BOOK82R

Notes:
"Solutions #2" on front and on spine

Blank pages: page opposite page 1, 228, 232, 255, 297-300

-pages 4, 83, 96, 102, 107, 125, and 168 each have 1 graph attached to it
-page 39 has small sheet of paper attached
-page 77 has (8.5x11) sheet taped
-pages 82/83 has blank index-card size sheet between pages
-page 165 has yellow post-it note with "9. sphere h/x=126" on it
-pages 164/165 has (8.5x11) sheet between pages
-pages 186 and 191 have 1 blank post-it note on each page
-pages 193/194 have paper clip at top
-pages 198/199 have 4 graphs and 2 small pieces of paper (2 small stapled together) between pages
-page 245 has a copy of a graph stapled to it (not to legible)

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
August 31, 1999

SECRET

SOME INSTRUCTIONS FOR USE OF THIS NOTEBOOK

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

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

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

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

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

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

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

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

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

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

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

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

SECRET

SECRET

OAK RIDGE NATIONAL LABORATORY
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POST OFFICE BOX P
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NOTEBOOK NO. 5056

Assigned to: C. D. Callihan

Department: Applied Nuclear Physics

Location: Bldg. 9213, Y-12

Date: Oct. 19, 1955

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

Assignee is responsible for the safe-guarding of this notebook in accordance with security regulations.

Do not use scrap paper.

Be sure to record all personal conferences.

This notebook must be returned to Laboratory Records-Bldg. 4500 when completed or upon termination of assignee.

Subject

"This document consists of 309 Pages, No. Page 1 of 5-25-60 copies, Series A"

~~CLASSIFICATION CANCELLED~~
DATE 6/3/60
For the Atomic Energy Commission
for the
Chief, Declassification Branch

RESTRICTED DATA
This document contains restricted data as defined in the Atomic Energy Act of 1954. Its transmittal or the disclosure of its contents in any manner to an unauthorized

H/X = ~~337~~ 33

Probe zeroed
safety Blade fall checked
soln. Level holds
Pump Installed

Expr. 1 Time 10 ~~AM~~ PM Date 7/11/ 1956
Purpose Crit. Cond. & Pos. Period
10" Al. Cyl. Bare Outside Sid
Personnel: LWG, C.C., R.G., J.K.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time ____ AM PM Date ____ 195

1
Annuli
Type

All inst
Trip with
source

P.M., DC-2,
DC-3, LN

Feed rate Set at ~ 1 l. per 27 sec.
Feed rate increased to 90 cm³/sec
Not critical at 52 in.

Expr. 18 Time 9:35 ~~AM~~ PM Date 7/13/ 1956
Purpose Crit. Cond. + Pos. Period
10" Al. Cyl. Bare, outside Sid
H/X = 337
Personnel: JKF, KG, LWG

START-UP CHECK LIST
Equipment Checked by JKF Personnel Check by JKF
Instrument and Safeties Checked and Reset by JKF
"Source In" Checked by JKF Source No. 123
Emergency Equipment in Control Room Checked by JKF
Red Light On by JKF 9:35 AM
Start-Up OK'd by JKF Time ____ ~~PM~~ Date 7/13/ 1956

T = 71.5°F

Probe zeroed
Critical height not exactly established
source out
66.69" slightly super
66.62" slightly sub critical

Fuel ht. raised to 67.55" for Period
Fuel ht. raised to 68.61" for Period
drain Fuel, Blade (Safety in Fuel)

Blade adjusted - source in 11:26 AM
Fuel feed started
11:55 source out
Fuel height, inches

67.38" slightly super
66.86" slightly super
→ 66.81" ~ critical

Raise fuel height for Positive Period
67.82" Isec 467 Period from log N
fuel added → 68.84" 208
fuel added → 69.86" 126.5

M

52° AM

Expr. 2 Time ~~1:30~~ ~~PM~~ PM Date 7-16 1956
Purpose Critical conditions + Period in 12" dia. Al. C/L. outside Sid
Personnel: LWG - JKF - RG

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ____ Time ____ PM Date ____ 195__

~~H/X = 337~~

DC-3 Trips:
80 - 20x10
DC-3 Trips
70 - 20x10
PM trips
LN Trips
R-1 Trips

Period

7-16 PM had to fix dump drain valve
Crit ht. 12.815"
~~12~~. 1st period 12.827
2nd period 12.845
Dropped Blade - see chart on LN

Expr. 2B Time 9:30 AM ~~PM~~ Date 7/17/1956
Purpose Added 70 cm³ for Pos. Period by Pipette
Personnel: LWG JKF

crit ht. = 12.807"
10:25 A.M. fuel added with bubbler
fuel ht. after 70cc addition = 12.84"

Expr. 2C Time 10:50 AM ~~PM~~ Date 7/17 195__
Purpose ~~To add~~ 100 cm³ meas. by Pipette
Personnel: LWG R.G, JKF

100 cc added. Crit. ht. = 12.805"
Fuel ht. after addition = 12.858
11:30 AM Temp. = 80° F

4

PM tripped

at 1240 V

When LN = .0008

LN .007 ≃ 1140

LN = .8 ≃ 780

LN Distance ~ 5'

PM " ~ 8'

Expr. 2D

Purpose Period obtained by adding 100 cc measured by pipette 7/18 1956

Personnel: Fox, Irwin, Gilbey

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked by ✓ Set by ✓

"Source In" Checked by ✓ Source Set ✓

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓ A.M.

Start-Up OK'd by ✓ Time ✓ P.M. Date ✓ 195

Fuel Int	Log N	
12.815	.0008	crit.
12.81	.02	crit.
11:40 A.M	100 cc added	
12.86+		See chart

Temp 76.5°F

Expr. 2E Time 9:30 A.M. P.M. Date 7/19/1956

Purpose To obtain period with 60 cm³ added by pipette

Personnel: LWG, RG, URF

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked by ✓ Set by ✓

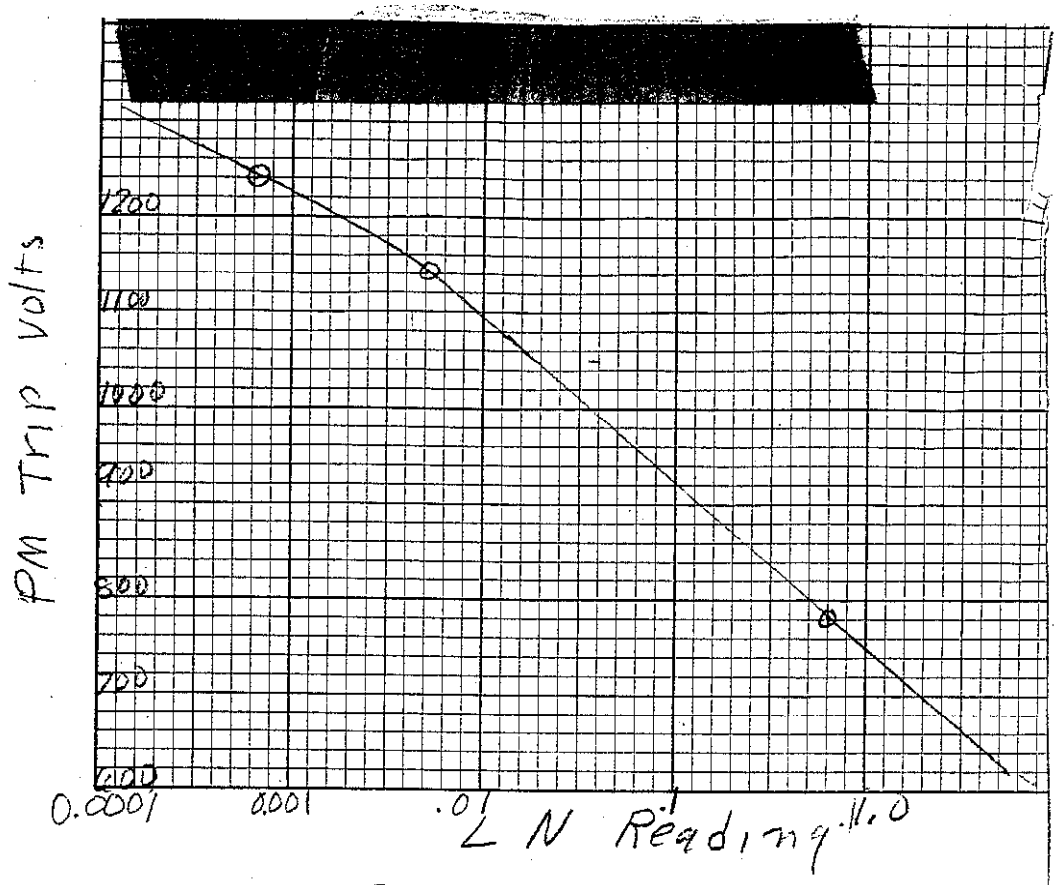
"Source In" Checked by ✓ Source Set 1 2 3

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓ A.M.

Start-Up OK'd by ✓ Time ✓ P.M. Date ✓ 195

crit. pt. ~~12.805~~ 12.795"


PM Trip Volts
1200
1100
1000
900
800
700
600
0.0001
0.001
.01
1
11.0
∠ N Reading

Outside

Expr. 2 F Time 1 ~~AM~~ PM Date 7/19/ 1956
Purpose To obtain period in 12 in dia cyl by adding 20 cc at critical using a pipette
Personnel: Fox, Irwin, Gilbert

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 2
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JWF Time 1 ~~AM~~ PM Date _____ 195_

Crit. ht. = 12,805 ✓

20 cc added – see chart

Temp = 77°

7/23/56 Sample taken

Reg # 35-4827 Sample # P-82

Gross 74.7241 gm

Tare 25.9941

Net 48.7300

Calibration of steel tube

cm Ht. per 10 cc added
6.5
11.1
15.9
20.7
25.5
30.4
35.3
40.1
45.0
49.9
54.8
59.7

Calibration of plastic "sight glass" used in calibrating tube

32.85 cm/10 cc

plastic tube ~~dia.~~ = 0.245"

average from above = 4.84 cm ht/10 cc for steel & plastic tube

Subtracting volume in plastic tube

4.84 cm ht/8.53 = 0.567 cm ht/cc

or 1.76 cc/cm

or 4.47 cc/inch

Expr. 2 G Time 1:20 ~~AM~~ PM Date 7/24 1956
Purpose Period measurement on 12" cyl. using "calibrated tube" method of adding fuel increments
Personnel: Tolz, Risteen

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

Note: The steel tube delivers ~~4.34~~ 4.46 cc/in to 12" reactor.

	Fuel ht.	T tube	Steel tube Syl reading	
.245"	12.705"	∅	9.93"	crit.
~~4 03 P.M.~~		402	15.11"	super
4 03 P.M.		202	20.11"	
4 09 P.M.		128	25.11"	
4 20			4.88"	sub

take H/X from sample 354 827

1.0000
-.0992
.9008

$$H/X = \frac{24.11 \times .9008}{.07110} = 331$$

.09990 gm U/cm³

Expr. C 2H 9:15 A 7/25 1956
Purpose Repeat of 2G to check reproducibility
Personnel: Fox, Gwinn, Hilley

Equipment
Instrument
"Source I:
Emergency
Red Light O:
Start-Up OK'd by JWG PM Date 195

14.98
9.71
5.27 = 23.5 cm³ fuel ht 12.695" Δh = .031 cm

	Tse	Steel tube scalyn reading	
	∞	9.71"	crit. (log N = .000)
	424	14.98"	log N = .004
20.15	195	20.15"	
9.71			
10.44	136	25.17"	

10:38 A.M.
10:45

11:00 Returned steel tube to 9.71 reading at log N reading = 1.0 and not crit. Raised tube to 10.20 and still not critical. Regular probe scalyn indicates = .05" leaked out.

H/x = 331

9

outside

3

Expr. ~~1~~ Time 9[33] AM PM Date 7/26 1956

Purpose Period measurement using 15" dia. cyl. Fuel additions made using 0.588 dia. steel tube

Personnel: J Jay, Kevin, Galley

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by —

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. —

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

Start-Up OK'd by JWJ Time AM PM Date 195

	Fuel ht.	Steel tube calagram reading	log N	
~~10,000~~				
.004				
10[18] AM	~~8.85~~ 8.85	~~5.04~~ 5.78"	~~.0005~~ .005	super

~~Safety~~

1[20] Safety blade support changed (made moveable)

		Tsec	
1[50] P.M.	8.85"+	6.91" .005 ∞ crit	reactor seems to be leaking thru dump valve very slightly
2[30] PM		11.91" 272	
2[37]		16.92" 114	
		20.43" —	

Average C.H. for 3, 3A-3F = 8.84"

.16

9.00" corrected for bottom plate

Note: The steel tube delivers 4.46 cc/inch[th] of tube is moved into 15" dia. cyl.

Expr. 3-A 1:20 P.M. 7/27 1954

Purpose Repeat of 2-I except dump well filled before critical to prevent leakage into it.

Personnel: Fox, Gwin, Tilley

Equipment Check: 1 2 3 Ready

Instrument and [illegible]

"Source In" Check [illegible]

Emergency Equip. [illegible] Inspected by

Red Light On by

Start-Up OK'd by GWH AM/PM Date 195

fuel ht. Steel tape Calsyn reading log N

1:45 8.85+ crit

1:5 Temp = 79°

1:45 Temp = 78.5°

There was a gradual drift in reactivity from crit. to sub. in above expr.

2:15 P.M. Drained back. Looked for leaks but found none.

Expr. Run in normal manner (dump well set, etc.)

fuel ht.

8.835 Temp 79°

(see next page)

steel tube

Selsyn	Probe	K
6.30	8.35	< 1
6.41	—	< 1
6.50	—	< 1
7.70	—	> 1
7.01	—	> 1
6.81	—	< 1
6.90	—	< 1
7.00	—	< 1
7.22		< 1
7.41		< 1

~~There was a critical drift down on charts.~~ K above indicates "drifts" on charts corresponding to steel tube position very near critical.

12

Expr. ~~2K~~ 3B Time 1:45 PM 7/30 1958
Purpose Period Meas. on 15" cyl
~~Plumbing Shaken~~ outside Bare
Personnel: LWG, R.G., J.F.

START-UP C[illegible]
Equipment Checked by ✓
Instrument and Safeties Checked [illegible] ✓
"Source In" Checked by ✓
Emergency Equipment in Control [illegible] ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time [illegible] Date [illegible] 195[illegible]

Examined Dump Valve Seems OK

slightly super at 8.83+"
Temp = 79° in solution

1:30 PM

Expr. 3C Time ~~4:00 PM~~ 7/31 1958
Purpose Period Meas. on 15" cyl
Reactor Covered to minimize evaporation
Personnel: LWG, R.G. J.F.

START-UP CH[illegible]
Equipment Checked by ✓
Instrument and Sa[illegible] ck by
"Source In" Ch[illegible] ✓
Emergency Eq[illegible] ✓
Red Light On [illegible] ✓
Start-Up OK'd [illegible] ✓ [illegible] 195[illegible]

PC-2 – 65x200
PC3 – 70x200
PM Trips
IR-1 Responds
LN Trips

fuel ht	steel cals	Tser	
8.83+	8.41"	∞	crit.
	~~8.~~ 13.17"	254 Period	
	9.22	∞	crit.
	13.98	290 Period	
	9.52	∞	crit
	23.63	76 Period	

Expr. 3D Time 142 ~~AM~~ PM Date 8-1- 195[illegible]
Purpose Period Meas on 15" Al c/l Bare, Dump Valve Blanked off
Personnel: LWG RG, JKF.

START-UP CHECK LIST
~~Equipment Checked by~~ ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
~~Source In'' Checked by~~ ____ Source No. ✓
Emergency Equipment in Control Room Checked by ✓
~~Red Light On by~~ ✓
Start-Up OK'd by ✓ Time ____ AM PM Date ____ 195__

4[14] Unable to maintain reactor at "just crit." after ~ 2½ hrs. Instruments indicate gradual loss of reactivity although fuel was added

Fuel ht.	Stel tube Selsyn			K
~~8.83~~"				
8.83	8.00"	∞	See T	≅ 1
4[15] PM	"	13.00"	255	2.88 x 10[4] > 1
4[22] PM	"	18.00"	120	5.45 > 1

Expr. 3E Time 955 AM ~~PM~~ Date 8-2- 195[illegible]
Purpose Period M. on 15" Al c/l Blanked off D.V & P. Drain.
Personnel: LWG, RG, JF,

START-UP CHECK LIST
~~Equipment Checked by~~ ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
~~Source In'' Checked by~~ ____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
~~Red Light On by~~ ✓
Start-Up OK'd by ✓ Time ____ AM PM Date ____ 195__

Fuel ht.	Stel tube Selsyn		See T
8.83"	8.60"	Crit.	∞
	11.60	> 1	478
	14.60	> 1	212
	17.60	> 1	135-139
	20.60	> 1	

Trip V.
DC-2 – 65 x 200
DC-3 – 75 x 200
LN Trips
PM "
R-1 Responds

14

Expr. 3F Time 1415 8-2- 1962
Purpose Period Meas. On 16" D.C.
Repeat of 3E
Personnel: LW G R.G J.F

Equipment Checked by ✓
Instrument and [illegible] ✓
"Source In" Checked by ✓
Emergency [illegible] 123
Red Light On ✓
Start-Up OK'd by ✓ 195

	Lead ht.	Steel tube Celsyn	Tree	K
3 AM. +4	8.83"	7.74"		<1
		9.91"	∞	~1
		23.96"	76	>1

70

Expr. 4 Time ____ AM PM Date 8/20 1956
Purpose period measurement on 20"x20" sl. vessel
Personnel: Fox, Gwin, Hilley

INSTRUMENT CHECK

Date ____ 195__ Time ____ AM Source No. ____
Inst ____
Det ____
Int ____
Trip ~80 on 10x20
Log N Trip
R-1 respond
R-2 ____
P. M. trip

START-UP CHECK LIST

~~Equipment Checked by~~ ____ Personnel Check by ____
Instrument and Safe[illegible] Checked and Re[illegible] ____
~~Source In~~ Checked by ____ [illegible] No. ____
Emergency Equipment in Control Room Checked by ____
Red Light On by ____ Time 9:30 AM
Start-Up OK'd by ____ Time ____ ~~PM~~ Date ____ 195__

	fuel ht.	Steel tube Selsyn reading	log N	T. Sec
7.04	* 6.88"	5.37"	.002	cut
11:08		10.37"		356
11:14		15.37"		170
		20.37"		102

11:20 Photo multiplier scanned system at log N=.2
Safety blade, dump, etc. operated properly
PM voltage set at 1040
Period rise was normal

* No. Bottom 1/4" Correction used - effect of 2" Central Pipe not known.
C.H. = 7.04" after correction for bottom plate

H/X = 331

Exp. 5-A Time 1,30 PM 8/22/1986
Purpose Critical height Experiment 64
30" dia. Al, Cu, bottom side Fed
H/X = 331
Personnel: Fox, Gilley, Gwinn

INSTRUMENT CHECK

Date ____ 195__ Time ____ AM PM Source No. ____

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	not used			
DC-2	trip	~ 60	20X10	
DC-3	trip	~ 85	20X10	
Log N	✓			
R-1	✓			
R-2				
P. M.	trip			

used 18" Dia safety Blade

START-UP CHECK LIST

Equipment Checked by ✓ Procedure Check by ✓
Instrument and Safeties Checked and Set by ✓
"Source In" Checked by ____
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by RG Time ____ AM PM Date ____ 195__

if trip occurs at start of exp. the safety blade will hit the bottom of the reactor.

At Selsyn reading (safety) of 985.55 safety begins to go in solution (first signs of decreased power).

C.H. = 6.36"
Corrected for bottom plate

fuel ht	Safety reading	
6.23"	985.55	just dirt
6.24"	986.57	
6.25"	988.31	

3:30 Probe zero checked; zero at ~~0.99.8~~ 0.06

Blade strake 19". Zero pos. of blade cocked 20" up from bottom

Expr. 5-B Time AM PM Date 195
Purpose Same as 5-A
Here 10" safety blade has replaced the 18" blade (annular blades).
Personnel: Fox, Brown, Tilley

START-UP CHECK LIST

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

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Instrument	No.	Scale	Source Distance	Start Up
DC-1				
DC-2	trip	at 60	on 10x20	
DC-3	"	" 60	on 10x20	
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

		fuel lbt	safety relays reading	
		6.27"	985.71	
		6.265"	"	g'vest unit.
		6.285"	988.13	" "
wer)	.03 m" ≅ 4066 m³	6.295	989.68	
		~~6.30~~ 6.305	991.92	
dit	9 32	6.30	990.36	see chart for period
	9 38	6.30	989.55	" " " "
		6.30	989.08	" "

C. H. ≅ 6.40 corrected for bottom plate

H/X=331

Expr. 5-C

Purpose Sandia S-13 (Period measurement 8/24 1956
These here safety and blade (4" cross → +
put in instead of 16" annular safety,

Personnel: Jerry crosby, Kelley

INSTRUMENT CHECK

Date _____ 195__ Time _____ AM PM Source No. _____

Instrument	Trip Value	Scale	Source Voltage	Start-Up Scale
DC-1				
DC-2	trip	on 65	on 10 x 20	
DC-3	trip	" 75	on 10 x 20	
Log N	trip			
R-1				
R-2				
P. M.	trip			

CH-CL

Equipment Checked by _____ Check by ✓
Instrument and Safeties ... ✓
"Source In" Checked by _____ ✓
Emergency Equipment in ... Room ✓
Red Light On by ✓
Start-Up OK'd by _____ time 10 30 AM PM 195__

fuel ht	Safety blade calcyn reading	Tadadden	
* 6.32"	986.07		~~just crit.~~ super
"	986.40		just crit.
6.32 5/8"	991.15		" "
6.32 +	996 +		" "
6.32 +	0.0	TDec	" "
6.32 +	"	2.15" ∞	" 8 "
1st period		12.15" 354	~~2.37 x 10⁻⁴~~
2nd "		19.15" 168	~~4.53 x 10⁻⁴~~
		27.15" 98	~~7.07 x 10⁻⁴~~

* Crit. ht. 6.32 - .04 = 6.28
.14" → correction for bottom plate
6.42"

Expr. 5D Time ____ AM PM Date 8/27/ 1956
Purpose 30" Dia. Cyl. Bare; Added 4-½" sheets of 2-S Al plates to Bottom
Personnel: LWC, JKF

4" cross for safety

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

DC-2 - Trips 50X200
DC-3 " 80X200
LN - "
PM - "

probe corrected Fuel Lt.
$C_H = 5.985$ 6.045" just crit.
Temp = 81.5° F

Expr. 5E Time ____ AM PM Date 8/27/ 1956
Purpose Same as above except: 2-½" sheets Al added to bottom
Personnel: LWC, JKF

Check List OK.

probe corrected Fuel Lt Tadded
$C_H = 6.085$ 6.145" 4.80 just crit. T_{sec}
" " 11.80 positive period 391
" " 18.80 " " 169
" " 25.8 " " 103

Extrapolation of C.H vs Thickness of Al bottom indicates .17" change due to ½" Al.

20

Safety Blade:
9" wide (APPR.)
48" stroke
up ~ 50" set.

2 15 PM changed Probe & re-zeroed

Expr. 6A Time 1 PM 8-28 1961
Purpose C.C. for 6" Al slab at ~~K~~ = 331 Bare
Personnel: LWG JKF

$k_\infty = 331$

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. ✓
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time _____ AM PM Date _____ 196_

DC-2 — Tr 35 x 200
DC-3 — " 90 x 200
R-1 — Resp.
LN — Trips
PM — Trips

Fuel ht. ~ 1.5 cm
47.82" just critical
Fuel Temp. ! ? Thermocouple broke Rm T. 81

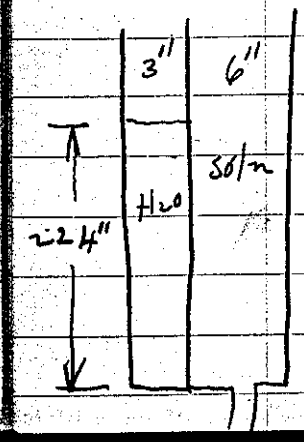
See p 135 Interaction Book, ~~Expt 65 — 6" slab Bare~~ Expt 71 " "

Expr. 6B Time 145 AM PM Date 8-29 1961
Purpose C.C. for 6" Al slab partially refl. on one side
Personnel: LWG JKF

DC-2 — 35 x 200
DC-3 — 80 x 200
PM — Trips
LN — "

Safety Blade Lowered to ~ 38" set. pos.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. ✓ 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time _____ AM PM Date _____ 196_



Crit. fuel ht = 13.26"

~13

H/X = 331

Expr. 6C Time 1[20] AM PM Date 8-29 195[6]
Purpose Same as above except water ht lowered to ~ 13"
Personnel: LWG, JKF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by JKF Time _____ PM Date _____ 195__

5x200
1x200
p.
3
1

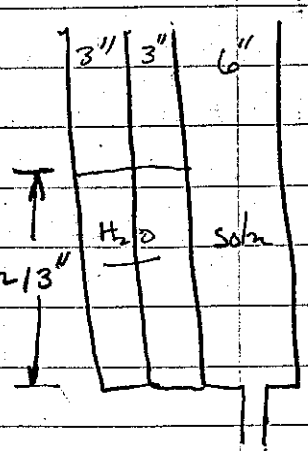
Fuel Temp.
27.5° C

Crit fuel ht. = 13.6[illegible]
Dropped safety b. - very potent
→ Corrected for equal heights = 13.59"

Expr. 6D Time 3[00] AM PM Date 8-29 195[6]
Purpose C.C. for 6" Al slab reflected on one side with 2-3" slabs containing H2O
Personnel: LWG C.C., JKF

35x200
80x200
Trips
"

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by JKF Time _____ PM Date _____ 195__



Crit fuel ht. 13.26

See Expt. 147 In Interaction Book
also Expt 7A in this book

22

Expr. 6E Time 332 AM PM Date 9-6 1956
Purpose Same as above, except Refl. on side, bottom & end
Personnel: LWG C.C, IRF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by GKT Time AM PM Date 195

H/X = 331

Plexiglas reflector on bottom & end.

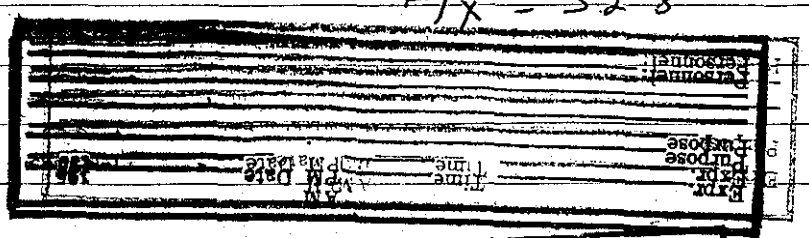
1" 9 ca th Wa Co 35

Fuel ht.
11.99 just crit
Fuel Temp 25°C

H/X = 328

gm H/gm = 0.07684
Sp. gr. = 1.0963

Co re



Blade Falls Freely

Expr. 7A Time 110 AM PM Date 10-5 1956
Purpose Crit. Cond 6" Slab against Concrete Wall - Bare otherwise
Personnel: C.C. TF, J.F

Probe zeroed

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by GKT Time AM PM Date

DC-2 Trips 50 - 20x10
LN, PM & R-1 Trip OK

Concrete Wall — Conduit — Solid Con. Blocks 6"x16" — Concrete Wall

Dish ht.
12.77 w Super crit
12.76 Sub. "

4/x = 32.8

Expr. 7B Time 3 12 AM PM Date 10-5 1956
Purpose Same as above except that 1/4" Boral sheet added between concrete wall and 6" slab
Personnel: C.C TF, J.F

1/9" Boral sheet canned in thin S.S.

Wall ht of Con. Blocks is 35" on slab.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by GKT Time AM PM Date 195

John lit.

16.80 w/ Super crit
14.78 Sub. 11

0.07684
.0963

Conc. Blocks removed.

Falls
ly
he
oed

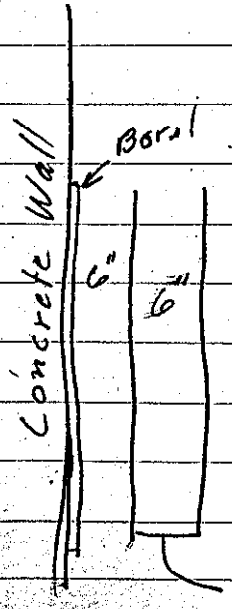
Expr. 8A Time 8 42 AM PM Date 10-18 1956
Purpose Crit. Cond. for 6" slab 6" from Conc. Wall with Boral sheet against Conc. Wall
Personnel: CC, LW & JF

DC-2 Trips 60X200
DC-3 " 85X200

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by GKT Time AM PM Date 195

LN - Trips
PM - "

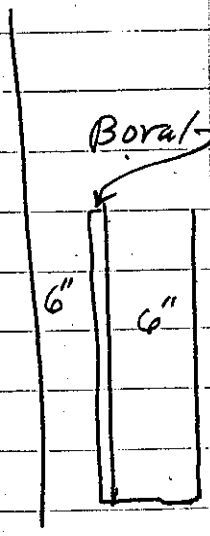
s
x10
R-1
K



Fuel lit in.
22.14 just crit.

H/X = 328

Expr. 8B Time 945A PM Date 10-18 196e
Purpose C.C. Same as above except Boral against slab
Personnel: CC. W.H. JF

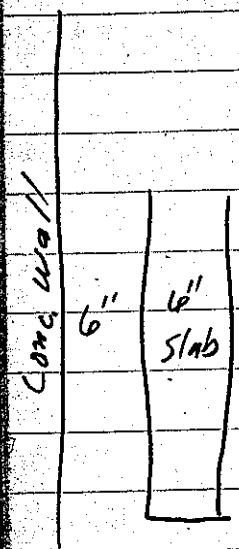


START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 196

Fuel ht in.
20.05 slightly sub.
20.06 super crit

Expr. 8C Time 10 50 AM PM Date 10-18 196e
Purpose Same as above except Boral removed
Personnel: LWG & KF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 196



Fuel ht in.
18.92 slightly super
18.91 just crit

8

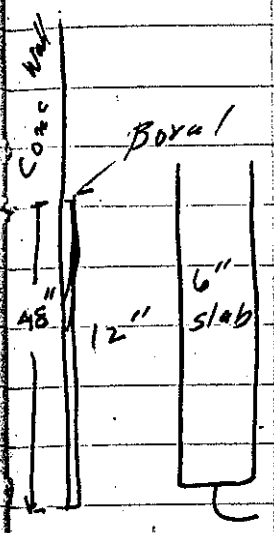
H/X-2328

25

Expr. 9A Time 8:40 AM PM Date 10-19 1956
Purpose C.C. for 6" slab 12" from 4' conc. wall with Boral sheet against wall
Personnel: E C, LWC, JKF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM PM Date _____ 195_

DC-2 - 70 x 200
DC-3 - 90 x 200
LN Trips
PM "



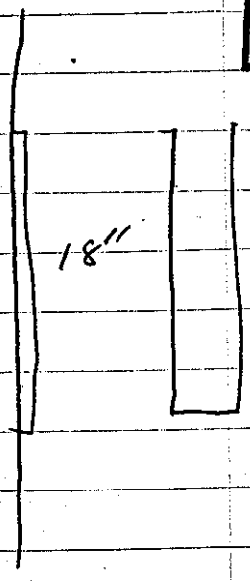
Fuel ht. in.
{ 26.53 Sub-crit
{ 26.55 Super "

26

18" spacing

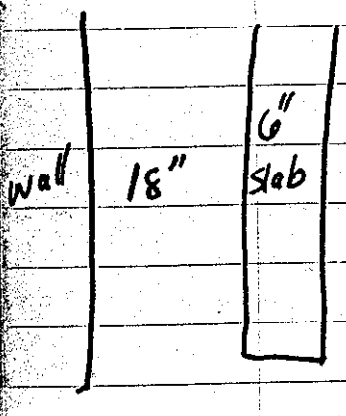
H/X : 328

Expr. 10A Time 950 AM PM Date 10-19 1956
Purpose C.C. 6" slab 18" from conc wall - Boral against wall
Personnel: C.C. LWC. JRF



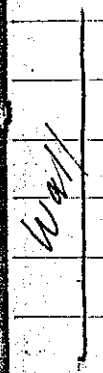
Fuel lt in.
30.15 just crit.

Expr. 10B Time 320 AM PM Date 10-19 1956
Purpose Same as above except Boral removed
Personnel: C.C LWC JRF



27.29

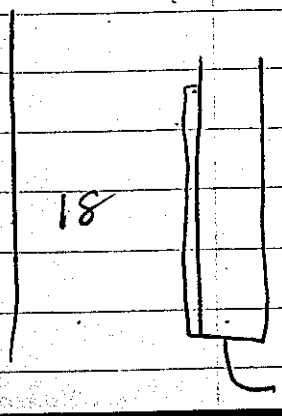
Fuel lt in
27.28 slightly sub.
27.30 " super



Expr. 10C Time 1035 AM PM Date 10-24 1956
Purpose Same as above except Boral against slab
Personnel: C.C, LWC, JRF

Insts. checked
DC-2 - 50X250

personnel checked, Red light, Insts reset, source in

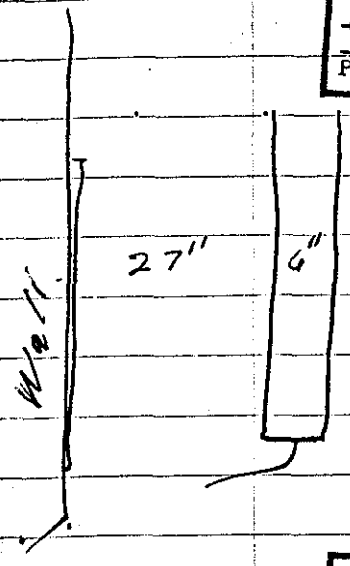


Fuel lt in
23.74 just crit.

27" spacing — 27

H/X = 328

Expr. 11A Time 12 AM PM Date 10-19-1956
Purpose C.C. 6" Slab 27" from conc. Wall - Boral plates against wall
Personnel: LWG, CC, JF

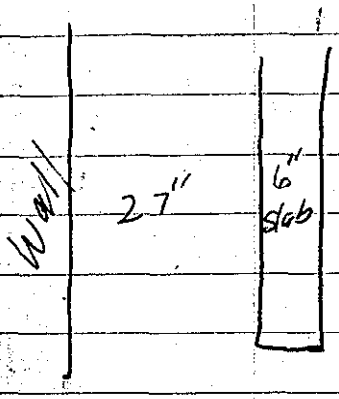


1

Fuel ht in
33.88 sub-
33.90 super
33.85 crit

Expr. 11B Time 2 ~~12~~ AM PM Date 10-19 1956
Purpose Same as above except Boral removed
Personnel: C.C., LWG JF

Fuel ht in



31.65 - { 31.66 slightly super crit
31.63 " sub.

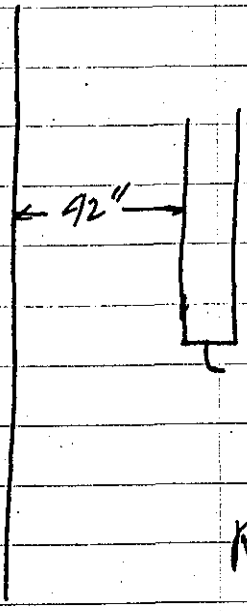
Checked
Y2.20.

28

H/X = 328

Expr. 12 A Time 3:05 AM PM Date 10-24 1956
Purpose C.C. 6" Slab 92" from Concrete Wall
Personnel: C.C LWG JKF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time [illegible] PM Date [illegible] 195



Fuel ht in
34.73 super crit.
34.59 " crit
34.56 just. "

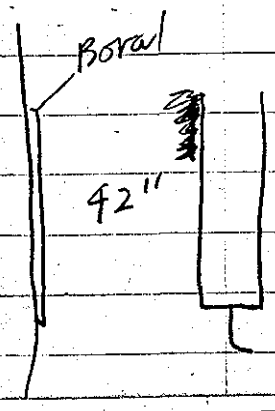
Repeat of 12 A above (with unistrut frame moved back.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time 1:05 PM Date 10-25 1956

Instr checked
DC2 = 60 x 200

Fuel ht in.
36.33 just crit

Expr. 12 B Time 2:05 AM PM Date 10-25 1956
Purpose Same as above except Boral added to wall
Personnel: C.C, LWG, JKFox



Fuel ht in.
37.62 sub. crit
37.71 just crit

H/X = 328

29

Expr. 13A Time 3 45 AM PM Date 10-25 1956
Purpose Crit. Cond. for 6" slab 90" from Core Wall Boral against wall Area ~ 40 x 36" opposite center of slab.
Personnel: C.C L.W.G. J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by _____ Time _____ AM PM Date _____ 195_

Fuel ht. in.
43.1 super crit
42.85 slightly super
42.67 just crit

Expr. 13B Time 8 20 AM PM Date 10-25 1956
Purpose Same as above except Boral removed from wall
Personnel: C.C L.W.G J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start Up OK'd by ✓ Time _____ PM Date _____ 195_

Fuel ht. in
42.05 slightly sub-crit
42.13 42.11 " " "
42.16 " super "

Expr. 14 Time 120 ~~AM~~ PM Date 10-26 1956
Purpose Crit. Cond for bare 10" Al cyl outside
Personnel: C. C. L W G J F

annuli type cyl.

10" Dia

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195__

units OK

Fuel ht in
59.04 super crit.
58.91 " "
58.60 " "
58.39 — slightly super crit
58.2 { 58.25 — " "
58.12 " sub. crit

4-½ half shells

Expr. 15 Time 250 ~~AM~~ PM Date 10-26 1956
Purpose Crit. Cond 10" Dia. Al. Cylinder
4" refl.
Personnel: L W G, J F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195__

4" bottom refl.

Fuel ht in.
14.97 { 14.98 slightly super crit
14.96 " sub. crit

$H/X = 328/329$

Expr. 16 Time 930 AM Exp. Date 11-23 1956
Purpose C. C. for 3" Al slab alone refl.
Personnel: R. R. LWG J.F

START-UP CHECK-LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM/PM Date _____ 195_

DC-2 - 65 x 200
LN Trips
PM "
R-1 resp.
R-2 "
DC-3 "

Fuel ht water ht
56.11 C_4 C_5 56" not crit.
" $6\frac{3}{16}$ $6\frac{5}{16}$ "
" $5\frac{15}{16}$ $5\frac{7}{16}$ "
40.12 $6\frac{5}{16}$ $6\frac{5}{16}$ 40"
14.93 $5\frac{5}{8}$ $6\frac{3}{8}$ 15"
Very little apparent multiplication

7.4
6.8
6.8
21.2
4500

End of series at $H/X = 328/329$.

All interaction book for C. H in 10" cyl bare at $H/X = -52$

#1 = 32 ~~50~~, 1

Expr. 17 Time 1:33 PM Date 12-3 1956
Purpose C.C. in 30" Dia. Al. cyl
Bare at #1 = ~52 Outside SID
Personnel: LW GT, C.C., J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by 123
Emergency Equipment in Control Room Checked by
Red Light On by
Start-Up OK'd by 195

DC-2 - Led
DC-3 - Res.
LN Trips
PM "
R-1 Rec.
R-2

Fuel lht
5,22 slightly Sub.
5,24 " super
5,225" just crit
Cor. C.H = 5.28" 13,4 + .4 = 13.8 cm C.H.
Bot. Cor → ~~5.28~~ "
Probe zeroed after exp. 06 C.V = 62.9 ℓ
Calcyn read 999.94" ∴ add ~~.06~~ to above readings

give Cor. C

Expr. 18 Time 8:30 AM PM Date 12-4 1956
Purpose Same as above except
½" Al added to bottom.
Personnel: LW G J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by Time AM PM Date

Inst. Checked
DC-2 - Go
DC-3 Rec.
R-1 "
R-2 "
LN Trips
PM "

Fuel lht
5,145" just crit
(apparently not level - see repeat

Cor. C.H. = 5.21"

give Co

H/X = 50.1

Expr. 19 Time 930 AM PM Date 12-4 195 6

Purpose same as above except added ½" Al to bottom additional, 1" total

Personnel: LWG J.F

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. 123

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓ AM

Start-Up OK'd by ✓ Time PM Date 195

Fuel ht in.

