BOOK81R

Notes:
"Solutions #1" on front
"NB-2829" on front

Blank pages: page opposite page 1, 1, 46, 122, 132, 222, 224, 238, 296-298, inside back cover sheet

-inside front cover has 3 (8.5x11) sheets, once taped now clipped
-inside front cover sheet has paper clip and piece of paper taped to it
-page 2 has 1 graph sheet and 1 green sheet stapled to it
-pages 7, 11, 27, 56, 61, 67, 81, 126, 128, 129, 131, 132, 175, 180, 197, 212, 220, 253, 289 have 1 graph sheet attached to each
-pages 12, 22, 26 each have 2 graph sheets attached
-page 29 has 4 graph sheets stapled
-the following pages have small sheets attached: 3(8), 13(1), 14(3), 18(1), 31(2), 34(1), 39(4), 41(3), 42(2), 43(4), 44(4), 45(3), 52(1), 59(1), 94(2), 98(2), 121(1), 134(5), 139(2), 146(1), 158(2), 181 (1), 183(1), 195(1), 204(2), 232(1)
-pages 111, 113, 115, 117, 119, 121 each have 1 drawing attached to it
-page 260 has 3 sheets taped to it

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
August 30, 1999

SECRET

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Soln Book # 1

Page	Container	Reflector
1-42		
47-52	9" ss	Bare, Reflected, Concrete Blocks
53	6" ss	Reflected
54-60	10 OD Annuli	Bare and Reflected
61	12 ss [contains 1.35" slugs]	
63-67	15" ss ["]	
68-70	20" ss ["]	
71-83	1.35" slugs in Hell	
84-85	10" OD Annuli	
85	Excursion	
85-94	Excursion Experiments [see 141-152]	
95-98	10" Annuli	
99-100	+ and Y Calibrations	
101-108	15" OD Annuli	
109-121	Ball Mill Experiments	
123-140	5" Y and X	
141-152	Excursion Experiments	
153-158	Furfural and Water Comparisons	
159-162	8 and 10" Annuli and no top reflected Cyl.	
163	Calibration of 7.5" cross	
164-165	15" Annuli	
166-169	20" Annuli	

Solu Book #1 (cont.)

Page	
170	20" Al cyl Bare
171-174	20"x20" Al Bare and Ref.
175-178	30" Al Cyl Bare and Ref.
179-180	7.5" cross
182-183	30" Al cyl Ref.
184	20" Al. Cyl Bare
185-~~194~~ 197	20" Al. Cyl. ref. with firebrick and Carbon
197-198	20x20 Al. Bare and Ref.
199-200	10" Al cyl Bare and Ref.
201-202	15" " " " " "
203	6" Al Reflected
205-209	7.5", 5", 4" Al cross
210-211	30" Al. Cyl Bare and Reflected
211-212	30 " " with Al. added to bottom
213	15" and 20" Al Cyl. Bare
214	6" ss Reflected
215-216	20x20 Bare and Ref.
217	10" Al. Cyl. Bare
218	12" Al Cyl Bare
219	6½ Al. Cyl Ref.
220	Repeat of Exp. #8
221	8.76" Al. cyl Bare

Soln Book #1 (cont)

223	8.5" ss Cyl Bare
225	6" Al Cyl Ref
226 - ~~229~~ 231	10" Al. Cyl Bare and Ref.
232	8" Al Cyl Ref
234-235	5.5" ~~Dia~~ Al Cyl Ref.
237-240	8.76" Al Cyl Bare [Period measurement.]
241-243	9.5" " " " " "
244-248	10" Cyl Bare [Period Measurement]
249-262	Plastic Slab
263-267	8" Al Cyl Partially Reflected
268	8.76" Al Cyl Bare
269	9.5 Al Cyl Bare {Period Measurement}
270-276	10" Al Cyl Bare and Ref. [" "]
277-285	12" " " Bare [" "]
286	30" " " " " "
287	30" " " " and Ref with H_2O plexiglass
289	30" " " Additional Al. on bottom
290	30" " " Period Meas. and Excursion [Feb 1, 56]
293-295	Experiments after Excursion

10-9-20

SECRET

SECURITY INFORMATION

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
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OAK RIDGE, TENNESSEE

INVENTORIED FEB 27 1975

Calvin Hopper
E. B. Johnson

NOTEBOOK NO. 2829

5/29/85 nd

Assigned to: A. D. Callahan

Department: Physics

Location: 9735

Date: 1-26-53

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.

"This document consists of 300 pages. No. 1 of 1 copies, Series A"

Be sure to record all personal conferences.

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

8/24/88 nl

Classification changed to: Unclassified (level and category)

Subject

By authority of CG-DAR-1 (classification guide)

C Harrington 6/23/94
ADC or ADD signature (first reviewer) Date

[illegible] 6/24/94
ADD signature (final reviewer) Date

This document consists of 396 pages. No. 1 of 1 copies, Series A

5-25-60

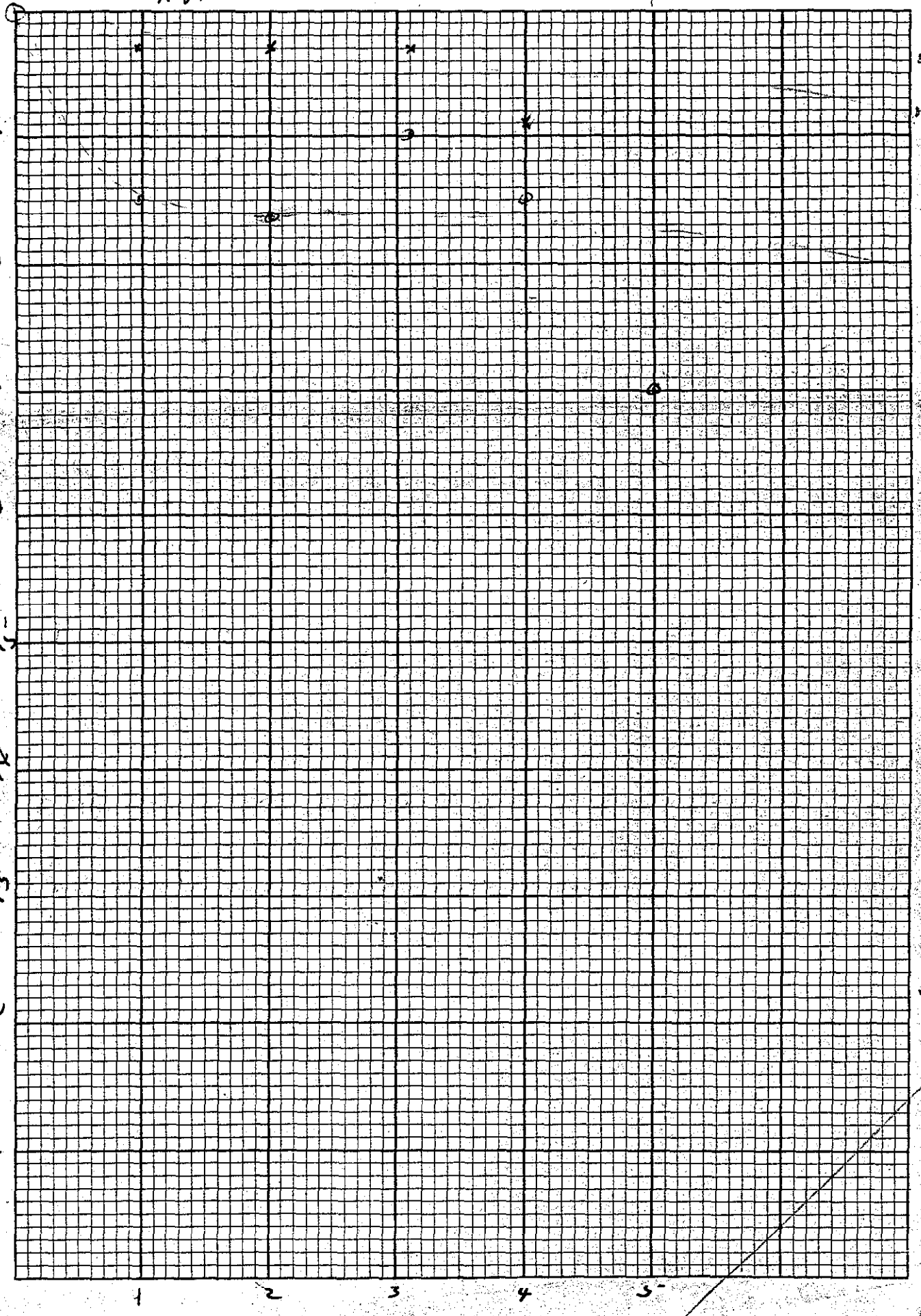
11/15/84 nl
11-15-90 BFC
8-5-91 BFC

This document [illegible] or the disclosure of [illegible] in any manner to an unauthorized person is prohibited.

SECURITY INFORMATION

Exp. w; R44434

Reflected 12 plates



EUGENE DIETZGEN CO.
MADE IN U. S. A.
NO. 340 -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

12 - 1/4" boral plates

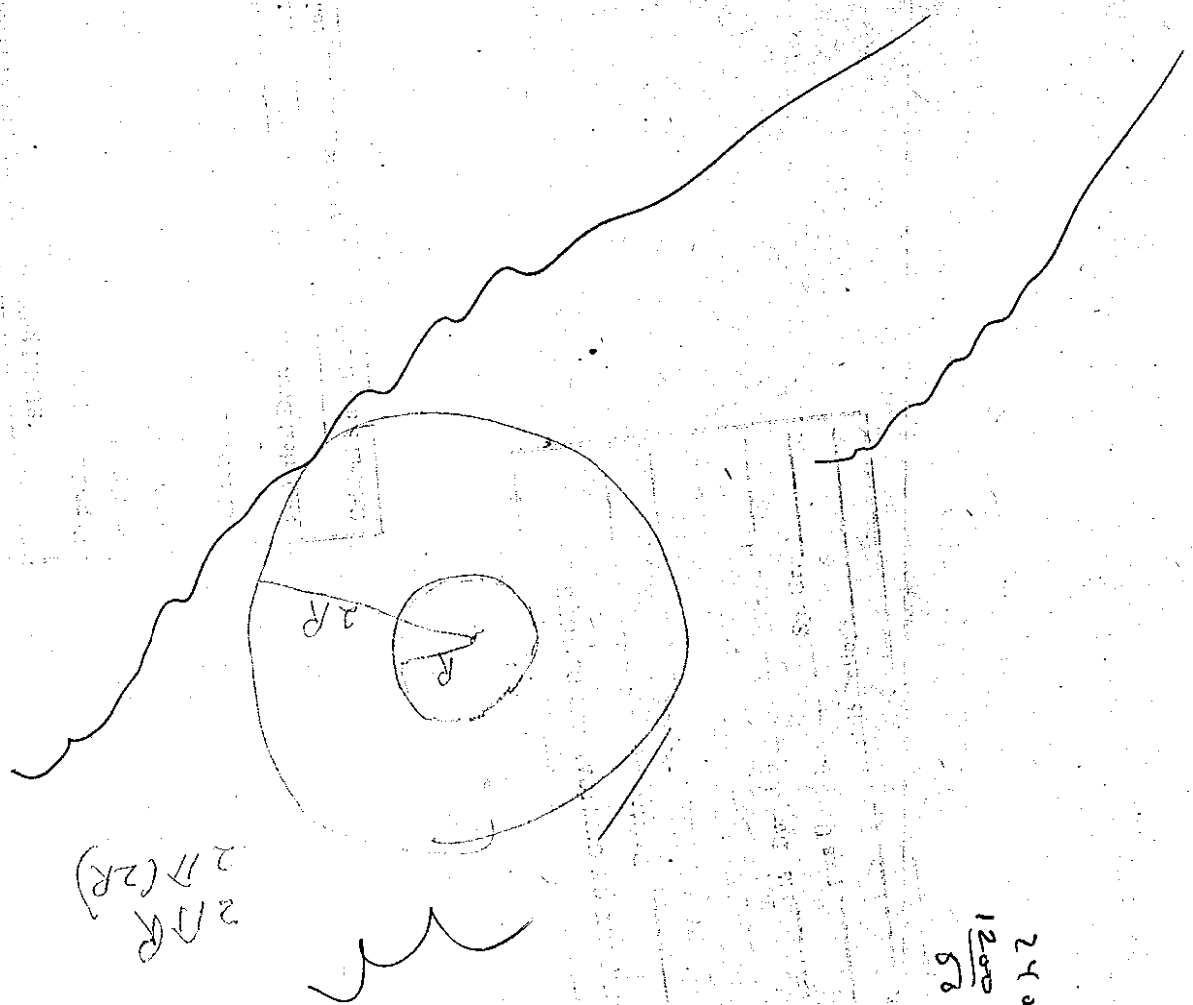
not critical using all fuel

Fuel ht.	M_4^{-1}	M_5^{-1}
.96"	.85	.97
2.00"	.834	.97
3.10	.80	.97
4.00	.85	.91
5.00	.70	—

gm4/gm = 0.254

spg = 1.414

1/2 Reflected



$2\pi R$
$2\pi(2R)$

$\frac{240}{1200}$
$\frac{60}{3}$

$\frac{60}{60}$

3 9 C
10.2
29.4
50.1
79.5

REPORT OF ANALYSIS LAB. NO. G4323.

Bldg 9213 DATE REC'D 10-1-53

Gilley ASSIGNED TO: 8

IDENTIFICATION	B, percent	Rel Std Error
A_1	18.8	2

95

STANDARD ERROR AT ~~99.5~~ PERCENT CONFIDENCE LEVEL

REPORTED BY L. Y. Brady NO DATE 11-27-53

REPORT OF ANALYSIS LAB. NO. G4323

DATE REC'D 10-1-53

Gilley ASSIGNED TO: 8

IDENTIFICATION	B percent	Rel Std Error
A_1	18.8	2
	68.795	7m

95

STANDARD ERROR AT ~~99.5~~ PERCENT CONFIDENCE LEVEL

REPORTED BY L. Y. Brady NO DATE 11-27-53

REPORT OF ANALYSIS LAB. NO. G4324.

DATE REC'D 10-1-53

Gilley ASSIGNED TO: 8

IDENTIFICATION	B percent	Rel Std Error
A_2	17.7	2

95

STANDARD ERROR AT ~~99.5~~ PERCENT CONFIDENCE LEVEL

REPORTED BY L. Y. Brady NO DATE 11-27-53

REPORT OF ANALYSIS LAB. NO. G4324.

DATE REC'D 10-1-53

Gilley ASSIGNED TO: 8

IDENTIFICATION	B, percent	Rel Std Error
A_2	17.7	2
	65.057	

95

STANDARD ERROR AT ~~99.5~~ PERCENT CONFIDENCE LEVEL

REPORTED BY L. Y. Brady NO DATE 11-27-53

REPORT OF ANALYSIS

LAB. NO. G 4325

DATE REC'D 10-1-53

ASSIGNED TO: 8

Gilley

IDENTIFICATION	B percent	Rel Std Error
B1	19.4	2

STANDARD ERROR AT 95 PERCENT CONFIDENCE LEVEL

REPORTED BY I. J. Brady IIA DATE 11-27-53

REPORT OF ANALYSIS

LAB. NO. G 4325

DATE REC'D 10-1-53

ASSIGNED TO: 8

Gilley

IDENTIFICATION	B, percent	Rel Std Error
B1	19.4	2
	39.966	

STANDARD ERROR AT 95 PERCENT CONFIDENCE LEVEL

REPORTED BY I. J. Brady IIA DATE 11-27-53

REPORT OF ANALYSIS

LAB. NO. G 4326

DATE REC'D 10-1-53

ASSIGNED TO: 8

Gilley

IDENTIFICATION	B percent	Rel Std Error
B2	21.3	2

STANDARD ERROR AT 95 PERCENT CONFIDENCE LEVEL

REPORTED BY I. J. Brady IIA DATE 11-27-53

REPORT OF ANALYSIS

LAB. NO. G 4326

DATE REC'D 10-1-53

ASSIGNED TO: 8

Gilley

IDENTIFICATION	B, percent	Rel Std Error
B2	21.3	2
	40.475	

STANDARD ERROR AT 95 PERCENT CONFIDENCE LEVEL

REPORTED BY I. J. Brady IIA DATE

00 Slab heights estimated from Zimmerman's curves (bare)

Hx	HT-in	HT-cm.
25	5.6	14.2
50.	5.2	13.3
200	5.35	13.6
300	5.7	14.5
400	6.1	15.5
600	7.1	18
800	8.1	20.5

Boral Samples

	A_1	A_2	B_1	B_2
Area	2.036" x 3.015" = 6.139 in.² = 39.61 cm²	2.040" x 3.020" = 6.161 in.² = 39.75 cm²	2.00" x 1.981" = 3.970 in.² = 25.61 cm²	2.011" x 2.020" = 4.082 in.² = 26.34 cm²
% B	18.8	17.7	19.4	21.3
wt.	68.795	65.057	39.966	40.475
gm/cm²	.32643	.28981	.30261	.3289 ~~.32725~~

10/21+22/53

Solution storage System charged with 93.2% UO_2F_2 As shown below

Con't.	~Net.*	UO_2F_2	Wt. U	H_2O	$\frac{gm\ H_2O}{gm\ U^{235}}$	U/X
A-1	11842		5287			
A-2	11263		5106			
A-3	11310		5228			
A-5	11217		5128			
A-6	11729		5237			
A-7	11604		5342			
A-8	9806		4525			
A-10	11534		5326			
A-11	1347		413			
T-8	12242		1399			
T-10	11110		997			
T-13	12561		1627			
F-3	11390		12487			
Total	138,959	61,099	47,071	77859	1.834	47.89
				+2600		
				80459		

* That is, approx. Nets put in system since each container was not thoroughly washed out at this time.

10/23/53

Approx. 10 Kg of U were added to storage system from containers # T-1 + T-20. ~~The U/X was unknown.~~

After this addition the U/X of the system was ~ 42

6

Fox
Cronin
Gilley

10/26/53

10/27/
Fox

Exp #1 H/X < 50

Run #1 (Mixing Run) Bare

	Fuel ht.	Source	Safety	C_4	C_5
3 25 PM	2.53	~~out~~ in	up	98.25 x256	87.75 x256
				90.75	87.5

Not critical with most of fuel in slab (center section) (tanks not blown dry)

10/27/53
Cronin 9 00 AM
Gilley

Run #2 Bare

	3.06	in	up	243.25 x64	342.0 x64
				238	341.25

Not critical with all fuel available in center section of slab (tanks blown dry).

Run #3

	Fuel Ht	Source	Safety	C_4 x64	C_5 x64
9 40 AM	0.50"	IN	up	151+54	203+60
				150+24	203+47
9 50 AM	1.50"	"	"	171+9 } .88	243+30 } .83
	1.45-1.38 avg 1.42"	"	"	169+7	244+38
10 05	2.47-2.41 avg 2.44	"	"	194+34 } .77	295+46 } .69
				195+24	293+28
10 15	3.04-2.97 avg 3.01	"	"	218+12 } .69	330+10 } .61
				218	335 -

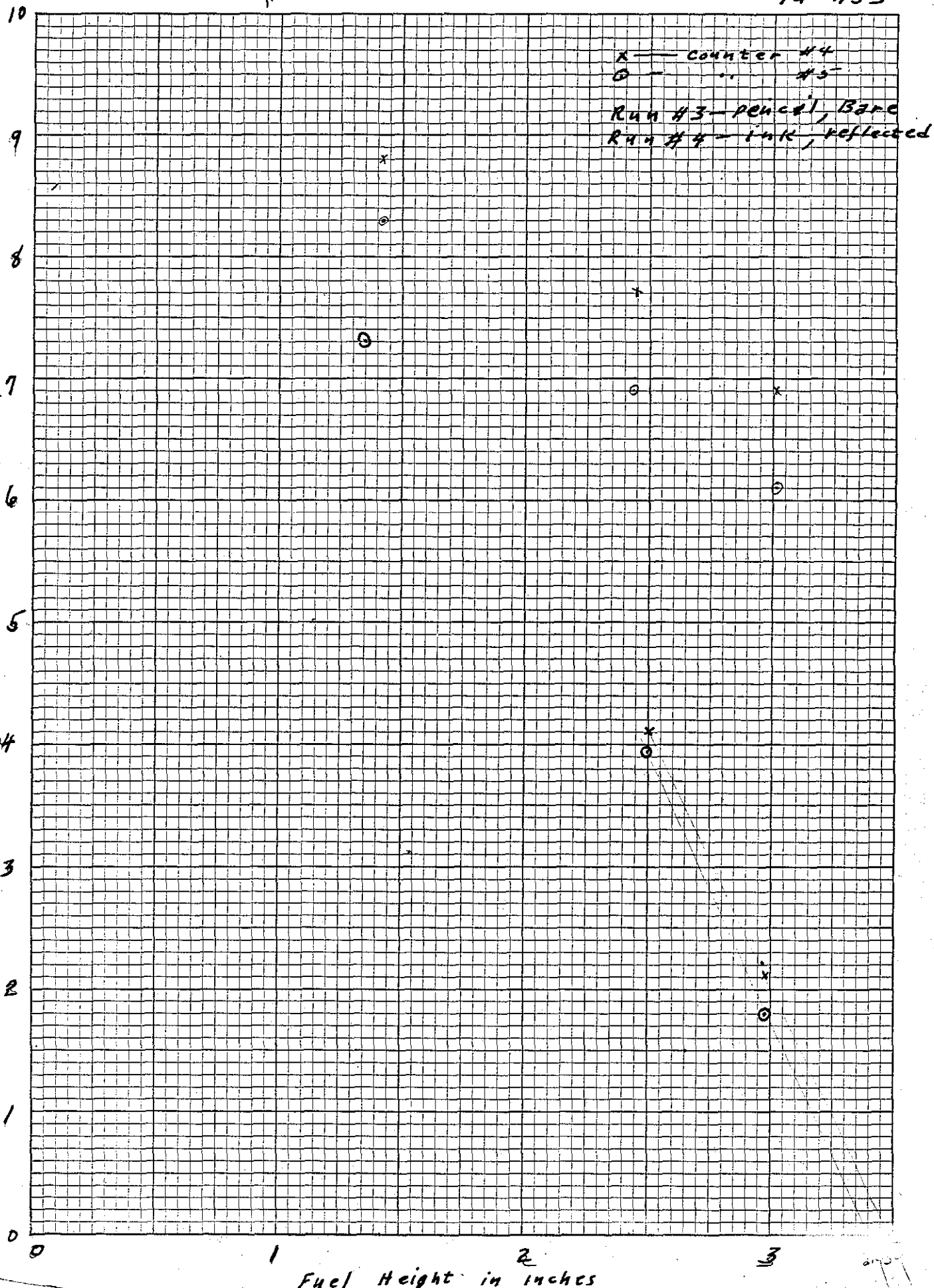
.."

358-5D KEUFFEL & ESSER CO.
10 X 10 to the inch, 7½ in. lines accented.
MADE IN U.S.A.

H/X ~ 42

Exp. #1, Runs #3 + 4

10/27/53



358-5D KEUFFEL & ESSER CO.
10 × 10 to the inch, ½ in. lines accented.
MADE IN U.S.A.

10/27/53

Run # 4 Partially Reflected

Fox	Fuel	Water	C_4		C_5	
	.48 - .54					
	avg 0.52	60cm	8+58		1+24	
	note ~~60~~ 63 cm water = zero on slab		8+44		1+27	
12 45	0.52	66 cm also end compartments	6+32		1+0	
	.46 - .49					
	avg .47		6+27		1+10	
1 10 PM	1.49 - 1.46					
	1.47	66cm	8+40	.73	1+22	
1 18 PM	2.52 - 2.49					
	2.50	66cm	16+45	.395	2 52	0.41
	2.99 - 2.96					
	2.975	66 cm	36+7	0.18	5+27	.21
1 32 P	"	70 cm	37+46		4+48	

Not critical with reflector water ~2.5 cm (1") above fuel ht.

Sample taken 2 30 pm 10/27/53

Req # 215331

Gross	53.3981	gm
Tare	20.8983	"
Net	32.4998	"

Sample Results: by phone .35190 gm H/gm

.35166 after correction

~~1 - .35190 = 10~~

.35190 x 1.2978 = ~~.45670~~ .45638 = gm HO_2F_2/gm

1 - .45670 = .54330 = gm H_2O/gm

.45638 .54362

$\frac{.5433}{.3519\ (.932)}$ 26.11 = H/X = ~~43.25~~ 43.31

.35166

10/28/53

Solution from container U-2 was placed in storage system. Also all but approx. 4 liters of container # U-5 was put in storage system.

Thomas

192

Thomas; Crouin; Gilloy

Exp #2

10/29/53 Run #1 Bare (Mixing Run)

	Fuel Ht.	Source	Safety	C_4	M_4^{-1}	C_5	M_5^{-1}
2^{32} PM	< 1.22"	in	up	174^{37}		202^{63}	
2^{42} PM	1.44	"	"	204^{1}	.85	235^{35}	.86
2^{50} PM	1.74	"	"	210^{23}	.82	249^{52}	.81
3^{01} PM	2.34	"	"	232.5	.75	282.76	.72
3^{11} PM	3.55	"	"	299.75	.58	391.75	.51
3^{50} PM	3.55	"	"	297^{57}		388^{23}	

Note: The last counts above were taken after Fuel had been drained back into storage system and reactor refilled. Agreement of last 2 counts indicates Fuel homogeneous.

10 Cronin
Fox
Gilley

10/30/53

Exp #2 cont.

Run #2 Partially Reflected

	fuel ht.	Source	Safety	C_4	M_4^{-1}	C_5	M_5^{-1}	Water ht cm
9^{10} AM	6.33 ~~0.36~~	in	up	27.25	×16 26	4.5	×16 4.25	69* cm
9^{15} AM	.33"	"	"	25.0		4.0		"
9^{36} AM	1.48"	"	"	35.0	.742	5.75	0.74	69 cm
9^{44} AM	2.19"	"	"	54.75	.475	6.5	0.655	"
9^{52} AM	2.78"	"	"	111.5	.233	13.25	.32	"
10^{01} AM	3.12"	"	"	262	.099	27.5	.154	"
10^{35} AM	3.37"	"	"	736	.035	77	.055	"
11^{28} AM	3.56"	"	"	1001	×256 .0016 ~~0.325×10⁻³~~	302	×64 .0017 ~~0.35×10⁻³~~	73.5 cm
Run #3								
1^{30} PM	2.36	"	"	82 5	.318	7 8	.60	89
1^{50} PM	3.12	"	"	359	.072	24	.176	"
	3.31			806	.032	54	.088	
2^{10} PM	3.47			2848 ~~1424~~	.009	192 ~~96~~	.023	

System slightly subcritical with all available fuel in reactor. Extrapolates to criticallity at 3.55".

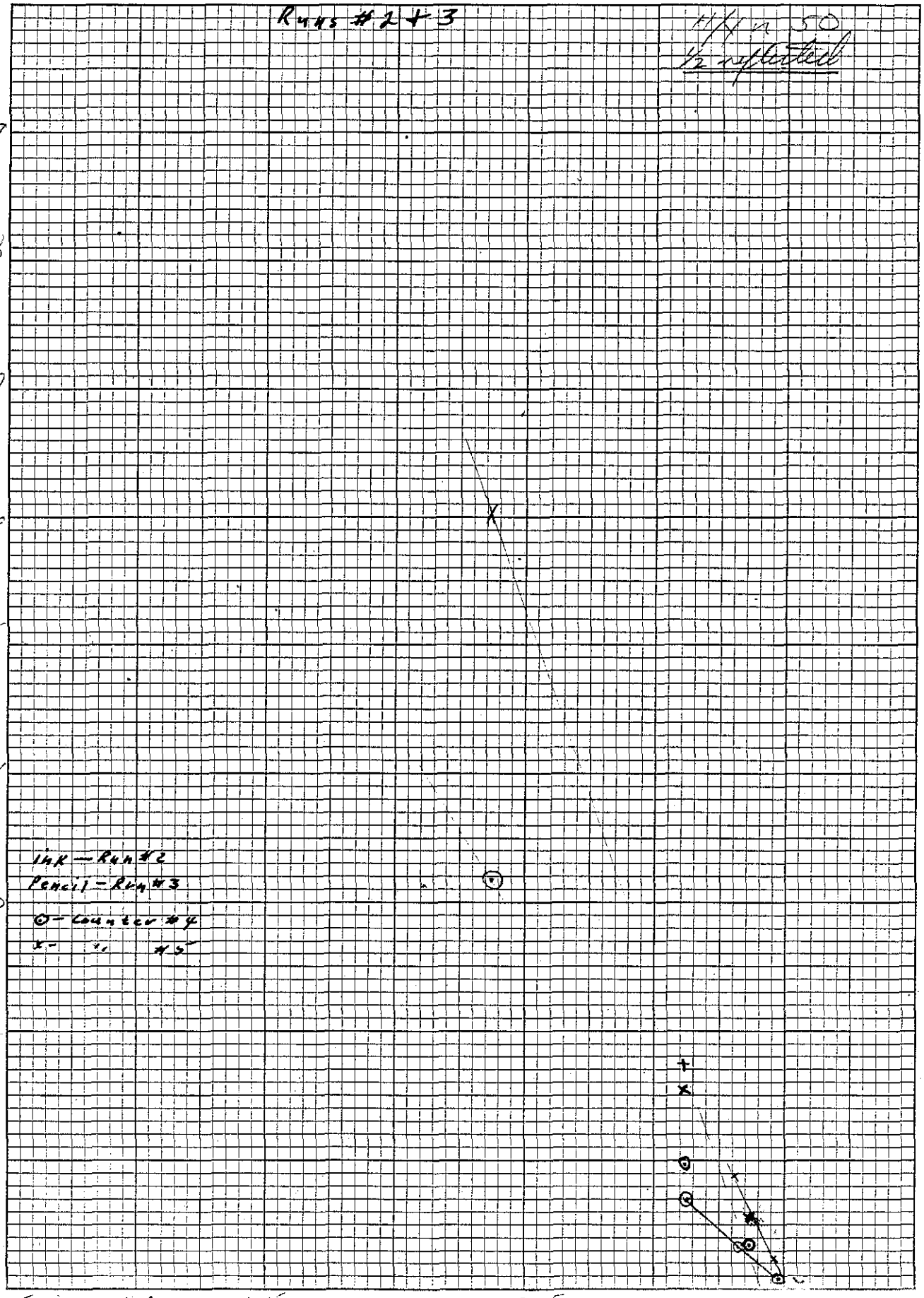
Note: Run #3 is essentially a repeat of Run #2 except ~~for~~ in #2 only 7 cm of reflector water was in side compartments when water ht. read 73.5 cm.

Sample taken: Gross: 57.6679 gm.
Req. # 215332 Tare: 26.4399
Sample bottle # P-15 Net 30.9280

*69 cm from bottom of reflector tank. ~~60 cm~~ 63 cm. corresponds to 0 fuel ht.

10/30/53

Exp. #2



M-1

53

358-5D KEUFFEL & ESSER CO.
10 X 10 to the inch, ½ in. lines accented.
MADE IN U.S.A.

11/2/53

Remainder of Solution in H-5, about 4 liters, was added to system. Also the contents of container F-1 were added to system. H/x now approx ~ 58

Calculation of H/x for Exp. #2 (before containers H-5 and F-1 above were added).

Sample Results, by phone — 0.32190 gm H/gm

$0.32190 \times 1.2978 = 0.41776$ gm HO_2F_2/gm

$1 - 0.41776 = 0.58224$ gm H_2O/gm

$$\frac{.58224}{.32190 \times .932} \times 26.11 = H/x = 50.67$$

Exp # 3 H/x ~ 58

11/3/53

Cronin
Gilley

Run #1 (mixing) Bare

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
9:00 AM	0.5"	in	up	42.5 x256		42.25 x256	
9:05 AM	~~1.50"~~	"	"	48.25	.88	50	.85
9:15 AM	3.0"	"	"	59.5	.71	68.5	.62
9:22 AM	3.50"	"	"	69.0	.62	80.25	.525
9:33 AM	3.92"	"	"	85.	.50	99	.425

Run #2 Bare (Repeat of above)

9:50 AM	.48"	in	up	44.25		41.75	
10:19 AM	3.50"	"	"	71.5	.62	78.75	.53
10:28 AM	4.00"	"	"	88.5	.50	104.25	.40

Run #3 Reflected

				x16		x16		Water ht.
11:05	0.50"	"	"	38		3.25		~~78.5~~ 78.0 cm
11:10 AM	1.51"	"	"	43.5	.87	3.75	.87	"
11:16 AM	2.42"	"	"	79.0	.48	6.5	.50	"
11:27 AM	3.15"	"	"	398	.095	27.0	.12	
11:48	3.51"	"	"	597 x256	.004	153 x64		
12:00	3.55"	out	"	Slightly super				78.0 cm
12:05 PM	3.55"	"	"	Slightly super (some fuel was added)				74.9 cm

12:10 pm Delayed here because of valve difficulties on storage tank # 8

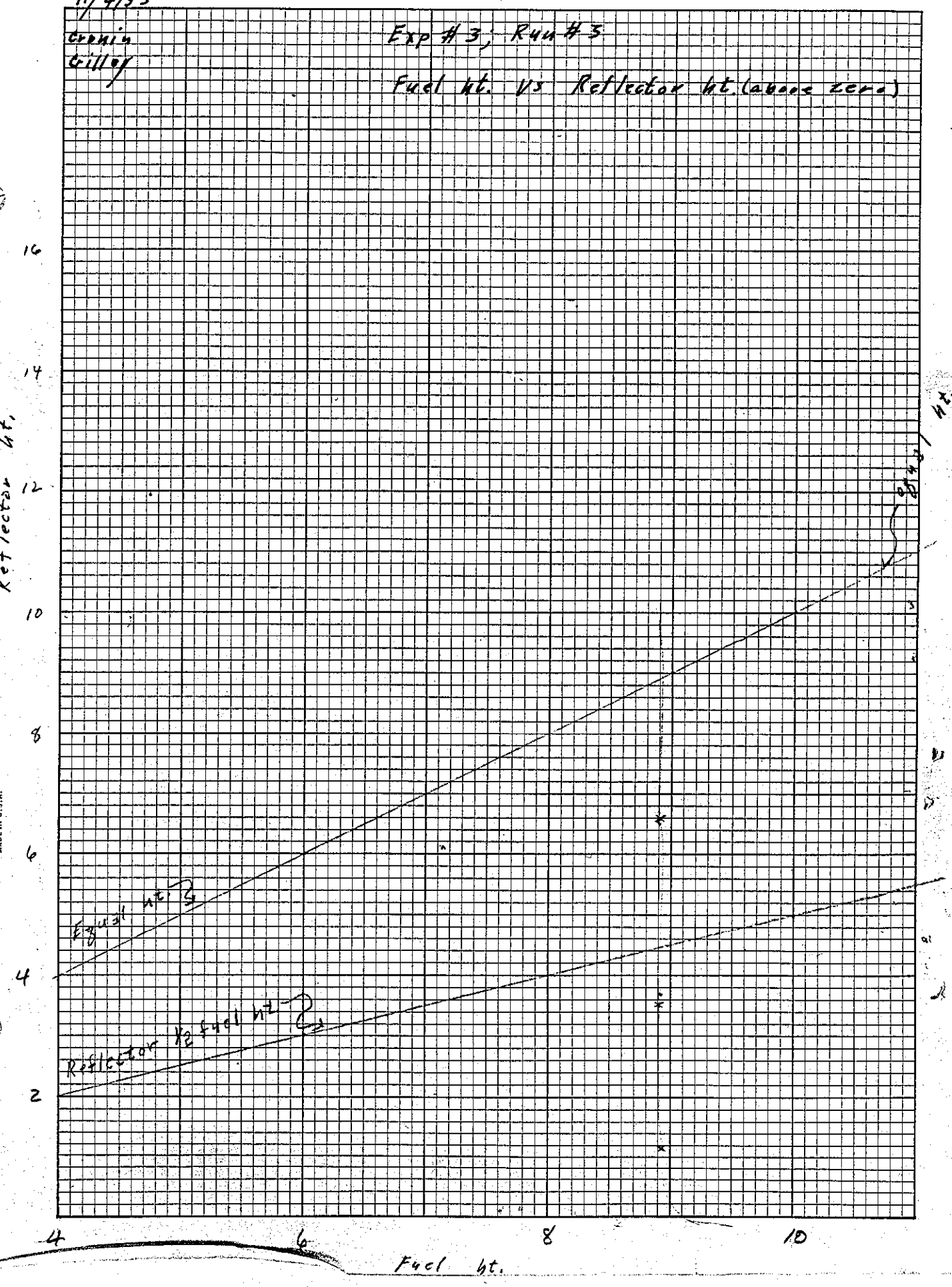
Note: Reflector Water in outside storage tank at ~ 12°C.

11/4/53

Cronin
Gilley

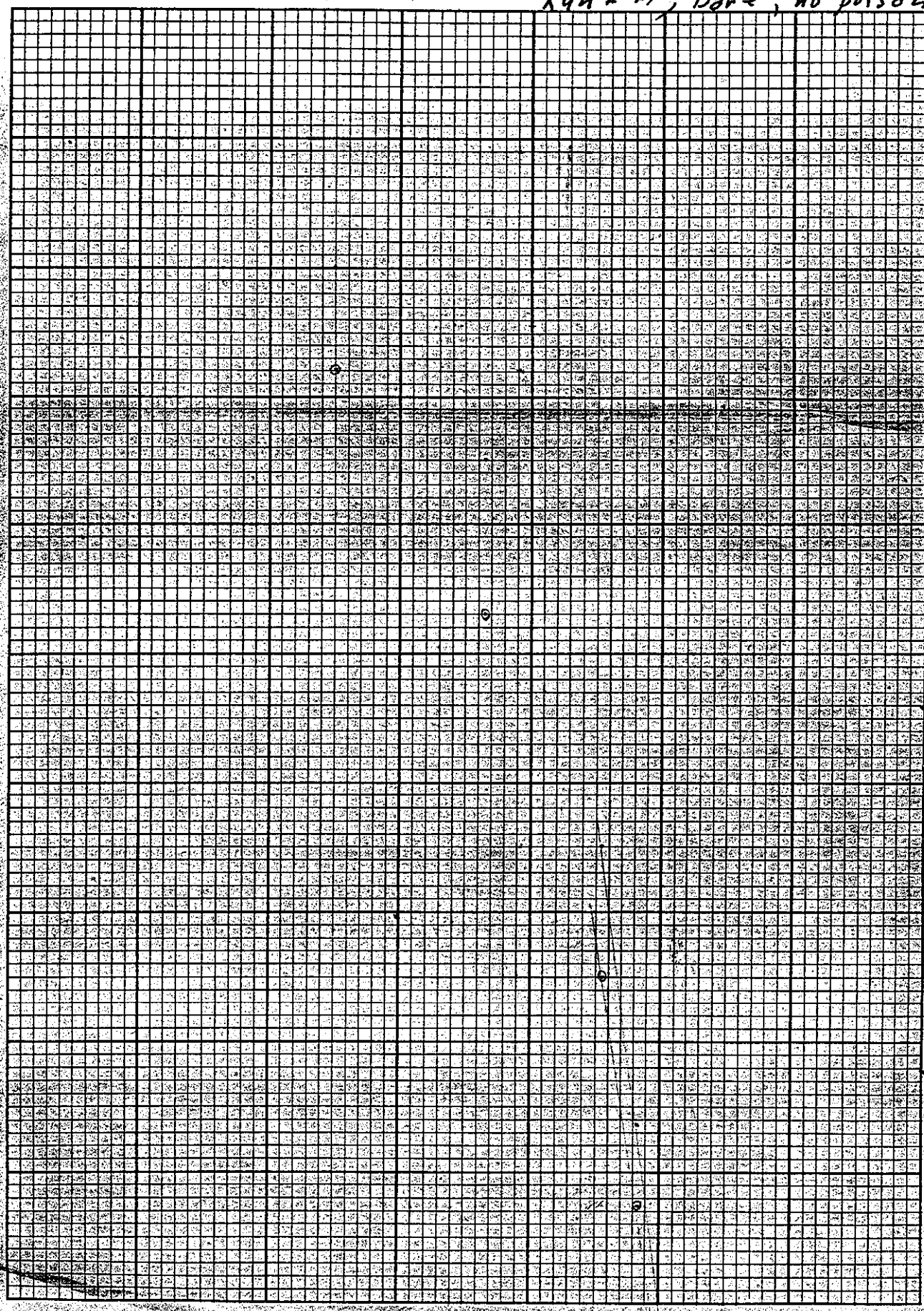
Exp #3, Run #3

Fuel ht. vs Reflector ht. (above zero)



358-5D KEUFFEL & ESSER CO.
10 X 10 to the inch, ½ in. lines accented.
MADE IN U.S.A.

Run #41; Bare, no poison



	№ 215333
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: Gilley, L. W.

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Relatively pure UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.30028
Sp G	1.518

SIGNED:

BY: DATE

11/4/53

Exp. # 3 cont.

Run # 3 con't.

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}	water ht.
	Reflector	Water	left in	Reactor	Room	oven	night	
10^{30} AM	2.9	in	up	179		18		69.6 cm
	3.50	out	"	just critical				69.6 "
	3.50	"	"	just critical				66.5 cm
1^{30} AM	3.51	"	"	"		"		~~63.7~~ 44.1

Sample taken:

sample bottle # P-268

" Req. # 215333

Gross 56.3680

Tare 27.2074

Net 29.1606

Results by Phone — 0.30028 gm U/gm

$0.30028 \times 1.2978 = 0.38970$ gm UO_2F_2/gm

$1.0 - 0.38970 = 0.61030$ gm H_2O/gm

$$\frac{0.61030}{0.30028(.932)} \times 26.11 = H/X = 56.94$$

.02793 gm U_{235}/gm

.425 gm U_{235}/cm³

r ht.
7.0
.5 cm

78.0 cm
74.9 cm
lties

11/4/53 3:30 PM Solution taken from storage system by Fox (Put in Cont. # F-1)

Gross 11017.0
Tare 1908.8
Net 9108.2 gm

REQUEST for
SPECTROGRAPHIC [redacted]

By Dept 2252 Time [redacted]
Sampled by [redacted] Date [redacted]

Cont'r No.			Batch Numbers
Gross			Cominco UO_2F_2
Tare			
Net	51.115		
Analy. Ans		By / Date	

Spectrographic Analysis
Answers in P.P.M.

Ag	Al 3	As <20	Au <2	B <.1
Ba <4	Be <.02	Bi <1	Ca <10	Cd <.2
Co <1	Cr 22	Cs	Cu 3	Fe 350
Ga <1	Ge <.4	Hg	In <2	K
Li <.2	Mg 2	Mn 6	Mo <2	Na 15
Ni 45	P <100	Pb 5	Rb	Sb <4
Si 4	Sn <1	Sr <20	Ti	Tl <4
U	V <.5	Zn <10	C	RE

Pd - 21 Signed WB-Cp Date 10-20-53

BATCH NUMBER	REQUISITION NUMBER
	№ 215332

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Pure UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T ✓	.321900
Sp. G	1.588

SIGNED:

BY: DATE NOV -3 1953

BATCH NUMBER	REQUISITION NUMBER
	№ 215331

REPORT TO: Gilley, L. W.

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Comparatively pure UO_2F_2 Solution

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

ASSAY REQUESTED AT ☑ DT ☑ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T ✓	.351660
Sp. Gravity	1.665

SIGNED:

BY: DATE

Exp. # 4

11/5/53 Run #1 (Mixing) Bare

Cronin, Harness, Gilley

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
1[27] PM	.51"	in	up	41.5 x256		38.5 x256	
	1.37	"	"	46.75 x256	.89	44.75 x256	.86
2[00] PM	1.87	"	"	60.5	.82	60.0	.77
2[15] PM.	3.52	"	"	70.0	.59	75.0	.51
2[28] P.M.	3.89	"	"	83.75	.495	91.0	.425
2[38] PM	4.30	"	"	121	.34	134.5	.285
2[43] PM	4.59	"	"	215	.193	247	.156
2[55] PM	Drained back at this point for mixing purposes						
	Run #2 Bare						
Cronin Harness Gilley 3[21] PM	4.59	"	"	223	.186	250	.156
3[27]	4.83"	out	"	Slightly super			
	4.82"	"	"	"		sub	

11/6/53 Run #3 Bare

9[13] AM	.50"	in	up	34		33	
9[37] AM	4.59"	"	in	126.25 x256	.285	148.5 x256	.22
	Safety blade in fuel at last count						
	4.55	in	up	171.5		189.5	
11[22] AM	4.85"	out	"	Slightly sub		difference not measurable	
	4.85"	"	"	slightly super			

Experiment With Safety

11/6/53

	Fuel ht.	safety ht.	C_+		C_0'
9 42' AM	4.55"	4.55'	174.5	.206	201
No fuel added →	4.56	3.55'	173.0 x256	.208	194.75 x256
	4.57	2.55	163.0 256	.22	180.25 256
		~~5.45~~			
	4.55	4.97	174.25	.206	196.5
		10.22	172.0	.209	192.0
		10.22+ safety set up.	171.5	.21	189.5
	4.55'	3.94	176.5'	.204	197.5

11/11/53

5' x 2' x ¼" Stainless Steel container filled with B_4C and covered with "plaster of Paris". Container is divided into 4 sections, marked A, B, C, + D. The following amounts of B_4C were placed in each section with the given dimensions

	A	B	C	D
Amount B_4C	1817 gm	2120 gm	2137 gm	2092
To a ht. of	15 3/8"	7 5/4"	7 5/4"	15 3/8"
width of sec.	29/2"	23 5/16"	23 7/16	29/2"
giving gm B4C/cm²	1.022 1.016	1.193	1.193	1.169
gm B/cm²	.7998	.9336	.9336	.9149

Run #4

11/12/53 Bare {Probe rezeroed before this run}

Harness
Cronin
Gilley

	Fuel ht.	Safety ht.	C_4	M_4^{-1}	C_5	M_5^{-1}	Source
3^{30} PM	.48"	out	33.5		32.5		in
3^{32} PM	.48"	out	34.0		32.0		"
3^{50} PM	4.01	"	63.5	.53	76.0	.424	"
3^{52}	4.92	"	Very Slightly Sub.				out
3^{59} PM	4.93			"	Super		

Run #5

11/13/53 Bare

Thomas
Cronin
Gilley

9^{05} AM	4.93"	out	just crit.	out

Agreement of last two runs indicates solution homogeneous

Run #6

Reflected

11/13/53

Thomas
Cronin
Gilley

	Fuel ht.	Safety ht.	Source	Reflector ht.	C_4	M_4^{-1}	C_5	M_5^{-1}
9^{53} AM	0.44"	up	in	6 cm	$25.25^{\times 16}$		$6.0^{\times 16}$	
10^{05}	1.47"	"	"	"	33.0	.76	5.25	
10^{17} AM	2.14"	"	"	"	39.0	.65	6.5	.92
10^{25}	3.01"	"	"	"	121.5	.209	14.75	.406
10^{34} AM	3.43"	"	"	"	858	.055	48.75	[illegible]
10^{50}	3.65"	"	out	"	just critical			

11/13/53 Sample taken:

sample bottle # — P-219 Req. # 215337

Gross 53.5249

Tare 30.7234

Net 22.8015

[redacted]

calculation of H/X

$0.24352 \times 1.2978 = .316040$ gm dO_2Fe/gm

$1 - .316040 = 0.68396$ gm H_2O/gm

$\frac{.68396}{.24352 \times .932} \times 26.11 = H/X = 78.68$

Tho
Cro
Gill
11/1

11/
Thoma
Croni
Gille

BATCH NUMBER	REQUISITION NUMBER
	№ 215337

REPORT TO: Gilley, L. W.

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Pure UO_2F_2 Solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.24352
~~Sp. gravity~~	~~1.383~~ 1.389

SIGNED:

BY: Md

DATE NOV 16 1953

Run # 7

Thomas
Cronin
Gilley

Poisoin plate containing B_4C placed in center of center section*

Bare

11/13/53	fuel ht.	safety	Source	C_4	M_4^{-1}	C_5	M_5^{-1}
3^{42} P.M.	1.06"	up	in	36.75		36.25	
	4.23"	"	"	65.5	.56	95.5	.48
4^{10} P.M.	4.92"	"	in	172.	.214	220	.165
4^{23}	5.13"	"	out	Slightly Super			difference not measurable
4^{25}	5.13"	"	"	Slightly Sub			

Run # 8

Reflected

11/16/53 Poison Plate containing B_4C placed in center of center section*

Thomas Cronin Gilley								Reflector no.
9^{13} AM	1.00	up	in	5.5		1.5		6.1 cm
9^{17} AM	1.00	"	"	5.5		1.25		6.1 cm
9^{32}				79	.07	7	.186	6.1
9^{44} AM	3.65	"	"	292	.018	24	.054	
10^{03} AM	3.76	"	out	Very Slightly Super				6.1
10^{05}	3.76	"	"	"	"	Sub.		6.1

* the B_4C plate was approximately one (1) inch from bottom of slab and ~ ½" from sides

Run # 9 Bare

one Boral Poison Plate placed in center of Slab.*

11/17/53	fuel ht.	safety	Source	C_4		C_5	
10^{08} AM	0.5"	up	in	22.5		27	
12^{30} P	3.72	"	"	38	0.59	53	0.51
12^{50} PM.	4.92"	"	"	136	.165	223	.121
1^{00}	6.07"	"	out	just critical			

Thomas Cronin Gilley

Run # 10 Reflected

one Boral Poison plate placed in center of Slab*

11/17/53	~~0.5"~~	~~up~~	~~in~~	C_4	M_4^{-1}	C_5	M_5^{-1}	Reflector
10^{40} A.M.	0.5"	up	in	20.25 x16		5.0 x16		6.9cm
11^{14} AM	3.65"	"	"	355	.057	92	.0542	6.6cm
11^{16}	3.65"	"	"	350		93		6.5
11^{25}	3.71"	"	out	slightly ~~super~~ sub				6.5
	3.72"	"	out	"	super			6.5cm
	~~[illegible]~~							

*The Boral plate was placed ~ 1" from bottom of slab.

Run # 11 Bare

11/17/53 Fox Thomas Gilley

	fuel ht.	safety	source	
2:00 P.M.	5.11"	up	out	slightly super
	5.10"	"	out	" sub

The above run (#11) is identical to run # 9 except that the poison plate was sitting on bottom of slab.

