Start up

11:35 Super cut. Ind. 13.86" Source out

11:45 Just out @ 13.825"  
 Positive @ 13.835"  
 11:47 Just out @ 13.830"  
 11:49 Shut down  
 2:55 Added 2 liters of H<sub>2</sub>O mixed for  
 30 min.  
 3:40 Source out.  
 3:42 Positive period Sol. H<sub>2</sub> = 14.22"  
 3:50 Just crit. @ 14.08"      14.085" slightly Pos.  
    14.075" slightly neg.  
 3:52 Shut down

CONVERTERS			Date _____			
Channel	Detector	Amplifier	Gain	Rise Time	PHS	HV
G-1						
G-2						
G-3						
G-4						





INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$10 \times 10^{-12}$	M ✓	1"	✓	10x10 <sup>-12</sup>
"	"	F ✓	1"	✓	"
K-2	$10 \times 10^{-12}$	M ✓	4"	✓	10x10 <sup>-12</sup>
"	"	F ✓	4"	✓	"
R-1					
	800 V	Alarm ✓	Cont'	✓	500V
	1200 V	W ✓	24"	✓	900V
	Bedman ✓	Alarm ✓	4"	✓	
LOG N CALIBRATION ✓		OPERATE ✓		SOURCE No. <u>Sony J R</u>	
DUMP WELL PROTECT ✓		RKR ✓			

Exp. #42

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. M-43

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

Instruments in help circuit: RKR

Red light checked by F.D.C Time 8:30 AM

Start-up checked by RKR, F.D.C Date 6/17/63

O = .370"

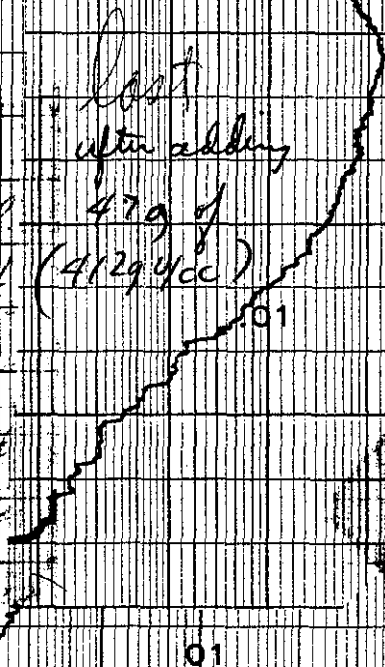
Purpose of exp. to check crit. HT. with 14. <sup>45</sup> alum. sphere, 40" from bottom of sphere to floor level.

845 added 1 more liter of H<sub>2</sub>O which makes a total of 3 liters of H<sub>2</sub>O. Mixed for 30 min.

9:15<sup>AM</sup> Start up -  
 9:30 Source out  
 9:32 Positive period @  
 9:40 just crit. @ 14.25  
 9:41 Shut down

9:50 Added 1 more liter of  
 total of 4 liters of "11" (412g/cc)

10:43 Source out  
 10:47 Sub. crit. @ 24.34  
 10:48 Shut down. Dumped  
 up to see if still  
 11:08 Source out.  
 11:10 Sub. crit @ 25.4  
 11:11 Shut down.



11:30 Added 47g of solution of 412 g<sup>cc</sup>/l;  
 mixed for 20 min.

12:05 Source out.  
 12:07 Sub. crit @ 25.15"  
 12:08 Shut down

12:40 Added 47g at 396 g<sup>cc</sup>/l, and 47g at 427g<sup>cc</sup>/l.  
 mixed for 20 min.

1:26 Source out.  
 1:40 slightly sub. crit @ 25.37" Shut down.

3:20 Recheck of Ht. after tilting system Cool for 1 hr. + 40 min  
 3:38 Source out.  
 3:40 Slightly pos. @ 30.45" (OVER)

- 9:15<sup>HM</sup> Start up -
- 9:30 Source out
- 9:32 Positive period @ 14.685"
- 9:40 Just crit. @ 14.25"
- 9:41 Shut down.
- 9:50 Added 1 more liter of  $H_2O$ . Now have a total of 4 liters of  $H_2O$ . Mixed for 30 min.
- 10:43 Source out
- 10:47 Sub. crit. @ 24.34"
- 10:48 Shut down. Dumped and pumping back up to see if still sub. crit.
- 11:08 Source out.
- 11:10 Sub. crit @ 25.48"
- 11:11 Shut down.
- 11:30 Added 47g of solution of 412 g<sup>24</sup>/l; mixed for 20 min.
- 12:05 Source out.
- 12:07 Sub. crit @ 25.15"
- 12:08 Shut down
- 12:40 Added 47g at 396 g<sup>24</sup>/l, and 47g at 427g<sup>24</sup>/l. mixed for 20 min.
- 1:26 Source out.
- 1:40 Slightly sub. crit. @ 25.37" Shut down.
- 3:20 Recheck of Ht. after letting system cool for 1 hr. + 40 MIN
- 3:38 Source out.
- 3:40 Slightly pos. @ 30.45" (OVER)

3:45 just crit. @ 15.21"  
 3:46 Shot down

INSTRUMENT CHECK

INSTRUMENT	RANGE	REP	WIND	TEMP	STARTUP
10 X 10	-12	✓	3"	10 X 10 <sup>-12</sup>	
"	"	✓	3"	"	
10 X 10	-12	✓	4"	10 X 10 <sup>-12</sup>	
"	"	✓	4"	"	
50V		✓	ant	500V	
1200V		✓	18"	12900V	
		✓	4"	900V	

BATTERY  OPERATE  SOURCE No. 5mg Na  
 DUMP WELL FROM LIGHT *AKR*

Exp. #43

STARTUP CHECK LIST

Equipment checked by *AKR* Personnel check by *F.D.C.*  
 Instruments and cables checked and reset by *AKR*  
 Source in checked by *AKR* Source No. *M-43*  
 Emergency equipment for contact reset checked by *I.D.C.*  
 Instruments in test circuit: *K-1 K-2 PM-1 PM-2*  
 Red light on by *AKR* Time *8:20*  
 Start up done by *F.D.C. AKR. DUM* to *6-16-63*

$\phi = .370''$   
 Purpose of Exp. to recheck crit. Ht.  
 8:40<sup>AM</sup> Start up.  
 8:55 Source out, Positive period @ 15.55"  
 9:05 just crit. @ 14.31" or 14.31"

Insert Control, 1" SS rod solution touched  
@ C.R. 18.32 Sol. Ht 14.32

∴ At 18.32 control 0.50 in below top.  
Increase solution level to ~24.3 and level  
with control

Critical position 17.30 CR = 24.30

Insert control fund limit @ 16.6

Drain sol. to reduce power

Positive period w.o. rod sol = 20.43.

Drain solution

Set up limit @ 19.55  
down " @ 7.38

9:45 Start up

10:03 Source out

10:05 Positive period, Sol. Ht. = 20.27", Control rod = 19.55"

Insert Control to 7.38 reduce power

Repeat Pos. Period 20.25" 19.545  
avg per = 178.5 sec = 3.39 s

12:20 After pulsing @ crit, rechecking positive  
period. Sol. Ht. = 20.13 at end of per:

12:32 Rod in

12:36 Rod out; Pos Per; solution ht = 20.11  
avg of per = 205.8 sec 3.02 s

12:50 Recheck crit Ht. - just crit @ sol. Ht of 14.31" for  
Rod control = 19.54"

12:53 Shut down

1 <sup>25</sup>/<sub>PM</sub>. Solution samples #1 & 2. taken: Control # S.F.A 930  
by #43 samples sent to X-10

sample #1 from vessel

sample #2 from storage section

sub for 2 g - density and sp. Gr.

#1  
G 83.8 g

T 19.0 g

N 64.8 g

#2  
G 92.2 g

T 18.8 g

N 73.4 g.

X-494

TO: R. K. Reedy

FROM: G. R. Wilson

SERIES NO.

ANALYTICAL DATA REPORT SHEET

CONTROL NO. S.F. A 210

DATE 6/18/63

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: density, Sp. Gr. METHOD OF ANALYSIS: P-Tentimetric.

Lab. No.	Sample code	density	24°C sp. gr.	Mg/g (%)										PRECISION OF ANALYTICAL METHOD	REMARKS
11075	EXP-43-1	1.0839	1.0868	59.89											
11076	43-2	1.0837	1.0866	59.87											

\* Corrected for enrichment

Activity in \_\_\_\_\_ REMARKS

Concentration \_\_\_\_\_

Sample Counted at \_\_\_\_\_ % geometry

- DISTRIBUTION:
- 1 (White) Requestor
  - 2 (Canary) S. F. Accountability
  - 3 (Blue) Analytical

samples + waste retained to be picked up by sender.

WRT + CB  
Laboratory Supervisor

REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Reedy, Jr  
 SERIES NUMBER 43-45 #1 & 2  
 DATE SUBMITTED 6-13-63

*chk # 9910-24*

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>43-1 11075</i>	<i>1/2</i>	<i>69%</i>			<i>92.9% H<sub>2</sub>(NO<sub>2</sub>)<sub>2</sub></i>	<i>#1 = 64 grams</i>
<i>43-2 11076</i>	<i>handy sp. for ↓</i>	<i>69%</i>			<i>in solution</i>	<i>#2 = 73.4 grams</i>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Reedy, Jr  
 Requestor

INSTRUMENT CHECK

123

INSTRUMENT	RANGE	IPP	SOURCE	ST	START-UP RANGE
10 K10	-12	✓	3"	✓	10 K10 <sup>-12</sup>
"	"	✓	"	✓	"
10 K10	-12	✓	4"	✓	10 K10 <sup>-12</sup>
"	"	✓	"	✓	"
850v		✓	cont	✓	500v
800v					
1200v		✓	14"	✓	900v
		✓	0"	✓	

Pulson ✓  
 CLEAN ✓  
 SOURCE No. 5mg/ha

DUMP WELL PROBE LIGHT

AKR/

Sept 17 99  
START-UP CHECK LIST

Equipment checked by AKR/ Personnel check by F.D.C.  
 Instrument calibration checked and reset by AKR/  
 Source for calibration AKR/ Serial No. M-43  
 Instrument checked for correct operation by F.D.C.  
 Fuel source checked for correct operation: K-1 K-2 PM-1 PM-2  
 Red light checked by AKR/ Time 8:15 AM  
 Start up checked by AKR/ F.D.C. D.W.R. Date 6-19-63

Counter out = 36.93"  
 Counter in = 20.03"  
 When counter is in (in) pos.  
 tip is .0700 from bottom

O = .370"  
 Purpose of exp. to run <sup>vert.</sup> flup traverse  
 using counter # RSN-1055 5/16" dia in 14.45" od. sphere.  
 Source out - Positive period Sol. HT 20.23"  
~~Count~~ Counter pos. 27.00" system sub. crit.  
 8:46 AM Shut down  
 9:00

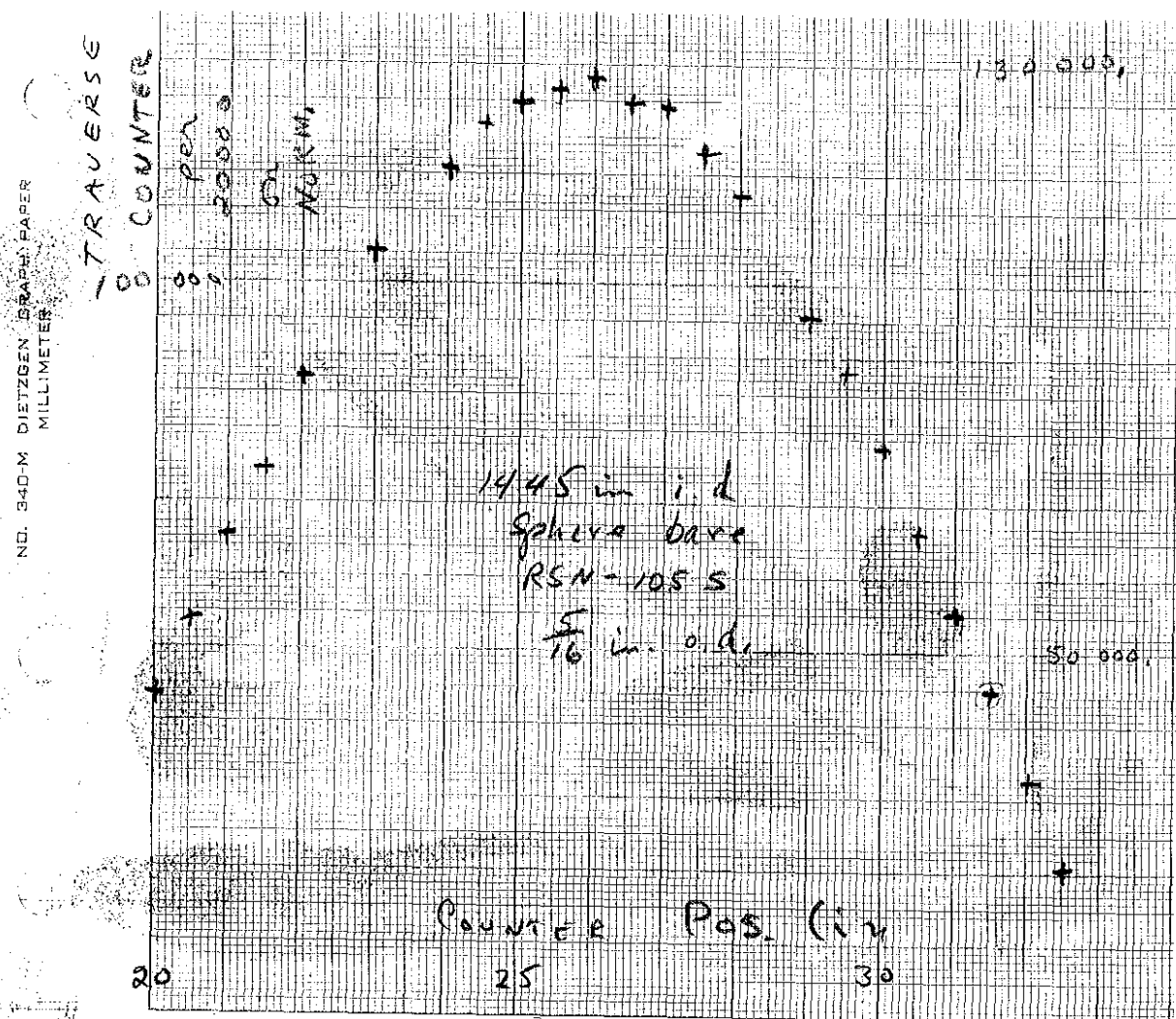


Shut down to set up normalizing counter  
 trav. counter timer and to add 1" x 1/32  
 plastic equatorial band (a few cuts react)  
 so that when trav counter is at midplane  
 react may be zero or  $\approx$  critical.

9:49 AM start pump's solution source in.  
 9:58 source out.  
 10:00 shut down to move normalizing counter closer to  
 vessel.  
 10:05 ~~source~~ start up  
 10:15 source out - system crit.

TIME	NORMLIZER	TRAVERSE	COUNTER Pos.	Sol. HT.
1.67 MIN.	20,000	115,797	24.00"	20.34"
1.00	20,000	177,559	30.00"	20.23"
1.13	20,000	124,579	25.00"	20.30"
.63	20,000	54,954	31.00"	20.19"
1.03	20,002	103,980	23.00"	20.33"
.52	20,000	32,197	32.00"	20.33"
1.00	20,000	87,114	22.00"	20.34"
1.30	20,000	123,900	27.00"	20.24"
1.25	20,002	111,605	28.00"	20.22"
.86	20,000	95,535	29.00"	20.20"
1.24	20,000	127,826	26.00"	20.24"
.98	20,000	66,200	30.50"	20.17"
2.27	20,000	43,400	20.03"	20.36"
1.70	20,000	87,768	29.50"	20.17"
.62	20,000	44,503	31.50"	20.13"

TIME	NORMLIZER	TRAVERSE	COUNTER Pos.	Sol. HT.
<del>1.22</del>	<del>20,000</del>	44,503	—	—
1.29	20,000	53,692	20.50"	20.33"
.62	20,000	20,876	32.50"	20.09"
.68	20,000	65,614	21.00"	20.32"
.45	20,000	55,262	31.00"	20.12"
.69	20,000	75,001	21.50"	20.30"
1.12	20,000	124,508	26.50"	20.22"
1.23	20,000	117,886	27.50"	20.20"
2.06	20,000	125,670	25.50"	20.21"
1.99	20,000	121,999	24.50"	20.23"



10/9/63

12" reactor

.02  
 999.98" edge of 3" drain  
 .265" Bottom of reactor completely covered.  
 .165" 6" circle in bottom of reactor.  
 .195" 10" circle in bottom of reactor.  
 .09" 5" circle in bottom of reactor.

INSTRUMENT	RANGE	TEMP	SOURCE	SET	START-UP RANGE
K-1	10X10-12	Mid ✓	6"	✓	10X10-12
"	"	" ✓	"	✓	"
K-2	10X12-12	Mid ✓	7"	✓	10X10-12
"	"	" ✓	7"	✓	"
EM-1	600v	High ✓	cont	✓	500v
PM-1	1200v	Low ✓	18"	✓	1200v
		High ✓	3"	✓	

Declaration  CALIBRATE  OPERATE  SOURCE No. Smg last

DUMP WELL PROBE LIGHT Exp O/F 45  
 START-UP CHECK LIST

Equipment checked by R.K.P. Personnel check by F.P.C.  
 Instruments and cables checked and reset by R.K.P.  
 Source in checked by R.K.P. Source No. PM-43  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by R.K.P. Time 1105  
 Start-up OK'd by R.K.P. F.P.C. Date 10-9-63

12" S.S. vessel (with & without)  
 (cd covered)  
 10-9-63 edge of 3" drain = 999.98" .02  
 bottom of vessel completely covered = .265"  
 6" circle in bottom = .165"  
 10" " " " = .195"  
 5" " " " = .09"  
 avg for zero =  $\frac{.47}{.15} = 3.13$ "

Purpose to check crit ht in 12" S.S. cd covered well: at an  $\dot{V} \sim 60.0$

Feed rate = 3.73" per min.

11:35 Source out. System super crit.

Sol. ht. = 9.49" = 66.8 cm = 13.4  $\phi$

11:45 System very, very, slightly sub crit.

Sol. ht. = 9.45"

11:47 System pos. @ Sol. ht. 9.45"  $\log n = \frac{.70}{K-1 \times K2 = 3 \times 10^{-9}}$

11:48 Drain system.

"Chks of crit ht with Cd cover removed."

Feed rate = 1.98" per min.

2:00 Start up - Drain rate thro  $\frac{1}{2}$ " drain line is 7.94" per min.

2:23 Source out. System super crit.

Sol. ht. = ~~9.525~~ 9.525" = 164.6 cm = 6.6  $\phi$

2:37 System very slightly sub crit @ 9.515"

System very very pos. at same height. 9.515"  $\log n = .10$

2:39 Drain

4:00 PM Measured sp. gr. = 1.528. 2 samples taken: one to X-10, one to Y-12. (Requested  $\frac{1}{2}$  g. sp. gr. density.)

X-10		Y-12	
G = 120.4	sp. gr. = 1.25552	G = 118.9	sp. gr. = 1.257300
T = 10.7	sp. gr. = 1.5264	T = 10.7	sp. gr. = 1.5255
N = 109.7	density = 1.5223	N = 108.2	sp. gr. = 1.62.7
	$\dot{V} \sim 63.2$		

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter <input checked="" type="checkbox"/>	6"	<input checked="" type="checkbox"/>	10 X 10 <sup>-12</sup>
"	"	Foot <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	10 X 10 <sup>-12</sup>	Meter <input checked="" type="checkbox"/>	8"	<input checked="" type="checkbox"/>	"
"	"	Foot <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
R-1					
R-2					
PM-1	600 V	Alarm <input checked="" type="checkbox"/>	Cont	<input checked="" type="checkbox"/>	500 V
PM-2	1200 V	Low <input checked="" type="checkbox"/>	18"	<input checked="" type="checkbox"/>	900 V
		Alarm <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	"

Dickman  ICG N CALIBRATE  OPERATE  SOURCE No. 5 mpst

DUMP WELL PROBE LIGHT

Expt # 46

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. PM-43

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

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

Red light on by AKM Time 0930

Start-up OK'd by AKM, F.P.C Date 10-10-63

12" S.S. Vessel

Repeat of crit ht check: (Cd cover removed.)

Feed rate = 1.76" in/min.

8:45 Start up.

9:02 Source out.

9:05 Pos. period Sol. ht. = 9.52" = 107.9 cm = 9.3  $\phi$

9:14 Slightly pos. @ 9.515"

Very very slightly neg. @ 9.510"

X-494

TO: R. K. Reedy, Jr.

FROM: G. R. Wilson

SERIES NO. Expt. #45

CONTROL NO. S.F. **A** 220

DATE 10-10-63

ANALYTICAL DATA REPORT SHEET

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U METHOD OF ANALYSIS: Potentiometric

Lab. No.	Sample code	mg/g U*	@ 24°C sp. g Density										PRECISION OF ANALYTICAL METHOD	REMARKS
11221	Exp. #45	255.52	1.5264	1.5223										
														* corrected for 93% enrichment

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_ % geometry

*Samples & waste retained  
To be picked up by sender*

*WRL YF JB*  
\_\_\_\_\_  
Laboratory Supervisor

DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. H. Ruddy Jr. *10-10-63*  
 SERIES NUMBER 495 *10-9910-28*  
 DATE SUBMITTED 10-10-63

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>495</i>	<i>775 directly from</i>	<i>~ 400%</i>			<i>1.9 / liter (49%) ...</i>	<i>109.1 grams</i>

OCT 10 1 36 PM '63  
 ANALYSIS DIVISION  
 SAMPLE RECEIVED

- DISTRIBUTION:
- 1 (White) Analytical
  - 2 (Canary) Requestor
  - 3 (Blue) S.F. Accountability

R. H. Ruddy Jr.  
Requestor

9:16 Drain  
 9:23 Source out - {Pos. period Sol. H<sub>2</sub> = 9.525"  
 9:26 Drain { = 58.2 m = 14.84"  
 11:20 Start up - Purpose to furnish  
 neutrons for Rhoette see page  
 208 instrument record book #NB-WI-4  
 11:37 Source out  
 11:43 Run # 3 Positive period = 9.145"  
 11:50 Shut down: (must move instruments)

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter -	3"	✓	10 X 10 <sup>-12</sup>
"	"	Fast -	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter -	6"	✓	"
"	"	Fast -	"	✓	"
R-1					
R-2					
PM-1	600 V	Alarm -	Cont'd -	✓	500 V
PM-2	1200 V	Low -	18"	✓	900 V
		Alarm -	3"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. 5000

DUMP WELL PROBE LIGHT \_\_\_\_\_

*Sept 27*

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH  
 Instruments and safeties checked and reset by E.R.R.  
 Source in checked by AKH Source No. PM-43  
 Emergency equipment in control room checked by AKH  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKH Time 0800  
 Start-up OK'd by E.R.R. AKH Date 10.11.63

Purpose to furnish neutrons for Rhoette!  
 12" S.S. vessel: (box).

Feed rate = 1.60" per min.

0830 + Per ①

Solution lit (in)  
 9.475"

source out,  
 avr,

		Solution ht. (in)
0840	kepton slightly sub emit	= 9.46"
0845	kepton slightly super emit	= 9.465"
<hr/>		
		Solution ht (in)
<del>0846</del>	- Per ①	9.465"
0855	- Per ②	9.465"
0915	+ Per ②	9.50"
0922	- Per ③	9.445"
0935	+ Per ③	9.485"
0950	- Per ④	9.47"
1008	+ Per ④	9.52"
1012	- Per ⑤	9.44"
1020	+ Per ⑤	9.495"
1031	- Per ⑥	9.45"
1040	+ Per ⑥	9.535"
1042	- Per ⑦	9.45"

		Solution ht (in)
1053	+ Per ⑦	<del>9.495"</del> 9.490"
1116	kepton very slightly - Neg	9.49"
1118	shut down:	

10-23-63 12.4 in sphere solution zero at reading of 1.00 on selsyn.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	6"	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	8"	-	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	600V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	18"	-	900V
"	"	Alarm ✓	3"	-	"

Beckman LOG N CALIBRATE = OPERATE = SOURCE No. 5 Mg Pt

DUMP WELL PROBE LIGHT \_\_\_\_\_

EXP 48  
START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. PM-43

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

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

Red light on by P.K.R. Time 19:00

Start-up OK'd by P.W.M. AKM Date 10-23-63

Response to check exit ht in 12.4" al sphere:

14:20 System sub exit: same act;  
Solution ht = 16.34" and 18.34 no change.  
- 1.00  
17.34 in sln above bottom

15:08 added .021" thick lead in ~3 layers around midplane of sphere to add partial reflector. (~2-3" wide)  
EXP # 49

15:24 System sub exit: same act  
Solution ht = 18.60" shut down:

Actual lead weighed 1136g, 021 x 2.5 x 120.5 in.

