BOOK102R

Notes:
"U (4.89) rads Log #4" on spine

Blank pages: inside front cover sheets, 2, 59-308, inside back cover sheets

-1 half sheet between cover page and page 1
-pages having 1 drawing and 1 sticker on each page: 4, 7, 10, 12, 16, 17, 19, 20, 25, 27, 33, 34, 37, 41, 45, 48, 50, 54, 56, 57

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
September 10, 1999

14-2-1

SHAW'S

PIONEERS SINCE 1831

Account Book

No. S 149

NO UNITS

Journal . . . . . .

Ledger, Single Entry . .

Ledger, Double Entry .

Record Ruled (27 Lines)

Made in 150, and 300 Pages

MADE IN U. S. A.

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

Can from Lg #3 p. 30 2 (5/8/65) 0.2 g B/l

0.2 g B/l in refl/back water:

6.51 L" rods, 2.82 Cm sep., ~~3 weeks~~	4
2.60 Cm sep.	10
2.41 - - - - -	17
0.3" rods, 2.05" Cm sep.	22
2.453 - - - - -	29
1.80	35
1.53 - - - - -	42
1.30	52

(end 5/26/65)

L of #4

Con. From L-4 #3 p. 30

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-2}	Meter	1"		3×10^{-2}
	"	Fast	"		"
K-2	"	Meter	"		"
	"	Fast	"		"
R-1					
R-2					
PM-1	700 v	Alarm	5"		500 v
PM-2	1200 v	Low	10"		900 v
	"	Alarm	2"		"

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

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

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

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

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

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

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

Red light on by A.K.H Time 1025

Start-up OK'd by F.D.C / A.K.H Date 9-9-69

4

1516 rods.
2.82 cm separation c-c.
30 cm length

Have an 13 x 13 array. With 10 rods removed from each corner. Total of 129 rods.

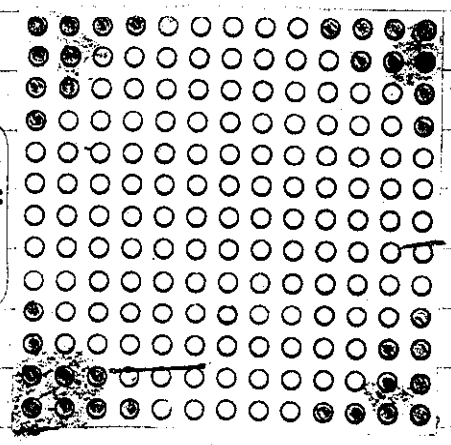
1057 Water ht = 27.70 cm — Temp °c
System sub critical — 23.6°c
Drain.

Added 4 rods. 1 to each corner. Have an 13 x 13 array, With 9 rods removed from each corner. Total of 133 rods.

Water ht = 27.60 cm — Δℓ = 7.05 cm — Temp °c
+Per — 23.7°c
C = 245.55 μc = 4.7¢ = .67¢/cm.

1123 Water ht = 20.55 cm
System just critical
Drain.

9/9/69: 13x13 array with 9 rods removed from each corner. Total rods: 133. 0.516" rods. Separation 2.825 cm C-C. 30 cm length. p. 4



p. 15

Removed 1 rod. Now have on 13 x 13 array, with 9 rods removed from 3 corners, and 10 rods removed from 1 corner. Total of 132 rods.

Water lvl = 27.60 cm — Temp °C
-Per. — 23.8°C
N.G.
1303 Drain.

Repeat with 132 rods. Now have on 12 x 12 array, with 3 rods removed from each corner. Total 132 rods.

Water lvl = 27.60 cm — Temp °C
System sub critical — 23.8°C
Drain.

over.

6

.516" rods.
2.825 cm separation c-c.
60 cm length.

Have an 11 x 11 array with 8 rods removed from each corner. Total of 89 rods.

$\Delta k = .45$

Water lvl = 42.35 cm Temp °c

^{3} + Per

$\tau = 39.11$ sec = 19.3 ¢ = 42.9 ¢/cm

1515 Water lvl = 41.90 cm
System just critical
Drain.

Removed 2 rod. 1 each from opposite corners.
Have an 11 x 11 array, with 8 rods removed from 2 corners and 9 rods removed from 2 corners. Total of 87 rods.

1543 Water lvl = 57.60 cm Temp °c
System sub critical 23.9°c
Drain

p-1

Added 1 rod. Now have an 11X11 array, with 8 rods removed from 1 corner, and 9 rods removed from 3 corners. Total of 88 rods.

$P_4 = 4.0$

Water lvl = 48.70 cm. Temp °C

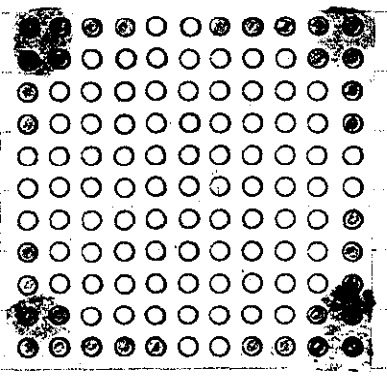
$q + P_{sr}$ 24.1°C

$C = 45.63 = 17.47 = 4.3 f/cm$

1606 Water lvl = 44.70 cm

System just critical

Drain.



9-9-69 11x11 array w/ 9 rods removed fr 3 corners & 8 fr 1 cor. Total 88 rods .516" rods 2.825 cm separation c-c .60 cm length P-7

8

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		CT	STT	START-UP RANGE
K-1	$3X10^{-12}$	Meter	✓	1"	✓	$3X10^{-12}$
"		Fast	✓	"	✓	"
K-2	"	Meter	✓	"	✓	"
"		Fast	✓	"	✓	"
R-1						
R-2						
PM-1	700 V	Alarm	✓	5"	✓	500 V
PM-2	1200 V	Low	✓	10"	✓	900 V
"		Alarm	✓	2"	✓	"

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

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by F.O.C RKK Personnel checked by F.O.C

Instruments and safeties checked and reset by RKK

Source in checked by RKK Source No. M-43

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

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

Red light on by RKK Time 0815

Start-up OK'd by F.O.C RKK Date 9-10-69

.516" rods.
2.825 cm separation c-c.
60 cm length.