Run # 12

11/17/53 Fox Thomas Gilley

three boral poison plates are now in center section of slab, dividing this section into 4 equal parts 18½ cm. wide.

	fuel ht.	safety	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Reflector ht.
3:30 P.M.	.78"	up	in	16.0		5.0		6.6cm
3:45 PM	3.65"	"	"	123.0	.13	20.0	.25	
4:10 P.M.	system scramed due to R-1 being on too sensitive a scale (Power level still low).							

Run # 12 continued

11/18/53 Thomas Cronin Gilley

9:45 AM	4.14	up	out	slightly super	6.5cm
	4.12	up	out	" sub	6.5cm

Run #13 Bare

11/18/53 Poisoning same as #12 (3 boral plates, 18½ cm spacing)

Cronin
Thomas
Gilley

	fuel ht	safety	source	C_4	M_4^{-1}	C_5	M_5^{-1}
10^{07} AM	.80"	up	in	32.25		27.25	
10^{25} AM	4.93	"	"	75.0	.43	81	.336
10^{53} A.M.	5.54"	"	"	383	.084	464	.0586
11^{05} AM	5.30"	"	"	142.25	.227	154.0	.177
11^{10}	5.10	"	"	102		106.	

Extrapolated critical ht. = 5.66"

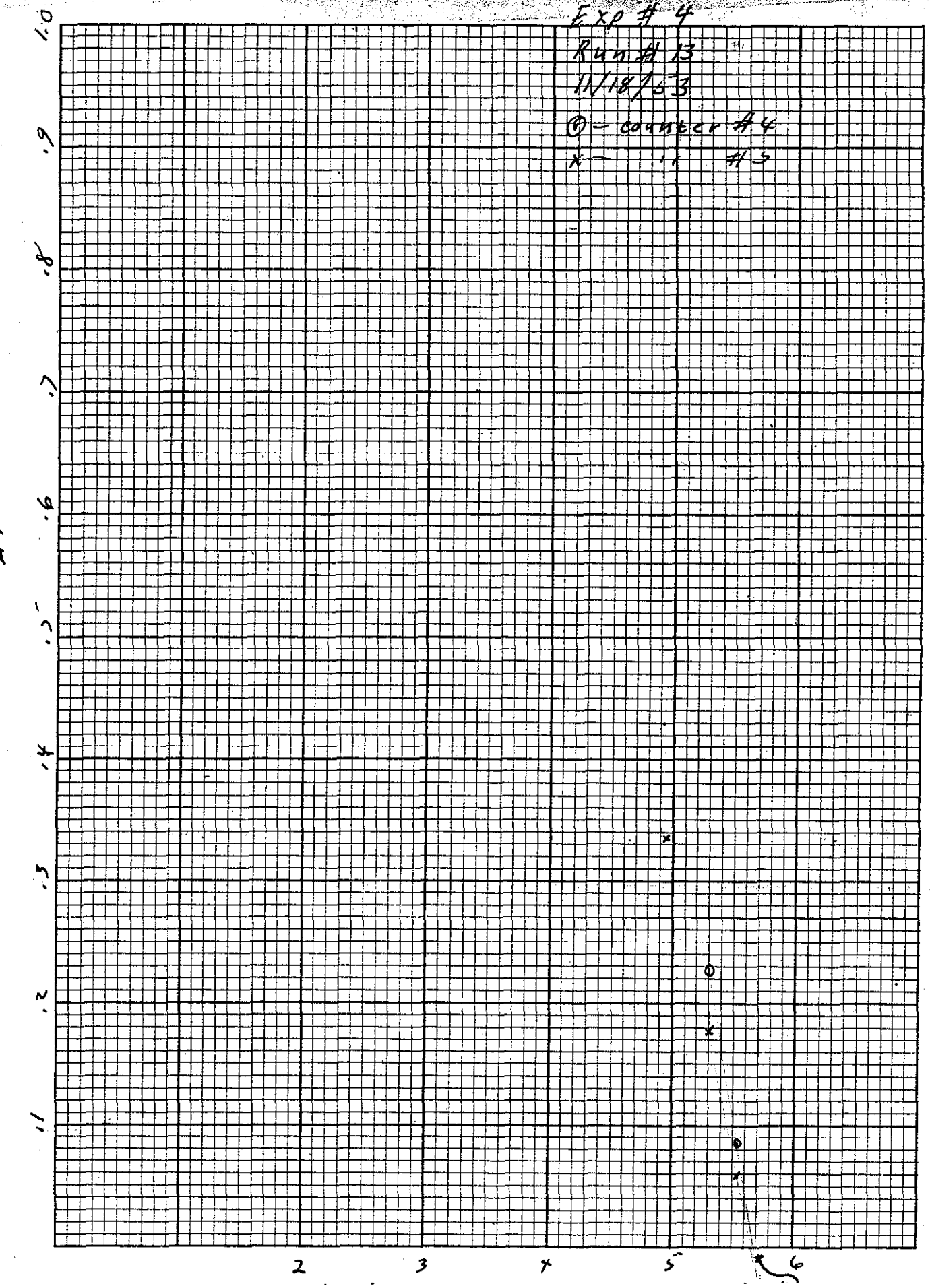
11/18+19/53 Safety blades removed and new probe holder put in. Prope rezeroed

11/19/53

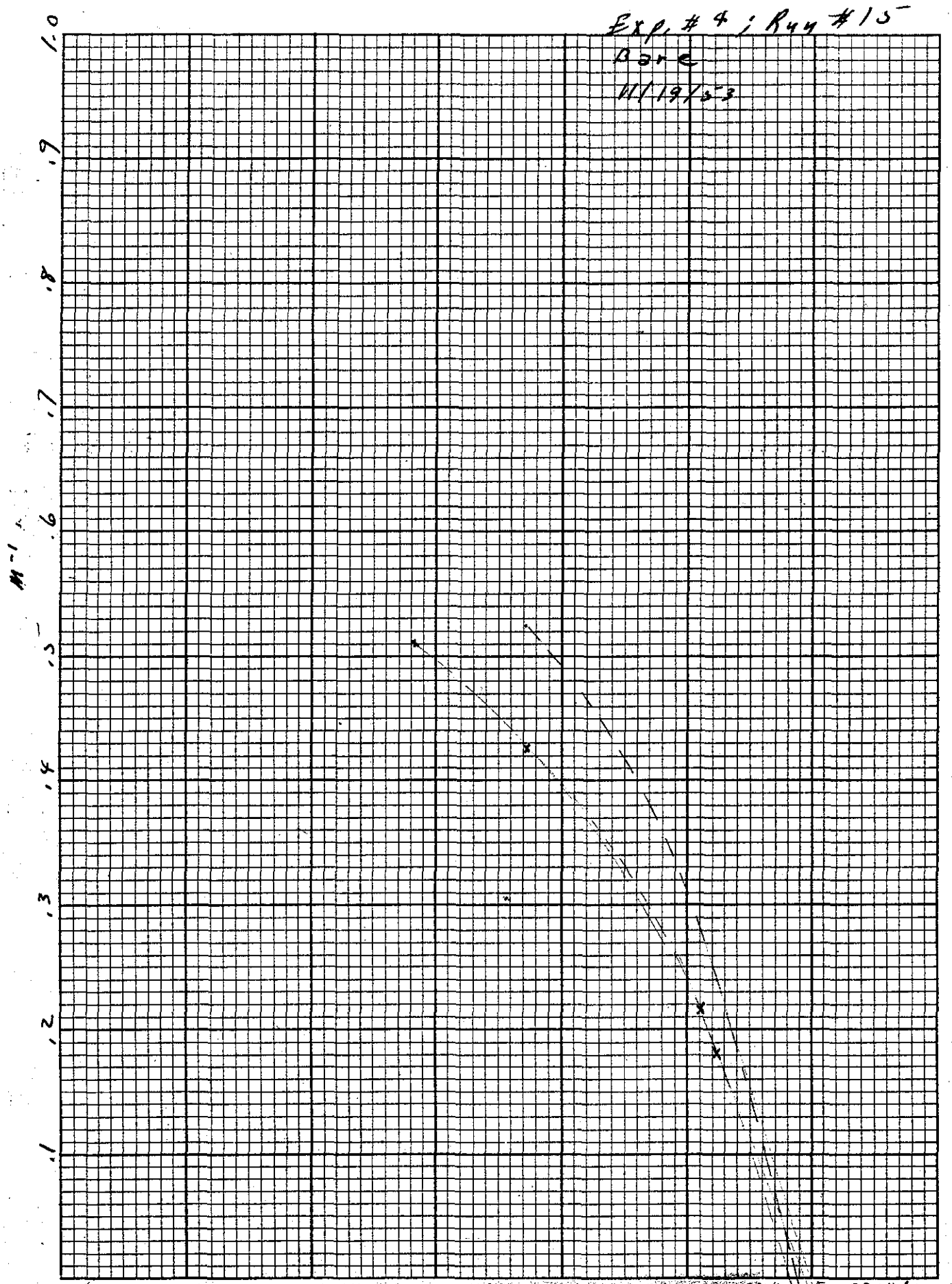
Run #14 Reflected

4 Boral plates now in reactor placed 15 cm apart (5 sections ~~15 cm~~ 14.1 cm wide).

	fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Reflector ht.
10^{43} AM.	.51"	in	16		4.75		6.3 cm
11^{00} A.M.	3.62"	"	77.0	.21	11.0	.43	6.3 cm
11^{10} A.M	4.22"	"	401	.04	54.5	.087	"
11^{30}	4.43"	out	just critical				"



EUGENE DIETZGEN CO.
MADE IN U. S. A.
NO. 340 - 10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH



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Exp. #4; Run #15

Bare; + 4 Boral plates in center section

11/19/53

Bare

fuel	Source	C_4 (x256)	M_4^{-1}	C_5	M_5^{-1}
4.43	IN	54		813 (x16)	
		54.5	.61	51 (x256)	.51
4.86	"	63	.525	61	.426
5.55	"	119	.28	121	.215
5.62	"	137	.24	143	.182
0.50	"	33		26	

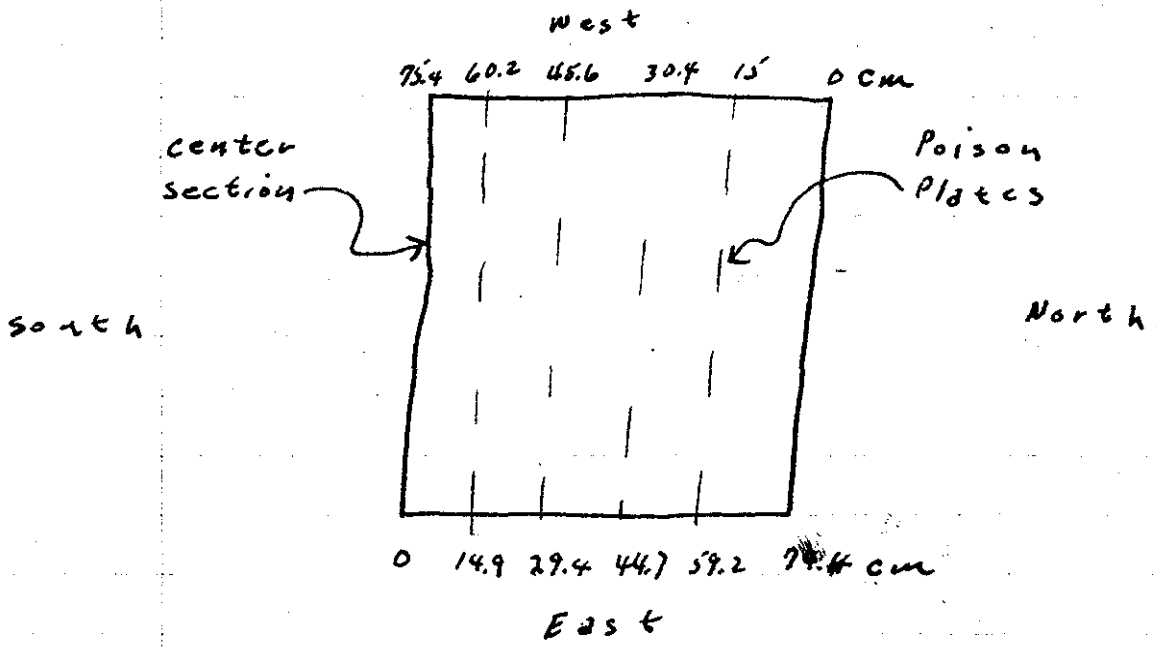
Straight line extrapolated critical ht. = 5.98"

curved " " " " = 5.93"

Poison Plate spacing for Runs # 14 + 15 (page 22+23)

11/20/

Thomas
Cronin
Gilley



11/2c

Plate Spacing for Runs # 16 + 17

5 plates now placed in center section with center of each plate being place as nearly as possible 12.5 cm apart. This means that the width of each section of fuel is ~ 11.58 cm.

~~Exp. #4~~; Run #16

Reflected; 5 Boral poison plates now in slab. See page 24 for spacing

11/20/53

Thomas Cronin Gilley

	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Reflector ht.
2:50 P.M.	0.52"	in	18.5		5.0		7.3 cm
3:00 P.M.	3.63"	"	59.25		9.25		7.3 cm
3:19 P.M.	4.72"	out	just critical				

Run # 17; Bare

5 Boral plates — same spacing as in Run #16

11/20/53

3:40 P.M.	5.78"	in	95.5	.35	99.5	.27
3:47 P.M.	5.58"	"	82.0	.41	81.25	.35
3:52 P.M.	5.23"	"	65.0	.52	64.0	.47
3:59	4.46"	"	51.5	.45	47.0	.58
4:07	3.86"	"	45.25	.54	40.75	.66
4:30 P	0.50	"	33.5		27	

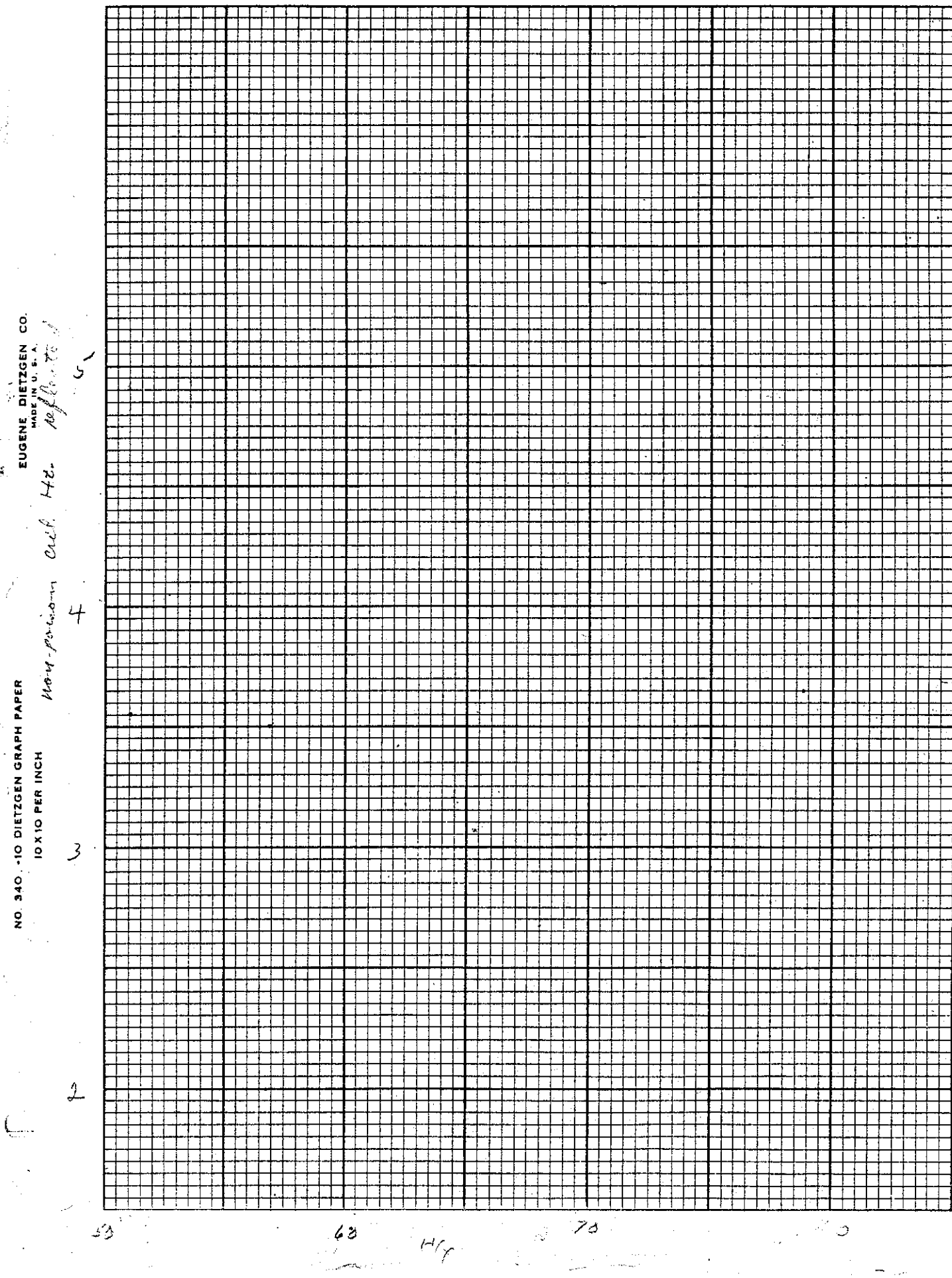
Run #18

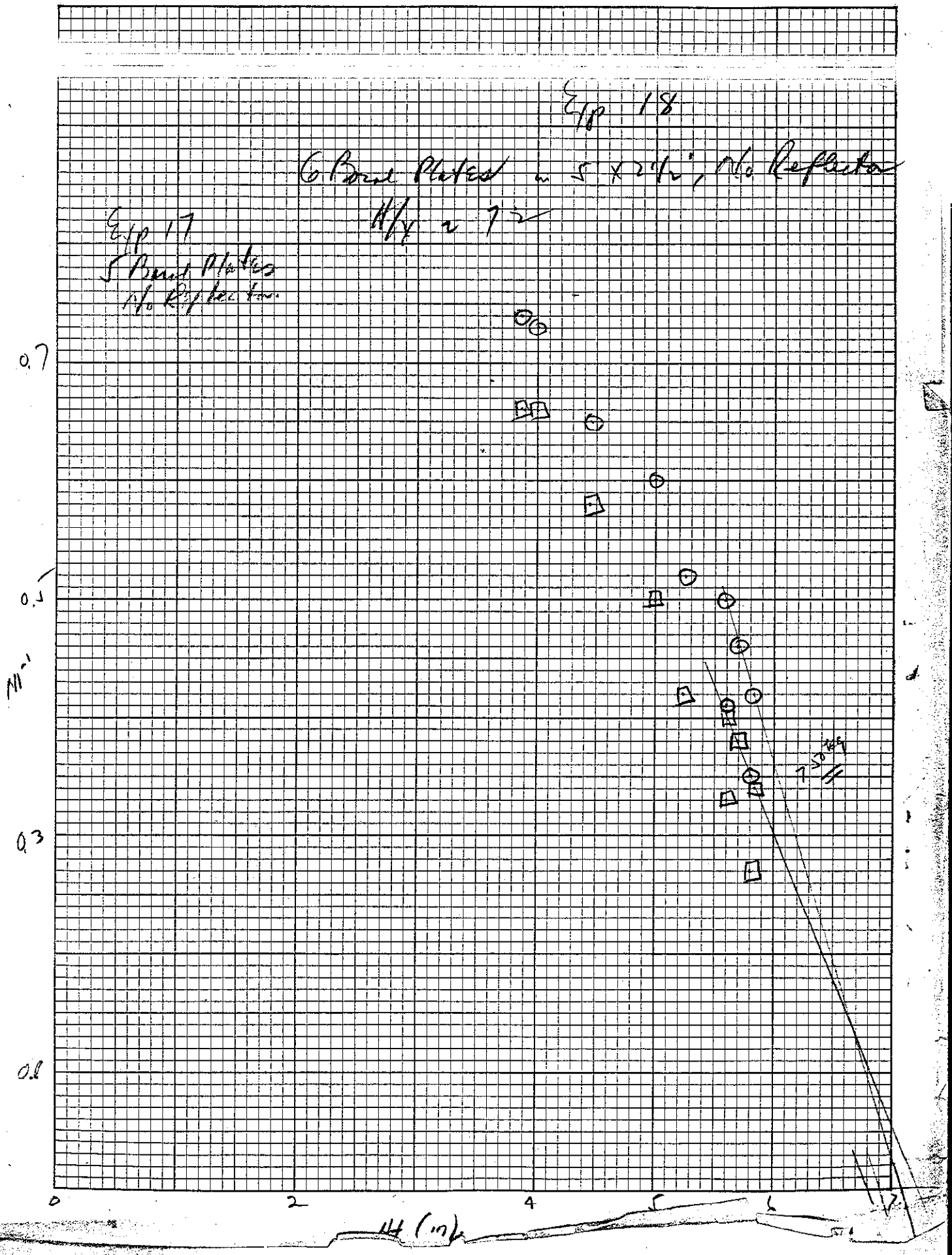
11/23/53 6- Boral Plates Equal Spacing
No Water Reflector

	Fuel Hgt	Source	Safety	C_4 ×256		C_5 ×256	
1 35 PM	0.50"	in	set	27.		24.75	
				28		25	
2 50	5.82"			73.25	.42	72.25	.39
2 55	5.70"	in		67.75	.455	64.75	.38
3 02 P.M	6.55"	"		62.5	.495	59.0	.415
3 10 P.M.	5.01"	"		51.5	.60	48.5	.50
3 15 P.M.	3.99"	"		42.25	.73	37.25	.64
3 34	0.49"	"		31.75		24.25	
3 37	.49	"		32.0		24.5	

11/23/53 Run 19

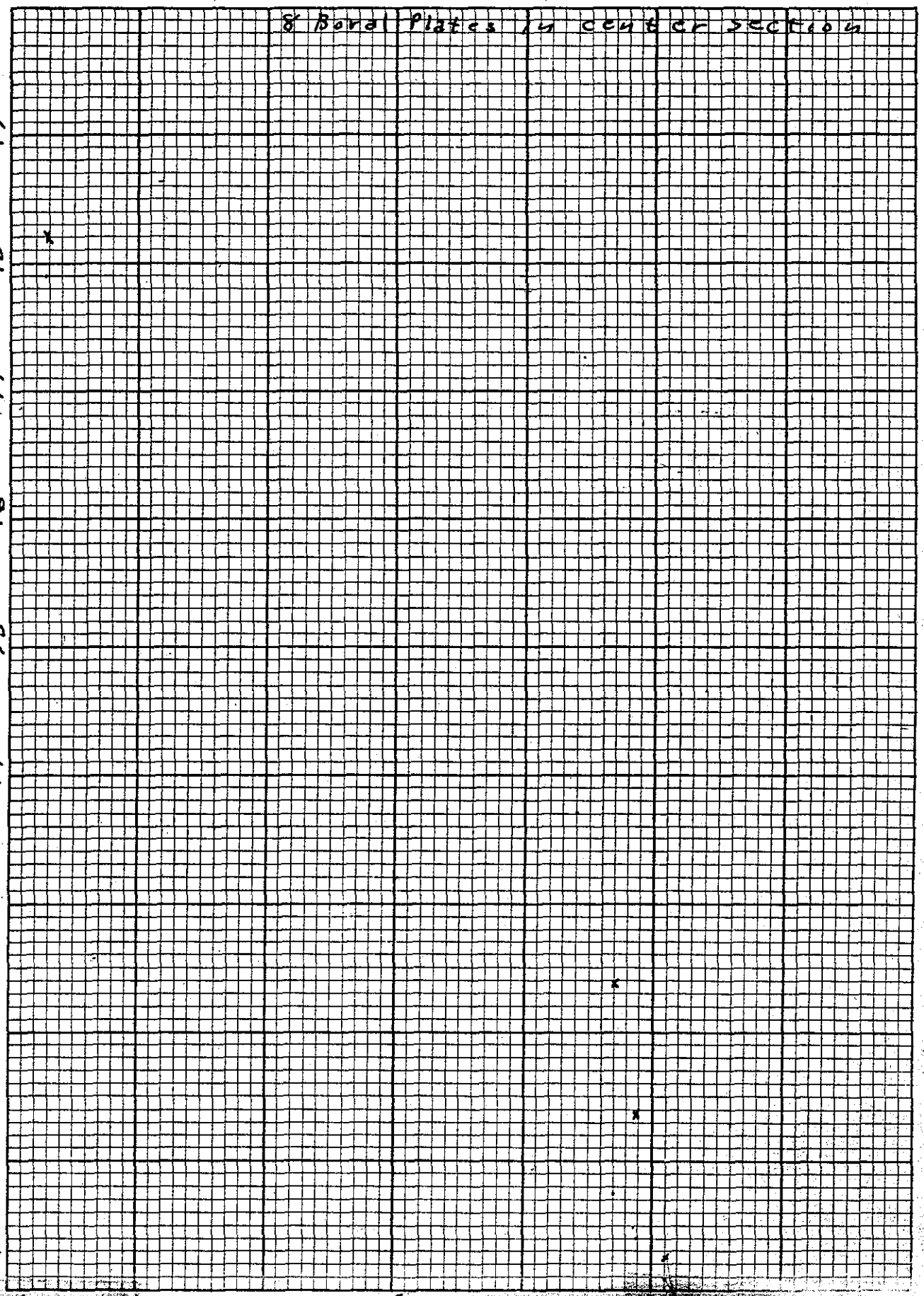
2 PM	Fuel	Water	Source	Safety	C_4 ×16	C_5 ×16
Thomas Cronin	0.50	7 cm ~~70.5~~	IN	set	16	4
Gill		7 cm	"	out	16	4
2 25 P.M	3.65 in	7 cm	"	"	46.5	7.5
2 40	5.02	7 cm	slightly sub.			
	5.04	7 cm	slightly super			


NO. 340 -10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH
EUGENE DIETZGEN CO.
MADE IN U. S. A.
non-poisson crit. Hz. reflected
5
4
3
2
60
70
H/r



359-5DG KEUFFEL & ESSER CO.
10 X 10 to the inch, 1/2 in. lines accented.
MADE IN U.S.A.

Exp. #4; Run #~~78~~



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MADE IN U. S. A.
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Run # 20

11/24/53 Reflected 7 Boral plates in center section

		fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
Thomas Cronin Gilley	9[40]	.48"	in	14.5		4.25		6.8cm
	9[55] AM	3.66"	in	28.0		4.0		6.6cm
.34	10[02]	5.03"	"	141		33.75		6.6cm
.38	10[15]	5.42"	out	just critical				6.6cm.
.415								
.50								
.66								

Run # 21

11/24/53 Reflected 8 Boral plates in center section

		fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
Thomas Cronin Gilley	1[20] pm	.39"	in	20.0		10.5		6.5cm
	1[33] p.m.	3.64"	in	25.25	.79	12.75	.82	
	2[00] p.m.	~~6.05"~~	~~in~~	~~139.5~~ x256		~~25.25~~ x256	~~.26~~	
		6.05"	in	156.0 x256	.008	27.0 x256	.0243	
	2[09] p.m.	5.94"	in.	32.25 x256	.039	4.75 x256	.138	
	2[20] p.m.	5.85"	"	17.0 x256	.074	2.75 x256	.238	

Not critical with all available fuel in reactor. $M^{-1} < .01$

Extrapolated critical ht. = 6.08"

Run #22

11/25/53 1 Boral plate in center of Slab

	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
Thomas Cronin Gilley 1^{15}	0.50"	in	12.5		7.75		5 cm
2^{15} P.M.	3.65"	in	107.5		24.0		
2^{35} P.M.	3.90"	out	just critical				

The above ~~experiment~~ Run is identical to run #10 except plate was on bottom of slab.

Run # 23

11/25/53 fuel ht. source

$3^{\cancel{00}}$ 6.20" out just critical

Note: The last run (#23) was identical to run ~~#13~~ #11 to check reproducibility of experiments.

Run #24 Reflected

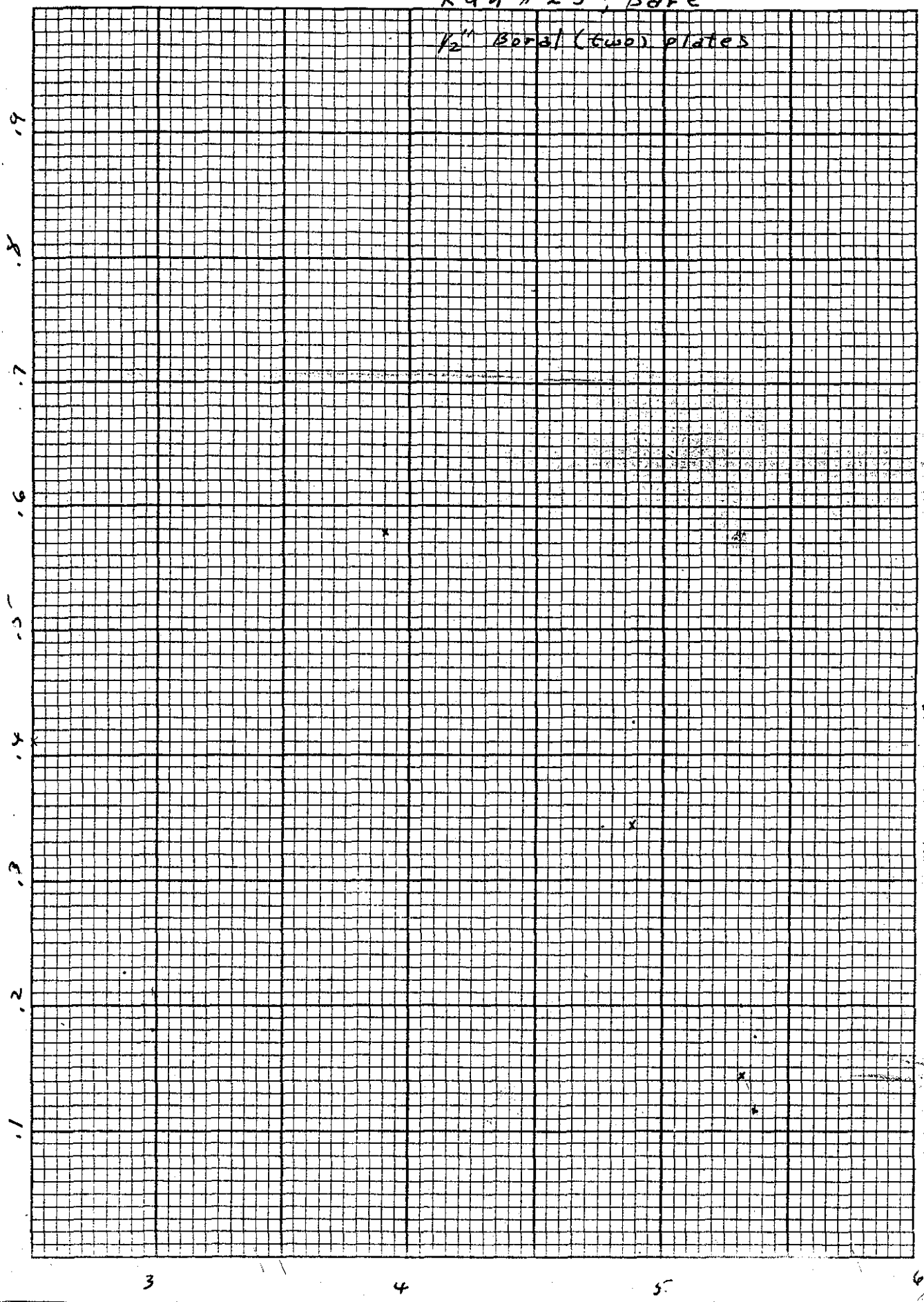
11/25/53 two 1/2" Boral plates in slab evenly spaced

fuel ht. source C_4 M_4^{-1} C_5 M_5^{-1} Ref. HT.

~~fuel~~ 4.15" out just critical 5.1 cm

Run #25; Bare

1/2" Boral (two) plates



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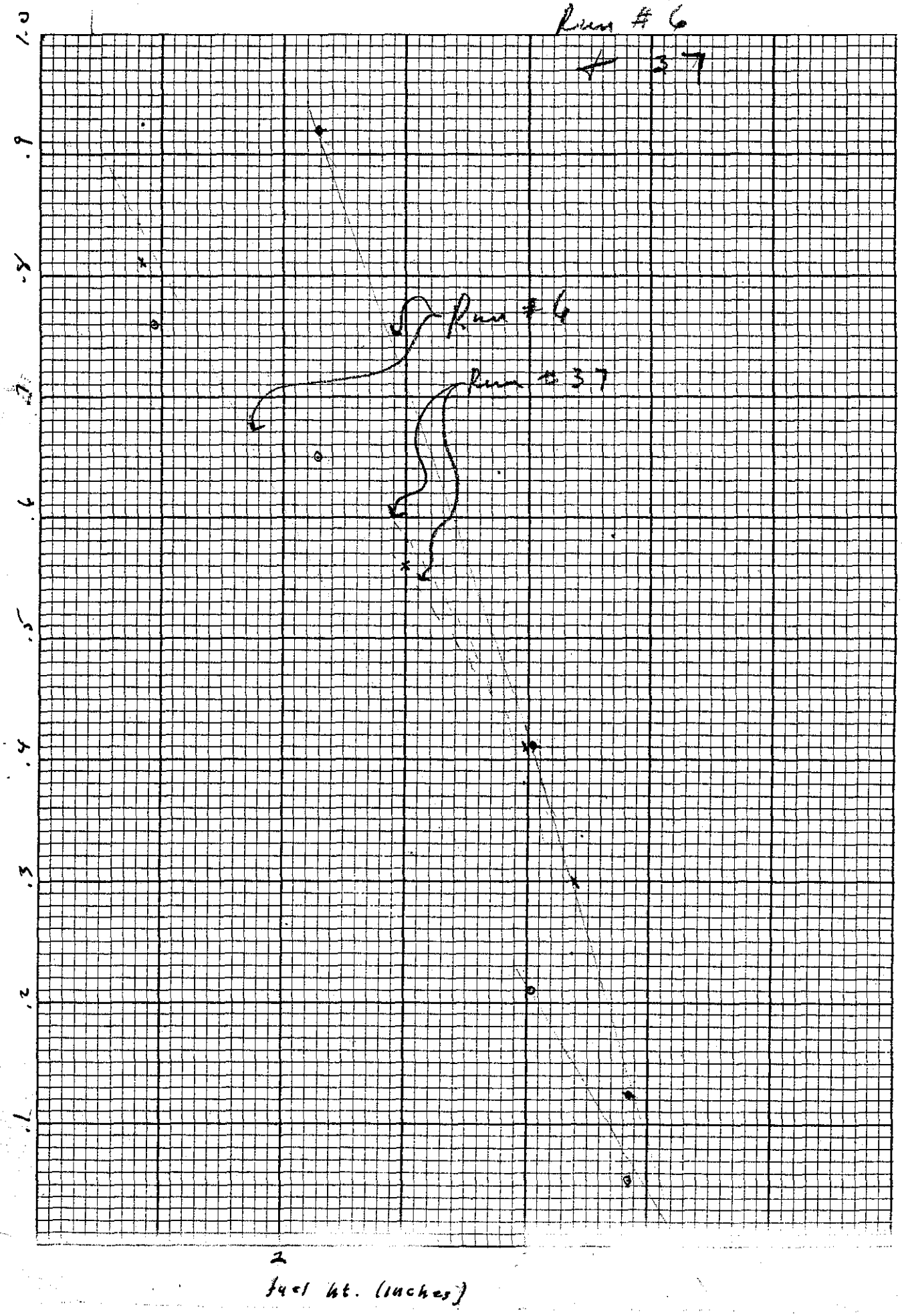

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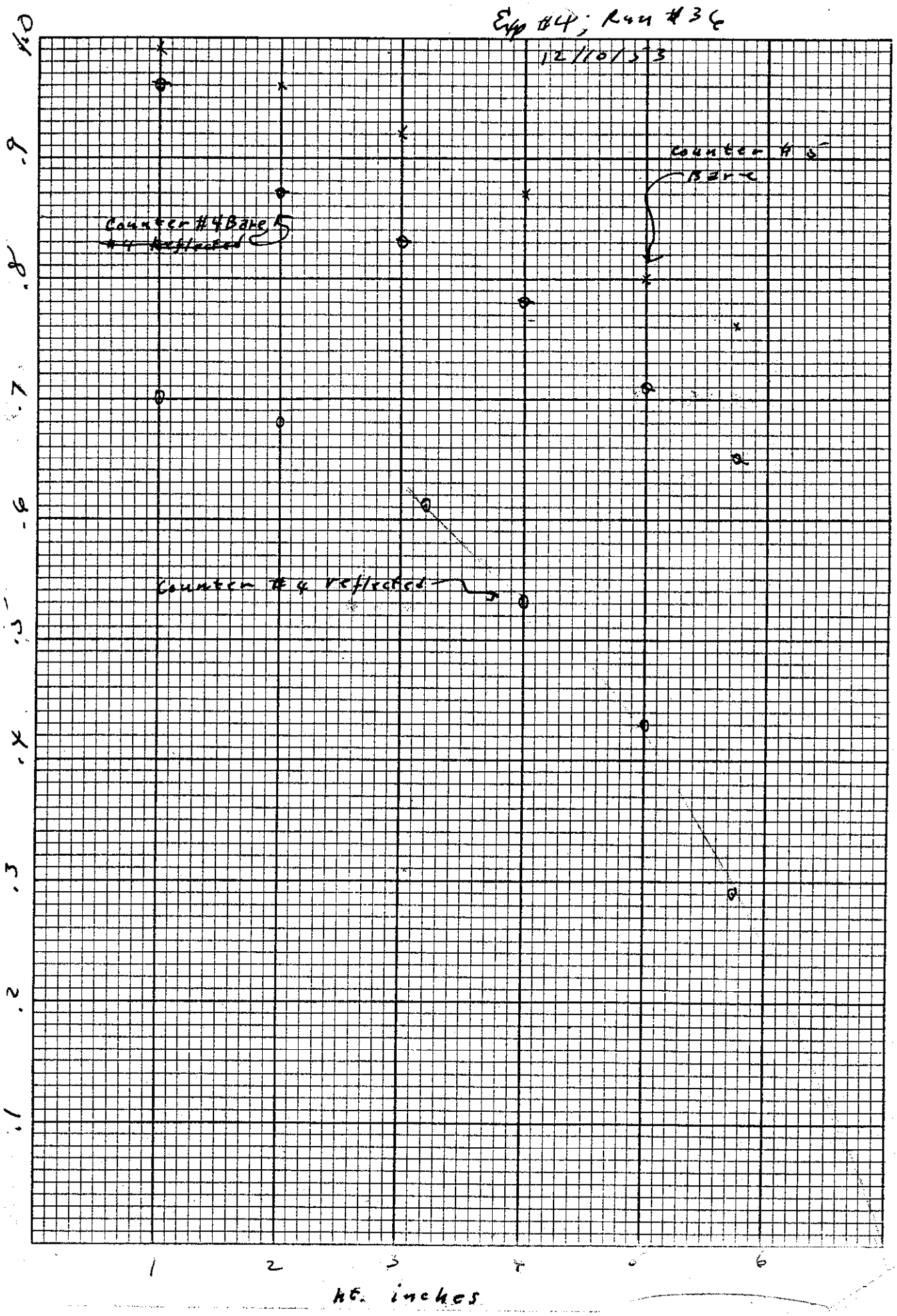
10 X 10 PER INCH

M-1



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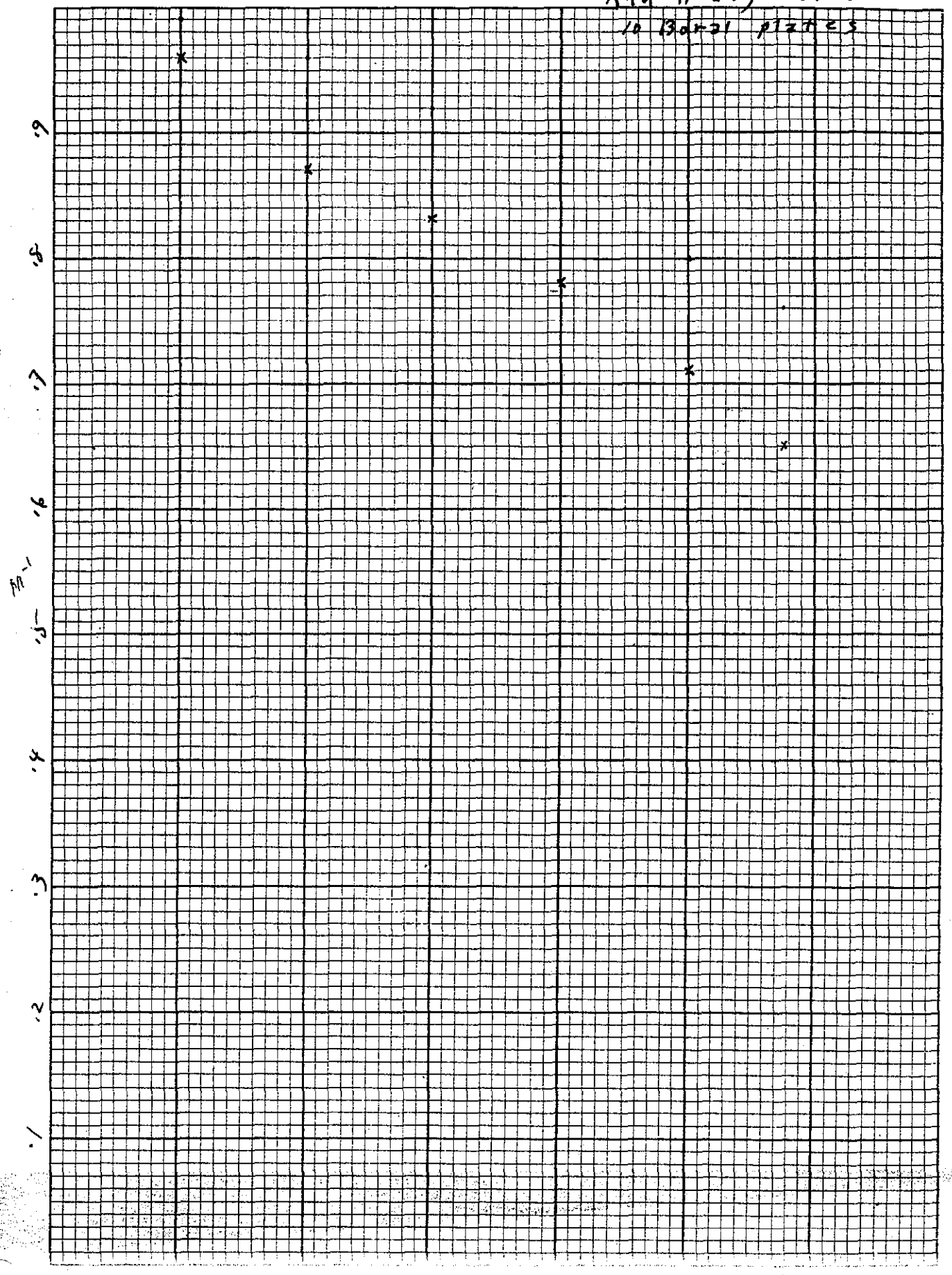
Run # 36; Bare
10 Bar-31 plates



Height (in).

Run #25 Bare

11/27/53 ~~2 1/2~~ two 1/2" Boral plates in slab

Thomas Cronin Gilley

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
8 45 AM	.51	in	out	18.75		18.5	
9 00	2.38"	in	out	22.75	.824	24.0	.77
9 02	3.90"	"	"	28.75	.65	32.0	.578
9 12	4.88	"	"	44.0	.420	54.0	.343
9 20	5.32	"	"	93.5	.20	128.5	.144
9 24	5.37	"	"	107.0	.175	159.5	.116

Run #26 Reflected

11/27/53 ~~Just~~ one 1/2" Boral plate in center of slab

Thomas Cronin Gilley

	fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Refl. ht.
10 30 A.M.	.50"	in	11.5		6.5		6.7 cm
10 42	3.65"	in	87.0		17.25		6.7 cm
10 53 A.M.	3.93"	out	just critical				6.7 cm

Run #27 Bare

one 1/2" Boral plate in center of slab

11 20 5.25" out just critical

Run # 28; Reflected

Thomas
Cronin
Gilley

two pairs of 1/4" Boral plates (4 plates)
dividing center section into 3 sections

11/30/53	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref ht.
9^{06} A.M.	.50	in	16.25 x16		10.0 x16		6.0 cm.
9^{30} AM	4.23	out	just critical				6.0 cm

Run # 29; Bare

two pairs of 1/4" Boral plates (same as #28)

11/30/53	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}
9^{52} A.M.	5.40"	in	80.75		103.5	
9^{56} A.M.	5.29"	in	67.0		82.0	
10^{01} A.M.	5.10"	in	52.5		61.0	
10^{09} A.M.	4.75"	in	39.5		41.5	
10^{22}	.49"	in	20.5		18.5	

	Nº 215339
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 Solution

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

NO ASSAY REQUESTED AT ☑ DT ☑	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25791
Sp. Gravity	
	Sp.G. - 1.415

SIGNED: Md

BY: DATE DEC 4 1953

	Nº 215338
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 Solution

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

ASSAY REQUESTED AT ☑ DT ☑	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25804
Sp. Gravity	1.415

SIGNED: Md

BY: DATE DEC 2 1953

11/30/53 two samples taken but only one sent for analysis at this time. Second sample is to be sent for analysis only if sample P-164 does not agree with previous sample taken at this H/X.

Sample sent 11/30/53

P-164 Req. # 215338 (Exp. #4)

Gross 81.1000

Tare 27.9826

Net 53.0174

Sample P-27 held back at this time. (11/30/53)

Sample P-27 sent for analysis (12/2/53)

P-27 Req. # 215339

Gross 43.7726

Tare 24.3557

Net 19.4169

Measurements on 1/2" Boral

	C_1	C_2
Length	2.00"	2.06"
width	1.96"	2.985" ?
Thickness	0.496"	0.4973 {ave. of 8 meas.
weight	75.160 gm	78.061 gm

area = 25.29 cm^2

$\frac{gm\ B}{cc}$ .78149

$\frac{gm\ B}{cm^2} = 0.456$

If thickness were 1.99

$\frac{gm\ B}{cm^2} = 0.686$

Run #30; Reflected

12/8/53 two Empty BuC Containers in reactor

For Thomas Gilley

	fuel ht.	source	C_4	M_4	C_5	M_5	Ref. ht.
9 45 A.M.	.59"	in	16.5		3.0		5.6 cm
10 15	3.73"	out	just critical				5.6 cm

Run #31; Bare

10 35	5.04"	out	just critical

Run #32; Reflected

For Thomas Gilley

No poison in slab

12/8/53

	fuel ht.	source		Ref. ht
3 55 P.M.	3.69"	out	just critical	5.0 cm

The above run was a repeat of run #6 to check effect of evaporation.

Run #33; Bare

12/9/53 No poison in slab

fuel ht.	source	
6.00	out	just critical

Run # 34; Reflected

For Thomas Gilley

12 - 1/4" Boral plates evenly spaced

12/9/53

	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
1^{45} P.M.	.48"	in	14.25 x16		7.75 x16		5.9 cm.
		"	13.75		7.5		
1^{58}	.96"	"	16.5	.85	8.0	.97	"
2^{05} P.M.	2.00"	"	16.75	.836	8.0	.97	"
2^{10} P.M.	3.10"	"	15.5	.9	8.0	.97	"
2^{15} P.M.	4.00"	"	16.5	.85	8.5	.91	"
[redacted]			17.5	.70	7.25	—	"

Sample taken 12/9/53 between runs # 33 + 34. Req. # 215347

Sample bottle P-260

Gross	52.7319
Tare	25.4623
Net	27.2696

[redacted]	No. 215347
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT. CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25437
Sp. gravity	1.4136 g/ml @ 25°C

SIGNED:

BY:

DATE DEC 15 1953

Thomas
Fox
Gilley
12/10/53

Run #35; Reflected

10 Boral plates evenly spaced

	fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
1^{00}	.46"	in	9.0		—		5.4 cm
	.46"	"	9.5 10.5		—		"
1^{30} P.M.	1.0"	"	13.5	.70			"
	1.0"	"	16.0				"
1^{40}	2.0"	"	14.0	.68			"
1^{50}	3.2"	"	15.5	.61	15.25		"
1^{55}	4.0"	"	18.0	.53	16.25		"
2^{05} P.M.	5.0"	"	22.0	.43	16.75		
2^{13} P.M.	5.75"		32.5	.29	19.25		

Run #36; Bare

10 Boral plates evenly spaced

Thomas Fox Gilley			$C_4^{\times 256}$		$C_5^{\times 256}$	
2^{25} P.M.	5.75"	in	22.75	.76	56.0	.65
	5.02"	in	21.5	.80	51.0	.71
2^{40} P.M.	4.01"	in	19.5	.88	46.75	.78
2^{48}	3.03"	in	18.75	.92	43.75	.83
2^{50}	2.01"	in	18.0	.96	41.5	.87
3^{00}	1.00"	"	17.5	.99	37.75	.96
3^{05}	.48"	"	17.25		36.25	

Run # 37; Reflected

12/14/53 No poison: Center section and one side compartment contains fuel

	fuel ht.	source	C_4	M_4^-	C_5	M_5^-	Ref. ht.
9 30 A.M.	0.46"	in	15.75		8.75		4.5 cm.
9 43	1.43"	"	17.0	.925	10.75	.81	
9 50	2.50"	"	27.25	.58	15.5	.56	
10 00 A.M.	3.19"	"	66.0	.24	29.5	.30	
10 05	2.99"	"	41.0	.38	21.5	.41	

12/11/23/53

For Thomas Gilley

Run #38;

No poison in slab. Center section only contains fuel. 3/8" stainless steel reflector on bottom

	fuel ht.	source	C_4	m^{-1}_4	C_5	m^{-1}_5
8:45 A.M.	.55"	in	11.75		—	
9:00	.41"	in	10.75		21.5	
9:10	1.46"	in	12.25		25.75	
9:15	2.54"	in	12.0		28.25	
9:23	3.53"	in	16.0		39.25	
9:24	3.99"	in	19.25		53.5	
9:45 A.M.	4.63"	out	just critical			

Run #39

12/11/23/53

Conditions same as in #38 except H_2O reflector brought up to zero in addition to stainless steel.

	fuel ht	source	C_4	m^{-1}_4	C_5	m^{-1}_5	Ref (H_2O) ht.
10:35 A.M.	.85"	in	12		9.75		2.5 cm
10:40	1.62"	in	14.25		11.0		
10:45	2.54"	in	15.5		12.75		
10:52 A.M.	3.51"	in	44.0		20.0		
11:04	3.95"	out	just critical				

12/23/53

Thomas
For
Gilley

Run # 40

No poison. Fuel in center section only.
~~No~~ reflected. (Same as run #39 except no stainless).

	Fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
1:35 P.M.	.55"	in	12.75		9.5		2.5"
1:40 P.M.	.57"	in	16.25		10.75		
1:45	2.50"	in	23.0		13.25		
1:52	3.47"	in	114.0		48.0		
2:00	3.65"	out	slightly		super		
	3.64"	out	"		sub.		

Run # 41

12/23/53

Thomas
For
Gilley

no poison. This run same as above except no reflector

	fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}
2:15 P.M.	3.64"	in	18.75	.65	40.5	.53
2:20	4.54"	in	35.0	.33	84.5	.25
2:35	4.83"	in	89.0	.138	293.25	.074
2:50	2.51"	in	15.5	.8	30.0	.72
3:00 P.M.	.44"	in	12.25		21.5	

12/23/53

Thomas
For
Gilley

Run # 40

No poison. Fuel in center section only.
~~Had~~ reflected. (Same as run #39 except no stainless).

	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}	Ref. ht.
1 35 P.M.	.55"	in	12.75		9.5		2.5 cm
1 40 P.M.	.57"	in	16.25		10.75		
1 45	2.50"	in	23.0		13.25		
1 52	3.47"	in	114.0		48.0		
2 00	3.65"	out	slightly		super		
	3.64"	out	"		sub.		

12/2

Run # 41

12/23/53

Thomas
For
Gilley

No poison. This run same as above except no reflector

	fuel ht	source	C_4	M_4^{-1}	C_5	M_5^{-1}
2 15 P.M.	3.64"	in	18.75		40.5	
2 20	4.54"	in	35.0		84.5	
2 35	4.83"	in	89.0		293.25	
2 50	2.51"	in	15.5	.5	30.0	.72
3 00 P.M.	.44"	in	12.25		21.5	

REPORT OF

	№ 215355
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25957
Sp. Gravity	
API	1.4319 25°

SIGNED:

BY: md

DATE

[redacted]

REPORT OF

Gill

	Nº 215354
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO2F

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.26173
Sp. gravity	
	Sp. G. 1.4359 25°C

SIGNED: md

DATE

[illegible] 1954

REPORT

Gilley, [illegible]

Bldg 9213

ASSIGNED TO: 8

IDENTIFICATION	B percent	Total weight of specimen, grams
C1	26.3	75.1497
C2	23.3	78.0525

Rel Std Error, percent

2

95.

STANDARD ERROR AT 95.0 PERCENT CONFIDENCE LEVEL

[illegible] DATE 12/22/53

RT OF ANALYSIS

LAB. NO. G4763-64

Gilley, L.W.

DATE REC'D 12-9-53

Bldg 9213

ASSIGNED TO: 8

IDENTIFICATION	B percent	Total weight of specimen, grams
C1	26.3	75.1497
C2	23.3	78.0525
	Rel Std Error, percent 2	

95.

STANDARD ERROR AT 95 PERCENT CONFIDENCE LEVEL

TED BY M Vaughn DATE 12/22/53

12/23/53 Two samples taken.

Sample # P-253 was taken with pipet touching bottom of reactor and hence contains some precipitate from previous runs which had been stirred up, and possibly a little UF_4.

Sample # P-284 probably contains little UF_4 or precipitate (undissolved UO_2F_2 from last "drying").

Sample # P-253 Req # 215355

Gross	54.7812
Tare	25.4606
Net	29.3207

Sample # P-284 Req # 215354

Gross	51.7261
Tare	21.1907
	29.7354

NOTE: Specific gravities reported on Req.#'s 215354 + 355 are not correct. Mult. by .99707 to get 1.4316 + 1.4278 (Temp. correction to 25°C)

1/6/54

Cronin
Fox
Gilley

Run # 42

Bare; no poison; center section only
About 6 liters of H_2O added to system

	fuel ht.	source	C_4	M_4^{-1}	C_5	M_5^{-1}
1^{37} p.m.	~~.51~~	~~in~~	~~7.25~~		~~13.75~~	
2^{30} p.m.	.53	in	23.0		63.75	
2^{40}	2.98	in	30	.77	96	.664
2^{50}	3.84	in	37.5	.614	125.25	.51
	4.92	out	slightly		~~super~~ sub	
3^{18}	4.93	"	"		~~sub.~~ super	

1/7/54

Thomas
Fox
Gilley

Run # 43

Repeat of run # 42

	fuel ht.	source	
9^{11}	4.91	out	just critical

1/7/54

Run # 44

1/2 reflected; no poison; center section only

10^{20} a.m.	3.67	out	just critical

1/7/54 Sample taken:

Reg. # 215358

Gross 54.9689

Tare 26.3936

Net 28.5753

BATCH NUMBER	REQUISITION NUMBER
	№ 215358

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2

Accuracy required 5 parts/10,000

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25384
Sp. Gravity	1.4136

SIGNED:

BY: DATE JAN 8 1954

BATCH NUMBER	REQUISITION NUMBER
	№ 215366

Reg.

Mat.

Dept.

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

1/12 relatively pure UO_2F_2

Batch Numbers

UO_2F_2 solution analysis

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25231
Spectrographic	

SIGNED: hd

BY: DATE JAN 22 1

Au	B <1
Ca 25	Cd <10
Cu 4	Fe 5,000
In	K <100
Mo <200	Na <10
Rb	Sb
Ti <100	Tl
C	RE

Date 1-21-54

	Nº 215358
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2

Accuracy requested 5 parts/10,000

IF NOT TO BE COMPOSITED CHECK HERE.....		
ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.	
ANALYSIS REQUESTED	REPORTED ANSWERS	
GRAM/GRAM T	.25384	
Sp. Gravity	1.4136	

SIGNED:

BY:

DATE JAN 8 1954

[redacted]

BATCH NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

relatively pure UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25231
Spectrographic	

SIGNED: Md

BY: DATE JAN 22.

[redacted]

[redacted] Time ____ M		Mat. Type Code	1921
Sampled by LMS Date 1-15		Dept. Code No.	CAL
Cont'r No.		Batch Numbers	
Gross		UO_2F_2	
Tare			
Net	6.6599		
Analy. Ans	By ____ Date ____		

Spectrographic Analysis
Answers in P.P.M.

Ag 2	Al 20	As	Au	B <1
Ba <10	Be <.2	Bi	Ca 25	Cd <10
Co <20	Cr 350	Cs	Cu 4	Fe 5,000
Ga	Ge	Hg	In	K <100
Li <10	Mg 8	Mn 16	Mo <200	Na <10
Ni 140	P <100	Pb <40	Rb	Sb
Si <10	Sn <20	Sr <100	Ti <100	Tl
U	V <100	Zn <100	C	RE

Signed WB-Lp Date 1-21-84

5565

1/7/54 Sample taken:

Reg. # 215358 bottle # P-199

Gross 54.9689

Tare 26.3936

Net 28.5753

1/15/54 Sample taken from manifold of solution storage system for spectrographic analysis

Reg. # 215366 Sample # 242

Gross 62.5464

Tare 25.8740

Net 36.6724

17/12/54 Sample taken of (green) solids on bottom of reactor to determine composition.

bottle # 5-A Req. # 215364

Gross 193.0621

Tare 121.0299

REQUEST for SPECTROGRAPHIC ANALYSIS 14506 Req. No. 215363

By Dept _____ Time _____ M

Sampled by Date

Cont'r No.		
Gross		
Tare		
Net		

Analy. Ans By _____ Date

Mat. Type Code

Dept. Code No.

Batch Numbers

What is it

32 mg.

Spectrographic Analysis Answers in P.P.M.

~30,000

615

Ag 50	Al 750	As	Au	B <
Ba 60	Be <.2	Bi	Ca 2000	Cd <
Co 30	Cr >4000	Cs	Cu 350	Fe >
Ga	Ge	Hg	In	K 2
Li <10	Mg 175	Mn >1000	Mo <200	Na
Ni 600	P <100	Pb 120	Rb	Sb
Si >10,000	Sn 90	Sr <100	Tf <100	Tl
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Signed [illegible] Date [illegible]

[redacted] No. 215363

BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Solids from bottom of reactor (possibly UF_4)

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	08279

SIGNED:
BY: md DATE JAN 22 1954

BATCH NUMBER | REQUISITION NUMBER

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED

AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.060150

SI

BY:

JAN 26 1954

DATE

L-4	Nº 215373
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute Washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.029170

SIGNED:

BY:

JAN 26 1954

DATE

F-3	№ 215370
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Dilute Washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.02020

SIGNED: BY: Md DATE JAN 25 1954

BATCH NUMBER	REQUISITION NUMBER
L-6	Nº 215372

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Dilute Washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	.01725

SIGNED:
BY: [illegible] DATE: JAN 25 1954

1/18/54

Container #	Gross	Tare	NET	Sample #	Gross	Tare	NET
L-2	12,633	1873	10,760	P-57	45.6429	25.2680	20.3749
L-1	13,200	1929.5	~~11,224~~ 11,270	P-152	48.2550	26.8091	21.4459
L-7	13,280	1927	11,353	P-125	48.6540	25.9822	22.6718
F-3	12,077	1944.9	10,132	P-142	48.5219	26.3522	22.1697
L-5	12,920	1958	10,962	223	48.7141	26.8681	21.8460
L-6	13,050	1827	11,223	P-234	49.7145	27.5406	22.1739
L-4	13,060	1867	11,193	P-266	44.8349	25.7246	19.1103
L-3	12,713	1886	10,827	P-271	47.1085	26.2618	20.8467

Container #	gm #/gm	gm #	Sample #	gm #	Reg. #
L-2	~~.06015~~ .01032	111.04	P-57		215-367
L-1	~~.01032~~ .06015	~~678.13~~ 677.9	P-152		368
L-7	.01277	144.98	P-125		369
F-3	.0202	204.67	P-142		370
L-5	.01976	216.61	223		371
L-6	.01925	193.60	P-234		372
L-4	.02917	326.50	P-266		373
L-3	.022	238.19	P-271		374

1/26/54 Containers L-3, L-5, and L-7 resampled

also L-2

Container # Sample # Req. # 215 374

L-3 P-264

	(1/26/54)	(1/27)	(1/28)
Gross	~~81.3885~~ 76.8067	76.8091	76.7985
Tare	~~27.8705~~ 25.6719		
Net	51.1348		

Container # Sample # Req. # 215 371

L-5 P-59

		(1/27)	(1/28)
Gross	81.2793	81.2791	81.2586
Tare	27.3086		
Net	53.9707		

Container # Sample # 215 369

L-7 P-254

		(1/27)	(1/28)
Gross	81.3885	81.3875	81.3631
Tare	27.8705		
Net	53.5180		

Container # Sample # 215 367

1/28 L-2 P-165

Gross	96.6157
Tare	26.2534
Net	70.3621

L-3	N. 51001
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. - Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.022000

SIGNED:

BY:

DATE FEB 3 1954

L-5	№ 215371
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute washings containing UO_2F_2 and UF_4

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.01976.0

SIGNED:

BY: DATE FEB 3 1954

L-7	№ 215369
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.012770

SIGNED:

BY:

DATE FEB 3 1954

L-2	№ 215367
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Dilute washings containing UO_2F_2 and possibly UF_4

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T L	.01/0328

SIGNED:

BY:

DATE FEB 3 1954

REQUEST for 14537
SPECTROGRAPHIC ANALYSIS

Req. No. 215379

By Dept 2230	Time 8:10A. M	Mat. Type Code	1937
Sampled by [illegible]	Date 3-3-54	Dept. Code No.	Ch. I
Cont'r No.		Batch Numbers	
Gross		UO_2F_2	
Tare			
Net	6.7034		
Analy. Ans	By / Date		

Spectrographic Analysis Answers in P.P.M.

Ag 8	Al 20	As	Au	B <1
Ba <10	Be <.2	Bi	Ca 140	Cd <10
Co <20	Cr 275	Cs	Cu 18	Fe 2800
Ga	Ge	Hg	In	K <100
Li <10	Mg 75	Mn 32	Mo <200	Na 25
Ni 450	P <100	Pb <40	Rb	Sb
Si <10	Sn <20	Sr <100	Ti <100	Tl
U	V <100	Zn <100	C	RE

NC Signed WB - [illegible] Date 3-9-54

	Nº 215379
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Pure UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.254140
Fe	.000579
Spectrographic	

SIGNED: MAR 15 1954

BY: DATE

3/2/54 Two samples taken from [illegible] storage system

P-37 — Analysis to be made in such a way as to take impurities into consideration.

Gross 95.9068 Reg.# 215378
Tare 27.6252
N 68.2816

Sp. gr. = 1.42 from curve

P-5 X-85 Analysis [illegible] manner (by direct ignition) also spectrographic.

Gross 69.7658 Reg.# 215379
Tare 20.1814
Net 49.5844

Beginning of cylinder and annuli experiment

I

March 24, 1954 9" stainless steel reactor

Bare

H/X same as indicated by analysis on req. # 215 378

	Fuel ht.	Source	C_4	M_4^{-1}	C_5	M_5^{-1}
2^{51} PM ~~3^{51} PM~~	15.9"	in	408.75 ^{256} (5 min)		186.0 ^{256} (5 min)	
			163.4 (2 min)		314.4 (2 min)	

3^{30} PM System scramed due to low trip point on DC-3.

3/25/54 Instruments moved and checked. DC-3 trip point changed to 68 on ~~500~~ 1000 scale
PM trips with source 4" away
DC-2 trips on 50 on 500 scale

	fuel ht	source	C_4		C_5	
9^{28} AM.	16.12"	in	~~17.75~~ ^{256}		~~296.25~~ $^{\times 256}$	
			~~19.0~~ Voltage changed		298.25	
9^{35}	"	"	296.5 $^{\times 64}$		290.75 $^{\times 64}$	
10^{08} AM.	24.54	"	278.75 $^{\times 256}$	.268	363.5 $^{\times 256}$	.2
	26.61	"	1249	.06	748	.097
10^{50}	27.58"	out	super			

11^{12} Drained back - Removed source PN-15 and replaced it with PB-307 - PN-15 in Rm 101 in Boroxtank. DK

3^{00} PM New diaphram put in automatic feed valve

9" s.s. cylinder bare

Fox, cross, Gillay

3/26/54 Instruments checked (PN 15)

8 30 AM Log N tripped ~ 2" away

DC-3 " " 2" {98 on 100 x 1 scale}

R-1 " " 4"

	fuel ht	source	safety	C_4	C_5
8 40 AM	16.08"	in	out	31.0 x256	22.5 x256
9 30 AM.	27.28"	out	out	just critical	

9" ss cylinder bare

3/29/54 Instruments checked (Gamma source)

Log N tripped

DC-3 " 1"

R-1 " 0"

DC-2 " 1"

This experiment same as above except different ~~[illegible]~~ source tube in reactor (~~[illegible]~~ a shorter one)

	fuel ht.	source	C_4		C_5	
10 16 AM.	3.08"	in	11.25 x256		5.25 x256	
10 23	15.59"	in	31.5	.357	23.5	.223
10 30	19.95"	in	56.5	.2	48.5	.108
	22.81"	out	super			
10 40	22.87"	"	super			
10 50	22.75"	"	just crit.			

≈ 57.8 cm + 1.2 Bottom correction → 59.0 cm

Fox
Cross
Grilley

2

9" s.s. cylinder
Reflected -

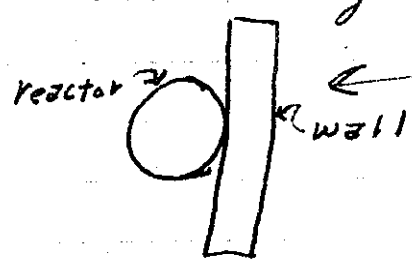
3/30/54 Instruments checked H_2O Ht.

	fuel ht	source	C_4	C_5
1[10] P.M.	2.96"	in	43.25	14.25
	"	"	38.5	14.25
	"	"	42.25	15.25
4[20] P.M	6.77"	out	just critical	100 cm.

3

3/31/54 9" s.s. Cylinder
48" x 42" x 6" concrete wall against reactor

	fuel ht.	source	
1[45] P.M.	15.78	out	just critical



4

9" ss cylinder
Experiment 4 same as 3 except system flooded with water (100 cm)

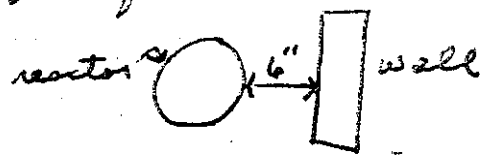
	fuel ht	source	
2[20] P.M.	7.62"	out	just critical

5

SS Cylinder (9")

3/31/54 Bare except 6" concrete wall 6" from edge of reactor

Fox
Cross
Gilley



fuel ht. source

3 30 P.M. 19.92"* out just critical

* The ~~sys~~ selsyn seemed to "skip" so probe was re-zeroed after experiment and the actual zero appeared to read about 0.2" low (add 0.2" to 19.92 = 20.12" for ht.).

6

4/1/54 SS cylinder (9")

Bare except 6" concrete wall 1' (one foot) from edge of reactor.

Instruments checked

DC-2 trip 100 on 10 x 10 ~1" away

DC-3 " 90 on 100 x 1 ~1" away

PM " 2" away

Period "

10 00 A.M. fuel ht. source safety

21.75" out out just critical

Fox
Cross
Gilley

4/1/54

7

ss. Cylinder (9")

Bare except for 6" concrete wall 18" away from reactor.

	fuel ht.	source	safety	
1:00 PM	22.45"*	out	out	just critical

* Probe regarded after run and selsyn was found to read 0.08" high. Corrected reading is ∴ 22.37".

8

S.S. Cylinder (9")

Concrete wall now 2' from reactor

	fuel ht.	source	safety	
2:22 P.M.	22.56"	out	out	just critical

9

SS. Cylinder (9")

Concrete wall now ~~2' (12")~~ 1' (12") thick and setting against reactor.

	fuel ht	source	safety	
4:00 P.M.	15.38"	out	out	just critical

4/1/54 Sample taken

Sample # X-91 Req. # 215383

Gross 83.6782 → 83.6908*

Tare 19.4593

Net 64.2189

* Sample weighed on 4/1/54. For other gross sample weighed on 4/2/54.

10

9" Cylinder stainless steel

4/2/54 Reflected except for top tamper

For Cross Gilley

fuel ht source safety H_2O ht. = 100 cm.

3:00 P.M. 7.63"* out out just critical

Probe regraded after experiment and was found to read about 0.05" too high (true height = 7.63 + .05 = 7.68")

$.2509 \times 1.298 = \begin{array}{r} 1.0000 \\ .3258 \\ \hline .6743 \end{array}$ 19.5 cm ht

$\frac{H}{X} = \frac{2611 \times .6743}{2338} = 75.3$

	№ 215383
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 sol'n containing impurities of Fe, Cr, etc.

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.250910
Specific Gr.	1.4070

SIGNED:

BY: DATE APR 7 1954

11

Cronin
Cross
Gilley
4/5/54

6" stainless steel reactor - completely Reflected

	fuel ht.	source	H_2O	C_4	M_4^{-1}	C_5	M_5^{-1}
3^{30} P.M	12.0"	in	179cm	5.25 x/4		5.0 x/4	
				3.5 x/4		6.0 x/4	
				3.5 x/4		5.0 x/4	
3^{35}	20.0"	in	179	3.25		5.25	
3^{40}	30.0"	"	"	3.75		4.5	
3^{47}	40.0"	"	"	5.0		6.0	
3^{55}	50.0"	"	"	4.25		6.75	

at ~~59.~~ 56.59" top of top tamper is even with outside water ht.

4^{00} P.M.	56.59"	in	179cm	5.5		6.0	

12

Annuli

4/7/54 Outside diameter = 10"; Inside dia. = 4"
Fox H₂O reflected; no top tamper.
Cross
Gilley

	fuel ht.	source	safety	C_4		C_5	H_2O
11⁰⁰ A.M	0.0"	in	up	210 x16		183.5 x16	73
	3.31"	"	"	206.5 x16		172.5 x16	
11¹²	9.13"	"	"	254	.83	228.5	.80
11¹⁶	9.84"	"	"	452	.465	378	.485
11²⁹	10.09"	out	out	just critical			

NOTE: The above run is completed on page 84.

13

4/7/54 Outside dia = 10"; inside dia = 4"
Fox H₂O outside and inside 4" cylinder
Cross no top tamper. H₂O ht. > 100 cm. (from bottom of "Big Sid")
Gilley

	fuel ht	source	safety	
1¹⁵ pm	8.43"	out	up	just critical
1³⁰ P.M.	8.86"	out	up	just critical

H_2O ht. = 50 cm from bottom of "Big Sid".

1⁵⁰	10.02"	out	up	just critical

H_2O ht. = 45 cm from bottom of "Big Sid".
Equal ht. interpolated to 23.75 cm from bottom of reactor.

14

4/8/54 10" outside dia.; 4" inside dia.; Cd inside
Fox 4" dia. cylinder; H_2O outside and inside
Cross H_2O ht. = 70.5 cm from bottom of "big bid".
Gilloy fuel ht. source safety
17.69" out up just critical
9:25 H_2O ht. = 69.0 cm from bottom of "big bid".
17.92" out up just critical
Equal ht. interpolation = 45.43 cm.
H_2O ht. = 54.1 cm from bottom of "big bid".
10:30 AM. 12.57" out up just critical
Here there was no H_2O inside 4" dia cylinder.

15

4/8/54 10" outside dia, 4" inside dia. H_2O and Cd
Fox in inside cylinder to ht. of 48".
Cross Bare outside
Gilloy

	fuel ht.	source	safety	c_4	M_4^{-1}	c_5	M_5^{-1}
2:40 pm	~~27.58"~~ 27.56"	in	up	140.0 x 64	.945	107.0 x 64	
3:00 pm.	39.95"	"	"	140.5		109.0	
3:05	48.04"	"	"	145.0	.90	109.25	
	18.5"	"	"	139.25	.95	109.5	
3:30	6.46"	"	"	131.75		104.75	

4/9/54
Fox
Cross
Gilley

10" outside dia, 4" inside dia.
No reflector outside; H_2O only inside to a ht. of 48"

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
9 40 A.M.	0.0"	~~out~~ in	up	122.0	x64	100.25	x64
9 50	15.10"	in	up	156.75	.78	130.0	.77
10 00	36.08"	in	up	198.5	.615	164.5	.61
10 08	40.12"	"	"	208.75	.584	170.75	.587
10 18	47.00"	"	"	221.0	.552	174.5	.576
10 34	56.10"	"	"	232.0	.526	186.25	.536

Exp. #16

10" outside, 4" inside
bare outside; H_2O only inside

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EUGENE DIETZGEN CO.
MADE IN U. S. A.

17

4/9/54 10" outside dia., 6" inside dia.
Fox H2O outside, nothing (air) inside.
Cross
Gilley

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
2 50 pm.	0.0"	in	up.	36.0		35.0	
3 00	18.03"	in	up	58.25		50.0	
3 05	26.75"	"	"	192.25		147.0	H_2O = 85 cm above bottom of "big sid".
	26.75"	"	"	111.25		93.75	H_2O = 100 cm above "big sid"
3 25 pm.	30.24" = 99.8 cm	out	up	just critical with water ht. = 100.2 cm above bottom of "Big Sid".			

18

10" outside; 6" inside: H_2O inside & outside
System scrammed ~~due~~ by DC-3. Water ht. was 90 cm from bottom of big sid and fuel ht. was ~~[illegible]~~ 25.28" or within 1 cm of H_2O ht. and system was very near critical (maybe slightly super)

1.8 (cont.)

	fuel ht.	source	safety	H_2O	
4/12/54	24.83"	out	up	89.6 cm	just crit.
9 45 AM.	25.23"	"	"	88.0 cm	" "

Interpolated crit. ht. = 64.13 cm.

19

10" outside; 6" inside; H_2O outside & inside with 48" Cd inside: H_2O ht. = 148.4 cm

	fuel ht.	source	safety	C_4	M^{-1}_4	C_5	M^{-1}_5
11 08	48.10"	in	up	11.75	.749	22.0	.66
	"	"	"	11.5	.766	20.25	.716
11 12	40.0"	"	"	12.25	.718	20.5	.708
11 18	35.0"	"	"	11.25	.782	19.75	.734
11 23	24.95"	"	"	10.25	.858	16.0	.907
11 28	9.88"	"	"	7.0		17.25	.841
11 30	0.54"	"	"	8.5	8.8	13.75	14.5
11 35	"	"	"	9.0		15.25	

BATCH NUMBER	REQUISITION NUMBER
	Nº 215385

4/1.

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution containing impurities of Fe, Cr, Ni, etc.

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.251920
Spec. Gravity	1.4115

SIGNED:

BY:

DATE APR 19 1954

4/12/54 Sample taken: Reg. # 215385

Gross 107.1337 Bottle # U-19

Tare 19.4839

Net 87.6498

Density of Concrete Blocks

21.9 wgt in air .3314 gm U235/cm³

11.7 " " H_2O

10.2

$\frac{21.9}{10.2} = 2.14$

$2519 \times .1298 = \frac{327}{673}$ 1000

$H/X = \frac{24.11 \times 673}{.2348} = 748$

20

4/14/54 10" outside, 6" inside. H_2O outside, Cd only inside (no H_2O inside).

Fox
Cross
Gilley

	fuel ht.	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}	H_2O
9 42 AM	48.25"*	in	up	12.75 -x16		19.25 -x16	.883	146cm
9 50 AM	39.99"	"	"	11.0	-	18.5	.92	"
9 55 AM	34.98"	"	"	11.5		18.5	.92	"
	24.91"	"	"	11.0		16.5		
	10.0"	"	"	11.5		17.0		
10 12	0.54"	"	"	11.25		17.75		

* Probe zeroed after this run and found to read 0.37" too high i.e., at 0.0" fuel level probe read 0.37".

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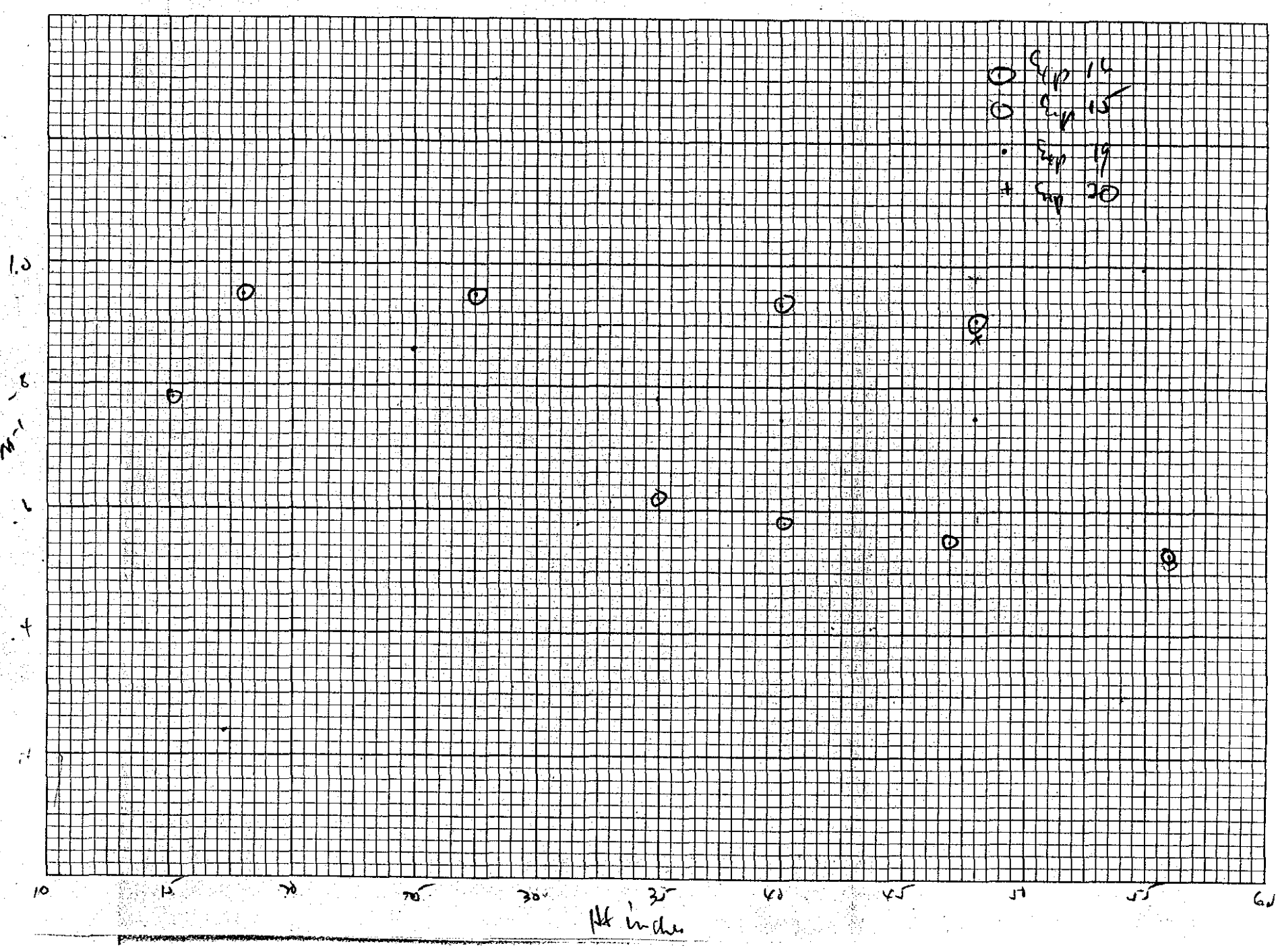


Slug Experiments

1

4/21/54 12" s.s. reactor; 35 slugs 1.35" in dia. spaced 0.4" edge to edge in hex. array

For Gilley

3 30 p.m.

H_2O	C_4	C_5
Full {sight glass read 235 cm	34.5 ×256	32.0 ×256
210 cm	35.0	31.5
178 cm	34.0	30.0
138 cm	32.5	28.75
88.0(?) ~~68.5~~	31.5	25.25
55.0	29.0	23.0
0.0 cm	29.0	23.0

2

12" s.s. reactor; 31 slugs 1.35" in dia. spaced 0.6" edge to edge in hex array

H_2O	C_4	C_5	
240 cm	35.5 ×256	32.5 ×256	source outside
240 cm	245.0 ×256	239.25 ×256	source in center of reactor
	M=3.5	M=3.5	
240 cm	70.25	67.0	source in center of reactor (same as above) 3 slugs in reactor for background

For slug experiment # 1 the following slugs were used

9019
#2
8
9021
1
2
3
4
5
9031
1
2
3
4
9040
2
3
4
5
7
8

9053
1
2
3
4
9034
1
2
3
4
5
6
7
9037
2
3
4
~~9044~~
~~4~~
9053
1
2
3
4

9044
4
2
8
9081
1

For Exp. #2 the following slugs were removed
9044
4
9034
3
4
9031
3

5-4-54
Harness
FOX

#3 S Lug Expt.

15" Dia. by 8 ft high S.S. cylinder containing 55 - 1.35" Dia. AL-U alloy rods in Hex. Lattice. Edge to Edge distance = .40"

Source outside reactor

Time	Water ht.	C_4	C_5 -
9 54	44 cm from floor	78.5 (5 min)	269
		[31.4] 2 min	[176] (2 min
10 14	62.3	38.5 " .81	139 " —
10 24	106.7	60.25 .52	221 .80
10 43	269 (full)	70.33 .446	258.2 .68

Source near center of reactor ~ 10" from bottom:

			44.0 x 256
	0	54.0 x 256	184.0 x 64
11 14	66	159.8 "	601.6 "
	"	"	150.4 x 256
	full	363.3 .44	345.0 .436

over

64 Rods used in Expt #3

1	9053-2	9044-2	9019-3
2	9044-4	9021-3	9037-4
3	9021-5	9053-3	9021-4
4	9031-1	9021-1	9021-2
5	9049-3	9040-8	9043-1
6	9020-2	9044-8	
7	9047-2	9034-1	Rods Removed for Expm't #4
8	9047-1	9042-1	9044-4
9	9047-4	9053-1	9053-2
10	9040-5	9049-2	9021-5
11	9043-2	9037-3	9031-1
12	9042-4	9053-4	9049-3
13	9034-7	9042-2	9020-2
14	9034-3	9020-1	9047-2
15	9020-3	9043-3	9043-2
16	9040-4	9019-2	9042-4
17	9031-4	9034-2	9020-3
18	9047-3	9040-7	9034-4
19	9034-4	9042-3	9040-4
20	9050-2	9040-1	
21	9040-2	9050-3	
22	9040-3	9031-2	
23	[redacted]3	9031-3	
24	[redacted]	9020-6	
25	9034-6	9037-2	
26	9037-1	9034-5	

Expt #4 15" Dia Cyl

Same as Expt #3 except spacing was .60" edge to edge on hex. lattice

Total 43 rods source outside

Time	water ht	C_4	C_3
2:55 PM	60 cm	37.3	31.94
3:10 "	267 cm	84.6	79.5

Moved source to near center vert. & ~10" up from bottom

322	~66 cm	174.2	160.3
	~210	503.5 ,35	470.3 .34
	269	509.8 ,344	474.0 .338

List of rods used on opposite page. Used 43 rods.

66 5-5-54
Harness
704

Expt # 5 15" Dia. Cyl.

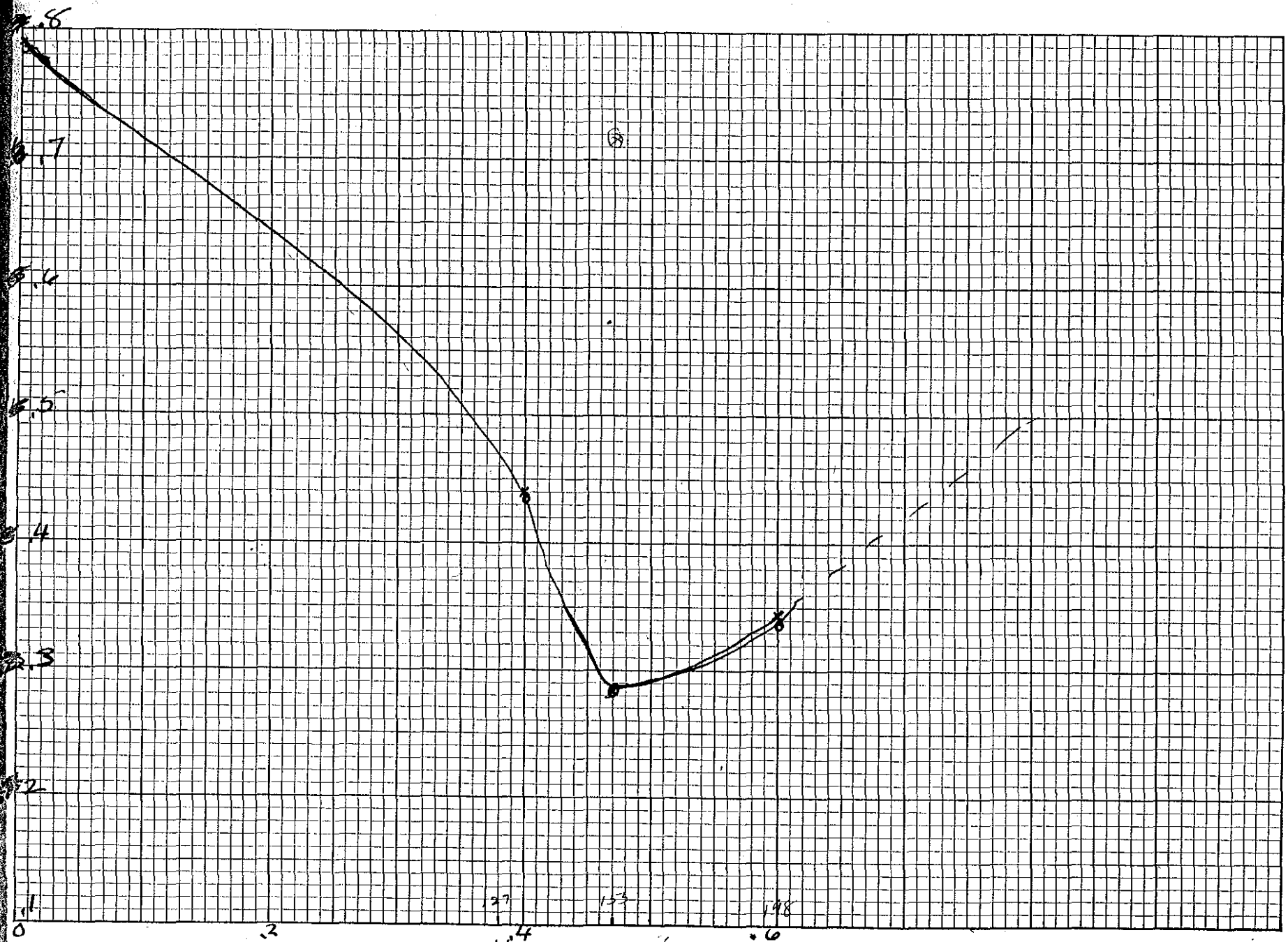
55 - 1.35" Dia Rods, Hexagonal spacing
.47" edge to edge distance

Source ~ 10" from bottom near center vertically

Water ht.	C4		C5	
66 cm	145.4		14[illegible]	
202	505.8	(287)	495.0	.29
207 full	514.1	(283)	500.8	.28[illegible]

Rods used same as in Expt #3

359-5DG KEUFFEL & ESSER CO.
10 × 10 to the inch, ½ in. lines accented,
MADE IN U.S.A.



had 2nd roll on top (~ 6)

Harmen
Fox
5-5-54 approx 96*

Expt # 6 . . 15" Dia. Cy 67

- Rods close Packed

Source in center ~10" up

Water ht	C_4	C_5
66	111.2	98.8
~270 full	141.7[illegible].79	126[illegible].785

* All the rods we received. Some short rods had 2nd rod on top (~6)

5-7-54

Harmer
Rohrer
Cronin
Fox

Expt. #7

Stainless steel Cylinder 20" in Dia., 8' long
Al-U rods in Hex Lattice - Edge to Edge distance 0.5". Source on the outside

Reactor zero water level 44.5 Cm. on Side Tg
76 full length rods, and 3 seven foot rods used

Time	Water Hght.	C_4	C_5
1:00 PM	50 Cm.	53.1	50.8

Critical at ≈ 60.5 cm (From Floor)
≈ 16 cm

Removed 16 rods from outer Edge. Total 63

Time	Water Ht.	C_4	C_5
2:10 PM	50.7 Cm	36.28	34.65

Slightly Super Critical at 92.7 Cm from floor
≈ 48.2

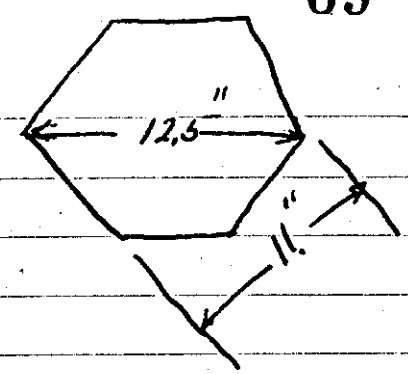
Removed 14 rods. 49 Left.

3:25 PM 97.5 cm Critical
≈ 53.0 "

3:48 PM. 26 rods remaining in center
3:58 Very little multiplication @ 232 cm. water
Log N showed ~~[illegible]~~ No rise from 3:53 to 3:58

5-7-54

37 rod hexagonal
Very little Multiplication
at 242 Cm.



Added 6 rods. Total 43

Critical at ~ 125 cm
44.5
80.5

5/10/54 9:25 AM — Removed 3 rods – Total 40 rods
Critical at 192 Cm

9:35 AM — Removed 1 rod — Total 39 rods

	C_4	C_5
~~194~~ 65 cm H_2O	27.2	24.1
194	109.7	112.8
227	233.7	249.8
239	394.2	422.1
247	735.2	839.1

Critical at 257.5 cm

over

List of rods used in last run

			wt
9020-1	6444	9031-4	6314 gm
9034-5	6323	9045-3	6290
9043-3	6271	9046-1 → (9106-1)?	(6315)
9047-1	6400	9041-3	6165
9019-2	6397	9034-4	6483
9031-3	6370	9047-2	6183
9049-2	6123	9040-4	6349
9019-8	6378	9042-2	6316
9040-5	6323	9019-1	5884 short
9046-5	6348	9053-1	6353
9032-3	6330	9032-2	6318
9045-2	6255	9050-3	6342
9040-8	6421	9047-3	6230
9040-2	6297	9044-2	6404
9049-3	6248		
9037-3	6254		
9021-4	6333		
9038-1	6241		
9031-1	6261		
9047-4	6403		
9053-4	6246		
9037-4	6211		
9020-2	6416		
9038-2	6226		
9046-3	6355		

5-12-54
Cronin
Fox

Expt # 8

8" x 1.35" Dia. J SLUGS

600 Thrown Randomly into a 15" Dia S.S. Cylinder
Filled to ~ 7' 10"
Source in Vertical Axis ~ 10" up
from bottom

Water ht	C_4		C_5	
66 cm (from floor)	178.9		167	
247 full	246	.724	226	.716

corresponds to a regular spacing
of ~ ½" in slug vs water ratio

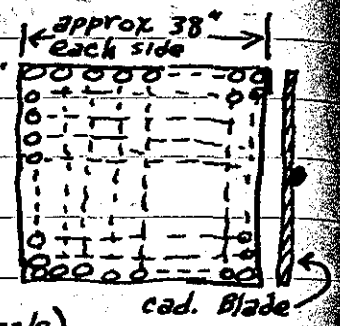
72
Harness
Fox
Cross

EXPT. #9

PART "A"

May 13, 1954

600 slugs in one tier, close packed
Square ~~edges~~ geometry



Approx. ½ of slugs were 8.0" long, rest were 8.25" and 1.35" in Dia.
Source near center of array

zero water level is flush with top of Plastic table (zero on "back" scale)

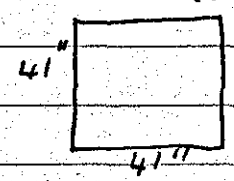
Time	Water Ht.	C_1	C_2	C_3
3:30 PM	1.5 cm from "zero" level	3.7	8.0	3.3
3:45 PM	40.3 cm	4.75	10.7	~~[illegible]~~

not critical

"PART "B"

May 14, 1954
9:00 AM

Added 400 slugs – total 1,000 slugs in array
square edges



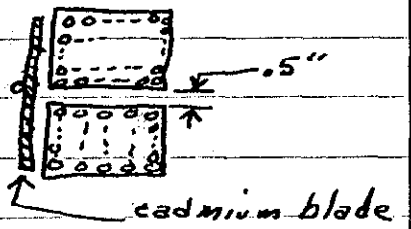
Water ht. above zero level	C_1	C_2	C_3
5.3 cm	3.75	3.8	5.5
41.0 cm	4.7	6.2	

not critical

PART "C"

10:10 AM — Array same as previously except divided into two equal sections with ½ inch between sections

Top Harness Cross



	water ht above zero	C_1	C_2	C_3
10:15	2.3 cm	4.0	6.0	~11.0
10:33	40.8 cm	4.9	6.5	21.0

made no appreciable difference in multiplication

NOT CRITICAL

PART "D"

12:50 PM — Cylindrical outer Edge, 32" dia average, 1000 slug array of two tiers. Each slug of top tier was placed directly on top of a ~~each~~ slug on the lower tier. Source near center within lower tier

Top Harness Cross

water Ht above "0" level	C_2	C_2	C_3
5.0 cm	3.5	4.75	8.75
62.2 cm	4.75	5.0	25.0
	.42	.52	.29

PART "E"

Removed 100 slugs from each tier — Array left cylindrical — Source left undisturbed

2:35

water ht.	C_1	C_2	C_3
62.8	3.75	5.75	18.25
	.53	.45	.40

5-14-54
Harmen
Crose
Fox

Expt #9 Continued

Part F

Removed 100 slugs from each tier
Remainder in form of cylinder in
outline, 600 remaining. Source unchanged

	Water ht.	C_{12}	C_{21}	C_3
3:00	62.5 Cm	3.25	3.75	14.5
		.61	.69	.50

Part G

Removed another 200 — 400 total remaining
in form of a rough cylindrical array of
two tiers. Source remained unchanged

	water ht.	C_1	C_2	C_3
4:15	63.2 Cm	2.6	2.9	11.0
		.77	.90	.66

Part "H"

Removed another 200, the remaining 200
still in shape of rough cylinder as before.
Source in center of array

water ht.	C_1	C_2	C_3
62.3 Cm	2.0	2.6	7.3

Extrapolated critical Number
is between 1500 & 2000

Expt #10

Hexagonal Array ½" Edge to Edge

5/17/54 Two tiers - 61 slugs per tier (TOTAL 122) - Source in center of array. Zero water level flush with top of table. Slugs 8.0" long & 1.35 in Dia.

Time	Water ht. above Zero level	C_1	C_2	C_3
12:45 PM	9.4	2.0	2.9	4.2

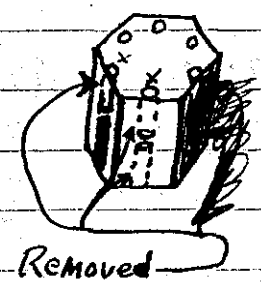
NOT CRITICAL AT 61.4 CM.

1:15 Added 6 slugs - total 128 slugs - (1 to each tier on every other side of Hex. making a symmetrical array)

CRITICAL AT 44.0 CM.

Removed one each of double tiers & one single tier making total of 125 slugs in array

1:30 CRITICAL AT 45.5 CM.



(over)

Removed 1 double tier - Total Remaining 123 slugs

CRITICAL AT 47.2 CM.

2:55 Removed one slug - Back to original Hex. of 122 slug Array to check again for criticality.

2:00 CRITICAL AT 49.5 CM.

The difference between the results of this Repeat EXP. and the first part of this EXP. was due to Air bubbles within the Array. The "water dump" switch was jogged to clear the Array of Air bubbles which resulted in latter being critical and the former sub-critical

2:10 Removed one slug from top tier. - TOTAL 121

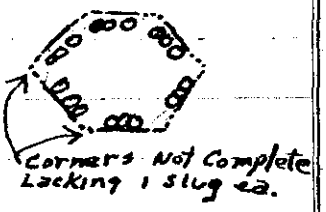
At 63.0 CM the Array was SLIGHTLY SUB-CRITICAL

EXP. # 11

5-17-54

Hexagonal Array of two tiers of 55 slugs per tier – total 110 slugs. Edge to Edge distance 0.6 inches

3:55 SUB-CRITICAL AT 62.5 Cm.



4:00 One slug Added to each tier At Corner of Array – Total 112 slugs

CRITICAL AT 46.1 Cm.

4:10 Removed one slug from corner. (Top tier). Total 111 slugs.

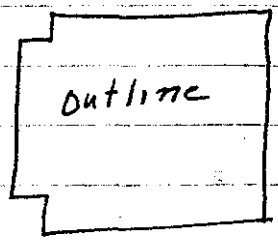
4:18 CRITICAL AT 47.8 Cm.

78
5-18-54
Rohrer
Fox

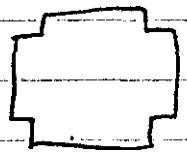
Expt #12
5/8" Edge to Edge Square Lattice
Two Tiers

1st Array 8x8x2 — 4 Slugs.
Total - 124

water ht	C_1	C_2	C_3
13.2 cm.	3.75	4.5	7.75
39.	Super. crit.		

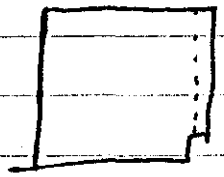


2nd Array 8x8x2 — 10 From corners
Total 118



40.5 cm Critical

3rd Array 8x7x2 - 2
Total 110



43.6 Critical

4th Array 7x7x2 + 8 centered
Total 106

45.6 cm Critical

3-18-
Harm
Fo

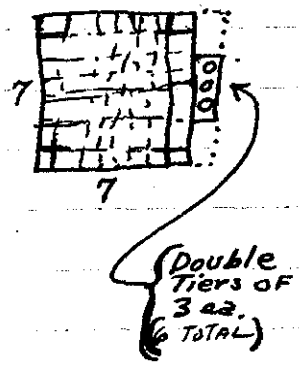
5-18-54

Harness, Cross
Fox

5th Array

Total 104 slugs - 7x7x2 + 6 centered on one side

49.6 cm. Super Critical



6th Array

Removed One of the six slugs

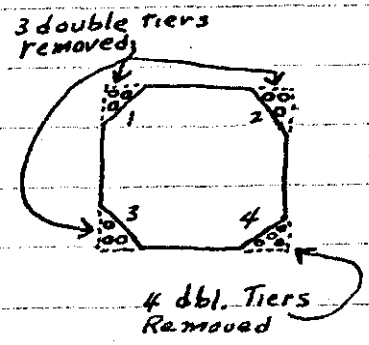
Total 103 slugs (7x7x2 + 5)

SUB-Critical

7th Array

3 double tiers removed from 3 corners (6 slugs total), & 4 double tiers removed from the remaining corner. (Total 48 slugs) Total remaining slugs - 102

CRITICAL AT 47.4 Cm.



8th Array

Removed 1 slug from above array

Total 101 slugs

CRITICAL AT 63.5 Cm.