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Mtr ✓	6"	✓	10X10 <sup>-12</sup>
"	"	Ftr ✓	"	✓	"
K-2	10X10 <sup>-12</sup>	Mtr ✓	6"	-	"
"	"	Ftr ✓	"	-	"
PM-1	600v	Alarm ✓	cont	-	500v
PM-2	1200v	Low ✓	18"	-	900v
		Alarm ✓	3"	✓	"

LOG IN CALIBRATE Hubman OPERATE ✓ SOURCE No. 5mg Ra

DUMP WELL FROSE LIGHT         

EXP 50  
START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. steel

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

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

Red light on by AKM Time 11:10

Start-up OK'd by AKM F.P.C. Date 10-28-63

Response to pulse 12.4" (in) sphere:

12:15 Solution ht = 18.63" (in) same off. Sub exit:

12:20 Pulsing sphere; wiring counter to RSN-105-S. " counter pos:  
upper limit = 39.27 "  
lower limit = 51.62 "

12:25 45.46 "

12:50 46.50 "

See D.W.M. Log Books for counter data, PMS-215 page 124



Counter Pool

13:07 47.50"  
 13:20 48.50"  
 13:34 46.50"  
 13:50 49.50"  
 14:41 Shut-down - Trouble with accel.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TEMP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Mid	6"	✓	10 X 10 <sup>-12</sup>
"	"	Mid	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Mid	7"	✓	10 X 10 <sup>-12</sup>
"	"	Mid	"	✓	"
P-1					
P-2					
PM-1	600v	Also	Cont	✓	500v
PM-2	1200v	Low	18"	✓	900v
		Also	3"	✓	"

Beckman LOG N CALIBRATE  OPERATE  SOURCE No. \_\_\_\_\_

DUMP WELL PROBE LIGHT \_\_\_\_\_

Exp # 51

START-UP CHECK LIST

Equipment checked by AKR/p Personnel check by F.D.C  
 Instruments and safeties checked and reset by AKR/p  
 Source in checked by AKR/p Source No. accel  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKR/p Time 0820  
 Start-up OK'd by D.W.M - AKR/p Date 10-29-63

Repeat of Exp # 50

0850 Solution ht = 18.93" System sub init.  
 Counter Pool  
 49.50"

9:45 Drawn: Shut down accel trouble.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Water ✓ 3"	3"	✓	10 X 10 <sup>-12</sup>
"	"	Dist ✓ "	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Water ✓ 4"	4"	✓	"
"	"	Dist ✓ "	"	✓	"
PM-1	000V	Alarm ✓ cont	cont	✓	500V
PM-2	1200V	Low ✓ 18"	18"	✓	900V
		Alarm ✓ 3"	3"	✓	

Personnel  OPERATE  SOURCE No.   
 LOS IN CALIBRATION

DUMP VALVE FREE LIGHT \_\_\_\_\_

*Opp #52*

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* Service No. *accel*

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

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

Red light on by *AKM* Time *11:00*

Start-up OK'd by *D.A.M. F.D.C.* Date *11-1-63*

*AKM*

*Repeat of Opp #50 after repair of accel.*

11:30 Solution ht = 18.10 " system sub unit.  
Counter Pos  
49.50 "

Counter Pos

- 11:20 49.50 " - repeat
- 12:06 50.50 "
- 12:15 51.50 "
- 12:25 45.50 "
- 12:33 42.50 "
- 12:40 43.50 "
- 12:48 44.50 "
- 12:56 45.50 "
- 13:08 46.50 "
- 13:16 47.50 "
- 13:25 48.50 "
- 13:34 49.50 "
- 13:42 50.50 "
- 13:51 51.50 "
- ~~41.50 "~~
- 14:02 42.50 "
- 14:15 Drain

15:50 ~~New piping 8.8" at system.  
 Solution ht = 11.80 " system sub unit. see page  
 Counter pos; in = 58.03  
 " " out = " 45 "~~

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Motor ✓	3"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	10 x 10 <sup>-12</sup>	Motor ✓	6"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	600v	Alarm -	cont	✓	500v
PM-2	1200v	Low -	18"	✓	900v
		Alarm ✓	3"	✓	"

LOG N CALIBRATE OPERATE SOURCE No. Eng Chart

DUMP WELL PROBE LIGHT       

Ept 53

START-UP CHECK LIST

Equipment checked by AKM Personnel check by AKM  
 Instruments and safeties checked and reset by AKM  
 Source in checked by AKM Source No. accel  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by F.D.C Time 10:00  
 Start-up OK'd by D.W.M AKM Date 11-5-63

Repeat of Ept # 50: and to check-out counter; trouble set.

10:20 Solution ht = 18.44"  
 Counter Pos = 47.00"

11:35 Rept on alarm: K-1 tripped at 10 x 10<sup>-12</sup> by the accel.

11:36 Drains shut down.

INSTRUMENT CHECK

INSTRUMENT	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1 10x10 <sup>-12</sup>	Meter ✓	3" <sup>1/2</sup>	-	10x10 <sup>-12</sup>
"	Fast ✓	3" <sup>1/2</sup>	-	11
K-2 10x10 <sup>-12</sup>	Meter ✓	6"	-	11
"	Fast ✓	6"	-	11
R-1				
R-2				
PM-1 600 V	Alarm ✓	Cont'	-	500V
PM-2 1200 V	Low ✓	18"	-	900V
	Alarm ✓	3"	✓	"

Beckman LOG N CALIBRATE  OPERATE  SOURCE No. 5mg RKR

DUMP WELL PROBE LIGHT

Expt. #54

START-UP CHECK LIST

Equipment checked by RKR Personal check by I.D.C.

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. accel

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

Instruments in trip circuit: K1, K2, PM1, PM2

Red light on by RKR Time 8:50

Start-up OK'd by RKR, I.D.C. Date 11/6/63

Repeat of experiment #50 after checking counter and accel. trouble.

4:00 AM Start up.

0910 Solution ht = 19.13" Counter Pos = 47.00" and off. System sub exit.

0950 Counter pos = 48.00" Solution ht = 18.87"

10:00	Counter Pos.
10:00	49.00"
10:17	50.00"
10:29	51.00"
10:43	51.50"
10:56	47.00"
11:08	42.50"
11:19	43.00"
11:28	44.00"
11:40	45.00"
11:51	46.00"
12:05	47.00"
12:25	Having reproducibility trouble with Counter see page 136 in D.W.M.'s log book, Drain solution to 11.20"
12:45	Drain solution to 10.22" working on counter.
13:10	Added solution <del>to</del> Solution ht. = 18.59"
13:10	Installed new normalization counter see page 136 in D.W.M.'s log book, Counter Pos.
13:20	47.00"
16:20	Drain solution; shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	1" ✓	4"	✓	10 X 10 <sup>-12</sup>
"	"	5" ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	1" ✓	5"	✓	10 X 10 <sup>-12</sup>
"	"	5" ✓	"	✓	"
R-1					
R-2					
PM-1	5600V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
		Alarm ✓	3"	✓	1"

LOG IN CALIBRATE  OPERATE  SOURCE No. Smg Rat

DUMP WELL PROBE LIGHT  7

Exp #55

START-UP CHECK LIST

Equipment checked by RKAJ Personnel check by F.D.C  
 Instruments and safeties checked and reset by RKAJ  
 Source in checked by RKAJ Source No. accel  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKAJ Time 0845  
 Start-up CK'd by O.W.M. RKAJ Date 11-7-63

0900 Repeat of Exp #54:  
 0:938 Solution ht. = 1878" Counter Pos 47.00" Sub. crit.  
 Counter Pos.  
 10:25 48.50"  
 10:33 50.00"  
 10:41 51.50"  
 11:05 50.00"

Counter Pos.  
 11:15 48.50"  
 11:24 47.00"  
 11:34 45.50"  
 11:45 44.00"  
 11:54 42.50"  
 12:15 44.00"  
 12:37 45.50"  
 12:48 47.00"  
 1:00 Drain; shut down.  
 See O.W.M.'s Log Book; Page 138 for counter data: RKAJ.  
 13:30 Sample # Exp 55 taken; sent to X-10 Control # A-933  
 sub for: density: sp. g. 2 1/2 g.  
 G = 132.0 g sp. g. = 1.5303  
 T = 18.2 density = 1.5262  
 N = 113.8 2 1/2 g = .256.63

Exp #56  
 15:50 Prepare pulse sub crit 8.8" sphere;  
 Now using 8.8" al sphere;  
 Solution ht = 11.86"; sub crit:  
 Counter pos: in = 58.03"  
 " " out = 47.24"

X-494

TO: R. K. Reedy, Jr.

FROM: G. R. Wilson

SERIES NO.

ANALYTICAL DATA REPORT SHEET

CONTROL NO. S.F. A 223

DATE 11-7-63

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U METHOD OF ANALYSIS: Pot.

Lab. No.	Sample Code	Density	Sp. g	mg/g U *									PRECISION OF ANALYTICAL METHOD	REMARKS
11281	Exp. #55	1.5262	1.5363	256.63										

\* corrected for enrichment

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_ % geometry

DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

Samples to be picked up by sender.

WRWLB  
Laboratory Supervisor

REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Rowley Jr.  
 SERIES NUMBER Exp # 55  
 DATE SUBMITTED 11-7-63

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<u>Exp # 55</u>	<u>4/1</u> <u>analy</u> <u>4</u> <u>4.9</u> <u>4</u>	<u>270/100</u>			<u>270/100</u> <u>analy</u>	<u>100 g</u>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Rowley Jr.  
 Requestor

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE IN RANGE	ST	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	High ✓	9"	✓	10 X 10 <sup>-12</sup>
"	"	Low ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Motor ✓	9"	✓	10 X 10 <sup>-12</sup>
"	"	Low ✓	"	✓	"
PI-1					
PI-2					
PM-1	600 v	Alarm ✓	cont	✓	500 v
PM-2	1200 v	Low ✓	18"	✓	900 v
		Alarm ✓	3"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. Emp Part

DUMP WELL PROBE LIGHT

Exp # ~~56~~ 57  
START-UP CHECK LIST

Equipment checked by R.K.A.P. Personnel check by F.D.C.

Instruments and safeties checked and reset by AKA.V.

Source in checked by AKA.V. Source No. sucl

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

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

Red light on by R.K.A.P. Time 0814

Start-up OK'd by D.W.M. AKA.V. Date 11-8-63

0840 Pump for pulse 8.8" at sphere. See D.W.M.'s log book for counter data; page 139-140  
Feed rate = ~ 3.82" per min.

0845 System secured by sucl; K-1 K-2 tripped on 10 X 10<sup>-12</sup>.

0900 Solution ht = 12.17" System sub cont.

Counter Pos.

10:10	58.00"
10:31	57.00"
10:49	56.00"
11:10	55.00"
11:30	54.00"
11:52	53.00"
12:15	52.00"
12:59	53.00"
1:20	54.00"
1:42	55.00"
2:07	56.00"
2:27	57.00"
2:50	58.00"
3:30	shut down!



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 - 12	Meter ✓	3.5"	✓	10 X 10 - 12
"	"	Fast -	"	✓	"
K-2	10 X 10 - 12	Meter ✓	4"	✓	10 X 10 - 12
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	6000	Alarm -	cont	-	5000
PM-2	12000	✓	18"	✓	9000
		Alarm ✓	3"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. 5mg Ra-226

DUMP WELL FROSE 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. 1122  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by RKH Time 0950  
 Start-up OK'd by D.W.M. RKH Date 11-11-63

Purpose to pulse 12" s.s. vessel at crit:  
 10:15 Fuel rate = 1.41 (in) per min.  
 10:30 System slightly sub crit: solution ht = 9.45 "in"  
 10:40 " just crit: " " = 9.48 "in"

12:00 after pulsing vessel; solution ht = 9.50"  
 System sub crit.  
 12:30 Blade out; pulsing at crit again; solution ht = 9.51"  
 slightly low.  
 13:40 Solution ht = 9.51 (slightly sub crit) (after pulsing)  
 13:50 solution ht = 9.51 "slightly low."  
 13:55 Blade out; pulsing at crit again; solution ht = 9.51 "in"  
 15:02 solution ht = 9.20 "slightly sub crit,"  
 shut down.

11-12-63 Drain from manifold ~ 48 l of solution (H<sub>2</sub> ~ 62.7 and ~ 392.5 g/l). Refilled with ~ 48 l of solution (H<sub>2</sub> ~ 91.7 ~ 279 g/l).

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Water ✓	3.5"	✓	
"	"	Fit ✓	"	✓	
K-2	10 X 10 <sup>-12</sup>	Water ✓	4"	-	
"	"	Fit ✓	"	-	
R-1					
R-2					
PM-1	600v	Alarm ✓	cont	-	
PM-2	1200v	Low ✓	18"	-	
		Alarm ✓	3"	-	

Belman LOG N CALIBRATE  OPERATE  SOURCE No. 5mg part

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKR Personnel check by F.D.C. & AKR  
 Instruments and safeties checked and reset by AKR  
 Source in checked by AKR Source No. PM-43  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKR Time 13:05  
 Start-up OK'd by AKR F.D.C. Date 11-12-63

13:10 Prepara to check crit ht in 12" s.s. vessel: (base)  
 Solution now in use is: (H<sub>2</sub>O ~ 91.7 and ~ 7798% L<sub>2</sub>)  
 Feed rate = 1.32" per min.

13:45 Source out - System on + Per: solution ht = 9.28 (in)  
 192.7 in = 5.8¢

13:56 System on - neg per: (very, very slight - neg) solution ht = 9.27 +  
 917 in = 1.5¢  
 14:04 On-line solution to: 3.78" Source in: repeat of crit ht.  
 14:23 Source out: System on + Per: solution ht = 9.28 (in)  
 66.9 in = 13.4¢  
 14:30 System very very slightly + pos: solution ht = 9.27 (in)  
 14:35 System slightly - neg: solution ht = 9.27 (in)  
 62.7 in = 11.6¢  
 14:36 Shut down:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Alarm ✓	4"	✓	10 X 10 <sup>-12</sup>
"	"	✓	4"	✓	"
K-2	10 X 10 <sup>-12</sup>	Alarm ✓	5"	✓	10 X 10 <sup>-12</sup>
"	"	✓	5"	✓	"
R-1					
R-2					
PM-1	600V	Alarm ✓	crit	✓	500V
PM-2	1200V	Alarm ✓	18"	✓	900V
		Alarm ✓	3"	✓	"

Beckman LOG IN CALIBRATE ✓ OPERATE ✓ SOURCE No. Eng Part

DUMP WELL PROBE LIGHT 7

Exp #60  
START-UP CHECK-LIST

Equipment checked by AKA Personnel check by F.P.C

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. acc

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

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

Red light on by AKA Time 0855

Start-up OK'd by D.W.M. AKA Date 11-13-63

Purpose to pulse 12" S.S. vessel at crit.  
Feed rate = 1.23" in/min.

0940 System very very slightly + Pos: Solution ht = 9.29"

0945 Pulsing now at just crit<sup>o</sup>

- 11:20 Stop Pulsing; Blade out; Solution ht = 9.30"  
System sub crit;  $914 \mu\text{m}/\mu\text{r}$  1.5  $\phi$
- 12:05 Blade out; System on - Per; Solution ht = 9.30"
- 12:20 System on + Per; Solution ht = 9.31" Now pulsing!
- 13:30 Stop Pulsing; Blade out; Solution ht = 9.31"  
System just crit;
- 13:42 Pulsing at just crit; Solution ht = 9.31"
- 15:00 Stop Pulsing; Blade out; Solution ht = 9.31  
System very very slightly - Neg! = -1456  $\mu\text{m}$  = ~.91  $\phi$
- 15:30 Sample taken; sent to Y-12 & X-10:
- |  |                                 |
|--|---------------------------------|
| Y-12 = Rg # 593203                               | X-10 = Control # A 4934         |
| Sp. g = 1.3794 G = 111.6                         | Sp. g = 1.3784 G = 97.5         |
| Density = T = 18.1                               | Density = 1.3740 T = 18.5       |
| $\frac{g}{g} = .204020$ N = 93.5 $\mu\text{r}$ . | $\frac{g}{g} = .20459$ N = 79.0 |
|  | $H_{\frac{1}{4}} = \sim 90.9$   |

X-494

CONTROL NO. S.F. A 225  
DATE 11-13-63

ANALYTICAL DATA REPORT SHEET

TO: R.K. Reedy  
FROM: G.R. Wilson  
SERIES NO. Exp. No. 60

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U METHOD OF ANALYSIS: Pot.

LAB. NO.	SAMPLE CODE	mg/l*	sp. g	DENSITY									PRECISION OF ANALYTICAL METHOD	REMARKS
11299	Exp. #60	204.59	1.3784	1.3740										
														* corrected for enrichment

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_ % geometry  
DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

Samples & waste retained  
To be picked up by  
Sender.

WRL + LGB  
Laboratory Supervisor

## REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Ready Jr.  
 SERIES NUMBER Exp # 00  
 DATE SUBMITTED 11-15-63

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<u>Exp # 00</u>	<u>1/2 4p.g ↓ Analyt</u>	<u>~279%</u>			<u>72.4% Wt (203) in water</u>	<u>77.0 grams</u>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Ready Jr.  
 Requestor

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter	4"	-	10 X 10 <sup>-12</sup>
"	"	Fast	4"	-	"
K-2	10 X 10 <sup>-12</sup>	Meter	3"	-	10 X 10 <sup>-12</sup>
"	"	Fast	3"	-	"
R-1					
R-2					
PM-1	600v	Alarm	Cont	-	500v
PM-2	1200v	Low	18"	-	900v
"	"	Alarm	3"	-	"

Beckman ✓ OPERATE ✓ SOURCE No. Smyhaft

DUMP WELL PROBE LIGHT \_\_\_\_\_

Exp #61

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKR

Source in checked by AKR Source No. Acad

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

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

Red light on by AKR Time 0845

Start-up OK'd by D.C.M. AKR Date 11-10-63

Purpos to pulse 6.8" all spheres:  
Feed rate = 2.81" / min

10:12 Selection alt = 13:58" System not exit:  
Counter Pos = 58:00"

10:15 Counter Pos 55:00"  
See O.W.M.'s Log Book of counter data Page 143-144

10:40 52:00"

Counter Pos

11:01 53:00"  
11:26 54:00"  
11:46 55:00"  
12:05 56:00"  
12:26 57:00"  
12:47 58:00"  
1:30 57:00"  
1:49 56:00"  
2:10 55:00"  
2:29 54:00"  
2:51 53:00"  
3:10 52:00"  
3:36 shut down

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Master ✓	3"	✓	10x10 <sup>-12</sup>
"	"	Test ✓	3"	-	"
K-2	10x10 <sup>-12</sup>	Master	4"	-	10x10 <sup>-12</sup>
"	"	Test	4"	-	"
R-1					
R-2					
PM-1	600v	Alarm	crit	-	500v
PM-2	1200v	Low	18"	-	900v
"	"	Alarm	3"	-	"

Unknown LOG IN CALIBRATE  OPERATE  SOURCE No. Smy Rad  
 DUMP WELL PROBE LIGHT

LHS # 62  
 START-UP CHECK LIST

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

Instruments and safeties checked and reset by RRR

Source in checked by RRR Source No. accd

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

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

Red-light on by RRR Time 1010

Start-up OK'd by D.E.W. RRR Date 11-15-63

Purpose to check for crit ht in 12.4" in al sphere:  
 Feed rate = 1.93 g/min

1114 System just crit: saturation ht = 12.79"  
 1116 Inserted counter to limit, sol. ht read  
 12.84" Counter Pos = 56.60"  
 Sol raised to 17.36" between 1 & 2 g's  
 sub. crit.



11:33 Sol. Ht. = 17.25" Counter Pos. = 54.50" system  
very, very slightly sub. crit.

54.20" very very slightly super crit.

11:35 Pos. period Counter Pos. 48.79"  
Sol. Ht. = 17.12" + 92.4 sec → 10.5¢

11:37 Shut down to Outer limit 74.26  
in <sup>SS</sup> central read. In limit 56.60

12.54

Estimated total excess react. ~15¢ of counter  
removed, see below (18.3¢ 42.4)

13:25 Installed 1" SS. Rod; End of C.R. about .250 from bottom  
C.R. in = 16.94" of 12.4" d sphere;  
C.R. out = 44.31" →

13:42 Same out; System on + Per; Solution ht = 12.94"  
C.R. in = 44.31" (out) (15.625") from top of sphere.  
Tip at top of sphere @ 28.68

Time	System	Solution ht	C.R. in	C.R. out	Dist
13:53	System just crit?	12.80"			
14:02	"	"	12.89	26.64	2.04
14:09	"	"	15.98	26.00	2.68
14:12	System sub crit	"	18.46"	16.95"	

14:22 System on + Per <sup>42.4 sec = 18.3¢</sup> " " 14.72" 44.31"

14:27 System sub crit " " 18.41 16.45"

15:00 Pulsing at sub. crit. Sol. Ht = 18.41"  
C.R. = 16.45"

15:45 Shut down

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Master ✓	3.5"	-	10 X 10 <sup>-12</sup>
"	"	Slave -	"	-	"
K-2	10 X 10 <sup>-12</sup>	Master -	4.5"	-	10 X 10 <sup>-12</sup>
"	"	Slave -	"	-	"
R-1					
R-2					
PM-1	600v	Alarm -	cont	-	500v
PM-2	1200v	Low -	18"	-	900v
"	"	Alarm ✓	3"	-	"
Robinson LCG N CALIBRATION ✓		OPERATE ✓	SOURCE No. <u>E 12679</u> 5mg/haat		
DUMP WELL FROSE LIGHT _____					

63

START-UP CHECK LIST

Equipment checked by AKR; Personnel check by F.D.C.  
 Instruments and safeties checked and reset by AKR.  
 Source in checked by AKR Source No. PM-43  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in loop circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKR Time 0920  
 Start-up OK'd by AKR, F.D.C. Date 11-18-63

Purpose to pick 12.4" at sphere at joint exit.

0950 Source out; Solution ht = 15.96" C.R. = 26.00  
 Solution super exit.

10:00 Solution ht = 12.98" C.R. = 26.00" Solution joint exit.  
 10:01 Solution ht = 15.38" C.R. = 16.95" (in) sub exit.  
 10:03 Source in;  
~~Solution ht =~~  
 10:15 Source out; Solution ht = 16.28" C.R. 26.00" + Per = 1.82 ft  
 10:25 Rod in; Rod out; + Per.  
 10:35 Rod in;  
 10:40 Now Pulsing;  
 11:50 ~~Stop~~ stopped pulsing; C.R. = 26.00" Solution ht = 16.07"  
 + Per; 2:15 ft  
 12:06 Rod in;  
 12:30 Now Pulsing; Rod out.  
 14:04 Stopped pulsing; Rod out (26.01") Solution ht = 15.97"  
 + Per;  
 14:25 Shut down;

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE IN RANGE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	3"	✓	10 X 10 <sup>-12</sup>
"	"	Fest ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4"	✓	10 X 10 <sup>-12</sup>
"	"	Fest ✓	"	✓	"
R-1					
R-2					
PM-1	600V	Alarm -	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	3"	✓	900V

LOG N CALIBRATE  OPERATE  SOURCE No. Emp Chart E-1269

DUMP WELL PROBE LIGHT

Off 64  
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. accel  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKM Time 0825  
 Start-up OK'd by D.W.M. AKM Date 11-20-63

Purpose is to pt pulse 8.5" at sphere:  
 0845 Solution ht = 13.50" System sub. crit.  
 10:17 Shut down - trouble with accel.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE IN RANGE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	3.5"	✓	10 X 10 <sup>-12</sup>
"	"	Fest ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter ✓	4.0"	✓	"
"	"	Fest -	"	✓	"
R-1					
R-2					
PM-1	600V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	3"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. E-1269

DUMP WELL PROBE LIGHT

Off 65  
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. accel  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKM Time 1405  
 Start-up OK'd by D.W.M. AKM Date 11-21-63

Repeat of expt. #64 after working on accel.  
 2:23 Start up  
 2:28 Solution ht. 13.77" System sub. crit.  
 4:16 Shut down

INSTRUMENT CHECK

INSTRUMENT	TRIP	SOURCE	SET	START-UP RANGE
K1 10x10 <sup>-12</sup>	Motor ✓	3.5"	✓	10 x 10 <sup>-12</sup>
"	✓	"	-	"
K2 10x10 <sup>-12</sup>	Motor ✓	4.5"	-	10 x 10 <sup>-12</sup>
"	✓	"	-	"
P-1				
P-2				
PA-1 600V	Alarm ✓	cont	-	500V
PA-2 1200V	Low ✓	18"	-	900V
"	Alarm ✓	3"	-	"

DUMP WELL PROBE LIGHT \_\_\_\_\_ 7  
 LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. E1269

Ep 66  
START-UP CHECK LIST

Equipment checked by AKRP Personnel check by AKRP  
 Instruments and safeties checked and reset by AKRP  
 Source is checked by AKRP Source No. accl  
 Emergency equipment in control room checked by AKRP  
 Instruments in trip circuit: K-1 K-2 PA-1 PA-2  
 Red light on by AKRP Time 0820  
 Start-up OK'd by D.W.M. AKRP Date 11-22-63

Repeat of Ep #64; see D.W.M.'s Log Book for data;

9:50 Solution Ht. 13.72" System sub. crit.  
 10:10 Solution Ht. 5.50" Sub. Crit.  
 11:20 Solution Ht. 3.49" Sub. Crit.  
 11:33 Shut down  
 12:48 Start up.  
 1:03 Sol. Ht. 3.50" Sub. Crit.

