

BOOK28R

Notes:

Blank pages: inside cover opposite page 1, 2, 8, 10, 22, 26, 87, 88, 92, 114, 136, 138, 188, 190-295, 299, 300, inside back covers.

- page 22 has 5 (8.5x11) sheets taped to it
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- page 43 has 1 sheet taped to it
- page 45 has 1 (8.5x11) sheet taped to it

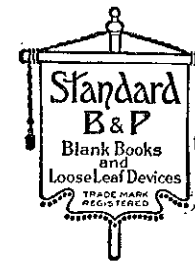
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RSICC /Oak Ridge National Lab.

August 5, 1999

DATA LOG BOOK USED
By several individuals at
Cultural Ecology 2-59 to 859
Received from J. T. Thomas by R. GWIN



Standard Blank Book

No. 38

Journals Double \$ and Cts. no Units

S. E. Ledgers " " "

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In 150, 200 and 300 Pages

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A BOORUM & PEASE PRODUCT

Slab storage tank

Designed for approx ~~approx~~ cross section area of 5' cylinder 16" X 16' X 8' hi. ESTIMATES of C.M. are ~ 4 kg higher than cylinder for equal volumes.

6" Mixing tank incorporated into system so that a premixing stage can be incorporated to avoid pumping even small amounts of conc. solution into the 16" slab tank.

5' cylinder

This vessel was fabricated 8' high so that a series of conc. can be made critical in this system. Several heights, 2, 3½, 5½, 7½ are under consideration as desirable geometries to be made critical.

At 4 ~~diameters~~ positions around the tank (4 diff diam.) the inside diam was meas at 7 diff heights 28 diam meas. were made ave. diam 60.920"
 $\therefore \frac{\text{Volume}}{\text{in}} = .7854 \times 60.92^2 \times 1 = 2914.82 \text{ in}^3/\text{in}$
 $= 1.6868 \text{ ft}^3/\text{in} = 47.763 \text{ l/in}$

Tad Adder Tank ~ 12" pipe X 48" long - a calibrated volume for additions to a crit system.

Model 3/4C Chem pump cap \approx 50 gpm
 @ 80 ft/head. As installed with 3/4
 fittings total delivery is \approx 15 gpm
 for filling 8' tank (\approx 57 l/min)
 Filling took \approx 75 minutes.

Calibration of Tank Adder Tank

High Level Manometer	wt of H ₂ O removed	
45.594	0	
43.061	5	
40.515	10	
37.984	15	
35.467	20	
32.920	<u>25</u>	total
30.383	5	30
27.843	10	35
24.793	16	41
22.749	20	45
20.214	<u>25</u>	50
17.681	5	55
15.141	10	60
12.606	15	65
7.518	<u>25</u>	75
0.033	15	90

Temp of H₂O = 14°C ρ = 0.99927 g/ml.

$$\frac{90 \text{ kg} \times 0.99927 \text{ g/ml}}{45.561} = 1.97393 \text{ l/min}$$

Instr location

- C₁ under slab tank in small paraffin housing
- C₂ under cyl tank " " "
- C₃ on floor ~8' below cyl tank, ~6' from slab tank in long counter housing
- IC-1 under cyl tank between dump valves
- IC-2 ~4' below cyl tank ~10' from slab tank
- IC-3 } on platform on remote corners from slab tank
- IC-4 } in special shielded paraffin cans with 2" lead
- PM-1 with IC-2
- PM-2 on top hat with short cables.

3-9-59 Counter Volts 1450
 Background Counting Rates with source in pig

	C ₁	C ₂	C ₃
802'	2141x256+228	596+227	246+149
	<u>684 c/MIN</u>	<u>191 c/MIN</u>	<u>79 c/MIN</u>

3-10-59
 Background Counting Rate with source inserted to top wall

47'	105x256+23	162+156	19+81
	<u>572 c/M</u>	<u>886 c/M</u>	<u>105 c/MIN</u>

Background Count Rate with large source 12" above bottom of slab tank on outside.

6'	1761 +11	42 +221	41 +60
	<u>75,138</u>	<u>1829</u>	<u>1759</u>

Moved large source 34" above tank bottom

	Small source removed to pig	CRM #1
5'	813 ^{x256} +63	20 +21
5'	816 76	20 +226
	41,638	1028
	41,794	1069
		34 +163
		35 +57
		1773
		1803

3-10-59

Started transferring ^{4'} solutions from barrels (4 bbl) to slot tank using small Chen pump to syphon the solutions out of the barrels.

Time	Count Time	C ₁ ^{x256}	C ₂ ^{x256}	C ₃ ^{x256}	Amount of Soln	CRM
140 PM	5'	428 + 3	20 + 6	33 + 145	1 barrel	2.5 x 10 ⁴
153	5'	359 + 251	19 + 207	33 + 177	2 "	2.0 x 10 ⁴
220	5'	298 + 138	19 + 123	33 + 128	3 "	1.7 x 10 ⁴
236	5'	266 + 140	19 + 117	32 + 84	4 "	1.3 x 10 ⁴
3 ¹⁴	5'	243 + 231	19 + 99	27 + 243	5 1/4 "	1.2 x 10 ⁴

All solution from barrels transferred to slot tank with no apparent multiplication in slot tank.

3-11-59

Back ground counts with both sources inserted

5'	245 + 169	34 + 248	28 + 155
----	-----------	----------	----------

Exp. #1 5' Cylinder

March 11, 1959

11⁰⁰ Start Pumping solution into cylinder, source in Inst Traps checked IC-1, fast and slow, IC-2, PM-1, High and low, PM-2 for alarm only. PM-2 required source laying on top to give meter reading of 23 μ s. See p. 9 for β kg count.

11²² 14.7" no apparent M_{rel}

11²⁴ 19.23" pump lost prime

	C_2	C_3	Temp
5'	$32 + 189$	$33 + 178$.9816
5'	$32 + 222$	$33 + 195$	

C_1 is located under slab tank and since the large source is still on side of slab tank, C_1 increased when solution was pumped into cyl. CRM $1.2 \times 10^4 \rightarrow 4.5 \times 10^4$.

Calculation predicts about 2kg U needed to enrich to get cyl crit. Add 1kg to 6" slab filled $\sim 3/4$ full. Recommend that slab tank should be filled above reserve line for further enrichments.

C_1 after addition of 1kg
 $278 \times 256 + 130$

targeted to be 102
 fuel before
 removed
 4-2-59

$\frac{1}{M} = 0.881$ for adding 1kg to 16" Slab Tank to 4' sphere solution

371

3-12-59 DWM, RG, C.C.

C, X256

5' 282 + 113

Inst checked, sources in room checked zero on Liq level $0 \pm .06$

$\sim 10^{15}$ Start filling cylinder. $V = \sim 13.9 + 1.0 = 14.9$

10^{32} Source @ 19.202" pump loss prim. $T = .98634$

Some widening of multiplication on IC-1

$3.2 \times 10^{-12} \rightarrow 4.0 \times 10^{-12}$

$C_2^{X256} \quad C_3$
 $56 + 66 \quad 25 + 22$

$\frac{I}{M} = .59$
 Add 1kg to 6" slot tank, mix 20', transfer to 16" slot tank

	C_1	level at end of Ct.	Circle thru feed and dump and rec. line. transfer line thru 2nd feed thru feed line and dump line to middle of slot tank
5'	346	30.00	
5'	337	21.18	
5'	331	13.54	
5'	331	6.50	
5'	331	0.00	
5'	336	0.00	
5'	340	} MIXING thru Tank (#3)	
5'	350		
5'	353		
5'	351		
5'	353		

$\frac{I}{M} = \frac{243}{352}$

3-12-59 EXP #2 DWM, RG, C.C.

144^{1/2} Start filling cylinder $V \approx 15.9$ kg. thru 9810 (113, 14, 15 are closed) (7 & 11 are closed)

47 4.25" IC-1

157 17.156 — 4.0×10^{-12} Stop adding.

219 Removed source on positive period.

225 19.462 TEMP = .9930

230 19.956 on Neg Period System is critical.

233 PM Set Beckman MTR Trip @ 90, to clean system.

Mixed solutions for over 30' Flushed Tad adder tank and line several times.

EXP #3

3-13-59 DWM C.C., RG

Filled Tad tank to 28.79 Checked Inst.

Source in, large source removed from room.

206 Start filling cylinder

Cyl HT Tad HT

98.47 28.79

08 1.7

15 10.0 29.79

28 17.7 Discovered small pump switch off in 113. Drain back to go in room.

	Cyl Ht	Taladd	Temp	
2 ⁴⁸	Source out on Positive Period 3-A			
	17.832	25.442		
	Level by draining into tank Adder Tank			
3 ¹²	17.804	26.661	.9891	level 2.9891
	Neg period by draining 3-B			
3 ²³	17.77	27.970		
3 ³⁰	start Positive Period 3-C			
	17.840	25.277		
3 ³⁷	start to level			
3 ⁴⁵	17.807	26.626		level
3 ⁴⁶	lower level for neg period 3-D			
	17.773	27.667		
3 ⁵⁵	increase level for + period 3-E			
	17.833	25.468		
	Level			
4 ⁰⁰	17.806	26.632		level
4 ⁰⁰	Negative Period by draining			
4 ¹⁹	17.789	(27.248)?	.98925	3-F

3-16-58 Checked zero on lig. level cyl lit - ~~0.034~~^{.006}
 ∴ actual lit) #31: 17.806 - .006 = 17.80

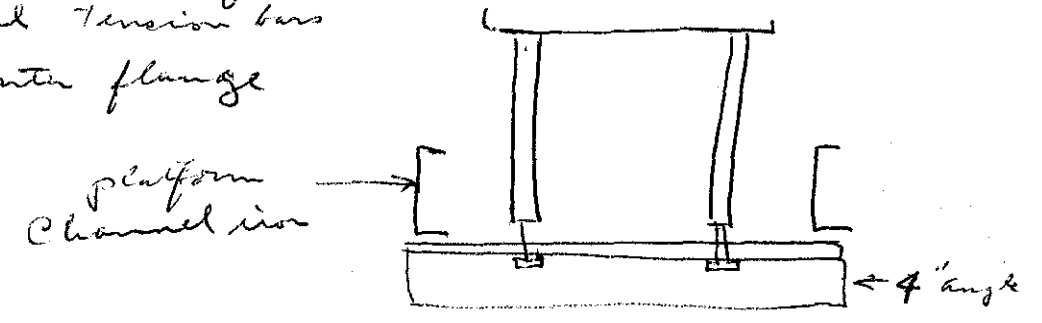
Bubbles were worked out of ~~float~~ float
 this reduced it to a zero.

Opened valve 2 to bleed air from pump line

3-16-59 e.c. Deo In

	Cyl Ht	Tal Adder	Temp
10 ⁵⁶	98.430		Start Pumping
57	101		27.14
11 ⁰⁰	4.4		

N.B. Bottom of Tank pulled down flat with special tension bars on center flange



11 ⁰³	7.83	27.14	
11 ¹⁶	17.409		Remove source on neg per.
17			insert source
11 ²⁰	17.535	26.350	.98522 Source out, + period, let
			Rise to 10" on IC-4
11 ²⁴			Start to level by draining in tad Adder
25	17.526	26.875	(drain a while)
31	17.521	27.027	
46	17.521	27.026	(slight sub crit)
12 ⁰⁰	17.521	27.025	.98584 Level for past 30' A
	Add solution for positive Period		
12	17.547	26.105	B

#4 (Cont)

Cyl HT	Tad Under HT	Temp	
12 ¹²	Start to level		
12 ²³	17.529	26.947	.98618 #4 C level
24	Drain for neg period		
34	17.494	27.951	#4 D
35	Add for pos period		
42	17.554	26.148 26.150	#4 E
47	Drain to level		
1 ⁰²	17.530	26.926	4 F level
1 ⁰³	Drain for neg period		
1 ¹³	17.492	28.009	4 G
	Add for pos Period		
		25.900	.98695 4 H
1 ²⁴	Drain for level		
1 ³³	17.531	26.908	4 I level
	Drain for neg		
1 ⁴⁶	17.509	27.519	4 J
47	Add for pos period		
1:58	17.538	26.522	4 K
	Drain to level		
2¹²	17.527	26.842	4 L
2 ¹⁷	17.526	26.856	4 L
	Drain for Neg Period		
2 ²⁵	17.519	27.218	.98761 4 M

EXP #5 Wm C.C. R.G. 3-17-59

10 ³² AM	Inst Checked, screws set, source in, flushed			
	Tad added again		TEMP	
~10 ⁴⁰	Started solution in.			
10 ⁵⁴	Cyflit Tad added			
	14.818	34.558		
A 11 ¹²	17.574	32.152	.99166	Positive
B 12 ³²	17.543	33.081	.99186	level
C 12 ⁴⁸	17.521	33.751		Neg
D 1:01	17.571	32.047		Pos
E 1:14	17.547	33.07		~ level
1:20	17.546	.068		
1:33	17.546	33.066	.99199	
1:38 1/2	Drain solution			
1:45	17.524	33.800	F .99202	Neg
1:46	Add solution			
1:57	17.554	32.629	G .99200	Pos
	Drain solution			
2:09	17.538	33.293	H .99201	Neg
2:12	Add solution			
2:26	17.549	32.811	I .99200	Pos
	Drain solution			
2:38	17.511	34.130	J .99201	Neg
2:39	Add solution			
2:50	17.567	32.260	K .99198	Pos
2:51	Drain solution			
3:14	17.5	33.078 sub 33.054 Super	L	N level

3-17-59 #5 (Cont)

3¹⁵ Drain Solution

Cyl HT	Tad HT	Temp		
3 ²² 17.511	34.156	.9920	M	Neg Period
3 ²³ Add Solution				
3 ³⁰ 17.584	31.857	.99202	N	Pos Period
3 ⁴⁰ 17.506	34.318	.99203	O	Neg Period

3⁴⁰ Drain thru Dump valve
Check Calib of IC-3 & IC-4

FXP #6 3-19-59

8:35 Insd. checked, recum set, Bldg. alarm set, source in, inst. response

8⁴⁰ start adding fuel

height, in.	Tad adder	Temp		
9 ⁰⁷ 16.367	34.312	.9934		Sub
9 ²¹ 17.979	34.313			source in → Pos
9 ⁴³ 17.510	34.005			source out → Neg
10 ⁰⁸ 17.511	34.065	.99184		Approx level
(A) 10 ⁴⁰ 17.512	33.774			source still out ~ level - 0.014 IC-4
(B) 17.513	33.994			source in
(C) 11 ⁴⁰ 17.5 ⁴⁸⁴	33.940 34.140			source in neg
(D) 11 ⁴⁹ 17.54 ⁴	33.368	.99205		(source in) Pos
12:19 17.521	34.031	.9921		" ~ level
E 12:27 17.522	33.960 (IC-4 → 0.89)			source in ~ level
F 12 ³⁵ 17.490	34.838			" neg
12 ⁴⁶ 17.511	34.104			" ~ level
G 1:02 17.516	34.043 ((IC-4) 0.1)	.99215		" level
H 1:08 17.516	34.043			source out neg
I 1:32 17.542	33.290			Pos
J 1:45 17.526	33.831			Pos
J 2:03 17.519	33.967	.99215		level neg
2:18 17.521	33.930			Pos
K 2:20 17.502	33.938 IC-4 1.05			level
L 2:45 17.557	34.626			neg
	32.982			Pos

M 3:09 17.524 33.931 (IC-4 1.0) .99214 level
 N 17.496 34.719 neg
 3:28 Drain for skat Down

4 samples taken 3-19-59
 numbered 94, 95, 96, 97

Radial flux traverse in 5' cyl.
 traverse will go from ~ 15" from one
 edge to ~ 2.25" from the opposite
 edge. The moving probe (counterhead)
 is ~ 2" from the bottom. The normalizing
 probe is ~ 2" off the bottom and
 ~ 10" off center.

Instruments checked. O.K. 1:25 P.M.
 source in Inst. response noted

1:35
 1:35 start adding fuel
 1:52 h = 15.737" IC-4 .00045
 1:58 h = 17.125" IC-4 .0016 source in
 1:07 h = 17.406 source out IC-4 ~ .02 positive
 Source back in for power level
 2:16 source out, raise power using 12" cyl.
 height Tab added Temp
 2:20 17.451 34.006 .9963 Pos
 2:33 17.419 34.940 start traverse
 4:16 17.410 35.138 .99605
 5:04 17.413 35.051 .99605
 5:05 drain soln.

EXP # 8

3-25-59

Radial traverse 5' cyl.
 $h_c \approx$ ~~17.349~~
 crit ht 17.349

Scale 256

Position	C_2	C_3	C_2	C_2	C_3	C_2/C_3
20.01	521 + 11	251 + 84	13	133387	64340	.48235
22.01	520 + 4	283 + 40		133124	72488	.54451
24.01	507 + 244	303 + 50		130036	77618	.59690
26.01 +	543 + 80	344 + 51	+	139088	88115	.63352
28.00 +	597 + 41	399 + 246		152873	102390	.66977
30.00 +	618 + 3	436 + 135		158211	111751	.70634
32.00 L	631 + 9	456 + 78		14545	116814	.723105
34.00 L	630 + 104	467 + 143		161384	119695	.74168
36.01	626 + 175	462 + 126		160431	118398	.73800
38.00	622 + 103	457 + 141		159335	11733	.73514
40.00	630 + 17	455 + 69		161297	116539	.72251
42.00	649 + 107	445 + 128		166251	114048	.68600
44.00	658 + 114	431 + 16		168564	110352	.65466
46.00 -	656 + 37	397 + 45		166437	101677	.61090
48.00	632 + 61	362 + 137		161953	92809	.573415
50.00	647 + 233	334 + 12		165865	85516	.515575

Exp #8

3-25-59

Scale 256							
Position	C1	C2					
52.00	630 + 195	296 + 142			161475	75918	.47015
54.00	637 + 25	257 + 83			163097	65875	.4039
56.00	653 + 43	218 + 124			167211	55934	.33451
58.00	658 + 206	175 + 181			168654	44981	.26671
60.00	662 + 151	130 + 113			169623	33393	.19686
62.00	664 + 226	81 + 51			170240	20787	.122125
62.00	656 + 15	80 + 151			167951	20631	.12284
62.00 -	420 + 148	53 + 11	transient		107669	13579	.126119
62.00 -	241 + 233	30 + 27	Steady		61929	7707	.12444
62.00 -	92 + 150	12 + 34	transient		23702	3106	.13104

EXP. # 7

3-24-59

Time of count min.	enches Position	256 reads		total counts		
		C ₂	C ₃	C ₂	C ₃	C ₃ /C ₂
2.5	20.01	357 + 188	174 + 159	91580	44702	0.48812
11	22.01	359 + 36	193 + 237	91940	49645	0.53997
"	24.01	352 + 102	208 + 185	90214	53433	0.59229
11	26.01	331 + 124	211 + 111	84860	54127	0.63784
11	28.02	335 + 35	226 + 23	85795	57879	0.67462
11	36.02	335 + 198	237 + 59	85958	60731	0.70652
11	32.00	336 + 203	241 + 217	86219	61913	0.71809
11	32.00	331 + 68	241 + 2	84804	61698	0.72754
11	32.00	328 + 77	239 + 36	84045	61220	0.72842
11	34.01	324 + 132	240 + 156	83076	61590	0.74137
11	34.01	316 + 104	234 + 227	81000	60131	0.74236
11	36.01	314 + 20	230 + 171	80404	59051	.73443
11	36.01	321 + 4	237 + 83	82180	60859	.74056
11	38.03	335 + 111	246 + 187	85871	63163	.73555
11	40.02	341 + 54	244 + 75	87350	62539	.71596
11	42.00	353 + 15	245 + 30	90383	62750	.69427

EXP #7

3-24-59

Time of	256 Scale						
Count Min.	Position	C-2	C-3				
2.5	44.00	356+127	237+131	91263	91263	0608034	0.66624
"	46.00	366+65	227+179		93761	58291	0.6217
"	48.00	369+42	212+97		94506	54369	0.5753
"	50.00	376+144	198+95		96400	50783	0.52679
"	52.00	378+121	177+164		96889	45476	0.46936
"	54.00	381+26	154+8		97562	39432	0.40417
"	56.00	383+225	131+98		98273	33634	0.34225
"	58.00	374+152	100+61		95896	25661	0.26759
"	60.00	367+18	73+88		93970	18776	0.19981
"	60.00	367+140	74+126		94092	19070	0.202673
"	62.00	365+36	46+51		93476	11827	0.12652
"	62.00	370+88	46+213		94808	11989	0.12646
"	62.00	368+232	46+91		94440	11867	0.12566
"	62.66	373+28	38+239		95516	9967	0.10435
"	62.66	376+218	39+84		96474	10068	0.10436
"	62.66	385+245	40+5		98801	10245	0.10369

EXP #7

3-24-59

me of	256 Scale						
amt	inches Position	C-2	C-3	Mag Per			
.15	46.60	328+97	203+161	84065	52129	0.62010	
.11	46.60	304+131	189+191	77955	48575	0.623115	
.11	40.01	307+29	321+52	79621	56628	0.72027	
.11	30.01	310+8	218+118	79368	55856	0.70376	
.11	26.01	321+146	154+123	82322	39547	0.48039	

Exp # 8 RR, C.C. 3-25-59 P.B. C.C.

Radial traverse in 5' cpl.

Repeat of # 7

Inst. checked, response OK

9:20 source in, Inst. responds
 9:50 lig level t. A temp

17.371 34.893 Pos Per

10:05 source out Pos Per

17.367 35.108 .99395

16:18 17.349 35.592 .99410 level

10:23 start counting I-C3 1.6×10^{-9} I-CH 9×10^{-10}

12:14 17.321 36.481 .99505

12:20 Shut Down Drain Soln

Detector probe moving # 1

" " fixed # 4

3-30-59

zero = 20.19"

EXP #12

2x121 traverse

Position	Scale 256		C ₂	C ₃	C ₂	C ₃	C ₃ /C ₂
	C ₂	C ₃					
inches							
20.19	543 + 196	²²² 2237 115	139204	57203	0.41093		
21.00	539 + 2	271 + 62	137786	69438	0.50322		
22.01	513 + 233	311 + 177	131561	79793	0.60651		
23.01	480 + 118	334 + 135	122998	85639	0.696263		
24.00	452 + 86	348 + 92	115798	89180	0.77013		
25.00	444 + 32	364 + 245	113696	93429	0.82174		
26.01	450 + 59	384 + 48	115259	98352	0.8533		
27.01	468 + 89	405 + 40	119897	103720	0.86507		
28.01	498 + 134	423 + 132	127622	108420	0.8495		
29.00	541 + 31	448 + 120	138527	114808	0.82878		
30.01	626 + 31	483 + 71	160287	123719	0.77186		
31.00	669 + 75	466 + 153	171339	119449	0.69715		
32.00	688 + 33	419 + 79	176161	107343	0.60935		
33.01	706 + 153	354 + 20	180889	90644	0.5011		
34.00	714 + 97	269 + 221	182881	69085	0.37776		
35.00	782 + 178	172 + 49	200370	44081	0.22000		
36.00	810 + 111	44 + 144					

oops!
my error
6/20/19
WD 01.E.

Bottom zero

20.19

EXP # 10

3-26-59

scale - 256

Position	C-2	C-3	C ₂	C ₃	C ₃ /C ₂
20.20	400 + 201	160 + 96	102601	41056	0.40015
21.00	405 + 1	199 + 8	103681	50952	0.49143
22.00	396 + 121	235 + 70	101497	60230	0.59542
23.01	378 + 254	255 + 7	97022	65287	0.67291
24.01	349 + 155	263 + 162	89497	67490	0.75409
25.00	324 + 190	261 + 251	83134	67067	0.80673
26.00	302 + 152	253 + 115	77464	64883	0.83759
27.00	281 + 156	236 + 244	72092	60660	0.84142
28.01	272 + 71	228 + 249	69703	58617	0.84095
29.00	271 + 42	219 + 157	69418	56221	0.80989
30.00	286 + 129	220 + 36	73345	56356	0.76837
31.00	316 + 43	218 + 172	80939	55980	0.69163
31.00	350 + 181	243 + 66	89781	62274	0.69362
32.00	365 + 251	223 + 100	93691	57188	0.61039
33.01	383 + 153	193 + 153	98201	49566	0.50469

Bottom Zero 10.19

Exp # 10

3-26-59

		Scale 256					
Position	C-2	C-3		C-2	C-3	$\frac{C-3}{C-2}$	
34.00	403 + 192	157 + 210		103360	40402	0.39089	
→ 35.00	416 + 7	163 + 13		106503	26381	0.24770	
→ 35.00	416 + 143	104 + 224		106639	26848	0.25177	
→ 35.50	415 + 152	68 + 46		106392	17454	0.16405	
→ 35.50	420 + 44	68 + 161		107564	17569	0.16333	
→ 35.50	422 + 139	69 + 10		108171	17674	0.16339	
→ 36.00	423 + 159	31 + 43		108447	7979	0.0736	
→ 36.00	424 + 9	31 + 112					

Exp. # 9 3-25-59 CC, RR
axial transverse 5' cyl.