100 would definately be sub-critical

5-18-54
Harmen
Cross
Fox

Expt #13

3/4" Edge to Edge Hexagonal Array
Paper patern used for spacing

1st Array:
55 Doube tiers in a hexagon with corners out. Total 110

Critical at 41.5 cm

2nd Array:
Removed 8 slugs as nearly symmetrical as possible. Total 102 slugs

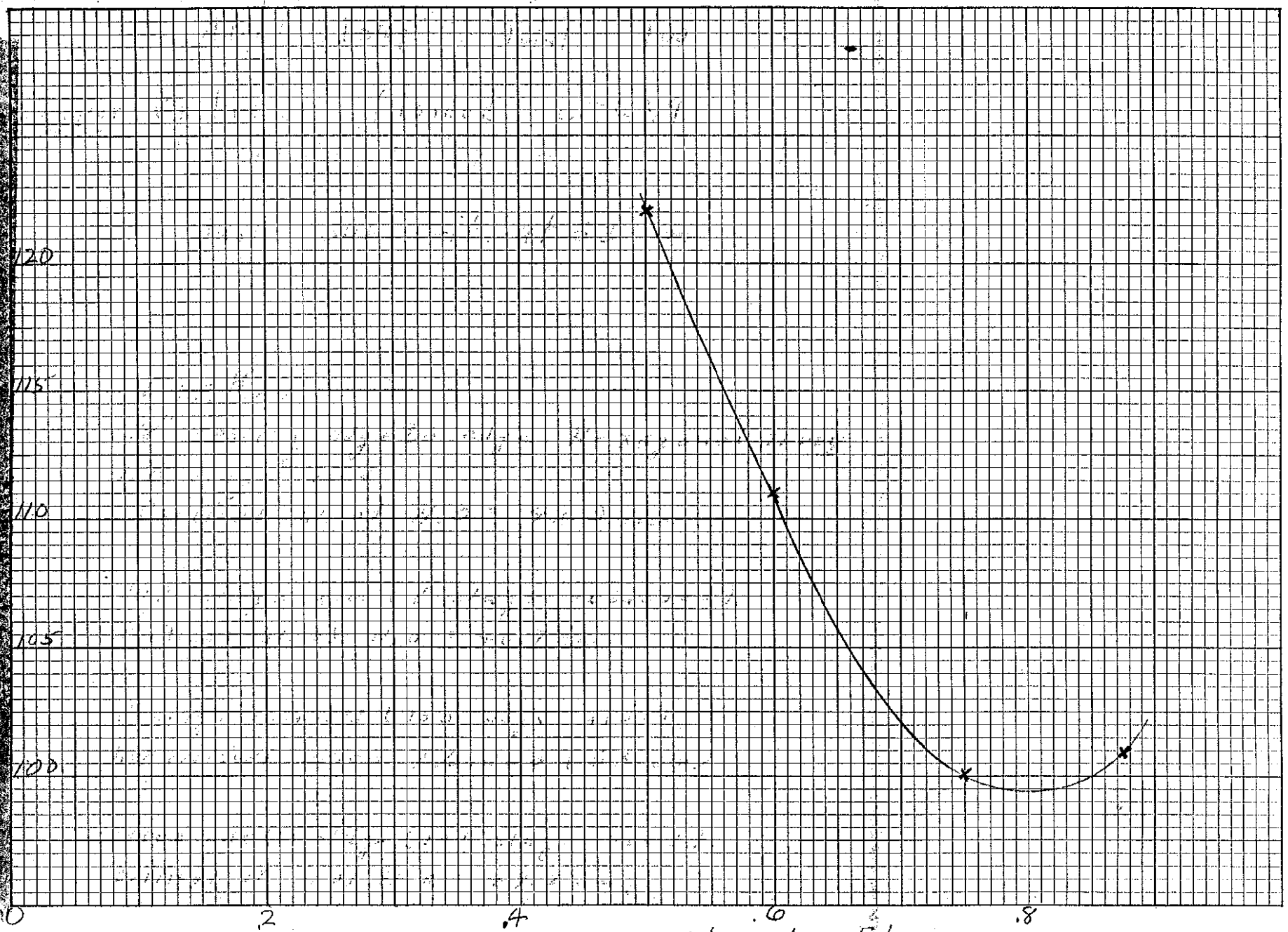
CRITICAL AT 45.9 Cm.

3rd Array
Removed 4 slugs making the array symmetrical. Total no. of slugs - 98

NOT-CRITICAL (at 62.5 cm)

4th Array:
Added 1 slug -- Total 99

Not critical at 63 cm



Hex. Spacing Edge to Edge in inches

359-50G KEUFFEL & ESSER CO.
10 X 10 to the inch. ½ in. lines accented.
MADE IN U.S.A.

5-18-54
Harmen
Cron
Fox

5th Array:
Added 1 slug Total 100

Super Critical flooded at 63.9
Still critical at 54.7 upon slow drain of water.
Just sub-crit. at 53 cm

Exp. #14
7/8" spacing edge to edge. Hexagonal array
110 slugs used
Critical ht. of H_2O = 42.0 cm

102 slugs now (8 slugs removed).
Critical ht. of H_2O = 46.7 cm

2 slugs removed (100 slugs used).
not critical when flooded (63 cm)

added one (1) slug (101 slugs used).
critical at ht. of H_2O = 49.2 cm.

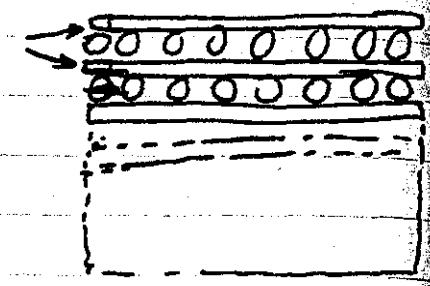
82
Gilley Crow
7-X
5-21-54

Expt # 15

Square spacing, Square Edges
Wood Spacers in one direction

1st Array 3/4" Edge to Edge; 8x8x2 = 128

(used 3/4" Pine Plywood) Wood



Little Multiplication
at 63 cm

2nd Array: 9x9x2 = 162

Not critical at 63 cm.

3rd Array: 9x10x2 = 180
18 slugs outside wood spacers

Critical at ~ 40 cm

4th Array: Removed 8 slugs
Total = 172

critical at 45.3 cm

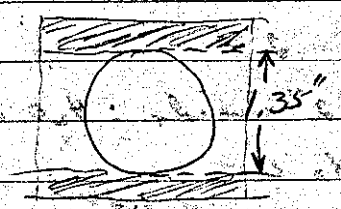
5th Array: Removed 6 : Total 166

critical at 48 cm

6th Array: Removed 2: total 164
Critical At 50.0 Cm.

7th Array: Removed 2: total 162
Not Critical At 63.4 Cm.

Plywood used was given one thick coat of Glyptal Varnish. There was some evidence of water getting thru the varnish - as indicated by swelling.



Lattice Area $= (2.1)^2 = 4.42$ sq. in
Wood " $= 2.1 \times .75 = 1.575$ " "
Slug " $= \frac{3.14 \times (1.35)^2}{4} = 1.435$

Total A. - slug A. = 2.985 □"

Wood fraction of Moderator $= \frac{1.575}{2.985} = 52.8\%$

This is completion of run 12 on page 64

Annuli (cont.)

5/24/54 Fox Cross Gilley

10" outside, 4" inside:

fuel — H_2O

1:30 10.57" just critical — 56.8 cm

10.88" " " — 50.7 cm

Interpolated equal height = 27.56 cm

2:00 Note: Sight glass checked and found to read accurately (± 3 cm). Also bottom of reactor (10" al. annuli) measured 23 cm. from bottom of big Sid. S.W.S.

5/25/54 Fox Cross Gilley

21

10" outside; 2" inside: H_2O outside, air inside

fuel ht. — H_2O

7.42" — 48.5 cm just crit.

10:15 AM 7.82" — 41.3 cm

Note: H_2O measured from bottom of big Sid; fuel measured from bottom of reactor.

Interpolated equal ht. = 20.65 cm

5/25/54

22

10" outside; 2" inside: Completely bare

fuel ht.

2:10 P.M. 19.52" just crit.

23

5/26/54 10" outside; 2" inside: bare outside, cd only inside.

Fox
Gross
Gilley

fuel ht

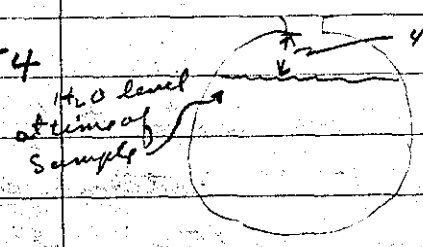
9:15 27.55" just critical

24 H_2O outside; cd only inside

	fuel ht.		H_2O
9:55	7.86"	just crit.	50.2 cm
	8.04"	" "	43.9 cm

Interpolated equal height = 2014 cm

6/3/54



H_2O sample taken from reflector tank 11:00 a.m. by D.F.C. -

Req. # 215389

Results of sample - .3 ppm

Special Exp. for Accident data

6/4/54/
Rohrer
Fox
Cross
Gilley

Reactor {10" outside dia; 2" inside dia} and pump well washed out with 10 liters H_2O. The 2" dia. cylinder was secured in the position into which it fell when the accident occurred on 5/26/54. The bottom of the 2" cyl. is in center of 10" cyl. and top of 2" cyl. is against outer edge of 10" cyl.

2 20 P.M. Instruments Checked

Channel	Trip
DC-3	85 100x1
R-1	set at .8 full scale
Log N	20 sec. p.
P.M.	2"

Elephant gun put on motor #1. when #1 system reads 177.8 bottom of safety rod is 28" from bottom of reactor.

	Fuel ht	Source	C_F x256	n	C_S x256		Safety
2 41 P.M	0.03"	in	26.0		21.75		up
~~2 55 P.M.~~	~~5.94"~~	~~in~~					"
3 01 P.M	10.04"	in	31.75	.82	27.25	.80	"
3 09 PM	25.00"	in	58.75	.45	48.75	.45	"
@ 3:15	28.00	Stopped feeding to check position of safety rod. Bottom almost in contact with solution.					
(Raised rod to 181.8 to limit)	3:20	Drained back from ≈28" to 22.4" to remove plastic length in rack (≈12")					

3:25 lowered safety to 177.5

~~33~~	fuel	source	e_4	M_4^{-1}	C_5		safety
3^{31} PM	29.21"	in	94.0	.275	92.5	.30	up
3^{38} PM	31.91"	"	160.25	.162	123.5	.176	"
~~3^{45} PM~~	~~33.23"~~	~~"~~	~~338.75~~	~~.077~~	~~254.0~~	~~.086~~	Instruments not level
3^{48}	33.23"	"	368.75	.071	273.5	.079	up
4^{01} PM	33.81"	"	762.5	.034	555.25	.039	"
4^{05}	33.81"	"	769.25		560.25		"
	34.22"	out	sub critical				"
	34.25"	"	slightly sub				"
4^{13} PM	34.26"	"	slightly super				"

fuel drains back slowly due to leaky valve

4^{16} Safety dropped manually

4^{18} Source put back in system

4^{18}	34.19"	in	no count ~~235.0~~	235.0		in

6/8/54 Special timing Exp. on safety dump.
#1

Gilley
Fox
Rohrer
Cross
Harness

The purpose of this exp. is to determine the time that elapses from the time the scram ~~button~~ is pushed until the solution level begins to drop. Timing is to be done by a standard clock which reads to 100th of a sec. The clock is electrically connected so as to begin recording when the scram button is pushed in and to stop recording when the solution level indicator probe breaks contact with the solution. The probe breaks contact after the solution drops approx. 0.03". note: probe was set to break contact .01" below of soln.

Time	fuel ht.	sylsen setting
.94 sec.	6.055"	6.07"
1.02 sec.	6.135"	6.15"
1.00 sec.	6.045"	6.06"

Avg 0.99 sec

note: sylsen setting here means soln. level was measured then the probe was raised ~.02" to reduce time of breaking contact.

time	fuel ht.	sylsen setting
12 ~~48~~ P.M.	~~24.16"~~	
.87 sec.	24.15"	24.17

fuel level after reset 22.60". Reset took ~ ~~[illegible]~~ ~.2 sec. This means that the fuel level droped from 24.15" to 22.60" in about 0.2 sec.

0.87
0.81
avg = 0.84 sec
at 24"

time	fuel ht	sylsen reading
.805	24.06"	24.08"

6/8/54
Fox
Cross
Gilby
Rohrer

#2

In this experiment the fuel dump valve will be opened by operating the manual dump switch instead of the scram buttons. This method of scramming by-passes three (3) relays. Otherwise this experiment is essentially the same as #1

2^00 p.m.

time	fuel ht.	sylsen reading
.822 sec.	6.09"	6.11"
	6.035" → after reset ~ 0.1 sec. later	
.945 sec.	6.035"	6.05"
	5.87" after reset ~ 0.1 sec later	
.938 sec	6.075"	6.09"
	5.925 after reset ~ 0.1 sec later	
.937 sec	6.08"	6.10"

avg = 0.947 sec

#3

6/8/54 This experiment is essentially the same as #2 with the following exception. The air vent line leading from the dump valve to the electrical valve which controls it has been shortened ~4' (to ~1').

Fox
Rohrer
Cross
Gilley

4 [illegible] PM

time	fuel ht.	sylsen reading
.674 sec.	6.09$\underline{5}$"	6.11$\underline{5}$"
.716 sec.	6.11"	6.13"
	~~5.96$\underline{3}$"~~	~~5.98$\underline{3}$"~~
4 [illegible] P.M. .697 sec.	6.09$\underline{4}$"	6.11$\underline{5}$"

6/9/54 9 [illegible] A.M. The air pressure reducer valve, which feeds air to the safety dump valve, was replaced and the air pressure reduced to 26 lb.

Rohrer
Gilley
Fox
Cross

#4

This experiment is essentially same as #3 except less air pressure is applied to safety dump valve.

9 [illegible]

Time (sec.)	fuel ht.	sylsen reading
.287	6.10$\underline{8}$"	6.12$\underline{5}$"
.446	5.94"	5.98"
.553	6.08"	6.10"
	5.97"	5.99"

10 [illegible] NOTE: A check of the air pressure shows

that the air pressure was greater than 30 lb. and had apparently gone up during the experiment.

Air pressure now reduced again to 25 lb.

time	fuel ht	sylsen reading
.312	5.97"	5.99"
.410	6.08½"	6.10½"
.407	6.01"	6.03"

5

This exp. is to determine the time of valve operation at ~24" fuel ht. and 25 lb. pressure.

time	fuel ht	sylsen reading
.372	24.09	24.11

6/9/54 # 6

This exp. is to determine rate of fall of solution. This is to be done by lowering the probe ~2" in solution and record the time taken for the sol'n. to fall this distance.

Rohrer
Gilloy
Fox
Cross

	time	fuel ht	sylsen reading
10 20 A.M.	2.972 sec	23.94"	21.98"* → no reading: dump well full
		24.10"	19.12 → no reading: dump well full.

*This gives a 2.0" drop of fuel.

6/9/54 #6 (cont.) dump well drained

	time	fuel ht.	sylsen reading
10 45 A.M.	2.044 sec.	23.95"	18.97"
12 35 P.M.	2.705 sec.	24.10"	19.12"
	1.87 "	24.13"	19.15"
1 10 P.M.	1.82 "	24.14"	19.16"

(10) 191

#7

6/9/54 This exp. same as #6 except fuel to be droped one (1") inch

	time (sec.)	fuel ht.	sylsen reading
1 45 P.M.	.915	24.14"	23.16"
Fox	.92	24.12"	23.14"
Cronin			
Gilley			
cross			

#8 ~~The purpose of this~~ Same as #7 except fuel to be droped 3".

	Time	fuel ht.	sylsen
2 15 P.M	1.52	24.20"	21.22

NOTE: After the last experiment the solution was allowed to fill the dump well (soln dump valve was not reset) and the fuel ht. was measured to be 4.35" in reactor when soln. stopped draining.

2^{25} PM ht fuel into dump = 19.85" = 24.55 Liters of solution

6/9/54 NOTE: Sol'n in container ~~L-1~~ L-5 is wash solution from dump well when reactor and dump well were washed out after "accident".

6/18/54 The following Samples were taken:

Sample from dilute washings (in big drum) from "big sid" after accident.

Batch # A-1 Req. # 215392

Sample # 6824

Gross 525.850

Tare 284.940

Net 240.910

Other dilute 95% washings in drum

Batch # B-1

Sample # L-850 Req. # 215393

Gross 481.435

Tare 289.470

Net 191.765

Sample from washings from reactor and dump well after accident

Batch # L-5 Req # 215394

Sample # N-122

Gross 134.4150 Batch Gross ~~12275~~ 12275

Tare 96.9134 Tare 1958

Net 37.5016 10317

[illegible]	[illegible]
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Dilute Washings of UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	~~.084840~~
	.00848

SIGNED:

BY: DATE JUN 23 1954

B-1	Nº 215393
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Dilute Washings of UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.000260

SIGNED:

BY: DATE JUN 24 1954

[illegible]	[illegible]
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
Dilute washings of UO_2F_2

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.000077

BY: DATE JUN 24 1954

6/24/54 Annuli Experiments cont. #25

10" outside dia.; 2" inside dia.

Gilley H_2O reflected, H_2O and Cd. in inside cylinder

Fox Instrument Check:

DC-3, trip at scale reading of 95 on 100 x 1

R-1,

Period trip – O.K.

P.M. trip with source ~2" from crystal

C_4 + C_5 O.K.

Source checked for operation – O.K. S.W.F.

Safety rod checked for operation – O.K. S.W.F.

2:00 P.M. Safety rod is now ~ 40" ~~top~~ below top of reactor ∴ ~32" from bottom. Elephant gun can be raised 20". Safety drive selsyn reads 39.5"

3:15 P.M. Fuel dumped due to 30 sec. period. May have been caused by weak valve on tank B-3 thus feeding soln

	fuel ht	H_2O ht.*	Source	Safety	
3:45 pm	7.98"	50.4 cm	out	up	just crit.
	8.26"	44.1 cm	"	"	" "

Interpolated equal ht. = 20.51 cm.

* from bottom of "big Sid".

6/25/54 Annuli exp. completion of # 24

Fox 10" outside, 2" inside dia. H_2O and Cd. inside

Cross 2" cylinder; bare outside

Gilley 8 30 Instrument check:

DC-3 trip @ 95 on 100x1

P.M. trip @ ~ 1"-2" from crystal

R-1 trip @ ~ .6 on 500 scale

Log N trip o.k.

Source checked o.k.

Safety set

	fuel ht	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
8 56 A.M.	1.2"	in	39.5*	53.0 x64 } 52		51.5 x64 } 50.5	
8 58	"	"	"	51.75		50.0	
9 05	10.12"	"	"	68.25	.763	67.75	.745
9 11 A.M.	20.01"	"	"	100	.52	106.5	.475
9 27	29.82"	"	"	163	.32	180	.28
9 35 A.M.	35.03"	"	49.5	227.25	.23	258.5	.195
9 44 A.M.	40.02	"	"	339	.154	384	.132
9 53	45.0"	"	60.0	579	.09	658	.077

10 15 Probe shortened at this point by taking one ~~sd~~ section of the al rod out. Fuel ht. measured before probe shortened = 45.05". After section taken out selsyn reads 7.32", ~~∴ 7.32" on selsyn = 45.05" fuel ht.~~ before safety blade was raised. After safety blade

* See page 95 for explanation of safety setting

was raised the selsyn read 7.23". ∴ 7.23" on selsyn = 45.05" fuel ht.

	fuel ht	source	safety	C_4	C_5
10^{23}	45.05"	in	60.0	513	579.5

This count taken to show decrease in activity at same fuel ht after probe change and safety rod put in and out.

11^{15} System scrammed by R-1 due to trip level being too low.

~~12~~

12^{25} P.M. A new safety rod was put in in place of the previous one to shorten the safety. The new rod is 29.25" long. At a selsyn reading of 60.3 on the safety line, the bottom of the new rod is 8" ~~abo~~ below top of reactor or 64" above bottom.

	fuel ht	source	safety	C_4		C_5	
12^{50} P.M.	40.07"	in	46.3"	309.5		345.5	
1^{10}	45.11"	"	"	502	.10	559	.09
1^{30} P.M.	50.04"	"	"	1132	.046	1271	.04
1^{45}	53.39"	out	46.3"	sub. crit.			
	53.56"	"	"	super crit.			

The solution was drained back and the experiment repeated.

	fuel ht	~~sour~~ source	safety	
3^{00}	54.36 (16.54)*	out	51.3	sub crit.
	54.40 (16.58)	"	"	super crit.

* direct readings from selsyn after change of probe length.

above exp. repeated again because of different values of ~~solu~~ crit. ht.

3:30 fuel ht. source

54.41" (16.59) out just sub.

54.44 (16.62) " just super

Immediately after this run the probe was lengthened in order to re zero it. Fox noticed a little solution on the very end of the safety rod.

3:50 P.M. After checking probe for zero it was found to read accurately (zero unchanged).

4:15 Sample taken from storage manifold.

Sample # P-88 Req. # 354657

6/25/54 → Gross 102.0948 Gross reweighed on

Tare 25.7794 6/28/54 → 102.0871

Net 76.3152 #/U

6/28/54 Sample taken from "hot" solution in stainless steel storage cylinders in vault.

Sample # P13 Req # 354658

Gross 38.2118

Tare 25.7429

Net 12.4689

	354657
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
UO_2F_2 Solution
may contain some
impurities (Fe etc.)

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25397
	.2367
Specific gravity	1.4129 @ 26.0°C
	.3588 gm U/cm³
	.3344 gm U235/cm³

SIGNED:

BY: Bd DATE JUN 30 1954

	354658
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
UO_2F_2 solution
may contain some
impurities (Fe, etc.)

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25190
Sp. gravity	1.4056
	.3541 gm U/cm³
	.3300 gm X/cm³

SIGNED:

BY: Md DATE

6-28-54
Gilley
Fox

Calibration of 5" Y & X Reactor for vol. vs. ht.

1 - Calibration of Y:

1l	- 3 1/8"		15l	39 3/8	39.375
2l	6 1/8	6.125	16l	40 13/16	
3l	9 3/16		17l	42 1/4	
4l	12 3/16		18l	43 5/8	43.625
5l	15 1/4	15.25	19l	45 1/16	45.062
6l	18 1/4	18.25	20l	46 1/2	46.5
7l	21 1/4	21.25	21l	47 13/16	47.94
8l	24 3/8	24.375	22l	49 3/8	49.375
9l	27 3/8	27.375	24l	52 1/4	
10l	30 3/8 (Y begins)		26l	55 1/16	
11l	32 5/8	32.625	28l	57 15/16 → top of Y	
12l	34 5/8	34.625	30l	61 7/8	
13l	36 5/16		32l	68.0	
14l	37 7/8				

2 - Calibration of cross

liters	ht (in.)
2	3 1/8
4	6.0
6	8 28/32
8	11 3/4
10	14 19/32
12	17 1/2
14	20 3/8
16	23 14/32
18	27 7/32
20	32 6/32
22	35 7/8
24	38 29/32
26	41 7/8
28	44 3/4
30	47 5/8
32	50 1/2
34	53 3/8
36	56 10/32
38	59 1/4
40	64 1/2

Annuli Exp. #26

6/29/54 15" outside dia., 2" inside dia.
Bare outside and inside (air inside 2" cylinder)

Fox
Cross
Gilley

Instruments checked:
R-1 — responds to source
DC-3 - trips at 95 on 100 x 1
P.M. - trips at ~ 2"
Log N - trips
Safety checked for operation — o.k.
Source — o.k.
Safety drive reads 38.2 when bottom of safety rod is 30" from bottom of reactor
Check for Personell — o.k.
The air operated valves on the horizontal storage tanks have been adjusted and are to be tried for better operation.

	fuel ht	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
3 17 P.M.	1.95"	in	38.2	52.25		50.5	
	6.00"	"	"	122.0	0.428	127.75	0.395
3 37 P.M.	6.55"	"	"	255	.205	276	.183
	6.90"	out	"	sub. crit.			
3 47 P.M.	6.92"	"	"	super crit.			

NOTE: Fuel can be feed from the big storage tanks if air pressure is ~ 8 lb.

6/30/54 Annuli Exp. # 27
15" outside; 6" inside dia.
Fox Bare outside and inside (air inside 6" cyl.)
Gilley Instrument check
R-1 - responds, won't trip with this source
DC-3 - trips at ~95 ~~on~~ 100 x 1
Log N - trips
P.M. - trips
Source - in
Check for personnell - o.k.

fuel ht source safety
9 43 11.77" out 38.2 just critical

6/30/54 Annuli Exp. # 28
Fox 15" outside; 6" inside dia.
Gilley Bare outside and H_2O inside to ht of 11½".
Source in
Safety out
2 03 P.M. Check for personnell - o.k.

fuel ht source safety Inside H_2O
2 15 9.91" out 38.2 11.5" just critical

Annuli Exp. # 29

15" outside, 6" inside Dia.

H_2O outside and inside

Source in

~~2~~ 2^{58} pm safety set

	fuel ht	H_2O ht.	source	safety	
	6.20"	41.3* cm	out	38.2	~~super~~ sub.
3^{10} pm	6.22	"	"	"	super
3^{20}	6.36"	38.8 cm	"	"	just critical

Interpolated crit ht (equal) = 16.0 cm.

Annuli Exp # 30

15" outside, 6" inside

H_2O outside, air inside

3^{55} source in; safety set

	fuel ht	Reflector	source	safety	
4^{10}	6.69"	45.3 cm	out	38.2	just crit
4^{19} pm.	6.85"	41.0 cm	"	"	" "

Interpolated equal ht. = 17.51 cm.

* From bottom of big tank.

7-
9.
7

7/1/54 Annuli Exp #31

15" outside; 6" inside

Bare outside; Cd. only inside (48" high)

1 45 Instrument checks

Fox R-1, responds – same sensitivity

Gilley DC-3 – trips at 100 on 100 x 1

Log N – trips

P.M. – trips

source – in

safety – set

fuel ht.	source	safety	
13.07	out	up	slightly sub-crit.
12.09	"	"	super. crit.

13.08 is much more likely to be right because of a habit of looking carefully at only the number left of the decimal the second time. JKF.

7/1/54 Annuli Exp. # 32

15" outside; 6" inside

2 40 P.M. Bare outside; Cd and H_2O inside to a height of 23½"

3 13

21.34	out	up	slightly ~~super~~ sub. crit.
21.41	"	"	" super "

7-2-54
Gilley
Fox

Annuli Expt #33
,15" outside & 2" inside cyls.
Reflected outside; ~~water~~ air inside

Inst. Check: R-1 responds; D-C-3 trips at 95X100; P.M. trips; LN Trips
Source in; Safety set

Fuel	H_2O	S_o	Safety	
5.17"	40 cm	out	up	slightly ~~super~~ sub.
5.19	"	"	"	" super
5.25				
5.31	35 cm	"	"	slightly sub.
5.32	"	"	"	" super

Interpolated equal ht. = 13.34

Expt #34
15" outside & 2" inside cyls.
Reflected outside Water inside

Fuel	Water outside	Water inside	
5.17"	35.2 cm	5.75"	super crit
5.14	"	"	just "
5.133	"	"	sub. "
5.13			
5.12	34	"	super. "
5.10	"	"	sub. "

Interpolated equal critical ht. = 12.85

7-2-54
Gilley
Fox
3:29 PM

Expt ~~36~~ 35
15" outside 2" inside
bare " H_2O " - ht. 5.75"
S_0 - in Safety up Insts checked

Fuel S_0 ~~out~~
6.71 out slightly sub. crit
6.72 " " super "

7-~~5~~ 6-54
Gilley
Fox

Expt 36
15" outside 2" inside
bare " bare
Inst. check ; DC-3 trips ~ 100x100
P.M trips ; R-1 responds ;
L.N trips
9:55 AM source in safety up R.L. on

Fuel ht. = 6.92" sub.
" 6.93" super

7-6-54
Gilley
Fox

Expt #37
15" outside ; 2" inside
bare bare + Cd
source – safety up
Fuel ht.
7.09 slightly sub-critical
7.10 " super- "

Expt 38
15 outside ; 2" inside
" bare " H_2O + Cd "
source – safety up

Fuel ht.
3 43 PM 7.17" just critical
7.14 sub. "

Expt 39
7-7-54 15" outside 0 inside
Gilley Refl. " 35 cm water ht.
Fox Instr checked: PM trips, DC-3 trips; LN trips
R-1 responds
Fuel ht.
5.05" just critical
10 50 AM 5.01 36 cm H_2O sub. crit
5.02 " slightly super crit.
Interpolated Equal Critical ht. = 12.66 cm.

7-~~6~~-54
Gilley
Fox

H/X = 74.0

Expt 4.0
15" outside / no insert
Bare
source in, safety up

Fuel ht
6.48 slightly super critical
6.47 (14.44) " - sub. "

C.V. 14.44 x 1141 = 18.758 l
C.M. = 18.758 x .3300 = 6.190 kg X

7/8/54 Ball mill Experiments
1

R. Gynn (Y-12) 15" stainless steel reactor
Fox No steel poison rods in reactor
Gilloy H_2O reflected

Instrument check
R-1 — responds to source
De-3 - trips on 85 ~~x 1~~ on 100 x 1
Log N - trips
P. M. — trips
source in
safety blade set

2 15 P.M	fuel ht	source	safety	H_2O ht.	
2 30	4.15"	out	up	38.4 cm.	sub
	4.17"	"	"	"	super
2 45 P.M.	4.26"	"	"	32.0 cm.	

Equal ht. interpolation = 10.78 cm.

NOTE: The reactor sits ~ 7.5" above bottom of big tank. Bottom of reactor ~ 1/4" thick. Inside reactor is al. plate 1/2" thick sitting 1/2" above bottom of reactor. Zero of probe is at top of al. plate (therefore some fuel is below zero). H_2O ht. measured from bottom of big tank.

7/9/54
Gilby
Gwin
Fox

Ball Mill Expt #2

15" S.S. Reactor with 30 7/8 Dia. steel Rods in a Regular Hex. ~~pattern~~ Lattice & 1 rod near outer edge in odd position. Total 31 rods. Edge to Edge spacing ≅ .9 cm

Instruments checked

RI - responds; PM trips - 2"

DC - trips 100x45; LN Trips

Safety set; scram set; R.L. on

10^{03} started adding fuel

Safety selsyn reads 34.4" when bottom of blade is 21" above bottom of bucket

	Fuel ht.	Water ht.	
10^{20}	X 4.87 in.	54 cm	~~Slightly~~ Just crit.
10^{35}	5.12 "	34	Slightly sub.
	5.13 "	"	" Super crit.

Interpolated equal ht. = 12.94 cm.

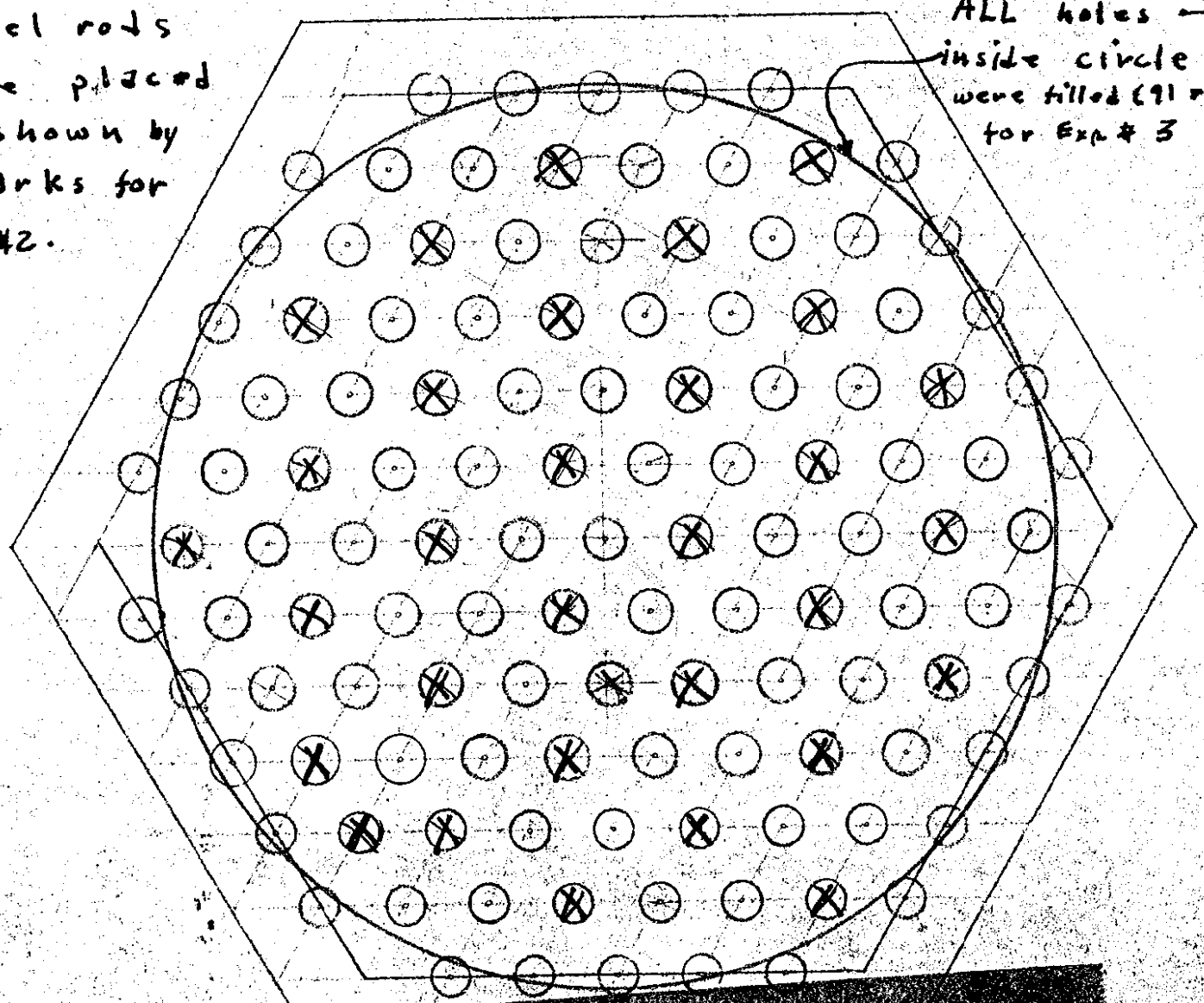
Measured dia. of rods with Heresite coating on = ~ .90"

X see note page 109

Ball Mill Exp. #2 + 3

Steel rods were placed as shown by X marks for Exp. #2.

ALL holes — inside circle were filled (91 rods) for Exp. # 3



7/9/54
Gilley
Lwin
Fox

Ball Mill Expt #3

15" Dia. S.S. Reactor with 91 - 7/8 Dia: Steel Rods in a reg. Hex. Lattice Edge to Edge distance = ~

Safety set, Scram set, R. Light on

	Fuel ht.	H_2O Ht.	
	8.44 in.	60 cm	slightly sub.
1:10 PM	8.44 "	"	" super
	8.84 "	43	" sub.
1:20	8.89 "	"	just crit.

Interpolated equal ht. = 22.47 cm

071554 BALL MILL Expr. #4

Gilley
Thomas
Cross

15" Dia S.S. Reactor with 1.45 7/8" Dia Steel rods in a regular Hex lattice having an edge to edge distance of approximately ~~0.54 cm~~ .11 in.?

Instruments checked, safetiys set, scram set and Red light is on.

Time	Fuel Ht.	Water ht.	Remarks
11 AM	43.63"	113 cm.	No apparent multiplication on instruments.

Multiplication Data

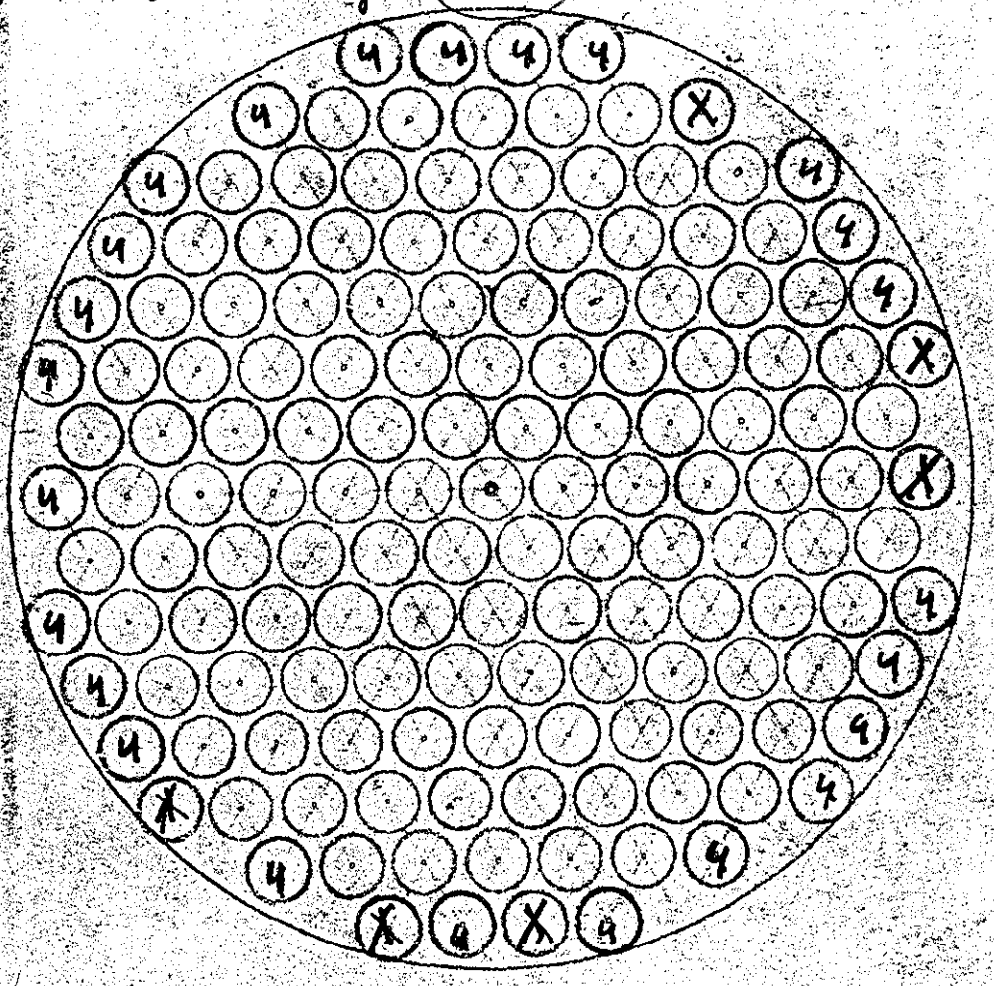
	Fuel Ht.	C_4	C_5
	43.63	$11^{16}+11$	$7^{16}+3$
	38.03	$12^{16}+0$	$10^{16}+0$
	~~34.03~~	$10^{16}+11$	C_5 not functioning properly
	24.98	$12^{16}+1$	$8^{16}+1$
	20.27	$13^{16}+4$	$9^{16}+0$
	10.70	$10^{16}+6$	$9^{16}+11$
12 55	0.0	$14^{16}+13$	$7^{16}+15$

7/18

Ball Mill Exp. # 4

145 rods total

edge to edge spacing = .54 cm



NOTE: Spaces marked "u" contained unichrome coated rods. Spaces marked "X" were empty (contained fuel). All other spaces contained ~~hercite~~ hercite coated rods.

7/18

Ball Mill Exp. #5

Determination of effect of nichrome

15" dia ss cylinder; 7/8" dia steel rod; hex. pattern

Instruments checked

R-1 - responds to source

DC-3 - trips at ~90 on 100 x 1

P.M. - trips

Log M - "

Safety set

See drawing for locations and type of coating of tag rods.

Time	Fuel ht.	H_2O ht.	Remarks
10^{32}	20.02"	79.7 cm.	~~Slightly~~ Supercritical
	19.95	79.2	super. critical
	19.80	79.2	Slightly super critical
	19.85	79.2	Slightly sub critical
11^{00}	22.59	69.0 cm	" sub critical
11^{07}	22.79	69.0 cm.	" super critical.

Equal ht. interpolation = 53.5 cm

= 21.1"

Ball Mill Expr. #6

Repeat Expr. #5 with center 7 rods replaced ~~by~~ with rods coated with Unichrome.

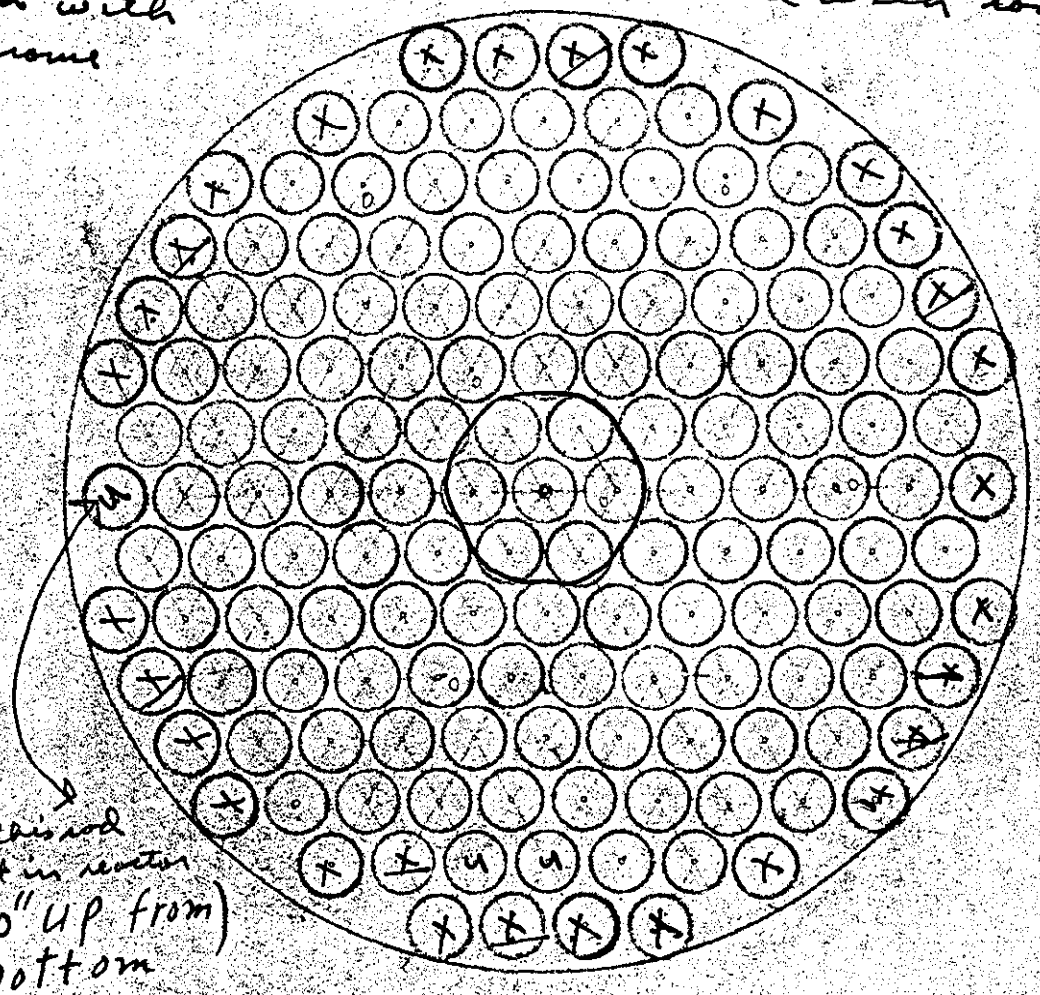
Time	Fuel Ht.	H_2O ht.	Remarks
3:13 P.M	21.12"	79.5 cm	super critical.
3:18 P.M	21.00"	79.5 cm.	slightly subcritical
		~~69.5 cm~~	
3:43 PM	23.73	72.0 cm	super critical
	23.55'	72.0	slightly super critical
3:45 PM.	23.35	72.0	just super critical
3:47 PM	23.24	72.0	slightly sub critical

Equal ht. interpolation = 55.4 cm
= 21.8"

Ball Mill Exp. #'s 5 + 6 & 7

For exp. # 5 the X's were spaces that contained no rods. The U's were rods that were coated with nichrome.

For exp. ~~[illegible]~~ # 6 conditions were exactly same except 7 center rods were replaced with rods coated with nichrome



(–) Indicates positions refilled for Expt. #7, seven rod removed from center

Filley
Foy

7-20-54

Ball Expt # 7 Lattice same as #6

unchrome 12 ~~##~~ rods total

Removed seven rods from the center of the array. Added seven heresite rods as shown in diagram. Same total number of rods, 1 rod hole in center. Inst. checked - OK

	Fuel ht	Water ht.	
10 50 AM	14.23 in.	60.5 cm	Very slightly ~~super.~~ sub. crit
10 54	14.25	"	
11 05	14.59	56.5 "	" " sub "
11 05	14.62	"	just critical

Equal ht. interpolation = 36.7 cm
= 14.5 "

7-20-54

Gilley
Fox

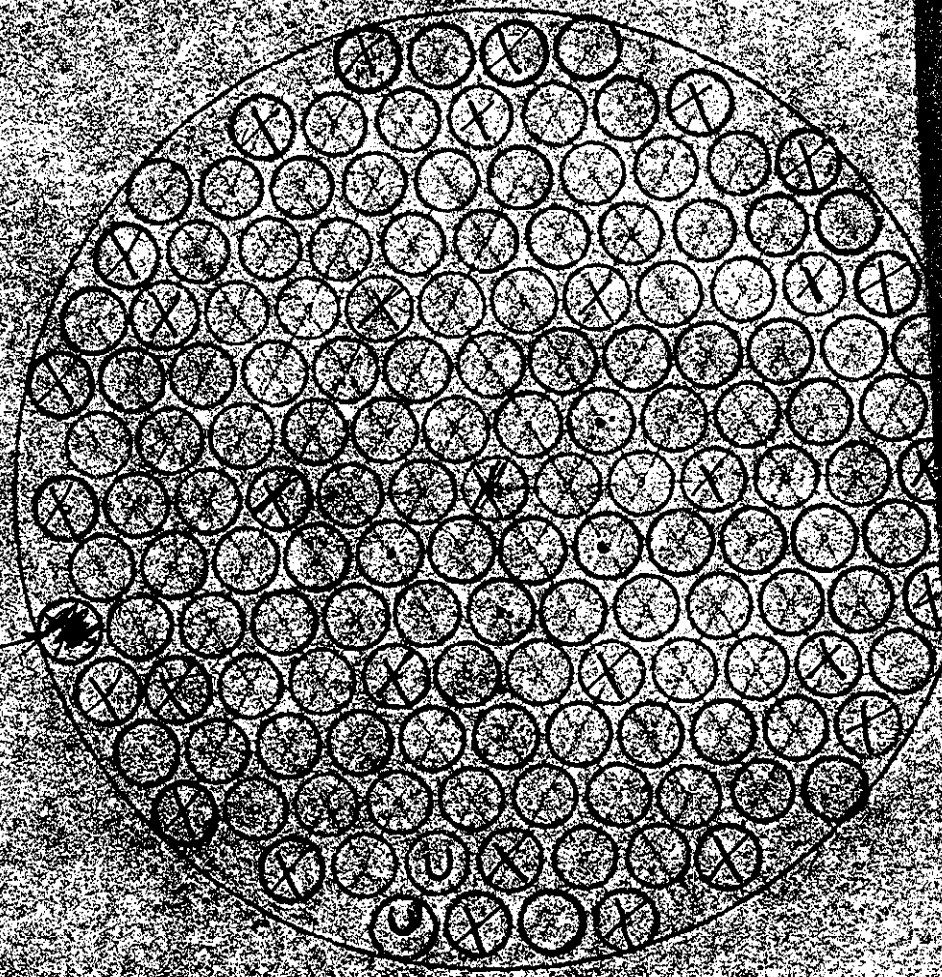
Ball Mill Expt #8

121 ~~119~~ rods - .54 cm Edge to Edge Lattice, Holes in Lattice even distributed - see diagram

Insts. OK Safety Set.

	Fuel ht	Water ht		
2.12	16.02"	70.5 cm	slightly sub.	
	16.04	"	"	super crit.
2.28	17.34	60.0 "	"	sub. "
	17.38	"	"	super "

Equal ht. interpolation = 42.7 cm.
= 16.8"


U

7/21/54 Ball Mill Exp. # 9

127 rods (one 10" up from bottom on edge)

Gilley The remaining holes were distributed as per drawing

H_2O reflected

8^{30} Instruments checked – trips work

safety set – source in

	fuel ht.	H_2O ht.	
9^{10} A.M.	19.26"	80.5 cm	slightly super
	19.20"	"	" sub.
9^{19}	19.90"	70.3 cm	slightly sub.
19^{24} A.M.	19.94"	"	slightly super

Equal H_2O + fuel ht. interpolation = 50.3 cm

= 19.8"

Ball Mill Exp. # 10

10 45 A.M. 139 rods placed as per drawing

for H_2O reflected.

Gilloy

	fuel ht.	H_2O ht.
11 45	42.45"	135 cm

no apparent multiplication was indicated on any instrument.