1:20 Sol. Ht. 5.67" Sub. crit.  
 1:33 Drain to sol. Ht of 0.  
 3:41 Drain

12/4/63 Repeat exp. #64 - changed norm. counter.  
 Counter # RSN 105 S-M2 Ser. no. E 1151.  
 Start up. See D.W.M.'s Log Book page 157

10:15 Start up.  
 11:10 Sol. Ht. 13.48" Sub. crit.  
 11:12 Counter Pas.  
 11:12 3.00"  
 11:19 0.00"  
 11:33 1.00"  
 11:52 2.00"  
 12:11 3.00"  
 12:32 4.00"  
 12:48 5.00"  
 13:01 6.00"  
 13:45 5.00"  
 14:04 4.00"  
 14:22 3.00"  
 14:39 2.00"  
 14:55 1.00"  
 15:16 Drain

~~12/5/63~~

12/5/63 Traversing counter, same as 12/4.  
 08:30 Start up.  
 08:33 Sol. ht. 13:31" Sub. Cnt.  
 Counter Pas  
 9:00 0.50"  
 9:10 1.50"  
 9:23 2.50"  
 9:39 3.50"  
 9:55 4.50"  
 10:10 5.50"  
 10:27 6.50"  
 10:52 5.50"  
 11:14 4.50"  
 11:30 3.50"  
 11:45 2.50"  
 12:05 1.50"  
 12:18 0.50"  
 13:15 Drain

INSTRUMENT	RANGE	FEED	FEEDER	FEED	START-UP CHANGE
10 x 10 - 12		✓	6"	✓	10 x 10 - 12
"		✓	6"	✓	"
10 x 10 - 12		✓	10"	-	10 x 10 - 12
"		✓	10"	-	
6000		-	1"	-	5000
12000		-	18"	-	9000
"		-	3"	-	"

Submersible \_\_\_\_\_ LOC N CALIBRATE \_\_\_\_\_ OPERATE \_\_\_\_\_ SOURCE No. 10mg Part #149

DUMP WELL PROBE LIGHT \_\_\_\_\_

EXP 267

START-UP CHECK LIST

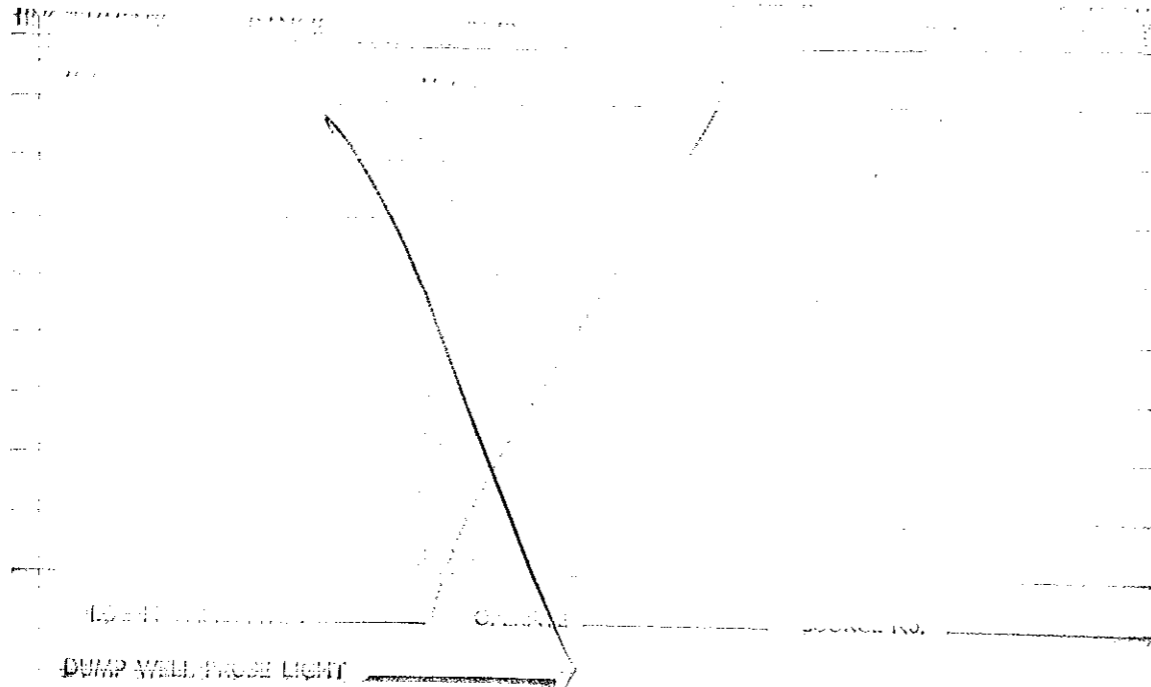
Equipment checked by AKA Personnel check by F.D.C.  
 Instruments and gauges checked and set by AKA.  
 Sources of water by AKA and and  
 Instruments checked by F.P.C.  
 Instruments checked by K-1 K-2 PM-1 PM-2  
 Red light on by AKA Time 15:00  
 Start-up OK'd by R.W.M. AKA Date 12-5-63

~~12.4"~~ 12.4" at sphere. Recheck of cut Per Per

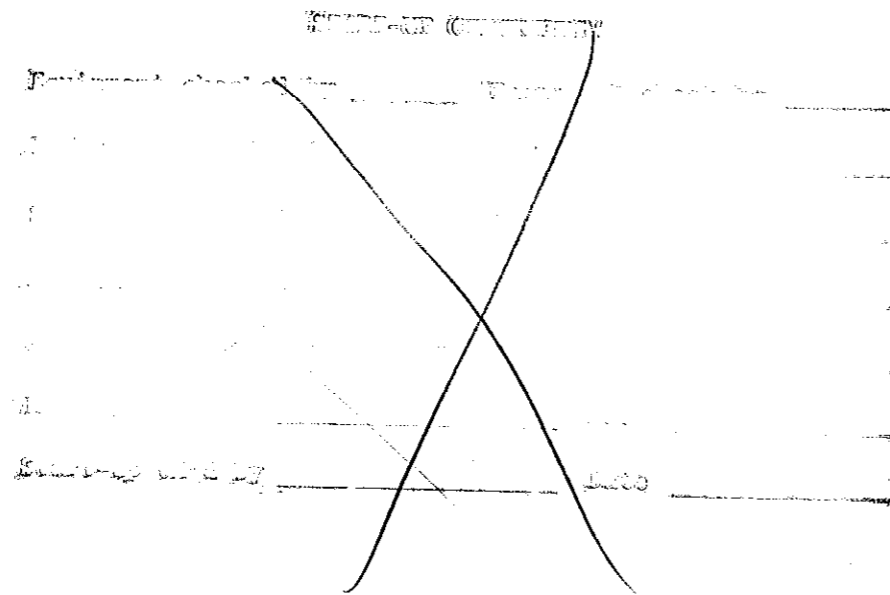
15:40 System on + Per Solution ht = 16.06" C.R. = 26.01"  
 ~ 1165 mm = 1.14

16:05 Shut down.

START-UP CHECK



DUMP WELL THROUGH LIGHT



DUMP WELL THROUGH LIGHT

START-UP CHECK

INSTRUMENT	UNIT	SCALE	READING	STATUS
10 X 10 - 12			10"	✓
"			"	✓
10 X 10 - 12			12"	✓
"			"	✓
6005			1"	✓
12005			34"	✓
			6"	✓

FEED RATE 2.0 G. RATE 2.0 SOURCE No. 10 mg ha t  
#129

DUMP WELL THROUGH LIGHT

Exp # 08  
START-UP CHECK RIG

Equipment checked by AKM. Personnel check by T.D.C  
 Instrument checked by AKM.  
 Equipment checked by AKM.  
 Instrument checked by T.D.C.  
 Instrument checked by K-1, K-2, PM-1, AM-2.  
 Red light on by AKM. Time 0815  
 Start-up OK'd by D.W.M. AKM. Date 12-6-63

Purpose to pulse 12.4" al sphere at first exit.  
 Feed rate = 2.0" per min.

08:40 System on + Per. Solution ht =  $\frac{15.98}{16.06}$  C.R. 20.01"  
 08:50 C.R. in; C.R. out + Per. Solution ht = 15.98 C.R. ~~20.01~~ 20.01"  
 09:00 C.R. in; avg for above + Per = 3.2 f

X-494

TO: R. K. Reedy

FROM: G. R. Wilson

SERIES NO. Exp. # 58

ANALYTICAL DATA REPORT SHEET

CONTROL NO. S.F. A 226

DATE 12-6-63

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U, spg, density METHOD OF ANALYSIS: Potentiometric

Lab. No.	Samples	Mg/g * U	@ 25°C Spg	@ 25°C Density														PRECISION OF ANALYTICAL METHOD	REMARKS
11308	Exp. # 68	203.32	1.3822	1.3780															

Activity in \_\_\_\_\_ REMARKS

Concentration \_\_\_\_\_

Sample Counted at \_\_\_\_\_ % geometry

- DISTRIBUTION: 1 (White) Requestor  
2 (Canary) S. F. Accountability  
3 (Blue) Analytical

Samples + waste retained to be picked up by sender

WR Laming  
Laboratory Supervisor

REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. W. R. [unclear]  
 SERIES NUMBER 24-63  
 DATE SUBMITTED 12-6-63

*off 28-10-28*

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>off 28-10-28</i>	<i>7.7 4.1 V locally</i>	<i>2.5107%</i>			<i>92.9% alcohol (200g) 2 d. [unclear]</i>	<i>10.5 grams</i>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. W. R. [unclear]  
 Requestor



0905 Trying to pulse at crit: Lauric with acid:

10:45 Now pulsing at crit.

12:01 Stop pulsing: light on + Per solution ht = 15:02" CR 26.0

12:10 " " + Per " " 15:05" CR 26.0  
4.94

12:20 C.R. in: shut down:

13:00 Sample taken: Control # S.F.A-935: sent to X-10  
ask for:  $G = 108.4$   
Sp. gr: 1.3822  $T = 17.9$   
Density: 1.3760  $N = 9.05$   
Z<sup>2</sup>/g: 20332

15:00 Drain ~ 10 l from manifold: ~ 292.0 g/l added  
+ 8 l of H<sub>2</sub>O: Now trying to get 12:4" al-phase  
just crit when just full:

15:20 After mixing: Start up.

1548 Just crit. Sol. ht 16:07" Control Rad 26.37"

1549 System sup-period Sol. ht. 16.15"  
C.R. 26.02" = 2940 sec = 5:17 #

1558 Per period. Sol. ht. 14.91" CR 44.31"

1600 Drain +64.2 sec = 13:8 #

Dec 9, 1963 React Change from dilution 194-5.1 = 9.5 #

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP
K-1	10 X 10 -12	✓	8"	✓	10 X 10 -12
"	"	✓	"	-	"
"	10 X 10 -12	✓	10"	-	"
"	"	✓	"	-	"
"	600V	✓	1"	-	500V
"	1200V	✓	24"	-	900V
"	"	✓	6"	-	"

LOG N CALIBRATE  OPERATE  SOURCE No. 10mg Pu-239 #149

DUMP WELL PROBE LIGHT

By #69

START-UP CHECK LIST

Equipment checked by PKR/V Personnel check by F.D.C

Instruments and cables checked and reset by PKR/V

Source in checked by PKR/V Source No. PM-043

Emergency equipment as control been checked by F.P.C

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

Red light on by PKR/V Time 0815

Start-up OK'd by O.W.M.M.K/V Date 12-9-63

12:4" al-phase.  
Response to report + Per. <sup>(12:06-05)</sup> checks for proper mixing:

0849 light on + Per: Sol ht = 14.93" C.R. = 44.30'

0857 light on + Per: Sol ht = 16.12" C.R. = 26.02"  
avg = +9.54  
-10.04

0904 Drain Sol: C.R. in. (16.94")

0940 added 1 lb H<sub>2</sub>O: New piping: C.R. = 16.94" same in:

10:25 after piping. Start up: C.R. = <sup>16.94"</sup>~~16.94~~ same in:

~~10:40~~ Checking for crit ht:  
10:55. Solution ht = 16.64" C.R. = 44.31 - Peri:  
wheels = -291.2 = 0.5¢  
Buchan = -235.8 = 0.5¢

12:15 Recheck of crit ht: C.R. = 16.94" same in:

12:50 Solution ht = 17.07" C.R. = 44.31" - Peri:  
avg - Peri = -386.8 ac = 3.7¢

13:15 C.R. in:

14:17 C.R. = 44.31" Solution ht = 16.77" - Peri: avg - Peri  
2.4¢

14:35 C.R. in: shut down:

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter -	8"	✓	10 X 10 <sup>-12</sup>
"	"	F. 4 ✓	"	✓	"
K-2	10 X 10 <sup>-12</sup>	Meter -	10"	✓	10 X 10 <sup>-12</sup>
"	"	F. 4 -	"	✓	"
PM-1	6000	Alarm -	1"	✓	5000
PM-2	12000	low -	24"	✓	9000
"	"	Alarm ✓	6"	✓	"

*Buchan* OPERATE  SOURCE No. 10 mg test  
2149

DUMP WELL PROBE LIGHT

*off* # 70  
START-UP CHECK LIST

Equipment checked by *AKK* Personnel check by F.P.C

Instruments and safeties checked and reset by *AKK*

Source in checked by *AKK* Source No. PM-2 13

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

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

Red light on by *AKK* Time 0825

Start-up OK'd by D.C.M. AKK Date 12-10-63

Response to check for crit ht. in 12.4" al sphere  
after cooling over mite

0925 Solution ht = 17.16" C.R. = 44.31" + Peri: 620 ac  
2.0¢

0935 shut down:

CHANNELS			Date			
Channel	Detector	Amplifier	Gain	Rise Time	PHS	HV
C-1	2" <sup>II</sup> 1773	44B	16	0.2	20	1500
		123801				
C-2	2" <sup>F</sup> 1939	347	16	0.2	20	1500
		100303				
C-3						
C-4						

INSTRUMENT CHECK

INSTRUMENT	RANGE	TYP	START	TT	START-UP
K-1	10 X 10 <sup>-12</sup>	1000	12"	✓	
"	"	"	"	✓	
K-2	10 X 10 <sup>-12</sup>	1000	18"	✓	
"	"	"	"	✓	
"	"	"	"	✓	
"	"	"	"	✓	
"	6000	1000	4"	✓	
"	12000	1000	36"	✓	
"	"	1000	4"	✓	

100 H CALIB W/ ✓ OPERATE ✓ SOURCE(S) 10 mg Pa + #149

EMPS WILL FLASH LIGHT /

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.P.C.  
 Instruments and safeties checked and reset by AKM.  
 Source in checked by AKM Source No. PM-43  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKM Time 11:10  
 Start-up OK'd by L.B. & D.L. AKM Date 12-11-63

Installed 2 <sup>60</sup> sphere in N-11 in low-mass pedestal. Encased in plastic bag. Installed 2 counters, K-1 and K-2 70 cm close to unit; K-2 further away.

On lead scale of manometer:  
 Top of table = 0.0  
 Bottom of sphere = 49.6 cm  
 Sphere 14.26 cm (5.615")  
 Top of sphere 63.86 cm 64.1 <sup>Observed</sup>  
 6" <sup>H<sub>2</sub>O</sup> above 79.10 cm 79.34 <sup>H<sub>2</sub>O</sup>

12:30 Water ht = 80.1 cm Source act: lighter sub exit!  
 12:33 Shut down:

Three measurement made of sphere:  
 2 at equator = 5.571"  
 1 at pole = 5.538"

14.15 cm

$$O.D = 5.615$$

$$r = 5.571 - 2/$$

$$p = 5.568$$

$$\frac{4}{3} \pi (R - \delta)^3 \times 18.5 \leftarrow$$
$$(5.561 \times 2.54)^3$$

$$2.785 \rightarrow 2.775$$

27.14 kg

$$\begin{array}{r} 27.50 \\ 27.14 \\ \hline .36 \end{array}$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	ST	START-UP
K-1 10 X 10 - 12		✓	8"	✓	10 X 10 - 12
"		✓	"	✓	"
K-2 10 X 10 - 12		✓	12	✓	"
"		✓	"	✓	"
HT 620V	Alarm	✓	1"	✓	500V
HT 1240V	Low	✓	32"	✓	900V
"	Alarm	✓	4"	✓	"

Beckman ✓  
 LOG # 1000000000 ✓ OPERATE ✓ SOURCE No. 10mg Be + 2149

DUMP WELL FLOOD LIGHT \_\_\_\_\_ 7

START-UP CHECK LIST

Equipment checked by AKP Personnel check by F.D.C.  
 Instrumental cal no/series checked and correct by AKP  
 Source in checked by AKP Source No. Accel  
 Emergency equipment in correct zone checked by F.D.C.  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKP Time 0820  
 Start-up OK'd by D.W.M. AKP Date 12-12-63

3' 30" required To fill lines up to bottom of sphere!  
 Purpose is to pulse 12.8" at sphere at joint unit.

0854 System served by accel. K-1, K-2 tripped.  
 0925 System joint unit. Saturation ht = 17.29" C.R. = 33.37"

0930 Now pulsing at joint unit.  
 10:52 Stop pulsing.  
 10:57 System on + Per Saturation ht = 17.10" C.R. = 33.39"  
 wheels = 999.6 sec = 1.3 f  
 Beckman = 914.8 sec = 1.4 f  
 11:20 C.R. in pulsing at well unit.  
 12:00 System on + Per; Saturation ht = 16.99" C.R. = 33.38"  
 782.0 sec = 1.0 f  
 12:00 C.R. in.  
 12:19 System on + Per; Saturation ht = 17.00" C.R. = 33.38"  
 652 sec = 1.9 f  
 12:24 C.R. in.  
 12:28 Now pulsing.  
 13:46 Stop pulsing.  
 13:47 System on + Per; Saturation ht = 16.97" C.R. = 33.39"  
 552.0 sec = 2.2 f  
 13:57 C.R. in.  
 13:59 System on + Per; Saturation ht = 16.97" C.R. = 33.39"  
 550 sec = 2.2 f  
 14:00 Shut down.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	FT	START-UP RANGE
K1 10 X 10 <sup>-12</sup>	10 <sup>-12</sup>	✓	10"	✓	10 X 10 <sup>-12</sup>
"	"	✓	"	✓	"
PM 10 X 10 <sup>-12</sup>	10 <sup>-12</sup>	✓	12"	✓	10 X 10 <sup>-12</sup>
"	"	✓	"	✓	"
600V	500V	-	1"	-	500V
PM 1200V	900V	-	36"	-	900V
"	"	-	6"	-	"

LOG IN CAMERA  OPERATE  SOURCE No. 10mg Na<sup>24</sup>  
2149

Exp #73  
 START-UP CHECK LIST

Equipment checked by AKK Personnel check by F.P.C.  
 Instruments and facilities checked and ready by AKK  
 Source is checked by AKK Source No. accel  
 Emergency equipment is checked and ready by F.P.C.  
 Instruments for trip checked: K-1 K-2 PM-1 PM-2  
 Red light on by AKK Time 0920  
 Start-up OK'd by D.W.M. AKK Date 12-13-63

Purpose is to run with flux traverse at just  
 crit in 12.4" at apex: Counter # RSN-1058  
 See D.W.M. Log book for counter data!  
 counter limits - out = 44.31" - in = 32.05"

0835 solution ht = 3.49". checking out counter.

0915	Solution ht = 16.17"	Counter pos = 44.31" just crit
0918	37.00"	crit conditions - Per = -378 - 3.884
0951	32.05"	- Per = -543.2 - 2.584
0956	33.05"	- Per = -378 - 3.884
10:01	34.05"	- Per = -302 - 4.954
10:06	35.05"	- Per = -278 - 5.454
10:16	36.05"	- Per = -253.2 - 6.14
10:25	37.05"	- Per = -250.0 - 6.194
10:33	38.05"	- Per = -334.2 - 4.404
10:42	39.05"	- Per = -352.0 - 4.154
10:49	40.05"	- Per = -630.0 - 2.204
10:59	41.05"	- Per = -1293 - 1.044
10:06	42.05"	crit
11:13	44.31"	Solution ht = 16.00" + Per = -1108 + 1.154

acc

11:28 37:05" Solution ht = 16.03 - Per = -236.9 - 6.519

11:31 Shut down.  
 Samples taken: sub for 2/8: sp.g. density.  
 Y-12 <sup>Arg</sup>#593212 X-10 Control #S.F.A936  
 G. # = 103.0 gram 2/8 = .176100 G. # 83.1 gram 2/8 = .17615  
 T. = 18.3 " sp.g. = 1.3126 T. = 18.2 " sp.g. = 1.3124  
 N = 84.7 " N = 64.9 " density = 1.3085

Exp #74

"now have 8.8" of sphere in system.  
 Response is too pulsed sphere."

13:50 Solution ht = 13.93" Counter = 10:81"  
 System sub unit.

14:30 Counter Pos = 3.00"  
 15:00 .50"  
 15:20 1.50"  
 15:35 2.50"  
 15:52 3.50"  
 16:08 4.50"  
 16:25 Shut down"

INSTRUMENT CHECK

INSTRUMENT	TYPE	SIZE	START-UP
10 X 10 -12	✓	5"	10 X 10 -12
"	✓	"	"
10 X 10 -12	✓	7"	"
"	✓	"	"
600v	-	cont	500v
1200v	-	12"	900v
"	-	4"	"

Beepson  OPERATE  SOURCE No. 48mg Ra228 #249

DUMP WELL PROBE LIGHT

Exp #75

START OF CHECK  
 RKAJ  
 RKAJ  
 RKAJ  
 RKAJ  
 K-1K-2 PM-1 PM-2  
 11:15  
 Started up by D.W.M. RKAJ Date 12-16-63

Repeat of Exp #74: see D.W.M.'s Log Book #164-65

11:32 Solution ht =  $\frac{13.78}{13.43}$ " sub unit.  
 Counter pos:

11:38 3.50"  
 11:55 0.50"  
 12:22 1.50"  
 12:40 2.50"

X-494

TO: R.K. Reedy, Jr.  
 FROM: G.R. Wilson

CONTROL NO. S.F. A 227  
 DATE 12-13-63

ANALYTICAL DATA REPORT SHEET

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U, sp.g., density METHOD OF ANALYSIS: Pot.

Lab. no	Sample Code	mg/g U*	@25°C Sp.g	@25°C density	PRECISION OF ANALYTICAL METHOD	REMARKS
11332	Cp # 73	176.15	1.3124	1.3085		
						* corrected for enrichment

Activity in \_\_\_\_\_ REMARKS  
 Concentration \_\_\_\_\_  
 Sample Counted at \_\_\_\_\_ % geometry

Sample waste retained to be picked up by sender.

WR Faung  
 Laboratory Supervisor

DISTRIBUTION: 1 (White) Requestor  
 2 (Canary) S. F. Accountability  
 3 (Blue) Analytical



## REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Rosales Jr.  
 SERIES NUMBER Exp # 73  
 DATE SUBMITTED 12-13-63

*by # 9410-11*

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>Exp # 73</i>	<i>874 4.4 ↓ lowly</i>	<i>~ 200 g/l</i>			<i>92.9% <math>VO_2</math> (743) 2 residue</i>	<i>6.9 g</i>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Rosales Jr.  
 Requestor

12:57 3.50"

~~13:50~~  
13:15 4.50"

13:32 5.50"

13:50 6.50"

14:02 6.50"

~~14:20~~  
14:20 5.50"

14:34 4.50"

14:49 3.50"

15:05 2.50"

15:20 1.50"

15:32 0.50"

15:48 Drain: shut down:

12-17-63 Drained system:  
added ~50 l of H<sub>2</sub>O ~191:  
10:05 Started miking:  
10:35 Stop miking:

ITEM	QTY	UNIT	PRICE	TOTAL
10x10-12	✓	12	-	10x10-12
"	✓	"	-	"
10x10-12	✓	16	-	10x10-12
"	✓	"	-	"
600v	✓	1"	✓	500v
1200v	✓	36"	✓	900v
1" Beckman	✓	6"	-	"

SOURCE No. 10mg Ra. d #149

Exp #76

START-UP CHECK SHEET

Equipment checked by AKB      Checked by F.D.C.

Equipment used by AKB      AKB

Special instructions AKB      accel

Location of equipment F.D.C.

Location of data K-1 K-2 DM-1 PM-2

Log sheets or by AKB      10:55

Start-up G.P.S. by D.W. M. AKB      Date 12-17-63

11:19 Solution ht = 13.88"      Counter pos = 3.50"  
System sub crit.      even.

