

BOOK97R

Notes:

"Solutions #3 4.9% page 40-300" on front

"Solutions #3 U(4.9) O₂F₂" on-spine

there are 2 un-numbered pages (bounded) between 221 and 222

Blank pages: page opposite page 1, 1, 28, 37-39, 56, 153, 158, inside back cover sheets

-pages 17, 18, & 134 has 1 graph taped to each page

-page 27 has 1 (8.5x14) sheet, with 1 (8.5x11) yellow copy stapled to it, stapled to page

-page 36 has small piece of paper - paper clipped at top

-pages 43/44, 97/98, & 183/184 has paper clip at top of each page

-page 104/105 has (8.5x11) sheet between pages

-page 140 has drawing taped to it

Scanned by:

Sheila Finch

RSICC /Oak Ridge National Lab.

September 9, 1999

Solutions #3

9/14/62 →

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

S·E & M·VERNON·INC
M A N U F A C T U R E R S
NEW YORK·N·Y  ELIZABETH·N·J

No. 168 BLANK BOOK

JOURNAL	}	WITHOUT
SINGLE ENTRY LEDGER		U N I T S
DOUBLE ENTRY LEDGER		
RECORD		

IN 150 AND 300 PAGES

M A D E I N T H E U . S . A .

TO REORDER THIS BOOK, SPECIFY
NUMBER, RULING AND THICKNESS
AS INDICATED ON BACKBONE OF BOOK

14-2-1

EXPT. 25A

9/14/62

20-in. dia. cylinder with glass R-zobing rings (K2-33)
25 in Expts. 14 - 15 (solution by #2).

4
+
+

H/x ≈ 200. H₂O not blind gasket in flange
below 30" cylinder and removed one from
flange below R-zobing ring tank. Will rinse rings
with present sol'n before making final density
measurement.

9/14
C-2

JCC
RKR
EJ

START UP CHECK	
Equipment Checked by RKR	by RKR
Instrument checked by RKR	
Source to RKR	M-43
Emergency Contact JCC	
Red Light On by EJ	
Start Up OK'd by EJ	1000 9/14 1962

In try
K1, K2

JCC
RKR
EJ

PM-1, PM-2 Preliminary & actual experiments.
Pumped to top of rings. Selwyn 35.7. Found
slightly higher for average height of lead.
Pumped on to 36.7, damped.

JCC
R-1
PM-

1315

Determined that N.C. remote valve on dump
tank does not close on inst. trip if switch in
console is in "open" position.

EXPT. 25A

Repeat above, except to bare critical.
Check of sp. gr = 1.192 Lead rate = 1.62 ^{imp}/_{min}
Critical 41.365+
Moved C₁ to less sensitive position.
No change in count rate.

9/14/62

33)

+ Period 41.365 ($\approx 100ms$)

Settings
C-2

~~C-2~~ 1600 volts
Gain 8, Rise Time \approx P.D.L. 20

Log .05

9/17/62 Req 593185 for Effat #25
8/14 - 0.118200 / by phone
W. G. = 1.1854 9/18/62
140.6 f/lc 47K = 191.6

Received by mail.
9-20-62
8/19 = 1182
4/8 = 1.1894

ICC
+ RKR
EW

PM-2 requires 1150 V to get length level trip
Expt. 25 B

Trips trip
R-1, K-2
PM-1, PM-2

START-UP CHECK LIST	
Equipment Checked by	RKR
Instrument	Check by IDC
Source	RKR
Emergency	IDC
Red tags	RKR
Start Up OK'd by	RKR
Date	9/17 1962

Pos Per = 41.51"
Level 41.57

4

9/17/62

Data N.E. -

2 min Count	Position C-2	C ₁	C ₂	
		9"	151565	2391
	11" 15"	167966	3967	358
	13"	162188	4431	414
	15"	177132	9782	837
	17"	175576	13841	1,194
	19"	185986	33458	2,723
	21"	189134	59471	4,705
	23"	188619	137044	1,10
	25"	189628	244708	19,53
	27"	188216	611885	4,923
	29"	193679	912070	913
	28"	174967	726892	62,4
	26"	176898	277559	201
	24"	189897	173018	13,1
	22"	198060	77260	5,94
	20"	191071	48150	3,01
	18" 18"	164394	21266	
	18" 16"	127273	21234	
	18" 14"	130609	20391	
	18" 12"	125209	19698	
	18" 10"	127635	20851	
	18"	132816	21459	
	18"	137842	123768	
	18"	135891	24226	
	20"	942823	43755	
	20"	999065	59707	

The gain on C-1 amplifier had dropped drastically since the counter was set up 9/14. Above data N.E.

9/17/62

Solution changed. Delay apparently repeats itself at low fuel level.

at 15" fuel level, activity ≈ 250 imp at contact
 + Period 41.48 (between 100 & 200 sec)
 level. 41.485

Unreflected

1400	Position C-2	C-1	C-2
2 counts.	9"	677956	1850 185
	11"	716874	13105 294
3	13"	706306	14128 396
3	15"	709684	17813 746
	17"	728710	12409 1.154
4	19"	744298	29531 2.69
8	21"	759296	48049 4.29
10	23"	772741	108457 9.47
9	25"	773045	195114 17.1
9	27"	805034	522644 44.8
	29"	835693	840427 68.2
	28"	809513	748986 62.8
	26"	822556	293773 24.2
	24"	845876	165892 13.3
	22"	827507	68610 5.62
	20"	807272	42254 3.55
	18"	782141	19146 1.66
	16"	756464	11693 1.05
	14"	744408	6265 0.571
	12"	737629	3733 0.344
	10"	721543	2467 0.25

9/18/62

Expt. 252

9/18/62

IBC
RKR
EQ

STAR	ST
Equipment checked by <u>RKR</u>	Checked by <u>J.D.</u>
Approved by <u>RKR</u>	by <u>RKR</u>
"Check-In" checked by <u>RKR</u>	Serial No. <u>4-43</u>
Emergency grip by <u>RKR</u>	checked on <u>ICE</u>
Not Logged by <u>RKR</u>	by <u>RKR</u>
Start by <u>RKR</u>	on <u>9/18/62</u>

In trip
K-1, K-2
PM-1, PM-2

Moved chambers in toward cylinder.
Selsyn on magnetized bluish. Lags low light.
374"

Level 41.475" (Unreflected)

Drain solution leads to add H₂O reflection.
Zero on H₂O = 32 cm on side scale.

H₂O level 7" below top of cylinder. Side scale
150.5 cm. K-2 out of trip. Working.

148.9 (cm)
32
116.9 cm
46.02 in

Critical 41.05"; H₂O 148.9 cm (side scale)

Log N ≈ 0.11 (26" away from reader)

C₁ (Nov) P₂₅

C₂

C₃

Log N 0.08

9"	989810	1243	
9"	776611	852	(PS)
11"	782188	1589	158
13"	774880	2326	233
15"	775406	4474	448
17"	751129	6519	675
19"	735040	14420	1524
21"	749220	23407	242
23"	770405	59136	596
25"	776575	109103	109
27"	756016	267975	275

9/18/62

29"	731429	416767	44✓
28"	723694	380034	408
26"	750028	139764	1448
24"	747638	82965	86✓
22"	737223	✓34281	361
20"	734909	✓21483	227
18"	737944	9726	1024
16"	744047	✓6371	666
14"	748372	✓3079	320
12"	748168	1720	179
10"	747357	1124	117

1200

Down

"solution reads @ 190 m² at contact"

9/20/62 Checked sp. gr. = 1.192 sent sample to g-12

Reg 593186

G = 105.3

sp. gr. 1.19000

T = 20.0

sp. gr. 1.1900

N = 85.3

g/l = 141.6

H/x = 191.6

75
524
43
56
9
5

8

Expt. 26

9/25/62 1.540 Br₂ Kimbol glass Rzhing rings in 20 dia. ^{SS} tank. 1 1/4" = 200

9/25/62

IDC
RKR
ZQ

Equipment Checked by	RKR	IDC
Instrument		
Source In	RKR	
Emergency		M-43
Red Light On	RKR	IDC
Start Up OK'd by	ZQ RKR	10:05 9/25/62

NC

Imp: pm-1
K-1, K-2

Installed ~~old~~ (3-place) manometer next to new (2-place). Cleaned both. Replaced reading rings with 1.540 Br₂ rings. (Cf Expt. 12^B, p. 270 of Vol. 1 for v). Average bed depth = 20". Tube not replaced in P.M. 2, is it not in trip.

Feed rate: Old - 0.807 in/min, New - 0.75 in/min

→ Zeros: Old 0.001, New 0.05.

Bed depth on manometers 21.0". Subcritical.

Supercritical	25.80	25.730
Critical	25.80	25.732

9/26/62
IDC
RKR
ZQ

1030

At selenis reading of 0.40 on traversing counter, it is 3" from bottom. (Tube and counter installed.)

Imp: pm-1, P

Zeros: Old 99.905, New 999.96

9:15
9:20
10:20
10:30

1350

Start.

Imp: pm-1
K-1, K-2

Log N ≈ 0.002	Critical 25.67	25.591
Position ϵr	$\epsilon - 1$ (hours)	ϵr
3.00	28737	65126 1.651
5.00	31855	85850 2.774
7.00	34107	123327 4.04
9.00	35815	161766 5.30

NI

9/25/62	Position C-2	C-1 (Leads)	C-2	
	11.00	36431	196407	1.55
	13.00	35435	229265	1.86
	15.00	32989	237214	2.06
NC - ?	17.00	25542	248364	2.79
	16.00	18918	141008	2.14
	14.00	17504	112362	1.84
	12.00	16714	102163	1.75
	10.00	16676	81388	1.40
	8.00	17008	65794	1.15
	6.00	17894	55094	0.882
	4.00	19344	45561	0.676

Expt. 26B

9/26/62
 IDC
 RKR
 29
 due time
 PM-1, PM-2

START-UP CHECK LIST	
Equipment Checked by	RKR Personnel Check by IDC
Instrument and Safeties Checked and Ready by	RKR
Source in Checked by	RKR Source No. M-43
Emergency Equipment in Control Room Checked by	IDC
Red Light On by	RKR
Start-Up OK'd by	RKR Time 0915 AM Date 9/26 1962

PM-2 high level
 does not trip til
 ~1300 v. (discharge
 ~1200)

1.5% B₂O₃ Keimble glass Roehrig ring in 20" dia SS

9:15 Water ht. = 97 cm.
 9:20 adding solutions.
 10:25 Supercritical level: 24.94 Old 24.856
 10:30 H₂O level 96.2. Critical: 24.94; 24.857; Fog N₂ 0.002

	Pos. C-2	C-1 (Leads)	C-2	
7	3"	34828	133539	0.139
7	5"	33644	139437	0.144
7	7"	32374	121125	0.184
4	9"	32988	189340	0.1996
0	11"	02301	194293	0.209

NC

Position C-1	C-1 (Count)	C-2	
13"	31271	191531	212
15"	29550	196971	232
17"	25790	203451	275
16"	24547	152210	215
14"	24474	149452	212
12"	24443	169217	209
10"	25126	159913	222
10"	25700	170509	

N. 24

1110 Subcritical. Grind tube pulling up in the transverse counter. Visual inspection proved this not so.

1140 2nd: 99998 99932

1215 Critical 24.95; 24.871; Hd 95.7 cm (side seat). The data above is void due to bad amplifier in (C-2).

Position (C-2)	C-1	C-2	
17"	29300	585985	586
15"	26463	443160	491
13"	25848	408992	464
11"	24796	385340	455
9"	24132	351658	427
7"	24729	308497	366
5"	25649	262153	299
3"	26645	251207	276
4"	27496	278862	297
6"	28236	330933	344
8"	27804	359468	379
10"	26691	400626	440
12"	25189	426212	496
14"	23401	381435	477

2 min counts

"Water reflected"

~~10~~

2 min

1.3

Position (C-2)

C-1

C-2

16

20434

342971

492

1.30 PM

Pos. (C-2)

C-1

C-2

Bores: Crit. ht = $\frac{25.66}{25.59}$ 20" S.S. cyl 1.5% B₂O₃

2 MIN COUNTS

3"

21920

114987

1.14

5

24325

150099

1.35

7

29411

238695

1.78

9

34830

360918

2.27

11

37829

460333

2.67

13

37304

507717

2.98

15

35468

571264

3.53

17

28000

613928

4.81

16

23000

417908

3.98

14

21152

320990

3.19

12

21054

299726

2.99

10

21405

248288

2.54

8

22005

196328

1.96

6

22792

165084

1.59

4

24423

141490

1.27

297
344
379
440
496
497

12

E xpt. 27

9/27/62

IOE

RKR

29

Imp. Temp. pm-1

K-1

ppr

START-UP CHECK LIST	
Equipment Checked by <u>R.K.R.</u>	Checked by <u>F.P.C.</u>
Instrument and Safeties	<u>A. 113</u>
"Source In" Check: <u>R.K.R.</u>	
Emergency Equipment: <u>R.K.R.</u>	<u>M-43</u>
Red Light On by <u>R.K.R.</u>	
Start-Up OK'd by <u>R.K.R.</u>	<u>9/27/1962</u>

1.5% B₂O₃ ~~flow~~ ~~sheet~~ Glass Racking ring
in 20" S.S. dia cyl; 32 mil Cd sheet around
cyl and to a ht of 22". Cd sheet's are held
by 1/4" S.S. bands. Cd ≈ 21" up on rings; bottom 1/2" thick

1300 Cudding soln (H₂O ≈ 200) H₂O ≈ 97 cm 9-

1310 K-2 removed from trap; ammeter

1320 K-1 removed from trap; leads to amplifiers
switched.

1325 K-2 leads in trap. Difficulty was transferred
to K-1 by above switch.

1345 Silicited @ ≈ 25.1". Dumps to inspect setup
and add support under Cd.

1430 Added H₂O to ≈ 97 cm

1500 25.29; 25.203 Supercritical
log N ≈ 0.002 H₂O ≈ 96.2 cm

	Pos. CT	C _N	C _T	
1525	3"	556.90	344448 (2 min)	102
	5"	267.24	188298 (1 min)	142
	7"	257.54	226011	114
	9"	241.43	259871	0928
	11"	227.06	279306	0814
	13"	214.66	280526	078
	15"	220.00	326641	068
	17"	206.57	382080	054

16"	198817	303814	.065
14"	20540	275853	.074
12"	20997	281747	.074
10"	22083	248545	.089
8"	22519	208813	.108
6"	22859	180376	.127
4"	23396	155766	.150

1550 Down

climb

9-28-02

Reg # 593187

8/8

big reflector water sampler

4

28

14

78

28

54

14

9/28/62

EXPT. #28

10/

K-1 K-2
PM-2 PM-1
in trip.

START UP CHECK LIST	
Equipment Checked by <u>RKR</u>	check by <u>L.D.C</u>
Instrument and Ser	<u>RKR</u>
Source In <u>RKR</u>	No. <u>M-43</u>
Emergency <u>RKR</u>	checked by <u>L.D.C</u>
Red Light On <u>RKR</u>	
Start Up OK'd by <u>RKR L.S.</u>	Date <u>9/28 1962</u>

Repeat of Expt #27. Boxes (unrepeated)(w/cd.)
Found faulty connector on K2. Repaired.

0925 K-1 erratic. Out of trip.

Feed rate: Old 0.776 New 0.27 in/min

1045 Level Log N $\approx 0.002V$; 25.64", 25.663"

Pos. Cf Cf Cf

1 min ct.	3"	21435	1327.86	.161	
	5"	21568	156713	.140	
	7"	21605	197972	.109	
	9"	21695	252085	.086	
	11"	20990	288405	.073	14
	13"	20228	309116	.065	14
	15"	18657	338786	.055	
	17"	15168	374822	.0405	
	16"	13632	243873	.052	
	14"	12485	215929	.059	
	12"	12305	186748	.063	
	10"	12009	157898	.076	
	8"	11892	120901	.097	
vision ct.	6"	24531	200234	.122	
	4"	24553	162426	.157	

IL
R
E
IL
K
PM

10/1/62

Exp. 29

30" dia. insulated-type aluminum cylinder. Bore
H₇ x \approx 200. 20" from floor to bottom of tank.
Zeros: 0.02V, 0.00V

IDC
RRR
EJ

Equipment Checked by	RRR	Checked by	IDC
Instrument and No.			RRR
"Source In" Checked by	RRR	No.	M-43
Emergency Equipment		Checked by	IDC
Red Label No.	RRR		
Start Up OK'd by	RRR	Serial No.	1340
		Date	10/1/1962

In trip
K.L.K. ✓
PM-1, PM ✓

Blind gasket removed from line to 30" Al
cylinder and placed in line to resting ring
tank.

Height from floor = 20 in. (Set up in basement
frame on floor of cell)
Feed rate: 0.3 in/min.

1440	Critical	6.222	6.112	
144 ✓	Dump	6.110	6.111	Converted: 6.126

20
2
9
6
26
97
2
51

16

Expt. 30

9/ 10/2/62 15" Annular-type A1. Cylinder. $H/2 \approx 200$

K- IDC
PM RKR
in EA

START-UP CHECK LIST	
Equipment Checked by	RKR
Instrument and	IDC
Source in Use	RKR
Emergency Equip.	M-4
Red Light On by	IDC
Start-Up OK'd by	RKR
Date	10/2/62

Working: K-1
K-2, PM

Bottom of cylinder 26" from floor.
Zeros: 0.43, 0.310

Feed rate ≈ 0.7 in/min

1315 Super-critical 8.275 (New) 8.168 (Old)

1320 Level 8.27 8.160

14 Drain $\frac{42}{7.84}$ $\frac{310}{7.85}$ Corrected: 8.00

12/2/62 12" Annular-type Aluminum Cylinder
1772200.

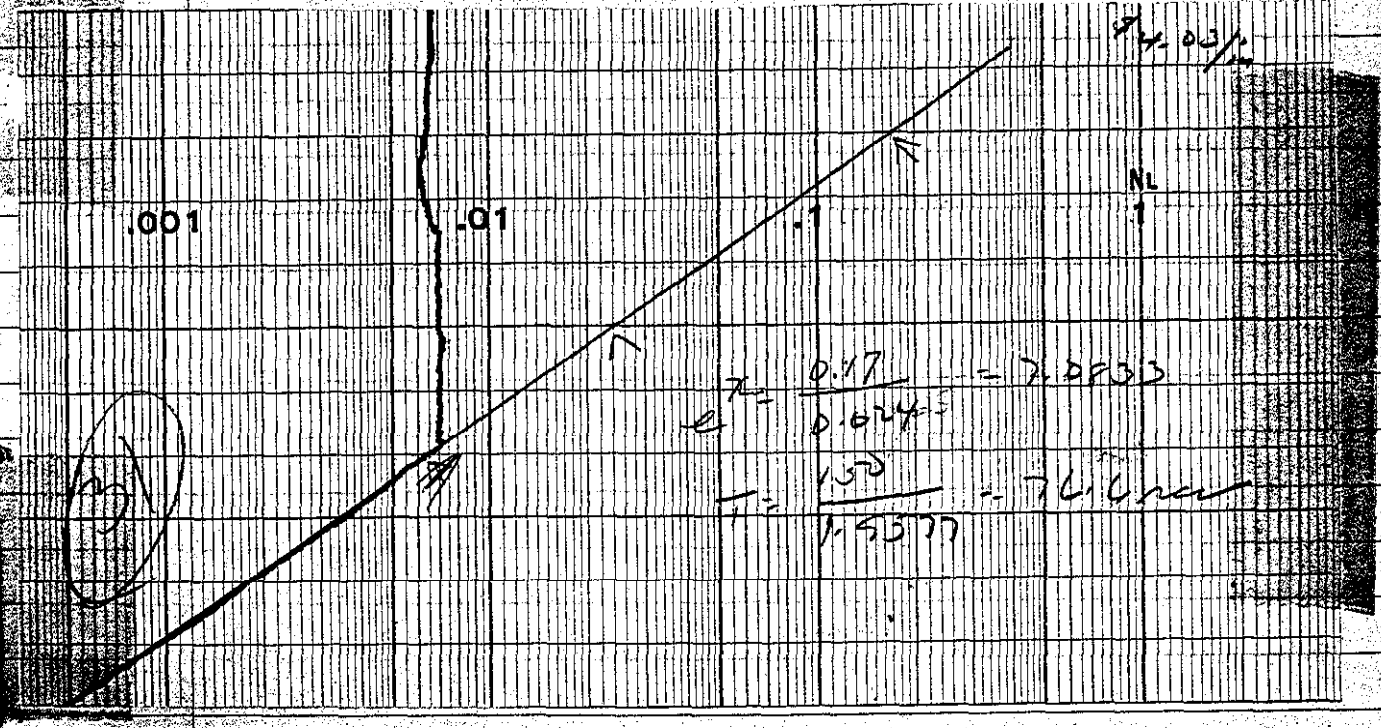
IDC
RKR
29
9m Trip
12-21
8m-1, pm-2

START UP CHECK LIST	
Equipment Checked by	RKR
Instrument	RKR
Source ID	RKR
Emergency Kit	IDC
Red Tag On by	RKR
Start-Up OK'd by	RKR
Time	1445
Date	12-10-62

Bottom of cylinder ~ 26" from floor

1450	mass: 0.65, 0.352		
	Feed rate 1.06"/min		
1515	+ level 11.21 in.	10.925 in	65.7 cm
	level 11.18 in.	10.892 in	65.7 cm
	0.65	0.352	
	10.53	10.500	

$T = 76.6 \text{ sec}$ $\Delta L = 0.03", 0.033"$ $\rho = \frac{7.7 \times 10^{-4}}{6.4 \times 10^{-3}} = 12.1 \text{ g/cm}^3$



18

Expt. 32

10" Annular-type Aluminum Cylinder

10/3/62

$\mu \approx 200$

IDC
RKR
EJ

START-UP CHECK LIST	
Equipment Checked by	RKR
Instrument and Set	by IDC
Source in Use	RKR
Emergency Equip.	M-40
Red Light On by	RKR IDC
Start-Up OK'd by	RKR EJ
Date	10/3 1962

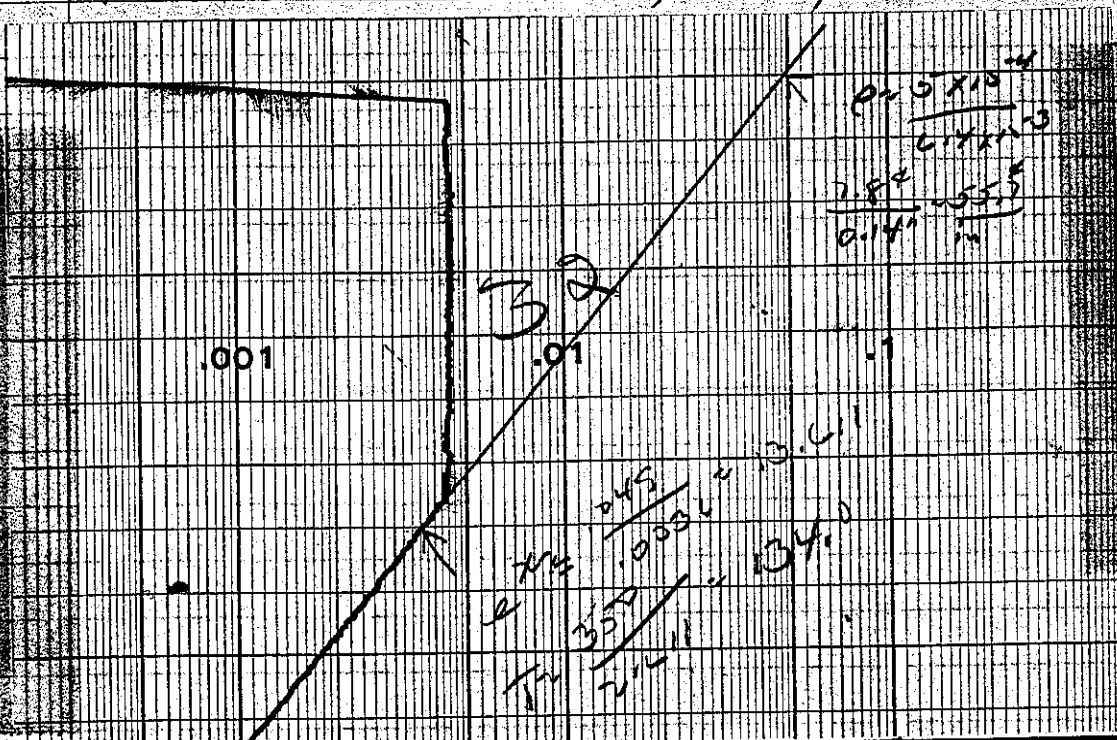
9:00 AM
10:00 AM
11:00 AM

Bottom of cylinder ≈ 20 " from floor.
zeros: 0.58", 0.310", 38.6 cm (telescope)

Feed rate: 1.6"/min

Level	≈ 1.56	91.9 cm
Level	≈ 1.70	92.3 cm
Level	≈ 1.56	92.0 cm
	.58	38.6
	.310	
	<u>20.98</u>	<u>53.4 cm</u>

T = 134.0 sec $\Delta t = 6.14", 0.119", 0.3 cm$



10/11/62

9 1/2" Aluminum Cylinder,

While pumping up to "good", a manometer line broke. About 1 liter of solution got in room 101. Scalded, painted grating; replaced both manometer lines.

There is a small leak in a Tim plumbing system feed manifold. Led snare joint taped with Jelco tape.
Factory representative sending replacements.

20

Expt. 33

5 1/2" Dia. Al. Cylinder with 1 1/2" plastic

10/17/62

line

EDC
RKR

START-UP CHECK LIST	
Equipment Checked by	RKR
Instrument used by	RKR
Source to	RKR
Emergency	EDC
Red Logm. Log by	EJ
Start-Up OK'd by	RKR 5:14:30 10/17/62

Sm. Amp.
K-1, K-2
PM

1510

H/x ~ 200.
Feed rate ~ 9 in/min. Flow 0.007;
Critical 42.95 in., 42.927 in
Drain

40/1

R
2
E

Sm
K-2

Res

E x p t . 34
0.595B heating rings in 20" dia. SS cylinder

9/19/62

RKR
E/R

START-UP CHECK LIST	
Equipment Checked by	RKR Personnel Check by RKR
Instrument and Safeties Checked and Reset by	E/R
"Source In" Checked by	RKR Source No. 17-43
Emergency Equipment in Control Room Checked by	SJ
Red Light On by	EA AM
Start-Up OK'd by	RKR Time 1:50 PM Date 9/19/1962

Imp: K11
PM-2
K-21

32 mmol cd sheet around cylinder on top, 12.
H/x ≈ 300. Feed rate = 1 in/min. Preliminary
size of rings before making final density
measurement. Critical ≈ 26.5 in. New
manometer not working properly.
In window voyage for Kette, John promising.

Res # 593189

Gross 110g	gm/gm = .083680
Flux 20	Sig. = 1.1276
Net 90g	
Dens = 1.130	

H/x ≈ 290 ; 94.36g/l

22

Expt. 34 B

10/22/62

Repeat of #34 for Dore Turbomere

IDC
RRR
EJ

START-UP CHECKLIST	
Equipment Checked by: <u>RRR</u>	by: <u>IDC</u>
Instrument checked by: <u>RRR</u>	<u>RRR</u>
Source in place checked by: <u>RRR</u>	
Emergency stop in center: <u>IDC</u>	<u>RRR</u>
Red Light On: <u>RRR</u>	<u>RRR</u>
Start-Up OK by: <u>RRR-0530</u>	Date: <u>10-22-1962</u>

1 1/2" ≈ 300
1.5" B₂O₃ lens
20" dia. vent.

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

Feed rate ≈ 0.8 in/min.

New (2-place) manometer in trouble; suggest tightening down, some improvement but does not read with 3-place. If flat follow sulin level.

1035 + Period 26.864
1040 End @ 26.864
1100 fog M ≈ 0.01

	C _N	C _T	Position C _T	C _T /C _N
1 min ct.	43123	114073	4"	2.69
	43732	115897	4"	2.65
	44084	179544	6"	4.07
	45170	257768	8"	5.71
	44262	378280	10"	8.54
	42975	519254	12"	1.21
	41571	632653	14"	1.52
	36515	751814	16"	2.06
	31385	859274	17"	2.74
N.G.	32609	675177	15"	2.05
	34618	460621	13"	1.33
	38060	387419	11"	1.02
	39899	293974	9"	.736
	40837	194422	7"	.476
	42594	107542	5"	.316

	C_N	C_T	Per. C_T	C_T/C_N
10/22/62	40066	719152	15"	1.67
7/2	41495	710330	15"	1.71
1135	Drain level to top of rings.			
1315	H_2O to ≈ 107 cm			
1330	Soln 26.509 in.; $H_2O \sim 104.5$ cm (side hole)			
	C_N	C_T	Pos C_T	C_T/C_N
1345	35609	117606	4"	3.30
	37097	177676	6"	4.78
	34960	237881	8"	6.82
	32957	321376	10"	9.74
	30819	430728	12"	14.0
	28080	505750	14"	18.0
	24827	596501	16"	24.0
	22433	741611	17"	33.1
	24527	505511	15"	20.6
	28664	427277	13"	14.9
	33070	380644	11"	11.5
	31636	268366	9"	8.48
	30128	167766	7"	5.58
	28992	108633	5"	3.74
1405	Dump			

24

Expt. 35

10/24/62 1.5% D_2O_3 Rings in 20" dia. Cylinder. H_2O 7400
with Cl (suspension)

In trip:
21, 16, 21
PM, PM

Equipment Checked by	RKR	Date	10/24
Instrument	RKR	Model No.	102
Source	RKR	Serial No.	M-43
Emergency		Operator	JDC
Revised by	RKR	Start-Up Date	10/24 1962
Start-Up Date	10/24	Operator	JDC

Diluted saline to $p = 1.086$. Pump over rings. Dry
Feed rates ≈ 0.7 in/min. H_2O level ≈ 111 cm (side)

11:45 Critical 27.765 in. (saline)

11:56 Saline 27.781 in, H_2O 107 cm (side scale)
 $Lg N \approx 0.015$

Reflected

C_N	C_T	Pos. C_T	C_T/C_N
17010	17726	4"	1.04
17353	31572	6"	1.82
16351	51556	8"	3.16
16252	90969	10"	5.60
16594	154558	12"	9.34
16512	234800	14"	1.42
16344	366002	16"	2.24
14858	507814	17"	3.41
15124	255456	15"	1.69
16197	166848	13"	2.04
17674	121962	11"	0.690
19258	80689	9"	0.419
19626	46066	7"	0.234
18875	25715	5"	0.136
17694	177421	13"	1.005

12:30 Drain H_2O , ^{completely} saline to top of rings. Move chambers.

12/24/62

Uninflated

1350

Critical 28.232 in.

C_N	C_T	Pos. C_T	
33727	29907	4"	0.888
35759	55159	6"	1.54
27651	72899	8"	2.61
27955	128840	10"	4.60
28174	222955	12"	7.92
28456	327825	14"	11.5
27250	507696	16"	18.6
24098	646634	17	26.8
23348	333760	15"	14.4
23663	200443	13"	8.47
24077	141598	11"	5.80
24898	86866	9"?	2.49
25978	51470	7"	1.98
27527	30001	5"	1.09
29001	102076	9"	3.52
30079	105567	9"	3.51

Reg # 593190 $g/g = .058420$ $H/x = 435.7$
 $G = 101.00g$ $S.g = 1.0839$ $63.3 g/l$
 $W = 20.00g$ $H/x = 436$

$M = 81.00g$
 sample sent for recheck. Reg # 593191 # 35 A
 $G = 104.50$ $g/g = .058460$
 $T = 20.00$ $S.g = 1.0834$
 $N = 84.50$ $H/x = 431$ $63.88 g/l$
 avg: 63.6 g/l

26

Eypt. 36

18/10/76 ✓ Check of Rhodette on + Periods

Equipment Checked:	RKR	J02
Instrument no:	RKR	
Source in use:	RKR	M-43
Emergency Number:		
Red Lights On:	RKR	DF3D 1945 18/10/76
Start Up OK'd by:	RKR	

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

Same equipment as for Eypt. 35.
Serial 28.234 in.

10:30 Down

X-494

TO: R. K. Reedy

FROM: G. R. Wilson

SERIES NO. _____

ANALYTICAL DATA REPORT SF

THIS FORM IS TO BE USED ONLY FOR REPORTING AN OF INVENTORY, VERIFICATION OF MATERIAL CONTENT LABORATORY TO OTHER INSTALLATIONS AND VERIFICA RECEIVED FROM OTHER INSTALLATIONS.

ANALYZED FOR: U

Lab. No.	Sample code	<i>corrected mg/gw.</i>	Density @ 20°C	sp. g
10869	1	59.325	1.0830	1.0859
10870	2	200.866	1.3687	1.3724
10871	3	86.116	1.1295 @ 24.5°C	1.1327
10872	4	119.750	1.1883	1.1916
10873	5	267.210	1.5533	1.5577

Activity in _____ REMARKS

Concentration _____

Sample Counted at _____ % geometry

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

Samples + waste retained to be picked up by sender.

CONTROL NO. S.F. A 181
 DATE 1-15-63

ANALYTICAL DATA REPORT SHEET

DESIGNED ONLY FOR REPORTING ANALYSIS FOR VERIFICATION OF MATERIAL CONTENT BEING SHIPPED FROM THE INSTALLATIONS AND VERIFICATION OF MATERIAL CONTENT IN INSTALLATIONS

U METHOD OF ANALYSIS: Pot.

									PRECISION OF ANALYTICAL METHOD	REMARKS
3p.g										
1.0859										
1.3724										
1.1327										
1.1916										
1.5577										

WRL + CB
 Laboratory Supervisor

*Added to
 1. Sender*

REQUEST FOR CONTROL ANALYSIS

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

NAME B. K. Ready
 SERIES NUMBER 661, 9213 4-12
 DATE SUBMITTED _____

Chg. No. 4410-28

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

SAMPLE CODE	DESIRED ANALYSIS	ESTIMATION OF CONCENTRATION	PREVIOUS HISTORY OF SAMPLE	NATURE AND ESTIMATION OF ACTIVITY	CONCENTRATION OF ALL CONSTITUENTS IN SAMPLE	VOLUME OR NET WEIGHT IN LITERS OR GRAMS
1	g/g U		63.3		93% Enriched	65.4 gms
2	Density 1.5g/cm ³		279		UNH	75.4
3	↓		94.4			79.8
4			141.6			68.8
5			414.9			67.5

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

B. K. Ready
 Requestor

1-19-63 solution samples sent to X-10 - Reg # A-924 ¹⁸¹

Sample # 2
 G - 95.6
 T - 20.2
 N - 75.4g
 $\frac{g}{g} = .200966$
 Density = 1.3697
 Sp. Gr. = 1.3724

Sample # 3
 G - 99.8
 T - 20.0
 N - 79.8g
 $\frac{g}{g} = .086116$
 Density = 1.1295
 Sp. Gr. = 1.1327

Sample # 4
 G - 89.5
 T - 19.7
 N - 68.8g
 $\frac{g}{g} = .119750$
 Density = 1.1883
 Sp. Gr. = 1.1916

Sample # 5
 G - 86.3
 T - 18.8
 N - 67.5g
 $\frac{g}{g} = .267210$
 Density = 1.5533
 Sp. Gr. = 1.5577

Sample # 1
 G = 84.5
 T = 19.1
 N = 65.4g
 $\frac{g}{g} = .059325$
 Density = 1.0830
 Sp. Gr. = 1.0859

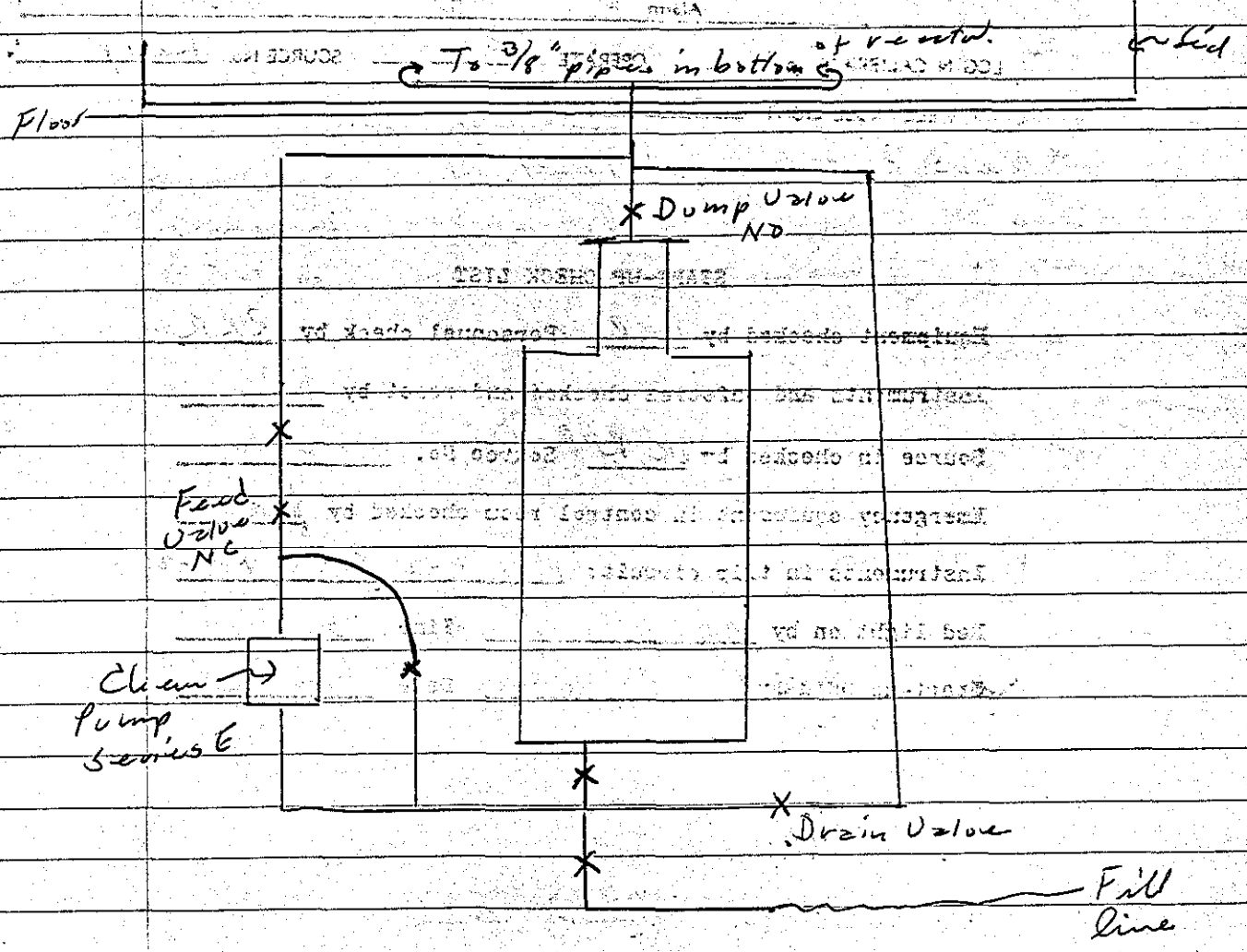
Sample taken from the following

#1 - manifold #4 - 10 l bottle #3
 #2 - 12 l bottle #149 #5 - " " #4
 #3 - " " " #185

6/26/63

Chemical Disposal

Received amount with water jacket
 filled with water - and capped off.
 Co. for coating on outside of jacket.
 Installed in pit with temporary
 plumbing system directly below in 151.
 About 55 l of water in 8" ID stainless
 cylinder which will serve as storage &
 dump well. H/x = 50.
 K-1 & K-2 & Log at bottom of pit with
 counters in top (See p. 2 for details)



30

6/26/63

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 10 ⁻¹²	Meter ✓	?	✓	10 X 10 ⁻¹²
		Fast ✓	?	✓	
K-2	10 X 10 ⁻¹²	Meter ✓	?	✓	10 X 10 ⁻¹²
		Fast ✓	?	✓	
R-1					
R-2					
PM-1	0.6 1200	Alarm ✓	Contact	✓	0.5
PM-2	1200	Low ✓	18"	✓	900
		Alarm ✓	2"	✓	
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. <u>R-1</u>	
DUMP WELL PROBE LIGHT				SOURCE No.	

D. X New detected on PM-1.

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by RR

Source in checked by DC, RKR Source No. M-006

Emergency equipment in control room checked by RKR

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

Red light on by ADC Time 1315

Start-up OK'd by RKR, DC Date 6/26/63

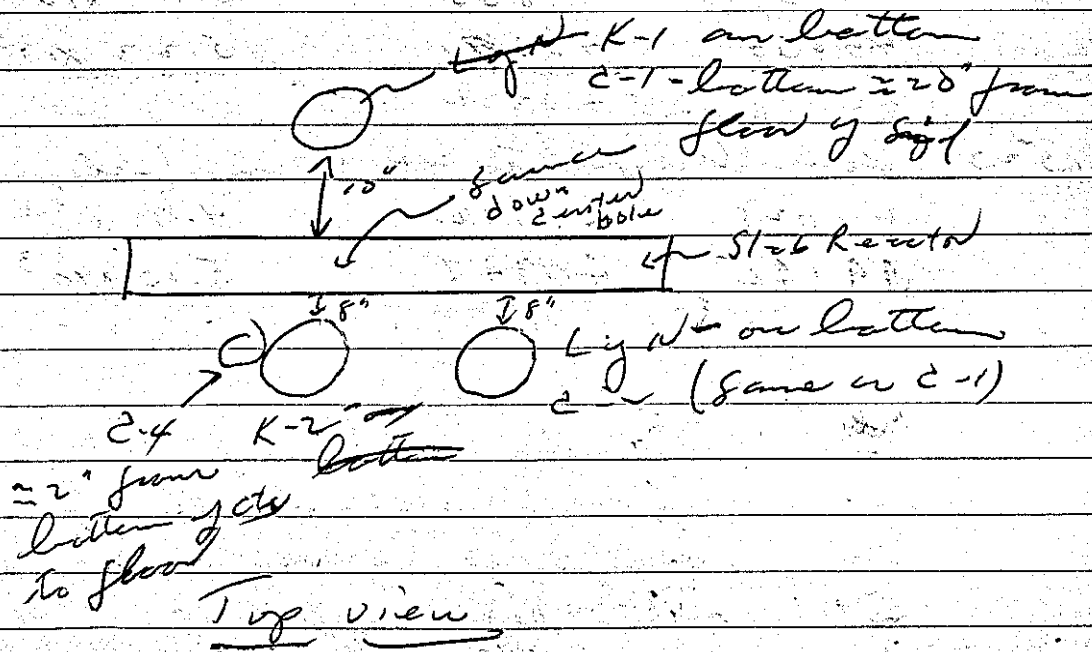
COUNTERS

Date

6/24/63

Channel	Detector	Amplifier	Gain	Rise Time	PHS	HV
C-1	2" RCL	PA-44B	8	0.2 μ s	15	1500
	#1939	A-123801	—	—	—	—
C-2	2" RCL	PA-349	16	0.2 μ s	25	1800
	#1773	A-100303	—	—	—	—
C-3	—	—	—	—	—	—
C-4	1" RCL	PA-502	16	0.2	20	1650
	1087	A-100363	—	—	—	—

At seleny reading of 7.39" the probe is judged to be within 1" of bottom of reactor. Max. safe height should be 47.5 in. at a seleny reading of 54.89 in.



same in. salin @ 7.39

4/24/63	C-1	C-2	C-4	
	4136	4101	8.4 x 10 ³	2 min
	10523	10428	2.12 x 10 ³	5 min
	10192	10063	2.11 x 10 ³	5 min
	10358	10396	2.12 x 10 ³	

Bottom of source is 10" above "zero" of 7.39. (Selaym reading of 17.85 in.)

1410 Salin height to 17.885 in. (Selaym)

15002	14677	2.55 x 10 ³	5 min
15163	14848	2.65 x 10 ³	
15083.686	14765	0.707	2.6 x 10 ³ .808

1430 Salin height to 25.89 in. (Selaym)

39548	36516	4.87 x 10 ³	5 min
39268	36792	4.86 x 10 ³	
39408.200	36504	.284	4.87 x 10 ³ .430

1453 Salin height to 34.52 in. (Selaym)

44137	40865	5.10 x 10 ³	5 min
44054	40691	5.23 x 10 ³	
44096.255	40778	.255	5.17 x 10 ³ 0.410

1520 Salin height to 44.93 in. (Selaym) (Feed rate 700cc/min)

44028	40770	4.97 x 10 ³	5 min
44142	40947	5.10 x 10 ³	
44085.255	40858	.255	5.03 x 10 ³ 0.421

When the salin height was about 52", it was noticed that the probe made a higher contact as if there were waves on the surface. At a probe & salin height of 52.21 in. an inspection of the height was made by RKR

4/26/43

from the cat-walk at the top of Sid.
 (There had been no increase in neutron
 level during the addition of the last at
 least 17 in. of solution.) An attempt to raise
 the probe toward its upper limit of 54.89 in.
 (design) made it clear that the probe had
 been, presumably on the top of the vessel
 where the pipe is welded, and was actually
 lifting the vessel. (The max distance the
 probe was actually withdrawn was ~50 in.)
 The tumbler supporting the vessel in
 its frame had come unhooked on the
 south side. Action: dump solution, remove
 tumbler, lower probe. No spill. Plumbing
 system secured. Sauce left in place. E/P

4/26/43

on

it

34

6/27/63

Expt. 2
Water Support & Chem Tech S-6.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	STARTUP RANGE
KK1	10 X 10 ⁻¹²	Meter ✓	?	10 X 10 ⁻¹²
		Fast ✓	?	
KK2	10 X 10 ⁻¹²	Meter ✓	?	10 X 10 ⁻¹²
		Fast ✓	?	
RR1				
RR2				
PRM1	0.6	Alarm ✓	Contact	500
PRM2	1200	Low ✓	18"	500
		Alarm ✓	4"	500
LOCK/UNLOCK	✓	OPERATE	✓	SOURCE
DUMP WHEEL PRESS LIGHT				Ray

START-UP CHECK LIST

Equipment checked by RKR Personnel check by IDCInstruments and safeties checked and reset by RKRSource in checked by RKR Source No. M-226Emergency equipment in control room checked by IDCInstruments in trip circuit: K-1, PM-1, PM-2Red light on by RKR Time 08:30Start-up OK'd by RKR, GJ Date 6/27/63

Removed probe.

Set "zero" on H₂O level at 25.0 cm (side scale) at top plate of bottom support plate (bottom of lowest cooling jacket).

9/27/63

0920

Slab reactor full of solution

C-1

C-2

C-3

46063

41708

 6.43×10^3

5 min

45813

42024

 6.27×10^3

5 min

46030

42319

 6.17×10^3

5 min

1027

H₂O @ 16.65 cm (side scale). This brings H₂O to top of 6" side pipes.

C-1

C-2

134504

216210

 1.967×10^4 5 min

134952

216360

 1.964×10^4

134721 .74

216959 0.46

 1.928×10^4 0.51

Dropped sol'n level 11.0 in.

130260

228857

 1.886×10^4

129625 0.77

229708 0.407

 1.882×10^4 0.502

1120

Dropped sol'n level 9 7/8" (9.625) = 20.625 in wet

126935

231446

 1.870×10^4

127752 0.788

231249 0.403

 1.826×10^4 0.54

1140

Dropped sol'n height 12.5" (32.625 in. wet change)

94932

165658

 1.614×10^4 5 min

94448 1.06

166047 .60

 1.593×10^4 0.626

1155

Dump sol'n.

88457

119779

 1.033×10^4 5 min

87926 1.13

119701 .834

 1.053×10^4 0.962

6-27-63 Samples taken from storage system.

Sample #1 sent to X-10. Control # A-931

G = 153.5 $\rho/\rho = .31268$ @ Phone 2-1-63
 T = 22.9 sp. gr. = 1.5624 312.68 ρ/ρ
 N = 130.6 Density = 1.5582 1.5624 @ 29°
 488.53 g/l = 24.43 Kg^m
 454.97 g/l = 22.75 Kg^m 0.35

Sample #2 Reg # 593198 sent to Y-12.

G = 133.0
T = 22.9
N = 110.1

ick for.

accy = W% 1.00 - X-93.13% U - .31% @ 5.56%
 $\rho/\rho = .312100$
 sp. gr. = 1.5610
 "40 Cement Pyro"

8-7-63 Samples S-1 - S-2: workings from acid after cleaning at X-10

S-1		S-2	
G = 97.0	$\rho/\rho =$	104.8	$\rho/\rho =$
T = 20.3	sp. gr. =	20.2	sp. gr. =
N = 76.7		84.6	

$\approx 50 \text{ l}$ Ed N.
 to J. Nichols
 9/1/63
 $\rho \approx 0.31268$
 $\rho = 1.5624$

488.53 g/l
 $24.43 \text{ kg for } 50 \text{ l}$
 $454.97 \text{ g (25) / l}$
 22.75 kg (25)
 $25 + 93.13 \text{ g}$
 $118 \approx 52$

U(5) 22 FV

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SFT	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	5"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	3×10^{-12}	Meter ✓	2"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	cont	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-90
DUMP WELL PROSE LIGHT		✓			

Exp #1

START-UP CHECK LIST

Equipment checked by E.D.G. ERR Personnel check by F.D.C.

Instruments and safeties checked and reset by ERR

Source in checked by RRR Source No. M-43

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

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

Red light on by RRR Time 10:05

Start-up OK'd by E.D.G. ERR RRR Date 5-21-69

E.N.