3:23 Source in, inst response.
3:24 start to add soln
3:49 h = 17.340 Source in rising power
3:53 h = 17.347 source out ~ level
3:55 add fuel from 12" cyl. to raise power
4:00 Temp = .9971
4:10 start to level IC-4 2×10^{-9}
4:12 start counting for transverse
4:52 17.358 33.490 .9968
5:22 drain

detector probe sticking in tube

Exp. # 10 3-26-59 RR, CC

8:30 AM Insd. checked - O.K. (re run # 9)
8:45 IC-1 fell apart - Jim Ellis repaired it
9:20 Source in Inst Response IC-1-2-3-4
17.337 33.670 .99444
9:45 17.337 33.670 .99444
9:53 source out Pos Per
9:59 17.331 34.573 .99475 Approx level
10:47 17.319 34.570 .99530 Pos Per
11:29 17.304 34.824 .99542 level
11:44 Damp Soln

Exp # 11 Foil run c.c. RR 3-26-59
Foil # 3 cd. covered, 1.5" above
center plane, #2 bare 1.5" below.
Foil are in place thru out the
entire exp.

1:25 source in, Insts respond
1:26 start fuel in to the cyl.
1:46 h = 17.175" source in, IC-4 $\sim 3 \times 10^{-10}$ ~ Pos., Temp. .99625
1:59 h = 17.341" source out, IC-4 $\sim 8 \times 10^{-10}$ - Pos. .99625
2:01 (20 sec) level IC-4 = 10^{-10} Pos Period
2:12 (30 sec) IC-4 = 10^{-9} check to level
expose foils for 20 min.
2:24 h = 17.314, I.A. = 32.364 IC-4 = 1.1×10^{-9} Temp .99625
2:32:30 dump

EXP. # 12

3-30-57 KY CC

Axial traverse

8:40 Inst. checked, O.K.
 8:51 Source in Inst Response IC-1-2-3-4
 lig level + A temp
 98.415 23.42
 9:23 17.151 23.49 .9913
 9:31 Source out Pos Per
 10:44 17.133 33.172 .99122
 11:21 Dump soln

"Note"

Counter # u/235 # 1 traverse counter
 # u/235 # 4 standard

Exp # 13 ce. own, R24 4-2-59

Purpose: to determine the reflection savings of a "Mock bottom" which will be placed above the soln, see diagram below.

9:30 Instruments checked - o.k.
 9:33 source in IC-1, IC-2, IC-4 respond
 9:34 start soln. in
 " " Tab added"
 9:50 14.874 33.349 made contact with reflector probe,
 raise reflector and proceed
 9:52 15.347 second contact IC-1 \rightarrow 10"
 9:59 16.488 33.351 source in, ~ Pos. IC-4 \rightarrow 0.004
 10:03 16.536 32.094 source in, Pos. IC-4 \rightarrow 0.007
 10:04 " " source out neg source in
 10:12 16.583 31.047 source out Pos. Per. A
 reflector probe in contact
 10:30 16.587 31.045 raise the reflector
 neg period to short to measure velocity
 source in
 10:38 16.993 21.289 source in, Pos. Period
 10:43 16.995 21.290 source out Pos
 10:45 17.010 20.780 Pos Period B
 10:54 16.995 21.636 level
 10:57 dump

16.583"	Reflector in contact "A"
16.995"	" " away "B"
.412"	= reflector savings
+ .016"	from reactivity difference
0.428"	in "A" + "B"

EXP. 14 4-3-59 R.D. CC.

8:40 Inst. checked o.k.
90 gallons of H₂O was added to the system. The soln. was mixed for ~ 1 hour.

9:09 source in IC-1, IC-2, IC-4 respond

9:06 soln. started by
9:40 height 26.279" all soln. in
10 min count scale 16
counter #1 #2 #3

396 + 5 110 + 5 76 + 2

10:08 Dump Soln

11:30 take 10 min. count with big Pu source on the big slab tank
scale 256

C1 C2 C3
461 x 256 27 x 256 + 39 15 x 256 + 145
461 + 217 26 x 256 + 96 65 x 256 + 251

EXP # 15 4-3-59 R.D. C.C.

3:12 source in Inst Response IC-1-2-4

lig level +A temp

98.418 99.999

added 2 Kg U to the system (12)

26.341 99.999

take 10 min count scale 256

C1 = 1613 + 35 C2 = 33 + 9 C3 = 71 + 209

4:09 Dump Soln

0.8 Kg U
3-6-59
R.D.

EXP # 16 4-6-59 PRCC DMH

to increase volume of soln. in system
count from 16" slab

10 min

C1 C2 C3
456 x 256 + 218 17 x 256 + 252 16 x 256 + 178

added ~ 1.2 Kg U and 40 gallons H₂O to 6" slab. Mixed and start adding to 16" slab. Monitor with counters

vol Uranium balance

original vol 950 liters 16 Kg U

3-3-59 add 90 gallons 7340 "

3-5-59 add 40 gallons 140 "

2 Kg U
18 Kg U

1440 liters

11:18 AM

Inst. checked, o.k. ~ 12.4 g/l

10 min

C1 "slab" C2 C3
256 x 52 + 116 9 x 256 + 118 13 x 256 + 33
453 + 66 9 + 30 13 + 53
453 + 251 8 + 230 13 + 11

11:48

source in IC-1, IC-3, IC-4 respond

11:53

start to feed 200 CRM on C2

12:03 PM

16.94" CRM 230 CRM on C2

12:21

29.45" all soln. in

C1 C2 C3
1567 + 170 18 + 115 70 + 214

Recount of Slab
 C_1 C_2 C_3
 $457 \times 256 + 19$ 7 + 230 13 + 6

Tad ≈ 30 CRM 1×10^4

Add 3 Kg U into 6" slab Mixed And
 Added to 16" Slab Monitor with Counters
 10 MIN Count scale 256

$C-1$	$C-2$	$C-3$
559 + 233	8 + 195	15 + 164
560 + 139	9 + 104	15 + 101
560 + 7	9 + 79	15 + 68

4-7-59
 8:10 AM 566 + 220 9 + 76 15 + 11
 $\frac{1}{M} = 0.832$

$\{ 18 + 3 \}$ Kg U in system
 Vol ≈ 1450 liters
 $\rho_u \approx 14.5$ g/liter

4-7-59 EXP #17 RXCC, P.M.

8:20 Invt. checked
 8:30 Source in Inst Response IC-1, 2, 3, 4.
 lig level +A temp
 98.384 99.982
 9:10 Pump lost Prime (out of Soln)
 27.270 00.293

10 MIN Count scale 256
 $C-1$ $C-2$ $C-3$

1605 + 175	19 + 223	71 + 8
1607 + 226	21 + 253	71 + 11

9:35 Drain Soln (fill 6" slab And +A)

10:30 Add 420 g U to 6" slab, Mixed And
 Added to 16" slab. Monitor with Counters

11:09 10 MIN Count
 $C-1$ ~~$C-2$~~ ~~$C-3$~~
 697 x 256 + 112
 694 x 256 + 228

Source
 Soln cyl.
 out

C_1	C_2	C_3
689 x 256 + 137	75 x 64 + 37	71 x 64 + 33
683 x 256 + 179	36 x 64 + 36	68 x 64 + 10

34

4-7-59 EAP #19 RQ CC

Run soln. from the 16" slab into the
5' cgl.12⁰³ Source in Just Response IC-1, 2, 3, 4
lig level + A temp

98.386 00.002

12³⁷ 29.681 00.150 (out of soln) (subcrit)

10 Min Count scale 256

C-1	C-2	C-3
1618 + 109	66 + 81	76 + 63
1616 + 207	66 + 97	75 + 169

1⁰⁵ Drain soln thru feed valve
Do not Detected Noise in Dump Valve

1:45 add 200 grams of U to the system

$$S_4 \approx \frac{21.62 \text{ kg}}{1450 \text{ liters}} \approx 15 \text{ g/liter}$$

256 scale

C ₁	C ₂	C ₃
713 + 67	12 + 15	17 + 179
716 + 55	11 + 13	17 + 229

4-7-59 EIP # 19 R&DWH, CC
 fill 5' cul

3:33 Source in, IC-1, IC-2, IC-4 respond

3:34 start to feed

lig level + A temp

29.752 00.001

4:05 Source out slightly ~~sub crit~~ IC-4 (4.5×10^{-12})

4:20 " " Just Critical 5×10^{-12}

Insert source.

4:25

power not rising linearly on IC-1 and
 IC-2 \therefore system not critical and
 upcount leveling @ 5×10^{-12} must
 be due to large source in room

4:26 1/2 Dump Solution

4-8-59 add ~ 26 liters H₂O

and ~ 525 g U to system

4-8-59 Exp # 20

10:25 Big Source Removed From Room #113.
Source in Inst Response IC-1, 2, 4
IC-3 is out of the circuit for Repairs

lig level +A temp
98.389 99.997

11:11 Source out

28.593 5.316 Approx level

11:18 28.762 2.675 Pos Period

11:32 28.601 5.341 .99801 Slightly Pos

11:49 28.455 8.921 .99801 Neg Per

12:05 fill +A thru feed valve

12:10 Dump Soln

~~4-8~~

4-8-59 Exp # 21 R.B. C.C.

Repeat of Exp # 20

1:02 Source in Inst Response IC-1, 2, 4

lig level +A temp

98.387 27.803

1:55 Source out 8

28.672 8.162

Pos Per

1:59 28.688 7.779

(A) Pos Per

2:18 28.593 10.052 .9991

Approx level

2:31 28.591 10.084

(B) ~ level

— 13.060

(C) Neg Per

2:58 28.722 6.796

(D) Pos Per

3:13 28.468 13.156

(E) Neg "

3:30 28.738 6.223 .99903

(F) Pos "

4:17 28.591 10.149

G level

Shut Down

4-9-59 EXP # 22 CC, R2
 8:15 AM Inst checked OK.

About 6" of Soln was left in 6" slab
 from last Exp. This was added to 16"
 slab and re-circulated for mixing.

9:15 Source in Inst Response - IC-1, 2, 4
 lig level T.A temp

98.387 00.433

9:57 28.419 10.054

Source out

10:03 28.542 9.363

10:49 28.392 13.103 .99685 (A) Pos Per level

10:58 28.190 17.986 (C) Neg Per

11:17 28.623 7.486 (D) Pos "

11:35 28.392 13.110 .99681 (E) level

11:40 28.157 19.013 (F) Neg

slow downward drift OK

T.A. liquid level indicator noted

11:45 19.003

12:09 28.628 7.485 (G) Pos Per

12:31 28.391 13.113 (H) level

12:54 28.257 16.440 (I) Neg Per

1:00 28.541 9.479 (J) Pos "

1:18 28.392 13.113 (K) level

1:23 28.254 16.493 (L) Neg Per

1:33 Dump Soln

4-9-59

Drained Approx 2 L Soln from 16" slab
 tank to flush line.

took 2 Samples Approx 60 ml ea # 98-99

Re-circulated soln for 15 min

Drained Approx 2 L Soln from 16" slab tank
 to flush line, and took an additional 2

Samples Approx 60 ml ea # 100-101

8:30 4-10-59 Exp # 23 DWM RY C1
Inst checked OK
Re-Run of Exp # 22

8:49 Source in Inst Response IC - 1, 2, 3, 4
lig level +A temp

9:24 Source out
28.378 16.477

9:30	28.441	17.161		
10:04	28.552	14.648	(A)	Pos Per
10:06	28.357	19.435	.9951	(B) level
10:29	28.211	22.972	.99508	(C) Neg Per
11:05	28.568	14.376		(D) Pos "
11:07	28.355	19.490		(E) level
11:35	28.215	22.975	.99514	(F) Neg Per
11:54	28.543	14.906		(G) Pos "
12:00	28.358	19.497		(H) level
12:12	28.212	22.981	.99519	(I) Neg Per

Drain solution

4-10-59 Exp # 24 DWM CC

foil Run
foil # 3 cd covered 1" Below center line
foil # 2 Bare 1" Above " "
Center line is calculated to be 14 3/16"
Above Bottom of cylinder 7 1/16"

1:42 lig level +A temp
28.384 22.979

2:15	Source in Inst Response IC-1, 2, 3, 4		
2:20	Source out		
2:25:12	28.644	16.854	Pos Per
2:27	Start turning foil exp @ IC-4 = 1.0 x 10^-9		
2:43	28.407	20.129	2.7 x 10^-9 level
2:45	Shut Down		

4-14-57 EXP #25

9:15 AM Checked Instruments - Trips OK.

Checked out trolley travel for radial counter traverse.

10:11 Source in Inst Response IC - 1, 2, 3, 4

lig level +A temp

98.582 13.729

10:44 Source out

28.196 13.731

Approx Crit
~~Slightly Neg Pos~~

10:50 28.360 9.834

Pos Per

11:00 28.178 14.370

Approx level

start counting IC-4

1.15×10^{-9}

ENCN 1.15×10^{-9} 3.00"

11:05 28.173 14.452 .98887

11:16 28.173 14.429

9.5×10^{-10}

11:29 28.179 14.185

9.5×10^{-10} level

11:39 28.173 14.385 .98889

1×10^{-9}

11:51 28.167 14.572

1.13×10^{-9}

11:57 28.166 14.573

~~2.8×10^{-9}~~

12:07 28.148 15.031 .98896

1.4×10^{-9}

12:20 28.145 15.031

1.4×10^{-9} ~43"

12:39 28.150 14.786 .9889

1.3×10^{-9}

N.B. Critical height with counter at edge is 28.145"

12:47 28.161 14.462 .98890

1.3

26.97

12:53 Shut down, during soln.

With $2 \frac{1}{16}$ spacer between counter and tank wall

Counter position was 43.75

.81
.77
Av 43.78

∴ Wall position = 43.78 + 1.94 = 45.72

Straight line extrapolation on graph

gives extrapolated boundary @ 46.62

δ + structural refl. savings = 0.90 in

EXP #25
Radial Flux Traverse

Counter movement always increasing after count.

TIME POSITION	Stationary		MOVING	C ₂	C ₃	C ₃ /C ₂
	C ₂	C ₃				
2' 1.50	366 + 212	259 + 240	93,908	66,549	71,709	.7086
2' 3.00	373 + 116	280 + 29	95,604	76,011	78,108	.7501
2' 5.00	364 + 176	296 + 235	93,360	78,382	76,011	.8142
2' 7.00	352 + 150	305 + 28	90,262	74,578	78,108	.8653
2' 9.05	337 + 107	306 + 46	86,379	77,189	78,382	.9074
2' 10.99	320 + 35	299 + 54	81,955	77,209	74,578	.9346
2' 13.02	308 + 172	301 + 133	79,020	75,135	77,189	.9768
2' 14.98	307 + 164	301 + 153	78,756	73,251	77,209	.9804
2' 17.04	303 + 192	297 + 16	77,760	72,369	76,048	.9780
2' 18.99	303 + 212	293 + 127	77,780	72,369	75,135	.9660
2' 21.01	304 + 116	286 + 35	77,940	72,369	73,251	.9398
2' 22.97	312 + 9	282 + 177	79,881	72,369	72,369	.9060
2' 25.04	326 + 255	282 + 123	83,711	72,369	72,369	.8639
2' 27.01	333 + 178	270 + 11	85,426	69,131	69,131	.8093
2' 29.01	335 + 109	251 + 57	85,869	64,313	64,313	.7490
2' 31.02	338 + 188	229 + 29	86,716	58,653	58,653	.6764
2' 33.00	349 + 213	207 + 228	89,557	53,220	53,220	.5943
2' 35.12	371 + 239	188 + 219	95,215	48,347	48,347	.5078
2' 37.00	397 + 0	171 + 61	101,632	43,837	43,837	.4313

EXP # 25

Radial Flux Traverse

Counter movement always increasing before count.

Give appropriate boundary @ 27.6.62
 S + S + S includes npl. savings " 0.90 in

TIME	POSITION	Stationary		Moving		C ₂	C ₃	C ₃ /C ₂
		C ₂	C ₃	C ₂	C ₃			
2'	1.50	366 + 212	259 + 240	93,908	66,544			.7086
2'	3.00	373 + 116	280 + 29	95,604	71,709			.7501
2'	5.00	364 + 176	296 + 235	93,360	76,011			.8142
2'	7.00	352 + 150	305 + 28	90,262	78,108			.8653
2'	9.05	337 + 107	306 + 46	86,379	78,382			.9074
2'	10.99	320 + 35	299 + 54	81,955	76,598			.9346
2'	13.02	308 + 172	301 + 133	79,020	77,189			.9768
2'	14.98	307 + 164	301 + 153	78,756	77,209			.9804
2'	17.04	303 + 192	297 + 16	77,760	76,048			.9780
2'	18.99	303 + 212	293 + 127	77,780	75,135			.9660
2'	21.01	304 + 116	286 + 35	77,940	73,251			.9398
2'	22.97	312 + 9	282 + 177	79,881	72,369			.9060
2'	25.04	326 + 255	282 + 123	83,711	72,315			.8639
2'	27.01	333 + 178	270 + 11	85,426	69,131			.8093
2'	29.01	335 + 109	251 + 57	85,869	64,313			.7490
2'	31.02	338 + 188	229 + 29	86,716	58,653			.6764
2'	33.00	349 + 213	207 + 228	89,557	53,220			.5943
2'	35.12	371 + 239	188 + 219	95,215	48,347			.5078
2'	37.00	397 + 0	171 + 61	101,632	43,837			.4313
3'	38.96	653 + 53	251 + 19	167,221	69,275			.3844
3'	39.01	702 + 160	240 + 132	179,872	61,572			.3427
4'	40.05	934 + 146	274 + 211	239,250	70,355			.2940
4'	41.10	920 + 146	227 + 70	235,666	58,182			.2469
4'	41.98	920 + 188	194 + 251	235,708	49,915			.2118
5'	43.03	1150 + 3	186 + 254	294,403	47,870			.1626
5'	44.05	1176 + 180	137 + 150	301,236	35,222			.1169
2'	3.04	419 + 126	311 + 226	107,390	79,842			.7435
2'	11.04	420 + 229	397 + 93	107,749	101,675			.9436
2'		417 + 165	393 + 205	106,917	100,813			.9429
2'	19.95	419 + 146	398 + 161	107,410	102,049			.9501
2'	26.9727	435 + 155	348 + 139	111,515	89,227			.8001
2'	35.00	455 + 5	233 + 168	116,485	59,816			.5135

4-15-59

EXP # 26

Counter Drive was set up for axial traverse
 Counter tip on Bottom when all syn = 3.84
 Counter center is in from tip.

10 ⁵⁰ AM	Inst checked, all respond OK			
	Inst source, run on IC-1, 2, 3 & 4			
11 ⁰²	lig level	+A	temp	
	98.384	14.864		
11 ³²	Source out			
	28.083	14.847		
11 ³⁸	28.268	10.463		
11 ⁴⁷	28.074	15.380		
12 ⁰⁶	28.073	15.241		
12 ²²	28.076	15.159	.98914	IC-4-1.6 x 10 ⁻⁹
12 ⁴²	28.074	15.528	.98912	IC-4-1.6 x 10 ⁻⁹
1 ⁰⁵	28.037	16.118	.9892	IC-4-1.6 x 10 ⁻⁹
1 ²⁰	28.033	16.208		level
1 ²⁶	With Drew counter to 35.21"			
	28.632	16.205		level
1 ²⁷	Dumped SolN			

Counter tip = $\frac{3.84}{2.21} = 1.63$ " from center
 $\frac{28.03}{30.24}$ Top surface
 $\therefore \delta = 31.0 - 30.24 = 0.75$ in
 *from blank shot only

4-16-59 Exp # 27

R.B.C.C.

Purpose: to determine the Reflector Savings of A "Mock Bottom" which will be Placed Above the SolN

9:30	Inst checked - O.K			
9:49	Source in Inst Response IC-1, 2, 3, 4			
	lig level	+A	temp	
	98.382	16.191		
	Mock Bottom Approx 27" Above Bottom of Cylinder			
9:53	start feeding SolN			
10:18	26.517	16.196		SolN Made contact with Mock Bottom
10:28	Source out Approx level			
	27.513	16.196		
10:33	27.610	14.121		{ Mock Bottom (A) Pos Per
10:45	27.641	14.116		Remove Mock Bottom (B) Neg "
10:50	27.94	-	.99788	level
11:32	27.431	18.365		Made contact Slightly subcrit
11:47	27.391	18.362		Slightly subcrit
	lowered Mock Bottom to SolN and Probe light would not go out when it was Raised.			
11:48	Dump SolN			
	δ Reflector savings = $27.94 - 27.43 = 0.51$ "			
	from "A" + "B" $\delta = 0.52$ "			

EXP# 26
 Vertical Traverse
 Crit height = 28.033
 Counter @

Start Time	En Ln N Counting Power	Counting Time	Pos	Stat.		Moving		c ₃ /c ₂
				c ₂	c ₃	c ₂	c ₃	
1149	1.7 x 10 ⁻⁹	3'	3.01	909 + 107	315 + 2	232 811	80 864	0.3464
53	"	3'	5.00	906 + 156	401 + 230	232 092	102 886	0.4433
57	1.6 x 10 ⁻⁹	2'	6.01	571 + 180	316 + 88	146, 356	80 984	0.5533
1200	"	2'	6.99	577 + 126	363 + 165	147, 838	93 093	0.6329
03	1.6 x 10 ⁻⁹	2'	8.03	573 + 18	412 + 127	146, 706	105 599	0.7198
06	1.6 x 10 ⁻⁹	2'	9.00	567 + 41	451 + 231	145, 193	115 687	0.7968
09	"	2'	9.99	549 + 227	483 + 29	140, 771	123 677	0.8786
13	1.5 x 10 ⁻⁹	2'	11.05	532 + 192	497 + 255	136, 384	127 487	0.9348
16	1.6 x 10 ⁻⁹	2'	12.03	542 + 144	537 + 22	138 896	137 494	0.9899
19½	1.6 x 10 ⁻⁹	2'	12.99	561 + 219	581 + 207	143 835	148 943	1.0355
22½	1.6 x 10 ⁻⁹	2'	13.98	570 + 39	607 + 117	145 959	155 509	1.0654
25½	1.6 x 10 ⁻⁹	2'	15.00	573 + 55	624 + 237	146 743	159 981	1.0902
28½	1.6 x 10 ⁻⁹	2'	16.00	579 + 222	630 + 209	148 446	161 489	1.0879
31½		2'	16.99	578 + 171	633 + 239	148 139	162 287	1.0955
34½	1.65 x 10 ⁻⁹	2'	17.99	580 + 177	627 + 187	148 657	160 699	1.0810
38		2'	19.00	585 + 107	616 + 109	149 867	157 805	1.0530
41		2'	19.99	585 + 177	596 + 6	149 937	152 582	1.0176
44	1.6 x 10 ⁻⁹	2'	20.98	581 + 116	563 + 84	148 852	144 212	0.9688
47		2'	21.98	586 + 112	540 + 175	150 128	138 415	0.9220
50		2'	23.02	578 + 141	491 + 28	148 109	125 724	0.8489
53		2'	24.04	574 + 166	445 + 4	147 110	113 824	0.7744
56	1.6 x 10 ⁻⁹	2'	25.01	578 + 169	401 + 44	148 137	102 700	0.6933
59		2'	26.01	577 + 255	350 + 10	147 967	89 610	0.6056
1 02		2'	27.00	581 + 42	297 + 37	148 778	76 069	0.5113
		3'	27.99	869 + 6	355 + 208	222 470	91 088	0.4094
1 08½	1.6 x 10 ⁻⁹	3'	29.01	862 + 14	250 + 218	220 686	64 218	0.2910
1 13½		3'	30.03	852 + 1	131 + 212	218 113	33 748	0.1547
1 17¾		5'	30.99	1419 + 167	48 + 102			

4-16-59
 about 375 liters of H₂O was
 put into the 6" slab.

8:15 4-17-59 ~ 3.5 Kg U was added
 to the 6" slab. The addition was
 monitored with neutron counters + large
 Pu source.