Purpose is to pulse 4.8" sphere at an  
 H<sub>2</sub> ~ 191. See O.W.M.'s Log Book for counter  
 data.

Counter Pos:

11:22	3.50"
11:53	0.50"
12:06	1.50"
12:24	3.50"
12:35	3.50"
12:47	4.50"
13:00	5.50"
13:10	6.50"
13:45	5.50"
14:00	4.50"
14:15	3.50"
14:30	2.50"
14:43	1.50"
14:54	0.50"
15:10	Drawn; Shut down:

10 X 10 <sup>-12</sup>	-	12"	-	10 X 10 <sup>-12</sup>
"	-	"	-	"
10 X 10 <sup>-12</sup>	-	16"	-	10 X 10 <sup>-12</sup>
"	-	"	-	"
600v	-	1"	-	500v
1200v	-	36"	-	900v
"	-	6"	-	"
Rechner	-		-	10 mg Part #149

Exp # 77

RKAp. F.D.C  
 RKAp.  
 RKAp. anal  
 I.P.C.  
 K-1 K-2 PM-1 PM-2  
 RKAp. 0945  
 O.W.M. RKAp. 12-18-63

Purpose is to pulse 12.4" sphere: H<sub>2</sub> ~ 191

10:06 Solution ht = 17:07" Repted sub end:  
 See P 165-166 O.W.M.'s Log book for data:

Counter Pos

10:30	37.05"
10:53	32.05"
11:08	33.05"
11:19	34.05"

(OVER)

11:30 35.05"  
 11:40 36.05"  
 11:58 37.05"  
 12:09 38.05"  
 12:20 39.05"  
 12:30 40.05"  
 12:48 41.05"  
 12:56 42.05"  
 13:20 41.05"  
 13:28 40.05"  
 13:37 39.05"  
 13:47 38.05"  
 13:55 37.05"  
 14:05 36.05"  
 14:15 35.05"  
 14:26 34.05"  
 14:35 33.05"  
 14:45 32.05"  
 14:55 34.05"  
 15:06 36.05"  
 15:19 38.05"  
 15:30 40.05"  
 15:43 42.05"  
 15:59 shut down:

10x10-12	✓	12"	10x10-12
"	✓	"	"
10x10-12	✓	16"	10x10-12
	✓	"	"
600v	✓	1"	500v
1200v		30"	900v
<del>1000v</del>		6"	"

10mg Ra / #129

Exp #18

ARR

F.D.C

RXM

ARR

accl

F.D.C

K-1 K-2 PM-1 PM-2

ARR

10:26

D.W.M. (AK)

12-19-63

Purpose to check out counter: see D.W.M. Log Book.

10:40 Solution ht = 17.08" System slip out!

10:42 Counter Pos

37.05

13:03 Drain: shut down

acc.

15:00 Now have 12" S.S. vessel in system: Purpose is to check crit ht and pulse at crit:  $H_p = 1.91$

Zero aug still .15"

Feed rate = 1.53" per min.

15:39 Super crit. @ 10.06"

15:45 Sub crit 10.04"

15:50 Just crit 10.05"

15:55 Control blade in contact:

16:06 System still just crit: Solution ht = 10.05"

10K10 -12	-	12"	-	10K10 -12
"	-	"	-	"
10K10 -12	-	16"	-	"
"	-	"	-	"
600V	-	1"	-	500V
1200V	-	36"	-	900V
"	-	6"	-	

10 mg ha t  
#129

Exp # 80

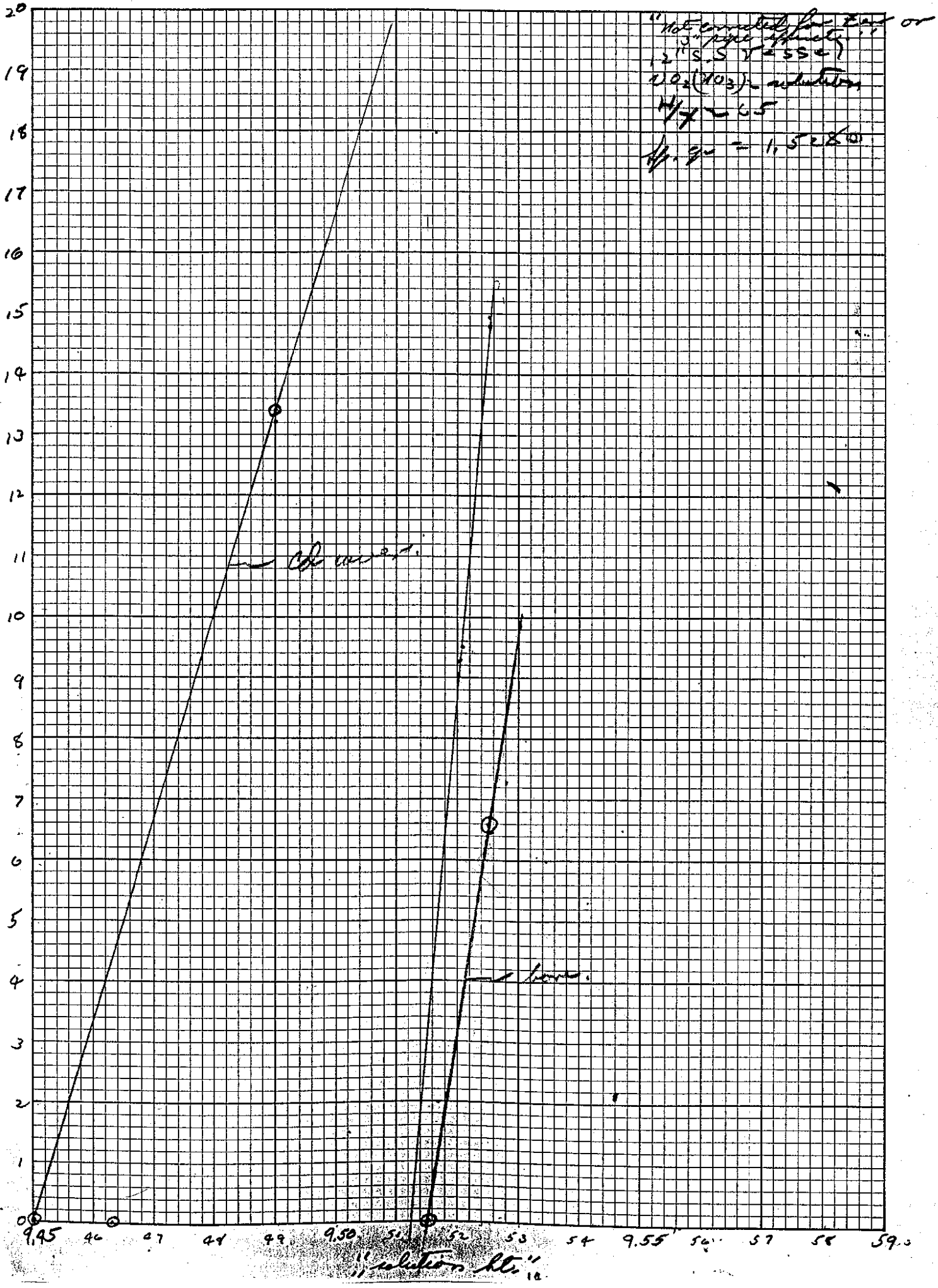
AKM  
I.O.C  
AKM  
AKM  
acid  
F.P.C  
K-1 K-2 PM-L DM-2  
AKM  
0825  
D.W.M. AKM  
12-20-63

Purpose is to pulse 12" S.S. vessel at crit:

09:07 System on + Per Solution ht = 10.01"

09:50  
~~10:50~~ Now pulsing:

10:11 Drain solution to 5.29" Moved K-1 & Log 21 from inside frame:



12/13/62

COUNTER	(SOIK or NORM)	TRAV COUNT	COUNT TIME		
POS					
44.31	5097		1.59		
37.0	136 806		3.51		
"	133 981		1. - (10)		
"	137 115		2.97		
"	135 216		1.86		
"	135 591		3.36		
"	133 520		2.2 +		
"	134 649		3.25		
32.05	47262		1.15	42.05	47559 1.06
"	47303		1.38	"	47580 1.08
33.05	74743		1.13	"	48127 1.08
"	75001		1.50	"	48007 1.06
34.05	98896		1.40		
"	99192		2.16		
35.05	117298		2.02		
"	117702		3.61		
36.05	131029		1.72		
"	131129		3.91		
37.05	134087		1.90		
"	135122		3.26		
38.05	130816		1.32		
"	130294		2.13		
"	132162		3 +		
39.05	118999		1.79		
"	117681		2.77		
40.05	100349		1.89		
"	95826		2.44		
"	97986		3.24		
41.05	75042		1.24		
"	75383		1.31		
"	74367		1.47		
					TRAVERSE COUNTER
					POS
					32.05 47283
					33.05 74872
					34.05 99043
					35.05 117500
					36.05 131079
					37.05 134605
					38.05 131091
					39.05 118340
					40.05 99053
					41.05 74931
					42.05 47811

X-494

CONTROL NO. S.F. A-663  
DATE 12-20-68

TO: R.K. Reedy  
FROM: G.R. Wilson  
SERIES NO.

ANALYTICAL DATA REPORT SHEET

THIS FORM IS TO BE USED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

*NO PROBLEMS  
7/22/71*

ANALYZED FOR: U METHOD OF ANALYSIS: Pot.

Sample no	Sample code	mg / μl gram	Sp. Gr. 26°C	density 26°C									PRECISION OF ANALYTICAL METHOD	REMARKS
11365	124.02	124.02	1.2005	1.1967										

Activity in \_\_\_\_\_ REMARKS  
Concentration \_\_\_\_\_  
Sample Counted at \_\_\_\_\_ % geometry

*Sample & waste returned  
to be picked up by  
Sender*

W.R. Lang  
Laboratory Supervisor

- DISTRIBUTION:
- 1 (White) Requestor
  - 2 (Canary) S. F. Accountability
  - 3 (Blue) Analytical



REQUEST FOR CONTROL ANALYSIS

THIS FORM IS TO BE USED ONLY FOR REQUESTING ANALYSIS FOR VERIFICATION OF INVENTORY, VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE LABORATORY TO OTHER INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT RECEIVED FROM OTHER INSTALLATIONS.

NAME R. K. Rudy  
 SERIES NUMBER 47 40  
 DATE SUBMITTED 12-20-62

*dy F 9910-23*

PURPOSE OF ANALYSIS	CHECK ONE
S.F. Receipt Verification	<input type="checkbox"/>
Inventory Verification	<input type="checkbox"/>
S.F. Shipment Verification	<input type="checkbox"/>

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
<i>47 40</i>	<i>17p 47 ✓ Analyt</i>	<i>~1405/lc</i>			<i>72.5% O<sub>2</sub> (residual) ~10% H<sub>2</sub>O</i>	<i>1.0 liter</i>

DISTRIBUTION: 1 (White) Analytical  
 2 (Canary) Requestor  
 3 (Blue) S.F. Accountability

R. K. Rudy  
 Requestor

10:46 <sup>(1)</sup> kept on + Per +42 d solution lit = 10.04"

10:51 <sup>(2)</sup> Blade in; out: + Per +.56 d solution lit = 10.04"

11:05 Now pulsing:

12:02 Stopped pulsing: Blade out <sup>(3)</sup> + Per 0.49 d solution lit = 10.04"

12:17 Blade in; out <sup>(4)</sup> + Per 0.0 " " "

~~12:25 Blade in; pulsing again, out~~

12:25 Blade in:

12:28 Blade out; now pulsing

13:21 <sup>(6)(5)</sup> Stopped pulsing; Blade out: - Per -.37 d solution lit = 10.04"

13:33 Blade in; out - Per -.52 d " " "

13:43 Shut down:

14:00 Samples sent to Y-12 and X-10

Y-12	X-10
Reg # 593213	Control # S.F.A-938
σ = 100.7 $\frac{d}{g} = .123600$	σ = 87.3 $\frac{d}{g} = .12402$
T = 18.4 $\frac{d}{g} = 1.1992$	T = 17.9 $\frac{d}{g} = 1.2005$
N = 87.3	H = 69.8 Density 1.1967 <sup>(6)</sup>

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE IMPEDANCE	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	None ✓	2"	✓	3X10 <sup>-12</sup>
"	"	" -	"	✓	"
K-2	"	None -	2"	✓	"
"	"	" -	"	✓	"
"	"	" -	"	✓	"
"	700v	None ✓	cont	-	500v
"	900v	None -	6"	-	900v
"	"	None ✓	cont	-	"

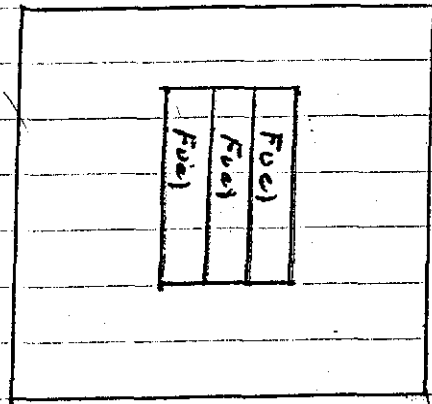
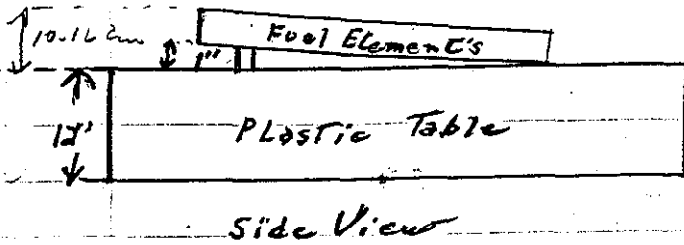
LOG IN CALIBRATION ✓ OPERATE ✓ SOURCE No. B-80  
DUMP WELL FROSE LIGHT \_\_\_\_\_

3x3 array; Elements in "contact."

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C.  
 Instruments and cables checked and reset by AKM  
 Source in checked by AKM Source No. M-43  
 Emergency equipment for critical room checked by F.D.C.  
 Instruments in trip checked: K-1 K-2 P.M. 1 P.M. 2  
 Red light on by AKM Time 12:50  
 Start-up OK'd by F.D.C. AKM Date 11-10-64

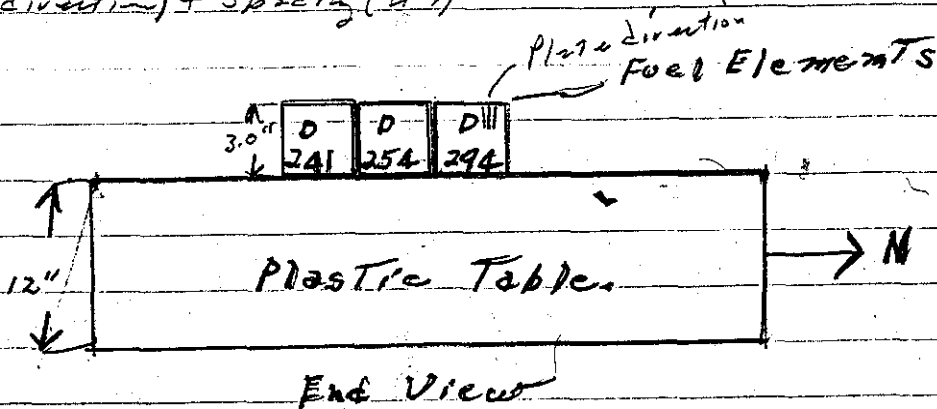
Purpose:  
 Approach to critical (3x3 array), have three elements in a horizontal position:  
 over.



1 in elevation (above) + 6" top reflected  
 = 7 in. = 17.78 cm

one element = 3 in. = 7.62 cm

∴ Reflected array height = 17.78 cm + 7.62 cm (no. of elements in vertical direction) + spacing (4-1)



202 maximum

Zero at top of Table: 0 cm (also bottom of element)

13:10 Water ht = 25.6 cm: system not critical! Drain:

2x3 array (elements in contact)

D	D	D
263	273	265
D	D	D
241	254	294

→ N (End view)

13:30 Added three elements as shown above. Now have 6 elements!

13:48 Water ht = 34.6 cm; system sub critical; Drain:

3x3 array (elements in contact)

D	D	D
249	29	285
D	D	D
263	273	268
D	D	D
241	254	294

→ N

14:32 Water ht = 43.1 cm; system sub critical;

14:35 Drain:

Water  
Temp °C

#7 = 22.5 °C

#8 = 22.5 °C

#3 = Room

Temp = 22.8 °C

## Elements in contact

D	D	D
24	26	249
D	D	D
249	29	285
D	D	D
263	273	268
D	D	D
241	254	294

→ N

Water Temp.

#8 = 22.0°C

#7 = 22.0°C

(Room) #3 = 22.6°C

1016 added element # D-249; as shown above. Now have a 3x4 array.

1038 Water ht = 48.4 cm; system sub-critical.

(Elements in contact)

D	D	D	
24	26	249	
D	D	D	
249	29	285	
D	D	D	D
263	273	268	211
D	D	D	
241	254	294	

Blank area

~ 3" x 3" al shells

Water Temp.

#7 = 22.0°C

#8 = 22.0°C

Room #3 = 22.6°C

1105 added element # D-211; as shown above. Now have 3x4 array + 1; total of 13 elements.

1122 Water ht = 49.3 cm; system sub-critical.

1123 Drain;

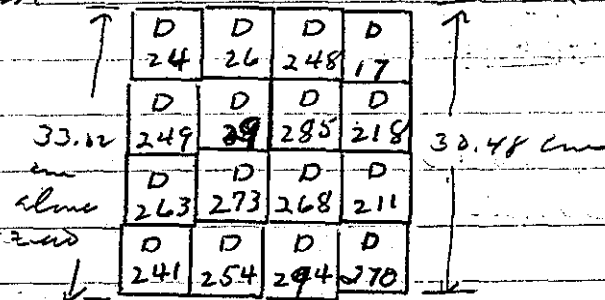
D	D	D	
24	26	245	
D	D	D	D
249	29	285	218
D	D	D	D
263	273	268	211
D	D	D	
241	254	294	

Water Temp  
 #7 = 22.0°C  
 #9 = 22.0°C  
 (Room) #3 = 23.0°C

12.10 added element # D-218, on shown above; now have 3x4 array + 2, total of 14 elements.

12.30 Water ht = 48.00 cm; system sub critical;

12.32 Drain: (element in contact)



12.45 added elements # D-17, D-270; now have a 4x4 array;  $Flow = 4.925 \text{ kg}^{235}U$   
 $4.903 \text{ kg} @ 306.46 \text{ g/elt}$

13.15 Drain; could not keep system just critical because of a leaky valve; shut down to find trouble;

13.22 Trouble is in 3.0" drain valve;

14.25 Replaced 3.0" drain valve;

over

new zero after changing volume = 0.7 cm.

1448 + Per: Water ht = 35.25 cm.

Water Temp:

#8 = 22.5°C

#7 = 22.5°C

1450 - ~~Per~~: Water ht = 35.20 cm

(Room #3 = 22.0°C)

1502 + Per: Water ht = 35.23 cm.

Ch = 35.215 cm.

- 0.7

34.515 cm

1504 Drain:

1.495 cm tip reflector (min)

(Elements in contact)

✓

D	D	D	
24	26	248	
D	D	D	D
249	28	285	218
D	D	D	D
263	273	268	211
D	D	D	D
241	254	274	270

Mon = 4.620

= 4.597 K 2550

1555 Remained fuel element # D-17; array now has 15 elements, as shown above:

1615 + Per: Water ht = 41.65 cm.

#7 = 22.4°C

#8 = 22.4°C

Room #3 = 25.0°C

1617 - Per: Water ht = 40.75 cm

1622 System just critical; Water ht = 40.80 cm.

40.10

33.02

- .70

40.10

7.88 cm tip reflector (min)

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter	2"	✓	$10 \times 10^{-12}$
"	"	Fist	"	✓	"
K-2	"	Meter	2"	✓	"
"	"	Fist	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm	cont	✓	500V
PM-2	1200V	Low	8"	✓	900V
"	"	Alarm	cont	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT					

## 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-23

Emergency equipment in control room checked by FDC

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

Red light on by AKM, Time 0805

Start-up OK'd by F.D.C. AKM Date 11-17-64

Response is to check critical water ht of array as shown on page 196. (15 element array)

0840 + Per: Water ht = 41.58 cm:

Water Temp  
#1 = 22.2°C  
#5 = 22.2°C

0848 - Per: Water ht = 40.52 cm:

Power #3 = 24.0°C



0851 t Pen; Water hts = 40.60 cm:

Critical 40.56 cm. ∴ 6.84 cm Top reflector.

0855 Drain:  $\frac{-0.70}{39.82}$

(min)

11-17-64 4.0" Water dump valve on "Nell" was found not to  
 ↓  
 11-18-64 be consistent in opening full each time. Valve was  
 taken apart and clean and oiled. Dump rate was  
 measured again:

4.0" dump valve:  $48.60^{cm} - 29.20^{cm}$  in 30 sec = 38.80 <sup>15.3</sup>

3.0" " " :  $29.50^{cm} - 23.90^{cm}$  in 15 sec = 24.40 <sup>9.6</sup>

Feed rate = 8.40 cm/min; 3.3"

INSTRUMENT CHECK

199

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	2"	-	$10 \times 10^{-12}$
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	2"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	-	500V
PM-2	1200V	Low ✓	8"	-	900V
"	"	Alarm ✓	cont	-	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80  
 DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKM 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 K-2 PM-1 PM-2

Red light on by AKM Time 12:20

Start-up OK'd by F.D.C RKM Date 11-18-69



Zero water ht = 0.76m:

Purpose is to check critical water ht of array shown on page 196 (15 element array) with elements #5 D-249, D-29, D-263, D-273, D-241, D-254 rotated 90° so that their fuel plate's are now horizontal. all others are and have been vertical.

Temp  
 #7 = 22.2 °C  
 #8 = 22.5 °C  
 Room #3 = 25.0 °C

1250 Water ht = 48.70 cm; system sub critical:

$$\begin{array}{r} 48.70 \\ -1.70 \\ \hline 47.00 \text{ cm} \end{array}$$

Top reflector = 14.98 cm (min.)

1255 Drain to 1.2 cm;

1256 same in: <sup>adding:</sup> ~~added~~ water to reflect water ht:

1315 Water ht = 48.70 cm; system sub critical:

Temp  
 #7 = 22.2 °C  
 #8 = 22.5 °C  
 Room #3 = 22.7 °C

4x4 array (Elements in contact):

0	D	D	D
24	26	248	17
D	D	D	D
249	29	285	218
D	D	D	D
263	273	268	211
D	D	D	D
241	254	244	270



Plate  
 Pos.

Mass = 4.440 kg

12 Fuel el. + 14 / 14 el. ∴

Mass = 4.458 kg

Elements #5 D-17, D-218, D-211, & D-270 have only 14 fuel plates each:

1455 Water ht = 48.80 cm; system sub critical:

Temp  
 #7 = 22.2 °C  
 #8 = 22.5 °C  
 Room #3 = 22.7 °C

$$\begin{array}{r} 48.80 \\ -1.70 \\ \hline 47.10 \text{ cm} \end{array}$$

Top reflector = 15.08 cm (min.)

1510 added 6 plates each to Elements #5, D-17, D-218, D-211 and D-270; these elements now have a total of 20 fuel plates each. Array same as shown on page 200; (Element in contact).  $W_{\text{max}} = 4.816 \text{ kg}$   
 $4.792 \text{ kg}$  235 U

1532 + Per; Water ht = 37.90 cm;  $W_{\text{ht}} = 37.30 \text{ cm}$

1535 - Per; Water ht = 37.20 cm;  $W_{\text{ht}} = 36.60$   
 Min. Top reflector = 3.58 cm

1536 Drain;

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter <input checked="" type="checkbox"/>	2"	<input checked="" type="checkbox"/>	$10 \times 10^{-12}$
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	"
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	cont	<input checked="" type="checkbox"/>	500V
PM-2	1200V	Low <input checked="" type="checkbox"/>	8"	<input checked="" type="checkbox"/>	900V
"		Alarm <input checked="" type="checkbox"/>	cont	<input checked="" type="checkbox"/>	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-90

DUMP WELL PROBE LIGHT

20  
50  
70

00 00 P

## START-UP CHECK LIST

Equipment checked by AKKJ Personnel check by F.D.C.Instrumentation and safeties checked and reset by AKKJSerials in control room by AKKJ Source No. M-43Emergency equipment in control room checked by F.D.C.Instrumentation in C.A.S. circuit: K-1 K-2 PM-1 PM-2Red light on by AKKJ Time 0805Start-up OK'd by F.D.C. AKKJ Date 11-19-64

Zero water = .70 cm

0800 Removed 2 fuel plates from each element #5 D-17  
D-218, D-211 and D-270. These elements now have  
a total of 18 plates each. <sup>= 72 plates in 4 el</sup> array same as shown  
on page 200. Elements in contact: Mass = 4.704 kg  
4.687 kg <sup>2250</sup>

0834 + Per: water ht = 39.43 cm; Temp  
TF 7 = 22.2°C  
TF 8 = 22.0°C

0838 System just critical; water ht = 39.32 cm; <sup>-70</sup> Ann #3 = 22.0°C  
39.62 cm

0840 Drain: Min. top reflector = 5.60 cm

0910 Removed 2 fuel plates from each element #9 D-17  
D-218, D-211 and D-270. These elements now have  
a total of 16 plates each. <sup>= 64 plates in 4 el</sup> array same as shown on page  
200. Elements in contact: Mass = 4.592 kg  
4.569 kg <sup>2250</sup>

0935 System sub-critical; water ht = 48.70 cm; Temp  
TF 7 = 22.2°C

0937 Drain: Min. top refl = 14.98 cm <sup>48.00</sup> TF 8 = 22.5°C  
Ann #3 = 22.7°C

10:50 Max. h<sub>1</sub> to top of fuel = 33.02 + 1.505 cm = 34.525 cm  
 Same array & fuel loading as describe at bottom of page 202; but with elements now spaced at .250" in.