Zero = .03

Solution feed rate = $1.43 \frac{\text{mg}}{\text{min}}$ 41

15" dl annular-type cyl: in Big lid: Done:

11 15

Solution ht = 26.45" System sub crit: Drain:
Stopped here in order to clean out filters in
by-pass line, and to adj feed rate:

1405

Solution ht = 52.57"; Same out:
System sub crit:
Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	cont	✓	3×10^{-12}
"	"	Test ✓	"	✓	"
K-2	3×10^{-12}	Meter ✓	cont	✓	10×10^{-12}
"	"	Test ✓	"	✓	10×10^{-12}
R-1					
P-2					
PM-1	650V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	24"	✓	900V
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

Exp # 2

START-UP CHECK LIST

Equipment checked by RRJ, Personnel check by RRJ.
 Instruments and safeties checked and reset by RRJ/ERR
 Source in checked by RRJ Source No. M-43
 Emergency equipment in control room checked by T.P.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by T.P.C Time 0915
 Start-up OK'd by T.P.C RRJ Date 5/22/64

Zero = .02

15" al cpl. annular type

10⁰⁰ mm solution ht = 65.03" System sub crit. (In Big Side; Box). Drain.

10³⁰ AM. Sample taken from well after draining back to
-42.00"

Req # 709688. Sp #2 sub for
G = 159.3 g 1. g/g = .437200
T = 17.0 g 2. sp. gr. = 1.9905
N = 142.3 g 170.258 g

K-1, K-2, L & N moved to inside of lid in
preparation for H₂O reflector. Top temp
installed.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	3"	✓	
		Fast ✓			
K-2	3 x 10 ⁻¹²	Meter ✓	Contact		
		Fast ✓			
R-1					
R-2					
PM-1	Low	Alarm			
PM-2	reduced	Low			
		Alarm			
LOG N CALIBRATE _____		OPERATE _____	SOURCE No. _____		
DUMP WELL PROBÉ LIGHT _____					

When pumping H₂O up to yard, noticed
that K-1 & L & N were both "rising"
because of chamber vibration. Will be
anchored better.

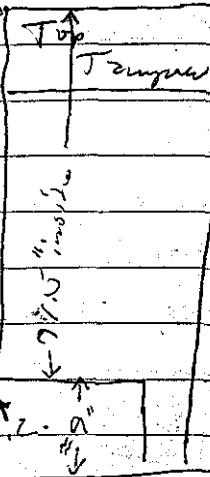
44

5/2/64

Experiment 3

U (590) F_v15 in. Al annular cylinder with H₂O reflector

Top of 15" dia cylinder



✓ Thermocouples located below cylinder and $\approx 15''$ from bottom.

? 21

H₂O Temp 22.5

Range: 22.7 @ 1527 to 22.8 @ 1400
Bottom of fluid

1440 Feed rate: 1.8 in./min. End correction: -0.02 in.

1455 H₂O @ 67.5 cm.1525 Solution 16.43 in., T_{emp} @ 48.89 in. (in contact). Supercritical.1530 Just critical with T_{emp} @ 48.77 in.

Solution reads 16.47 in., which means that some is clinging to T_{emp}.

1540 T_{emp} 48.99 in. in contact with solution @ 16.42 in. - 0.02 = 16.40 in. critical height

1545 T_{emp} @ 49.11 in., solution indication @ 19.12 in., subcritical. Vol of soln not changed. Drain solution. (T_{emp} lowered to val. which was critical).

1615 Repeat critical:

Set solution @ 16.42 in. T_{emp} lowered to 48.955 in. (contact). Repeat with T_{emp} lowered to 48.98 in. (also contact). Added soln to a soln indication of 21.66 in. (in annulus) + period

5-25-64 Sample Taken from manifest:

Reg # 709689 Exp #3

S. = 163.8 act for

T. = 18.1 1. 7/8 = 1.44000

N. = 145.7 2. 1/2 = 1.9896

③ 875.46 2/2

cut

zib
l.
il)

ed

46

U(5) OFR

13-in. Aluminum Cylinder

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D	SET	START-UP RANGE
K-1	3×10^{-12}	Master ✓	Cont	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	10×10^{-12}	Master ✓	Cont	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm	Cont	-	500V
PM-2	1200V	Low	18"	✓	900V
"	"	Alarm	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

Exp # 4

START-UP CHECK LIST

Equipment checked by AKK Personnel check by AKKInstruments and safeties checked and reset by AKK ERRSource in checked by AKK Source No. M-43Emergency equipment in control room checked by F.P.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKK Time 13:25Start-up OK'd by AKK F.P.C. Date 6-1-64

13" F.P. al. cyl. accumulator type: Bari

Solution level in vessel = 11.995" M4 level reads 12.03"
 ∴ zero correction = -0.03 in. 29 7/20/64

M-2

M-4

60.108 in.

60.10¹⁴ (Top of tunnel)

14:15 Filled cylinder to 108.180⁺ in. on M-2. Quite
subcritical - essentially no multiplication.

14:20 Drains.

13" Al, H₂O reflectors, U(5) on Fr

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	ST	START UP RANGE
K-1	3 X 10 ⁻¹²	M for ✓	3"	✓	3 X 10 ⁻¹²
"	"	Ext ✓	"	✓	"
K-2	10 X 10 ⁻¹²	Meter ✓	Cont	✓	10 X 10 ⁻¹²
"	"	✓	Cont	-	"
R-1					
R-2					
PM-1	700V	Alarm	Cont	-	500V
PM-2	1200V	Low ✓	18"	-	900V
"	"	Alarm ✓	2"	-	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT					

Expt #5

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKM Time 0825
 Start-up OK'd by F.D.C. AKM Date 2-69

x_{end} = 0.00 in.
 (5th of 4th)
 7/20/69

13" F.O. al cpl; conular type - water reflected;
 H₂O In ≈ 130 cm.

0935 Without top + ampw: slight + period @
 H₂ = 29.75 m² 9.78 in.; definitely + @ 29.91 m.

4/2/64

Approximately level @ 29.775 in. in throat
top tapers. (Nominal 12" dia tapers, (oil)
more tapers down to solution.

09:45 Oil contact: Solution @ 28.54 in., critical.
(Tapered solution reading 28.77 in.)
Drain to center tapers in cylinder.

With tapers realigned:

10:15 { Taper @ 28.82 in. (contact), slight + period
Solution 28.54 in. - 0.03 = 28.51 in. - H_c ^{7/10/64}
Run tapers in to displace solution and
fill the annulus. Subcritical. (No change
in mass.)

Back to contact @ 28.82 in. ~~run~~ Don't
find level point: try period with tapers
Taper @ 28.49 in.
Solution 30.06 in.

Taper removed to 28.82 in. (contact) again slightly + period
Solution added to fill annulus

@ sol. ht 29.44 in. definite + period.

Taper out. solution height read 28.74 in.

Add fuel to maintain level

(10:30) Sol. ht: 29.80 in. slightly positive

10:36 Sol. ht 29.63 in. critical [K₂ chart paper removed]
in By-pass screws of K₂

29.74 + period

10:40 Drain fuel. Shutdown.

6-2-24

11:04

Recheck critical without sampler. (Sampler @ 68.02")

11:20

Salutim @ 29.79 in., very slightly positive.

H₂O Temperature 19°C.

11:25

Drain.

12:30

Sample taken from manifold:

Ref # 709690

G = 165.8 sub for:

T = 17.2 1.74g = .445900

N = 151.6 2. sp. gr. = 2.0169

Refluxor Water sample sent to 1-12

Ref # 709691.

U(5) $0.2F_2$ in 12" 14 " Aluminum, Reflectors

INSTRUMENT CHECK

4/3/64

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

LOG IN CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

Sheet # 6

START-UP CHECK LIST

Equipment checked by PKA Personnel check by AKA

Instruments and safeties checked and reset by PKA

Source in checked by PKA Source No. M-43

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

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

Red light on by PKA Time 10:45

Start-up OK'd by F.P.C. PKA Date 6-3-64

12.250" F.P. all cylinders; aneroid type;
Water reflected:

Solution in vessel = 12.03"; M4 reads 12.02"

1130 Sid filled in the Hd

1305 + permit in the solution @ 08.74 in. Top
temp at top of cylinder.

4/3/64

1315 Critical without top tanger @ a solution height
 of 56.81 in. H₂O Temp 15°C
 + 0.01 = 56.82 in ^{7/11/64}
 (out of contact)

1325 Solution 55.30 in, tanger 55.52 in, + period.
 Tanger 55.54, solution reading 55.42 in. (contact)

1335 Tanger in contact: Tanger 55.15 in, Solution 55.20 in
 Remove Tanger to 55.64 in, Solution 54.97 in.
 Sub-critical $\frac{+ 0.21}{54.98 \text{ in} = H_0}$
 Tanger 55.15 in - Contact - Slightly positive $\frac{7/11/64}{2/}$
 Solution 55.21 in
 Remove Tanger to ~~55.64~~^{55.64} in, Solution 54.96 in
 Very slightly sub-critical

1340

Insert Tanger to 54.63 in, Solution 59.46 in - period
 Tanger set @ 55.15 in, add fuel to 59.75 in, + period.

4/4/64

U(5) O₂ in vacuum* 12.13-in.-ID Aluminum 53
 Cylinder, Reflector
 INSTRUMENT CHECK

#	INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
	K-1	3 x 10 ⁻¹²	Motor ✓ Fast ✓	3"	-	10 x 10 ⁻¹² "
	K-2	3 x 10 ⁻¹²	Motor ✓ Fast ✓	Contact	-	10 x 10 ⁻¹² "
	R-1					
	R-2					
	PM-1	700V	Alarm ✓	Contact	-	500V
	PM-2	1200V	Low ✓ Alarm ✓	18" Contact	-	900V "
	LOG IN CALIBRATE ✓		OPERATE ✓	SOURCE No.	B-80	

Expt. 7

START-UP CHECK LIST

1. Equipment checked by RKR Personnel check by AKK
 Instruments and safeties checked and reset by CI
 Source in checked by RKR Source No. M-43
 Emergency equipment in control room checked by F.P.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by RKR Time 11:45
 Source pulled by F.P.C Date 6-4-64

* Installed nominal 60-mil plastic liner on inside of 12 1/4-in.-ID Al cylinder. Contact is poor in region of joint joints in plastic, thus leaving gaps between liner and inside of cylinder.

4/4/64

1230

Side full of H₂O.

1318

Solution height 71.02 in., + print. no temp
tamper.

1320

Solution @ 69.78 in. Critical + 0.01 = 69.79 in.

1325

Drain solution.

H₂O 7/4/64 89

"with top tamper"

1418

Begin run to check critical height of cylinder
with tamper. Upper level of tamper travel set
at 71.96 in. Above this point tamper will hang
on liquid.

1448

Solution @ 68.15 in before contact - sub-critical

Contact between solution & tamper: Tamper 68.39 in. just
Solution 68.27 in. critical

1450

Tamper withdrawn to 69.00 - Solution @ 68.16 in. neg. period

Contact.

Tamper 68.39 in.

Solution 68.30 in. just critical

.01
68.17 in. H₂O 7/4/64 89

Water temp = 19.3°C

1452

Drain:

6-15-64 Samples taken from manifold:

IS Report 709692

Expt 7-1

G = 157.6 arb. for

T = 18.5 $1.9 \frac{1}{2} = .444600$

N = 139.1 $2.4 \frac{1}{2} = 2.0155$

= 896.098%

Report 709693

Expt 7-3

sent to 7-12

G = 143.5

T = 18.0

N = 125.5

arb. for:

1 = 242 = .44600

2 = 49 = 2.0135

3 = Pyro 40:

4 = oxy: 5.04

= 898.028%

IS Expt 7-2

G = 179.8 arb. for

T = 18.0 $1.9 \frac{1}{2} = .44344$

N = 161.8 $2.4 \frac{1}{2} = 2.0195$

= 895.528%

Expt 7-4

G = 162.7

T = 18.1

N = 144.6

sent to X-10

arb. for

1 $2 \frac{1}{2} = .44400$

2 $4 \frac{1}{2} = 2.0186$

= 896.268%

The reason for two samples each. In taken samples

there was a distinct difference in color in

samples 7-1-7-2 from 7-3-7-4. Samples 7-3-7-4

were taken after mixing in manifold for ~ 30 min.

7-1-7-2 taken before mixing: was used last on 6-9-64

in Expt 7.

INSTRUMENT CHECK

57

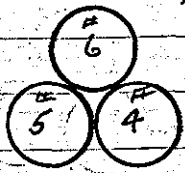
INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10 ⁻¹²	Meter -	2"	✓	300 ⁻¹²
"	"	Fast -	"	✓	"
K-2	3X10 ⁻¹²	Meter ✓	"	✓	10X10 ⁻¹²
"	"	Fast -	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm -	Cont	✓	500 V
PM-2	1200 V	Low -	18"	✓	900 V
"	"	Alarm -	Cont	✓	"
LOG-N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

Exp # 8

START-UP CHECK LIST

Equipment checked by AKH, Personnel check by AKH
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH Source No. M-93
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKH Time 1345
 Start-up OK'd by F.D.C., AKH Date 6-30-67

1415 Three (Non 9.5" I.D. cylinder unreflected) in a triangular array: avg spacing ^{5.5} = .060"; could not get in contact.



(OVER)

Zero = .05

14:25 Feed rate = 1.58" / min.

~~14:25~~ When liquid level on M-1 needs 40.00"; M-2 needs ~~40.00~~ 40.003"

15:30 Solution ht = 56.07" System very sub crit:
 K-1 = 10 ~~10~~ 10⁻¹² ~~10~~
 K-2 = 10 ~~10~~ 10⁻¹² ~~10~~

15:35 Drain;

Sept 19
 INSTRUMENT CHECK

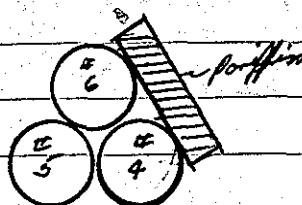
INSTRUMENT	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1 3 x 10 ⁻¹²	Meter ✓	Cont	✓	10 x 10 ⁻¹²
"	st ✓	"	✓	"
K-2 "	Meter	2"	✓	"
"	st	"	✓	"
R-1				
R-2				
PM-1 7000	Alarm	Cont	✓	5000
PM-2 12000	Low	18"	✓	9000
"	Alarm	Cont	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80
DUMP WELL PROBE LIGHT ✓				

Apt #9

START-UP CHECK LIST

Equipment checked by RKL Personnel check by F.D.C.Instruments and safeties checked and reset by RKLSource in checked by RKL Source No. M-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by RKL Time 0830Start-up OK'd by F.D.C. RKL Date 7-1-69 $Z_{\text{zero}} = .05''$

Three (from 9.5" I.D. al cylinders with 6" x 4 1/4" baffles on one face) in a triangular array; avg spacing = .060" could not get in contact.



0926 Saturation level = 56.05" system very sub crit:

K-1 10.110⁻¹²K-2 10.110⁻¹²

0940 Drain solution down to 24.05"; in order to fill cylinders #4, 5, 6, to proper level; 24.00"

over.

1455 Now have 6 units in line: unreflected:



avg F_{err} in #8,7 = 0.57"



Solution ht in #5, 4, 5, 6 = 24.00"
 " " " #7, 8, 9 = 40.00"

1521 System very sub crit:

1530 Drain solution down to 24.57" in #5, 7, 8, 9, in order to fill cylinders to proper level: 24.00"

1555 Shut down:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	cont	✓	3 x 10 ⁻¹²
"	"	Fst ✓	"	✓	"
K-2	3 x 10 ⁻¹²	Meter ✓	1/2"	✓	10 x 10 ⁻¹²
"	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

Exp #10

START-UP CHECK LIST

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

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

Source in checked by A.K.A. Source No. M-93

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

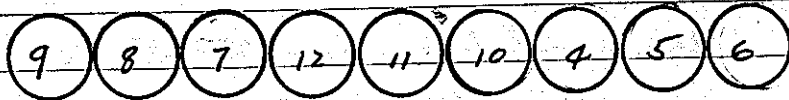
Instruments in trip circuit: K-1 K-2 PM-1 PM-2

Red light on by A.K.A. Time 10:05

Start-up OK'd by F.D.C. A.K.A. Date 7-6-69

Zero = 0.56" in F³ 10, 11, 12

Now have 9 (non 9.5" cylinder) in-line and unreflected.



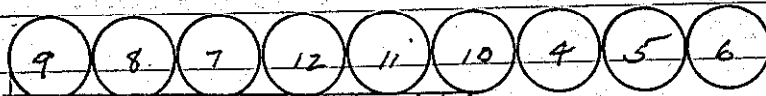
11:00

Resolution ht in #s 4, 5, 6, 7, 8, 9 = 24.00"

" " " #s 10, 11, 12 = 40.18"

System sub crit;

~~11:05~~



poriffis



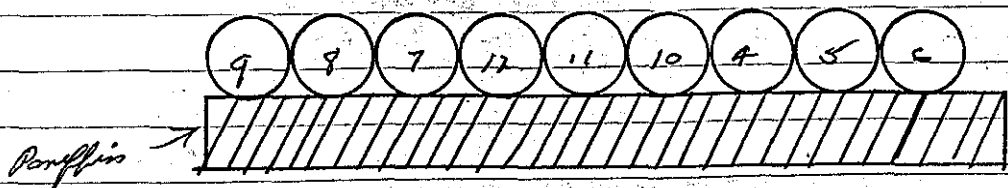
12:30

Now have poriffis on one face as shown above.

6" x 2 1/4" x 5 9" (#s 12, 11, 10, and the remote fill cyl)

over

12:55 Solution ht = 25.20"; system very sub crit:



13:10 Now have perffin on all of one face as shown above.
6" x 24" x 90"

13:35 Solution ht in #s 10, 11, 12 = 36.56" system very sub crit

13:45 Drain solution down to 24.56" in #s 10, 11, 12, in order
to fill cylinders to proper level;

14:00 shut down.

7/23/64

N.B

Since the nominal r.i.d. is spacing (P. 81) it
was determined that the variation in spacing
over the 24 in. height was ± 0.030 in

INSTRUMENT CHECK

63

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	cont	-	3x10 ⁻¹²
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	10x10 ⁻¹²
"	"	Fast -	"	-	"
R-1					
R-2					
PM-1	700V	Alarm -	cont	-	500V
PM-2	1200V	Low -	18"	-	900V
"	"	Alarm ✓	cont	-	"

LOG IN CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

Exp # 11

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. M-43

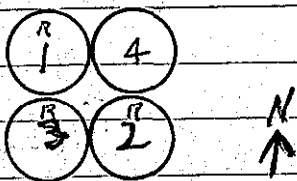
Emergency equipment in control room checked by I.D.C.

Instruments in trip circuit: R1, K2, PM1, PM2

Red light on by RKR Time 0845

Start-up OK'd by RKR I.D.C. Date 7/7/64

Four (9.5" dia cylinders) in a square array, unsheathed:
 avg spacing^{5.5} = 68 mil. #4 cylinder at a fixed ht of 24.00"
 Avg. Zero in #1, 2, 3 = 0.72"



cur.

0935

0940

Solution h_5 in #3 1.2.3. = 29.74" : system sub crit.
 Drained solution; shut down.

13:25

added ~ 225 l of solution to manifold: Mixed
 for ~ 35 min: Two samples taken: one sent
 to Y-12 and one to X-10

Y-12 #1

X-10 #2

Reg # 709694

Reg # A-940

sub for:

sub for:

1. $g/g = 1.445200$

1. $g/g = 1.44283$

2. $sp. gr. = 2.0250$

2. $sp. gr. = 2.0252$

3. $conv = X\% = 4.99$

= 896.828%l

4. $Pyro 40$

= 901.538%l

Y-12

X-10

$\bar{G} = 137.6$

$\bar{G} = 143.6$

$T = 18.1$

$T = 18.1$

$N = 119.5$

$N = 125.5$

INSTRUMENT CHECK

65

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1/2"	-	3 X 10 ⁻¹²
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	10 X 10 ⁻¹²
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700 V	Alarm -	cont	-	500 V
PM-2	1200 V	Low ✓	18"	-	900 V
"	"	Alarm -	cont	-	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

Exp 5 # 12
START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKAJ

Source in checked by RKAJ Source No. M-43

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

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

Red light on by RKAJ Time 0910

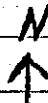
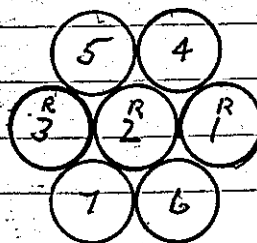
Start-up OK'd by F.D.C RKAJ Date 7-8-69

Seven (7) 9.5" I.D. cylinders unruptured in a triangular array; avg S.S. spacing = 13.7" (Can not get in contact).

Zero in #^s 1, 2, 3 = .98"

#^s 4, 5, 6, 7. RB = 24.00"

avg.



11:25 + Per ; solution ht = 17.39"

11:29 lightest just crit ; solution ht = 17.34"
 .98

11:30 Drains

$16.36 = H_c$

Sept # 12-1

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter -	1/2"	-	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter -	1"	✓	10×10^{-12}
"	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	700v	Alarm ✓	cont	✓	500v
PM-2	1200v	Low ✓	78"	✓	900v
"	"	Alarm ✓	cont	✓	

LOG N. CALIBRATE ✓

OPERATE ✓

SOURCE No. B-80

DEMAND WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-43

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

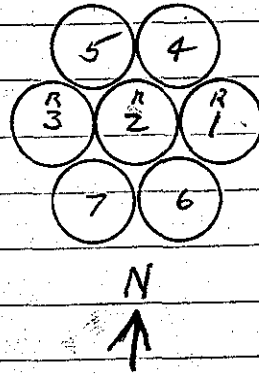
Instruments in trip circuit: K-1 K-2 DM-1 DM-2

Red light on by AKA Time 0915

Start-up OK'd by F.D.C AKA Date 7-9-64

Zero in #^s 1, 2, 3 = .98"

Repeat of Expt #12: avg side-side spacing ~~now~~ now = 354"



09:50 solution ht = 25.09" system sub crit;

10:20 solution ht = 56.06" system just crit; crit ht = 56.06

-.98
H_c = 55.08"

10:22 Drain;

12:55 Repeat of above: spacing now avg 2.51"

13:15 Per: solution ht = 18.37" avg crit value = 18.36"

13:17 - Per: solution ht = 18.35" -.98
H_c = 17.38

14:50 Repeat of above; avg S.S. spacing = 382" in.

15:10 + Pen: solution at = 19.73"

15:11 + Pen: " " = 19.67"

15:12 - Pen: " " = 19.09"

15:14 + Pen: " " = 19.65"

avg end 15 = 19.645

142 ~ $\frac{198}{18.665}$

Shut down:

APP 12-2
INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1/2	-	3 X 10 ⁻¹²
	10	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	10 X 10 ⁻¹²
	"	Fast ✓	"	-	"
R-1					
R-2					
FM-1	700V	Alarm ✓	cont	-	500V
FM-2	1200V	Low ✓	18"	-	900V
	"	Alarm ✓	cont	-	"

LOG-N-CALIBRATE OPERATE SOURCE No. B 80
DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RKAJ Personnel check by RKAJInstruments and safeties checked and reset by RKAJSource in checked by WLL Source No. M-43Emergency equipment in control room checked by F.P.CInstruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by RKAJ Time 0820Start-up OK'd by F.P.C. RKAJ Date 7-10-64Ferro in #^S 1.23. = .98"Repeat of Expt #12: avg side-side spacing = 1.501"

0950 + Per: solution ht = 21.30" avg crit value = 21.29"

0955 - Per: solution ht = 21.28" $H_2 = \frac{-98}{20.31}$ Repeat of above: avg side-side spacing = 1.754"

11:00 + Per: solution ht = 25.78"

11:02 + Per: " " = 25.71"

11:04 - Per: " " = 25.69"

11:05 hyper joint crit: solution ht = 25.69" $H_2 = \frac{-98}{24.71}$

11:06 Drain:

Expt #13

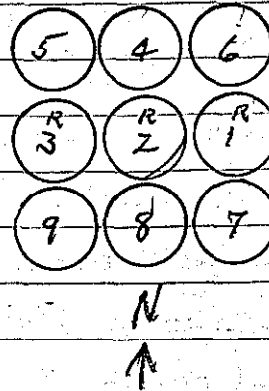
14:50 Now have a square 3x3 array:

Ferro in #^S 1.23. = .98"

Side to side spacing = 1.50"

over,

S.S. spacing = .750"



15:35 Solution $H = 50.46''$

$$H = \frac{-0.98}{49.48''} \text{ system sub crit!}$$

15:37 Drain:

Opt # 13-1
INSTRUMENT CHECK

INSTRUMENT	CE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE	
K13 X10-12		Meter ✓	40"	✓	3 X10-12	
"		Fast ✓	"	✓	"	
K2 "		Meter ✓	1"	✓	10 X10-12	
"		Fast ✓	"	✓	"	
R-1						
R-2						
PM-1 7000		Alarm ✓	cont	✓	5000	
PM-2 12000		Low ✓	18"	✓	9000	
"		Alarm ✓	cont	✓	"	
LOG IN CALIBRATE		✓	OPERATE		✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT						

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKJ

Source in checked by RKJ Source No. M-43

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

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

Red light on by RKJ Time 10:05

Start-up OK'd by F.D.C/RKJ Date 7-13-68

Zero = .98"

Repeat of Ept¹³ (page 69+70); file-side spacing (.500)

1037 + Per; solution ht = 24.87"

1040 - Per; " " = 24.80"

1042 system just exit; solution ht = 24.82"
- .98"
H₂ = 23.84"

1045 Drain;

7-14-63 Filling cylinder # 13. $F_{err} = .01$
 Solution at = 24.01" #13 filled to 29.00"

INSTRUMENT CHECK

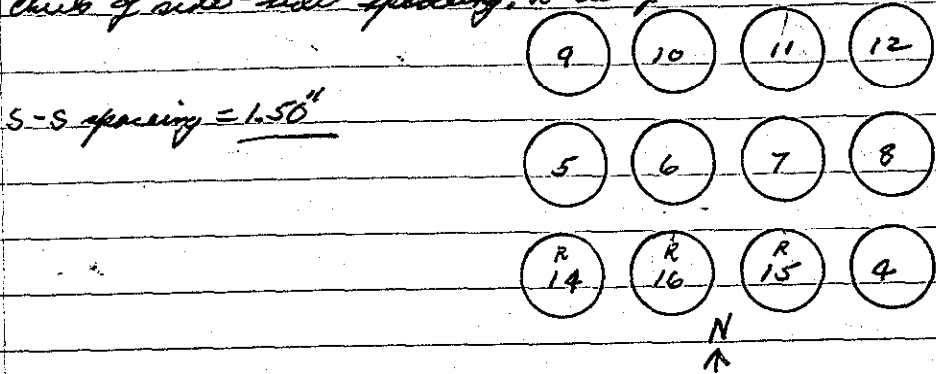
INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1/2"	✓	3 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	3 X 10 ⁻¹²	Meter ✓	1"	✓	10 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	✓	cont	✓	"
LOG IN CALIBRATE ✓			OPERATE ✓	SOURCE No. B-8	
BUMP WELL PROBE LIGHT ✓					

Exp # 14

START-UP CHECK LIST

Equipment checked by AKK Personnel check by AKK
 Instruments and safeties checked and reset by AKK
 Source in checked by AKK Source No. M-93
 Emergency equipment in control room checked by T.D.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKK Time 10:10
 Start-up by T.D. - AKK Date 7-16-63

10:25 $F_{err} = .08''$ in #s 14, 15, 16
 Purpose is to fill cylinders #s 14, 15, 16 to 24.00" and a
 check of side-side spacing, to see if 4 more units can be added to array.



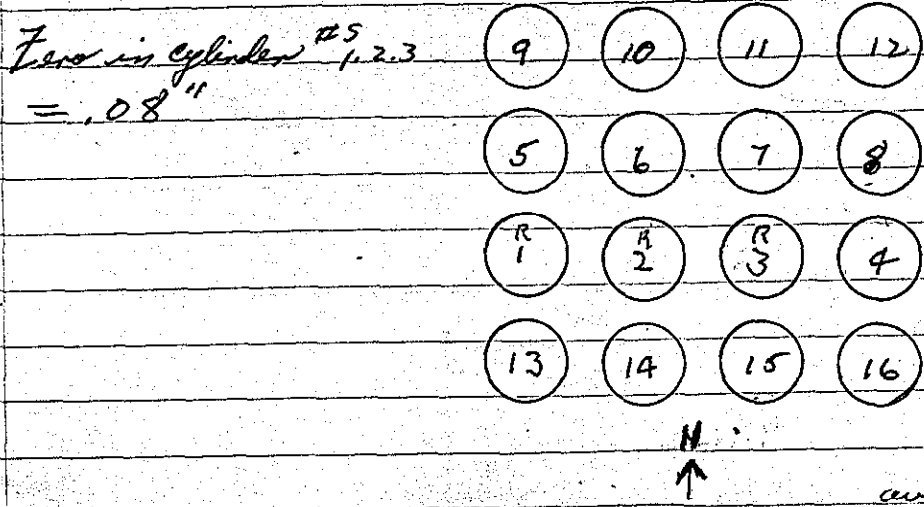
11:00 Solution h.t. in cylinders #s 14, 15, 16 = 40.00" system sub side.

$$\begin{array}{r} 40.00 \\ -.08 \\ \hline 39.92'' \end{array}$$

11:12 Drain solution down to 24.08" in order to fill cylinders
 #s 14, 15, 16 to proper level of 24.00"

Eff # 14-1

15:20 Now have 16 cylinders in square array: 4x4
S-S spacing = 1.50"



over

1600 + Rev: Solution ht = 27.07" in:

1609 System joint crit: Solution ht = 26.94" in

H_c = 26.83

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	1/2"	✓	10 x 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	crit	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	cont"	✓	"
LOG-N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-90	
DUMP WELL PROBE LIGHT ✓					

Expt # 14-2

START-UP CHECK LIST

Equipment checked by AKA Personnel check by F.D.C.Instruments and safeties checked and reset by AKASource in checked by AKA Source No. M-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKA Time 0930Start-up OK'd by F.D.C. AKA Date 7-17-64

0930 Repeat of Expt # 14-1 (P 73-74):

Zero = .08"

S-S spacing now = 1.40"

10:00 + Pen: solution ht = 23.80" in.

10:05 system just on; solution ht = 23.76"
-0810:06 Drain: H₂ = 23.68" in.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter —	1/2"	—	3 x 10 ⁻¹²
"	"	Fast ✓	"	—	"
K-2	"	Meter ✓	1"	—	10 x 10 ⁻¹²
"	"	Fast ✓	"	—	"

R-1

R-2

PM-1	700V	Alarm —	cont	—	500V
PM-2	1200V	Low —	18"	—	900V
"	"	Alarm ✓	cont.	—	"

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

DUMP WELL PROBE LIGHT _____

Exp # 15

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RAK

Source in checked by RAK Source No. M-43

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

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

Red light on by RAK Time 11:10

Start-up OK'd by I.D.C. RAK Date 7-21-64

Purpose is to fill cylinders #^s 17, 18, 19, 20, 21, 22, 23, 24, 25, to a ht of 24.00"

11:25 Zero in cylinders #^s 24, 20, 22, = .01"

11:39 Solution ht in cylinders #^s 24, 20, 22 = 24.01" - .01 = 24.00"

12:25 Found valve now leaking in cylinder # 24. Went re-fill.
~~to~~

13:05 Zero in cylinders # 24, ~~17, 23~~ = .01" = 24.01" - .01 = 24.00"
17. = -.06" = 23.95 + .05 = 24.00"
23 = .03" = 24.03 - .03 = 24.00"

14:10 Added solutions to check for leak in and zero
Zero in cylinders # 18 = -0.07 + 24.07 = 24.00
19 = -0.07 + 24.07 = 24.00
25 = -0.07 + 24.07 = 24.00

7-22-69 Sample taken from manifold after filling the above
0800 cylinders; sent to 7-12.

Reg # 709695 - Eff # 15

G = 153.4g
T = 19.1g
N = 135.3g
add for: 1. = $g \frac{1}{2} = .445239$
2. = $sp. gr. = 2.0189$
3. = $P_{gr} = 40$
4. = $corr = 4.98 wt\% \times$
} = 898.679/l

11:00 added ~ 325 l of solution to manifold; wiped for
about 40 min; two samples taken:

Reg # 709696; Eff # 15-1 - 7-12
G = 180.5g
T = 18.4g
N = 162.1g
add for:
1. = $P \frac{1}{2} = .449460$
2. = $sp. gr. = 2.0381$
3. = $P_{gr} = 40$
4. = $corr = 4.98\% \times$
Reg # 946; Eff # 15-1 x-10
G = 180.9g
T = 17.8g
N = 163.1g
add for:
1. = $g \frac{1}{2} = .44862$
2. = $sp. gr. = 2.0406$
3. = $P_{gr} = 40$
4. = $corr = 4.98\% \times$
} = 915.45 g/l

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

Exp # 15-1
 START-UP CHECK LIST

Equipment checked by AKA Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKA
 Source in checked by AKA Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKA Time 12:25
 Start-up OK'd by F.D.C. AKA Date 7-22-64

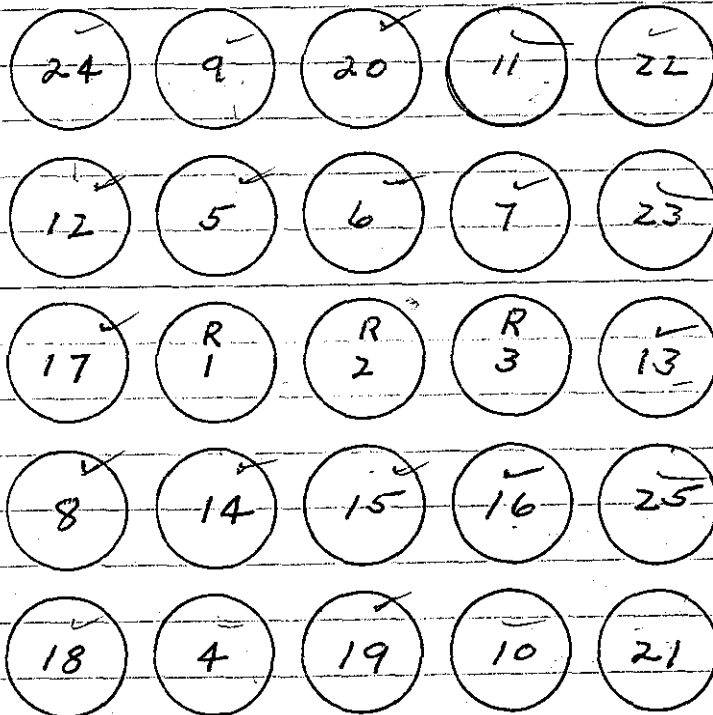
7/22/64

Hoses connecting to #21 (SE corner) and to 2 control units. Clamp off hoses to remote units.

1248 2nd fuel #21 = 0.00; filled to 24.00 in.

1313 Valve off #21.

Cyl #15-2

5 x 5 square array;
2.30" S-S spacing.

See page 80 for zero in
cylinders #22, 23, 25.



7/22/64

Expt 15-2

25 cylinders at 2.3 in spacing in square pattern
 (see p. 79 for diagram) Filled cylinders @ 24"
 height, 2 in for remote units = 0.08 in. (p. 73).
 Spacers are in at top, about 3" down.

1438 Solution $kt = 57.054$ "System sub crit."

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K1	3×10^{-12}	Meter ✓	1/2"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K2	"	Meter ✓	1"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
"	"	Alarm ✓	Cont	✓	"
LOG-N CALIBRATE	✓	OPERATE	✓	SOURCE No.	B-80
DUMP WELL PROBE LIGHT	✓				

Expt # 15-3

5 X 5 square array: S-S-spacing = 2.00"

START-UP CHECK LIST

Equipment checked by AKH Personnel check by F.D.C.Instruments and safeties checked and reset by AKHSource in checked by AKH Source No. M-43Emergency equipment in control room checked by AKHInstruments in trip circuit: K-1 K-2 PM-1 PM-2Red-light on by AKH Time 1205Start-up OK'd by F.D.C. AKH Date 7-23-64Repeat of Expt # 15-2 (p 79-80): S-S-spacing now = 2.00"
Error in cylinders # 1, 2, 3 = .08"

12:40 + Per: solution ht = 23.32"

12:43 system just exit: solution ht = 23.31"
-.08
H₂ 23.23"

Expt # 15-4

1425 Repeat of ~~state~~ above; S-S-spacing now = 2.060"

1448 solution @ 24.22 in., + period

1451 solution @ 24.16 in., level H₂ = 24.08 in.

7/27/64

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓ Fast ✓	1"	3 X 10 ⁻¹²
K	3 X 10 ⁻¹²	Meter ✓ Fast ✓	1"	10 X 10 ⁻¹²
PM-1	500 ✓	Alarm ✓	Contact	500
PM-2	1200 ✓	Low ✓ Alarm ✓	18" Contact	900
CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80

7/27/64 FROSE LIGHT

START-UP CHECK LIST

Equipment checked by EG Personnel check by IOK
 Instruments and safeties checked and reset by EG
 Source in checked by EG Source No. M-43
 Emergency equipment in control room checked by M-43
 Instruments in trip circuit: K-1, K-2, PM-1, PM-2
 Red light on by EG Time 1315
 Start-up OK'd by IOK EG Date 7/27/64

Program: To fill cylinders to 48"
 Start with # ~~15~~ 6, 15, 17.
 25 cyl. in square pattern, spacing 4.6 in. between
 containers.

7/27/64

Changed M-2 to match M-4 more nearly
Filled # 6, 15, 17 to 48.00 in. on M-4

1500 Moved hoses to # 5, 12, 14 to fill.

1535 Cylinders filled to 48.00 in. on M-4.

1600 Moved hoses to # 8, 15, 20

Partially closed by-pass in 102.

1626 Cylinders filled to 48.00 in. on M-4.

1630 Dump.

Probe light on dump well did not
come on!

7-28-64 added ~ 270 l of solution to manifold; Wiped
for ~ 35 min; Two samples taken:

Y-12
Rep # 709697

$$G = 175.3g =$$

$$T = 18.0g$$

$$N = 157.3g$$

calc for

$$1. g/g = .463360 = 943.03$$

$$2. H/g = 2.0352$$

$$3. P/g = 40$$

$$4. assay = 4.96\% F$$

X-10

Rep # 942

$$G = 165.3g$$

$$T = 18.0g$$

$$N = 147.3g$$

calc for:

$$1. g/g = .448.04$$

$$2. H/g = 2.0302$$

$$909.612\%$$

7/30/64

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹⁴	Meter ✓ Fast ✓	12"		3x10 ⁻¹⁴
K-2	3x10 ⁻¹⁴	Meter ✓ Fast ✓	1"		10x10 ⁻¹⁴
PM-1	700V	Alarm ✓	Contact		500V
PM-2	1200V	Low ✓ Alarm ✓	18"		500V
LOG N CALIBRATE ✓		OPERATE ✓	SOURCE No. B-80		
DUMP WELL PROSE LIGHT ✓					

new building alarm system checked.

START-UP CHECK LIST

Equipment checked by RRR Personnel check by RRR

Instruments and safeties checked and reset by EQ

Source in checked by RRR Source No. M-42

Emergency equipment in control room checked by IDC

Instruments in trip circuit: _____

Red light on by EQ Time 0940

Start-up OK'd by RRR, IDC, EQ Date 7/30/64

10:10 Pump: To fill cylinders # 7, 13, 16 to 48"

10:28 Cylinders # 7, 13, 16 filled to 48.00"

10:31 Pump

7/30/64

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓ Fist ✓	4"	✓	3 x 10 ⁻¹² "
K-2	3 x 10 ⁻¹²	Meter ✓ Fist ✓	5"	✓	" "
R-1					
P-1		Alarm ✓			5000
PM-1		Low			9000
PM-2		Alarm			"
LOG N CALIBRATE ✓			OPERATE ✓	SOURCE No. B-80	

START-UP CHECK LIST

Equipment checked by RKR Personnel check by FPCInstruments and safeties checked and reset by EFSource in checked by RKR Source No. M-43Emergency equipment in control room checked by F.P.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by RKR Time 1405Start-up OK'd by F.P.C. RKR Date 7/30/64

Installed 15" Aluminum cylinder in dist. moved instruments, valves, made necessary plumbing changes to do demonstration for teachers from small colleges. Moved M-2 to use for level of solution.

Water ht = 51.00" (Reflector)
Zero = 00.000 for solution
Feed rate = 1.20" per min.

14:31 + Per; Solution ht = 16.854"

14:36 liquid just exits: solution ht = 16.852"

14:38 Drain to 14.684"

15:37 + Per; solution ht = 16.863"

" : 38 + Per; " " = 16.905"

15:50 Drain solution:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	1/2"	✓	10 x 10 ⁻¹²
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	cont	✓	500 ✓
PM-2	1200 ✓	Low ✓	183	✓	900 ✓
	"	Alarm ✓	cont	✓	"

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

DUMP WELL PROBE LIGHT ✓

Bldg alarm checked for response: ok.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. M-43

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

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

Red light on by AKK Time 0950

Start-up OK'd by I.D.C. AKK Date 7-31-69

Purpose is to fill cylinders to a ht of 48.00"

10:27 cylinders #5, 11, 23, 25, filled to 48.00"

10:29 dump

over

11:32 Cylinder #^s 4, 10, 18 filled to 48.00"
 11:35 Dump.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K 1	110-12	Meter ✓	4"	✓	10X10 ⁻¹²
	"	Fast ✓	"	✓	"
K 2	"	Meter ✓	5"	✓	"
	"	Fast ✓	"	✓	"
P-1					
PA 1	700V	Alarm ✓	cont	✓	500V
PA 2	1200V	Low ✓	18	✓	900V
	"	Alarm ✓	cont	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by AKA Personnel check by AKAInstruments and safeties checked and reset by AKASource in checked by AKA Source No. M-93Emergency equipment in control room checked by I.D.CInstruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKA Time 13:25Start-up OK'd by I.D.C. E.H.P. M.A. date 7-31-69

Purpose is to demonstrate for teachers: During 15"
at vessel in big lid:

Solution Level = 00.000

Reflector ~~the~~ Water ht = 51.00"

14:37 System on slight + Per: Solution ht = 16.874"

14:39 Drain to ~ 12.00"

15:16 + Per: Solution ht = 16.858"

15:20 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1/2"	✓	3 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	3 X 10 ⁻¹²	Meter ✓	"	✓	10 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
PIA 1	7000	Alarm ✓	Cont	✓	5000
PIA 2	1200	Low ✓	18"	✓	9000
	✓	Alarm ✓	Cont	✓	"
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR
 Instruments and safeties checked and reset by RKR
 Source in checked by RKR, Source No. M-43
 Emergency equipment in control room checked by I.D.C.
 Instruments in trip circuit: K1, K2 PM1, PM2
 Red light on by RKR Time 09:50
 Start-up OK'd by I.D.C. RKR Date 8/3/64

Purpose is to fill cylinders to a ht of 48.00"

10:22 cylinders #5 9.22.24. filled to 48.00"

10:25 Dump.

15:30 added ~310 l to manifold: Wiped about
40 min. Two samples taken:

Y-12
Rep # 709698
#1

G = 150.0g

T = 19.6

N = 130.4

X-10
Rep # A-943
#2

G = 153.5g

T = 19.6

N = 133.9

calc for

$$1 = g\% = .469400 = 944.349\%e$$

$$2 = sp. gr. = 2.0118$$

$$3 = Pyro 40 =$$

$$4 = assay = 4.99\%f$$

calc for

$$1 = g\% = .44187$$

$$2 = sp. gr. 2.0138$$

$$Density = 2.0078$$

$$889.94 g\%e$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	START-UP RANGE
K-13	X10 ⁻¹²	Meter ✓	1/2	10 X10 ⁻¹²
"	"	Fast ✓	"	"
K-1	"	Meter ✓	1"	"
"	"	Fast ✓	"	"
PM-1	7000	Alarm ✓	cont	500
PM-2	12000	Low ✓	18"	900
"	"	Alarm ✓	cont	"
<input checked="" type="checkbox"/> IN CALIBRATE		<input checked="" type="checkbox"/> OPERATE		SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT <input checked="" type="checkbox"/>				

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Sensors in checked by AKM Source No. M-23

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

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

Red light on by AKM Time 0900

Start-up OK'd by F.D.C. AKM Date 8-4-68

Purpose is to fill cylinder #21 to 48.00"
 Cylinder #21 filled to 48.00 in.

1010

Found that cylinder #17, supposedly filled to 48 in. on 7/27 (p. 82, 83), was actually ^(~40 in.) less than 24 in. ^(~40 in.) more liner to fill.

1120

Cylinder #17 filled to 48.00 in.

(48.00 " in ht.)

5 x 5 array: see page 79 for unit pair
side to side spacing = 4.6". Range:

12:10 + Per: solution ht = 38.50"

12:13 lighter just unit: solution ht = 38.38" in cylinders
5, 1, 2, 3.

Removed thick plastic covers from #14, 15, and 16. Now have no covers except Al "handles. It was necessary to remove, in addition to these three, # 4, 19, 10 to storage rack and to replace them.

1510

Slight negative at 38.71 in.

94104

1514

Essentially level (maybe slight +) at 38.74 in

1515

Drain part way $H_c = 38.725$ in.38Added Plexiglas $3/4" \times 11" \times 6"$ inside to tops of three cylinders (14, 15, 16) which had lids removed

1552

Solution at 38.51 in. Very slightly negative.

1555

Period slightly + at 38.55 in. $H_c = 38.53$ in.

Masking tape on top of three topless cylinders.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	$\frac{1}{2}$	-	10×10^{-12}
"	"	Fast	"	-	"
K-2	"	Meter	"	-	"
"	"	Fast	"	-	"
R-1					
R-2					
PM-1	700V	Alarm	Cont	-	500V
PM-2	1200V	Low	18"	-	900V
"	"	Alarm	Cont	-	"
LOG N CALIBRATE <input checked="" type="checkbox"/>		OPERATE <input checked="" type="checkbox"/>		SOURCE No. <u>B-80</u>	
DUMP WELL PROBE LIGHT <input type="checkbox"/>					

START-UP CHECK LIST

Equipment checked by AKH Personnel check by ZDC

Instruments and safeties checked and reset by AKH

Source in checked by ZDC, Source No. M-93

Emergency equipment in control room checked by ZDC

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

Red light on by AKH Time 0840

Start-up OK'd by ZDC EBP AKH Date 8-5-68

Repeat of "ho top" run by 9/4/64

0920 + Per: solution ht = 38.71"

0924 Septen final crit: solution ht = 38.63" over.

0948 Removed masking tape from cylinders #s 14, 15, 16.

+ Per: Solution ht = 38.68"

0952 Hydro-jet end; solution ht = 38.69"

0953 Drain.

8/6/64

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D. RANGE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter <input checked="" type="checkbox"/> Fast <input checked="" type="checkbox"/>	1/2"	<input checked="" type="checkbox"/>	10x10 ⁻¹²
K-2	3x10 ⁻¹²	Meter <input checked="" type="checkbox"/> Fast <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	10x10 ⁻¹²
R-1					
R-2					
PM-1	200V	Alarm <input checked="" type="checkbox"/>	Contact <input checked="" type="checkbox"/>		500V
PM-2	1200V	Low <input checked="" type="checkbox"/> Alarm <input checked="" type="checkbox"/>	IF Contact <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	900V
LOG-N CALIBRATE		OPERATE <input checked="" type="checkbox"/>		SOURCE No. B-80	
DUMP WELL PROBE LIGHT					

Done 8/5/64 } Removed all plastic covers, replaced with yellow tape. Perit spacing to 4.60 in. Instrument metal surfaces.

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by EJ

Source in checked by IDC Source No. M-43

Emergency equipment in control room checked by IDC

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

Red light on by EJ Time 0940

Start-up OK'd by RKR, IDC, EJ Date 8/6/64

1020 Solution at 39.19 in. + Period
 1025 Solution at 39.14 in. Very slight negative.
 1028 Solution at 39.14 in. = H₂

98

9/6/44

1030

Drain.

Repeat: no known change.

1151

System just cut: solution ht = 39.20"

Repeat: no known change.

1331

Solution at 39.30 in. Negative

1337

Solution at 39.31 in. = the

At the end of this run, the 6 ft. A1 ladder was found "adjacent" to south face of array.

Placed "squares" of plastic on top at top of all cylinders. Plastic 0.455 in. thick. Faded still at south face.

14:15

System just cut: solution ht = 38.66"

Removed plastic. Faded still on south.

1449

Solution at 39.30 in. Slightly negative.

He judged to be 39.31 in.

INSTRUMENT CHECK

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

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-43

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

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

Red light on by D.C. Time 0810

Start-up OK'd by D.C., E.D.C., AKA Date 8-7-69

Purpose is to recheck crit ht of 4-6-69

0.946 System just crit; solution $RS = 39.26$ "

Army (25 units) spaced 5.0 in. Second spacing
still in, final adjustments not made.

1535 Solution at 38.38 in. Slightly positive

1542 System "just" critical at 38.35 in.

1545 Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1/2"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"

R-1
R-2

PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1700V	Low ✓	16"	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG N-CALIBRATE ✓ OPERATE _____ SOURCE No. B-80
 DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH
 Instruments and safeties checked and reset by AKH, ERP
 Source in checked by AKH Source No. M-43
 Emergency equipment in control room checked by F.P.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKH Time 0755
 Start-up OK'd by F.P.C AKH Date 8-10-64

Purpose is to check for expositions over well-end; see page 100 for last crit. ht. found still in.

0830 System just crit. solution ht = 38.31"
 avg.

8/12/64

Final alignment of arm completed. Spacing 51.00 in
between A1 cylinders. Record removed. (25 units, 48" l)

10:27 Solution ht = 52.91" in. System - Neg.
(from amt of weight on M-4 transducer.)

10:08 Drain.

Raise M-2 to overlap M-4. Reset. Thin-wall tube
bows tube away from screw. Taped so that
max of 58.10 in. is readable. Correction of + 0.12 in.

12:20 Solution at 57.59". System slightly negative.

12:24 Solution at 57.752 in. Critical. H₂ = 57.87 in.

12:25 Drain.