5.01 - super crit

zero Cor. C.H. 5.07" 5.01 slightly sub.

= 12.9 cm

Expr. 18 Repeat Time 1045 AM Date 12-4 195 6

Purpose see expt 18

Personnel: LWG J.F

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

Source In" Checked by Source No. 123

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓ AM

Start-Up OK'd by ✓ Time PM Date 195

Fuel ht in

5.09 slightly sub.

zero Cor. C.H 5.15" 5.095 " super

= 13.1

Zero Thick. of Al. Bottom. C.H = ~5.45"

34

H/X = 51.5
50.1

Expr. 20 Time 3:15 AM PM Date 12-4-1956
Purpose C.C. for 10" Al. Annuli Type Cyl.
at H/X = 25.3 Bare
Personnel: LWG J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓ Source No. ✓
Emergency Equipment in Control Room checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

Fuel ht in.
13,445 slightly super
13.435 " Sat

13.44
34.0
.4
Cor. C/L 34.6 in

Expr. 21 Time 1:40 AM PM Date 12-5-1956
Purpose Same as above except added ½" Al. to bottom
Personnel: LWG J.F

START UP CHECK
Equipment Checked by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓
Emergency Equipment ✓
Red Light On by ✓
Start-Up OK'd by ✓ 195

DC-2 - 20
DC-3 Rec.
LN Trip
PM "
R-1 Rec.
R-2 "

Fuel ht in
13.34 Slightly super
13.33 just 1 cut

13.33

33.9

Expr. 22 Time 2:20 ~~AM~~ PM Date 12-5- 195 6
Purpose Same as above except added another 1/2" al to Total added 1" Bare
Personnel: LWG S,F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light: On ✓
Start-Up OK'd ✓ AM
PM Date 195

Fuel ht
13.215 slightly super crit.
13.21 13.200 " "
33,5 cm

Expr. 23 Time 9:17 AM ~~PM~~ Date 12-7- 195 6
Purpose C.C. for 15" D. Al cyl.
Bare - outside
Personnel: LWG, C.C, S.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195

Fuel ht. in
~~6.875~~ Sub. crit
6.86 just crit
Reactor not exactly level
Will repeat.

H/X

Expr. 24 Time 10 AM PM Date 12-7 1956
Purpose Same as Expt 23 except added ½" Al to bottom
Personnel: LWG, J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time _____ AM PM Date _____ 195_

Fuel ht in.
6.785 very slightly super crit
6.78 just crit.

Expr. 25 Time 10 20 AM PM Date 12-7 1956
Purpose Same as above except added ½" Al.
Personnel: LWG J.F

Check list OK

Fuel ht. in
~~6.67 Sub~~ crit
6.665 just "
16.9 cm

Expr. 23A Time 1 00 AM PM Date 12-7 1956
Purpose Same as 23 above after re-leveling
Personnel: LWG J.F

Fuel ht. in.
6.875 super crit
6.87 sub- "

6.87
17.45 cm
1.4
17.85

H/X = 50.1

37

Expr. 26 Time 1025 AM PM Date 12-10 195 6
Purpose Crit. cond. E. 75" Dia Al cyl.
Bare - outside H/X = ~52
Personnel: C.C, LWG J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time _____ AM PM Date _____ 195

R-1 - resp.
R-2 "
D-C3 "
DC-2 - 60 X 200
LN Trips
PM "

Changed probe at 60.025"
Fuel ht. in.
79.74 slightly super crit.
79.43 just crit
201.7 cm
+4
205.7

Expr. 27 335 AM PM Date 12-10 195 6
Purpose C.C. for 6" Al slab
bare outside at H/X = ~52
Personnel: C.C LWG J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time _____ AM PM Date _____ 195

Fuel ht. in
12.895 very slightly super
12.885 " " "
C.H = 12.89 ≈ 32.75 cm (7 cm left in manifold
+4
33.2

Compare with value in 2-3 slabs adjacent
outside rid - 12.54

38

Expr. 28 Time 9 06 AM Date 12-11 1956
Purpose C.C. Same as 27 except 1/8" Al plate added to both sides of Slab
Personnel: C.C.; L.W.G. J.F.

DC-2 — GD
DC-3 Res.
R-1 "
PM Trips
LN "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM/PM Date _____ 195_

Fuel ht. in.
11.89 slightly super
11.84 11.88 " " Ins.

Expr. 29 Time 10 40 AM Date 12-11 1956
Purpose Same as above except 1/8" Al Plates on both sides
Personnel: L.W.G., J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM Date _____ 195_

Fuel ht. in.
12.32 slightly ins.
12.325 " " "
12.33 slightly super

1-18-57 - W.T. No. has been lost.

[redacted] NUMBER

REPORT TO: HK 70X

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 Powder

a, 3 gm/cm³

IF NOT TO BE COMPOSITED CHECK HERE.....

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
✓ GRAM/GRAM T	.324000
spgr.	1.5887

SIGNED: HB

BY:

JAN 3 - 1957

DATE

Sample from Manifold 12-13-56

Ref # 354-838

118.62
20.49
98.13

gm U/gm = .3240

Sp. gr. = 1.5887

gm X/gm .30197

UO_2F_2/gm 1.00000
.42055
gm H_2O/gm = .57945

$\frac{H}{X} = \frac{26.11 \times .57945}{.30197} = 50.1$

gm U_{235}/cm^3 = .4798

H/X = 800

Outside Sid

Tad adder installed

Expr. 30A Time 12 35 Date 2/18/1957

Purpose C.C. 12" Al. Cyl. Bare

for period data

Personnel: LWG R.G J.F

START-UP CHECK-LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safetids Checked and ✓

"Source In" Checked by ____ Source No. 123

Emergency ____ Room Packed by ✓

Red Light ____ A.M. ✓

Start Up Clear ✓ Date ____ 195

DC-2 - 75X200

LN Trips

PM "

DC-3 "

RI resp

RL - "

Height, critical 8.71" ≈ 22.1 cm

Tad adder tube 99 6.07" super

5.98 super

5.86 sub

5.91 ~ critical

000.91 Period = 85.79 sec.

995.91 critical

05.91 T = 202.72 sec.

C.H = 8.71 ≈ 22.1

14

22.5 cm

C.V = 16,40 l

C.M = 7.87

Expr. 30 B Time 3^00 PM Date 2/18/57
Purpose Repeat for period
Personnel: LWG R.G., J.F

+½ = 52.1

L23
32.0
74.3

Crit lit 8.71 Zadadded

1.98 at crit.
4.84 " "
9.84 T = 211 sec.
5.75 at crit
10.75 → T = 189 sec
5.75
15.77 → T = 77.8 sec

System apparently leaked For period →

Temp 24° C For period →

For period →

$H/2 = 50.1$

Feed pipe

Expr. 30-C 2/19 1957

Purpose Repeat of 30-B for reproducibility

Personnel: Fox, Fox, & Gillespy

INSTRUMENT CHECK

Date _____ Run No. _____

Instrument	Trip Scale
DC-1	
DC-2	trip 35 on 10 x 50
DC-3	trip 40 on 10 x 100
Log N	trip
R-1	respond
R-2	respond
P. M.	trip

Fuel ht at crit. Tadadder at Crit.

8.73" 5.52

Period measurement

Tadadder

5.52 at crit

10.52 for period T = 184.8 Sec.

lowered tadadder to 5.52 — ~~not~~ not crit.

10^{40} A.M. raised tadadder to ~~6.52~~ crit.

Temp is 26°C (10^{40} AM)

10^{44} raised tadadder to 10.52 for period T = 179.5

" " T = 124.9 " 14.02 from 10.52 ~~for period~~

10^{50} " T = 84.7 16.52 " 14.02 " ~~for period~~

lowered tadadder to 6.52 not crit (over)

raised tadadder to 7.02 crit.

Expr. 30 D Time 1:25 AM PM Date 2/19/ 1957

Purpose Repeat after adding mock-up of 2nd feed pipe

Personnel:

START-UP CHECK LIST

Equipment Checked by ✓ Check by ✓

Instrument and Source Inserted ap... Check by ✓

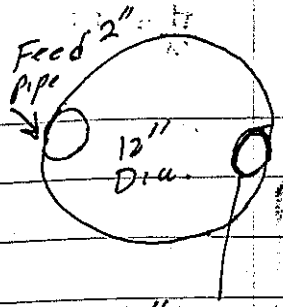
Source In... Checked by ... Check by 123

Emergency ... Check by ✓

Red Light ... ✓

Start Up Ok'd by ✓ Time AM PM Date 195

Fuel ht at Crit. 8.725"



Hx = 50 ml

44

Expr. 31A Tim. ____ AM PM Date 2/20 1957
Purpose CC for 20" dia. cyl bore outside
Also period measurement
Personnel: Lop, Swim, Silber

INSTRUMENT CHECK

Date ____ 195 Time ____ AM PM Source No. ____

Instrument	Trip Value	Scale	Source Distance	Start-up Scale
DC-1				
DC-2	trip			
DC-3	trip			
Log N	trip			
R-1	responds			
R-2	responds			
P. M.	trip			

Rapidly ret
set up OK
Red light on

#5 = 50.1

X-zero = .9996

5.95" corrected

Fuel ht 5.97" at crit

Temp 26°C for period

		Period, sec
	9.20	∞
	9.20	220.8
"	9.20	∞
26°C " "	11.70	150.1
	14.70	103.2
"	7.80	∞
	12.80	221.54
"	8.70	∞
	13.70	220.1

Av. C.H = 5.95" = 15.1

15.4

15.5

C.V = 31.42 ρ

C M 15.7

$H_{f/x} = 50.1$

Expr. 31-B Time 3:30 AM PM Date 2/20 1957
Purpose To measure effect of 2" feed line by placing ~2" heater under heater opposite feed line Bore. Also measure period
Personnel: Fox, H Alley

← 20" dia. Cyl. not made 4/15/57

Selsyn reads .9996 when fuel at zero.

Fuel ht.
(Selsyn reading)

5.91" crit 6.86 T = ∞
11.86 T = 207 sec

Expr. 31C Time 8:30 AM PM Date 2/21/1957
Purpose Repeat for period
Personnel: R.G., W.G. J.F

START-UP CHECK LIST
Equipment Checked by ✓ Check by ✓
Instrument and Safety Checked and ✓
"Source In" Checked by ✓ Count No. 123
Emergency Equipment Control Room Checked by ✓
Red Light On by ✓ A.M.
Start-Up O.K'd by ✓ Time PM Date 195

crit at 5.91"

7.01 ∞
17.01 for period T = 106 sec
8.50 ∞
13.50

H/L = 58.1

Expr. 31D Time 180 AM PM Date 2/21 1957
Purpose Repeat for period
Personnel: LWG, R.G. J.F

Crit ht 5.91" 99631 ∞
For period → 6.31 88.6 sec
99710 ∞
" " 710 89.4 sec

DC-3 - 60 x 1000
DC-2 - 80 x 200
PM Trips
LN "
R-1 "
R-2 Rep
#

Expr. 31E Time 900 AM PM Date 2/22 1957
Purpose 26" D. Al. 4% Bare
added ½" Al to Bottom
Personnel: LWG, R.G., J.F

START-UP CHECK LIST
Equipment Checked by _____ Person ____ heck by ✓
Instrument and Safeties ____ ed and ____ ✓
"Source In" Checked by _____ 123
Emergency Equipment ____ ✓
Red Light On by ✓
Start-Up OK'd by ✓ ____ Date _____ 195

Crit ht *5.78 997.82 ∞
2.82 for period

Temp 26°C period = 204 sec.

Corr Corrected H = 5.82"
14.8 cm

* - 0 = 9996

H/X = 50.1

Expr. 31-F Time 10 45 AM PM Date 2/22 195 7
Purpose 20" dia. al. cyl. bore
added ½" al. to bottom (total added = 1")
Personnel: Jay, Gilley

Cut ht = 5.68 995.17 ∞
For period 5.17 T=123 sec
999.41 ∞

Zero corrected CH = 5.72
14.5 cm

Expr. Time AM PM Date 195
Purpose
Personnel:

H/F=50.1

Expr. 32-A Date 2/26 1957
Purpose Period Meas. on 20" Dia Cyl - Using 3" Slab for reservoir
Personnel: Fox, Ewing, Gilley

Purpose: Period measurment on 20" dia. al. cyl using 3" slab as solution manifold to prevent "leak back" from reactor during measurments.

INSTR'S

Date _____ Source No. _____

Instrument	Range	Distance	Selection Scale
DC-1			
~~DC-2~~	20 on 10K	100	
DC-3	respond		
Log N	trip		
R-1	trip		
R-2	respond		
P. M.	trip		

* When selsyn reads ~~9997~~ 0,01 probe is o.o

Rack.

~~TD~~ - 19.72 — 3.87 Fuel ht crit

Temp ~~2000~~ 26.0°C

		TDS
19.00	5.64 5.64	5.90 ∅
18.00	5.33 5.37	14.10
17.00	~~5.1~~ 5.05 5	7.75
15.00	4.40	
13.00	3.78	
11.01	— 3.14	

Expr. 32B Time 8:20 AM PM Date 2/27/1957

Purpose Repeat of A for period

Personnel: R.R, J.F

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Read by ✓

"Source In" Checked by _____ Source No. 123

Emergency Equipment in Control Room Checked by _____

Red Light On by ✓

Start Up OK'd by ✓ Time _____ AM PM Date _____ 195

	Rod	Fuel Lt	Reddler	
	19.35"	5.80"	0.00	
	19.52	5.85		
	19.60	5.875		
	19.65	5.89		
	19.73	~~5.91~~	0	
Time	19.73"	5.91	3.05	sub. T = 26°C
	"	"	5.99	"
10:54	"	"	8.16	"
11:04	"	5.91 ⊥	10.43	
11:20	"	5.91 ⊥	11.71	T = 26°C
11:40	"	5.91 ⊥	12.71	
12:03	"	5.71 ⊥	13.69	
12:24	"	5.91 ⊥	14.65	
12:52	"	"	15.84	
12:57		"	16.66	
1:15		5.915	23.64	
1:30		5.91 ⊥	17.92 approx crit.	
1:35			18.24	
1:38			18.12	
1:42			18.01	
			19.94 just crit	
		5.915 for period	25.60	
			17.94	
			18.41	
2:15		5.902	020	
2:28		5.914	18.00 ~ crit	

50

Time	TDS	Soln. Int
2:32	18.12	—
2:34	18.24	—
2:41	25.01	5.915
2:48	18.24	—
2:59	0	5.903
3:12	17.45	—
3:14	18.62	5.913
3:35	18.30	—
3:42	18.45	—
3:47	18.40	—
3:55	25.24	5.917
4:03	18.40	—
4:11	18.47	—
4:14	0	—

S. sno. cut for period

H/L = 5

Expr. 32 C Time 9:40 AM Date 2-28-1957
Purpose Repeat for period
Personnel: R. G. R. Rehm, J.F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by 123
Emergency Equipment ✓
Red Light On ✓
Start Up OK'd by ✓

DC-2 - 50x200
DC-3 - 50x1000
PM Trips
LN "
RI - resp
R-2 "

Time	Temp	R	TDS	Soln Int
9:40	71°F	19.72	0.06	5.918
10:09			0.31	
10:13			10.31	for period 5.918
10:22			0.31	
10:24			0.44	
10:26			0.60	
10:28			0.85	
10:29	71.5°		1.02	
10:31			1.21	
10:33			1.33	
10:37			1.80	
			11.80	for period
10:50			1.80	

V.S. Super

9:00
9:43
10:16
11:07
11:08 AM
11:30

$H_{\frac{1}{2}} = 50.1$

Expr. 33A 9 45 AM Date 3-1-1957
Purpose 12" Al. cyl. Bare - outside
Repeat Jan. period
Personnel LWG, R.G. J.F

D-C-2 ≡ 45X200
D-C-3 — 60X1000
LN Trips
PM "
R-1 "
R-2 reap.

START-UP CHECK
Equipment Checked by ✓
Instrument and Sa[illegible] ✓
"Source In" Checked by 123
Emergency Equipment [illegible]
Red Light On by
Start-Up OK'd by Time AM Date 195

Temp		Rock	Probe	
9 00	70.5	6.52	3.58 "	Tadadder
		14.00	7.80	
		15.51	8.64	
9.43	71.0	15.65	8.72	99.45 (T = 275.3 sec)
10.16	71.5		8.72	7.44 } added 6.99 "

Tadadder brought back to 99.44 ≡ just crit
Added to 11.45" on tadadder for period T = 187 sec
then lowered tadadder to 99.62 - slightly sub.
raised to 99.80 - still slightly sub.
raised to 0.00 - " " "
" " 0.30 - " " "
11 08 AM 71.8° " " 0.62 - just crit T = 219.7 sec
Tadadder raised to 10.62 for period
" lowered to 0.62 for "leveling" — sub. crit.
11 35 A.M. " raised to 1.13 — just crit.

X200
X1000

Expr. 33B Time 1 40 ~~AM~~ P.M Date 3-1- 195 7
Purpose Repeat for Checks on Source effect
Personnel: I W G, R. G J. F

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible] ✓
"Source In" Checked by [illegible] Source No. 123
Emergency Equipment & Control Room checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time [illegible] AM 195

$H/X = 50.1$

H/X

Time	Rack	Probe	Tadadder	Temp
1 40	—	—	9.99	72.0°F
2 00	15.20	8.70 ~ out.	10.13	—
2 42 PM.	15.62	8.72	8.96 just crit.	Log N = 0.000 75 Log N = 0.000

Tadadder raised to 20.12 for period → 9.95 ~ ∞
Lowered TD to 0 to lower power level

See Interaction Book for data on 20" cyl at $H/X \simeq 330$ P 210 Expt 142

H/X = 325 / 325

Expr. 34 Time 12:52 AM PM Date 4-17 1957
Purpose C.C. 10" Cyl Bare Outside DC-2 – 65 x 200
for Period DC-3 – 57 x 1000
Personnel: LN Trips

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓ PM "
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ____ Source No. 124 R-1 Trips
Emergency Equipment in Control Room Checked by ____
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time ____ PM Date ____ 195__

crit ht 58.59" at LN .0005
" 58.83 " " .034
1st Period 59.86
2nd " 60.44

crit. ht. = 58.89" @ 0.9 on log N

Expr. 34A 4/18 1957
Purpose Same as above DC-2 – 59 x 200
Repeat DC-3 – 53 x 1000
Personnel: LW Cr R.G J.F PM – Trips

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓ LN " "
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ____ Source No. 124 R-1 " "
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time ____ PM Date ____ 195__

fuel ht
58.00" crit at log N = 0.10
58.50" period meas.
58.00" after leveling at log N = 0.25
~59.00 period
58.01" leveled to crit after period log N = 1

~~326~~ ~~328~~ 325

H/L ~~328~~ 330

Expr. 35 Time 9 AM Date 4/23 1957
Purpose C.C 6" Slab bare outside for period
Personnel: LWG, R.G, J.F

DC-2-90X201
DC-3-60X1500

START UP CHECK LIST
Equipment Checked by ✓
Instrument and ... and ... ✓
"Source In" Ch... by ... 124
Emergency Equipment ... and Doors Secured by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time ... PM Date ... 195...

ΔN Trips
PM 11
R-1 resp.

$\Delta\rho/\Delta h$
1. 1.83×10^{-4}
2. 1.91×10^{-4}
3. 1.80×10^{-4}

Fuel ht
~~46.01~~ " — just crit prob. not accurate
44.27 1st period
~~45.92~~ just crit
~~44.42~~ 2nd period
116.6cm 45.92 just crit
+1.4
117.0 46.15

Temp = 75°F

See Interaction Book p 146, Expt. 60 - 6" slab Bare
& p 135 " 43 - " " "
& p 156 " 71 " " "

See Interaction Book for 6" slab refl. on one side; Expt. 47 page 212

Also see page 22 Expt 7A for 6" slab refl. by concrete wall

5/10/57 Sample from manifold; Hydro. Sp. Gr. = 1.100

Reg. No. 354877 .07748 gm U/gm, 1.0959 Sp. gr

42.7
20.6
42.7 gm.

Cor. .07744 " " "
" .07217 gm X/gm
.0791 gm X/cc

total Imp.
~~.00~~ gm
3800 PPM

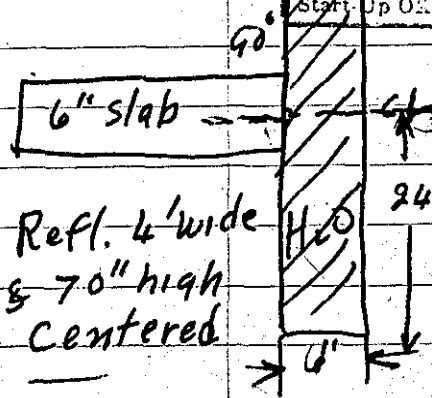
$H/X = \frac{26.11 \times .8995}{.07217} = 325.4$

DK 201
X 1000
1 M S
MP
curate
re

Expr. 36 Time ~~845~~ AM Date 5/10/ 195 7
Purpose C. Cond. 6" slab H/X = ~325
refl only on one end in
Contact = ~0.5" on av.
Personnel: LW LT JF

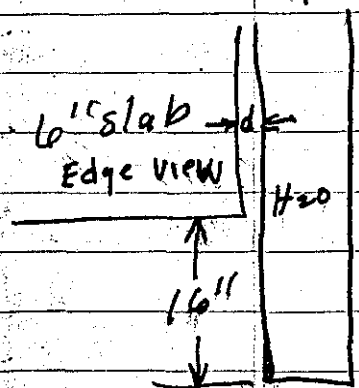
DC-2 - 80 x 200
DC-3 - 35 x 1000
R-1 - Trips
PM "
LN "

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



39.85 Super crit
39.68 ~~Ref~~ Sub crit "

Refl. 4' wide
& 7.0" high
Centered



Expr. 37 Time 1023 AM Date 5/10/ 195 7
Purpose Same as above except
water moved back ~ 4¼"
Personnel: LW GL C.C JF

Crit fuel ht 91.58"

Expr. 38 Time 120 PM Date 5/10/1957
Purpose Same as above except
Sep now = 1.5"
Personnel: LWG C.C. JF

Crit fuel ht 43.16"

6" sla

Expr. 39 Time 312 AM PM Date 5/10/1957
Purpose Same as above
except d = 42"
Personnel: LWG, J.F.

Fuel ht. 43.77 Dub. crit
" 43.80 just "

5/1

5-15-57 Wm. Lear

Expr. 40 Time 935 AM PM Date 5/16/1957
Purpose C.G single 6' slab Bare but with empty 3" slabs as shown
Personnel: L W G J F

DC-2 - 90X20U
DC-3 - 58X100
L N Trips
PM "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by
"Source In" Checked by Source No. 12a
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

01955

6" slab

~50"

Empty slabs 3'

β = .02090
.02018
.00072

Crit fuel ht. 43.41
Room Temp 74.5°F

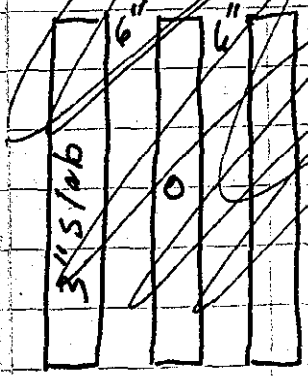
Expr. 40A Time 12 40 AM PM Date 5/16/1957
Purpose Same as above after Removing 3" slabs
Personnel: L W G, J.F.

zero rechecked

Crit fuel ht. 43.81 ~ 74.5
at 1:21 raised room heat controller ~ 140°F
1:32 Drained to ~ 41.25" & opened truck door
2:43 Soln temp 25.5 C crit at 43.80" (78°F)

see Expt. 35 - Evidently the H/X changed before above expt.
5/17/57 Hydro. Sp. gr from manifold [redacted] 1.100 at 74°F
Some soln was added about 4/29/57 at approx. the same conc.

H/X = 58 = 324



Expr. H Time 2:45 AM PM Date 5/17 195 7
Purpose Crit. Cond 3-3" Slabs Bare Outside, SGR 6"
Personnel: C.C. LWC. JF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Checked by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up O.K'd by ✓ AM Time PM Date 195

DC-2 - 85" x 200
DC-3 55" x 1000
R-1 Thps
PM "
LN "

H/X = 55.4

Expr. H Time 830 930 AM PM Date 5/24 195 7
Purpose C.C. 8.75" Dia. Cyl. Bare Outside H/X = 57
Personnel: LWC. JF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Checked by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 124 ✓
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up O.K'd by ✓ AM Time PM Date 195

DC-2 - 85" x 200
DC-3 55" x 1000
LN Thps.
PM "
R-1 "

1st Probe Limit: 34.62"

New prope in contact at 34.58"
1st Crit ht. = 67.46" + .18
Drained 30 sec. fuel ht 57.57
Repeat after drainback for mixing

Crit fuel ht. = 67.20
zero cor. .18
67.38

H/X = 55.4

Expr. 42 Time 3:20 ~~AM~~ PM Date 5/24/195 7
Purpose C.C. for 10" Dia. Al. Cyl. Ann. Type
Bare Outside H/X = 57
Personnel: LWC, JF

Crit fuel ht { 13,33

Expr. 43 Time 9:45 AM PM Date 5/27/195 7
Purpose C.C. for 12" Al. Cyl. Bare
Outside at H/X = 57
Personnel: LWC, JF

DC-2-80X200
DC-3-55X1000

	Trips
LN	
PM	11
R-1	6

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Figure No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195__

Probe at zero reads .05"

Crit fuel 8,84
-,05
8,79 — high value

C.H = 22.3
4
22.7 cm

C.V = 16.5

60

5/27/57 Sample Taken of Solution in Slab Manifold {H/X ≅ 55}

Reg. # 354881

Gross 64.9908

Tare 19.7630

Net 45.2278

Sp gr. Hydro = 1.544

gm U/gm = .3055

gm X/gm .2845

$H/X = \frac{26.11 \times 6035}{2845} = 55.7$

Sp gr. 1.5345 spec. 2700 ppm.

Expr. 44 Time 8:30 AM Date 5/28/57

Purpose C.C. for 12" Ann. Al. Cyl.

Bare outside at H/X = 62

Personnel: LW CT JF

H/X = 60.8 →

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and

"Source In" Checked by 124

Emergency Equipment ✓

Red Light ✓

Start Up Ok'd by ✓ 195

DC-2 - 85 x 200

DC-3 - 55 x 1000

LN Trips

PM Ti

R-1 11

Rm Temp 76°F

Fuel ht 8.725"

Jaddder 96.89 just crit.

need just to lower level 97.00 " "

100.00 T =

Rm Tem

93

12:53 Lowered power level to same as beginning of last period

C.H = 8.725 x 254 = 22.2 / 1.4 = 22.7

C.V = 14.6

97.00 not level

97.10

97.20 not level

97.40

97.60

97.70

97.80 just crit

2.90 T =

93.4

11:10 AM

* Probe zero - .03

H/x = 40.8

Exp. 44 (cont.)

11 25 AM Power level lowered after period to approx. level before period.

	Tadadder	
	97.90	
	98.00	
	98.10	
	98.20	just crit
11 38 AM	2.20	T=

Expr. 45 Time 8 40 AM PM Date 5/29/ 195 7
Purpose C.C. for 20" D. Al. Cyl Base DC-2 - 85 X 200
Outside at H/x = 40.2 DC-3 - 56 X 1000
Personnel: LW-G, J.F. LN Trips
PM "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time PM Date 195

Rm Temp 77°

P. Level	Fuel Int	Tadadder	Remarks
.01	5.88	99.75	just crit.
935		4.75	for Period
		~~lowered P. level~~	
.01		99.85	just crit
954		3.85	for Period
		"	
.01		0.25	just crit
		3.25	for period

C.H = 14.9 cm
.4
15.3

62

H/2 60.8

Expr. 46 Time 2:30 ~~AM~~ PM Date 5/29/1957
Purpose C.C. for 10" Dia. Cyl. Ann. Type
Bare outside H/2 = 62
Personnel: LWG, C.C., JF

Probe zero 99.97

Pr. Level	Fuel ht	Tadadder pos.	Remarks
.01	13.25 + .03 (13.28)	96.15	just cut
		3.15	for period
.01		97.60	just cut
	C.H = 33.7 / 34.1	7.60	for period
		C.V = 17.3	

air & paint chips in Tadadder tube

Expr. 46 cont Time 8:30 AM ~~PM~~ Date 5/31/1957
Purpose
Personnel:

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safe... Checked ...
"Source In" Checked ... 124
Emergency Equipment in Control Room Tested ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time ... AM PM Date ... 195...

IC-2 - 85X200
IC-3 - 95X1050
LN TRIPS
PM "
R-1 "

Pr. Level	Fuel ht	Tadadder	Remarks
.01	13.245	98.25	just cut
		9.0 { 7.25	for period
.01		98.40	just cut
.01		10.0 { 8.40	for period.
"		98.00	just cut
		5.00	for period

H/X = 60.8

Expr. 47 Time 2 45 Pol Date 5/3/ 1957
Purpose C.C. for 8.75" Dia. Al Cyl. Bare outside, H/X = ~~40~~ 60.8
Personnel: C.C., DEC, J.F.

START UP CHECK LIST
Equipment Checked by ✓ Clear by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓ Rods No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

Equil. Fuel ht 19.0"

Pr Level	Fuel ht	Remarks
.0075	63.80	just crit
	67.51	for period
	63.86	just crit.
4:27 P.M.	66.58	for period

200
1050
P3

Sample taken from 3" slab:

Reg No. 354882 Hydro sp gr 1.501

776
19.8
57.8

✓ gm U/gm = .28856 — .2688 gm X/gm
✓ sp gr. 1.496 at 25°C
spec. ~ 2900 ppm gm X/cm³ = .4021

$$H/X = \frac{24.11 \times .6254}{.2688} = 60.8$$

Drained to approx. 70l. and added ~ 7l at H/X = 325 to 3" slab.

64

H/L = 66.1

Expr. 48 — 1a — Date 6/3/195 7

Purpose C.C. for 8.75" Dia - Cyl. at H/L = ~ 66

Personnel: DEC, J.F.

DC-2 - 85/200

DC-3 = 55/1000

LN - Trips

PM - "

R-1 - "

START-UP-CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Recorded by ✓

"Source In" Checked by ✓ Form No. 124

Emergency Equipment in Control Room Energized by ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time ... A.M. Date ... 195

Rm Temp 76°F

Equil ht 1.8.63"

LN	DC-2	DC-3	Fuel ht
~~.0003~~ ~~.0005~~	~~40~~ ~~45~~	~~25~~ 24	51.28" Drained Back
.0025	38	23½	51.28

62.35 super
61.97 Init crit

Repeat for mixing:

62.35 super
62.20 slightly sub.
Crit ~ 62.25

Temp 7

Jacket only ~ 30" away may account for some of difference between: ~ 62.25 and 62.78

Jac

INSTRUMENT CHECK

Date 6-4 195 7 Time 8 ~~PM~~ AM Source No. X

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	90	10x20		1 ~~0~~ x 5
DC-3	52	10x100		1 x 10
Log N	Tank			Tank
R-1	10 on	10 x 1000		100 x 10
R-2	40			
P. M.	2"	750V		750V

B/G alarms checked

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by

"Source In" Checked by Source No. 124

Emergency Equipment in Control Room Checked by

Red Light On by ✓

Start-Up OK'd by ✓ Time ~~PM~~ AM Date 195

Expr. 48 cont. Time 8:55 ~~PM~~ AM Date 6-4- 1957

Purpose same as above
check on mixing

Personnel: DFC, JF

Temp 76.5°F

Ladder moved farther away:
63.03" slightly super.
62.5 sub.
→ 62.78 ~~slightly~~ + just crit
16
62.94

H/x = 65/66.1

$H/_X = 64.1$

Expr. 49 Time 2 30 AM PM Date 6/4/1957
Purpose C.C. 10" Dia, Ann. T. Cyl.
Base outside $H/_X = 66$
Personnel: DFC, JF

Probe zero = .05" Fuel ht
13.33 just crit.
.05
13.28

Prelim Hydro.

Probe same

Sample from 3" Slab:
Reg no. 384883
60.0
19.4
40.4

Hydro. Sp. gr. 1.464 @ 76°F
gm U/gm = 27364 − .2548 gm X/gm
Sp. gr. = 1.462 @ 25.0°C
Vel. = 2760 fps

1.000
.355
.645

$H/_X = \frac{26.11 \times .645}{.2548} = 66.1$

$gm/_{cc} = 0.373$

Probe

Drained ~ 7l from system & added ~ 6l at $H/_X = 325$

Expr. 50 Time 10^{00} AM Date 6/5/1957
Purpose C.C. 10" Dia. Ann. T. cyl. at H/X = 70 Bare Outside
Personnel: LWG, C.C. & JF

DC-2 — 80 x 200
DC-3 — 50 x 1000
LN Trips
PM "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible] ✓
"Source In" Checked by [illegible] Source No. 124
Emergency [illegible] ✓
Red Light [illegible] ✓
Start Up [illegible] ✓ 195

Preliminary Hydro. 1.4356

Probe zero same as Expt 49.

Fuel ht in
13.35 slightly super
13.34 " "
13.33 just. Crit
.03
13.28 — 33.73
40
34.1

Expr. 51 Time 8^{50} AM PM Date 6/6/1957
Purpose C.C. 8.75" Dia. Cyl. Bare Outside H/X = 70
Personnel: LWG C.C. J.F.

DC-2 — 100 x 200
DC-3 — 50 x 1000
LN - Trips
PM - "
R-1 - "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195

Probe zero 99.95

Fuel ht.
64.03" just crit.
zero cor. .05
64.08

68 sample 354 884 was routed to wrong lab. Not enough sample left for recheck

6/6/57 Sample Taken after last Experiment

Req. # 354884 gm U/gm 0.25318 ← x-ray method result low

Gross 62.24 Sp gr. 1.432

Tare 19.50 gm/gm (14,000 ppm) .99

42.76

10000
.3288
.6712

$H/X = \frac{26.11 \times .6712}{.2358} = 74.8$ ← better to use H/X from Sp.gr. curve = ~71

$\Sigma X/gm = .2358$

To 62ℓ at H/X = ~70 added 20ℓ at H/X = 55

FOR ANAL SEE

Expr. 52 Time 2 AM PM Date 6/7/57

Purpose C.C. for 8.5" Dia. Stainless cyl.

at H/X = 60 63.7

Personnel: LWG, C.C. FF

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by —

Instrument and Safeties Checked and ✓

"Source in" Checked by 124

Emergency Equipment in Control Room ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time AM Date 195

At 80.23" little increase on DC-2, DC-3 or LN

DC-2 - 85 X 200

DC-3 - 55 X 1000

LN Trips

PM "

R-1 "

changed Probe * 43.73

	C1	C4	C2	C5	C3
Fuel ht	80.23"	60 14	12 40	22 40	2 20	23 40
			12 33		2 27
Counters on scale of 64	63.0	46 20	11 22	20 05	2 18	25 30
			10 48		2 29
	41.70	35 19	8 11	16 54	1 25	22 41
			8 17		1 40	
	~18.0	22 02	4 32	10 50	0 57	19 21
			4 17		0 56	

* reads .05" too high

H/X = 63.7

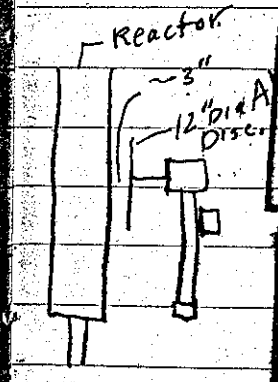
→ FOR SAMPLE ANALYSIS SEE PAGE 82

Expr. 53 Time 135 AM PM Date 6/10/1957
Purpose C.C. for ~11" Dia sphere (Cap. 12,981) Bare Outside
Personnel: C.C., T.F., T.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time AM PM Date 195

DC-2 - 80 x 200
DC-3 - 35 x 1000
LN - Trips
PM "
R-1 "

Full ht	C2	C4	C5	Volume
11.0"	28 9	11 9	—	12.92 liters
"	28 9	11 21	8 33	"
7.83	25 27	10 36	7 54	10 liters
7.83	24 45	10 28	8 39	"
5.06	24 15	9 61	7 53	5.5 liter
5.06	24 48	9 60	8 0	"
0 bg	24 15	9 17	7 0	0



52.5 ✓ changed probe *

Expr. 54 Time 200 AM PM Date 6/11/1957
Purpose C.C. 8.73" Dia. C4 Bare outside to check on H/X ~~Reactor~~ approx capsule activity vs LN
Personnel: DFC, T.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time AM PM Date 195

DC-2 - 108 x 200
DC-3 - 55 x 1000
~~DC~~ LN Trips
PM "
R-1 "

Crit ht 57.86 corrected

Lower crit ht due to presence of Al. Disc. & Motor Drive + stand made of unistrut. ~3/8" Thick ↓ 1/8 H.P. Motor back

* reads .05" high about 5/8" from Reactor

70

capsule Suspended on Nylon Thread

H/X = 63.7

H/X =

Expr. 55 Time 10:20 AM PM Date 6/12/195 7

Purpose 8.75" Dia. Al. Cyl. Bare - 1 capsule In center of reactor for Approx. Power Level. Measure

Personnel: T.F; J.F

START-UP CHECK LIST

Equipment Checked by ✓ Instrument Check by ✓

Instrument and Safeties Checked and ✓

"Source In" Checked by 124

Emergency Equipment and Room Clear ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time AM PM Date 195

DC-2 - 95 x 200

DC-3 - 55 x 1000

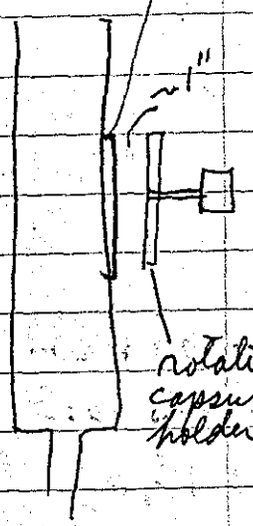
LN Trips

PM 4

R-1 11

Time start 11 L9

Power Level .12 crit ht. 62.45



Expr. 56 Type 9 00 AM PM Date 6/13/195 7

Purpose As above for calibration 1 capsule Plastic Disc in front of Cadmium Plating Disc

Personnel:

START-UP CHECK LIST

Equipment Checked by ✓ Instrument Check by ✓

Instrument and Safeties Checked and

"Source In" Checked by 124

Emergency Equipment and Room Clear

Red Light On by ✓

Start-Up OK'd by ✓ Time

DC-2 - 90 x 200

DC-3 - 55 x 1000

LN Trips

PM 11

R-1 11

crit. ht. 42.44

Time start 10:07 AM

Power level .10

H/X = 63.7

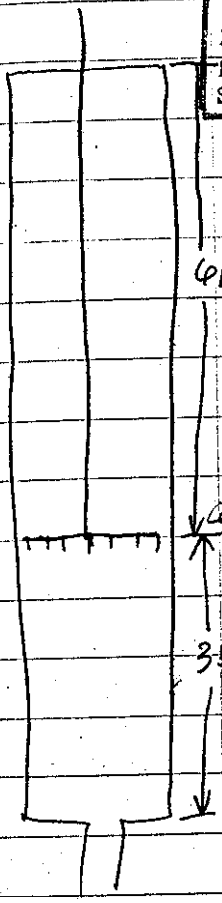
Expr. 57 Time 12:35 PM Date 6/14/1957
Purpose 8.75" Cyl. Bare, Bare capsule run

Personnel: LWG, TF, JF

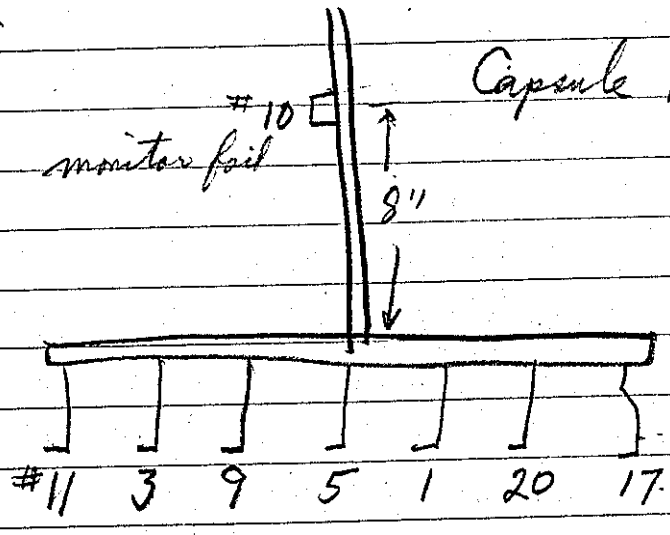
START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓ Recorder No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

DC=2 -85-
DCS Trips
LN "
PM "
RH "

Time start 1:28
67.89" crit fuel ht
Power level .10



Capsule Positions



Relative activities

10	1.29	1	1.370
11	.265	20	.956
3	.945	17	.265
9	1.261		
5	1.400		

72

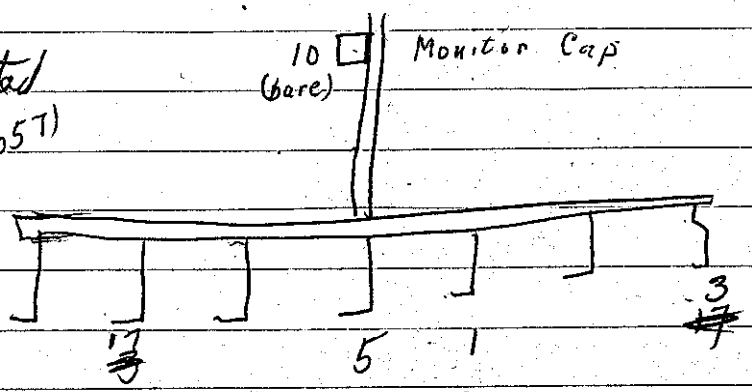
$H/x = 63.7$

Expr. 58 Time 130 AM PM Date 6-17 1957
Purpose 8.75 cylinder bare, Cadmium Covered capsules.
Personnel: LWG TF CC

START-UP CHECK-LIST
Equipment Checked by ✓ Personnel Checked by ✓
Instrument and Safeties Checked and Set ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time 1-35 PM Date 6-17 1957

DC-2 95 x 10
DC-3 55 x 10
Log N trip
P.M. trip
R-1 trip x 10

Holder located as before (Exp 57)



Cd covered capsules

Short probe put in - add 19.70" to obsyn reading

Started foil exposure at 2:37 p.m.