Zero Water = .70 cm  
 Mass = 4.592 Kg  
 4.569 Kg 235°J

11:10 System just critical: Water h<sub>1</sub> = 34.45 cm

11:12 Drain:  

$$\frac{34.45 \text{ cm}}{4} - .70 \text{ cm} = 33.75 \text{ cm}$$
  
 Min. Top refl = -1.175 cm  
 Temp. #7 = 22.2°C  
 #8 = 22.0°C  
 Room #3 = 24.5°C

12:30 Removed 4 fuel plates from each element; #5 D-17, D-218, D-211 and D-270. These elements now have a total of 12 plates each. Array same as above; Spacing .250" in.

Mass = 4.368 Kg  
 = 4.347 Kg 235°J

12:46 + Per: Water h<sub>1</sub> = 35.40 cm

12:51 System just fuel critical: Water h<sub>1</sub> = 35.43 cm

Min. Top reflection = -0.155 cm  

$$\frac{0.7}{34.73 \text{ cm}}$$
  
 Temp. #7 = 22.2°C  
 #8 = 22.2°C  
 Room #3 = 22.2°C

arr?

3 x 4 array : .250" spacing.

(Removed element  
with 12 fuel plates in  
each.)

D	D	D
24	26	248
D	D	D
249	29	285
D	D	D
263	273	268
D	D	D
241	254	<del>244</del>

$$\text{Mass} = 3.696 \text{ Kg} \quad 235\text{U}$$

$$3.677 \text{ Kg}$$

Zero water ht = .70 cm

1320 Water ht = 55.30 cm. System very sub critical

$$\frac{.7}{54.60}$$

min. reflector = 19.68 cm

Water Temp

$$\# 7 = 22.2^\circ \text{C}$$

$$\# 8 = 22.2^\circ \text{C}$$

$$\text{Room } \# 3 = 23.8^\circ \text{C}$$

4 x 4 array : .250" spacing.

D	D	D	D
24	26	248	17
D	D	D	D
249	29	285	218
D	D	D	D
263	273	268	211
D	D	D	D
241	254	244	270

$$\text{Mass} = 4.012 \text{ Kg} \quad 235\text{U}$$

$$4.032 \text{ Kg}$$

1330 added elements #5 D-17, D-218, D-211 and D-270. With  
6 fuel plates each. Array shown as above: 4 x 4. with  
.250" spacing.

1352 Water ht = 38.12 cm. System just critical.

$$\frac{-1.70}{37.42} = H_c$$

min. reflector = 2.50 cm

Zero Water ht = .70 cm:

1404 Removed 2 fuel plates from each element #<sup>s</sup> D-17, D-218, D-211 and D-270. These elements now have a total of <sup>-14 plates in 4 el</sup> 4 fuel plates each. Array same as on page 204; 4x4 with .250" in spacing. Mass = <sup>3.905</sup> 3.920 Kg <sup>235J</sup>

1422 Water ht = 41.70 cm: System just critical:

$$41.70 - 1.10 = 40.60 \text{ cm}$$
 Water Temp  
 #7 = 22.2°C  
 #8 = 22.2°C  
 Room #3 = 25.0°C  
 Visin Reflector thickness = 6.08

1423 Drain;

1430 Removed 1 fuel plate from each element #<sup>s</sup> D-17, D-218, D-211 and D-270. These elements now have a total of 3 fuel plates each; array and spacing same as above. Mass = <sup>3.864</sup> 3.845 Kg <sup>235J</sup>

1450 Water ht = 54.20 cm: System sub critical:

$$\frac{.7}{53.50}$$
 Top refl = 18.58 cm  
 Water Temp  
 #7 = 22.5°C  
 #8 = 22.5°C

1452 Drain;

Room #3 = 25.0°C



Top of fuel now 33.02 cm + 1.5 in (2.54) = 34.56 cm

4 x 4 array: .500" spacing.

Same array or describe at bottom of page 205. Fuel loading same: spacing now .500" in!

31843  
Mass = 3.864 kg 255

Zero water ht = .70 cm:

1600 + Per: Water ht = 39.40 cm:

1601 - Per: Water ht = 39.40 cm.

Water Temp

# 7 = 22.5

# 8 = 22.5

Room # 3 = 23.0

o/h = 39.40 cm

- .70  
38.70 cm

1603

Drain:

min. top reflector 1.87 cm

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
" 3X10 <sup>-12</sup>		Motor ✓	2"	✓	1.0X10 <sup>-12</sup>
" "		Fast ✓	"	✓	"
" "		Motor ✓	3"	✓	"
" "		Fast ✓	"	✓	"
PAGE 1	700V	Alarm ✓	cont	✓	500V
PAGE 2	1200V	Low ✓	8"	✓	900V
"		Alarm ✓	cont	✓	"

LOG IN CALIBRATION ← OPERATE ←

SOURCE No. B-80

DUMP VOLTAGE

3 x 4 array: .500" spacing.

START-UP CHECK LIST

Equipment checked by AKH Personnel check by E.P.C

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-63

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

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

Red light on by AKH Time 0815

Start-up OK'd by I.D.C AKH Date 11-20-69

0810 Removed 4 elements with 3 fuel plates each: new lower  
a. 3 x 4 array: spacing .500" in.

D	D	D
24	26	248
D	D	D
249	29	285
D	D	D
263	273	268
D	D	D
241	254	294

Mass =  $\frac{3,677}{3,646}$  kg (235)

Zero Water ht = .70 cm.

0830 Water ht = 55.50 cm: System sub critical!

Tip reflector ht = 18.6 cm

Temp.

#7 = 22.2 °C

#8 = 22.5 °C

Room # 3 = 24.3 °C

0832 Drain!

over:

4 X 4 array: .500" in spacing.

0850

D	D	D	D
24	26	248	17
D	D	D	D
149	29	285	218
D	D	D	D
263	273	268	211
D	D	D	D
241	254	244	270

3,733  
Mass = 3,752 Kg <sup>25</sup>

0850 added elements #s D-17, D-218, D-211 and D-270. These element now have a total of 1 fuel plate each. <sup>1 fuel plate in array</sup> spacing = .500" in.

0906 Water ht = 55.00 cm: system sub-critical.

0907 Drain.

18.1 cm min. top reflector

4 X 4 array: .750" in spacing.

1036 Max. top of fuel at this spacing is 38.73 cm. added 8 fuel plates to elements #s D-17, D-218, D-211 and D-270. <sup>9 plates in each of these elements.</sup> Array is as shown above: .750" in spacing: <sup>4,199</sup> mass = 4,200 Kg <sup>25</sup>

D-17, D-218, D-270 and D-211 have 9 fuel plates each.

Zero Water ht = .70 cm:

1055 + Per: Water ht = 39.70 cm:

Water temp  
#7 = 22.5°C

1058 - Per: Water ht = 39.70 cm:

#8 = 22.5°C  
Room #3 = 25.0°C

1059

Drain:

min. top reflector = 0.27 cm

gh = 39.70  
- .70  
39.00 cm

4 x 4 orrag; .750" in spacing.

Zero Water ht = .70 cm

1225 Removed 2 fuel plates <sup>soil</sup> from elements #5 D-17, D-218.

D-211 and D-270. These elements now have 7 fuel

plates each; 4 x 4 orrag; .750" in spacing.

$$\text{Mass} = \frac{4.068}{235} \text{ Kg}$$

1243 + Per; Water ht = 40.60 cm.

1245 - Per; Water ht = 40.60 cm.

$$\text{eff} = 40.60 \text{ cm.}$$

$$- .70$$

$$\hline 39.90$$

Water temp

#7 = 22.5°C

#8 = 22.5°C

Room #3 = 25.0°C

1246 Drain:

Min. top reflector

1255 Removed 2 fuel plates each from elements #5 D-17, D-218

D-211 and D-270. These elements now have 5 fuel

plates each; 4 x 4 orrag (page 208) .750" in spacing.

$$\text{Mass} = \frac{3.954}{235} \text{ Kg}$$

1312 + Per; Water ht = 42.40 cm.

Water Temp.

#7 = 22.5°C

#8 = 22.5°C

Room #3 = 23.0°C

1314 - Per; Water ht = 42.25 cm.

$$\text{eff} = 42.33$$

$$- .70$$

$$\hline 41.63$$

Min. Top reflector = 2.90 cm

1325 Removed 2 fuel plates each from elements #5 D-17, D-218

D-211 and D-270. These elements now have 3 fuel plates

each; 4 x 4 orrag (page 208) .750" in spacing.

over.

Zero Water ht = .70 cm

4x4 array: .750" spacing:

$$\begin{array}{r} 3.845 \\ \text{Mass} = 3.864 \text{ Kg.} \end{array} \quad \begin{array}{l} 235 \\ \text{J} \end{array}$$

1344 Water ht = 60.80 cm: System slightly sub critical:

$$\begin{array}{r} - .70 \\ 60.10 \text{ cm Water ht.} \end{array}$$

Water Temp:

#7 = 22.5 °C

#8 = 22.5 °C

Room #3 = 23.0 °C

Min. reflector = 21.37 cm

1347 Drain:

4x4 array: 1.00" spacing:

1435

Same array as shown on page 208. But elements #5  
D-17, D-218, D-211 and D-270 have a total of 10 fuel plates  
each; array 4x4: 1.00" spacing:

$$\begin{array}{r} 4.235 \\ \text{Mass} = 4.255 \text{ Kg} \end{array} \quad \begin{array}{l} 235 \\ \text{J} \end{array}$$

1453

~~1458~~

Water ht = 59.50 cm: System sub critical:

$$\begin{array}{r} - .70 \text{ cm} \\ 58.80 \text{ cm} \end{array}$$

Min. top reflector = 18.16 cm

Water Temp

#7 = 22.5 °C

#8 = 22.5 °C

Room #3 = 22.5 °C

1455

Drain:

Max. Top of fuel at 1" spacing for this array  
is  $33.02 + 3(1.0)(254) = 40.64 \text{ cm}$

4 x 4 array 1.00" spacing:

Zero Water ht = .70 cm.

15.15 added 4 fuel plates each to elements #5 D-17, D-218, D-211 and D-270. Now have a total of 14 fuel plates each, array 4x4: 1.00" spacing.

$$\text{mass} = \begin{array}{r} 4.457 \\ 4.480 \text{ Kg.} \end{array} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} 205$$

15.31 Water ht = 61.20 cm: system sub critical:

15.33 Drain:  $\frac{.70 \text{ cm}}{60.50 \text{ cm}}$   
 Min. Top refl. = 19.86

Water Temp  
 # 1 = 22.5°C  
 # 8 = 22.5°C  
 Room # 3 = 24.5°C

15.43 added 2 fuel plates each to elements #5 D-17, D-218, D-211 and D-270. Now have a total of 16 fuel plates each, array 4x4: 1.00" spacing.

$$\text{mass} = \begin{array}{r} 4.569 \\ 4.592 \text{ Kg.} \end{array}$$

15.57 + Per; Water ht = 48.00 cm

16.00 Water ht = 47.85 cm: system just critical:  
 $\frac{-70 \text{ cm}}{47.15}$

Min. Top reflector = 6.51 cm

16.04 Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-13	$\times 10^{-12}$	Motor ✓	2"	✓	
"		Fast ✓	2"	✓	
K-2	"	Motor ✓	2"	✓	
"		Fast ✓	2"	✓	
PM 1	700V	Alarm ✓	cont	✓	
PM 2	1200V	Low ✓	8"	✓	
"		Alarm ✓	cont	✓	

LOG IN CALIBRATE  OPERATE  SOURCE No. 13-80

DUMP WELL PROBE LIGHT 7

START-UP CHECK LIST

Equipment checked by AKA Personnel check by F.R.C.  
 Instruments and safeties checked and reset by AKA.  
 Source in checked by AKA Source No. M-43  
 Emergency equipment in control room checked by \_\_\_\_\_  
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2  
 Red light on by AKA. Time 10:10  
 Start-up OK'd by F.R.C. AKA Date 11-23-64

4x4 array . 1.00" in spacing.

Purpose is to check critical water ht of array  
as described at bottom of page 211. (11-20-64.)

4.569  
Mass = 4.592 Kg, 23° J

Zero Water ht = .70 cm

0830 + Per: Water ht = 48.20 cm:

0833 Water ht = 47.90 cm: System just critical. water temp.

$\frac{-70}{47,20 \text{ cm}}$

#7 = 22.0°C

#8 = 22.0°C

Room #3 = 21.5°C

Minimum top reflector = 6.50 cm

0844 Remained 1 fuel plate each from elements #<sup>s</sup>D-17, D-218,  
D-211 and D-270. These elements now have 15 fuel  
plates each. array 4x4: 1.00" in spacing.

4.513  
Mass = 4.536 Kg, 23° J

0857 Water ht = 62.20 cm: System slightly - Neg:

Minimum top reflector = 20.68 cm water temp.

#7 = 22.0°C

#8 = 22.2°C

Room #3 = 21.5°C

0859 Drain:

aver:



4x4 array: 1.250" spacing.

11.00 Now have 16 full elements: 4x4 array: 1.250" spacing: as shown below:

4.903  
~~Mass = 4.928 Kg~~ 235J

P	D	D	D	D
24	26	248	17	
D	D	D	D	
249	29	285	218	
D	D	D	D	
263	273	368	211	
D	D	D	D	
241	254	244	270	

1.250" spacing:

11.22 max height to top of fuel = 42.54 cm  
 water ht = 62.25 cm: system subcritical:  
 $\frac{17}{1.55}$

Water Temp.

#7 = 22.0 °C

#8 = 22.2 °C

Room #3 = 21.8 °C

min. top reflector = 15.01 cm

11.25 Drains:

4x5 array: 1.250" in spacing.

D	D	D	D	D
24	26	248	291	17
D	D	D	D	D
249	29	285	22	218
D	D	D	D	D
263	273	368	138	211
D	D	D	D	D
241	254	244	257	270

→ N

6.129  
 Mass = 6.160 Kg 235J

12.35 added four full elements: Now have a 4x5 array: 1.250" in spacing. 20 full elements.

1255 Water ht = 63.30 cm. System very slightly - 11.4g.  
 $\frac{7}{1.6 \text{ cm}}$

min. top reflector = 20.06 cm

Water Temp:

# 7 = 22.2°C

# 8 = 22.2°C

Room # 3 = 22.5°C

1257 Drain:

5 x 5 array: 1.25" in spacing.

0	0	0	0	0
217	247	253	15	105
0	0	0	0	0
24	26	248	291	17
0	0	0	0	0
249	29	285	22	218
0	0	0	0	0
263	273	268	138	211
0	0	0	0	0
241	284	274	257	270

max. height in top  
of array = 53.34 cm

0.195  
Mass = 6.230 Kg 255J

1425 Now have a 5 x 5 array. Have 20 full elements:  
 Elements # 5 D-105, D-17, D-218, D-211 and D-270.  
 have the plate rails:

1443 + Por: Water ht = 58.40 cm:

1447. Water ht = 58.20 cm. System just critical:  
 $\frac{-7.0 \text{ cm}}{57.5 \text{ cm}}$

min. top reflector = 4.16 cm

Water Temp:

# 7 = 22.2°C

# 8 = 22.2°C

Room # 3 = 22.5°C

INSTRUMENT CHECK

LINE	ADJUST	RANGE	TRIP	SOURCE DISTANCE	SET	START-RANGE
3	X10	12	High ✓	3"		
"	"	"	Fast ✓	"		
"	"	"	Master ✓	2"		
"	"	"	Fast ✓	"		
	7000		Alarm ✓	Cont		
	<del>12000</del> 12000		Low ✓	6"		
	"		Alarm ✓	Cont		
LOG IN CALIBRATE ✓			OPERATE ✓	SOURCE No. B-80		
DUMP WELL PROBE LIGHT _____ 7						

START-UP CHECK LIST

Equipment checked by AKH Personnel check by F.D.C.  
 I \_\_\_\_\_ safeties checked and reset by AKH  
 Source in control by AKH Source No. M-43  
 Instrument in control room checked by F.D.C.  
 Trip circuit: K-1 K-2 P.M.-1 P.M.-2  
 End of \_\_\_\_\_ AKH Time 1335  
 \_\_\_\_\_ F.D.C. AKH Date 11-30-69

5 x 5 array 1,500" in spacing:

217

D	D	D	D	D
217	247	253	15	105
0	0	0	0	0
24	26	248	291	17
0	0	0	0	0
249	29	285	22	218
D	D	D	D	D
263	273	268	138	211
D	D	D	D	D
241	254	294	257	270

Max length of array = 55.88 cm

Mass =  $\frac{7.661}{7.700} \text{ kg} \approx 205 \text{ J}$

Zero Water ht = 1.70 cm:

Now have a 5 x 5 array; 1,500" in spacing; 25 full elements; Mass =  $\frac{7.661}{7.700} \text{ kg} \approx 205 \text{ J}$

1357 Water ht = 74.60 cm: System very sub critical:  
 $\frac{.7}{73.90}$

Min temp reflection = 18.02 cm

Water Temp:

#7 = 22.5 °C

#8 = 22.5 °C

Avg #3 = 22.5 °C

1358 Drains:

5 x 6 array 1,500" in spacing.

D	D	D	D	D	D
217	247	253	15	271	105
D	0	0	0	0	0
24	26	248	291	214	17
D	D	D	D	D	D
249	29	285	22	243	218
D	D	D	D	D	D
263	273	268	138	8	211
D	D	D	D	D	D
241	254	294	257	277	270

Mass =  $\frac{9.154}{9.240} \text{ kg} \approx 205 \text{ J}$

1452 Now have a 5 x 6 array; 1,500" in spacing; 30 full elements. Mass =  $\frac{9.240}{9.154} \text{ kg} \approx 205 \text{ J}$

1514

Water ht = 75.10 cm: System sub critical:  
 min temp reflection = 18.10 cm

Water Temp  
 #7 = 22.5 °C  
 #8 = 22.5 °C

6 x 6 array: 1.500" in spacing.

D	D	D	D	D	D
294	62	16	255	251	266
D	D	D	D	D	D
217	247	253	15	271	105
D	D	D	D	D	D
24	26	248	291	214	17
D	D	D	D	D	D
249	29	<sup>255</sup> 268	22	243	218
D	D	D	D	D	D
263	273	268	138	8	211
D	D	D	D	D	D
241	254	294	257	277	270

max height = 67.31 cm

→ N

11.033 kg  
mass = 11.088 kg

7.00 Water ht = .70 cm.

Now have a 6 x 6 array: 1.500" in spacing. 36  
full elements: mass = 11.033 kg

16.05 + Per: Water ht = 66.30 cm.

16.10 Septen just critical: Water ht = 65.00 cm.

$$\begin{array}{r} 65.00 \text{ cm} \\ - .70 \\ \hline 46 \quad 64.30 \text{ cm} \end{array}$$

Water temp.

$$\begin{array}{l} \#7 = 22.5^\circ\text{C} \\ \#8 = 22.5^\circ\text{C} \\ \text{Avon } \#3 = 22.5^\circ\text{C} \end{array}$$

16.11 Drain:

min top reflector = 3.51 cm

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-110	$10^{-12}$	Meter ✓	1"	✓	$10 \times 10^{-12}$
"	"	F. S. ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	F. S. ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	8' cont	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80  
 DUMP WELL PROBE LIGHT

6 x 6 array; 1.500" in spacing:

## 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 K-2 PM-1 PM-2

Red light on by AKH Time 0845

Start-up OK'd by F.D.C. AKH Date 12-1-69

TKF

Removed 11 fuel plates each from elements F.S. D-266  
 D-105, D-17, D-218, D-211, and D-270. These elements  
 now have 11 fuel plates each:

over.

6 x 6 array: to 500" in spacing:

D	D	D	D	D	D
244	62	16	255	251	266
D	D	D	D	D	D
217	247	253	75	271	105
D	D	D	D	D	D
24	26	248	291	214	17
D	D	D	D	D	D
249	29	285	22	243	218
D	D	D	D	D	D
263	273	268	138	8	211
D	D	D	D	D	D
241	254	294	257	277	270

→ N

10.113 kg <sup>~35J</sup>  
 flow = 10.154 kg.

Zero Water ht = 70 cm.

0910 + Per: Water ht = 72.50 cm

0913 - Per: " " = 70.40 cm.

19.15 Water ht = 70.40 cm: system just critical:

$$\frac{-70}{29.70}$$

min. top reflector = 2.09 cm

Water Temp  
 #7 = 22.20°C  
 #8 = 22.00°C  
 #9 = 21.7°C

0940 Removed 2 fuel plates each from elements #S D-266,  
 D-105, D-17, D-218, D-211 and D-270. These elements  
 now have 9 fuel plates each. flow = 9.946 kg <sup>235J</sup>

0958 + Per: Water ht = 74.00 cm.

10.00 Water ht = 72.30 cm: system just critical.

$$\frac{-70}{71.60}$$

10:01 On air.

min. top reflector = 4.29 cm

Removed 1 fuel plate each from elements #5, D-206.

D-105, D-17, D-218, D-211, and D-270. These elements

now have 8 fuel plates each. Mass =  $\overset{9.812}{9.812}$  Kg.  $\sim 35$  J

1034 System just critical: Water ht = 74.50 cm:

min. top reflector =  $\overset{.70}{73.80}$  cm

Water Temp  
#7 = 22.2°C  
#8 = 22.2°C  
Pool #3 = 21.5°C

1045 Removed 1 fuel plate each from elements #5, D-206, D-105  
D-17, D-218, D-211, and D-270. These elements now have  
7 fuel plates each. Mass =  $\overset{9.779}{9.779}$  Kg.  $\sim 35$  J

1107 System very slightly - neg: Water ht = 84.20 cm:

$\overset{-.70}{83.50}$  cm;

min. top reflector = 16.19 cm

1110

Drain:

6 x 6 at 1.500" in spacing  
avg mass =  $\overset{9.870}{9.870}$  Kg.  $\sim 35$  J

Water Temp  
#7 = 22.2°C  
#8 = 22.2°C  
Pool #3 = 22.0°C



## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	2"	✓	$10 \times 10^{-12}$
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	8"	✓	900V
"	"	Alarm ✓	cont	✓	"
LOG IN CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

7 x 7 array 1.600" in spacing.

## START-UP CHECK LIST

Equipment checked by RKAF Personnel check by F.P.C.

Instruments and safeties checked and reset by RKAF

Source in checked by RKAF Source No. M-43

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

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

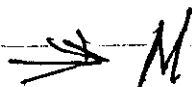
Red light on by RKAF Time 0955

Start-up OK'd by F.P.C. J.K.F. RKAF Date 12-2-64

7x7 array: 1.600" in spacing:

D	D	D	D	D	D	D
205	30	208	18	223	228	245
D	D	D	D	D	D	D
244	62	16	255	251	282	266
D	D	D	D	D	D	D
217	247	253	15	271	236	105
D	D	D	D	D	D	D
24	26	248	291	214	202	17
D	D	D	D	D	D	D
249	29	258	22	243	201	218
D	D	D	D	D	D	D
263	273	268	138	8	246	211
D	D	D	D	D	D	D
241	254	294	257	277	219	270

max. array height =  
80.26 cm



Free Water ht = .70 cm:

Now have a 7x7 array: as shown above: spacing  
= 1.600" in. Mass =  $\frac{15.017}{235} \times 235 = 15.017$  kg

Water run  
#3 = 24.0  
#7 = 22.2  
#8 = 22.2

10:55 System just critical: Water ht = 81.80 cm:

$\frac{- .70}{81.10}$

min. top reflector = 0.84 cm

12:35 Removed 6 fuel plates each from elements #5, D-245  
D-266, D-105, ~~D-105~~, D-17, D-218, D-211 and D-270.  
These elements now have 16 fuel plates each.  
Mass = ~~14.504~~ 14.431 kg  $\frac{235}{235}$

13:00 + Per: Water ht = 87.30 cm:

13:04 System just critical: Water ht = 85.90 cm:

$\frac{- .70}{85.20 \text{ cm}}$

min. top reflector = 4.94 cm

7 x 7 array: 1.600" in spacing:

1323 Removed 2 fuel plates each from elements #s D-245  
 D-266, D-105, D-17, D-218, D-211, and D-270. These  
 elements now have 14 fuel plate each:  
 Mass = <sup>14.234</sup>~~14.308~~ Kg. <sup>235U</sup>

1349 System slightly sub critical: Water ht = 99.60 cm.  
 - 7.0  
 minus top reflector = 18.64 cm 98.96 cm

1352 Drain:

Water Temp

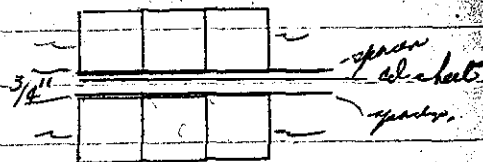
7 x 7 at 1.600" in spacing #3 = 21.7 °C  
<sup>14.337</sup>  
 dry mass = 14.461 Kg. #7 = 22.2 °C  
#8 = 22.2 °C

Slab array's:

4 x 5 array: (.750" in spacing) with Cd sheet in center:

1545

	D	D	D	D	D
	282	208	15	62	270
	D	D	D	D	D
Cd sheet	277	26	248	257	266
	D	D	D	D	D
	219	29	249	217	17
	D	D	D	D	D
	241	254	294	257	218



Elements are spaced .750" in vertical position, and are in contact in the horizontal position. There is a (.025" thick) cadmium sheet equal spaced in center of array.