Ball Mill Exp. # 11

136 rods — see drawing H_2O reflected

NOTE: Probe sylsen doesnot read direct. must be zero

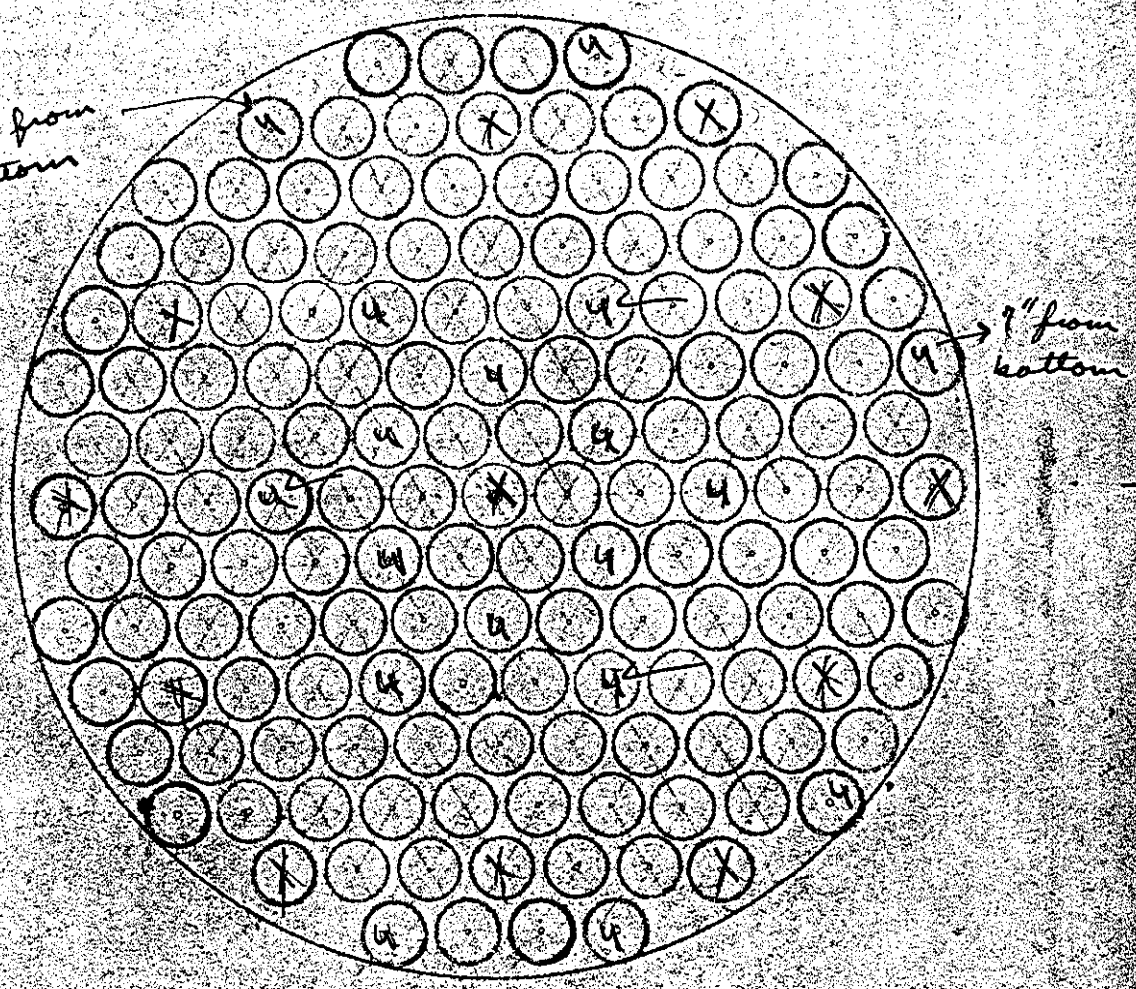
	fuel ht	H_2O	
2 35 P.M.	35.63"	120.2 cm	super critical
	35.60"	"	slightly super crit.
2 40	35.55"	"	" "
	35.43"	"	sub critical
2 47	35.93"	115.2 cm	sub.
	36.13"	115.2 cm	super

Probe zero: When probe is on zero sylsen reads 98.28, [illegible] zero, therefore 1.72" must be added to fuel [illegible] exp. #11 to get correct ht.

fuel ht. interpolation after correction = 95.41 cm

= 37.56 in.

Exp. # 10 + 11



Rods marked — were removed for exp. # 11

18W
121H
139

[redacted]

BATCH NUMBER | REQUISITION NUMBER

REPORT TO: J. T. Thomas

BUILDING NO. 9213 (78237)

DESCRIPTION OF MATERIAL: 7/23/54

UO_2F_2 solution.

~ 0.25 gms U/gm soln

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
✓ GRAM/GRAM T	.256130
sp. gr.	1.4201
	H/x = 73.03
	Direct Ignition

SIGNED:

BY: DATE JUL 26 1954

[redacted] Sample taken by J. T. [redacted]
Reg. # 354665
Wgt. of Sample recorded by Thomas.

— .2387 gm X/gm —

factor = .2387 X 1.42
= .3390

7/29/54
Gilley
Fox

5" Dia. "T" or "Y" Reactor
6 ft. in Length.

H/X = ~72

INSTRUMENT CHECK

7/29 4 8^15

trip @ 90 on 100 x 1
trip
responds to source
trip ~2"

START-UP CHECK LIST

Equipment Checked by Fox Personnel Check by Fox
Instrument and Safeties Checked and Reset by Fox + Cross
"Source In" Checked by Gilley Source No. PB ~~267~~ 307
Emergency Equipment in Control Room Checked by Fox
Red Light Lit by Gilley
[illegible] E.W.J. Time 8^50 AM ~~PM~~ Date 7/29 1954

Expr. "T" Time 9^22 AM ~~PM~~ Date 7/24 1954
Purpose Test for Criticallity
Reflected
Personnel:

MULTIPLICATION

Expr. "T"

4 2000V 3.5
5 3.25

			4	5
	6 ft	1.02"	3.5	3.25
9.35 AM	"	10.7	3.75	3.0
9^44	"	31.76	3.75	3.0
9^51	"	45.2	3.25	3.25 ← solution above safety blade
* 11^18	"	40.02	3.5	3.25

see top of next page

37" of probe removed i.e. solution ht. = system reading +37". Safety blade rack shortened and safety blade raised.

11 25 A.M. As solution was being raised from 40" to 52" reactivity suddenly rose and system was scramened by period meter (set on 5 sec.). Photomultiplier and R-1 did not trip. Radiation level at dump well ~ 2 mr. Cause of excursion as yet unknown since no appreciable multiplication was indicated by instruments.

New source, PB-15, put in. Instruments moved closer. Above experiment to be repeated.

~~Source covered by solution~~

START-UP CHECK LIST

Equipment [illegible] by J.W.G. [illegible] check by

Instruments and Safeties [illegible] J.W.G.

[illegible] Gilley

Emergency Equipment [illegible]

[illegible] Cronin

[illegible] by J.W.G. Time 2 50 PM Date 7/29 1954

MULTIPLICATION

Case T Time 3^{55} PM Date 7/29 Pt. 4

Settings

4

5

M^{-1} or Remarks

Time	Rate	Sol'n	Rate	Sol'n	C( )	M^{-1}( )	C( )	M^{-1}( )	C( )	M^{-1}( )

Source covered for background

	Sol'n ht.	C_4	M_4^{-1}	C_5	M_5^{-1}
	source covered	0.75		$3^{16}+13$	
	"	0.75		$3^{16}+1$	
	990.85*	$2.0^{16}+7$		$6^{16}+12$	0.56+.45
	995.27"	1.0+10	0.46	7+1	0.43
	0.12"	1.0+14	0.4	6+13	0.45
	3.10"	2.0+3	0.34	9.0+13	0.31
	4.52"	1.0+14	0.4	10.0	0.31
3^{28}	6.01"	2.0+6	0.32	11.0+8	0.27
3^{34} P.M	7.5"	7.0+3	0.10	23.0+10	0.13
	7.5"	8.0		21+6	
	7.72"	10.0+4	0.07	25.0+8	0.12

3^{55} drained back, relocated the ion chambers since instruments do not show the above multiplication.

* See note on previous page

MULTIPLICATION

Expr. T Time 4^05 ~~AM~~ PM Date 7/~~30~~ 29 1954

Settings

	Scalar	H. V.	Disc.	B. G. (2) min.
C(4)		2000	50	.74
C(5)		2000	50	.44
C( )				

Temperature Time	Refl.	Sol'n	Height Refl.	Sol'n	C( )	M^{-1} ( )	C(4)	M^{-1} (4)	C(5)	M^{-1} (5)
				~~43.1~~						
4^08				6.1*			2^16	13	0.27	11^16	9	0.27
4^23				7.50			7^16	.2	21.7	0.14
4^30				8.02			9.11	0.05	27.11	0.11
4^44				8.94			35.0	0.02	86.6	0.03
4^48				8.94			38.3	0.02	98.9	0.03
5^03				9.28			slightly supercritical			

Droped safety – not very effective.

SUMMARY OF CRITICAL CONDITIONS

Expr. _____ Reactor T

Solution UO_2F_2 Height 46.28" Volume 19.85 Temp _____

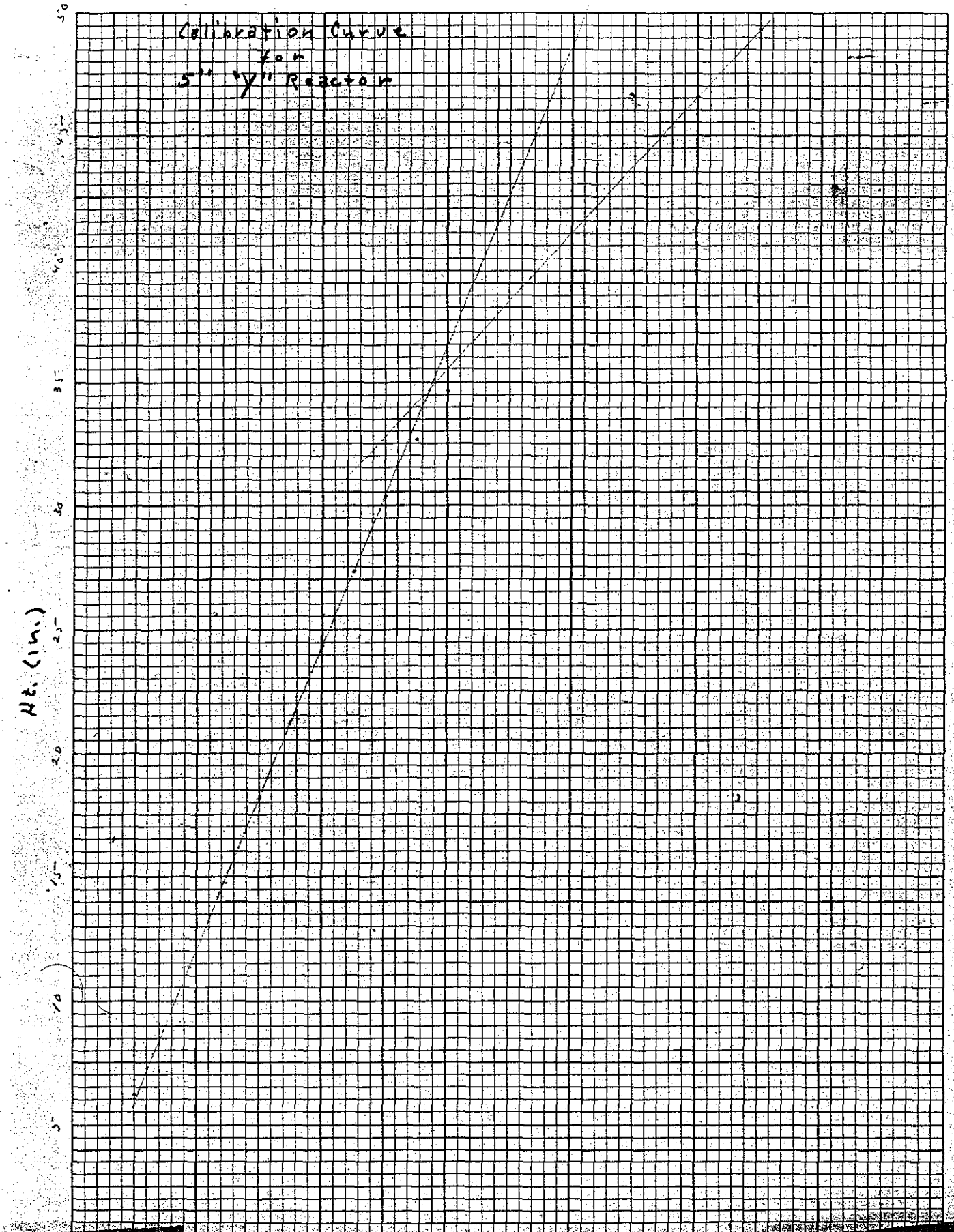
Reflector Water Height 200 cm Temp _____

Time Critical 5^15 PM ~~AM~~ Duration _____ min. ~~Log N~~ _____

Anal. Req. 354645 gms U / gm .256130 Sp. Gr. 1.4201

Critical Mass 6.73 Kg. Atomic Ratio 73

* 37" must be added to this ht. See note on page 124.

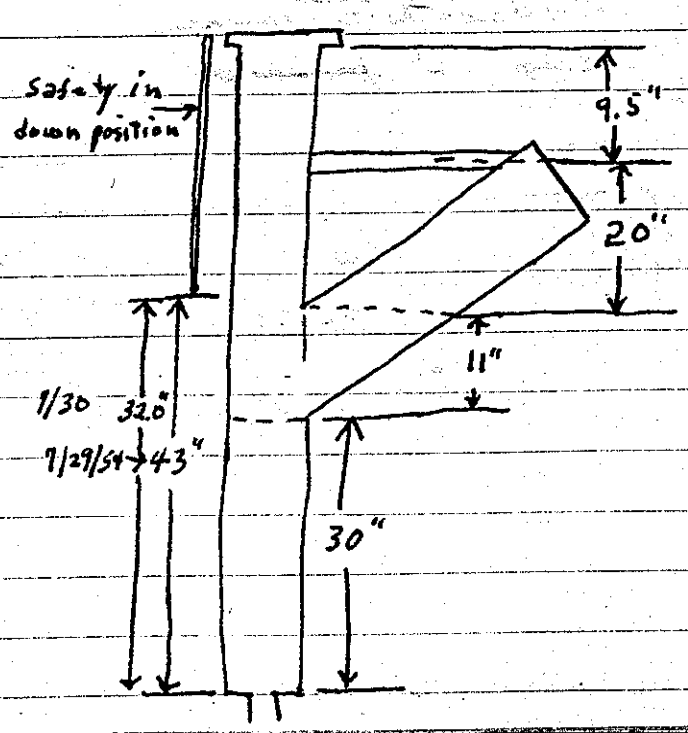


NO. 340/ 10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH
EUGENE DIETZGEN CO.
MADE IN U. S. A.

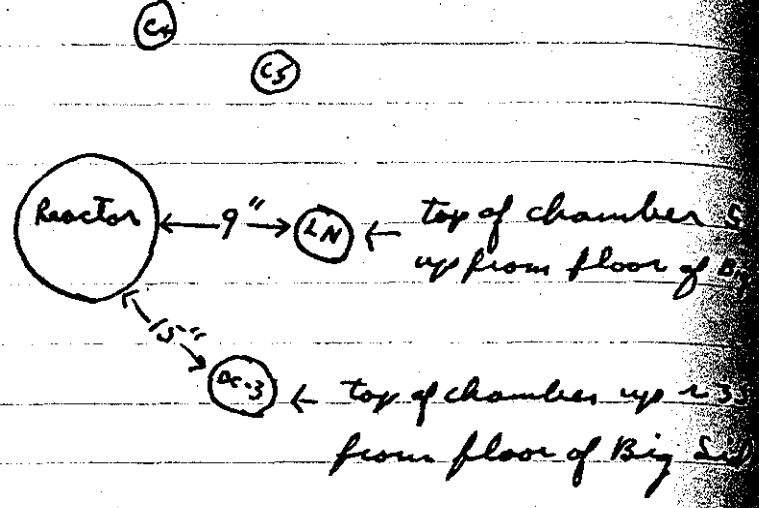
Expr. T-2 Time ____ AM PM Date 1/30 1954
Purpose Test Multiplication curve of Previous Exp
Personnel:

NOTES: Safety stroke is 20.4". ~~at~~ Safety drive selsyn reads directly the position of the bottom of the safety blade in the fired position. The changes that have been made since the previous experiment are: ~~DC 3 and log w have been m~~ A new source has been strapped to the side of the "Y" ~35" from bottom of reactor and on opposite side from instruments.

Reactor Dimensions



Instrument positions
for both "T" and T-1 experiments.



INSTRUMENT CHECK

Date 7/30 1954 Time 9:00 AM ~~PM~~ Source No.

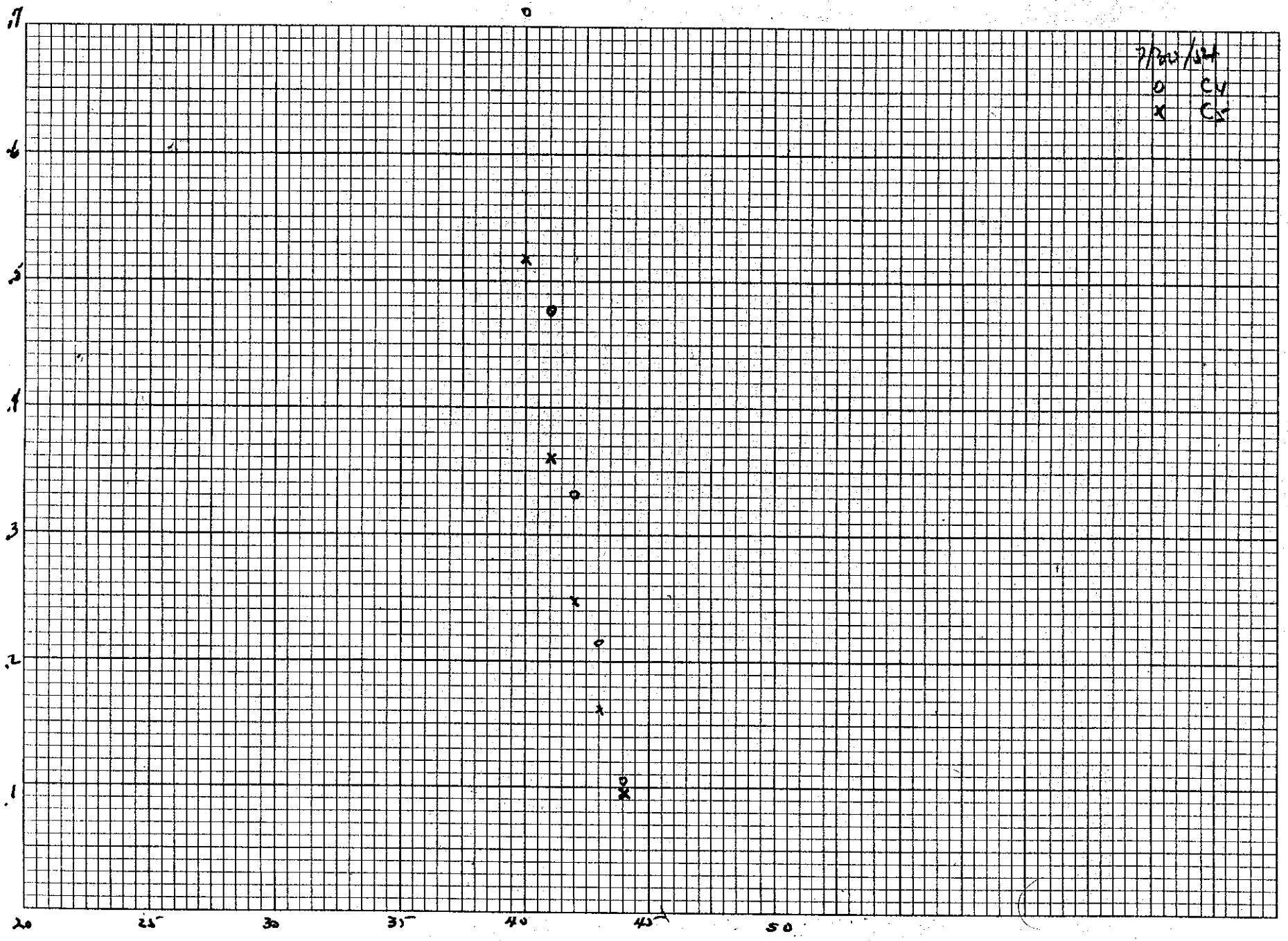
Instrument	Trip Value	Scale	Source Distance	Source No.	Scale
DC-3	trip @ 90 on 100 X 1				
Log N	trip @ 5 sec.				
R-1	responds to source				
R-2					
P. M.	trip ~ 2" f[redacted]				

START-UP CHECK LIST

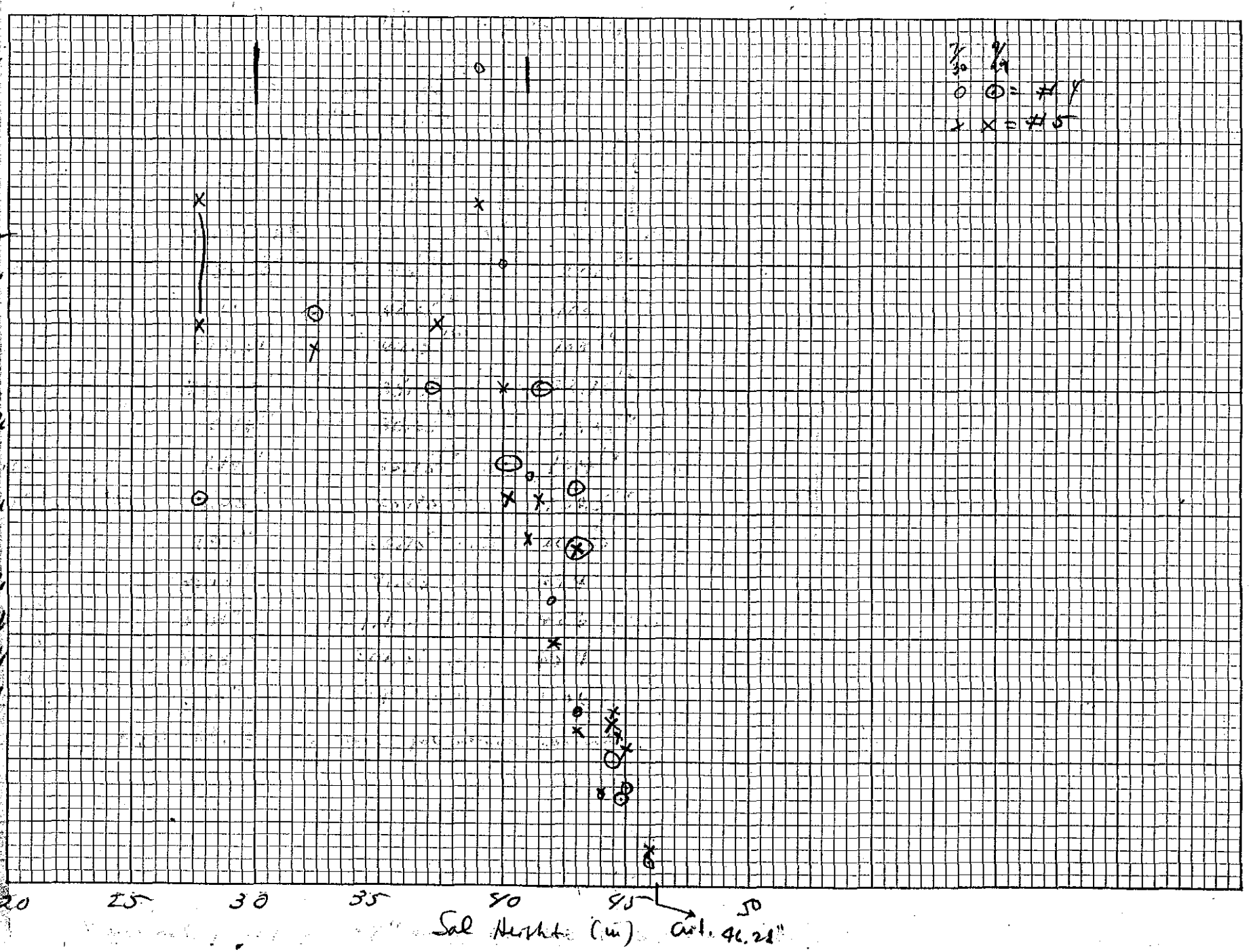
Equipment Checked by G.W.G. Personnel Check by Fox
Instrument and Safeties Checked and Reset by Gilley
"Source In" Checked by Fox-Gilley Source No.
Emergency Equipment in Control Room Checked by Gilley
Red Light On by Fox
Start-Up OK'd by G.W.G. Time 10:25 AM ~~PM~~ Date 7/30 1954

NO. 340/ 1-10 DIETZGEN GRAPH PAPER
10 X 10 PER INCH

EUGENE DIETZGEN CO.
MADE IN U. S. A.



359-5DG KEUFFEL & ESSER CO.
10 X 10 to the inch, ½ in. lines accented.
MADE IN U.S.A.



Y-refl

MULTIPLICATION

Expt. T-1 Time 10^20 AM ~~P.M.~~ Date 7/30 195 X

Scaler	H. V.	Disc.	B. G. c/( ) min.
C( )			
C(4)	2000	50	
C(5)	2000	50	

Time	Temperature Refl.	Temperature Sol'n	Height Refl.	Height Sol'n	C( )	M^{-1} ( )	C( )	M^{-1} ( )	C( )	M^{-1} ( )

	Sol'n ht.	C_4	M_4^{-1}	C_5	M_5^{-1}
10^35 AM	988.30" *	45 ×16		27.25 ×16	
	"	42.25 ×16		106 ×16	
	993.07"	42.5 ×16		108 ×16	
	998.04"	35.5		→82.75 ×16	
10^53	0.16"	→30.25 ×16		93.25 ×16	0.89
11^00	1.14"	36.75 ×16	0.82	124 ×16	0.67
11^03 A.M.	2.03"	45.75 ×16	0.66	150.5 ×16	0.55
	2.98"	60.75	0.50	205.25	0.40
11^18	4.03"	91.25	0.33	294	0.28
11^25	5.04"	131.5	.23	426	0.194
11^30	5.98"	214.5	.141	659	0.126
11^38 A.M.	7.04"	419	0.072	1104	.075

H_2O ht. = 195 cm. for above counts.

* See note page 124: 37" must be added to get correct reading. Above reading 11.7" below zero on scaler.

130
8-2-54

5" Y Bare

Expr. T-3 Time 10 45 AM ~~PM~~ Date 8-2 1954
Purpose Check criticality of T-2 unreflected.
Personnel: J.K. Fox, J.T. Thomas

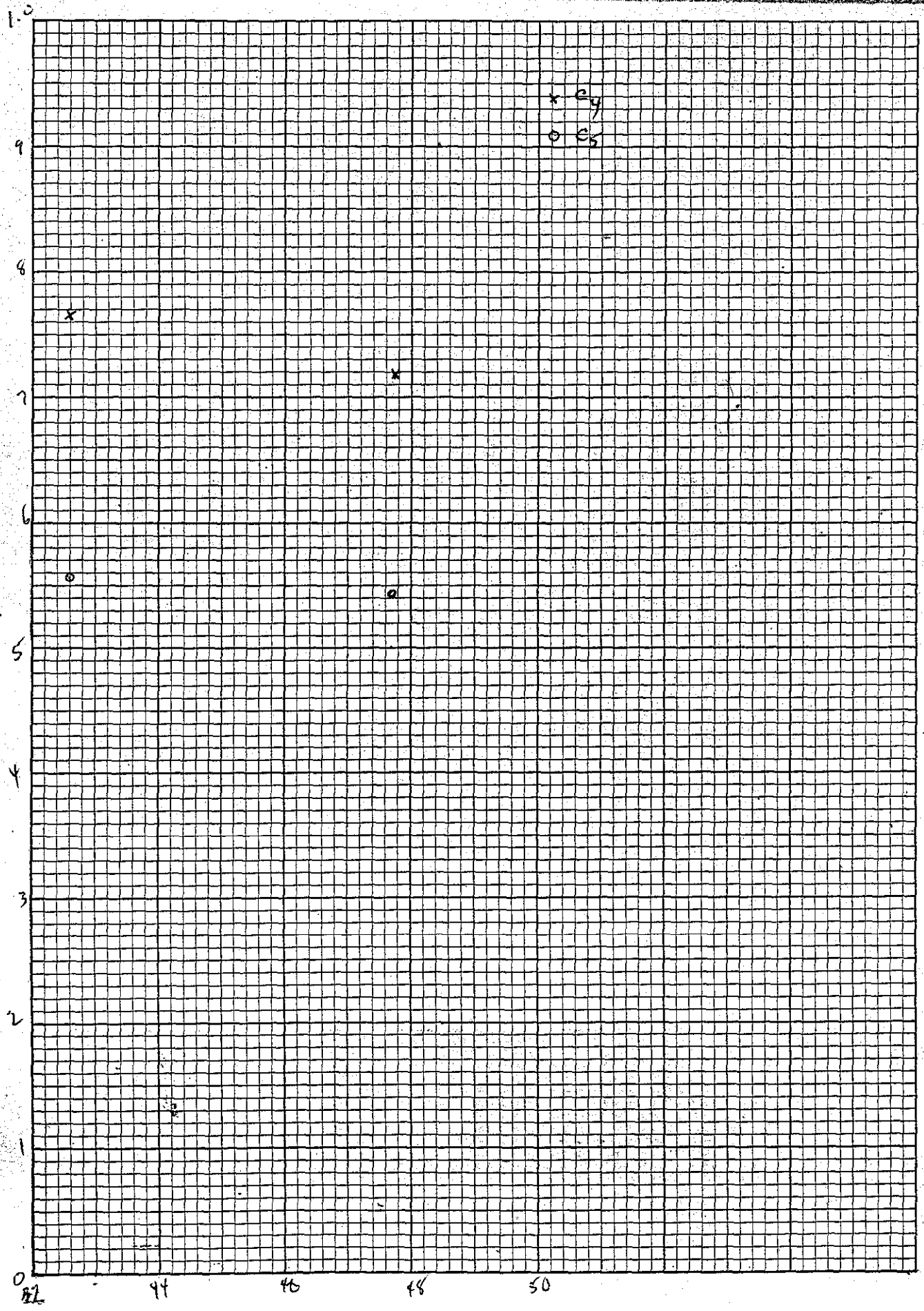
INSTRUMENT CHECK

Date 8-2 1954 Time 10 45 AM ~~PM~~ Source No.

Instrument	Trip Value	Scale	Source Distance	Start Up Scale
DC				
DC				
DC3	90	100	Contact	
Log N	Sec	-	Contact	
R-1	80	100	Contact	100
R-2				
P. M.				

START-UP CHECK LIST

~~Equipment Checked by~~ J.K.F Personnel Check by J.K.F.
Instrument and Safeties Checked and Reset by J.K.F.
"Source In" Checked by J.K.F Source No. 307
Emergency Equipment in Control Room Checked by J.T.
Red Light On by J.K.F.
Start-Up OK'd by J.K.F. Time 10 50 AM ~~PM~~ Date 8-2 1954



359-5DG KEUFFEL & ESSER CO.
10 X 10 to the inch, ½ in. lines accented.
MADE IN U.S.A.

MULTIPLICATION

Expr. T-3 Time 11 AM ~~PM~~ Date 8-2 195 Y

Settings B.G.

Scalar	H. V.	Disc.	c/(2) min.
C(4)	2000	50	114(64) + 38
C(5)	2000	50	105(64) + 3
C( )			

Time	Temperature Refl.	Sol'n	Height Refl.	Sol'n	C( )	$M^{-1}_{(\ )}$	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$	or Remarks
11 –	*	R.T.	*	26.96"			7334	–	6723	–	Background.
11 05	*	R.T	*	36.94"			118/2	.97	132/54	.791	
11 20	*	R.T	*	42.62"			149/26	.766	158/45	.557	
11 33	*	R.T	*	47.75"			154/30	.718	193/31	.543	
11 40	*	R.T.	*	57.34"			158/51	.72	164/44	.539	

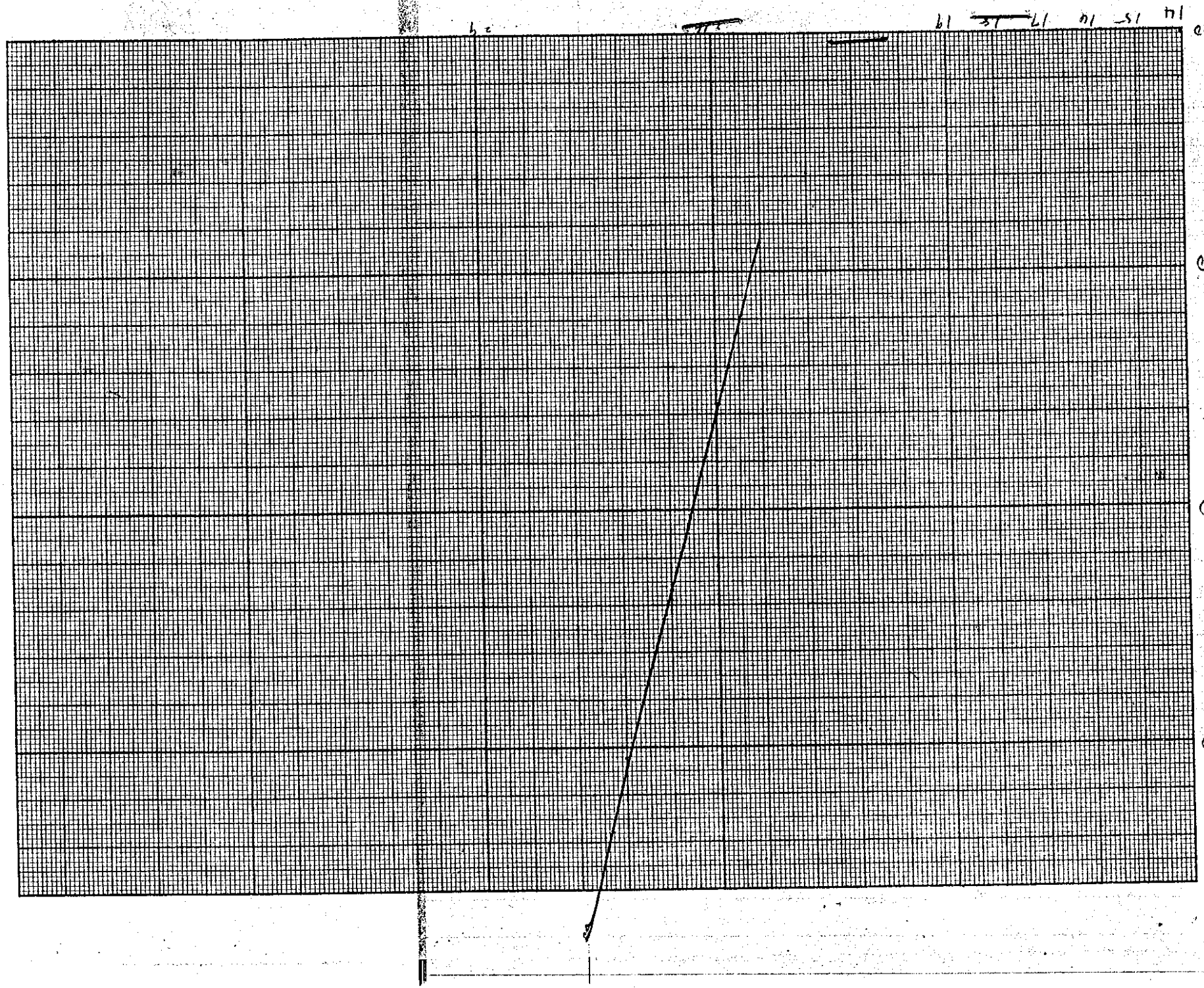
definitely not critical

11 41

Note: there has been no change on instruments since 11 20 AM.

Also noticed increase in level ht when switching to drain. Reading ~ 21.80. Unexplained delay in draining back.

NO. 340-M DIETZGEN GRAPH PAPER
MILLIMETER
EUGENE DIETZGEN CO.
PRINTED IN U. S. A.



Calibration of The 5" Cross (⊥ ~90°)

Volume (liters)	Height (cm.)	Vol. (cont.) liters	Ht. (cm)
1	7.5	27	97.6
2	15.2	28	104.7
3	23.0	29	111.9
4	30.7	30	119.1
5	38.5	31	126.9
6	46.2	32	134.6
7	54.0	33	142.3
8	55.6		
9	56.6		
10	57.3		
12	58.8		
14	60		
16	61.4		
18	62.8		
20	64.2		
21	65.0		
22	65.9		
23	68.8		
24	76.0		
25	80.8 83.4		
26	90.5		

Analysis of bottles to be shipped to 9212

F-2	354675
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	.08468
[illegible]	

SIGNED:

BY: Md

SEP 29 1954

DATE

T-20	354672
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

~~Rafs~~ UO_2F_2 wash solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	1141
Xroy	

SIGNED:

BY: Md DATE SEP 29 1954

#2	354671
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Relatively pure UO_2F_2 H_2O solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T ✓	
5.55	12233
X-ray analysis sp gr.	1.1565

SIGNED: SEP 29 1954

BY: Md DATE

#3	354674
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 wash solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	03681
Kray	

SIGNED: SEP 29 1954

BY: Md DATE

T-1	354673
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 wash solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	
	.02259
Xray	

SIGNED:

BY: [illegible] DATE [illegible]

9/28/54 Removed from manifold by Joe Thomas:

Gross 6845 gm

Tare 1912

4953 gm solution

Above solution was "hot" solution which was put in empty manifold from 9 stainless steel cylinders stored in vault after "accident".

5" 90° Cross
reflected.

Expr. 90° Cross Time 9:15 AM ~~PM~~ Date 10-1 1954
Purpose To determine critical conditions
Personnel: Fox, Cross, Gilley

INSTRUMENT CH

Date 10-1 1954 Time 9:15 AM Source No.

Instrument	Trip Value	Scale	Source			
DC-1						
DC-2						
DC-3	OK	90	100x1			
Log N	OK					
R-1	OK					
R-2						
P. M.	OK					

START-UP CHECK

Equipment Checked by Fox, Gilley Perso[illegible] by Fox, Gilley
Instrument and Safeties Checked and Reset Fox, L.W.G.
"Source In" Checked by L.W.G. No.
Emergency Equipment in Control Room Ch[illegible] by L.W.G.
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 9:20 AM ~~PM~~ Date 10-1 1954

H_2O (reflector) at 25°C

	fuel ht.	H_2O ht.	Source	Safety	C_4	M_4^{-1}	C_5	M_5^{-1}
	Experiment delayed because fuel dump valve and counter #5 were not working properly. Both appear ok now (11:05) L.W.G.							
11:05 A.M.	0.42" ~~[illegible]~~	150 cm	in	30"	5.25 x256		5.5 x16	
11:08 A.M.	0.42"	"	"	31"	5.25 x256		6.0 x16	
1:02 P.M.	19.60"	"	"	"	7.0 x256		7.0 x16	
1:19 P.M.	28.35"	"	"	"	7.0 x256		6.5 x16	

	fuel ht	H_2O ht	Source	Safety	C_4	M_4^{-1}	C_5	M_5^{-1}
1^{23}	28.35	150 cm	in	31.0"	7.5 ×256		4.0 ×16	

1^{30} P.M. Experiment discontinued at this point to change source positions. Source now (before change) at bottom of reactor and reactivity did not respond promptly with additions of fuel at ~32" (very near critical).

Source put in from top; about 4" from center of cross.

2^{45} P.M.	21.35"	150 cm	in	40.9"	0 + 247 ×256 = 4.0 ×64	2.5 ×16
2^{59} P.M.	24.77"	"	"	"	8.5 ×64	2.0 ×16
3^{04} P.M.	26.27"	"	"	"	19.0 ×64	2.5 ×16
3^{22}	28.58"	"	"	"	48.0	3.5
3^{40}	31.87"	150	out	slightly super	{within 0.3" of critical}	

use 31.8 ≈ 80.8 cm

90° Cross bare

Expr. 90° Cross bare Time ____ AM PM Date ____ 195 4
Purpose To determine critical conditions

Personnel: Fox, Rohrer, Cross, Gilley

INSTRUMENT CHECK

Date 10/18 195 4 Time 9 30 AM ~~PM~~ Source ✓

Instrument	Trip Value	Scale	Source Distance	In Scale
DC-1				
DC-2				
DC-3	80	100x1		
Log N	trip			
R-1	trip			
R-2				
P. M.	trips at ~ 2"			

START-UP CHECK LIST

Equipment Checked by Gilley, Fox Personnel Check by Gilley
Instrument and Safeties Checked and Reset by Gilley, Fox
"Source In" Checked by Gilley Source No. ____
Emergency Equipment in Control Room Checked by Gilley
Red Light On by Gilley
Start-Up OK'd by Gilley Time 1 45 ~~AM~~ PM Date 10/18 195 4

	fuel ht.	Source	Safety	C_4	M^{-1}_4	C_5	M^{-1}_5	C_3	M^{-1}_3
	11.51"	in	36"	13.25		8.75		12.75	
2 00 P.M.	"	"	"	17.75		—		12.25	
	"	"	"	18.25		8.75			
2 05 P.M.	20.20"	"	"	3.5		9.75		12.5	
2 13 P.M.	24.0"	"	"	—		10.75		15.25	
2 20 P.M.	26.39"	"	"	—		13.0		17.0	
2 26 P.M.	34.12"	"	46			13.25		~~13.20~~ 17.5	
2 30 P.M.	48.27"	"	51.4			12.5		16.25	

unfolded)

REQUEST for 354689
SPECTROGRAPHIC ANALYSIS 01148

Req. No. 354689 6543

By Dept 2230 Time A M

Sampled by [illegible] Date 10-24

Mat. Type Code 1925

Dept. Code No.

Batch Numbers (None)

UO_2F_2

Cont'r No.		
Gross		
Tare		
Net	.5634	

Analy. Ans By
Date

Spectrographic Analysis Answers in P.P.M.

Ag 4.3	Al <7	As	Au	B 3.0
Ba <10	Be	Bi	Ca 98	Cd
Co	Cr 460	Cs	Cu 23	Fe 10,900
Ga	Ge	Hg	In	K <50
Li	Mg 65	Mn 53	Mo <200	Na 10
Ni 250	P <100	Pb 50	Rb	Sb
Si 12	Sn <10	Sr	Ti	Tl
U	V	Zn 50	C	RE

Signed WB - [illegible] Date 10-26-54

4 pm. Sample Taken by L.W.G. 10/18/54 (from manifold)

Req. # 354689

Gross 112.5675

Tare 25.2204

Net 87.3471

	354689
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

F_2 in H_2O

NOT TO BE COMPOSITED
CHECK HERE.....

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.2543
Density	→ 1.4136@
	gm U/cc = .3595
H/X = 73.8	OCT 25 195
	DATE

.3351 gmX/gm

Expr. Tilted Core Anniversary Time 2:15 ~~AM~~ P.M Date 10/21/ 1954
Purpose To determine ΔR/R/ΔM/M

Personnel: Fox, Cross, Gilley

INSTRUMENT CH

Date 10/21 1954 Time 2:15 Source No.

Instrument	Trip Value	Scale				Scale
DC-3 trip	90 on 100 X 1					
Log N trip						
trip						
P. M. trip						

START-UP CHECK

Equipment Checked by Fox, L.W.G. Perso[illegible] Check by Fox L.W.G.
Instrument and Safeties Checked and Rese[illegible] Fox, L.W.G.
"Source In" Checked by Fox, L.W.G. [illegible] No.
Emergency Equipment in Control Room Checked by Fox, L.W.G.
Red Light On by Fox ~~AM~~
Start Up OK'd by L.W.G. Time 2:5 PM Date 10/21 1954

Experiment not run at this time due to lack of fuel, L.W.G.

Annuli Experiments Continued
#41

Expr. #41 (Annuli) Time 1:55 ~~AM~~ PM Date 10/22 1954
Purpose To determine criticality conditions
Personnel: Fox, Cross, Gilley

START-UP CHECK LIST
Equipment Checked by Fox, Gilley Personnel Check by Fox, L.W.G.
Instrument and Safeties Checked and [illegible] by L.W.G., Fox
"Source In" Checked by Fox, L.W.G. Source No.
Emergency Equipment in Control Room Checked by Fox, L.W.G.
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 2:00 ~~AM~~ PM Date 10/22 1954

INSTRUMENT CHECK
Date 10/22 1954 Time 2:00 ~~AM~~ PM Source No.

Instrument	Value	Scale	Source Distance	Start-Up Scale
D.C.				
D.C.				
D.C.	trip	@ 85 on 100 x 1		
Log N	trip			
R.1	trip			
R.2				
P. M.	trip			

10" outside dia. 2" inside dia. H_2O outside and inside

Fuel ht.	Source	Safety		H_2O
7.11"	out	3.3"	slightly sub.	42.0 cm
7.15"			slightly super	42.0
6.99"	out	3.3"	slightly super	44.6 cm
6.76"	out	"	slightly sub.	44.6 cm

Equal critical ht. interpolation = 17.78 cm

Expr. #42 Time 9 05 AM ~~PM~~ 10/25 1954
Purpose To determine criticality conditions
Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 10/25 1954 Time 9 05 AM ~~PM~~ Source No. Y

Instrument	Trip Value	Scale	Source Distance	Start Up Scale
DC-1				
DC-2				
DC-3	90	100X1		
Log N trip				
R-1 trip				
R-2				
P. M. trip				

START-UP CHECK LIST
Equipment Checked by Fox, Gilley Personnel Check by J.W.G.
Instrument and Safeties Checked and Reset by Fox
"Source In" Checked by J.W.G. Source
Emergency Equipment in Control Room Checked by J.W.G.
Red Light On by J.W.G.
Start-Up OK'd by J.W.G. Time 9 15 AM ~~PM~~ Date 10/25 1954

10" cylinder reflected (no 2" dia. cylinder in center). no top reflector

	fuel ht.	Source	Safety	H_2O ht.
	6.67"	out	3.3	38.5 cm
9 35 AM.	6.55"	out	"	38.5 cm

Experiment discontinued at this point because instruments were not "seeing" source well. Instruments rearranged

6.98"	out	3.3"	40.5 cm	slightly super
6.92"	"	"	40.5 cm.	" sub.
6.82"	"	"	43.5 cm	slightly super
10 53 A.M. 6.79"	"	"	43.5 cm	" sub.

Equal critical ht. interpolation = 17.52 cm.

~10 liters of solution were added to storage system at roughly same concentration. For analysis after mixture see page 146.

Expr. 43 Time 8:30 AM Date 10/26 1954
Purpose To determine ΔK/Δm for "tilted" poison in 10"-2" annulus
Personnel: Fox, Gilley

INSTRUMENT CHECK
Date 10/26 1954 Time 8:30 AM Source No. r

90 100×1
trip
trip
trip

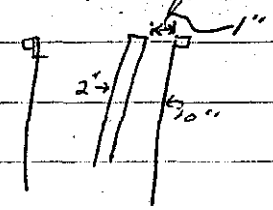
START-UP CHECK LIST
Equipment Checked by Fox L.W.G. Personnel Check by L.W.G.
Instrument and Sa[illegible] Secured and Reset by L.W.G.
"Source In" Checked by L.W.G. Source No.
Emergency Equipment in Control Room Checked by L.W.G.
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 8:40 AM PM Date 10/26 1954

Part A

fuel ht source safety
~~33.25"~~ out
33.13" out 7.9" just critical
53.70" out 7.9" ~100 sec. period
see log W chart
Inner 2" cylinder with cd and H_2O was leaning against inside edge of 10" cylinder at top.

Exp. 43 – Part B

2" cylinder is 1" from edge of 10" cylinder



	fuel ht	source	safety	
10^{30} AM	35.88"	out	7.9"	just critical
	36.56"	"	9.2"	~100 sec. period

see log N chart

Exp. 43 – Part C

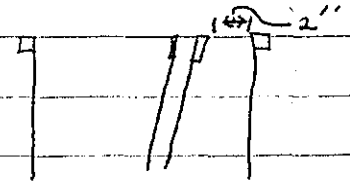
The safety rod was positioned ~~[illegible]~~ more carefully. When selsyn dial reads -99.8 (i.e. .2" below zero) the bottom of the safety rod just touches the bottom of the reactor when released. The stroke is 30".

Period measurement with control rod

	fuel ht.	~~source~~ safety	source	
12^{13} PM	36.80"	1.3	out	just critical
	36.78"	3.9"	out	for period see log N chart
	36.40"	3.9"		just critical
	36.58"	out		for period see log N chart

Exp. 43 - Part D

Inner cylinder now 2" from edge of 10" cyl.



	fuel ht.	source	safety	
	38.90" ~~38.99~~	out	11.1"	just critical
2:20 P.M.	40.48"	"	11.1	for period see log W chart.
	40.93"	out	1.0"	just critical
2:30 P.M.	40.91"	out	3.8"	see log W chart for period
	38.27"	out	3.8"	just critical
	38.24"	out	9.1"	see log W chart

Because of inconsistancy in data

Exp. 43 - B repeated

2" cylinder is 1" from edge of 10" cylinder.

	fuel ht.	source	safety	
3:10	35.92" ~~35.96~~	out	15.0	just critical
	36.99"	"	"	See chart for period

10 [illegible] Sample taken from manifold after 10 liters added and before second addition

Sample # P-124 Req. 354693

Gross 98.7303

Tare 27.1787

Net 71.5516

.2380 gm 25/gm

.3372 gm 25/cm³

$$H/X = 1.298 \times .25537 = \frac{\begin{array}{r} 100000 \\ .33147 \end{array}}{\frac{26.11 \times .66853}{.2380}} = 73.4$$

BATCH NUMBER	REQUISITION NUMBER
	354693

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 and H_2O solution

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25537
Sp. gravity	Sp G - 1.41671
	.3618 gm/cm³

SIGNED:

BY: md

DATE NOV 15 1952

Expr. 43 - E Time 10 AM PM Date 10/27 1954
Purpose ΔR/Δm determination for annuli
Personnel: Fox, Gilley, Cross

INSTRUMENT CHECK

Date 10/27 1954 Time 10 AM PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start
D-1				
D-2				
D-3 trip	85	100 x 1		
Log N trip				
R-1 trip				
R-2				
P. M. trip				

START UP CHECK LIST

Equipment Checked by J.W.G., Fox Personnel Check by J.W.G.
Instrument [illegible] by J.W.G.
Source Inst. [illegible] J.W.G. Source No.
Emergency [illegible] Room Checked by J.W.G.
Red Light [illegible] J.W.G.
Start-Up OK'd by J.W.G. Time 10½ AM PM Date 10/27 1954

2" inner cylinder now 3" from edge of 10" cylinder
fuel ht. source safety

10 x 2 A.M. 42.74" out 15.1" Just critical
44.72" " 15.1 See log N chart for period

control rod inserted to 1.9 inches and fuel raised to get critical again

45.26" out 1.9" just critical
45.22" out 6.0" See log N chart for period

43-E cont.

fuel drained to get system just critical

fuel ht source safety

44.60" out 6.0 just critical

11 30 A.M. 44.52" out out see chart for period

In this experiment (43-F) central 2" poison is against 10" cyl. at top, more than one period measurement to be run ~~[illegible]~~ to get ΔK/Δh

Expr. 43-F Time 1:45 ~~AM~~ PM Date 10/29 1954
Purpose To Determine ΔK/Δh

Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 10/29 1954 Time 1:45 ~~AM~~ PM Source No.