Critical height = 69.20 (49.50 + 19.70)

Power level - .27 on Log N

Shut down at 2:57 p.m.

$H/x = 63.7$

95 x 10 x 20

55 x 10 x 100

trip

trip

trip x 10 x 1000

Expr. 59 Time 2 35 AM PM Date 6-18 1957

Purpose 8.75 Cylinder bare, reruns Cadmium Covered Capsules of Exp 58

Personnel: TAT LWG

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

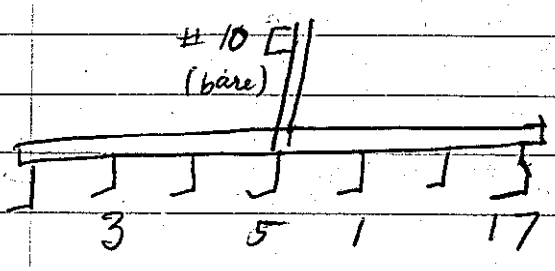
Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by _____ Source No. 124

Emergency Equipment in Control Room Checked by _____

Red Light On by ✓

Start-Up OK'd by ✓ Time 2 40 ~~AM~~ PM Date 6-18 1957



Started foil exposure at 4:02

Critical height = 68.65" (49.95 + 19.70)

Power level = .14 on log N

Shut down at 4:22

6-19-57 · WTM. Hurst

74

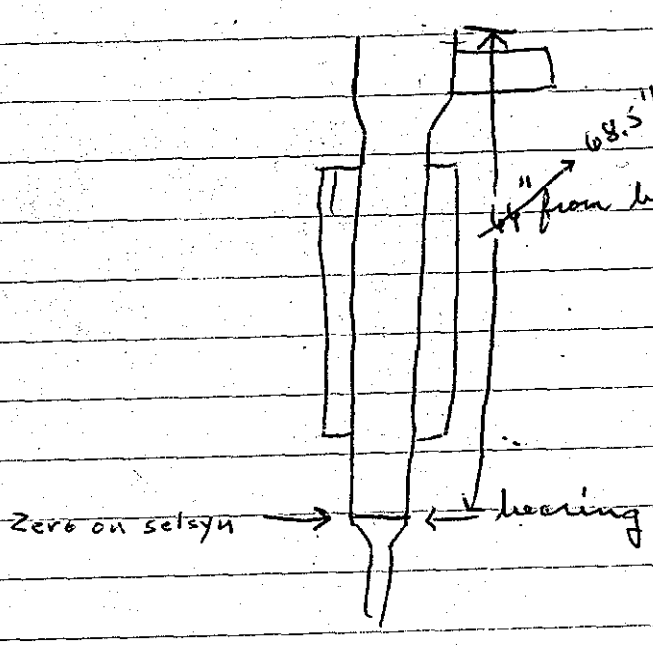
H/X = 63.7

Expr. 60 A Time ____ A.M. P.M. Date ____ 195__
Purpose Critical Conditions for Y-12 evaporator
Personnel: Cross, Mee, T. Fox, Gilley

DC2 90 10x20
Log N trip
DC3 55 on 10x10
PM trip
R-1 trip

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Tested by ✓
"Source In" Checked by ✓ Source Out ____
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by EWH Time 3 ~~AM~~ PM Date 6/21 195 7

Conditions: H/X = 65 ; 8"X4" "top"
Fuel in steam jacket
Rotator mock up removed from assembly
Insulation around outside



$H/x = 63.7$

60 A cont.

10x20

4" ⌀

Selsyn reads 64" — very little multiplication as shown by DC instrument (~~Log N~~ Log N not on scale)

When selsyn read 64" solution was approx 5" below top (by actual observation)

DC-2 95 x 10 x 20

DC-3 50 x 10 x 100

Log N - Tube

P. M. Trippy

Assembly

Expr. 60 B Time 2:15 ~~AM~~ PM Date 6-24 1957

Purpose Critical Condition for Y-12 evap. ~~Run Top Section~~ → 10.75" Top section inside dia.

Personnel: TAF LWG Mee ~~Cross~~

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. 12 #

Emergency Equipment in Control Room Checked by ✓

~~Red Light On by~~ ✓

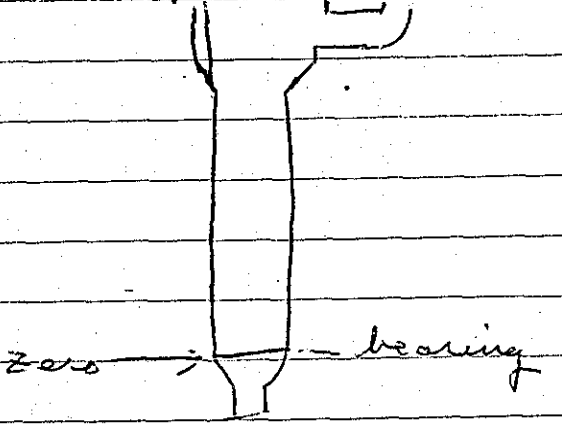
Start-Up OK'd by ✓ Time 2:20 ~~AM~~ PM Date 6-24 1957

Conditions: $H/x = 65$; 12" x 6.5" "top"

Fuel in steam jacket

Rotator mech up removed from assembly

Insulation around outside.



(cont page 74)

76

$H/_F = 63.7$

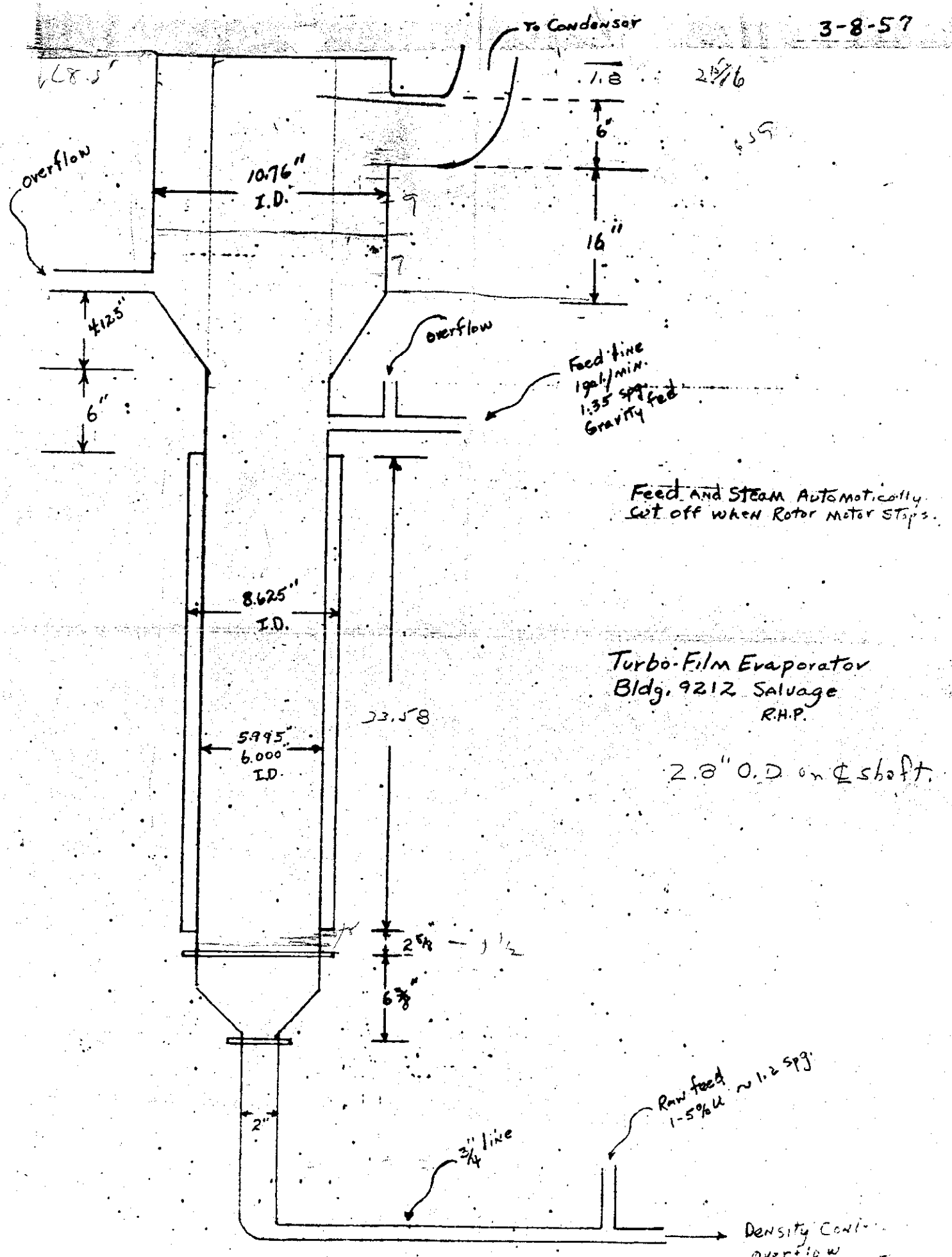
Selsyn

3 05 P.M. 54.1111 just cut.

M" curve for above cut. assembly

Height	C_4	C_5	C_1	C_2
40.04"	20 60	7 32	47 22	37 48
49.93	21 31	7 40	45 1	39 34
51.97	23 3	7 46	47 4	42 45
53.04	24 58	8 4	31.21	44 1
53.835	32 24	9 51	——	58 3
54.05	69 62	19 4		113 34
~10	9 1	5 23	17 40	25 11

3-8-57



Feed and Steam Automatically cut off when Rotor Motor Stops.

Turbo-Film Evaporator
Bldg. 9212 Salvage
R.H.P.

2.8" O.D on ℄ shaft.

$H/X = 63.7$

DC-2 ÷ 90 x 10 x 20

DC-3 - 50 x 10 x 110

Log - 7 sec

P.M. trippers

Expr. 60 C Time 10[10] AM ~~PM~~ Date 6-25 1957
Purpose Critical conditions for V-12 evaporator - Cd. rod in center of tank
Personnel: JAF, LWG, Mec

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 124
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time 10[15] AM ~~PM~~ Date 6-25 1957

Conditions: $H/X \cong 65$; 10.75" x 6.5" "top" section
Fuel in steam jacket
Insulation out side
3" od. filled (6 kg CdO) pipe in center

Selsyn

11[43] AM. 64.44" slightly super
64.425" sub. crit.

78

$H/X = 63.7$

Expr. 60 D Time 1:30 Date _____ 195__
Purpose M-1 curve for conditions of previous experiment
Personnel: Mee, Cannon, Gilley

START-UP CHECK LIST
Equipment Checked by _____ Log Book by _____
Instrument and Shield Key Switch _____
"Source In" Check by _____ Time _____
Emergency Equipment _____ Security _____
Red Light On by _____ AM
Start-Up OK'd by GWM Time _____ PM Date _____ 195__

fuel wt.	C_4		C_5	
background (2/10")	$35^{2} \times 16$	7/m	$5^{9} \times 64$	5 min count
54.08"	$36^{4} \times 16$		$4^{39} \times 64$	" "
2:20 P.M. 60.01	$34^{0} \times 16$		$4^{44} \times 64$	" "
3:00 PM 64.40"	$199^{1} \times 16$	66/min	$55^{9} \times 16$	3 min count
64.34"	$137^{2} \times 16$		$40^{9} \times 16$	4 min count
64.25"	$105^{14} \times 16$		$33^{9} \times 16$	5 min count
63.52"	$47^{4} \times 16$		$20^{12} \times 16$	5 min count

$H/x = 63.7$

Expr. 60E Time 945 AM PM Date 6-26 1957
Purpose Critical conditions for Y-12 evaporator - Rod in Center filled with H_2O
Personnel: Mec LWG CC TAF

DC-2 = 85x10x20
DC-3 = 55x10x100
Log N = 7 sec
P.M = Tripped

START-UP CHECK LIST
Equipment Checked by TAF Personnel Check by CC
Instrument and Safeties Checked and Reset by TAF
"Source In" Checked by LWG Source No. PN213
Emergency Equipment in Control Room Checked by TAF
Red Light On by CC
Start-Up OK'd by ✓ Time 1000 AM PM Date 6-26 1957

Conditions: $H/x = 65$ 10.75" x 6.5" "top" section
Same conditions as 60C except 8" pipe (SS) filled with H_2O

	Selsyn			
10^{45}	58.77"		Critical	

M^{-1} Curve for 60E

	Fuel Ht	C_4 x64	C_5 x64	time
	58.725	129^{+23}	34^{+44}	5 min
11^{05}	58.67	79^{+40}	21^{32}	"
	58.52	45^{+19}	12^{+31}	"
	58.05	27^{+41}	8^{+59}	"
	56.13	21^{+55}	6^{+50}	
11^{35}	44.145	20^{21}	7^{+27}	
background	~10"	17^{15}	5^{34}	

80

H/X = 63.7

Expr. 60F Time 135 AM PM Date 6-26 1957
Purpose Critical Conditions for Y-12 evaporator - Rod in center empty.
Personnel: LWG TAF Mee

Conditions: Same as 60C and 60E except 3" SS pipe has water removed from top 3 ft of pipe (essentially empty center rod)

Selsyn reading

60.235" slightly sub-critical
60.24 critical

$M_X = 63.7$ 81

Expr. 60 G Time ____ AM PM Date 6/27 1957
Puepose Critical Conditions for Y-12 evaporator. Rotor and baffle in assembly
Personnel: Mee, Cronin, Gilley

START-UP CHECK LIST

Equipment Checked by ✓ [illegible] by ✓
Instrument and Safeties Checked by ✓
"Source In" Checked by ✓
Emergency Equipment in Control [illegible] by ✓
Red Light On by ✓
Start-Up OK'd by JWA Time 1[illegible] PM Date 6/27 1957

Conditions:

$M_X \geq 65$; 10.75" top section

Rotor in assembly same as in original equipment, also baffle is same

5/8" steel plates were laid on top of assembly to simulate top bearing reflection.

Selsyn

65.475" super crit

2 P.M. 53 65.45" sub. crit.

7/2/57 Sample Taken from Al. Slab Manifold after Y-12 Evaporator Expts.

Reg. # 354885

Gross 78.59 gm
Tare 19.74 gm
58.85 gm

gms U/gm = .2801
gms X/gm = .2610
Sp gr = 1.476

$$H/X = \frac{26.11 \times .6365}{26.10} = 63.7$$

10000
3635
6365

$\frac{H}{X} = 50.4$ Begin Annuli with H_2O and Cd center

$gm^4/gm = 0.3230$

sp. gr. 1.599

Expr. 61 2:30 PM 8/15 1957

Purpose 12" O.D., 4" I.D. annulus H_2O + Cd inside, Bare outside

Personnel: Fox, Gilley

Equipment C[illegible] d by ____ by ____

Instrume[illegible] by ____

Source [illegible] ____

Emergenc[illegible] ____

Red Light[illegible] ____

Start-Up Ok'd by JWH ____ Date ____ 195__

fuel ht	C_4	C_5	
60.6"	.50 52 $\frac{38}{64}$	31 $\frac{0}{16}$ .47	hot crit.
55.98	.46 57 $\frac{46}{64}$	28 $\frac{9}{}$ .51	
51.53	.47 56 $\frac{28}{64}$	25 $\frac{7}{}$ .57	
45.65	.50 52 $\frac{19}{}$	23 $\frac{1}{}$ .63	
40.29	.53 ~~49~~ 50.	20 $\frac{13}{}$ .69	
28.87	.60 43 $\frac{24}{}$	21 $\frac{6}{}$ .67	
17.90	.7734 $\frac{27}{}$	16 $\frac{3}{}$ .89	
10.08	26 $\frac{18}{}$	14 $\frac{7}{}$	

Very probably D

84

$H/X = 50.4$

9" I.D. Cyl. Lined with 20 mil. Cad. ~ 1½ Turns, Water filled to ~ 60"

Expr. 62
Purpose 12" OD & 4" ID Annulus Crit. Cond. Refl.
9-17-195 7
Personnel: LWG

Equipment Chec'ed by ✓ Check by ✓
Instrument and [illegible] Check by ✓
"Source In" Ch[illegible] Check by ✓
Emergency Equi[illegible] Check by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time [illegible] Date 195

DC-2 ~ 75 × 200
DC-3 Trips
L-N "
PM "
R-1 "

759
81
678

Fuel ht. in. 8.58
2.18 cm
C.V = 14.8 l
C.M. = 7.11 kg U^{235}

Water ht. cm
21.8 ≈ 8.58" crit.

No in on DC- ~ 20"

63 mil. Cad Liner inside 6" Cyl. ~ 60" High.

Expr. 63 Time AM PM Date 9-17-195 7
Purpose 12" OD & 6" ID Annulus Crit. cond. refl. outside H_2O + Cd inside
Personnel: LWG, JF

759
18
577

Fuel ht in.
19.16
48.7 cm
28.1 l
13.5 kg

Water ht. cm
48.6 ≈ 19.13" + 19.15
crit

10 mil cad. and H20 to 48" high.

Expr. 64 Time 930 AM PM Date 9-18 1957
Purpose C.C. for 12" D.D. Al cyl Annulus with 8" I.D. cyl. H20 + Cd
Personnel: Leff LWG JF

START-UP CHECK LIST
Equipment Checked by ✓
Instrument and Sa[illegible] heck by ✓
"Source In" Che[illegible]
Emergency [illegible] No. PM123
Red Light [illegible]
Start Up OK'd by ✓ Time [illegible] 195

Hx = 50.4
85

DC-2 = 75 x200
DC-3 Trips
L N "
R-1 "
PM "

	Fuel ht	C_4 x10	H_2O Ht.	C_6 x10
No increase on DC-2 above ~20"	18.08"	4.7	122 cm Not Out	2.5
	"	3.6	"	2.5
	38.7	3.6	99	2.1
	"	3.6	"	2.7
	28.30	3.4	71.2	1.8
	"	3.4	"	2.2
	9.90	5.3	25	2.0
	"	4.4	"	2.5

C_4 & C_5 under "Sed". Level during expt. too low for counters to get above back ground. see expt. 61 for response for same geometry when more M^{-1} was experienced

86

H/X = 50.4

20 mil cad & H₂O up to 48"

Expr. 65 Time ____ AM PM Date 9-18 1957
Purpose C.C 15" OD. Annulus with 8" ID refl. Cad + H₂O inside
Personnel: LWG JF

Critical →	Fuel ht	H₂O ht.
1141	12.24	31.1 cm = 12.24"
325	31 cm	
816	25.4 l	
	12.2 kg	

Expr. 66 Time 3:30 AM PM Date 9-18-57
Purpose Same as above except Bare Outside
Personnel: LWG, J.F.

Fuel ht	C^{49}/C^{6}	C^{5}/C^{6}
48.06	100.0	43.5
39.79	109.0	47.5
31.66	100.5	45.0
10.54	94.5	42.75

no appreciable M^{-1}

Annuli Expts.

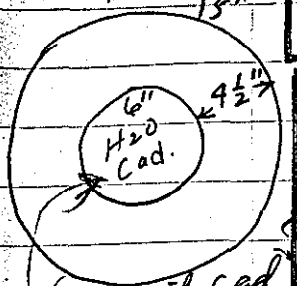
$H/X = 50.4$

Expr. 67 Time 9 32 AM PM Date 9-19-195 7
Purpose C.C. 15" Cyl. outside & 6" cyl inside with H_2O + Cad
Bare outside
Personnel: LWCT JF

DC-2 ~ 75 x 280
LN Trips
PM "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible]
"Source In" Checked by [illegible] Source No. 123
Emergency [illegible] Checked by ✓
Red Light ✓ A[illegible]
Start Up Count [illegible] Date [illegible] Date [illegible] 195[illegible]

Bare 15"



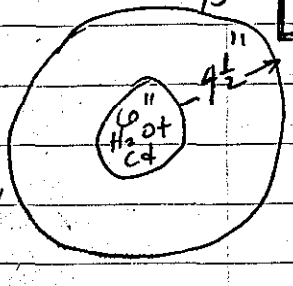
(63 mil cad)

1141
182
959

Fuel ht.
19.90" Super crit
19.86 Sub. "
crit ht 19.88" = 50.5 cm
48.4 l
23.3 kg U²³⁵

Expr. 68 Time 10 45 AM PM Date 9-19-195 7
Purpose Same as above except
Refl outside
Personnel: LWCT JF

Refl. 15"



Fuel ht. H_2O ht. Crit.
7.67" 19.5 cm
19.5 cm
18.7 l
9.00 kg

88

H/X = 50.4

1½ Turns 20 m.t. Cad + H₂O + 0 60"

Expr. 69 Time 840 AM Date 9-20 195 7
Purpose 15" O.D. Cyl. & 4" I.D. Cyl., H₂O + Cd Inside Bare Outside
Personnel: LWG, JF

DC-2 - ~ 75 X 200
DC-3 Trips
LN "
R-1 "
PM "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment _____ Control Room Checked by ✓
Red Light Out by ✓ AM
Start Up Ordered by ✓ at _____ Date _____ 195

1141
81
1060

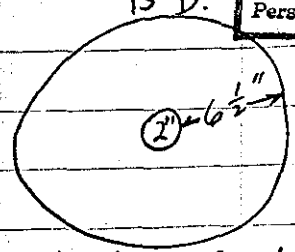
5½" annulus of Water Bare
Fuel ht in.
9.79 crit.
≈ 4.9 cm
24.4 l
12.7 kg

Expr. 70 Time 915 AM Date 9-20 195 7
Purpose Same as above except refl. outside
Personnel: LWG JF

Fuel ht. H₂O ht.
6.05" 15.5 cm crit.
15.4 cm
16.3 l
~~7.85~~ kg
7.9

H/X = 50.4

Expr. 71 Time 1:15 AM PM Date 9-20 195 7
Purpose C.C. 15" O.D. – 2" I.D. Annulus
H₂O + Cd inside, Bare outside
Personnel: LWG JF



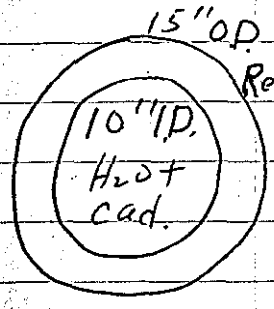
Cd + H₂O up ~40"

11 41
20

1121

Fuel lit in.
7.56 just crit
19.2 cm
21.5 ℓ
10.35 kg → 10.4

Expr. 72 Time 3:00 AM PM Date 9-20- 195 7
Purpose C.C. 15" O.D. – 10" I.D. Annulus
H₂O + Cd inside; Refl outside
Personnel: LWG, JF



Fuel lit
40.04"

H₂O Ht.
102 cm

No appreciable M⁻¹

H/X = 50.4

Expr. 73 Time 1030 AM PM Date 10-23 1957
Purpose 20" O.D. & 10 I.D. Annulus
Bare
Personnel: L.W.G., J.F.

DC-2 ~ 75X200
DC-3 ~ 75X1000
PM = Trips
LN "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency _____ Control Room Checked by ✓
Red Light _____
Start Up OK'd by ✓ AM
_____ PM Date _____ 195__

2027
607
1520

20 3 17

Fuel ht
19.30 " critical

36.3 cm
35.2 l
26.5 kg

Expr. 74 Time 10 AM PM Date 10-23 1957
Purpose Same as above except
refl. outside
Personnel: L.W.G. J.F.

20" Dia. refl.
10" Dia Heated — 5" →

Fuel ht
7.24 "

Water ht.
18.3 cm critical

18.4
28.0 l
13.5 kg

1320

H/x = 50.4

Expr. 75 Time 2 55 ~~AM~~ PM Date 10-23 1957
Purpose C.C. 20" OD & 8" ID Annulus
H2O outside 48" high & Bare outside
Personnel: LWG, J.F.

X200
X1000

Fuel ht

2027
325
1702

23.1 in 9.10" Critical
393 l
18.9 kg

Expr. 76 Time 3 32 AM PM Date 10-23 1957
Purpose same as above
except refl. outside
Personnel: LW Ct JP

1702

Fuel ht
~~4.0~~ 5.91"
15.0 cm
25.5 l
12.3 kg

H2O ht
15.1 cm

itical

92

$H/x = 50.4$

Expr. 77 Time 9[12] AM Date 9-24 1957
Purpose: 20" OD & 6" ID Annulus H2O+Cd to 60" Inside Bare Outside
Personnel: LWG JF

2027
182
1845

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safety Circuits Checked and ✓
"Source In" Checked ✓ No. 123
Emergency Equipment ✓
Red Light ✓
Start Up OK'd by ✓ Time ____ Date ____ 195__

Fuel ht.
19.2 7.54" critical
35.4 l
17.0 kg

Expr. 78 Time 10[30] AM Date 9-24 1957
Purpose Same as above except Refl.
Personnel: LWG, JF

Fuel ht
5.23"

Water ht
13.25 cm crit

13.3
24.5 l
11.8

H/X = 50.4

Expr. 79 Time 11⁰⁵ AM Date 9-25 195 7

Purpose 20" O.D. & 14" I.D. Annulus Refl outside - Heated inside to 48"

Personnel: LWG, JF

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset ✓

"Source In" Checked by _____ Source No. 123

Emergency Equipment in Control Room Checked by _____

Red Light On by ✓

Start-Up OK'd by ✓ Time _____ AM PM Date _____ 195

Areas
2030
~~990~~
~~1042 cm² net~~
2027
992
~~1035~~

DC-2 - 70 X 200
DC-3 - 30 X 100
PM - Trips
IR-1 4
LN 11

1 1

Fuel lit H₂O lit.
36,74" ≈ 93.4 cm 93,5 cm.
93.4 cm
96.90 ; 46.5 kg

Effective Inventory: ~~1042 X 93,5 = 97,4~~.

Expr. 80 Time 230 ~~AM~~ PM Date 9-26 195 7

Purpose 20" O.D. & 12" I.D. Annulus Heated inside up to 98" Bare outside

Personnel: LWG JF

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

~~Instrument and Safeties Checked and Reset~~ ✓

"Source In" Checked by _____ Source No. 123

~~Emergency Equipment in Control Room~~ Checked by ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time _____ AM PM Date _____ 195

DC-2 - 75 X 200
DC-3 Trips
LN 11
PM 11
R-1 11
R-2 rep

2027
754
1268

Fuel lit	C9	E3
38,22"	~~25~~	43,5
93,32	—	40.5
27.14	45.6	41
21.0	49,5	38.5
11.72	46.5	36

No appreciable M⁻¹

H/X = 50.4

20 - 12"

4" annulus

1268 cm²

Expr. 81 3:32 9-24 1957
Purpose Same as above except
Refl. outside
Personnel: LWG JF

Fuel ht
10.24
260.0 cm
33.0 l
15.9 kg

Water ht
24.1 cm Crit.

4540
2020
2530
33

Expr. 82 Time 3:25 Date 9-27 1957
Purpose C.C. 3.0" OD & 2.0" ID annulus
H₂O to cd inside to 48" Bare
Outside
Personnel: LWG, JF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible]
"Source in" Checked by [illegible] Source No. 123
Emergency Equipment [illegible] Checked by ✓
Red Light Circuit ✓ AM
Start-Up OK'd by ✓ Time PM Date 195

DC-2 - 70 X 200
DC-3 - 52 X 1000
P-1 - Trips
PM "
LN "

94 - 3.84 = 90.16 in
2 15.1 cm

Fuel ht
15.26" just Critical

38.8 cm

98.2 l
473 kg

H/X = 50.4

95

Expr. 83 Time 8:35 AM PM Date 9-30 1957
Purpose Same as #82 except refl. outside
Personnel: LWG, JF

DC-2 - ~ 70 x 200
DC-3 resp.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time _____ PM Date _____ 195__

R-1 Trips
PM "
LN "

Fuel ht
7.48"
19.0 cm
48.1 l
23.1

H2O height
19.1 cm critical

Expr. 84 Time 12:20 PM Date 9-30 1957
Purpose CC. 30" OD - 15" ID Annulus
Cd + H2O inside ~30" up. Bare outside
Personnel: LWG, JF.

x200
1000
s

LiSOO
11 40
3420

Fuel ht. n

18.8 cm 7.40" crit
64.3 l
30.9 kg

"96"

30-15

H/x = 50.4

Expr. 85 Time 1:35 PM Date 9-30 195 7
Purpose Same as Expt # 84
~~except refl. outside~~
Personnel: LWG, JF

Fuel ht. 13.4 5.27" = 13.5 cm

Water ht. 13.5 cm Crit

45.8 l
22.0 kg

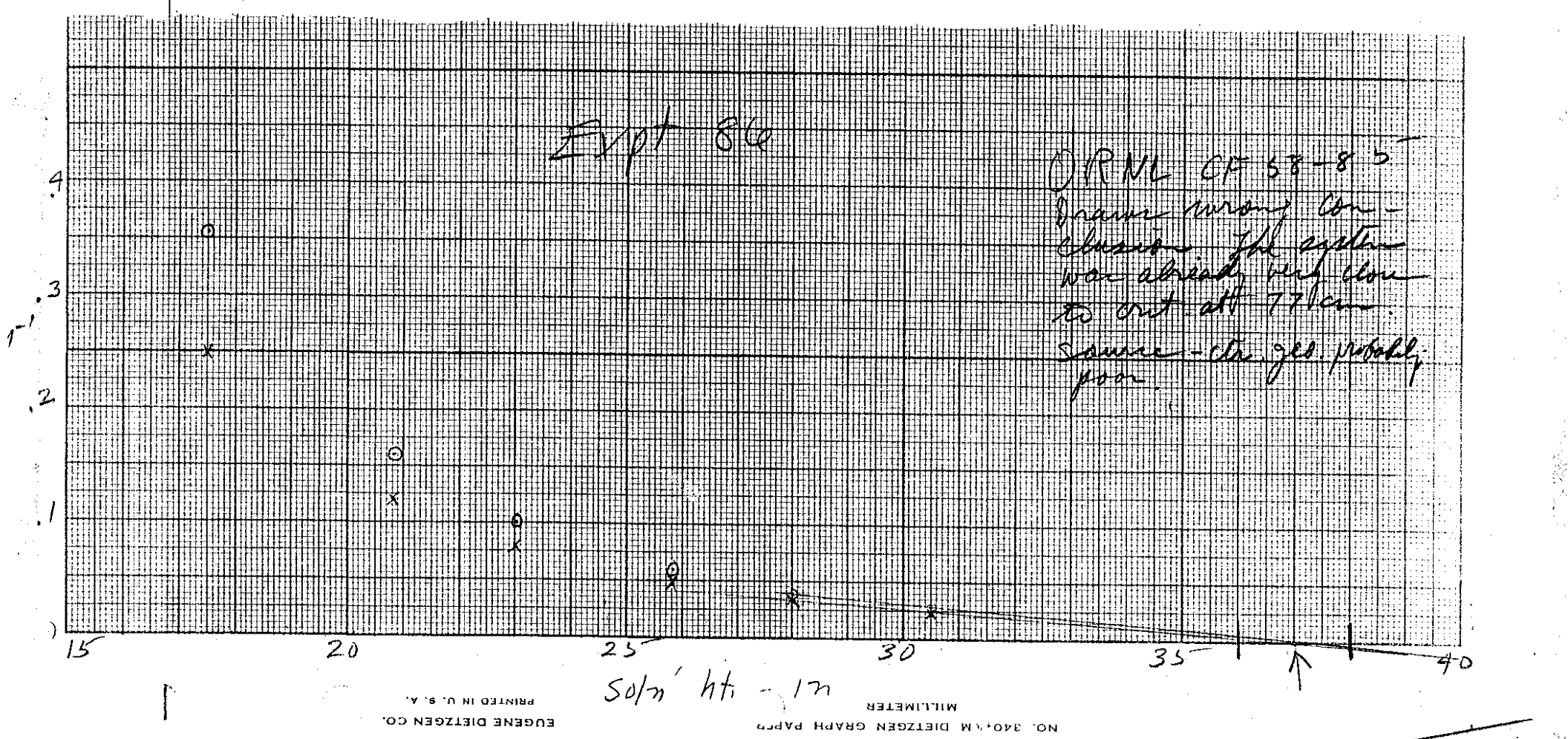
Expr. 86 Time 8:45 AM Date 10-1-7 195
Purpose CC. 30" OD & 24 ID.
Cd & H2O to 36" refl.
Personnel: LWG, CC, JF

DC-2-70X200
DC-3-70X1000
PM Trips
LN "
P-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible] ✓
"Source In" Checked by 123
Emergency Equipment in Control Room Checked by ✓
Red Light Checked by ✓
Start Up OK'd by ✓ Time Date

	Fuel ht	C_4	x44	H_2O ht.		C_5	x64
Out of core →	30.48"	85.7	.023	77.6	.021	182.5	
	28.04	59.5	.033	71.6	.037	136	
	25.82	41.2	.049	65.4	.060	83.2	
	23.04	25.7	.078	58.4	.101	49.4	
	20.82	16.8	.119	53.0	.141	31.1	
	17.47	8.1	.241	44.4	.355	14.2	
	9.77	1.3	*	"		2.2	
	"	1.5		"		2.4	
	"	(2.0)		24.8		(5.0)	

Extrapolates to 36-38"


Expt 86
ORNL CF 58-8-5
Drawn wrong con-
clusions. The system
was already very close
to crit. at 77 cm
Source - Cf. gel. probably
poor.
1/M
.4
.3
.2
.1
15
20
25
30
35
40
Sol'n ht - in
EUGENE DIETZGEN CO.
PRINTED IN U. S. A.
NO. 340 M DIETZGEN GRAPH PAPER
MILLIMETER

H/x = 50.4

97

Expr. 87 Time 10:30 AM Date 10-2-195 7

Purpose CC. 10" OD & 2" I.D. Annulus
Bare outside

Personnel: LWG, C.C. I.F.

START-UP CHECK LIST

Equipment Checked by L Personnel Check by L

Instrument and Safeties Checked and "Source In" Checked by L

Emergency Equipment in Control Room Checked by No. 123

Red Light On by ✓

Start-Up OK'd by L Time AM PM Date 195

H_2O + Cd up to 71"

Blade UP 64"

46" stroke

507
20
487

DC-2 – 75 X 200
DC-3 50 X 1000
LN Trips
PI "
PM "

Fuel ht. in.
101.5 cm = 39.94" just exit
Start of drain time test. System had to be raised to above roll height several times during test.
1st Re-start of expt. from drained back conditions
1st Restart of expt. from drained back cond. to empty dump well
2nd Restart of expt. from drained back cond.

4940
23,8 kg

98

H/x = 50.4

Expr. 88 Time 8 40 AM PM Date 10-3 195 7
Purpose CC. 10" OD & 2" I.D. - H₂O ckd.
refl. outside
Personnel: LWG, C.C., JF

DC-2 - 7 0x2 00
DC-3 - 45X1000
PM TRIPS
LN "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Checked by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by 123
Emergency Equipment: ✓
Red Light On by ✓
Start Up OK'd by ✓ Time Date 195

L87 - net A.