Mass = 6.160 Kg <sup>235U</sup>  
 6.129 kg

note:

cadmium sheet measurements = (18.00" x 25.50" x .025 mil)

14.10 Water h<sub>t</sub> = 57.25 cm; System sub critical;

Water Temp.

#3 = 24.5°C

#7 = 22.2°C

#8 = 22.2°C

### INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE	
K-1	$10 \times 10^{-12}$	Meter	2"	-	$10 \times 10^{-12}$	
"	"	Fast	"	-	"	
K-2	"	Meter	2"	-	"	
"	"	Fast	"	-	"	
R-1						
R-2						
PM-1	700V	Alarm	cont	-	500V	
PM-2	1200V	Low	10"	-	900V	
"	"	Alarm	cont	-	"	
LOG N CALIBRATE		<input checked="" type="checkbox"/>	OPERATE		<input checked="" type="checkbox"/>	SOURCE No. B-80
DUMP WELL PROBE LIGHT <input type="checkbox"/>						

START-UP CHECK LIST

Equipment checked by AKH Personnel check by E.D.C  
 Instruments and safeties checked and reset by AKH  
 Sources in checked by AKH Source No. M-93  
 Emergency equipment in control room checked by E.D.C  
 Instruments in trip circuit: K-1 K-2 P.M-1 P.M-2  
 Red light on by AKH Time 0800  
 Start-up test by E.D.C. J.K.E. AKH Date 12-3-64

4x6 array (.750" <sup>with</sup> spacing) with cd sheet in center.

P	D	D	D	D	D
292	208	15	62	223	270
D	D	D	D	D	D
297	26	248	251	30	266
D	D	D	D	D	D
219	29	249	217	214	17
D	D	D	D	D	D
241	254	294	257	228	218

cd sheet ←

15.25 in. 38.735 cm to

→ N Max Top of fuel

6.463  
 mass 6.496 kg. 235J

Zero water ht = .70 cm:

Elements one spaced (.750" in) in out position, and one in contact in the hog position. There is a (.025 mil) cd sheet equally spaced in center of array. (see page 224). Elements #5 D-270 D-266. D-17. D-218 have 6 fuel plates each; Mass = 6.496 kg. 235J

0900 + Per: water ht = 43.00 cm:

0903 System just critical: Water ht = 42.90 cm:

$$\begin{array}{r} .70 \\ 42.20 \text{ cm} \end{array}$$

Min. Top reflector: 3.42 cm

water temp.

#3 = 22.0°

#7 = 22.2°

#6 = 22.2°

0950 Remove 2 fuel plates each from elements #5 D-270, D-266  
 D-17, D-218. These element now have 4 fuel plates  
 each. The cadmium sheet was reduced to  $15.5625 \times 25.50''$   
 (Remain 2.4375" in form <sup>just of</sup> sheet.)

$$\text{Mass} = 6.384 \text{ Kg} \quad \begin{matrix} 235 \\ 235 \end{matrix}$$

0908 + Per: Water ht = 43.00 cm

0911 System just critical: Water ht = 42.80 cm

$$\begin{array}{r} - .10 \\ 42.80 \\ \hline 42.70 \text{ cm} \end{array}$$

Min top reflector = 3.36 cm

no water temp

$$\#3 = 24^\circ \text{C}$$

$$\#7 = 26.2^\circ \text{C}$$

$$\#8 = 28.2^\circ \text{C}$$

1035 Remove 2 fuel plates each from elements #5 D-270, D-266  
 D-17, D-218. These elements now have 2 fuel plates  
 each. Cadmium sheet same as above ( $15.5625 \times 25.50''$ )

$$\text{Mass} = 6.272 \text{ Kg} \quad \begin{matrix} 235 \\ 235 \end{matrix}$$

1052 + Per: Water ht = 44.90 cm

System just critical: Water ht = 44.70 cm

$$\begin{array}{r} 44.70 \text{ cm} \\ - .70 \\ \hline 44.00 \text{ cm} \end{array}$$

Min top reflector = 5.26 cm

4 x 5 array, (.750" in spacing) Cd sheet in center

1115 Now have a 4 x 5 array: With cadmium sheet in center (see 224-228). Cadmium sheet also reduced to 15.00" x 25.50" x .025 mil.

Mass =  $\frac{6.129}{235}$  Kg.

1138 Water ht = 56.75 cm. System sub critical:

$$\begin{array}{r} 56.75 \\ - .70 \\ \hline 56.05 \end{array}$$

min top reflector = 17.31 cm

$\therefore$  c/p Mass =  $\frac{6.185}{235}$  Kg. and would have 4 x 6 array: With one plate in bottom row.

Water Temp  
 #3 = 23.0°C  
 #7 = 22.2°C  
 #8 = 22.2°C

4 x 6 array, (.750" in spacing) with two Cd sheets,

D	D	D	D	D	D
292	208	15	62	223	270
D	D	D	D	D	D
277	26	248	251	30	266
D	D	D	D	D	D
219	29	249	217	214	17
D	D	D	D	D	D
241	254	294	257	228	218

Cd sheet  
 $\rightarrow$  N  
 end sheet (D)

Mass =  $\frac{7.355}{235}$  Kg.

Elements are spaced (.750" in) in the vert position, and are in contact in the horz position. There is a cadmium sheet (18.00" x 25.50" x .025") between the first & fourth row! There are 24 full elements.

1417 Water ht = 58.30cm; system sub critical,

$$\frac{-70}{57.60}$$

min. Top reflection = 18.82 cm

Water temp.

#3 = 24.5°C

#7 = 22.5°C

#7 = 22.5°C

4x7 array (.750" <sup>width</sup> spacing) with 2 cl sheets.

0.25"

D	D	D	D	D	D	D
282	208	15	62	223	291	270
D	D	D	D	D	D	D
277	26	248	251	30	243	266
D	D	D	D	D	D	D
219	29	249	217	214	273	17
D	D	D	D	D	D	D
241	254	294	257	228	268	218

cl sheet (.025 mil)

cl sheet (.025 mil)

Lava Water ht = 70cm

Element one spaced (.750" in) as described ~~on page~~ on page

228. This array is a 4x7. Mass =  $\frac{8.581}{4.624 \text{ kg}}$  <sup>235</sup>

28 full elements.

cl sheet = 21.00" x 25.50" x .025" between 1st & 4th rows.

1519. Water ht = 58.40 cm; system slightly sub critical

$$\frac{-70}{57.70 \text{ cm}}$$

min. Top reflection = 18.56 cm

over



4 X 8 array: (.750" in spacing) with two cl sheets

D	D	D	D	D	D	D	D
282	208	15	62	223	291	270	290
D	D	D	D	D	D	D	D
277	26	248	251	30	243	226	211
D	D	D	D	D	D	D	D
219	29	249	217	214	273	17	245
D	D	D	D	D	D	D	D
241	254	294	257	228	268	218	105

cl sheet (.025 mil)

cl sheet (.025 mil)

Mass =  $\frac{8.65 \times 235}{1000} = 2.03 \text{ Kg}$

Spacing same as described on bottom of page 228: Elements D-290, D-211, D-295, D-105 have two fuel plates each:

cl sheet =  $21.375" \times 25.50" \times .025"$

Water Temp.  
 Run # 3 23.5°C  
 # 7 22.2°C  
 # 8 22.2°C

1606 + Prev: Water ht = 54.90 cm:

1610 System just critical: Water ht = 48.80 cm:

$\frac{48.80}{.170} = 287 \text{ cm}$

$\therefore \text{Mass} = \frac{8.636 \times 235}{1000} = 2.03 \text{ Kg}$

Min top reflection = 9.36 cm

INSTRUMENT CHECK

231

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	2"	✓	$10 \times 10^{-12}$
"	"	Fast ✓	2"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast ✓	2"	✓	"

R-1

R-2

PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	900V
"	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL-PROBE LIGHT

*Recheck of 4x8 array (described on page 230)*

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKA

Source in checked by BKA Source No. M-43

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

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

Red light on by BKA Time 0820

Start-up OK'd by E.D.C BKA Date 12-4-64

0840 Water ht = 48.80 cm: *light just critical!*  
 $- .10$   
 48.10 cm:

0945 Drain

Water Temp.  
 Room #3 = 23.0°C  
 #7 = 22.2°C  
 #5 = 22.2°C

232

Non 6.0'pc Element array's.

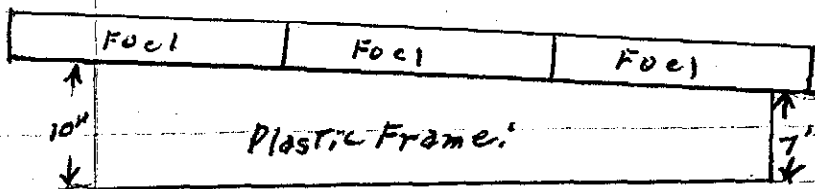
INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SFT	START-UP RANGE
K 10 X 10 <sup>-12</sup>		Meter -	1"	-	10 X 10 <sup>-12</sup>
"		Fast -	"	-	"
"		Meter -	1/2"	-	"
"		Fast -	"	-	"
700V		Alarm ✓	cont	-	500V
1200V		Low	10"	-	900V
"		Alarm	3"	-	"
LOG IN CALIBRATE ✓		OPERATE ✓			SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

3 X 4 array: spalling: - contact:

START-UP CHECK LIST

Equipment checked by AKN Personnel check by F.D.C  
 Instruments and safeties checked and reset by AKN  
 Sources in checked by AKN Source No. M-93  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: N-1 N-2 PM-1 PM-2  
 Red light on by AKN Time 1130  
 Start-up OK'd by F.D.C V.K.F. N.K. Date 12-7-64



Three (non 2.0p) elements are combined to make one (non 6.0p) element. Pattern below shows elements used to make one element:

3 x 4 array: contact spacing



1st 2nd 3rd 4th row:

0	0	0	0
253	217	206	273
277	291	270	22
13	223	30	29
0	0	0	0
218	249	62	214
241	294	251	282
26	248	15	247
0	0	0	0
254	105	201	257
319	268	202	246
228	211	205	208

wrap fuel length dim  
"gap" = 12" = 30.48 cm

Mass = 11.033 kg <sup>255</sup>

Zero = Water ht = 0.0 cm: at bottom of fuel (7" ht. on above) <sup>diag</sup>  
11.50 Water ht = 50.85 cm: system self-critical?

min. Temp reflector = 20.37 cm

Water Temp.  
= 20.0°C

over:

4 x 4 array; contact spacing.

N  
↑

Max fuel height  
38.10 in.     1st 2nd 3rd 4th - rows:

0	P	D	D
273	214	257	246
272	282	245	263
279	247	208	271
0	0	0	P
253	217	266	16
277	291	270	138
18	223	30	255
0	P	0	0
218	249	62	24
241	294	251	285
26	248	15	243
0	0	0	D
254	105	201	17
219	268	202	3
228	211	205	244

12.871  
Mass = 12.936 kg     235J

Low Water ht = 0.0 cm.

Now have a 4 x 4 array; Elements in 4th row have 11 fuel plates each.

1.430 + Per; Water ht = 36.45 cm. Min. Top reflector =

1.432 - Per; Water ht = 36.40 cm. - 1.7 cm

1.435 Drains:

1530 Removed 5 fuel plate from elements in each element in the 4th row; Each element now has 6 fuel plates each.     12.836     235J  
Mass = 12.896 kg.

1545 + Per; Water ht = 39.55 cm.

1547 System just critical; Water ht = 39.55 cm. Min. Top reflector = 1.45 cm

Water Loss

#8  
Room #3 = 22.5  
#1 = 21.0  
#2 = 21.0

1550 Feed rate = 5.95  $\text{cm}^3/\text{min}$ : "Max Feed rate"  
 3" Drain valve = 7.40  $\text{cm}^3/\text{min}$ :  
 3" Dump valve = 7.60  $\text{cm}^3/\text{min}$ :  
 Feed rate set to 5.0  $\text{cm}^3/\text{min}$ : 0 - 5.0  $\text{cm}^3/\text{min}$

## INSTRUMENT CHECK

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

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

## START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKAJ

Source in checked by RKAJ Source No. M-43

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

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

Red light on by RKAJ Time 0905

Start-up checked by F.D.C O.K.F.R.M.J Date 12-8-64

4x4 array: contact spacing:

Same array as shown on page 234. Removed 3 fuel plates from each element in the 4th row: each element now has 3 fuel plates each: Mass = <sup>11.534</sup> 11.592 Kg <sub>235U</sub>

0935 Water ht = 55.20 cm: System sub critical:  
 Min. reflector = 17.1 cm

Water Temp:

Room #1 = 21.6 °C

#2 = 19.5 °C

#3 = 19.2 °C

<sup>11.78</sup>  
 Cpn = 11.844 Kg

3x4 array: .500" spacing:

1st 2nd 3rd 4th - Rows

Max top of fuel = 33.00 cm

P	D	D	D
253	217	266	16
277	291	270	138
18	223	30	253
D	D	D	D
218	249	62	24
241	294	251	235
26	248	15	243
D	D	D	D
254	185	201	17
219	268	202	8
228	211	205	244

<sup>9.027</sup>  
 mass = 9.072 Kg <sub>235U</sub>

Now have a 3x4 array: .500" spacing: Elements in the 4th row have 6 fuel plates each. Mass = <sup>9.027</sup> 9.072 Kg <sub>235U</sub>

12:15 Water ht = 52.55 cm: System sub critical:  
 Min. top reflector = 15.03

Water Temp:

#1 Room = 22.7 °C

#2 = 20.0 °C

#3 = 20.0 °C

3 x 4 orragi, 500" spacing:

added 3 fuel plates to each element in the 4<sup>th</sup> row. Element in the 4<sup>th</sup> row now have 9 fuel plates each

$M_{acc} = 9.450 \text{ Kg}$  <sup>9.483</sup> <sub>~35)</sub>

1532 + Per: Water ht = 43.10 cm.

1535 Water ht = 41.75 cm: System just critical.

Min top reflector = 8.73 cm

$M_{om} = 9.324 \text{ Kg}$  <sup>9.28</sup> <sub>~35)</sub>

Water Temp.

#1 = Room	= 22.5°C
#2	= 21.7°C
#3	= 20.0°C

9

00



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-RANG.
3 X 10 <sup>-12</sup>		Motor ✓	3"	✓	10 X 10 <sup>-12</sup>
"		Fast ✓	"	-	"
"		Motor ✓	3"	-	"
"		Fast ✓	"	-	"
700V		Alarm ✓	cont	-	500V
900V		Low ✓	8"	-	900V
"		Alarm ✓	2"	-	"

LOG IN CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

4 X 5 array: 1.250" spacing:

START-UP CHECK LIST

- Equipment checked by AKH Personnel check by F.D.C
- Instruments and safeties checked and reset by AKH
- Source is checked by AKH Source No. M-43
- Emergency equipment in control room checked by F.D.C
- Instruments in trip circuit: K-1 K-2 PM-1 PM-2
- Red light on by AKH Time 1510
- Start-up OK'd by F.D.C D.K.F. AKH Date 12-9-69

Now have a 4 X 5 array. 1.250" spacing. Elements in the 5<sup>th</sup> row (page 239) have 3 fuel plates each.  
<sup>13.21V</sup>  
~~Mass = 15.288 Kg~~ ~ 35V

4x5 array: 1.250" spacing:

1st 2nd 3rd 4th 5th - Room.  
 max temp of fuel  
 77.6-5 mm

<sup>0</sup> 221	<sup>0</sup> 290	<sup>0</sup> 204	<sup>0</sup> 229	<sup>0</sup> 244
237	234	212	250	8
230	231	286	213	17
<sup>0</sup> 266	<sup>0</sup> 273	<sup>0</sup> 257	<sup>0</sup> 245	<sup>0</sup> 285
270	282	214	22	243
30	208	39	247	24
<sup>0</sup> 253	<sup>0</sup> 217	<sup>0</sup> 218	<sup>0</sup> 249	<sup>0</sup> 138
277	291	241	294	255
18	223	26	248	16
<sup>0</sup> 264	<sup>0</sup> 105	<sup>0</sup> 201	<sup>0</sup> 62	<sup>0</sup> 263
219	268	202	251	271
228	211	205	15	246

Zero Water ht = 0.0 cm.

1543 + Pa; Water ht = 48.60 cm.

1546 System just Critical; Water ht = 48.40 cm; <sup>Water Temp.</sup>  
 #1 = Room: 29.0°  
 #2 = 22.2°  
 #3 = 21.9°  
 min. temp reflector = 0.78 cm

1547 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-L RANGE
K-1	$10 \times 10^{-12}$	Meter ✓	1/2"	-	$10 \times 10^{-12}$
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1/2"	-	"
"	"	Fast ✓	"	-	"
PM-1					
PM-2	700V	Alarm ✓	cont	-	500V
PM-3	1200V	Low ✓	10"	-	900V
"	"	Alarm ✓	1"	-	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		_____			

4 X 5 array; 1.250" in spacing.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKP

Source in checked by AKP Source No. M-43

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

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

Red light on by AKP Time 11:15

Start-up OK'd by F.D.C AKP / Date 12-10-69

Zero water ht = 0.0 cm.

Same array as described on pages 238 & 239.  
 Except element in the 5<sup>th</sup> row now have  
 only 1 fuel plate each: Mass =  $\frac{17.877}{14.952}$  kg  $\sim 35$

4x5 mmoy: 1.250" in spacing:

241

1140 + Pen: Water ht = 50.40 cm

1143 Water ht = 50.10 cm: h<sub>crit</sub> just critical:  
min. Top reflector = 2.48 cm

1145 Drain:

Water Temp.

#1 Room: 23.2°C

#2 22.2°C

#3 22.0°C

$$\therefore \overset{14.71}{q_m} = 14.784 \text{ Kg: } \sim 35 \text{ J}$$

2 ft Elements - Sid

INSTRUMENT CHECK

INST	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	2"	-	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1/2"	-	"
"	"	Fast -	"	-	"
PM-1	700V	Alarm ✓	cont	-	500V
PM-2	1200V	Low -	15"	-	900V
"	"	Alarm -	2"	-	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80  
 DUMP WELL PROBE LIGHT  7

2 ft elements  
 Slab array's: 2 X 16 spacing = .500" in.

START-UP CHECK LIST

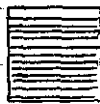
Equipment checked by AKA Personnel check by I.D.C.  
 Instruments and safeties checked and reset by AKA  
 Sources in checked by AKA Source no. M-93  
 Emergency equipment in control room checked by I.D.C.  
 Instruments in this circuit: K-1 K-2 PM-1 PM-2  
 Checked on by AKA Time 1400  
 Started on by I.D.C. / AKA Date 12-16-69

Now have a 2 X 16 array, as shown on page 243. Spacing = .500" in. both directions  
 Mass = 9.856 Kg <sup>9.857</sup> 205

2X16 array . . 500" in spacing :

243

221	22	282	294	259	212	273	218	219	62	251	290	250	237	214	229
236	213	15	205	18	247	29	231	230	208	211	26	30	248	228	223



Fuel plates in  
this array are in  
the long position:

14:40 Fuel rate = .30 cm to 1.70 cm = 1.40 cm/min:

14:50: Shut down due to a leak in 1.5" in feed valve;  
system was not brought to critical:

16:15 Replaced <sup>with</sup> new water feed valve:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	REF	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	2"	-	10 X 10 <sup>-12</sup>
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1/2"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	-	500V
PM-2	1200V	Low ✓	16"	-	900V
"	"	Alarm ✓	2"	-	"

LOG N CALIBRATE  OPERATE  SOURCE NO. B-80

DUMP WELL FLOOD LIGHT

2 X 16 array; .500" in spacing.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKAJ.

Source in checked by RKAJ Source No. M-93

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

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

Red light on by RKAJ Time 0810

Start-up OK'd by F.D.C. RKAJ Date 12-17-69

Same array as shown on page 243.

2 X 16 array: .500 in spacing.

$M_{ow} = \frac{9.807}{9.856} \text{ kg} \approx 35^\circ \text{J}$

Zero Water ht = 0.0 cm: at bottom of element (ref. p. 170, for example)

0830 Water feed rates = 1.0 cm to 5.8 cm = 4.7 cm/min:

0840 Water ht = 34.80 cm: system sub-critical:

0848 Drain:

Water Temp  
 #1 = Room = 23.2  
 #2 = 22.2  
 #3 = 22.2

3 X 16 array: 0.0 in spacing:

Elements in the top row have 6 fuel plates each: all elements are in contact:

$3 \left(\frac{6}{2}\right) = 0.273 \text{ in} + 2(5) + 1 = 7.273 \text{ in} = 18.47 \text{ cm}$

18.47 cm

266	268	234	202	249	227	201	222	209	207	204	210	226	105	238	242
221	22	282	294	257	212	273	218	219	62	251	290	250	237	214	229
236	213	15	205	18	247	29	231	230	208	211	26	30	248	228	223

$M_{ow} = \frac{11.174}{11.260} \text{ kg} \approx 35^\circ \text{J}$

11.27 + Per: Water ht = 36.60 cm.

aver:



Zero Water ht = 0.00 cm.

1132 Water ht = 32.30 cm: System just critical:

1133 Drain:

min. rpl. height = 13.83 cm.

Water Temp.

# 1 - Room = 22.2

# 2 = 22.2

1200 Found that source was still in; Repeated # 3 = 22.2  
e.g.t above:

1245 Water ht = 37.50 cm: System sub critical: source  
out; ∴ critical water ht reported at 1132 of 32.30  
cm was false due to source being left in: ??  
min. rpl. height = 19.03 cm.