9:40 addition completed
 source moved to big 16" slab
 and a back ground count started
 5 minute count C₁ → 1.8 × 10⁴ cts/min
 256 scale regular source in "pig"

	C ₁	C ₂	C ₃
9:55	356 + 178	35 + 49	9 + 47
9:02	358 + 212	35 + 135	9 + 44

9:10 soln. in 6" slab started into
 the 16" slab

10:30 309 + 38

10 (32-37) 296 + 135 (5' count)

10:45 addition complete

	C ₁	C ₂	C ₃
	275 + 20	27 + 201	7 + 170

Exp 28 4-17-59
 Pump soln. mixed the morning of 4-17-59
 (page 46) into the 5' c/l.

12:05 Inst. checked, all respond
 12:13 source in IC-1, IC-2, 3, + 4 respond
 12:14 start to feed soln.

12:50 height = 38.7" no multiplication
 dump soln

1:10 PM add ~ 300 liters H₂O to 6" slab
 Bottle # 8 3.327 Kg U
 2:00 start adding U to 6" slab

	C ₁	C ₂	C ₃
	29 + 249	50 + 50	14 + 100
	Change source		
	29 + 114	50 + 102	15 + 19
4:08		58 + 7	

4-20-59
 8:15 AM Pump soln. in 6" slab to
 16" slab. C-1 counter rate 1.5 × 10⁴
 256 scale

	C ₁	C ₂	C ₃
9:40	260 + 198	26 + 168	7 + 28
	260 + 94	26 + 111	7 + 76

EXP # 29 4-20-59 R&CC
Pump mixed soln. into 5' cyl.
Inst. checked OK

10:15 source in IC-1, IC-3, IC-4 respond

10:17 start soln. into cyl.

11⁰² lig level +A

44.673 99.997 Pump lost Prime

start 5 min Count scale 256

c-1	c-2	c-3
910 + 191	76 + 33	33 + 168
912 + 149	75 + 248	33 + 247

11¹⁶ Dump soln

1:30 PM add ~ 500 grams U to system
16" slab

2:20	c ₁	c ₂	c ₃
	272 + 114	26 + 48	7 + 132
	276 + 17	26 + 216	7 + 83

4-20-59 EXP # 30 R.H. cc
Pump mixed soln into 5' cylinder
lig level +A

98.382 00.005

2³³ Source in Inst Response IC-1, 2, 3, 4

3¹⁵ 44.743 00.005 Pump lost Prime

start 5 min Count scale 256

c-1	c-2	c-3
919 + 86	80 + 140	33 + 233
921 + 131	80 + 167	33 + 138

3³⁰ Dump soln AND fill 6" slab

Add 500 g U to 6" slab

5' Counts

Source Pos.	C ₁ ^{x256}	C ₂ ^{x256}	C ₃ ^{x256}	CRM
M-2 6" Slab Tank	39 + 15	283 + 31	16 + 12	C ₂ : 3500
16" Slab Tank	250 + 78	117 + 11	6 + 235	C ₁ : 13000
All int increased i; Po B source is stronger!				
Po B 16" Slab Tank	582 + 91	277 + 29	15 + 174	C ₂ : 30000
6" Slab Tank				

Po B source replaced by Po B source

8³⁵ AM 4-21-59

Start transferring solution from 6" slab tank to 16" slab tank

9⁴⁷

Exp # 31 4-21-59 DWA, RL, CC

Pump mixed soln into 5' cylinder
lig level + A

98.382 99.996

source in Inst Response IC-1, 2, 3, 4

44.694 99.997 Pump lost Prime

start 5 MIN Count scale 256

C-1	C-2	C-3
1924 + 244	193 + 213	80 + 44
1926 + 250	194 + 70	80 + 113

9⁴⁸
10³¹

10⁴⁵
11⁰³

Fill 6" slab from 5' cylinder
Dump soln

11²⁵
12⁴⁰

Add 500g u to 6" slab
Pump soln from 6" slab into 16" slab
while mixing

C ₁ ^{x256}	C ₂ ^{x256}	C ₃ ^{x256}
206 + 100	71 + 36	19 + 209
582 / 706 = .824	277 / 284 = .975	

1/M

4-21-59 Exp #32 C.C. D.W.M.

Pump Mixed Soln into 5' Cylinder

lig level +A

98.384 00.010
 Source in Inst Response IC-1, 2, 3, 4
 44.788 00.010 Pump Lost Prime

start 5 MIN Count Scale 256
 C-1 C-2 C-3
 No use 237 + 145 84 + 83
 238 + 80 84 + 181

Fill 6" Slab from 5' Cylinder

Dump Soln
 start 5 MIN Count Scale 256
 C-1 C-2 C-3
 708 + 78 73 + 235 18 + 208
 707 + 100 73 + 53 18 + 227

Add 5.00g u to 6" Slab
 start Pumping Soln from 6" Slab into 16"
 slab while mixing
 Count Rate Meter 3.5×10^4

1 02
 1 43

2 02
 2 24
 2 31

3 00
 3 48

	$C_1 \times 256$	C_2	C_3
Pump lost prime	741 + 98	73 + 155	
4 ¹² all solution in slab tank	757 + 192	73 + 190	19 + 178
	$\frac{1}{M}$.769		
4 ²⁰ Cont' Mixing	754 + 18	74 + 122	
	$\frac{1}{M}$.772		
4 ²⁵ Cont' Mixing	753 + 155	74 + 120	
4 ²⁶ Continued Mixing	755 + 176	74 + 21	
4 ⁴¹ " "	752		
4 ⁴⁴ pm	747 + 221		
4 ⁵²	751 + 90	73 + 194	
5 ⁰²	753 + 134	74 + 17	
5 ⁰⁸	Stop Circulation & shut down for the day 4-22-58		
8 ¹⁰	757 + 232	72 + 168	
8 ¹⁵ Start Circulation	761 + 49	73 + 164	
8 ²⁶	753 + 22	72 + 219	
8 ³⁵	Stop mixing		

4-22-59 EXP # 33 DWM CC

8 ³⁹ Pump mixed soln into 5' cylinder
 Source in Inst Response on IC-1, 2, 3, 4
 lig level + A

98.382	99.996	
44.761	99.999	Pump lost Prime
start 5 MIN Count		scale 256
C-1	C-2	C-3
—	360 + 199	79 + 251
	366 + 253	80 + 1

9 ³⁴ Fill 6" slab from 5' cylinder, Dump

10 ³⁰ Add 500 g u to 6" slab

45 Stop Mixing in 6" Slab tank

10 ⁴⁶ Start Transferring to 16" Slab Tank

47	Start Count C ₁ x 256	C ₂ x 256	C ₃ x 256
53	738 + 15	76 + 116	19 + 240
58 1/2	753 + 247	75 + 228	—
11 04	776 + 13	76 + 214	21 + 60
11 10	769 + 231	76 + 197	21 + 65
15 1/2	777 + 212	77 + 108	21 + 206
	772 + 250	77 + 195	21 + 232

11 17 Start Mixing (Transfer complete) Open feed valve with dump

11 22 open Circulation is thru #13 and dump line

12 15 Stop Mixing

4-22-59 EXP # 34 DWM CC

12 17 Start pumping solution into cylinder.

12 30 15.40 -1.18 in / 1 min
12 40 26.78 -1.138 in / 1 min

1 02 source out (large Po B source removed @ 39" height)

42.094	99.998	TEMP	Super crit
41.747	07.816	.99714	Approx level
41.711	08.555	.99705	" "

1 27 Dump Soln Rm Air Temp
 2 40 Start Mixing Soln in 16" slab by circulating
 Stop Mixing.

N.B. Resistance thermometer inserted in tank.

EXP # 35

2 44 Start adding solution, source in Response on all Inst (Large Po B source remove from room)

2 58 16.40

3 07 26.8

3 10 Stopped to fill Ted added to 11.76

3 13 start adding again

3 21 36.75

3 24 PM 40.2

3 30 42.053 Super Crit. Source Out

3 32 42.280 11.751 On Positive Period.

41.72 sub crit.

3 46 41.752 X .99957 near crit

3 58 41.922 X Critical

Dump solution

4-23-59 Setup for radial counter traverse
 17.27

with spacer 6.75 in long the counter
 was moved until it touched the spacer

∴ 6.75 in from wall = 39.36
 39.365

$$\begin{array}{r} 39.355 \\ 6.75 = 39.36'' \\ \hline \therefore \text{Wall} = 46.11'' \end{array}$$

Counter is mounted directly on rod drive!

Checked inst, IC-1 IC-2, PM-1, PM-2
 IC-3 and IC-4 respond OK.

4-23-59 EXP # 36, DWM c.c.

10³⁵ Start adding solution source in traps set

	Cyl	Tub addn	Temp	Rad drive	Enln N
36	6.19	25.308		44.06	
41	7.06	"		17.21	4 x 10 ⁻¹³
49	16.50				
59	22.22				

11¹³ 41.737 25.311

11¹⁵ source out Super exit ~~Approx level~~

11²⁴ 41.520 30.868 Approx level

Dump Soln to check Counter

Rohrer & Harner changed cable to moving counter.

Magnuson & Cross added 1 liter H₂O to 16" Tank

12³⁰ PM started mixing. 12²⁶ Stop circulating

4-23-59 EXP # 37 DWM c.c.

	Start feeding to cyl	Temp	Source Dr	Enln N (IC-4)
12 ²⁷				
32	Cyl Tub addn			
36	5.7 30.87		3 x 10 ⁻¹³	
	10.2		3 x 10 ⁻¹³	

1⁰⁵ Source out Approx level

41.923 30.872

1⁰⁸ Dump Soln to check Counter - Counter moved

~~|||||~~

4-23-59 Exp # 38 DWM c.c.

1⁴² Added 1 liter H₂O to 16" slab

Source in Inst Response IC-1, 2, 3, 4

1/2 level + A temp

2³¹ 42.184 10.584

Source out Slightly Pos

2³⁹ 42.497 3.010 Pos per

2⁵² 41.933 11.059 Slightly Neg

3¹⁹ 41.979 9.842 .99835 (Approx) level

4⁰⁵ 41.878 12.314 level

4²⁵ Dump Soln

4-24-59 Counter 39.14 } 39.08 = 6.75" from wall
 39.02 }
 39.08 }
 Counts = 45.83 + .13 = 45.96 at well

4-24-59

238-4 counter mounted as moving

counter $\left. \begin{matrix} 39.08 \\ 38.99 \\ 38.97 \end{matrix} \right\} 39.01 = 6.75 \text{ from well}$
 $39.01 + 6.75 + .13 = 45.89$

Counter center at well when counter reads 45.89

In preparation for high level run for 238 counter
 traverse 2 ion chambers were brought in
 and set behind counter in control room so that
 when the start up instrumentation saturates these
 chambers can be substituted. IC-4 chamber
 was moved (w/o parafin) to southwest corner
 of room.

EXP #39 DWDm C.C.

Mounted source IC-1, 2, 3, 4 and C-1 responded.

Start feeding solution to cylinder

Time	Cyl. Level	Tab	Temp	IC-3	IC-4
129	8.27	11.247		$< 10^{-13}$	2.6×10^{-13}
143	24.56				
154	33.74	11.251		1.6×10^{-13}	3.5×10^{-13}
156	39.38				
157 1/2	40.989	11.252		10^{-12}	10^{-12}
159	41.515				
160	41.767	Remove source		1×10^{-12}	3×10^{-12}

203 42.141 on positive period.

Started level @ 3×10^{-8} on IC-4 PM-2 = 24

Put IC-3 on chamber in control room
 Shut down because IC-2 not working

Ellis Harnes & Magnuson checked out C-2
 UHF
 no trouble found - possible connection
 was dirty, male prong was scraped clean by VGH.

IC-4 chamber moved to East wall behind
 barrel of H₂O. IC-3 chamber used in Run 112
 Counter position vs well has changed
 EXP #40

324 Start pumping solution.

Time	Cyl. Level	Tab Address	Temp	IC-3	IC-4	PM-1 (475V)
326	2. +	17.161				
349	29.25	17.162		3×10^{-12}	4.4×10^{-13}	0
350	36.02					
354 1/2	41.066	17.164		3.6×10^{-12}	9×10^{-13}	0
3	41.490					
	41.728	Remove source	.99566			
358	41.727	17.163	.99566	4.9×10^{-12}	1.8×10^{-12}	
401	42.131	17.164				On positive period
408	42.131	17.164				
413						Start to level drain using both feed valves.
418	41.532	27.552	.99564		1.7×10^{-8}	

IC-1 =
 PM-1 = 28 V = 475V

PM-2 = 10.5 V = 100 (1250)

C-3 = (47 x 16 + 3) 2 MIN

2610 = 4.5 mc @ window

423 41.505
 425 mg

Dump solution
 2610 readings out side
 Truck gate over 20 mph
 Personnel gate 15 mph

4-24-59

After shutdown, it was decided that the 238 counter on the moving probe was defective, and hence we moved the fixed 238 counter probe to the moving position and dangled a U-235 counter in the upper corner of the critical cylinder of solution - counter tip 38" off the bottom and approx 1" from the wall.

Cyl level	Started	EXP # 41	Dwgn C ²				475+ 1250T	
			Tad. Addn Temp	1	2	3	4	PM-1
21	7.12	25.131						
27	14.6		3.7 ^{x10⁻¹¹}	1.1x10 ⁻¹¹	.3	.060	0	0
33	21.3		3.4	.9	.3	.055	0	0
41	30.26		2.8	.7	.3	.032	0	0
46	35.89		2.6	.6	.3	.035	0	0
50	40.999 sgp	25.133	2.5	.55	.4	.1	0	0
53	41.512		2.7	.6	.5	.17	0	0
55	41.816		Rising 3.6	.9	.9	.4	0	0
55			Remove Source Continue to rise on period.					
57	41.820	25.133						
	41.996							
6 ⁰⁰	42.094							Pro period
			Changed chamber on IC-3 to control room ion chamber					
6 ⁰³	42.095	25.133	0.9x10 ⁻⁹	1.9x10 ⁻¹⁰	3x10 ⁻¹³	1.8x10 ⁻¹⁰	0	0

6" 1mm thru Concrete Wall IC-4 = 5×10^{-8}
 Beckman linear changed to ion chamber in control room.
 IC-2 Doesn't work. IC-7 has become noisy - probably saturated.

6²⁷ Start to level
 PM-2 = 83 PM-1 = 42
 41.491 (zero shifted 7.62)
 ln N = 7.5×10^{-8} on helipad

6²⁸ Start counting glass window
 zero PM-1 PM-2 2610 IC-3 IC-4
 6³⁴ 7.63 40 (4750) 84 19mm 7×10^{-12} 7×10^{-8}

6⁴⁵ level = 41.993 count @ 17.48
 7.63 37 (4750) 86 18.7 8×10^{-12} 8.5×10^{-8}
 7⁰⁰ 7.63 34 88 16.5 8×10^{-12} 6.5×10^{-8}
 level 41.984
 7¹² level = 41.470 Temp = .99648
 7¹³ 7.63 40 95 — 8.2×10^{-12} 6.7×10^{-8}
 7²⁵ level = 41.457
 7.63 40 97 — 7.8×10^{-12} 6.8×10^{-8}
 7³⁶ level = 41.489 Temp .99656 Count @ 10.00

7^{32 1/2} Drain solution

April 27, 1959

Circulated solution ~ 30' for mixing prior to sampling for radio chemical analyses following high level run.

Take sample # for S. A. Reynolds

8:15 AM

4-28-59 C.C. Added 3 liters H₂O to 16" slab

And started mixing. Stop mixing.

~ 10:00

Previous measurements of counter position U-238 trip = 6.75" from wall @ $\left. \begin{matrix} 37.63 \\ 37.645 \\ 37.68 \end{matrix} \right\} 37.68$

Previous mea of U-235 counter Cd covered

U-235 Cd = 6.75 @ $\left\{ \begin{matrix} 39.42 \\ 39.68 \\ 39.49 \end{matrix} \right\} 39.42$

Check of Lij. level zero 99.959 ~~99.950~~ moved relay to 10000

April 28, 19 EXP # 42 DWM RB CC

10:10 Start Pumping solution to cyl. some response. Cyl level A Cyl B

10:13 A spurious scram signal tripped the scram system, thought to be a blown fuse from operating main pump and second pump also - scram panel seems dead. Reset doesn't work. Rod and some spares, but nothing else.

note -> Fuse was Blown (Replaced by ERR)

10:31 start feeding Soln
lig level 1 + A temp
A B

11:08	40.452	40.452	99.991	
11:10	41.349	41.354	"	
11:11	41.613	41.616	"	
11:13	41.755	41.758	"	
11:14	41.875	41.875	"	
11:15	41.934	41.940	"	
11:16	41.995	41.998	"	
	Source out		"	super crit
11:17	42.051	42.051	"	pos Per
11:19	42.129	42.129	99.991	" "
11:36	41.603	41.617	lost indicator	Approx level

(see Next Page)

Exp #	42	Continued	DWM	CC
lig	level		+ A	temp
	A	B		
11 ⁴²	41.599	41.614	-	
11 ⁴⁴	41.661	41.671	-	Approx level
11 ⁵⁰	41.684	41.700	-	.99503
11 ⁵⁷	41.712	41.726	-	" "
12 ⁰⁵	41.713	41.731	-	" "
12 ¹⁴	41.683	41.708	-	.99507
1 ¹⁰	41.480	41.503	-	.99505
1 ²²	41.581	41.606	-	
1 ³⁵	41.692	41.708	-	.9951
1 ⁴⁵	Dump Soln			

Note → Previous Exp was for Cd Covered u/235 Counter traverse

zero on B liquid level is now 40.318

~ 3³⁰ pm Liquid level A removed and given to Fox, Gilley & Cronin.

4-29-59

Moved control rod to top of tank, Moved IC-4 chamber back to platform in orig paraffin lead shielded Residual liquid at 1.27 1.29 1.31 av 1.29

Bottom 0.99 0.99 0.99

In Center Residual liquid intake 0.30"

Have used a correction of 0.25" which is probably pretty good.

Lower limit switch set at 1.34"

When counter says 0.99 the counter center is 1.63" from bottom ∴ bottom @ -0.64 in

12¹⁴ Int Check OK, checked IC-3, IC-4 calib.

Axial Traverse #43. DWM C.C.

lig level B	Tad Addn	Counter Pos	
12 ¹⁹ Start Pumping, Source response OK, Scram set.			
29 40.313		27.44	
(lig. visible)		44.06	
44 (level at indicator) 12.35		44.06	
54 cell not showing multiplication			
54 ¹ 40.463	12.351	44.06	
56 41.260			
57 41.586			
58 41.587	Remove source	Still on pos period.	
102 41.906	12.351	44.06	On Pos Period
108 41.906	Start to level	→ 3 x 10 ⁻⁹	

(over)

4-29-59 Exp # 43 continued

	lig level	+ A	temp	Approx level
1 <u>15</u>	41.286	12.878	.99425	
1 <u>45</u>	41.292	12.876	.99427	neg
2 <u>20</u>	41.339	11.651	.99425	pos
2 <u>46</u>	41.298	12.895		level
2 <u>48</u>	Dump Soln			

3 15 Add 2 liters H₂O to 16" slab and start mixing by Recirculation
 4 20 stop mixing

4-29-59

Results from S.A. Reynolds on fission rate

$$\text{Ba} \rightarrow 1.39 \times 10^{10} \text{ f/ml}$$

$$\text{Mo} \rightarrow \frac{1.56 \times 10^{10}}{1.48 \times 10^{10}} \text{ f/ml}$$

Barney Beal
1.07×10^9 ϕ_{th}
3.78×10^6 ϕ_{det}
counted April 27, 59

$$\text{Total volume} = 2100 \text{ l}$$

$$= 3.11 \times 10^{16} \text{ fissions Total}$$

$$= 10^6 \text{ watt sec.}$$

$$4800 \text{ sec running time.}$$

$$\frac{10^6}{4800} = 208 \text{ watts power level}$$

1. Put Cd Cover on Moving counter
2. Moved IC-1 from under tank cylinder to below water window - no paraffin
3. Moved IC-4 behind water barrel no paraffin
4. IC-3 amplifier removed for repair.

EXP #44 DuM.C.C.

lig level (B)	Tad Alder	Temp	Rod
40.312	99994		
9:00 AM Start feeding solution into cylinder Shut down to remove control rod A cable.			
9:19 Start feeding again			
9:35 ~15 to 20" of solution in tank			
9:36 40.312	00.067	19.98	
9:47 ~35"	.067	19.98	No Mult.
9:54 40.50"	.067	19.98	Some Mult.
9:57 41.53	.067	19.95	
↓			
41.74			
↓			
10:00 42.003	.067	99448	19.98 Rising
10:00 Remove Source, nearly level apparent			
↓			
42.267			
↓			
10:04 42.412	.067	IC-4	19.98 Pos Period
10:08 42.411	.067	(2×10^{-10})	" "
IC-1	IC-2	IC-3	IC-4
$.225 \times 3 \times 10^{-9}$	$.523 \times 3 \times 10^{-9}$		1.7×10^{-9}
10:17 level @ 9×10^{-9} on IC-3			
10:22 Start counting traverse			
41.797	11.853	19.98	Computer level
10:23 41.710	13.940	10.00	Pos -
10:34 41.631	16.067	1.34	" +
10:39 41.631	16.151	2.00	"
Cont. Next Page			

lig level	+A	Temp	Counter Pos
10:44 41.632	15.939	.99465	4.00"
10:54 41.654	15.060		6.00 level
10:56 41.685	14.228		8.00 Pos
11:01 41.687	14.228		10.02 Neg
11:05 41.708	13.629		12.00 "
11:10 41.752	12.599		14.01 Pos
11:14 41.754	12.597	.99464	16.01 Neg
11:18 41.761	12.261		17.99 level
$\left. \begin{matrix} IC-2 & 8.25 \times 10^{-9} \\ IC-1 & 4.0 \times 10^{-9} \\ IC-4 & 8.7 \times 10^{-9} \end{matrix} \right\} PM-2 = 6$			
11:22 41.766	12.184		20.01 level
11:26 41.767	12.297		22.00 Pos
11:30 41.760	12.805		24.01 level
11:34 41.750	13.325		26.00 "
11:38 41.714	14.148		28.01 Pos
11:42 41.683	15.017		30.01 level
11:46 41.644	15.931	.99463	32.00 "
11:50 41.609	16.732		34.02 "
11:55 41.578	17.515		36.01 Neg
12:00 41.563	17.755		38.02 level
12:09 41.610	16.010		31.01 Neg
12:14 41.726	13.286		25.00 "
12:18 41.779	11.949	.99466	19.00 Pos
12:35 41.523	18.660	.99471	44.07 level
12:38 Dump Solution 40.316			

Preparation for 238 counter traverses axially

1. U-238 counter + bott. tomulus soap when selwyn reads 4.85
2. U-235 counter Cd Covered placed @ 21" height with approx 1" dist from wall
3. Moved IC-4 behind ~15" concrete near door.
4. Put IC-1 in lead paraffin pig under window.

	EXP # 45	U-238 Counter	
	Cyl level(B)	Tabladder Temp Rod	
225	Start feeding solution to system		
	40.315	18.664	
233	~ 8-10"	18.664	23.48
243	40.316		
2	~ 20"	18.665	27.48
	40.316		
251	~ 28"		
	40.316		
257	~ 35"	No Mult.	
300		Mult has begun to show on inst.	
300.15	Start down lig	level	
301	41.538	18.667	
	41.78		
	42.008	Remove source	
	42.311	Pos Period	
318	~ 1.5 x 10 ⁻⁸ on IC-4 drained some solution		
	42.213		

3 ²⁵ 6 1/2 level TA temp C-Pos in.
41.602 18.668 23.48" Level

IC-1 $3.5 \times 10 \times 10^{-8}$ IC-3 9×10^{-8} PM-2 = 36
IC-2 $7.4 \times 10 \times 10^{-8}$ IC-4 5.5×10^{-6} 2610 = 15mm

3 ³⁰ 41.606 18.332 19.50" Level

3 ³⁵ 41.610 18.337 .99544 15.51" Level

3 ⁴¹ 41.609 18.539 11.49 "

3 ⁴⁸ 41.607 18.650 8.74 "

3 ⁵⁴ 41.608 18.497 5.01 Pos

IC-1 = $3.22 \times 10 \times 10^{-8}$ IC-3 = 8.7×10^{-8} PM-2 = 42
IC-2 = $7.45 \times 10 \times 10^{-8}$ IC-4 = 5.4×10^{-6}

4 ⁰³ 41.597 18.942 7.03 12-59 level

4 ¹⁵ 41.602 18.323 13.01 Pos

4 ¹⁸ 41.603 18.322 21.50 Pos

4 ²⁴ 41.598 18.688 26.01 neg

4 ³⁰ 41.598 18.695 29.06 Level

4 ³⁴ 41.596 18.865 .99561 31.99 level

41.584 — 35.01 neg

4 ⁴⁸ 41.586 18.873 38.01 Pos

4 ⁵² 41.579 19.355 .99573 41.01 level

5 ⁰¹ 41.571 19.473 43.01 Neg

41.577 18.939 36.01 Level

5 ¹⁹ 41.589 18.484 31.06 Pos

5 ²³ 41.591 18.488 26.94 Pos

See Next Page

72

EXP # 45. CONT

4-30-59

5 ²⁵

IC-1 = 3.5×10^{-8}

IC-3 8×10^{-8}

PM-2 = 54

IC-2 = 7.95×10^{-8}

IC-4 6×10^{-8}

lig level + A temp c. Pas

5 ²⁸

41.588

18.743

.99582

29.01

Level

5 ³²

Dump Sol'n

41.319

8¹⁰ AM - 5-1-59

Rm 113 15-20 m/hr near sinks

IC-2 (Berlin) $0.5 \times 3 \times 10^{-11}$

IC-1 (Keithley) 5×10^{-13}

(In 2" lead 3" paraffin ^{wind} near)

IC-3 Berk 1×10^{-12}

(In 2" lead on platform)

IC-4 Berk 5×10^{-13} behind counter

5-1-59 Exp # 46 D.W.M. R.B. C.C.