Repeat of last experiment (#-7).
Have an 11X11 array, with 8 rods removed from 1 corner, and 9 rods removed from 3 corners. Total of 88 rods.

$\Delta k = 2.85$

Water lvl = 47.65 cm Temp °C
+ Per 23.9 °C
$\tau = 60.84$ sec = 14.3 ¢ = 5.0
0908 Water lvl = 44.80 cm
System just critical
Drain.

.516" rods.
2.60 cm separation c-c
30 cm length.

Have an 13X14 array, with 11 rods removed from 3 corners, and 10 rods removed from 1 corner. Total of 139 rods.

$\Delta k = .70$

Water lvl = 15.60 cm Temp °C
+ Per 23.9 °C
$\tau = 21.73$ sec = 27.3 ¢ = 39.0 ¢/cm
1100 Water lvl = 14.90 cm.
System just critical
Drain:

over

10

.516" rods
2.60 cm separation c-c
30 cm length.

Removed 2 rods. Have an 13 x 12 array with 12 rods removed from 1 corner and 11 rods removed from 3 corners. Total of 137 rods.

$\Delta L = 1.1$ cm

Water lvl = 16.80 cm Temp °C 14C
3 + Per 24.0° C
$\tau = 19.56 = 28.8\,\phi = 26.18$

1118 Water lvl = 15.70 cm
System just critical
Drain.

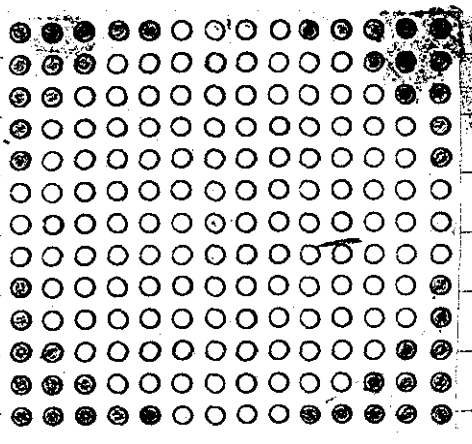
Removed 3 rods. Now have an 13 x 14 array, with 12 rods removed from each corner. Total of 134 rods.

$\Delta L = 9.5$

Water lvl = 27.70 cm Temp °C 1
4 + Per 24.0° C
$\tau = 49.98$ cm $= 16.4\,\phi = 1.7$

1300 Water lvl = 18.20 cm
System just critical
Drain.

9-10-69 13x14 array w/
12 rds removed fr ea.cor
Total rods 134. .516"rds
2.60 cm separation c-c
30 cm length P-10



.516" rod.
2.60 cm separation c-c
30 cm length.

Removed 2 rods. Have an 13 X 14 array, with 12 rods removed from 2 corners, and 13 rods removed from 2 corners. Total of 132 rods.

1408 - Water lvl = 27.60 cm — Temp °c 24.0°c
System sub critical
Drain:
Added 1 rod. Have an 13 X 14 array, with 12 rods removed from 3 corners. And 13 rods rods removed from 1 corner. Total of 133 rods.

Water lvl = 27.60 — Temp °c 24.1°c
5-Per
t = - 278,14 ns = -5.4 t

1428 Drain:
Change array: Now have an 13 X 13 array, with 9 rods removed from each corner. Total of 133 rods.

Water lvl = 27.60 cm — Temp °c 24.1°c
4-Per
t = 302.05 ns = -7.9 t
Drain:

12

.516" rods
2.60 cm separation c-c
30 cm length.

added 1 rod. Have an 13 X 13 array, with 9 rods removed from 3 corners, and 8 rods removed from 1 corner. Total of 134 rods.

Water ht = 27.60 $\delta k = 8.95$ Temp °C

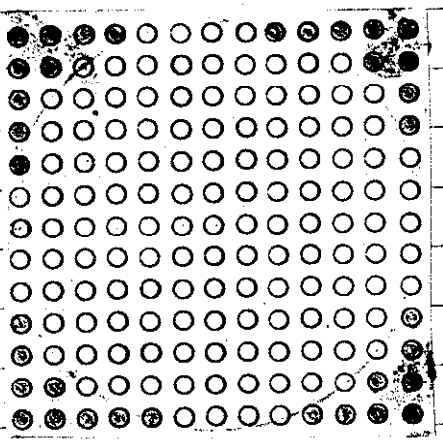
7 + Pr 24.1°C

$\tau = 67.36$ mc = 13.34 = 1.54 ¢/cm

1.513 Water ht = 18.65 cm

System just critical

Drain



9-10-69 13x13 array w/9 rds removed fr 3 corners & 8 fr 1 corner Total 134 rds. .516" rods 2.60 cm separation c-c 30 cm length P-12

.516"
2.60 cm separation c-c
60 cm length.

Have an 11 x 11 array, with 8 rods removed from each corner. Total of 89 rods.

10 22 Water ht = 57.60 cm
System sub critical
Drain.

Temp °c
24.0°c

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	5	✓	500V
PM-2	1200V	Low ✓	10"	✓	900V
	"	Alarm ✓	2"	✓	"

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

DUMP WELL PROBE LIGHT

START-UP [illegible]

Equipment checked by _____ [illegible] check by _____

Instruments and [illegible] by _____

Source in [illegible] _____

Emergency [illegible] _____

Instruments in [illegible] _____

Red light on by _____

Start-up OK'd by _____

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AHH

Source in checked by AHH Source No. M-43

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

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

Red light on by AHH Time 0950

Start-up OK'd by I.D.C AHH Date 9-11-69

.516" rods.
2.60 cm separation a-c
60 cm length.

added 1 rod. Have an 11 X 11 array with 8 rods removed from 3 corners, and 7 rods removed from 1 corner. Total of 90 rods.