Fuel ht. in H₂O Ht.
7.96" 20.2 cm. Cut
20.2
9.8 l
4.7 kg

H₂O ckd inside
507
81
426

Expr. 89 Time 10 40 AM Date 10-3-195 7
Purpose CC. 10" OD & 4" ID
refl. outside
Personnel: LWG, C.C. JF

Fuel ht. " H₂O ht. cm
16.10" 40.85
40.9 cm
17.4 l
8.4 kg

H/x = 50.4

99

Expr. 90 Time 2:20 PM Date 10-3-1957
Purpose Cf. 12" D.D & 2" I.D Annulus
H₂O+Cd. Inside, Bare outside
Personnel: LWG, C.C., JF

759
20
739

Fuel height. in.
27.8 cm 10,9 Just crit

20.5 ℓ
9.9 kg

Expr. 91 Time 2:38 AM Date 10-3-1957
Purpose Same as above except
Cyl. Outside
Personnel: LWG, C.C., JF

	Fuel ht. in	H₂O ht. cm
2:50 PM	~~14~~ 14.5 cm	
3:10 PM	~~15.0~~ 14.5 cm	6.23 ρ_0 N = .0002
	16.1	6.23 " .0003
3:15	16.1	6.325 Some out slight + period
	16.0	6.325 still point
	16.0	6.315 sub-
3:17 PM	Crit fuel + Reflector at 6.31" H₂O	
	16.0 cm	

11.8 ℓ, 5.7 kg
Sp. gr (H) = 1.4055

End of Series at H/x = 50

100

Start of New H/X = ~~325~~ ~~340~~

Expr. 92 Time 10 ~~AM~~ PM Date 10-7-195 7
Purpose C.C. 12" OD & 2" ID Annulus
Rodded inside & Bare Outside
Personnel: L.W.G., C.C., J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by ✓
Emergency Equipment ... Source No. 123 ✓
Red Light ... ✓
Start ... ✓

H/X = 309
gm U/gm = .0812
Sp. gr. = 1.105
.0836 gm U/cm³

DC-2 - 70x200
DC-3 - ~100x500
LN Trips
R-1 "
PM "

~~Sp. gr. 1.110~~

Fuel ht.
22.51" just crit 1st try
Repeat for → 22.66" " "
mixing

Expr. 92A. Time 2 ~~AM~~ PM Date 10-8-195 7
Purpose Repeat 2 above after thorough mixing
Personnel: L.W.G., C.C., J.F.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment ... Control Room Checked by ✓
Red Light ... by ✓
Start-Up OK'd by ✓ Time ... AM PM Date ... 195

circulated soln with pump
12 - ✓

DC-2 - 70x200
DC-3 ~ 100x500
LN Trips
PM - "
R-1 - "

Hydro.
Sp. gr. 1.104
75
9
20
739

Fuel ht
18.12 sub. crit
18.18 just crit
34.1 l
2.82 kg

4/x = 309

Expr. 93 Time 10 AM Date 10-11-195 7
Purpose C.C. for 12" OD & 2" ID H2O tcd inside & refl. outside
Personnel: LWG C.C. JF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time AM PM Date 195

DC-2 70 on 10x20
DC-3 45 on 10x100
R-1 trip
Log N trip
PM trip

739

Fuel ht. in. 9.43 24.0
17.7 l
1.48 kg

Water ht. ins 24.0 critical

Expr. 94 8:55 AM Date 10-14 195 7
Purpose C.C 12" OD - 9" I.D refl. outside
Personnel:

H2O tcd inside
DC-2 — 70x200
DC-3 — 45x1000
R-1 — Trips
LN "
PM

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

759
81
678

Fuel ht in 18.34 466
31.6 l
2.44 kg

H2o ht. cm. 46.7

H/X = 309

Expr. 95 Time 1:20 PM 10-14-1957
Purpose C.C. 15" O.D & 8" I.D
refl. outside
Personnel: LWG, C.C., JF

H2O cd inside
to = 48"

H2O Ht.	Fuel ht cm	$C_4^{\chi 254}$	H_2O	$C_5^{\chi 254}$	
93.2 cm	36.73"	48.75	.25	102.25	.117
80.8	31.84	46.5	.26	97.0	.123
63.6	25.04	41.7	.29	81.7	.147
50.5	19.90	33.7	.355	61.2	.196
28.0	11.00	12.0		12.0	

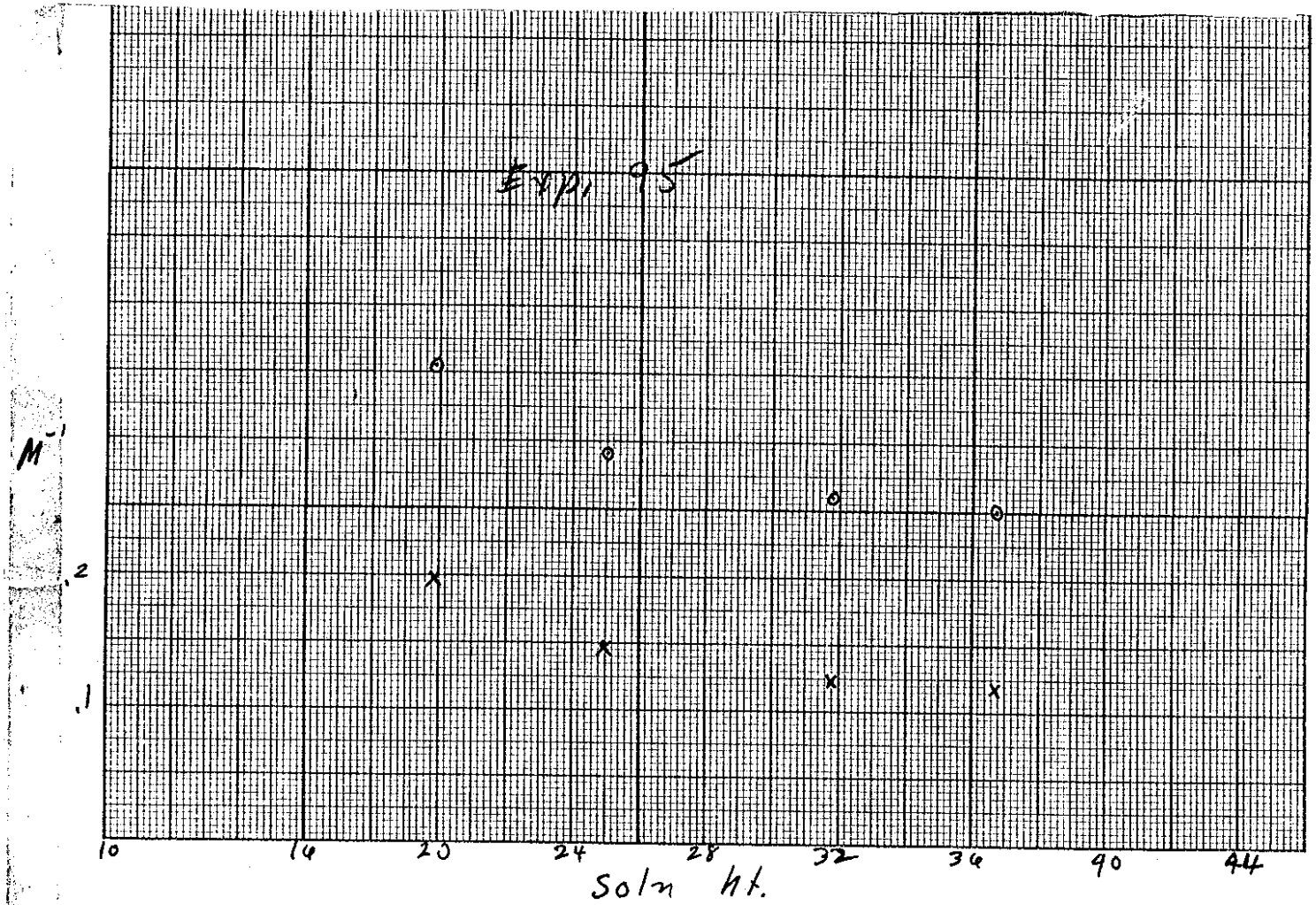
M^{-1} indicates sub-crit at ∞ height.

Expr. 96 3:20 PM 10-14-1957
Purpose 15" O.D. & 6" I.D.
Bare outside
Personnel: LWG, C.C., JF

9½" Ann.

1141

Fuel ht.	$C_4^{\chi 254}$	$C_5^{\chi 254}$
36.20"	9.3	5.0
30.73	4.3	4.7
24.88	4.0	4.4
11.41	2.0	2.2



H/x = 309

Expr. 97 Time 8:20 AM PM Date 10-15-195 7
Purpose C.C. 15" OD & 6" ID.
refl. outside, inside, w cd shut inside
Personnel: C.C., DFC, JF

DC-2 - 70 x 200
DC-3 TRIPS
L N "
P M "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Control Check by ✓
Instruments and Safeties Checked and ✓
Source ... Checked by ✓
Emergency ... Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time AM PM Date 195

1741
182
959

123

Fuel ht. Water ht.

8:40 AM	0 in	9.5 cm
8:44	10.03	25.0 cm
9:00	12.24	31.2
9:10	13.63	34.48 slightly sym
9:15	13.63 (13.63)	34.5 slightly sub-almost crit

Crit cond = 34.6 cm

13.63 in fuel 34.6 cm water

33.2 l ; 2.78 kg

Expr. 98 Time 1:10 AM PM Date 10-15-195 7
Purpose C.C 15" OD & 4" ID (H2O + Cd)
Bare outside
Personnel: DFC, JF

1741
81
1060

10:36 AM Fuel

16.88 in very slight drift up.

10:38 16.87 just critical

42.9 cm ht.

45.5 l

3.80 kg

106

H/X = 309

6" ann.

Expr. 103 Time 925 AM 10-16-1957
Purpose C.C. Same as above - 20OD-8 I.D.
except bare
Personnel: LWG, JF

2027
325
17-02

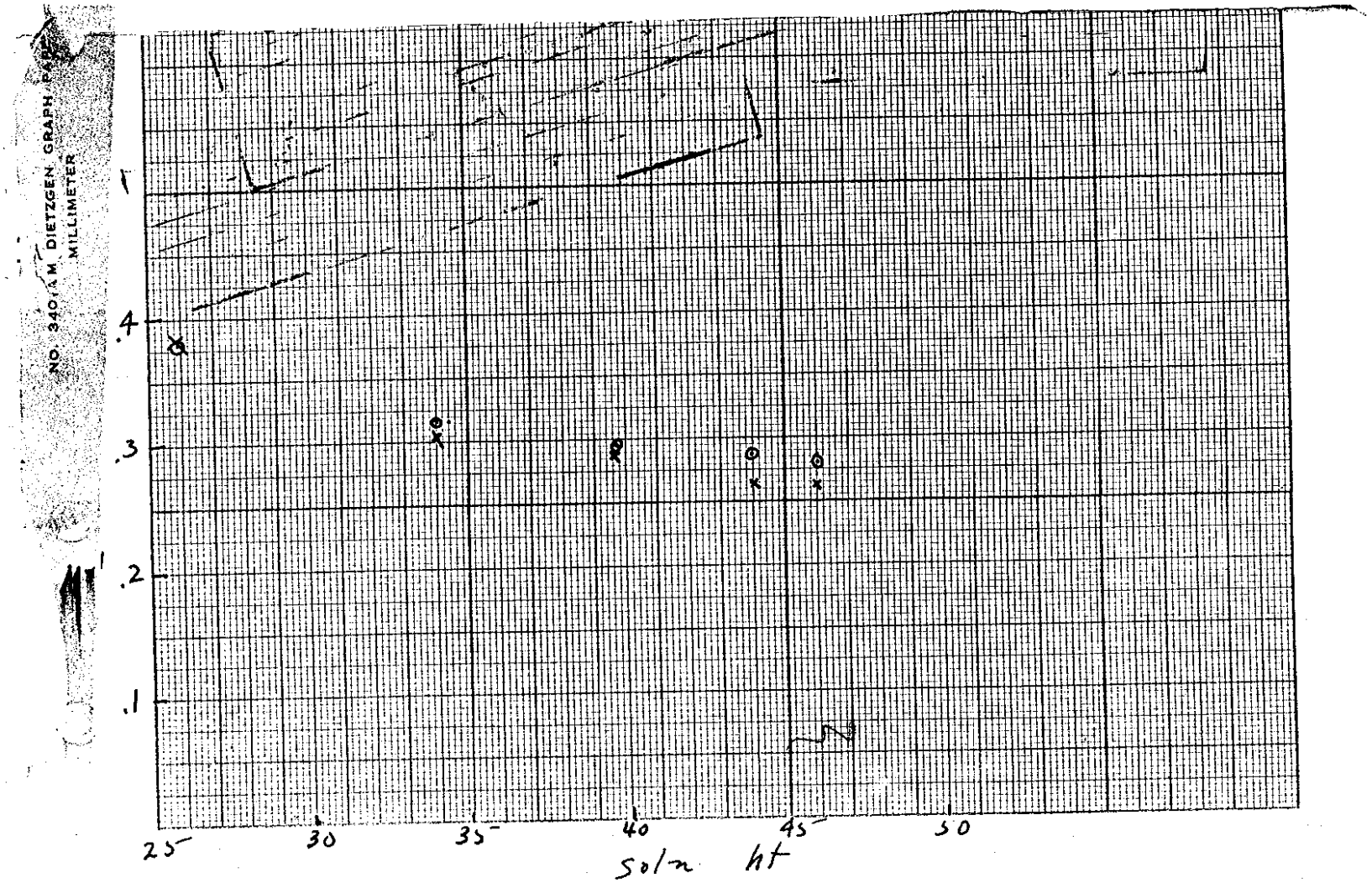
Fuel ht m.
13.78" critical
35.0 cm
39.6 l
4.98 kg

Expr. 104 1105 AM 10-16-1957
Purpose C.C. 20" OD & 10" ID (H2O fcd)
refl. outside
Personnel: LWG, CC, JF

2029
307
1520

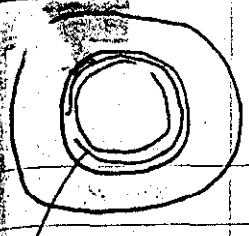
Fuel ht
11.95"
30.3 cm
46.1 l
3.85 kg

water ht.
30.3 cm
critical


NO. 340 K M. DIETZGEN GRAPH PAPER
MILLIMETER
.4
.3
.2
.1
25
30
35
40
45
50
Soln ht

4/x = 309

Expr. 105 Time 1245 AM PM Date 10-16 1957
Purpose C.C. 20" OD & 10" ID (H₂O+cd)
Bake outside
Personnel: LWG, CC, JF



2-PC-28 mil cad.
~2" gap in each around circumference (av. cad. thick. ~ 50 mil. same for expt 104

Fuel ht	C_9^{+2} 5€	C^{5+2} 5€
45.98"	10.0 .28	10.65 .263
43.95	9.8 .287	10.6 .245
39.85	9.4 .296	9.4 .292
34.06	8.8 .318	8.9 .305
25.84	7.3 .38	7.3 .384
11.88	2.8	2.8

Expr. 106 325 Date 10-16 1957
Purpose 20" OD & 12" ID (cd+H₂O)
ref. outside
Personnel: LWG, CC, JF

2027
754
1268

Fuel ht
883cm 3476
1120 l
9.37 kg

Water ht.
*88.5

108

H/X = 30.9

Expr. 107 Time 9 25 AM Date 10-17 1957
Purpose C.G. 20" OD & 6" ID (Plotted)
refl. Outside
Personnel: C. G, L W G, J F

DC-2 — 70X200
DC-3 TM PS
LN "
PM "
P-1 "

1
7" ann.

2027
182
1845

STA[illegible] LIST
Equipment Checked by ✓
Instrument and Safeties [illegible] by ✓ 123
"Source In" Checked by [illegible] 123
Emergency Equipment [illegible] ✓
Red Light [illegible] by ✓
Start-Up OK'd by ✓ Time [illegible] 195

7 rod ht, 185cm - 7.29" 34.1 ℓ 2.85
water ht ~18.5 cm

Expr. 108 Time 10 00 10-17 1957
Purpose C.G. Same as above except Base outside
Personnel: L W G J F

7" ann.
1845

7 rod ht
10.04" crit
25.5
47.2 ℓ
3.95

H/X = 309

Expr. 109 Time 1:45 ~~A.M.~~ P.M. Date 10-17-~~53~~57
Purpose CC 10" OD & 2" I.D. (Hotcd) refl. outside
Personnel: LWG., C.C., JF

109

507
20
487

~~Fuel~~ Fuel ht. 15,40" 39.1 cm

Water ht. 39.2 cm

19.0 ℓ
1.54 kg

Bare expt. to determine rate of drain thru drainwell.
Data kept by Rohrer

Sample from manifold:-
Ref. 354 844

74.758
19.267
55.49

Hydro. Sp gr. 1.107
Lab 1.1051
gm U/gm = 0.0812
gmX/gm = .07568
gmX/cm³ = .08363

1.0000
.1054
.8946

H/X = 26.11 V.8946 = 309
.07568

110

4/x = 309

4/x

H₂O inside ~36" High.

Expr. 110 Time 1245 AM PM Date 10-21-1957
Purpose C.C. 30"OD & 20 I.D. (H₂O tcd) refl. outside
Personnel: LWG C.C. J.F.

DC-2 — 70X200
DC-3 - 50X1000
LN Trips
PM "
R-1 "

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time ____ Test Date ____ 195__

4560
2027
2533

4560
11
34

Fuel ht. Water ht.
12.42" 31.5 cm critical
31.5 cm

Omit.

Expr. 110A Time 200 AM PM Date 10-21-1957
Purpose Same as above except H₂O inside Lowered to ~ 13"
Personnel: LWG, J.F.

2533

Fuel ht Water ht.
12.435 31.6 cm critical
~ 31.6
80.0 ℓ
6.69 kg

H/x = 309

111

Expr. 111 Time 8 43 AM PM Date 10-22-195 7
Purpose C.C. 3.0" O.D & 15" I.D. (H2O+cd)
Refl. Outside
Personnel: LWG, E.C., J.F.

DC-2 — 70×200
DC-3 — 50×1000
LN Trips
PM "
R-1 resp.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
Source In" Checked by ✓ Source No. 123
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time AM PM Date 195

4560
1140
3420

Fuel ht. Water ht
7.14" 18.2 critical
18.1 cm
61.9 l
51.8 kg

Expr. 112 Time 9 10 AM PM Date 10-22-195
Purpose Same as above
except Bare outside
Personnel: LWG, J.F.

Fuel ht m.
9.53 critical
242 cm
82.8 l
69.2 kg

112

Gwin's Annular Exp.s

DC-2 48 x 10 x 20
DC-3 52 10 x 60
period trip
R-1 trip
R-2 responds

Expr. # 1 9/5 195
Purpose 15" outside, 6" inside dia annular H₂O inside to bt. of 49.5" bare outside
Personnel: Gwin, Fox, Gilley

Bottom of safety blade is ~ 47" above bottom of reactor

Soln Wt. (lm.)	
19.40	super crit.
19.395	slightly super crit.
19.385	super
19.37	sub:
19.380	sub
19.385+	super

~~Probe~~ Selsyn reads 121.71 when bottle is at zero

19.38+
19.385

Sample bottle lowered to the center of of the annular center {H2O}, a slightly neg. effect was observed. The suspension for the bottle had a small piece of stainless steel at the top.

Expr. 2 Time 9:10 AM Date 1/21 1958
Purpose 15" outside, 6" inside; bare outside
H_2O inside to height of 20"
Plastic bottle filled with H_2O
Personnel: Fox, Gilley, Gwin

Selsyn #2 reads 92.10 when bottom of Tadadder is level with bottom of reactor.

In this experiment plastic bottle had no steel associated with it. It was "weighted down" with plastic glued to bottom

Selsyn #1 reads 112.45 when bottom of plastic to which bottle is cemented is at zero.

Fuel Wt.	
19,595"	crit.*
19.51	sub.
19.515	crit*

Log W ≅ .001 Bottle lowered.

Positive period was obtained when bottle was being lowered, due to displacement of water in center cylinder

* these two values of crit. ht. were presumably due to warming of cold water placed in center cylinder.

Expr. 3 — 140 ± — 1/21 — 1958
Purpose 15"; 6" annulus; boron steel; water inside
Plastic bottle filled with water
Personnel:

H_2O ht. in center cylinder is now 45,88"
with bottle out of water.

Selsyn reading when bottle is just submerged = 71.98
Salem ut.

19.39" super
19.365" crit.

2 35 System made exactly critical with Taddder

Bottle lowered to center of reactor; selsyn reading = 105.0". Bottle resulted in very slight positive period.

Bottle raised back to original point (selsyn = 71.98")

System just critical

Temp = 23.5°C

Taddder

95.61" crit bottle out
93.80 crit. bottle in
95.62 crit. bottle out

4[05] 1/21/58 Rack changed so as to raise bottle when rack raises. Selsyn = 82.13" when bottle = zero

DC-2 40 10x20
Log N trip
R-1 "
R-2 "
DC-3 "
Im trip

Expr. 4 Time 9[10] A.M. Date 1/23 1958
Purpose 15"/6" annular
Plastic bottle filled with water
Personnel:

Top of bottle at top of water when selsyn is 122.31
Temp. = 23 °C

	Soln Wt.	Tadadder	Bottle	
~~Bottle up~~	19.40"	92.65	122.31	crit.
	"	"	89.60	slightly positive

Solution drained back to check air in Tadadder line.
Vent to tadadder opened more

Log N=.001 ~~Log N~~	19.40"	94.43	120.57	crit.
~~Log N=.0032~~	"	111.17	120.57	pos. period
~~Bottle inserted~~	Log N=.0032 "	94.43	120.57	crit
Bottle inserted	Log N=.0032 "	94.42	89.60	super
	= "	90.03	89.60	crit
Bottle removed		94.44	120.23	crit

Expr. 5 2'5 11/23 1958
Purpose 15" 6" annulus water inside
Plastic bottle contains dilute
solution - see below
Personnel: Fay Culley Gwin

Volume of bottle = 153.3 cc
Volume of Soln added = 25 cc @ ≅ 4/x = 299.

	Soln T	Added	Bottle	
Log N, 004	19.385"	92.89	120.23	crit

Bottle inserted to ~96" on enlargement period too short to continue

Soln. drained and bottle placed in carton

18.81"	92.92	89.6	crit.

Bottle removed to obtain negative period

Bottle added

Expr. 6 Time 3 45 AM PM Date 1/23 1958
Purpose 15" 6" annulus, water inside
Plastic bottle contains dilute
solution - see below
Personnel:

Vol. of bottle 153.3 cc
Vol of Soln added 10 cc - @ ~ .02 g^{435}/cc

Log N	Soln	Td adder	Bottle	
.004	19.385	107.05	120.59	crit.
Bottle added →	"	~~89.6~~ 107.05	89.4	positive period
	19.31	86.49	"	crit

contains

Sample taken from manifold (4/x ~ 299)
Req. # 354913
G 72.5
T 20
N 52.5 g
Note: This sample was returned to manifold without being sent for analysis.

Expr. 7 9[10] 1/24 1958
Purpose 15"6" annulus bare cyl'dr, H_2O inside
Plastic bottle contains dilute solution
Personnel: Fox, Gilley, Gwin

Vol of bottle = 153.3 cc
Vol of soln added = 5. cc ≃ .02 g/cc

Temp = 22.5°C

Log N	Soln Ht.	Td adder	Bottle	
.0034	19.32"	110.98	89.6	crit.
"	"	"	120	neg. period
"		110.98	89.6	pos. period
	19.32	89.81	89.6	crit

Expr. 8 1/24 1958
Purpose 15"6" annulus
Plastic bottle contains dilute solution
Personnel: Fox, Gilley, Gwin

Vol of bottle 153.3 cc
Vol of soln added 1.0 cc @ .02 g/cc

Log N	Soln Ht.	Td adder	Bottle	
.005	19.38	~~107.92~~ ~~107.69~~	122.28	crit
"		~~89.6~~ 107.92	89.6	pos period
"		99.22	89.6	crit.

Expr. 9 Time 155 ~~AM~~ PM Date 1/24 1958
Purpose 15", 6" annulus
Plastic bottle. with H_2O only in it.
Personnel: Fox, Gilley, Gwin

Log N	Soln Ht	Tod adder	Bottle	
.004	19.38	99.64	121.37	crit
"	"	"	89.6	pos. period
"	"	93.51	89.6	crit
"	"	99.64	121.02	slightly sup ~3 PM
"	"	99.20	"	just crit
"	"	"	89.6	pos period
"	"	95.00	89.6	crit.
"	"	99.2	121.37	sub.
"	"	100.7	"	crit.

Expr. 10 Time 9:30 195__

Purpose Expose two gold foils to determine odegiast power level for flux traverse

Personnel: Fox, Lewis, Gilley

START UP CHECK LIST

Equipment Checked by ✓

Instrument ✓

"Source In" ✓

Emerg. key ✓

Red Light On by ✓

Start-Up OK'd by _____ Time _____ Log Book _____ 195__

Soln

19.4" cut

LogW = .1 19.4 + super

LogW = .1 19.4 cut

DC-

PM

LogW

DC-3

R-1

R-2

Log

outside

inside

OC-2 45 on 10x20

PM - 800 V

LogN 7 sec

OC-3 50 on 10x50

R-1 70 on 10x1000

R-2 responds

Expr. 11 Time 10:15 AM PM Date 2/3 1958

Purpose Flux traverse with Au foils 15"-6" annulus bare outside

Personnel: Gwin, Gilley

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instruments and Safety Equipment Checked by ✓

"Source In" Checked by ✓ Source No. ✓

Emergency Exits and Control Room Checked by ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time ✓ AM PM Date ✓ 195 ✓

Solu lit.

LogN @ 0.2 19.44" crit.

foils exposed at LogN = 12 for ~ 15 min.

Nominal dimentions in in.

	Foil #	Location	Foil #	Location
outside surface → wall		0	16	5
inside surface → wall		1/16	14	5 1/2
	38	3/8	11	6
	33	7/8	12	6 1/2
	37	1 3/8	9	7
	22	1 7/8	15	7 1/2
	center →	2 5/16	center →	7 9/16
	41	2 3/8	8	8
	19	2 7/8	10	8 1/2
	36	3 3/8	6	9
	20	3 7/8	17	9 1/2
	34	4 3/8	18	10
	wall	4 9/16	wall	10 1/2
	wall	4 5/8	wall	10 9/16

Foils located 62 5/16" from top except #25 Cd covered which was 57" and #4 Cd covered which was 59"

Expr. 12 Time 2 AM PM Date 2/5 1958
Purpose Critical conditions for ~~15"-9"~~ annulus 15"-6" annulus with H_2O inside and outside
Personnel: DFC. SWH

START-UP CHECK
Equipment Checked by SWH Log by SWH DFC
Instrument and Safety Circuits
"Source In" Checked by Plutonium DFC
Emergency Equipment in Control Room
Red Light On by SWH
Start-Up OK'd by SWH Time 2 15 PM Date 2-5 1958

	Soln ht.	H_2O (outside)
2 15 PM	0	24cm (left hand end) bare cyl.
2 40	9.31"	48cm Supercrit
2 45	9.31" H_2O = 9.29"	47.6cm Slightly super

crit value good to 9.31 ± .005"

23.6 cm.
22.6 l.
1.89 kg.

Exp. 12 A Au foil #24 placed in center of annulus

			Log N
3:40 PM	9.37"	water at 47.0 cm just oxygen –	.0005
	9.37"	47.2 cm for period	
"annulus	9.34+	47.2 cm crit	.1

Exposure time = 15 min 20 sec.

4:10 H_2O valve apparently leaking during experiment

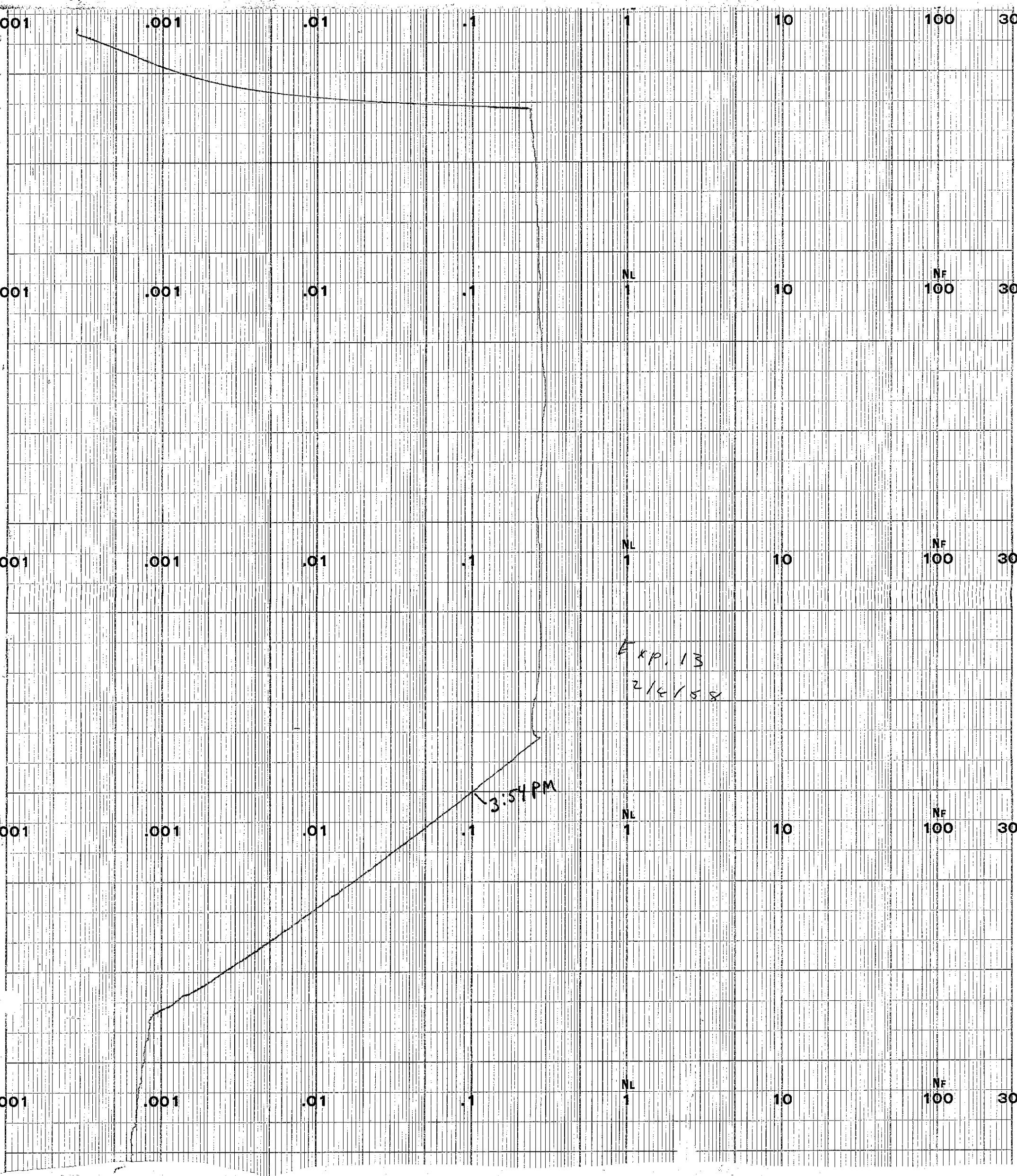
cyl.

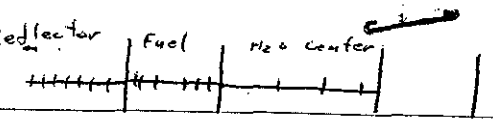
Expr. 13 Time 3:25 PM 2/6 1958
Purpose Au foil traverse for annulus when reflected
Personnel: Galley, Cronin

DC3 52 10x50
PM Trip
R-2 responds
DC-2 35-40 10x20
Log W Trip
R-1 trip Full scale x10

Soln Wt	H_2O	- log W	
9.28	47.6 cm	.0007	< crit
9.28	47.6 cm	.278	crit.

Foil Exposure = 20 min.





Beginning at outside surface of reactor as zero, foils were placed in reactor as follows:

foil	distance (in.)	
39	3 7/16	
4	2 15/16	nominal distance from
43	- 2 7/16	center line of foils to top
2	- 1 15/16	of reactor = 67 5/16"
13	- 1 7/16	
29	- 15/16	Exposure time = 20 min
30	- 7/16	
wall	0	
wall	1/4"	
27	5/16	
26	13/16	
23	1 13/16"	
31	2 13/16	
21	3 13/16	
40	4 5/16	
wall	4 8/16	
wall	4 9/16	
5	4 15/16	
3	5 15/16	
1	7 7/16	
Center	7 1/2"	

Expr. 14 Time 905 Date 195
Purpose Cd covered foil exposure

Personnel: Fox, Gilley

START-UP CH
Equipment Checked by ✓ Check by
Instrument and Safeties Checked and ✓
"Source In" Checked by
Emergency Equipment in Control Room Tested ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time 905 Date 195

9 20 System scrammed by R-T due to power level.
Crit ht. ~ 19.50 (slightly super)
Crit. Rx = 19.46 @ Log N = .3

Temp = 23.5°C

PM tips at 1000 V & Log N: .3

Log N in same position as Exp. 13

Exposure time 30 min.; Power Log N: .3
Taking the outside wall of the reactor as zero the foils were placed as follows

Exposure began at 9:41

Foil	Position
52	
50 (Cd Covered)	-13/16
Wall	0
Wall	11/16

See Next Page (127) →

foil	Position (in.)
outside edge wall	0
inside edge wall	1/16
52 {Cd covered}	~~1 5/16~~ 1 6/16
50 {Cd Covered}	3 6/16
55 {bare}	5 10/16
53 {bare}	6 10/16
28 {Cd covered}	7 10/16
42 {Cd covered}	9 2/16
35 {Cd covered}	10 2/16

Foil #2 (U^{235} foil) is bare and was placed 1", center to center, above center traverse foil (#28).
Foil #3 (U^{235} foil) is Cd covered and was placed 1", center to center, below center traverse foil (#28).

Center traverse foils placed 62 5/16" from top as also foils in fuel.

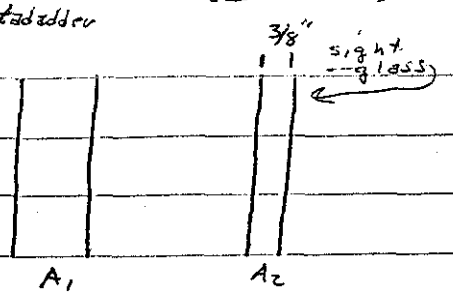
Calibration of Tad adder

H_2O added	Scale Reading
0	0.2 ~~mm~~ cm
100 cc	27.7
20 cc	30.5
20 cc	33.3
20	36.2
20	39.0
20	41.8
100	55.6
100	70.0
100	84.3
100	98.5
100	112.6
100	126.7
100	141.0
100	155.2

Average = 14.1 cm / 100 cc = .141 cm/cc

Tad adder

tadadder



$V = (A_1 + A_2)\,h$

$A_1 + A_2 = \frac{V}{h}$

$A_1 = \frac{V}{h} - A_2 = \frac{1}{.141} - .713$

$A_1 = 7.092 - .713 = 6.379\ cm^2$

$A_2 = \pi (.4763)^2$

$= .713\ cm^2$

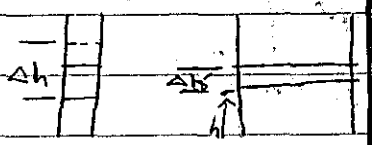
$A = \pi R_1^2 = 6.379$

$R_1 = 1.424\ cm$

$Dia. = 2.848\ cm$

Tadadder Vol = 6.38 c/cm

To determine amount tadadder delivers to reactor:



$V = A_T \Delta h' + A_R \Delta h'$

$V = 6.379\ \Delta h$

$\Delta h' = \frac{6.379\ \Delta h}{6.379 + A_R}$

Δh = rise of tadadder

Δh' = rise of soln

h = Soln ht. before tadadder rise

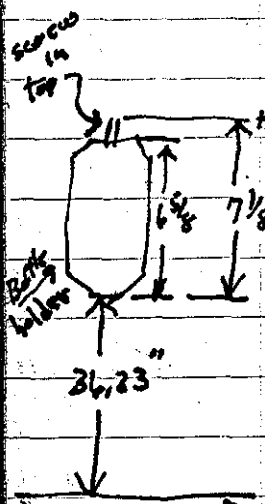
If $\Delta h = 1\ cm$

$\Delta h' = \frac{6.379}{6.379 + A_R} = \frac{\text{increase of Soln ht.}}{\text{cm rise of tadadder}}$

10 c-2

Expr. 15-A 2/26 1958
Purpose Comparison of various sample bottles in 15", 6" annulus bare bottle # 20
Personnel Fox, Gwin, Gilley

Height of H_2O in center = 43.4"
sample bottle # 20 used
bottle "out" position = 36.01
bottle "in" position = 7.5



fuel ht.	Tad zdder	Bottle selsyn reading	
19.25	100.09		super
	99.75		sub
	99.89	~~36.01~~	
	99.84	36.01	crit
	99.84 (Log W = .001)	7.5	pos. period
	92.47	7.5	just crit.
	99.84 (Log W = .01)	7.5	pos. period
	92.47 (Log W .05)	7.5	just. sub.
	92.47	36.01	neg. period
	100.76 (Log W .01)	36.01	just crit.
	100.76	7.5	pos. period
3 20/24 m	100.76	36.00	crit.

Expr. 15-B Time ____ AM 2/24 1958
Purpose comparison of sample bottles
bottle # 24
Personnel: Bob Gilley

Height of H_2O in center = 43.x"
bottle "out" position = 36.01
bottle "in" " = 7.5

fuel wt.	Totalizer	Bottle	
19.27-	96.50	36.00	just crit.
	96.50	7.5	pos. period
	88.63	7.5	just. crit.
	96.51	36.00	sub
	96.86	36.00	just crit.

15-B cont. 2/27/58

Positive period using bottle # 24

PM trip = 12.6 at log N = .1	fuel ht 19.24	Tadadder 94.20	Bottle 36.05	just crit.
		94.20	-7.5	pos. period
		86.50	7.5	just crit
Temp = 23°C		94.20	36.00	just crit.
	10^{18}	94.20	7.5	pos period
		86.50	7.5	just crit.

Calibration of Tadadder (Bottle out)

19.24	94.40	crit
	102.10	pos. period

Expr. 15-C Time ___ AM PM Date 2/27 1958
Purpose Comparison of sample bottles
bottle # 14
Personnel: Fox, Gwin, Gilley

2306

Ht. of H_2O in Center = 43.4"
bottle "out" position 36.00
bottle "14" " 7.5"

	fuel ht.	Tadadder	Bottle	
130 PM	19.27	92.32	36.00	just crit.
		92.32	7.5	pos. period
		84.11	7.5	just crit.

second period, re establish critical, same bottle

	102.27	36.00	just crit
	102.27	7.5	pos. period
~~2306~~	~~102.27~~	~~36.00~~	
	102.47	36.00	just crit.

2:56

Expr. 15-D Time A.M. Date 6/17 1958
Purpose Sample bottle comparisons
bottle # 8
Personnel: Fox, Gwin, Gilley

H_2O ht. in center = 43.4

bottle out = 36.00, bottle in = 7.5

fuel ht.	Todadder	bottle	
~~96.64~~	~~36.00~~		~~crit~~
~~96.64~~	~~7.5~~		
re established crit.	96.44	36.00	just crit
	96.44	7.5	pos. period
	88.20	7.5	crit.
	96.31	36.00	crit.
	96.31	7.5	pos. period
	88.20	7.5	crit.

Check on #2 rack travel by comparing scribed distances read off on selsyn with vernier caliper measurements.

		Selsyn dist.	Vernier mean.
	1	12.00	11.96
Bad joint in rack	2	12.00	12.08
	3	12.00	12.15
	4	11.00	11.08

3/20/58

Solution taken from the manifold and transferred to the [redacted]" south wing.