Instrument	Trip Value	[illegible]	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip	86	100 x 1	
Log-2	trip			
R-1	trip			
R-2				
P. M.	— did not trip			

START-UP CHECK LIST

Equipment Checked by LWG Personnel Check by LWG
Instrument and Safety [illegible] and Recorder L.W.G.
"Source In" Checked by LWG Source No. PB-307
Emergency Equipment in Control Room Checked by L.W.G.
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 1:45 ~~AM~~ PM Date 10/29 1954

Fuel ht. source safety

33.45" out 4.7 just critical

34.24" " 4.7 see chart for period
33.45
.79

Expr. 43 G Time ___ Date 11-1 1954
Purpose Safety rod Drop Measurements
Personnel: Cross, Rohrer, Fox

START-UP CHECK LIST
Equipment Checked by JKZ Personnel Check by ✓
Instrument and Safeties Checked and Rec. ✓
"Source In" Checked by ✓ No. ✓ PB-307
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKZ Time ___ AM Date ___ 195__

DC-3 trip at 908100
PM trips ok.
LN " "

safety rod set at 40" up & ~2" in from side wall of reactor, stroke 38".
Critical at 33.65"
Dropped safety rod for reactivity change meas.

2nd 11-1-54 Rod drop measurement. Rod set at 50" up
crit at 33.64

3rd Rod drop measurement. Rod set at 55" up

11-1-54

Expt 43 H

Repeat of period measurement 43-F

Crit at 33.40 safety at 40"

Raised level to 34.56 for period mean.
33.40
1.16 dif.

Expr. 43-I Time 10 45 AM Date 11/2 1954
Purpose ΔK/ΔH for tilted poison at slow period
Personnel: Fox, Zimmerman, Gilley

← 43-I run with 2" poison leaning against 10" cyl. at top.

INSTRUMENT CHECK

Date 11/2 1954 Time 10 45 AM Source No. V

Instrument	Value	[illegible]	[illegible]	Tolerance	Start-Up Scale
[illegible]					
[illegible]					
[illegible]	trip	85	100×1		
Log N.	trip				
R-1	trip				
R-2					
P. M.	trip				

START-UP CHECK LIST

Equipment Checked by Fox Personnel Check by J. W. G.
Instrument and Safeties Checked and Reset by J. W. G.
"Source In" Checked by J. W. G. Source No. PB-307
Emergency Equipment in Control Room Checked by J. W. G.
Red Light On by J. W. G.
Start-Up OK'd by J. W. G. Time 10 50 AM Date 10/2 1954

	fuel ht.	source	safety	
11 07 A.M.	33.40"	out	10.0"	just critical
	33.75"	"	"	see chart for period

DC-3 → 0-10 4.13 min

Expr. 43-J Time 3 PM 11/2 1954
Purpose To see if source is affecting critical height.
Personnel: Fox, Gilley

START-UP CHECK LIST
Equipment Checked by L.W.G. Power Check by L.W.G.
Instrumentation
Source L.W.G. PB-307
Emergency L.W.G.
Red Light on by L.W.G.
Start-Up OK'd by L.W.G. Time 3:00 PM Date 11/2 1954

This experiment is a check to see if power level has been affecting the critical ht. in the period measurements. To run power vs C.H.

	Fuel ht.	Power level	source	safety		
	33.25"	0.015	out	10.0"	just critical	
	33.57"	0.10	"	"	"	"
3:45 P.M.	33.40"	0.05	"	"	"	"

10" dia. al. cylinder with ~~a~~ four 1" annuli & surrounding reactor to be filled with H_2O and then furfural to compare as reflectors.

Expr. A Time 2^45 Date 11/5 1954
Purpose Compare H_2O reflector with Furfural reflector
Personnel: Fox, Gilley, Noake

START-UP CHECK LIST
Equipment Checked by Fox, W.G. Personnel Check by Fox
Instrument [illegible] and Reset by Fox, W.G.
"Source In" Checked by W.G. [illegible] Source No.
Emergency Equipment [illegible] Control Room Checked by W.G.
Red Light On by W.G.
Start-Up OK'd by W.G. Time 2^50 ~~AM~~ PM Date 11/5 1954

INSTRUMENT CHECK
Date 11/5 1954 Time 2^45 ~~AM~~ PM Source No. 1

Instrument	Trip	Source Distance	Start-Up Scale
	trip		
	trip		
P. M.	trip		

fuel ht.	source	safety	reflector	C_4	C_5
3.14"	in	up	H_2O (4" thick)	92¼	33.5
"				88.5	20.75
				81.25	10.0
"				88.25	
5.07"	in	up	"	135.25	.65
"	"	"	"	141.5	.62

	fuel ht.	source	safety	Reflector	C_4	M_4^{-1}
3^{34} p.m	6.01"	in	up	H_2O	217.5	0.40
	6.98"	"	"	"	555.0	0.158
	7.51"	out	"	"	slightly sub.	
3^{45} p.m	7.52"	"	"	"	"	super

Expr. B Time 8 30 AM ~~PM~~ Date 11/8 1954
Purpose Comparison of Surfural + H_2O reflector
Personnel: Fox, Cross, Gilley

INSTRUMENT CHECK
Date 11/8 1954 Time 8 30 AM Source No. V
Start-To Scale
PM trip
DC3 trip
R-1 responds
log N trip

START-UP CHECK LIST
Equipment Checked by Fox Personnel Check by Fox
Instrument and Safeties Checked and Reset by Y.W.J. Cross
"Source In" Checked by Fox Source No.
Emergency Equipment in Control Room Checked by Y.W.J.
Red Light On by Fox
Start-Up OK'd by Y.W.J. Time 8 40 AM ~~PM~~ Date 11/8 1954

10" dia. cylinder with 3 one inch annulus of H_2O reflector (no reflector on ends).

fuel ht. source safety
7.64" out up very slightly sub.

C — 10" dia. cylinder with 2 one inch annuli of H_2O reflector
8.07" out up slightly sub.
8.09" " " slightly super

D— 10" dia. cyl. with one 1" annuli of H_2O reflector

fuel ht source safety
9.36" out up slightly sub.
9.39" " up " " super

E— 10" dia. cyl. - Bare
fuel ht source safety
13.11" out up super
13.09" (33.25 cm) " just critical
C.V. 16,89 l C.M. = 5.70

F— 10" dia. cylinder with one 1" annuli of furfural reflector.
1[13] P.M. fuel ht source safety
1[27] P.M. 9.89" out up just critical

G— 10" dia. cyl. with two 1" annuli of furfural reflector
fuel ht. source safety
8.56" out up sub.
1[45] 8.58" " " super

H— 10" dia. cyl. with three 1" annuli of furfural reflector
fuel ht. source safety
2[10] P.M. 7.91" out up just critical

I – 10" dia. cyl. with four 1" annuli of furfural reflector

fuel ht.	source	safety	
7.55"	out	up	sub
7.58"	"	"	super

Four foils were attached to a rotating plastic plate (~12 rpm) and irradiated to check uniformity of foils (Indium). Plate placed ~ 6½" above bottom of reactor near side. Foils are to be irradiated for 20 min. beginning at a power level of 0.37 and leveling off at 0.5

fuel ht.	source	safety	power level	
12.95	out	up	0.5	just critical

11/9/54 Sample taken from manifold by Gilley.

Req. # 354694 Sample # P-284

Gross 122.8315

Tare 20.9605

101.8710 gm soln.

Purpose of above sample is to get accurate determinations of Fe content.

gm U/gm = .25356 gm X/gm = .2382 ✓

sp. gr from curve 1.415 .3370 gm X/cm³

.25356 x 1.298

1.000
.3317
.6683

$$\frac{H}{X} = \frac{26.11 \times .6683}{.2382}$$

= 73.25

REQUEST for 22 M 84 354694
SPECTROGRAPHIC ANALYSIS

Req. No. 3780

By Dept 2230 Time 9 30 PM M

Sampled by Marlin Date

Cont'r No.		
Gross		
Tare		
Net		

Analy. Ans By Date

Mat. Type Code 1925

Dept. Code No.

Batch Numbers U_3O_8 Fe run high?

Rush Spec on dead basis

Spectrographic Analysis Answers in P.P.M.

Ag <1	Al 20	As	Au	B 2.8
Ba <10	Be	Bi	Ca 70	Cd
Co	Cr 365	Cs	Cu 18	Fe 6680
Ga	Ge	Hg	In	K <50
Li	Mg 27	Mn 40	Mo <200	Na 15
Ni 450	P <100	Pb <10	Rb	Sb
Si <10	Sn <10	Sr	Ti	Tl
U	V	Zn <40	C	RE

(see Back of Sheet) Signed WB - Bd Date 11-30-54

354694

BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:
UO_2F_2 solution containing ~10,000 ppm of Fe

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.25556
Fe	683. ppm
Spectrographic	
	H/x = 73.26

SIGNED:
BY: Md DATE DEC 1 1954

we tried to run the iron by gravimetric method but the weight of Fe_2O_3 was too small to be accurate. we ran the Fe by colormetric method and got very good results - we consider this to be a very reliable answer, since the gravimetric answers were in the same range.

colorimetric results - .000683 g/g Fe

Spec Fe converted to liquid = .002017 g/g Fe

M. S. Dill
"B" Shift.

Expr. #44 (Annuli) Time 11^00 AM Date 11/15 1954
Purpose 8" al. reactor with no poison in center and reflected except for top.
Personnel:

INSTRUMENT CHECK

Date 11/15 1954 Time 11^00 AM Source No. ✓

Instrument

DC-3 trip
~~Dec~~
~~Top~~
trip
trip
P. M. trip

START-UP CHECK LIST

Equipment Checked by Fox Check by J.W.G.
Instrument and ... Fox
"Source In" Checked J.W.G.
Emergency Equipment ... J.W.G.
Red Light On by J.W.G.
Start-Up OK'd by J.W.G. Time 11^01 AM Date 11/15 1954

	fuel ht	source	safety	H_2O	
	9.32"	out	up	48.7 cm	sub.
	9.34"	"	"	"	super
12^42 P.M.	9.64	"	"	46.5 cm	just critical

Equal critical ht. interpolation = 23.97

45

8" reactor (al.) with 2" al. tube in center.
H_2O inside and outside

Fuel ht	source	safety	H_2O ht.	j'ust critical
10.06	out	up	52.3 cm.	
10.42"	"	"	48.4 cm.	sub
10.46"	"	"	48.x cm.	super

Equal critical ht. interpolated = 27.1 cm

46 (Annuli)

11/15/54 8" outside dia. – 4" inside dia.
H_2O outside + inside

	Fuel ht.	source	safety	H_2O ht.	
	19.23"	out	up	86.3 cm	super
	19.17"			84.3 cm	sub
	19.62"	"	"	75.4 cm	sub
3 10 P.M.	19.65"	"	"	75.4 cm	super

Equal critical ht interpolation = 50.04 cm

Expr. 47 (Annuli) Time 1:45 ~~AM~~ PM Date 11/16 1954
Purpose 10" reactor (al.); no cylinder inside, reflected outside (no top tamper)
Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 11/16 1954 Time 1:45 ~~AM~~ PM Source No. "γ"

Instrument [illegible] scale

DC-3 trip 100x1 on 100 scale
[illegible] trip
R-1 responds to "γ"
R-2
P. M. trip

START-UP CHECK LIST

Equipment Checked by J.W.G. Personnel Check by J.W.G.
Instrument [illegible] J.W.G. Fox
"Source In" [illegible] J.W.G. [illegible] No.
Emergency Equipment in Control Room Checked by J.W.G.
Red Light On by J.W.G.
Start-Up OK'd by J.W.G. Time 1:55 ~~AM~~ PM Date 11/16 1954

Fuel ht. source safety H_2O
6.70" out up 44.2 cm just critical
2:17 P.M. 6.80" " " 42.0 cm " "
Equal to critical ht. interpolation = 17.35 cm.

48

10" al. reactor with 2" cylinder in center. H_2O outside and inside. (no poison inside.)

Fuel Ht.	course	safety	H_2O	
7.12"	out	up	42.0 cm	sub. ~~super~~
7.14"	"	"	42.0 cm	super ~~sub~~

Calibration of the 7.5" "Crans".

Vol. (liters)	Ht. (cm)		
2	7	46	68.1
4	14	48	69.4
6	21.0	50	71.7
8	28.0	52	78.4
10	35	54	85.3
12	42.1	56	92.1
14	49.2	58	98.9
16	53.1	60	105.6
18	54.7	62	112.4
20	55.9	64	119.3
22	56.9	66	126.3
24	57.8	68	133.4
26	58.7		
28	59.7		
30	60.5		
32	61.4		
34	62.3		
36	63.2		
38	64.0		
40	65.0		
42	66.0		
44	67.0		

Expr. 449 Time 9:40 AM ~~PM~~ Date 11/17 1954
Purpose Annuli (cont.)

Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 11/17 1954 Time 9:40 AM ~~PM~~ Source No. "V"

Instrument Trip Value [illegible] No scale

DC-3 trip 100 x 1 on 100
Log W trip
responds
P. M. ~~[illegible]~~ trip

START-UP CHECK LIST

Equipment Checked by L.W.G. Personnel Check by L.W.G.
Instrument and Safeties Checked and Reset L.W.G. Fox
"Source In" Checked by L.W.G.
Emergency Equipment in Control Room Checked by L.W.G.
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 11:45 AM ~~PM~~ Date 11/17 1954

15" reactor with 4" dia. center H_2O inside and outside

fuel ht. source safety H_2O

5.59" out up 35.7cm super

5.58" " " 35.7cm sub.

5.43" " " 38.5cm sub.

5.44" " "

Equal Critical ht. interpolation = 13.87 m.

50

15" reactor with 8" inside cylinder. H_2O inside and outside.

fuel ht	source	safety	H_2O	
8.11"	out	up	49.3 cm	super
8.09"	out	up	49.3 cm	just critical
8.26	"	"	45.1	sub.
8.27	"	"	45.1	just critical

Equal critical ht. = 21.0 cm

51

15" reactor with 10" inside dia. cylinder. H_2O inside and outside

	fuel ht.	source	safety	H_2O	
11/17/54	16.29"	out	up	66.4 cm.	super
	16.26"	"	"	"	slightly super
	16.24"	"	"	"	just critical
	16.34"	"	"	65.7 cm	sub.
	16.36"	"	"	65.7 cm	sub.
4 05 P.M	16.37"	"	"	"	just critical

Equal critical ht. = 41.6 cm.

Expr. 152 Time 10:00 AM Date 11/19 1954
Purpose Annuli criticality determinations

Personnel: Fox, Gross Gilboy

INSTRUMENT CHECK

Date 11/19 1954 Time 10:00 AM Source No. "Y"

Instrument

hog W trip
DC-3 trips 100 x 1 on 100
responds
P.M. trips

START-UP CHECK LIST

Equipment Checked by JWG Personnel Check by JWG
Instrument and Safety Checked by JWG
"Source In" Checked by JWG Source No.
Emergency Equipment in Control Room Checked by JWG
Red Light On by JWG
Start-Up OK'd by JWG Time 10:15 AM Date 11/19 1954

20" al. reactor with no cylinder in center. H_2O reflected except for top.

fuel Wt.	source	safety	H_2O	
4.44"	out	up	36.6 cm	super
4.42"	"	"	36.6 cm	sub
4.47"	"	"	34.8 cm	super
4.45"	"	"	34.8 cm	slightly super
4.44"	"	"	"	just critical

Equal critical ht. = 11.28 cm.

53

20" al reactor with 2" cylinder in center, H_2O inside and outside, no top reflector

	Fuel Ht.	source	safety	H_2O	
12 49 P.M.	4.49"	out	up	34.8	super
	4.47"	"	"	34.8	just critical

Critical ht. = 11.35 cm

54

20" reactor with 6" center cylinder, H_2O inside and outside, no top reflector

Fuel Ht.	source	safety	H_2O	
4.95"	out	up	38.4 cm	super
4.93"	"	"	38.4 cm	sub.
4.97"	"	"	36.6 cm	slightly super
4.96"	"	"	36.6 cm	slightly sub.

Equal Critical ht. = 12.6 cm.

Expr. 55 Time 8 30 AM Date 11/22 1954
Purpose Criticality conditions for annuli
Personnel: Fox, Ailley

INSTRUMENT CHECK

Date 11/22 1954 Time 8 30 AM Source No. "F"

DC-3 trip on 100 on 100 x 1
Log N trip
R-1 responds
P. M. trips

START-UP CHECK

Equipment Checked by J.W.G. Pr... Check by J.W.G.
Instrument and Safeties Checked and Fox, J.W.G.
"Source In" Checked by J.W.G. Source No.
Emergency Equipment in Control Room Checked by J.W.G.
Red Light On by J.W.G. AM
Start-Up OK'd by J.W.G. Time 9 00 ~~PM~~ Date 11/22 1954

20" reactor with 10" inside cylinder. H_2O inside & outside. H_2O temp = 22.5°C

	fuel ht.	source	safety	H_2O	
	6.52"	out	up	39.8 cm	super
9 12 AM	6.50"	"	"	39.8 cm	just critical
	6.40"	"	"	40.9 cm	super
	6.38"	"	"	40.9 cm	~~super~~ just critical

Equal interpolated ~~check~~ critical ht. = 16.35 cm.

56

20" outside 15" inside. H_2O inside and outside

fuel ht. source safety H_2O
17.45" out up 68.4 cm just critical
Equal critical ht = 44.3 cm

Expr. #57 Time 9:00 AM ~~PM~~ Date 12/22 1954
Purpose To determine Critical conditions of 20" cyl.
Personnel: Fox, Cross, Gilley

START-UP CHECK LIST
Equipment Checked by L.W.G. Personnel Check by L.W.G.
Instrument and Safeties Checked and Tested by L.W.G.
"Source In" Checked by L.W.G. Source PN-15
Emergency Equipment in Control Room Checked by
Red Light On by L.W.G.
Start-Up OK'd by L.W.G. Time 9:00 AM ~~PM~~ Date 12/22 1954

INSTRUMENT CHECK
Date 12/22 1954 Time 9:00 AM ~~PM~~ Source No. V

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3 trip	90	100×1		
Log N trip				
R-1 responds to "V"				
R-2				
P. M. trip				

C.V. = 14.76 × 2027
= 29.92 l

C.M. = 29.92 × 3477
= 10.40 kg

20" al. cylinder. Completely bare.

	fuel ht	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
9:22 AM	1.09"	in	up.	12.25		12	
	1.09"	"	"	11.5		12.25	
9:31 A.M.	3.80"	"	"	13.75	.872	18.5	.65
	4.88"	"	"	18	.668	24.75	.485
	5.43"	"	"	22.5	.534	37.75	.318
9:55 AM.	5.71"	"	"	44.5	.27	74.25	.165
	5.80"	out	up	slightly sub.			
10:09	5.82"	"	"	"	super.		

5.81 × 2.54 = 14.76 cm

$\frac{H}{4} = 72.\cancel{4}$

Expr. #58 Time 9 45 AM ~~PM~~ Date 12/23 1954
Purpose To determine critical ht. of 20"x20" al reactor Bare
Personnel: Fox, Gilley

START-UP CHECK LIST

Equipment Checked by LWG Personnel Check by LWG
Instrument and Safety [illegible] LWG
"Source In" [illegible] LWG
Emergency Equipment [illegible] LWG
Red Light On by Fox
Start-Up OK'd by LWG Time 9 45 AM ~~PM~~ Date 12/23 1954

INSTRUMENT CHECK

Date 12/23 1954 Time 9 45 AM ~~PM~~ Source No. 1

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip	.05x1	on 100 scale	
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

	fuel ht.	source	safety	C_4	M_4''	C_5	M_5''
	0.02"	in	up	10.25		<4.25	
9 54 AM	4.02"	"	"	15.25	.672	~~24.0~~	.594
	5.11"	"	"	33.75	.305	78.0	.183
10 11 A.M.	5.30"	"	"	47.5	.216	138.5	.096
	5.48"	out	up	super			
	5.47"	"	"	sub.			

5.475 x 2.54 = 13.90 cm

C_1V_1 = 13.90 x 2580 = 35.86 l

C_1M = 35.86 x .3477 = 12.47 kg

Expr. #59 Time ____ AM/PM Date 12-27 1954
Purpose H_2O Reflected 20" X 20" Square Reactor
Personnel: JKZ OK JTT CC

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

INSTRUMENT CHECK
Date 12-27 195__ Time ____ AM/PM Source No. ____

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1 Out				
DC-2 ✓				
DC-3 ✓	90	100		
Log-N ✓				
R-1 ✓				
R-2				
P. M. ✓				

10^{16} AM Start feeding Refl water preset at: 58 cm temp 87°F

	Tamper	water	C_4		C_5	
10:25 AM	1.40"	58.0 cm	4 1/4	4 1/4	6 1/2	5 3/4
			4 1/4		5 1/4	
10^{29}	2.00	58.0	4 3/4		5 3/4	
			6 3/4	0.63	11	0.52
10^{34}	2.50	58.0 cm	20 1/2	0.208	39 3/4	0.144
10^{43}	2.60	58 cm	34 3/4	0.123	70 3/4	0.081
			34 3/4		69	

DC-3 screamed – reset Safety

20 X 20" reactor zero at 7 1/2" or ~ 19 cm

11^08 Began feeding again
Water 54 cm temp 38°F
11^14 2.70 - Tamper contact Sub C
2.75 not contact Supr.
2.709 contact just Sub C
2.72 super with tamper not quite in contact

2.71 Critical water at 54 cm.
2.71 x 2.52 = 6.88 cm
crit vol. = 17.75
Crit mass = 6.71

H/X = ~74

Expr: 60 Time ~~AM~~ PM Date 12-27 1954
Purpose 20" x 20" sq Reactor
½ Reflected
Personnel: Curtis, Thomas, Fox

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

Water at 24 cm from floor or ~22" above bottom of reactor. No top refl.

1 52	water 24 cm fuel 0.0	ex x256	cs x64
1 54	Fuel 0.34 inches Background	7 3/4	18 1/4
1 59	Fuel 2.03 inches	9 3/4	13
2 06	Fuel 3.03	62 3/4	21 1/2
2 09	Fuel 3.50	98 3/4	30 3/4
2 15	Fuel 4.00	230 1/4	72 1/4
2 24 PM	Fuel 4.365 inches Super		
	4.36 Sub		

Drained water to bring reactor 19 cm

2 31 4.46 inches Sub.
4.50 Super
4.475 Super
4.475 inches critical ≈ 11.33 cm

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Expr. 61 Time ____ AM PM Date 12-28 1954
Purpose Crit Condition for 30" dia Al. Cyl. Bare
Personnel: JKZ OK

H/x = ~ 74

START-UP CHECK LIST

Equipment Checked by JKZ 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 12-28 1954 Time ____ AM PM Source No. 8

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	—			
DC-2	✓			
DC-3	90	x100		
Log N	✓			
R-1	✓			
R-2				
P. M.	✓			

		C_4 x256		C_5 x256	
10^{02} AM	Fuel at 0.0 inches no reflector -	17		12	
10^{11}	Fuel at 2.03 inches	19 3/4	.86 ~~.896~~	28 1/4	0.429
10^{17}	3.06 inches	20 3/4	.82	34 1/4	.384
10^{23}	4.00	22 1/2	.755	35 1/4	.341
10^{40}	4.80	37	.484	62 3/4	0.191
10^{50}	4.60	29 1/2	.576	47.75	.251
10^{54}	4.50	27.75	.612	44.5	.27
11^{00}	4.40	26 1/2		39 3/4	

System empty at 4.80". Inventory = 4.45 x 4.80 x 2.54 = 54.2 liters
Extrapolated Crit ht. = ~ 5.3" ~ 13.46 cm
Crit vol ~ 61.37 l Crit Mass = ~ 21.34

Expt. 62 Time ~~AM~~ PM Date 12-28 1954
Purpose C Conditions 30" Dia
Cyl. ½ Reflected
Personnel: JKT DFC

START-UP CHECK LIST
Equipment Checked by JKT Personnel Check by JKT
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. PN-15
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by _____ Time _____ ~~AM~~ PM Date 12-28 1954

Reactor water zero = 24 cm

	Fuel ht.	Refl. ht.	C_4 x64		C_5 x64	
1⁴⁰ PM.	0	35 cm	11.0		14.0	
			11.0	11.5	7.0	6.75
			12.¼		6.5	
1⁴⁸ PM	2.30"	35 cm.	12.¼		7.75	
1⁵³ PM	3.~~4~~	"	18¼	.625	8.5	.795
2⁰⁴ PM	3.82"	"	55¾	.206	22.0	.307

2¹⁰ Drained H_2O to 34.3 cm. — ~ same H_2O ht as fuel
2¹⁵ 3.89" slightly supercritical ≈ 9.84 cm ≈ 44.96 l
2¹⁶ 3.882" slightly subcritical. C.M = 15.39

2²⁵ Drained H_2O to 29.3 cm. out ht = 10.1 cm
2³⁰ 3.93" slightly supercritical out Vol = 46.05 l
2³¹ 3.925" " subcritical. out Mass = 14.05
} for ½ refl.
2³³ Drained H_2O to 24 cm.
2³⁸ 3.975" just supercritical
2³⁹ 3.920" just subcritical.

Expr. 63 Time ____ AM PM Date 12-29 1954
Purpose Crit. Condition 30" dia
Cyl. fully refl.
Personnel: JKJ DFC

START-UP CHECK LIST
Equipment Checked by JKJ Personnel Check by JKJ
Instrument and Safeties Checked and Reset by JKJ
"Source In" Checked by ✓ Source No. RN75
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time ____ AM PM Date ____ 195

INSTRUMENT CHECK
Date 12-29 195__ Time ____ AM PM Source No. ____

Instrument	Trip Value	Scale	Source Distance	Start Up Scale
DC-1				
DC-2 ✓				
DC-3	90	x100		
Log N	trips			
R-1	OK.			
R-2				
P. M.	trips			

Time	Fuel ht	Water ht	C_4	C_5
	*1.20"	47 cm	~~[illegible]~~ 11 3/4	~~[illegible]~~ 2 1/2
4:00 P	2.01		73 1/4	20 1/4
4:18	2.29" just slightly supercritical			
	2.285" " " subcritical.			

see next page
Apparently the zero was not set very accurately for the above expt.

* Zero off by ~.20" (weld beads not taken into consideration.)

Expt 63 Repeat

START-UP CHECK LIST

Equipment Checked by JST Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. PN15
Emergency Equipment in Control Room Checked by J.T.
Red Light On by C
Start-Up OK'd by ✓ Time AM ~~PM~~ Date 12-30 1954

INSTRUMENT CHECK

Date 12-30 1954 Time AM ~~PM~~ Source No. PN15

Instrument		Trip Value	Scale	Source Distance	Start-up scale
DC-1					
DC-2	✓				
DC-3	✓	90 X100			
Log N	✓	Trips			
R-1	✓	"			
R-2					
P. M.	✓	Trips			

Probe zero changed to read zero with top refl. setting on weld beads, or ~ 3" above reactor bottom

Time	Probe ht	refl. ht	C_4 X16	C_5 X16
9:05 AM	0.77	51.5 cm	2.0	1.5

*2.49 just critical
.05
2.44 – corrected value

Note: It was necessary to lower top refl. approx. .34" to make contact. Lowering by this amount gave a max. in reactivity.

crit ht. 6.20 cm crit vol 28.27 l crit mass = 9.838

* – selysn zero at .05" when top refl at zero

Expr. 64 Time ~~AM~~ PM Date 1-3 1955
Purpose C. Cond for 7.5" Dia. Cross Bare
Personnel: JKF JTM

START-UP CHECK LIST

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

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	—			
DC-2	✓			10
DC-3	90	X100		10
Log N	trip			
R-1	"			
R-2	—			
P. M.	trip			

MULTIPLICATION

Expr. 64 Time 2 ~~AM~~ PM Date 1/3 1955

Scaler	Settings H.V.	Disc.	B. G. c/(2) min.
C(4)	1900 v.	40	27 (256)
C(5)	1900	60	23.5 (64)
C( )			

Time	Temperature Refl.	Sol'n	Height Refl.	Sol'n	C( )	$M^{-1}_{(\ )}$	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$	
2:05	—		—	23.3"			27	456 —	23.5	64 —	Background
2:10	—	74°F		14.70"			51.5	.524	41.25	.570	
2:17	—	"		21.04"			53.5	.505	44.0	.535	
2:25		74°F		24.05"			55.5	.485	45.25	.520	
2:31		74°F		27.57"			60.0	.450	50.25	.467	

Temperature			Height			M^{-1} or Remarks					
Time	Refl.	Sol'n	Refl.	Sol'n	C( )	$M^{-1}_{(\ )}$	C(4)	$M^{-1}_{(4)}$	C(5)	$M^{-1}_{(5)}$	
245		1	None	38.36"			64	.422	56	.42	

Estimated volume of solution ~ 57.4 liters.

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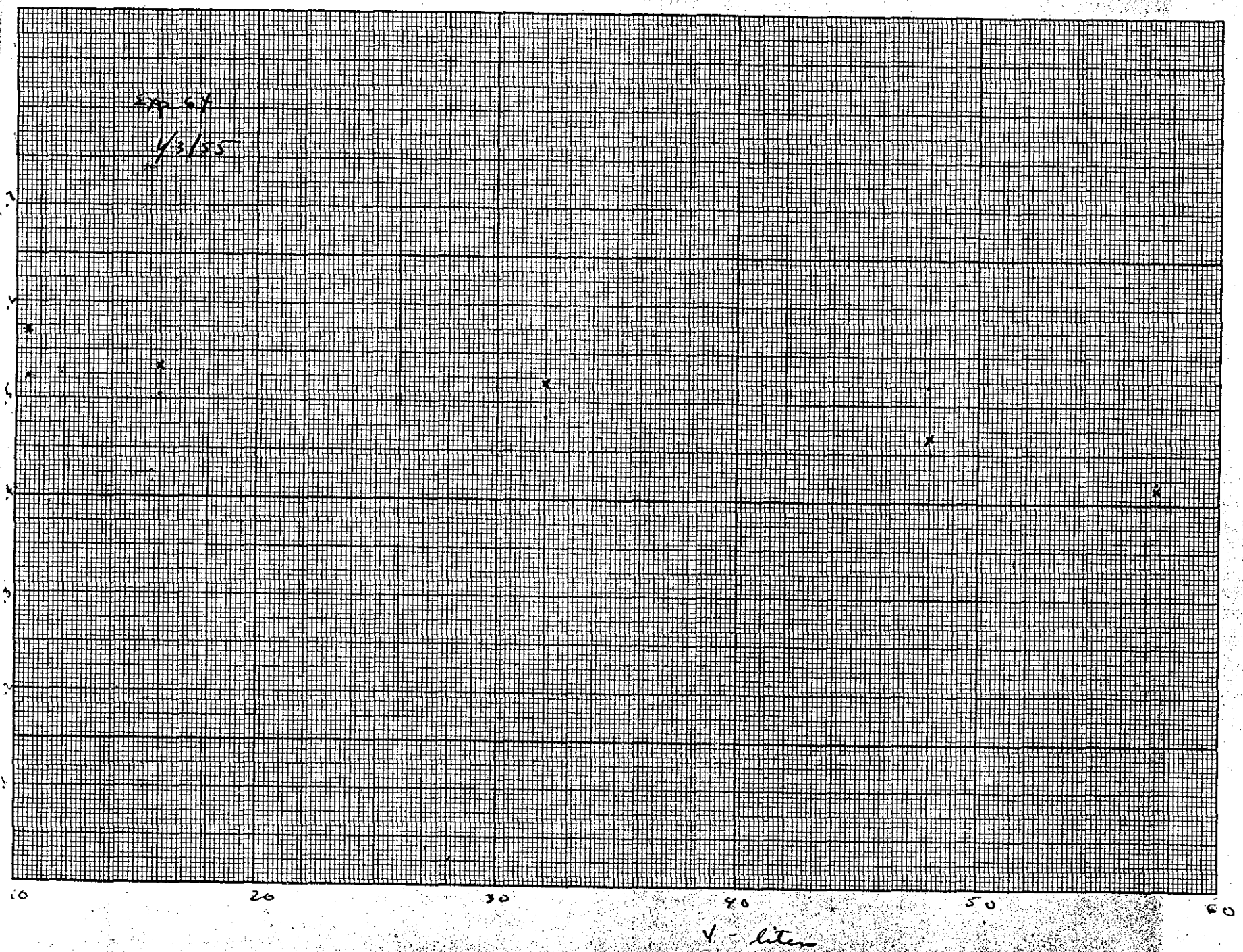


[redacted] 9

BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L.W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution

Special

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.125967
Sp. G.	Sp G 1.4369 @ 25.0°C

Ind

JAN 13 1955
DATE

1/4/55 sample taken from manifold Conc. Change

Sample Bottle H P-97 Req. #354699

Gross 116.4726

Tare 26.0962

Net 90.3764

The above sample taken from solution at H/X ~ 74.

Solution at H/X ~ 25 added to system

.25967 X 1.4369 = .3731 gm U/cm³

.2420 gm 235/gm

.3731 X .932 = .3477 gU235/cm³

$$H/X = 1.298 \times .25967 = \frac{1.0000 \quad .3370}{\frac{26.1 \times .6630}{24.20}} = 71.5$$

H/α = ~25

Expr. 65-A Time ____ AM ~~PM~~ Date 1-5 1955
Purpose crit. cond. 30" Dia. cyl. completely refl
Personnel: Gilly JRF

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

INSTRUMENT CHECK
Date ✓ 195__ Time ____ AM PM Source No. ____

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2 ✓				
DC-3	90	100		
Log N	Trip			
R-1	"			
R-2				
P. M.	"			

fuel ht	source	safety	C_4	M_4^{-1}	C_5	M_5^{-1}
0.28"	in	up	4.5		6.5	
1.49"	"	"	8.25	.546	7.75	.84
2.00"	"	"	17.0	.265	15.0	.433
2.28"	"	"	163.75	.0275	136.75	.0475
*2.31"	out	"	just crit			

Reflector temp. = 28°C @ 12^45 pm

* ~~selsyn correction~~ + .04

[redacted]

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

Very dilute UO_2F_2 in H_2O (~ppm)

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

ASSAY REQUESTED AT ☐ DT ☐

AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.01 ppm
PPM	

SIGNED:

BY: [illegible] DATE JAN 7 1955

$H/x \sim 25$

1/5/55 Exp. 65-B

This is repeat of last experiment to check mixing of solution. Completely reflected

fuel ht. source safety

2.25" out up just critical

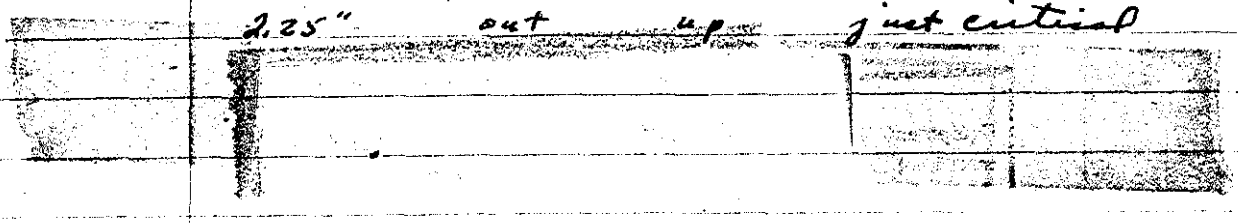
5.72 cm crit. vol. = 24.08 l ; Mass U^{235} = 21.67 kg

Exp. 65-C

Repeat of above

fuel ht source safety

2.25" out up just critical



1/6/55 Sample taken of reflector H_2O from storage tank. Req. # 354700

H/x ~25

Expr. 66-A Time AM Date 1/10 1955
Purpose Criticality conditions for 20" cylinder Bare
Personnel: Fox, Cross, Gilley

INSTRUMENT CHECK

Date 1/10 1955 Time 11:00 AM

Instrument

DC-1
DC-2
DC-3 trip
Log N trip
R-1 trip
R-2
P. M. trip

START-UP CHECK LIST

Equipment Checked by G.W.G. Personnel Check by G.W.G.
Instrument and Safeties Checked and Reset by G.W.G.
"Source In" Checked by G.W.G. Source No.
Emergency Equipment in Control Room Checked by
Red Light On by Fox
Start-Up OK'd by G.W.G. Time 11:2 AM Date 1/10 1955

20" dia. al. cyl. completely bare, H/x ~25

fuel ht	source	safety	C_4	M_4^-	C_5^-	M_5^-
0.50"	in	up			~~42.5~~ 23.0 ×64	
"	"	"			24.0	
3.40"	"	"			28.75	.833
5.48"	"	"			45.0	.534
6.00"	"	"			157.0	.153
6.07"	out	up			sub.	
6.08 (15.44 cm)	"	"			super	

Crit. vol. = 31.28 l; Mass U^{235} = 25.99 kg.

4/4 ~ 25

66-B

1/10/55 20" dia. al. cyl. with 1/2" fire brick reflector
3 45 PM on bottom only

fuel ht. source safety

5.99" out up super

5.98" " " sub.

crit. vol = 30.789 l; Mass U^{235} = 25.583

Expr. 66-C Time 8 55 AM ~~PM~~ Date 1/11 1955
Purpose Criticality conditions for 20" cyl. with fire brick
Personnel: Fox Cross Gilley

INSTRUMENT CHECK

Date 1/11 1955 Time 9 55 AM ~~PM~~ Source No.

Instrument	Trip Value	[illegible]	[illegible]	[illegible]	Start-Up Scale
DC-1					
DC-2					
DC-3	trip				
Log N	trip				
R-1	trip				
R-2					
P. M.	trip				

START-UP CHECK LIST

Equipment Checked by J.W.G. Personnel Check by J.W.G.
Instrument and S[illegible] by JWG
"Source In" Ch[illegible] JWG Source No.
Emergency Eq[illegible] Room Checked by JWG
Red Light On by JWG
Start-Up OK'd by JWG Time 9 40 AM ~~PM~~ Date 1/11 1955

20" al. cyl with 5 1/2" of fire brick on bottom. bare otherwise

fuel ht source safety

5.75" out up super

5.74" " " sub.

crit. vol. = 29.553 l; Mass U^{235} = 24.555 kg.

1/11/55

Exp. 66-D

20" dia. al. cyl. with 2" of fire brick on bottom. base otherwise. $H/x \sim 25$

fuel ht. source safety

5.89" out up ~~sub~~ just crit.

crit vol. = 30.325 l ; mass U^{235} = 25.197

Exp. 66-E

20" dia. al. cyl. with ½" carbon immediately ~~below~~ below bottom with 2" fire brick behind this

fuel ht. source safety

1 12 P.M. 5.65" out up just crit.

crit. vol. = 29.090 l ; mass U^{235} = 24.171 kg

Exp. 66-F

20" dia. al. cyl. with 1" carbon immediately below bottom with 2" fire brick below this.

fuel ht. source safety

5.47" out up sub

5.48" " " super

crit. vol. = 28.163 l ; mass U^{235} 23.401 kg

1/11/55 Exp. 64-G

20" dia cyl with 1/2" carbon immediately below bottom with 5 1/2" fire brick below this.

fuel ht. source safety

3'5" RM 5.53" : out up sub

5.54" " " super

crit. vol = 28.492 l ; mass U^{235} = 23.657

Exp. 64-H

20" dia. cyl with 1" carbon immediately below bottom with ~~5 1/2"~~ 5" fire brick below this.

fuel ht. source safety

Experiment discontinued due to feed valve not operating.

Density of dry fire-brick:

Dimensions: 8 3/4" X 4 3/8" X 1 7/8"

Weight: #1 — 1040 gm

#2 — 1060 gm

Expr. 66-H (Cont) Time 8:45 AM ~~PM~~ Date 1/12/ 1955
Purpose

Personnel: Fox Cross Gilley

INSTRUMENT CHECK

Date 1/12 1955 Time 8:45 AM ~~PM~~ Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip	100 x 100		
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by YWG Personnel Check by YWG
Instrument and Safeties Checked by YWG
"Source In" Checked by YWG
Emergency Equipment in Control Room Checked by YWG
Red Light On by YWG
Start-Up OK'd by YWG Time 8:50 AM ~~PM~~ Date 1/12 1955

20" dia al. cyl. with 1" carbon immediately below bottom with 5" fire brick below this.

fuel ht. source safety

5.43" out up ~~[illegible]~~ just crit.

crit. vol = 27.957 l ; mass U^{235} = 23.229

Exp. 66-I

1/12/55 20" dia al cyl with ½" carbon only on bottom
fuel wt same safety
5.81" out up sub. just crit.
crit. vol. = 29.913 l ; mass U^{235} = 24.855

Exp. 66-J

20" dia al. cyl. with 1" carbon only on bottom
fuel wt. same safety
5.61" out up sub.
5.62" " " super
crit. vol = 28.884 ; mass U^{235} = 24.00 kg

Exp. 66-K

20" dia. al. cyl. with 2" carbon only on bottom
fuel wt same safety
5.29" out up super
5.28" " " sub.
crit. vol = 27.185 l ; mass U^{235} = 22.588

Exp. 66-L

20" dia al cyl with 5½" carbon only on bottom
fuel wt. same safety
4.84" out up super
4.83" " " sub.
crit. vol = 24.919 ; mass U^{235} = 20.705

1/12/55 Exp. 66-M

20" dia al. cyl with 3½" carbon only on bottom.

fuel ht. same safety

5.00" out up just crit.

crit. vol = 25.743 l; mass U^{235} = 21.390 kg.

Exp. 66-N

3 40 P.M. 20" dia al. cyl. with 1" fire brick under bottom and H_2O reflector brought up to bottom of reactor.

fuel ht. same safety

4.86" out up super

4.85" " " sub.

crit vol = 24.971 l; mass U^{235} = 20.748

Expr. 66-0 AM Date 1/13 1955
Purpose
Personnel: F.

INSTRUMENT CHECK

Date 1/13/ 1955 Time 8 55 AM Source No.

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip on 80	100 x 1		
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by LWG Personnel Check by Fox
Instrument and Safety Checked and Reset by Fox
"Source In" Checked by LWG Source No.
Emergency Equipment in Control Room Checked by LWG
Red Light On by Fox
Start-Up OK'd by LWG Time 9 00 AM Date 1/13 1955

20" dia. al. cyl with 2" firebrick on bottom with H_2O brought up to bottom.

Level ht source safety

4.88" out up sub.

4.89" " " super

crit. vol = 25.125 l ; mass U^{235} = 20.876 kg

4/x ~ 225

1/13/55

66-P

20" dia. al. cyl. with 2" of wet firebrick under bottom (the H_2O was drained back from exp. 66-O and exp. run while firebrick still wet)

fuel ht. source safety

5.29" out up just critical

crit. vol = 27.234 l ; mass U^{235} = 22.630 kg

Exp. 66-Q

20" dia. al. cyl. with no fire brick under bottom and with H_2O reflector brought up to level of bottom of reactor.

fuel ht. source safety

11 10 AM 4.76" out up sub

4.77" " " super

crit. vol. = 24.507 l ; mass U^{235} = 20.343

Exp. 66-R

20" dia. al. cyl. with 1" carbon immediately under reactor with 1" fire brick under carbon and H_2O brought up to bottom of reactor.

fuel ht. source safety

1 27 P.M. 4.66" out up just crit.

crit. vol = 23.992 l ; mass U^{235} = 19.935

1/13/55

Exp 66-S

20" dia. al. cyl. with 3" carbon immediately under reactor with H_2O brought up to bottom of reactor.

	fuel ht.	source	safety	
2 47 P.M.	4.44"	out	up	just critical

crit. vol. = 22.860 l; mass U^{235} = 18.994 kg

Exp. 66-T

20" dia. al cyl. with 5½" carbon immediately below bottom with H_2O brought up to bottom

	fuel ht.	source	safety	
3 55	4.27"	out	up	just crit.

crit vol. = 21.985 l ; mass U^{235} = 18.267

Expr. ~~66-T~~ 66-U Time 9 55 AM ~~PM~~ Date 1/17 1955
Purpose

Personnel: Fox, Gilley

INSTRUMENT CHECK

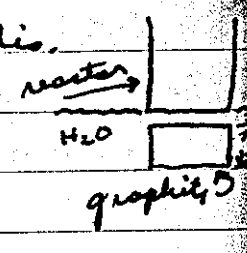
Date 1/17 1955 Time 9 30 AM ~~PM~~ Source No. 8

Instrument	Trip Value	Scale	Source Distance	Gain Cycle
DC-1				
DC-2				
DC-3	trip	85	on 100x1	
Log N	trip			
R-1	responds			
R-2				
P.M.	trip			

START-UP CHECK LIST

Equipment Checked by JWG Personnel Check by Fox
Instrument and Safeties Checked and Tested by JWG
"Source In" Checked by JWG Source No.
Emergency Equipment in Control Room Checked by JWG
Red Light On by Fox
Start-Up OK'd by JWG Time 9 55 AM ~~PM~~ Date 1/17 1955

20" dia. al. cyl with 1" H_2O under bottom (next to reactor) and 5½" carbon below this.



fuel ht source safety
4.34" out up ~~super~~ sub.
4.35" " " super

~~Fuel temp. at end of~~

crit vol = 22.345 l ; mass U^{235} = 18.566 kg

[redacted]	
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UD_2F_2 Solution

Special

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

ASSAY REQUESTED AT ☐ DT ☐ | AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.44278
Sp. gravity	2.01360 Sp.Gr. at 25.0°C
7E	75 ppm

SIGNED:

BY: md DATE FEB 1 [illegible]

1/17/55 Exp. ~~66-U~~ 66-V

2:50 P.M. 20" dia. al cyl. with 1/2" H_2O immediately under bottom and 5 1/2" carbon immediately below this.

fuel ht.	source	safety	
4.22"	out	up	sub
4.23"	"	"	super

Fuel temp. at end of experiment = 72° F.
crit vol = 21.727 l ; mass U^{235} = 18.053 kg

[redacted]

1/17/55 Sample taken from manifold:
Reg. # 354702 Sample bottle # P-184
Gross 152.7708
Tare 26.0487
Net 126.7221
Result by phone: .44278 gm U/gm ✓
sp. gr. 2.0136
≈ .8304 gm U^{235}/cm^3 =
≈ to H/x = 2092

Expr. ~~66-V~~ 66-W Time 8:45 AM ~~PM~~ Date 1/18 1955
Purpose

Personnel: Fox Cross Gillery

INSTRUMENT CHECK

Date 1/18 1955 Time 8:45 AM ~~PM~~ Source No. V

Instrument	Trip Value	Scale	Source Distance	Start-Up Level
DC-1				
DC-2				
DC-3	trip at 88 on 100x1			
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by JWG Personnel Check by JWG
Instrument and Safeties Checked and Reset by JWG
"Source In" Checked by JWG No.
Emergency Equipment in Control Room Checked by JWG
Red Light On by JWG
Start Up OK'd by JWG Time 9:09 AM ~~PM~~ Date 1/18 1955

20" dia. al. cyl. with 1/4" H_2O immediately under bottom and 5 1/2" carbon immediately below this

fuel ht. source safety
4.26" out up. just crit.

9:30 A.M. Fuel temp measured after exp. = 73.5 °F
crit. vol = 21.933 l ; mass U^{235} = 18.224 kg.

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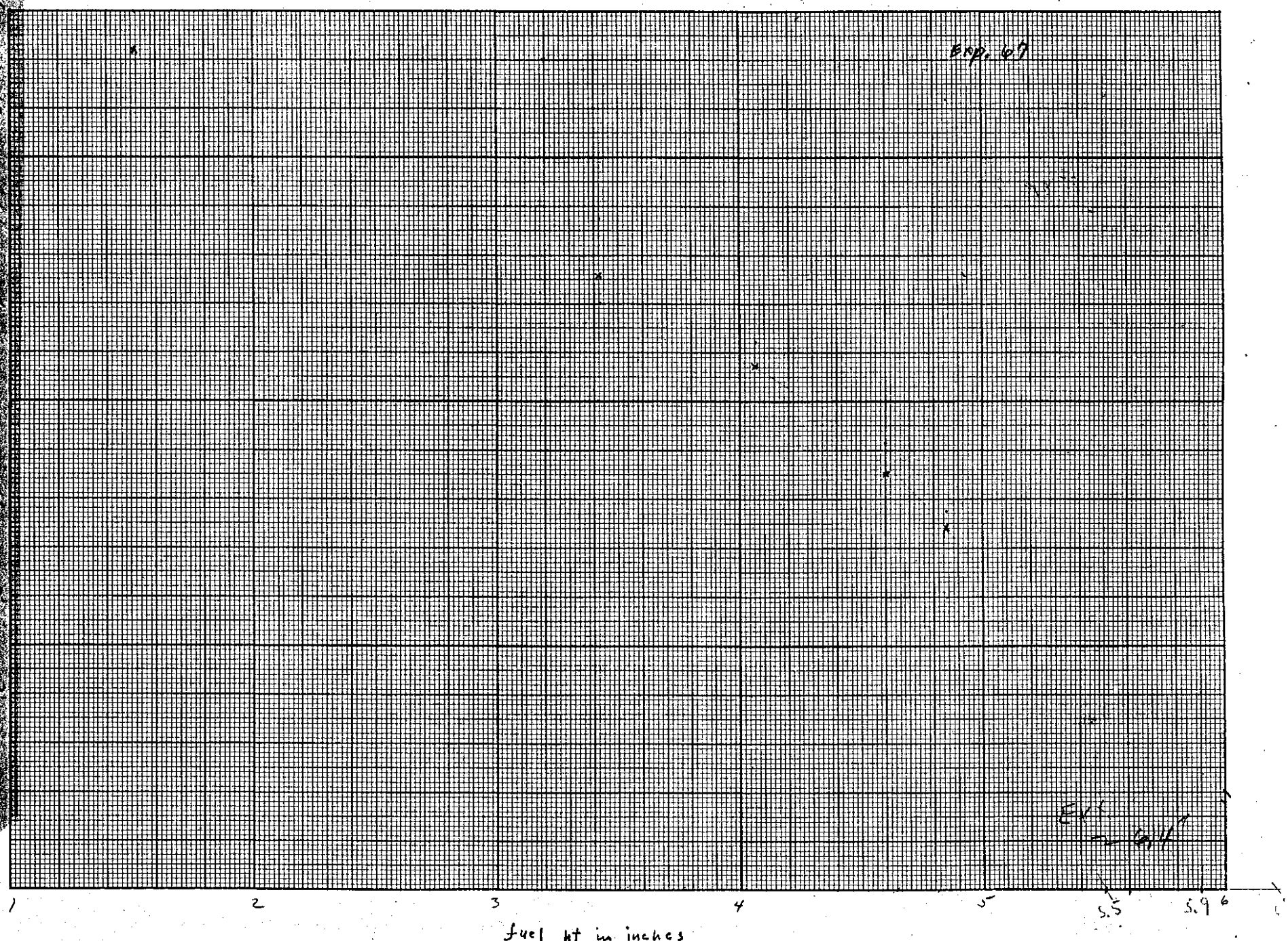


1/18/55 Exp. ~~66 W~~ Cole-X

11 20 A.M. 20" dia. cyl. with 3 1/4" H_2O immediately under bottom with 5 1/2" carbon immediately under this

fuel ht. source safety

11 29 A.M. 4.28" out up just crit.

fuel temp. = 75.5 °F

crit. vol = 22.036 l ; mass U^{235} = 18.310

1/18/55 Exp. 67 $U/X \sim 25$

2 20 P.M. 20"x20" sq. al. reactor. Bare

	fuel ht.	source	safety	C_4	M_4^{-1}	C_6	M_6^{-1}
2 44	4.85"	in	up	274.75	.388	266.25	.37 ~~.432~~
	4.60"	"	"	233.5	.457	232.25	.425 ~~.495~~
2 58 P.M.	4.06"	"	"	190.5	.56	184.25	.536 ~~.622~~
3 03	3.42"	"	"	155.25	.688	157.25	.628 ~~.73~~
	1.53"	"	"	118.75	.9	114.75	.86
3 28	.48"	"	"	106.75		98.75	

Long Ext. crit. at 6.4" ≈ 16.25 cm

approx. crit vol. ~ 41.3 l ~ 34.3 kg.