1057 Water ht = 57.60 cm — Temp °c
System sub critical — 24.0°c
Drain

added 2 rods. Have an 11 X 11 array with 8 rods removed from 1 corner and 7 rods removed from 3 corners. Total of 92 rods.

Δl = 2.05 cm

Water ht = 44.60 cm — Temp °c
+ per — 24.0°c
k = 26.09 = 24.6 ϕ = 12.0 #/cm

1172 Water ht = 42.55
System just critical
Drain.

ans:

16

.516" rods.
2.60 cm separation c-c
60 cm length.

Removed 1 rod. Have an 11 X 11 array, with 8 rods removed from 2 corners, and 7 rods removed from 2 corners. Total of 91 rods.

$\Delta\ell = 12.3$ cm

Water lvl = 57.60 cm — Temp °c

$+P_{H_2O}$ — 24.0°c

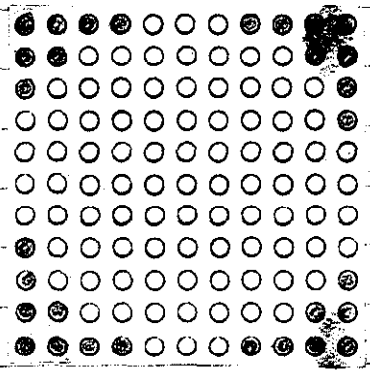
$\tau = 56.50$ cm = 15.1¢ = 1.2¢/cm.

1318 Water lvl = 45.30 cm

System just critical

Drain.

9-11-69 11x11 array w/8 rods rem'd fr 2 corners & 7 fr 2 corners Total rods 91. .516" rods .2.60 cm separation c-c .60 cm lgth P-16



Samples:

Y-12 Reg # 684572 — X-10 -12-12

sent for.

1	g %/l = 0.204	g %/l ~ 0.20
2	Density = 0.9972	Density ~ 0.9973
3	Temp °c = 25°	Temp °c ~ 25°c

.516" rods.
2.41 cm separation c-c.
30 cm length.

Have an 13 x 14 array, with 10 rods removed from each corner. Total of 142 rods.

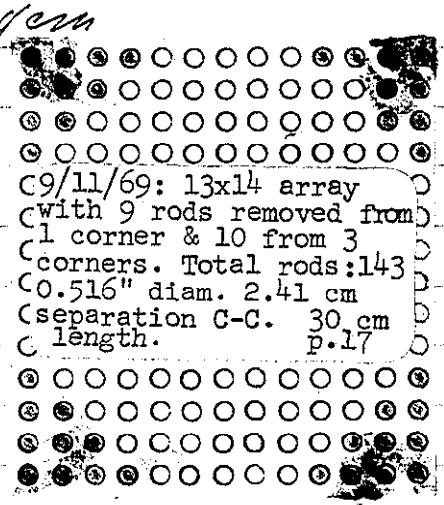
1505 Water ht = 27.60 cm — Temp °c
System sub critical — 24.0°c
Drain.

added 1 rod. Have an 13 x 14 array, with 9 rods removed from 1 corner, and 10 rods removed from 3 corners. Total of 143 rods.

$\rho k = 8.0$ cm

Water ht = 27.60 cm — Temp °c
3 + Per — 24.1°c
E = 132.55 ue = 7.9 ℓ = .90 ℓ/cm

1534 Water ht = 19.60 cm:
System just critical
Drain.



18

9/10/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	ET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
		Fast ✓		✓	
K-2	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
		Fast ✓		✓	
R-1	—				
R-2	—				
PM-1	700V	Alarm ✓	½"	✓	500V
PM-2	1200V ✓	Low ✓	10'	✓	500V
		Alarm ✓	2"	✓	

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

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by IDC, EJ Personnel check by IDC

Instruments and safeties checked and reset by EJ

Source in checked by EJ 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 0910

Start-up OK'd by EJ IDC Time 9/10/65

5/10/65

$\delta k = 4.25$ cm

Repeat of run reported end of p. 17.

0557 H_2O @ 24.3 cm. + Pu sol'n #1 t/ 23.2°C

$\tau = 199.92$ sec = 5.6 = 1.3 ¢/cm

1017 H_2O @ 20.05 cm. Critical.

Drain

6.0 cm. H/L Lattice

~~0.00~~ ~.41 cm Center Separation

0.516 rods

11 x 11 with 5 cm ty 3 corners & 6 cm ty 1.

Total 100 rods. $\delta k = .70$ cm

1350 Water @ 42.05 cm. + Pu sol'n #2 Temp. 23.3°C

$\tau = 97.78$ sec = 10.0 ¢ = 14.3 ¢/cm

1404 Water @ 42.05 cm. Critical

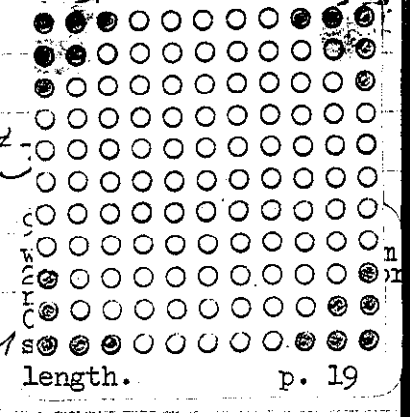
Drain

Removed 1 rod. Now have 5 cm ty 2 corners + 6 cm ty 2. Total 99 rods

$\delta k = 7.8$ cm

1440 Water @ 52.4 cm + Pu sol'n #3

$\tau = 32.59$ sec = 21.6 ¢ = 2.8 ¢/cm



1445 Water @ 44.6 cm. Critical

Drain.