Purpose - Period: Measurements

9⁴⁵ Inst checked OK9⁵³ source in Inst Response IC-2, 3, 4

lig level +A temp

18.730

9⁵⁹ start feeding soln into 5' cylinder10³³ 40.399 18.73010³⁷ source out Approx level

41.686 17.789

10⁴⁰ 41.844 13.979 Pos Per A11⁰² 41.296 27.717 level B11²⁹ 40.978 35.677 Neg Per C11⁴⁰ 41.606 19.867 Pos Per D12¹⁴ 41.298 "Boo Boo" .99480 level E12²⁰ 40.932 36.891 Neg Per F12³⁸ 41.603 19.836 Pos " G1²⁵ 41.297 27.884 .99484 level H1³⁰ 40.932 36.980 Neg Per I1⁵³ 41.608 19.648 Pos Per J2²⁶ 41.298 27.845 .99490 level K2³⁷ 40.931 36.910 Neg Per L2⁵⁷ 41.708 17.306 Pos Per M3¹⁶ 41.302 27.799 level N3²³ 40.929 37.061 .99490 Neg Per O3³⁵ Dump Solnh_c = 41.298

74

8:45 AM

5-4-59

EXP # 47

Inst checked OK PM-1 tripped At .68
lig level TA temp

40.309 Above Zero 00.949

9:02

source in Inst Response IC-1, 2, 3, 4

9:03

start feeding soln into 5' cylinder

9:41

40.530 10.066

9:45

Source out

Slightly Super Crit

9:47

41.749

10.017

Pos Per A

10:33

41.179

24.591

level B

10:50

40.745

35.154

Neg Per C

10:56

41.419

18.119

.99285

Pos Per D

11:39

41.161

24.687

level E

11:45

40.791

34.161

.99285

Neg Per F

12:20

41.390

18.954

Pos " G

12:39

41.170

24.660

level H

12:43

40.814

33.573

.99292

Neg Per I

1:12

41.436

17.846

Pos Per J

1:40

41.177

24.642

level K

1:45

40.780

34.478

.99304

Neg Per L

1:55

40.775

34.964

" "

2:02

41.334

20.316

Pos Per M

2:40

41.184

24.529

.99312

level N

2:45

40.797

34.051

Neg Per O

2:55

40 Dump soln

(41.17 away but down)

Note

Previous Exp was for Period Measurements

Samples #104, 105, 106, 107
removed from Tank. First
draining ~ 500 cc from tank
to flush port at valve 5.

EXP # 48

5-5-59

Suspended foils with center line at 19.5
bottom of holder to ϕ 2.125

at 21.625 inches reactor height was 4.1. ϕ .

#3 Cd Covered 1" below ϕ (Cd Cover #1)
#2 Bar 1" above ϕ

Inst Check OK, Check Calit. of IC-3 & 4

Run # 78, $\epsilon_N(\text{IC-4}) = 1 \times 10^{-9}$

Swm C.C.

10⁴⁵

Source in Inst Response IC-2, 4, 3
lig level +A

10⁴⁶ →

start feeding soln into 5' cylinder
lig level +A temp

11²³

40.678 34.632

11²⁷

Source out

Approx level

11³⁰

41.808 24.026 .99440

Pos Per

11^{36.5}

start timing foil Exposure

11⁴³

41.268 35.017

Approx level

11⁵⁰

41.275 34.657 .99435

Level

11^{56.5}

Dump Soln

76

5-5-59 Exp # 49
Purpose: Period Measurements

1:06 PM source in IC-3 responds
 1:07 start fuel addition
 lig level +A temp
 1:48 source out Pos Per A
 1:50 41.632 13.849 " " A
 2:13 41.237 17.912 .99515 Level B
 2:20 40.546 23.012 Neg Per C
 2:35 41.504 10.991 Pos Per D
 2:41 Selsyn on Tad Adder was found to be defective - shut down for repair
 Dump Soln

5-6-59 Exp # 50 77

Purpose: Period Measurements dwn RH cc

8:30 Inst checked OK
 8:50 source in Inst Response IC-2, 3, 4
 8:51 start feeding soln into 5' cylinder
 lig level +A temp
 9:28 40.532 03.232
 9:31 source out Super critical
 41.660 10.390 Pos Per A
 41.176 (11.792) level B
 Dump Soln - Selsyn still defective

5-6-59 Exp # 51 dwn cc RH

Purpose: Period Measurement
 1:23 source in Inst Response IC-2, 3, 4
 1:24 start feeding soln into 5' cylinder
 lig level +A temp
 2:04 source out Super Crit
 41.677 10.018 Pos Per A
 2:39 41.205 22.237 Level B
 2:45 40.790 32.564 .99533 Neg Per C
 3:10 41.539 13.514 Pos Per D
 3:36 41.204 22.315 Level E
 3:45 40.796 32.338 .99538 Neg Per F
 4:00 41.603 11.900 Pos Per G
 4:23 41.203 22.352 level H
 4:29 40.615 neg per
 4:41 40.607 36.844 neg per I

78

EXP # 50
51

5-6-59

4:50	41.553	(start	Pos	Period)	TEMP	0.99537
5:02	41.557			13.128	Pos.	J

|||||

5-8-59

10:04 IC-3 AND IC-4 Chambers ex Amplifiers changed by Mr. Harness

79

5-8-59 # 52
EXP

R.B. C.C.

Purpose: Period Measurements AND External Dose Measurements for Mr. Sanders AND Mr. Ogg. (X-10 HP Dept)

10:10
10:21
10:23

Inst checked OK
Source in Inst Response - IC-2, 3, 4
Start feeding soln into 5' cylinder
lig level + A temp

11:00
11:03

40.539	9.255			
Source out				Super Crit
41.616	9.254			Pos Per A
41.118	22.298	.99367		Level B
41.110	22.419			Level C
40.703	32.607	.99370		Neg Per D

12:10

Dump Soln for HP Boys to make inst change in Reactor Room.

12:39

Source in IC-3 respond

12:41

Pump soln into 5' cyl.

1:19

lig level + A temp

1:55

41.709	32.618			Pos Per E
41.139	47.432			level F
41.135	28.961			level G
40.637	41.398	.99452		Neg Per H

2:20

2:28

2:35

Drained Approx 12' Soln out of 5' cylinder to make inst change

cont Next Page

80

5-8-59 Exp # 52 cont

2⁴⁰

Source in
Start feeding soln into 5' cylinder
Source out super crit

3⁰¹

lig level +A temp
41.746 8.132 .99462 Pos Per I

3³⁸

41.149 23.310 Level G

3⁴³

40.632 35.777 Neg Per K

4⁰⁶

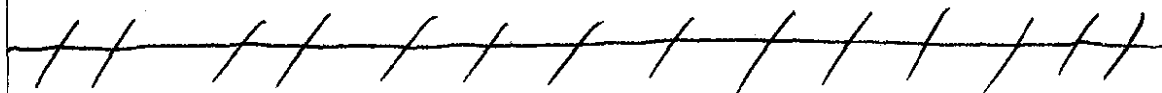
41.650 10.390 Pos Per L

4²²

41.137 23.396 .99462 level M

4²³

Dump soln



5-11-59 Exp # 53 D.W.M. R.A. C.C.

Purpose: External Dose Measurements for
Mr. Saunders and Mr. Ogg (X-10HP Dept)
Inst checked OK

9⁰⁵

Source in Inst Response IC-2,3,4

9⁰⁸

lig level +A temp
Start feeding soln into 5' cylinder

9¹⁰

40.562 2.788 Super Crit

9⁴⁵

Source out

9⁴⁹

41.551 10.114 Pos Per

9⁵¹

41.633 10.124 Pos Per

10¹⁰

41.010 23.854 .99253 level

10²³

Dump soln to Re-locate Insts

5-11-59

Exp # 54

81

Purpose: cont External Dose Measurements
DWM RA CC

11²⁰

Source in Inst Response - IC-2,3,4,

11²¹

Start feeding soln into 5' cylinder

11⁵⁸

lig level +A temp

Source out

41.637 22.032 .99343 Pos Per

12¹²

41.048 36.739 Approx level

12³⁰

41.041 36.783 Level

12³⁵

Dumped soln Down^{to} About 30" to make
Inst Change

5-9-59 Exp # 55

Purpose - cont External Dose Measurement

12⁵⁹

Source in

1⁰⁰

Start feeding soln into 5' cylinder

1¹¹

Source out super crit

lig level +A temp

41.643 20.083 Pos Per

1²⁶

41.052 35.184 Approx level

1³⁹

41.049 35.194 .99377 level

1⁴⁵

Dump soln Down to Approx 30" ht to make
Inst Change

5-11-59 Exp # 56
Purpose - Cont External Dose Measurements

2¹² Source in
start feeding soln into 5' cylinder
lig level + A temp

2²⁵ Source out Super crit

2 ⁴⁶	41.666	20.715	.99384	Pos Per
3 ⁰³	41.058	35.524		Level
3 ³³	41.060	35.734		Level A
3 ⁵²	40.582	47.055	~1	Neg Per B
	41.050	35.704		Level D
4 ⁰⁶	40.586	46.993		Neg Per E
4 ²⁰	41.716	18.795		Pos Per F
4 ²⁶	Dump soln			



5-14-59

9¹⁵ Add 2 liters H₂O to 16" slab tank
And start Pump for mixing

10¹⁵ stop mixing

11¹⁷ AM start Pump cont mixing

12⁵⁰ PM stop mixing

5-14-59 Exp # 57 D.W.M. c.c.

IC-3 and IC-4 both have been repaired
also a calib. check was made with current
generator. Inst check OK Source in
cylinder TAD Temp IC-4
start feeding solution

12 ⁵⁷	40.318	0002500		temp
1 ³⁵	Source out			sti Super crit
	41.793	00.025		
1 ⁴⁴	41.531	7.094		Approx level
1 ⁴⁷	42.027	7.093		Pos Per A
1 ⁵⁵	42.036	7.094		" " "
	Calibration Check on IC-3 AND 4			OK
2 ²⁸	41.485	20.878	.99605	Approx level
3 ⁰⁷	41.484	20.821		level B
	40.949	33.970		Neg Per C
3 ³⁷	41.952	8.988		Pos Neg Per D

Check Calib of IC-3 OK
IC-4 (blue) slightly off ~ .92 x 10⁻⁸ - .95 x 10⁻⁸
or 1% per decade.

IC-4 Calibration re adjusted to read correct on chart

3 ⁵¹	41.485	20.890	.99623	Approx level E
4 ¹⁰	41.182	28.348		Neg Per F
4 ²⁷	41.728	14.384		Pos Per G
4 ³³	41.732	14.389	.99623	" "
4 ⁴⁰	41.485	20.857		Level H
4 ⁴⁴	41.485	20.858		" "

Cont Next Page

5-14-59 EXP # 57 cont

	lig level	TA	temp	
4 ⁵⁹	41.039	31.869		Neg Per I
5 ⁰⁹	41.966	8.599		Pos Per J
	IC-3	Calib	OK	
	IC-4	Calib	1.6 x 10 ⁻⁸ → .98 x 10 ⁻⁸ ~.7% / decade.	
	Result	IC-4	on Calib.	
5 ²⁴	41.487	20.868	.99624	Level K
5 ³⁸	40.945	34.134		Neg Per L
5 ⁵²	41.855	11.382	.99626	Pos Per M
5 ⁵⁴	Dump	Soln		

9³⁸
9³⁹
10¹⁶
10²⁰
10²²
10³²

11³⁷
11⁴¹
11⁵¹
12¹³

12³²
12⁵⁰

1²⁰
1³⁷
1⁵²

EXP # 58 5-15-59

Inst Check OK D.W.M. C.C.

Source in Inst Response IC-2, 3, 4

lig level TA temp

Start feeding Soln into 5' cylinder

41.535 4.862

Source out

super crit Pas

41.654 4.862

41.485 7.989

41.428 7.983

.9949

Delayed Due to High Power level in RM # 108

41.404 8.732

level

41.400 8.731

Level

41.895 8.725

Pos Per A

41.406 21.176

Level B

IC-3 AND 4 Calibration checked AND Adjusted

By E.R.R.

.99500

40.969 31.962

Neg Per C

41.812 10.816

Pos Per D

IC-3 & IC-4 Calib. OK

41.401 21.246

.99505

Level E

40.939 32.681

Neg Per F

41.784 11.543

Pos Per G

IC-3 Calib off 4% in 3 decades
.95 x 10⁻⁸ - .99 x 10⁻⁸

Result on Calib

IC-4 Calib OK.

Cont Next Page

	lig level	TA	temp	
258	41.405	21.179	.99513	Level H
313	41.105	28.662		Neq Per I
325	41.691	13.722		Pos Per J
	IC-4 Cal	OK	- IC-3 Cal	OK
348	41.407	21.164		Level K
402	41.167	27.131		Neq Per L
404	Dump	Soln		

<10 pp.

5-18-59 Dawn, C.C. 89

Dilution of solutions to make cylinder critical when full.

Added ~ 475 l H₂O to 6" slab tank
 ~ 110 l ^{1/2 barrel} to 16" slab tank

~ 11²⁰ Start transferring U from #5 ^{4.366 kg} ^{~ 200g from exp #16}
 CRM C₁ x16 Becklin Keith

11²⁰ 1.7 x 10³ 4' 695 +3

11²⁵ 1.7 x 10³ 4' 685 +13

11⁴⁰ 3.3 x 10³ 4' 1141

11⁴² Stop adding and mix in 6" slab.

11⁵³ 2.0 x 10³ 4' 193 x64 + 20

12⁵² 1.8 x 10³ 2.65 x 10⁻¹² 4.7 x 10⁻¹²

1²⁷ 1.7 x 10³ 4' 215 x64 + 49 2.75 5.0

1³⁵ #5 bottle empty ~ 4.366 + 200g = 4.57kg in 6" slab

Move source to slab tank ~ 48" hi in 4.75 l

1⁴⁰ C₂ 4 x 10³ C₁ ^{x64} C₂ ^{x64} C₃ ^{x64} Beck Keith
 4' 549 517 ~ 52 3.1 x 10⁻¹² 8.2 x 10⁻¹²

1⁴⁵ Start main circ pump. Start transfer solution from small slab to large slab thru valve 10 and dump line.

CRM	C ₁	C ₂	C ₃	Beck	Keith
48 C ₂ 5 x 10 ³	4' 539	506	52	3.0 x 10 ⁻¹²	2.8 x 10 ⁻¹²
53 C ₂ 4 x 10 ³	527	459	44	1.9	4.9
59 C ₁ 4.5 x 10 ³	523	256	37	1.7	3.9
64 C ₁ 4.5 x 10 ³	520	204	38	1.65	3.7
04/2 Pump lost prime ∴ transfer complete. MP TAD add	522	193	37		

5-18-59

2²⁵ Continue mixing with main circ pump in 16" slab.

3⁰⁰ C₁ 7.8 x 10³

Counting rate was high because of high level run in 108. After shut down

3⁰⁵ C₁ 4.5 x 10³ 522 197 35

4²³ C₁ 4.3 x 10³

4²⁵ Stop Circulation thru 16" Slab Tank

4⁴⁵ Filled 6" Tank to 62" = 500L (2 1/3 Barrels)

5-19-59

8⁰⁸ Start Circulation - drain some from 6" slab (too full). Move source to 6" Slab (N.B. too much)

Add bottle #2 4.52 kg 16 6" slab

CRM	C ₁ x6V	C ₂ x6V	C ₃ x6V	Keith IC-1	Beck IC-2
-----	--------------------	--------------------	--------------------	------------	-----------

8³⁰ C₂ 3.3 x 10³ 5' 4.0 x 10⁻¹² 2.2 x 10⁻¹²
6.0 x 10⁻¹² 2.6

Just started increasing, water was removed from 6" slab to below source. Add 2/3 barrel of H₂O

9⁰² Start #2 bottle into 6" slab 3.8 2.1

9⁰⁸ C₂ 3.0 x 10³ 5' 202 357 48 3.9 2.2

9³¹ C₂ 3.5 x 10³ 5' 234 404 56 4.2 2.4

9⁴⁵ C₂ 3.6 x 10³ 5' 234 439 59 4.4 2.5

9⁵⁵ C₂ 3.8 x 10³ 5' 252 464 63 4.7 2.6

10¹⁴ Bottle #2 empty

10²⁰ C₂ 4.5 x 10³ 5' 277 528 71 5.2 3.0

2 1/3 barrels = 500 L 1/3 barrel = 140 L

Total added = 640 L

475
110
1225 L added

4.52
4.57
9.09 kg → 9.09 / 1225 = 7.42 g/L

10²⁰ Move Source to 16" Slab

10²² Start removing filling 16" slab from 6" slab.

CRM	C ₁ x6V	C ₂ x6V	C ₃ x6V	Keith	Beck
10 ²⁸	C ₁ 5.5 x 10 ³	668	213	41	3.4 x 10 ⁻¹² 1.5 x 10 ⁻¹²
10 ³⁴	C ₁ 5.0 x 10 ³	668	201	40	
39		662	198	39	

41 Solution transfer complete.

Add 2 barrels H₂O to 6" Slab Tank. 54" = 420 L

12⁰⁷ PM Start #6 3.938 kg into 6" slab tank.

12¹² C₂ 3.3 x 10³ 208 362 51 4.0 x 10⁻¹² 2.25 x 10⁻¹²

12²⁵ 219 380 57 4.1 2.3

12⁴³ C₂ 3.8 x 10³ 223 409 57 4.3 2.4

12⁵⁶ C₂ 4.0 x 10³ 252 439 60 4.5 2.5

1⁰⁹ C₂ 4.0 x 10³ 276 484 67 4.7 2.65

1¹² #6 empty

1¹⁸ Start transferring to 16" slab, Move source to 16" slab

12⁰ O₁ East end on a power surge - line on

incl response may be abnormal. 3.2 1.35

13⁹ C₁ 5 x 10³ 631 185 38 3.2 1.35

13⁷ Pump off lost prim

EXP #59 DuAm ~~to~~ R.G.

Pump to Cyl to check Total Volume -

1 46 PM

Start solution into cyl. with Org source (P.O.B) at midplane.

	CRM #2	IC-1	IC-2	Cyl level
146	1.5×10^4	5.8×10^{-12}	3.0×10^{-12}	
155	0.5×10^4	4.4	2.3	~14"
204	0.3×10^4	3.75	2.05	~24"
220	.27	3.5	2.05	~40.8" <i>alarm started</i>
230	.22	3.2	1.8	51.92
240	.19	2.9	1.7	63.42
247				71.38
53	.19	2.8	1.4	78.13

53 1/2

Slab Tank empty 78.777

No Multiplication at all.

54

Drain thru dump valve

307
413

Start Circ in 16" slab Tank 79" + 12" = 91"
Stop circ in 16" slab
12" = 573 l needed.

Added 2 barrels of #20 ~ 420 Q
Move source to 6" Slab tank

359

Start adding uranium from #15 3.336 kg O

C₂ 3.0×10^3 3.9×10^{12} 2.15

424

4.0×10^3 Stop ~ 1/2 MT on #15.

Continue mixing in 6" slab tank

428

Stop " " " "

5-20-59

8⁰⁸ am Start circ. in 6" slab tank.
 8¹⁵ Start solution into 6" slab tank
 #2 CRM IC-1 IC-2
 8¹⁵ 3.5 x 10³ 4.5 x 10⁻¹² 2.4 x 10⁻¹¹
 8²¹ 3.5 4.6 2.5
 26 3.8 4.8 2.6
 29 Bottle #15 MT
 Continue Mixing in 6" slab
 8⁴³ Start Bottle #9 3.657 kg
 44 4.0 5.1 2.75
 53 4.0+ 5.2 2.85
 9⁰⁴ 4.5 5.3 2.95
 9¹⁵ 5.0 5.5 3.05
 22 5.0 5.5 3.05 #9 1/2 MT
 35 5.0 5.6+ 3.15 → #9 Power in 108 between these readings.
 46 5.0 5.9 3.3
 10⁰⁶ 5.0 5.65 3.15
 20 5.0 5.9 3.35
 10⁴⁶ Bottle #9 Nearly MT (Crud out used)
 4.5 6.4 3.5
 Continue Mixing in 6" slab
 10⁵⁷ Move some to 16" slab tank
 10⁵⁸ Stop circulation in 6" slab
 10⁵⁹ Start transfer of solution to 16" slab
 11⁰² C₁ 4.0 x 10³ 3.0 x 10⁻¹² 1.3 x 10⁻¹²
 11⁰⁴ C₁ 4.0 x 10³ 3.0 1.3 x 10⁻¹²
 11⁰⁷ Stop transfer
 11¹⁵ open feed valve to mix thru dump also
 11¹⁸ C₁ 4.5 x 10³ 3.15 1.3 x 10⁻¹²
 11²¹ Start remainder of transfer from 6" to 16"
 11³⁰ Stop Pump - lost prime.
 Continue mixing 16" slab tank
 11³⁷ open feed valve, dump open to empty drain line of enticed soup.

CRM	IC-1	IC-2	Level	Tad Adu	Temp																									
12 ⁴⁷	close feed valve	continue mixing	in 16" slab.																											
12 ⁴⁹	C ₁ 5.1 x 10 ³	3.2 x 10 ⁻¹²	1.3 x 10 ⁻¹²																											
12 ⁵⁰	Stop circulation close	check dust	OK	(Mixed over 1 hr)																										
12 ⁵⁴	Start pumping into cylinder, move source to ~ mid plane of assembly																													
12 ⁵⁷	#C ₂ 1.5 x 10 ⁴	5.9 x 10 ⁻¹²	3.0 x 10 ⁻¹²	3m 40.322	00.018																									
1 ⁰⁵	4.5 x 10 ³	4.4 x 10 ⁻¹²	2.2	"	"																									
<table border="1"> <tr> <td>Total H₂O</td> <td>4th 420</td> <td>total U</td> <td>6.993</td> <td>#9 + 16"</td> </tr> <tr> <td></td> <td>3rd 420</td> <td></td> <td>3.938</td> <td>#6</td> </tr> <tr> <td></td> <td>2nd 640</td> <td></td> <td>4.52</td> <td>#2</td> </tr> <tr> <td></td> <td>1st 585</td> <td></td> <td>4.57</td> <td>#5</td> </tr> <tr> <td></td> <td>20652</td> <td></td> <td>20.02</td> <td>kg U</td> </tr> </table>						Total H ₂ O	4 th 420	total U	6.993	#9 + 16"		3 rd 420		3.938	#6		2 nd 640		4.52	#2		1 st 585		4.57	#5		20652		20.02	kg U
Total H ₂ O	4 th 420	total U	6.993	#9 + 16"																										
	3 rd 420		3.938	#6																										
	2 nd 640		4.52	#2																										
	1 st 585		4.57	#5																										
	20652		20.02	kg U																										
1 ¹⁷	C ₂ 2.7 x 10 ³	3.7 x 10 ⁻¹²	2.0 x 10 ⁻¹²	(~2 nd Ring out)																										
1 ³⁰	2.8	3.9	2.2	4/20 00.021																										
	(4 th power in 108 causing increase)																													
1 ³⁸	2.5	3.5	2.1																											
1 ⁴⁵	2.2	3.2	1.8	58.80																										
2 ¹⁰	2.0 x 10 ³	2.6	1.55	87.485	(No Mu/P)																									

Drain into Tad Adu + 6" slab to ~ 45"
 Move some to 6" slab tank
 2⁵² Start adding U from #14 (3.478 Total) to 6" slab
 2⁵³ C₂ 5 x 10³ 5.6 3.2 x 10⁻¹²
 3⁰⁴ C₂ 5 x 10³ 5.8 3.35
 3¹⁴ 5 x 10³ 6.0 3.4
 3²³ 6 6.3 3.65
 3⁴³ #14 2/3 MT
 add ~ 2.5 kg
 Continue circ in 6" slab
 3²⁷ Start circ in 16" slab

5-20-59

DuSh. C.C.