Expr. 68 Time 12 30 ~~AM~~ ~~PM~~ Date ~~1/19~~ 1/20 1955
Purpose

Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 1/20 1955 Time 12 30 AM ~~PM~~ Source No. r

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip	85	on 100 x 1	
Log N	trip			
R-1	trip			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by YWG Personnel Check by YWG
Instrument and Safeties Checked and Reset by YWG
Source Int Checked by YWG Source No.
Emergency Equipment in Control Room Checked by YWG
Red Light On by YWG
Start Up OK'd by YWG Time 12 30 AM ~~PM~~ Date 1/20 1955

20"x20" square of reactor completely reflected (including top tamper); H/x ~ 25 H_2O height 5/[illegible]
fuel ht. source safety
1 1/2 P.M. 2.75" out up just crit.
crit. vol = 18.02 l; mass U^{235} = 14.97 kg

Expr. 69 Time 1:00 ~~AM~~ PM Date 1/21 1955
Purpose

Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 1/21 1955 Time 1:20 ~~AM~~ PM Source No. –

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip	100	on 100×1	
Log N	trip			
R-1	trip			
R-2				
P. M.	trip			

Equipment Checked by YWG Check by
Instrument YWG
"Source" YWG
Emergency YWG
Red Light YWG
Start-Up Ok by YWG 1:20 Date 1/21 1955

10" al. cyl. completely reflected (including top tamper). 4/x ~25 H_2O ht. = 50 cm from floor
fuel ht. source safety

2:05 P.M. 4.88"* out up just crit. 12.2 cm

H_2O Temp. = 82.4 (measured with mercury thermometer)

Feed pipe ~~Bottom~~ correction for 10" cyl = +.93 cm
corrected crit. ht. 13.13

crit. vol = 6.670 l; mass U^{235} = 5.542

* Recheck of zero on probe shows reading 0.06" too high.

1/21/55 Exp. 70

10" dia. al. cyl. completely bare. 4/x ~ 2.5

Probe reads 0.03" too low.

Dual ht. source safety

4 13 p.m. 14.81" out up. just crit.

Correction to critical ht. = 0.93 cm.

Corrected crit. ht. = ~~38.63~~ 38.53 cm

crit. vol = 19.6~~24~~ l ; mass U^{235} = 16.~~306~~ 27 kg

Expr. 71 Time 3:15 ~~AM~~ PM Date 1/25 1955
Purpose Determine Critical Conditions

Personnel: Fop, Gilley

INSTRUMENT CHECK

Date 1/25 1955 Time 3:15 ~~AM~~ PM Source No. ✓

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	Responds			
DC-3	trip 90 on 100x1			
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by JWG Personnel Check by JWG
Instrument and Safety Checked and Re[illegible] JWG
"Source In" Checked by JWG [illegible] No.
Emergency Equipment in Control Room Checked by JWG
Red Light On by JWG
Start-Up OK'd by JWG Time 3:15 ~~AM~~ PM Date 1/25 1955

15" al reactor, Bare, 4/x ~ 25

Used K-25 cyl.

fuel let source safety

3:37 P.M. 6.98" out up just crit.

3:45 Solution temp. as read by thermocouple = ~~76.5~~ 77.0°F

Zero cor. + .41 cm

6.98 x 2.54 = 17.73 cm
.41
18.14

crit. vol = 20.698 l ; mass U^{235} = 17.198

Expr. 72 Time 9:30 AM ~~PM~~ Date 1/26 1955
Purpose: Criticality conditions for cylinders 15" Refl.
Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 1/26 1955 Time 9:30 AM ~~PM~~ Source No. r

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	responds			
DC-3	trip	100	on 600 x 1	
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by LWG Personnel Check by LWG
Instrument and Safeties Checked and Reset by LWG
"Source In" Checked by LWG Source No.
Emergency Equipment in Control Room Checked by LWG
Red Light On by LWG
Start-Up OK'd by LWG Time 9:40 AM ~~PM~~ Date 1/24 1955

15" al. reactor completely reflected. M/x ~ 25

fuel ht source safety
3.15" out up just crit.
Sol'n. Temp. as measured by thermocouple = 77°F
Correction for feed pipe = 0.41 cm
+ 8.0
8.41 cm = crit. ht.

crit. vol = 9.596 l ; mass U^{235} = 7.973 kg

Expr. 73 Time 10^15 AM ~~PM~~ Date 1-27 1955
Purpose C. Cond. 6" cyl (Al) completely reflected
Personnel: Gilley, Fox, Cron

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and S[illegible] and [illegible] ✓
"Source In" Check[illegible] ✓ [illegible] No. –
Emergency Equipment [illegible] Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by [illegible] Time 10^20 AM ~~PM~~ Date 1/27 1955

INSTRUMENT CHECK

Date 1-27-55 195 Time _____ AM PM Source No. _____

Instrument	[illegible]	[illegible]	[illegible]	[illegible]	Start-Up Scale
DC-1					
DC-2	✓				
DC-3	90	1100			
Log N	✓				
R-1	✓				
R-2					
P. M.	✓				

To start water at 36" on cyl ≈ 124.5 cm
Safety blade at ~ 33" from bottom of R.

Surf wt.	source	safety	C_4	M_4^{-1}	C_6	M_8^{-1}
11.87"	is	33.0"	33.0		36.0	
"	"	~~31.5~~ "	31.5		38.0	
24.05"	"	44	67.5	0.475	78.5	0.47
29.79"	"	"	110.5	0.29	145	0.255
33.10"	"	"	185.0	.173	141	

water level raised to ≈ 44"

34.41" out up just crit. ≈ 87.4 cm

Soln. temp. as measured by thermocouple = 77.5°F

Corr. for feed pipe 2.6 cm

H.C = 87.4 + 2.6 = 90.0 cm.

crit. vol = 16.380 l ; mass crit = 13.61 kg U^{235}

1/31/55 Sample taken from manifold:

Reg. # 354703 Sample # P-21

Gross 115.5689

Tare 30.4233

Net 85.1456

Sample taken from bottle L-4

Reg # 354704 Sample bottle # P-16

Gross 59.0179

Tare 25.4639

Net 33.5540

L-4: Gross 13320

tare 1860

Net 11460

gm/gm = .4105

gm/cm³ = .8268

Sample taken from West Storage tank:

Reg. # 354705

$$H = .44045 \times 1.298 = \begin{array}{r} 1.0000 \\ .5717 \\ \hline .4283 \end{array}$$

$$= \frac{26.11 \times .4283}{.4105} = 27.24$$

L-4	354704
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 washings containing HNO_3

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.03400

SIGNED: BY: Md DATE FEB 23 1955

[redacted]	354703
BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐ AT CODE NO.

ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.44045
Sp. gravity	2.0141

SIGNED: BY: Md DATE FEB 23 195

H/X ~ 50 See Analysis in "Interaction" Data Book

205

~~13.7~~
~~43.2~~
44.3

Expr. 74 Time 11:00 AM ~~PM~~ Date 7/6 1955
Purpose CC for 7.5" al. cross bare
Personnel: Fox, Gilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Time Distance	Start-Up Scale
DC-1				
DC-2	trip ~85 on	10 x 20		
DC-3	trip ~85 on	100 x 1		
Log N	trip			
R-1	wasponds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safety [illegible] ✓
"Source In" [illegible] ✓
Emergency Equipment in Control Room [illegible] ✓
Red Light On by ✓
Start-Up OK'd by J.W.A. Time 11:00 AM ~~PM~~ Date 7/6 1955

fuel ht.*	C_3	C_4	C_5
50.03"	46.13 48	~~9~~ 10	
"	47 47.5	30.14	15.5
46.54	45.5	28.11	13.13
"	46.5	24.2	15.13
"	47.0	13.3	14.15
"	47.75	12.1	13.15
39.31"	46.25	15.7	14
"	45.5	13.7	13.6
"	45.25	14.4	13.8
30	38.7	9	12

Contd.

* Selsyn reads ~ 0.04" too high i.e. ~~add~~ subtract 0.04" from above reading

Fuel Ht	C_3	C_4	C_5
30.16"	38.5	9 8	13 2
"	39.0	8 12	11 11
26.81"	25.5	5 11	9 11
"	25.25	4 14	9 15
23.66"	15.75	3 7	7 5
"	16.5	3 9	6 7
9.70"	11.5	3 2	4 4
"	12.0	3 5	4 5

Expr. 75 Time 2 ~~AM~~ PM Date 7/6 1955
Purpose cc for 7.5" dia. al. "cross" reflected (this was run to obtain 7.5" cylinder value if critical below 20.25")
Personnel: Fox, Gilley

START-UP CHECK-LIST
Equipment Checked by ✓ Check by ✓
Instrument ✓
"Source In" ✓
Emergency ✓
Red Light On ✓
Start-Up OK'd by J.W.G. Time AM PM Date 7/6 1955

fuel ht.* H_2O ht.
10.41" 26.5 cm just crit.

~~Expr. 76 Time AM PM Date 7/6 1955~~
~~Purpose CC for 5" al. "cross" reflected~~
~~Personnel: Fox, Gilley~~

* sub. 0.04" from this value for yeco correction

Expr. 76 Time 8 25 AM ~~PM~~ Date 7/7 1955

Purpose cc for 5" al. "cross" reflected

Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 7/7 1955 Time 8 25 AM ~~PM~~ Source No.

Instrument	Trip Value	Scale	Source Distance	Up Scale
DC-1				
DC-2	trip	~85	on 10x20	
DC-3	trip	~80	on 10x1	
Log N	trip			
R-1	responds			
P				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

Source Ind Checked by ✓ Source

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

Start Up OK'd by JWG Time 8 30 AM ~~PM~~ Date 7/7 1955

Fuel Temp fuel ht H_2O

73° F 29.75" 86.6 cm (34.1)" just crit.

Expr. 77 Time 11 05 AM ~~PM~~ Date 7/7 1955
Purpose "c for 4" dia. al. cross" 88° reflected
Personnel: Fox, Gilley

fuel ht.	H_2O	C_3	C_5
47.01"	120cm	2^{14}	1^{12}
"		3^{3}	1^{12}
		2^{13}	
40.91"		2^{00}	~~1^{12}~~ 1^{9}
"		2^{14} 2^{11}	1^{11} 1^{8}
34.60"		2^{11}	1^{4}
"		2^{4}	1^{11}
27.21		3^{1}	2^{2}
"		2^{8}, 2^{13},	1^{14}, 1^{13}
12.14		2^{7}, 2^{11}	0^{14} 1^{10}

Indicates 4" cross inf. rope

Expr. 78 Time 10 PM Date 7/8/55 H/K = ~ 45
Purpose C.C. for 30" Dia. Cyl.
completely refl.
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. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time AM PM Date 195

H2O ht Fuel ht Remark
Had difficulty with leak

Re-start

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time 8:32 AM ~~PM~~ Date 7/11/195

Instr checked OK
Trip level normal

* Fuel ht H2O ht Remark
24.0 cm

Fuel Probe 0.30" below top Tamper (probe
10:02 AM 2.12 [zeroed against bottom with
10:08 2.20 PM set back to 700V tamper down

Tamper at 1.93 - no change in activity - Source out
almost crit.

10:19 Tamper raised to 1.95 - fuel added - Super crit
draining small amt tamper now at 1.92 just crit
Just critical adjustment - tamper at 1.93"
Fuel ht remeasured = 2.19"
Water ht 24 cm. = 9½"
Corrected fuel height = 2.15"
* - zero reads + .04"

Expr. 79 Time 3:00 AM PM Date 7/11/1955
Purpose C.C. for 30" Dia. Cyl. Bare
Personnel: Cronin, Fox

H/X - 245

START-UP CHECK-LIST
Equipment Checked by F Personnel Check by F
Instrument and Safeties Checked and Reset by F
"Source In" Checked by ✓ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time ____ AM PM Date ____ 195__

Fuel dump is only safety

*Fuel ht

3:55 PM 5.26" Source Out Just Critical
corrected crit ht = 5.22"
= 13.25 cm

al plate

Expr. 80 Time 12:10 AM PM Date 7/12/1955
Purpose C.C. for 30" Dia. Cyl. refl. & with ½" al plate underneath
Personnel: Cronin Fox

START-UP CHECK-LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time ____ AM PM Date ____ 195__

Instr checked ok.
DC3 - 75 x 200
DC2 - 75 x 200

	Fuel ht	Water ht	Remarks
12:40	2.37"	26.5 cm	not crit source out
	2.38	"	just " " "

2.02 reading at contact

Corrected value 2.34"

* zero reads +.04" ⊕

Expr. 81 Time 2:20 AM PM Date 7/12/195

Purpose C.C. 30" cyl. refl. with 2 Al plates underneath, 1/2" & 3/4" total of 1 1/4" in addition to reactor bottom

Personnel: Cronin, Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by _____ Source No. 68

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

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

Fuel ht H2O ht

~~Fuel~~. 26 cm.

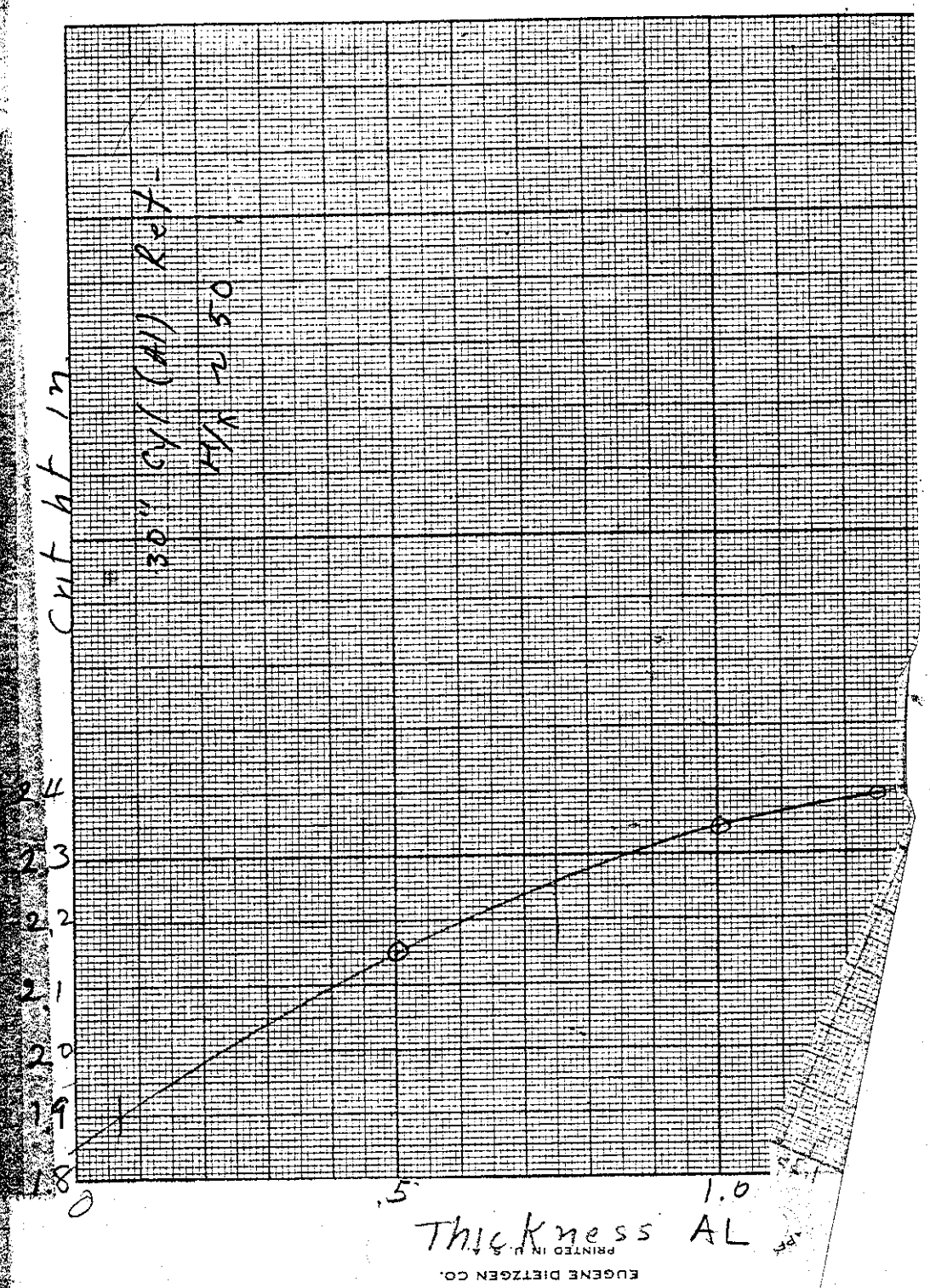
2.10" top tamper ht. at critical

2.43" fuel ht at critical

corrected value 2.39"

When top tamper touched bottom selsyn read .10", However, since prope protruded ~ .10" more than in expt 78, this is a good check on the zero

Difficulty in leveling the bottom makes the above results only approximate



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Expr. 82 Time 3:32 AM PM Date 7/13/ 1955
Purpose C.C. for 15" D. cylinder (Al) Bare
Personnel: Cronin, Fox

annuli type reactor

H/X = ~45

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 38
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by AK Time PM Date 195

Fuel ht	Remark
3:57 PM 6.90"	~~super~~ just Critical ± .01"
≈ 17.5 cm	

Expr. 83 Time 10:55 AM PM Date 7/14/ 1955
Purpose C.C. for 20" D. Al cylinder Bare
Personnel: Cronin Fox

annuli Type

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by Source No. 38
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by Time PM Date 195

Fuel ht	Remark
5.76"	Super
5.75	just barely Super
5.74	just C

Expr. 84 Time 3:51 AM PM Date 7/15 1955
Purpose C.C. 6" Dia S.S. Reactor completely refl.
Personnel: Cronin, Cross, Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time _____ AM PM Date _____ 195__

Volume ht Water ht. = 192.0 cm:
(all available)

Top tamper came loose from rock

7/18/55 Top tamper replaced. Experiment cont.

Expr. 84 Time 9:30 AM PM Date 7/18 1955
Purpose cc for 6" dia S.S. reactor completely reflected
Personnel: Cross, Cronin, Gilley

Instruments checked – ok

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 9:30 AM PM Date 7/18 1955

fuel ht H_2O ht
46.01" 190 cm just crit.

215

H/X = ~45

Expr. 85 Time 9:30 AM ~~PM~~ Date 7/19 1955

Purpose CC for 20x20" al. square bare

Personnel: Cross, Cronin, Kelley

INSTRUMENT CHECK

Date 7/19 1955 Time ____ AM ____ PM Source No. ____

Instrument	[illegible]	[illegible]	[illegible]	Start-Up Scale
D-1				
D-2	trip			
D-3	trip			
Log N.	trip			
R-1	~~trip~~ responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ____ Personnel Check by ____

Instrument and [illegible]

"Source In" [illegible] Source No. ____

Emergency Equipment [illegible] Room Checked by ____

Red Light On by ____ AM

Start-Up OK'd by ____ Time ____ PM Date ____ 195__

fuel ht.

5.58"

just cut.

Expr. 86 Time 8:30 AM PM Date 7/20 1955

Purpose Critical condition for 20"x20" square al reactor. completely reflected

Personnel: Cronin, Gilley

INSTRUMENT CHECK

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

Instrument				Scale Distance	Start-Up Scale
DC-1					
DC-2	trip @ 70 on 20x10				
DC-3	trip @ 70 on 20x10				
Log N	trip				
R-1	response				
R-2					
P. M.	trip				

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Checked by ✓

Instrument and Safeties Checked and Reset by ✓

Source (n) Checked by ✓

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

Start Up OK'd by JWA Time 8:30 AM PM Date 7/20 1955

fuel ht.* H_2O

2.00" 35 cm just crit.

corrected ht. = 1.95"

Comparison with refl. plastic slab. indicate above value in low

* Probe reads 0.05" too high

Expr. 87 Time 3 00 ~~AM~~ PM Date 7/20 1955
Purpose cc for 10" al. cyl.
base
Personnel: ~~Guys~~ Gwin, Cronin, Gilley

annuli type cyl.

START UP CHECK LIST
Equipment Checked by — Personnel Check by —
Instrument [illegible] —
"Source In" [illegible] — [illegible] No. —
Emergency [illegible] Room Checked by —
Red Light On by —
Start-Up OK'd by J.W.G. Time 3 00 ~~AM~~ PM Date 7/20 1955

fuel ht.
13.68"

just crit.

Expr. 88 Time 10 00 AM ~~PM~~ Date 7/21 1955
Purpose cc for 12" dia. of cyl. bare
Personnel: Cronin, Cross, Gilley

annuli type reactor

INSTRUMENT CHECK

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

Instrument	Trip Value	Code	Source Distance	Start-Up Scale
DC-1				
DC-2	trip @ 70 on 20 x 10			
DC-3	trip @ 70 on 20 x 10			
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset _____
Source In" Checked by ✓
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by [illegible] Time 10 00 AM ~~PM~~ Date 7/21 1955

fuel ht.
8.96"

just crit.

Expr. 89 2 25 ~~AM~~ PM Date 7/22 1955
Purpose Critical conditions for 6 1/2" al. cyl. completely reflected
Personnel: Cronin, Kelley

INSTRUMENT CHECK

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

Instrument	[illegible]	[illegible]	[illegible] Distance	Start-Up Scale
DC-1				
DC-2	trip	~ 85	on 20	X 10
DC-3	trip	~ 85	on 20	X 10
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Check by ✓
Instrument [illegible] ✓
"Source In" [illegible] No. ✓
Emergency [illegible] Checked by ✓
Red Light On [illegible] ✓
Start-Up OK'd by J.W.S. Time 2 25 ~~PM~~ Date 7/22 195__

fuel ht H_2O ht, 100 cm

14.68
Top tamper 13.96 - slightly super - approx 200 sec period allowed to remain on period 250 sec - straight line on Log N chart.

14.62 100 cm
Top tamper = 13.91 source put back in and power level raised ~ half decade - source removed system slightly sub.

Out ht 14.65" ≈ 37.2 cm
+ 2.2 — Bottom correction for 3" feet line
39.4

220

Expr. 90 Time 3:15 ~~AM~~ PM Date 7/25 1955
Purpose Repeat of exp. # 84 to recheck critical ht. of 6" S.S. cyl. completely reflected
Personnel Fox, Kelley

Instruments checked — OK.

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
Source In" Checked by ✓ No.
~~Emergency Equipment in Control Room Checked By~~ ✓
Red Light On by ✓
Start Up OK'd by JWA Time 3:30 ~~AM~~ PM Date 7/25 1955

Fuel ht *	C_4	C_5	H_2O
0.00	2^{11}, 1^{15}, 2^{8}	31^{3}, 31^{4}, 30^{6}	
10.29"	2^{1}, 2^{9}	29^{6}, 28^{2}	
30.26"	7^{7}, 2^{14}, 2^{6}	27^{5}, 27^{6}, 27^{8}	
40.01"	2^{8}	26^{2}, 27^{10}	

46.5" Sym critical approx 200 sec
see log N recorder chart

45.56" log N at approx 1.0 level —
(Safety Blade Selsyn reads 46.0

4:35 PM safety blade raised to 57.0"
level still just critical 45.56" w safety raised

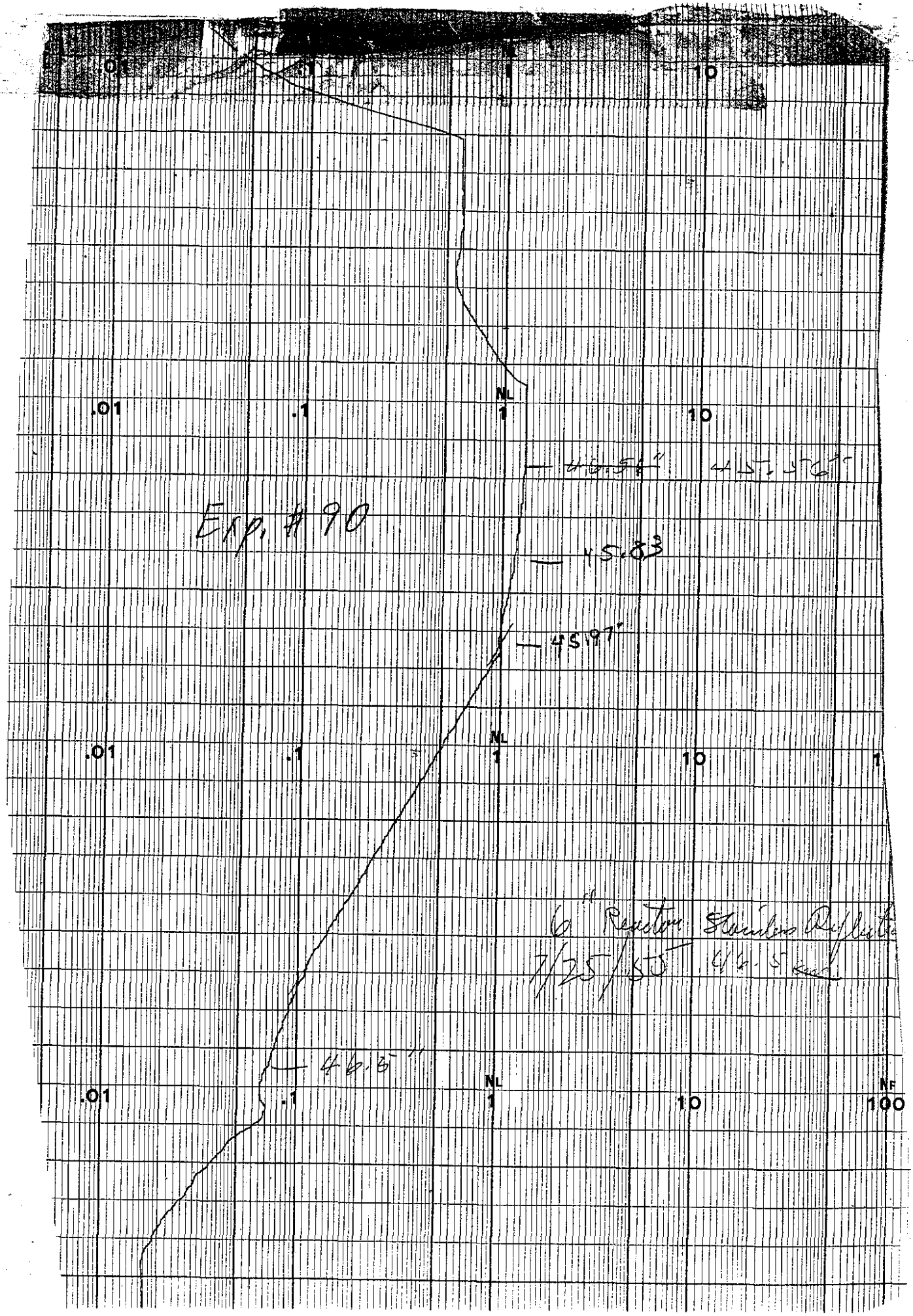
4:50 Temp. of H_2O reflector = 27°C

45.62 × 2.54 = 115.8 cm

Distance ~~from~~ from source dog house to top tamper = 40 inches

115.8
2.6 — bottom correction
118.4

* add 0.06" to ht. for zero correction *



.01
.1
1
10
NL
NF
100
Exp. #90
45.83
45.97"
46.5"
6" Reactor Stainless Reflector
7/25/55

Expr. 91 Time 8 30 AM ~~PM~~ Date 9/1 1955
Purpose C.C. for* 8.76" al. cyl bore
Personnel: Fox, Cross, Gilley

INSTRUMENT CHECK

Date [illegible] Time [illegible] AM [illegible] Source No. [illegible]

Instrument [illegible] Start-Up Scale

DC-1
DC-2
D [illegible] trip @ ~ 100 [illegible] 1x100
Log N trip
R-1 respond
R-2
P.M. trip

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and [illegible] ✓
"Source In" [illegible] ✓ [illegible] No. [illegible]
Emergency Equipment in Control Room [illegible] ✓
Red Light On by ✓
Start-Up OK'd by G.W.D. Time 8 45 AM ~~PM~~ Date 9/1 1955

At 62" fuel ht. stopped drained back & shortened safety & probe length.

Fuel ht.

86.81" slightly super
86.37" } 85.9" " "
85.37" } sub

* special cyl 8" tall with 2" feed pipe at bottom, 16 ga al. heresite coated. Calibrated area ≈ 8.76" dia.

Expr. 92 Time 3:15 ~~AM~~ PM Date 9/1 1955
Purpose: cc for 8.50" dia. stainless steel cyl. (1/8" wall) bare
1/16
Personnel: Fox, Gilley

CHECK LIST
Equipment ✓
Instrum. Check by ✓
Source ✓
Emerge. No.
Red Light ✓
Start-Up OK'd by SWG Time 3:20 PM Date 9/1 1955

fuel ht.	~~C4~~ C1			~~C5~~ C3		
90.10"*	8 2 / 8 23	8.1	.91	34 41 / 35 21 ×64	34.75	.90
80.56"	8 38 / 8 11 / 8 45	8.5	.87	48 55 / 35 8 / 35 27	35.1	.89
70.67	9 21 / 10 0	9.7	.74	41 / 35 16	38.	.82
60.13	8 29 / 8 29	8.5	.87	33 27 / 33 58	33.5	.93
~24"	7 21 / 7 22	7.4		32 30 / 30 38	31.25	

Recording instr. indicated very little increase in reactivity above about 40-50" Comparing this result with Expt 91 indicates definately that this is inf. cyl

* ~~Sy~~ Selsyn reads 0.07" too high

H/X = 43.2

Expr. 93 Time 9^15 AM ~~PM~~ Date 9/30 1955
Purpose Cl. for 6" dia. al. cyl. completely reflected – including top temper.
Personnel: Fox, Cross, Gilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	trip @ 70 on 10 x 20			
DC-3				
Log N.	trip			
R-1	~~id~~ trip			
R-2				
P. M.	trip			

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 LWG Time 9^20 AM ~~PM~~ Date 9/30 1955

Note added on 8/15/57 .... to correct for bottom Al plate subtract 0.7 cm from corrected ht.

~~70.~~ 70.8 cm
~~70.1~~ -.7
C.H = 70.1 cm
~~CV 12.8~~
C.V. = 12.8
C.M =

Water zero = 34 cm on side scale
fuel ht. 26.87" ~~just crit.~~ slightly super
26.98" super critical
26.85" slightly sub.
26.86 C. Ht. ≈ 68.2 cm
+ 2.4 end cor.
70.8 corrected crit. ht
for bottom feed line

H2O ht. 120.5"

C.V = 12.9 C.M = 6.98
on side scale – see note above

Expr. 94 Time 1:45 ~~AM~~ PM Date Oct 10 1955

Purpose Critical conditions of 10 inch als cyl. — bare

Personnel:

H/K = 43.2

START-UP CHECK LIST

Equipment Checked by LWG Personnel Check by LWG

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 JWG Time 2 ~~AM~~ PM Date 10/10 1955

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	trip	≈ 50 cm	10 x 20	
DC-3	trip	"	"	
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

fuel ht.

13.27" slightly super

13.24" ≈ 33.6 cm just crit

13.21 sub. critical

13.24
.37
13.61"

(Most probably FOS type since top refl. expts performed next.)

33.6 cm

End cor. → .93 → for feed line

34.5

C.V = 17.50 l

C.M. = 17.50 x .537 = 9.40

Correct for bottom plate

34.5 cm
0.4
34.9 cm

C.V = 17.69 L

C.M = 9.50 kg

$H/x = 43.2$

Expr. 95 Time 9:00 AM PM Date 10/11 1955
Purpose Critical conditions for 10" cl. cyl reflected except top
Personnel: Fox, Tilley

INSTRUMENT CHECK

Date _____ 195 Time _____ AM PM Source No. _____

Instrument _____

Unit trip @ 65 on 10x20

Log N. trip
R-1 responds
R-2
P. M. trip

CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument ✓
"Source In" ✓
Emergency ✓
Control Room ✓
Red Light On ✓
Start-Up OK'd by [illegible] Time _____ AM PM Date _____ 195__

fuel ht. H_2O ht
6.45" 16.4 cm just crit.
Solution temp. = 76 °F by thermocouple # 13

End cor $\frac{6.45 \; .37}{6.82} \approx 17.3$ cm no plate cor. applied

C.V = 17.3 x 507 = ~~8.76~~ 8.77 L
C M = .537 x ~~8.76~~ 8.77 = ~~4.70~~ 4.71 kg

$H_{/x} = 43.2$

Expr. 96 Time 10 30 AM ~~PM~~ Date 10/11 1955
Purpose C.C. for 10" ol. reactor reflected except for top tamper with H_2O at various height above fuel int.
Personnel: Fox, Gilley

Fuel ht.	H_2O	
6.14"	31.3 cm	just critical ~~slightly super~~
6.13"	34.7 cm	just crit.
6.10	38.3	
6.06"	46.6 cm	

Effect of raising water level above that of soln.

Expr. 97 Time 1 45 AM PM Date 10-11 1955
Purpose C. C. for 10" dia cyl fully reflected
Personnel: LWG, C, Cross, JKF.

H/X = 43.2

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 ___ Date ___ 195

fuel ht. H_2O ht.
5.06" 35.8* cm top tamper just in contact slightly super
4.82" after lowering T.T. to max just crit.
The last measurement (4.82") was obtained by lowering the top tamper ~~down~~ until no increase in activity was observed after probe had made contact.

See pag. 231 EXPT 97A repeat ~~max activity~~ ~~4.64~~
∠ 4.64

4.82
.37
5.19" End cor.
22
13.2 cm
− 0.7 − Bot. plate
12.5

Expr. 97A Time 8 30 AM PM Date 10-12 195
Purpose Repeat of above after inserting plastic plugs in top tamper
Personnel: LWG C.C., JKF

to see if soln. in the three holes gives the above effect.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ___
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. PN 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKF Time ___ AM PM Date ___ 195

Tamper just in contact (probe)

Fuel ht	H_2O ht	
4.96"	36.6 cm	slightly super
4.80"	36.6 cm	~~Just Critical~~

with tamper at max. (tamper raised for measuring soln ht.) did not get reading with tamper at max?

* Measured from bottom of reactor.

CON

H/x = 43.2

Expr. 97B Time 10^05 AM ~~PM~~ Date 10-12 1955
Purpose Compare top refl. at ~~1 cm 1.45~~ above soln with it in contact
Personnel: LW.G. C.C. JRF

1 cm. Lowered probe in top tamper 1 cm.

H/x =

Fuel ht H₂O ht

*5.65" → 5.24" corrected 36.0 cm Just Crit.

5.24
.37
5.63 End cor

To the 1 cm that probe was lowered must be added .18 x 2.5 = .45 cm due to probe not being a true zero of top tamper in 97A expt. Not strickly true. The above is more due to "holes" in the top refl. The .45" correction should "Probably" best be neglected.

Expr. 97C Time AM PM Date 195
Purpose Lowered probe total of 2 cm — corrected to 2.45
Personnel: LWG CC, JRF

Fuel ht H₂O ht

5.32
.37
5.69

*6.11" → 5.32 corrected 36.0 cm Just Crit.

Expr. 97D Time 1^30 ~~AM~~ PM Date 10/12 1955
Purpose Same as above except probe lowered a total of 4 cm — corrected to 4.45
Personnel: J.R.F., Cross, Jelley

Fuel ht. H₂O ht.

7.06 36.0 cm Just Crit

5.49
.37
5.86

5.49" corrected

* uncorrected value. Probe lowered 1 cm & 2 cm

H/X = 43.2

Expr. 97E Time 2:10 PM Date Oct 12 1965
Purpose Same as Above except Probe lowered A total of 6 cm ~~Corrected 6.45 cm~~
Personnel: J.R.F. L.W.G. C.C.

Fuel Ht H₂O Ht just Crit
7.97" 36.0 cm ~~slightly sub Crit~~
5.61" Corrected
.37
5.98

Expr. 97A-repeat Time 2 30 AM PM Date Oct. 12, 1965
Purpose Recheck of C.H. with top tamper in contact.
Personnel: LWG, C.C., JRF

Fuel Ht H₂O Ht
Peak of reactivity at 4.64"
4.82
4.64
.18
4.82" 36.0 cm just Crit
→ value taken after peak of reactivity was obtained by lifting top tamper and re-making contact.

~~Using crit ht. corresponding to position of max. reactivity:~~
~~C.H = 4.64 x 2.54 = 11.8 cm~~
~~C.V. = 5.99 l.~~

Using stn. ht after removing tamper:
C.H = 4.82 x 2.54 = 12.2 cm
End Corrected (for feed pipe) .37
5.19 x 2.54 = 13.2 cm
Bot. Plate cor. → .27
4.92

Expr. 98 Time 9:30 AM PM Date 10-13 1955 Ann. Type ?
Purpose C. C. for 8" dia. al. cyl. fully reflected & ~~with air gap~~
Personnel: L.W.G, C.C, J.KF

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source PN 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by JKF Time PM Date 195

No plugs in tamper

Fuel ht H_2O Ht
6.85" position of max reactivity
19.3 7.59" corresponding crit ht
0.7
18.6

Nov 1, 1955 sample taken from storage system after mixing
P-145 req. No. 354727

93.212 .352 gm U/gm
26.838 .328 gm X/gm
66.374 gm net 1.637 sp. gr.

gm X/cm³ = .537

$H/X = \frac{.543}{.35201(.932)} \times 26.11 = 43.2$

[redacted]

BATCH NUMBER	REQUISITION NUMBER

REPORT TO: L. W. Gilley

BUILDING NO. 9213

DESCRIPTION OF MATERIAL:

UO_2F_2 solution

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

ASSAY REQUESTED AT ☐ DT ☐	AT CODE NO.
ANALYSIS REQUESTED	REPORTED ANSWERS
GRAM/GRAM T	.352010 g/g
Sp. gr. =	1.6368

RECEIVED
NOV -2 AM 11
1955

SIGNED: [signature]
BY:

NOV 13 1955
DATE

11-14-55

Calibration of 5½" Dia. cylinder 8' long

Vol. added	Ht. reading
0 l.	17.0 cm.
2	30.0
4	42.9
6	55.9
8	68.9
10	82.0
~~14~~ 12	95.0
14	108.0

Vol.	Ht.
16 l	121.0 cm
18	134.0
→ weld Bead 20	147.1
22	160.1

Area = 153.8 cm²

NOTE: 3 liters of H_2O were added to solution in manifold on 11/15/55 to dilute solution back to 4/x of approx. ~~45.~~ 44.7

H/X = 44.7

Expr. 99 Time 9:00 AM ~~PM~~ Date 11/16 1955
Purpose Critical conditions for 5.5" Dia. al. cyl. water reflected
Personnel: Fox, Gilley

INSTRUMENT CHECK

Date 11/16 1955 Time _____ Reference No. _____

Instrument:
DC-1
DC-2 trip ~80 on 10x20
DC-3
Log N trip
R-1 respond
R-2
P. M. trip

START-UP CHECK LIST

Equipment Checked by JWG Personnel Check by JWG
Instrument and Safeties Checked and Reset by JWG
Source In" Checked by JWG
Emergency Equipment Control Room Checked by JWG
Red Light On by JWG
Start Up OK'd by JWG Time 9:05 AM ~~PM~~ Date 11/16 1955

	fuel ht.	H_2O ht.	C_2	C_3
9:25	18.18"	~5 ft.	5	15.75 ~~50.75~~
	"	"	5.0	14.5
	30.38"	"	5.0	35.25 (?)
	"	"	6.0	15.0
	"	"	5.0	16.0
	40.36	"	5.0	24
	"	"	6.0	14.5
	53.92"	"	4.75	16
	"	"	5.5	15.5

Con't.

Exp. 99 (cont'd)

53.92
14.01
39.91
30.26
90.17

Solution probe shortened. A reading of 14.01 on sglsyn corresponds to fuel height of 53.92". Safety blade ~x" below top of reactor when cocked. H_2O is ~ 1" below top of reactor.

fuel ht.	H_2O	C_2	C_3
25.38	~8"	6.0	15.75
"	"	6.0	15.25
36.68	"	4.5	15.0
"	"	5.25	15.5
50.26	"	5.0	14.5
"	"	6.0	15

50.26
14.01
36.25
53.92
90.17"

$H/x = 44.7$

Expr. 100 Time 3:00 ~~AM~~ PM Date 11/16 1955
Purpose Period measurements on bare 8.75" dia reactor (al.)
Personnel: Fox, Gwin, Gilley

Temp. = 77.5 °F by thermocouple
Fuel ht. before change of probe = 50.09"
Selsyn reads 10.15 when probe in contact with solution after probe change
3:40 Shut down because DC-2 tripped.
Instrument tripped when changing scale

H/X = 44.7

Expr. 100 (cont.) 8:30 AM ~~PM~~ Date 11/17 1955

Purpose

Personnel: Fox, Cross, Kelley

INSTRUMENT CHECK

Date AM PM Source No.

Start Up Scale

DC2 trip on 65' on 10 x 20

trip

responds

P. M. trips

START UP CHECK LIST

Equipment Checked by ✓ Check by ✓

Instrument ✓

"Source In" ✓

Emergency ✓

Red Light On by ✓

Start-Up OK'd by JWA Time 8:30 AM ~~PM~~ Date 11/17 1955

Discontinued because of spilling solution inside tank. Air pressure remained on storage tanks when feed-drain switch was in drain position - caused by burnt out coil in relay.

H/x = 44.7

50.825

Expr. 100 (cont.) Time 10 30 AM ~~PM~~ Date 12/2/ 195 5
Purpose Period measurements on
bare 3.75" dia. el. reactor
Personnel: Fox, Cross, Gilley

INSTRUMENT CHECK

Date 12/2 195 5 Time 10 30 AM ~~PM~~ Source No.

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	trip is erratic – responds to source			
DC-3				
Log N				
R-1	respond			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safety 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 [illegible] Time 10 30 AM ~~PM~~ Date 12/2 195 5

10 45 probe changed (shorter probe put in):
selsyn reading before change = 50.825"
" " after change = 10.975"
39.850

fuel ht. = 26.91" (selsyn reading)
39.85
66.76

{ stopped at this point to drain fuel that had been left in dump well

fuel ht

2 30 P.M	32.15"	source out	super critical
	30.56"	"	" "
	29.83"	"	slightly super

(over)

H/X = ~44.7

Exp # 100 (cont.)

fuel ht.	source	
29.33"	out	slightly super
28.57"	"	slightly sub.
28.68"	"	" sub.
28.82"	"	" "
28.97"	"	slightly super
28.90"	"	just critical

Period measurements

	32.15"	"	super (see chart)
3:10	23.72"	"	sub.
3:16 P.M.	35.53"	"	super
	22.11"	"	sub.
3:35	28.90 ←	"	just crit.
3:36	38.88	"	super
	18.97	"	sub
3:58	42.13	"	Super
4:06	27.70		Sub

28.90
39.85"
Crit ht. 68.75" = 174.6 cm
0.4 cm
175.0 cm → corrected for bottom Al plate

C.V. = 68.1 l
CM = 36.25 kg U^{235}

Expr. 101 Time 1:40 ~~AM~~ PM Date 12-5 1955
Purpose Period measurements with 9½" al cyl bare
Personnel: LWG R Guinn, FOX

$H/X = 44.7$

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

fuel ht* source

2:15	16.93"	out	slightly super
→	16.92"	"	just critical
	17.02"	"	super (see chart for period)
	16.735"	"	sub (")
	17.11"	"	super (")
	16.88"	"	sub (")
3:08	Temp. = 77°F by thermocouple		
3:17	17.19"	"	super (")
	16.81"	"	sub (")
End cor ≈ 1.0 cm	17.02" (same as first period)		super (")

16.92
End. Correction .40
17.32 in = 44.0 cm
0.4 cm ← correction for bottom Al plate
44.4 cm = 17.48"

C.V. = 20.34 L
C.M. = 10.83 kg U^{235}

* Selsyn reads 0.03" when probe is at zero.

H/X = 44.7

Expr. 101-B Time ____ AM PM Date ____ 195__
Purpose Period measurement on 9.5" dia. cl. cyl. bare using 100 cc pipet to obtain Δh.
Personnel: Jax, Gwin, Gilley

INSTRUMENT CHECK

Date 12/6 1955 Time ____ AM PM Source No. ____

Instrument	Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	responds			
DC-3	responds			
Low N	trip			
RG1	responds			
RG2				
PPM	trip			

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 1:00 AM PM Date 12/6 1955

fuel ht. source
16.88" out slightly super
16.85" " " sub.
temp. = 71.5°F by thermocouple
16.865" out just critical
2:40 P.M. Added 100 cc from pipet – see chart for period

16.87
.40
17.27

CH = ~43.9 cm
0.4 ← bottom plate correction
44.3 cm

Exp. 101-B cont.

(Repeat of above to check reproducibility)

fuel ht. same

14.845" out just critical

added 100 cc from pipet - see chart for period

Exp. 101-C

Period measurement on 9.5" dia cl. cyl. bare using 200 cc pipet to obtain Δh

fuel ht. same

14.847" out just crit.

3:30 P.M added 200 cc from pipet - see chart for period.

Note: Sample taken

Req. # 354740

Gross 58.8215 .3455 gm U/gm

~~net~~ 25.6390 1.6519

net 33.1825

gm U_{235}/gm = .322

$$\frac{H}{x} = \frac{26.11 \times .5320}{.322} = 44.7$$

H/x = 44.7

Expr. 102-A Time 9 AM ~~PM~~ Date 12/7 1955
Purpose Period measurements on 10" dia. al. cyl. bare — ANM Type
Personnel: Jop, Gwin, Kelley

INSTRUMENT CHECK

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

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

START-UP CHECK LIST

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

fuel ht* source
13.49" out slightly sub.
13.495" " just crit.
13.605 " super (see chart for period)
Temp. = 72°F by thermocouple

C.H. = ~~34.4 + 0.4 cm~~ 34.3 + 0.4 = 34.7 cm corrected for bottom Al plate

C.V. =

* selsyn reads 0.01" when probe is zero.

$H/X = 44.7$

Exp. 102-B

Period measurement on 10" dia al. cyl bare
100 cc of fuel to be added with pipet.
fuel ht. source
13.495" out just crit.
Temp. = 72°F by thermocouple
11:30 added 100 cc of solution from pipet. super critical - see chart for period.

Exp. 102-C

Period measurement on 10" dia. al. cyl. bare.
100 cc of solution is to be added from pipet.
The difference between this exp. and 102-B is that the pipet has been lowered to near top of fuel when critical to prevent "splattering" when this this 100 cc is added.
fuel ht. source
13.495" = out just crit.
2:11 P.M. 100 cc added from pipet - see chart for period.
2:30 After above period was taken it was found that the pipet had been inserted approximately 2 inches in the solution when critical.
2:45 Pipet raised so that the tip is approx. one inch above solution when critical. - period repeated.
fuel ht source
13.488" out just crit.
3:00 PM 100 cc. added from pipet - see chart for period.

$H/X = 44.7$

Exp. 102-C cont.

The last period measured was longer than the preceeding one. Reason for the inconsistancy not yet determined, however it was noticed that pipet apparently leakes slowley (approx. 1 drop in 1½ min.). In this run ~ 1 cc extra was put in pipet as a rough check on that that leaks out.

Fuel ht source

3 50 13.49" out just crit

100 cc added from pipet - see chart (selsyn now reads 13.57")

H/x = 44.7

Expr. 102-C (cont) Time 2:40 ~~AM~~ PM Date 12/8 1955
Purpose Period measurement of on 10" dia. cl. cyl bare. 6
Personnel: Fox, Gilley

INSTRUMENT CHECK

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

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

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 2:40 ~~AM~~ PM Date 12/8 1955

Note: In this run one 100cc pipet is to be used to obtain exact critical ht. as shown by instruments then a second 100cc pipet is to be used to add 100cc for period measurement.

Fuel ht source.

13.50" out just crit.

3:40 P.M. 100cc added from pipet - see chart for period

Temp. = 73°F by thermocouple.