9/15/69

$\Delta k = 4.25$ cm

Repeat of run reported end of p. 17.

0557 H_2O @ 24.3 cm + Point #1 ± 23.2°C

$E = 199.92$ cm ÷ 5.6 = 1.3 #/cm

1017 H_2O @ 20.05 cm. Critical.

Drain

6.0 cm. Hex Lattice

~~2.160~~ ~2.41 cm Center Separation

0.516 rods

11x11 with 5 cent y 3 corners & 6 cent y 2.

Total 100 rods. $\Delta k = .70$ cm

1350 Water @ 42.05 cm. + Point #2 Temp. 23.3°C

$E = 97.78$ cm = 10.0 # = 14.3 #/cm

1434 Water @ 42.05 cm. Critical

Drain

Removed 1 rod. Now have 5 & 6 cent y 2. Total 99 rods

$\Delta k = 7.8$ cm Temp.

1440 Water @ 52.4 cm + Point #3 23.4°C

$E = 32.59$ cm = 21.6 # = 2.8 #/cm

1445 Water @ 44.6 cm. Critical

Drain.

9/15/69: 11x11 array with 5 rods removed from 2 corners & 6 from 2 corners. Total rods: 99. 0.516" rods. 2.41 cm separation C-C. 60 cm length. p. 19

5/16/65

30 cm Height
2.05 cm center separation
0.3 in.-diam rods in 0.2 gB/L

15x15 lattice, square pattern, with 23 rods removed from each corner.
Total: 265 rods

1432 Water @ 27.7 cm. Subcritical. Temp. 23.5°C
Drain.

Added 12 rods. Now have 15x19 with 23 rods removed from each corner.
Total 281 rods

1512 Water @ 27.6 cm. Subcritical. Temp. 23.6
Drain

Added 4 rods. Now have 15x15 with 15 removed from each corner. Total 265 rods.

1535 Water @ 27. cm. Subcritical. Temp. 23.7
Drain.

Added 4 rods. Now have 15x15 with 18 rods removed from each corner. Total 265 rods.

OH = 9.25 cm

1552 Water @ 27.7 cm. + Pump #1 23.5°C
C = 58.67 cm = 14.6 ¢ = 1.6 ¢/cm

5/16/65

W-11w @ 18.45 cm. Critical

Drain.

5/14/65

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
		Rat ✓		✓	
K-2	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
		Rat ✓		✓	
P.S	—				
R.E	—				
Pen 1	700V	Alarm ✓	½"	✓	500V
Pen 2	1200V	Low ✓	15"	✓	900V
		Alarm ✓	2"	✓	

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-40

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by EJ, IDC Personnel check by IDC

Instruments and safeties checked and reset by EJ

Source in checked by EJ 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 1400

Start-up Ok'd by EJ, IDC Date 5/14/65

20

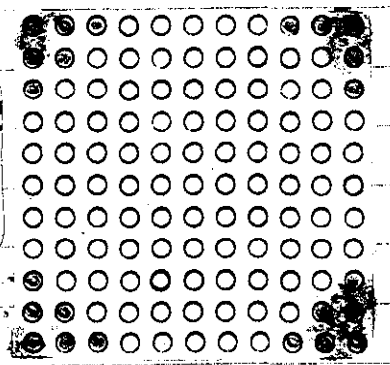
9/15/69

Removed 1 rod. Now have 5 out of 1 corner, 6 out of 3 corners. Total 5 of rods.

1545 Water @ 50.8 cm. Subcritical. 23.2

Drain

9/15/69: 11x11 array with 5 rods removed from 1 corner & 6 from 3 corners. Total rods: 98. 0.516" diam. 2.41 cm separation C-C. 60 cm length. p.20



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	1"		3×10^{-12}
"	"	Fast	"		"
K-2	"	Meter	"		"
"	"	Fast	"		"
R-1					
R-2					
PM-1	700 V	Alarm	.5"		500 V
PM-2	1200 V	Low	10"		900 V
"	"	Alarm	2"		"

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

DUMP WELL PROBE LIGHT ____

START-UP CHECK LIST

Equipment checked by I.O.C AKM Personnel check by I.O.C

Instruments and safeties checked and set by AKM

Source in checked by AKM for S.D. M-93

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

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

Red light on by AKM Time 1010

Start-up OK'd by I.O.C AKM Date 9-17-69

2.05 cm separation C-C
30 cm length.
0.3" rods.

Have an 19 X 19 array, with 19 rods removed from 1 corner, and 18 rods removed from 3 corners. Total of 288 rods.

$\Delta \ell = 7.65$ cm

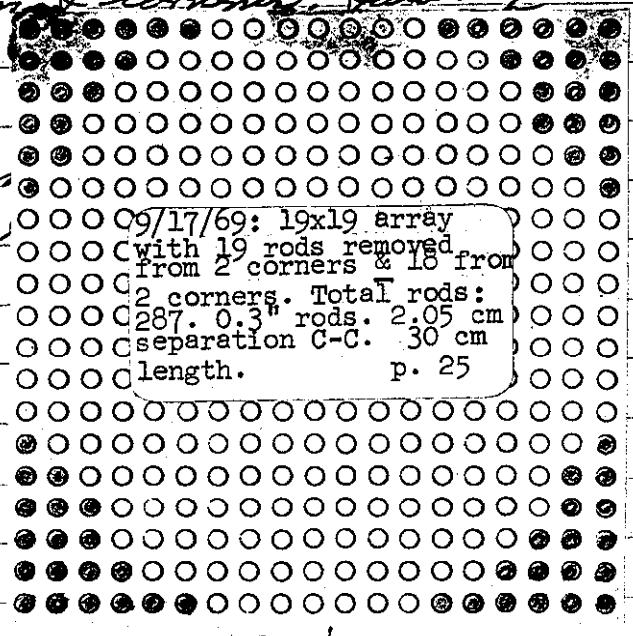
Water ht = 27.60 cm
+ Per.
$\Sigma = 176.01$ sec = 6.2 ¢ = .81 ¢/cm

Temp °C
23.6 °C

1105 Water ht = 19.95 cm
System just critical
Drain.

Removed 1 rods. Have an 19 X 19 array, with 19 rods removed from 2 corners, and 18 rods removed from 2 corners. Total of 287 rods.