CRM IC-1 IC-2

3⁴⁶

Moved source to 16" slab

47⁰²

$\sim 1.4 \times 10^3$ 3.35 1.55×10^{12}

3⁵⁸

~ 2.3 4.0 1.95 (108 Hi Power)

4⁰⁰

Start Transferring solution to 16" slab tank

4⁰⁴

$\sim 1.3 \times 10^3$ 3.2 1.45

4¹⁷

~~1.3×10^3~~ 3.2 1.35

4¹⁸

Solution transfer complete to 16" slab.

4¹⁹

Stop Circ on 16" slab.

4¹⁹

Start feeding solution to cyl and circulating thru dump valve

4²¹

C_1 CRM = 5×10^3 NB

4²⁹

Stop feeding solution to cyl and drain line

4³⁰

Start circulation in 16" slab tank thru #14 valve

5³⁰

Stop Circ.

5-21-59

Check Inst OK, Move large source to cyl mid plane.

5-21-59

EXR #60

DuSh. C.C.

CRM C_2 IC-1 IC-2 level rad

40.315 00.001

8⁵²

Start filling cylinder

5³

10⁴ 6.0×10^{12} 3.0×10^{12} 40.315 00.001

9⁰²

4×10^3 4.4 2.15 #14"

9¹²

7×10^3 4.7 2.5 Hi Power 108

9²⁵

2.2 3.45 1.8 ~

26

#1.55

9⁴⁴

3.2 3.17 63.8

9⁵⁹

2.3 3.0 1.6 #79.67 00.04

10⁰⁹

2.3×10^3 2.9 1.55 87.718

Dump solution No Multiplication

Move source to 6" slab -

Fill 6" slab with solution

10⁴³

Start circulation in 16" slab

11⁰⁰

Start transfer solution from #14 bottle to 6" slab

~11⁴⁰

#14 empty (~1 kg U)

11⁴⁵

start Bottle * (from west end manifold)

5.5×10^3 2.2×10^{12} 3.5×10^{12}

11⁵⁸

5.5 2.2 3.55

12²⁵

5.5 2.2 3.65

1³⁰

^{#524} 1/2 of Bottle (from W END manifold) Added to 6" slab

start full circulation in 6" slab

1⁴⁵

stop Pump on 6" slab

1⁵⁰

start Circ in 6" slab

cont Next Page

5-21-59

C.S. #8

2⁴⁵
2⁵⁵

start Pumping from 6" slab to 16" slab
stopped transferring soln and cont to mix
in 16" slab

3⁰²
3¹⁴

start Pumping soln from 6" slab to 16" slab
soln transfer complete pump lost prime
cont mixing in 16" slab

3³⁰
3⁴⁰
4²⁵

Mixing thru feed line only

3⁴¹
4²⁵

Start Mixing 16" slab 13 #14 open
stop " " " closed.

5-22-59

EXP # 62 DWM C.C

CRMC₂ | IC-1 | IC-2 | Cyl | TA-

	CRMC ₂	IC-1	IC-2	Cyl	TA-
8 ²¹	Start Feeding solution into space ^{effluent} Check				
	Inst, move source to midplane of cylinder.				
22	10 ⁴	5.7 x 10 ⁻¹²	2.7 x 10 ⁻¹²	40.314	00.380
28	5 x 10 ³	4.9	2.3		
43	3 x 10 ³	3.8	2.0	40.314	
54	2 x 10 ³	3.4	1.8	40.8	
9 ⁰³	3.0 x 10 ³	3.8	2.0	52.1	H ₁ Power 108
9 ¹²	3.5 x 10 ³	3.9	2.2	61.8	
9 ²⁴		3.5	1.8	75.7	
9 ³⁰	3.0	3.4	1.75	81.7	
9 ³⁵	3.0	3.2	1.8	87.901	Slab Tank MT

No Multiplication

Drain solution thru during to Slab tank

10 ¹⁷	Start Circulation in 16" slab Move source				
10 ²⁰	Start adding uranium to 6" slab 1/2 bottle #524				
10 ³⁰	2.5 x 10 ³	6.3	3.5		
11 ⁰⁰	C ₂ 5 x 10 ³	6.5	3.7		
11 ⁰³	#524 MT.				
11 ¹⁰	Start #504 Transfer only 1/4 bottle.				
11 ¹³	C ₂ 5 x 10 ³	6.7	3.8		
11 ³³	C ₂ 5 x 10 ³	7.0	4.0	Stop on #504 @ 3/4 mark.	
	Continue mixing 6" slab				
11 ⁴⁹	Move source to 16" slab Close #2 open feed				
11 ⁵⁰	C ₁ 5 x 10 ³	4.0	1.7		
11 ⁵⁹	C ₁ 5 x 10 ³	3.9	1.65	stop transfer	

5-22-59

	CRM	IC-1	IC-2	T.A.	Temp	Cyl level
12 ⁰⁵						
	Start transfer again					
12 ¹⁰	C ₁ 5x10 ³	3.9x10 ⁻¹²	1.6x10 ⁻¹²	00.064	6" tank not empty	
	Close 12 continue transfer.					
12 ¹⁶	6" slot empty					Transfer complete.
12 ¹⁶	C ₁ 5x10 ³	4.15	1.6x10 ⁻¹²			
12 ¹⁷	Continue mixing in 16" slot					
12 ⁰⁰	C ₁ 5.5x10 ³	4.2	1.65x10 ⁻¹²			
48		4.3	1.65			
49	Mix thru feed valve and dump line for 5'					
54	open #14 closed, continue mixing.					
1 ¹⁷	Stop circ. Start pump into cyl.					

Exp # 63 DuDu c.c.

	CRM	IC-1	IC-2	T.A.	Temp	Cyl level
1 ¹⁸	Start pumping of more power to mid plane of cyl.					
1 ²⁰	C ₂ 10 ⁴	6.0	3.0			
1 ³⁶	5x10 ³	4.5	2.15	00.063		40.323
1 ⁴¹	"	4.2	2.05	.063		
50	4x10 ³	3.9	1.9	.063		40.323
52		3.8	1.9			40.97
	<u>Mult</u>					
1 ⁵⁸	8x10 ³	5.0	2.2			47.6
2 ⁰²	1.2x10 ⁴	.2x3x10 ⁻¹²	2.5	.99881		53.
2 ⁰⁵	2x10 ⁴	.2x7x3x10 ⁻¹¹	3.0			
2 ⁰⁶	Stop feeding. Hd. Power 108 shows on Inst. 58.00					
2 ¹¹	Start feeding					
2 ¹²		3.5x3x10 ⁻¹¹	3.7			59.25
16	4x10 ⁴	.45x3x10 ⁻¹¹	4.6x10 ⁻¹²			64.0
21	9x10 ⁴	2.7x10 ⁻¹¹	.28x3x10 ⁻¹¹			69.8"
24	Stop adding solution					
25						73.132

EXP # 63 (Cont) DuDu c.c.

Inst still rising indicating that this level is critical or super critical. Rise on IC-1 and IC-2 more than linear indicating super critical.

	IC-1	IC-2	Temp	Cyl level
3 ³⁴	3.3x10 ⁻¹²	.36x3x10 ⁻¹⁰	.99992	73.136

Start to level.

2⁴¹ Approx level 72.19³
 Drain solution and continue mixing
 Move source drive - and remove large source from room 113.

EXP # 64 DuDu c.c.

	IC-1	IC-2	CRM #2	Level	Temp
3 ⁰⁵	Start Solution into cyl. Inst source				
07	2.8x10 ⁻¹²	.30x3.0x10 ⁻¹²	3.5x10 ²		
16	2.7x10 ⁻¹²	.28x3x10 ⁻¹²	2.0x10 ²	40.324	
21	2.6	.26			
25	2.6	.29	5.0x10 ²	40.324	
40	2.0	.205	2.8x10 ²	44	
46	2.0	.19	7.0x10 ²	51.4	
	Counter showing multiplication!				
51	2.0	.19	1. x10 ³	56.7	
56	2.05	.20	7. x10 ³	62.4	
4 ⁰⁰	2.35	.22	3.5x10 ³	66.85	
05	4	.42	1.2x10 ⁴	72.58	
4 ⁰⁶	Remove source stop adding. On pos. period 74.20				

IC-1 IC-2 lig cyl
 4" Add more solution
 4²² Rising in Pos Period 75.018
 72.444 1.00039 Approx level
 C₁ for Period data
 start 100 mi
 stop 200 86 x 256 + 121 } graph
 start 230 yielded
 stop 330 160 x 256 + 168 } 146 sec
 4.65 x 10⁻⁴

4²⁸ 4 x 10⁻¹⁰ .42 x 3 x 10⁻¹⁰ 72.442 level critical
 4²⁹ Drain Solution
 $\Delta h = 2.574''$
 $\Delta g = 4.65 \times 10^{-4}$
 $\frac{\Delta g}{\Delta h} = 1.807 \times 10^{-4}$

9¹⁵ 5-25-59
 Added 15 L H₂O (while mixing) to 16" slab
 Cont Mixing After Addition

12⁵⁰ Installed miniature fission counters at midplane (75")
 one on center axis C₁, the other 15 1/2" from
 outer edge ~ 1/2 way from center to edge. C₂

5-25-59 Exp # 65⁻ D.W.M. C.C.

Purpose: to Determine Crit Ht & Check Counters
 Inst checked OK C₁, C₂ Fission C₃ - BF₃

2²⁴ source in Inst Response IC-1, 2, 3, 4
 2²⁵ IC-3 AND 4 Are Not Calib Properly
 start feeding soln into 5' cylinder
 lig level + A temp
 2⁵⁸ 40.70 00.063 No Mul/p
 3³⁷ source out Super Crit
 80.753 00.063
 3³⁵ 81.087 00.063 Pos Per
 3⁵³ 78.084 00.063 .99676 Approx level
 4⁰⁶ 78.072 00.065 .99678 level
 4²² Dump Soln

Counter on C₁ not functioning properly.
 at enough gain.

5-26-59
 8³⁰ Start circ and adding 15 L H₂O.
 previous 15L changed h_c from 72.444 → 78.084
 or 5.64"

(Vic is giving the three counting channels a check out.)


Instrument changes

Po B source on IC-3 with normal chamber 1.25×10^{-10}
with enriched chamber 3.4×10^{-10}

source dist ~5.0"

Po B source IC-4 with enriched chamber 5" ~ 3.3×10^{-10}

IC-3 with enriched chamber now on floor near top hat with add 4" of lead
IC-4 with normal chamber in orig position now has 4" lead additional.

4²⁰ Stop Mixing (turn off Pump)


8^{47 AM}

5-27-59
Start Mixing in 16" slab tank

4¹⁵

Stop Mixing (turn off Pump)

5-28-59 EXP # 66

Purpose - Check Crit HT

DWM CC

11⁵⁵

Inst checked OK

11⁰⁹

source in Inst Response IC-1, 2, 3, 4

11¹⁰

start Pumping soln into 5' cylinder

lig level + A temp

11⁴⁴

41.125 00.063

12²⁵

88.630 00.063 (out off soln)

12²⁴

source out

Approx level

12³⁴

source in to increase Power level

12⁴²

source out

super crit

12⁵⁵

Dump soln



2¹⁵

5-28-59
Mix 1 liter con. soln with Approx 14 liters H₂O And Add slowly to 16" slab while Mixing

4²⁵

Put Big source on 16" slab tank
stop Mixing (turn off Pump)
Remove Big source from RM

8²³

6-1-59
start Mixing in 16" slab

10²⁵

stop Mixing in 16" slab

106

6-1-59 Exp # 67

Purpose - to check Crit Ht
and make $\frac{d\theta}{dt}$ meas.

DWM RY CE

10 ²⁵

Inst checked OK

10 ³¹

Source in Inst Response IC-1, 2, 3, 4

10 ³²

start feeding soln into 5' cylinder

lig level + A temp

11 ⁴⁵

source out -

Super Crit

83.398 -

Pos Per

12 ⁰⁵

80.085 -

Approx level

12 ³⁰

79.982 -

0.99375

level

1 ¹⁵

79.977 -

0.99375

level A

1 ²⁰

78.017 -

Neg Per B

1 ⁴⁵

83.262 -

Pos Per C

2 ¹⁰IC-1 = 2.8×10^{-8} IC-3 = 1.2×10^{-8}

PM-2 = 6.5

IC-2 = 3.4×10^{-8} IC-4 = 1×10^{-8}

80.043 + -

level \pm 2 ²⁵

80.011 -

level D

2 ³⁰

78.412 -

~~Neg Per E~~2 ⁴⁹

78.407 -

Neg Per E

3 ³⁰

82.531 ? -

Pos Per F

3 ⁴⁰IC-1 = 3.6×10^{-8} IC-3 = 1.8×10^{-8} PM-2 = ~~8~~ 9.9IC-2 = 4.7×10^{-8} IC-4 = 1.4×10^{-8} 3 ⁴⁶

80.032 -

level H

4 ¹⁷

78.190

.99394

Neg Per H

Dump soln

6' Counter U-235 #4 seems to be defective!

C₁ now has U-235 counter ~18" off center at mid plane - C₂ has U-233 counter on axis at mid plane, and is fixed or held by control rod drive. Counters checked with source!

6-2-59 #68 Down C.C.

Purpose: to make more $\frac{dP}{dt}$ meas.

Source In, Just checked

10¹⁷ start feeding solution

Cyl Level	Temp	IC-1	-2	-3	-4	PM-1	2
18	40.320	4.5×10^{-12}	1.5×10^{-12}	2×10^{-13}	1×10^{-13}	5	0

(Solution still has higher than background activity from yesterday's run.)

10 51 41.1 1.5 1.3 3×10^{-13} 2×10^{-13} 2 0

11 02 54.07

11 ¹³ 66.148 ,99400

11 ³⁴ Source out

84.165

Super crit
Pos Per

12 ²⁷ 42

Level for H.P. exp. ^(see 2) $9.0 \text{ to } 9.2 \times 10^{-10}$

9.9 12 ²⁰ 79.944 .99426 Approx level

12 ⁴⁶ 79.942 Level A

1 ⁰² 78.505 Neg Per B

Calibration of IC-3 & 4 OK

2 ¹⁵ 81.484 .99425 Pos Per C

(over) →

6-2-59 Exp # 68 cont

lig level \pm MP IC-1, IC-2, IC-3, IC-4 5000 PM
PM-1 - 2
 3.7×10^{-8} 3.8×10^{-9} 4.8×10^{-9} 3.8×10^{-9} #2

2⁴⁸ 79.947 .99441 Level D
3²⁰ 78.451 Neg Per E
3²⁵ Calibration Check OK (IC-3 diode has shifted. 0.0)
3³⁰ start adding solution to ~82.0"
3³³ Stop adding solution Pos Per F
3⁵⁸ 82.026 .99428 " "
4²⁵ 78.020 .99429 Neg Per G
4²⁷ Dump Soln
4³² (40.323)



6-3-59 Exp # 69

Purpose: Measure $\frac{\partial P}{\partial h}$ + H.P. meas. DWM CC

8⁵⁵ Inst checked OK
8⁵⁸ source in inst Response IC-1, 2, 3, 4
8⁵⁹ start feeding soln into 5' cylinder
lig level temp IC 1 - 2 - 3 - 4 PM2
40.827
9³⁴ 42.575
10¹⁰ source out Super crit
84.055 Pos Per
10²⁰ start to level
26 approx level @ 9.05×10^{-10} on IC-2 79.900
30 79.828 2.7×10^{-9} 9.1×10^{-10} 1.1×10^{-9}
36 79.800 .99380

Exp #69 (Cont) 6-3-59 DWM C. C.

Lig level Temp IC-2
10^{43 AM} 79.816 9.05×10^{-10} Level
11⁰³ 79.785 Level A
11³⁵ 78.482 Neg Per B
12¹⁷ 81.735 Pos Per C
12⁴⁵ 79.777 Level D
1¹⁷ 77.708 Neg E
1⁴⁴ 82.427 .99387 Pos Per F
2²⁷ 78.002 IC-1-4 checked OK Neg Per G
IC-1-4 checked OK
2⁵³ 81.042 Pos Per H
3³⁸ 79.778 Level I
3⁵⁵ 77.508 .99388 Neg Per J
4⁰² Drain solution

~4¹⁵ Samples # 109, 110, 111, #112.

In preparation for a counter traverse, axial counter was raised so that upper limit is 30 1/4" above tank when relay reads 46.00. This corresponds to a height of 60" in tank. Lower limit reads 1.00 on relay or 35" in tank. Moving counter U-235 Normalizing counter @ Midplane U-233

EXP # 70 Axial Counter Traverse *Dr. P. e*

	Inst Check OK, Source in	lig level Temp. IC-3	-4 Counter	
10 ⁴⁰	40.320	5×10^{-13}	4×10^{-13}	Start pumping solution
	Hi Power 108			
10 ⁴⁵	40.320	2.2×10^{-13}	1×10^{-13}	46.0 ↓ 25.00
11 ¹³	46.875			
11 ³⁰	60.86	Hi Power 108		
11 ³⁵		5×10^{-13}	2.5×10^{-13}	25.00
11 ⁵²	Stopped to get Counters from 113 for CORNIN			
	66.961			
	Source out			Super crit
	84.037			Pos Per
12 ⁰⁰	84.040	.99362	5×10^{-10}	
01	Start to level			
12	79.838	IC-2: 9×10^{-10}		approx level
	79.838			25.00
	79.812			23.04
	77.887			17.03
1 ²⁹	79.736	.99361		25.01 slightly Neg
2 ⁴¹	79.731	.99362		45.00 " Pos
2 ⁴⁵	Dump Soln			

Moved control Rod for Horizontal (Radial) traverse. Added 12 H₂O mixed for 2 hrs.

EXP # 71 Radial Counter Traverse *DWCC*

Inst Check OK Source in
lig level Temp IC-3 -4 Counter

10 ²⁰	Start Pumping solution.		
	40.324		0.99
10 ⁵⁴	41.250		
11 ¹⁹	70.33	6×10^{-13}	3×10^{-13} 0.99
11 ³²	Source out		Super Crit
	84.375	.9947	Pos Per
11 ⁴⁸	80.250		Approx level
12 ²⁰	80.173	(slightly sub crit)	" "
12 ²⁵	55.996	Drained to check Counter #1	
	Source in		
	Dump Soln for ERR. to check Counter		

June 8, 1959,

EXP # 72

DWCC cc.

Radial Counter Travers.

Liq level Temp IC-3 - 4

8²⁰ Start Pumping Solution. Source in, but checked

40.318 3.2×10^{-13} 1.7×10^{13}

9²⁴ 40.705

10⁰² source out

84.155

super crit

Pos Per

10¹⁵ 79.349 .9922 1.2×10^{-9} 9×10^{-10} IC-2 = 9.05×10^{-10} level

10³⁵ 79.208 level

11⁵⁹ 79.336 Counter Pos 10.0 Approx level

12¹² 79.152 " " 3.0" slightly supercrit

12¹⁵ Dump Soln

1⁰⁰ Add 3 liters H₂O to 16" slab and

start mixing

4¹⁵ stop mixing

6-9-59

8¹⁷ start mixing in 16" slab

11" stop mixing in 16" slab

June 9, 1959 EXP # 73

DWCC cc

Purpose: foil Exposure #3 cd covered 1" below center
#2 Bare 1" above center

11¹⁵ Inst Checked OK

11²² source in 2nd Response IC-1, 2, 3, 4

start feeding Soln into 5' cylinder

liq level temp

11⁵⁷ 40.710

12³⁰ source out

Super Crit

86.017

Pos Per

12^{43.5} start timing foils IC-4 2×10^{-10}

48.5 81.841 .99546 IC-4 5.6×10^{-10}

53.5 81.728

58.5 81.726 .99550 5.6×10^{-10}

1^{03.5} Dump Soln

6-10-59 Exp # 7H R.H. CC

Purpose: H P Measurements (for Mr Ogg)

8²⁵

Inst checked OK

9⁰⁰

Source in Inst Response IC-1, 2, 3, 4

start feeding soln into 5' cylinder

lig level temp ~~IC-2~~

9³⁶

40.675

10¹⁵

Source out

Super crit

85.517 .9943

Pos Per

10³¹

81.105

IC-2 = 9 x 10⁻¹⁰

Approx level

10⁴³

81.012

~~9.07~~ IC-2 = 9.1 x 10⁻¹⁰ " "

10⁵⁰

81.007

IC-2 = 9.1 x 10⁻¹⁰ Level

Drain soln to go in RM 113 AND MAKE

inst change

11⁰²

57.068

11¹⁵

start feeding ^{soln} into 5' cylinder

57.068 (Source in)

11⁴⁰

Source out

Super crit

85.430

Pos Per

12⁰⁴

81.095 .99451

IC-2 = 8.9 x 10⁻¹⁰ Approx level

12²⁰

81.055

IC-2 = 9.0 x 10⁻¹⁰ Level

12²⁵

Drain soln to MAKE inst change in RM #113

57.040

(over)

116

6-10-59

Exp # 74 cont

109 lig level temp
57.040
Source in
110 Start feeding soln into 5' cylinder
135 Source out Super crit
85.622 Pos Per
156 81.172 .99469 IC-2 = 8.9×10^{-10} Approx level
209 81.100 IC-2 = 8.9×10^{-10} level
Drain soln to make inst change in RM #113
Source in
215 57.760
233 Start feeding soln into 5' cylinder
259 source out Super crit
85.675 .99488 Pos Per
317 81.218 IC-2 = 8.95×10^{-10} Approx level
322 81.138 IC-2 = 9×10^{-10} " "
328 81.136 .99493 IC-2 = 9×10^{-10} Level
331 Dump soln



6-12-59

1015 Sample #113 taken from 16" slab
TANK Approx 40 ML

6-12-59

117

Exp # 75 E.R.R. C.S. Ready

Purpose: to Determine the Neutron Spectrum for the Dosimetry Measurements ($\times 10$ HP)

1030 Inst checked OK
1048 Source in Inst Response IC-1, 2, 3
Start feeding soln into 5' cylinder
~~lig level~~ +A
IC-4 Moved Behind wall inside corridor Door in RM #113
lig level temp IC-1 - 2 - 3 - 4 PM-1 PM-2
46.625
1122 Source out Super crit
1200 84.823 Pos Per
1244 86.569 IC-1 2 3 4 Approx level
(2.5×10^{-9}) - (9×10^{-10}) - (1.2×10^{-9}) - (2.4×10^{-9}) - 0
1224 83.536 .99316 Pos Per
1232.25 Start timing Exposure
1240 80.597 level
(2.27×10^{-7}) - (3.4×10^{-8}) - (4.1×10^{-8}) - (1.05×10^{-8}) PM-2
IC-4 = 1.08×10^{-8} 24
150 80.553 37
150 80.550 .99338 Level
1 2.3 $\times 10^{-7}$ - 3.4 $\times 10^{-8}$ - 4.2 $\times 10^{-8}$ - 1.05 $\times 10^{-8}$ 32
228 80.549 2.2 $\times 10^{-7}$ - 3.3 $\times 10^{-8}$ - 4 $\times 10^{-8}$ - 1.01 $\times 10^{-8}$ 32
232.5 Dump soln

6-15-59

80" height large sample taken
 50ml #144 taken for radiochemical

DWM 7-23-59

6-18-59

#114	12.6×10^9	fissions/ml
------	--------------------	-------------

113	4.0×10^9	"
-----	-------------------	---

	8.6×10^9	fissions/ml
--	-------------------	-------------

$$\times \sim 9200 \text{ l}$$

$$= 36.1 \times 10^{15} \text{ fissions}$$

$$\div 3.1 \times 10^{10} \text{ fissions/watt sec}$$

$$= 11.7 \text{ watt sec}$$

$$\div 7200 \text{ sec}$$

$$= 162 \text{ watts}$$

6-29-59

Removed ~ 23 barrels of solution @ 13.7L
 or ~ 3150 L. ∴ ~ 1050 L remains or ~ 22⁰⁰ inches

Liquid level B moved down - new zero
 on level is 40.530 = zero.
 out of solution 59.340

18.81 " level not working properly

Moved source, but still respond to source,

Moved by level new zero 41.706

Pump solution into cylinder again 60.24

41.71

18.53

level zero on tape on tub 39.991

Mass calculation Total solution Volume = 18.53 * 47.76 = 883.02

• 16.91 - 13.89 = 3.02 g/ster change

Mass ∴ 883.56 * 3.02 = 2.685 kg

Bottle #501 has 2.498 kg

Should be out crit by 0.190 kg.