- .08
57.79 in

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	1/2"	✓	10×10^{-12}
"	"	Fast	1/2"	✓	"
K-2	"	Meter	1"	✓	"
"	"	Fast	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm	cont	✓	500V
PM-2	1200V	Low	16"	✓	900V
"	"	Alarm	cont	✓	"

LOG N CALIBRATE _____ OPERATE _____ SOURCE No. B-80
 DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by AMG, Personnel check by L.P.C.
 Instruments and safeties checked and reset by AMG
 Source in checked by D. CAPAN Source No. M43
 Emergency equipment in control room checked by L.P.C.

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

Red light on by E.P.J. Time 10:30

Start-up OK'd by E.P.J. L.P.C. Date 8-11-69

$Z_{sw} = 108$

Spacing of 25-unit, 48 in. high array = 4.85 in. paint-to-paint

1150 solution at 46.96 in. System slightly negative
 1152 solution at 46.98 in. Critical. = $H_2 = 46.90$ in.

9/11/64

Installed two pieces of aluminum plate under the oil channel which supports the three remotely-filled units and secured these units. The upper piece is $\frac{1}{4}$ " thick, $3\frac{1}{2}$ " wide and 40 in. long. The lower is $\frac{1}{4}$ " x $3\frac{1}{2}$ " x 40". The two are taped together at the ends.

15:40 System just crit. solution ht = 46.98", H_c = 46.9 in.

15:42 Onassis: This Al, which extended essentially under and between the units, produced no measured change in H_c .

OAK RIDGE NATIONAL LABORATORY

OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION



POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

July 31, 1964

Dr. Lamar P. Bupp
Technical Program Chairman
American Nuclear Society
Post Office Box 576
Pleasanton, California

Dear Dr. Bupp:

The two enclosed papers are submitted for your consideration for presentation at the forthcoming ANS meeting in San Francisco. If accepted, the two papers should be scheduled together, the paper entitled "Experimental Measurements of the Variation of the Ratio of the Capture and Fission Cross Sections of ^{235}U " preceding the one entitled "An Investigation of a Technique for Measuring the Fission and Capture Cross Sections of ^{233}U and ^{239}Pu ."

I shall act as Dr. Weston's sponsor, since he is not a member of the Society.

Sincerely yours,

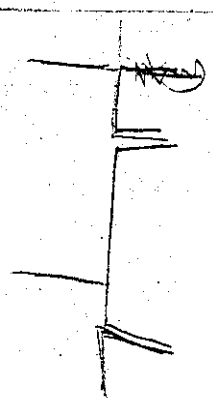
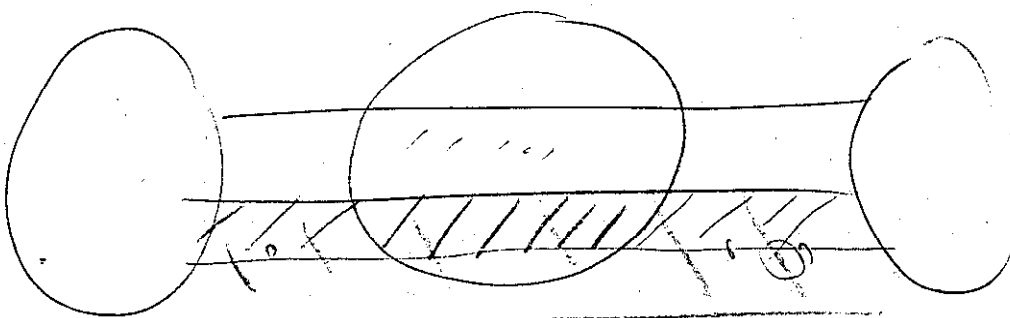
A handwritten signature in cursive script that reads "R. Gwin/lsa".

R. Gwin
Neutron Physics Division

RG:LSA:em

Encl.

1 central qt - in 48" long



$\frac{36.25}{5} = 7.25$
 $\frac{4.125}{5} = 0.825$
 $\frac{4.125}{5} = 0.825$

$\frac{4.875}{9.75} = 0.5$
 $\frac{4.125}{9.75} = 0.423$

$\frac{9.125}{21.5} = 0.424$
 $\frac{21.5}{21.5} = 1$

1"	- 3	10φ
1"	1	3φ
1"	25	75φ
1/4"	25	16

16φ ←

$\frac{50}{3} = 16.6\phi$
~~25φ~~

15 → 10φ

25-

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1/2"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	7000	Alarm ✓	cont	✓	500V
PM-2	12000	Low ✓	16"	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG IN CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by MMJ

Source in checked by MMJ Source No. M-43

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

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

Red light on by P.C. Time 0910

Start-up OK'd by F.D.C. MMJ Date 8-12-64

Purpose is to recheck critical ht (Page 103 8-11-64). No alarm on page 104.

0900 System just crit. Solution ht = 46.97"

8/17/64

Added strips of channel under the
"exposed" bottoms of the three center
rows of joints. Fastened in middle with
wood. Channel diam. = $\frac{1}{4}$ " x 4" x 9' $\frac{1}{4}$ ".
 $\frac{1}{4}$ " x 9" x 9' $\frac{1}{4}$ " in long

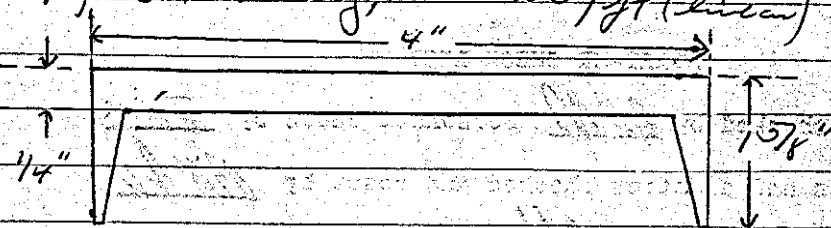
11:40 System just critical; solution $h_t = 46.06$ " $\Delta l = 0.9$

12:45 added on; Removed the 3rd channel; added
a 1 pc of Al angle $\frac{1}{4}$ " x 2" x 48" wide channel
in center row at center:

13:29 System just critical; solution $h_t = 46.95$ " $\Delta l = 0.0$

Dimensions of bottom Al channel:

9 ft $3\frac{1}{4}$ in. long, 2.16 lb/ft (linear)



Cross section aluminum area of end, 1.52 in.²

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter	1/2"	✓	10 X 10 ⁻¹²
	"	Fast	"	✓	"
K-2	"	Meter	1"	✓	"
	"	Fast	"	✓	"
R-1					
R-2					
PM:1	7	Alarm	const	✓	5000
PM:2		Low	16"	✓	9000
		Alarm	const	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKK Personnel check by AKK

Instruments and safeties checked and reset by EBJ

Source in checked by AKK Source No. M-43

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

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

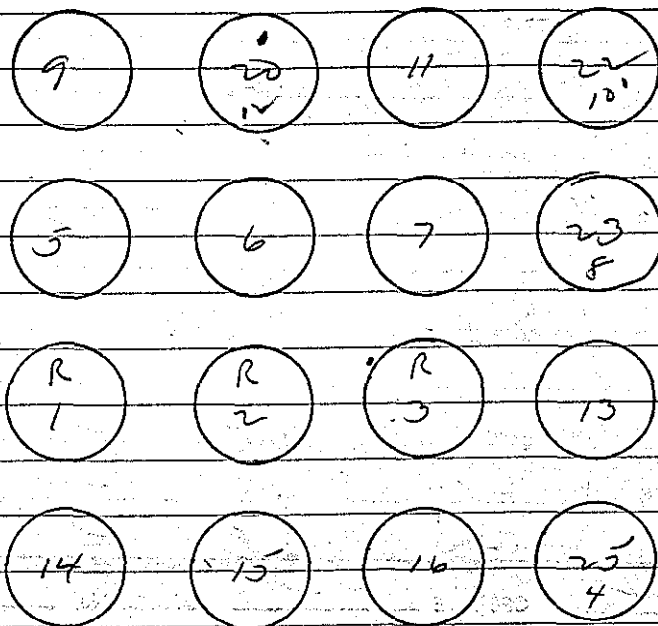
Red light on by AKK Time 0950

Start-up OK'd by E.D.C. AKK Date 8-13-64

Spacing between metal cylinders = 4.60 in.
see next page for diagram

0935 Day solenoidal at a solution height of 53.875
Drain

Substitutions
made 8/17/64 P. 1112.



1355

Spacing lines 3.50 in. between cylinders
System quite subcritical with solution
at 55.94 + 0.33 52.31 in (4.2)
Drum

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3.510 ⁻¹²	Master ✓	16"	—	10.510 ⁻¹²
"	"	Fast ✓	"	—	"
K-2	"	Master ✓	16"	—	"
"	"	Fast ✓	"	—	"
R-1					
R-2					
PM-1	700 ^v	Alarm ✓	cont	—	500 ^v
PM-2	1200 ^v	Low ✓	16"	—	900 ^v
"	"	Alarm ✓	cont	—	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RAA Personnel check by RKA

Instruments and safeties checked and reset by RKA

Source in checked by RAA Source No. M-43

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

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

Red light on by RKA Time 0835

Start-up OK'd by F.D.C. / RKA date 9-14-64

16 unit square array; spacing now 3.60" between
all cylinders.

0925 Septon just critical; solution wt = 48.50"

8/14/64

At some spacing (3.00 in. between point), various
cylinders with "collars" and replaced with
new cylinders. The replacements were:

#12 substituted for #20, #10 for #22, #8 for #20,
and #4 for #25.

1350 solution at 49.00 in. Critical, being slightly +.

1356 solution at 49.96 in. Critical

.108
49.852 in

For + period, solution level raised to 49.965 in.

$T = 143.2 \text{ sec}$; $\rho = 7.384 / 1.0 \text{ in.}$

Read Y-12 sensors at various venturi levels

	A	B	C	P14-2	Log N
Room	550	250	875	28 (6800)	12
201	340	180	430	14 (6800)	4.5
	250	150	260	05 (7400)	1.9
	210	140	175	14 (7400)	0.64
	190	130	150	22 (9200)	6.2
1448 Dump	190	130	140	30 (9000)	0.001
1452 Ross				14 (9000)	

Readings in Room 102 remained constant
during above procedures, including the dump.
A: 140; B: 310; C: 160. With Curie file,
radiation levels in Room 201 as much as 150 mR/hr
in Room 102, 50 mR/hr.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Master ✓	1/2"	✓	
"	"	Fast ✓	"	✓	
K-2	"	Master ✓	1"	✓	
"	"	Fast ✓	"	✓	
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	
PM-2	1,200V	Low ✓	16"	✓	
"	"	Alarm ✓	cont	✓	

LOG N CALIBRATE OPERATE SOURCE No. 13-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKN Personnel check by F.P.C.
 Instruments and safeties checked and reset by AKN.
 Source in checked by AKN Source No. M-42
 Emergency equipment in control room checked by F.P.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKN Time 0810
 Start-up OK'd by F.P.C. AKN Date 9-17-69

Purpose is to check unit status of 8-14-69; (see page 110.)

0900 + Pen; solution ht = 48.91 "

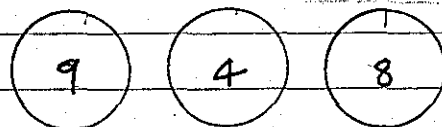
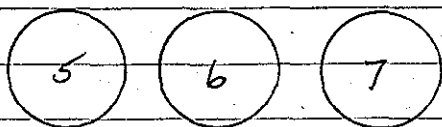
0908 System just crit; solution ht = 48.62"

08

48.54"

0909 Drain

3 x 3 square array: solution ht = 48.00"



N



Side-side spacing = 2.20" (al-al):

1440: solution ht = 55.82" System sub crit:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Motor -	1"	-	10 x 10 ⁻¹²
"	"	Fat -	"	-	"
K-2	"	Motor -	2"	-	"
"	"	Fat -	"	-	"

R-1
R-2

PM-1	700V	Alarm -	cont	-	500V
PM-2	1200V	Low -	1/6"	-	900V
"	"	Alarm -	cont	-	"

LOG N CALIBRATE OPERATE SOURCE No. 13-80
DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH + P.C. Source No. M-43
 Emergency equipment in control room checked by AKH
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by D.C. Time 0745
 Start-up OK'd by D.C. AKH Date 9-18-69

3 x 3 square array; side - side spacing = 1.70" (al-al)

0830 System just exit; solution pt = 40.13" - 0.07" = 40.05"

Drain

8/18/64

Spacing 1.9 in. Outward paint surfaces.
 2x3 array square pattern.

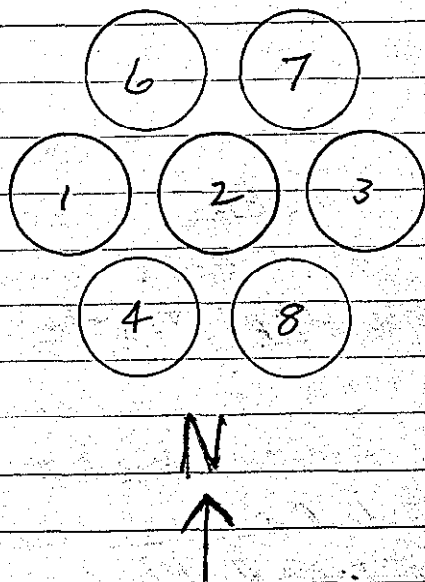
1050 Solution at 47.89 in. Very slightly +

1032 Solution at 47.85 in. Very slightly -

1005 " " 47.855 in. Critical

- 0.08

47.775



Seven units in a triangular array; side-side spacing = 2.250 (al-al)

16:05 Solution ht = 53.09; system sub crit;

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X15 ^{-1V}	Meter ✓ Fast ✓	1/2"		1.2X15 ^{-1V}
K-2	3X15 ^{-1V}	Meter ✓ Fast ✓	1"		1.2X15 ^{-1V}
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont.		500V
PM-2	1200V	Low ✓ Alarm ✓	16"		500V
LOG N CALIBRATE ✓		OPERATE ✓	SOURCE No. <u>B-80</u>		
DUMP WELL PROSE LIGHT _____					

START-UP CHECK LIST

- 1. Equipment checked by RRR Personnel check by RRR
- 2. Instruments and safeties checked and reset by EJ
- 3. Source in checked by IDC Source No. 17-43
- 4. Emergency equipment in control room checked by IDC
- 5. Instruments in trip circuit: PM-1, PM-2, K-1, K-2
- 6. Red light on by EJ Time 930
- 7. Start-up OK'd by RRR, IDC, EJ Date 8/15/64

Seven count & pattern, separation between point 1.5 in.

1028 Solution at 55.480 in. Not critical. Some multiplication (\approx a factor of 10)

14:20 Separators now 1.65" (al-al)
 hepten-jul exit solution hts = 42.10"

15:30 End chud = 0.22 in. 41.88

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
3110-12		Meter ✓	1/2"	✓	3X10 ⁻²
"		Fast ✓	"	✓	
"		Meter ✓	1"	✓	10X10 ⁻²
"		Fast ✓	"	✓	
PC9-1	700V	Alarm ✓	cont	✓	
PC9-2	1200V	Low ✓	16"	✓	
"	"	Alarm ✓	cont.	✓	
		← RATE			No. B-80

BUMP WELL AND LIGHT

START-UP CHECK LIST

Equipment checked by RRR Personnel check by RRRInstruments and safeties checked and reset by RRRSource in checked by RRR Source No. M-43Emergency equipment in control room checked by IDCInstruments in trip circuit: K₁, K₂, PM₁, PM₂Red light on by RRR IDC Time 0835Start-up OK'd by RRR IDC EA Date 9/20/64

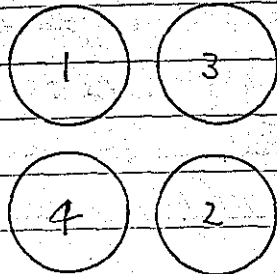
7-mil triangular pattern, 48" high.
Spacing between points 1.75 in.

0933 Solution at 49.10 in. Positive.

0935 Solution at 48.95 in. Slightly negative.

0940 Solution at 48.96 in. Critical. $H_2 = 48.74$ in.

2 x 2 square array; side-to-side operation (al-al)
= .140"



N

13:15 Solution $ht = 53.40$ in. System sub-critical.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K 1	3410 - 12	Meter ✓	1/2"	✓	10 K10 ³¹²
	"	Fast ✓	"	✓	"
K	"	Meter ✓	1"	✓	"
	"	Fast ✓	1"	✓	"
	700V	Alarm ✓	cont	✓	500V
	1200V	Low ✓	16"	✓	900V
	"	Alarm ✓	cont	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

48.00" ht.

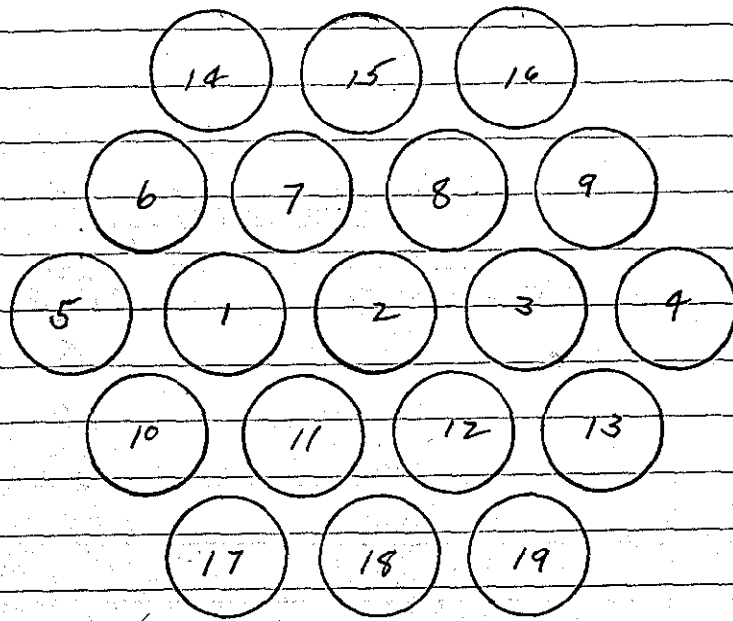
START-UP CHECK LIST

Equipment checked by AKK Personnel check by D.C.
 Instruments and safeties checked and reset by AKK
 Source in checked by AKK Source No. M-93
 Emergency equipment in control room checked by AKK D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKK Time 0755
 Start-up OK'd by D.C. AKK Date 8-25-69

Zero = 0.30 in.

19 units in a triangular array; side-side spacing
 (al-al) = 4.90"

0835 Septen first cont. solution ht. = 40.18" H₂ = 39.88"



8/25/64

19-min interval triangular pattern, 5.016 in. spacing (vertical surfaces).

1540 Solution at 43.08 in. Slightly positive.

1545 Solution at 43.03 in. Very slightly negative.

$$H_2 \sim 43.04 - 0.30 = 42.74 \text{ in.}$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10⁻¹²	Meter	16"	✓	10 x 10⁻¹²
"	"	Fast	"	✓	"
K-2	"	Meter	1"	✓	"
"	"	Fast	"	✓	"
P-1	"	"	"	"	"
PM-1	7000	Alarm	cont	✓	5000
PM-2	12000	Low	16"	✓	9000
"	"	Alarm	cont	✓	"
LOGICAL RATE	_____	OPERATE	_____	SOURCE No.	B-80
DUMP WELL FROZE LIGHT	_____	_____	_____	_____	_____

START-UP CHECK LIST

Equipment checked by AKH Personnel check by BKS
 Instruments and safeties checked and reset by AKH-JLS
 Source in checked by AKH Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1K-2PM-1PM-2
 Red light on by F.D.C. AKH Time 7:30.5
 Start-up OK'd by F.D.C. AKH Date 8-26-69

Repeat of pages 118-119+120: 19 unit array
 side-side spacing (ab-ab) = 5.150"

1355 System just critical: solution ht = 46.77"

- 0.30

46.47" in: d

1359 Drain:

INSTRUMENT CHECK

9/27/64

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
------------	-------	------	--------------	-----	----------------

	3 x 15 ¹²	Meter ✓	1/2"	✓	10 x 15 ¹²
		Fst ✓		✓	
K-1	3 x 15 ¹²	Meter ✓	1"	✓	10 x 15 ¹²
		Fst ✓		✓	

	700 V	Alarm ✓	Cont.	✓	500
PIA-7	1200 V	Low ✓	16"	✓	900
		Alarm ✓	1"	✓	

IN CALIBRATE ✓ OPERATE ✓ SOURCE No. B-80
 DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by RF

Source in checked by IDC Source No. M-43

Emergency equipment in control room checked by IDC

Instruments in trip circuit: K-1, K-2, P14-1, P14-2

Red light on by RF Time 1330

Start-up OK'd by RKR, IDC, RF Date 9/27/64

Program: To check the 4 x 4 unit array square pattern, 3.60-in. surface of Pt. 104. Array has cylinders located on in p. 108, with the substitutions. Compare the array of 9/14 at 1352 (p. 110) and 9/17 at 0909 (p. 112).

9/27/64

14:27 System just critical; solution ht = 50.09"

$$H_c = \frac{50.09}{.55} = 91.07$$

14:30 + Pen; solution ht = 51.11"

14:38 Division to check zero: = 0.55 in.

from K-2: T = 163.7 sec; p = 6.6%

from by N: T = 168.7 sec; p = 6.45%

8-28-64 added ~ 50 l to manifold; Hospel ~ 75 min;
Two samples taken:

7-12

X-10

Rep II
684402 = G = 155.5g
T = 17.4g
N = 138.1g

Rep R A-944 = G = 156.8g
T = 18.2g
N = 138.6g

act for

act for

1. 2 1/2 g = 444.900

1. 2 1/2 g = 448.39

2. 1/2 g = 2.0173

2. 1/2 g = 2.0208

3. assay = X% = 5.01

3. assay = 2.0148

4. Pipro 40. =

906.11 g

897.50 g

9/3/64

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	2		10x10 ⁻¹²
		F-1 ✓			
K-2	3x10 ⁻¹²	Meter ✓	1"		10x10 ⁻¹²
		F-1 ✓			
R-1					
R-2					
PM-1	700	Alarm ✓	2		5000
PM-2	1200	Low ✓	12		9000
		Alarm ✓	2		
LOG IN CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DURING VAC. RED LIGHT ✓					

START-UP CHECK LIST

Equipment checked by EG Personnel check by IOC

Instruments and safeties checked and reset by EG

Source in checked by EG Source No. M-43

Emergency equipment in control room checked by IOC

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

Red light on by EG Time 1000

Start-up OK'd by IOC, EG Date 9/3/64

Program: To fill cyl # 5, 7, and 15 to 56.
 Aray is 16-unit, square pattern, spacing 4.2 in.
 between cylinders.

1135 Above cylinders filled to 57.74 in. on M-2 (No. 560 in. 120' M-4). Actually corresponds to 59.48 in. from off!! (9/3/64)

9/1/64

II	MENT	RANGE	TRIP	SOURCE DISTANCE	SET	START UP RANGE
K-1		3×10^{-12}	Meter -	"	✓	10×10^{-12}
	"	"	Fast ✓	"	-	"
K-2		"	Meter -	"	✓	"
	"	"	Fast ✓	"	-	"
PWA-1		700V	Alarm	cont	-	500V
PWA-2		1200V	Low	12"	-	900V
		"	Alarm	cont	-	"
CALIBRATE			✓	OPERATE	-	SOURCE No. B-80
DUMP WELL PROBE LIGHT			✓			

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by RKR

Source in checked by _____ Source No. M-43

Emergency equipment in control room checked by _____

Instruments in trip circuit: _____

Red light on by EJ Time 1000

Start-up OK'd by _____ Date 9/1/64

After moving hoses to fill cyl. # 6, 14, and 14, inspecting the heights in #5, 2, & 15. Found it to within $\frac{3}{4}$ in. of the top of cylinder - much too full. This on 8/31. Measurements on 9/1 showed heights to be

31
20
4.11

1225 Filled cyl to M-2 reading of 54.04 in. This corresponds to solution heights, determined by measuring from the top of cylinders, of #14: 55.81 in., #16: 55.875, and #6: 55.687 in. Value of and drawn.

1325 Filled cyl #5, 7, and 15 to 54.04 in. on M-2. (These are the three that were filled too full on 8/31/64.) Measurement indicated that the actual solution heights (again determined from the tops): #5: 55.4375 - 0.25 = 55.19; #7: 55.5625 - 0.25 = 55.31; #15: 55.5625 - 0.25 = 55.31 in. Will add more solution.

N.C.
Lester
1/12/67

9/2/64 "Painter" stop on bottom of M-2 tubes, which had to be replaced because the installed one was found cracked under the clamp; changed dial on M-2 to agree with M-4 on console. Check over range of ± 10 in. showed that the tube do follow ± 0.01 in., with M-2 beginning to lag by about 0.01 in. near the top of M-4's range.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K1	3 X 10 ⁻¹²	Meter	1/2"	-	10 X 10 ⁻¹²
"	"	Fast	"	-	"
K2	"	Meter	"	-	"
"	"	Fast	"	-	"
PM-1	700V	Alarm	Cont	-	500V
PM-2	1200V	Low	16"	-	900V
"	"	Alarm	Cont	-	"

IN CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT 7

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

Instruments in trip circuit: K-14-2 PM-1 PM-2

Red light on by AKH Time 0930

Start-up OK'd by F.D.C. / AKH Date 9-2-64

Prepare in to fill cylinders #5, 7, & 15 to a wt of 56.00"

Selection wt # on M-2 = 56.018"
56.017"

Measurements show #5: 55.50 - 0.25 = 55.25 in.

#7: 55.625 - 0.25 = 55.375; #15: 55.625 - 0.25 = 55.375 in.

9/2/64

21200

Determination of zero for cylinder #5: 1.27 in

1335

Filled #5 cylinder to 57.693 in. - 1.27 = 56.02 in
as indicated by M-V. Measured from top:
56.563 - 0.250 = 56.313 in. Drain some.

9/3 and 9/4/64

Installed solution manometer in control room.
It comes from the feed manifold thru a needle
valve thru the metal grating between 10V and
20V. It is vented thru the wall into 201
and into vent line cylinder on deckway on
east wall. Here clamp at bottom of manometer
tube. Centimeter scale behind tube.

9/4/64

Established "zero" on #5 cyl. as 1.24 in. on M-V,
6.85 cm in 20V. & dried off #5 with solvent gas

Drained #15 cyl to get zero: 1.23 in. on M-V,
6.7 cm in 20V. Filled #13 to 56.25 in (from
top), 56.19 (from bottom).

9/8/64

Went to check under lid because of mal-
functioning of 20V manometer. Correct.

9/9/64

Levee #5 cyl. empty because of blister in paint on inside bottom. Valve off and open #7 to adjust its height. Final measurement: 202 barometer reading 148.25 cm, $pressure = 50.1875$ - $0.25 = 55.9375$ in. (from bottom). Valve off. Extended M-4 to cover entire 50-in. height. Moved lever to cyl #6, 14, 16 to adjust heights. Filled the three to a height of 148.4 cm (202) w 60.28 in. (M-4). (M-2 is now out of service.)

9/17/64 Moved jacks to more nearly level support channels. Produced cross-sections of all cyl with the following results:

#1, 2, 3, & 5 empty. The three remain all show slight corrosion on bottoms.

#4: full to ≈ 48 in.

- #6: $56 - 0.25$ in. = 55.75 in.

- #7: ≈ 52 in. (see above: 55.9375 in. (solid))

#8: ≈ 48 in.

#9: 54.9 in; possible corrosion and blister

#10: ≈ 48 in; look at; dent, air.

#11: ≈ 48 in; air sides & bottom. Drain?

#12: ≈ 48 in.

#13: ≈ 48 in.

- #14: $56.89375 - 0.25 = 55.844$ in.

- #15: $56.25 - 0.25 = 56.00$ in.

- #16: $56.125 - 0.25 = 55.875$ in.

#5 cyl removed from array; minor solution removed; paint from inside bottom.

9/10/64

Moved down to fall #4, 8, 13. Filled to indicated solution height of 148.7 cm (202) and 60.36 in. (M-4). Results: (cyl. volume of)

- #4: $56.21875 - 0.25 = 55.969$ in. (This one drains slightly from 56 $\frac{3}{8}$ to 56 $\frac{1}{2}$ in.)
- #8: $56.250 - 0.25 = 56.00$ in.
- #13: $56.250 - 0.25 = 56.00$ in.

Moved down to cyl #9, 11, 12. Filled to a height of 148.9 cm (202) w/ 59.88 in. (M-4). Probe results:

#9: $56.4375 - 0.25 = 56.1875$ in.

#11: $56.4375 - 0.25 = 56.1875$ in.

#12: $56.3125 - 0.25 = 56.0625$ in.

Drained #10 cylinder (dented) in preparation for removing it.

9/11/64 Removed #10, replaced it with #18, put #17 in place of #5.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1/2"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	
K-2	"	Meter ✓	1"	✓	10×10^{-12}
"	"	Fast ✓	1	✓	
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	900V
"	"	Alarm ✓	Cont	✓	
LOG N CALIBRATE		OPERATE	SOURCE No. <u>B-80</u>		
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by RKR Personnel check by IDC

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. M-43

Emergency equipment in control room checked by _____

Instruments in trip circuit: _____

Red light on by RKR Time 0930

Start-up OK'd by RKR, IDC, SA Date 9/10/64

Moved down to fill #17, 18, and 3. #18 has
 white + corrosion, #17 is too sandy to see
 bottom. Filled to 148.7 cm (-202) or 60.36 in.
 (M-4). Results: #17 produced 56 7/8" - drained to
 56.4375 - 0.25 = 56.1875; #18: 56.2875 - 0.25 =
 56.0375 in; #3: 56.5 - 0.25 = 56.25 in.

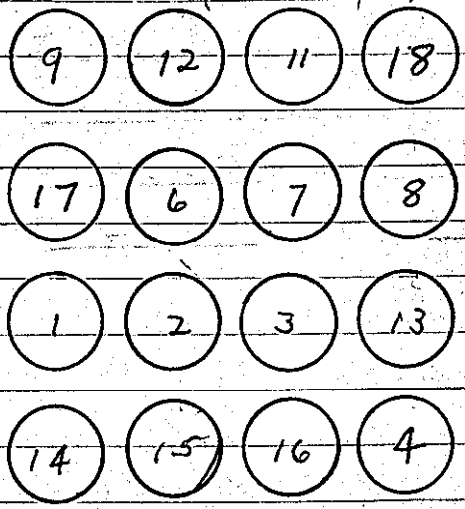
16 units, square pattern (4.25) cl. cl.)

9/11/64

Here moved to remate cylinders. Respac'd array to 4.2-in. metal separation. Determined yrd line remates at 6.4 cm (202), which is first in #1 & #3, low in #2. Put centerline on centerline of remates to be read thru Transit at window. Purpose: Clean seq.

	4.4	202	#1	#2	#3
2-202)	4.31 in.	6.4 cm	6.1 cm	5.96 cm	5.50 cm
1500	16.36	37.1"	6.15	6.00	5.95
1512	28.42	—			
1517	29.26	69.7			
	Feed rate 1.8 in./min.				
1533	40.36	97.95	6.30	6.10	6.00
1545	52.42	128.5	6.40	6.15	6.02
1555	59.29	145.9			
1600	60.395	148.875	6.42	6.18	6.02
Total change	56.09 in.	142.35 cm	0.32 cm	0.22 cm	0.16 cm

- Sub-critical - ? 9/23/64



N
↑

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	ST	START-UP RANGE
K-1	3 x 10 ⁻¹²	cont	cont	✓	10 x 10 ⁻¹²
"	"	✓ "	"	✓	"
K-2	"	✓ 1/2"	1/2	✓	"
"	"	✓ "	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm cont	cont	✓	500 V
PM-2	2,000 V	Low 76"	16	✓	400 V
"	"	Alarm cont	cont	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

4 x 4 array: 56" ht. Side-side spacing (al-al) 4.00"

START-UP CHECK LIST

Equipment checked by AKM Personnel check by AKM

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-43

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

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

Red light on by AKM Time 10 45

Start-up OK'd by F.P.C. S.P.A. Date 9-14-69

AKM

	M-4	202	#1	#2	#3
Zero	3.99"	5.73 cm	6.12 cm	5.98 cm	5.90 cm.
1125	13.03"	29.8 ⁸ "			
1140	31.40"	74.45			
1150	41.18"	100.15			

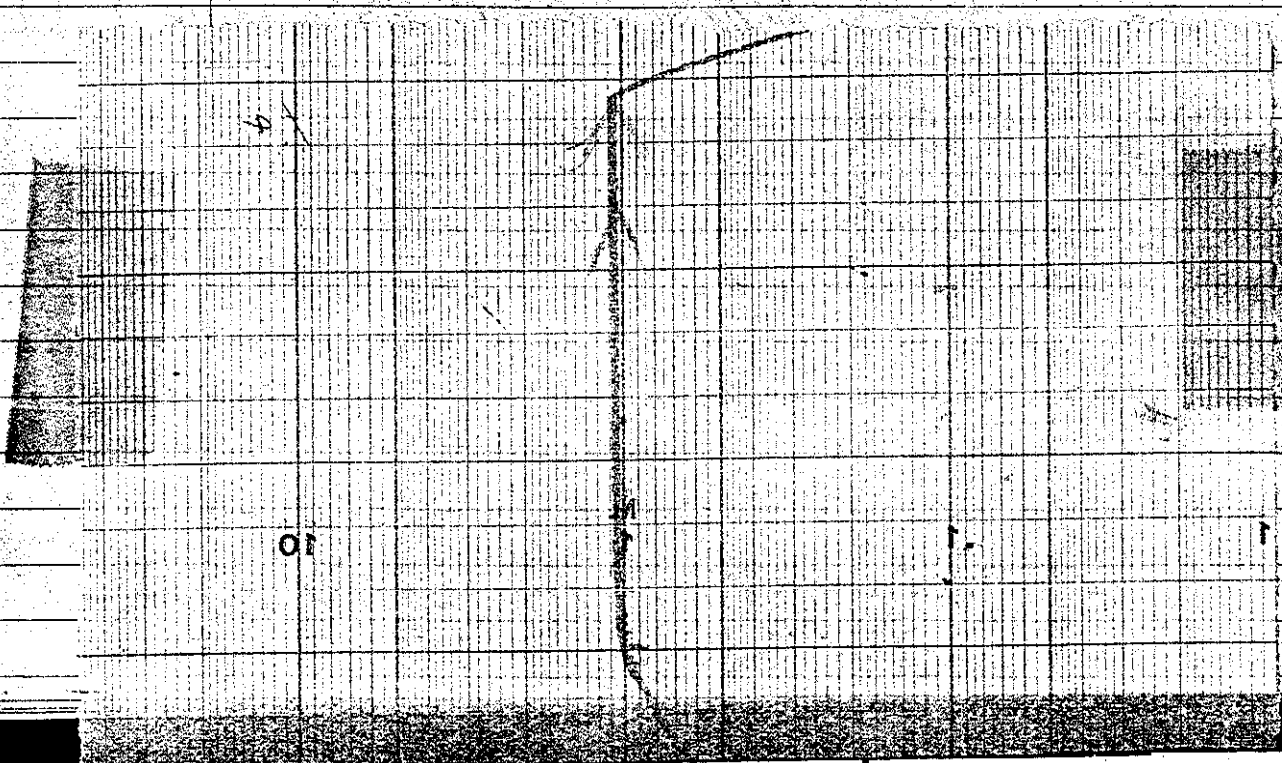
any:

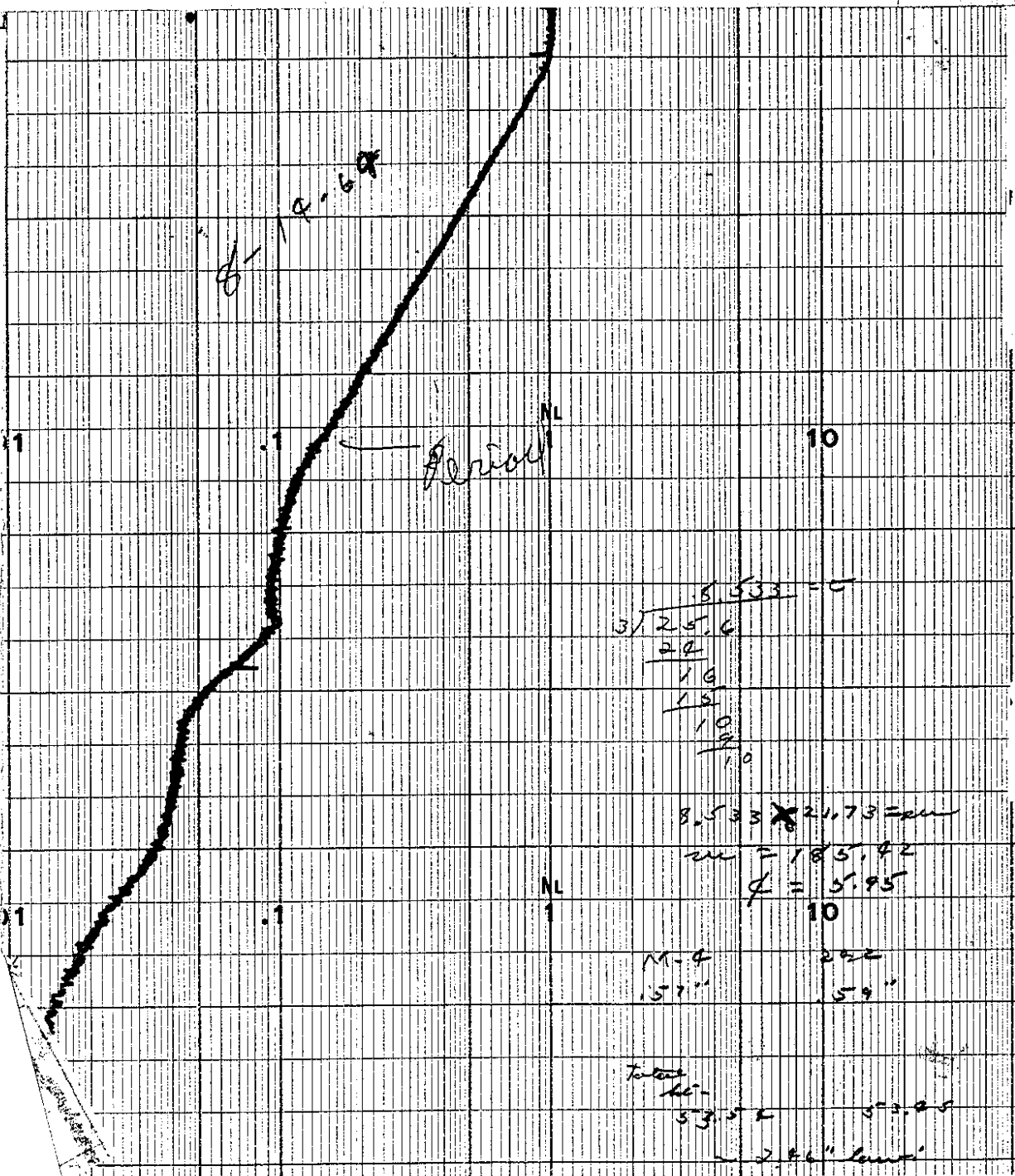
	M-4	202	#1	#2	#3
12:00	51.65"		126.75 cm		
12:05	56.22"		138.30 cm		

12:10 58.10" } 143.00 cm + Peri.
 } Period indicated above
 12:22 57.53" } 141.50 cm (depth just critical.)

	M-4	202	#1	#2	#3
12:25	Drain		6.40	6.18	6.02
			5.11	5.98	5.93
	57.513	141.50	at 57.53"		
	- 3.99	- 5.73	0.20	0.20	0.20 cm
	53.54 1/2	135.77 cm: 1/2 (53.45")			

$$\left\{ \begin{aligned} \text{Slope} - \text{Time} &= 185.42 \text{ cm} = 5.954 / 1.15 \text{ cm} = 10.1 \text{ ft/min} \\ \text{M-4} &= .57" \quad 202 = .59" \end{aligned} \right.$$
 Add channel sag to "Hc": $135.77 + 0.20 = 135.97 \text{ cm} = 53.53 \text{ cm}$





$\frac{1}{2.6}$

Aerial

$$\begin{array}{r} 3 \overline{) 25.6} \\ \underline{24} \\ 16 \\ \underline{15} \\ 10 \\ \underline{9} \\ 10 \end{array}$$

$8.533 \times 21.73 = 185.42$

$m = 185.42$

$\phi = 5.95$

$M = 4$	252
$157''$	$59''$

Total
 53.5×53.25
 $286''$ lower

9-Unit Array, 50' height
Square Pattern

9/15/64

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Alarm ✓	1"		10x5 ⁻¹²
K-2	3x15 ⁻¹²	Alarm ✓	1"		10x5 ⁻¹²
R-1					
R-2					
PM-1	700 V	Alarm ✓	Contact		0.20
PM-2	1200 V	Low ✓	10"		
		Alarm ✓	Contact		0.20
LOG IN CALIBRATE ✓		OPERATE ✓	SOURCE NO. B-80		
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by RKR Personnel check by IDC
 Instruments and safeties checked and reset by EJ
 Source in checked by IDC Source No. M-43
 Emergency equipment in control room checked by IDC
 Instruments in trip circuit: K-1, K-2, PM-1, PM-2
 Red light on by EJ Time 0930
 Start-up OK'd by IDC, EJ Date 9/15/64

Spacing 2.15 in. (metal-to-metal). 9 units,
 square pattern
 2 end: 4.34 in. (M-4), 6.6 cm (204). This is
 high in #1, OK in #2, low in #3. fudged
 about as good an average as possible.

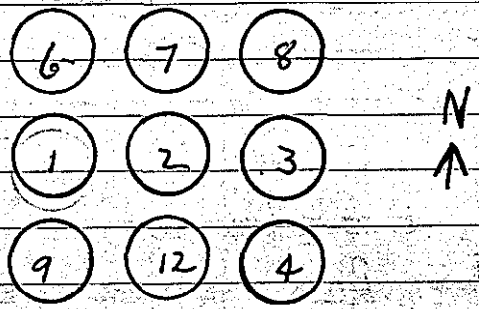
9/15/64

#1 #2 #3

Transit from center window 2 sides 611 5.52 + 5.8

1004	15.09 in. (M-4)	33.9 cm (100)		
1010	22.58 in.	52.5 cm		
1017	32.53 in.	79.15 cm		
1038	48.22 in.	117.85 cm		
1100	55.07	135.3 cm		
1114	58.23 in.; + period	143.7 cm	$H_2 + 0.2 \text{ cm} = 137.3 \text{ cm}$	
1116	58.15 in.	143.7 cm	Critical H_2	54.25 cm
1123	58.70 in.	144.45 cm; + period		

On K-1, $e^2 = \frac{80}{20} = 4.0$ $T = 213.5 \text{ sec} = 154 \text{ rev}$ (27.0 sec)
 Log 10:



3x3 array side-side spacing = 2.250" (al-al)

1405	M-4	202	#1	#2	#3
Zero	4.34"	6.6 cm	6.10 cm	5.90 cm	5.76 cm
1515	60.09 in.	147.95			
1523	62.4 in.	152.6 cm	6.01	6.10	5.98

quite but critical.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	cont	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter -	$\frac{1}{2}$	-	"
"	"	Fast ✓	"	-	"

PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low -	10"	-	900V
"	"	Alarm ✓	cont	✓	"

LOG-N CALIBRATE _____ OPERATE _____ SOURCE No. B-80
 DUMP WELL PROBE LIGHT _____

Unit triangular array: 56" ht

START-UP CHECK LIST

Equipment checked by PKK Personnel check by F.P.C
 Instruments and safeties checked and reset by PKK
 Source in checked by BAW Source No. M-93
 Emergency equipment in control room checked by F.P.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by PKK Time 10:30
 Start-up OK'd by F.P.C B.F.R Date 9-16-69
PKK

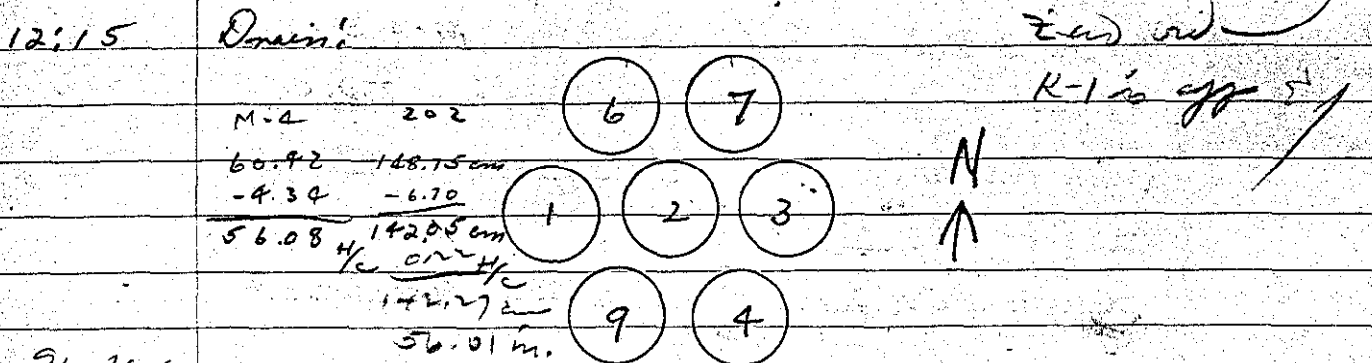
side-side spacing = 2.00" in (al-al)

array

	M-4 (in)	202 (cm)	# 2	# 3
Find	4.34 "	6.7	5.89 cm	5.75 cm
11:08	15.00 "	33.7		
11:16	25.75 "	60.95		
11:23	33.15 "	79.65		
11:32	45.92 "	112.05		
11:39	52.88 "	129.70		

11:59 { 60.42" 148.75 $\frac{6.11}{0.22 \text{ cm}}$ $\frac{5.97}{0.22}$ }
 System just critical

12:04 + Per M-4 202 Log n = 189.05 sec = 5.84
 61.42" $\frac{151.35}{453.50}$ 7K-1 = 189.8 sec = 5.84
 2K-2 = 168.9 sec = 6.54



9/18/64

NB Inspected #25 (48 in height). Blistered bottom, made end on top. Resistance measurement indicates solution can't act with aluminum.

15-unit, Δ pattern, 36-in. (vertical) (17) 139
 (see p. 140 for diagram)

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-2}	Moder ✓ Fast ✓	Contact		10×10^{-2}
K-2	3×10^{-2}	Moder ✓ Fast ✓	1/2"		10×10^{-2}
P-1					
P-2					
PM-1	700V	Alarm ✓	Contact		500V
PM-2	1200V	Low ✓ Alarm ✓	10"		500V

LOG & CALIBRATE _____ OPERATE ✓ SOURCE No. B-80
 DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by RKR Personnel check by IDC

Instruments and safeties checked and reset by CP

Source in checked by IDC Source No. M-40

Emergency equipment in control room checked by IDC

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

Red light on by RKR Time 1045

Start-up OK'd by RKR, IDC, CP Date 9/18/64

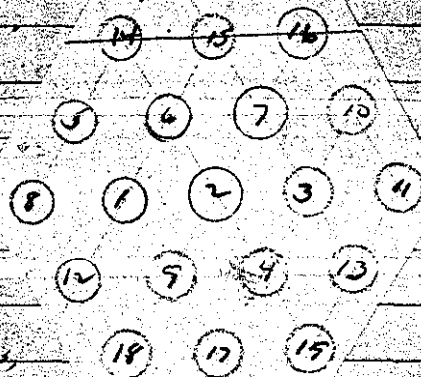
Installed #5, 10 (empty). #15 is still at 48".
 Will fill +6 +6 over to 36-in. height. Wood
 spacers still in surface spacing between
 metal 5.60 in.

9/18/64	M-4	202	4 lb	DL (202)
2-205	4.29 4.29 in.	6.45 in.	(see #5 & 10)	
1110	19.41	44.7 2mm	15.12 in.	15.06 in.
1114	24.53	58.7	20.64 in.	20.07 in.
1120	34.55	83.2	30.26	30.20 in.
1127	42.39	103.1	38.10 in.	38.10 in.
1130	52.37	128.4		
1148	57.90	142.4		
1155	60.29	148.40		
1159	60.39	148.68		

$\geq 10\mu$ off cylinders and probe from top.
 Results, increasing from bottom center of
 cylinders, #5: $56.625 - 0.25 \text{ in.} = 56.40 \text{ in.}$;
 #10: $56.5 \text{ in.} - 0.25 = 56.25 \text{ in.}$; #15: $56.5 \text{ in.} - 0.25 =$
 56.25 in.

1300 Add 4 bottles of solution to manifold.
 Mix thru dump well for ? min.
 Adjust height in #5 cyl: $56.50 - 0.25 = 56.25 \text{ in.}$

≈ 1530 Mess: a weld in the 55
 fitting on the discharge side
 of the dumping device -
 a pinhole leak due to
 corrosion. Result: about 22 l.
 of solution out of manifold.
 12 l recovered from drip pan,
 the rest into Kleenex and other
 scrubbing materials. See "Minor Difficulty Report"
 of 9/64.



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Motor -	cont	-	
"	"	Fast -	"	-	
K-2	"	Motor -	$\frac{1}{2}$ "	-	
"	"	Fast ✓	"	-	
P1					
P2					
PM-1	700 V	Alarm -	cont	-	
PM-2	1200 V	Low -	10"	-	
"	"	Alarm ✓	cont	-	

LOG N CALIBRATE OPERATE SOURCE No. B-90

DUMP WELL PROBE LIGHT

19 unit triangular array; 56" ht
side-side spacing = 5.6" (al-al)

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 12:30

Start-up OK'd by F.D.C. AKH Date 9-23-69

12:30 added ~ 12 l solution to manipell. Wiped about 30 min.