1116 Water ht = 27.60 cm
System just critical
Drain.



0.3" rods.
2.05 cm separation c-c.
60 cm length.

Have an 15 X 15 array, with 10 rods removed from each corner. Total of 185 rods.

$\Delta L = 1.1$ cm

Water ht = 43.55 cm Temp °C
^{2} Thr 23.7 °C
E = 58.67 sec = 14.7 ℓ = 13.4 ℓ/cm

1515 Water ht = ± 42.45 cm
System just critical
Drain.

Removed 4 rods. 1 from each corner. Have an 15 X 15 array, with 11 rods removed from each corner. Total of 181 rods.

1545 Water ht = 60 cm Temp °C
System sub critical 23.7
Drain.

2 added 1 rod. Have an 15x15 array, with 10 rods removed from 1 corner, and 11 rods removed from 3 corners. Total of 182 rods.

DR = 9.6 cm

Water ht = 57.50 cm Temp °C

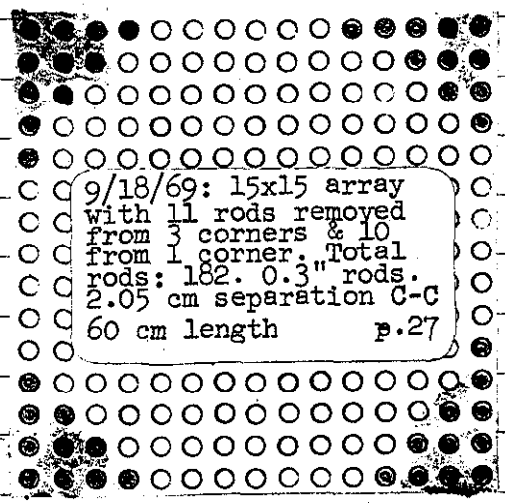
3 + Per 23.8°C

C = 315.08 cm = 3.7 f = .38 f/cm

1614 Water ht = 47.90 cm

System just critical

Drain.



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X10 -12	Meter ✓	1"	✓	10 X10 -12
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	3 X10 -12
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	15"	✓	500 ✓
PM-2	1200 ✓	Low ✓	10"	✓	1200 ✓
	"	Alarm ✓	2"	✓	"

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

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-93

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

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

Red light on by RKH Time 0940

Start-up OK'd by I.D.C RKH Date 9-18-69

0.30" rods.
2.05 cm separation c-c.
60 cm length.

Repeat of last run (p-27)

Have an 15 X 15 array, with 10 rods removed from 1 corner and 11 rods removed from 3 corners. Total of 182 rods.

$\alpha_L = 9.6$

Water ht = 57.60 cm — Temp °c
+Rain — 23.7°c
τ = 352.03 sec = 3.4 ℄ = .35 ℄/sec

1040 Water ht = 48.00 cm
System just critical
Drain

0.30" rods.
2.453 cm separation c-c.
30 cm length.

Have an 22 X 22 array. With 21 rods removed from each corner. Total of 400 rods.

1347 Water ht = 27.60 cm — Temp °c
System sub critical — 23.7°c
Drain

0.30" rods.
2.453 cm operation c-c.
30 cm length

added 24 rods. Have an 22 X 22 array, with 15 rods removed from each corner.
Total of 424 rods.

1418 Water ht = 27.60 cm — Temp °c
System sub critical — 23.7°c
Drain.

added 60 rods. Have an 22 X 22 array.
Total of 484 rods. (Full grid plate).

1425 Water ht = 27.70 cm — Temp °c
System sub critical — 23.8°c
Drain.

START-UP CHECK LIST

Equipment checked by [illegible] Personnel check by T.O.C.

Instruments and safeties checked and reset by [illegible]

Source in checked by [illegible] Source No. M-43

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

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

Red light on by [illegible] Time 0800

Start-up OK'd by T.O.C. [illegible] Date 9-15-60

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter	1"	✓	3 X 10 -12
"	"	Fast	"	✓	"
K-2	"	Meter	"	✓	"
"	"	Fast	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm	5"	✓	500 V
PM-2	1,200 V	Low	2"	✓	900 V
"	"	Alarm	10"	—	"

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

DUMP WELL PROBE LIGHT —

0.30" rod.
2.453 cm separation c-c.
60 cm length.

Have an 18 x 18 array, with 21 rods removed from each corner. Total of 240 rods.

0850 Water ht = 39.40 cm — Temp °C
System just critical — 23.5°C
Drain!

Removed 8 rods: 2 from each corner. Have an 18 x 18 array with 23 rods removed from each corner. Total of 232 rods.

$\Delta k = 2.0$ cm

Water ht = 44.80 cm — Temp °C
+Rea — 23.5°C
$\zeta = 28.25$ cm = 23.5 ¢ = 11.7 ¢/cm

0940 Water ht = 42.80 cm
System just critical
Drain.

Removed 4 rods. 1 from each corner. Have an 18 x 18 array, with 24 rods removed from each corner. Total of 228 rods.