Bottle # 102 G 17.345 Sample from manifold
T 2.369 on 10/17/57
N 14.976 kg gm U/gm = 0.0812
kg U = 1.216 Sp. gr. = 1.105

#103 G 17.425
T 2.372
N 15.053 kg
kg U 1.222

Refill #103 G 17.375
T 2.372
N 15.003 kg
kg U: 1.218

1.216
1.222
1.218
3.654 kg U
1.200
4.854
.424
5.280

Refill #102 G 17.150
2.369
14.781

Refill #103 G 7.590
2.372
5.218

Styra foam Expts. H/2 = 290
= 293

Expr. 1 Time 10:31 AM PM Date 5/12/1958
Purpose 6" ~~Refl~~ Slab Refl
Personnel: LWG, Reedy, Pyror, Fox

Back scale Zero at outside bottom

	Probe	Manometer	Water ht.
av 8.07	8.09"	8.04"	20.4 cm *

C.Ht. = 20.5 cm
C.V. = 37.3 l
C.M = 3.28

Expr. 2 Time 3:24 PM Date 5/12/1958
Purpose 6" Slab Bare Std
Personnel: LWG, Reedy, Fox

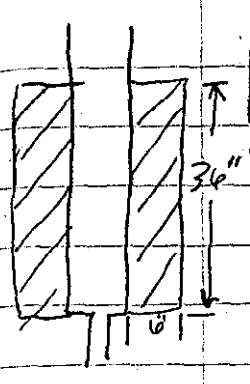
START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safety ✓
Source In... ✓
Emergency ✓

	Probe	Manometer
	27.25"	27.23" Critical

69.2 cm + 4 = 69.6
C.V = 127
C.M = 11.2

* corrected

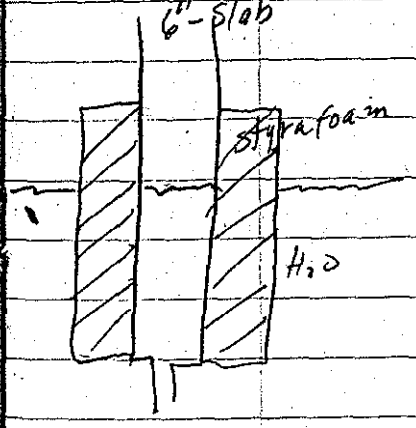
Expr. 3 9:40 5/13/1958
Purpose 6" slab with 6" of styra foam on both sides - not on ends
Personnel: LWG, Reedy, Fox



START-UP CHECK LIST
Equipment Checked by ✓ Check by ✓
Instrument
"Source
Emerg
Red
Start Up OK
Std Date 195

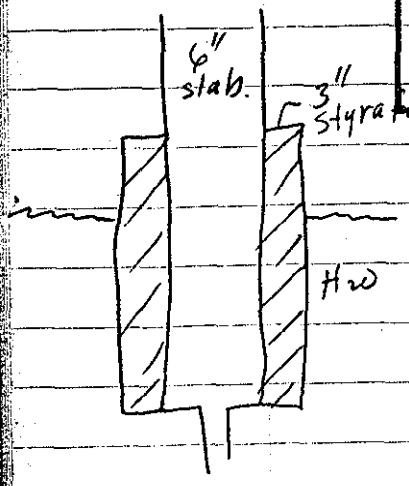
Probe	Manometer	
21.86"	21.91"	slightly pos.
21.84	21.89	" "
21.82	21.87	" Zero.

Expr. 4 10:50 AM Date 5/13/1958
Purpose 6" slab with 6" styra foam on both sides & Backed up with Water
Personnel: LWG, Reedy, Fox



Probe	Manometer	Water
12.345" Stpos.	12.359" Cut	12.35"

Expr. 5 Time 1355 Date 5/13/1958
Purpose 6" slab with 3" of Styrafoam on the sides backed up with water
Personnel: LWG, Reedy, Fox



Probe	Manometer	Water
10.84"	crit. 10.86"	10.82"

Expr. 6 Time 2255 AM Date 5/13/1958
Purpose 6" slab with 3" Styrafoam on each side, bare otherwise
Personnel: LWG, Reedy, Fox

Probe	Manometer
22.94	22.96" super
22.90	22.92 crit

Expr. 7 Time 8 45 AM 5/15/1958
Purpose 2-6" slabs ~ 6" apart
ref. except top
Personnel:

START-UP CHECK LIST
Equipment Checked by ____ Back by ____
Instrument and Safety ____
"Source In" Checked by ____
Emergency Equipment ____
Red Light On by ____
Start Up Cleared by ____ Time ____ PM Date ____ 195__

Zero rechecked; Probe .011, Man -.003
Probe rezeroed

For Analysis of Solution used Above
see Interaction Book #1 Page 264
0.0878 gm U^{235}/cc
H/x = 293

Experiments to Check Previous Experiments near minimum volume

Expr. 1 9[45] Date 5/23 1958
Purpose 8" Al. Annuli type cylinder Reflected w/ including top Tamper
Personnel: Fox, Reedy, Gilley

START-UP CHECK-OFF LIST
Equipment Checked by ✓ Time ✓
Log ✓
"Scram Bar" ✓
Emergency ✓
Red Light ✓
Start-Up OK'd by SWH Date 5/23 1958

When soln is at zero by inspection:
monometer = 0.05
probe = 0.01
Water sight glass zeroed to read directly from scale

	H_2O ht.	Mono Reading	Top Tamper Probe Reading
	6.9"	6.839	} raising H_2O 26" Does not change fuel ht.
	32.8cm	6.839	}
10[15] AM.	"	6.839	6.75 Sub.
Tamper not in contact	36.9cm	8.06	8.23 super
~~max~~ reactivity	"	10.80	7.54 ~ Crit
~~fuel ht with Tamper in contact with fuel~~	"	7.72	7.62 Sub.
		monometer reading with top Tamper above solution for volume of soln at max reactivity	probe reading when tamper just comes into contact with fuel as indicated by rapid rise of monometer.

11[00] AM Water Temp. = 26 °C by Thermometer

Expr. 2 Time 1 30 PM Date 5/23 1958
Purpose Repeat of #1 (8" Alcyl.) after rezeroing monometer and top tamper
Personnel: Fox, Reedy, Gilley

START-UP CHECK-LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Reactivity Checked and Reset by ✓
"Source In" Checked by ✓ Source No. ✓
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up O.K.'d by ✓ Time 1 30 ~~AM~~ PM Date 5/23 1958

For vol calculations see p 142

when soln is at zero by inspection:
monometer = 0.005
Top Tamper = 0.00

	H_2O	mono Reading	Top Tamper		
	363 cm (14.2")	7.76	7.95	super	Tamper above soln.
1 55	"	7.75	7.82	"	"
	"	7.735	7,80	"	"
	"	7.64	7.73	"	"
2 00 P.M.	"	7.62	7.69	crit when tamper is just in contact (no soln around edges of tamper).	
	monometer reading with Tamper raised above soln				
just crit	"	10.77	7.54	point of maximum reactivity	
		~~9.98~~ 7.63			

The last monometer reading should actually be lower than the one recorded at crit when tamper was just in contact since some solution was drained. This discrepancy is probably due to inaccuracies in the monometer.

Expr. 3 Time 3 18 AM Pol Date 5/23 1958
Purpose 8" Al cyl. Annuli type
Reflected to ht. of fuel - no top tamper
Personnel: Fox, Reedy, Gilley

	H_2O	Soln (monometer)	
3 PM.	23.4 cm (9.21)	9.23"	just. crit
crit ht		23.5 − 1 = 22.8	

C.V = 7.39
C.M = 3.61

Vol & Mass Calculations for Exps 1 & 2

area of 8" cyl = 323 (324.2925) cm^2

Average ht for two exps = 7.67" = 19.48 cm

Vol = ~~19.48 × 323~~ = ~~6.29~~ (6.314) l uncorrected

Vol 18.8 × 323 (324) = ~~6.07~~ (6.09) l corrected for Al. plate

✓ 6.09 × .488 = 2.97 kg.

Experiments to check previous experiments on cyl. near min. vol. 143

Expr. 4 Time 2 ~~AM~~ PM Date 5/26 1958
Purpose Crit. Conditions for 10" (FOS Type) Al Cyl Completely H_2O reflected including top Tamper
Personnel: Fox, Reedy, Gilley

START-UP CHECK LIST
Equipment Checked by ✓
Instrument ✓ Checked by ✓
Safety ✓ ✓
Emergency ✓
Red Light ✓ ✓
Start-Up OK'd by ✓ 2²² 5/26 1958

The "holes" in the top tamper were filled with ~~paraf~~ CH_2 and the bottom of the top tamper was smothed over with CH_2

	Monometer	Tamper	H_2O	
	~~1.98~~ 1.95"	1.98" ← when just in contact		
	4.12"	4.09" " " " "		
	4.85	4.90	12.25"	
3 08 P.M.	4.88"	4.95"	12.25"	~crit
	~7.82 ~~4.82~~	4.83	12.25	crit
	4.85	7 8 (tamper up)	"	

144 5/23/58

Sample 354934

~~H/X 1.50~~

117 / 20 / 97 gm net

~~kg/liter~~ gm/gm .3274 .3051 gm U^{235}/gm

Sp. gr 1.6008 .488 gm U^{235}/cm^3

H/X - 49.5

Fe = 1550

Al = 185

Cd = 15

Cr = .150

10" cyl Vol and Mass Calculations for Exps 4 + 5

area = 506 cm^2 {corrected for temp. = 507.3 note added 9/19/58 HWG}

ht. = 4.85" = 12.32 cm

corrected ht = 12.32 + .93 + .7 = 12.55 cm

12.32 / .93 / 13.25 / .70 / 12.55

12.32 / .93 / 13.25 / .7 / 12.55

Vol = 506 × 12.55 = 6.35 l

Mass = 0.3274 × 1.601 × 0.932 × 6.35

= 3.10 Kg U-235 ✓

Expr. 5 Time 3³⁰ ~~AM~~ PM Date 5/26 1958
Purpose Repeat of previous (Expt 4) expt. (10" FOS Al, reflected) as a check on the results
Personnel: Fox, Reedy, Gilley

	Monometer	Tamper	H_2O	
3 PM	4.45"	4.51"	12.25"	sub.
tamper just in contact	4.87"	4.93"	"	~ crit
tamper "dunked"	~ 8.2	4.83	"	crit
	4.84	up	"	

Expr. 6 Time 8⁵⁰ ~~AM~~ PM Date 5/27 1958
Purpose Crit. Cond. for 10" (FOS Type) Al cyl reflected except for top
Personnel: Fox, Gilley

START-UP CHECK LIST
Equipment Checked by — Personnel Check by —
Instrument and [illegible] checked and Tested by —
"Source In" Shown by —
Emergency Equipment in Control Room checked by — Source No.
Red Light On by —
Start-Up OK'd by — Time — AM PM Date — 195

16.23
.93
17.16
.7
16.46

Monometer — H_2O

~~15.1~~ 16.1 cm — 14 cm — sub

16.23 cm — ~~16.4~~ 16.3 — crit

Ht. = 16.23 + .93 − .7 = 16.46 cm 16.5

Vol = 8.35 l.

Mass = 4.08 kg 4.235

H/x ~ 49.5

Expr. 6 Time 2:40 PM Date 5/27 1958
Purpose Crit. Conditions for 6.4 liter Al sphere completely reflected
Personnel: Fox, Reedy, Gilley

Probe sylsen reading when soln at zero = 99.98
Monometer reading " " " " = -14.998

	Probe	Monometer	
2:55 PM	1.27"	16.27"	
	7.40"	22.48"	soln
	7.99"	23.04	slightly super
not full	7.98"	23.04	crit.

Expr. 7 Time 10 AM PM Date 5/28 1958
Purpose Crit. Cond. for 6.4 liter sphere (Al, reflected) after adding ~100 cc of H_2O to solution to change H/x ~ one (1)
Personnel: Fox, Reedy, Gilley

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instruments Checked and Ready by ✓
Source ... Source No. ...
Emergency Equipment in Control Room Checked by ✓
Red Light On ✓
Start Up O.K.'d by ✓ Time ... AM PM Date ... 195 ...

100 cc of H_2O added to soln. and mixed by circulating with pump for ~45 min.

Reflector water temp. = 76° F by thermometer
Zero of monometer selsyn = 15.14 at soln. zero
Zero of probe selsyn = 0.0 " " "

	~~Soln ht.~~ Probe	monometer	
	4.78	19.89 (4.75")	
10:30 AM	7.20	22.41	sub.
	7.91	23,11	slightly super
	7.90	23.09	" "
not full	7.90	23,10	crit.

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200 cc H_2O added / Total of 300 cc added

Expr. 8 Time 1 25 5/28 1958

Purpose Critical Conditions for 6.4 liter Al sphere H_2O reflected after adding 200 cc of H_2O to soln. to change H/X

Personnel: Fox, Reedy, Grilley

	Probe	Monometer
1 #1 PU	3.5	15.24
	5.31	~~21.7~~ 20.18
not full	7.90	22.85
		15.14
		1.71

Expr. 9 Time 4 ~~PM~~ PM Date 5/28 1958
Purpose C.C. for 6.4 liter sphere reflected after adding 300 cc of water to soln
Personnel: Fox Reedy, Gilley

300cc added prior to this exp. total of 600 cc added

Probe zero = 0.02

Monometer = 14.545 at soln zero

	Probe	Monometer	
	8.44"	23.10	slightly super
not full	8.43	23.10	slightly sub.

Expr. 10 T 8 30 — AM Date 5/29 1958
Purpose Repeat of exp. 9 — 6.4 liter sphere, no change in concentration
Personnel: Fox, Reedy, Gilley

Equipment Checked by
Instrument ✓ Valve ✓
Source ✓ ✓
Emergency
Red Light ✓
Start-Up Check ✓ 105

Probe selsyn = 99.99 at solution zero
Monometer " = 14.99 " " "

	Probe	Monometer	
not full	8.02	23.02	crit.

Expr. 11 Time 10 1/2 AM Date 5/29 1958
Purpose 6.4 liter sphere reflected after adding 400 cc of H_2O to solution in [redacted] dump well
Personnel: Fox, Reedy, Gilley

400cc of H_2O added prior to this exp. Total of 1000cc added to original soln.

Probe and monometer readings agreed to within .03 at ~~0.0~~ zero soln ht.

	Probe	Monometer
not full	8.02	23.04

Sp. gr. after total of 1 liter addition of H_2O to original soln. = 1.571

~2 liters of soln. removed from dump well then 700cc H_2O added. Total of 1.7 liters H_2O added

Expr. 12 Time 1333 5/29 1958
Purpose Crit. Conditions for 6.4 liter Al. sphere ref. ~two liters of soln were removed from manifold (dump well) after exp. 11 and 700cc H_2O added
Personnel: Fox, Reedy, Gilley

Probe = 0.03 at soln zero
Monometer = 14.62 " " "

	Probe	Monometer	
not full	8.04	22.66	crit.
		14.62	

Sp. gr. of soln after total of 1.7 liters of H_2O were added = 1.549

Expr. 13 Time 3:45 PM Date 5/29 1958
Purpose Crit. Cond. for 6.4 liter Al sphere after concentration change noted at right
Personnel:

~1 liter removed from dump well then 1 liter of H_2O added.

9" sphere

~~monometer = 14.39~~
~~probe = 0.05~~

probe 0.22
monometer 14.74
19
14 53

	Probe	Monometer	
	8.07	22.41	slightly super crit.
not full	8.07	22.40	

Expr. 13 A Time 8 45 AM Date 6/2 1958
Purpose Repeat of last exp. without changing probe or concentration
Personnel: Fox, Gilley, Johnson, W.A.

START-UP CHECK LIST
Equipment Checked by — Re-gone Check by —
Instrument and Safeties Checked and Set by —
"Source In" Checked by — —
Emergency Equipment Tested and Found Satisfactory by —
Red Light On by — AM
Start-Up OK'd by — Time — PM Date — 195—

Probe	monometer	
0.78"	15.27	
8.06"	22.50	~ Crit

Sp. gr. at end of exp. 13A = 1.518 by hydro

Sample Taken after 13A:

Req. # 354937		Sp. gr. = 1.514
Gross	74.27	gm4/gm = .2962
tare	20.9	4/x = 58.2
	53.37	Fe = 950
		Ni = 80
		Cr = 75
		Al = 25

Approximately 2 liters of Soln. were drained from dump well after Expr. 13A and 2 liters of H_2O were added.

Expr. 14 Time 11 ~~AM~~ CC AM Date 6/2 1958.
Purpose 6r4 liter sphere
Concentration changed (from 13A)
by addition of 2 liters of H_2O
Personnel: Fox, Johnson (K-25), Reedy, Gilley

Probe 1.23 Monometer 15.75

{ Probe and monometer sylsens have not been changed i.e. rezeroed since expr. 12 }

plus

Probe	Monometer	
8.16	22.57	crit

6/2/58 1[25] Approximately 2 liters of solution drained from dump well and 2 liters H_2O added
Sp. gr. of soln before adding H_2O = 1.455

H/X

H/X = 76.1

Expr. 15 Time 2'15 AM PM Date 6/2 1958
Purpose 6.4 liter sphere concentration changed as noted above
Personnel: Fox, Johnson (K-25), Reedy, Gilley

Probe 0.24 Manometer 14.67"
8.45 22.87 crit,
~ 10.50 pos. period,
T = 40.8 μc

$H/X = 76.1$

Expr. 15A Time 2 53 AM PM Date 6/2 1958
Purpose Repeat of expt 15 to check mixing and ht. of full sphere
Personnel Fox, Johnson (K-25) Reedy, Gill

9" sphere

probe	monometer	
0.55	15.01	
8.43	23.05	crit
9.03	23.44	pos period
10.00		pos period full

T = 64.7

• slightly super when full — see exp. 16.

Full at ~ 9.05 in.

approximately 2 liters of soln drained from dump well and 500 cc of H_2O added

Sp. gr. of soln before 500cc added = 1,403

Sample taken corresponding to exp 58A.

H/X = 78,7 (see p. 159)

Expr. 16 Time 8:20 AM Date 6/3 1958
Purpose 6,4 liter sphere after concentration change noted above
Personnel: Fox, Johnson, Reedy, Gilley

START-UP CHECK LIST
Equipment Checked by ~~~ Rec'd by ~~~
Instrument and ~~~ ~~~
"Source In" ~~~ ~~~
Emergency ~~~ ~~~
Red Light On by ~~~ AM
Start-Up OK'd by ~~~ Time ~~~ PM Date ~~~ 195~

Probe	Monometer	
,26	14,85	
9,68	24,33	~~crit~~ slightly supr
9,49	24,28	slightly sub. crit.
9,52		

Soln apparently in Top Tube

13,78 for period

T = 119,5 sec

Sample taken after Exp 16 Req. # ~~354938~~ 354939

Fe = 750
Ni = 80
Cr = 55
Al = 30

Sp. gr = 1.390 by hydro
Sp. gr = 1.388
gm/gm = .2434 $\frac{gm\ x}{cm^3}$ = .315
H/x = 78.7

Gross 70.76
tare 20.9
49.86

→ Exp. 16A Req. # 354938

sp gr 1.403 by hydro
Sp. gr. = 1.4004
gm u/gm = .2491 .232 gm x/gm
H/x = 76.1 ✓ .325 gm x/cm³

Gross 69.82
tare 20.9
48.92

Fe = 850
Ni = 80
Cr = 75
Al = 40

Reported Crit at full H/x = 76.1 in ORNL 2409

H/X = 78.7

Expr. 17 Time 9:45 AM PM Date 6/14 1958
Purpose Crit. Cond. for 8" dia Al cyl
Annuli type, completely reflected
H/X corresponds to expt. 16
Personnel: Fox, Reedy, Gilley

START-UP CHECK LIST

Equipment Checked by ~ Personnel Check by ~
Instrument and Safedias Checked and Set ~
"Source In" Checked by ✓ ~
Emergency Equipment in Control Room Checked by ~
Red Light On by ✓ AM
Start-Up OK'd by ~ Time ~ PM Date ~ 195~

Tamper	Manometer	H_2O = 37 cm
0.73	0.72	tamper in contact
8.09	8.06	paper not in contact
	8.05	
7.82	8.03	crit tamper in contact
7.70	11.2	sub. crit
7.71	10.53	crit, with tamper submerged
8.8	8.01	tamper raised & but with no change

H/X = 78.7

Expr. 18 10 AM Date 6/4 1958
Purpose Repeat of exp. 17 after re gearing tamper and monometer
Personnel: Fox, Reedy, Gilley

H_2O = 37 cm

tamper ~~probe~~ : 99.94 at zero
monometer : 0.0 " "

Tamper	Monometer	
7.77	7.76	sub. in cont.
7.84	~~8.04~~ 7.83	super in contact
→ 7.83	7.83	crit. with Tamper
7.72	10.7	crit with tamper sub merged
7.77	~~8.05~~ 8.00	

these last two values correspond to the volume of solution that is critical with tamper at position of max. reactivity. tamper was raised and lowered to obtain measurements.

Check on difference between bottom of entrance pipe weld bead and top .026"

$H/x = 78.7$

Expr. 19 Time 10^05 AM PM Date 6/5 1958

Purpose Repeat of expt. 18 after changing monometer float and readjusting

Personnel: Fox, Reedy, Gilley

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by —

Instrument and Safeties Checked by —

Electrical Circuits —

Reactor —

Start Up Completed —, —, — 195—

Probe = ~~0.04~~ 0.03 at zero H_2O = 37 cm

monometer = 0.0 " "

Probe	monometer	
2.81	2.76	
4.17	4.14	
7.23	7.23	
7.90	7.90	in contact super
7.86	7.89	in contact sub.
7.89	7.90	in contact sub.
7.81	10.54	crit submerged
Av. 7.90	7.89	7.92* tamper just in contact

C.H = 20.1 $\frac{(-)}{cm^3}$, ϕ^{Plate}_{cor} = ~~2.008~~ 19.4 $\frac{x324}{cm}$ C.V = 6.~~28~~ 29 ρ 198 kg x

* This reading was obtained after draining water ~~at~~ and tapping monometer with tamper raised. A repeat measurement after bringing tamper into contact for tamper reading and then raising tamper gave 7.92 also. this exp is considered more accurate than either 17 or 18

Check of accuracy of monometer with new float

Solution Additions

99.22 reading after "tapping" to assure equilibrium
99.47 reading " adding — no tapping
99.45 " " " — after tapping

99.45 "
99.52 "
99.55 "

99.50 "
99.91 "
99.90 "

99.90 "
0.08 "
0.07 "

Solution subtractions

.07 equilibrium 99.86 "
.06 after drain-no equi 99.72 "
.04 " " after equi. 99.65 "

.04 "
99.97 " 99.65 "
99.86 " 99.43 "
99.36 "

H/X = 18.7

Expr. 20 Time 8:20 AM Date 6/6 1958
Purpose Crit. Cond. for 6.5" Al. cyl FOS type completely reflected
Personnel: Fox, Reedy, Gilley

monometer = 0.0 at zero

top of wire screen = 0.23" above zero

H_2O = 60.1

	Probe	mono	
	= 0.28	= 0.3	in contact
This difference → is probably due to float dragging on wall of monometer	15.51	15.63	
Tamper just in contact	16.27	16.34	sub
	~ 16.33	16.40	super
max. reactivity	15.90	~~16~~ > 18	
	16.14	16.20 *	

ht. of vol. of soln in reactor at maximum reactivity measured with tamper just in contact.

Cr. ht. = ~~16.20~~ 16.17" = ~~41.1~~ 41.1 + 2.2 (lead in connection) − .7 (bottom plate) = ~~42.6~~ 42.6 cm

Vol = ~~42.6~~ 42.6 × 214 = ~~9.12~~ 9.12 l

* This value for the monometer was obtained after draining water and tapping monometer to assure equilibrium

Mass U^{235} = 9.12 × 315 = 2.87 kg

p. 181
Reg 354544

H/K = 81
87,593 230 U-4s Lithe

~~p. 178~~
~~Reg 354?~~

p. 204
Reg 354574

If 354572 GW-73 is dated ≈ 12/58
(GW after 11/17/58) it is probably it.

6/9

Expr. 21 Time 3'15 — Date 6/8 1958

Purpose Crit. concentration for 9" Al. sphere reflected.

Personnel: Fox, Reedy, Gilley

Sphere Vol = 6.96 L

9" SPHERE H/X=120

START-UP CHECK LIST

Equipment Checked by ✓ Checked by ✓

Instrument ... ✓

Source ... ✓

Emergency ... y ✓

Red Light ... ✓

Start Up OK'd by ✓ Time ... Date 6/9 1958

Probe reads 99.94 at Soln zero

Monometer float stuck – not operating

Soln ht. (probe)	
8.57	super
8.52	sub
8.55	super
8.54	slightly super

~~The H/x of this (#21) exp. is in neighborhood of 120.~~

4 20 PM

Sp. gr. by hydro. = 1.271

H/X ≅ 115

Concentration changed after exp. 21. Approx. 3 liters of Soln were removed from dump well and 3 liters H_2O added

Expr. 22 - 6/10 1958
Purpose CC for 9.29" dia Al sphere reflected
Personnel: Fox, Reedy, Gilley

START-UP CHECK
Equipment Checked by ✓
Instrument ... ✓
Source ... ✓
Emergency ... ✓
Rod ... ✓
Start-Up Cl'd by ✓ 9:30 ... 195

Probe
9.80
12" sub. crit.

One
at 4/
to in
witho
any

One liter of Soln at $4/x \sim 60$ added to inventory without draining any

Expr. 23 Time 11 AM Date 6/10 1958
Purpose C.C. for 9.29" dia. Al. sphere reflected
Personnel: Fox, Reedy, Gilley

Probe	
12.4"	slightly super
10.75"	sub,
11.41"	~ crit

Expr. 23A Time 12 40 PM Date 6/10 1958
Purpose Repeat of expt. 23 to check mixing of solution
Personnel: Fox, Reedy, Gilley

Probe	
11.38"	~ Crit

Sample Taken — see next page

Sp. gr. for Exp. 23A by hydrometer = 1.245

Sample Reg. = 354940

G 64.56
20
44.56

gm U/gm = .1697
Sp.gr. = 1.238
H/L = 1-28.7

.1582 gm U/gm

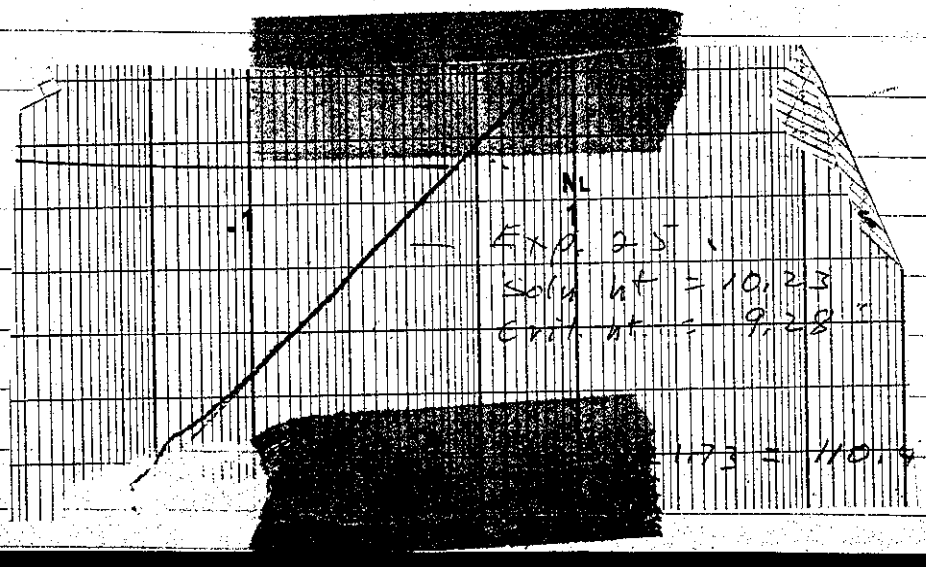
Ni 12.5
Fe 115.0
Cr. 27.5
Al 4.75

Approx. 2 liters soln drained and 300cc H_2O added

Expr. 24 Time 2[15] AM Date 6/10 1958
Purpose C.C. for 9.29" diz. Al. sphere reflected
Personnel: Fox, Reedy, Gilley

Probe removed. When Probe = 0.08
monometer = 16.87

Probe	mono	
6.30	23.09	
15.12"	31.99	sub. crit.



Reported ORNL 2609

Approx. 460 cc of Soln at 4x260 added to inventory without draining any.

Expr. 25 Time 3 45 PM Date 6/10 1958
Purpose C.C. for 9.29" dia. Al sphere reflected
Personnel: Fox, Reedy, Billey

Probe = 0.75 when manometer = [manometer float stuck - not operating

Probe	
9.34"	very slightly super
9.28"	just crit.
10.23	period

Sample Taken:

SP gr. 1.248 ?

Req # 354941

G 73.84 → gm U/gm = .1720

T 20 SP gr. 1.2395

53.86 Ni .115 = .199

gm U/gm = .1603 Fe .110 gm U/cm³

Cr .235

H/U = 126.5 Al .473

The H/K for this exp. is given by sample K— Leg # 354941 on p 169

Expr. 26 8:50 am 6/12 1958
Purpose Crit. Cond. for 10" dia cyl EOS A1 completely reflected.
Personnel: Fox, Reedy, Gilley

START UP CHECK
Equipment Checked by
1958

monometer was zeroed by visual inspection at solution zero. Tamper was zeroed by lowering tamper until it touched bottom. With soln raised to zero as measured by monometer, tamper read 0.04 upon contact with soln.

	Tamper ~~Probe~~	monometer	
	~~5.09~~ 5.00	4.94	tamper in contact
	5.64	5.46	~~just crit.~~ slightly super
	5.62	5.55	"
	5.61	5.51	"
Tamper in contact	5.62	5.52	Crit.
Tamper at maximum	5.56	~~5.5~~ 7.5	
Tamper in contact after raising from max.	5.64	5.50	
		5.57 monometer reading after "Tapping" monometer tube	

14.15
.93
15.08
.70
14.38

C. Ht. = 5.57 x 2.54 = 14.15
= 14.15 + .93 - .7 = 14.38 cm

note: 8.8 liters of soln at 4/x ≃ 50
added to soln in dump well (plus 5" cyl)

6/18/58 Approx 4 liters added to inventory (in addition to above)

Expr. 27 Time 10^05 AM PM Date 6/18 1958
Purpose Crit. Cond. for 14.35 liter Al. sphere bare (outside std)
Personnel: Fox, Reedy, Gilley

3/4" safety rod being used.

START UP CHECK LIST
Equipment Checked by ✓ Check by ✓
Instrument ✓
"Source ✓ Pile No.
Emergency ✓ Count Recorded by ✓
Red Light On ✓ AM
Start Up Ok'd by ✓ PM Date 195

Monometer reading at soln zero = 16.09"

~10^00 AM This exp. discontinued

C.H cm. 14.4 cm
C. Vol. = 14.4 x 507 = 7.30
C. Mass = 7.3 x .199 = 1.45 kg x

172

20" Cylinder "Mock-up" Expts

Expr. 1-A Time 930 PM Date 6- 1958

Purpose Zero run to check on H/x required

Personnel: Culley, Peedy, etc, etc

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source Is PO-Be

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

Start-Up Ok'd by 10:01 PM 6/18 1958

monometer Selsyn = 14.45" at soln zero

Tadadder Selsyn = 15.12" when "down". tadadder travel is 51". When tadadden is down the top of the tube is ~21" above bottom of reactor.

10:07

monometer Selsyn

19.22"

31.10

Check for leaks - OK

monometer stopped with pump on and feed valve open - apparently out of solution

Exp. 1-B Since critical ht. of exp. 1-A was too high approx 1.75 liters of soln of H/X ~300 added to inventory and mixed

10 4/5 PM

monometer Selsyn = 17.89" at soln zero

Monometer

34.38 ~ crit

Exp. 1-C Approx. 2.5 liters of soln at H/X=300 added to inventory to concentrate soln.

11 30 PM

6/18/58

monometer Selsyn = 33 4 / 18.39" at soln zero / 15.0

11 50

monometer selsyn

33.25" super

~~33.24"~~

33.23" (very) slightly super

Expt. 2A. 1st Power run
~ 500 times previous run

1:2 45 AM

12 47 Thermocouple readings:

# 11	.95	mv
# 12	.95	"
# 14	.95	"
# 13	.91	"
# 15	.96	

Positions of Thermocouples:

# 11	under cyl. near center
# 12	7" up from bottom of soln (not cyl) on east side of cyl. (outside)
# 13	outside sid in room
# 14	16" up from bottom of soln on east side of cyl. (outside)
#15 (probably)	28" up on east side

monometer selsyn = 18.40" at soln zero
when t-d adder is down (against) limit switch
selsyn = 23.32"

manometer selsyn	Td adder	
33.41"	23.34	just crit.

6/19/58 1 08 AM photo multiplier by-passed

1/10 period of ~50 sec ~~to be attempted~~ is being attempted with Tadadder

1/10 no change in temperature

monometer	sensyn	tadadder	
33.51		54,61	~50 sec. period

1/18 P.M. A.M. System scrammed by DC-2 due to power level (during attempt to level).

monometer	Tadadder	
33,52	23.30	super (near crit)
~~34,~~	33,56	
33,57	37,61	~50 sec. period

1/35 A.M.

1/40 power level estimated at 10 watts with log W = ,2 10.4^{+0}_{-5} - 11

~~Power~~ System brought back to critical with log W = ,22

monometer	Tadadder	log W	
33,47	29,87	,22	just crit

1/43 no change in temperature

1/49 Shut down

Time at power level of ,22 was ~11 min from log W chart.

176

Exp. 2-A cont.

6/19/58

photo multiplier check:

Log W = .22 at μA reading of 1040

(Log W on least sensitive range by factor ~100).

2^{20}

check of monometer indicates usual (.1) agreement.

Final

$$\frac{H}{X} = \frac{26,111 \cancel{9649}}{.02515} = 1002$$

1002
.0351
.9649

Exp. 3-A 6/19/58

3 46 AM Initial start-up, source in personnell checked

100).

3 47 Temp = 1.0 mv on # 11, 12, 14

~4 00 Shut down temporarily because monometer indicated continued rise after pump was shut off. (ht. ~30"). Reactor was vented

	monometer	Tadadder	
4 20	33.50	23.32	super
	33.54	33.71	~70 sec period
		~~36.10~~	
4 24 A.M.	33.55	38.22	~ 55 sec. period

" Power level rise begun

4 31 System brought to critical at power level ≈ 30 times previous level (6.6 on Log N)

4 33 AM. Soln temp = 74° F

System maintained level with Tadadder

4 45 Monometer = 33.48" at critical at Log W = 6.6

~~15.40~~

15.08

Exp. 3-A cont 6/19/58.

4 44 1st Sodium sample removed

4 49 Thermo couple readings.

#12	1.03 mv
#11	1.0 mv
#14	1.05 mv
#15	1.07
#16	1.02
#13	1.01

4 55 ~~to~~ Power level being maintained at 6.6 on log W by tadadder.

4 58

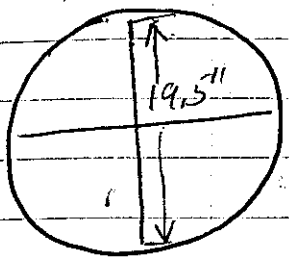
#11	1.01	Thermo couple
#12	1.04	readings
#13	1.00	
#14	1.07	
#15	1.09	Analysis 35495 2
#16	0.99	gm U/gm .027
		gm gm 1.03

5 09 AM

#14	1.05	27.8 gm U/liter
#15	1.09	25.929 gm U/l
#14	1.09	
#13	1.01	Cent ht 15.08" = 383 m
#12	1.08	CV = 2027 x 38.3 = 77.7 l
#11	1.06	CM = 2.01 kg

5 13 AM Shut down dumped solution

Y-12 "Poisoned Drum" Experiments



Expr. 1 Time ____ AM PM Date 6/24 1958

Purpose 20" S.S. Cyl. with cd cross in place

Bare ?

Personnel: LWG, Reedy, Fox

START-UP CHECK LIST

Equipment Checked by ✓ Checked by ✓

Instrument

"Source In"

Emergency

Red Light

Start-Up OK'd by ✓ Time ____ AM PM Date ____ 195__

Pu

monometer selsyn = 0.27 at soln zero (by inspection)

9.14
.27
8.87

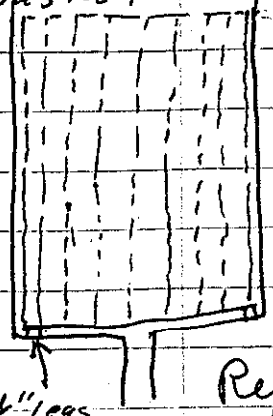
9.14" slightly super

9.13 " Sub.

C.H. = 8.87"

180

Tubes in Basket



~½" Legs on Basket

Basket ~18" Dia

Expr. 2 Time 4:00 7/10 1958
Purpose C.C. 20" Dia SS Cyl Bare with 49 1½" Dia Pyrex Tubes Coated with Unichrome
Personnel: DFC, Reedy, Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instruments and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. PN213
Emergency Equipment in Control Room checked by ✓
Red Light On by ✓ AM
Start Up OK'd by ✓ Time PM Date 195

at ~ 20" drained Back for mixing

Repeat of above

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and ✓
"Source In" Checked by PN213
Emergency Equipment in Control Room ✓
Red Light On by ✓ AM
Start-Up OK'd by ✓ Time PM Date 195

Pyrex tubes ~ 36¼" Long - Basket Raises bottom tubes ~ ¾"; ∴ Top of tubes at ~ 37"

No appreciable M^{-1} at 37"

Super crit at 42.47"
crit " 42.46"

Drained to 37" & added refl.
Do reactor zero "
No appreciable M^{-1} at 37.05"

Added refl. to 37"
no appreciable M^{-1}

Displacement of Unichrome Coated 1½" ~~181~~.

Pyrex Pipe : 4 samples — 480 cm²/ft

12 | 441
36.7 cm²/in = 14.46 cm²/in

480
470
415
4 | 1765
441 cm²/ft

14.46 X 49 = 709 cm²/in for 49 tubes

O.D. coated pipe = 2 3/32 2.094
I.D. " " 1 1/4 1.25

8-4-58

Sample from manifold:

Reg no 354966

Wt. not recorded ~ 50 gm soln.

gm U/gm = .2064

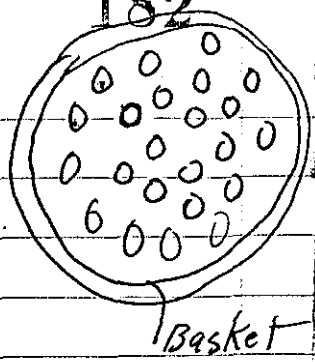
1.000
.268
.732

Sp.gr. = 1.31

$$U/X = \frac{26.11 \times .732}{.1924} = 99.3$$

$$\frac{gm\ X}{cm^3} = .12704$$

182



Expr. 3 Time ____ AM PM Date 10 8-4 1958

Purpose C.C. 20" Dia. S.S Cyl. Bare with 19 Pyrex tubes in Hex. array 3 3/4" C to C!

Personnel: LWG Reedy Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Pu

✓

Rod Light On by ✓

Start Up Off by ✓ 195

9.51" slightly sub.
9.52 just crit.

Expr. 3A. Repeat Time 145 AM PM Date 8-5- 1958

Purpose Same as above — Repeat for Demonstration.

Personnel: LWG, Reedy, Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

PU

✓

Rod Light On ✓

Start Up Off ✓ 195

9.60" just crit.

START-UP CHECK-LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrum...

Source ... by ...

Emerg... P.D.

Red Light ... by ...

Start-Up OK'd by ✓ Time ... AM PM Date ... 195...

Expr. 4 Time 1 ~~00~~ PM Date 8-11-1958

Purpose C.C. 20" dia, S.S. Cyl. Bare, with 19 pyrex tubes in hexagonal array. 3½" c.t.c.

Personnel: D.F.C. L.W.G. R.K.R.T.

11.94" just Crit.

~~Expr.~~ 4-A Time 2 ~~30~~ ~~PM~~ PM Date 8-11 195~~8~~

~~Purpose~~ Same as above, but reflected

~~Personnel~~ D.F.C. L.W.G. R.K.R.T.

3.45 P.M.

System scrammed by "Period Meter". Rapid ~~Drop~~ Drop in period was characteristic of Log N instrument, when neutron level rises to the point that the instrument first comes on scale. "The system was not critical."

3.10 P.M.

Expt Cont.

water Height	Fuel Height
7.80"	7.79" just Crit.

START-UP CHECK LIST

Equipment Checked by R.K.R. Personnel Check by L.W.G.
Instrument and Safeties Checked and Reset by L.W.G.
"Source In" Checked by R.K.R. Source No. P.U
Emergency Equipment in Control Room Checked by ~~—~~
Red Light On by ~~—~~
Start Up O.K'd by ~~—~~ Time ~~1:00~~ ~~A.M.~~ P.M. Date 8-12 1958

Expr. 5 Time ~~1:00~~ ~~A.M.~~ P.M. Date 8-12 1958
Purpose C.C. 20" dia. ely. S.S. Bank with 31 pyrex tubes in hex array on 2 3/4" c to c spacing.
Personnel: L.W.G. J.T.M. R.K.R.