• over

M - 4 (in) 202 (cm) II 1 (cm) II 2 (cm) II 3 (cm)
 Zero (avg) 4.18" 6.10 cm 6.55 6.15 6.05

13:52 14.84 33.25

14:00 23.39 54.95

14:13 35.78 86.35

14:21 45.56 111.10

14:28 50.69 124.15

14:31 53.20 130.60

14:40 { 53.43 131.00 $\frac{6.70}{0.15}$ $\frac{6.25}{0.10}$ $\frac{6.15}{0.10}$
 } *Hypon just critical* avg 0.12 cm

14:45 { + Peri: $\log n = 302.05 \text{ cm} = 3.94$ = 16.5 ft/in.
 } 53.72 131.60 0.6 cm

14:55 Drain:

53.43"	131.00 cm
- 4.18"	6.10 cm
<hr/>	<hr/>
49.25"	124.90 cm
$\frac{H_c}{c}$	$\frac{0.2 \sqrt{H_c}}{c}$
	<hr/>
	125.02 cm $H_c = 49.22 \text{ in}$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10 ⁻¹²	Meter ✓	cont	✓	10X10 ⁻¹²
"	"	F.W. ✓	"	✓	"
K-2	"	Meter ✓	1/2	✓	"
"	"	F.W. ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	900V
"	"	Alarm ✓	cont	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-82

DUMP WELL PROBE LIGHT

zeros 4.196 (M-4) 6.252m (202)

START-UP CHECK LIST

Equipment checked by AKA Personnel check by EJLInstruments and safeties checked and reset by AKA, EJLSource in checked by AKA Source No. M-43

Emergency equipment in control room checked by _____

Instruments in trip circuit: K-1, K-2, PM-1, PM-2Red light on by AKA Time 19:30Start-up OK'd by EJL, I.D.C., AKA Date 9-29-69

1
Metal-to-metal spacing 5.80 in. 19-unit, 26-in. diff
away, Δ patterns.

	M-4 (in)	20.2 (cm)	#1 (cm)	#2 (cm)	#3 (cm)
Zeno	4.19	6.25	5.55	5.25	5.05

14:58 16.84 38.50

15:03 21.56 50.30

15:10 27.45 65.20

15:17 ~~37.58~~
35.58 90.95

15:25 45.89 112.00

15:30 53.10 130.25

15:35 56.82 139.60

15:40 60.23 ^{148.25} ^{148.28} Critical 5.85 5.42 5.35
0.30 0.17 0.30

15:51 } + Pen
60.99 150.10
Avg 0.26 cm

15:59 Drain:
60.23
4.15
56.08
148.25
6.25
142.00
0.26
142.26 cm - H₂ = 56.01

9-25-64

0800 Samples taken from manifold; two held to be sent
at a later date: # 1-A & 2-A.

1 - Y-12

Reg # 684903

1. $\frac{1}{2}$ = 4444702. $\frac{1}{2}$ = 2.0199

3. Pyro 40

4. assay = 4.99
897.18 g/l

2 - X-10

Reg # A-945

1. $\frac{1}{2}$ = 444072. $\frac{1}{2}$ = 2.0194

3. density = 2.0134

= 896.76 g/l

1

G = 136.0

T = 16.7

N = 119.3

2

G = 127.8

T = 16.7

N = 111.1

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DIST.	ST	START-RANG
3 X 10 ⁻¹²		Meter ✓	cont	✓	
"		Fast ✓	"	✓	
"		Meter ✓	"	✓	
"		Fast ✓	"	✓	
PM-1	700 V	Alarm -	cont	-	
PM-2	1200 V	Low -	"	-	
"		Alarm -	cont	-	
LCG N CALIBRATE ✓		OPERATE ✓	SOURCE No. B-80		
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by AKP Personnel check by AKP
 Instruments and safeties checked and reset by AKP & S.J.B
 Source in checked by AKP Source No. M-43
 Emergency equipment in control room checked by F.D.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKP Time 12:30
 Start-up OK'd by F.D.C S.J.R AKP Date 9-28-64

Purpose is to fill cylinders # 22, 23, & 24 to 500"

13.08 Filled to a hgt 60.40" on M-4. 148.2 cur^{on} 202.

13:45 # 22 = 56.4375" - .250" = 56.1875"

23 = 56.250" - .250" = 56.00"

24 = 56.3125" - .250" = 56.0625"

14:15 New filling cylinders #5, 20, 21, 25. To 50.00"

14:31 Filled to a ht of 60.42" on M-4; 148.65 cm on 202:

20 = 56.3125 - .250 = 56.0625"

25 = " " " = " "

21 = " " " = " "

15:15

Open

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INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	cont	-	10 X 10 ⁻¹²
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1/2"	-	"
"	"	Fast ✓	"	-	"
P					
PM-1	700V	Alarm ✓	cont	-	500V
PM-2	1200V	Low ✓	8"	-	900V
"	"	Alarm ✓	cont	-	"
LOG N CALIBRATE <input checked="" type="checkbox"/>			OPERATE <input checked="" type="checkbox"/>		SOURCE No. B-80
DUMP WELL PROBE LIGHT <input type="checkbox"/>					

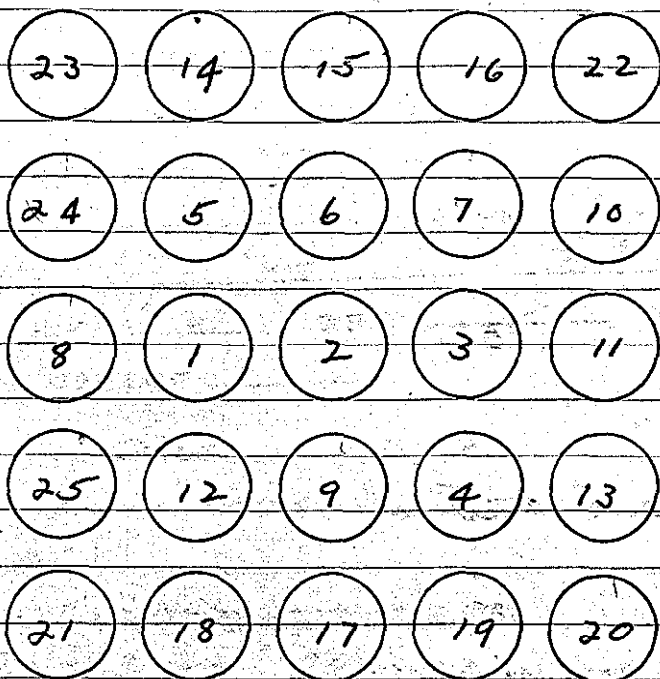
5 x 5 square array: side-side spacing = 5.35"
(cal - cal)

START-UP CHECK LIST

Equipment checked by PKM Personnel check by F.P.C
 Instruments and safeties checked and reset by PKM
 Source in checked by PKM Source No. M-43
 Emergency equipment in control room checked by F.P.C
 Instruments in trip circuit: K-2 PM-1 PM-2
 Red light on by PKM Time 0810
 Start-up OK'd by F.P.C Date 9-29-69

	M-4 (in)	202 (cm)	#1 (cm)	#2 (cm)	#3 (cm)
Zero	4.18 "	6.20 cm	5.69	5.35	5.24
0835	8.09	15.85	5.70	5.35	5.28
0848	20.45	47.50			
0859	31.16	74.55			
0904	35.84	86.30			
0916	44.98	108.40			
0939	52.29 ^{0.5"}	128.10	5.82	5.47	5.40
	Hypon just critical				
0943	+P _{sw}		K-1: T=180m		
	52.76	129.38	K-2: T=191m		
			Log N: T=181.7m; $\frac{L \cdot \Delta \sigma}{0.47m}$		
1953	Drains:		12.98/in		

5 x 5 square array: (56.0 hL)



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1 1/2"	✓	10 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	low ✓	✓	500 V
PM-2	1,200 V	Low ✓	6" ✓	✓	900 V
"	"	Alarm ✓	low ✓	✓	"

INSTRUMENT CALIBRATE OPERATE SOURCE No. B-80
 TRIP WHEN RED LIGHT

5 x 5 square array! side-side spacing = 5.490" (61-0)

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

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

Red light on by AKH Time 0800

Start-up OK'd by A.D.C E.D.C Date 9-30-68

	M-4 (cm)	202 (cm)	# 1 (cm)	# 2 (cm)	# 3 (cm)
Zero	4.22	6.20	5.65	5.35	5.17
0.825	15.93	36.00			

AKH

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	M-4 (cm)	202 (cm)	π_1 (cm)	π_2 (cm)	π_3 (cm)
0834	22.78	53.40			

0842	33.14 33.13	79.60			
------	---------------------------	-------	--	--	--

0849	38.86	94.15			
------	-------	-------	--	--	--

0854 System examined by K-1.

0900	32.92	78.70 78.75	(after retesting & checking for air)		
------	-------	---------------------------	--------------------------------------	--	--

0911	40.07	96.90			
------	-------	-------	--	--	--

0915 Transferred all solution in manifolds to #4 hold tank.

0931	44.99	109.40			
------	-------	--------	--	--	--

0939	51.75	126.55			
------	-------	--------	--	--	--

0945	55.82	136.80			
------	-------	--------	--	--	--

0959	57.84	140.60	5.86	5.48	5.32
------	-------	--------	------	------	------

System full critical.

1007	+Per 57.93	142.10	$\log \pi = 2.25992w = 5.09$ K-1 = 226.2 m K-2 = 218.7 m		
------	---------------	--------	--	--	--

1015	Drain:		K's on 3×10^{-9} K-1 on amp K-2 on Res.		
------	--------	--	--	--	--

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	ST	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1/2"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1/2"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"

PW 1	700V	Alarm ✓	cont	✓	500V
PW 2	1200V	Low ✓	7"	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-43

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

Instruments in trip circuit: K-1 K-2 P-19-1 P-19-2

Red light on by AKA Time 1045

Start-up OK'd by F.D.C AKA Date 10-16-64

Response to check critical ht in 22" in all dia sphere; Base volume = 296.5 d

	M-4 (inches)	202 (cm)	Scope (cm)
Zero	15.24	34.08	2.50
11:16	25.55	60.30	2.62
11:26	29.87	71.30	2.65
11:35	+ Per #1		
	31.00	74.10	
11:22	30.96	74.00	2.70
	System slightly - mag		
11:45	30.96	74.00	2.70
	System slightly + Per.		
11:46	Orain'		

+ Per:

$$K-1 = 87.9 \text{ sec} = 10.97 \text{ f}$$

$$90.61 \text{ sec} = 10.7 \text{ f}$$

$$\text{Log } 70 = 64.9 \text{ sec} = 13.1 \text{ f}$$

12:55 Recheck of critical pt:

Zero	15.24	34.08	2.50
13:06	24.29	56.90	2.62

ME 802 *leaf* 10
 13:27 { 31.04 74.10 2.70
 + Per #2

13:37 { 31.03 74.00 2.70
lysten very slightly + Per.

13:41 { 31.03 74.00 2.70
lysten very slightly - Neg.

13:42 Drain:
 + Per:
 Top = 136.25 mm = 7.64

14:05 Samples taken from manifold:
 #22-1 - f-12 #22-2 - X-10
 Reg # 684426 ~~Reg # 684426~~ A-946
 G = 136.3 G = 132.3
 T = 16.6 T = 16.6
 N = 119.7 N = 115.7
 calc for: calc for
 1. $\frac{G}{T} = 4.46270$ 1. $\frac{G}{T} = 4.46464$
 = 903.30 = 906.01 g%
 2. $\frac{N}{T} = 2.0241$
 3. $\frac{N}{G} = 2.0233$
 4. $\frac{N}{G} = 2.0233$

10-16-69

Samples #5. 1-A & 2-A Taken on 9-25-69; sent in for
checkboxon analysis: (Page 1 & 5)

1-A - Y-12

2-A - X-10:

Reg # 684427

Reg # A-947

G = 131.0

G = 141.1

T = 16.7

T = 17.5

N = 114.3

N = 123.6

calc for:

calc for:

1. $\frac{G}{T} = 7.844810 = 898.20$

1. $\frac{G}{T} = 7.82242 = 895.23$

2. $\frac{G}{N} = 2.0193$

2. $\frac{G}{N} = 2.0243$ $\frac{912}{2}$

3. Paper 40

3. Density = 2.0183

4. assay

2/6

Mom (25 l Polyethylene bottles)

159

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	B X10 ⁻¹²	Fast ✓	1/2"	✓	
"	"	Fast ✓	"	✓	
K-2	"	Motor ✓	1/2"	✓	
"	"	Fast ✓	"	✓	
R-1					
R-2					
PM-1	700 v	Alarm ✓	cont	✓	
PM-2	1200 v	Low ✓	8"	✓	
"	"	Alarm ✓	cont	✓	

LOG N CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

3 units triangular array (units in contact)

START-UP CHECK LIST

Equipment checked by AKH Personnel check by AKH

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

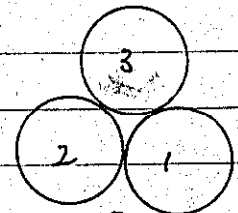
Emergency equipment in control room checked by T.D.C

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

Red light on by AKH Time 1300

Start-up OK'd by T.D.C. AKH Date 10-21-69

Zoo M-4 2.02 loop
 5.40 8.9 cm 3.00cm



13:29 Feed rate in three units = 1.19" per min

"Units in contact."

aver,

	M - 4 (in)	2.02 (cm)	Slope (cm)
13.55	23.40"	55.10	3.35

System sub critical.

1400 Drain rate ($\frac{1}{2}$ " drain valve) = 3.23 in per min.
Drain rate (3" dump valve) = 33.78 in per min.

Mon (252 bottles)

161

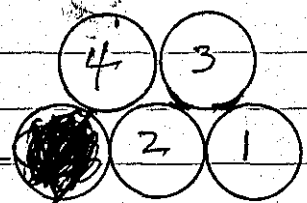
INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×5^{-12}
	1"	Fast ✓	1"	✓	
K-2	1"	Meter ✓	1"	✓	3×5^{-12}
		Fast ✓	1"	✓	
R-1					
R-2					
PM-1	900V	Alarm ✓	Cont	✓	500
PM-2	1200V	Low ✓	6"	✓	900
		Alarm ✓	Cont.	✓	
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
EMERGENCY LIGHT		✓			

START-UP CHECK LIST

Equipment checked by IDC Personnel check by DC
 Instruments and safeties checked and reset by IDC, ERR
 Source in checked by FDC Source No. M-43
 Emergency equipment in control room checked by IDC
 Instruments in trip circuit: K-1, K-2, PM¹, PM²
 Red light on by DC Time 08:25
 Start-up OK'd by SJ, ERR, IDC Date 10/22/64

	M-4	202	Scope
Zero	5.40 in.	(from p. 159) 8.9 cm	3.15 cm
0900	11.65 in.	24.9	3.25
0913	16.85	38.1	3.30

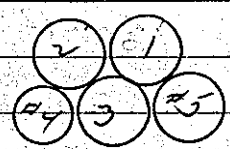


10/22/64	M-4 (in.)	202 (cm)	Slope (cm)	
0925	21.67	50.5	3.40	
0928	22.33	52.1	3.40	(This is just about equal in length)
0931	23.76	55.1	3.40	

Sub-critical. A little multiplication on last few inches.

0934	24.07	56.35	3.40	(solution just into well)
0935	Drain			

Added CE-64 (Now #5) to survey
(see p. 159 for 2 wells)



	M-4 (in.)	202 (cm)	Slope	
1328	6.00	10.25	3.15 cm	
	10.52	21.0	3.20	
1348	14.60	31.8	3.25	
1357	19.10	42.4	3.30	
1402	20.43	47.2		
1419	22.33	50.8	3.40	Critical
1421	Drain			

INSTRUMENT CHECK

163

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	cont	-	10 x 10 ⁻¹²
	"	Fst ✓	"	-	"
K-2	"	Meter -	1/2"	-	"
	"	Fst -	"	-	"
R-1					
R-2					
PM-1	700 v	Alarm -	cont	-	500 v
PM-2	1200 v	Low -	8"	-	900 v
	"	Alarm -	cont	-	"

LOG IN CALIBRATE OPERATE SOURCE No. B-10

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKM Personnel check by AKM

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-43

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

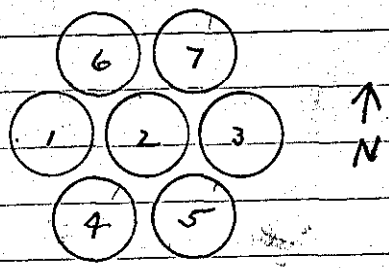
Instruments in trip circuit: K-1 K-2 PM-1 PM-2

Red light on by AKM Time 13:50

Start-up OK'd by F.D.C AKM Date 10-26-69

6 - was CE 39

7 - was CE 5



Seven sensors with triangular array; side-side spacing = .750"

	M-4	202	proper
F-20	5.40 in	8.9 cm	3.0 cm
13:31	12.03 in	25.50 cm	3.15 cm

	M-4 (in)	202 (cm)	Slope (cm)
1341	16.49	37.10	3.20
1350	20.98	48.65	3.30
1400	22.28	51.70	3.30
Hyphen just critical!			
1404	22.32	51.90	

14:10 Drain:

Period: $K-1 (10 \times 10^{-10})$ $K-2 (10 \times 10^{-10})$
 $\rho = \frac{50}{20} = 2.5$ $\rho = \frac{60}{24} = 2.5$
 $T = \frac{1.8 \text{ cm}}{0.916} = 203 \text{ sec}$ $T = \frac{3.125 \text{ cm}}{0.916} = 203.5 \text{ sec}$
 $\rho =$ $\rho =$

$\log \pi = 203.17 \text{ sec} = 5.5 \text{ f}$

INSTRUMENT CHECK

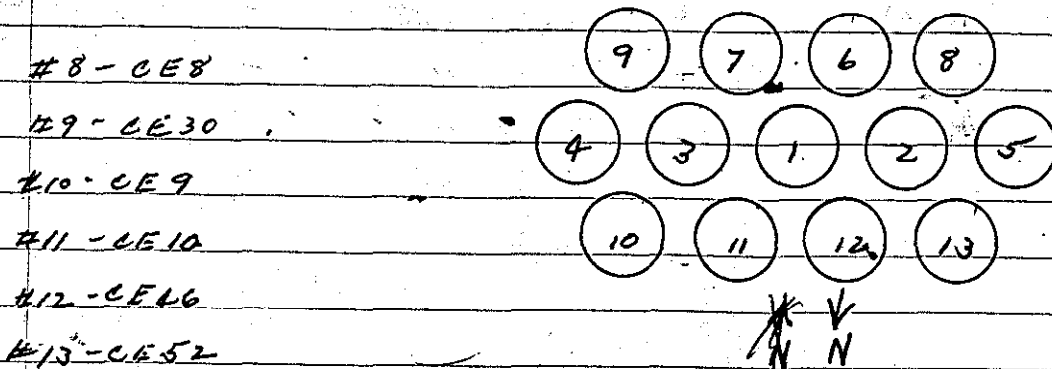
INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter <input checked="" type="checkbox"/>	cont	-	10×10^{-12}
	"	Fest -	"	-	"
K-2	"	Meter <input checked="" type="checkbox"/>	"	-	"
	"	Fest <input checked="" type="checkbox"/>	"	-	"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	cont	-	500V
PM-2	1200V	Low <input checked="" type="checkbox"/>	8"	-	900V
	"	Alarm <input checked="" type="checkbox"/>	cont	-	"
LOG N CALIBRATE <input checked="" type="checkbox"/>		OPERATE <input checked="" type="checkbox"/>		SOURCE No. B-80	
DUMP WELL FROGE LIGHT <input checked="" type="checkbox"/>					

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKM Time 12:20
 Start-up OK'd by F.D.C AKM Date 10-27-69

	M-2 (in)	202 (cm)	light (cm)
Low	5.40	8.90	4.00

13 units in triangular array: side-side spacing
 = 2.950" in.

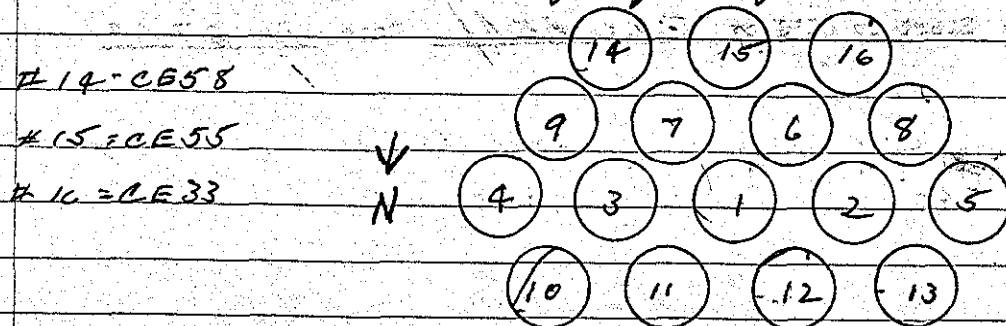


	M. G (in)	202 (cm)	height (cm)
12:55	11.53	24.75	4.05
13:06	18.13	41.40	4.15

13:14 { 22.95 53.70 4.20
 System not critical.

13:15 Drain:

13:45 added three units to south face: now have
 16 units in triangular array. Spacing still 2.950"

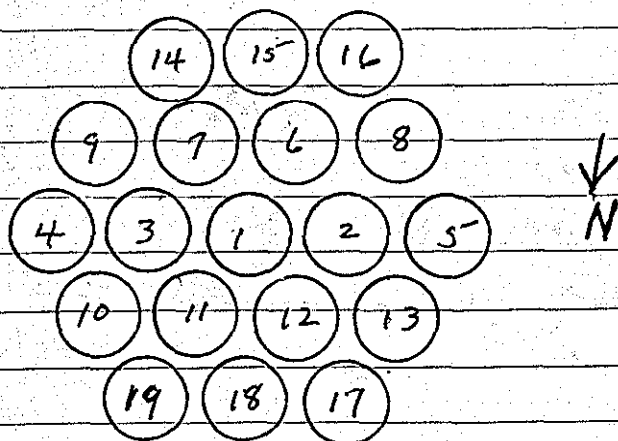


	M. L. (in)	202	Large Com
Zero	5.90	8.90	8.00
14:06	18.72	41.70	4.15

14:12	{	23.02	53.80	4.20
		System sub critical		

14:14 Drain:

15:15 added three units to north face; now have 19 units in triangular array spacing 2.950"



17 = CE61

18 = CE31

19 = CE60

(OVER)

	M-4 (in)		Scope (cm)
Zero	5.40	202 8.90	4.00
1532	16.51	37.30	4.10
1536	20.20	46.20	4.15
1542	23.10	54.00	4.20
{ System sub critical: (Very little null.)			
1544	Drain:		

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Master ✓	1/2"	-	10x10 ⁻¹²
"	"	Foot -	"	✓	"
K-2	"	Master ✓	1/2"	-	"
"	"	Foot ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	-	500V
PM-2	1200V	Low ✓	8"	-	900V
"	"	Alarm ✓	cont	-	"

LOG-N CALIBRATE ✓ OPERATE ✓ SOURCE No. 13-80
 DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by AKKJ Personnel check by F.P.C
 Instruments and safeties checked and reset by AKKJ
 Source in checked by AKKJ Source No. M-43
 Emergency equipment in control room checked by F.P.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKKJ Time 10:40
 Start-up OK'd by F.P.C AKKJ Date 10-28-69

13 units in triangular array; side-side spacing now = 2.90" (see page 166 for array pattern)

Zero	M-1 (in)	202 (cm)	scope (cm)
	5.40	8.90	4.00
			aver

	M-Q (in)	202 (cm)	Slope (cm)
1115	23.16	54.10	4.20
	System very sub critical.		

1117 Drain:

12:30 added three units to south face: Now have a 16 unit triangular array: (see page 166 for array pattern) side-side spacing still 2.800"

	M-Q (in)	202 (cm)	Slope (cm)
1258	23.22	54.20	4.20
	System sub critical:		

1259 Drain:

1325 added three units to north face: Now have a 19 unit triangular array: (see page 167 for array pattern) spacing still 2.800" in.

	M-Q (in)	202 (cm)	Slope (cm)
1345	23.34	54.60	4.25
	System sub critical.		

1347 Drain:

1505 Remains 6 units from array. Now have 13 units
in a triangular array (Page 166): side-side spacing
now = 2.53 "in".

	M-4 (in)	202 (cm)	Prop. (cm)
1525	15.82	34.8	4.10

{	23.20	53.70	4.20
	system very sub critical.		

1538 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1/2"	✓	10×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1/2"	✓	"
"	"	Fast ✓	"	✓	"
PM 1	700V	Alarm ✓	cont	✓	500V
PM 2	1200V	Low ✓	6"	✓	900V
"	"	Alarm ✓	cont	✓	"
LOG IN CALIBRATE ✓		OPERATE ✓	SOURCE No. <u>B-80</u>		
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

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

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

Red light on by RKH Time 0900

Start-up OK'd by F.O.C RKH Date 10-29-69

0800 Added three units to south face. Now have 16 units in a triangular array. Spacing = 2.53" side-side. (Page 106).

Zero	M-4 (in)	202 (cm)	loop (cm)
	5.40	8.90	4.00

0842	17.99	41.10	4.10
------	-------	-------	------

0850	23.12	54.10	4.20
------	-------	-------	------

System sub critical

0913 added three units to north face; now have a 19 unit triangular array; spacing 2.53" side-side.

0930	17.56	40.10	4.10
------	-------	-------	------

0941	23.97	56.25	4.18 4.15
------	-------	-------	-------------------------

System sub critical.
Drain:

1305 Removed 6 units from array; now have a 13 unit triangular array; side-side spacing now 2.00"

Zero	M-4 (in)	202 (cm)	loop (cm)
	5.40	8.90	4.00

1330	23.05	53.80	4.20
------	-------	-------	------

1322 Drain:

array:

1355 added 3 units to south face: Now have 16 units in a triangular array: spacing 2.00" in:

1414	M-4 (in)	20.2 (cm)	heaps (cm)
{	23.40	54.70	4.20
	System sub critical:		

1415 Drain:

1440 added 3 units to north face: Now have 19 units in a triangular array: side-side spacing 2.00" in:

	M-4 (in)	20.2 (cm)	heaps (cm)
Zero	5.40	8.90	4.00

1451	15.16	33.90	4.10
------	-------	-------	------

1458	19.03	43.70	4.20
------	-------	-------	------

1510	22.55	52.45	4.20
{	Same out: System slightly sub critical: - Neg.		

1512 Same in:

{	22.69	52.85	4.20
	22.70		
1518	Same out: System very slightly sub critical: - Neg.		

1520	22.70	52.86	4.20
{	System very slightly super critical: + Pos		

1521	Drain:	52.86	ch = 22.695 M-4
		8.5	" 52.855 202
		43.9	(Note not Zero corrected.)

INSTRUMENT CHECK

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

LOG N. CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

9 (25 l bottles) in-line. In contact: (Done)

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

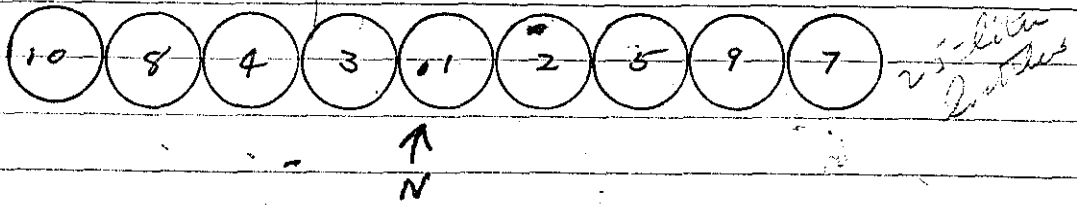
Instruments in trip circuit: K-1 K-2 PM-1 PM-2

Red light on by AKH Time 0805

Start-up OK'd by F.D.C AKH Date 10-30-64

Zero M-4 (cont) 20.2 (cm) Prof (cm)
5.40 8.90

over.



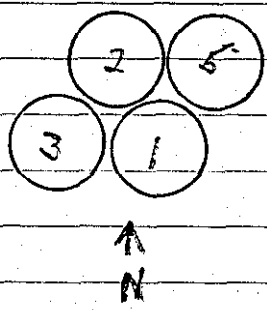
0837 M-4 (in) 20.2 (cm) *lyca (cm)*
 17.96 41.1 4.10

0845 { 22.99 53.80 4.15
 { *lyca sub critical?*

0846 *Drain!*

10-30-64 ~~56.00"~~ 56.00" ht.

1305 Installed 4 (9.5" I.D. cylinders) in a triangular array: Fixed height in cylinder # 5 = 56.00" avg spacing (al - al) = .060" (con. not get in contact)



Time	M-4 (in)	202 (cm)	Seep (cm)
13:15	M-4 (in)	202 (cm)	Seep (cm)
Zero avg for 1-2-3	4.68	7.20	7.00

13:30 Feed rate in units $\#^s 1, 2 + 3 = 2.12$ in/min

13:34	25.32	59.60	7.12
-------	-------	-------	------

13:43	36.79	88.70	7.20
-------	-------	-------	------

13:50	46.56	113.30	7.22
-------	-------	--------	------

13:58	50.16	122.50	7.25
-------	-------	--------	------

14:04	55.38	135.90	7.30
-------	-------	--------	------

14:14	60.79	149.50	7.30
-------	-------	--------	------

{ System sub critical: very little mtl

14:16 Drain rate ($1/2$ " drain valve) = 4.72 in/min
 Drain rate (3" Dump) = 57.44 in/min.

14:20 Drain!

9th of September

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	cont	✓	10 x 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K	"	Meter ✓	1/2"	✓	"
"	"	Fast ✓	"	✓	"

PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1,200V	Low ✓	8"	✓	900V
"	"	Alarm ✓	cont	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-50

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-93

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

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

Red light on by AKM Time 0845

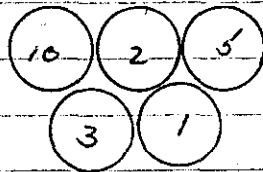
Start-up OK'd by F.D.C. AKM Date 11-2-64

0900 Purpose is to fill #10 cylinder to a pt of 56.00.

	M-4 (in)	20.2 (cm)
Zero	4.69	7.2
0924	61.38	151.10

Drain cylinder back to 56.3125" by measuring down from top: \therefore ht in #10 cylinder now = $56.3125" - .250" = 56.0625"$

1030 Now have five (9.5" I.D. al cylinders) in a triangular array: Fixed ht in cylinders #5, 5 + 10 = 56.00" avg spacing (al-al) = .060" Critical ≈ 25.03 in.



↑
N

Zero	M-4 (in)	20.2 (cm)	Length (cm)
	4.60	71.00	7.00
1046	15.80	35.50	7.02
1055	25.76	60.80	7.10

also:

	M-4 (in.)	20.2 (cm)	Slope (cm)
1104	30.84	73.50	7.10

1118	33.76	80.90	7.11
------	-------	-------	------

{ System very slightly super critical.

1122	33.74	80.85	7.11
------	-------	-------	------

{ System just critical.

Computed $q_4 = 73.74 \text{ cm} = 29.03 \text{ in.}$

1123 Drain:

12:45 Five units in a triangular array (Page 179); spacing now .750" in. (al-al).

Zero	M-4 (in.)	20.2 (cm)	Slope (cm)
	4.60	7.00	7.00

13103	23.85	55.90	7.10
-------	-------	-------	------

13116	38.15	92.20	7.15
-------	-------	-------	------

1326	50.76	124.10	7.20
------	-------	--------	------

1336	61.23	159.7	7.20
------	-------	-------	------

{ System sub critical.

1338 Drain:

9" Al Cylinders

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	START-UP RANGE
K-1	3 x 10 ⁻¹²	Motor ✓	cont	10 x 10 ⁻¹²
"	"	Fast ✓	"	"
K-2	"	Motor ✓	1/2	"
"	"	Fast ✓	"	"
R-1				
R-2				
PM-1	700 V	Alarm ✓	cont	500 V
PM-2	1200 V	Low ✓	8"	900 V
"	"	Alarm ✓	cont	"

LOG N-CALIBRATE OPERATE SOURCE No. B-80

DUMP-WELL PROBE LIGHT

48.00" H₂O

START-UP CHECK LIST

Equipment checked by AKK Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKK
 Source in checked by AKK Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1, K-2, PM-1, PM-2
 Red light on by AKK Time 0950
 Start-up OK'd by F.D.C. AKK Date 11-3-69

0905 Now have 5 units (9.5" F.O. of cylinders) in a Triangular array. (See page 179): Fixed ht. in cylinders #^s 5 & 10 now 48.00" in. side-side spacing = .300" in. (cal-dl.)

Zero	M-P (in)	20.2 (cm)	slope (cm)
	4.58	7.0	7.00

0931	29.26	69.70	7.10
------	-------	-------	------

0939	36.96	89.00	7.11
------	-------	-------	------

0948	39.33	95.00	7.12
------	-------	-------	------

System just critical
 corrected $4h = 88.85 \text{ cm} = 34.99 \text{ in.}$

0949 Drain:

1030 Five units in a Triangular array: (48.00 ht): side-side spacing now .450" in. (cal-dl.)

Zero	M-P (in)	20.2 (cm)	slope (cm)
	4.58	7.0	7.0

1048	29.82	70.9	7.1
------	-------	------	-----

1055	35.08	84.2	7.15
------	-------	------	------

11.19	46.35	112.80	7.19
-------	-------	--------	------

System just critical
 corrected $4h = 105.61 \text{ cm} = 41.58 \text{ in.}$

11.20 Drain:

12:30 Two samples taken from manifold:

γ -12	λ -10
Reg # 684430	A-948
σ = 142.9	σ = 135.1
T = 16.7	T = 17.0
N = 126.2	N = 118.1

all for:

1 - $g \frac{1}{2}$	1 - $g \frac{1}{2}$ = 4438
2 - sp. gr.	2 - sp. gr. = 2.0267
3 - Reg # 40	3 - Density = 2.0216
4 - avg.	= 899.45 $g \frac{1}{2}$

2-23-65 25 l bottles

185

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4.5"	✓	3×10^{-12}
"	"	Exp ✓	"	✓	"
K-2	"	Meter ✓	3.5"	✓	"
"	"	Exp ✓	"	✓	"
P-1					
P-2					
PM-1	700V	Alarm ✓	1/2"	✓	500V
PM-2	1200V	Low ✓	11"	✓	900V
"	"	Alarm ✓	3"	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

5 (25 l bottles) in line: in contact with
 bottom reflector only

START-UP CHECK LIST

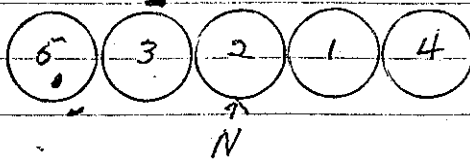
Equipment checked by AKH Personnel check by F.D.C
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH Source No. M-93
 Emergency equipment in control room checked by F.D.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AKH Time 1020
 Start-up OK'd by F.D.C AKH Date 2-23-65

When solution ht. in 202 reads 69.10 cm: the ht. in
 the 3 remote bottles are ~ even with ones;
 the liquid units: ~18.00"

18C

2-23-65

6" bottom reflection.
units in contact



10:35 Feed rate = 13.50" in. to 14.70" in. = 1.20" in./min.

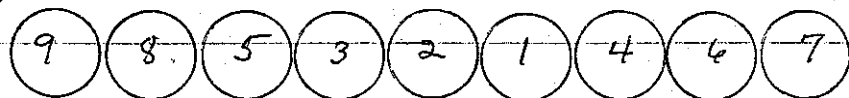
Zero solution = no	{	20.2 (cm)	M-4 (in)
		26.80 cm	12.34

11:00	{	70.10 cm	29.40"
		System sub critical. very little multiplication.	

Drain rate 1/2" drain value 29.40" to 28.61" = .79 in/15 sec.
 " " 3" " " 28.61 to 23.40" = 5.21 in/10 sec.

11:08 Drain

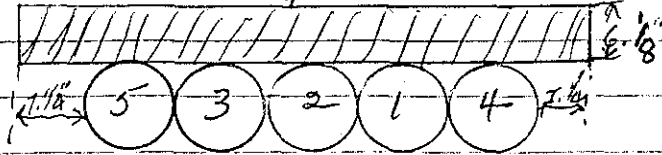
13:30 Start Up



{	20.2 (cm)	M-4 (in)
	69.40 cm	29.40 in.
	System sub critical	

2/23/65

5 units in contact; with wall on one face; + bottom reflector 187
 Top of wall is 9.5" above top of fuel;



1512

202 (cm)

M-9 (in)

69.40 cm

29.15 (in)

System sub critical: very little multiplication

1513

Drain;

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	4"	—	—
"	"	Fast ✓	"	—	—
K-2	"	Meter ✓	1"	—	—
"	"	Fast ✓	"	—	—
R-1					
R-2					
PM-1	700V	Alarm ✓	cent	—	—
PM-2	1200V	Low ✓	11"	—	—
"	"	Alarm ✓	2"	—	—

LOG N CALIBRATE ✓

OPERATE ✓

SOURCE No.

B-80

DUMP WELL PROBE LIGHT ✓

2-24-65

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

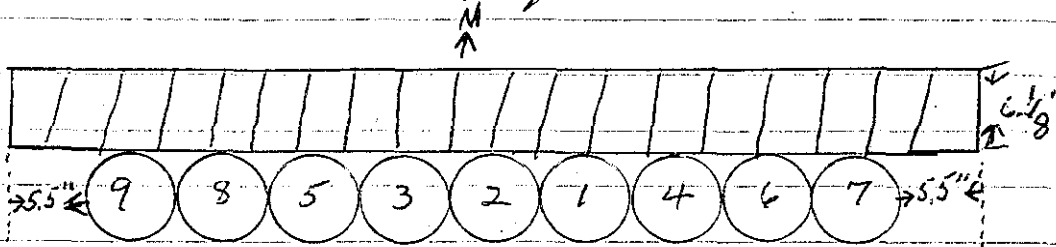
Source in checked by AKH Source No. 19-93

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

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

Red light on by AKH Time 0805

Start-up OK'd by F.D.C AKH Date 2-24-65



9 units in contact with wall on one face. + bottom. Top of well is 9.5" above top of wall.

Solution
Zero

20.2 (cm) 11-4 (in)
26.80 cm 12.34"
 29.63"

0838

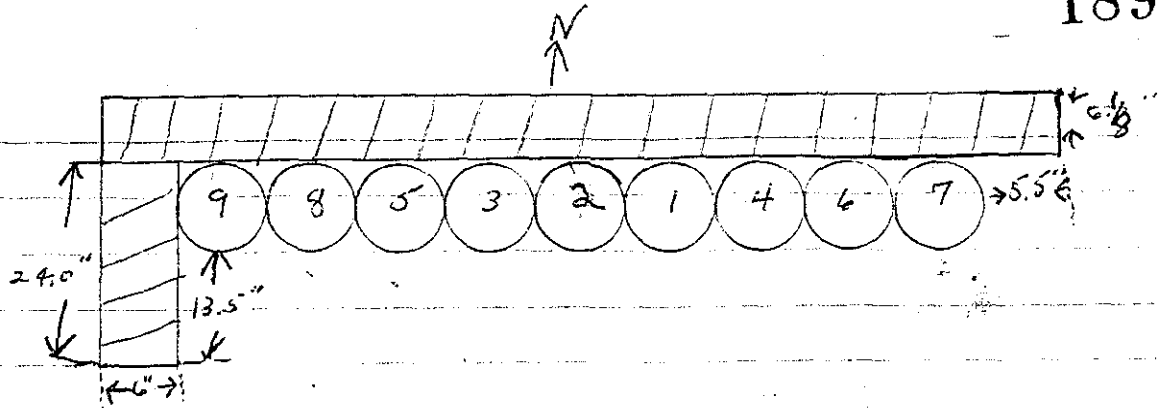
70.60
70.70 cm 29.63"

System sub critical. very little multiplication.

0840

Drain!

2/24/65

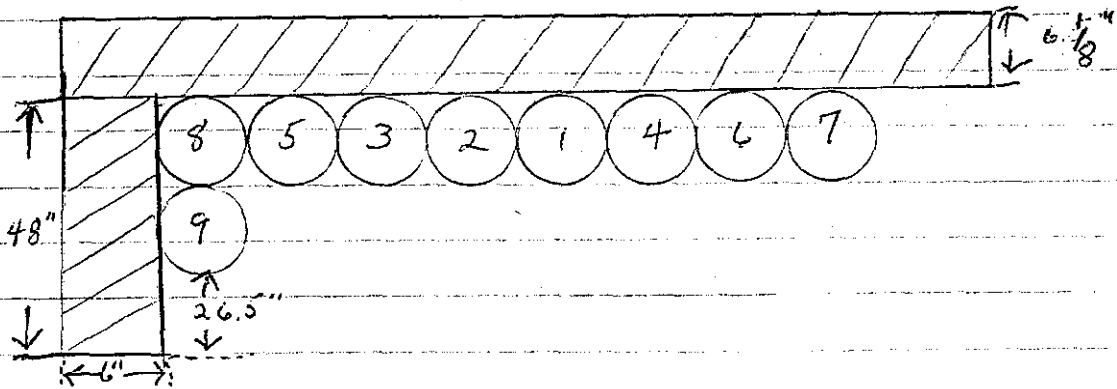


Ø 850 added wall to west face as shown above.

Ø 920 202 (cm) M-4 (in)

70.50 cm 29.63"

System sub critical: very little multiplication



Moved #9 unit as shown above.

1025 202 (cm) M-4 (in)

70.40 cm 29.99"

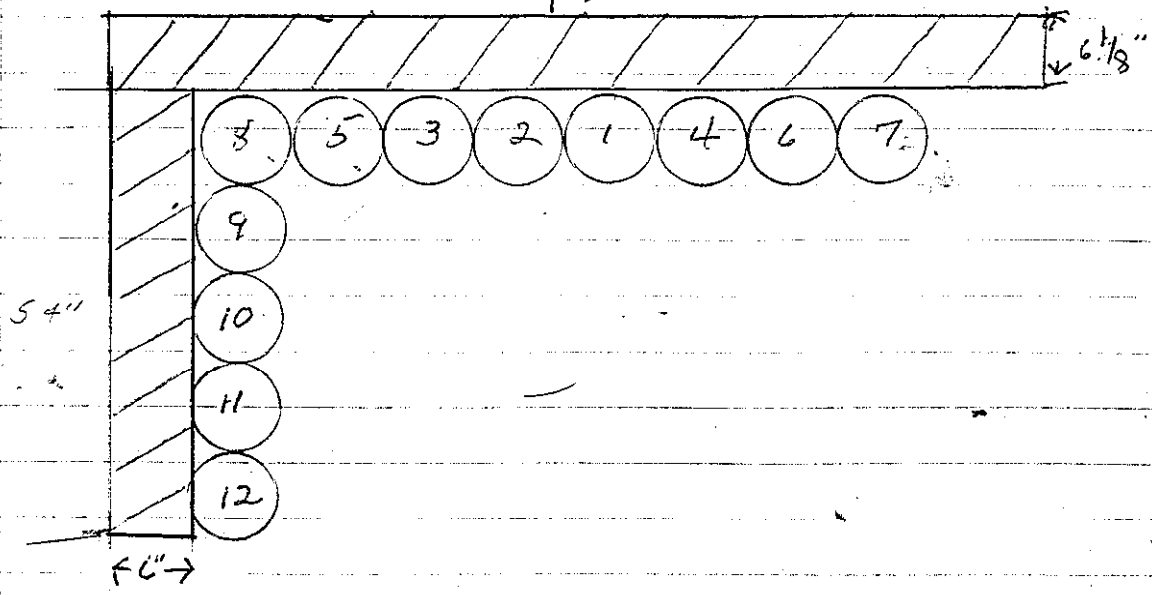
System sub critical: Very little multiplication

1027 Drain:

190

2/24/65

N
↑



11:00 Mould #10, 11, 12 units as shown above.

11:15

20.2 (cm)

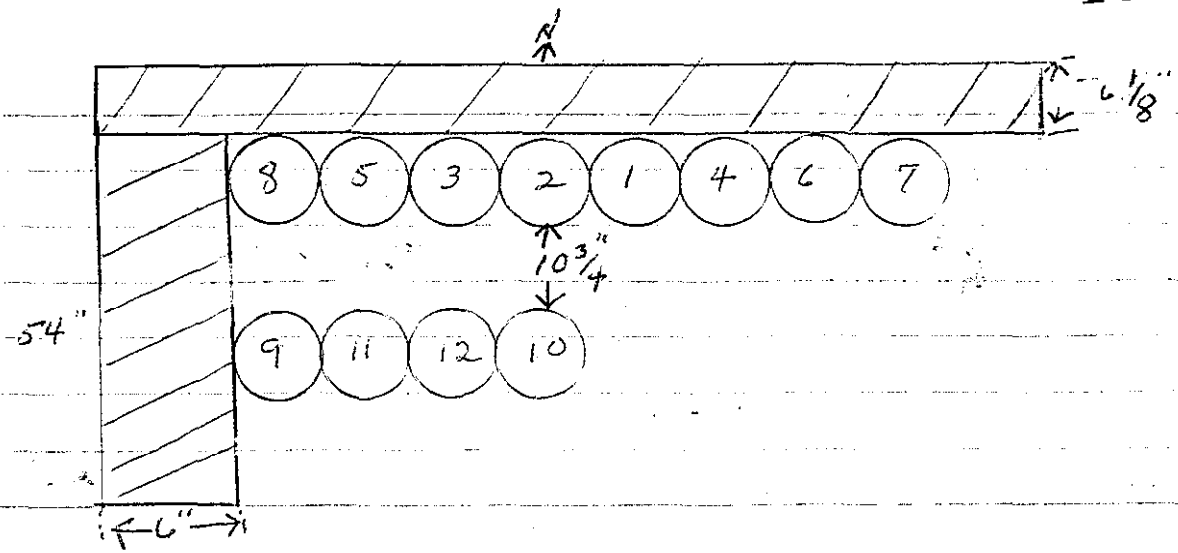
19.2 (in)

69.70 cm

29.29"

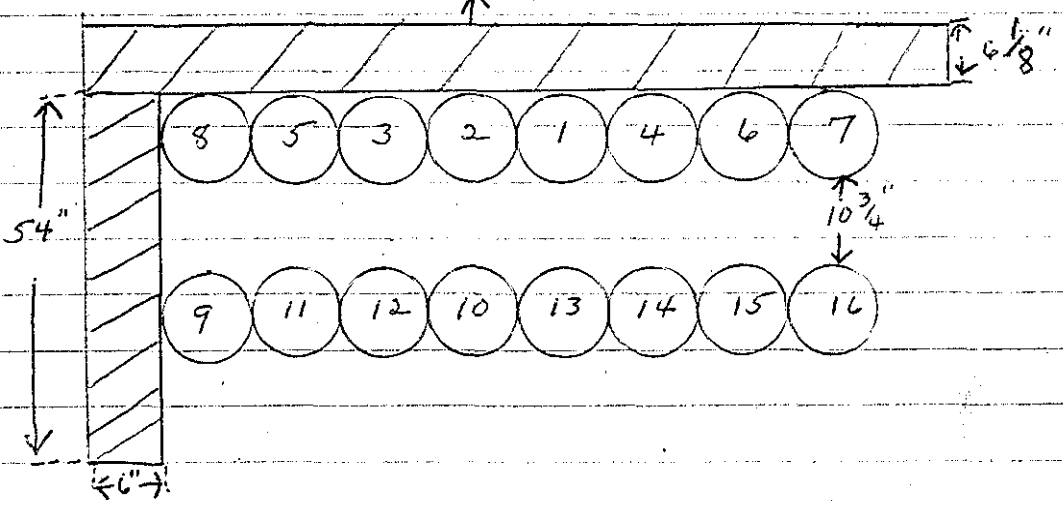
{ System sub critical! Very little multiplication:

2/24/65



1220 Moved 10, 11, 12 units in line with 1st row
 $10\frac{3}{4}$ " separation between rows.

1237 { 202 (cm) M-4 (in)
 69.10 cm 29.25"
 System sub critical: Very little multiplication:

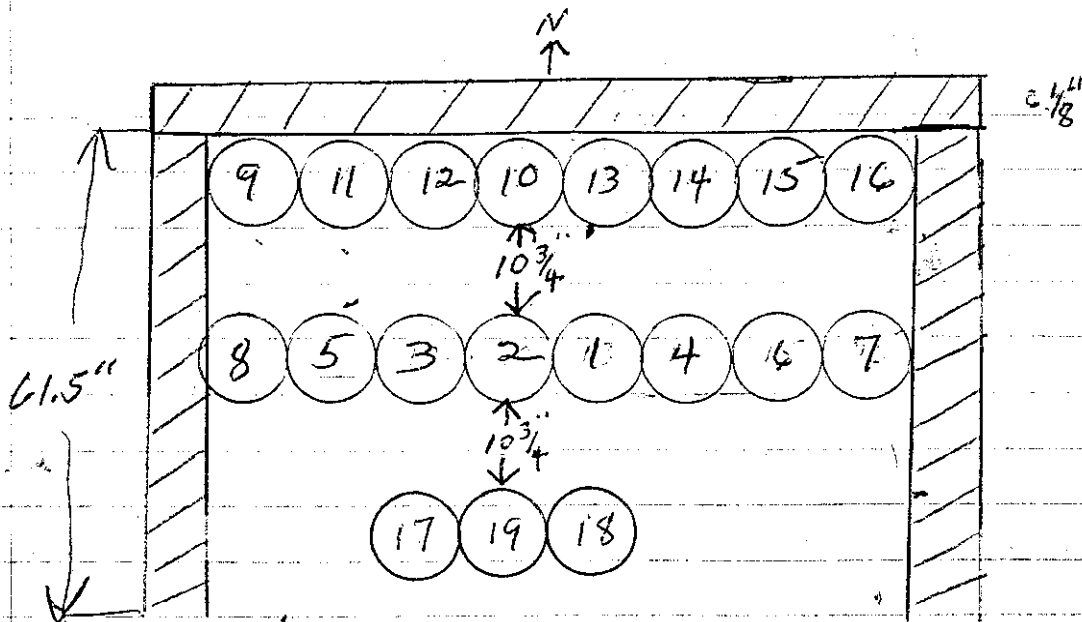


1300 Moved 13, 14, 15, 16 units in line - $10\frac{3}{4}$ " separation
 between rows.

1320 { 202 (cm) M-4 (in)
 70.6 29.6"
 Sub critical. Little multiplication.