Use Po B source of H.P. (Sanders) ~ 10⁷ neut/sec
 on 6" slot tank

11⁰⁰

Start adding UO₂ (NO₃)₂ solution to 6" slot tank
 from #501 (2.5 kg)

39.991 - 1.706 = 38.285 → next to 38.285

120

#501 empty, 6" slot transfer
 complete

~~38.285~~
 increased .03

6-29-59

1²⁰ PM Remove H.P. P.O.B. source, use 1" x 5" PuBe source on side of 16" slot tank

1³⁰ after mixing in 6" slot for ~~37'~~^{37'}, start transferring to 16" slot.

[Checked lig level zero @ 00.004
type @ 98.320]

2⁰⁷ Start transferring to 16" slot

CRM on #1 BF₃ under Slot Tank 3×10^4 C/M.

Circ pump is ON.

2" Tad addr = 37.2" CRM = 3×10^4

2¹⁶ 20.6" "

2¹⁸ Stop Transfer ~ 23.1 3.5×10^4

2²⁶ Start transferring solution 4.0×10^4

2²⁹ Stop " " 4.5×10^4

2⁴⁴ Start " " 4.5×10^4

2⁵¹ Close T.A. line, drain Tank 5.5×10^4

2⁵⁴ End of transfer 6.0×10^4

Flushed drain line using circ feed pump

3⁰² Start Circ Mixing

3⁵⁶ Stop mixing 5.5×10^4

6-29-59 EXP # 76 DWM C.O.

Inst Check OK Source In.

Remove large source from room.

359 Start pumping solution into cylinder
Checked for source response.

CRM #1	IC-1	IC-2	IC-3	IC-4	lig level
402 200	1.1×10^{-10}	$.4 \times 10^{-10}$	4×10^{-13}	1.9×10^{-13}	13.00
410 600	1.5	.6	8	5	Hi Power 108
402 Stop for a few min	unread	108	3	2	gone down
444 300	1.4	.4	9	1.3	
418 Stop solution					
422 450	2.5	.55	6.5	2.0	<u>18.78</u> "

Sub Critical but with some multiplication
Dump solution

6-30-59

Add ~ 100 g or 1 1/4 from of solution
from "old" bottle of same solution from West end.
(large source on side of 16" slab tank)

8⁵⁵ Start Circ Mixing10⁵⁵ Stop MIXING

6-30-59 EXP # 77

10¹⁰ Inst checked OK
 source in Inst Response IC-1-2, 3, 4
 10¹¹ start pumping soln into 5' cylinder
 10¹³ stop pumping (Power level High in 108)
 lig level temp
 7.980
 10²⁶ start pumping soln into 5' cylinder
 10²⁹ stop pumping to check on (incoming soln)
 10.382
 10³² start pumping soln into 5' cylinder
 10⁴⁰ 18.797
 source out sub crit
 10⁴² Dump soln

Subcritical bit with increased Multiplication

IC-1	2	3	4
3.2×10^{-10}	$.8 \times 10^{-10}$	9×10^{-13}	3×10^{-13}

10⁵³ Add ~ 1 1/4" of solution from # 50 & West End solution
 start adding solution with source on slab tank
 CRM #1 6×10^4
 11¹¹ Soln Transfer Complete - Start Circ Mixing in 16" slab
 12²⁶ Stop Mixing
 12²⁷ Start Mixing thru feed and drain line.

6-30-59 EXP # 78 AWTM e.e.

Source In.
 12³⁹ PM start Pumping solution into cylinder

lig level	Temp	Temp	
98.322	00.062		
8.70	7.089		

 107 18.885 0.050 1.00117 Rising with source in
 Remove source - - slightly sub critical
 Drain solution

1^{21/2} Start adding ~ 100g to system.
 CRM $10^4 \times 6$
 1⁴¹ Finish adding ~ 100g of solution to system
 1⁴¹ PM Start Circ. Mixing
 2³⁵ Stop " "
 2³⁵ Start Feed - Drain Mixing.

6-30-59 EXP # 79 D.W.M.C.C.
 lig level TA Temp 1 2 8

246 start filling cylinder.
 48 1.75 0.063
 308 Source Removed - very near critical
 18.464 7.864 2×10^{14} $.4 \times 10^{11}$ 1.00282
 Add solution to increase power by ~100

312 18.529 6.286 Rising on +Period
 1320 start to level by draining into TA.
 323 18.491 8.096 2.75×10^{-9} ~ level 5.8×10^{10}

357 18.472 ~~8.164~~ + level 1.00300
 8.189 level

402 18.450 8.960
 Neg Period

411 18.442 8.956 Neg Period Neg Period

Drain Solution

U-235 #1 counter mounted on moving Probe
 Lower limit switch set @ 1.80" when
 counter is ~.1" off bottom upper limit @ 44.67
 U-233 (#2) counter mounted 15" from
 center of cylinder with center of counter
 @ 9 1/4", tip 7 3/8" off bottom of Tank.

7-1-59 Exp # 80 D.W.M.C.C.
~~Vertical Counter traverse~~ U-235 Moveable
 Period Measurements U-233 fixed

1029 Inst checked OK
 source in Inst Response IC-1, 2, 3

lig level	TA	temp	Counter Pos
1032 1.627	00.071		9.20
1053 source out			Super crit
1155 18.457	5.914	.99471	Pos Per
11 18.438	6.864	.99476	Level A
1210 18.460	6.057		Pos Per B
1235 18.410	7.663	.99495	Neg Per C
			Pos Per D
104 18.442	6.887		Level E
check cal of IC-3 and 4 OK			
126 18.400	7.907		Neg Per F
152 18.486	5.390		Pos Per G
213 18.410	7.689		Neg Per H (over)

126

Exp # 80 cont

	lig level	+ A	TEMP		
2 ³³	18.441	6.531		Pos Per	M
2 ⁵⁷	18.417	7.479	.99475	Neg Per	J
3 ¹²	18.432	6.634		Pos Per fer	K
3 ⁵⁰	18.432	6.942		Level	L
4 ⁰²	18.413	7.624	.99463	Neg Per	M
4 ¹⁴	Dump Solu				

For the previous Run #80, The RIDL Switch scaler equipment was used to get counting data for calculating periods.

U-235 counter

U-233

8 ft cable

~3 ft cable

Preamplifier Channel #3

Preamplifier Channel #2

L.A. # C-3

L.A. # on C-1

Double Scaler #57 (#2)

Double Scaler #58 (#1)

Printer

The period data is on a roll of tape from printer.

7-21-59 On 7-2-59 2 samples #122 & #123 were taken after run #81 as well as a large 4 liter sample for reference.

7-2-59 Exp # 81

127

DWM CC

Period
Purpose: Measurements And Dose Measurements for

PI X-10 HP (Mr Saunders)

Three samples taken from 16" slab # 119, 120, 121

9³⁰ Inst checked OK

source in Inst Response IC-1, 2, 3, 4

lig level + A temp

98.318 7.612

9³³ start Pumping soln into 5' cylinder

9⁵² source out

super crit

18.468 4.572 99235 Pos Per

10⁴¹ 18.410 6.634 .058 Level A

10⁵³ 18.351 8.122 .059 Neg Per B

11¹⁵ 18.441 5.417 Pos " C

11²⁰ IC-3, 4 cal OK

11³⁶ 18.411 6.647 Level D

11⁵⁷ 18.373 7.510 Neg Per E

12¹⁵ 18.425 5.832 .99255 Pos Per F

12²³ 18.408 6.672 Level G

12⁵⁰ 18.389 7.223 Neg Per H

1⁰⁴ 18.411 6.226 Pos Per I

1³² 18.404 6.685 .070 Level J

1⁴⁵ 18.334 8.538 Neg Per K

2⁰² 18.457 5.032 .053 .99261 Pos Per L

2²² 18.340 8.378 Neg Per M

2³² 18.474 4.663 Pos Per N

2⁴¹ 18.408 6.701 Level O

2⁵² 18.355 8.062 Neg Per P

3⁰⁰ Drain solution

7-7-59 EXP # 82 *Slon J. J. L.*

Purpose - Run for H.P.
last check OK *Janice*

~9⁵³ Start adding solution to cylinder
by emptying Tad counter Tank.
big level Tad adder IC-1 2 ~~Temp~~ 4 Temp

10⁰⁵ 9.30 .055 1.4×10^{10} $.4 \times 10^{10}$
10²⁰ 18.384 .055 On Pos Period

~10³⁰ leveled for H.P.
10⁴⁵ 18.304 ~~1.863~~ 2.4×10^8 5.6×10^9 5.7×10^9 2.5×10^{-9} .99140
C₂ x 10 C₃ x 10
9282 18417 C₂ @ 9.20"

10⁵¹ Drain to tad adder to shut down
10⁵⁶ ~17.417 23.554

H.P. moved their counters

7-7-59 EXP # 83 *Slon J. J. L.*

11⁰⁰ Start adding solution from Tad adder
06 level tad ~~IC-1~~ 3 4
06 18.361 .140 Rising on + Period. Some out.
21 18.365 .141 " " " " "
22 Start to level
27 18.317 1.824 2.4×10^8 5.6×10^9 5.6×10^9 2.5×10^9 Temp.

11⁴⁷ Adjust counter from 9.20 to 19 to check
on drift rate, drained a little solution from
system and reactor on neg period @ 9.20
and positive period at 19.

11⁴⁸ 18.301 2.004 } drift - no change in reactor.
12¹⁰ 18.298 2.010 }
12³⁹ 18.298 2.014 1.4×10^8 3.0×10^9 1.4×10^9 .99175

Shut down by dumping solution

Check of counting data shows that moving
counter erratic.

V. Harnes checked moving counter, cables etc
nothing found to blame.

July 4, 1959

EXP #84 *John J.L.*

level Tab Temp IC-1 2 3 4

1⁵³PM Start adding solution

Purpose - Counter traverse

56 3.5 2.017 $.4 \times 10^{-10}$ 3.4×10^{-12}

2²³ On Pos Period Source Out

2²⁵ 18.362 2.018 .99 Pos Period

Found that the previous setting of 0 on pulse height selector was probably at fault. Now set at -5.

2⁴⁷ Start counting data

48 18.298 4.089 .99249 IC-2 $\sim 3 \times 10^{-9}$

3¹⁴ 18.301 4.089 2.2×10^{-9}

3³¹ 18.301 4.089 2.2×10^{-9}

3³⁷ 18.301 4.089 .99242 2.8×10^{-9}

3³⁸ Drain thru dump Valve

Plot of data looks good.

$h_c = 18.301$ inches

July 7, 1959

EXP #85 *John J.L.*

9⁰⁵ Start pumping solution into cylinder

Just Check OK Source response noted.

level tab Add Temp IC-1 2 3 4

9¹⁶AM 10.65 .068 .99210 1.9×10^{-12} $.5 \times 10^{-12}$ 3×10^{-13} 1.5×10^{-13}

Run for H.P. and for Cd covered U-235 axial counter traverse.

9²⁶ 18.368 .067 — 2.2×10^{-11} $.5 \times 10^{-11}$ 5×10^{-12} 2.4×10^{-12} Source Out

and rising slowly on pos. period.

9²⁸ 18.420 Rising on ^{plus} 100 sec period,

9³³ 18.426 .067 1.5×10^{-9} 8×10^{-9} Rising

9⁴³ Approx level

18.330 2.402 .99179

9⁴³ Start counting at midplane during H.P. counts.

9⁵⁵ 18.326 2.420 2.4×10^{-8} 5.6×10^{-9} 5.4×10^{-9} 2.5×10^{-9} Level

11²⁵ Shut down by drain thru dump.

h_c varied from 18.326 to 18.277

July 8th

Moved Cd covered U-235 counter to edge to use as normalizing counter, installed U-238 counter on extension - counter tip touches solution in tank @ 5.57, set limit switch it stops counter @ 5.54

Moved IC-4 Behind wall near door in cylinder
" IC-2 Near west wall - no paraffin shield
PM-1 " " "

July 8, 1959

EXP #86

Swdn J.J.L.

Purpose U-238 Counter traverse
H-P foil exposure.

12³⁵ Start pumping solution (Inst Check OK Source Resp)

level Tad Temp. Counter IC-1 2 3 & 4

39 7.7 .059 . 12.70 2.0×10^{-12} $.2 \times 10^{-12}$ 3×10^{-13} $< 10^{-13}$

12³⁹ Start timing run for Sanders
IC-4 = 10^{-8}

116 Approx level

117 18.243 1.594 .99207 @ 12.70 4×10^{-7} 5.5×10^{-8} 2.8×10^{-8} 1.25×10^{-7}

228 18.234 1.589 .99243 9.01 (3.1×10^{-7}) 5.6×10^{-8} 2.8×10^{-8} 1.25×10^{-7}

312³⁴ Dump Solution.

Plot of data looks OK

220 858.01

July 9, 1959

J.J.L. Swdn

Exp # 87

Purpose: Provide neutrons & gammas for H.P. (Fred Seiber)
Inst Check OK Source Response on IC-1

9²⁷ pm Start pumping solution into cylinder
lit to background from 7-8-59 run
shows on IC-1 and 2 in mediate
IC-3 & 4 do not respond because of the
lead surrounding these ion chambers.

level Tad Temp

9⁵⁶ AM 18.267 1.387 .99221 On PPA Period Source out
10⁰⁵ Start to level @ 5.6×10^{-10} on IC-2
~18.2

10²⁴ Shut down by draining into tad ladder
16.878 ~35

EXP # 88 JJS dwt

Repeat for H.P.

10⁴⁰ start pumping from Tad adder tank
 10⁵⁰ Level Tad
 18.274 10.97 on Pos. Period Source out
 11:00 AM start leveling @ 5.65×10^{-9} on IC-2
 Level 18.238 Tad 2.76
 11:17 Start draining into Tad Adder
 level ~ 16.86 Tad 35.46

EXP # 89

Repeat for H.P.

11:33 Start pumping from Tad adder tank
 11:45 Level 18.267 Tad 1.018 on Pos Period Source out
 11:54 Start leveling @ 5.65×10^{-9} on IC-2
 Level 18.216 Tad 2.76
 12:12 Dumped.

Operating Time
0723 hours

7-14

Added 2 Barrels H₂O
lig level → 7.86 "

7-15

Added 2 1/2 Barrels → 19.177
 Drain thru feed valve to check lig. level zero.
 *99.983 ~~19.177~~
 increased to 00.003 ΔL = .02

5⁰⁰ PM

U-233 Build-Up.

Cylinder # 4 brought into room ~ 2:30 PM
 July 20, 1959. 108 at hi power as readings have been
 The following times and readings were taken
 on the instruments

Date	Time	Count Rate #1	Count Rate #2	IC-1	2	3	4
7-20	5:30 P	1000 $\frac{mr}{hr}$	1000 $\frac{mr}{hr}$	1.3 $\times 10^{-12}$	3.2 $\times 10^{-12}$	1.9 $\times 10^{-12}$	1.1 $\times 10^{-12}$
7-21	8:30 A	1000	1000	1.4	3.4	1.95	1.1+
7-21	3:10 P	1000	1000	1.4+	3.45	2.1	1.15
7-22	8:40 A	1200	1000	1.45	3.6+	2.1	1.2+
7-23	8:20 A			1.05	3.85	2.2	1.25
7-22		Bottle # 5	orig 700	107 PM	760 mr/hr		in vault
7-22		" # 6	orig 400	107 PM	490 mr/hr		in vault

Start U-233

July 23, 1959

100 P M H₂O ≈ 950 l in aptn, 500 in 6" tank
Started adding U-233 from bottle #4

Total { #5 }
U-233 { #4 } = 5.3 kg
in { #6 }

120 IC-1 = 5.1 x 10⁻¹² amp. IC-2 = 3.65 x 10⁻¹²

130 Started adding U-233 from #5

145 Finish " " " #5

IC-1 = 7.0 x 10⁻¹² IC-2 5.0 x 10⁻¹²

145 Remove source

= 5.7 x 10⁻¹² 4.1 x 10⁻¹²

200 Replace source on 6" slab 7.1 x 10⁻¹² 5.05 x 10⁻¹²

IC 3 = IC-4 = 2.2 x 10⁻¹² w.o. source dropped to 5 x 10⁻¹³

209 PM Start adding U-233 #6

256 Finish #6

IC-1 = 8.5 2 = 5.95 3 = 2.5 4 = 2.5 x 10⁻¹²

Move source to 16" slab.

1 = ~~3.2 x 10⁻¹²~~ 2 = 0.95 x 10⁻¹² = 1.7 x 10⁻¹² 4 = 1.1 x 10⁻¹²

302 Start transfer to 16" slab.

CRM on C-2 under 16" slab: 1000 cpm

422 Transfer complete 5.3 kg in 16" slab

425 IC-1 2 3 4
0.8 x 10⁻¹¹ 2.35 x 10⁻¹⁰ 1.1 x 10⁻¹² 6.5 x 10⁻¹³

7-24-59

8⁰⁷ Start mixing in 16" slab
 CRM #2 = 2000 CPM same as slab tank
 Discovered that the bottles that were brought into Room 13 yesterday afternoon were at a level of 600 m/hr now read 1800 m/hr! contain 3.6 kg
 Moved these bottles to the vault

9¹⁶ Stop mixing
 Move source to 6" slab CRM #2 ~1000 CPM

9²⁰ Start filling 6" slab.
 slab #3 full CRM #2 ~500 CPM

9⁴⁴ Stop filling
 9⁴⁵ start adding U-233 Bottle #7
 10²⁵ Bottle #7 empty.

10³⁰ Start adding U-233 Bottle #8
 11³⁰ Bottle #8 empty.

Total Est 8.9 kg U-233
 Bottle 4-5-6-7-8

Continue mixing in 6" slab
 12¹¹ stop " " " "
 12¹⁵ Start mix in 16" slab.
 12²⁰ Start Transfer to 16" slab CRM #2 ~2000 CPM
 1²⁰ Transfer Complete - Continue mixing
 4¹⁰ stop mixing.

4²⁰ PM July 24, 1959 8.9 kg in 16" slab

IC-1	2	4	3	(steps) C.P.
.45 x 10 ⁻¹¹	2.4 x 10 ⁻¹²	3-4 x 10 ⁻¹³	1.1 x 10 ⁻¹²	2610 16" slab
				5 1/2 M/hr 180 M/hr

7-27-8¹⁰/_A .50 x 10⁻¹¹ 2.5 x 10⁻¹² 5 x 10⁻¹³ 1.1 x 10⁻¹²

Remove ^{last} source from Room.

Insert small source.
 CRM #2 ~ 50-60 CPM
 #1 and #2 on printing system

U-233 EXP #90 7-27-59
 Check Multiplication in 5' Cylinder

Met. not detected @ 20.830" in air with 8.9 kg

8⁴⁵ Dump solution. no appreciable amount of activity on air monitor!

4⁰⁰ Check liquid zero. 0.023
 next to 0.003

Date	Time	1	2	3	4	
7-28	11:10 A	$.5 \times 10^{-11}$	2.5×10^{-12}	3.5×10^{-13}	1.2×10^{-13}	No Source
7-29	8:15 A	$.5 \times 10^{-11}$	2.5×10^{-12}	4×10^{-13}	2×10^{-13}	" "
7-30	2:00 P	$.5 \times 10^{-11}$	2.5+			

Moved 3 bottles of U-233 into room (#10-12-75)

7-30	2:45 P	$.55 \times 10^{-11}$	2.9×10^{-12}		
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7-31 8:20 A Moved in Bottle #13 & 14 Filled 6" slab into to 5.45
 7-31 12:35 Bottle #13 & 14 5.60



7-31-59

8:50 AM Start filling 6" slab from 16" slab
 By using small pump.
 9:20 6" slab filled to H+ Desired (Pump off)

Gross Alpha estimates of U content

#	Total	U-233
#10	504	489
#12	1876	1820
#15	207	201
#13	2186	2120
#14	1972	1913
Totals to date		
	15.8 kg	15.3

Total Volume ~ 1000 liters 8.9 kg ~ 8.9 g/mliter

add 1.876 kg to ~ stock - conc → 10.8 g/liter

July 31, 1959

Inst Check OK

Start Transferring from Bottle #12

CRM #1	#2	#3	IC-1	IC-2	IC-3	IC-4
1:38 PM 280	150	250		Source on 6"		
3:30 250	1500	150		Source on 16"		
3:40			.7 x 10 ⁻¹¹	3.4 x 10 ⁻¹²	1.1 x 10 ⁻¹²	5 x 10 ⁻¹³
3:45			Remove Source	Insert Small Source		
> 1:00	2:00	> 1:00	.65 x 10 ⁻¹¹	3.2 x 10 ⁻¹²	5 x 10 ⁻¹³	4 x 10 ⁻¹³

~ 3:30 PM Transfer to 16" slab was complete

Continue mixing in 16" slab for 30' before pumping to cfl.

EXP #1 Sw. In. CC.

4:23 Start Pumping up into sylinder from slab

Source In Total loading 8.9 + 1.9 = 10.8 kg

4:20	IC-1	1.68×10^{-11}	C-1 CRM	50 CPM
	IC-2	9.25×10^{-12}		40 CPM
	3	4×10^{-13}		30 CPM
	4	4×10^{-13}		

4:24 - 20.783 in

DUMP SOLUTION

1	$.75 \times 10^{-11}$
2	3.4×10^{-12}
3	5.5×10^{-13}
4	5.0×10^{-13}

August 3, 1959

IC-1 $.75 \times 10^{-11}$
 2 3.6×10^{-12}
 3 $\sim 5 \times 10^{-13}$
 4 5×10^{-13}

8¹⁴ Start filling 6" slab tank from 16" slab
 ~830 10000 6" slab full
 ~845 Start adding U from #13 (2.18 kg)
 9⁰⁰ AM CRM #1 #2 #3 With Source in Room 4
 300 130 200 $.44 \times 10^{-11}$ 7.8×10^{-12} 2.5×10^{-12} 2.5×10^{-12}
 9²⁰ 300 130 200 .46 7.9 2.5 2.5
 ~933 #13 empty.
 9⁵⁵ Start Transfer to 16" slab. Move Source
 9³⁷ 350 1500 100 .46 7.9 1.8×10^{-12} 9×10^{-13}
 9⁴³ Start Transfer to 16" slab open #4.
 ~10⁰⁰ System acts as though valve #7 is plugged
 transfer stopped after ~16" of solution was
 transferred.
 ~10¹⁰ started second pump, and transferred by
 pumping into cylinder with drain open
 10¹⁹ transfer complete continue mixing with
 hp pump in 16" slab.
 10¹⁵ Inst Check OK.

Aug 3

EXP #92 ~13.0kg U-~~235~~ Total U
 Inst Check OK Source in Screen unbypassed.

11¹⁹ Start filling cylinder
 11³¹ CRM #1 2 3
 35 35 35
 11⁴² 50 40 30 Solution in cylinder.
 level = 21.067
 IC-1 2 3 4
 $.65 \times 10^{-11}$ 4.6×10^{-12} 2.2×10^{-12} 4×10^{-12}
 Drain Solution

12⁰⁰ Noon Transfer solution to fill 6" slab.
 12³⁰ " " Complete.
 12⁴² Start Bottle #14, put in ~1/2 of content
 (~41" → down to 20 1/2")
 1⁰³ 1/2 Bottle transfer complete, continue Mixing.
 1²⁰ Stop mix in 6"
 1²¹ Start transferring to 16" slab with
 Source on 16" slab.
 Had to open #8 in order to get flow
 System acts as though #7 is plugged!
 J Fox suggests a possibility that
 valve stem is loose from rubber diaphragm!
 146 Transfer complete.

Aug 3

148 Start Mixing in 16" slab tank.
Auto Printer - Scram set up and now working.
150 C₂ (CRM) = 1000

226 Remove Source from Room
240 Stop Circ.
EXP #93 NWJm JKFD,
Loading ~ 14.0 kg
Source in Scrams Set
241 Start pumping solution into cylinders.
255 ~16" no mult on Inst or Counter.