$\Delta k = 11.50$

Water ht = 57.65 cm — Temp °C
2+Rea — 23.8°C
$\zeta = 102.13$ cm = 9.7 ¢ = .84 ¢/cm

p-33

1035 Water ht = 46.15 cm
System just critical
Drain.

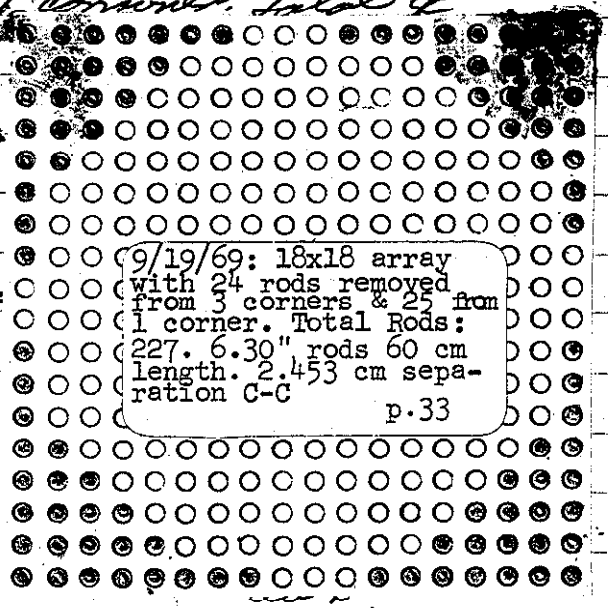
Removed 2 rod: 1 each from opposite corners. Have an 18 x 18 array, with 25 rods removed from 2 corners and 24 rod removed from 2 corners. Total of 226 rods.

1102 Water ht = 57.60 cm
System sub critical
Drain.

Temp °C
24.0°C

added 1 rod: Have an 18 x 18 array, with 24 rods removed from 3 corners and 25 rods removed from 1 corner. Total of 227 rods.

Water ht = 57.60 cm
3 + Per
τ = 484.58 sec = 25 ¢ =
Water ht = 48.60 cm
System just critical
Drain.



9/19/69: 18x18 array with 24 rods removed from 3 corners & 25 from 1 corner. Total Rods: 227. 6.30" rods 60 cm length. 2.453 cm separation C-C
p.33

1035 Water ht = 46.15 cm
System just critical
Drain.

Removed 2 rod: 1 each from opposite corners. Have an 18 x 18 array, with 25 rods removed from 2 corners and 24 rod removed from 2 corners.
Total of 226 rods.

1102 Water ht = 57.60 cm
System sub critical
Drain.
added 1 rod: Have
24 rods removed from
rods removed from
227 rods.

Δh = 9.0 cm

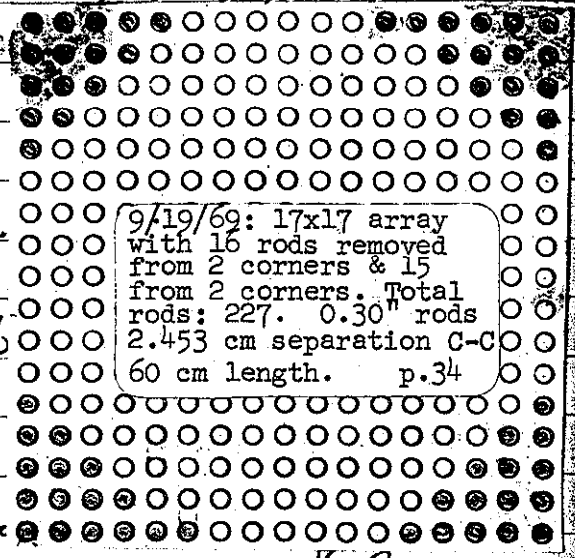
Water ht = 57.60 cm
+Per
t = 484.58 sec = 2.5 ℓ = .28 ℓ/cm
Water ht = 48.60 cm
System just critical
Drain.

Temp °C
24.0°C

0.30" rods.
2.453 cm separation c-c.
60 cm length.

Have an 17 X 17 array, with 16 rods removed from 2 opposite corners and 15 rod removed from 2 corners. Total of 227 rod.

Water ht = 57.60 cm.
4 + Per
ζ = 286.84 μ = 4.14 = .
1345 Water ht = 47.70 cm
System just critical
Drain.



Removed 1 rod. Have 16 rods removed from 3 corner, and 15 rods removed from 1 corner. Total of 226 rods.

Water ht = 57.60 cm
5 - Per
ζ = - 410.70 μ = - 3.54
1421 Drain.

Temp °C
24.2°C

0.30" rods.
2.453 cm sq
60 cm leng

Have an 17 X 17 array,
from 2 opposite corner
from 2 corners. Tot

Water ht = 57.60 cm.
4 + Per
C = 286.84 ue = 4.14 = .41 H/cm
1345 Water ht = 47.70 cm
System just critical
Drain.

Temp c
24.1°c

Removed 1 rod. Have an 17 X 17 array with 16 rods removed from 3 corner, and 15 rods removed from 1 corner. Total of 226 rods.

Water ht = 57.60 cm
5 - Per
C = - 410.70 ue = - 3.5 H
1427 Drain.

Temp °c
24.2°c

0.30" rods.
1.80 cm separation c-c.
30 cm length.

2

Have an 19 X 19 array, with 19 rods removed from each corner. Total of 285 rods.

$\Delta_2 = 1.0$ cm

Water ht = 16.70 cm — Temp °c
6 + Per — 24.2°c

$C = 23.99$ cm $= 25.9$ ℄ $= 25.9$ ℄/cm

1540 Water ht = 15.70 cm
System just critical
Drain.

Removed 4 rods. 1 from each corner. Have an 19 X 19 array, with 20 rods removed from each corner. Total of 281 rods.