2/25/65

2/



1500' added units # 17, 19, 18 as shown above.

202 (cm)

M-4 (ins)

70.30 cm

30.00"

1510 } System sub critical: very little multiplication

1512 Drain:

START-UP RANGE	SOURCE DISTANCE	SET	TRIP	STOP	OPERATE	SOURCE No.	LOG IN CALIBRATE	DUMP WELL PROBE LIGHT

INDICATOR CHECK

2/25/64

INSTRUMENT CHECK

193

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	-	3×10^{-12}
"	"	Fast -	"	-	"
K-2	"	Meter ✓	1"	-	"
"	"	Fast -	"	-	"
R-1					
R-2					
PM-1	700V ✓	Alarm -	cont	-	500V
PM-2	1200V ✓	Low ✓	11"	-	900V
"	"	Alarm -	2"	-	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. 14-43

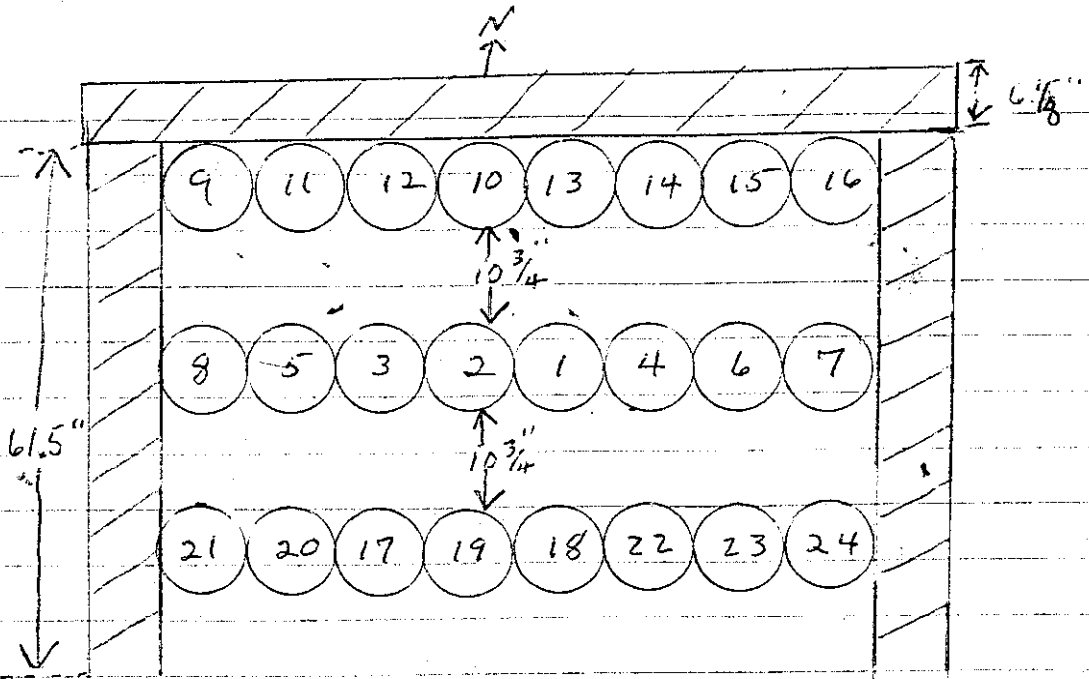
Emergency equipment in control room checked by F.D.C.

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

Red light on by AKK Time 0820

Start-up OK'd by F.D.C. AKK Date 2-25-65

2/25/65



0800 Added units # 21, 20, 22, 23, 24 as shown above.

Solution

20.2 (cm)

M-4 (in)

Zero

26.80

12.34 in

0855

71.20 cm

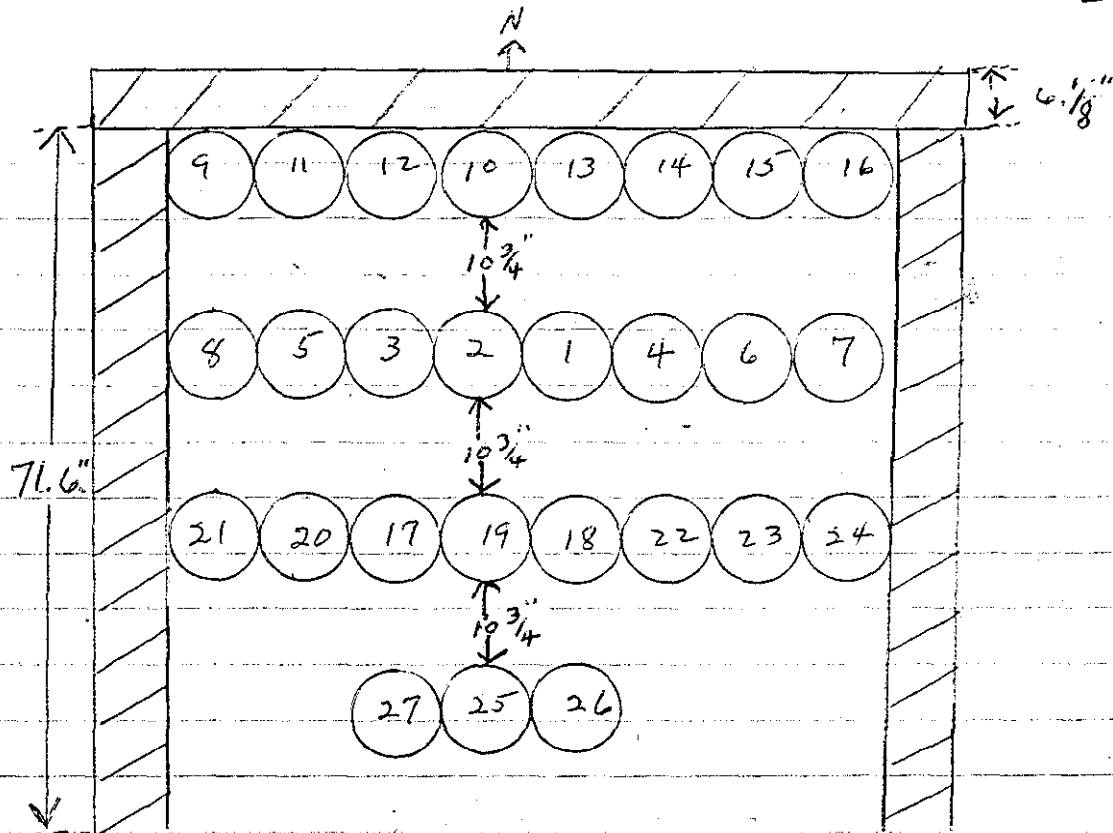
29.90 in.

System sub critical; very little multiplication

0856

Drain:

2/25/65

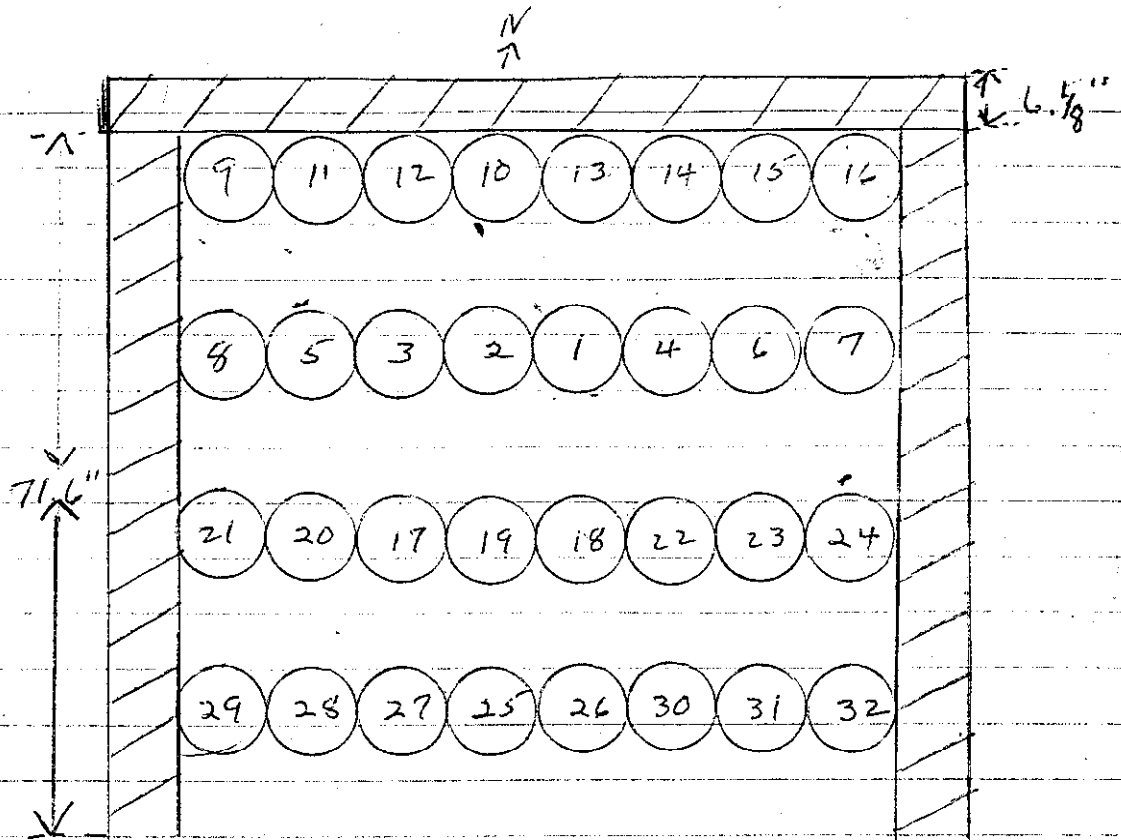


09:30 added units # 27, 25, 26 as shown above.

0.952 20.2 (cm) M-4 (in)
 solution ht = 71.20 cm. 29.99 in

0.954 Drains

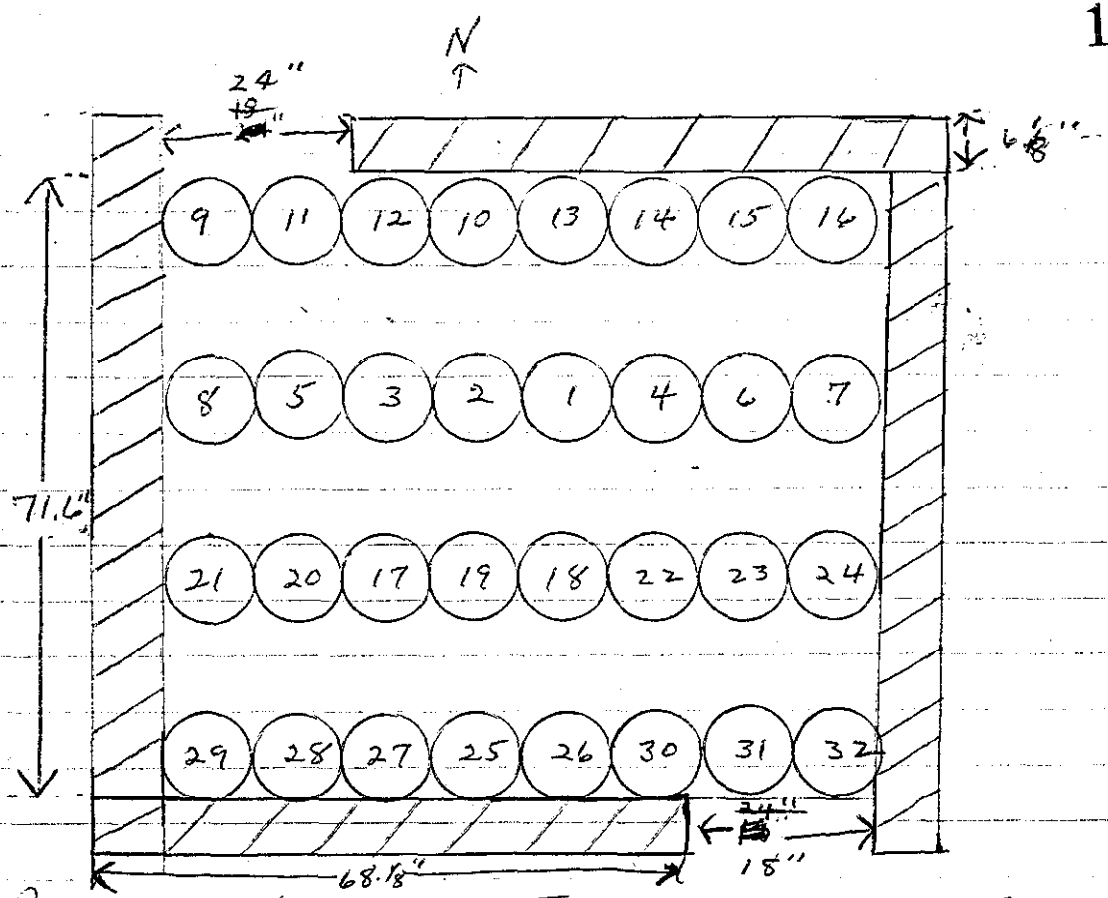
2/25/65



10:15 Added Units # 29, 28, 30, 31, 32 as shown above.

<p> solution ht 10.39 10.40 </p>	<p> 202 (cm) 71.30 } System sub critical: very little multiplication. Drain </p>	<p> M-9 (in) 29.96 in </p>
---	---	---

2/25/65



Removed 18" of n.w. reflector slab: Then added 68.18" to cavity face as shown above!

Solution 20.2 (cm) M-4 (iso)
 ht 71.20 cm 29.96 in
 11.25 } system sub critical: very little multiplication

11.26 Drain:

12.30 added ^{24"}/_{18"} of reflector to n.w. slab.

Solution 20.2 cm M-4 (iso)
 ht 71.30 cm 29.97 in
 12.54 } system sub critical: very little multiplication

15.55 Drain:

over:

2/25/65

1304 added 18" of reflector to S.C. corner as shown on page 197.

Salvation	20.2 (cm)	M-4 (ins)
ht	71.10 cm	29.92" in

1327 System sub critical; very little multiplication.

1328 Drains.

INSTRUMENT CHECK

INSTRUMENT	TRIP	SOURCE DISTANCE	SET	STARTUP RANGE
A-1 3×10^{-12}	Water ✓	4"	✓	3×10^{-12}
K-1	Fast ✓	"	✓	"
K-2	Water ✓	1"	✓	"
K-2	Fast ✓	1"	✓	"
700V	Alarm ✓	cont	✓	500V
1200V	Alarm ✓	18"	✓	900V
"	Alarm ✓	2"	✓	"
LOG N CALIBRATION	✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL FROSE LIGHT	✓			

0
Sol
09
0

3/1/65

25 liter bottles

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

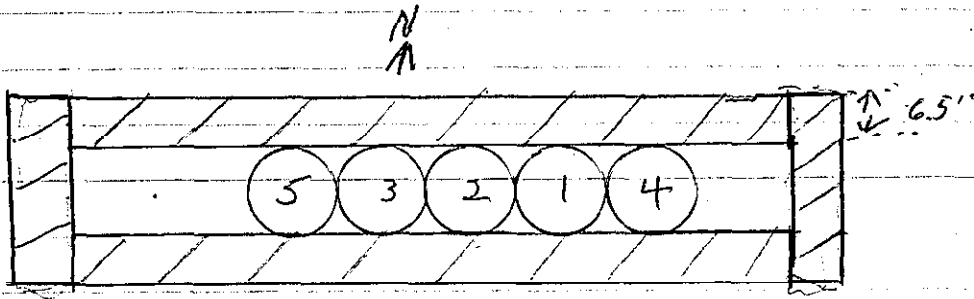
Source in checked by AKH Source No. M-93

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

Instruments in trip circuit: K-1K-2 R19-1 D19-2

Red light on by AKH Time 0910

Start-up OK'd by E.D.C AKH Date 3-1-65



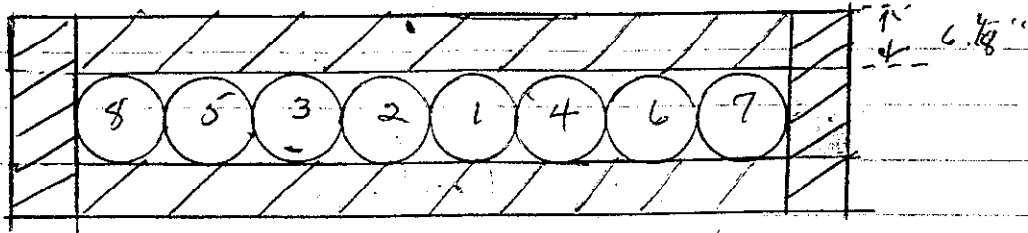
09:15 5 units elements in contact with reflector in contact as shown above

Solution	20.2 (cm)	M-9 (in)
Zero	26.80 cm	12.34"

0940 { 71.20 cm 29.92"
 System sub critical: very little multiplication.

0941 Drain:

3/1/65



10:15 added units # 8, 6, 7 as shown above

10:45

20.2 (cm)

M-9 (in)

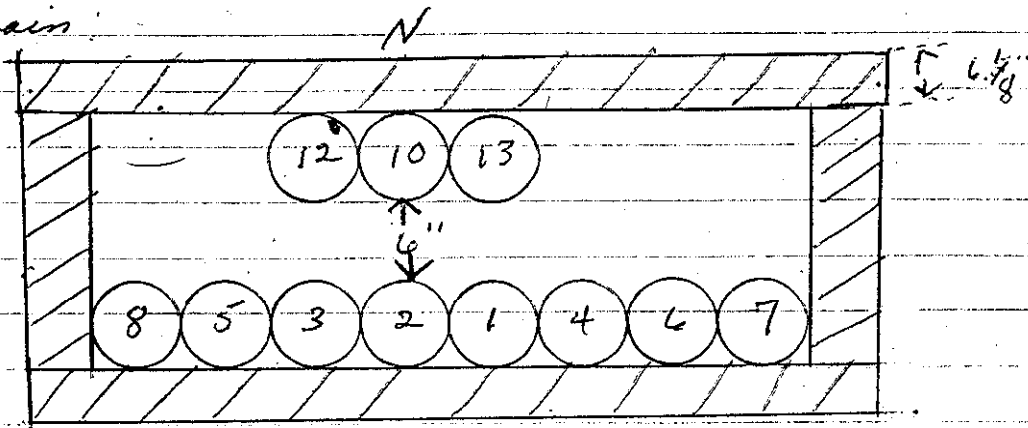
71.40

29.96"

System sub critical: Very little multiplication

10:47

Drain:



11:20 added units # 12, 10, 13 with 6" separation as shown above

11:41

20.2 (cm)

M-9 (in)

71.70 cm

30.08 in.

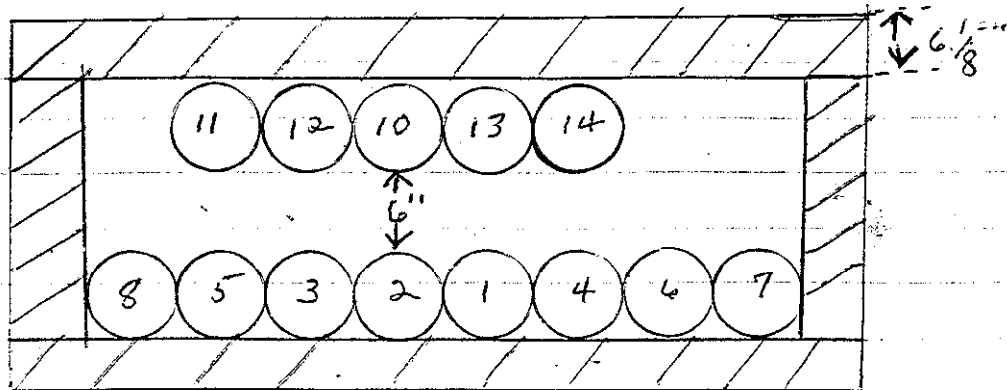
System sub critical: Very little multiplication

11:42

Drain:

3/1/65

N

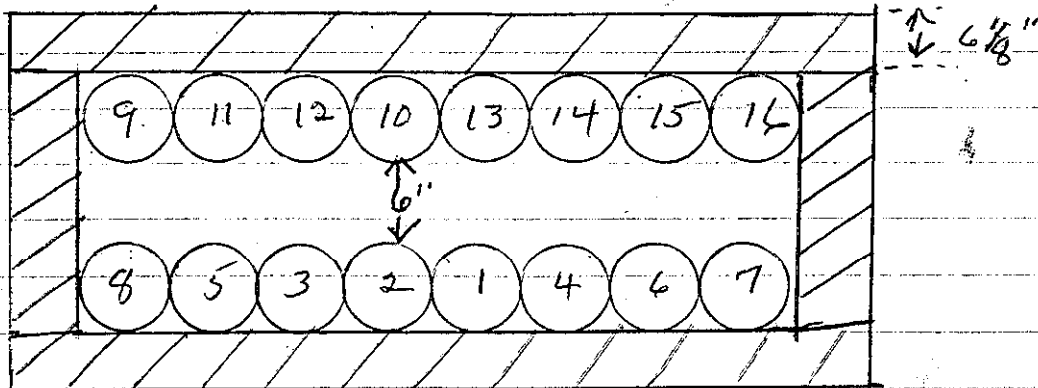


12:15 Added units # 11, + 14, with 6" separation as shown above.

12:58 } 202 (cm) M-4 (ins)
 71.40 (cm) 29.97 (ins)
 System sub critical: some multiplication:

13:00 Drain:

N



13:30 added units # 9, 15, 16 with 6" separation as shown above.

Zone 2 simulation
 65.25
 36.55
 37.45 cm } 202 (cm) M-4 (ins)
 14:04 + Per: 65.25 cm 27.58"
 $v = 166.5 \text{ cm} = 6.54$
 $M-4 = 46.4 \text{ /in} : 202 = 47.2 \text{ /in}!$ conv-

202
3/1/65

31

1413

202 (cm) $q_k = 39.10 \text{ cm}$

M-4 (in)

64.90

27.44 "

System just critical:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
"13 X 10 ⁻¹²		Motor -	4"	-	3 X 10 ⁻¹²
"		Fast -	4"	-	"
K 1 "		Motor ✓	1"	-	1.0 X 10 ⁻¹²
"		Fast -	1"	-	"
Panel 700V		Alarm -	Cont	-	500V
Panel 1200V		Low -	18V	-	900V
"		Alarm -	Cont	-	"

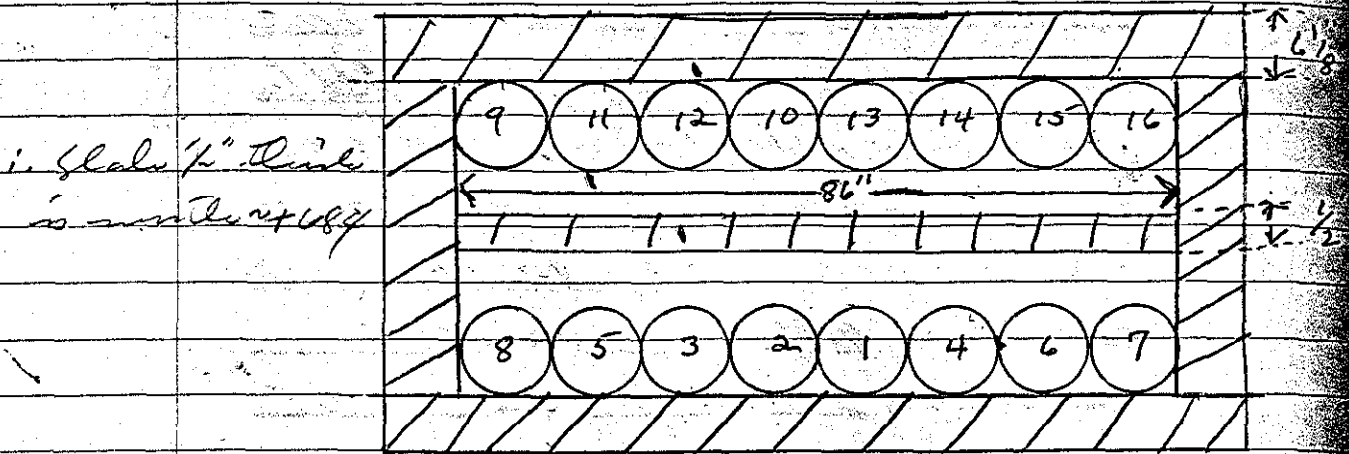
LOG-N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

3-2-65

N

3/21



12:20 Added more plexiglass (1/2 x 86" x 24") plexiglass now in contact with east & west walls as shown above. 6" separation between rows

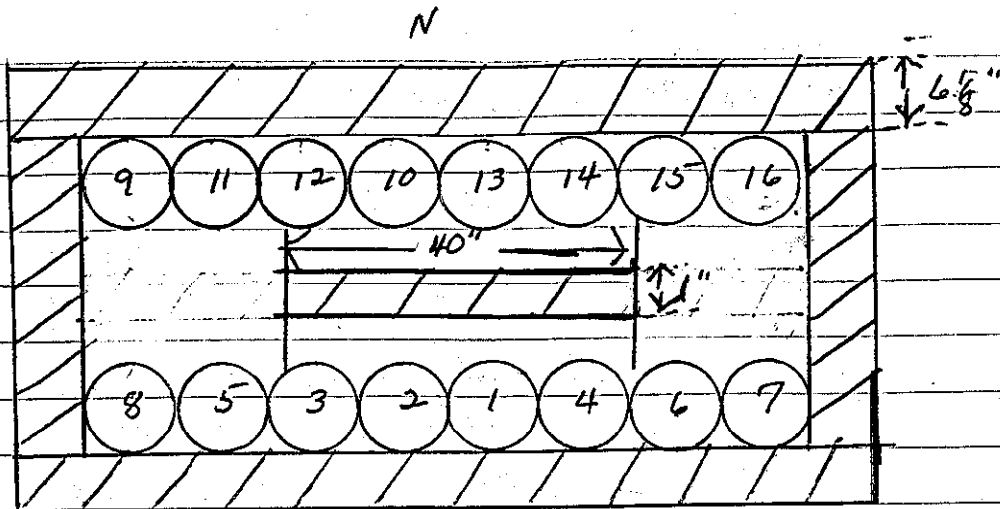
1300 } + P.V. 20.26 cm M-4 (in) 26.24" 26.25 in
 = 43.58 in C = 91.98 cm = 10.54" = 44.1 1/2 in

1308 } Septes just initial 1/2 34.25 cm 26.00"

Drain:

3/2/65

205



1500 Removed $\frac{1}{2}$ " plexiglass, + added $1" \times 40" \times 29\frac{3}{4}"$ plexiglass as shown above. 6" separation between rows.

1515 + Per 202 (cm) M-2 (in)
 63.10 cm 26.82" in.
 $Z = 129.58 \text{ cm} = 8.3 \text{ ft}$
 $= 48.8 \text{ ft/min}$

1530 } 202 (cm) M-2 (in)
 62.55 #2 = 35.75 26.65
 System just critical.

1532 Dennis:

1545 Two samples taken from manifold:

#1		#1A	
Y-12 Reg # 684464		X-10 S.F.A-874	
G-163.1g	act for	G-159.8g	act for
T-15.7	$1.9 \frac{g}{g} = .446600$	T-18.6	$1.8 \frac{g}{g} = 892.6 \text{ mg/ml}$
N-145.0g	$2.1 \frac{g}{g} = 2.0247$	N-141.2g	$2.1 \frac{g}{g} = 2.0280$
	3. by 40		3. density = 2.0235

206

3/3/65

INSTRUMENT CHECK

31

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter <input checked="" type="checkbox"/>	4"	<input checked="" type="checkbox"/>	3 x 10 ⁻¹²
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	10 x 10 ⁻¹²
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
R-1					"
R-2					"
PS-1	700V	Alarm <input checked="" type="checkbox"/>	cont	<input checked="" type="checkbox"/>	500V
PM-1	1200V	Low <input checked="" type="checkbox"/>	14"	<input checked="" type="checkbox"/>	900V
"	"	Alarm <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	"

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

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. M-93

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

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

Red light on by AKK Time 0812

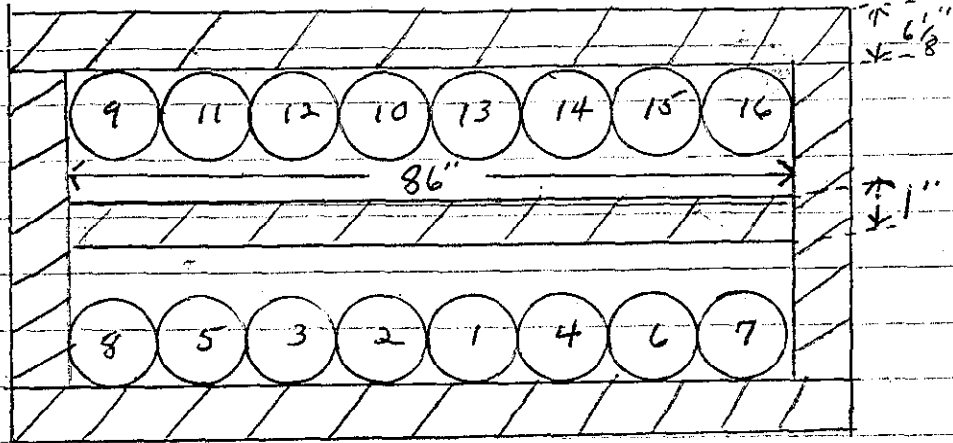
Start-up OK'd by F.D.C AKK Date 3-3-65

3/3/65

207

solution 202 (cm) 11-9 (in)
 zero 26.80 12.34"

N



width = 272.45

0800 added more plyglass (1" X 86" X 29 3/4"). now in contact with west and east wall. Room separation 6 1/8"

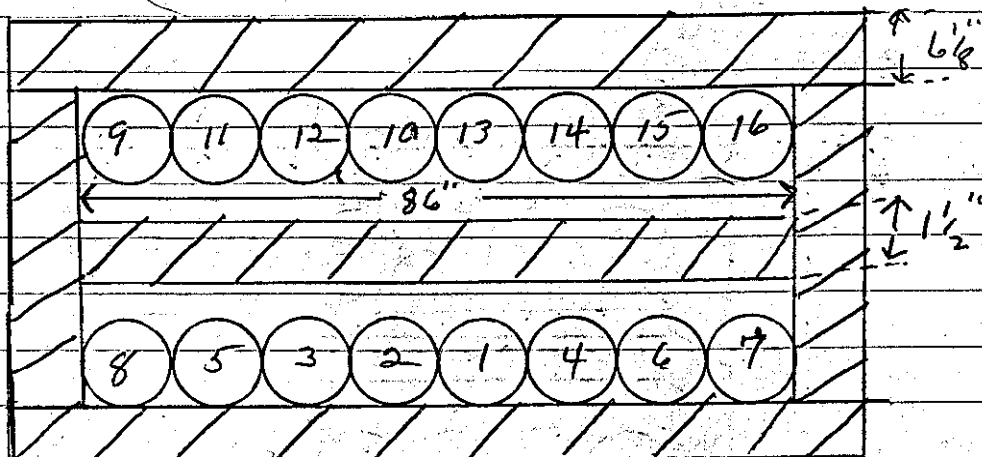
	202 (cm)	11.9 (in)
+ P.V.	61.40 cm	26.35 in.
	= 43.74 in.	G = 10.579 in = 9.54
		56.21 = 45.64 in.

0903 { 60.85 H₂ = 34.55 cm 26.19 in.
 system just critical!

208

3/3/65

N



09:30 added plexiglass ($\frac{1}{2}$ " x 86" x 24"). Now have $1\frac{1}{2}$ " x 86" at contact to east & west wall and $\frac{1}{2}$ " x 86" x 24" also at contact to east & west wall. Row separation still 6". Total thickness = 1.50" in.

1059

202. (cm)

M-2

+ P_{air}

63.15 cm

28.05 in ??

$$T = 115.89 \text{ cm} = 4.5 \text{ ft}$$

$$= 16.02 \text{ ft/cm} = 40.09 \text{ ft/in.}$$

1104

63.15 cm

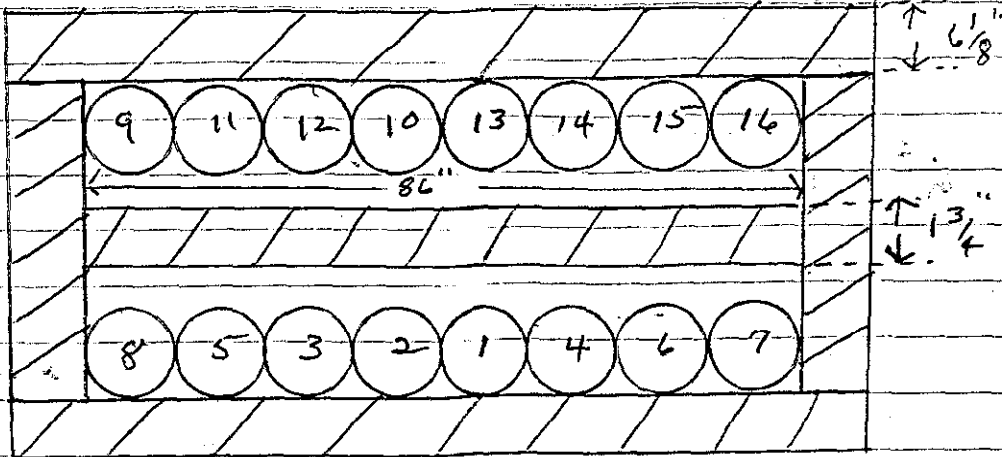
H_v 36.55 cm

27.08 in

system just critical.

3/3/65

N



3/4

12:30 added plate glass ($\frac{1}{4} \times 86 \times 24$) Total thickness = 1.75"
 Row separation 6"

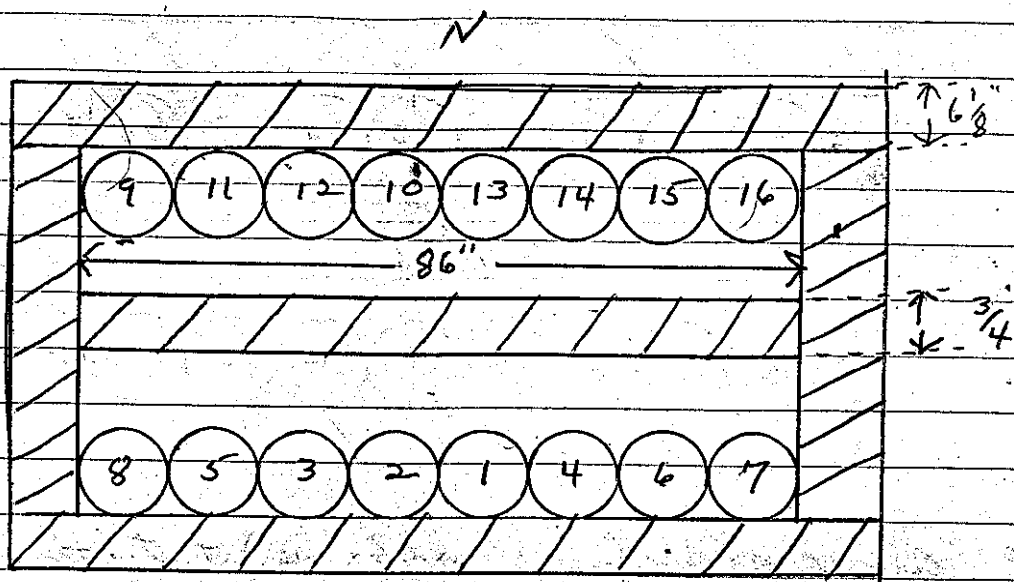
1432 202 (cm) $M-4 \text{ (in)}$
 $+ P_{in} \quad 65.35 \text{ cm}$ 28.07 in
 $\tau = 149.20 \text{ new} = 7.24$
 $= 14.4 \text{ /cm} = 36.58 \text{ /cm}$

1445 } $64.95 \text{ } \tau = 36.58 \text{ cm}$ 27.73
 System just critical

Draw:

210

3/3/65



1500 Removed 1" of total thickness - now have 3/4" plexiglass at contact to east & west wall. Row separation 6". total thickness = .750"

$$\begin{array}{r} 60.50 \\ 26.80 \\ \hline 33.70 \end{array}$$

20.2 (cm)

M-F (in)

1530

+ P₂

61.00 cm

26.20" in

$$\sigma = 126.03 \text{ cm} = 8.24$$

$$= 16.4 \text{ f/cm} = 41.66 \text{ f/in}$$

1540

60.50 cm H₂ = 33.70 cm

26.01" in

System just critical

Drain!

3/4/65 AM Polaroid pictures of above.

3-4-65

5% $W_{O_2} F_2$

17.5" I.D. Cylinder 211

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3.5"	-	10×10^{-12}
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	"	-	"
"	"	Fast -	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	-	500V
PM-2	1200V	Low ✓	20"	-	900V
"	"	Alarm ✓	2"	-	"
LOG N CALIBRATE ✓			OPERATE ✓	SOURCE No.	B-80
DUMP WELL PROSE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.D.C.Instruments and safeties checked and reset by AKMSource in checked by AKM Source No. M-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1 K-2 PM-1 PM-2Red light on by AKM Time 1310Start-up OK'd by F.D.C. AKM Date 3-4-65.

Purpose is to check critical ht in 17.5" I.D. cylinder: (Bore in fig lid.) Vessel is unpainted in side; inside ht = $67.3/4$ " outside ht = 68.0 " : Bottom = $1/4$ " wall thickness $1/8$ "

212

3-9-65

Zero solution: 202 (cm) M-4 (in):
 0.0 cm 3.93"

1400 + Per 50.2 cm 23.67"
~~23.64 in.~~

$\sigma = 463.94 \text{ cm} = 3.1 \%$
 $\Delta h = 0.3 \text{ cm} = 10.32 \text{ } \mu\text{m}$
 $\sigma/h = 19.65 \text{ } \mu\text{m} = 26.21 \text{ } \mu\text{m}$

X416 { 49.9 cm 23.67" in
~~-3.93~~
 19.74"

System just critical

Drain!

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3"	-	3×10^{-12}
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	10×10^{-12}
"	"	Fast ✓	"	-	"
R-1					
R-2					
BM-1	700V	Alarm ✓	600"	-	500V
BM-2	900V	Low ✓	14"	-	900V
"		Alarm ✓	1"	-	"

LOG N. CA. OPERATE SOURCE B-80
 BUMP N. CA. FROG LIGHT

3-5-65

START-UP CHECK LIST

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

Instrumentation and safeties checked and reset by AKV

Source in checked by AKV Source No. M-43

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

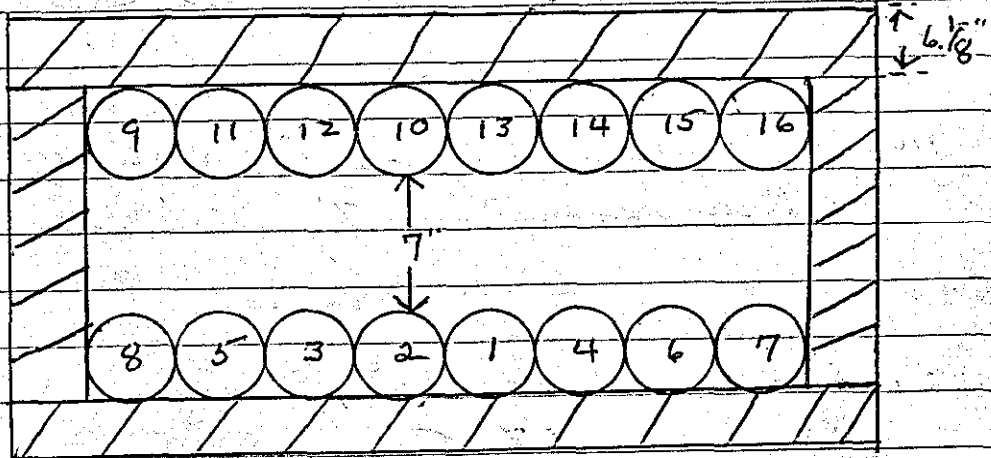
Instruments in trip circuits: K-1 K-2 PM-1 PM-2

Red light on by AKV Time 0935

Start-up OK'd by F.P.C., AKV Date 3-5-65

"New"

Solution's zero: 20.2 (cm) M-4 (in)
at 3-5-65" 26.80 cm: 12.84" in.



0800 Separation between rows now 7" as shown above

9h

72.30
26.80
45.50 cm

1035

20.2 (cm)

M-4 in.

72.30 cm

31.05"

System just critical!

over!

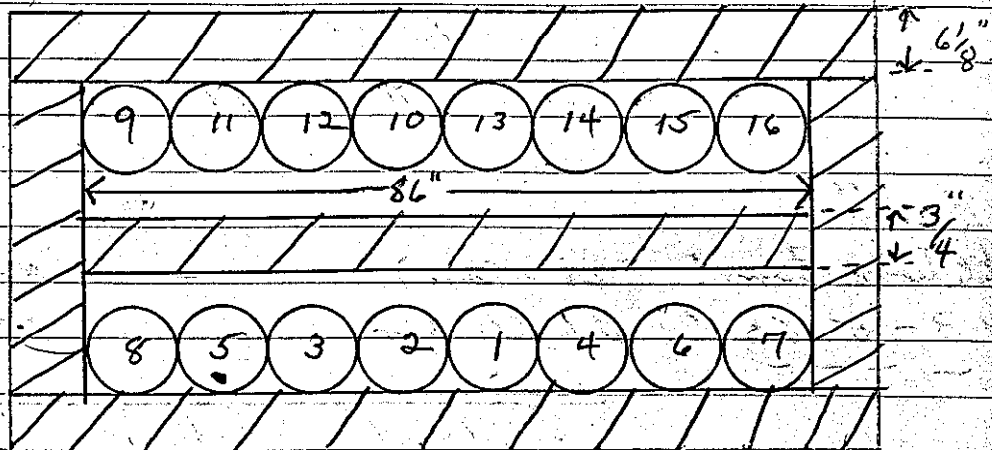
214

3/5/65

1038 - Per: 202 (cm) M-9 (in)
 70.20 cm 30.00 in

Recessed out high enough to get a good - Neg Per:

1044 Drains:



1100 Added plexiglass (3/16" x 24" x 86") Total thickness = .750
 Row separation 7"

$$\frac{1}{4} C = \frac{67.35}{40.55} = 1.66$$

1121 + Per 202 (cm) M-9 (in)

$$67.75 \text{ cm}$$

$$29.04 \text{ in}$$

$$T = 173.19 \text{ cm} \\ = 6.34 = 15.75 \text{ ft/cm} = 40.01 \text{ ft/in}$$

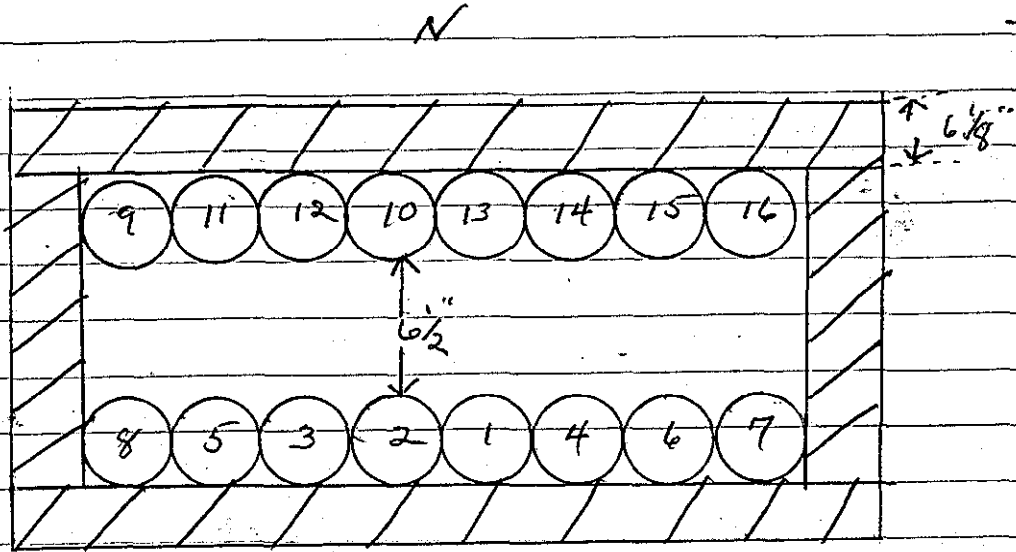
1154

$$67.35 \\ 67.35 \text{ cm}$$

$$29.89 \text{ in}$$

System just critical

3/5/65



1320 Separation between rows now 6.50" as shown above.

Solution 166	202 (cm)	M-2 (in)
--------------	----------	----------

1345	4 Per	29.22" in
------	-------	-----------

4/6 amount = 68.70	68.20 cm	
26.80	67.70	
40.90	1.50	
S = 143.42 mm = 7.94 = 14.84/in = 37.64/in.		

1354	67.70 cm 4/6 40.90	29.08" in
------	--------------------	-----------

System just critical:

Drain:

216
3/8/65

31

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3X10 ⁻¹²	Meter ✓	3.5"		3X10 ⁻¹²
"	"	F-1 ✓	"		"
K	"	Alarm ✓	1"		10X10 ⁻¹²
"	"	" ✓	"		"
P					
	7000	Alarm ✓	const		5000
	12000	Low ✓	12"		9000
	"	Alarm ✓	const		
LOG-N CALIBRATE ✓			OPERATE ✓	SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

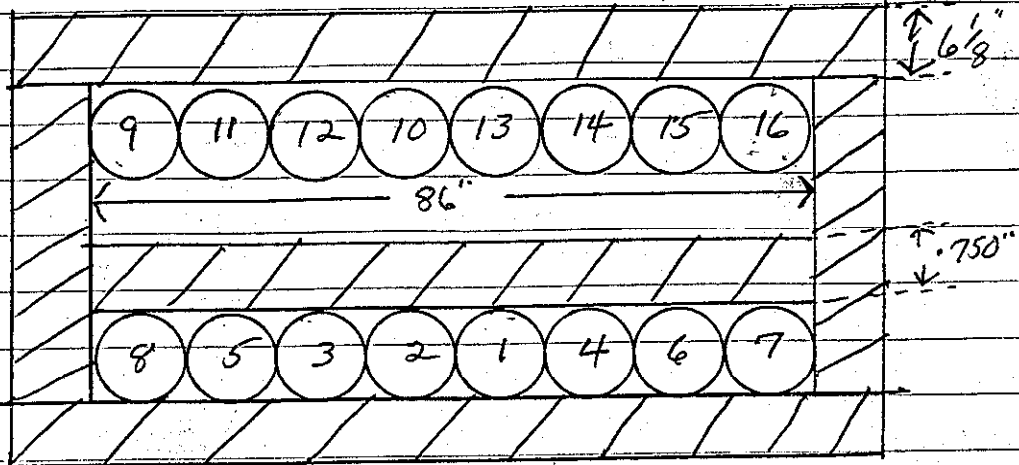
Equipment checked by AKH Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1-K-2 PM-1 PM-2
 Red light on by AKH Time 0915
 Start-up OK'd by F.D.C. AKH Date 3-8-65

Solution Level 202 (cm) M-2 (cm)
 2690 cm 1284"

3/8/65

217

N

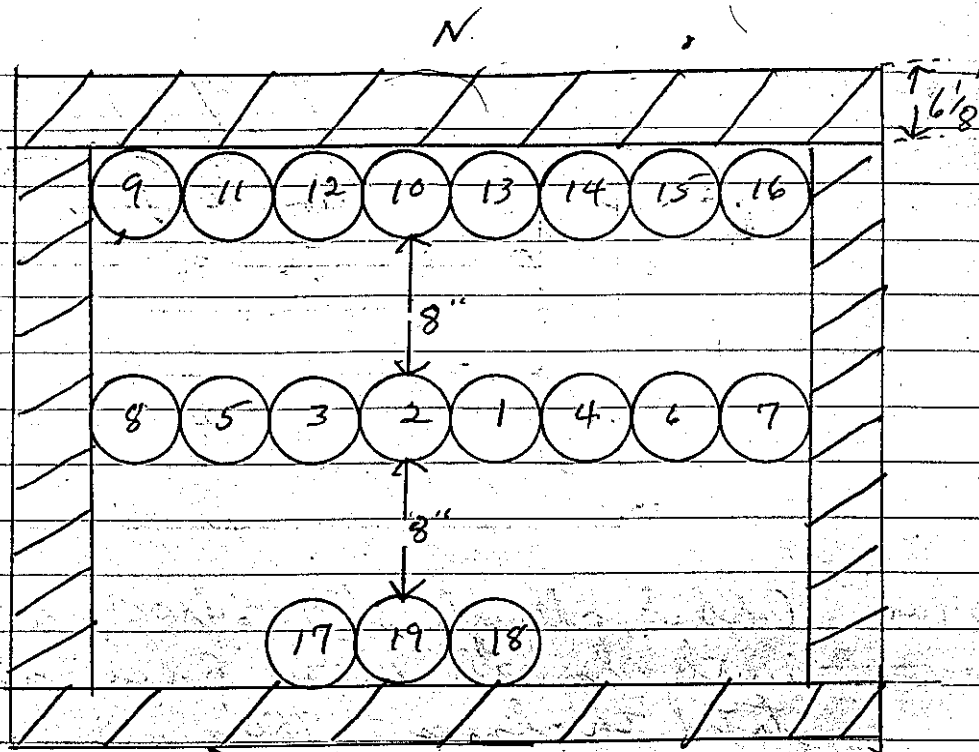


0900 Added plexiglass (3/4" x 24" x 86") at contact with South row. Row separation 6 1/2" total thickness = .750"

		202 (cm)	AA-4 (in)
0945	+ Per	62.35	26.90"
		$\frac{61.90}{.74} = 45 \text{ cm.}$	
	$\frac{61.90}{.74} = 83.78 \text{ cm.}$		
		$\sigma = 119.5 \text{ mm} = 8.64 = 19.09 \text{ %mm.}$	
0958	}	61.90 cm	26.73"
		System just critical	

Drain

218
3/8/65



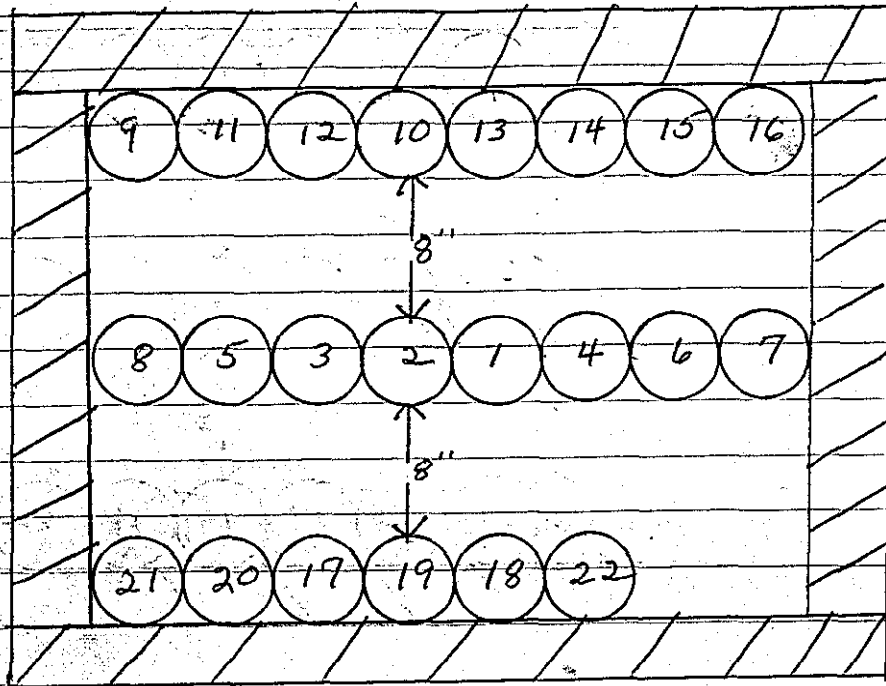
1220 Removed pleigloss, and added 3 units (17, 19, 18.)
Row separation now 8" as shown above.