300 level @ 21.198 no multiplication.
IC-1 .66 x 10⁻¹¹
2 9.8 x 10⁻¹²
3 5.5 x 10⁻¹³
4 3 x 10⁻¹³

302 Drain Solution into Slab Tank

306 Close Valve #10
Fill 6" Slab thru both feed valves
using big pumps.
310 Slab full
318 Start adding U-237 from #14 ~1 kg.
Move source to 6" Slab Tank from under

Aug 3, 1959

320 IC-1 .52 x 10⁻¹¹ CRM #2 ~1000 CPM
2 8.0 x 10⁻¹² #1 ~ ~~800~~ CPM
3 2.8 x 10⁻¹³ #3 ~ 700
4 2.6 x 10⁻¹³

~332 Stage Bottle #14 empty -
Continue Mixing
340 Start Transfer to 16" Slab.
Not thru 7 but thru #8!!

357 Transfer Complete
Start Mixing.

	TOTAL	15.8
Bottle # 16	-	1934
17		1777
18		1554
19		1657
(8-4-59		1774)
		24.5 total

8-3-59 EXP #94 R.H. C.C.

445 Big Source Removed from Room
447 Source in Inst Response IC-1, 2, 3, 4
506 start pumping soln into 5' cylinder
lig level

21.344 Sub Crit
Source out - observed Decline on
All Insts. IC-1-2-3-4

5:10 Drain into 6" slab in order to add conc. of soln.

5:40 Drain remaining soln. in 5' cyl. into 6" slab

5:45 start adding from bottle # 16, plan to add ~ 1 kg of soln. on ~ 20" of slab.

6:45 addition to 6" slab completed

6:50 start soln. into 16" slab

7:10 Transfer complete

7:10 Mix in 16" slab

8:00 Stop Mixing and Remove Big Source from Room

8-3-59 Exp # 95 R.G. CC

8:02 Source in Inst Response IC-1, 2, 3, 4

8:03 start feeding soln into 5' cylinder

8:21 source out slightly super crit

lig level temp

19.235 1.00539

8:38 19.233 Approx level

8:45 Dump soln

~~8:4~~

8:47 start mixing in 16" slab

9:20 stop mixing

Exp # 96

R.M. C.C.

Purpose: Period Measurements

9:32 Source in Inst Response - IC-1, 2, 3, 4

lig level + A temp

9:34 start feeding soln into 5' cylinder

9:58 source out slightly super crit

19.250	5.980		Pos Per
19.253	5.981		" "
19.287	4.960	1.00522	" " A
19.268	5.995	1.00472	Approx level

Dump soln

EXP # 97 Aug 4, 1959

Purpose: PERIOD vs Δh
 Inst Check OK, Scrums Set, Source On.

8³⁹ Start adding solution, pumped out 5.8 inches of solution from tad adder, which must be filled later.

leg. level Tad Adder Temp
 9¹⁰ 19.155 1.353 Rising on pos period

• Remove Source → Rising slowly - add sol.
 9¹⁵ 19.255 0.845 .99796

9¹⁷ Start printing Pos Period A (IC-3 IC-4 not calib.)
 19.264 0.844

9²³ Start to level
 31 19.252 1.783 .99810 Subcritical but has a tendency to level.

9⁵⁷ Slightly super - must drain a little

10⁰² 19.251 1.784
 Drain a tad
 1.801

10¹² Drain a tad
 1.822 Too much - Negative slightly

10³³ System seems to have ^{Not} leveled add some.
 10³⁸ 19.251 1.811 Super crit.

Drain a little
 19.251 1.817

ROHRER REPLACED PRINTER - PERIODS SHOULD BE OK

#97 (Cont.)

level Tad Temp. Level B
 11⁴⁷ 19.251 1.817 .99827

11⁴⁹ Drain for neg. Period (calibration OK)

11⁵⁶ 19.229 2.558 .99817 Neg Per C

11⁰⁵ Add solution
 11¹⁴ 19.254 1.160 .99820 Pos Per D

11¹⁸ Drain to level (calibration OK)

~~11²¹ 19.248 1.833 .99819 (Neg) Level E~~

11³⁵ 19.248 1.815 .99819 Level. E

11³⁶ Drain for neg period.
 11⁴⁷ 19.231 2.569 .99815 Neg Period F

Add for pos period
 12⁰⁵ 19.253 1.164 Pos Period G

12⁰⁹ Drain for level. (Calibration check OK)

12²³ 19.247 1.842 .99813 Level H

Drain for neg period.
 12⁴⁰ 19.240 2.285 Neg Per. I

Add for Pos Period
 1⁰¹ 19.250 1.474 .99810 Pos Per J

1^{01 1/2} Drain to level
 1¹¹ 19.247 1.847 Level K

1¹¹ Drain for neg period
 1³² 19.241 2.200 .99804 Neg. Per L

1³² Add for pos. period
 1⁴⁰ 19.252 1.378 .99805 Pos Per M

97 (Continued)

Aug 4, 1959

PM
 144 Drain to level.
 158 19.249 1.855 .99803 level N
 159 Drain for Neg Period
 214 19.226 2.709 .99800 Neg Per O
 216 Add soln for Pos Period
 228 19.255 1.012 .99800 Pos Per P
 229 Drain to level
 238 19.250 1.857 .99796 Level Q
 Drain to get Neg Per.
 249 19.235 2.425 Neg R
 300 Drain into tank added to Shutdown

301 18.474 20.857

R.H. C.C.

Purpose: Period Measurements

5⁰⁵ source in Inst Response IC-1, 2, 3, 4
 lig level +A temp
 18.465 20.860
 5⁰⁷ Feed from +A into 5' cylinder to
 obtain critical Ht log N
 source out IC-4 2.3×10^{-12} sub crit
 19.127 3.864 IC-3 7×10^{-12} level
 19.181 2.572 IC-4 7×10^{-12} "
 IC-3 1.8×10^{-11} "
 lig level +A log N temp
 19.208 2.012 IC-4 3.2×10^{-11} "
 IC-3 1.1×10^{-10} "
 6³¹ 19.226 1.741 Pos Per
 6³⁶ 19.241 1.186 " "
 6⁵⁹ 19.238 1.926 IC-4 4.5×10^{-9} Level
 7³⁶ IC-3 9.2×10^{-9} "
 7⁴⁴ 19.232 2.375 .99770 Neg Per A
 8²³ 19.243 1.476 Pos " B
 8³⁵ IC-3 AND 4 cal checked by Mr ERR (OK)
 8⁴⁷ 19.238 1.939 .99755 Level C
 9⁰⁷ 19.222 2.602 Neg Per D
 9²¹ 19.248 1.271 Pos " E
 9⁴³ 19.240 1.943 IC-4 4.1×10^{-9} Level F
 IC-3 9×10^{-9} .99750 "
 10¹⁰ 19.232 2.201 Neg Per G
 10²⁸ 19.234 1.687 .99750 Pos Per H
 10⁵² 19.237 1.948 .99747 Level I
 11⁰⁵ 19.211 3.004 .99748 Neg Per J
 (over)

8-4-59

Exp # 98 Cont

	lig level	TA	log N	temp	
11 ¹³	19.254	0.966			Pos Per K
11 ⁴²	19.241	1.961	IC-4 4.1×10^{-9}		Level L
11 ⁴⁴	Shut Down	Dump Soln	IC-3 9.4×10^{-9}	.99745	

Note
IC-3 ^{is} Does not as stable as IC-4

Exp # 99 DW 9m JKF

Purpose MORE $\frac{\partial \rho}{\partial h}$ measurements.

N.B. No Source Start-up washing built in source. Screen set Just Ch OK

	level	Tad	Temp	
8 ⁴⁰ AM	start adding solution			
8 ⁵⁰	11.4	0.058		
9 ⁰⁵	19.253	3.658	.99440	
9 ¹²	19.262	3.660	.99440	POSITIVE PERIOD
9 ¹⁵	start Draining into Tad adder to level near 10^{-9} m ln N.			
9 ⁵⁸	19.248	4.500	.9945.6	Level A
9 ⁵⁹	Add solution for Pos Period			
10 ⁶⁰	19.252	4.088		Pos B
10 ¹³	Drain for neg period. (Calibration OK)			
10 ²¹	19.233	4.980	.99463	Neg Per C
33	231	4.981		
33	start to added for Pos Period (Calibration OK)			
51	19.245	4.246	.99467	Pos Per D
11 ⁰²	start to level			
11 ¹³	19.242	4.498	.99475	Level E
11 ¹⁴	Drain for neg.			
11 ²⁷	19.222	5.352	.99477	Neg Per. F
11 ³²	Add for Pos Per			Pos G
		3.651		
11 ⁴⁴	Drain for Neg Period			

Exp # 98 Cont

	lig level	TA	log N	temp	
11 ¹⁵	19.254	0.966			Pos Per K
11 ⁴²	19.241	1.961	IC-4 4.1×10^{-9}		Level L
11 ⁴⁴	Shut Down	Dump Soln	IC-3 9.4×10^{-9}	.99745	

Note
IC-3 ^{is} Does not as stable as IC-4

Exp # 99 D.W.M. J.K.F.

Purpose More $\frac{\partial \rho}{\partial h}$ measurements.

N.B. No Source Start-up using Brill
in source. Screen set Just Ch OK

	level	Tad	Temp	
8 ⁴⁰ AM	start adding solution			
8 ⁵⁰	11.4	0.058		
9 ⁰⁵	19.253	3.658	.99440	
9 ¹²	19.262	3.660	.99440	POSITIVE PERIOD
9 ¹⁵	start Draining into Tad adder to level near 10^{-9} m ln N.			
9 ⁵⁸	19.248	4.500	.9945.6	Level A
9 ⁵⁹	Add solution for Pos Period			
10 ⁰⁰	19.252	4.088		Pos B
10 ¹³	Drain for neg period. (Calibration OK)			
10 ²¹	19.239	4.980	.99463	Neg Per C
33	237	4.981		
33	start to added for Pos Period (Calibration OK)			
51	19.245	4.246	.99467	Pos Per D
11 ⁰²	start to level			
11 ¹³	19.242	4.498	.99475	Level E
11 ¹⁴	Drain for neg.			
11 ²⁷	19.222	5.352	.99477	Neg Per. F
11 ³²	add for Pos Per			
		3.651		Pos G
11 ⁴⁴	Drain for Neg Period			

#99 (Cont.)

	level	Temp	Temp	
1156	19.240	4.909	.99480	Neg Period H
12 ⁰⁸ PM	Start to level by adding			
12 ²²	19.246	4.497		Level I
12 ²²	Start to add for Pos Per			
<p>{ N.B. From plot of counter data as high as 2×10^6 per 30 sec, the curvature begins at 6×10^5 of 30 sec. }</p>				
12 ³⁵	19.251	4.196	.99500	Pos PERIOD J
12 ⁴²	19.250	4.198		
	IC-384	Calibration OK		
12 ⁴²	Start drain for Neg Period			
12 ⁴⁷	19.218	5.531		Neg Period K
12 ⁵⁴	19.215	5.528		
12 ⁵⁹	Start adding for Pos Period			
1 ¹⁵	19.259	3.781	.99497	Pos PERIOD L
1 ¹⁵	Drain for Neg Period			
1 ⁵⁰	19.238	4.963		Neg Period M
	Add to level			
1 ⁴⁵	19.243	4.504	.99502	Level O
1 ⁴⁵ PM	Dump solution			

149 EMPTY T.A. Tank.

Took 2 samples + 1 gallon #125 and 126 and #127

~ 3⁰⁰ Start adding 1 barrel of H₂O approx 200 liters. This will add approx. 4" to the 21" plus of solution available in the last series of experiments.

Calculated equal increment in B₃ from 19.25 to 60.0 in in height, ∴ 2nd Exp ~ 23.4 " 3rd Exp ~ 31.4 " U-233 Total U on hand 24.5 kg.

5⁰⁰ PM Fill 6" slab from 16" slab Start Adding from Bottle #16 Approx " 1 Kg Add Bottle #15 " 201 g Add " #10 489 g 7²³ start feeding into 16" slab from 6" slab 7⁴³ transfer completed Cont Mixing in 16" slab 8³⁰ Stop Mixing

8-5-59

Exp # 100 *Swan*

8³³
8⁵⁸

start Pump soln into 5' cylinder
Pump lost Prime (out of soln)

lig level log N
26.321 10.4 8×10^{13} 10.3 3×10^{12}

9⁰⁶
9²⁹

Drain into 6" slab
6" slab filled to Desired Ht

9³⁵

Dump into 16" slab
Start Adding soln from Bottle # 18
Approx 1.0 Kg

10⁵⁵

start pumping from 6" slab into 16" slab

11¹²

transfer Complete
Cont Mixing in 16" slab

Exp # 101 *Swan*

11³⁵

Pump fuel into 5' cyl
big source out of room.

horiz
12:00

source in
~ critical at 23.00"
needs more mixing
drain into 6" slab

August 6, 1959

Since the amount of solution in excess is approx 3.3 inches, this corresponds to approx 165 l of solution. Much more than this was drained out the 6" slab. Pump solution out of slab down to a height of 19" or 130 liters leaving a surplus of approx 25l.

9⁵⁵

Start Circulation while pumping from 6" slab into cyl then dump valve into 16" slab.

Pumped solution thru drain for ~10'
" " in and out of tad adder
Three times

EXP # 102

~10¹⁰

Start Pumping solution to cyl - add to tad level Tad Temp

10¹⁸

11.39 4.521

most source - (not needed) for inst check

10⁵⁸

Near critical, not above bull in source.

11⁰⁰

23.098 3.216 .99960 On pos period

~ 11⁰⁹

start to level

11¹⁵

23.080 4.359 approx level

EXP #102 (Cont.)

	level	tad	Temp	IC-3		
11 ³³ AM	23.074	4.356			Super.	
12 ¹⁴	23.074	4.406	.9995 ₂	1.7x10 ⁻⁹	Level	A
12 ²⁵ PM	23.074	4.420	.99949	1.7x10 ⁻⁹	Level	A
	add for small pos period calibration OK					
12 ³³	23.077	4.054	.99950		Pos Per	B
12 ⁴⁰	Drain For neg Period					
12 ⁵¹	23.031	2.565	.99940		Neg Period	C
1 ⁰³	add for pos. Period					
1 ¹⁹ PM	23.098	3.319	.99941		Pos. Per	D.
1 ²⁰	Drain for neg. Period					
1 ³²	23.060	4.834	.99940		Neg Per	E
1 ⁵³	add soln to level <i>possible that we read wrong pulse</i>					
2 ¹⁴	23.063	4.480	.99939		Level	F
2 ¹⁵	add for slow Pos Period					
2 ²⁵	23.073	4.004	.9993 ₂		Pos Period	G
2 ³⁴	Drain for neg Period					
2 ⁴⁵	23.041	5.288			Neg Period	H
3 ⁰²	add for pos Period					
3 ⁰⁶	23.103	3.084			Pos Period	I
~ 3 ¹¹	Start to level (Calibration OK)					
3 ³⁴	23.071	4.512			Level	J
3 ³⁷	Start on neg Period					
	23. —	5.005			Neg Per	K
4 ⁰⁰	Drain into tad adder to shut down					

Purpose: Period Measurements

R.N. CC

4 ⁴³ PM	Source in Inst Response IC-1, 2, 3, 4					
	lig level	+A	log N	temp		
	21.980	29.505				
4 ⁴⁵	Start pumping soln from +A into 5' cylinder					
4 ⁵⁵	Source out Super Crit					
	23.054	2.625				
4 ⁵⁸	23.087	1.738			Pos Per	
5 ³⁸	23.071	3.025	IC-3 9.5x10 ⁻⁹		Level	A
5 ⁵⁵	23.002	4.678	IC-4 4.2x10 ⁻⁹	.99906	Neg Per	B
6 ⁰¹	23.103	1.426			Pos ..	C
6 ²⁶	23.065	3.048	IC-3 1.02x10 ⁻⁸		Level	D
6 ⁴⁰	23.031	4.015	IC-4 4.2x10 ⁻⁹	.99895	Neg Per	E
6 ⁵⁶	23.084	2.060			Pos ..	F
7 ³⁵	—	3.047			Level	G
8 ⁰⁰	23.048	3.571		.99881	Neg Per	H
8 ¹⁴	23.066	2.524			Pos ..	I
8 ³⁸	23.061	3.093	IC-3 1x10 ⁻⁸		Level	S
9 ⁰⁰	23.016	4.358	IC-4 4.4x10 ⁻⁹	.99876	Neg Per	K
9 ¹³	23.087	1.845			Pos ..	L
9 ³⁷	23.063	3.121	IC-3 9.6x10 ⁻⁹		Level	M
10 ⁰²	23.000	4.642	IC-4 4.4x10 ⁻⁹	.99866	Neg Per	N
10 ¹²	23.094	1.558		.99860	Pos Per	O
10 ¹⁵	Cal check OK					
	Dump soln					

Aug 7, 1959

8³⁰ AM Took samples #128 and #129
" 1 gallon sample #130

8-7-59 Expt. 104 DWM, JKF

10⁰⁵ RISING ON POS PERIOD LN-4 @ 1.2x10⁻¹⁰

level Tad Temp Pos Per.
23.078 3.621

10³⁵ 23.067 4.495 .99530 ^{IC-3} 5.5x10⁻¹⁰ ~ level

10⁵⁷ 23.067 4.496 Level A

10⁵⁸ Add for Pos Per

11⁰⁸ 23.071 4.082 .99528 Pos Per B

11²⁸ Drain for Neg Per.

11⁴³ 23.050 5.105 .99530 Neg Per C

12⁰² Add for Pos Per.

12²⁰ 23.077 3.694 Pos Per D

Drain for ~~Neg Period~~ level. (ln N @ 10)

12⁴² 23.067 4.460 .99531 ^{Crit.} Sub, ~~level~~ A

12⁴⁵ 23.067 4.448 " 1x10⁻⁸ level E

Drain for Neg Period → Neg P. F

10²⁸ 23.035 5.359

Forgot to record ~ 336 ~~Pos Per~~

23.074 4.496 level G

Drain for Neg.

23.029 5.543 neg P. H

2⁰⁸ Add for Pos Period

~~23.086~~ ~~3.735~~

→ Pos Per I

2²⁰ 23.093 3.235

Drain for neg Period.

2²⁹ 23.027 5.550

Neg Per J

2³⁰ Add for Pos Period

2⁴⁵ ~~23.070~~ ~~2.3065~~ 3.836

Pos. Per K

start Level by draining

2⁵⁸ 23.063 4.455

Level L

Scram Button was pressed by John

Just Check OK
After Run

Aug 7, 1959

Two cont. of U-233 arrived
#5 1557 g } in vault
#7 1606 g }

8-7-59 Exp # 105

Purpose

5:55

Source in Inst Response IC-1, 2, 3, 4
lig level + A log N temp

5:58

Start Pumping Soln into 5' cylinder

6:23

Source out super crit

23.114 4.798 IC-3 8.8 x 10⁻⁹ .99537 Pos Per

7:14

23.084 6.474 IC-4 4.1 x 10⁻⁹ Level A

7:29

23.024 7.933 .99545 Neg Per B

7:50

23.101 5.039 Pos " C

8:07

23.083 6.459 IC-3 9.5 x 10⁻⁹ IC-4 4.6 x 10⁻⁹ .99544 Level D

8:26

23.046 7.459 Neg Per E

8:35

23.089 5.489 Pos Per F

8:54

23.076 6.467 IC-3 9.5 x 10⁻⁹ IC-4 4.6 x 10⁻⁹ .99545 Level G

9:12

23.054 7.183 Neg Per H

9:26

23.076 5.795 Pos " I

9:59

23.070 6.473 IC-3 9 x 10⁻⁹ IC-4 4.5 x 10⁻⁹ .99546 Level J

10:13

22.994 8.412 Neg Per K

10:20

23.115 4.575 Pos " L

10:22

Scram System (By Letting Beckman IC-2 trip)

8-7-59

10:50 PM

Add one Barrel of H₂O or About 200 liters to 16" slab while mixing.

11:15

Fill 6" slab from 16" slab to

11:15

Desired Ht And cont to mix in 16" slab
Start Adding soln from Bottle #18 into 6" slab. Approx + kg 500

11:35

Bottle empty cont to mix in 6" slab

12:03

Stop mixing in 16" slab

" " " 6" slab

8-10-59

R&R + R&R

8:20

start soln. in 6" slab into 16" slab

8:55

operation complete, continue to circulate

9:00

Inst. check → o.k

10:00

Bottle #5 brought into reaction room

Exp # 106

10:17

Source in, very small response, big source still on 16" slab

10:18

start to feed

10:46

soln. out of 16" slab

h = 30.7" in slab

IC-2 10 x 10⁻¹² recorder 5.9

IC-3 3 x 10⁻¹⁰

counter meter 5 x 10²

10:49

draw into 6" slab

11:20 6" slab to desired level
Dump

11:40 start adding soln. from bottle #5 into 6" slab. Plan to add 2/3 of 1557 g or ~ 1kg Estimate of critical less than 500g to be added when above addition is complete.

12:55 addition to 6" slab complete

1:00 PM start adding to 16" slab

1:20 addition complete, continue to circulate in the big slab.

2:18 Prepare to add soln to 5' cyl.

2:19 source in, start feeding

2:48 fuel in 5' cyl 30g

IC-2 $10 \times 10^{-12} \rightarrow 6.1$

IC-3 2.8×10^{-12}

Count rate meter 3.5×10^{-2}

2:50 Drain into 6" slab

3:16 Dump remaining soln.

3:23 start adding remaining soln. in bottle #5 into 6" slab.

3:50 addition complete.

3:54 start fuel in 6" slab into 16" slab

4:25 addition into 16" slab complete, Continue Mixing in 16" slab

E
x
p

1
0
7

(Bottle #19 1657 g.) set in place.

5:20 PM August 10, 1959 Stop Mixing

EXP # 108 DWM JKF.

Invert Source IC-2 response

5:29 PM Start adding solution

Time	Count	Tad	Temp	Notes
28	4.0			stop to valve in Tad addn.
41				and valve out 6" slab tank
				flush line
42	14.5	.13		
				IC-1 2.2×10^{-11} -3 5.5×10^{-12}
				IC-2 6.3×10^{-12} -4 3.0×10^{-13}

5:57 30.966 .13 .9996

Solution in Cylinder, some multiplication but sub critical

IC-1	2.4×10^{-11}
2	5.9×10^{-12}
3	1.5×10^{-12}
4	7.0×10^{-12}

Drained 10" into tad addn

Add ed ~ 100g (2 1/2" from bottle #19).

Used solution in Tad addn to flush line thru pump. To get all the enriched solution into slab tank

6:30 Antenna Start Mixing.
7:45 Stop Mixing

August 10, 1959

EXP #109 DWM J & Fox

749 Start Adding solution to cylinder

log level Tad Temp

750 1.17" .067

809 20.7 .065

Drain into Tad adder to 6.6" pumped back to cylinder.

820 30.01 .065 drain into T.A.

821 29.85 4.580

825 30.952 0.067 1.0017 Sub critical

IC-1 3.1 x 10⁻¹¹

2 .75 x 10⁻¹¹

3 3.3 x 10⁻¹²

4 1.6 x 10⁻¹²

Drain ~ 16" in Tad.

Add ~100g U To 16" lab tank (~2 1/2 from #19) Drain T.A to flush lines.

850 Start Mixing

930 Stop Mixing

EXP # 110 DWM J & Fox

930 Start pumping to cylinder

938 ~9" drain ~ 16" into T.A.

Pump solution out of Tad.

1008 Raising on period - remove source.

Exp #110 (cont)

1016 Level Tad Temp 30.480 5.708 1.00265 Raising on Pos Period

1019 start to level

1028 30.409 7.965 1.00260 level

1030 Dump solution, empty Tad adder

1037 Start Mixing

1142 Stop Mixing

8/11/59 EXP # 111

RQ + RKR

Purpose - Critical height + $\frac{L}{2}$

source in, response in IC-1, 2, 3 + 4

Temp = .99945

8:29

9:05 AM

9:28

Pos Period L.S. = 30.423 Tad = 5.095

9:50 AM

Level Tad Temp Per. 30.360 7.282 .9992 level A

9:53

Drain for neg Per.

9:56

30.325 8.341 Neg Per B

10:18

adding for Pos Period.