$\Delta_2 = 1.6$ cm

Water ht = 18.80 cm — Temp °c
7 + Per — 24.2°c

$C = 47.81$ cm $= 16.9$ ℄ $= 10.6$ ℄/cm

1600 Water ht = ± 17.20 cm
System just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1" ✓	10×10^{-12}
	"	Fast ✓	" ✓	"
K-2	"	Meter ✓	" ✓	3×10^{-12}
	"	Fast ✓	" ✓	"
R-1				
R-2				
PM-1	7600 ✓	Alarm ✓	.5" ✓	1500 ✓
PM-2	1200 ✓	Low ✓	10" ✓	900 ✓
	"	Alarm ✓	2" ✓	"

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

DUMP WELL PROBE LIGHT ———

START-UP CHECK LIST

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

Instruments and safe[illegible]ecked 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-1-2 PM-1-2

Red light on by AKM Time 0830

Start-up OK'd by F.D.C AKM Date 9-22-69

.30" rods.
1.80 cm separation c-c.
30 cm length.

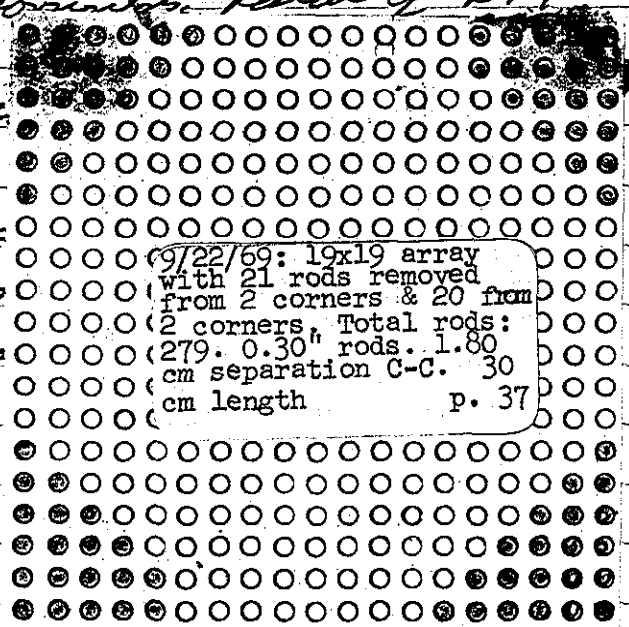
Repeat of last experiment (p-35).
Have an 19X19 array, with 20 rods removed from each corner. Total of 281 rods.

$\Delta k = 1.95$ cm

Water lvl = 19.30 cm Temp °C
1 + Per 23.2°C
τ = 47.81 sec = 16.9 ℓ = 8.7 ℓ/cm
0922 Water lvl = 17.35 cm
System just critical
Drain

Removed 2 rods, 1 each from opposite corners.
Now have an 19X19 array, with 21 rods removed from 2 corners and 20 rods removed from 2 corners. Total of 279

Water lvl = 27.60 cm
2 + Per
τ = 130.38 sec = 8.0 ℓ =
0950 Water lvl = 19.50 cm
System just critical
Drain.



30° rods.
1.80 cm separation c-c.
30 cm length.

Repeat of last experiment (p-35).
Have an 19X19 array, with 20 rods removed from each corner. Total of 281 rods.

$\sigma_4 = 1.95$ cm $\pm$ 0

Water lvl = 19.30 c
+ Pu
τ = 47.81 sec = 16.9 ¢ = $

0922 Water lvl = 17.35 cm
System just critic
Drain

Removed 2 rod, 1 e
Now have an 19X1
removed from 2 c
removed from 2 c

$\sigma_4 = 8.1$ cm

Water lvl = 27.60 cm
+ Pu
τ = 130.38 sec = 8.0 ¢ = .99 ¢/sec

Temp °C
23.3°C

0950 Water lvl = 19.50 cm
System just critical
Drain.

avg

Removed 1 rod. Have an 19 X 19 array, with 20 rods removed from 1 corner and 21 rods removed from 3 corners. Total of 278 rods.

Water ht = 27.60 cm — Temp °C 23.3°C

δ^3 — Per

$E = -1151.69 = -1.2 f$

1017 Drain.

30" rods.
1.80 cm separation C-C
60 cm length.

Have an 15 X 15 array, with 11 rods removed from each corner. Total of 181 rods.

1420 Water ht = 57.60 cm — Temp °C 23.4°C
System sub critical
Drain.

.30" rods.
1.80 cm separation c-c
60 cm length.

added 4 rods. Have an 15x15 array, with 10 rods removed from each corner. Total 185 rods.

1458 Water ht = 57.60 cm — Temp °C 23.5°C
System sub critical
Drain.

added 11 rods. Now have an 16x16 array, with 15 rods removed from each corner. Total of 196 rods.

1533 Water ht = 37.50 — Temp °C 23.7°C
System just critical
Drain.

Removed 4 rods, 1 from each corner. Now have an 16x16 array, with 16 rods removed from each corner. Total of 192 rods.

Water ht = 41.55 — Temp °C 23.8°C
System just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	1"		10×10^{-12}
	"	Fast	"		"
K-2	"	Meter	"		3×10^{-12}
	"	Fast	"		"
R-1					
R-2					
PM-1	700V	Alarm	15 cm		500 V
PM-2	1200V	Low	10 inch		900 V
	"	Alarm	2 "		"

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

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

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

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

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

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

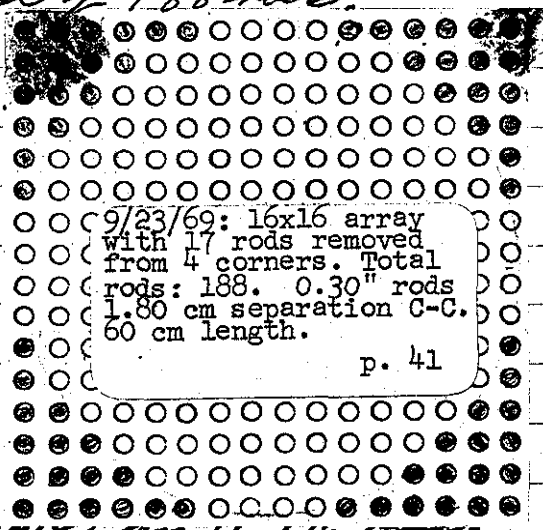
Instruments in trip circuit: K-1-2 PM-1-2

Red light on by A.K.K. Time 0805

Start-up OK'd by F.D.C. A.K.K. Date 8-23-62

.30" rods,
1.80 cm separation c-c.
60 cm length.