Solution	202 (cm)	M-4 (in)
Freq	26.80 cm	12.84

1250 { 69.20 cm. 29.61"
System sub-critical? Very little multiplexing.

3/8/65

N



6 1/8

1300 added units #s 21, 20, & 22.

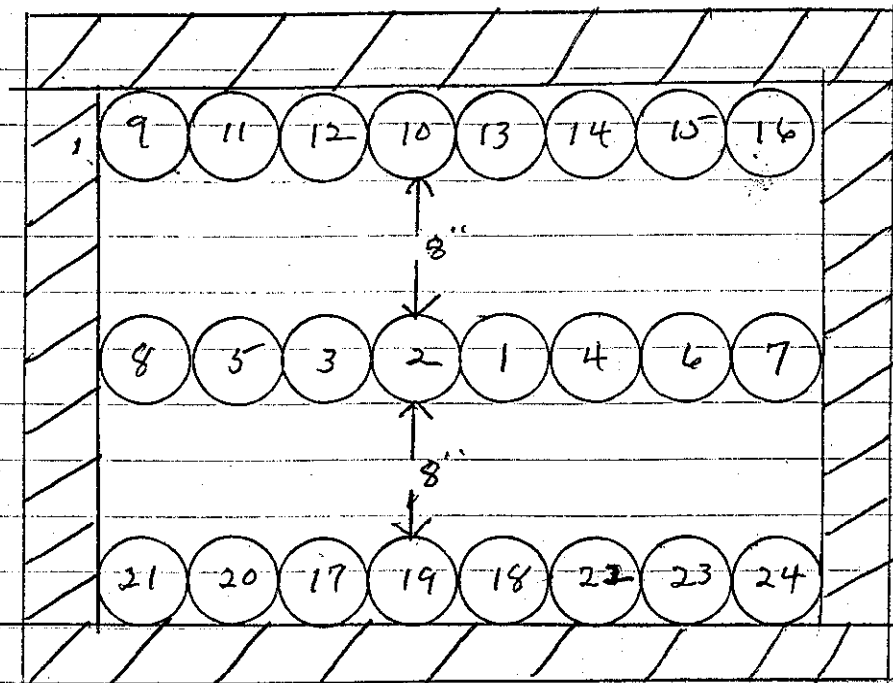
1331 { 20.2 (cm) M-L (cm)
 69.55 cm 29.75
 System not critical; some multiplication;

1332 Drain!

220

3/8/65

3/8/



13:40 added units # 23, 24 as shown above.

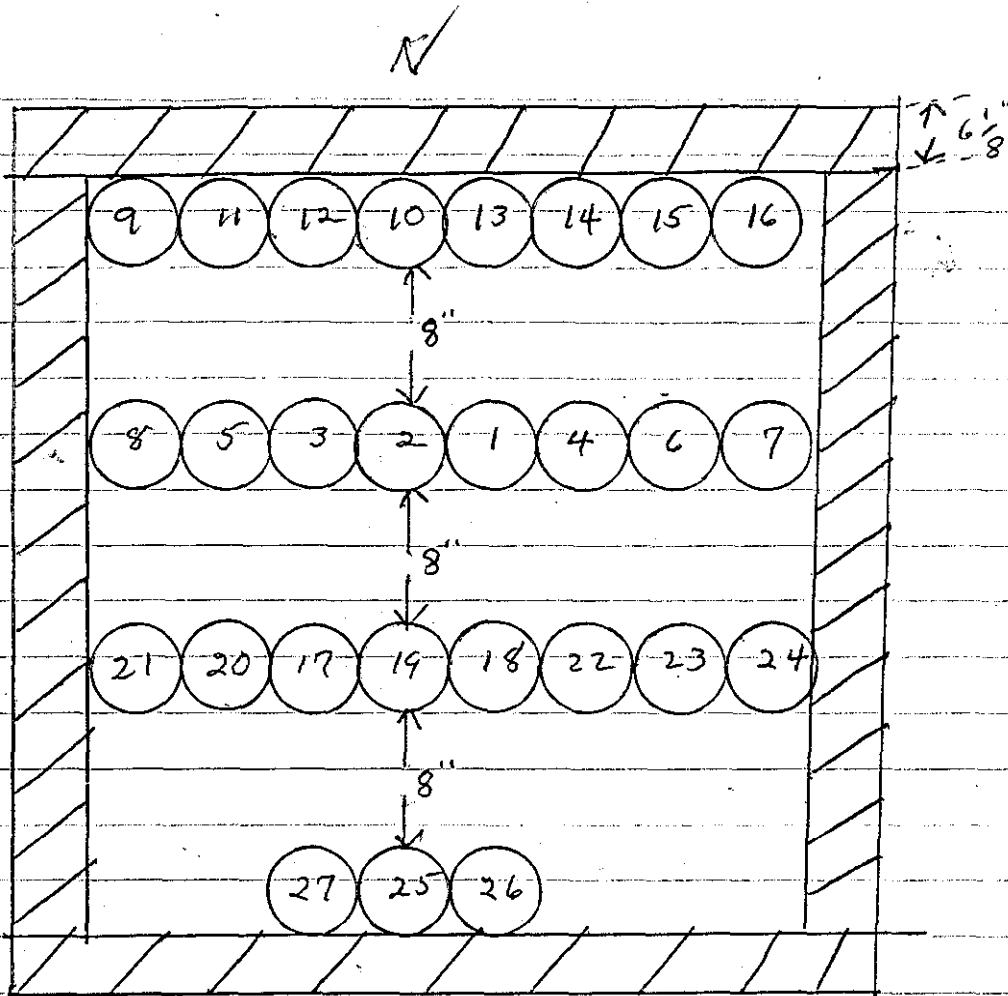
1402 { 202 (cm) M-f (in)
 69.30 cm 29.67"
 system sub critical: some multiplication: K-2 from
 10×10^{-12} to 3×10^{-11} .

1403 Drain:

25

3/8/65

221



1500 added units # 27, 25, 26

1520 { 202 (cm) M-4 (in)
 69.55 cm 29.74"
 System sub critical: Very little multiplication:
 (~25% of start-up range on K-2; 10X10-12)

Drain:

222

3/9/65

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

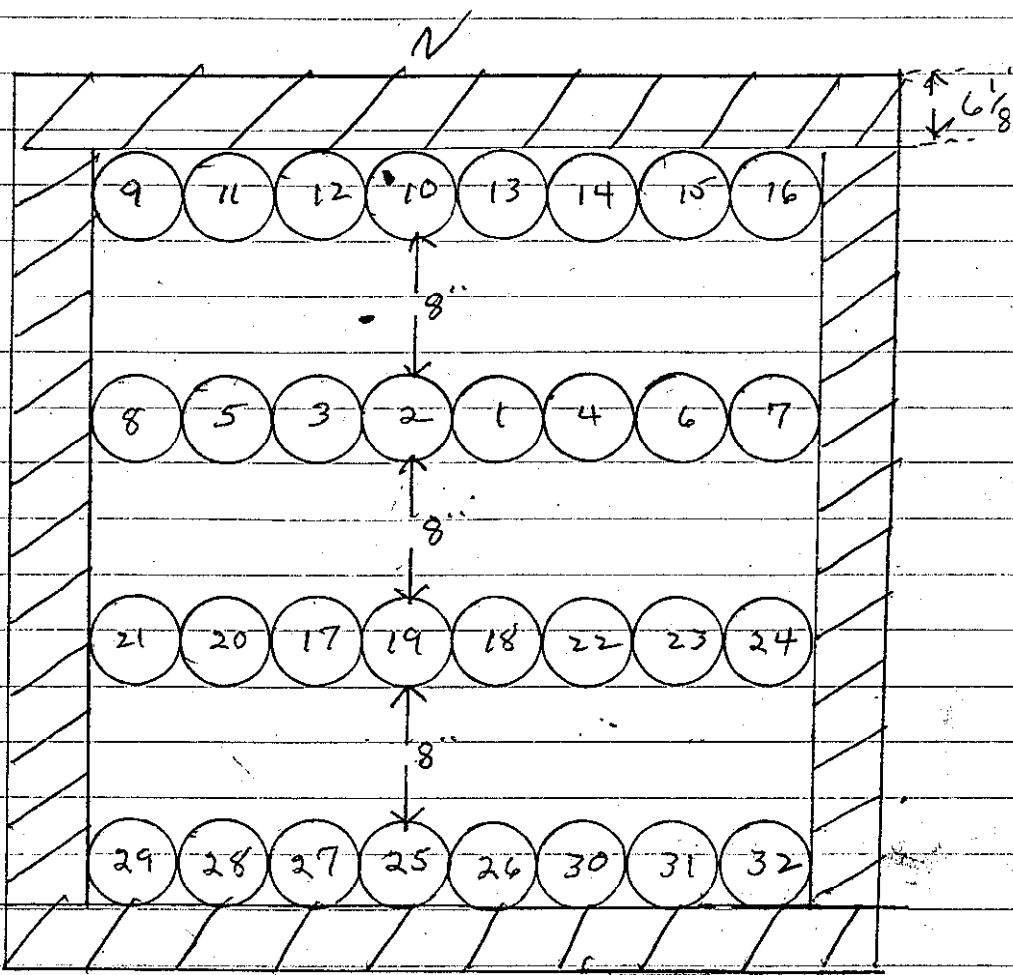
Source in checked by AKM Source No. M-43

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

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

Red light on by AKM Time 0815

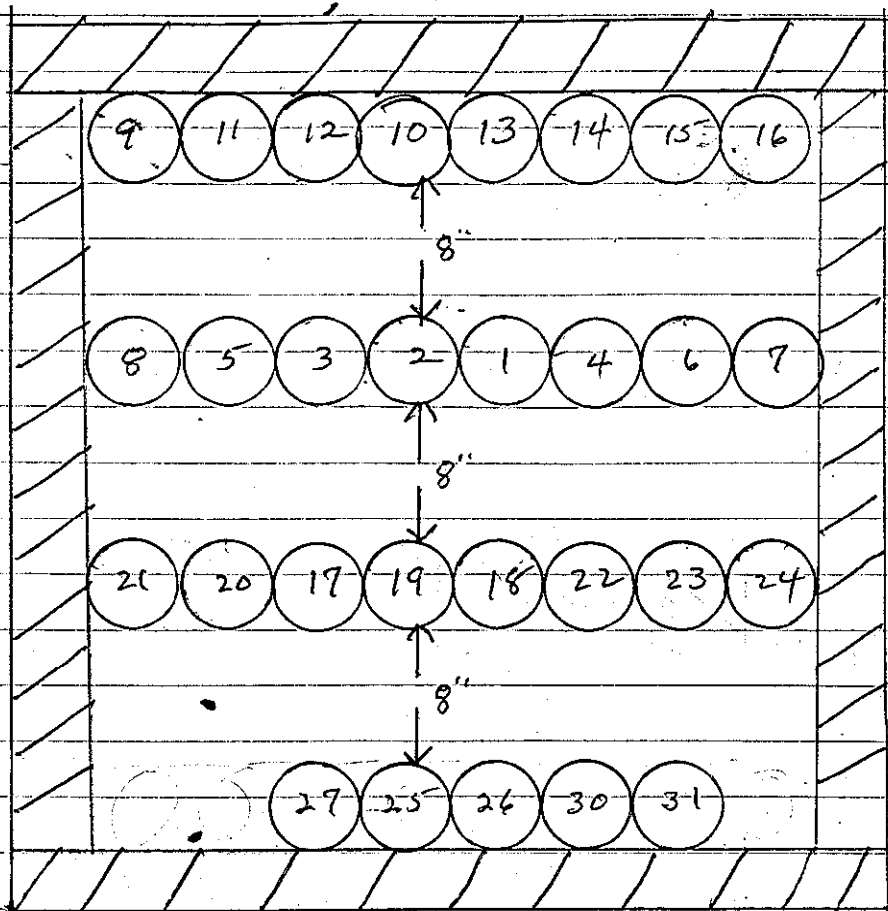
Start-up OK'd by F.D.C. AKM Date 3-9-65



0800 added units #29, 28, 32. Now have 32 units
Row separation 8"

3/8/65

N



1530 added units #30, 31.

202 (cm)

M-4 (-in)

1555

69.30

29.67"

{ System sub-critical: some multiplicative K-2 form
 10 x 10⁻¹² to 3 x 10⁻¹²

Drains

3/9/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 K10 ⁻¹²	Meter ✓	3"	-	10 K10 ⁻¹²
	"	Fast ✓	"	-	"
K-2	3 K10 ⁻¹² 70 K10⁻¹²	Meter -	1"	-	10 K10 ⁻¹²
	"	Fast -	"	-	"
R-1	-	-	-	-	-
R-2	-	-	-	-	-
PM-1	700 V	Alarm ✓	cont	-	500 V
PM-2	1200 V	Low ✓	12"	-	900 V
	"	Alarm -	1"	-	"

LOG N CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

~~Equipment checked by _____
 Instruments and satellites checked and reset by _____
 Source in checked by _____ Source No. _____
 Emergency equipment in control room checked by _____
 Instruments in trip checked by _____
 Red light on by _____
 Start-up OK'd by _____
 Date _____
 Time _____~~

START-UP CHECK LIST

Solution Zero

202 (cm)
26.90 "cm"

M-4 in 225
12.84 "in."

3-9-65

202 (cm)

M-4 in

0845

+ P_{sw}

66.30

28.44

$$C = 198.18 \text{ cm} = 5.94 \Delta h = .500 \text{ cm}$$

$$= 11.84 \text{ f/cm}$$

0900

65.80 cm

28.24 "

System just critical:

65.80

26.80

92.60

Drain:

1005

Same array as shown on page 222. Separation between raw raw = 8.5 "in.

202 (cm)

M-4 (in)

1025

+ P_{sw}

72.75

31.00 "in.

$$\Delta h = \frac{71.60}{1.15 \text{ cm}}$$

$$C = 274.88 \text{ cm} = 4.24 = 3.5 \text{ f/cm}$$

1038

71.60 cm

30.55 "

System just critical:

71.60 cm

71.60 cm

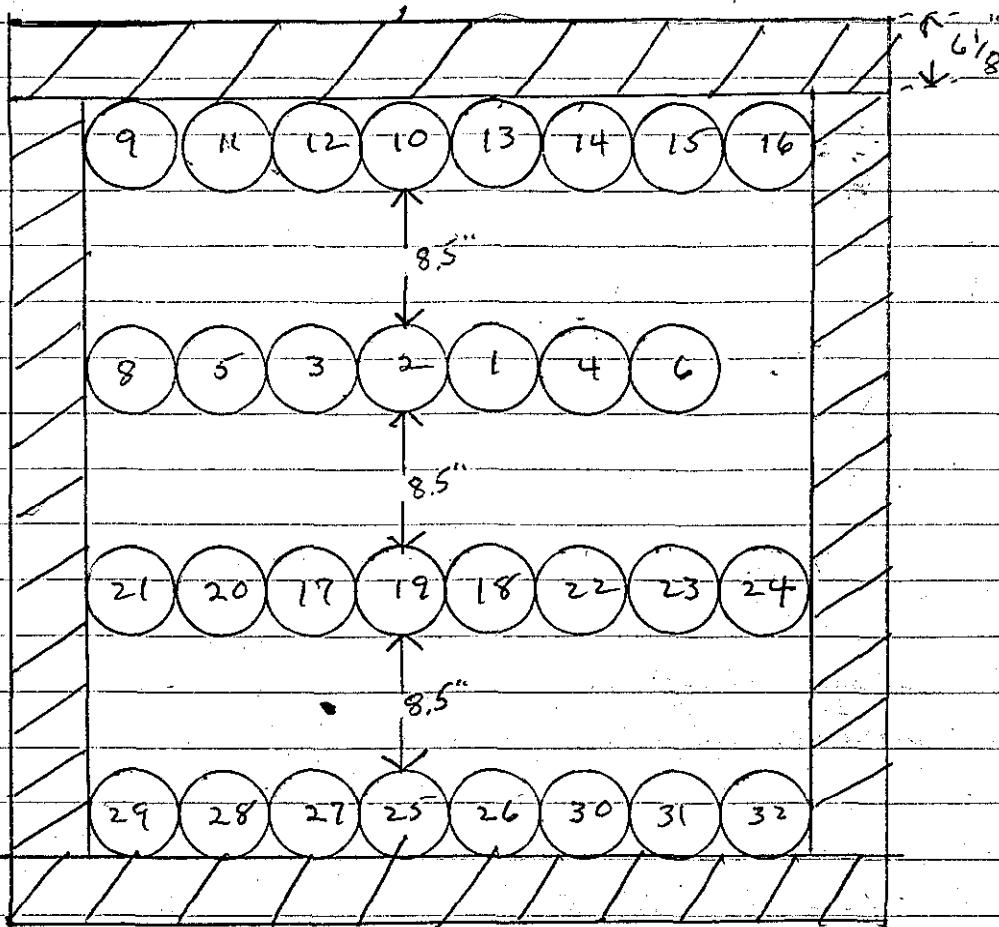
Drain: 92.60 cm

226

3/9/65

Purpose of following experiments is to see the effect of moving one unit from end of a row.

3/10



1300 Removed unit # 7 from in second row from north end. Separation = 8.5"

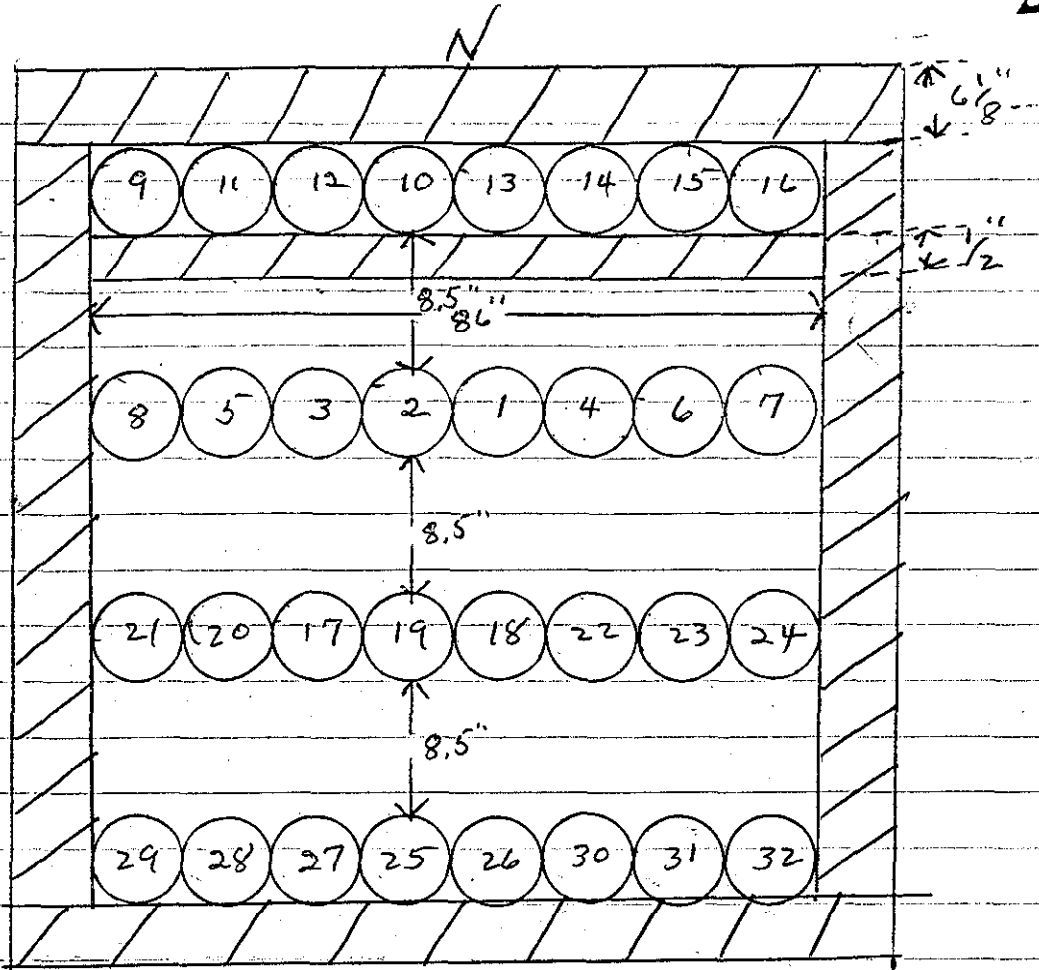
1320 { 202 (cm) 19-4 (in)
73.20 cm 31.17"

System slightly sub critical. Could not get power level high enough for a good - 7 day period.

Drain

3/9/65

227



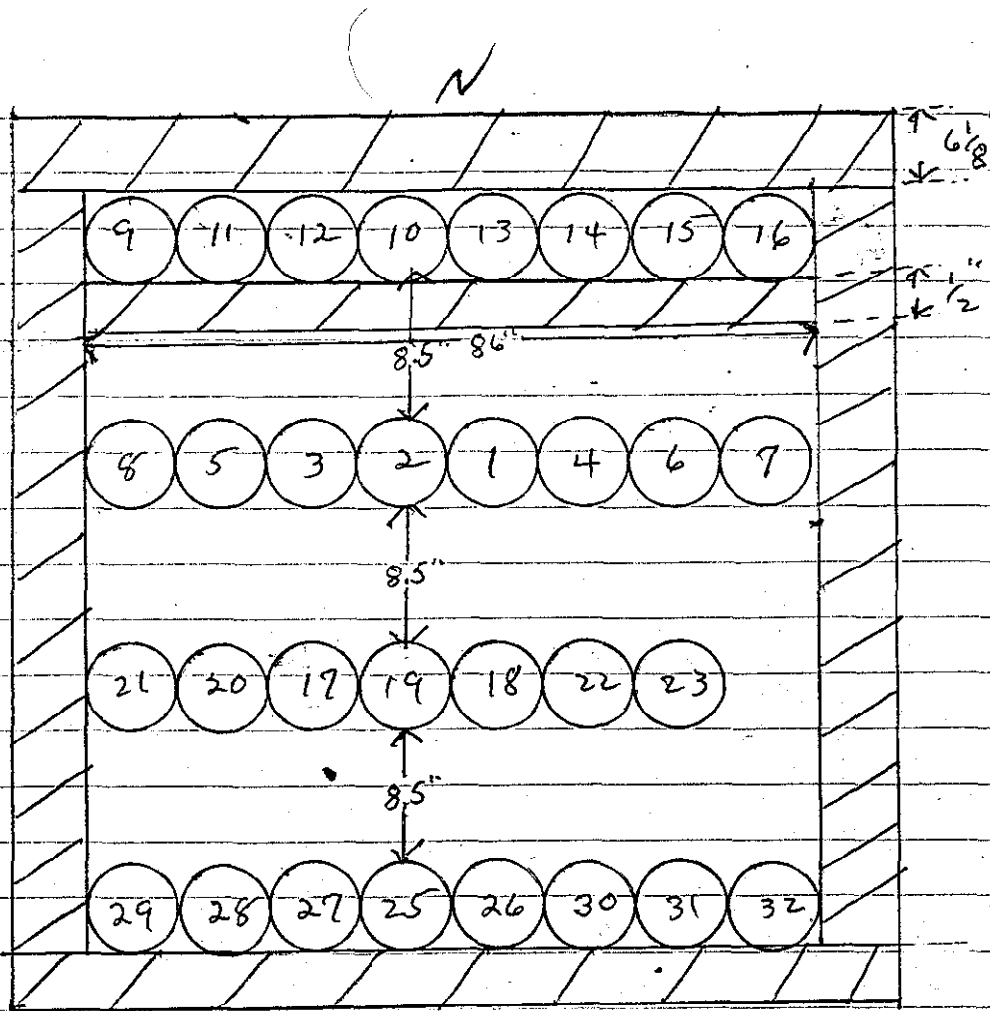
1345 Added unit #7 back to array, and added plexiglass ($\frac{1}{2} \times 24 \times 86$) in contact with north row. Purpose is to reduce critical hit in 3 remote filled units. Separation = 8.5 in.

1410 202 (cm) M-4 (in)
 + Per: 67.10 cm bh = .50 cm 28.80"
 $T = 198.19 \text{ cm} = 5.94 = 11.8\% \text{ cm}$

1421 { 66.60 cm
 System just critical.
 Drain: 66.60
 26.80
 39.80

228

3/9/65



14:30 Removed unit #24 from array as shown above.
 1/2" plywood at contact with north row. (1/2" x 86" x 24")
 Separation = 8.5"

1450 + Per 20.2 (cm) M-9 (cm)
 69.30 cm: $\Delta h = .40 \text{ cm}$: 29.67
 $t = 204.20 \text{ cm} = 5.5 \text{ ft} = 13.75 \text{ ft/cm}$

1501 } 68.90 cm 29.48"
 13 }
 System just critical.
 Drain 68.90
 - 26.80
 4h 42.10

3-10-65

INSTRUMENT CHECK

229

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

LOG IN CALIBRATE OPERATE SOURCE No. B-80
 DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

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

Red light on by AKH Time 0810

Start-up OK'd by E.D.C AKH Date 3-10-65

Purpose is to repeat + Per + initial at as shown on page 228. (3-9-65). With same array as shown.

AKH

230

3/10/65

3/1

	202 (cm)	14-4 (in)
Saturation Zero	26.80 cm	12.84"

0845¹ + Per 69.30 cm 29.61
 $\Delta h = .35 \text{ cm}$
 $T = 295.50 \text{ cm} = 3.954 = 11.29 \text{ /cm}$ K-v; T = 294.4 sec (meter)

0903 { 68.95 cm 29.48"
 Lipten just critical!
 $\frac{68.95}{26.80}$
 Drain: $\frac{1}{4} = 42.15$

1005² + Per 69.25 cm 29.62"
 $\Delta h = .25 \text{ cm}$
 $T = 294.07 \text{ cm} = 3.974 = 15.98 \text{ /cm}$ 29.58"
 K-v; T = 290.3 (meter)

1022 { 69.00 29.51"
 Lipten just critical!
 $\frac{69.00}{26.80}$
 $\frac{1}{4} = 42.20$

1024¹ - Per 68.25 cm 29.23"
 $T = 220.71 \text{ cm} = 6.974 = 9.22 \text{ /cm}$

1032 + Per 69.25 cm 29.59
 $\Delta h = .30 \text{ cm}$
 $T = 435.69 \text{ cm} = 2.774 =$
 $= 9.22 \text{ /cm}$ K-v T = 442.4 sec (meter)

avr

3/10/65

231

202 (cm)

68.95
26.80

19-4 (line)

1047

68.95 cm

9442.15

29.50

System just critical;
Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter	3.5"	-	10 x 10 ⁻¹²
"	"	Fast	"	-	"
K-2	"	Motor	2"	-	"
"	"	Fast	"	-	"
R-1					
R-2					
PM-1	7000	Alarm	6"	-	5000
PM-2	12000	Low	12"	-	9000
"	"	Alarm	1"	-	"

LOG N CALIBRATE

OPERATE

SOURCE No.

B-80

DUMP WELL PROBE LIGHT

232
3/11/65

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

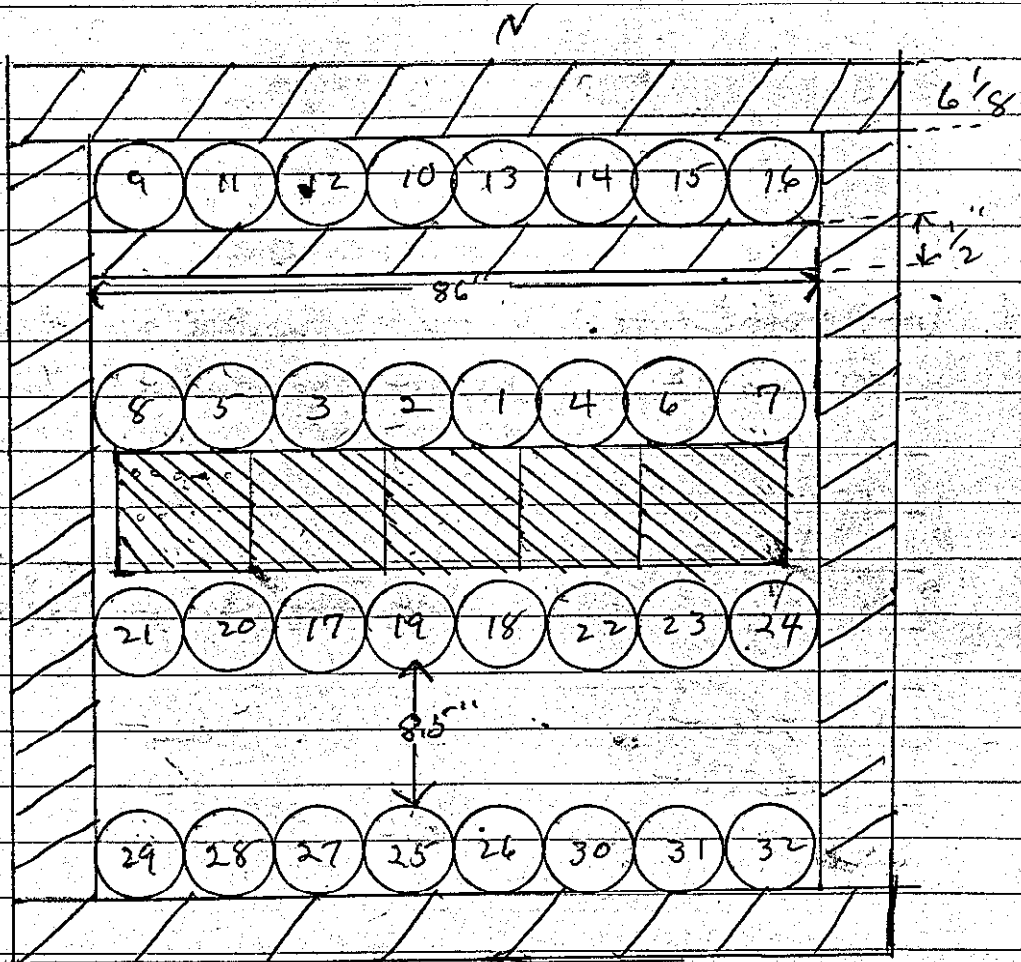
Source in checked by AKH Source No. M-43

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

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

Red light on by AKH Time 0830

Start-up OK'd by F.P.C. AKH Date 3-11-65



0800 added unit #24 back to array, + adding a wall
made of standard concrete hollow blocks
 $7\frac{3}{4} \times 7\frac{1}{2} \times 7\frac{1}{2} \times 15\frac{1}{2}$ which makes a wall

Selection Zero
3/11/65

202
26.80 cm

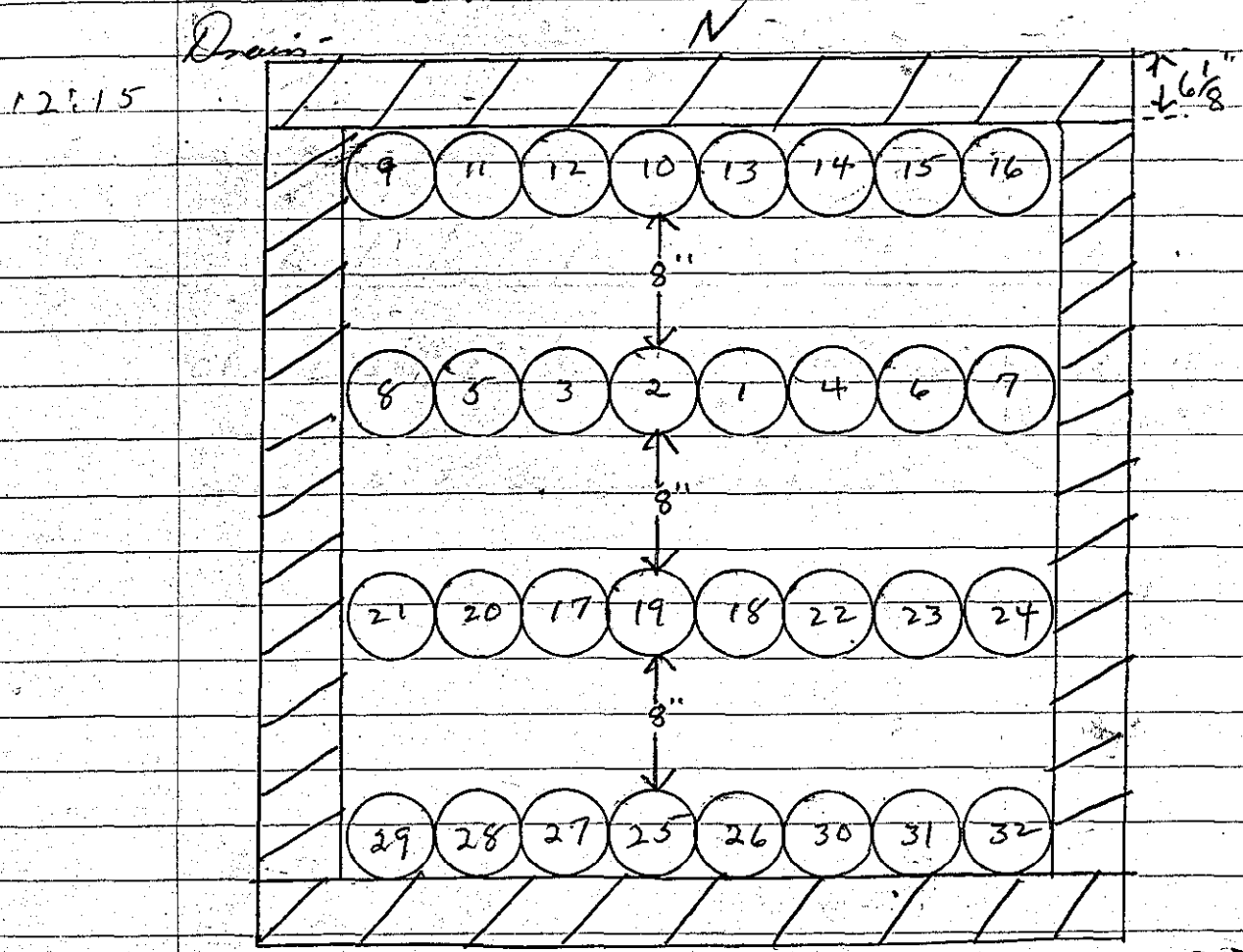
M-8 (in)
12.84"

233

that is $22\frac{3}{4}$ H X $97\frac{1}{2}$ L. placed in array that is shown on page 232. Array still has $\frac{1}{2}$ " plyglass as shown, spacing still 8.5".

0910 (H) + P.W.: 202 (cm) $11-8 \text{ in.}$
 58.20 cm 25.29 ''
 $\frac{57.50}{.70 \Delta h}$
 $t = 123.12 \text{ m} = 8.4 = 12.01 \text{ H/cm.}$

0920 } 57.50 cm 24.99 ''
 system just critical.
 $\frac{57.50}{26.80}$
 3.070



OVER

234
3/11/65

31

12:15 Removed all plexiglass and blocks.
now have 32 units with 8" separation
as shown on page 233. This is a
repeat of experiment shown on page 222.

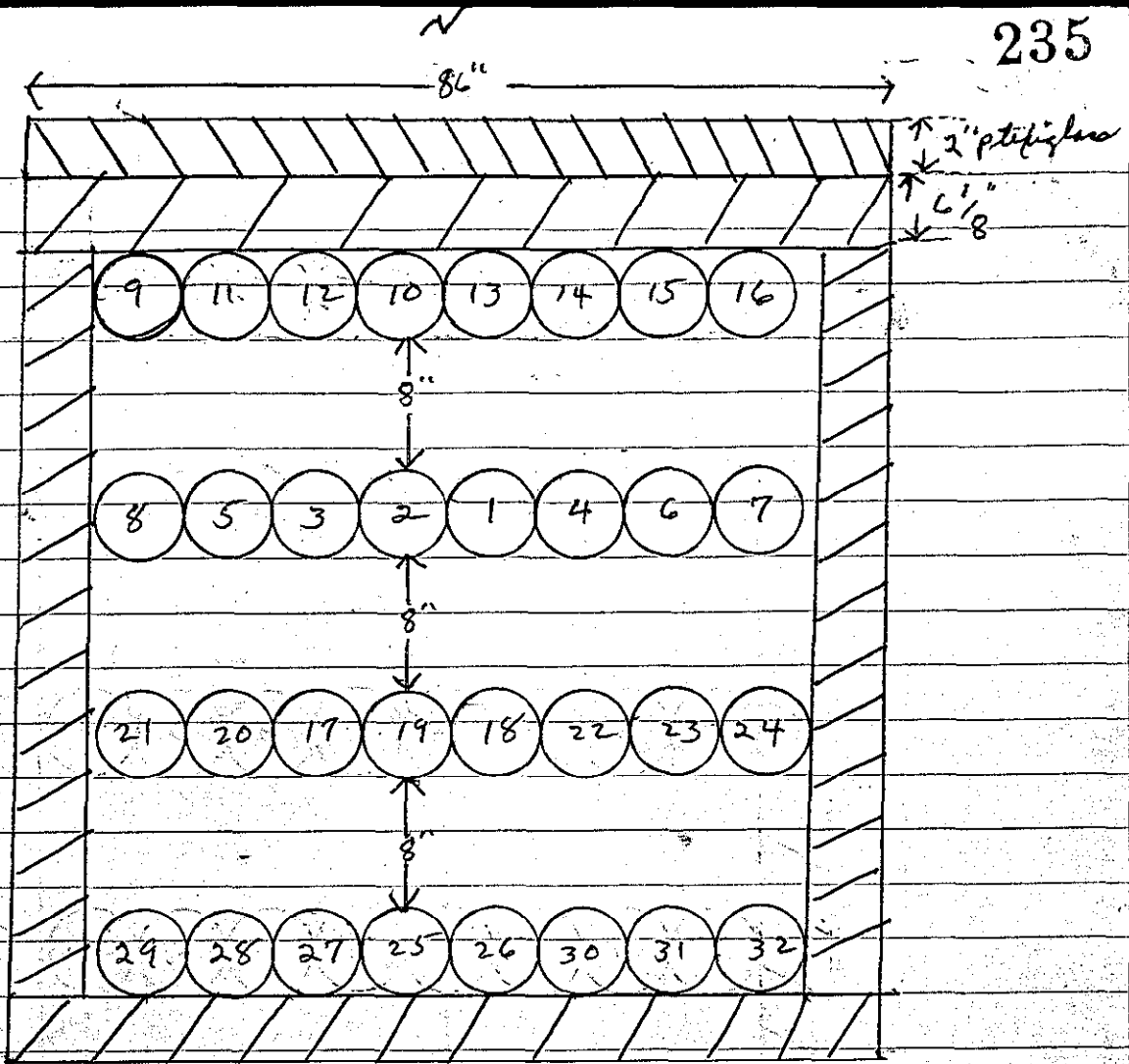
1235 (2) + Per 202 (cm) M-4 (in)
66.60 cm $\Delta h = 6.0$ 28.58"
 $\tau = 170.93 \text{ cm} = 6.74 \text{ ft} = 10.62 \text{ ft/cm}$

1246 66.00 cm 66.00 28.35"
heights just critical $\frac{26.80}{4} = 6.70 \text{ cm}$

array shown on page 222. Critical ht = 39.00 cm 3-9-65
Critical hts differ by .20 cm

3/11/65

235



13:30 added plexiglass (2" x 36" x 86") in contact with north wall. Separation = 8". Total north wall thickness now = 8.125"

13:45 ⁽²⁾ + P_{ex} 202 (cm) M-a (in) 28.59"

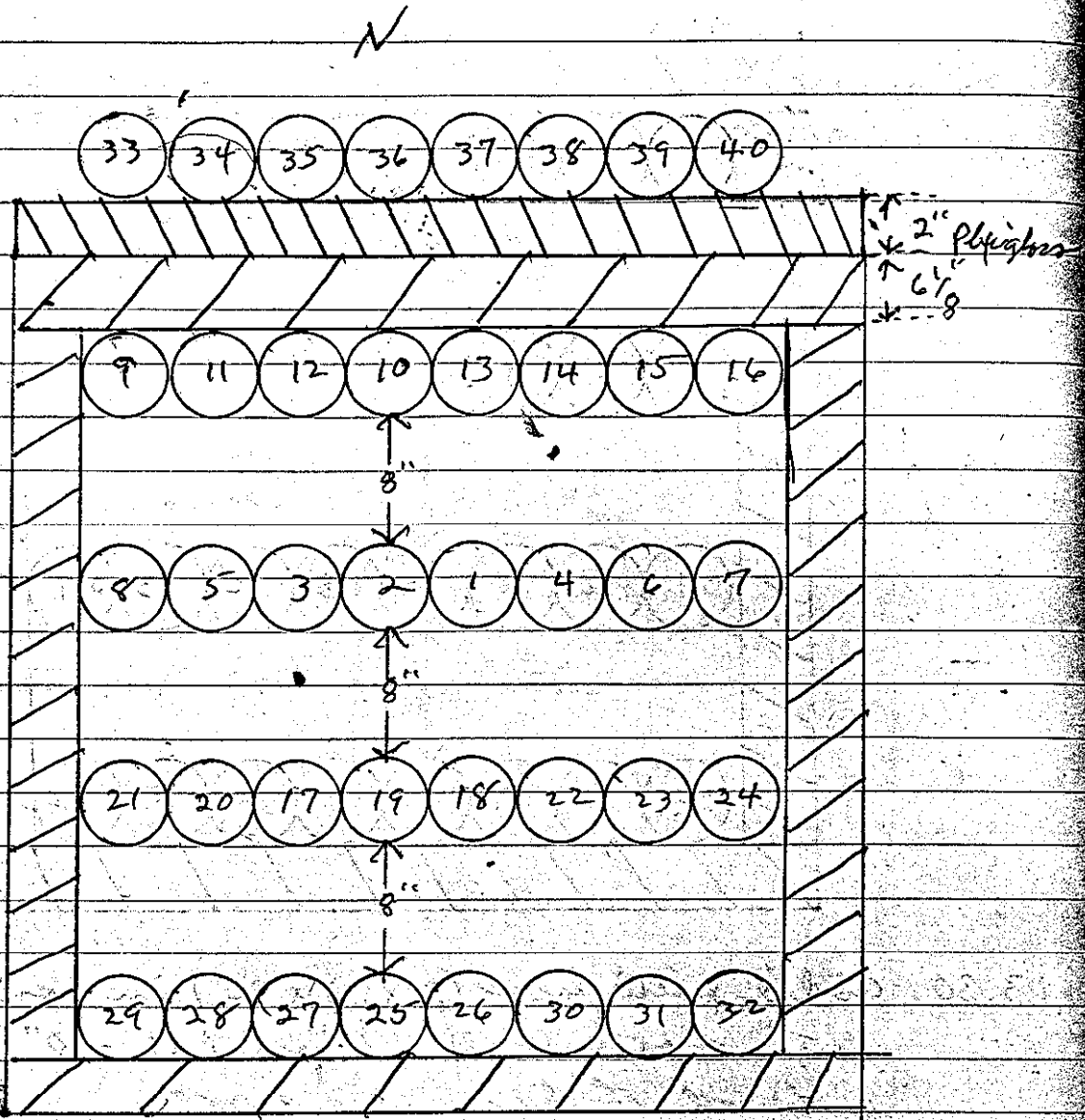
$\sigma = 1.5863 \text{ cm} \times 6.84 = 11.29 \text{ g/cm}$

13:57 65.80 cm 28.26"

System just critical: $\frac{65.80}{39.0} = 0.8 \text{ cm}$

Drain:

236
3/11/65



14:45 added units #33, 34, 35, 36, 37, 38, 39, 40 in contact with north wall as shown above.

separation between the 2 rows on north wall = 8.125"

14:55 (S) + Per
 202 (cm)
 66.50 cm 262.70 cm 28.56
 $E = 128.92 \text{ cm} = 8.14 = 11.58 \text{ ft}$

3/11/65

237

202 (cm)
~~202~~

M-9 (in)

1506

65.80 cm:

28.29 in:

Lepton-jet critical:

Drain:

65.80
26.80
44 39.00 cm ✓

INSTRUMENT CHECK

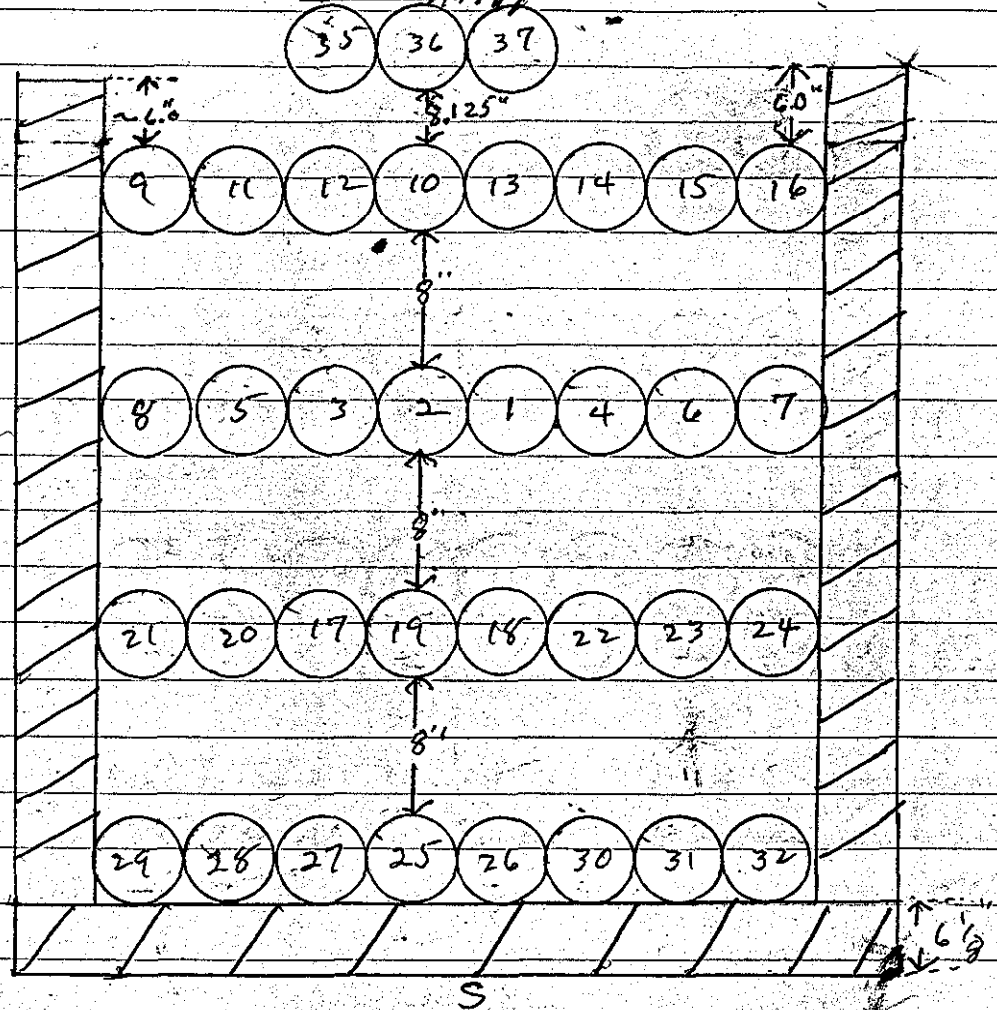
INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter	3"	-	10 x 10 ⁻¹²
"	"	Test	"	-	"
K-2	2 x 10 ⁻¹²	Meter	1"	-	"
"	"	Test	"	-	"
P-1					
P-2					
P-3					
P-4					
P-5					
P-6					
P-7					
P-8					
P-9					
P-10					
P-11					
P-12					
P-13					
P-14					
P-15					
P-16					
P-17					
P-18					
P-19					
P-20					
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P-89					
P-90					
P-91					
P-92					
P-93					
P-94					
P-95					
P-96					
P-97					
P-98					
P-99					
P-100					

LGS IN CALIBRATE OPERATE SOURCE No. B-90
 DUMP WELL PROBE LIGHT

238
3/12/65

START-UP CHECK LIST

Equipment checked by AKV Personnel check by F.D.C
Instruments and safeties checked and reset by AKV
Source in checked by AKV Source No. M-43
Emergency equipment in control room checked by F.D.C
Instruments in trip circuit: K-1 K-2 PM-1 PM-2
Red light on by AKV Time 0815
Start-up OK'd by F.D.C AKV Date 3-12-65



0800

Removed all of north wall + added 3 units (35, 36, 37). Separation in this row = 8.125" separation in other rows still 8" as shown above.