10:20 AM

30.363 6.341 Pos Per C

10:59

30.358 7.391 .9992 level D

11:00 AM

Drain for neg Per

11:02

30.303 8.922 Neg Per E

11:22

adding for Pos Per.

over

	Level	Tad	Temp	Per.
11 ²⁴	30.381	5.866		Pos Period F
11 ⁵⁵ AM	30.359	7.436		Level G
11 ⁵⁶	Drain for neg Period.			
11 ⁵⁸ AM	30.256	10.055	.9991	Neg Per H
12 ¹¹ PM	adding for Pos Per.			
12 ¹³	30.418	4.967		Pos Per I
1 ²⁹ PM	30.354	7.504		Level J
1 ³⁰ PM	Drain for neg Period			
1 ⁰⁶ PM	30.230	10.785	.9990	Neg Per K
1 ⁴⁵	adding for Pos Period			
1 ⁴⁷ PM	30.448	4.239		Pos Per L
2 ¹² PM	30.355	7.524		Level M
2 ¹⁵	Drain for neg Period.			
2 ¹⁷	30.281	9.510		Neg Per N
2 ³⁰ PM	adding for Pos Period			
2 ³² PM	30.408	5.292	.99885	Pos Per O
3 ⁰⁰ PM	30.353	7.571		Level P
3 ⁰² PM	Drained into Tad adder to shut down.			
3 ⁰⁴	Source in.			
3 ⁰⁷ PM	L.S. = 29.379		Tad adder = 31.291	

@ 2:00 PM 8/11/59 Bottle #20 put in vault.
 460 m³/hr at contact
 1890 g total U
 from gross alpha ~ 97% U²³³

	Level	Tad	Temp	Purpose: ²⁸ / ₂₈ Meas.	SWM	J K Fox
4 ³³ PM	29.368	31.294	.99875	Source in, Scans SA		
4 ³⁵	Start feeding from Tad adder					
4 ⁴⁰	30.404	5.304		Rising on + Period		
4 ⁴¹	Remove Source. Still Rising on ~ 150 sec Period					
4 ⁴⁸	30.407	5.304	.99870	Start POS Period A		
4 ⁵¹	Start to level by draining into TA.					
5 ⁰⁶	30.342	7.707	.99865	Level		
5 ²⁰	"	"		level		B
5 ²²	Start to go on + period.					
	30.372	6.045	.99843		Pos. Per	C
	Drain for neg. period					
	30.283	9.071	.99858		Neg per	D
	Calibration Check					
5 ⁵⁴	Start to level					
	30.307	7.777			Level	E
6 ¹⁵	Start to add for + period.					
6 ²⁰	30.383	5.761	.99852		Pos. per	F
6 ²⁷	Start to drain for - period					
	30.243	10.078	.99853		Neg per	G
	Add for pos. period					
	30.419	4.839			Pos. Per.	H
7 ⁰¹	Start to drain for Neg Period					
08	30.256	9.227	.99845		Neg Per	I
7 ²⁶	Start to level					
7 ⁴⁶	30.305	7.935	.99837		Level Pos Per	J

EXP # 112 (Cont)

	Level	Tad	Temp		
7 ⁵¹	Start to add for + period				
7 ⁵⁸	30.394	5.524		Pos Per	K
8 ⁰⁵	Drain for Neg Period				
~ 8 ²⁰	30.267	9.480	.99835	Neg Per	L
8 ³⁶	add for Pos Period				
8 ⁴⁴	30.414	5.092		Pos Per	M
8 ⁴⁸	Start to level at hi Power				
9 ⁰⁰	30.332	7.862	.99830	level	Neg Per N
9 ⁰³	Start to drain				
9 ⁰⁸	30.237	10.358	.99825	Neg Per	O
~ 9 ²²	Pos Per				
	30.403	5.345		Pos Per	P
9 ^{31 1/2}	Start to level				
	30.334	7.884	.99824	level	Q
9 ⁴²	Start on Neg Period				
	30.256	9.761		Neg	R

8:54 PM screw button shutdown
Calib Check OK

8-12-59
samples taken # 131, 132, + 133
133 sample is ~ 1 gallon

EXP # 113 RLL + RKR
Critical + Periods

10:20	Inst. check - <u>O.K.</u>				
11:09	Source in IC ₁ + IC ₂ respond				
11 ¹⁰	adding solution.				
11 ⁴⁵	source out, slightly sub at 30.08'				
11 ⁵⁵	on Pos Period to Power, temp = 0.99518				
	Liquid Level	Tad	Temp	level	
1 ¹³	30.338	IC-3 = 9.10 ¹⁰ 7.491	0.99515	Level A	
1 ¹⁵ PM	adding solution to raise power level. + Pos Per.				
1 ¹⁷ PM	30.354	6.341		Pos Per B	
1 ⁵⁶ PM	30.341	IC-3 = 8.510 ¹⁰ 7.485		Level C	
1 ⁵⁷	Draining for Neg Per.				
1 ⁵⁹ PM	30.292	8.827		Neg Per D	
2 ¹⁶ PM	adding for Pos Per.				
2 ¹⁸	30.368	6.213	0.9952	Pos Per E	
3 ¹⁹ PM	30.333	7.483		Level F	
3 ²¹	Draining for Neg Per.				
3 ²³ PM	30.262	9.526		Neg Per G	
3 ²⁰ PM	?	?		Pos Per H	
3 ⁵⁰ PM	Draining to level.				
4 ¹⁸	30.331	7.482	0.99524	Level I	
4 ¹⁹ PM	Draining for Neg Per.				
4 ²¹ PM	30.260	9.526		Neg Per J	
4 ⁴⁴	x	5.323	0.99524	Pos. Per K	
4 ⁴⁴	Screw button Shut down				

174

@ 380
PM

8/14/59 Bottle # 21 & 22 put into vault.

21 = 2.97 Kg and 250 ^{mm} / hr
22 = 2.95 Kg and 290 ^{mm} / hr.

? D/G/A

Reg grain from "Birky"

#21 1663 g
#22 1971 g

Materials on hand

In Vault

#6 1.77
#7 1.61
#20 1.89
#21 1.66
#22 1.97

In Room

#19 1.46 (1.66 - .20)
#17 1.78

12.14 kg

According to my summary Total Delivered \approx 33.22 kg

Newton curve @ 57" C.M. = 32.25 $\times .97 = 32.22$

Newton curve @ 30.3" C.M. = 18.0 kg

26.9" \approx 12.85 l

Best estimate 33.22 - 12.14 = 21.08 kg in system

$\times .97 = 20.44$

hence Newton may be off 10% or gross analyses are off by that much.

If we add 5 barrels + 7 bottles = 1091 l or 22.8"

h = 30.3 + 22.8 = 53" Newton C.M. = \approx 30 kg

Too Much

Aug 12, 1959

5⁴⁰ Source on 16" slab tank, start
 Barrel #1 into slab. 31" 204 l

6 ⁰⁵	start #2	28" 185 l
6 ³⁰	start #3	28" 185 l
6 ⁵⁵	" #4	31" 204 l

Total Water Added 778

Move source to 6" slab.

7⁵⁰ Start (Bottle #19) to 6" slab tank 1.46 kg
 8⁰⁶ Start mixing 16" slab.
 8³⁵ Start Bottle #17 to 6" slab 1.78 kg
 3.24 kg

9¹⁷ Bottle #19 Complete

Move source Start Transfer to 16"

9⁴³ Transfer completeShift to fill 6" slab thru
both feed valves9⁵⁴ Tank full~10⁰⁵ Start transfer #6 to 6" slab 1.77 kg~10⁴⁰ start transfer #7 to 6" slab 1.61

(Transferred 4 ea 50 ml pipettes from #133 to #16
 bottle of Nisch, MTR)
 #7 1/2 gone.

11¹⁶11²²#7 empty - start transfer to 16"
from 6" slab with circ cont. in 6" slab.

Move source to 16" slab

12⁰⁰

CRM #2 ~ 4000 CRM ~ 12" to 6" in 6" slab.

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1201

AM

1205

Transfer Complete, cont Mix.

1205

Mixing stopped - homeward Bound

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8:15
AMSource on 16" slab C.R.M. = 4×10^3

Pump on, and mixing.

Inst Check, OK.

8:56

Source in: 1C-1 + 1C-2 respond.

8:58

Pumping solution into 5' cylinder.

9:45

Stop pumping.

EXP #114

$$1C-4 = 6.5 \times 10^{-13}$$

$$1C-3 = 2.1 \times 10^{-12}$$

$$1C-2 = 5.9 \times 10 \times 10^{-14}$$

$$1C-1 = 6 \times 10 \times 10^{-11}$$

Source
on
16" slab9:56
AM

Source out. Fuel ht = 49.268"

Sub Crit. Temp = 0.99747.

Drain into 6" slab

10:41

dup P reworking soln in 5' cyl. into 16" slab

10:45

Started mixing bottle #22 (1.97 kg) into 6" slab

12:02

transfer complete

Start soln. in 6" slab \rightarrow 16" slab

12²³ PM Transfer completed from 6" slab to 16" slab.

1¹⁰ PM Stop mixing.

same in

Adding solution to 5' cylinder

1⁵⁸ Stop feeding. $1C-3 = 2.2 \times 10^{-12}$

EXP #115 $1C-2 = 7.5 \times 10^{-13}$

$1C-2 = 5.5 \times 10 \times 10^{-12}$

$1C-1 = 6.1 \times 3 \times 10^{-11}$

C.R.M. = 5×10^3

Big Source
in 16" slab

Fuel ht = 98.398" Temp = 0.99925
Sub Crit.

2²² PM Dump solution.

2³⁰ Bottle #23 put in vault. (1.87 kg)

2⁴⁰ Started mixing bottle #21 (1.66 kg) into 6" slab.

3⁴² PM Transfer complete.

3⁵² Start Transfer to 16" Slab

4⁰⁹ Transfer complete. Cont. mix for 1/2 hr

4⁴⁹ stop mixing.

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EXP #116

done JKF

level Tad Temp

4⁵¹ PM Start pumping into 5' cylinder

5³⁰ 40.69 0.069 Some Multiplication 349

5³⁵ 49. 0.069 Max "

38 46 0.069 " "

41 47 0.069 " "

43 48.616 0.069 " "

add solution in cyl.

1C-1 = 0.0×10^{-11} 3 2.5×10^{-12}

CRM ~ 6000 2 = 1.9×10^{-11} 4 0.9×10^{-12}

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FC -1

2

3

4

Remove Small source, no change.

Insert source, remove large source

 1.65×10^{-11} $.55 \times 10^{-11}$ $.75 \times 10^{-12}$ $.4 \times 10^{-12}$

Remove small source.

 $.66 \times 10^{-12}$ $.35 \times 10^{-12}$ Dump Solution5⁵⁴~~Start Mixing circuit #3 & #4~~

Pump into 6" slab thru feed valves

6⁰⁵

Start Mix thru #13 & #14

6¹⁸

Start transferring from #23 bottle to 6" slab

Continue Mixing in 6" slab source on 6" slab

6⁵³

Transfer Complete. Continue Mixing in 6" and 6" slab.

7⁰⁸

Start Transfer to 16" slab thru feed valves and dump line. Continue mixing in 16" slab

Move Source To 16" slab

7^{26^{1/2}}

Transfer Complete. Continue Mixing in 16" slab

8¹⁶

Stop Mixing

EXP # 1178²⁰

Start Pumping into cyl.

Level Tad Temp 1 2 3 48⁴⁰

21.3

.069

 2.3×10^{-11} $.8 \times 10^{-11}$ 1.9×10^{-12} $.75 \times 10^{-12}$ 8⁵⁰

89.79

.069

Stop feeding

α detector jumped up perhaps a leak, a check in the room found no leaks. Since the ^{paper} advanced mechanism on the α monitor is defective it is possible that the sample

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was collected over a much longer period of time than ~~35~~ 35 min hence an abnormally high reading. A 13 minute sample was not excessive! Will proceed.

EXP # 117 (cont)

9:05 Start adding solution

Level	tail	Temp	1	2	3	4	
04	30.1	.069	2.3×10^{-11}	$.75 \times 10^{-11}$	2.0×10^{-12}	$.9 \times 10^{-12}$	
11	33.61	.069	2.8	.85	3.6	1.7×10^{-12}	
14	34.25	.069	3.5	1.05	5.5	2.8	
15	34.513	.069	4.3	1.25	8.0	4.0	
18	34.516	.069	1.00-374	5.0	1.45	10.0	5.0
26	34.695		on + period with some				
27	remove source						
29	34.695	.069	1.0×10^{-10}	2.9×10^{-11}	2.3×10^{-11}	1.3×10^{-11}	

nearly level, probably slightly sub because power level not high enough to override build in source as well as large source on 16" slab tank.

35 Drain thru during valve.

Add 171 L 26" from Barrel
(Estimated that 203 were needed)

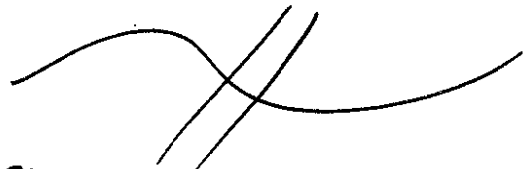
9:50 Start H₂O into slab10:23 Finish H₂O ~ 170 L

10:24 Transfer to 6" slab.

10:40 Completely fill 6" slab Start Mixing 16" slab

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10⁴⁹ Start Transferring U from # 20
 Cont. Mixing in Slab Tank
 ~ 11³⁰ Transfer complete from # 20 Continue
 Mix in 16" slab
 11³⁵ Start Transfer To 16" slab turn T.A feed and drain Continue
 mix in 16" Slab.
 ~ 12⁰⁰ Transfer complete Continue Mixing
 12¹³ Stop Mixing.



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8:15 Start mixing solu in 16" slab
 9:25 stop mixing
 9:26 just check OK
 9⁴⁵ AM Same in. 10-1 10-2 respond. EXP # 118
 9⁴⁹ Pumping solution into 5' cylinder.
 10²⁶ AM Same out. Pos Per. Solution ht = 41.025"
 10³⁸ AM Draining into 6", in order to estimate volume
 of solution.
 10³⁹ Same in.
 10⁴⁰ Shut down
 at this point it must be known
 whether more material will be
 obtained or not.

11:10 Yes, more U²³³ ~ 1.5 Kg
 11²⁰ AM 35l water added to 16" slab. Mixing pump
 on.
 12¹² PM Same in: 10-1 & 10-2 respond. EXP # 119
 12¹³ PM Pumping solution into 5' cylinder.
 1⁰⁰ PM Same out. Pos Per. Solution ht = 49.572?
 10-3 2 x 10⁻¹⁰
 10-4 1.2 x 10⁻¹⁰
 1⁰² PM Shut down, by dumping solution.
 liquid level jammed, next run drain
 thru feed valve in order to
 check seizure.
 2:30 } bottle # 24 received, 1140 mg U²³³
 at surface. Mass ~ 1.5 Kg U²³³
 EXP # 120.
 3²⁰ PM Same in. Pumping solution into 5' cylinder.
 Liquid level B = 46.036" Liquid level A = 16.032"
 4:25 19.701 on Level A → 49.9
 4:37 Start to level ~ IC-3 = 1.5 x 10⁻¹⁰
 4: 19.717 + 30 = 49.717 nearly level
 Temp = 1.0009.

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5¹⁰ PM Start adding 120 liters H₂O
 ~ 18" in Barrel

5³⁵ PM H₂O Transfer complete

5⁴⁰ Start filling 6" slab

5⁴⁶ 1/2 6" slab full - start mixing in 16" slab

5⁵⁵ PM Start transferring U from bottle #24.

6⁰⁷ Move source to 6" slab!

6³⁰ U Transfer complete Continue
 mixing 16" slab - Move source

6³¹ Start transfer to 16" slab from
 6" slab.

6⁴⁸ Transfer complete, continue mixing.
 Flush back into 6" tank by opening
 other feed valve until solution could be seen
 then transferred back to 16" slab.

7²⁸ Stop mixing and pump into cylinder
 Remove large source from room
 EXP # 121 SWM JKF
 Purpose: Check Crit Ht.

7²⁹ Start pumping into cylinder
 level tad
 3.3" Stop pump drain thru feed
 to check zero on cy. level B. reads .049
 change to 9.999. Drained some in 6" slab while
 decreased A 0.05" also

7⁵² Start pumping into cylinder

EXP #121 (Cont) Source set

level	Tad	Slab (Est)	Temp
7 ⁵⁷ PM	4.75	.069	Reb line ~ 21"
8 ⁰³	12.087	.070	" .9980
8 ⁰⁶	14.53		Stop for Porter to read gamma level on side of 16" slab = 250 mr/hr
8 ⁰⁶ 1/2			Start up again
8 ²⁰	29.76	.069	~ 21" 1.00238
	B	A	
8:26	36.53	15.632	.069 ~ 21"
8:30	41.07	15.632	.069 ~ 21"
8:35	45.956	16.028	
8:38	47.213	17.277	
8:40	48.449	18.490	
8:42		20.809	
8:45	Out	23.196	Out of solution in 16" slab
			IC-4 = ~ 2 x 10 ⁻¹² IC-3 = 3 x 10 ⁻¹²
			Pump out of 6" slab.
8 ⁵¹	Remove source	IC-3	solution had disappeared in bright glass
8 ⁵³	25.638		On pos period. level less than 8" in 6" slab
8 ⁵⁶	25.645		
8 ⁵⁶	start to level		
9 ⁰³	24.779		level 1.00236
9 ⁰⁷			D pump solution Pumped remaining solution out of 6" slab
9 ¹⁵			Start mixing. solution in 16" slab Pumped 13.6" in tad adder to flush line. Pumped out to 16 in slab.
9 ⁴⁵			Stop mixing

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Inst Check OK Purpose: 29/2h meas. on final sol.

EXP # 122 DWA, R.G., RKR

8⁴⁵ Start Pumping Solution Into 5 Cylinder

8⁵⁵ Stop - lq level B not responding

Drain thru feed valve to check level

zero again

level B	level A	Tad	Temp.
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9 ³⁰	000.00	15.620	0.67
-----------------	--------	--------	------

Start adding solution to

9 ⁵³	23.00	-	7.318	.99288	still feeding
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10¹⁵ Stop pumping: in order to check levels A & B.

level B.	level A.	Tad.	Temp.
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46.505	16.536	7.322	
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10 ²¹	47.597	17.565	7.321
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48.534	18.546		change A selcgn. 02
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X	18.526		
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10²⁶ start feeding solution, again, some mult.

10 ³³	some mult,	23.030	7.321	.99315
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10³⁸ Rising on period remove source, add more solution for faster rise.

10⁵² lost float on the odder liquid level
small Pump will not raise soln. into the 5' cyl at level (24.0 on A)

11⁰⁵ draining thru feed valve to lower power.

11¹⁷ source in

11²⁵ DWA adjusted #11 start → O.K. unjammed level

H:26	level B	level A	Tad adder	LCMP
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11:26	49.534	16.171	3.366	
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11:36	Pos. Period	source out	24.117	2.274	.9932
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11:39	source out	add soln			
-------	------------	----------	--	--	--

11:39		24.119	2.274		~ Positive
-------	--	--------	-------	--	------------

add move soln.

11:55		24.397	17.467		sub critical
-------	--	--------	--------	--	--------------

12:15		24.407	16.811		.9933
-------	--	--------	--------	--	-------

12:22			16.939		
-------	--	--	--------	--	--

12:43		24.400	16.939	.99331	Level A Critical
-------	--	--------	--------	--------	------------------

Start adding for Pos period

12:44	54	24.548	12.865	.99329	Pos Per B
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Start draining, Foamy period Allt OK

1:06		24.089	24.906	.99335	Neg Per C
------	--	--------	--------	--------	-----------

1:16 PM Start adding for Pos Period.

1:38 1/2		24.705	9.040		Pos Per D
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2:00 PM Start draining for neg per.

2:12 PM		24.250	20.889	.99331	Neg Per E
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2:29 Start adding for just exit.

2:51	48.534	24.378	16.904		Level F
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2:54 Start adding for Pos Per

3:00 PM		24.530	13.311	.99336	Pos Per G
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3:12 PM Start draining for Neg Per.

3:25		23.994	27.289	.9934	Neg Per H
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3:44 PM Start adding for Pos Per

3:51 PM		24.821	6.288		Pos Per I
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4:02 PM Start draining for Neg Per.

over.

	level B	level A	Tad level	Temp
4:13 PM	48.534	24.158	23.394	.99342
	Neg Per J			

	Adding solution for just emit.		K
4:26 PM	24.381	16.854	.99336
4:30			

4:30 PM shut down by scanning system.

EXP 123

8-18-59

DWM, RKR, RJ

8:15 Incl. check OK

8:20 sampler broken

8:05 source in, response → OK.

8:06 startup

	level B	level A	Temp
9:45	45.953	15.929	.99318
	46.075	16.151	
	47.038	17.089	
	48.038	18.075	
	48.228		
9:50	OFF	18.075	

	Level A	Tad level	Temp
9:58	23.951	0.052	.99322
10:00		source out	level
10:11	24.739	5.467	Positive
10:23	Start To level Drain into TA.		
11:07	24.438	17.244	.99335
11:15	24.585	12.755	

A level
B +

	level A	Tad level	Temp
11:31			
11:37	29.269	21.892	.99335 Neg Per C
12:14 PM	Start adding for Pos Per.		
12:22	24.700	9.929	.9933 Pos Per D
12:36	Start draining for Neg Per		
12:43 PM	24.142	24.532	Neg Per E
12:58	Start To level, build power level up to 10^{-9} on IC-3		
1:04 PM	29.441	17.307	Level F
1:26	Start adding for Pos Per.		
1:32	24.543	13.820	.99335 Pos Per G
2:01 PM	Start draining for Neg Per.		
2:07	24.306	20.782	.99335 Neg Per H
2:22	Start adding for Pos. period		
2:25	24.678	10.760	.99339 Pos Per. I
2:52	Start draining for just emit.		
3:17 PM	24.445	17.188	Level J
3:25	shut down.		

N.B. Slab reads 2 R @ 4:20 PM

Slab read 500 MR/HR @ 8:10 AM before Run # 123

R.K.R. DWM

8-19-59

8-20-59

8-21-59

8-24-59

Slit Tank

550 m/ha

600 m/ha

650 m/ha

700 m/ha

5 ft diam cylinder
 @ $h_c = 187$ cm 1 liter
 @ $h_c = 92$ cm 1 liter
 @ $h_c = 46$ cm 1 liter
 ~ 18.11 in.

5 hr period

$\frac{5}{8}$ hr period = 37.5 MIN

$\frac{5}{64}$ hr period = 4.6875 MIN = 281.25 Sec

$$S = \frac{1 + \epsilon_0 B^2}{1 + \epsilon B^2} \left[\frac{L^2}{1 + L^2 B^2} + \frac{\tau}{1 + \epsilon B^2} \right] \quad L^2 = L_0^2 \frac{\tau}{L} \approx 3.77 - 106 B^2$$

\tilde{h}_c	B_h^2	$B_c^2 = .00089$	B^2	S
50	.00395		4.84-3	24.7
51	.00379			
	.000153		1.53-4	
100	.000987		1.88-3	27.9
101	.000968			
	.00001945		1.945-5	
150	.00043865		1.33-3	28.5
151	.00043285			
	.00000579		5.79-6	
187	2.8224 -4			28.8
188	2.7924 -4			
	2.9946 -6			

$1.17-3 \left(\frac{187}{50} \right)^3 \times 2.9946 -6 = 1.5666 -4$
 vs 1.53-4

12/1/80

Chuck Newton wants

 $\frac{\partial S}{\partial h}$ detailsP162Found only one @ $h_c = 72.444 \text{ in.} = 184. \text{ cm}$

$$\frac{\partial S}{\partial h} = \frac{4.65 \times 10^{-4} \text{ (146 sec period)}}{2.574 \text{ in.}}$$

$$= 1.807 \times 10^{-4} / \text{in.}$$

at 47.76 l/in

$$= 3.784 \times 10^{-6} / \text{liter of solution}$$

$$R = 30.46$$

$$= 77.37 \text{ cm}$$

$$\frac{3}{80.37}$$

For 1 liter

$$T \approx \frac{122.9 \times 4.65 \times 10^{-4}}{3.784 \times 10^{-6}} \times 146 = 17941. \text{ sec.}$$

or 299. MIN
or 4.98 hrs

$$B^2 = \left(\frac{\pi}{187} \right)^2 + \left(\frac{2.404}{80.37} \right)^2 = 1.18 \times 10^{-3} \text{ cm}^2$$

$S \approx 28.8$

@ $\tilde{h} = 50 \text{ cm}$ $h = 47 \text{ cm} = 18.50 \text{ in.}$

$$B^2 = \left(\frac{\pi}{50} \right)^2 + .00089 = 4.84 \times 10^{-3} \text{ cm}^2$$

$$.00395$$

$$\Delta B^2 = \frac{-2}{k^3} \Delta h \quad \left(\frac{h_1}{h_2} \right)^3 = \left(\frac{187}{50} \right)^3 = 3.74^3 = 52.31$$

$$S \approx 24.9 =$$

$$\frac{2.574}{52.31} = 0.0492 \text{ in} \times \frac{24.9}{28.8} = 0.0425'' = \Delta h$$

for 146sec
@ 18.5 in
 h_c