1315 added 2 fuel plates to each element in top  
row of array: (see diagram on page 245) Mass = 11.648  
16.70  
Each element now has 8 fuel plates each: K<sub>g</sub> 235J

1334 + Per; Water ht = 26.80 cm:

1336 Water ht = 26.60 cm: System just critical: source out to  
min. top rpl. ht = 7.9 cm

1338 Drain:

1341 Source in: adding water to reach critical ht.

1355 +Per: Water ht = 26.70 cm: Same out;

1357 -Per: Water ht = 26.60 cm:

∴ Gr Water ht at just critical = 26.65 cm:  
which is with in 0.050 cm: of last critical ht:

$$Q_{pm} = \frac{11.367}{11.424} \text{ Kg: }^{235}\text{U}$$

1400 Drains:

Water Temp.  
#1 - Norm 23.0°C  
#2 = 22.8°C  
#3 = 24.2°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Alarm	2"	✓	10x10 <sup>-12</sup>
"	"	"	"	✓	"
K-2	"	Alarm	1/2"	✓	"
"	"	"	"	✓	"
P-1					
P-2					
P-3	700V	Alarm	5"	✓	500V
P-4	1200V	Low	16"	✓	900V
"	"	Alarm	2"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

4 X 16 array: Spacing = .50" vert. & .50" horz. / See  
 1.50" horz. spacing / Diagram below

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source gas checked by AKH Source No. M-43

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

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

Hot light on by AKH Time 0815

Start-up OK'd by F.D.C (AKH) Date 12-18-64

Low water ht = 0.0 cm: (bottom of element)

~~Now~~ <sup>now</sup> have a 4 X 16 array: spacing in the vert portion = .50" and 1.50" in the horz portion: 64 full elements:

max fuel weight = 44.45 gm

1 <sup>st</sup>	17	217	222	266	16	243	244	246	24	271	207	209	263	210	234	238	1.5"
2 <sup>nd</sup>	253	245	268	241	249	201	204	202	242	105	138	258	277	8	254	270	1.5"
3 <sup>rd</sup>	221	22	282	294	62	257	212	251	290	273	218	219	250	237	214	229	1.5"
4 <sup>th</sup>	236	213	18	15	205	247	29	231	230	208	211	26	30	248	228	223	

19.613 20"  
 Mon = 19.711 kg 0

0843 + Per: water ht = 27.80 cm:

0845 Water ht = 27.60: system just critical:

Prime reflector = -16.83 cm

Water Temp:  
 Room #1 = 23.5 °C  
 #2 = 22.2 °C  
 #3 = 22.2 °C

3 X 16 array; spacing =  $\begin{matrix} .50'' \text{ vert} \\ 1.50'' \text{ long} \end{matrix}$  249

0900 Now have a 3 X 16 array. (page 248). Remount top (new) of array shown of page 245. Spacing the same: 48 full elements. Mass =  $\frac{14.710}{14.784} \text{ kg}$   
max fuel ht = 33.02 cm

0932 Water ht = 29.40 cm. System just critical.  
min. reflector ht = 3.64 cm

Same array as above: 3 X 16 array; spacing =  $\begin{matrix} .50'' \text{ vert} \\ 2.0'' \text{ long} \end{matrix}$  } Spacing

1020 Increased spacing in the long position to 2.0" vert position still .50"  
Mass =  $\frac{14.710}{14.784} \text{ kg}$   
max fuel ht = 35.52 cm

1042 Water ht = 37.60 cm. System just critical. (count out)  
min. reflector = 2.04 cm

1043 Drain: water temp. = 22.2°C

3 X 16 array:

1125 Same array or above: 3 X 16; spacing =  $\begin{matrix} .50'' \text{ vert} \\ 2.50'' \text{ long} \end{matrix}$   
Increased spacing in the long position to 2.50" in vert position still .50"  
Mass =  $\frac{14.710}{14.784} \text{ kg}$   
max fuel height = 15" = 38.1 cm

1145 Water ht = 54.70 cm. System very sub critical;  
min. reflector = 16.6 cm

1147 Drain: Water Temp. = 22.2°C

temp.  
22.5°C  
22.2°C  
22.2°C

array

4 X 16 array: spacing = 1.50" vert position  
2.50" long position.

1330 Now have a 4 X 16 array: (page 248) vertical spacing  
still .50" but horizontal spacing now 2.50" in. 64  
full elements: <sup>15.413</sup> Mass = 19.712 kg <sup>135J</sup>  
max fuel length = 52.07 cm

1420 Water ht = 53.50 cm: system just critical: <sup>same as</sup> 50  
min. Top reflector = 3.43 cm

1422 Drain:

Water Temp  
= 22.2°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	cont	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
F-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	1.2"	✓	900V
"	"	Alarm ✓	cont	✓	"
LDC-N CALIBRATE ✓		OPERATE ✓	SOURCE No. B-80		

## START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH.Instruments and safeties checked and reset by AKH.Source in checked by AKH Source No. M-43Emergency equipment in control room checked by AKH.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKH Time 11:00Start-up OK'd by C.C. AKH Date 1-4-65

4 X 16 array: spacing =  $\begin{matrix} .50'' \text{ vert position} \\ 2.625'' \text{ hor position} \end{matrix}$

Same array as shown on page (248): vertical spacing still .50"; Horz spacing now 2.625"  
 6.4 full elements:  $\begin{matrix} 19.613 \\ \text{Mass} = 19.7 \pm 2 \text{ Kg} \end{matrix}$   $\begin{matrix} 235 \\ \text{J} \end{matrix}$   
 max fuel length = 53.0 cm

From

Water ht = 0.0 cm

Min top reflector = 18.68 cm

1140

Water ht = 71.70 cm: System sub-critical;  $\begin{matrix} \text{same} \\ \text{and} \end{matrix}$ 

1141

Drain:

Water Temp:

#1 = Room = 23.0°C

#2 = 22.5°C

#3 = 22.5°C

∴ For 4 X 16 array

spacing =  $\begin{matrix} .50'' \text{ vert position} \\ 2.5625'' \text{ hor position} \end{matrix}$ 

1407

Now have a 3 X 16 array (removed 1st row see page 248). Vertical spacing still .50"; Horz spacing now = 2.250"; 48 full elements.  $\begin{matrix} 14.710 \\ \text{Mass} = 14.78 \pm 1 \text{ Kg} \end{matrix}$   $\begin{matrix} 255 \\ \text{J} \end{matrix}$   
 max fuel length = 36.83 cm

1433 Water ht = 54.60 cm. System sub critical:  
 Min Top reflector = 17.77 cm

1436 Drains:

Water Temp  
 #1 Room = 26.0°  
 #2 = 22.5°  
 #3 = 22.5°

1600 3 X 16 array; Vertical spacing still .50" in. Horiz spacing  
 now 2.125" 48 full elements. Mass = <sup>14.71</sup> ~~12.7~~ 14.71 g (55)  
 Max fuel length = 36.195 cm

1616 + Pres Water ht = 41.20 cm; critical water ht  
 = 41.15 cm.

1619 - Pres Water ht = 41.10 cm:

1620 Drains: Min Top reflector = 4.95 cm

∴ For 3 X 16 array

spacing = .50" vertical  
 = 2.186 ± .001

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10X10 <sup>-12</sup>	Meter ✓	1"	—	—
"	"	Fast ✓	"	—	—
K-2	"	Meter ✓	1/2"	—	—
"	"	Fast ✓	"	—	—
R-1					
R-2					
PM-1	700 <sup>v</sup>	Alarm ✓	Cont	—	—
PM-2	1200 <sup>v</sup>	Low —	18"	—	—
"	"	Alarm ✓	1"	✓	—

LOG N CALIBRATE  OPERATE  SOURCE No. 13-80  
 DUMP WELL PROBE LIGHT

4 X 16 array .50" w/ht spacing  
 .50" between 1<sup>st</sup> & 2<sup>nd</sup>  
 5.0" between 1<sup>st</sup>, 2<sup>nd</sup> - 3<sup>rd</sup> & 4<sup>th</sup>  
 1.50 between 3<sup>rd</sup> & 4<sup>th</sup>.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-43

Emergency equipment in control room checked by F.D.C (AKA)

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

Red light on by AKA Time 1015

Start-up OK'd by F.D.C (AKA) Date 1-5-64<sup>65</sup>

Zero Water at 0.2 cm

1 <sup>st</sup>	17	217	222	266	16	243	244	246	24	271	207	209	263	210	234	238	1/2
2 <sup>nd</sup>	253	245	268	241	249	201	204	202	242	105	138	258	277	8	254	270	5.0"
3 <sup>rd</sup>	221	22	282	294	62	257	212	251	290	273	218	219	250	237	214	229	1/2"
4 <sup>th</sup>	236	213	18	15	205	247	29	231	230	208	211	26	30	248	228	223	



10.20 Max have a 4x16 array: 64 full elements.  
 see page 253. spacing in vertical pos = .50"  
 and between 1st & 2nd row's = .50. spacing between  
 3rd & 4th row = .50". The spacing between the  
 1st, 2nd, from the 3rd & 4th = 5.0"  
 Each slab contains  $5.807 \text{ kg } ^{235}\text{U}$   $\text{Mass} = \frac{19.613}{19.712} \text{ kg}$  (Both slabs)

11.20 - Peri: Water ht = 48.65 cm.

11.25 Water ht = 48.70' - system just critical.  
 Min. Top reflector = 0.44 cm

11.27 Drain:  
 Max. fuel height = 48.76 cm  
 Water Temp.  
 #1 Room = 22.5°  
 #2 = 22.7°  
 #3 = 22.5°

12.50 Same array as above except spacing separating  
 the 1st & 2nd from the 3rd & 4th = 5.25" in 64 full elements  
 Max fuel ht: 48.90 cm  $\text{Mass} = \frac{19.712}{19.613}$

13.37 + Peri: Water ht = 50.60 cm. critical water ht: 50.55 cm.

13.40 - Peri: Water ht = 50.50 cm. Min. Top reflector = 1.65 cm

13.41 Drain:  
 (Water Temp)  
 #1 Room = 22.5°  
 #2 = 22.5°  
 #3 = 22.7°

14.35 Same array as above except spacing separation the 1st & 2nd  
 row from the 3rd & 4th row = 5.375"  
 64 full elements  $\text{Mass} = \frac{19.613}{19.712} \text{ kg}$

TREK YOUNG 71-11220

1522 F. Per. Water ht = 51.40 cm.

1526 Water ht = 51.20 cm. System just critical;

1527 Drain:  
 Max. fuel height = 45.2 cm  
 Min. fuel height = 1.59 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	Cont	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	1"	✓	"

LOG-N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

4 x 16 array:

## START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C.Instruments and safeties checked and reset by AKMSource in checked by AKM Source No. M-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKM Time 0830Start-up OK'd by F.D.C. AKM Date 1-6-65

Same array as shown on pages 253, 254, 255. Spacing separating 1<sup>st</sup> & 2<sup>nd</sup> row from the 3<sup>rd</sup> & 4<sup>th</sup> row now = 5.625". Max fuel lit = 49.85 cm

0912 + Per: Water ht = 53.55 cm

0915 System joint critical: Water ht = 53.40 cm

0916 Drains: Min Top reflector = 3.55"

Water temp.

#1 Room = 22.0°

#2 = 23.0°

#3 = 23.0°

1030 Same array: spacing separating 1<sup>st</sup> & 2<sup>nd</sup> row's from the 3<sup>rd</sup> & 4<sup>th</sup> rows now = 5.875".

Max fuel height = 50.48 cm

1106 + Per: Water ht = 55.80 cm

1110 Water ht = 55.65 cm. System joint critical:

1111 Drains:

Min Top reflector = 5.32 cm

1305 Same array; spacing separating 1st & 2nd row from  
the 3rd & 4th row now = 6.875". Max. fuel 27 =  
53.02 cm

1347 Water ht = 70.60 cm; system sub critical;  
min top reflector = 17.58 cm

Water Temp.  
#1 Room = 25.5  
#2 = 22.5  
#3 = 22.5

1400 Same array; spacing separating 1st & 2nd row from  
the 3rd & 4th row now = 6.375".  
Max. fuel length = 51.75 cm

1520 Water ht = 69.90 cm; system very slightly sub critical;  
same aut. = -Pw = -434.6 w = 3.3 f  
min top reflector = 18.45 cm

1525 Drain.

Water Temp.  
#1 Room = 23.0°C  
#2 = 23°C  
#3 = 23°C



**INSTRUMENT CHECK**

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
F-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	900V	Alarm ✓	1"	✓	"

LOG N CAL. DATE 1/7/65 OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT \_\_\_\_\_

**START-UP CHECK LIST**

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

Instruments and safeties checked and reset by AKA

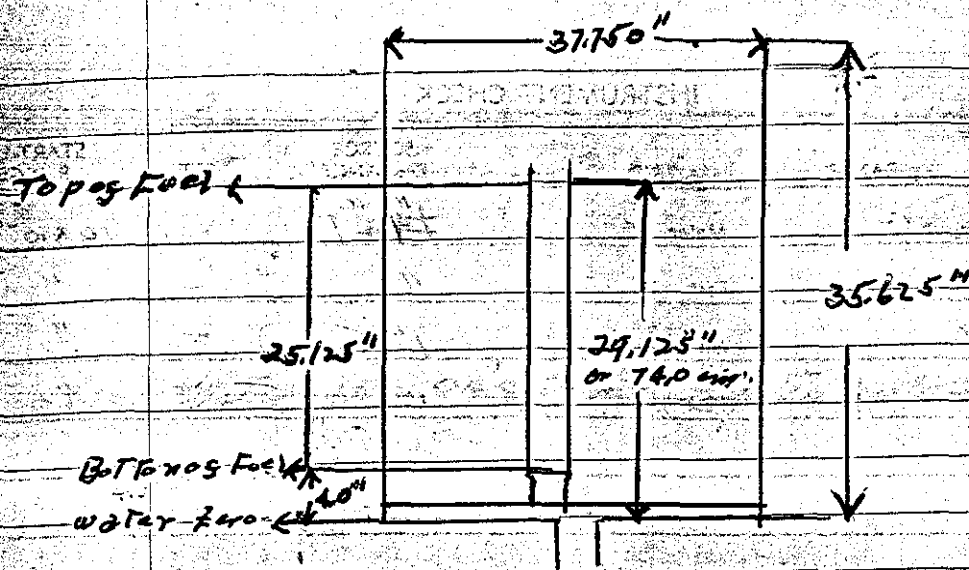
Source in checked by AKA Source No. M-43

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

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

Red set on by AKA Time 1425

Start-up OK'd by F.D.C./AKA Date 1-7-65



Fuel rate = 3.8 cm/min.  
 Drain (1/2") = 4.2 cm/min.  
 Pump (3") = 39.7 cm/15 sec.

4 x 4 array, .50" spacing

Zero - Norm = 0.0

208	230	231	29	- 1st
138	17	244	271	- 2nd
24	243	217	246	- 3rd
285	263	255	16	- 4th

Water Temp  
 #1 - Room = 23.0°C  
 #2 = 23.6°C  
 #3 = 23.5°C

4 x 4 array, .50" spacing: 17 fuel elements. Elements in first row have 2 fuel plates each.

Mass = 3.789 kg

1.550 Water hts = 74.60 cm; System just Critical.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	-	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓		✓	500V
PM-2	1200V	Low ✓	1"	✓	900V
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		OPERATE	SOURCE No.		B-40
DUMP WELL PROBE LIGHT					

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-23

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

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

Red light on by AKM Time 0810

Start-up OK'd by F.D.C. AKM Date 1-8-05



4x8 array .50" in spacing: 261

Same array as shown on page 259: 12 full elements:  
But now have only 1 fuel plate in first row elements.

Mass = 3.752 Kg

0850 Water ht = 84.85 cm: System sub-critical!

1045 Same array as shown on page 259: 12 full elements, and  
2 fuel plates in each element in first row: Elements  
# 16 & 285 in 4th row have be rotated 90°

Mass = 3.808 Kg

1137 + Per: Water ht = 74.80 cm

1190 Water ht = 74.60 cm: System just critical.

1141 Drain: Water Temp = 22.5°

1230 Same array as shown on page 259: except element # is 16.  
255, 263, 285 & 29, rotated 90°

1300 - Per: Water ht = 74.40 cm:

1304 Water ht = 74.50 cm: System just critical:

1305 Drain:



4 x 4 array .50" in spacing.

1320 Same array as shown on page 259. Except now elements #5, 263, 285, 24, 243, 138, 17, 208 and 230 are rotated 90° from other half of array.

1409 H<sub>2</sub>O Overight 77.3 cm. Critical.

1415 Dropped H<sub>2</sub>O to 75.4 cm for long period.

1430 H<sub>2</sub>O at 77.3 cm. Critical

1434 Dump.

Temp: #1 22.5; #2, 24.0; #3, 24.0

Rotated elements 208 and 230 50° to take "leaving off above array; this orients them as they were in original array.

1518 H<sub>2</sub>O Overight 74.5 cm. + period (slightly)

1521 H<sub>2</sub>O at 74.4 cm. Slightly long term

1523 H<sub>2</sub>O at 74.4 cm. Critical

Temperatures: #1 25.0; #2 = 23.0; #3 = 24.0

1526 H<sub>2</sub>O at 74.8 cm for + period long term.

1531 Dump. This period was 8.9, corresponding to a height change of 0.4 cm. i.e.  $\frac{1}{2}$  in 8/cm

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$10 \times 10^{-12}$	Meter <input checked="" type="checkbox"/>	1"		$10 \times 10^{-12}$
"	"	Fast <input checked="" type="checkbox"/>	"		"
K-2	"	Meter <input checked="" type="checkbox"/>	1"		"
"	"	Fast <input checked="" type="checkbox"/>	"		"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	Cont		500V
PM-2	1200V	Low <input checked="" type="checkbox"/>	14"		900V
		Alarm <input checked="" type="checkbox"/>	1"		"

LOG N CALIBRATE OPERATE 

SOURCE No. B-80

DUMP WELL PROBE LIGHT 

4x4 array: 50" spacing:

## 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-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKM Time 10:00Start-up OK'd by F.D.C. AKM Date 1-11-65

4x4 array: 50" spacing:

Purpose of exp. is to reduce critical mass by rounding of array.

AKM

N

29	285	16	231
138	17	244	271
24	243	217	246
208	263	255	230

3.789 kg  
 Mean = 3.808 kg

N


plate pos:

Elements # 29, 231, 208 & 230 have 5 fuel plates each.  
 " # 138, 24, 271 & 246 have 19 fuel plates each.

1045 Water ht = 67.00 cm system just critical.

1057 Removed 2 fuel plates <sup>each</sup> from elements # 29, 231, 208 & 230  
 These elements now have 3 fuel plates each.  
 Mean = 3.696 kg

1128 Water ht = 71.10 cm system just critical.

1129 Drain:

Water Temp:  
 #1 Room = 23.0°  
 2 = 22.5°  
 3 = 23.5°

12410 Removed 1 fuel plate each from elements # 29, 231, 208 & 230. These elements now have <sup>3.62</sup>Mass = 3.62 Kg 2 fuel plates each.

1241 System just critical; Water ht = 74.45 cm.

1242 Drain:

1248 Removed 1 fuel plate each from elements # 29, 231, 208 & 230. These elements now have <sup>3.566</sup>Mass = 3.566 Kg 2 fuel plates each.

1320 Water ht = 84.25 cm; System sub critical; Power level not high enough for measuring - Per.

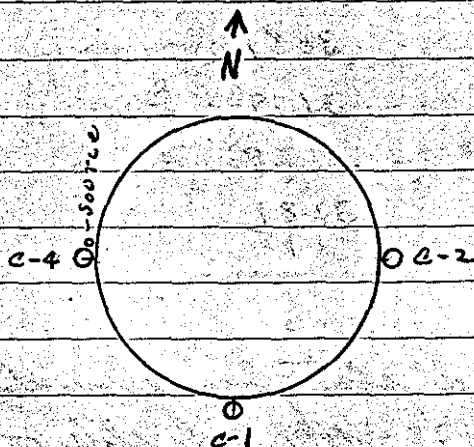
1322 Drain:

Water Temp:

#1 = Room = 22.5°C

2 = 23.8°C

3 = 23.7°C



Counter pos for mult effs:

COUNTERS

Date 1-11-65

Channel	Detector	Amplifier	Gain	Rise Time	P.S	NV
C-1	1946	44B PA+	—	—	—	1500
	2 <sup>nd</sup> P <sub>23</sub>	123801 LA	16	0.2	23	—
C-2	1947	249 PA+	—	—	—	—
	2 <sup>nd</sup> P <sub>23</sub>	100300 LA	16	0.2	10	1500
C-3	—	—	—	—	—	—
	<del>511</del>	—	—	—	—	—
C-4	1939	502 PA+	—	—	—	—
	511 P <sub>23</sub>	100263 LA	16	0.2	29	1500

(2mv detector sensitivity)

1.4.2.5 Water ht = 84.40 cm. Assy is the same as described at bottom of page 265.

Mass = 3.584 kg.

Water temp  
 = 1: 100m 23.50  
 2: 22.50  
 3: 23.50

2 min counts:

C-1	C-2	C-4	Mass
3254	3126	309738	
3358	2937	311779	
3251	3087	311188	Mass
3321	3179	310619	= 3.584 kg
3369	3179	308892	
3227	3181	306923	
AVG 3297	AVG 3115	AVG 309857	

1.4.5.0 Removed 1 fuel plate from elements # 29, 231, 271, 246, 230, 208, 24 & 138. all fuel plate or out of elements # 29, 231, 230 & 208. Elements # 271, 246, 24 & 138 have 18 fuel plates each. Mass = 3.472 kg.



2 min count.

C-1	C-2	C-4	
2951	2055	308226	
2906	2044	306717	Mass = 3.472kg
2967	2035	308605	
2929	1980	309047	
AVG 2938	AVG 2029	AVG 308149	

1515 Removed 4 fuel plate each, from elements # 285, 16, 255 & 263. These element now have 18 fuel plate each.  
Mass = 3.248kg

2 min counts.

C-1	C-2	C-4	
2976	1931	308228	
2915	2002	306857	
2955	1983	305220	
2966	1995	307578	
AVG 2953	AVG 1978	AVG 306971	

1530 Removed Elements # 16, 285, 24, 198, 255, 263, 246 and 271 (each of which contained 18 plates), and the empty boxes of # 231, 29, 206, & 230.  
Mass = 1.232kg

2 min counts

C-1	C-2	C-4	
2954	1929	305336	
2913	1922	304813	
2939	1911	306018	
AVG 2935	AVG 1921	AVG 305389	

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SEE	START-UP RANGE
K-1	10x10 <sup>-12</sup>	Meter <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	10x10 <sup>-12</sup>
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	cont	<input checked="" type="checkbox"/>	"
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	cont	<input checked="" type="checkbox"/>	500V
PM-2	1200V	Low <input checked="" type="checkbox"/>	18"	<input checked="" type="checkbox"/>	900V
"	"	Alarm <input checked="" type="checkbox"/>	2"	<input checked="" type="checkbox"/>	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

*Big lid:*

8 X 8 array, spacing = 1.50" with 1.50" long with cd sheet (0.25 mil) between rows. insert for

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 0820

Start-up OK'd by F.O.C AKH Date 1-13-65

8 X 8 array: Spaced at optimum (50") 269  
 with (.025 mil) sheet spaced in center of row as  
 shown below.

	1/2"								
1/2"	17	243	30	271	246	263	244	255	→ ed (.025 mil) (27.5 X 25.125)
	29	230	217	231	24	138	16	258	→ ed ( " ) "
	210	268	26	241	248	211	201	249	→ ed ( " ) "
	242	105	8	277	18	336	15	213	→ ed ( " ) "
	250	237	223	229	202	221	204	222	→ ed ( " ) "
	238	234	253	245	266	209	222	267	→ ed ( " ) "
	270	254	229	214	257	62	282	294	→ ed ( " ) "
	247	205	251	212	290	273	219	218	

19.613  
 Mass = 19.712 kg

Few 0.0 cm: bottom of fuel;

0910 Water ht = 92.50 cm. System very sub critical.

No multiplications on start up - range;

0915 Drain;

Water Temp.

~~22.0°C~~ 22.0°C



270

1-13-65

Array now in tank, as shown on Page 259.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-L RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	✓	
	"	Fast ✓	"	✓	
K-2	"	Meter ✓	1"	✓	
	"	Fast ✓	"	✓	
P-1					
PM-1	7005	Alarm ✓	cont	✓	
PM-2	12005	Low ✓	14"	✓	
	"	Alarm ✓	1"	✓	

LOG N CALIBRATE  OPERATE  SOURCE No. B-80  
 DUMP WELL PROBE LIGHT

4 x 4 array, 50" spacing.

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-13

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

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

Red light on by AKM Time 12:10

Start-up OK'd by F.D.C. Date 1-13-65

N

29	285	16	231
138	17	244	271
24	243	217	246
208	263	255	230

N

5 			5 
15 			15 
15 			15 
5 			5 

Plate Pos.

Elements # 29, 231, 208, & 230 have 2 fuel plates each;  
 Element # 138, 24, 271, 246 have 19 fuel plates each;  
 all other elements shown above are full elements.

Mass =  $\frac{3.6 \times 10^4}{3.6 \times 10^4} \approx 35$

12:50 + per. Water ht = 74.60 cm

12:52 - per. Water ht = 74.53 cm

12:53 Drain:

Temp.

#1 Room = 22.5°

2 = 22.5°

3 = 23.5°

13:00

Elements # 29, 231, 208 & 230 have 4 fuel plates each;  
 Elements # 138, 24, 271 & 246 have 17 fuel plates each;  
 all other elements shown above are full elements.

Mass =  $\frac{3.6 \times 10^4}{3.6 \times 10^4}$

13:33 Water ht = 72.10 cm; System just critical;

Elements # 29, 231, 208 & 230 now have 5 plates each.

Elements # 138, 24, 271 & 246 now have 16 plates each.

All other elements shown are full elements.

$$\text{Mass} = 3.640 \text{ kg}$$

1410 Water h<sub>5</sub> = 71.85 cm; system just critical;

1411 Drain;

Elements # 29, 231, 208 & 230 have 5 plates each.

Elements # 138, 24, 271 & 246 now have 15 plates each.

All other elements shown are full elements.

$$\text{Mass} = 3.584 \text{ kg}$$

1442 Water h<sub>5</sub> = 74.20 cm; system just critical;

Elements # 29, 231, 208 & 230 have 5 plates each.

Elements # 138, 24, 271, & 246 now have 14 plates each.

All other elements shown are full elements.

$$\text{Mass} = 3.534 \text{ kg}$$

1520 H<sub>2</sub>O height = 77.8 cm. Critical.

Temp. # 1 = 25°, # 2 = 22.5°, # 3 = 24.5°

Elements # 29, 231, 208 & 230 have 5 plates each.

Elements # 138, 24, 271 & 246 now have 13 plates each.