1:30 PM No M-1 at 37.0"

1:55 PM No M-1 at 39.55 (out of solution)

Expr. 5-A Time ~~2:10~~ ~~A.M.~~ P.M. Date 8-12 1958
Purpose Same as above but reflected.
Personnel: L.W.G. J.T.M. R.K.R.Jr

2:37 P.M. System scrammed by "Period Meter."

3:45 Left Cont.

Fuel Height	Water Height.	
16.23	16.26	Sub Crit.
16.25	16.26	Just Crit.

Sphere Exps. Con't.

Expr. 28 Time 8 ~~45~~ AM ~~PM~~ Date 8/20 1958
Purpose ~~22"~~ 22" dia. Al Sphere reflected
Personnel: JJT, RKReedy, DF Cronin, LW Gilley

monometer = 8.00 at soln zero
Not crit. at monometer reading of 31
Sp. gr. = 1.023 {measured after experiment}

Expr. ~~28-A1~~ Time 10 15 AM ~~PM~~ Date 8-20 1958
Purpose 22" dia Al Spheres reflected.
Personnel: J.T.C. Rick R. L.W.G.

monometer = 8.10 at soln zero
NOT crit, at 31"
Sp. gr = 1.023.

Note: to obtain above inventory ~80 liters of solution at Sp. gr = 1.03 and ~ 44 liters of water were mixed in storage system [6" slab]

Expr. 28-B2 Time 1 00 AM PM Date 8-20 1958
Purpose 22" dia. al Sphere, reflected.
Personnel: J.T.L.W.C. R.K.R.

(added 120 c.c. of solution @ 11/4 = 50.1. Sp gr = 1.589)
Not crit at 31.36"

Expr. 28-B3 Time 1 30 AM PM Date 8-20 1958
Purpose 22" dia. al Sphere, reflected.
Personnel: J.T.L.W.C. R.K.Reed Jr.

(added again 125 c.c. of solution @ 11/4 = 50.1 Sp gr = 1.589)
Not crit at 31.55"

Expr. 28-B4 Time AM PM Date 8-20 1958
Purpose 22" dia al sphere, reflected
Personnel:

(added again 215 c.c. of solution, @ 11/4 = 50.1. Sp. gr. 1.589)
Not crit at 31.07"

Hydrometer reading taken immediately after experiment.
= 1.024

Expr. 28-05 Time 4⁰⁰ ~~AM~~ PM Date 8/20 1958
Purpose 22" reflected Sphere
concentration changes
Personnel: A.I.T. L.W.G. R.K.R.

1.589) (added again, 300 c.c. of solution @ M/f = 50.1 fg Σ 1.589)

Monometer

28.60 super

28.54 sub

=1.589)

Expr. 28-06 Time 8³⁰ ~~AM~~ PM Date 8-21 1958
Purpose 22" Al reflected sphere.
Personnel: A.I.T. L.W.G. R.K.R.

Repeat of Expr 28-05

Monometer

1.589) 30.77 Sub Crit.

32.99 Sub Crit

f.

Expr. 28-57 Time 12:15 ~~AM~~ PM Date 8-21 1958
Purpose 22" Al reflected sphere.
Personnel: L.W.G. R.K.R.S.

Repeat of Expr 28-55 and 28-56

Monometer
32.23

DC3 Reads 1X50 on 3+ scale.

Sp.gr. measured by hydrometer = 1.0265

Expr. 28-58 Time 2:50 ~~AM~~ PM Date 8-28 1958
Purpose 22" Al reflected sphere
Personnel:

Repeat of last expr.
monometer = 0" at start.
" = 24.92". Sub Crit.

Expr. 28-9 Time 8 ~~PM~~ 9:5 AM Date 8-29 1958
Purpose 22 at reflected sphere.

Personnel: Fox L.W.G. Reed

Added 90 c.c. of solution @ $^{++}/_{x}$ = 50.1 Sp Gr = 1.589
Monometer = 0" at start
" = 20.8 just Crit.

added ~ 850 cm^3 water

11 ^{25} A.M. Soln zero checked and found to be correct.

12 ^{40} P.M. Repeat of expn 28-9 after adding ~ 850 c.c. of water and mixing.
Monometer = 0" ~~at start~~ at start.
" = 23.29 Sub crit.

2 ^{20} P.M. Repeat of expn 28-9 after adding ~ 20 c.c of solution @ $^{++}/_{x}$ = 50.1 Sp Gr = 1.589. and mixing.
Monometer = 0" at start
" = 26" Sub Crit.

3 ^{20} P.M. Repeat of expn 28-9
Monometer = 0" at start
" = 26" Sub Crit.

~~Dup~~ 967 M.V.

Expr. 28-10 Time 2:20 ~~AM~~ PM Date 9-2 1958
Purpose 22" Al. Sphere continued Refl
Personnel: LWG, Reedy, Fox

STARTUP CHECK LIST
Equipment Checked by ✓
Instrument and Safety Check by ✓
Source ✓
Emergency ✓ PU
Red Light ✓
Start-Up Okay by ✓ time AM PM Date 195

2nd Mixing run Temp = 76°F
slightly super at 20.56"
1st Temp. 76.0°F 2nd 76.25°F
Water Temp 77.25°
3:18 PM Repeat run
20.52 just crit.
Temp 76.6
Sp.gr. 1.026 20.79" ≅ ~100 sec.

added ~ 500 cm³ Water & mixed.

4:25 PM 28-10 cont.
23.31" slightly super
21.95 just crit. Temp. 76.5°F

5:15 PM Repeat
23.29" slightly super
22.33 just crit

Samples taken from slab after last 22" sphere run:

#1 Reg. # 354967 #2 G 120.7 Reg # 354968

G 113.3 T 20

T 20 N 100.7

N 93.3

Samples # 3 and # 4 were sent to Vaughn

#3 95.4 #4 84.0

20 20

75.4 64.0

Samples # 5 and # 6 were sent to Cooper

#5 105.1 #6 118.4

20 20

85.1 98.4

22" sphere Vol = 91.2 $\frac{H}{X} = \frac{2611 \times .9722}{.01995} = 1272$ 1.0000 .0278 .9722

Best result of above samples (according to JTT)

$\frac{gm\ y}{g\ Soln} = 0.0214$ 0.01995

Sp. gr = 1.0254 $gm\ x/cm^3 = 0.02047$

Cloudy residue from Manifold Draining:

Reg. 354972

80.5
20
60.5 gm/soln.

192 Experiments Using $UO_2(NO_3)_2$ at ~87.5% Assay; H/X = ~~75~~ 85

This Expt. is to be compared with Expt 5A Page 184 using UO_2F_2 soln.

Expr. 1 Time ___ AM PM Date 11-17-1958
Purpose 20" Stainless Steel Cyl with 31 Pyrex tubes (1.D = 1.5) Coated with Nichrome
Personnel: L.W.G., M.T.Mec., J.K.F.

soln zero at reading of 0.14"

2.3/4" C to C

Water Ht. 18.03"

Height of soln. 18.14 − 0.14 = 18.0" crit

Coated 1 1/2" Pipes: O.D = 2 3/32"
I.D = 1 1/4"

Same Lattice spacing: 2 3/4"

Tubes: 1 1/2" I.D, 1.875" O.D

Expr. 2 Time 3:40 AM PM Date 11-18-1958
Purpose Same as above except 31 pyrex tubes (1.5" I.D.) Uncoated
Personnel: L.W.G. M.T.M., R.K.R., J.K.F.

Water ht. ~~12.80~~ 12.70

Fuel ht critical 12.80 − .14 = 12.66

$A_{gl} = .786\left(\frac{3.51-2.25}{1.26}\right) = .99^{in^2} \times 31 = 30.7^{in^2}$

$\frac{V_{gl}}{V_l} = \frac{30.7}{\frac{314-30.7}{283.3}} = \frac{30.7}{283.3} = .1083$

314 / 52 / 261

$\%\ void = \frac{30.7}{314} = 9.78\%$

Expr. 3 Time ____ AM PM Date 11-18-1958
Purpose Same as Expt #2 except Unreflected
Personnel: LWG, W.T.M. JKF

Fuel ht

26.73 super crit
26.71 just crit − .14 = 26.57" corrected
26.67 Sub. crit

Expr. 4 Time ____ AM PM Date 11-19-1958
Purpose 53 Uncoated 1/2" Dia. Pyrex tubes Close Packed = H2O reflected − except top
Personnel: LWG, W.T.M. JKF

Water ht
41.35

Fuel ht.
41.24 − .14 just crit
41.1

.99 x 5.3 = 5.245

$\frac{V_{gl}}{V_U} = \frac{5.245}{314 - 5.245} \doteq .200$

314.16
5.245
261.7

% void = 16.7

194

Tube Dim.
2.0 I.D
2.3750D
Flange O.D = 2.675

Expr. 5 Time 150 ~~AM~~ PM Date 11-20 1958
Purpose 34-2" Uncoated Pyrex tubes
~~5~~ close packed, H2O reflected
Personnel: LWG, W.T.M. JKE

START-UP CHECK LIST
Equipment Checked by ✓ Check by ✓
Instrument an... ✓
"Source In... ✓
Emerge... ✓
Red L... ✓
Start U... ✓ 195

Water ht.
30.15"

Solu ht.
30.25 - .14 Fuel crit.
30.11

Expr. 6 Time 241 ~~AM~~ PM Date 11-20 1958
Purpose Same as above
except no reflector
Personnel: LWG, W.T.M., JKE

Fuel ht
41.83 slightly supc.
41.82 " sub.
crit Ht = 41.82 - .14 = 41.68"

$A_{gl} = .784(5.64 - 4.0)$
$= 1.288\ in^2$

$1.288 \times 34 = 43.8\ in^2$

$A_{agl} = 314 - 43.8 = 270.2$

$\frac{V_{gl}}{V_U} = \frac{43.8}{(314 - 43.8)} = .16$

% void = 13.95

3
28

Hex. Lattice with tube in center

Dia. of Array ~ 14"

Expr. 7 Time 1:45 11-21-1958

Purpose C.C. - 19 - 2" pyrex tubes in 3" C. to C Hex. Lattice Refl. ✓

Personnel: LWG, WTM, JKF

START-UP CHECK

Equipment Checked by ✓

Instrum[illegible] ✓

"Source [illegible] ✓

Emergency [illegible] ✓

Red Light ✓

Start Up Of[illegible] 195

Water ht. Fuel ht.

9.77" 9.89 - .14 = 9.75 just crit

Expr. 8 Time 2:20 AM Date 11-21-1958

Purpose ~~Same as above except~~ No refl. ✓

Personnel: LWG WTM, JKF

Fuel ht.

16.91 - .14 slightly super

Corr ht. 16.77" just crit.

$$\frac{V_{gl}}{V_u} = \frac{24.5^{\circ}}{(314 - 24.5)} = .0846$$

314
24.5
289.5

196

Expr. 9 Time 3:50 ~~AM~~ PM Date 11-21-1958
Purpose 16 - 3" I.D. Pyrex Tubes Close - packed in 20" SS Cyl. Refl. - except top
Personnel: LWG, WTM, JKF

Pipe
I.D = 3.0"
O.D = 3,44"

Water ht	Fuel ht.	zero correction
12.52	12.78 - .24	= .24
Just crit.	12.50	

$A = .784\left(\frac{11.83}{9.00} - 9.\right)$
2.83
$= 2.225\square''$
$\times 16 = 35.6$

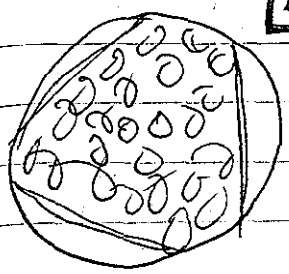
% void = 11.34

Expr. 10 Time 1:45 ~~AM~~ PM Date 11-24-1958
Purpose Same as above except No reflector
Personnel: LWG JKF

START UP CHECK LIST
Equipment Checked by ✓ Check by ✓
Instrument and Safety Circuits and ✓
"Source In" Observed by ✓
Emergency Equipment and Personnel Removed by ✓
Red Light On by ✓
Start-Up Ordered by ✓ Time AM PM Date 195

Fuel ht.
23.68 super.
23.66 sub. crit
23.67
24
Crit ht 23.43"

Expr. 11 Time 2 45 PM Date 11-24-1958 ✓
Purpose 28-2" Pyrex tube - Close-packed except around edges
Personnel: LWG, WTM, JKF

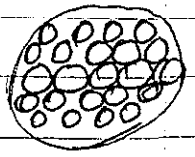


Water ht - 13.60"

Fuel ht. 13.60" just crit
corrected

Expr. 12 Time 5 PM 11-24-1958 ✓
Purpose same as above except no reflector
Personnel: LWG, WTM, J.K.F.

Fuel ht.
40.66
-.24
40.42 just crit



Expr. 13 Time 2^20 Pd Date 11/25 1958 ✓
Purpose 23 - 2" pyrex tubs on 3" centers [Hex lattice displaced from center ~1"]
Personnel: J.E.Fox Bill Mee L.W.G.

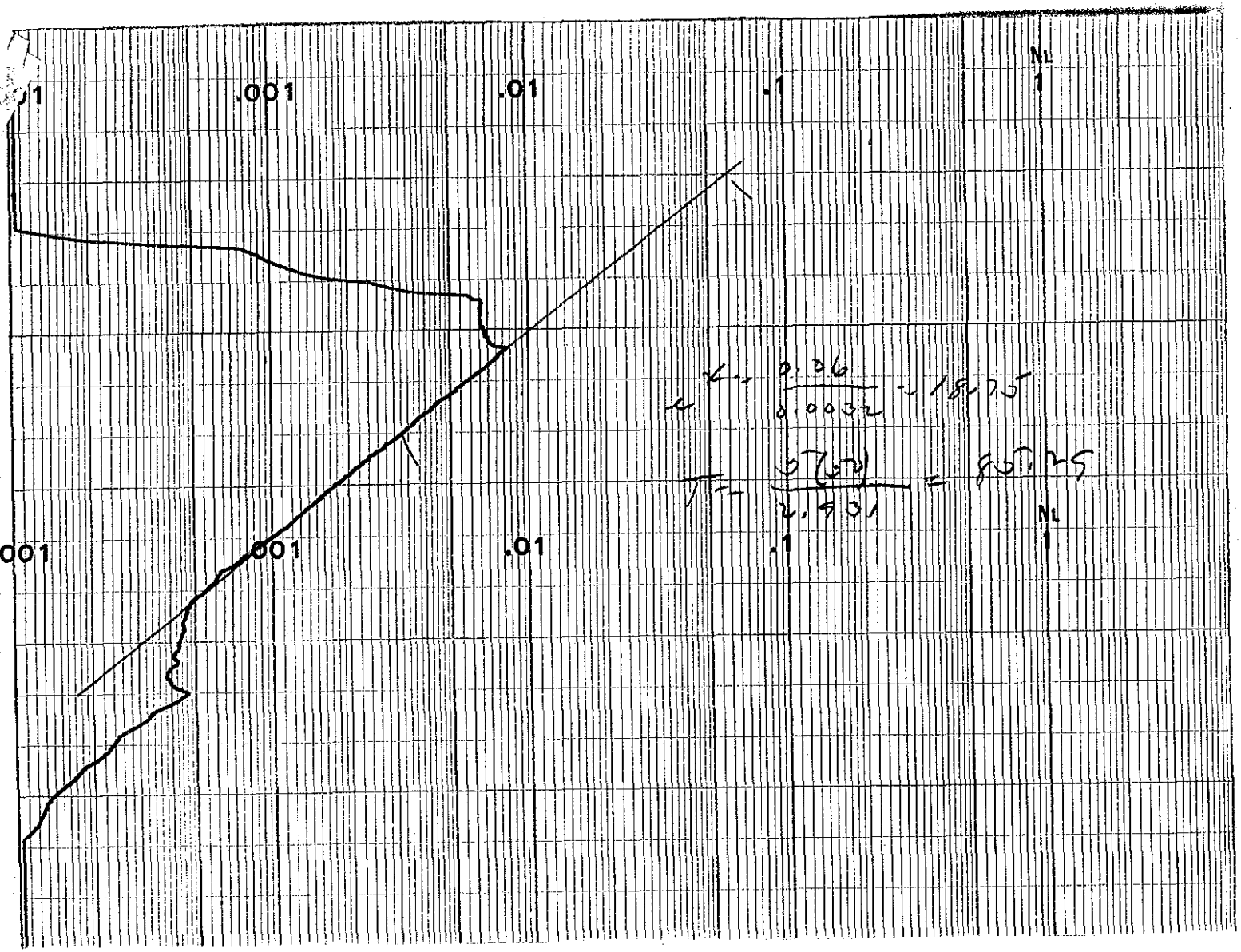
Fuel ht — H_2O ht.

11.79 — 11.50"
.24
11.55" corrected

Expr. 14 3'5" 11/25 1958 ✓
Purpose Same as #13 except no reflector
Personnel: Fox, Mee, Reedy, Gilley

Fuel ht

24.55
-.24
24.31" corrected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NL
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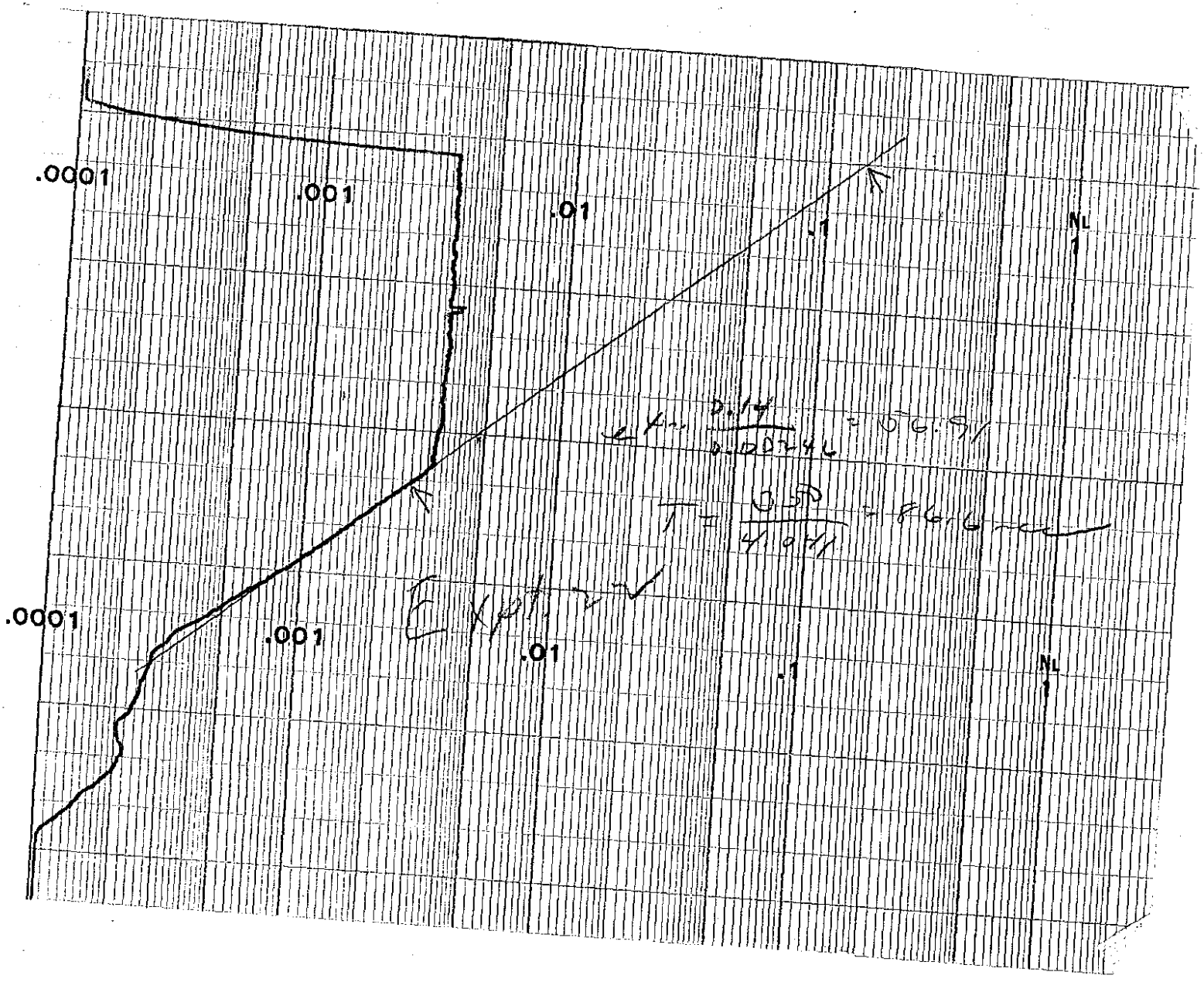
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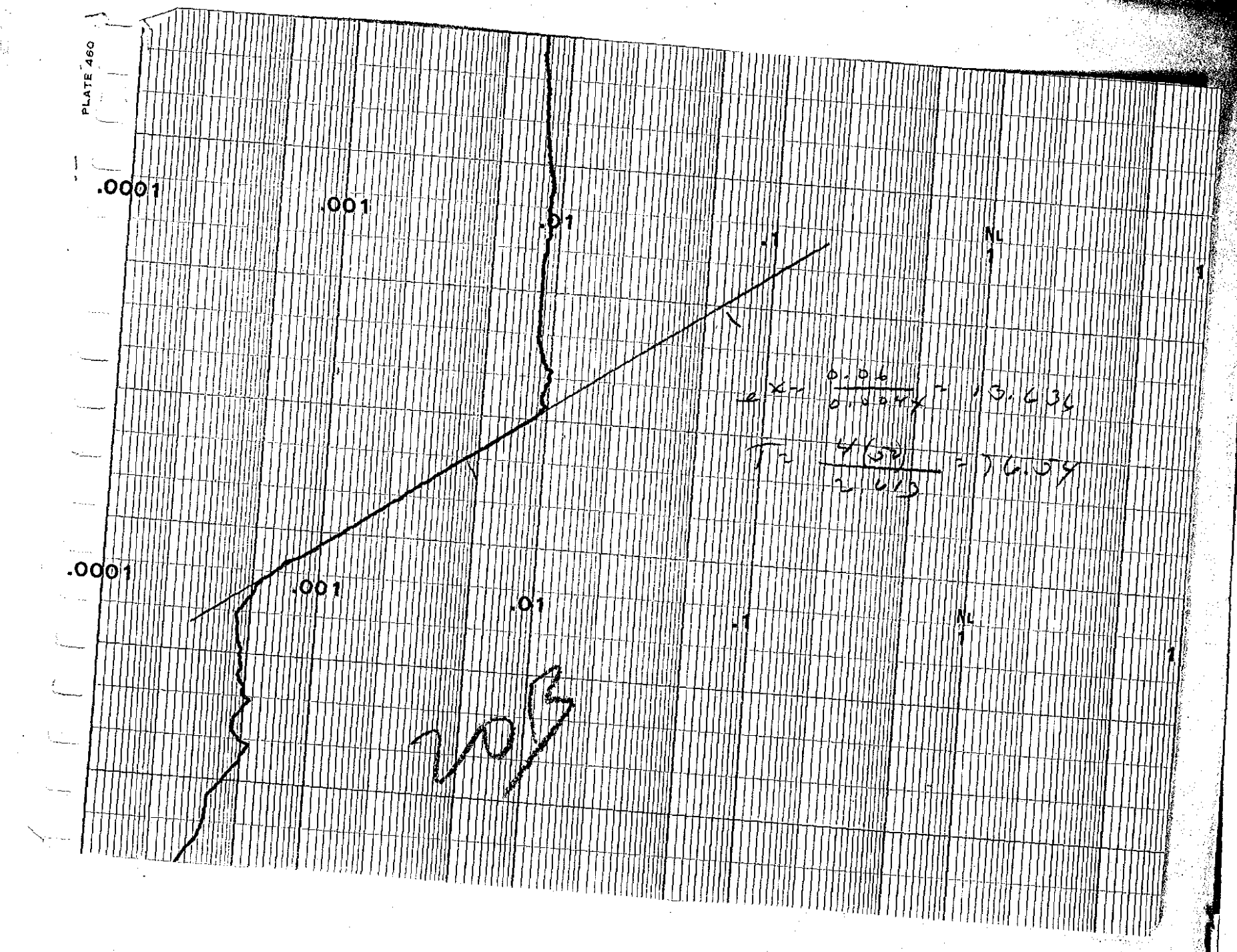
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NL
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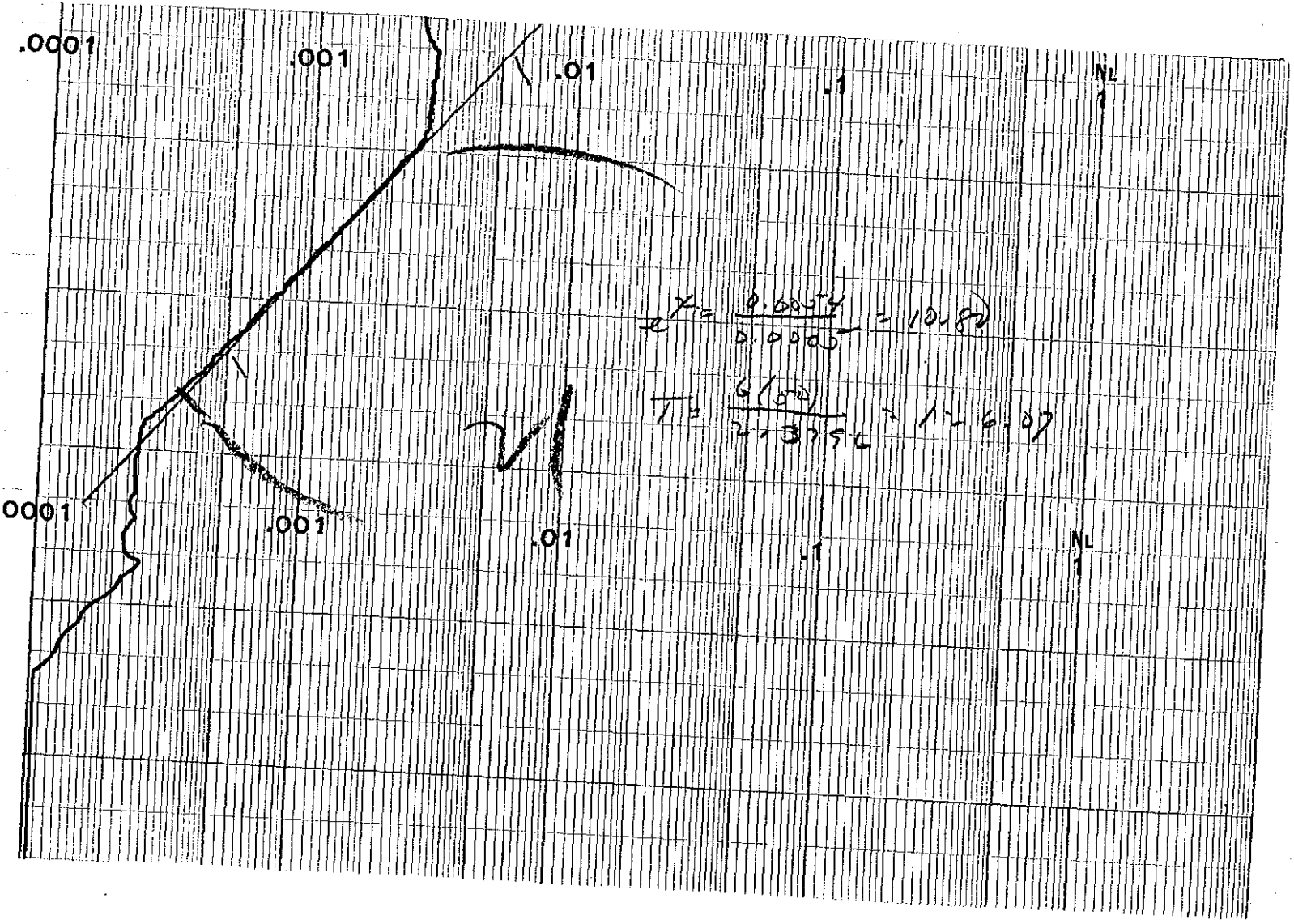
NL
1


.0001
.001
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.1
NL
1
.0001
.001
.01
.1
NL
1

Req. No. 354974

N.C		PYRO		AVG.
Be	<.30	Be		
Ni	<25	Ni		
Sn	<10	---	--	
Si	20	Si		
Li	9	Li		
P	<100	P		
Na	170	Na		
Mo		--	--	
Mn	15	Mn		
Mg	30	Mg		
K	<50	--	--	
Fe	75	Fe		
Cu	<2	Cu		
Cr	<6	Cr		
Ca	50	Ca		
Ba	<10	--	--	
B	<1	B		
Al	<7	Al		
Ag	<1	--	--	
		Cd		
1900		Co		
		V		
		Hg		
		In		
P.D. 51504		C		
		F		

Spectrographic Report
All results in ppm.

DEC 6

354974

BATCH NUMBER | REQUISITION NUMBER

REPORT TO: J. K. FOX

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

$UO_2(NO_3)_2$ ~ 39 gm/gm

Att. Acrutransky

IF NOT TO BE COMPOSITED CHECK HERE.....

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T ✓	.15589
Total N_2 or NO_3	
SP GR.	.0885392 g N23 g
1.2665 Sp g.	

SIGNED: Md DATE 12/15/56

Expr. Exp. 15 Time 1 00 AM PM Date 11/26 1958
Purpose 20" ss cyl.; 87% soln.; no poison; reflected
Personnel: Fox, Reedy, Mee, Gilley

	Fuel ht	H_2O	
1 30 PM	5.22"	4.96"	crit
	.24		
	4.98		

Expr. Exp. 16 Time 1 40 ~~AM~~ PM Date 11/26 1958
Purpose Same as above except no reflector
Personnel: Fox, Rehrer, Mee, Gilley

Fuel ht.
6.21"
-.24
5.97" corrected

1964 rings

Expr. 17 Time 245 Date 11/26 1958
Purpose wire basket in 20"ss cyl full (36") of rashing rings reflected
Personnel: Reedy, Fox, Mee, Gilley

2.155
1.640
.515

Dimensions of rashing rings:

Height = 1 9/16" 1.562
I.D. = 1 9/32" 1.281
O.D. = 1 15/32" 1.609

$V = \frac{\pi(D_1^2 - D_2^2)h}{4}$

$= \frac{\pi(2.155^2 - 1.640^2)1.562}{4}$

$= \frac{\pi(.515)1.562}{4}$ = ~~.613~~ .632 in³

.637
.632
1240
1240
~~.613 x 1964 = 1204 in³~~

Fuel ht.	H_2O	
37.72"	37.55"	crit.
-.24		
37.48		

average top edge of basket = 36.87"
+.24
36.63

11329
Vol. soln to 36" = 11,300 in³

Vol Glass / Vol. Soln = ~~1.824 / 1670~~ 11.02

% Void = 10.97

July 31, 1969
Wire Basket Inside Diameter ~17 5/8" ± 1/8"
Measured at top
RKR & DWM

Expr. 20 Time 2:30 ~~PM~~ Date 12-2 1958
Purpose 20" SS. Cyl. no poison reflected on bottom only
Personnel: LWG, W.T.M., JKF

5.24 just crit
.24
5.00" corrected

EXP. 20A added side refl.
Fuel 5.02 Water 9.8
-.24 just crit
4.78

New Palm. Conc ~ 150 ~~#~~ g/l

Expr. 21 Time 2:00 ~~AM~~ PM Date 12-4-1958
Purpose 20" SS. Cyl with 19-2" Pyrex tubes 3" C. to C. Hex Bare at 4g/l = 150
Personnel: LWG WTM JKF

1st run Fuel ht. 34.83 correction not valid
~~.24~~
~~34.59~~ Critical
35.83

Should be +1.00"

2nd run Fuel ht 35.77 35.77
Probably unmixed ~~1.00~~ 1.00
~~35.53~~ 36.77
36.77

3rd run Fuel ht. 36.19 36.19
~~.24~~ 1.00
~~35.95~~ 37.19

Expr. 22 Time 3:50 AM PM Date 12-4 1958
Purpose 20" s.s. cyl. with 19-2" pyrex tubes 3" c-c Hex, H/X ~150 Water Reflected except the Top.
Personnel: L.W.G., W.T.M., J.K.F.

~~Water Ht.~~

Fuel Htr

11.54 in

~~+ .100~~

~~11.30~~

12.54

Water-Htr (in)

11.3 just critical

Expr. 23 Time 11:30 AM PM Date 12-5 1958
Purpose 20" S.S. Cyl. - No poison, reflected except top H/X ~ 150
Personnel: LWG, WTM, JKF

Manometer found to read low - rezeroed

Water ht

18.2 Cm = 5.2"

Fuel ht

5.19" just crit

Expr. 24 Time 1:50 ~~AM~~ PM Date 12-5 1958
Purpose 20" S.S. cyl., No Poison, Bare
Personnel: L.W.G. J.K.F W.T.M.

Fuel Ht. 6.15" just critical

Sample at $H/_X \cong 150$

143.2
20.
Net 123.2 gm Soln

.2592 gm Salt/gm

Reg No. 354974
.1362 gm $U/_{gm}$
0.15589 gm U/gm
Sp. gr. 1.2665
0.08854 gm NO_3/gm

$\frac{124}{235} \times .1559 = .08210$ gm/gm combined NO_3
$.00644$ gm/gm free $NO_3 \cong .000935$ gm H_2O/gm
$\times \frac{9}{62} =$

.25920 salt
.00644 free NO_3
.26564

1.00000
.26564
.73436 gm H_2O
gm H_2O .00094 gm
.73530

$\frac{H}{X} = \frac{.2616 \times .7353}{.1362} = 141.2$

$\frac{N}{U} = \frac{.0885}{62} \frac{235}{.1559} = 2.15$

$\frac{gm\ X}{gm^3}$ .1725

H/L ≈ 300 -- 205

Expr. 25 Time 935 AM Date 12-9-198
Purpose C.C. 20" Dia S.S. Cyl. With 19-2" pyrex pipes on 3" C. to C. Reflected except top
Personnel: V.W.G. J.K.F.

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrumen... ✓
"Source ... ✓
Emer... ✓
Red ... ✓
Start ... ✓
105

Water Temp 23.5°C

	Fuel ht	Water ht		
1st run	~~35.6974~~	35.80		
Drained Back	35.74	"	just. cut	
2nd run	36.50	36.50	"	"
	Blew out sight glass several times			
3rd run	37.90	38.00		

The last value is felt to be the "best" one.

Expr. 26 Time 2:00 ~~AM~~ PM Date 12-9- 1958
Purpose C.C. 20" Dia. Stainless S Cyl.
reflected except top
Personnel: L.W.G. W.T.M., J.K.F.

Water ht
5.43"

Fuel ht.
5.41" just cut

Rechecked manometer zero - found .3" high.
Corrected .3
5.71"

Expr. 27 Time 2:50 ~~AM~~ PM Date 12-9- 1958
Purpose same as above
except Bare
Personnel: L.W.G., W.T.M., J.K.F.

Fuel ht
6.30
+ .30
6.60 just cut

Sample Mg. No. 354975

10.75
20.10
opt. 87.5

.09138 gm U/gm
.07987 gm x/gm
opt gr. 1.1409

.1518 gm salt
.0064 gm
.1582 (Total S.)

Total NO_3 5.47% of soln.

NO_3 in salt: $\frac{124}{235} \times .0914 = .0482$

$.0065 \frac{gm\ NO_3}{gm}$ free NO_3

.000949 gm $H_2O \simeq .0066$ gm HNO_3/gm

K-25 Cu Tube Exps — 207

12/15

Expr. 1 Time 10[23] AM Date 12/16 1958
Purpose mixing run for soln
H/X ~ 50, bare
10" ss cyl, 1/4" cu shell around cyl.
Personnel: J. K. Fox, L. W. Gilley

12 tubes ; 2.375" O.D.

This tube on outer edge → 1 tube ; 1.66" O.D. ; .194 wall thickness

fuel ht.

42.78" very subc. {near upper limit of monometer - stopped

$\frac{H}{X} = \frac{.84161}{9} \Big/ \frac{.07987}{2355} = 26.16 \times \frac{.8416}{.07987} = 276.$

$\frac{N}{U} = \frac{.0547}{62} \times \frac{235}{.09139} = 2.27$

↘ using H_2O equiv. of free HNO_3

1.0000
.1584
.8416

$\frac{gm\,X}{gm^3} = .09112$

Cu Tube Data

I.D. (in)	O.D (in)	Wall thickness (in)	Cross Section (in^2)	lb. Cu per lin. ft.
0.495	0.675	0.090	0.167	0.641
0.822	1.050	0.114	0.333	1.3
1.368	1.660	0.146	0.669	2.69
0.736	1.050	0.157	0.433	1.71
1.272	1.660	0.194	0.881	3.46
1.933	2.375	0.221	1.477	5.80

ft.

Expr. 2 Time 11 04 AM 12/15
Purpose H_2O reflected - otherwise same as #1 Date 12/16 1958
Personnel: J. K. Fox, L. W. Gilley

fuel ht. H_2O ht.
14.29" 14.32" crit.

1 00 PM Repeat of #2 to check mixing of soln.

fuel ht. H_2O ht
14.22" 36.1 cm crit.
% vol occupied by Cu = 23.9

Expr. 3 Time 2 00 PM AM Date 12/16 1958
Purpose 12" cyl reflected with Cu loading given below
Personnel: Fox, Gilley

12 tubes ; 2.375" O.D.
13 tubes ; 1.66" OD, 0.194" wall thickness
12 of the smaller tubes were inside the 12 large tubes
monometer raised 13 1/16"
without changing reading i.e, add 13.0625" to fuel ht. reading to obtain fuel ht,
% vol. occupied by Cu = 37.6
fuel ht (reading) H_2O ht,
47.18" + 13.06 = 60.24" 158 cm very sub crit
reactivity changed very little over last several inches

Temp = 24°C

12/15

Expr. 4 4 00 pm 12/16 1958

Purpose 10" cyl. reflected - C4 loading given below

Personnel: Fox, Gilley

26 tubes ; 1.64" O.D , 0.194" wall thickness

Note; Add 13.06" to fuel ht reading for zero correction

% vol. occupied by C4 = 29.5

fuel ht. (reading)	H_2O	
18.20"	79.0 cm	crit
13.04		
~~31.24~~		
31.26"		

Expr. 5 10 05 12/16

Purpose 10" cyl., reflected - C4 loading ~~+ 147~~ 1958 below

Personnel: Fox, Gilley

~~17~~ 26 tubes ; ~~2.375~~ 1.64" O.D , .194" wall thickness

5 tubes ; 1.05" O.D, .157 placed inside center 5 large tubes

~~1 tube ; 1.05 O.D, .194" wall at outer edge of array but not inside large tubes~~

11.27 vol % 3.4.1 g 15.55 annular

Exp. #5

Note: add 13.06" to manometer reading for zero correction

fuel ht. (reading)	H_2O	
45.5"	59.0"	
13.0		
58.5"		sub crit

Expr. 6 Time 11:15 AM PM Date 12/17 1958
Purpose Same as #5 except 1 tube (1.05" OD) removed from inside center of large tube (near center of reactor)
Personnel: Fox, Gilley

12/16

fuel ht	H_2O ht.	
45.11"	59.0"	
13.06		
58.17"		sub. crit.