3/12/65

239

Solutera Zeno's

202 (cm)

M-4 (in)

26.80 cm

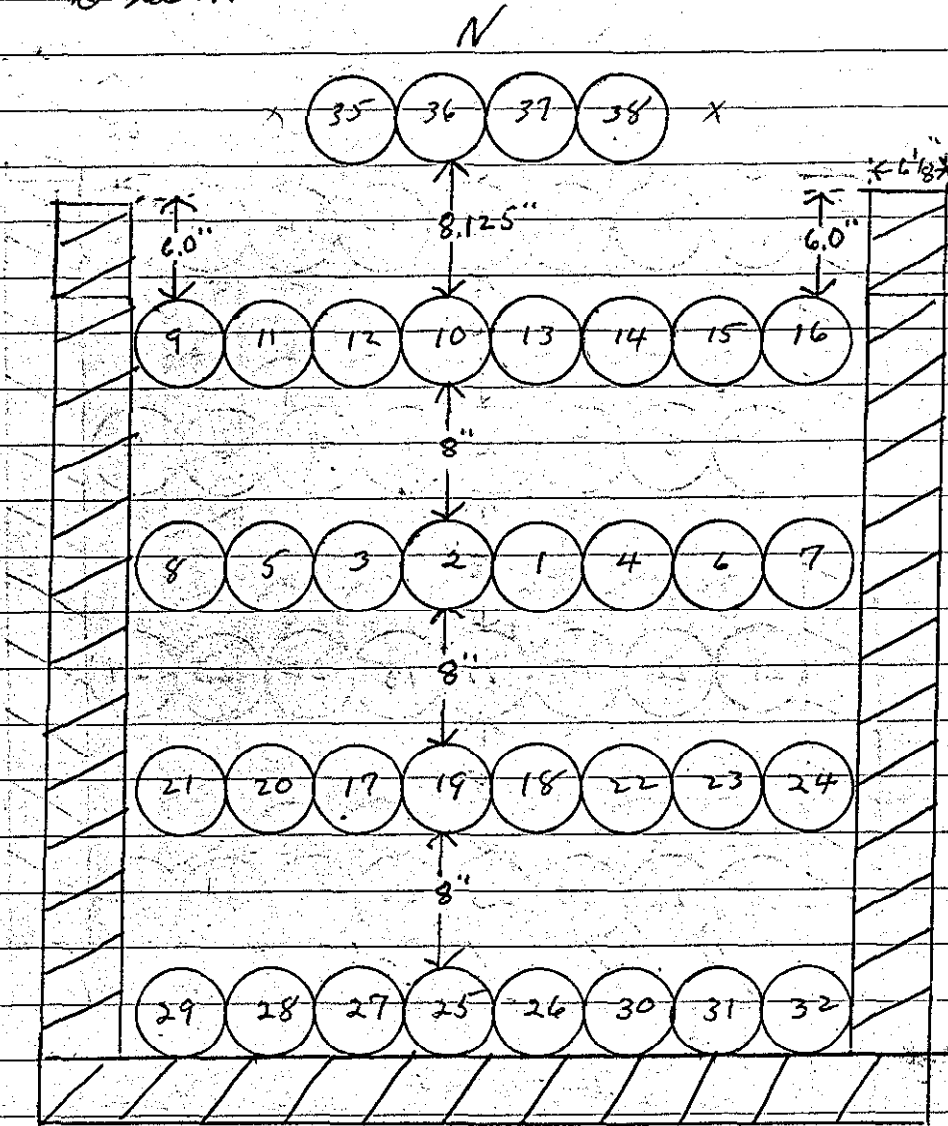
12.84"

0.958

$\phi/L = 44.30 \text{ cm.}$

71.10

System just critical.
Drawn:



09:00

added Unit #38. Separation is same.

cm.

240

3/12/65

202 (cm)

M. F. (in)

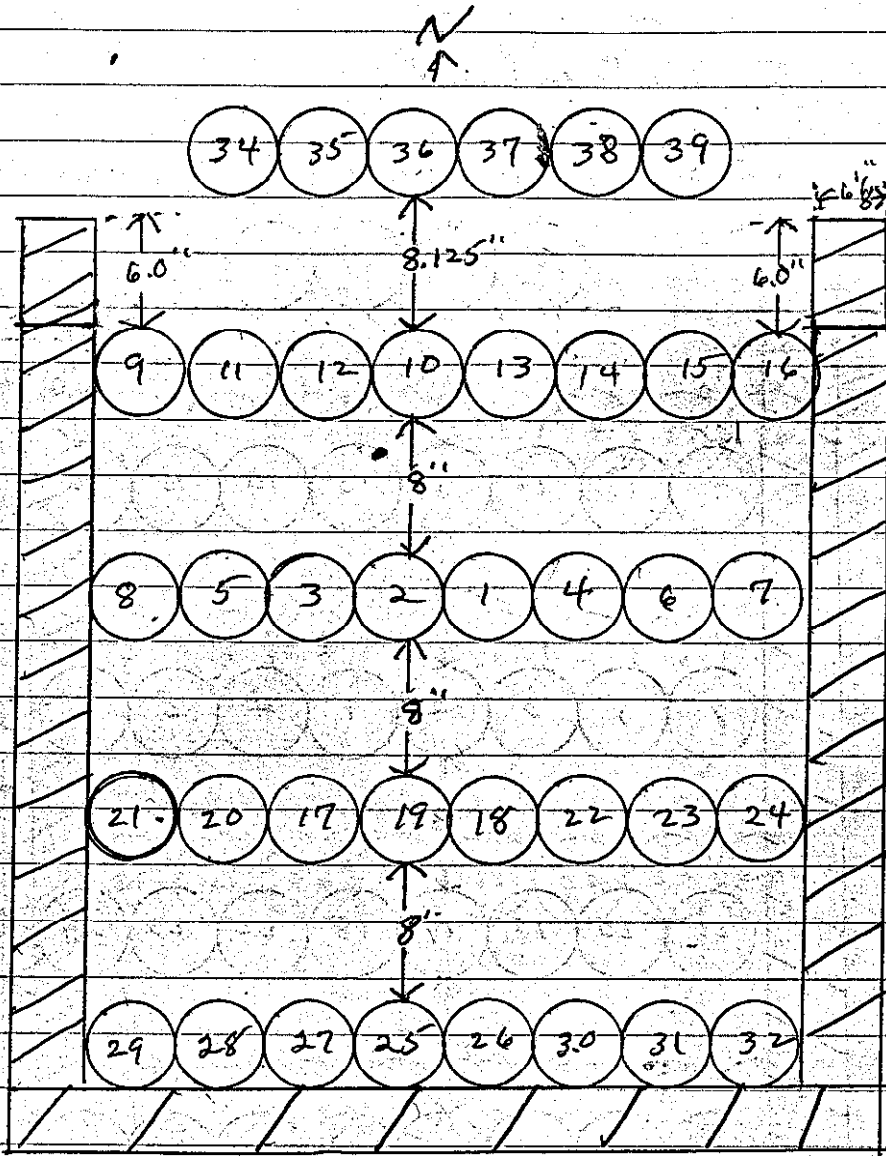
0932

69.550m

29.76

System just critical:
Drain:

10:45



11:00

added units # 34, 39. Separation same.

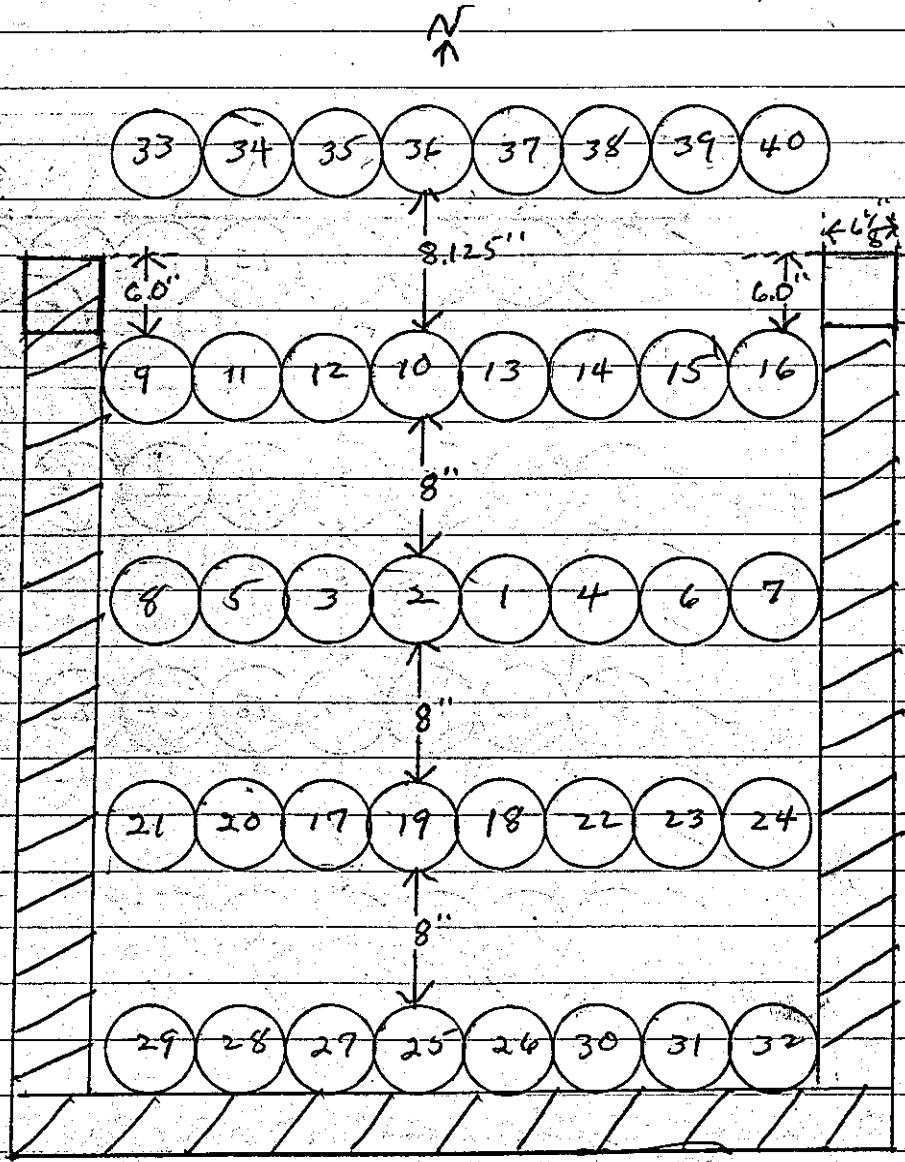
3-12-65

11:10 (11) + Pen 202 (cm) 68.30 cm, $\Delta h = 1.0$ cm
 $C = 91.27 \text{ cm} \times 10.6 = 10.6 \text{ g/cm}$

M = 4 min
 29.28"

11:23 { System just critical:
 Drain

11:30



11:30 added units # 33, 40. Separation some

242
3/12/65

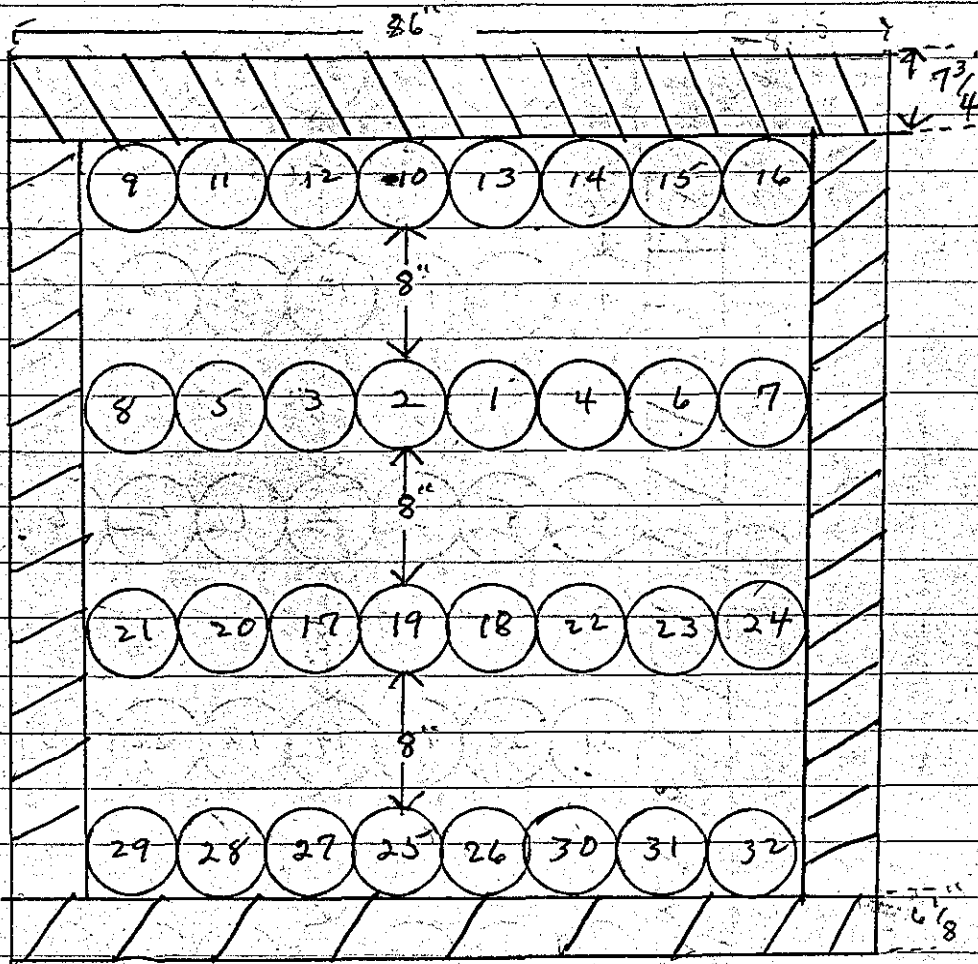
3/12

1150 (2) 202 (cm) M.F (in)
 + Per 66,50 cm. Δ . 85 cm 28,56
 $I = 106.48 \text{ cm} - 9.44 = 11.09 \frac{\text{cm}}{\text{cm}}$

1200 } 65,65 cm 28,22
 system just critical

$$\begin{array}{r} 65,65 \\ - 26,80 \\ \hline 38,85 \text{ cm} \end{array}$$

13:30



13:30 added north wall with hollow concrete blocks
 ($9 \frac{3}{4} \times 7 \frac{5}{8} \times 15 \frac{1}{2}$) north wall dimensions $22 \frac{7}{8} \times 7 \frac{3}{4} \times 86$
 shown above
 holes vertical

3/12/65

243

#3

202 (cm)

m-9

1413

+ Pen

$$\begin{array}{r}
 68.40 \text{ cm} \\
 \underline{67.25} \\
 1.15 \\
 \Delta H = 1.15 \text{ cm}
 \end{array}$$

29.31"

$\epsilon = 81.12 \text{ mm} = 11.6 \text{ ft} = 10.09 \text{ ft/cm}$

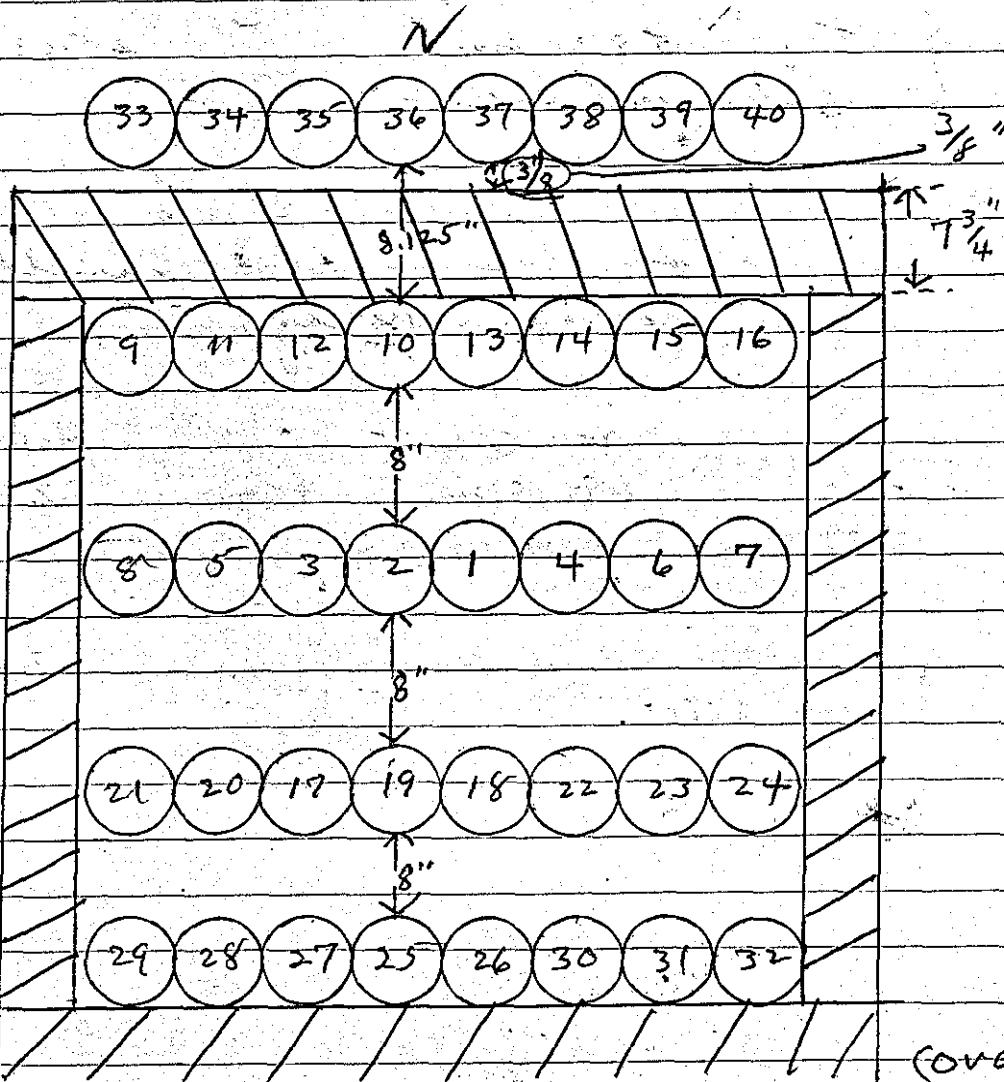
1420

67.25 cm

System just critical:

$$\begin{array}{r}
 67.25 \\
 \underline{26.80} \\
 40.45 \text{ cm} \quad H_c
 \end{array}$$

1430



(OVER)

6 1/4"

86"

244
3/12/65

14:30 added units # 33, 34, 35, 36, 37, 38, 39, 40 which are $3\frac{1}{2}$ " separation from concrete wall, separation between north row = 8.125" Rest of rows separation = 8.0" as shown on page 243.

1458 $\left\{ \begin{array}{l} 202 \text{ (cm)} \\ + \text{Per } 60.20 \text{ cm } \Delta h = 120 \text{ cm} \\ \bar{c} = 80.40 \text{ cm} = 11.74 = 9.75 \text{ ft/cm} \end{array} \right. \quad \begin{array}{l} M-9 \\ 26.70'' \end{array}$

1506 $\left\{ \begin{array}{l} c/h = 32.20 \text{ cm} \\ 59.00 \text{ cm} \\ \text{System just critical} \end{array} \right. \quad 25.63''$

15:45 Moved north row of units out to 3" separation from block wall, no other change in array.

1611 $\left\{ \begin{array}{l} 202 \text{ (cm)} \\ + \text{Per } 64.10 \text{ cm } \Delta h = 95 \text{ cm} \\ \bar{c} = 97.79 \text{ cm} = 10.14 = 10.6 \text{ ft/cm} \end{array} \right. \quad \begin{array}{l} M-6 \text{ (in)} \\ 27.60'' \end{array}$

1620 $\left\{ \begin{array}{l} 63.15 \text{ cm} \\ \text{System just critical: } c/h = \frac{63.15}{36.35} \text{ cm} \\ \text{Drum: } \end{array} \right. \quad 27.31''$

3/15/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
3	10 ⁻¹²	-	3"	-	10 x 10 ⁻¹²
"	"	-	"	-	"
"	"	-	14	-	"
"	"	-	"	-	"
"	"	-	"	-	"
700V	Alarm	-	Cont	-	500V
1200V	Low	-	129	-	900V
"	Alarm	-	"	-	"
LOG N CALIBRATE	-	OPERATE	-	SOURCE No.	B-80
DUMP WELL PROBE LIGHT	-	-	-	-	-

START-UP CHECK LIST

Equipment checked by AKM Personnel check by FIDC
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-43
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1 K-2-PM-1 PM-2
 Red light on by AKM Time 0815
 Start-up OK'd by FIDC AKM Date 3-15-65

0836

Purpose of experiment is to continue experiments shown on pages 233, 234 3/12/65. now have north room at 5" separation from hollow block wall

246

3/15/65

3/15

	202 (cm)	14.4 in.
Reduction Factor	26.80 cm	10.54"

0903 + Pen ⁽¹⁾ 65.10 cm $\Delta h = .75$ cm. 28.26 in.
 $\tau = 119.52 \text{ sec} = 8.64 = 11.9 \text{ ft/sec.}$

0912 " 64.35 cm 27.97 in.
 System just critical:

$$\begin{array}{r} 64.35 \\ - 26.80 \\ \hline 37.55 \text{ cm} \end{array}$$

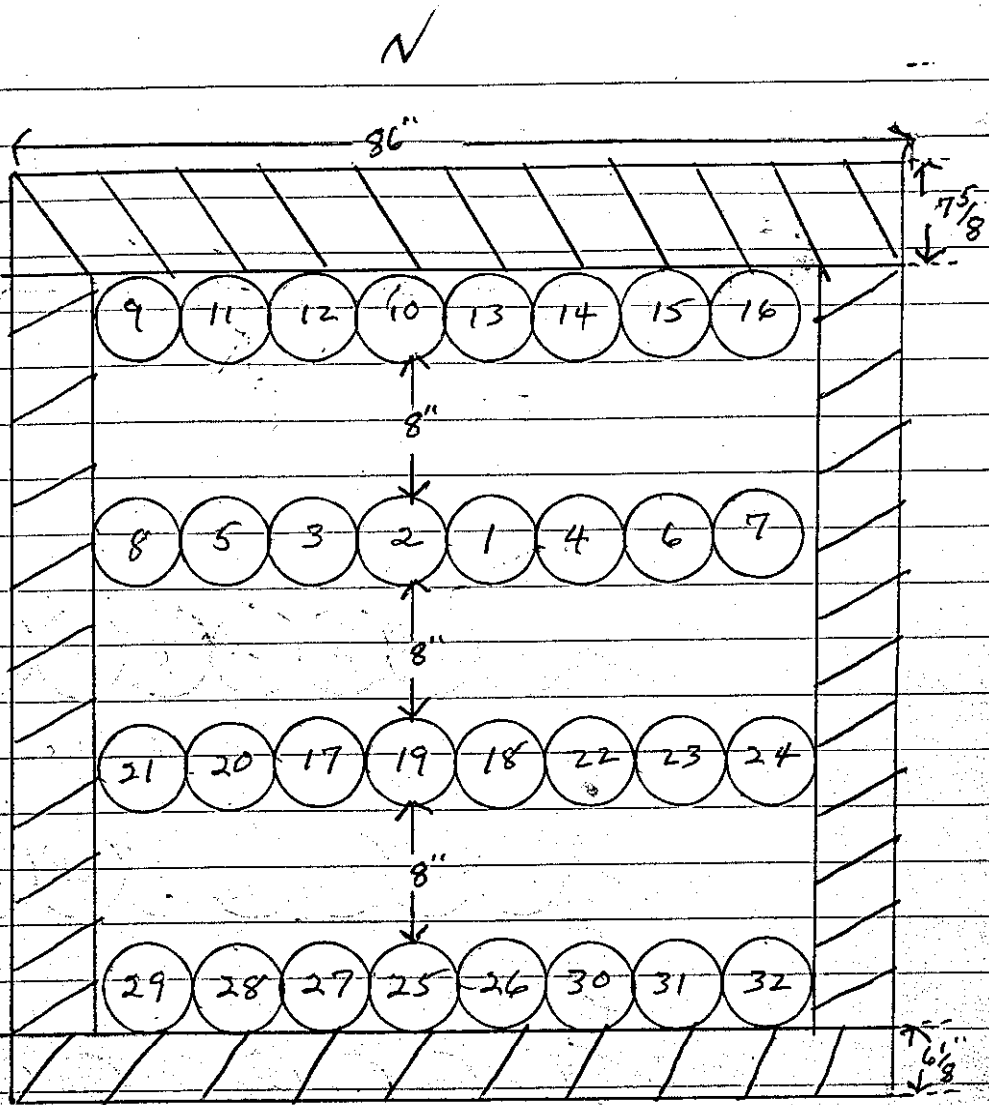
10:00 Separation from hollow block wall now = 6.0"

	202 (cm)	14.4 in.
1021 + Pen ⁽²⁾	65.70 cm $\Delta h = 1.0$ cm	28.72"
	$\tau = 89.81 \text{ sec} = 10.74 = 10.7 \text{ ft/sec.}$	

1033 " 64.70 cm 28.34
 System just critical:

$$\begin{array}{r} 64.70 \\ - 26.80 \\ \hline 37.90 \text{ cm} = H_i \end{array}$$

3/15/65



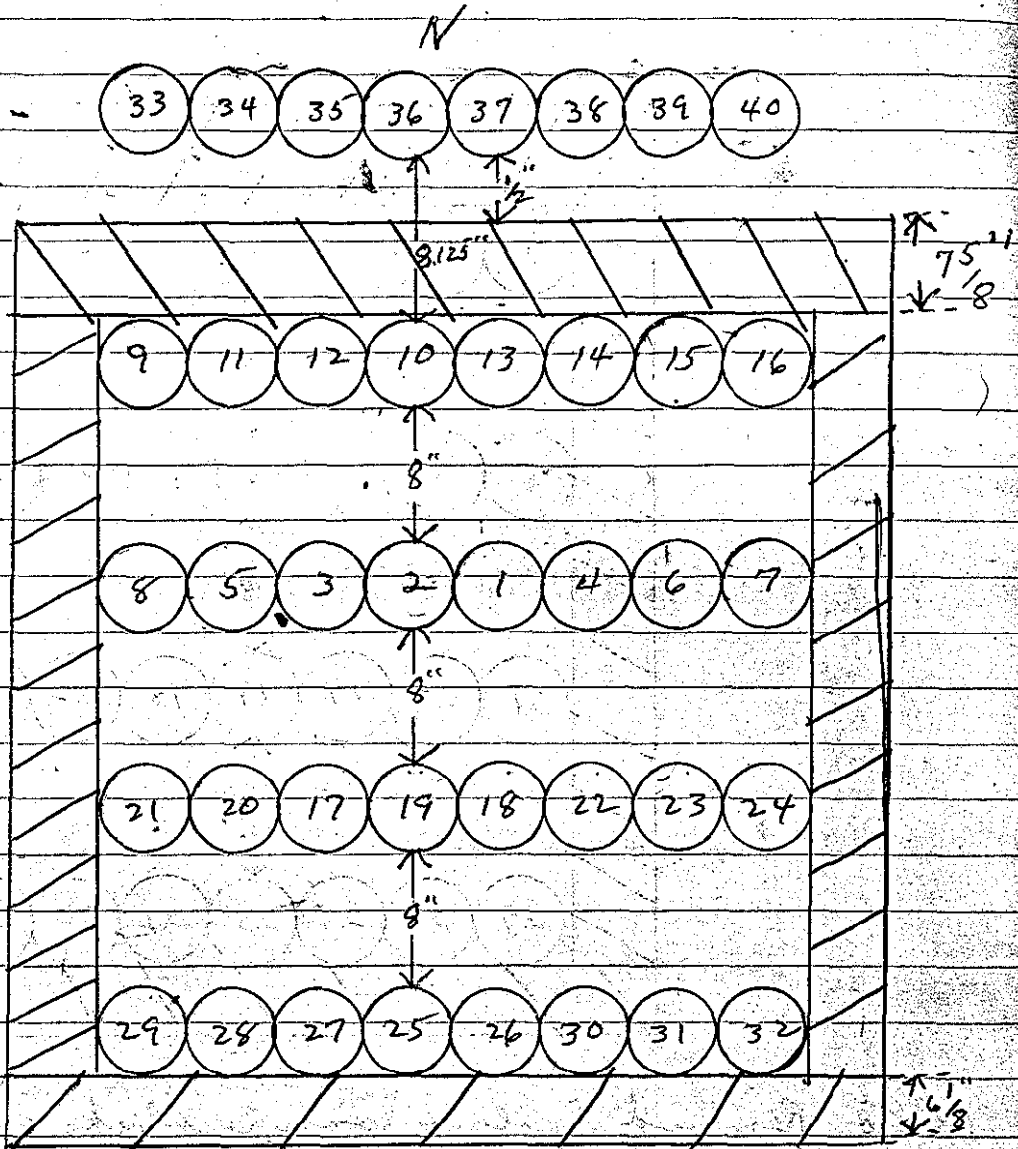
12:30 Removed hollow concrete blocks and replaced with solid concrete blocks ($7\frac{5}{8} \times 7\frac{5}{8} \times 86$) at contact with north row. Separation = 8.0"

1349 (3) 202 (cm) 11.9 (in)
 64.20 cm $d_h = 1.85 \text{ cm}$ 28.19
 $\tau = 96.33 \text{ cm} = 10.24 = 12.0 \text{ f/cm}$

1359: 63.35 cm 27.51 ''
 System just critical: $d_h = 36.55 \text{ cm}$

~~3/15/65~~
3/15/65

14:15



14:30 Added units # 33, 34, 35, 36, 37, 38, 39, 40. $\frac{1}{2}$ " spacing from solid concrete block wall. Separation between row 8, 125" other rows separation = 8.0" as shown above.

14:49 (4) Pen

202 (cm)

M-4 (in)

$\Delta h = 1.20 \text{ cm}$

26.05"

59.00

$E = 78.95 \text{ cm} \times 11.84 = 9.84 / \text{cm}$

3/15/65

1958 { 202 (cm) M-P (in) --
 57.80 cm:
 System just critical:
 Drain $q_h = 31.00 \text{ cm}$ ✓

15:20 Moved north row of units out to 6" separation from north wall. no other change.

1545 (5) 202 (cm) M-P (in)
 62.70 cm $\Delta h = 1.90 \text{ cm}$ 27.57 (in)
 $t = 82.57 \text{ cm} = 11.4 \text{ ft} = 12.7 \text{ ft/cm}$

1555 61.80 cm:
 System just critical, $q_h = 35.00 \text{ cm}$ ✓
 Drain 27.22
~~27.26~~

250
3/16/65

3/c

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-13	10 ⁻¹²	Meter	3"	✓	10 x 10 ⁻¹²
"	"	Fast	"	✓	"
K-2	"	Meter	Cont	-	"
"	"	Fast	"	-	"
PM-1	700V	Alarm	Cont	-	500V
PM-2	900V	Low	14"	-	900V
"	"	Alarm	1"	-	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-93

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

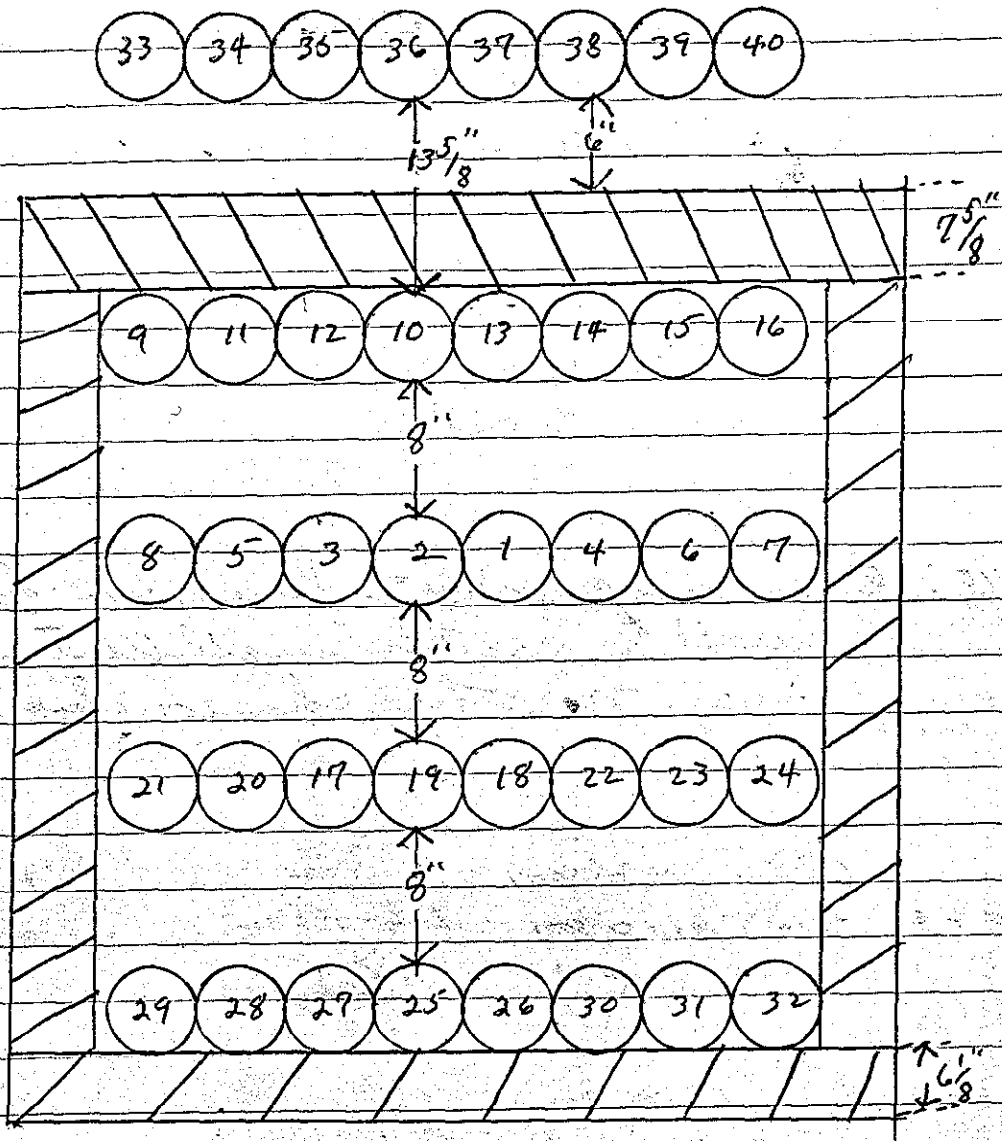
Instruments in trip circuit: K-1, K-2, PM-1, PM-2

Red light on by AKM Time 0830

Start-up OK'd by F.P.C. Rolf Date 3-16-65

3/26/65

N



0800 - added ~~polyethylene~~ ^{polyethylene} ~~padding~~ slab ($68\frac{1}{4} \times 27\frac{1}{2} \times 6\frac{1}{8}$).
 This slab is ^{centered} on top of solid concrete
 block wall, with a one inch gap between top
 of wall + bottom of slab with row of
 rivets still 6" from wall. Total separation
 between rows $13\frac{5}{8}$ ". The other rows 8" separation
 as shown above.

over

252
3/14/65

202 (cm) M-F (in)
Solution Tank 26.80 cm 12.89"

0908 (1) + Per 61.50 cm $\Delta h = 1.1$ cm 27.69"
 $T = 79.95 \text{ min} = 11.8 \text{ f} = 10.7 \text{ f/min}$

0916 60.40 cm 27.22"
System just critical:
 $q/h = 33.60 \text{ cm}^2$

10:30 Removed polyethylene slab from north wall to south wall, (centered). Still 1" gap. No other change. See page 251.

(2) 202 (cm) M-F (in)
1044 + Per 61.60 cm $\Delta h = .80$ cm 27.89"
 $T = 110.8 \text{ min} = 9.9 \text{ f} = 11.4 \text{ f/min}$

1054 60.80 cm 27.51"
System just critical:
Drain: $q/h = 34.00 \text{ cm}^2$

3/17/45

INSTRUMENT CHECK

INSTRUMENT	RANGE	UNIT	SCALE	SPR	SPR
K-1	3X10 ⁻¹²	Counts	3"	-	3X10 ⁻¹²
"	"	"	"	-	"
K-2	"	Counts	2"	-	"
"	"	"	"	-	"

PIA-1	700V	Alarm	Cont	-	500V
PIA-2	1200V	Low	12"	-	900V
"	"	Alarm	1"	-	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT
 Extended top of well to 5m height ^{made each 27.5"} ~~21~~ 20002, mounted instrument E-W to support top Dept. W. N wall still solid concrete with top extension of polyethylene; ~~2-45"~~

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-93

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

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

Red light on by AKM Time 12:55

Start-up OK'd by Dr. E.B.J. AKM/F.P.C. Date 3-17-45

Started lowering by means of remote pendant a 1-in.-thick piece of Plexiglas 72x45 in. which would have covered approximately the south half of the tray. Because of increased neutron level in all channels, stopped with Plexiglas 4" above top of well. ^{11.5" instrument, which was 11.5" above} A d.c. relative

3/17/65

solution to remote units.

1336

20V

17-4

37.00

18.22

Critical.

Drain some solution, lower Plexiglas "a few" levels (neutron) 2 ft. No solution height rose lower.

Decided to raise Plexiglas remotely 1) in order to determine worth of additional wall height and 2) because it was obvious that this top segment could not be lowered to its intended position without making a vertical change in the array. Visual inspection thru end door (DC) showed cone beam drastically tilted. Remaining soup dumped. Inspection ^{from} balcony showed that upper limit on cone beam not worked from remote pendant. Further checking revealed that 1) limit is bypassed by remote pendant, 2) that "down" switch failed to act when push button was depressed 3) that limit is effective on ground pendant.

1422

+Per

202 cm

2.80 cm

 $\Delta h = 1.10 \text{ cm}$

19-4 in

28.38

$$G = 78.95 \text{ au} = 11.84 = 10.74/\text{cm}$$

1429

System just critical:

Draw:

61.70 cm

27.96

 $cf/h = 34.90 \text{ cm}$

File

3/26/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	4"		
"	"	Feet ✓	"		
K-2	"	Meter ✓	cont		
"	"	Feet ✓	"		
P-1					
P-2					
PM-1	700V	Alarm ✓	cont		
PM-2	1200V	Low ✓	14"		
"	"	Alarm ✓	1"		

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKW Personnel check by FIDC

Instruments and safeties checked and reset by AKW

Source in checked by AKW Source No. M-43

Emergency equipment in control room checked by FIDC

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

Red light on by AKW Time 0925

Start-up OK'd by FIDC AKW Date 3-26-65

	202 (cm)	19-4 (in)
<u>Station Leo</u>	26.80 cm.	12.84"

{ 64.90 cm 29.19"
 Septer sub critical.
No Top reflector.

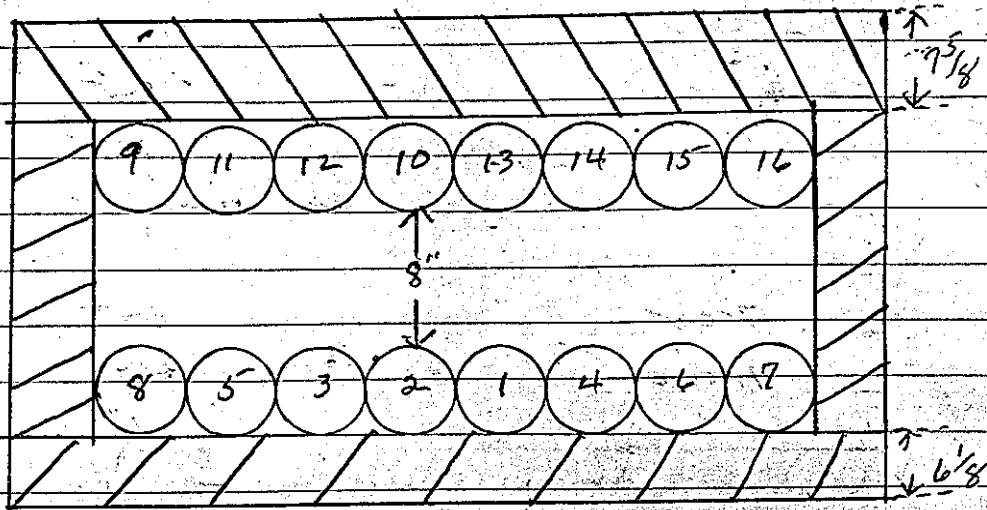
256

3/26/65

31

N

(Top reflector can not be brought closer than 11.50")



Added pleigloss reflector (1" x 45" x 72) top.

1110 (1) 202 M-8
 + Per 61.00 $\Delta h = .55cm$ 27.67"

With pleigloss or disabled blow:
 $E = 116.82$ or $9.14 = 16.64cm$

1120 { 60.45 $q/h = 33.65cm$ 27.94

System just critical: with 1" x 45" x 72 pleigloss reflector. Distance from top of fuel = 11.50"

Draw:

Repeat:

1320 (2) 202 (cm) M-9 (in)
 + Per 60.95 $\Delta h = .65cm$ 27.62"

$E = 99.96$ or $9.94 = 15.34cm$

1330 { 60.30 cm $q/h = 33.50cm$ 27.40"

System just critical

Draw:

3/26/65

1410 Installed Rhoette changer; Purpose is to check worth of removing 1" x 4.5" x 72" plexiglas top reflector.

(3) 202 (cm) 19-4 (in)
1420 + Rev 61.00 cm; $\Delta h = .70$ cm 27.68
with 1" top reflector
 $E = 79.00 \text{ cm} = 17.86 = 16.94 \text{ cm}$
Rhoette = 10.424

1436 } 60.30 cm $\Delta h = 33.50$ cm 27.40"
system just critical

1437 Mound top reflector up 61.5" in; Rhoette's value for
(1) - Neg Rev = ≈ 1.50 using upper limit of Rhoette 195.04

(4) 202 (cm) 19-4 in
1445 + Rev 60.85 cm; $\Delta h = .60$ cm 27.61"
with 1" top reflector;
 $E = 107.91 \text{ cm} = 19.34 = 15.44 \text{ cm}$
Rhoette = 9.164

1453 } 60.25 cm $\Delta h = 33.45$ cm 27.39
system just critical

1454 Mound top reflector up 61.5" in; Rhoette value for - Neg Rev
(2) ≈ 1.50 - 195.04 upper limit.

(5) 202 (cm) 19-4 (in)
1500 + Rev 61.10 cm; $\Delta h = .60$ cm 27.70
with 1" top reflector;
 $E = 66.62 \text{ cm} = 13.44 = 16.84 \text{ cm}$
Rhoette = 12.334

1507 } 202 (cm) 19-4 (in)
60.30 cm $\Delta h = 33.50$ cm 27.40
system just critical; with 1" plexiglas reflector

258
3/24/65

(3)

1509

Open 3" Drain valves: - Neg. Pres: Rhettai

20.2 (cm)

19.4 (in)

39.55 cm

19.28 in

$\Delta h = 20.75 \text{ cm}$; Rhettai - Pres = #2.99 using upper limit.

1512

Drain:

3/29/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	10×10^{-12}
"	"	Fast ✓	"	"
K-2	"	Meter ✓	2"	"
"	"	Fast ✓	"	"
R-1				
R-2				
PM-1	700V	Alarm Contact ✓		500V
PM-2	700V 1200V	Low 14" ✓		700V 900V
"	"	Alarm Contact ✓		900V
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80
BURNER LIGHT ✓				

3-29-65 away some or shown on page 256

START-UP CHECK LIST

Equipment checked by RRR Personnel check by R.G.V.

Instruments and safeties checked and reset by RRR

Source in checked by RRR Source No. M-43

Emergency equipment in control room checked by RRR

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

Solution

Zero

Red light on by RRR Time 9:50

202 (cm)

Start-up OK'd by RRR Date 3/29/65

= 26.80 cm

with 1" x 45" x 72 pleppiglow top reflector at 11.50"

(1) 202 (cm) M-4 "

1100

+ Per 61.20 cm, dh = 195 cm 27.72"

Log = 5 = 61.56 cm = 14.24 = 14.94 cm.
Rhoette = 13.24

1109

(2) 60.25 cm dh = 33.95 cm 27.37"

System just critical.

1115

(2) - Per Moved top reflector .50"

Log = 5 = 181.45 cm = -9.34
Rhoette = -7.74

1122

(3) + Per 61.05 dh = 25 cm 27.68"

Log = 5 = 237.94 cm = 4.84 = 19.20 cm.
Rhoette = 4.04

1126

60.80 dh = 34.00 cm 27.58"

System just critical. Top reflector at 12.00"

1127

(4) - Per Moved top reflector .875"

Log = 5 = 130.38 cm = -15.34
Rhoette = -13.14

over

260

3/29/65

3/2

TELEVISION STATION

(5) 20.2 cm $dh = .30 \text{ cm}$ $28.05''$
 1132 + Per 62.00 cm
 $\text{Log } C = 205.35 \text{ sec} = 3.5 \text{ f} = 16.82 \text{ f/cm}$
 $\text{Rhoelle} = 4.6 \text{ f}$

1139 61.70 cm $dh = 34.90 \text{ cm}$ $27.95''$
 System just critical. Top reflector at $12.875''$

(6) 1140 - Per Moved Top reflector $62.5''$
 $\text{Log } C = 143.42 \text{ sec} = -13.7 \text{ f}$
 $\text{Rhoelle} = -11.4 \text{ f}$

1145 + Per 63.00 cm $dh = .60 \text{ cm}$ $28.47''$
 $\text{Log } C = 97.79 \text{ sec} = 10.1 \text{ f} = 16.83 \text{ f/cm}$
 $\text{Rhoelle} = 8.9 \text{ f}$

1150 62.90 cm $dh = 35.60 \text{ cm}$ $28.25''$
 System just critical. Top reflector at $13.50''$

1151 - Per Moved Top reflector $7.50''$
 $\text{Log } C = 135.91 = -14.2 \text{ f}$
 $\text{Rhoelle} = -11.9 \text{ f}$

1155 + Per 63.50 cm $dh = .30 \text{ cm}$ $28.66''$
 $\text{Log } C = 182.53 \text{ sec} = 6.0 \text{ f} = 19.98 \text{ f/cm}$
 $\text{Rhoelle} = 5.1 \text{ f}$

1200 63.20 cm $dh = 36.40 \text{ cm}$ $28.54''$
 System just critical. Top reflector at $14.250''$

3/29/65

1202 ¹⁰ - Per Moved top-reflector .750"
 $z_{top} = 137.96 \text{ cm} = -8.9 \text{ f}$
 $R_{shell} = -8.4 \text{ f}$

1209 ¹¹ + Per $l = 4.20 \text{ cm}$ $\Delta h = .45 \text{ cm}$ 28.9 f "
 $z_{top} = 141.25 \text{ cm} = 7.5 \text{ f} = 10.65 \text{ f/cm}$
 $R_{shell} = 6.6 \text{ f}$

1215 $l = 3.75 \text{ cm}$ $z_{th} = 36.95 \text{ cm}$ 25.8 f "
 Repton just critical; top-reflector at 15.00"

1215 ¹² - Per Moved top-reflector .100"
 $z_{top} = 140.16 \text{ cm} = -13.5 \text{ f}$
 $R_{shell} = -12.3 \text{ f}$

1220 ¹³ + Per $l = 5.10 \text{ cm}$ $\Delta h = .50 \text{ cm}$ 29.27 f "
 $z_{top} = 132.55 \text{ cm} = 7.9 \text{ f} = 15.80 \text{ f/cm}$
 $R_{shell} = 7.6 \text{ f}$

1225 $l = 4.60 \text{ cm}$ $z_{th} = 37.80 \text{ cm}$ 29.10 f "
 Repton just critical; top-reflector at 16.00"

1225 ¹⁴ - Per Moved top-reflector .1250"
 $z_{top} = 124.95 \text{ cm} = -16.5 \text{ f}$
 $R_{shell} = -13.7 \text{ f}$

1231 ¹⁵ + Per $l = 6.10 \text{ cm}$; $\Delta h = .50 \text{ cm}$ 29.65 f "
 $z_{top} = 132.55 \text{ cm} = 7.5 \text{ f} = 15.80 \text{ f/cm}$
 $R_{shell} = 7.6 \text{ f}$

clear

262
3/29/65

3/2

202 (cm) M-4"

1235 65.60 cm. $4/4 = 38.80$ cm 29.47

hepten just critical: Top reflector at 17.250"

1235 ¹⁶ - Per Moved Top reflector 1.50" in
Log = 122.77 cm = -17.0 f
Photo = -13.9 f

1242 ¹⁷ + Per 67.20 cm D-h = .70 cm 30.07"
Log = 94.16 cm = 10.4 f/cm = 14.87 f/cm

1247 66.50 cm $4/4 = 39.70$ cm 29.82"
hepten just critical: Top reflector at 18.750"

1247 ¹⁸ - Per Moved top reflector 1.50" in
Log = 140.16 cm = -13.5 f
Photo = -12.2 f

1252 ¹⁹ + Per 67.95 cm D-h = .65 cm 30.37"
Log = 110.82 cm = 9.1 f = 14.01 f/cm
Photo = 8.1 f

1257 67.30 cm $4/4 = 40.50$ cm 30.15"
hepten just critical: Top reflector at 20.250"

3/29/65

20
1257 - Per Moved top reflector, 2.50"
Top = 106.48 mm = 23.24
Rhoite = -16.64

21
1304 + Per 69.00 cm. $\Delta h = .50$ cm. 30.78"
Top = 0 = 106.23 mm = 6.54 = 13.04 mm
Rhoite = 5.74

1310 68.50 cm $\Delta h = 41.70$ cm. 30.62
System just critical; top reflector at 22.750"

22
1312 - Per Moved top reflector to 61.50"
Rhoite, worth = 94.64

1315 Drain; to = 21.93"

23
1325 + Per 62.65 28.32"
Top reflector at 12.875"

1332 61.75 cm.
61.80 cm. 27.99"
System just critical; top reflector at 12.875"

1334 Moved top reflector south away from array.
- Per: = 181.04

1336 Drain;

264

3/30/65

31

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	STAIR RA
K-1	3×10^{-12}	Meter ✓	3"	-	10×10^{-12}
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1 1/2"	-	"
"	"	Fast ✓	"	-	"
R-1					
P-2					
PM-1	700V	Alarm -	Out	-	500V
PM-2	1200V	Low -	14"	-	900V
"	"	Alarm -	1"	-	"
LOG N CALIBRATE ✓		OPERATE ✓	SOURCE No. B-80		

DUMP WELL PROBE LIGHT ✓

Same array on shown on page 256

2" plexiglass top reflector

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 1020

Start-up OK'd by I.D.C. AKH Date 3-30-65

Top reflector now 2" x 4.5" x 72" plexiglass:

11

12

12

12

12

Solution Zero
3/30/65

202 (cm)
26.80 cm

"2" top refl. "

265

1103 202 (cm) 19.4" in
57.20 cm $q_h = 30.40 \text{ cm}$ 26.29" in

System just critical: Top reflector at 11.50"
Dain: adjusted top reflector to be in same pos
on 3-29-65.