H/X = 44.7

12-15-55 Exp-103 Slab Thickness 2.25"

	Inst Check—	Source	Trip
1 35 PM	DC-2 —		responds
	DC-3 (20x10)	1"	87
	R-1 (10x1000)	contact	Responds
	log N 10 sec	2"	10 sec period
	P.M (800V)	1½"	Trips

2 15 PM Safety equipment work using source

Probe zero at selsyn reading of 994.53 add 547"

to zero on water scale from inside bottom of reactor is 15 3/16" or 38.3 cm

	23.38	slightly super
	23.34	" "
	23.30	slightly super
28.76	23.29	just critical

Water height 113.7 cm

Temp. 76° F

6.00 P.M. The safety blade was in the solution about 5.0"

H/X = 44.7

Expr. 104 Time 12:30 ~~AM~~ PM Date 12/16 1955
Purpose Critical conditions of plastic slab with no water reflector
Personnel: Given, Tilley

2 1/4" slab thickness

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	45	on	10 x 20	
Log N	trip			
R-1	respond			
R-2				
P. M.	trip			

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 12:50 PM Date 12/16 1955

essentially all fuel in the reactor

Fuel height" = selsyn reading plus 5.47"

Ht." (selsyn)	C_1	C_2
36.24	5 1 x64	65 8 x64
36.21	5 48	85
36.21	4 34	66 14
31.49	5 40	65 32
22.16	4 43	6[illegible]

36.21

∴ H/x = 44.7

Expr. 105 Time 1:00 ~~AM~~ PM Date 12-19 1955
Purpose Crit cond. Lucite slab with 1/8" lucite plate inserted inside dim - ~2 1/8"
Personnel: LWG C. Cross, 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 ✓ AM
Start-Up OK'd by ✓ Time PM Date 195

Safety blade zero at 202.9

Fuel ht.	Source	H_2O ht (sight glass reading)	
28.44"	out	75.6*	super
28.30"	"	"	super
28.19"	"	"	slightly super
28.13"	"	"	" sub.
28.18"	"	"	just crit.

75.6
41.0
116.6

* Add ~~38.3~~ 41 to above reading to get correct H_2O ht, see page 248.

H/x = 44.7

Expr. 106 Time ____ AM PM Date ____ 195__

Purpose Critical Conditions for plastic slab with 1/4" shim placed inside - hence thickness = 2.0". — Reflected

Personnel: Fox, Crocy, Willey

INSTRUMENT CHECK

Date ____ AM PM Source No. ____

Instrument ____ Scale

Dist. responds

Dist. trip 85 on 200

Log ____ trip

R-1 responds

R-2

P. M. trip

Equipment Checked by ✓ Check by ✓

Instrument ____

"Source In" Checked by ✓ Source No. ____

Emergency Equipment ____ Checked by ____

Red Light On by ____ AM PM Date ____ 195__

Start-Up OK'd by ____ Time ____

Fuel ht.	source	C_1	C_3
46.48"	in	~~C_1~~ 9^{13} x64, 8^{54}	~~C_3~~ 14^{0} x64, 14^{40}
2 50 P.M. 43.00"	in	9^{32}	14^{28}
37.66"	"		

29.48" log N shows stepwise decrease with draining, Counters too far away to give true M-1 curve

Counters outside Big sid

$H/x = 44.7$

Expr. 106 (cont.) Time ___ AM PM Date ___ 195__

Purpose To obtain M^{-1} curve for plastic slab with 1/4" skim in. Thickness of slab 2.00" — Reflected.

Personnel: Jay, Gilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
D-1				
D-2				
D-3				
D-4				
R-1				
P				
P.M.				

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. ___

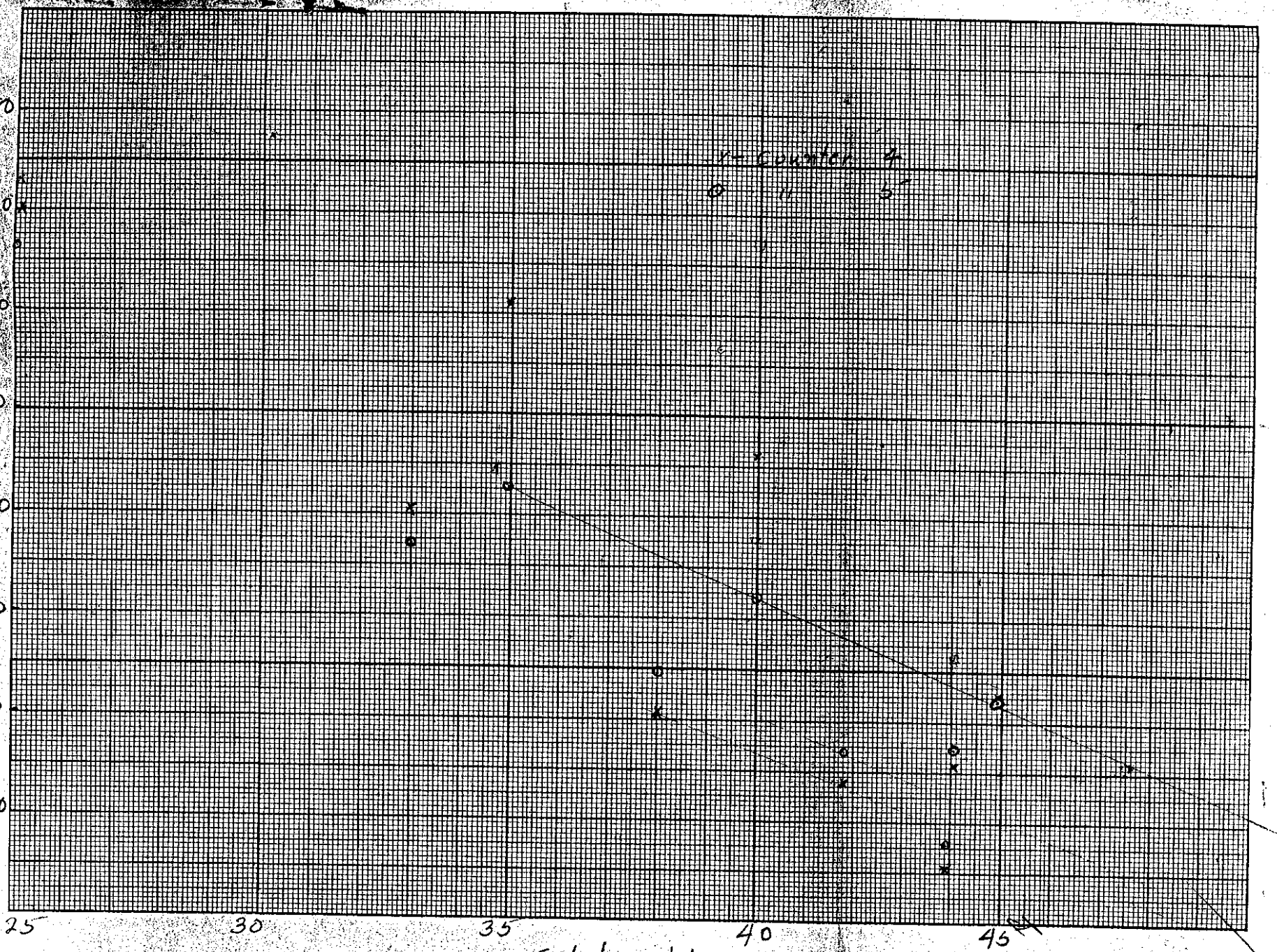
Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

Start-Up OK'd by ✓ Time 10:00 AM PM Date 12/21 1955

fuel ht.	H_2O ht*	source	C_4	M_4^{-1}	C_5	M_5^{-1}
20.13"	24.5 cm.	in	24.25 x64		62.75 x64	
"	"	"	23.25		62.5	
25.13	38.2 cm	"	33.0 x64	0.728	94.25 x64	0.665
"	"	"	35.25, 36.0	0.676	94.5, 92.75	0.664
33.09	58.7	"	61.5, 58.25	0.404	163.0 166.25	0.373
38.05"	72.6 cm		116, 117.25	0.206	249, 254.25	0.249
41.77"	87.0 cm		180.25, 171.75, 170.25	0.137	347.5, 372.5, 365.75	0.170
43.88"	88.0 cm		421, 443	0.0542	760, 810	0.0772

* add 41.0 cm to H_2O ht. reading to get H_2O ht. measured from bottom of fuel.



NO. 340-M DIETZGEN GRAPH PAPER
MILLIMETER
EUGENE DIETZGEN CO.
PRINTED IN U. S. A.

Exp. 106 cont.

Note: At this point water ht. was raised from 88.0 cm reading to 112 cm reading without adding any fuel. However the fuel ht. probe reading changed from 43.88" to 44.02" indicating that additional pressure of added water ht pressed the sides of the slab-in.

	Fuel ht. ~~44.02~~	H_2O ht (cm)	C_4		C_5	
1:45 P.M.	44.02	112.0	~~38~~ 152	0.158	360	0.174
	44.775	112.0				
	44.90"	139.0 cm	100 ×64		289 ×64	
2:55	Temp by thermocouple = 70°F					
	44.90"	139.0 cm	106	.226	282	.22
Counted → while draining back - leaving [illegible] ht. at way up.	39.97"	139.0 cm	53.25 ×64	.46	197.25	.324 ~~.67~~
	"	"	51.0		190.0	
	34.98		40.75	.61	145.75	
	"		38 +7		148.25 ×64	.426

.65
2.664
173
.249
.170
.772

2.0.6

H/X = 44.7

Expr. 107 Time 14⁰ ~~AM~~ PM Date 12/22 1955
Purpose Critical conditions for plastic slab with 3/16" shim inside - hence width of slab is 2 1/16". - reflected
Personnel: Fox & Gilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Source	Response	Check
DC-1				
DC-2	responds			
DC-3	trip ~ 85 on 10x20			
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible] ✓
"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__

Note: 3 extra "spacer braces" were placed along top edge of plastic shim in addition to six original ones.

fuel ht	source	H_2O*	
36.16"	out	80.0 cm	slightly super
36.04"	"	"	" "
35.89"	"	"	just critical
35.91"	"	89.0	slightly sub.
36.17"	"	89.0	just crit.

H_2O added while just critical - no solution added → 3⁴⁵ P.M.

Temp. = 72.5°F by thermocouple

* add 41.0 cm to this reading to obtain ht.

89
41
130

H/x = 44.7

New Plate with Legs on 12" centers in each direction Highest row at 48" up + 2 spacers at top of Tank.

Expr. 108 Time 1:20 ~~AM~~ PM Date 12/23 1955
Purpose Crit. Cond. for plastic slab with 1/4" plate inside - spacers are in length 2,000" ± .002
Personnel: DF, Cronin, JKF

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2 ✓				
DC-3 ✓	Trips			
Log N ✓	Trips			
R-1 ✓				
R-2				
P. M. ✓	"			

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 1:22 ~~AM~~ PM Date 12-23 1955

1:25 PM	Fuel 18.565 in	Water - 5 cm [add 41 cm to scale reading for zero of slab)		
1:37 PM	18.56 in	28.5 in [9" above fuel]		
		#4 4+5 x64	#5 27 1/4 x64	[2 min counts]
		5°	27 1/4 x64	
1:52 PM	24.97 in	47.7 cm		
		10.5 x64	66.5 x64	
		8.5	65 1/2	
		7.5	65 1/2	

$H/x = 44.7$

Exp 108 (cont)

	Fuel	Water	#4	#5
2 10 PM	32.97	47.7		
	33.07	67.5	17 / 16 1/4	193 / 191 1/2
		Source Out		
2 45	37.92	67.5	Super (approx 200 sec)	
	37.99	76.1	Sub	
	~~38.90~~ 39.15	77.1	Super	
	39.16	78.1	Just Crit.	
	39.17	79.0	Just Sub	
	39.47	79.0	Approx 400 sec period	
	39.47	~~79.3~~ 80.3	Just Crit.	
3 03	39.95	83.8	"	
	40.34	84.8	Super	
	40.36	85.8	Super	
	40.36	86.4	Sub (just)	
	40.77	86.4	Super	
	40.79	88.6	Super	
	40.80	89.7	Sub	
	41.39	89.7	Super	
	41.42	93.5	Sub	
	42.09	93.5	Super	
	42.09	97.5 ✓	Just Crit.	
	43.08	101.9	Super	
	43.08	103.2 ✓	Just Crit.	
	Period Meter Scrammed System			
3 28 PM	(Reset + held Water Value)			

5 31 PM Reach + Held at: Fuel = 26.79 in water = 120 cm
(No detectable radiation in Rm 202
3 33 Gamma monitor (RCl) Room 202 = 50 on x3 scale –
Neutron Inst – DC-2 Log N period –
show a small pip log N = 0.1 → 0.18
in time Period meter DC-2 = 33.5 → 45 (50 x10) ?
went off scale (<3 sec) and swamped – no indication on DC-3 (100 x1)
or R-1 (100 on 1000 mr scale)
PM evidently did not swam (set at 780V)
(All safetis operated except alarm bell (operated by PM) OK
Source replaced
3 50 Safety block reset – probe needs 26.71 in
(2.000 – 10/1000) gauge – fit into reactor over most of area
but a 2.000 would not enter slot.
4 00 Adding fuel
36.23 in water 120 cm
lowering safety – ~~22.20~~ 222.0
to 187.4
24.6 inches
4 12 Reinserting thickness template
About same situation as before adding 100 inches fuel.
Template was tight over approx. ½
of the slab area
4 24 Temp of Solution 75°F

H/X = + 4.7"

Expr. 109 Time 2:15 ~~AM~~ PM Date 12-27 1955

Purpose Repeat Exp. 108

Personnel: Fox, Gwin & Thomas

INSTRUMENT CHECK

Date 12-27 1955 Time 2:15 ~~AM~~ PM Source No. ~~PN-7~~ RA 4.75

Instrument	Trip Value	Check	Source Distance	Start Up Scale
DC-1				
DC-2	yes	75	100/1	4"
DC-3	yes	Inst. tripped due to high Radiation level in Well.		
Log N	yes	7 sec		
R-1	yes	1	1000/1000	4"
R-2				
P. M.	Trip check.			

START-UP CHECK LIST

Equipment Checked by J.K.F. Personnel Check by J.K.F.

Instruments and Controls Checked and Reset by J.K.F.

Source Installed by J.K.F. Source No. PN-57

Emergency Equipment in Control Room Checked by J.K.F.

Red Light On by J.K.F. Time 2:50 ~~AM~~ PM Date 12-27 1955

Start Up OK'd by J.K.F.

2:25 pm Fuel height Probe zeros at 00.06"

45.48"	103.2 cm	slightly super
45.35	105.6 cm.	" "
45.38	108.4 cm.	just critical
4:32 PM 47.21	122.0 cm.	barely subcritical

Solution Temp. 75°C.

47.25"	128.5 cm.	sub critical
47.20	121.0 cm.	slightly super

~ 40" 121.0 cm. 2" gauge block can be moved in center bay only but with difficulty - can not be inverted to bottom. *

4:15 PM

H/x = 44.7

Sample taken Reg. 354742 see next page

4:20 PM Observed one floating wedge.

4:25 PM Took sample while draining.

Expr. 110 Time 2:20 AM PM Date 12-29 195

Purpose Repeat of Expt 107 with 3/16" plastic plate in using more inside spacers and a more uniform plate.

Personnel: C. Cron, R. Quinn, Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. 57

Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

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

Inst. checked ok

Soln Wt	H.O Wt	
34.99"	78.5 cm*	slightly super
35.02	94.4	just crit.
34.86	86.0	" "
34.91	89	" "
35.64	89	pos-period meas. on chart.

Temp. 74°F probe zero checked

* add 41 cm

260 Req. 354742 sample 12-24-56

P 268

.3456 gm U/gm

Gr. 68.262 gm. 1.6526 Sp. gr

27.147

41.115 net

~~.5844 x 26.11~~

$\frac{.552 \times 26.11}{322} = 44.7$ H/X

~~.4155~~
~~.5845~~
1.000
.448
.552

sample P168 after adding 14 liters water to system 1-5-56

100.889 Req. 354758

26.727

74.162

$\frac{.586 \times 26.11}{.2992} = 51.5$

	354742
NUMBER	REQUISITION NUMBER
TO:	JK 70X
G NO.	9213
PTION OF MATERIAL:	UO_2F_2 ~ 0.25 gm/gm
	Rush
NOT TO BE COMPOSITED CHECK HERE.....	
REQUESTED DT	AT CODE NO.
NALYSIS QUESTED	REPORTED ANSWERS
GRAM/GRAM T ✓	.34559
sp.gr.	
Sp G -	1.6526
SIGNED: BY: md	

	354758
BATCH NUMBER	REQUISITION NUMBER
REPORT TO:	JK 70X
BUILDING NO.	9213
DESCRIPTION OF MATERIAL:	~ .25 gm U/gm UO_2F_2
	Rush
NOT TO BE COMPOSITED CHECK HERE.....	
Y REQUESTED DT	AT CODE NO.
NALYSIS QUESTED	REPORTED ANSWERS
✓ GRAM/GRAM T	~~32~~
sp.gr.	.31933
spec. Sp G	1.5781
SIGNED: BY: md	

Req. No. 354 58

N.C.		PYRO		A
Be	<.3	Be		
Ni	175	Ni		
Sn	<10	--	--	
Si	<10	Si		
Li	<2	Li		
P	<100	P		
Na	<10	Na		
Mo		--	--	
Mn	23	Mn		
Mg	80	Mg		
K	<50	--	--	
Fe	1500	Fe		
Cu	28	Cu		
Cr	160	Cr		
Ca	<50	Ca		
Ba	<10	--	--	
B	<1	B		
Al	155	Al		
Ag	<1	--	--	
		Cd		
		Co		
		V		
		Hg		
		In		
		C		
		F		

U. NO_3

Complete Spec

1900 Rey

TC
1689

Jean 1-11-

Spectrographic Report
All results in ppm.

9131

Expr. 111 Time 9 32 AM ~~PM~~ Date 1-5 195 66
Purpose Crit cond. for plastic slab. with 3/16 spacer
Personnel: Gwin, Gilley Fox, Cross

H/x changed to ~ 52 = 51.5

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. PN58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM ~~PM~~ Date _____ 195__

Fuel ht	Water ht.	Remarks
34.71	67.5	super
34.73	72.0	just crit
35.20	79.2	" "
35.64	84.0	slightly super
"	~~87.0~~ 86.5	just crit.
36.66	84.5	pos. period mean.
36.27	94.5	just. crit.

Solution temp. = 66°F
Water " 74°F

Repeat at higher Temp.

3 45 ~~45~~ PM Temperature of solution 71°F

36.27	94.5	not crit.
36.81	"	slightly super
36.73	"	just crit.
37.00	105.4	" "
37.54	121	slightly sub.
Temp 71.5°F		
37.70	121	slightly super

$H/X = \frac{\cancel{53}}{51.5}$

Expr. 112 Time 1 ~~AM~~ PM Date 1-6 1956

Purpose Crit. Cond. for plastic slab with 2.00" open slot

Personnel: Cross, Gilley, Gwin, Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓

Instrument and Safeties Checked and Reset by ✓

"Source In" Checked by ✓ Source No. PN58

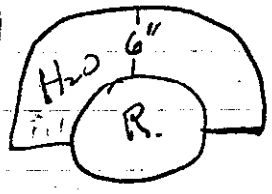
Emergency Equipment in Control Room Checked by ✓

Red Light On by ✓

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

soln ht."	Water ht	Remarks
52.09"	139 cm	not critical all solution
51.99	125.4	just crit.
51.33	121.3	super crit
51.28	"	just crit.
Temp 73.5°F		

AL Half Shell



Expr. 113 Time 9:10 ~~AM~~ PM Date 1/9 1956
Purpose Critical Conditions for 8" dia al. cyl. 1/2 water reflected on the lateral surface
Personnel: Gwen, Filley

INSTRUMENT CHECK

Date _____ Source No. _____

responds
trip @ 50 on 10 x 20
trip
R-1 responds
R-2
P. M. trip

START-UP CHECK LIST

Equipment Checked by ✓ Checked by ✓
Instrument ✓
"Source" ✓
Emergency
Red Light Ch. ✓
Start-Up OK'd by G.W.G. Time 9:12 PM Date 1/9 1956

Selsyn for solution height probe reads 6.18" when solution level is zero.

fuel ht. (selsyn reading)	source	
24.40"	out	slightly super
24.38" +	out	slightly super
~~Positive Period~~		
24.33	out	just critical
Positive Period		
24.51	out	super critical

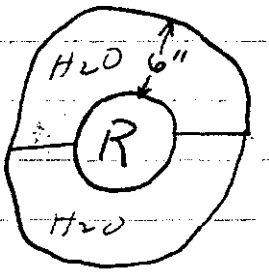
corrected value: T = 75.5°F

24.33
6.18
18.15" = 46.1 cm

Expr. 114 Time 11:30 Date 1/9/ 1956
Purpose Critical condition for 8" reactor (Al.) with both shells ¾ full of Water
Personnel: Gilley + Gwin

AM. Feeding from tank 4b at 11:43 PM on a Positive Period. The feed switch was was placed in the off (neutral) position but the air pressure remained on but solution stopped feeding. Fuel was dumped into dump well. The source was out.
When the 4b switch was turned off, 4b was vented. The fuel height was greater than 9.5".
4a and 4b will not vent. When the feed drain switch is on (drain position) the drain valve does not open. All the solution was put in the dump well.

Expr. 114 Cont 4:35 PM 1-10 1954
Purpose Crit cond for 8" with bath shells 2/3 full of water
Personnel: Gilley, Gwin, Fox



Equipment	✓		✓
Instruments		✓	
Sources		✓	PN58
Emergency			✓
Red Light	✓		
Start Up Ok	✓		195

59.2 cm

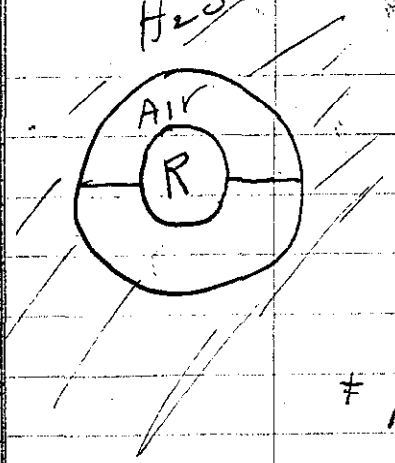
Fuel ht*
Feed switch again had contacts that would not break. soln. ht was at about 6". We used a screw driver to break the stuck contacts

Fuel ht

9.93"	super crit
9.84	sub. "
9.89	" "
9.92	slightly super.

Corrected crit ht. 9.91 + .05 = 9.96"
25.3 cm

* selsyn zeroed: add .05" to reading



Expr. 115 Time 5 35 AM PM Date 1-10 1955
Purpose Crit. condition for 8" Al Reactor with 2-6" thick Half shells with air inside surrounded with water
Personnel: Gwin, Gilley Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. PN 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM PM Date 195
Start-Up OK'd by ✓ Time

‡ Fuel Ht		H2O Ht.*	c/h cm	
22.74	57.88 (c/h cm)	119.5 cm	148.5 cm	slightly super crit
22.71	57.81	"	148.5 cm	" " "
22.68	57.73	"	148.5 cm	just crit
22.66	57.68	"	148.5 cm	slightly sub.
22.78	57.99	104.8	133.8 cm	just crit.
23.13	58.88	77.2	106.2 cm	"
25.14	63.98	38.6	67.6 cm 26.6"	very slightly super
25.13	63.96	"	67.6 cm	" " sub.
~~34.50~~	~~29.3~~			~~Super~~
~~34.50~~	~~—~~			
~~32.53~~	~~29.3~~			~~Sub.~~
~~32.68~~	~~29.3~~			~~Super~~
32.83	83.51	29.3	58.3 cm 23"	H2O just crit
54.37	138.23	28.4	57.4 cm 22.6	" "
45.83	116.53	28.48	57.5 22.65"	slightly super

Safety Rod Probably In Soap

Temp = 72° F.

safty reading of 218.7 = ~52"
‡ add .05 to reading
* add ~29 cm to back scale reading

No top refl.

Expr: 116 Time 7:30 ~~AM~~ PM Date 1-11- 1956
Purpose C.C. for 8" Al cyl. without shells but with water refl. in sid.
Personnel: Gilley, Fox Cross

H_2O

R

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. PN38
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time _____ AM PM Date _____ 195__

Fuel ht		Water ht			
9.36"	23.8 cm	47 ~~[illegible]~~ cm	* crit		47 / 23.2 / 23.8
8.94	22.7	57	"	just crit	33.8
9.05	23.0	51.5	"	"	28.3

51.5
23.2
28.3

* side scale – ~~no correction needed~~ zero = 23.2 cm
safty zero at 194.7 on selsyn stroke ~31"

H/X = ~52

Expr. 117 Time 9:30 ~~AM~~ PM Date 1-11 1956
Purpose Crit. Condition for 8.76" Dia AL. Cylinder Bare
Personnel: Gilley, Cross Fox

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source-In" Checked by ✓ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by JKZ Time ____ AM PM Date ____

10:30 P.M. Temp. = 75.5°F

	fuel ht.	source	
	61.19"	out	super critical
	60.82"	"	super "
	59.98" ~~59.98"~~	"	" "
	59.25"	"	slightly super
	58.78"	"	" "
	58.64"	"	very slightly super
	58.52"	"	~~"just" crit.~~
	58.38		very slightly sub.
11:00 P.M.	62.00"	"	see chart for period.
	63.49"	"	see chart for period.
11:30 P.M.	66.07	"	" " " "

Crit ht = ~ 58.45" (58.5" - no corrections applied)

E.C.

H/x = 51.5

Bare

Expr. ~~120~~ 118 8³⁰ ~~AM~~ PM Date 1-12 1956
Purpose Period measurements in 9.5" D. Alum. cyl. unreflected.
Personnel: Gwin, Cross, and Thomas

INSTRUMENT CHECK

Date 1-12 1956 Time 8³⁰ ~~AM~~ PM Source No. RA-4-80

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1 No				
DC-2 Yes		1/100	4"	20/1
DC-3 yes	.75	1/100	"	50/1
Log N yes	10 sec		4"	—
R-1 yes	1	1000/1000	4"	50/1000
R-2 No				
P. M. yes	Trip	check	1"	800 V.

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by ✓ Source No. 58.
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by G.T. Time 8³⁰ ~~AM~~ PM Date 1-12 1956

Sol'n ht.*

9⁰⁴ PM 16.54" source out - just critical.
9¹² PM 16.58" " supercritical 50cc added.
9²⁰ PM 16.57+ Sol'n leaking out - Straight line on log N missing!
Drained sol'n to ~14.0".
9⁴⁵ PM 16.56" source out k>1 Sol'n Temp. 77°F
9⁵⁵ 16.54" + 1/2 " k=1 ~~add 100cc~~
10⁰³ 16.~~545~~ 64 + 1/2 " k>1 added 100cc
10⁰⁹ 16.62 sol'n still leaking; drained back to ~14.0"
10⁴² 16.54 + 1/2 source out k=1
10⁴⁴ 16.68 " k>1 added ~50cc.
over

H
16.54
E.C. .40
16.94

4200
1.00
43.00

* Selsyn zeros at -0.03"

C.H = 43.4 cm after correction for bottom plate

H/X = 51.5

Soln ht

11^14 16.55" source out k = 1

11^17 PM 16.72" " k > 1 added 200 cc.

Expr. 119 Time 6:30 AM PM Date 1-13 1956
Purpose Bare crit. for 10" Al. cyl. & Period Meas on same
Personnel: Cronin, Cross, Fox

Inn. Type

Insts. Tripod period DC-3 and PM.

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. PN58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start-Up OK'd by ✓ Time 6:30 AM PM Date 1-13 1956

	Soln ht.	13.09"	Just Critical
6:55 PM	" "	13.082"	very slightly super Critical
6:56 PM	" "	13.086"	" " " "
6:57 PM	" "	13.07"	Sub Critical
6:58 PM	" "	13.086"	Just Critical
6:59 PM		13.085"	" "

added 50 cc for Period Measurement

7:02 PM Soln. ht 13.105"

Period Measurement with 100 cc

8:26	Soln. ht.	13.04"	Just Critical
	" "	13.041"	" "
	" "	13.038"	" "
	" "	13.045"	" "

added 100 cc for Period Measurement

Soln ht 13.12"

Period Measurement with 150 cc
soln. ht. 13.03" Just Critical
added 150 cc for Period Measurement
soln. ht. 13.145" temp 77°F
Recheck of Period Measurement with 50 cc
soln. ht. 13.03" Just Critical
Added 50 cc for Period Measurement
soln. Ht. 13.07"

Expr. 120 Time 10:22 ~~AM~~ PM Date 1-13 1956
Purpose 10" Dia. Al. Cyl. Completely refl.
Ann. Type
Personnel: Cross Cronin Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by
"Source In" Checked by ✓ Source No. PN 54
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ 10:37 ~~AM~~ PM Date 1-13 1956

Fuel ht	Water ht.*	
4.62"	47 cm	just crit with tamper at position of max. reactivity

4.72" − .28 = 4.49" corresponding soln ht. with probe pt. just in contact

C.H. = 4.49" after correction for bottom plate

*Water zero at 14 cm on side scale

Expr. 120 Repeat Time 9 AM Date 1-16 1956
Purpose 10" al cyl. completely refl
Personnel: Gilley, Gwin, Cross, Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. PN58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by ✓ Time _____ AM PM Date _____ 195__

top tamper
zero re-checked

soln ht water ht
4.60" ~ 46.7* cm just crit
4.77 " probe just in contact.

Expr. 119 Repeat Time _____ AM PM Date _____ 195__
Purpose 10" al cyl bare for period mean.
100 cm addition
Personnel: Cross, Gilley, Gwin Fox

START-UP CHECK LIST
Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
Source In" Checked by ✓ 58
Emergency Equipment in Control Room ✓
Red Light ✓
Start Up OK'd by ✓ Time _____

Probe zeros at 999.97
Probe reading"
13.02 100 cm³ added just critical
13.09 super critical
Temp. = 77°F

*reading on side scale

Expr. ~~120~~ 121 Time 1 ~~26~~ ~~AM~~ PM Date 1/16 1956
Purpose 10" al. cyl., bare
period measurement
Personnel: Fox, Quinn, Gilley

safety zero
159.8

Probe reading Probe zero 999.97
13.01" just critical
control rod (safety) added ~ 4"
into top of reactor near center.
13.15 slightly super
safety about 7" in
13.17 sub critical
13.97 just critical
13.01 just critical
50 cm³ added for positive period
13.04+ super critical
safety placed into sol. ~ 7"
safety reading 165.7
20 cm³ added and safety removed 179.1
Probe 13.06 super critical
safety placed at 165.7
20 cm³ added safety removed
13.07+ super critical
safety placed at 165.7
20 cm³ added
13.08 super critical
Safety added 161.9

20 cm³ added

safety removed

Probe 13.09" super critical

safety added 161.0

20 cm³ added

safety removed

Probe 13.10+ super critical

Temp = 76°F

soln. drained

C.H = 13.17" after correction for bottom plate (+ 0.4 cm)

Expr. 121-13 10:00 AM PM Date 1/17/ 1956
Purpose 10" al. cyl. period measurement bare
Personnel: Dwin, Cross, Billey

RUMENT CHECK

Date _____ AM PM Source No. _____

Instru... Distance Start-Up Scale

DC-1
DC-2
DC-3 trip @ 73 on 10x20
Log N trip
R-1 respond
R-2
P. M. trip

START-UP CHECK LIST

Equipment Checked by ✓ Check by ✓
Instrumen... ✓
"Source In... ✓ No.
Emerge... ...ed by ✓
Red Lig... ✓
Start-Up ... 9:45 AM Date 1/17/ 1956

Safety rod has a stroke of $31\frac{1}{16}$"
selsyn setting of 190.9 is zero
of released rod.

	time	Probe reading"	
	10:03	10.09 -	sub critical
	10:08	10.08	"
	10:10	10.08 -	"
T = 77°F	10:20	13.03 +	super critical
	10:25	13.03 +	super critical
	10:30	13.03 -	super critical
	10:35	13.02	~ critical
T = 77°F	10:45	13.02	sub critical

time	Probe reading	
10:50	13:01 +	sub-critical

The above Procedure was followed to determine Possible leakage from the reactor. At a Probe reading of 13.03" DC-3, R-1, and Pile Power all indicated a super-critical reactor. As time progressed all these instruments indicated a decrease in reactivity and eventually a sub-critical system was indicated.

Using the Probe as an index ~ 13 cm³ of soln. leaked from the system in ~ 15 minutes.

The reactor will be made slightly super-critical using the regular feed valve. Then 100 cm³ will be added remotely.

Probe reading

13.07 Super critical

100 cm³ added

trip due to Power level

C.H = 13.17" after correction for bottom plate

Expr. 122 Time 155 ~~AM~~ PM Date 1/18 1956

Purpose 12" dia. cl - cyl - period measurements here

Personnel: Jay, Dunn, Crow, Gilley

INSTRUMENT CHECK

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

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

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 JWD Time 2:00 ~~AM~~ PM Date _____ 195__

At this point it was found that the solution dump valve was faulty. Experiment was discontinued and a new dump valve was installed.

Expr. 122 Time 9:15 AM ~~PM~~ Date 1/19 1956
Purpose period measurement on 12" dia. al. cyl. bare
Personnel: Gwin, Cross, Tilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2				
DC-3	trip @ 73 on 10 x 20			
Log N.	trip			
R-1	responds			
R-2				
P. M.	trip			

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
Source Inf. Checked by ✓ Source No. _____
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by G.W.A. Time 9:25 AM ~~PM~~ Date 1/19 1956

Delay due to valve leakage

12:55 P.M. Probe zero 99998
1:10 Probe 8.73+ slightly super
1:20 8.73+ slightly super
1:25 Pile Power indicates a change (negative in reactivity.
1:30 Probe 8.73- just critical
blade (safety) inserted
blade withdrawn to check for soln. clinging to blade
1:40 Probe 8.73- sub-critical

Probe

8.72 + ~ critical

add 20 cm³

8.73 T = 76.5° F super - critical

add 20 cm³ super - critical

8.73 evidence of leak " "

blade inserted and with drawn

8.73 super-critical

blade inserted - closed valve

upstream of dump drain.

blade removed

8.73 slightly - super

add 20 cm³

3.58 evidence of leakage on instruments

the instruments indicated that the

reactor went from a Positive Period

thru critical to a negative reactivity.

Temp = 76.5° F

Expr. 122 cont. Time 9:00 ~~AM~~ ~~PM~~ Date 11/20 1956
Purpose

Personnel: Owen, Craig, Gilley

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
IC-1				
IC-2				
IC-8	trip	3	13 cm	10 x 20
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

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 J.W.A. Time 9:13 AM ~~PM~~ Date 195

Probe zero 99998

~~9~~ Probe

9.25 8.76 super-critical

drain back

8.73+ critical

9.37 8.74+ slightly-super

9.40 8.74 " "

9.50 8.74- sample period " "

observed over time interval

9:40 — 9:50

drain

Temp = 76 °F

Exp. continued

8.71+ super-critical

8.71 sub-critical

added 40cm³

now restablish critical without 40cm³ bottle above reactor.

8.71+

3:15 P.M. In the following portion of the experiment, the reactor will be made super critical and then the bottle which is about 5 feet from the reactor will be lowered to about 1 ft. from the solution and fuel added by tipping the bottle.

8.75- super-critical

Period unstable

4:15 T = 74°F

4:52 8.74- super-critical

added 40cm³ to obtain Period

Expr. 122 Cont Time 930 AM ~~PM~~ Date 1/23 195 6
Purpose

Personnel: Irwin Gross Dilley

INSTRUMENT CHECK

Date 195 Time AM ~~PM~~ Source No.

Instrument	Trip / Value	Scale	Source [illegible]
DC-1			
DC-2			
DC-3	trip @ 75 on 10x20		
Log N	trip		
R-1	responds		
R-2			
P. M.	trip		

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and [illegible] ✓
Source In" Checked by Source No.
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓
Start Up OK'd by JWD Time AM ~~PM~~ Date 195

Probe

10:15 8.72- slightly super
10:18 8.71 + ~ critical
check for leaks
instruments stable ~ critical
10:30 add 40cm³
~8.73 super critical
10:35 insert safety blade
10:47 blade with drawn to
check previous period
10:57 blade inserted
11:05 blade with drawn

11:09 added 20 cm³

Probe 8.73 super critical

11:12 blade inserted

11:30 blade withdrawn

11:34 add 20 cm³

11:38 drain reactor

Temp = 75°F

2:00 PM 8.70 critical

40 cm³ added

drain

3.20 8.73+ super

check for stability of period

log N indicates slight decrease in period with time.

3.55 8.71+ sub-critical

4.10 8.72 ~ critical

This last reading is at a higher power level than previous measurements of just critical systems. Previous critical .01 to .05, this system ~ .2 on log N.

4.47 add 40 cm³ to ~ critical system

drain

Temp = 75.5°

C.H = 8.89" after correction for bottom plate

Expr. 122 B/cont. Time 5:50 ~~AM~~ PM Date 1/24 1956
Purpose
Personnel: Gwin, Fox, Gilley

INSTRUMENT CHECK

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

Instrument	Trip				Start-Up Scale
D-1	respond				
D-2					
D-3	trip				
Log N	trip				
R-1	respond				
R-2					
P. M.	trip				

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 5:55 ~~AM~~ PM Date ____ 195__

This experiment is different from the previous ones in that a pipet is to be used to make small additions of fuel to obtain exact critical ~~ht~~ conditions as shown by the instruments. Additions made remotely.

fuel ht source
8.67"
~~8.76~~ out just crit.

7:20 P.M. 40 cc of solution added from bottle on rack.
T = 78°F See Chart for Period
8.67" out just crit
40 cc added
T = 77.5°F See chart for Period
8.68" just critical
added 60 cm³ see chart for period
T = 77.5°F

122 cont.

fuel ht. - source

8.67" out just crit.

20 cc added See chart for period.

286

Expr. 123 Time 8 ~~AM~~ PM Date 1/25 1954

Purpose Critical conditions of 30" dia. al. cyl. Also period measurement

Personnel: Fox, Cross, Gilley

bare

INSTRUMENT CHECK

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

Instrument Trip Scale Source Distance

DC-1 responds

DC-2

DC-3 trip or 80 en 10 x 20

Log N trip — Log N calibrated

R-1 responds

R-2

P. M. trip

Expr. _____ Time _____ AM PM Date _____ 195__

Purpose _____

Personnel: _____

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Checked 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 JWA Time _____ AM PM Date _____ 195__

fuel ht. source

5.13" out just crit.

10 ~~AM~~ PM added 50 cc from bottle see chart for period

added 100 cc from bottle " " "

Temp = 77.5°F

Expr. 124 Time 6.07 ~~AM~~ PM Date 1/26/ 1956
Purpose Comparison of Plexiglass and H_2O as reflectors on bottom of 30" dia. Al. reactor
Personnel: Thomas, Cross, Gwen

INSTRUMENT

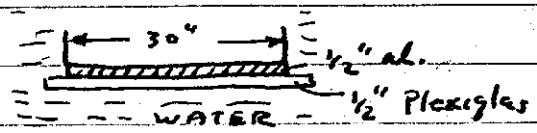
Date 1-26-56 Time 6 15 PM Source No. RA-4.80

Ins.				Start-Up Scale
DC 1	Yes	?		
DC 2	Yes	10/10 ~7.0	4	20
DC 3	Yes	100/1 ~7	4"	10/1
Log N	Yes	10 sec	4"	50/1
R-1	Yes	response		
R-2				25/1000
P. M.	Yes	800 V.		

START-UP CHECK LIST

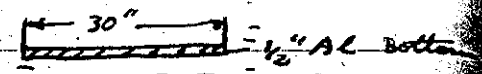
Equipment Checked by J.T.T. Personnel Check by J.T.T.
Instrument and S... and ... by J.T.T.
"Source In" Ch... J.T.T. ... No PN-56
Emergency ... J.T.T. ... by J.T.T.
Red Light ... J.T.T.
Start-Up ... J.T.T. 6 20 ... Date 1-26 1956

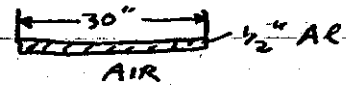
4.8 cm H_2O Bottom of Reactor.



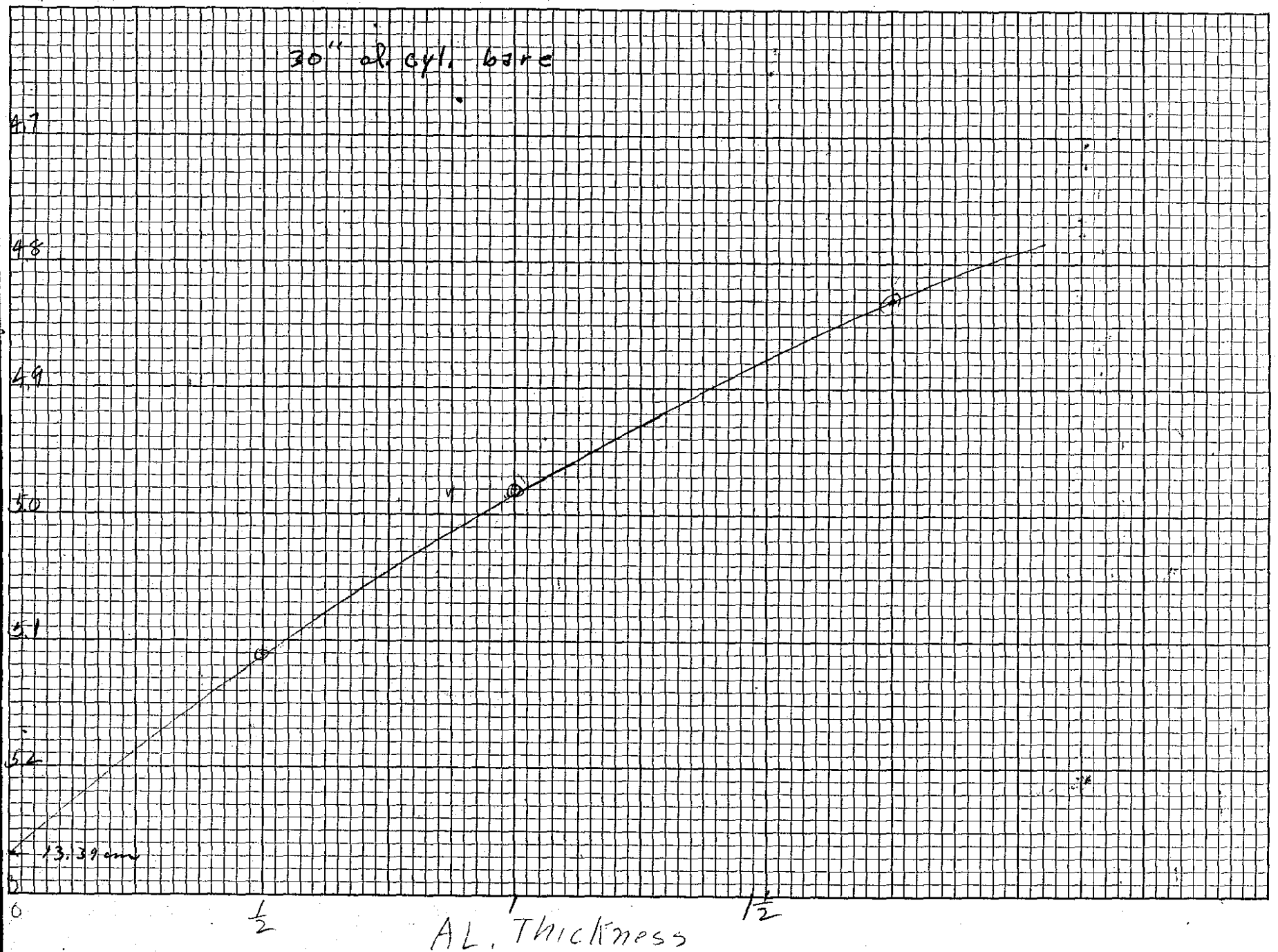
	Sol'n ht. "	H_2O Ht. cm.		
8 15 PM	3.871	1.0	k ≤ 1 just sub.	Temp 73.5°F
	3.872	1.0	k = 1 just critical	
8 27	3.874	1.0	k > 1 just supercritical.	

9 30 PM	3.870	1.0	k > 1
	3.868	1.0	k > 1
	3.866	1.0	k < 1
	3.867	1.0	k > 1



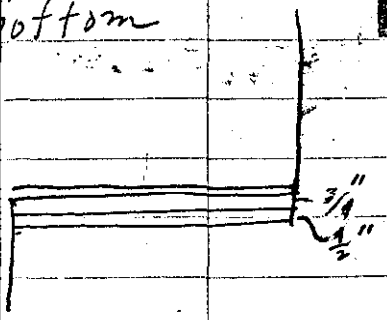
	Sol'n ht."	H_2O ht. cm.	
9^{10}	3.855	1.0	k > 1 just super.
9^{17}	3.853	1.0	k > 1 slightly
9^{22}	3.852	1.0	k < 1 slightly
9^{27}	3.785	0.00	
9^{44}	5.096	0.00	k > 1 super
9^{46}	5.094	0.00	k > 1 slightly (out)
9^{47}	5.093	0.00	k < 1 slightly

Sol'n Temp. 73.5°F



350-5D KEUFFEL & ESSER CO.
10 × 10 to the inch, ⅛ in. lines accented.
MADE IN U.S.A.

30" Dia AL.
Cyl. has ½" Al
bottom



Expr. 125 Time 4:40 AM PM Date 1-27- 1956
Purpose Crit. Cond for 30" Dia AL Cyl. Bare with 1¼" Extra AL Under Reactor - total 1 3/4"
Personnel: Cross, Cronin, Fox

H/X = 52

START-UP CHECK LIST

Equipment Checked by ✓ Personnel Check by ✓
Instrument and Safeties Checked and Reset by ✓
"Source In" Checked by _____ Source No. 58
Emergency Equipment in Control Room Checked by ✓
Red Light On by ✓ AM
Start-Up OK'd by JKZ Time _____ PM Date _____ 195__

Trip Levels O.K.

Fuel ht
4.83" slightly ~~super~~ sub.
4.85 " super
~~4.84~~ 4.835 ~~12.28~~ 12.29 cm just crit

Reported Part VIII

Expr. 126 Time 6:30 AM PM Date 1-27 1956
Purpose Same as above except Removed 3/4" of Al.
Personnel: Cross, Cronin, Fox

Fuel ht
4.99" slightly super
4.985 12.66 just crit

Reported in Part VIII

Expr. 123. Repeat Time AM PM Date 195
Purpose 30" Bare Al cyl. Period mean

Personnel: Cross, Gwin Fox

Fuel int.
5.11" ~~13.0~~ 12.98 crit added 50 cm³
for period.
soln. temp 77°F
Reported in Part VIII

C.H. = 5.27" corrected for bottom plate

Expr. 123 repeat 9:30 AM 1/31 1956

Purpose

Personnel: Irwin, Gilley

INSTRUMENT CHECK

Date 195 Time AM PM Source No.

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1	respond			
DC-2	respond			
DC-3	trip @ 80 on 10 + 20			
Log N	trip			
R-1	respond			
R-2				
P. M.	trip			

Equipment [illegible] Check by ✓

Instrument [illegible] Check by ✓

"Source In" [illegible] Source No.

Emergency [illegible] Control Room Checked by ✓

Red Light On by ✓

Start-Up OK'd by J.W.I. Time AM PM Date 195

fuel lt. source

5.05" out just out-

3:00 50cc added - see chart for period

3:15 Temp = 74 °F

70 cc added - see chart for period

selsyn reads 0.05" when probe is zero.

Expr. 123 Cont. Time 8 50 ~~AM~~ ~~PM~~ Date 2/1 1956
Purpose

Personnel: Fox, Gwin, Gilley

INSTRUMENT CHECK

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

Instrument	Trip Value	Scale	Source Distance	Start-Up Scale
DC-1				
DC-2	responds			
DC-3	trip @ 70 on 10 x 20			
Log N	trip			
R-1	responds			
R-2				
P. M.	trip			

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 G.W.G. Time 8 55 AM ~~PM~~ Date _____ 195__

fuel bt.* source Excursion

Pannel readings at 3 15/PM 2-1-56

97313 00779 00523 01805

turned off Period chart.

D-C-1 off scale

DC 2 75 x 50/100

DC-3 83 x 50/100

ln N 1.05

Selsyn reads 0.05 when probe is at zero.

2/8/56

Special Experiments after
Feb. 1 expusion

Exp. # 1

Purpose: To determine feed rate of solution from tank ~~3-A~~ 3-B into 30" Dia. cyl. with 14 pounds of pressure.

Selsyn reading before feeding	Selsyn reading after reading	Time of flow ~~14 sec.~~
0.13"	0.33"	14 sec.
0.055"	1.00"	70 sec.

Exp. # 2

Feed on Dying pressure. Pressure was raised to 14 pounds and "feed-drain" switch was moved immediately from "pressure" position through "neutral" to "drain position.

~~amount of solution in w~~

selsyn reading while pressure was on = 0.92"
" " ~~w~~ before pressure released was 0.925". Results: liquid level light came on

After drain was closed the Probe read 0.97"

Another trial

Probe at 0.647"

Presseure on, Probe raised to

0.710" Probe light came on.
After the drain valve was closed
Probe reads 0.73"
Another trial
Probe at 0.73" Pressure on
Probe set at 0.84" switch on drain
Pressure released light came on.
Probe light reads 0.825"
Another trial
Probe at 0.825" Pressure on
Probe set at 0.945" Probe light
came on.
On this trial the Probe will
be set 0.13" over the fuel height.
fuel at 0.69"
Probe at 0.82"
Pressure on
switch to drain — light did not
come on.
Now the Probe ~~to~~ will be
set 0.09" above the fue and
a rough check of the feed
rate will be made for dying
Pressure. Procedure: Pressure applied
to the tank - no feed - rapid switch
to drain. fuel 0.765, Probe
at .865", time 6.5 sec.

in this experiment ~~the~~ Pressure will be put on the tank, the switch will be put on neutral for about 3 sec. and then on drain. The Probe will be se .09" above the fuel.

fuel 0.725"
Probe 0.815"

time interval estimated by wall clock.

Pressure released - interval - switch on drain - Probe did not light. Probe read 0.755" after switch placed on neutral.

repeat 2 sec. interval
fuel 0.755"
Probe 0.845"
Probe light came on.
Probe reads 0.82" (drain left on)

Dump well check
fuel set at 0.82"
Probe set at 0.83"
dumped - light did not come on
no visual bubble.

Check List

Instruments	Date (1954)	Date 1954
DC-2 trip	3/29	3/31
DC-3 "	3/29	"
Period "	3/29	"
R-1 "	3/29	"
P.M. "	3/29	"
Source	3/29	"
safety	3/29	"
control	3/29	"

300

Reactor Vessel:

Bottom thickness values

20X20 al.		- 0.5"	Bottom.
10" Al. - (F-05)		0.5"	"
10" "	Ann.	0.5	"
12 "	"	0.5	"
15 "	"	0.5	"
20 "	"	0.5	"
6 S.S		0.25	"
8½ "		0.25	"
9 "		0.25	"
30X60 Al. Tank		.37"	"

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