Expr. 7 Time 12:55 ~~AM~~ PM Date 12/17 1958
Purpose Same as #6 except 1 tube (1.05" OD) removed from inside large tube near center of reactor
Personnel: Fox, Gilley

12/16

fuel ht.	H_2O ht	
45.3		
13.06		
58.36"	59.0"	sub. crit

Expr. 8 Time 1:30 ~~PM~~ Init Date 12/17 1958
Purpose same as #7 except t-tube 1.05" O.D. removed from center of large tube near center
Personnel: Fox, Gilley

% vol occupied by Cu = 30.7

fuel ht.	H_2O	
47.3 "	61 "	crit
13.04		
60.34		

Expr. 9 Time 2:10 ~~PM~~ Init Date 12/17 1958
Purpose 10" cyl, reflected - cu loading below
Personnel: Fox, Gilley

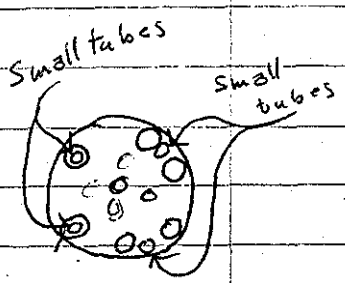
26 tubes 1.66" OD; .194" wall th.
3 tubes 1.05" O.D; .157 wall th. placed ~~t-tube~~ inside 3 large tubes 120° apart on outer edge
~~1 tube 1.05" O.D, .157 wall th. on outer edge but not inside large tube~~
% vol. occupied by Cu = ~~31.8~~ 31.2

fuel ht.	H_2O ht.	
31.91 "	111.4 cm	crit.
13.06		
44.97		

Expr. 10 Time 2 40 — Date 12/16/17 1958
Purpose Same as ~~the~~ #9 except 1 tube (1.05 OD) added on outer edge inside larger tube. The 4 small tubes were evenly spaced.
Personnel: Fox, Gilley

% vol occupied by Cu = 31.76

fuel ht.	H_2O
~~17~~	130 cm
37.74"	
13.06	
50.80	crit.



Expr. 11 Time 3 30 ~~AM~~ PM Date ~~12/17~~ 12/16 1958
Purpose 10" cyl. ref. - Cu loading below
Personnel: Fox, Gilley

Same tubes as #10, but here two small tubes (1.05" OD) were taken from center of larger tubes and placed in spaces between

fuel ht	
37.33	127.5 cm
13.06	
50.49	crit.

Expr. 12 Time 1005 12/17 1958
Purpose 10" cyl, reflected - Cu loading given below
Personnel: Fox, Gilley

26 tubes, 1.66" O.D., 0.146" wall th.
6 tubes, 1.05" O.D., 1.57" wall th.
5 of the 6 smaller tubes were placed inside larger tubes in center of assembly. 1 small tube was near outer edge (not inside a larger tube).
% vol. occupied by Cu = 26.4

fuel ht.	H_2O ht.
11.1"	24.1"
13.1	
24.2"	crit.

Expr. 13 Time 105 ~~AM~~ PM Date 12/17 1958
Purpose 10" ayh. reflected cu loading below
Personnel: Fox, Gilley, R.C. Smith (K-25)

Loading same as #12 except 6-1.05" OD, ~0.157" wall th. tubes added. These 6 small tubes were placed inside larger tubes near center (leaving a complete ring of the unfilled large tubes on outer edge).

Approximately 1/2 of usual

% vol. occupied by Cu = 29.8

Summary

Fuel ht.	H_2O
47.0"	59.3
13.1	
60.1"	sub. crit.

Expr. 14 Time 2 45 ~~AM~~ PM Date 12/17 1958
Purpose Same as exp. 13 except 2 1.05" OD, ~~tt~~ 0.157" wall th. tubes removed
Personnel: Fox, Gilley

Total 10 - 1.05" O.D. Centered
% vol. occupied by Cu = 28.7

fuel ht.	H_2O
43.16"	57.1"
13.04	
56.22"	crit.

Expr. 15 Time 3 30 ~~AM~~ PM Date 12/17 1958
Purpose 10" cyl, ref.
Personnel: Fox, Gilley

26 tubes, 1.64" OD, 0.146" wall th.
16 tubes, 1.05" OD, 0.157" " ", The small tubes were inside large tubes, (except one), around outer edge of cyl.
% vol. occupied by Cu = 32.1

fuel ht.	H_2O
17.09	76.9 cm
13.06	
30.15"	crit.

Expr. 16 Tim 155 AM PM Date 12/18 1958
Purpose Same as #15 except
4 1.05" OD, .157 wall th. tubes
added near outer edge
Personnel: Fox, Gilley

26-1.66" OD
20-1.05" OD

% vol. occupied by C_4 : 34.3

fuel ht.	H_2O ht.
46.0"	58.7"
13	
59.0"	sub. crit

Expr. 17 2 28 PM 12/18 1958
Purpose Same as #16 except one
1.05" OD, .157" wall th. rod removed
Personnel: Fox, Gilley

26 tubes, 1.660D, 0.146 wall th.
19 tubes, 1.05 OD, 0.157 " "

% vol occupied by C_4 = 33.7

fuel ht.	H_2O ht.
47.0	60.0"
13	
60"	slightly sub.

It was agreed that reactor was sufficiently near critical that removal of one more small rod would have made it critical

Expr. 17 Time 3:10 ~~A~~ PM Date 12/18 1958
Purpose 10" cyl ref.
Personnel: Fox, Gilley

.146
.146
.292

1.660
.292
1.368

24 tubes, 1.66" - 0.0, 0.146" wall th.

% vol occupied by C_4 = 23.0

monometer readjusted for this exp. so that selsyn reads zero at zero.

fuel ht.	H_2O ht.
14.51"	14.55"

Expr. 18 Time 3:50 ~~A~~ PM Date 12/18 1958
Purpose Same as exp 17 except no reflector
Personnel: Fox, Gilley

monometer readjusted so that fuel ht. = 18.06" at selsyn reading = 0.0"

fuel ht. − Bare

40.3
18.06
58.36"

Assembly was quite sub. crit no. appreciable Mult. for last 6-8".

Expt. 19 Time 3:20 Date 12-22-1958
Purpose 60 1.05" O.D. X .114" wall copper Tubes in 10" S.S. Cyl. — Tubes in S.S "Hodder" Basket
Personnel: RKR, REK, JKF

└ 6 3/8" Dia S.S rods around edges

Soln Zero at 18.06

Water ht	Soln ht	
54.8 cm	4.14"	Just cut
	18.06	
	22.20"	

% vol. occupied by Cu: 60-3/4" pipes = 25.6%

Expt. 20 Time 9:20 Date 12-23-1958
Purpose Same as above except Removed outside copper Jacket
Personnel: RKR, JKF

60 - 3/4" copper tubes in basket.
Fuel zero cor. changed to 12.82"

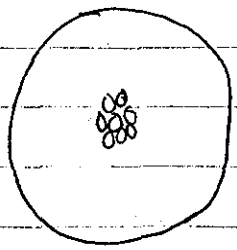
Water ht.	Fuel ht.	
	12.82	
15.45"	+ 2.50	
	15.32	Just cut

Expr. 21 Time 1:30 AM PM Date 12-23 1958
Purpose Same as above except Add 7 - 3/8" tube about center of Basket
Personnel: RKR, JKF

7-Inside Larger tube without Copper Jacket

Water ht. 19.3"

Soln ht. 19.22" corrected out.



Total % Vol Copper = 25.6 + 1.47 = 27.07 %

Expr. 22 2:30 12-23 1958
Purpose Same as above except Added 3 more 3/8" Tubes
Personnel: RKR, JKF

Total of 10-3/8" tubes in center of array without Copper Jacket

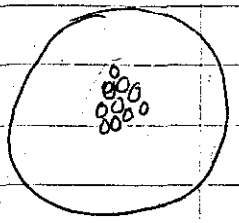
Water ht 54.8 cm

Soln ht 12.82 + 8.52 = 21.34 int cut

Total % Vol. Copper 25.6 + 2 = 27.7

Expr. 23 3:30 Date 12-23-198
Purpose Same as above expt. except Copper Jacket Put back on
Personnel: RKR, JKF

10-3/8" Dia. copper tubes centered



Water ht
40.5"

Fuel ht.
45.85
12.80
58.67 just crit

46.57
12.82
59.39 slightly super

Expr. 24 Time 12:45 PM Date 12-24 1958
Purpose 12-2" sch. 80 pipe + 2-1 1/4" sch. 80 pipe + 2-3/4" sch. 80 pipe + 17-3/8" pipe + 18 pc. of 1/4" wire
Personnel: RKR JKF

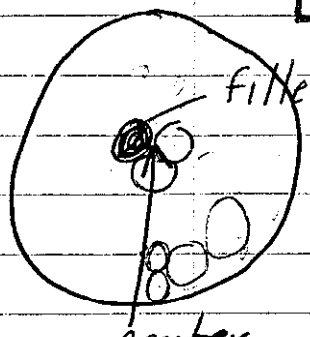
12-2" pipe & 2-1/4" pipe empty but smaller pipes are filled as much as possible with smaller 3/8" pipes and/or wires - Interstices not all filled

12 - 22.80 %
2 - 2.28
2 - 1.12
17 - 3.57
18 - 1.04
30.83

Water ht.
35.2"

Fuel ht.
Zero cor. → 12.82"
22.36
35.18" just crit

Expr. 25. Time 1143 AM PM Date 12-24 1958
Purpose 12-2" pipes + 3-1¼" pipes + 3-¾" pipes (all Schedule 80) + 8-⅜" Pipe + 15-¼" wire
Personnel: RKR, JKF



1-2" Pipe has 1-1¼" + 1-¾" + 1-⅜" + 1-¼" wire inside as shown in sketch.

center	Water ht	Fuel ht
12- 22.80 - 2"	58.13"	12.82
3- 3.25 - 1¼"		46.48
3- 1.68 - ¾"		59.30
8- 1.68 - ⅜"		
15- 1.88 - ¼" wire		
30.29		

Finite sub-crit

Sample from Manfold 12-26-58
Req. No. 354977
141 gm.
20
121 gm net.

Cu -	350 ppm
Fe	400
Al	35
Cd	10
Ni	35

sp gr 1.5761 est

Sample analysis:
gm/gm = .31953
Sp. gr = 1.5761

Expr. 26 Time 1 ~~AM~~ PM Date 12/30 1958
Purpose 10" cyl. with ¼" Cu jacket and H2O reflected except top. no Cu inside
Personnel: Fox, Gilley

Reactor zero checked: no correction needed

Note added: ss basket not in assembly

fuel ht.	H_2O ht.	
6.96"	6.95"	crit.

Expr. 27 Time 3 40 ~~AM~~ PM Date 12/30 1958
Purpose 10" cyl. with ¼" Cu jacket and 4" Cu rod placed in center of cyl. Cu rod was held by ss "basket".
Personnel: Fox, Gilley

fuel ht.	H_2O ht.	
11.92"	11.96"	crit.

Expr. 28 Time 4^05 ~~PM~~ Date 12/30 1958
Purpose ~~10~~" Same as #27 except two - 2" tubes placed on opposite sides of 4" rod
Personnel: Fox, Gilley

fuel ht H_2O
14.01" 14.1"
% vol. occupied by Cu = 19.8%

Expr. 29 Time 9^45 ~~AM~~ Date 1/11/59 195
Purpose Same as above except two additional 2" tubes placed in cyl.
Personnel: Fox, Gilley

% vol. occupied by Cu = 23.6

fuel ht. H_2O ht.
18.06" 18.06"

Expr. 30 10^30 ~~AM~~ Date 1/11 1959
Purpose Same as #29 except two more 2" tubes added
Personnel: Fox, Gilley

% vol. occupied by Cu = 27.4

fuel ht H_2O ht.
29.81" 29.9"

Expt. 31 Time 1[15] ~~AM~~ PM Date 11 1959
Purpose Same as #30 except 3 2
1¼ C4 tubes (schedule 80) were added
Personnel: Fox, Gilley

Monometer raised 15.75" without changing selsyn servo [i.e. add 15.75" to selsyn reading for fuel ht.]

% vol. occupied by C_4 = 29.66

fuel ht.	H_2O ht.
44.26"	153 cm
+ 15.75	
60.01"	sub. crit.

Expr. 32 Time 9 45 AM PM Date 1/12 1959
Purpose 10" cyl with cu jacket, water reflected and containing s.s "basket."
Personnel: Fox, Reedy, Gilley

Selsyn zero checked and set to read 0 at 0.

Fuel ht.	H_2O ht.	
7.33"	7.36"	crit.

Expr. 33 Time 1 00 PM 1/12 1959
Purpose 10" cyl with cu jacket & H_2O reflector containing Al. tubes given below
Personnel: Fox, Reedy, Gilley

Al. tube loading

7 Tubes	2 3/8" O.D;	2 1/4" I.D
9 "	1 7/8"	1 19/32"

Fuel ht.	H_2O	
9.88"	9.88"	crit.

Area of $2\frac{1}{16}$" tubes = $\pi(.1833)$ = ~~1.616~~ 1.092 in²

Area of $1\frac{19}{32}$" = $\pi(.144)$ = ~~1.133~~ .778 in²

Area of 10" cyl = $\pi(25)$ = 78.6 in²

% vol occupied by 7 (large) tubes = ~~9.33~~ 9.71

" " " " 9 (small) " = ~~5.19~~ 9.02

total = ~~18.49~~ 18.73 %

(for exp. 33)

Expr. 34 Time 2⁰⁰ ~~AM~~ PM Date 11/12 1959

Purpose 3 tubes ($1\frac{19}{32}$") added to above exp.

Personnel: Fox, Reedy, Gilley

12.03
9.71
21.74

% vol occupied by Al = ~~30.62~~

fuel ht.	H_2O ht.	
11.27	11.34"	crit

Expr. 35 Time 2³⁵ ~~AM~~ PM Date 11/12 1959

Purpose 10" cyl. water reflected with Cu jacket removed and no voids or extraneous materials in reactor

Personnel: Fox, Reedy, Gilley

fuel ht.	H_2O ht.	
6.55"	6.54	crit

Reedy
Cronin
Fox

2-8-61

Critical Expts Using $UO_2(NO_3)_2$ 29

No. free HNO_3 ; H/X ≃ 60

Same Fuel as used in Y-12 Bottle Interaction Expts.

Expt. 1

10 in Dia (new ann. type) Bare Outside Cylinder zero ~ 18" above floor

Reflector minimized

Fuel selsyn zeroed at reactor zero.

17.87 ~ Crit. (low power

Toward fuel to sub. ~~(up x 10)~~

Readjusted manometer

17.90 slightly super

17.86 just crit. ≃ 45.4 cm

2-9-61

Reedy
Cronin
Fox

Expt 2

12 in Dia An. type Al. Cyl Bare Outside Cyl. zero ~ 30" above floor

Fuel selsyn zeroed.

slightly super at 10.00

just Crit. 9.99"

2-9-61 Reedy @ Pont-Fox

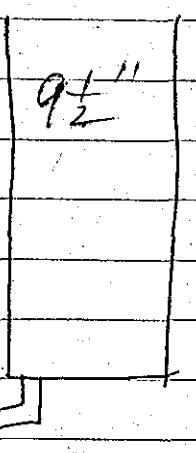
Expt. 3

15" Dia. Al. Cyl. Ann. Type Bare Outside

Manometer zeroed.
slightly sup at 7.57"
just cut at 7.58"

Expt 4

2-9-61 9½" Dia al. Cyl. (Interaction Cyl. with side feed spout.) Bare Outside
" Blade up 37" when cocked - stroke 25".
" zero = 31" above floor reflectors minimized
Manometer zeroed



slightly sup 28.41
just. cut 28.07

This cylinder was checked for dia. using calipers and found 1" Hone to be oval: see next page

Deviation

In direction of weld :	O.D. = 9.49"		− .13"
90° from above	OD = 9.78"		+ .14"
do 45° " "	OD = 9.70		+ .08
			31 + .17
	A.V. Dia. = +.04"		.04

Oval shape may lower P appreciably.

Raschig Ring Expts in 4.8" Dia. S.S. Tank.

Purpose: To determine the poisoning effect of O.D=1.56", ID=1.25", length=1.75" (5% B.) raschig Rings using 93% - enriched $UO_2(NO_3)_2$ in water. H/X=40 Counting will be done stepwise as fuel is added - both bare and reflected. A fixed Po-Be source is near the center of the cyl radially and 1 near the bottom. Three counters are inserted in thimbles and there placed ~ 6" from the outer edge of the tank. The height of the counters is approx. at the cyl. zero. Ion chambers are also located in a similar manner.

Since it is possible to dump rain much faster than it can be filled no poison safety was installed

Fuel is same as used for large arrays of intracting cylinders.

Expt. #1

Rasching rings about 18" deep in tank.

Fixed source inserted in center of cyl. near bottom PoBe S.

START-UP CHECK LIST

Equipment Checked by RKR — Check by RKR

Instrument and Safety Checked by RKR

"Source In" Checked by ✓ ✓

Emergency [illegible] ✓

Red Light On by RKR

Start-Up O'k'd by JKT Time ____ Date 5-23-1962

K-1, K-2, PM-1 PM-2 in Trip

Soln ht 10.16"

Bare Counts

	C_1	C_2	$C_4 \times 64$
	1983 } 992 c/m	302 } 128 c/m	2 min 49+42 = 3168 48+48 = 3168 6296 1573 c/min
	1983	252	

10.17 Reflected bottom & sides (61 cm on side scale)

	C_1	C_2	$C_3 \times 64$
	1102 } 525 c/m	130 } 63.5 c/m	26+22 25+3 2 | 1664 832 c/m
	999	124	

RKR
9K7

Expt. 1A

Fixed source → Po-Be

START-UP CHECK LIST

Equipment Checked by RKR Personnel Check by 9K7

Instrument and Radiation Checked and Tested by RKR

"Source In" Checked by ✓ Log No.

Emergency Equipment and Control Rods Checked by ✓

Red Light On by RKR

Start Up O.K'd by 9K7 Time ALL Date 5-24 1956 62

Repeat of counting Bare at 10.16" fuel ht.

C_1	C_2	$C_4 \times 64$	
5136	717	82^{+48}	5 min
5244	728	82^{+35}	
10,380	1445	5290 - 5 min	
1038 c/m	144.5 c/m	1050 c/m	

Same as above except refl. bot. & sides

2537 } 2570	259 } 274	43^{+43} - 2793	5-min
2588 }	296 }	2707 --	
514 c/m	55.2 c/m	550 c/m.	

Drained water. And started adding fuel. System empty at 15.75" no apparent M-1. Drained; Dump well full reading ~ 13.75" ✓ solution in cyl ? ✓ 1/65

5-2266-2

48 boxes in tank x 256 = 12,288 pcs

fills tank to ___ in.

Draining into dump well covers fuel — 2.00" ≈ 5.08 cm. This is approx equiv to 40.5 l as meas from draining dump well into storage. This is equiv. to 7.97 l/cm.

RKR
JKT

Expt 2

START-UP CHECK LIST

Equipment Checked by V Personnel Check by RKR

Instrument and Safeties Checked and Reset by RKR

"Source In" Checked by Po-Be Source No. ___

Emergency Equipment in Control Room Checked by V

Red Light On by RKR

Start-Up OK'd by JKT Time ___ AM Date 5-25 1962

Fixed source

K-1, K-2
PM-1, PM-2 in trip

Bo
ta

Adding more fuel to tank

Bare

Dolm ht. in	C-1	C-2	C4 *64
20.0			
5 min count	5250	805	85+13 } 85+25
	5283	779	85+36 }
	5267	792	
for normalizing to Expt #L	1055 c/m	158 c/m	1090 c/m
Background	2245 "	343.5 "	2095 "

Reflected bottom & sides

Soln ht	C_1	C_2	$C_4 \times 64$	
20.0"	2995	341	53^{+54}	5 min
	2992	337	51^{+61}	
	600 c/m	68.0 c/m	680 c/m.	

At 20.03 we have ~175 l in tanks

" ~~24.13~~ 27.78 " " ~~0~~ " "

19.1 cm ≈ 175 l or 8.88 l/cm

27.78" Refl. bottom & sides

C_1	C_2	$C_4 \times 64$
3003	372	55^{+35}
3055	336	50^{+25}
6058/m	708/m.	6738/m.

Bare

Bottom of tank wet

C_1	C_2	$C_4 \times 64$
6850	917	125^{+2}
6194	819	100^{+51}
5628	795	106^{+19}
5475	806	101^{+44}
5432	819	84^{+33}
5579	760	83^{+21}
~1095 c/m.	~158 c/m	~1075 c/m
.49	.44	.51

238
5-25-62

Expt 2 B

Continued adding fuel

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by RKR

Source In" Checked by ✓

Emergency Equipment in Control Room Checked by ✓

Red Light On by RKR

Start Up OK'd by RKR Time P.M. Date 5-25 62

Fixed → K-1, PM-1, PM 2 in trip

Bare

	C_1	C_2	$C_4 \times 64$
Calc ht. 32.58"	~~5583~~	~~548~~	~~86~~ +47
	5498 } 5502	773 } 765	82 +95 } = 88
	5506	757	83 +32
	1100 c/m	153 c/m	1042
	.51	.45	.50

LR RKR RKR

2 C

Repeat of above on 5-28-62

	C_1	C_2	$C_4 \times 64$

START-UP CHECK LIST

Equipment Checked by RKR

Instrument [illegible] Check by RKR

Source In [illegible]

Emerger[illegible]

Red Light RKR

Start-Up OK'd by RKR [illegible] 5-28 1962

Fixed → K-1, K-2, PM-1 PM-2 in trip

Bare

	C_1	C_2	$C_4 \times 64$
Calc ht 32.58	5089	633	78+46
"	5156	568	80 +5
	1020 c/m	120 c/m	1015 c/m.

2C Cont

Reflected on bottom & sides

Soln ht.	C_1	C_2	C_4
32.60	2922	282	47 + 49
	2959	297	45 + 48
	2938	589 g/m	686 g/m
	588 g/m		

~520 (p. 234)

Added another 10 boxes of packing rings + ~~1500~~ 1250 rings from S.S. 15D. reactor

58 × 25 + 1250 = 1450 + 1250 = 1700

Lines × rings/box

Measured bed depth: top of bed is approx 16" down from top of tank.

This means that 60-16 = 44" is depth of cylinder part. The bottom is cone shaped with a cone depth of ~ 1.0" ≈ 0.33" of cyl ht.

~44 in. 44.3 in.

$$\text{Bed Vol} = \pi r^2 h = \pi (61)^2 \times 112.6\text{ cm} = 1{,}315{,}000\ \text{cm}^3$$

1315000

$$\text{Glass vol} = 16{,}130 \times 19.42\ \text{cm}^3 = 313{,}500\ \text{cm}^3$$

16140 .38 313500

~318

23.5 Eff. Dia

$$\% \text{ Vol frac} = 23.84$$

3168

240 5-28-62 2 D Continued

Soln ht Bare

Soln ht	C_1	C_2	$C_4 + 64$
40.89	5603	641	96^{+37}
"	5478	641	89^{+43}
	5457	591	89^{+1}
	1100 g/m.	125 g/m.	$\sim 92 = 1175$
	.49	.36	.54

Reflected on side & bottom

Soln ht.	C_1	C_2	$C_4 \times 64$
40.90	2882	284	60^{+43}
"	3024	280	52^{+3}

Added 5 more boxes or 1280 rasing 1742 total rings. Rv. Cyl. bed depth now ~ 46.5"

$\pi r^2 = 11630$ $2.54 \times 46.5 = 118 = 1.372 \times 86$

Bed vol = $11,680 \times 118.9 = 1,388,080$

Soln vol = 338500 / $1,380,000$ ~24.7 Eq 367

% vol. fract. = 24.35

~~24.7~~ 24.3 Rv. & Two measurements = 24.1%

~~24.7~~ ~24.5 / ~~48.6~~ ~48.2

" Free Area in cyl. for fuel = $11,680\ cm^2$
$- 2810$
$8870\ cm^2$

5-29-62

2 D Repeat (some soln. drained off thru dump valve. — 241)

Soln ht.	Bare C_1	C_2	C_4
40.54	5139	613	87^{+49}
"	5156	636	79^{+12}
	10309/m.	1259/m.	~ 1060 c/m
	.46	.56	

Expt. 3

RKR
JKT

Fixed

START UP CHECK LIST

Equipment Checked by RKR — Check by RKR RKR

Instrument and [illegible] and

Source In — Checked by ←

Emergency Lights — Coal Room Checked by ←

Red Light On by RKR

Start Up OK'd by JKT Time AM Date 5-29 1962

K-1, K-2, PM-1, PM-2 in trip

Continued filling cylinder

Band

Soln ht	C_1	C_2	$C_4 \times 64$
44.67"	5248	618	99^{+5}
	5152	542	80^{+12}
	5326	582	80^{+8}
	10489/m.	1169/m.	1025 c/m
	.47	.34	.49

Reflected on bottom and filler

Soln ht.	C_1	C_2	$C_4 \times 64$
44.68	2961	298	$47+53$
	2978	278	48
	3097	279	$45+30$
	6009/m.	579/m.	603 c/m.

242
5-29-62

Expt. 3 B

Bare count after draining Soln. back to 12,21"

C_1	C_2	$C_4 \times 64$
5477	656	99+11 6450
5293	627	92+39 5829
1070 c/m.	127 c/m.	~1200 c/m

Source in soln all out

1670	113	33+26
1507	165	34+12
1542	202	27+45

315 c/m (counts low due to no moderator)

Source very roughly same distance from C_1 & C_4 in air

C_1	C_4
1662	27+44

Source in place soln. all out & refl. water up ~ 20" in sid.

C_1	C_2	$C_4 \times 64$
26405	2330	412+14
26563	2390	411+19
5290 c/m.	470 c/m	5260 c/m.

5-31-62

Source placed in refl. water at approx. same distance from counter (C, & C4) as ~~if was~~ it was in the reactor re-entrant tube position:

C_1	C_4 $\times 64$
546	~~9~~ 9+5 = 628
593	10 640
589	10+10 650
115 c/m	127 c/m

244

Expt. 4

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by JKT
Instrument and Safeties Checked and Reset by
"Source In" Checked by Source No.
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKT Time PM Date 5-31-1962

Fixed Po-B

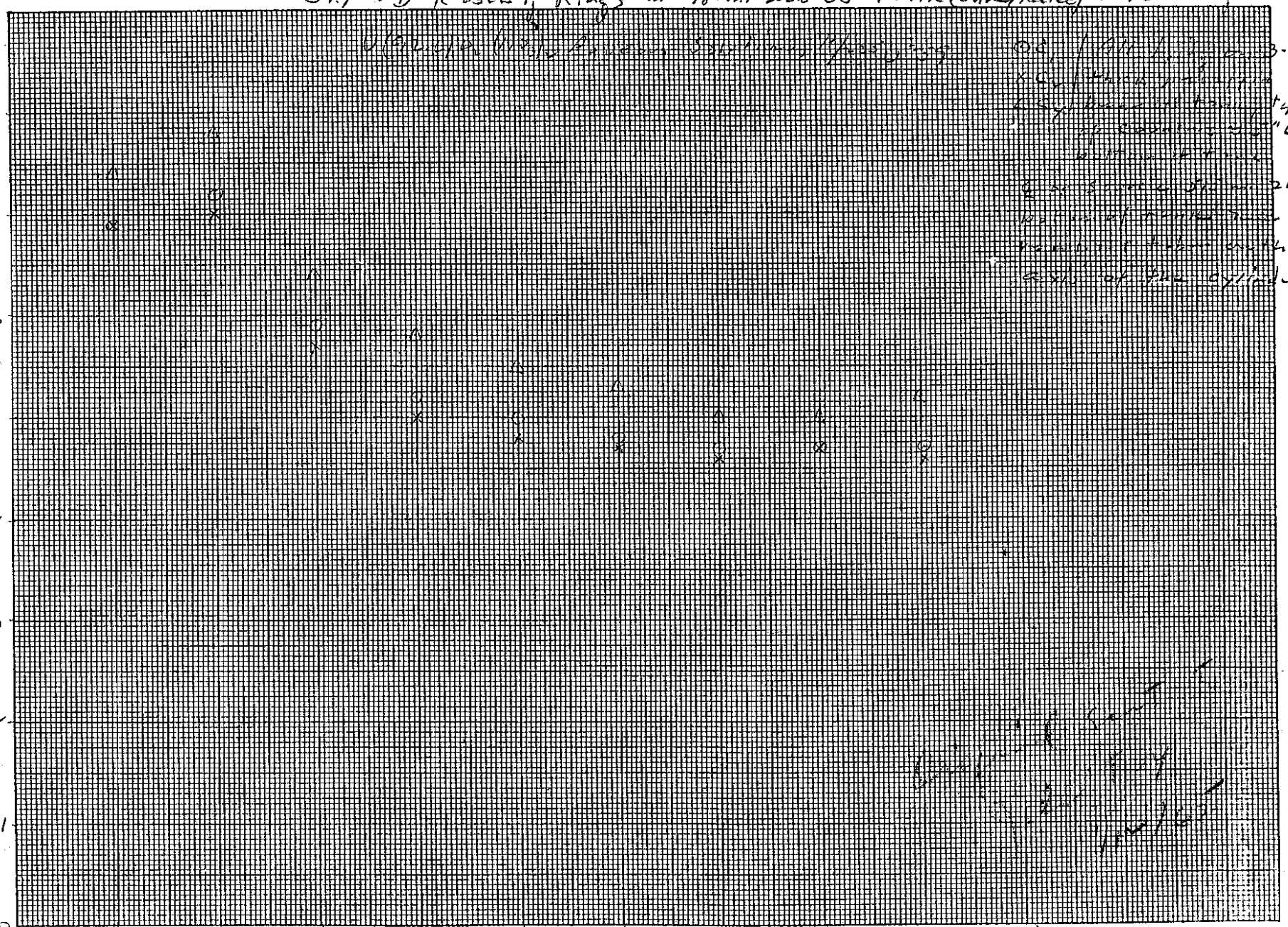
Soln ht.	C_1	C_2	C_4 X 256	
0	22,562	4108	102^{+188}	1 min counts
"	22,944	4140	106^{+71}	
"	23,214	4049	104^{+26}	
	22,560 c/m	4100 c/m	~ 26,600 c/m.	

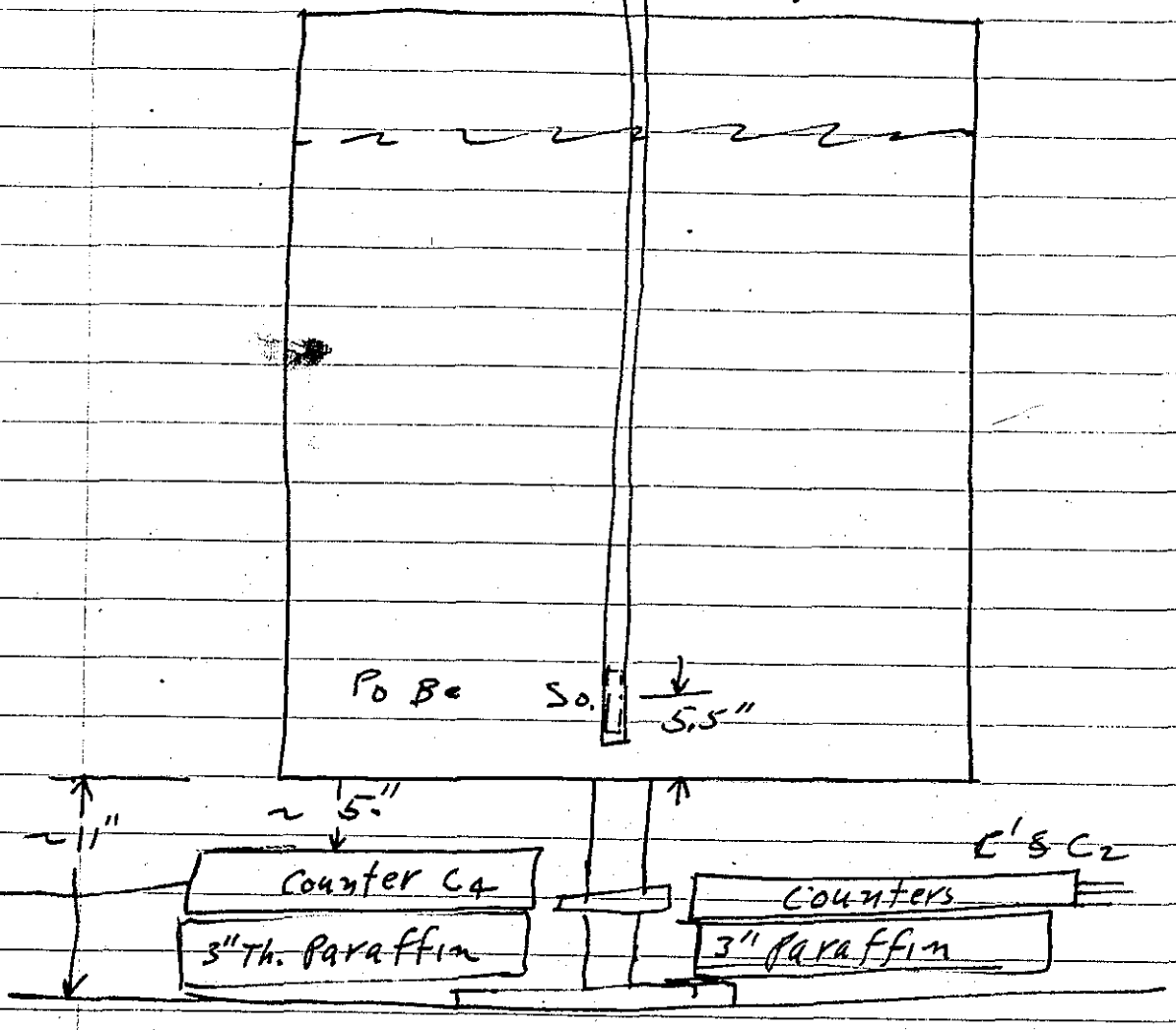
Expt. 4 in bare with counter under tank & source about 5.5" up from bottom to center line. (See opp. page)

1.98"	33,222	5935	139^{+110}	1 min counts
" Av.	32,798	5918	142^{+98}	
	33,000 c/m / 0.69	5925 c/m / 0.69	36,000 c/m / 0.74	
4.01"	31,494	5949	135^{+150}	
"	31,690	5829	131^{+233}	
	31,300 / 0.72	5890 / 0.70	34,200 / 0.78	
5.98	38,450	7204	164^{+45}	"
"	38,709	7188	158^{+164}	
	38,600 / 0.59	7195 / 0.51	41,500 c/m / 0.64	
7.98"	43,258	8191	184^{+163}	"
	43,407	8223	175^{+123}	
	43,300 c/m / 0.52	8210 / 0.50	~ 46,000 c/m / 0.58	

Expt. 4

5.9 % B Raschig Rings in 48-in-dia SS Tank (Unrecirculated) 5/31/62





Soln ht.	C_1	C_2	$C_4 \times 2.56$
10.01	45579	8430	190^{+112} 1 min
"	45432	8629	190^{+128} "
	45,500/0.50	8530/0.48	48,600 gm/0.55
12.03	47,085	8759	200^{+251} "
"	47,059	~~8632~~	196^{+45}
	47,070/0.48	8709/0.47	50,700 gm/0.53
14.05	47,575	8920	209^{+250} "
"	47,836	8867	207
	47,700/0.47 cont	8890/0.44	53,200 gm/0.50

Expt 4

Soln ht	C_1	C_2	$C_4 \times 256$
16.00	48,047	8838	207^{+188}_{+200}
11	47300	8743	206
	47,700 c/m / 0.47	8800 / 0.47	53,000 c/m. / 0.50

soln ht	C_1	C_2	$C_4 \times 256$
18.05	47697	8932	221 +140
	48218	8815	198 +120
	47,950 c/m / 0.47	8880 c/m. / 0.46	51,200 c/m / 0.62

Expt. 4 A

Moved 3 counters down against floor & covered with ~ 4" of plexiglas + paraffin on top & sides of counters

Soln ht.	C_1	C_2	$C_4 \times 256$
18.05	31, 952	5022	233^{+74}_{+128}
11	32 180	5104	218
	32,000 c/m. / 1.077	5050 c/m / 1.15	57,600 c/m. / 0.95
16.05	31, 789	5122	205^{+22}_{+240}
	31, 571	5162	209
	31,670 / 1.09	5140 / 1.13	53000 / 1.02

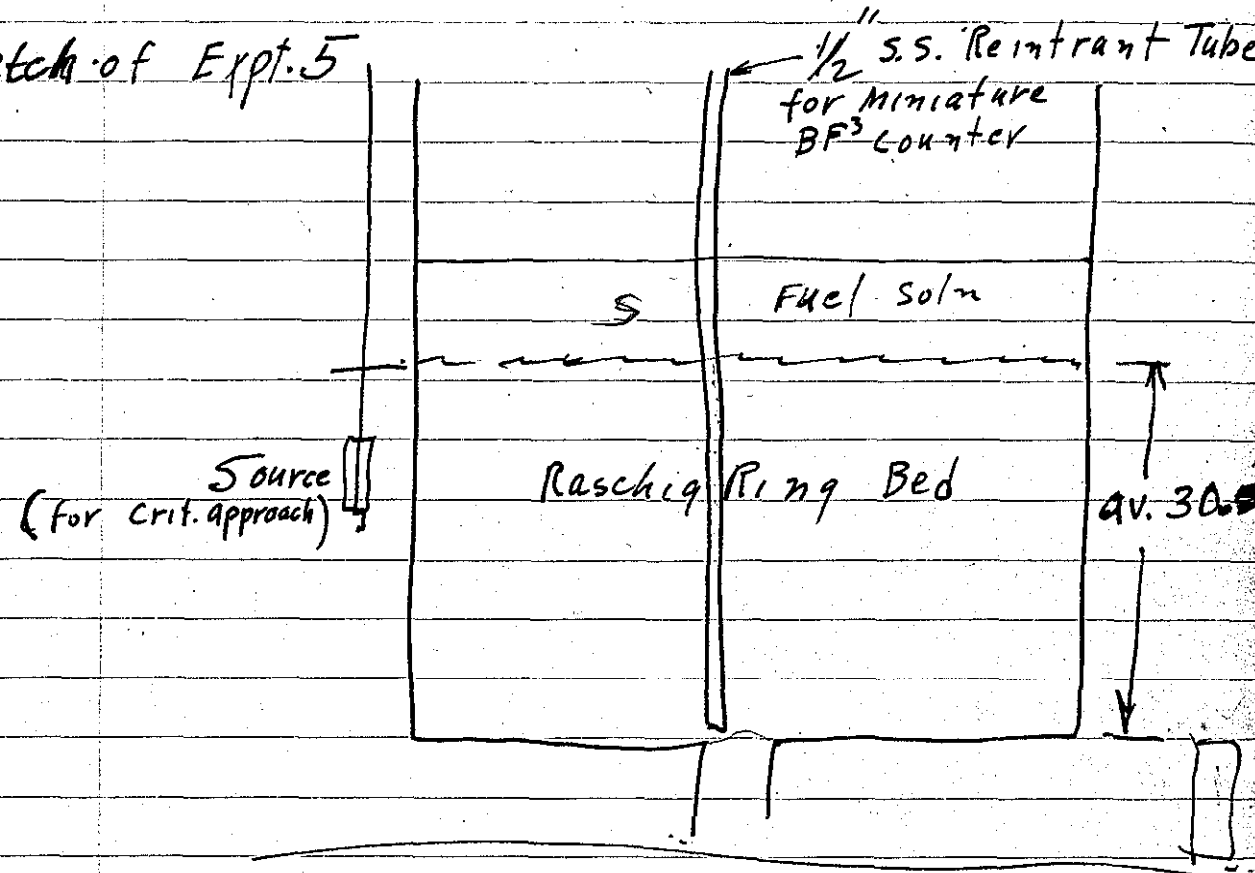
Gals hit.	C_1	C_2	C_4 x 2 Sec
14.03	31,883	5066	204^{+40}
"	31,877	5011	209^{+149}
	31,880/1.08	5030/1.15	53,000/1.02
12.05	31,708	4908	204^{+172}
"	31,540	4910	208^{+118}
	31,620/1.09	4910/1.18	52,900/1.03
10.02	30810	48667	205^{+60}
	30758	4676	$204^{+223,-}$
	30,790/1.12	4770/1.21	52,500/1.04
8.04"	29,726	46667	210^{+52}
	29,462	4433	211^{+175-}
	29,600/1.165	4550/1.27	54,000/1.00
6.01	26,772	4049	~~188~~ 101
"	26,423	4152	193^{+} 208
"	26,312	4200	186^{+}
	26,500/1.30	4150/1.40	48,700/1.12
4.04	23,584	3719	166^{+67}
"	23272	3679	158^{+79}
	23,450/147	3700/1.56	41,520/1.31
2.05	28,820	4712	199^{+18}
"	28,501	4727	193^{+21}
	28,650/1.20	4720/1.225	50,200/1.08

Over

Expt 4A

Daylight	C_1	C_2	$C_4 \times 25\%$
0	34,264	5773	221^{+118}_{+253}
11	34,605	5811	202^{+169}
11	34,581	5774	213^{+169}
	34,500	5790	54,300

Sketch of Expt. 5



$$B_M^2 = B_r^2 - \gamma^2$$

Expt 5

Exponential Expt. to determine B^2_m for system poisoned with 5.9% B. raschig rings.