1133 (1) + Per 202 (cm) M-4 in
57.65 cm $q_h = .80 \text{ cm}$ 26.57" in
 $E = 88.38 \text{ cm} = 10.94 = 13.63 \text{ f/cm}$

1145 202 (cm) M-4 in
56.85 cm $q_h = 30.05 \text{ cm}$ 26.28

System just critical: Top reflector at 11.50" (Note
this is after adjusting top reflector)

1148 2 - Per: Moved Top reflector to 61.50"
Upper limit = 199.0 f

1205 3 + Per: 60.25 cm 27.57"
Top reflector at 13.125"
 $E = 73.88 \text{ cm}$, 12.44 - Top reflector change in ht = -.50"
= 24.84 f/cm

1215 } 60.25 cm 27.57"
System just critical: Top reflector at 13.625"

1216 4 - Per: Moved reflector south away from array:
upper limit = 199.0 f

1217 Dain:

266

3/31/65

3/3

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3"	-	3×10^{-12}
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	1"	-	2×10^{-12}
"	"	Fast ✓	"	-	"
R-1					
PM-1	700V	Alarm ✓	out	-	500V
PM-2	1200V	Low ✓	1.9"	-	900V
"	"	Alarm ✓	1"	-	"
LOG N CALIBRATE <input checked="" type="checkbox"/>		OPERATE <input checked="" type="checkbox"/>		SOURCE No. <u>B-80</u>	
DUMP WELL PROBE LIGHT <input type="checkbox"/>					

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

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

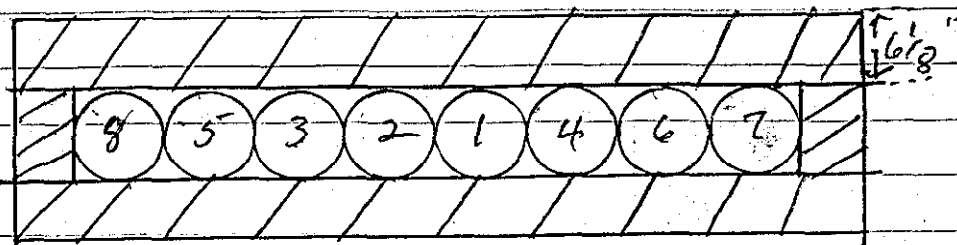
Red light on by AKH Time 0810

Start-up OK'd by F.D.C. AKH Date 3-31-65

3/31/65

267

N



new row 8 units in line with polyethylene reflector at contact, as shown above.

0845 202 (cm) M-4 in
67.30 (cm) 30.37" in

System sub critical: With a $6\frac{1}{8}$ " x 27 x $68\frac{1}{4}$ " board from top polyethylene slab lowered from top to 10.5" of fuel in fixed filled units.

0846 Drain:

9:07 Array now fully reflected on top with 6" Polyethylene. Top reflector ~ $9\frac{3}{4}$ " from top of fuel in fixed filled units.

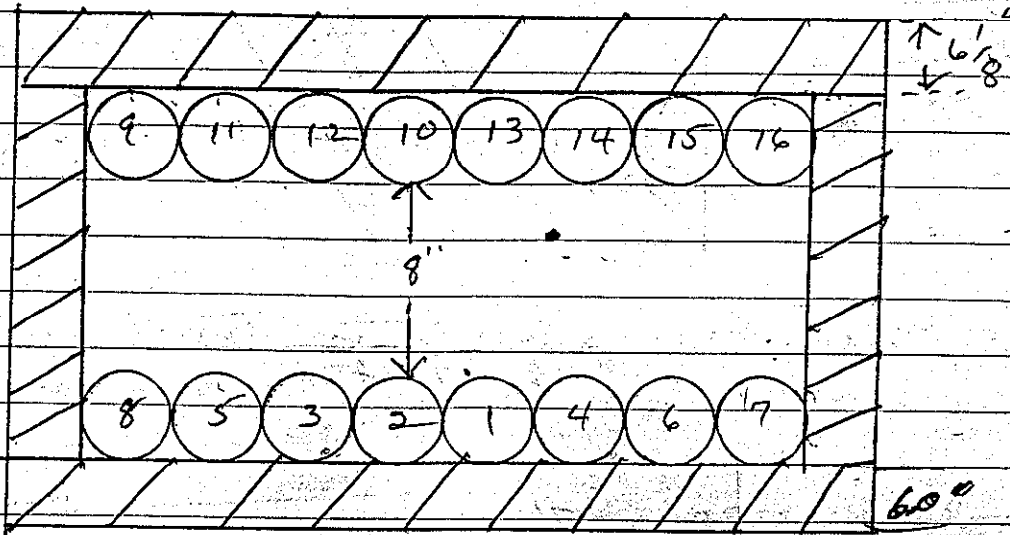
0927 202 (cm) M-4 (in)
69.40 cm 31.29"

System sub critical; very little multiplication.
Drain:

268

3/31/65

4-1-c5



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1 3710-12		Meter	3 1/2"	-	
"		Fast	"	-	
K-2 "		Meter	1/2"	-	
"		Fast	"	-	
R-1					
R-2					
PM-1 700		Alarm	cont	-	
PM-2 1200		Low	19"	-	
"		Alarm	1"	-	

LOG N CALIBRATE

OPERATE

SOURCE No.

B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AMN Personnel check by F.D.C
 Instruments and safeties checked and reset by AMN
 Source in checked by AMN Source No. M-43
 Emergency equipment in control room checked by T.A.C
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by AMN Time 0951
 Start-up OK'd by F.D.C AMN Date 4-1-65

Solution $F_{202} = 202 = 20.80 \text{ cm.}$

1032

202 (cm) M-4 (in)
 56.05 cm $q_h = 29.25 \text{ cm}$ 26.02" ??

System just critical: With a 2" x 45" x 72" Plexiglass
 top reflector ~100" from top of fuel in fished
 filled units: see page 268 for array:

1035

adjusted top reflector to be centered over array:

1050

① 202 (cm) M-4 (in)
 + Pos = 56.85 cm $q_h = 29.85$ 26.56
 $T = 62.29 \text{ cm} = 14.14 = 16.54 \text{ cm.}$

1103

202 (cm) M-4
 56.00 cm $q_h = 29.20$ 26.20"

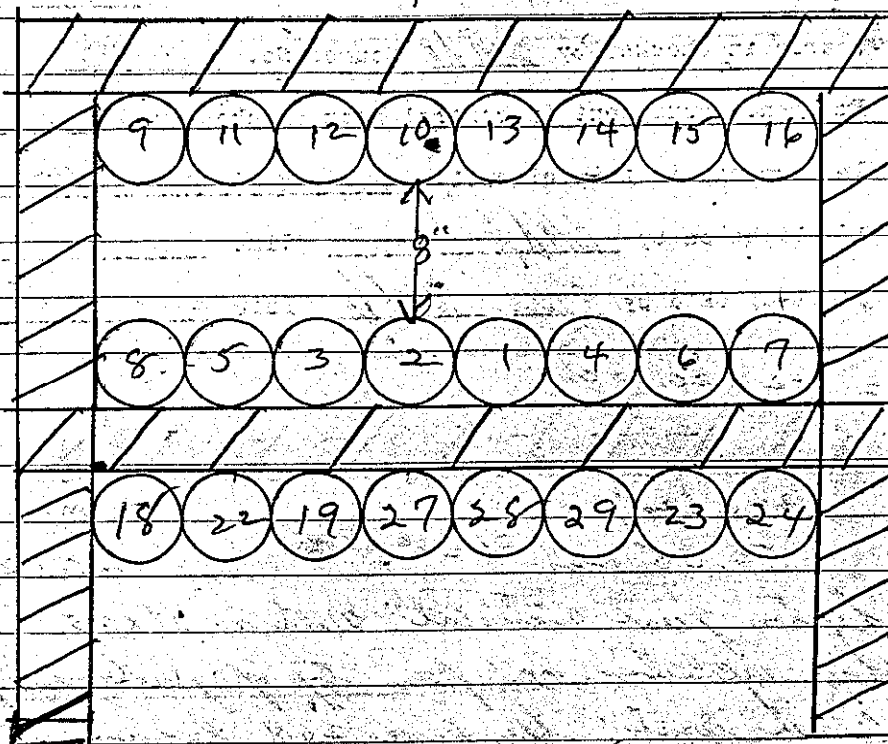
System just critical: Top reflector ~10.0" from top
 of fished filled units:
 Drain!

over!

270

4/1/65

47



6 1/8"

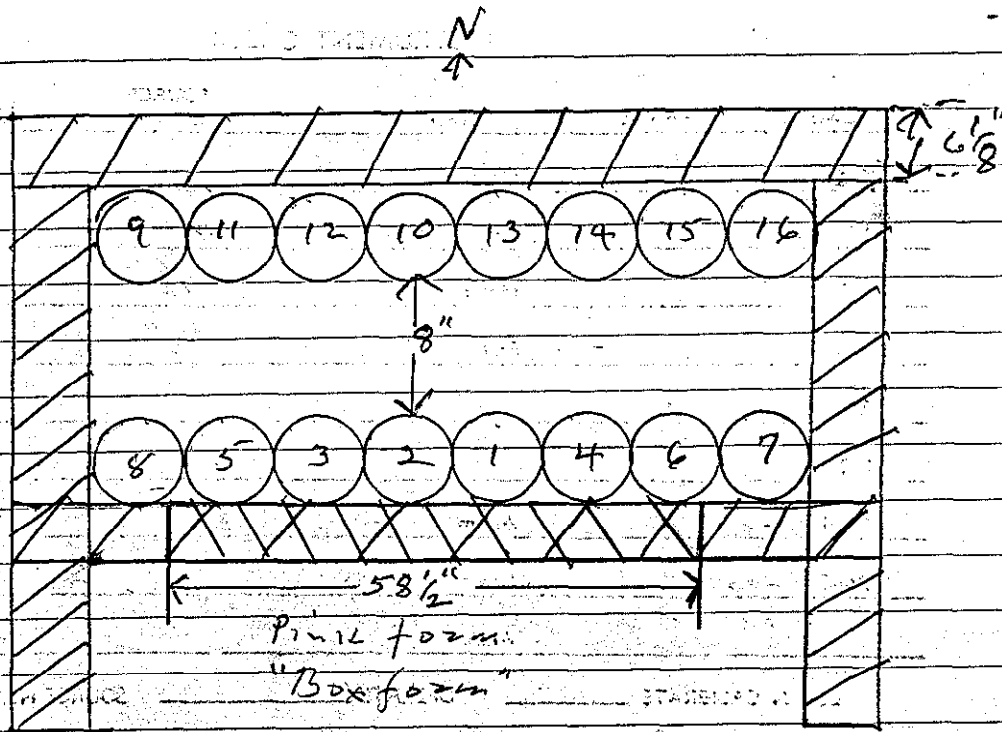
add 3rd row as shown above:

1348 (2) 202 cm M = 2 (in.)
 + Per 56.30 cm Dh = 55 cm 26.95"
 S = 115.17 cm = 8.8¢ = 16¢ flow.

1402 55.15 cm 9/4 = 28.95 cm 26.22"

System just critical: 2" top infiltration ~ 10.0" from top of feed in piped filled units.
 Drain:

4/1/65



1500

Removed outer south row. Replaced part of 6" polythene south wall with 2 slabs supplied by K-s Dimensions 1 pc 8" x 11" x 58 1/2" and 1 pc 8" x 12" x 58 1/2"; also 3/8" up B pink form and "plastic" supplied by A.I.M. = 11-11.

1536

(3) 202 (cm) M-9
 + Per 70.60 cm bh = .65 cm. 32.04 ??
 $50.15102 \text{ cm} = 7.17 = 10.93 \text{ ft cm.}$

1546

69.95 (cm) $q_h = 43.15$ 31.79 ??
 System just critical!
 Diver!

272
4/2/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 K10 ⁻¹²	Meter ✓	2"	✓	10 K10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	"	Meter -	1/2"	-	"
"	"	Fast -	1/2"	-	"
R-1					
R-2					
PM-1	700V	Alarm	cont	✓	500V
PM-2	1200V	Low	10	✓	900V
"	"	Alarm	1"	-	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

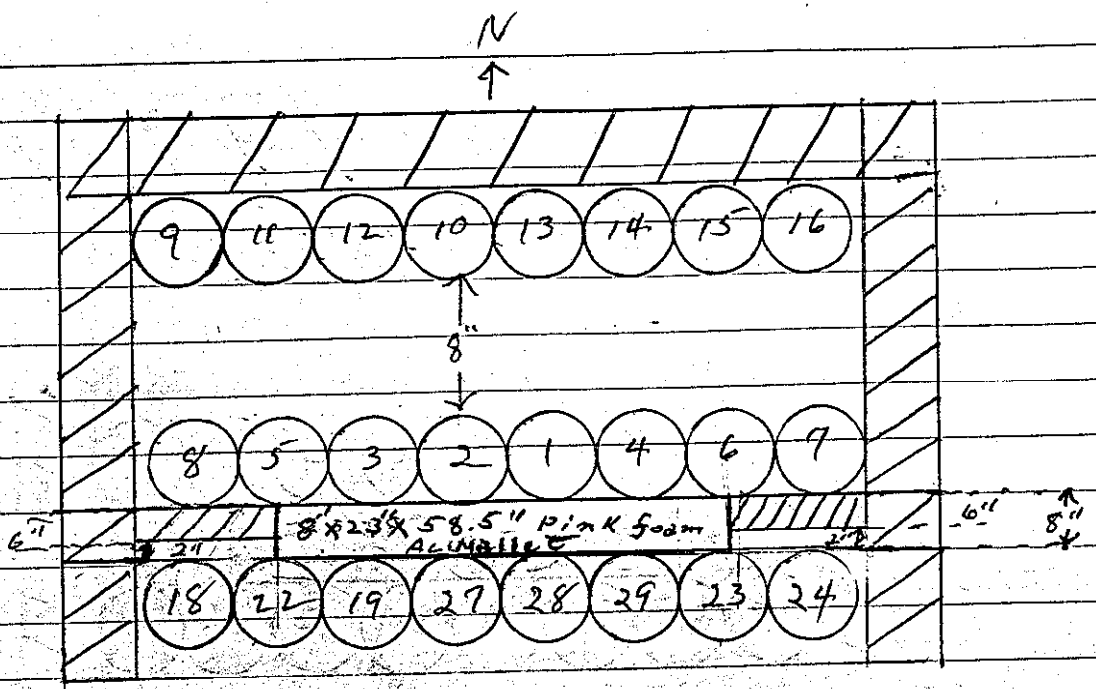
Instruments in trip circuit: K-1 K-2 PM-1 PM-2

Red light on by AKH Time 0925

Start-up OK'd by F.I.C. AKH Date 4-2-65

Solution Ferri's 202.0cm 10-411
26.80 cm 14.77" ⁴ in

4/2/65



0890 Added South center row of units, and still have 2 pcs of pink foam as shown above.

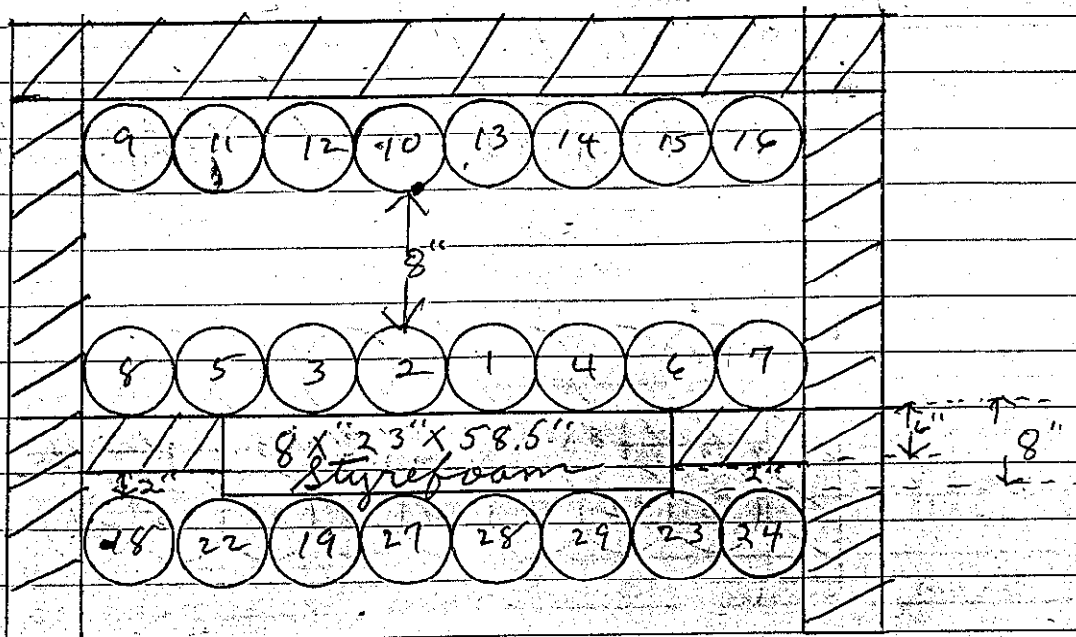
0895 (1) 2.02 (cm) M.F. in.
 7.85 65.45 cm Δh = .65 cm 30.09"
 $E = 119.43 \text{ mm} = 8.64 = 13.294 \text{ cm}$

0908 64.80 cm $9/16 = 38.00 \text{ cm}$ 29.96"

System just critical: 2" top reflector ~10.0 foam
 top of fuel in fuel filled vessel.
 Drain:

274

4/2/65



11:20 Removed Pink foam from south wall and replaced it with styrofoam as shown above.

11:14 (2) 20.2 (cm) m.e. (cm)
 + Per $54.55 \text{ cm } \Delta h = 185$ 25.73 "
 $S = 79.31 \text{ cm} = 11.84 = 13.92 \text{ cm}$

11:21 $53.70 \text{ cm } \frac{9}{16} = 26.90 \text{ cm}$ 25.70

System just critical: 3" top reflector ~10.0" from top of fuel in fiped units.

12:25 Removed ~~west~~ ^{South} outer row of units. no other change.

4/2/65

(3) 202 (cm) M-4 (in)
 12.48 + Pen 69.85 cm $\Delta h = .85$ 32.05"
 $t = 110.82 \text{ cm} = 9.14 = 10.74 \text{ ft/cm.}$

12.58 69.00 cm $q_h = 42.20 \text{ cm.}$ 31.72"
 System just critical: top reflector ≈ 10.0 " from
 top of fuel in fixed filled unit
 Drain:

14:50 Removed styrofoam from south
 wall, and replaced with foam glass
 Dimensions $8 \times 23 \times 58.5$ " ~~to the change~~
 Still only have 2 rows 16 units, 8" separate

(4) 202 (cm) M-4 (in)
 15.10 + Pen 72.00 $\Delta h = 1.45 \text{ cm}$ 32.91"
 $t = 102.13 \text{ cm} = 9.74 = 6.7 \text{ ft/cm.}$

15.20 { 70.55 cm. $q_h = 43.75 \text{ cm.}$ 32.34
 System just critical: ~~to~~ 2" top reflector ≈ 10.0 "
 from top of fuel in fixed filled unit.
 Drain:

15:30 Added South row of units, now have
 3 rows 24 units. No other change.

(5) 202 (cm) M-4 (in)
 15.51 + Pen 64.45 $\Delta h = .80 \text{ cm.}$ 30.22
 $t = 78.23 \text{ cm} = 11.94 = 14.9 \text{ ft/cm.}$

over.

276

4-2-65

4/6

202 (cm)

M-4 (in)

16.00

63.65 cm $\phi_{1/2} = 36.85$ cm

29.63 "

System just critical: 2" top reflector ~ 10.0 from fuel top of fuel in fuel units.
Drain:

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

4/5/65

277

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKL

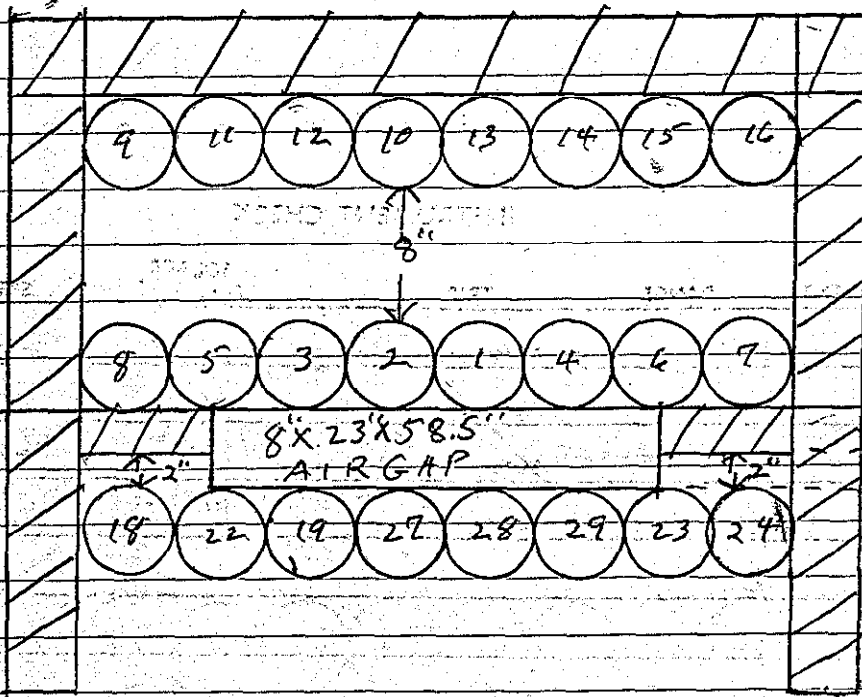
Source in checked by AKL Source No. M-93

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

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

Red light on by AKL Time 0940

Start-up OK'd by F.D.C. AKL Date 4-5-65



10.12 ⁽¹⁾ + Pw 2.02 (cm) M-9 (cm) 53.70 5h = 26.5 cm 25.6.9"

$T = 86.42 \text{ cm} = 11.04 = 10.94 \text{ cm}$

10.20 53.05 cm 4h = 26.25 25.91"

System just critical: 2" top insulation ~ 10.0 from top of fuel in fuel filled units.

1120 ~~1127~~ (2) - Per 202 (cm) M. 4
 73.30 cm $U = 604.09 \text{ cm} = -2.3 \text{ f}$ 33.42

System slightly sub critical: With south
 row shown on page 277 removed: sub 2" top
 reflection ~ 10.9" from top of fuel in fiped unit.

1132 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-L RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	2.5"	✓	10 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	14	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	7000	Alarm ✓	cont	✓	5000
PM-2	12000	Low ✓	14"	✓	9000
"	"	Alarm ✓	"	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

4-6-64

START-UP CHECK LIST

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

Instruments and safeties checked and reset by MAL

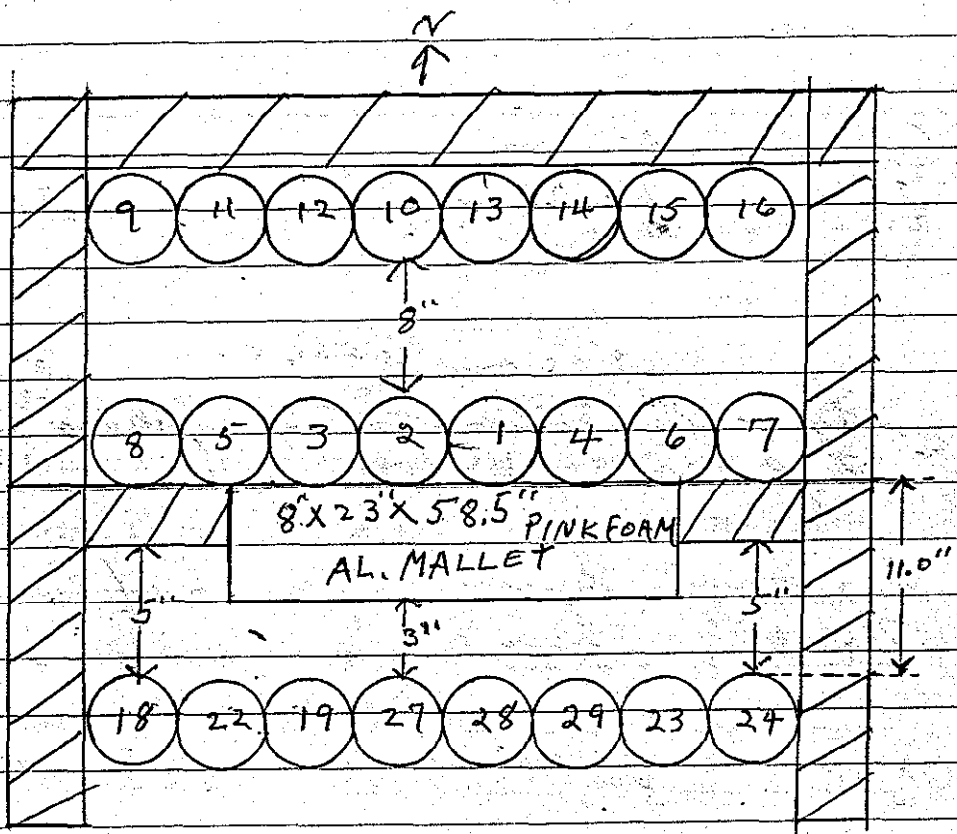
Source in checked by MAL Source No. M-43

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

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

Red light on by MAL Time 0915

Start-up OK'd by F.P.C. MAL Date 4-6-65



0900 Now have pink foam in south wall with separation of 3" from units as shown above

(4) Bottle separation 11"

0940 tPr 20 ~ (cm) M. 4 in.

$E = 83.60 - 11.34 = 16.14\%$ 66.80 $ab = .7000$ 30.88" $accr.$

280
4/6/65

4/9

10:53 202 (cm) M-F in.
66.10 $\eta_h = 39.30$ 30.59

System just critical: 2" top reflector ~ 10.0" from top of fuel in fixed filled units.
Drain:

10:55 Moved south row of units out to a separation of 12" from Pink form. Total separation between 2 south rows now = 20"

10:51 202 (cm) M-F (cm)
+ Per 68.80 cm $\Delta h = 40$ 31.76 in.
 $E = 94.53 \text{ w} = 10.24 = 12.75 \text{ f/cm}$

11:00 68.00 cm $\eta_h = 41.20$ 31.46 in.
System just critical: 2" top reflector ~ 10.0 from top of fuel in fixed filled unit.

12:30 Removed south row of units. No other change.

12:51 202 (cm) M-F in.
(3) + Per 70.40 cm $\Delta h = .55 \text{ cm}$ 32.47"
 $E = 151.02 \text{ w} = 7.14 = 12.94 \text{ f/cm}$

1:30.1 69.85 cm, $\eta_h = 43.05 \text{ cm}$ ~ ??
System just critical: 2" top reflector ~ 10.0" from top of fuel in fixed filled units.

4/9/65

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

2 - 12" Z.P. cylinders: 1st - 15-3.

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH.

Source in checked by AKH Source No. M-43

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

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

Red light on by AKH Time 0915

Start-up OK'd by Z.P. CRK Date 4-9-65

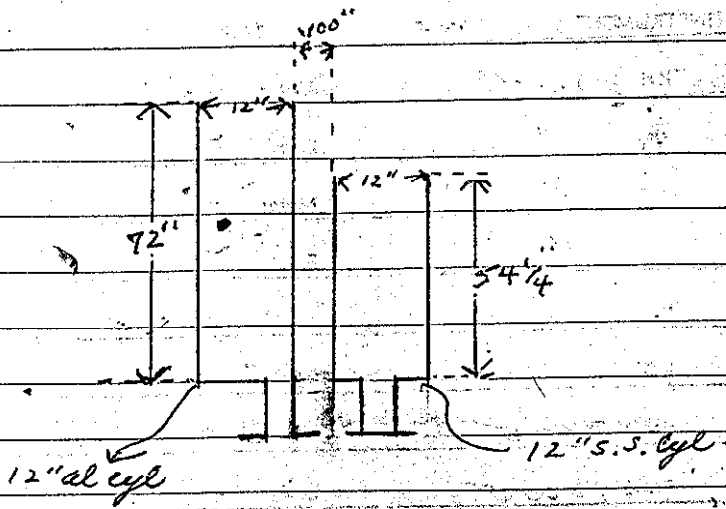
Solution Zero: 202. (cont)
7.40

M-4 in.
8.00 in.

cont.

282

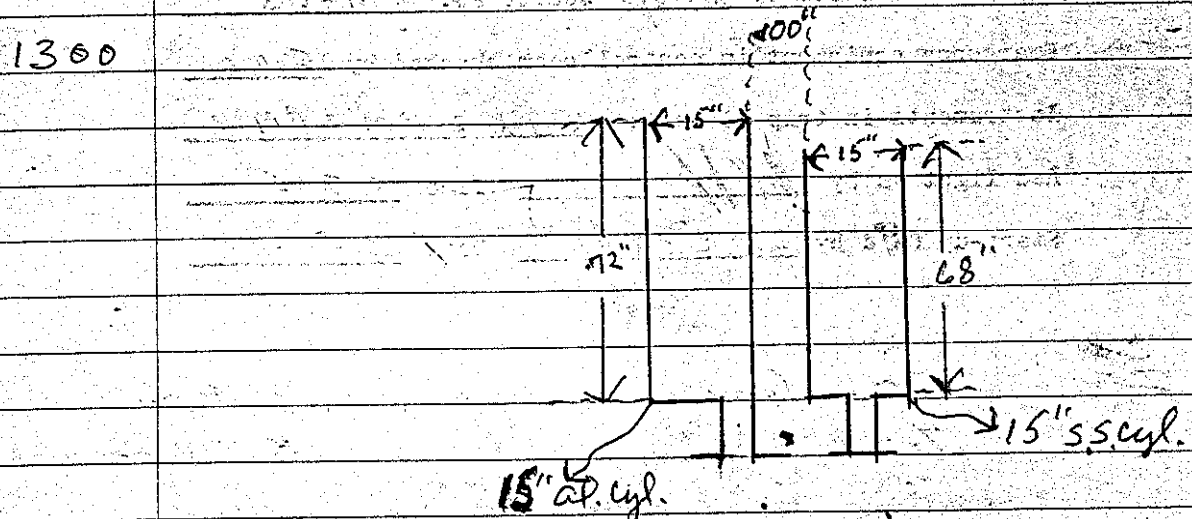
4/9/65



0800 None two 12" cyls. as shown above. Separation = 100" (Can not get cyls in contact) unreflected

0930 202 (cm) 134.60 cm $g_b = 127.20 \text{ cm}$ 19.9 (in) 58.10" $g_b = 50.10$

System just sub critical. No multiplication. Over:



1300 None two 15" cyls. 155 & 142. shown above. Separation = 100" (Can not get cyls in contact) unreflected.

202 (cm) MT 2 = (1.5)
 Solution Zero 7.50 cm. 8.05"

1427 + P₁ 76.20 cm D₁ = .70 cm. 35.59"
 $G = 81.49 \mu = 11.64 = 16.6 \mu/cm$

1435 75.50 cm D₁: 26.71 (cm) 35.59" 23
D₂: 68.00 cm.
 System just critical.
 D₁ =

50.10

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	3"	-	10 X 10 ⁻¹²
"	"	" ✓	"	-	"
K-2	"	Meter ✓	3"	-	"
"	"	" ✓	"	-	"
R-1					
PW	7000	Alarm ✓	cont	-	5000
PM	12000	Low ✓	14"	-	9000
"	"	Alarm ✓	1"	-	"

LEG N CALIBRATION ✓ OPERATE ✓ SOURCE No. B-80
 DUMP WELL PROBE LIGHT ✓

4-12-65

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-93

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

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

Red light on by AKM Time 0845

Start-up OK'd by F.D.C. AKM Date 4-12-65

Have some ~~two~~ two ¹⁵" gyl's shown on page 282.
Separation mass = 3.250"

Solution Zero 202 (cm) M-9 "i"
7.50 cm 8.05 "
1003 (1) 4 Per 96.20 cm $\Delta h = 1.10$ cm 43.09 "
 $E = 111.91$ cm = 9.04 = 8.24/cm.

1012 95.10 cm $\Delta h = 87.60$ cm 42.67 "
 $\Delta h = 34.49$ cm
Hepton just critical.
Drain:

1045 Separation mass = 6.0 "i"

1145 (2) 4 Per 108.00 cm $\Delta h = 1.75$ cm 48.12 "
 $E = 73.88$ cm = 10.44 = 7.14/cm.

286

4/15

4-15-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	3.5"	✓	10 X 10 ⁻¹²
"	"	Fast ✓	"	"	"
K-2	3 X 10 ⁻¹²	Meter ✓	3"	✓	"
"	"	Fast ✓	"	"	"
R-1					
R-2					
PM-1	7000	Alarm ✓	Cart	✓	5000
PM-2	12000	Low ✓	19"	✓	9000
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>A-80</u>
DUMP WELL PROBE LIGHT _____					

" 15.50" I.D., 031" stainless steel cylinder "

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKJ

Source in checked by RKJ Source No. M-43

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

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

Red light on by RKJ Time 12:10

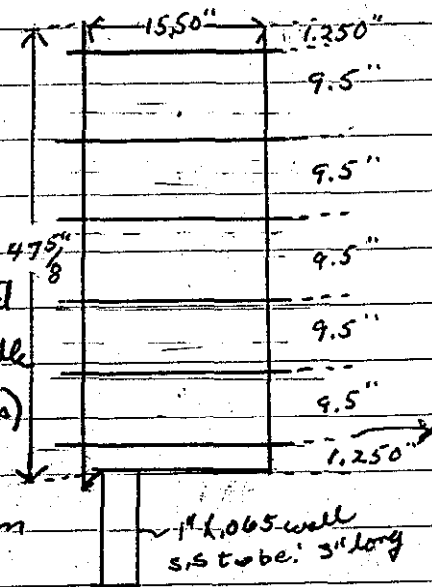
Start-up OK'd by F.P.C. RKJ Date 4-15-65

Solution F₂₀₂
20.2 (cm)
22.65 cm

M-4"
21.80 cm 15

Top of unslit girded
leg in four places
with $\frac{1}{16}$ " SS cable

The unslit is supported
at bottom by a bundle
of (3"x3" al. sq. tubes)
3 wide + 4 long
total of 12 x 36" from
the floor.



Note: Wall on
top of and bottom
are made of .031"
stainless steel:
Note: wall on
top of by 6 ring's.
"slip-on" $\frac{1}{16}$ " al
x 1" wide spacers
as shown: (A)

(1)
1314 + Per 202 (cm) $\Delta h = 1.65 \text{ cm}$ M-4"
124.55 cm 72.73 " ??
 $\sigma = 120.95 \text{ mm} = 8.54 = 5.15 \text{ f/cm}$

1324 122.90 cm $\Delta h = 100.25 \text{ cm}$ 79.70 " ? }
 $\sigma = 39.49 \text{ in}$
Lepton just critical: $\frac{h}{\lambda} = 2.55$
Drain

Solution Zero 202 (cm) M-4 (in)
22.65 cm 13.21" (mm)

Response is to reach critical ht:

(2)
1521 + Per 202 (cm) M-4"
126.00 cm $\Delta h = 2.50$ 54.01"
 $\sigma = 80.40 \text{ mm} = 11.74 = 4.68 \text{ f/cm}$

288

4-15-65

4/1

202 (cm)

14-9 (in.)

1528

123.50 cm

$\Delta h = 2.50 \text{ cm!}$

53.00 "

very slightly - Neg.

1535

123.50 cm

$ch = 100.85 \text{ cm.}$

53.01 "

very slightly + Pos

$ch = 89.70 "$

Drain:

$\frac{1}{2} = 2.56$

4/19/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹⁰	Meter ✓	2"		
		Fast ✓	2"		
K-2	3 x 10 ⁻¹⁰	Meter	3"		
		Fast	3"		
R-1	—				
R-2	—				
PM-1	7000	Alarm	Contact		5000
PM-2	12000	Low	16"		9000
		Alarm	1"		
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DRAIN WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by RRR Personnel check by RRR
 Instruments and safeties checked and reset by EJ
 Source in checked by _____ Source No. M-43
 Emergency equipment in control room checked by EJ
 Instruments in trip circuit: _____
 Red light on by RRR EJ Time 1205
 Start-up OK'd by RRR EJ Date 4/19/65

Solution given: none
22:1 am

M-4
13.24 in.

1057 (1) 202 (cm) $\Delta h = 2.30 \text{ cm}$ M-P (in)
 + Per 125.00 cm 53.60"
 $E = 86.18 \text{ cm} = 11.14 = 4.83 \text{ ft/cm}$

1405 122.70 cm 52.71"
 slightly + Per

1110 122.65 $\frac{1}{4} h = 100.60 \text{ cm}$
 $\frac{1}{4} h = 39.61''$ 52.69"
 slightly - Per: $\frac{h}{2} = 2.56$
 Drain:

Added 4 rings between ~~last~~ existing ones
 (except for top which would have been above
 solution height).

solution year 202
 22.05 cm 13.045 in

1340 2 202 (cm) $\Delta h = 2.35 \text{ cm}$ M-P (in)
 + Per 125.25 cm 53.74"
 $E = 78.95 \text{ cm} = 11.84 = 5.02 \text{ ft/cm}$
 $\frac{1}{4} h = 100.85 \text{ cm}$
 $\frac{1}{4} h = 39.70''$
 $\frac{h}{2} = 2.56$

1351 122.90 cm 52.80"
 $\frac{h}{2} = 2.56$

System just critical:

Added 6 more rings around the form bottom
 in., approx 4. $15 \frac{3}{8}''$ from outside bottom to
 center ring (one of original set)

solution year 202
 22.05 cm 13.04 in

(3) 202 (Cm.) M-4
 124.75 2h = 2.25 cm 53.50
 + P.W. + 25.75
 5 = 87.64 cm = 10.9 ft = 4.8 ft/cm.

1.537 122.50 cm. $q_h = 100.45 \text{ cm.}$ $q_h = 39.55''$ 52.67"

System just critical. $\frac{h}{s} = 2.55$
 Drain

Removed all rings which were added earlier in the day.

Solution zero: ~~44~~ 202 = 22.05 cm M-4 = 13.04 in.

1632 + Period 125.60 cm $H_c = 101.90$ = 53.85 in.

1644 Critical 123.95 cm = ? in. 53.?

Drain

Repeat

1705 + Period 53.99 in.

1710 Critical - 123.95 cm $H_c = 101.90$ 53.24 in.

Drain

$q_h = 40.12''$

292

4-20-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3"	✓	70×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	11"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT :		✓			

Repeat of 4-19-65.

START-UP CHECK LIST

Equipment checked by RRM Personnel check by RRM

Instruments and safeties checked and reset by RRM

Source in checked by RRM Source No. M-93

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

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

Red light on by F.D.C. Time 0820

Start-up OK'd by F.D.C. RRM Date 4-20-65

Solution Zero

202 (cm)
22.10 cm

M-9 (in)
13.03"

4-20-65

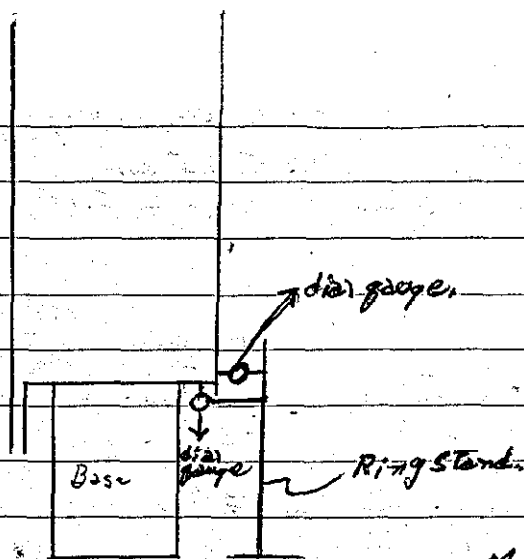
0908	(1) + Per $\tau = 76.77 \text{ cm} = 12.10 \phi = 5.15 \text{ ft/cm.}$	202 (cm) 125.35 cm $\Delta h = 2.35 \text{ cm}$	M-4 (in) 53.75"
0920		123.00 cm system just critical: $\frac{h}{d} = 2.56$	$\frac{q}{h} = 100.90 \text{ cm.}$ $\frac{q}{h} = 39.72 \text{ in.}$ 52.81"
0922	Drain ≈ 1.44 "		
0930	(2) + Per $\tau = 86.92 \text{ cm} = 11.00 \phi = 4.78 \text{ ft/cm.}$	125.30 cm $\Delta h = 2.30 \text{ cm}$	53.71"
0940		123.00 cm system just critical: $\frac{h}{d} = 2.56$	$\frac{q}{h} = 100.90 \text{ cm.}$ $\frac{q}{h} = 39.72 \text{ in.}$ 52.81"
0941	Drain ≈ 4.10 "		
0946	(3) + Per $\tau = 63.02 \text{ cm} = 13.94 \phi = 4.89 \text{ ft/cm.}$	125.85 cm 125.90 cm $\Delta h = 2.45 \text{ cm}$	53.92"
0956		123.00 cm system just critical: $\frac{h}{d} = 2.56$	$\frac{q}{h} = 100.90 \text{ cm}$ $\frac{q}{h} = 39.72 \text{ in.}$ 52.81"
	Drain:		
Solution Zero		202 (cm) 22.05 cm	M-9 (in) 13.04"

aver:

294

4-20-65

Installed two dial gauges: One at bottom and one at side, $\frac{1}{2}$ " in up from bottom.



1310 (4) 202 (cm) 125.70 cm $o/h = 2.40$ cm 11-9 (in) 53.90"

$$E = 78.23 \text{ cm} = 11.94 = 4.96 \text{ Hem.}$$

1320 123.30 cm $o/h = 101.25$ cm $o/h = 39.86$ " 52.97"

System just critical!

Zero of bottom dial gauge = .042"
Zero of side " " = .059"

1. When system was just critical 123.30 cm bottom dial gauge had moved ~~0.0845~~ .0845" from zero.
2. When system was just critical 123.30 cm side dial gauge had moved ~~0.0095~~ .0095" from zero.
3. Drain system through $\frac{1}{2}$ " drain valve. Bottom gauge returned to .0435"; difference of .0015". Side gauge returned to .064"; difference of .005."

4-20-65

1500 Four samples taken from manifold: 1 sent to Y-12, 1 sent to X-10, 2 held for school.

Y-12		X-10	
Rep # 684477 #1		S.F.A-875 #1-A	
G = 161.3 g	sub for.	C = 149.9 g	sub for
T = 18.5	$\rho = .447160$	T = 18.6 g	$\rho = .4441$
N = 142.8 g	$\rho_{sp} = 2.0278$	N = 131.3 g	$\rho_{sp} = 2.0320$
	conv. = 5.01%		Density = 2.0283
	906.75 g/l		
			$\rho_h = 1.47$

294 296

4-21-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 ⁻¹²	Meter ✓	3"	-	10 x 10 ⁻¹²
"	"	Fast ✓	"	-	"
K-2	"	Meter ✓	3"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700 v	Alarm ✓	cont	-	500v
PM-2	1200 v	Low ✓	14"	-	900v
"	200	Alarm ✓	1"	-	"
LOG N CALIBRATE <input checked="" type="checkbox"/>			OPERATE <input checked="" type="checkbox"/>		SOURCE No. B-80
DUMP WELL PROBE LIGHT <input checked="" type="checkbox"/>					

START-UP CHECK LIST

Equipment checked by ARK Personnel check by F.D.C.
 Instruments and safeties checked and reset by ARK
 Source in checked by ARK Source No. M-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1 K-2 PM-1 PM-2
 Red light on by ARK Time 1225
 Start-up OK'd by F.D.C. ARK Date 4-21-65

Solution Zero 20.2 (cm) 19-9 (in)
 27.05 cm 13.03"

9-21-65

297

added 6.031" stainless steel strips 48.8" long around
15.50" S.S. rods. These were placed between the
sl rings by using stainless steel bands 7/8" wide.
Height of strips = 46.25" from bottom of rods.

1300 (1) 202 (cm) M-9 (in)
120.10 cm $\Delta h = 2.17$ cm
+ Per 12.00
5 = 69.54 cm = 13.00 ft = 5.99 ft/cm
51.71"

1314 $q/h = 95.88$ cm.
117.925 cm $q/h = 37.75$ " 50.80"
System just critical: $\frac{h}{L} = 2.44$
Drain = 2.0"

1322 (2) $\Delta h = 2.40$ cm
+ Per 120.30 cm 51.78"
I = 65.91 = 13.50 ft = 5.63 ft/cm

1330 $q/h = 95.85$ cm.
117.90 cm $q/h = 37.74$ " 50.83"
System just critical.
Drain.

1430 Removed the 6 stainless strips: + much of
zero:

Salaction zero 202 (cm) M-9 (in)
22.05 cm 13.03

298

4-11-65

(3) 202 (cm) $\Delta h = 2.30$ cm. M-9 (line)
 1458 $\frac{7}{8}$ 125.50 cm. 53.83 "
 $t = 86.18$ m = 11.10 ϕ = 4.83 $\frac{7}{8}$ in

1512. 123.20 cm $\frac{9}{16} = 101.15$ cm.
 $\frac{9}{16} = 39.82$ " 52.97 "

System just critical.
 Drain.

4-22-65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	3"	✓	
"	"	Fast ✓	"	✓	
K-2	"	Meter ✓	"	✓	
"	"	Fast ✓	"	✓	
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont	✓	
PM-2	1200 V	Low ✓	14"	✓	
"	"	Alarm ✓	1"	✓	
LOG N. CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

501
sup
al

X =
the
short
72.

10

"
"
by

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RAK

Source in checked by RAK Source No. M-43

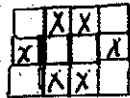
Emergency equipment in control room checked by F.D.C

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

Red light on by RAK Time 0945

Start-up OK'd by F.D.C RAK Date 4-22-65

Top of support, 3x3 al sq tubes



X = tubes that were shorten by 12.00"

Shorten six of the 3x3" al. square support tubes by 12"

Solution Zero 20.2 (cm) M-4 (in)
22.05 (cm) 13.03" in

10.43 (1) + Pen 126.00 cm. dh = 3.15 cm. 54.03"
 $\tau = 52.87 \text{ m} = 15.84 = 5.02 \text{ f/cm}$

10.51 122.85 cm dh = 100.80 52.77"

System just critical:
Drain:

12:30 Added 1 SS. disc .031" x 15.250" to bottom of vessel: Contact not to good due to the upward bulge of the bottom.

"Solution Zero": 20.2 (cm) M-4 (in)
"before run": 22.20 (cm) 13.11" in

13:10 (2) + Pen 125.90 cm dh = 2.60 cm. 53.98"
 $\tau = 61.56 = 14.2 = 5.46 \text{ f/cm}$ avr.

2 2 300

9 9 9-2265

1 202 (cm) $\frac{c}{h} = 101.10 \text{ cm}$ M-9 (cm)
123.30 cm $\frac{c}{h} = 39.80''$ $\frac{h}{a} = 2.57$ 52.96''

1320 hepten just critical.

1.5 Residuals of solution zero after after run:

202 (cm) M-4

22.20 cm 1308''

4 1405 added 2nd ^{S.S.} disk (.031" x 15.250") to bottom.

Solution Zero - 202 (cm) M-4 in.
22.20 cm 13.11''

1435 (3) + Pen 126.00 cm $\Delta h = 2.30 \text{ cm}$ 54.05''
 $E = 81.12 \text{ m} = 11.64 = 5.04 \text{ g/cm}$

1448 $\frac{c}{h} = 101.50 \text{ cm}$
123.70 cm $\frac{c}{h} = 39.96''$ 53.11''

hepten just critical. $\frac{h}{a} = 2.58$

Drain

Residuals of solution zero after run

202 (cm) M-9 (cm)

22.20 cm 13.07''