All other elements shown are full elements.

$$\text{Mass} = 3.472 \text{ kg}$$

1550 Water ht = 84.20 cm; system sub critical.

1-14-65 added 6,725 cc of  $UO_2(NO_3)_2$  solution (412 g/l) (381.52 <sup>235</sup>g/l)  
 to reflector water in dump tank. Volume of dump tank  
 = ~ 641.0 l. This addition of solution gives about  
 4.0 g <sup>235</sup>U in dump tank.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	—	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm —	cont	—	500V
PM-2	1200V	Low ✓	14"	—	900V
"	"	Alarm —	cont	—	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKV

Source in checked by AKV Source No. M-93

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

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

Red light on by AKV Time 1335

Start-up OK'd by F.D.C. AKV Date 1-14-65

4x9 oring 50" opening (optimum) in No.2 (No.3) solution  
 $\sim 49 \frac{239}{L}$   
 N

29	285	16	231
138	17	244	271
24	242	217	246
208	263	255	230

Fuel rate = 5.9 cm to 7.0 cm = 1.6 cm/min.

N


plate pos,

13.45 - Element # 29, 231, 208 & 230 have 5 fuel plates each.  
 Elements # 138, 24, 271, 246 now have 13 fuel plates each.  
 all other elements shown above one fuel element  
 22 plates each.  
 Now = 3.455 kg



1438 + Per: solution ht = 56.20 cm

1439 Trying to level:

1443 Solution ht = 56.03 cm System just critical:

Solution Temp.

#1 Room = 23°

2 = 23.0°

3 = 24.0°

1450 Drain:

~~1525~~  
~~1510~~ Same loading as above. Prepare to recheck.  
Just critical ht.

1554 Solution ht = 56.04 cm: System just critical:

1555 Drain:

Temp.

#1 Room = 22.5°

2 = 23.9°

3 = 24.0°

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10x10-12	Meter	1"	✓	10x10-12
	"	Fast	"	✓	"
K-2	"	Meter	1"	✓	"
	"	Fast	"	✓	"
PM-1	700V	Alarm			out
PM-2	1200V	Low	1 1/2"	✓	900V
	"	Alarm	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by PKH Personnel check by F.D.C  
 Instruments and safeties checked and reset by PKH  
 Source in checked by PKH Source No. M-43  
 Emergency equipment in control room checked by F.D.C  
 Instruments in trip circuit: K-1 K-2 PM-2  
 Red light on by PKH Time 0820  
 Start-up OK'd by F.D.C PKH Date 1-15-65

3 x 4 array, spacing = .50" (optimum) in  $\text{CO}_2$  ( $\text{NO}_2$ )<sub>2</sub>  
 solution = 4.09  $\frac{\text{cm}^3}{\text{g}}$ .

N

29	285	16	231
138	17	244	271
24	243	217	246

N


plate pos.

Elements # 29 & 231 have five fuel plate each.  
 Elements # 138, 271, 24 and 246 have 13 fuel plate each.  
 all other elements shown above are fuel elements.  
 Mass =  $\frac{2.70}{2.776} \text{ kg}$

0908 solution ht = 84.30 cm kepler sub critical.

0910 Drain

Temp.  
 #1 Room = 22.2°C  
 #2 = 22.2°C  
 #3 = 23.5°C



0945 Fuel samples taken from dump tanks: #1 sent to Y-12  
#2 sent to X-10. #1-A & 2-B held for checks.

1-25-05

#1 Reg # 684436	#2 Reg # A-949
G = 106.6 g	G = 94.5 g
T = 16.9 g	T = 16.4 g
N = 89.7 g	N = 78.1 g

Y-12: out for:	X-10: out for
1. $Zr/g.$ = .004258	1. $Zr/g.$ = 4.3021 g
2. $Sp. gr.$ = 1.0020	2. $Sp. gr.$ = 1.0043
3. $Pyro 40.$ =	3. $Density.$ = 1.0016

1025 Same array as shown on page 277: Except elements  
#29, 231, 24 & 246 have 9 fuel plates each. all other  
elements are full elements (22 plates each.)  
Mass = 2.968 kg <sup>953</sup>

1114 Solution ht = 70.25 cm: System just critical.

1115 Drain:

1225 Removed 2 fuel plates each from elements # 138 & 271. These  
elements now have 20 fuel plates each. Element # 29, 231  
24, & 246 have 9 fuel plates each. all other elements are  
full elements.  
Mass = 2.912 kg <sup>2,897</sup>

1300 Solution ht = 72.10 cm: System just critical.

Temp.  
 #1 - Room = 22.5°C  
 2 = 23.5°C  
 3 = 24.0°C

1305 Drain solution down to 24.00 cm:

1310 Removed 2 fuel plates each from elements #138 & 271.  
 These elements now have 14 fuel plates each. Elements  
 #29, 234, 24 & 246 have 9 fuel plates each. All other  
 elements are full elements.

2.84  
 Mass = 2.856 kg

1340 Solution ht = 74.47 cm: System just critical.

Temp.  
 #1 - Room = 23.0°C

1345 Drain solution down to 24.00 cm:

#2 = 22.5°C  
 #3 = 24.5°C

1348 Removed 2 fuel plates each from elements #138 & 271.  
 These elements now have 14 fuel plates each. Elements  
 #29, 231, 24 & 246 have 9 fuel plates each. All other  
 elements are full elements.

2.786  
 Mass = 2.800 kg

1618 Solution ht = 77.70 cm: System just critical.

Temp.  
 #2 = 23.5°C  
 3 = 24.5°C

see

1428 Drain solution down to ~34.0 cm.

1431 Removed 2 fuel plates each from elements # 138 & 271  
 These elements now have 14 fuel plates each. Elements  
 # 29, 231, 245 & 246 have 9 fuel plates each. all other  
 elements are full elements.

<sup>2.730</sup>  
 Mass = 2749 Kg

1455 Solution ht. = 84.35 cm. System slightly sub Critical;  
 beam out. - Neg Per = ~94 mc.

~~1500~~ Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 <sup>-12</sup>	Meter ✓	1"	✓	10 X 10 <sup>-12</sup>
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont.	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT \_\_\_\_\_

START-UP CHECK LIST

Equipment checked by EBT/AM Personnel check by RKR

Instruments and safeties checked and reset by EBT

Source in checked by AM Source No. M-43

Emergency equipment in control room checked by AM

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

Red light on by AM Time 0830

Start-up OK'd by EBT/AM Date 1-18-65

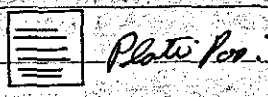
Purpose is to check last critical; of 1-15-64 same now.  
 added 2 fuel plates each to elements # 138 & 271.  
 These elements now have 16 fuel plates each. Elements  
 # 29, 231, 24 & 246 have 9 fuel plates each, all  
 other elements are full elements.  
 Mass <sup>238</sup> 2.800 kg.

0937 Solution ht = 77.60 cm System just critical;  
 " " 77.70 " " 1-15-65

0940 Drain; Temp.  
 # 1 Room 21  
 # 2 = 23.0°C  
 # 3 = 23.5°C

N  
A

295	16	231
17	244	271
243	217	246
29	138	24



Notes  
with  
pen

over:

118105

1030

Now have a 3x4 array (P 291). Element # 29, 138, and 24 have 5 fuel plates each. All other elements are full (22 plate) elements.

Mass =  $2.567 \frac{14}{4} \cdot 35$   
 $2.782$

1005

System just critical: solution ht = 71.70 cm.

1106

Drain:

1115

Removed 1 fuel plate each from elements # 29, 138 & 24. These elements now have 4 fuel plates each. All other elements are full (22 plate) elements. Mass =  $2.525$   
 $2.940 \text{ kg}$

1158

Solution ht = 74.00 cm; System just critical:

Temp.  
 #1 = 29.0°  
 #2 = 22.5°  
 #3 = 23.5°

1159

Drain:

Removed 1 fuel plate each from elements # 29, 138 & 24. These elements now have 3 fuel plates each. All other elements are full (22 plate) elements. Mass =  $2.883$   
 $2.878 \text{ kg}$

1327

Solution ht = 76.625 cm; System just critical:

1335

Removed 1 fuel plate each from elements # 29, 138 & 24. These elements now have 2 fuel plates each. All other elements are full (22 plate) elements. Mass =  $2.841$   
 $2.856$

1400

Solution ht = 84.25 cm; System slightly sub critical.  
 - Per = 133.99 sec = 14.36 f

1406

Drain:



INSTRUMENT CHECK

283

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	✓	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80  
 DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKJ Personnel check by EDC

Instruments and safeties checked and reset by AKJ

Source in checked by AKJ Source No. M-43

Emergency equipment in control room checked by EDC

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

Red light on by AKJ Time 0905

Start-up OK'd by EDC AKJ Date 1-19-65

Purpose is to check last critical HT of 1-18-64.  
 3x4 array (page 281). Elements # 29, 108 and 29 have 3 fuel  
 plates each. all other elements are full (22 plate) elements.

Mass = 2.878 kg  
 2.183

0.850 Solution ht = 76.62 cm: System just critical.

Temp.  
 1 - 3.0°C  
 2 - 21.0°C  
 3 - 23.3°C

INSTRUMENT CHECK

INSTR	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 K10 <sup>-12</sup>	Meter ✓	1"	✓	10 K10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	low	✓	500V
PM-2	1200V	Low ✓	1 1/2"	✓	900V
"	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. 13-80

DUMP WELL PROBE LIGHT

3 x 4 way; with 0.4% B/l

START-UP CHECK LIST

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

Instruments and safeties checked and reset by MAH

Source in checked by MAH Source No. M-23

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

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

Red light on by MAH Time 0815

Start-up OK'd by F.D.C MAH Date 1-22-63

added ~1397.4g of H<sub>3</sub>BO<sub>3</sub> to dump tank. This gives ~0.4% B/l in (4.02<sup>20235</sup> of VO<sub>2</sub>(NO<sub>3</sub>)<sub>2</sub>) solution.

3 x 4 array:

1/22/65

Elements # 29, 138 & 24 have 3 fuel plates each, all other elements one full (22 plate) element.

$\dot{M}_{max} = 2.8991 \text{ kg}$

N  
↑

285	16	231
17	244	271
243	217	246
29	138	24



Plate Pos.

Temp.  
 $T_1 - Room = 250$   
 $T_2 = 22.58$   
 $T_3 = 240$

0850 Solution  $h_5 = 84.15 \text{ cm}$ ; System very sub critical;

0552 Drain:

0925 3 x 4 array; all elements shown above one full element (22 plates).

$\dot{M}_{max} = 3.696 \text{ kg}$

0950 Solution  $h_5 = 84.25 \text{ cm}$ ; System very sub critical;

0951 Drain:



4 x 4 array:

4/22/65

N  
↑

255	285	16	231
263	17	244	271
208	243	217	246
230	29	138	24



Plate Pos.

10:00 Now have a 4 x 4 array: all elements shown above are full elements. (22 plates each).

4,923  
Mass = 4,928 Kg.

10:32 Solution  $nt = 84.20$  cm: system sub critical. (low multiplication.)

10:35 Drain:

4 x 5 array:

N  
↑

255	285	16	231
263	17	244	271
208	243	217	246
230	29	138	24
229	214	268	210



Plate Pos.

4/22/65

12:05 Now have a 4x5 array; all elements shown are full elements. (22 plates each)  $\text{Mass} = 6.129 \text{ kg}$

12:40 Solution ht = 63.05 cm; System just critical;

12:40 Drain:

Temp  
#1 = 23.0°C  
2 = 23.0°C  
3 = 24.0°C

12:54 Remove 7 fuel plates each from elements # 229, 214, 268, & 210. All other elements are full elements (22 plates each).

$\text{Mass} = 5.739 \text{ kg}$

13:20 Solution ht = 67.25 cm; System just critical.

13:21 Drain solution down to ~ 26.0 cm;

Remove 3 fuel plates each from elements # 229, 214, 268 & 210, all other elements are full elements (22 plates each)

$\text{Mass} = 5.293 \text{ kg}$

13:50 Solution ht = 74.60 cm; System just critical.

Drain solution down to ~ 35 cm; Removed 2 fuel plates each from elements # 229, 214, 268, & 210. These elements now have 5 fuel plates each, all other elements are full elements. (22 plates each)

$\text{Mass} = 5.152 \text{ kg}$

1/22/65

1422 + Per; solution ht = 79.90 cm:

1425 - Per; solution ht = 79.70 cm:

1428 solution ht = 79.72 cm: system just critical

1429. Drain: -  
Samples taken:

1500 Remained 1 fuel plate each from elements # 229, 214, 268 & 210. These elements now have 4 fuel plates each, all other elements are full (22 plate elements)

$$\text{Mass} = \frac{5.176}{5} + 52 \text{ kg}$$

1530 Solution ht = 84.25 cm: system slightly sub critical  
Bever level not high enough for measuring Temp.

- Per:

Drain:

Temp: #1 - Room = 24.0°C  
2 = 23.0°C  
3 = 24.5°C  
g/m = 5.180 <sup>key V</sup> <sub>20 plates</sub>  
5.15

Four samples taken from dump tank: 1 sent to X-12  
1 sent to X-10. Two held for later.

#1 - X-12	Ry 0684443	X-10	A-950
G = 114.5g	sub for	G = 113.3	sub for
T = 19.2	1. g/g 0.004012	T = 18.5	1. g/g
N = 95.3	2. Density 1.0021	N = 94.8	2. Density
	3. % of Boron .0401		3. % of Boron
		density = 1.0013	
		g/g = 4.32 mg/ml	
		% B = 0.397 mg/ml	

1/25/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	SOURCE DISTANCE	SET	START-UP RANGE
K-1	16 x 10 <sup>-12</sup>	1"		10 x 10 <sup>-12</sup>
"	"	"		"
K-2	"	1"		"
"	"	"		"
R-1				
R-2				
PM-1	700V	1"		500V
PM-2	1200V	19"		900V
"	"	1"		"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

4 x 5 array

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AMH

Source in checked by AMH Source No. M-F3

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

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

Red light on by AMH Time 0810

Start-up OK'd by F.D.C. AMH Date 1-25-65

Purpose is to check last critical lot of (1-22-65) Fuel elements # 229, 214, 268, & 210 have 5 fuel plates each, all other elements are full (22 plate elements) see page 286 for array. 5.18V Mon = 5.208

0852 solution ht = ~~79.72~~<sup>80.68</sup> cm system just critical

0855 + Per: solution ht = 84.20 cm:  
 $= 264.37 \text{ mm} = 4.44 = 1.25 \%$

0912 Per: solution ht = 79.71 cm:  
~~467.20 mm~~ = -3.04 3.14 %

0918 Drain:

1100 Four samples taken from dump tank. 1 sent to X-12  
 #1 to X-10, two held for later:

#1 - Y - Reg # 684444  
 G = 110.6 out for:  
 T = 19.3 2.4% .003966  
 N = 91.3 density = 1.0027  
 %B .0390

X-10 - A-856  
 G = 104.7 calfo  
 T = 19.2 density  
 N = 85.5 2.4%  
 density = 1.0008  
 2.4% = 4.29 mg/ml  
 %B = 0.385 mg/ml

5x5 array: Boron = ~0.6 g/l

Added 704.712 g of  $^{14}\text{N}_3\text{B}_3\text{O}_3$  salt to solution.

255	285	14	231	290
263	17	244	271	219
208	243	217	246	251
230	29	138	24	8
229	214	268	210	218

 Plate Pos.

1410 Now have a 5x5 array: All elements shown above one full (22 plate) element: Mass = <sup>7.66</sup>7.700 kg

1439 + Per; Solution ht = 66.00 cm.

1421 - Per; Solution ht = 65.95 cm.

1422 Drain.

1500 Removed 16 fuel plates <sup>each</sup> from elements # 229, 214, 268, 210, & 218. These elements now have 6 fuel plates each. All other elements shown above one full (22 plate) element. Mass = <sup>6.547</sup>6.540 kg

1520 H<sub>2</sub>O Height 81.3 cm. Subcritical.

1526 Added 2 fuel plates each to element # 229, 214, 268, 210 & 218. These elements now have 8 fuel plates each. All others one full (22 plate) element. Mass = <sup>6.686</sup>6.710 kg

1546 H<sub>2</sub>O Height = 81.5 cm. Subcritical

1550 added 2 fuel plates each to elements # 229, 214, 268, 210 & 218. These elements now have 10 fuel plates each, all other elements are full (22 plate) elements:

Mass = <sup>6.826</sup> 6.860 kg

1615 solution ht = 76.15 cm: system just critical:

1616 Drains:

Temp  
 21 - Room 29°C  
 2 - 23.5°C  
 3 - 24.5°C

1620 Four samples taken:

#3 & 3A (1-25-65) & 4 & 4A (1-25-65)

R# 68445

Y-12 (43-1-25-65)

X10 (4-1-25-65) A-957

C = 110.0 sub for  
 T = 18.4  $\rho_{7g} = 1.004097$   
 N = 91.6g density = 1.0039  
 %B = 1.0567

C = 107.9 sub for  
 T = 18.7  $\rho_{7g} = 1.0041$   
 N = 89.2g density = 1.0026  
 %B = 0.575

Samples 3A & 4A (1-25-65) held for later.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X10 <sup>-12</sup>	Meter ✓	1"	—	10 R10 <sup>-02</sup>
"	"	Fast ✓	"	—	"
K-2	"	Meter ✓	1"	—	"
"	"	Fast ✓	"	—	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	—	500V
PM-2	1900V	Low ✓	14"	—	900V
"	"	Alarm ✓	cont	—	"
LOG IN STATE	✓	OPERATE	—	RUN NO.	B-80
DUMP W/...					

5 x 5 array.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AMV

Source in checked by AMV Source No. M-43

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

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

Red light on by AMV Time 0810

Start-up OK'd by F.D.C. AMV Date 1-26-65

5 x 5 array.

Purpose is to check last critical ht. (1-22-65) shown on page 292. Elements # 229, 214, 269, 210 & 218 have 10 fuel plates each. all other elements are full (22 plates) elements. (see page 291)

6.826  
Mass = 6.860kg

0850 Solution ht = 76.18cm. System just critical:

$\therefore \gamma_m = 6.790 \pm 2 \text{ plates}$



5x6 array: 0.87 g/l

added 700.9749 H<sub>2</sub>BO<sub>3</sub>

IV  
↑

213	255	285	16	231	290
207	263	17	244	271	219
222	208	243	217	246	251
15	230	29	138	24	8
248	229	214	268	210	218

≡≡≡ Plate Pos.

5x6 array: all elements shown above are full  
(22 plate) elements.

9.194  
Non = 9.240 kg

1300 To insure proper mixing, brought solution ht up to ~  
40.0 cm. Dumped.

1335 Solution ht = 74.90 cm. System just critical

Temp -  
#1 = Room 23.5°C  
2 = 23.5°C  
3 = 24.5°C

1345 Remove 1 full plate for each of elements # 248, 229,  
214, 268, 210, & 218. These elements now have 21 full  
plates each. All other elements are full (22 plate)  
elements.

9.110  
Non = 9.156

1400 Solution ht = 76.20 cm. System just critical.

N

290	219	251	8	219
213	255	285	16	231
207	263	17	294	271
222	208	243	217	246
15	230	29	138	24
248	229	214	268	210

 Plate pos

1420 Rearrange array shown on page 294. To above.  
 Elements # 210, 249, 229, 214 & 268 have 20 fuel  
 plate each. all other elements one full (22 plate)  
 element.  
 Mass = 9.100 kg

1442 Solution ht = 77.00 cm. System just critical.

Temp.  
 #1 = 23.50  
 2 = 24.00  
 3 = 24.50

1450 Removed 1 fuel plate each from elements # 210,  
 268, 214, 229 & 248. These elements now have 19  
 fuel plates each. all other elements one full  
 (22 plate) element.  
 Mass = 8.943 kg

1500. Solution ht = 79.55 cm. System just critical

8.90 ± 0.05  
 $\therefore G_m = 8.995 \text{ kg} \pm 2 \text{ plates.}$

Temp.  
 #1 = 24.50  
 2 = 23.50  
 3 = 24.50

1505 Drain:

15.20

Four samples taken: 1 sent to Y-12 & X-10; two held for later:

Y-12 Reg # 684446 (1-26-65) (1)      X-10 A-858 (1-26-65) (2)

C 110.7      oak for

C 100.4      oak for

T 18.4      density = 1.0028

T 17.8      density 1.0032

N 97.3g      24g = 004129  
%B = .0764

N 88.6g      24g = 4.32 mg/mil  
%B = 0.769 mg/mil

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 x 10 <sup>-12</sup>	Meter ✓	1"	-	10 x 10 <sup>-12</sup>
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM 1	700V	Alarm ✓	cont	-	500V
PM 2	200V	Low ✓	14"	-	900V
"	"	Alarm ✓	cont	-	"

100% CALIBRATE ✓      OPERATE ✓      SOURCE No. B-80

DURING WELL TRODE LIGHT \_\_\_\_\_

## START-UP CHECK LIST

Equipment checked by B.K.V. Personnel check by B.K.V.Instruments and safeties checked and reset by B.K.V.Source in checked by B.K.V. Source No. M-43Emergency equipment in control room checked by B.K.V.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by B.K.V. Time 0800Start-up OK'd by \_\_\_\_\_ Date 1-27-655 X 6 array: 0.89%<sup>2</sup>


0800 Purpose is to check test critical ht of (1-26-65 page 295). Elements 210, 268, 214, 229, 248 have 19 fuel plates each, all other elements are full (22 plate) elements. 8.543  
W<sub>now</sub> = 9.0304g

0840 Solution ht = 79.70 cm. System just critical:

Temp:  
#1 = 22.5°C  
#2 = 23.5°C  
#3 = 24.0°C

6 X 6 array:  $0.9 \frac{8}{16}$ added 271.547 g of  $H_2BO_3$  + 68.106g of  $B_2O_3$ . Salt.

290	219	251	8	218	238
213	255	285	16	231	234
207	263	17	244	271	270
222	208	243	217	246	202
15	230	29	138	24	221
248	229	214	268	210	211

 plate Pos.

Elements 211, 210, 268, 214, 229, 248, have 19 fuel plates each. All other elements shown above are full (22 plate) elements.

$$M_{\text{now}} = 10.78 \frac{22}{19} \text{kg}$$

1007 added solution to a ht of  $\approx 40.0$  cm. Deepened to ensure proper mixing.

1039 solution ht = 71.65 cm: system just critical.

Temp.  
 # 1 = 10cm = 29.0°C  
 2 = 23.0°C  
 3 = 24.2°C

1095 Drain solution down to  $\approx 40.0$  cm. Remove 3 fuel plates each from element # 211, 210, 268, 214, 229, 248. These elements now have 16 fuel plates each. All other elements are full (22 plate) elements.

$$M_{\text{now}} = 10.58 \frac{16}{22} \text{kg}$$

1102 Solution ht = 73.85 cm: System just critical.

1107 Drain to ~ 40.0 cm: Removed 2 fuel plates from elements # 211, 210, 268, 214, 229, & 248. These elements now have 14 fuel plates each, all other elements are full (22 plate) elements.  
 $\text{Max} = 10.364$   
 $\text{Max} = 10.416 \text{ Kg}$

1120 Solution ht = 75.15 cm: System just critical.

~~1125~~  
~~1125~~ Drain to ~ 50 cm: Removed 1 fuel plate <sup>each</sup> from elements # 211, 210, 268, 214, 229, & 248. These elements now have 13 fuel plate each, all other elements are full (22 plate) elements.  
 $\text{Max} = 10.280$   
 $\text{Max} = 10.332 \text{ Kg}$

1143 Solution ht = 76.25 cm: System just critical:

1145 Drain:

1230 Removed 2 fuel plate each from elements # 211, 210, 268, 214, 229, & 248. These elements now have 11 fuel plates each, all other elements are full (22 plate) elements.  
 $\text{Max} = 10.113$   
 $\text{Max} = 10.167 \text{ Kg}$

1300 Solution ht = 84.20 cm: System very slightly sub critical:  
 $- \text{Re}_v = 296.61 \text{ sec} = -5.0 \text{ f}$

1305 Drain: to ~ 44.0 cm:

$\text{Temp} =$   
 $1 = 23.5^\circ$   
 $2 = 23.5^\circ$   
 $3 = 24.5^\circ$

1312 added 1 fuel plate each to elements # 211, 210, 208, 219, 229 & 248. These elements now have 12 fuel plates each, all other elements have full (22 plate) elements.  
 Mass =  $10.157 \times 10^3$  Kg.

1332 solution ht = 79.50 cm. system just critical:  
 $\therefore C_{fm} = 10.206 \pm 3 \text{ plates}$

1335 Drain to  $\sim 35.0$  cm.  
 Four samples taken: ~~sent~~

1345 Drain:

samples: 1 sent to Y-12. 1 sent to K10.

Y-12 Rep # 684447 (1) 1-27-65

G = 114.5g carb for  
 T = 18.7g density 1.0021  
 N = 95.84g  $\frac{g}{g}$  .004081  
 % B .0861

X-10 Rep # A-859 (2) 1-22-65

G = 118.6g carb for  
 T = 18.6g  $\frac{g}{g}$  4.32  $\frac{mg}{g}$   
 N = 100.0g density 1.0039  
 % B 0.863  $\frac{mg}{g}$