START-UP CHECK LIST

Equipment Checked by RKC Personnel Check by JK7

Instrument and Services Checked and Tested by RKC

~~Tested~~ "Source In" Checked by M-43

Emergency Equipment in Control Room Checked by —

Red Light On by JK7 AM

Start-Up OK'd by JK7 Time ____ Date 6-5 1962

Tube

It is proposed to make the system critical by raising fuel level the required distance above the top of the bed of raschig rings. The bed is ~31" deep in the 4 ft. dia. S.S. tank. A minature BF^3 counter is to be used to determine the exponential decay in the raschig ring bed below the critical top layer.

0.5"

Top of bed is very irregular. Av. ht. of glass is roughly 30". (Appreciably more than half of glass covered at 30.5")

For initial approach to crit. the PoBe source was placed on lid of tank in addition to M-43 at one side.

Bare Crit fuel height = 34.27"

30.00

~4.27 Crit. thickness

250

Counter Hr	C_1 (Nov.)	C_4 (Miniature BF_3)	
	LN = .0006		
28.00	35367	31426	2 mm
"	34464	30596	"
26.00	35106	21650	"
24.00	34787	14627	"
22.00	35233	8078	"
"	35045	8132	"
20.00	35203	53777	"
"	34917	55106	"
18.00	34625	4595	"
"	34578	4628	"
16.00	35064	3405	
"	34460	3384	
6.00	34968	456	
"	34732	507	
20.00	34676	5489	
	"		

Increased power level sol 34,31 on period.

	LN = .007		
28.00	432060	399947	2 mm
26.00	407862	266420	"
24.00	392443	177209	"
22.00	455812	112574	"

soln ht.	C_1	C_4	
20.00	381422	63,349	2 min
18.00	341102	46,107	
16.00	320850	31427	
10.00	270037	8044	
6.00	244,414	3232	
30.00	208869	383,991	792

RK252
JK7.

Expt 5A.

Repeat of Exponential Traverse

K-1, K-2, PM-1
PM-2 in trap C.

START-UP CHECK LIST
Equipment Checked by RKR Program Check by JK7
Instrument and Sources Checked and Tested by RKR
"Source In" Checked by ✓ Source No. M-43
Emergency Programs Tested and Doors checked by ✓
Red Light Checked by RKR
Start-Up OK'd by JK7 AM/PM Date 6-6 1967

Cut at 34.3/~~29~~" Ln = ~~.014~~ .007

Counter Pos.	C, Nor.	C4 (Trav. ctr.)	
28.00	~~800468~~	—	
"	393193	375605	
26.00	426199	232198	
24.06	500484	220865	
22.06	513060	123,240	
20.00	512110	81,950	
18.00	506350	61833	
16.00	499524	41144	
14.06	492409	27410	
12.00	481412	14827	
10.00	471533	11465	
8.00	465337	7909	
6.06	454753	5554	
7.06	443302	6759	
9.06	428543	9246	
11.00	415361	11,506	
13.00	402403	13,248	

ctr. ~~Sol~~ ht.	C_1	C_4
16.00	383,079	31,117
17.00	436555	42,001
19.00	463171	73855
21.00	481210	91644
~~23.00~~	498426	165516
25.00	509203	229421
26.00	511538	~~25645~~ 268,600
27.00	502320	322,459
29.00	483475	600994

Expt 5B

Repeat of Expt 5 with water refl. on Sides & Bottom of 5 ft. Tank. Here, refl. only against cut. slab above rings on edges

Water height ≈ to 34" salt in 4 ft. Tank.

Crit ht. ≈ 34.~~32~~ 25 (after ≈ 20 min.)

~~ctr~~ for	C_1	C_4
28.00	332,074	171,257
27.00	338331	125,480
26.00	366867	111620
25.00	370981	94324
24.00	381725	95052
23.00	404061	74164
22.00	385874	49836

0.1446

Expt. 5B cont

21.00	409,199	41996	2 min
20.00	393,611	34366	
19.00	400,353	36504	
18.00	407 980	29610	
17.00	416 235	24063	
16.00	403 271	19,990	
15.00	393 879	19,233	
14.00	394,253	12,874	
13.00	401389	7,388	
12.00	417897	7.206	
11.00	426194	6 6446	
10.00	433,205	6 113	
8.00	941 671	10,438	5 min
6.00	942 977	7162	"

Drained water from st & shook manometer line:

soln ht = 34.25 (quite cut)

Added more fuel with valves out:

Crit. at 34.31

256

Expt. 6

5.9% B Rasching Rings in 20" Dia. cyl.
(Same as used in 48" tank)

START-UP CHECK LIST

Equipment Checked by RKR Personnel Check by JKZ
Instrument and Safeties Checked and Reset by RKR
"Source In" Checked by ..... Source No. M-43
Emergency Equipment in Control Room Checked by ~~JKZ~~
Red Light On by JKZ
Start-Up OK'd by JKZ Time AM Date 6-13 1962

Calm. zero reset. Rasching Ring bed depth ≈ 34". Water up on side to 102 cm. from cyl. zero.

Av. height of Rasching Ring bed as observed from calm. is 34.60"

Critical. 40.64 (refl. sides & bottom) 40.64 − 34.60 = 6.04"

ℓN = .0026

Ch. Pos	$C_1(N)$	C_2 Traversing	
30.0	241907	292738	2 min.
28.0	249 406	243147	2358×10^2
26.0	243 937	108,718	996 "
24.0	276762	99,914	873 "
22.0	293067	52849	434 "
20.0	315780	34579	246 "
18.0	315460	22482	172 "
16.0	321301	13603	162.5 "
14.0	327000	7921	586 "
12.0	344004	4837	340 "
10.0	346701	3384	223 "

Ctr Pos.	Nov.	Trav. ctr	
13.0	326930	4971	34.8×10^2
15.0	366910	13585	90.0
17.0	344840	18956	133.
19.0	327020	33419	247
21.0	315350	46735	358
23.0	309350	84650	662
25.0	307730	116065	912
27.0	309230	202335	1582

Drained water
added fuel to crit bare.

Bare crit $\frac{41.03}{40.64}$ "
$.39$

Measurement of glass vol. fraction:

Started with one storage tank full (113.1 l) at reactor zero. Tank became empty at 29.01"

29.01" ≈ 113.1 l
73.7 cm

$\frac{1530}{2020} = 75.7$ Circular Cross Sect.

net area = 1,530 cm²

% soln = 75.8

% gl. = 24.2

$\frac{100.0}{75.8}$
24.2

Expt. 7

Y-12 → 3.9% B Pyrex raschig rings in a 20" dia. SS cyl. Approx. ring height = 35"
Rings are ~ 1.8" O.D.; 1.5" I.D. & 1.9" long

Mean Av. of 3 : O.D. = 1.853
I.D = 1.575 Av. Th. = 0.173"
L = 1.893

K-1, K-2 & PM2 in Trip

START-UP CHECK LIST
Equipment Checked by RKR Checked by RKK
Instrument and Safeties Checked and Checked by RKR
"Source In" Checked by _____ Source No. M-43
Emergency Equipment in Control Room Checked by _____
Red Light On by RKR AM
Start-Up OK'd by RKK Time _____ PM Date 6-14-62

38.53
33.75
4.78

Reflector water at ~~104~~ 98 on reactor
Av. height of rings ≅ 33.75"

Cut at 38.53 [~ 4.78" slab on top]

Ctr ~~Lth~~ ht	C_1 (Non)	C_4 (Trav.)	
28.00	1911283	588788	C_1 loosing Count
26.00	983729	426299	~~495~~
24.00	934806	384813	
~~22.00~~	~~683285~~	~~266609~~	
28.00	738084	360111	2 min
26.00	670180	211315	2330 X 10
24.00	606490	184388	2060
22.00	642400	137840	1585
20.00	680640	100960	1095
18.00	718016	85632	892

16.00	66194°	61692	717 x10⁻
14.00	665280	40198	476
12.00	6906660	36790	393.5
10.00	696808	27620	292.5
8.00	704440	15,636	164
11.00	706330	30014	314
13.00	707500	43560	454
15.00	707501	52643	550
17.00	710100	78224	814
19.00	705930	96620	1010
21.00	700470	120320	1268
23.00	699700	166610	1756
25.00	694200	202500	2150
27.00	690220	272330	2910

Drained Water for bare crit. Value

Bare crit height = 38.88
38.53
Δh = .35"

4.78
3.5
5.13

Bare Slab th = 5.13" ≈ 13.0 cm

see p. 257; Vol of one storage tank

113.11 l fills 20" dia. cyl containing pyrex (Y-12) raschig rings to 27.80" = 70.6 cm

net area = 1602 sq. cm.

2027
1602
425

20.9
% glass Vol = ~~20.69~~

Expt. 8

V-12 (40% B) rosling rings Bare
Same as Expt. 7 except Traverse bare)

START-UP CHECK LIST
Equipment Checked by RKR — Check by RKR
Instrument and Sequence Panel Set
"Source In" Checked by ✓ — No.
Emergency Equipment Checked by —
Red Light On by RKR — AM
Start-Up Ordered by YK7 — Date 10-15-1962

K-1, K-2, PM-1, PM-2 in Trip.

Traverse ctr. Taken out between Expts 7 & 8

Ctr Pos.	C_1 (Nor.)	C_4 (Trav.)	
28.00	509840	370982	
26.00	518450	212744	209 $\times 10^3$
24.00	521950	152940	151.3
22.00	525710	121090	117.5
20.00	533900	78540	75.8
18.00	537800	57540	44.8
16.00	532700	43270	41.4
14.00	529200	28560	27.5
12.00	519430	25900	25.4
10.00	5121-	18050	18.0
11.00	4968-	22841	23.4
13.00	4815-	26210	27.7
15.00	454608	30950	34.7
17.00	4354	33460	39.2
19.00	4164	5480	66.1
17.00	4729	35080	37.8
21.00	4732	8925	96.2
23.00	4741	11230	120.7

25.00	474900	172400	185
27.00	470500	241100	261

Cut ht = 38.67" (apparently fuel height was lowered in take reactor out and replacing ~~it~~.)

Expt. # 9

Same as Expt. # 8 but reflected

START-UP CHECK LIST

Equipment Checked by	RKR	K-1, K-2, PM-1 &
Instrument and Safety Checked by	RKR	
"Source In" Checked by	M-43	PM-2 in line
Emergency Equipment Checked by		
Red Light On by	RKR	
Start-Up Cl'd by	RKR	6-18 1962

Also, repeats Expt. 7 except that peel depth is ~ 0.2" less with increased glass density.

~ crit. ht. 38.29 ~ 38.4" water

Ch. Pos.	C1 Nor	C4 (Traverse)	
28.00	601090	307990	308 x 10³
26.00	619100	186680	182.5 "
24.00	611000	135000	133.
22.00	619100	109220	106
20.00	6091	74080	73.1
18.00	6004	53710	52.7
16.00	6114	43300	42.6
14.00	5850	31450	32.3
12.00	5677	28700	30.3
10.00	5917	21870	22.2
8.00	6264	10900	10.45
11.00	6128	28110	27.6
13.00	6042	30820	30.7
15.00	6233	39900	38.5
17.00	6204	4130	39.1

Cube	C-1	C-4	
19.00"	627377	64939	62.2 $\times 10^3$
21.00	650960	93210	860
23.00	6508	111,500	1085
25.00	65500.	167501	1534
27.00	666400	224,200	202.
29.00	66489	335500	303
30.00	666420	386590	348.5
31.00	66700	488960	441
32.00	50933	40733	481

264

Expt. 10

Kimball

~~Ryerson~~ → 5/8" O.D. x 5/8" long K-25 packing rings (I.D. = .43) in 20" Dia. S.S. Cyl., Bed depth ≈ 28"
Refl. sides & bottom to ≈ ~~98 cm~~

K-1, K-2, PM-1
PM-2 in Trip C.

START-UP CHECK LIST
Equipment Checked by PKR Personnel Check by LKF
Instrument and Safeties Checked and Reset by PKR
"Source In" Checked by _____ Source No. M-42
Emergency Equipment in Control Room Checked by ←
Red Light On by PKR
Start-Up OK'd by LKF Time ~~AM~~ PM Date 6-19-62

Mean Av. of 7 pcs: O.D. = 0.61", ID = 0.43"
length = 0.64 (OD & ID of all 7 same)

Av. Bed height, meas. with tape in
27.18"

32.37
27.18
5.19

Crit ht ≈ 32.37

Water height = 82 cm ≈ 32.4"

24.00	950,060	534950	523	5.29×10^4
11	958880	528130		
22.00	936710	27057		27.45
20.00	937040	16210		16.42
18.00	950186	95709		9.57
16.06	913902	42949		4.52
14.06	885280	22039		2.37
12.07	916580	13354		1.40
10.00	90,9030	7211		.754

9.2	8.00	890750	4004	$.427 \times 10^4$
11	6.00	889630	2600	.278
	9.00	90492	5148	.541
	11.00	936360	10,962	1.11
	13.00	910880	16694	1.74
	15.00	880540	30890	3.33
	17.00	857640	62040	6.87
43	19.00	839390	106870	12.98
	21.00	83000	189750	21.7
	23.00	82989	349950	40.1
	25.60	828320	541060	62.0
	26.00	414400	374820	85.9
	27.00	371570	564130	164.2
	28.00	316290	903020	271.
	29.00	071290	296620	395
	30.00	050010	208340	396

$\times 10^4$

Measurement of void fraction of glass:
Starting at soln. at zero. Emptying one storage tank containing 74.8 liters soln. Raised level in reactor to 23.29"

$23.29'' \cong 59.16\text{cm} \times 2,027 = \frac{119.91\ l}{74.8}$

45.1

$\frac{45.1}{119.9} = 37.6\%$

Note: glass already wet with solution when this measurement was made.

see page 267

Expt. 11

K-25, 5/8" OD x 5/8" L. Raschig rings

same as Expt. 10 except bare

START UP CHECK LIST

Equipment Checked by RKR — Check by DK7

Instrument and Safeties [illegible] — RKR

"Source In" Checked by ✓

Emergency Equipment in Co[illegible] ✓

Red Light On by RKR

Start Up OK'd by DK7 Time AM PM Date 6-20 1956

K-1, K-2, PM-1 & PM-2 in, trip

ent. ht. 32.69

Ctr Position	C_1 (Nor.)	C_4 (Traverse)	
24.00	~~29025~~	~~139390~~	
11	276000	135,610	135.6×10^3
22.00	258800	61060	65.1
11	453380	107120	65.2
20.00	499100	69630	38.5
18.00	518900	39600	21.4
16.00	520690	18340	9.73
14.00	519620	9708	5.26
12.00	518570	5442	2.89
10.00	307170	2855	1.55
11.60	518055	4204	2.24
13.00	526330	7002	3.67
15.00	531450	13440	6.98
17.00	526290	28640	15.0
19.00	518869	50777	27.5
21.00	502890	90479	49.7
23.00	486080	164590	93.6

	C_1	$C_{\mu\mu}$	
25.00	465399	258870	153.5
26.00	439080	327660	206,
27.00	388750	495740	352
28.00	315560	745390	652
29.00	224860	671700	875

6-21-62 Sample #1 Reg # 593170

G = 142.7 gm U/gm 0.2661 #/# = 59.03

T = 20.0

N = 122.7 1,551 Vol. Density

10^3

Measurement of glass vol. fraction in a 5 gal. bucket.

Total vol. to a mark on side of bucket
= 10.80 l

Vol. to mark with glass in bucket!

7.56 l

10.80
7.56
3.24

$\frac{3.24}{10.80} = 30\%$

268

Expt. 12

1½% B_2O_3 Kimball glass Raschig Rings ~ ~~1.60~~ 1.60" OD, ~~1.25~~ 1.28 I.D. & ~~1.75~~ 1.69" Long

START-UP CHECK LIST

Equipment Checked by RKR — Personnel Check by AKJ

Instrument and Safety [illegible] Checked and Placed by RKR

"Source In" [illegible]

Emergency [illegible]

Red Light On by RKR

Start-Up OK'd by AKJ Time ___ Date 6-21-1962

K-1, K-2
PM-1, PM-2
in trips

per expt. 12B

— Crit at 13.12" Bare

Vertical traverse

Ctr. Poz.	C_1 Nor.	C_4 (Traverse)	
7.00	136,602	446,710	4.467×10^5
6.00	147584	511580	4.735
5.00	161230	530870	4.525
4.00	173200	54026	4.24
3.50	169060	51731	4.18
4.00	164290	545°01	4.53
5.50	164340	591498	4.92
6.50	161768	563160	4.73
7.50	158855	504720	4.34
8.50	15994	43234	3.69
9.50	162220	355190	2.99
10.50	170170	233050	1.87
11.50	178550	96740	.74
12.00	188700	73090	.53
11.00	199580	179340	1.23

Ctr. Poz.	C_1	C_4	
10.00	204770	37830	2.52×10^{-5}
9.00	203980	496710	3.33
8.00	201010	573490	3.90

Crit 13.12" in reactor 20.0 ℓ remained in #2 storage tank; 74.8 / 20 / 54.8 ℓ in reactor.

13.12 = 33.3 cm × 2.027 = 67.6 ℓ.

Vol. ℓ. = 12.8 ℓ. Drain just below reactor at zero.

47.3

20.3

20.3 / 67.6 = 30%

$\frac{1}{2}$ gl = 1.9.

Expt. 12B

Same as above except refl. sides & air in gap

Crit. at 10.35" = 26.3 cm water at 20.8 cm; 53.35 ℓ total vol. 13.12 / 10.35 / 2.77

33.80 / 19.55

Soln required to go from 0.0 to 10.35" = 33.8 ℓ

Dead vol. to zero mean ar. 7.5 ℓ

In feeding up above 10" to check on flash. vol. & reactivity surge was noted that undicated the crit. height to be much less than 13.12".

270 cc
6-26-62
1:20 pm
Ready for

Expt. 12 B

Repeat of Expt. 12 to check on bare crit. height. (suspect air in sight glass line)

Crit. height 10.86"

#3 storage tank has 74.8 used 33.5 l. left 41.3

41.3 l ≈ 10.86" ≈ 27.6 x 2.027 = 55.95 / 41.3 / 14.65

26.2% glass.

Expt. 12 C

Same as above except repl. Teflon gasket

Crit. at 8.34" with water at 22.0 c

Results of Vol fraction using #4 tanks.

when full #4 tanks = 113.11

at 10.04" = 74.00

used = 39.11

∴ 39.11 ≈ 10.04 = @ 3.90 / 5.14 = 24%

From mean of Av. bed depth & total no. of pieces used:

Total no. ≃ 1190

Bed depth ≃ 21.4"

Mean. Av. size of rings: 1.60" O.D, 1.28" ID & 1.69" Long

$V_{(1\,ring)} = \frac{\pi}{4}(2.54 - 1.638)\,1.69 = 1.222$ cu. in

Vol. of 1190 = 1455

Total Vol. of bed = 6725

$\frac{1455}{6725} = 21.6\%$

272

Expt 13

Y-12 Raschig Rings in 30" dia Cyl.
Reflected side & bottom

K-1, K-2
PM-1, PM-2
in trip

START-UP CHECK LIST

Equipment Checked by JKT Check-by Mac:
Instrument and Safeties Checked and JKT
"Source-In" Checked by No M-43
Emergency Equipment
Red Light On by JKR
Start-Up OK'd by JKR Time AM PM Date 7-10 62 196

Zero should be rechecked later (approx. right)
Preliminary test for crit. Fuel & water raised to ~ 41." Rain out of fuel in storage system
with still creeping upward on reader

H2O
~16"
~12"
~20"
~30"
~50"
"

START-UP CHECK LIST

Equipment Checked by JKF Personnel Check by Mac

Instrument and Safeties Checked and Reset by JKF

~~Source In~~ Checked by _____ Source No. 2

Emergency Equipment in Control Room Checked by _____

Red Light On by JKF A&I

~~Start Up OK'd by~~ JKF Time _____ Phl Date 7-11-1962

2 sources under bottom plate M-43

Expt 13A

Cont. of above expt. 2 counters on top of Reactor

H_2O	Fuel ht	C_1	C_2 (2 min.)	C_4
26"	6.00"	~~720~~ 526	33 x 16 = 528	974, 962
"	"	~~720~~ 553	34 x 16 = 544	1000 / 1032, 927
"	"	~~720~~ ~~720~~		1106
				1054
~12"	12.00	607	38 x 16 = 608	1779
~20"	20.00	429	26½ x 16 = 424	2077 2068
"	"	401	25 x 16 = 400	2062
~30	30.00	262	16½ x 16 = 264	2157 2075
		239	15 x 16	2009
~30"	88	135	9 x 16	1942
"	50	151	9 x 16	2049

Av. bed. ht ~ 50.~~"~~

Stopped Expt. because of time limit. Removed 10 baffles & rods from manifold. Plan to take out more packing rings

Cross
Thomas
Johnson

Exp 13.B

START-UP CHECK LIST

Equipment Checked by JTT Personnel Check by C.C

Instrument and Safeties Checked and Reset by J.T.T.

"Source In" Checked by JTT Source No.

Emergency Equipment in Control Room Checked by JTT

Red Light On by JTT

Start-Up OK'd by JTT Time 11 ~~PM~~ AM Date 7-13 1962

30" Dia. Alum. Reactor with 4-12 rings

Ring bed height 35.86 in.

Critical ht of solution 39.48+ in ~~water~~ ht ~105. cm.

12 45 PM " " " " 39.48 in. water ht 106.6 cm.

2 10 PM Critical ht 39.47+ in water ht 106.6 cm.

2 42 PM Critical height 39.48 in water ht 106.6 cm.

need to add 3 inches to these values for position locations

2 min counts → Position of C_4	C_1 (norm)	C_4	
32.00	133809	296457	
30.00	141748	216989	2048
28.00	120202	131587	1465
26.00	133701	107507	1075
24.00	126263	74563	790
22.00	149529	83257	785
20.00	170365	65086	511
18.00	158169	68965	553
16.00	165729	44998	903
14.00	160410	31068	259
12.00	180410	35034	268

Position of C_4	C_1	C_4	
10.00	174706	31075	24
8.00	184089	24605	179
6.00	184359	18805	137
7.00	180830	20260	150
9.00	175760	27553	213
11.00	174354	34603	266
13.00	169558	39520	243
15.00	172002	43032	333
17.00	181120	64751	478
19.00	180209	67008	495
21.00	180035	65690	485
23.00	180525	97063	715
25.00	175209	100955	810
27.00	172484	144248	1119
29.00	164589	189597	1538
31.00	160724	2F1437	2345

4[07] Critical ht 39.486 water ht = 107.1 cm.

4[16] PM Critical ht 39.71 in. water ht = 0.

LBJ
JIT

Exp 13 C

START-UP CHECK LIST

Equipment Checked by JKF Personnel Check by JKF
Instrument and Safetics Checked and Reset by JIT
"Source In" Checked by JIT Interlock No. ✓
Emergency Equipment in Control Room Checked by JIT
~~Red~~ Light On by JIT
Start-Up OK'd by JIT Time 8 52 ~~PM~~ AM Date 7-16 1962

Unreflected traverse in 30" dia cyl. with 4-12 rings.
Ringbed height taken as 35.86 in.
Critical ht 39.72" no water

position	C_1 (norm)	C_4	
32	215044	26602	2 min counts
30	202325	169213	1754
28	217067	122930	1248
26	248633	93345	954
24	259176	70380	683
22	214643	52049	544
20	241755	40205	358
18	255279	44633	373
16	262088	31589	209
14	259078	15601	163
12	254041	17654	150
10	240169	14305	128
8	228851	9476	0851
6	213543	6502	0608
7	197121	6842	0776
9	181500	9067	107
11	200931	13444	144
13	200713	13356	1435

need to add 3 nines to these values.

Position of ζ_4	C_1 (Norm)	ζ_4	
15	197278	18294	159
17	190660	26956	304
19	180800	27645	325
21	187531	28545	332
23	233208	57756	532
25	244246	73916	600
27	240052	106461	534
29	226196	147607	1452
31	219006	222213	2182
32	217420	250916	248

11 08/Aug Critical height 39.748 in. no water.

JKF
JTT

Exp 14. A

START-UP CHECK LIST

Equipment Checked by JKF Personnel Check by JKF
Instrument and Safeties Checked and Reset by JTT
"Source In" Checked by JTT Source No. ✓
Emergency Equipment in Control Room Checked by JTT
Red Light On by JTT
Start-Up OK'd by JTT Time 845 AM Date 7-20 1962

20 in - dia Aluminum vessel filled to approximately 36 in with glass Raschig Rings Type K-23 (nom 8.) Total number of rings present: 2184 [1284 Kimbel + 900 Pyrex (x-10)].

Cylinder Unreflected.

9°/Am. Average Ring bed height 35.55 in. (JKF)

Crit height. 41.32" Bare

41.32
35.55
5.77

Position	C. NOT.	Ca Trav.	
29.00"	399745	177484	
27.00	403386	127000	12.58
25.00	398685	65148	~~61~~ 45.4
23.00	395375	41544	42.0
21.00	461688	28004	24.25
19.00	441753	19594	17.72
17.00	408033	10114	9.90
15.00	424850	8453	7.96
13.00	437290	5412	4.96
11.00	423798	4178	3.94
9.00	~~423798~~ 379514	2661	2.80

POS.	C_1	C_4	
10.0	352,028	26866	3.05
12.0	377923	35955	3.80
14.0	399620	5368	5,37
16.0	411414	9586	9,31
18.0	415952	13,216	12,71
20.0	415979	21,635	20,80
22.0	407816	29887	29,3
24.0	388389	53716	55.2
26.0	364198	70121	76,5
28.0	376880	142974	151,5
29,58	400242	181940	181,4

Exp 14 B

START-UP CHECK LIST
Equipment Checked by JKF Personnel Check by JKF
Instrument and [illegible] JH
"Source In" Checked by JH Source No. 4
Emergency Equipment [illegible] Checked by JH
Red Light On by JH 9046 A.M.
Start-Up OK'd by JH Time 9046 Date 2-20 1962

20 in. dia cylinder with ¼ glass packing rings; same (KG-33)
as experiment 13 S.
Ring bed height = 35.55 cm.
Cylinder Reflected with water.
Cnt. ht. 40.84. Water ht. 134.21 cm from floor

40.84
35.55
5.29

Pos.	G	C4	
29.58	512533	315427	31.5
28.00	523148	261599	25.9
26.00	543532	150923	14.25
24.00	553 066	114,564	10.91
22.00	551 654	65,401	6.12
20.00	559 103	50 186	4.60
18.00	560 477	30,070	2.7
16.00	558 485	23,042	2.11
14.00	552 805	14,2 15	1.32
12.00	558,790	9887	9.07
10.00	563 123	7510	6.84
9.00	562955	6314	5.75
11.00	566 784	9618	8.70
13.00	567 305	11,911	10.76

Pos.	C_1	C_4	
15.00	553921	17925	16,58
17,00	565444	23143	21,0
19.00	558,600	37345	34,25
21,00	558033	49780	45,7
23,00	565673	83154	75,4
25.00	563676	116043	105,5
27,00	565775	216473	194,
29,00	538309	309410	294,5

L 282
ID
JKT

Expt 15

Repeat of expt 14 with an H/x ≃ 90

K-1, K-2
PM-1, PM-2
in trap

START-UP CHECK LIST
Equipment Checked by JKT Personnel Check by LJ
Instrument and Safety Circuits Tested and Reset by LJ
"Source In" Checked by _____ Source No M-43
Emergency Equipment in Control Room Checked by JKT
Red Light On by LJ AM
Start-Up OK'd by JKT Time _____ PM Date 7-25 1962

See p. 278

instead of 54. Filled glass bed to ~36" and drained all back for mixing. Repeated 2nd time.
crit ht. 41.48

41.48
35.55
3.93

	Position of C_4	C_1 (known)	C_4	
N min to zero	28.06	1480325	219,811	2198
	26.00	471723	94818	966
	24.00	504244	63904	609
	22	503582	32317	308
	20	536212	23298	209
	18	540069	12198	108
	16	533523	7618	68.6
	14	508081	4278	40.5
	12	474344	2663	27
	10	548802	2225	19.5
	9	558360	1973	14.5
	11	634828	3470	24.2
	13	708447	4472	31
	15	687493	7509	52.8
	17	649636	10145	75

Position of c_4	c_1 (known)	c_4	
19	616247	19445	15
21	555400	25107	217
23	568432	50634	424
25	589156	87606	714
27	558149	176539	1382

L 284
ID
JKT

Expt 15B 7-25-62 PM

Repeat of Expt 15A except reflected

Clea
out
Exp

Fuel Cut. ht $\frac{41.12}{35.55}$ $\frac{\text{or}}{5.57}$ water at ~ 135 (side scale)

Position	C_4	C_1 (Norm)	C_4	
28		67249	38406	
26		68528	18386	179
24		70591	12853	125
22		72730	6647	64
20		76260	4385	42
18		75753	2402	23
16		72584	1933	18
14		74856	1220	11
12		71008	798	7
10		73005	685	6
9		78350	627	5
11		75392	823	7
13		79131	1004	8
15		80201	1535	12
17		81586	2106	17
19		84898	3697	29
21		80646	4842	40
23		80164	8907	74
25		81595	14645	120
27		84013	33674	269

clean cut Expts.

Expt 16 A 10" dia cyl. 285 (al) ann. type

START-UP CHECK LIST
Equipment Checked by JKT Personnel Check by JKT
Instrument and Safety Equipment Checked by ✓
Source In Source No. M-43
Emergency Power Valves Checked by K
Red Light On
Start-Up Ok'd by JKT Time AM PM Date 7-27-62

Clean Cut Expt for $UO_2(NO_3)_2$ at H/X = 90 fully enriched.

Nelson ~~Broad~~ on fuel (.10 low
slightly super at 16.86
" cut. 16.83(-)
just cut 16.83 + .10 = 16.93 ~~94~~

Expt 16B
Repeat to check on mixing

slightly super 16.93
just cut. 16.92

Con. cut ht = 43.4 cm

L 286
I D
JKT

Expt 17 A

12" dia. al cyl ann type

START-UP CHECK LIST

Equipment Checked by ✓ Panel Checked by JKT

Instrument and Safety Equipment by JKT

"Source In" Switch by M-43

Emergency Equipment Control Panel ✓

Red Light On by JKT At

Start-Up OK'd by JKT Time PM Date 7-30-62

slightly super at 9.79

(later) " " sub at 9.79 ???

gen rechecked, ok

Expt 17 B

Repeat to check on crit. ht.

after increasing sensitivity of manometer.

supercrit at 9.80

" " 9.78

crit at 9.78

Corrected C.H.T. = 25.2 cm

L.J.
I.D.C.
J.K.T.

Expt 18A

15" dia. Al. Cyl. Ann. type

START-UP CHECK LIST

Equipment Checked by ✓	By L.J
Instrument and Safeties Checked by	L.J
"Source In" Checked by ✓	M-43 ✓
Emergency Equipment in Control Room	
Red Light On by L.J	
Start-Up OK'd by J.K.T. Time	P.S.T. Date 7-30 1962

Slightly super crit at ~~7.47~~ 7.455
Crit at 7.45

Expt 18B

Repeat for accuracy test after re-zeroing Selsyn.

Super crit at 7.47.
slightly super. crit at 7.46
Crit at 7.44 ± .03

↓

see p. 288

LJK
(D288
JK7

Expt 18, C

7-30-62

L
ID
J.K.

Repeat after re-checking zero and adjusting manometer.

2l. Supercrit at 7.465

Crit. at 7.45

corrected C. Ht. = 19.3 cm

LG
IDE
JKT.

Expt. 19A

≈ 9½" dia al. cyl (contraction type with side feed in spout)

START-UP CHECK LIST

Equipment Checked by JKT Personnel Check by JET

Instrument and Safeties Checked and [illegible] LGM-43

Source In" Checked by [illegible] ...ce No.

Emergency Equipment in Control Room [illegible]ssed by

Red Light On by LG

Start Up OK'd by JKT Time AM PM Date 7-31-1962

Selsyn zeroed, reactor = 21" above floor. Odd distortion in reactor has been partially corrected

at ≈ 24.3 approx. at cut. drained to ≈ 21.6" because of air in feed hose. Hose then freed of trapped air.

Just cut at 24.25

Per period	24.67	T = 56.6
cut	24.29 ✓	

Better cut ht. = 24.30 after period

ΔP = 13.4 ℓ

cor. cut ht = 62.2 cm

Checked dia. with calipers outside

Near ~~LT~~ Weld	O. Dia.	=	9.62 Av.
Clockwise 45°	"	=	9.75 20" up
" "	"	=	9.71 6" up
" 90°	"	=	9.65 Av.
Av.	9.67 − .12 ;	I.D =	9.55", r = 12.13 cm.

8-2-62 Reg # 593174

G = 128.1 Grams/gram = .203400

T 20.0

N 108.1 Sp. gr. = 1.3727

9/

9/

I C
R R
E J

I H
K-1
PM

Publ
d
de

9/

Expt. 20 A
~ 9½ in. Dia Cylinders (side fed)
(al)

9/4/62 Diluted $UO_2(NO_3)_2$ of H/x ≈ 91.7 to give about 60 liters of H/x ≈ 125. Installed 9½" dia cylinder-Ind reflector.

9/5/62 Drained all solution to small bottom tank. Density 1.307

ICC
RKR
EJ

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

START-UP CHECK LIST

Equipment Checked by RKR - Check by ICC
Instrument RKR
Source RKR No. M-43
Emergency and Cutoff Checked by
Red Light On by RKR
Start Up OK'd by [illegible] Time 1500 PM Date 9/5 1962

Preliminary data - don't use

Zero set @ 0.005
Bottom of reactor 30" from floor
Sugar 25.54
"Level" slight + 25.36
~~Sub~~ Level 25.30
Sub 25.22

9/6/62 During above expt, there was trouble adjusting flow rate thru flowmeter, due to glass and other junk in solution. Removed float from f.m. and cleaned it and "strainer" still glass and junk in soln.

292

Expt. 20B

IDC
RKR
EJ

START-UP CHECK LIST
Equipment Checked by RKR Personnel Check by IDC
Instrument and Safeties Checked and Reset by RKR
"Source In" Checked by RKR Source No. M-43
Emergency Equipment in Control Room Checked by IDC
Red Light On by EJ
Start-Up OK'd by EJ Time 10:15 AM PM Date 9/6 1962

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

9/6/62

Feed rate: 1½"/min
+ Period (semi-crit) 25.72
Slight + 25.38 $\Delta k = 0.355$ in
Slight − 25.035 T = 76.54 sec
∴ Critical 25.365 $\rho_K = 7.73 \times 10^{-4}$ $\Delta k/in = \frac{2.70 \times 10^{-4}}{0.355} = 2.18 \times 10^{-3}$
Drain thru ½" feed line for ½ min:
25.365 to 18.94 = 6.42"/½ min = 12.84 in/min
Big dump for 15 sec ~~7.48"/15 sec~~ Slight lag on bubbler
Repeat:
Critical: 25.365 − 25.36
Dump complete in 10 sec ∴ thru dump valve rate = 15" in/min (thru 1¼" tubing)

9/6/62

Reg 593184 (#20-B)
G − 95.8 $\Sigma\gamma/g$ − 0.171500
T − 20.0
N − 75.6 $\Sigma\beta$-Eff − 1.3345

Expt. 21

10" (:) dia Cylinder (Al)

9/7/62
IDL
RKR
EJ

START-UP CHECK LIST
Equipment Checked by RKR — Check by IDL
Instrument and Safeties Checked by RKR
Source In Checked by IDL — No. 4-43
Emergency Equipment ... Checked by IDL
Red Light On by RKR
Start-Up OK'd by EJ Time 1540 Date 9/7 1962

In trip
K-1, K-2,
PM-1, PM-2

Zero 0.03
Bottom of cylinder 26" from floor
Feed rate 1.64"/min
Critical. Cylinder in trouble. Height undetermined.
Cleaned transmitter tube, adjusted cylinder.

1300

Repeat:
+ Period 17.18 $\Delta h = 0.07$ in
Critical 17.11 (Final) = 17.08
Drain thru 2" line 15 min 14.09 - 0.02"/15 min
= 12.08"/min

$T = 126.07$ min ; $\rho_K = 5.23 \times 10^{-4}$

$\Delta K/\text{in} = \frac{5.23 \times 10^{-4}}{0.07} = 7.47 \times 10^{-3}$

294

Expt. 2v

9/10/62v

12" dia Al Cylinder (Cannular type)

ICC
RKR
EJ

STARTUP CHECK LIST
Equipment Checked by RKR
Instrument and Safeties Checked and Tested by RKR
"Source In" Checked by RKR
Emergency Equipment in Control Room Checked by ICC
Red Light On by RKR
Start Up C&'s by EJ Time 1015 Date 9/10 1962v

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

Bottom of cylinder 26" from floor.
Zero 999.95
Feed rate: ~ 1"/min.

+ Period 9.7v
Critical 9.68 9.69

1545

Repeat:
Critical 9.69

Expt 23

15" dia AS cylinder (annular type)

START-UP CHECK LIST
Equipment Checked by RKR Personnel Check by RKR
Instrument and Safeties Checked and Reset by RKR
"Source In" Checked by LDC, RKR Interlock No M-23
Emergency Equipment in Control Room Checked by LDC
Red Light On by RKR AM
Start-Up OK'd by [illegible] Time PM Date 9/11/62 195

LDC
ED
RKR/p.

In Trip
K-1 K-2
BN-102

Bottom of cylinder 26" from floor.
Zero = 00.00"
Feed rate = 1.3"/min = 0.65"/min

+ Period 7.45
Level 7.455
Drain to repeat:
Slight + 7.45
FW = 100 sec period (Log N), selsyn read 7.43:
Level 7.44
Drained slightly, came back level @ 7.44.
Because of selsyn, unable to get Δh for period.

296

Expt. 24

9/14/62

38" Al cylinder - Annular Type

IDC
RKR
EJ

START UP CHECK LIST

Equipment Checked by RKR Personnel checked by RKR EJ

Instrument and Safety Devices Checked by RKR on 14-45

Emergency Equipment Checked by

Red Light On by EJ

Start Up OK'd EJ, RKR 1305 9/14 1962

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

Zero = 0.00

Bottom of tank 26" from floor

Feed rate: 0.16"/min

Used all salin; selyn @ 2.73, tank empty essentially, to multiplication. K-2 dial 30 → 37

Drain into small storage tank for calib. check.

SECRET

SECRET

SECRET

180

SECRET