Have an 16 X 16 array. With 17 rods removed from each corner. Total of 188 rods.



α_r = 9.1%

Water lvl = 57.60 cm

k_{eff} Per

S = 528.09 cm = 2.3 ¢ = .25 $/hr

0905 Water lvl = 48.50 cm
System just critical
Drain.

Removed 1 rod. Now have an 16 X 16 array, with 18 rods removed from 1 corner. And 17 rods removed from 3 corners. Total of 187 rods.

0935 Water lvl = 57.60 cm
System sub critical
Drain.

Temp °C
23.7°C

awr

1.30 m
1.80 C.
60 cm

Have an 16 X 16 array.
from each corner. Tot

Water lvl = 57.60 cm Temp °C
4 + Per 23.6 °C

0905 Water lvl = 48.50 cm
System just critical
Drain.

Removed 1 rod. Now have an 16 X 16 array,
with 18 rods removed from 1 corner. And
17 rods removed from 3 corners. Total
of 187 rods.

0935 Water lvl = 57.60 cm Temp °C
System sub critical 23.7 °C
Drain.

awr

.30" rods.
1.530 cm separation c-c
30 cm length.

Have an 22 X 22 array, with 21 rods removed from each corner. Total of 400 rods.

1112 Water ht = 8.55 cm — Temp °c
System just Critical — 23.7°c
Drain.

Removed 16 rods. Have an 22 X 22 array, with 25 rods removed from each corner. Total of 384 rods.

1244 Water ht = 9.25 cm
System just critical
Drain.

Removed 20 rods. Have an 22 X 22 array with 30 rods removed from each corner. Total of 364 rods.

$\delta k = .25$ cm

Water ht = 12.60 cm — Temp °c
2 + Per — 23.7°c

$C = 43.46 - 18.04 = 72.04$ cm

Water ht = 12.35 cm
System just Critical
Drain.

p-43

.30" rods
1.530 cm operation c-c
30 cm length.

Removed 8 rods. 2 from each corner. Have an 22 X 22 array, with 32 rods removed from each corner. Total of 356 rods.

$\delta_4 = .30$

Water Ht = 13.35 cm
3 ft Per
Temp °c
24.0°c ?

E = 39.11 cm = 19.3 ft = 64.3 ft/cm

1346 Water Ht = 13.05 cm.
System just critical
Drain.

Removed 16 rods. 4 from each corner. Have an 22X22 array, with 36 rods removed from each corner. Total of 340 rods.

$\delta_4 = .90$

Water Ht = 15.35 cm
4 ft Per
Temp °c
23.8°c

E = 58.67 cm = 14.7 ft = 36.7 ft/cm

1410 Water Ht = 14.95 cm
System just critical
Drain.

avg.

.30" rods.
1.530 cm separation c-c.
30 cm length.

Removed 8 rods. 2 from each corner.
Have an 22X22 array, with 38 rods
removed from each corner. Total of
332 rods.

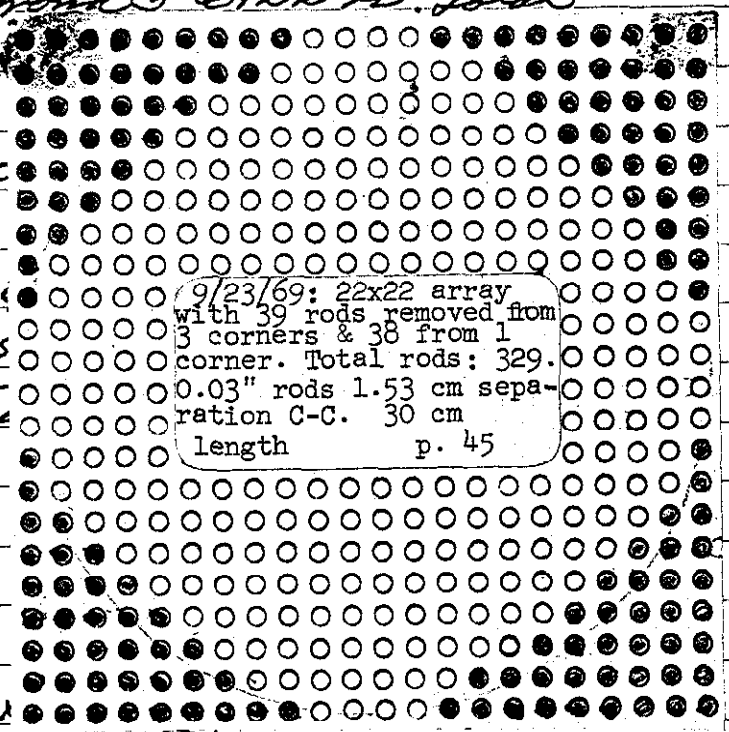
$\sigma_4 = 1.05$ cm

Water ht = 18.35 cm Temp °c
5 + Per 23.7°c
τ = 73.88 sec = 12.4 f = 11.8 f/cm
1433 Water ht = 17.30 cm
System just critical
Drain.

Removed 4 rods. 1 from each corner.
Have an 22X22 array, with 39 rods
removed from each corner. Total of
328 rods.
Water ht = 27.60 cm
6 - Per
τ = - 1499.4 sec = .89 f
1455 Drain.

.30" rods.
1.530 cm separation c-c
30 cm length.

added 1 rod. Have an 22x22 array, with 38 rods removed from 1 corner, and 39 rods removed from 3 corners. Total of 329 rods.



Water ht = 27.6C
7 + Per
t = 171.68 sec = 6.3
1517 Water ht = 19.95
System just critical
Drain.

Now have an 20
removed from each corner. Total of 328 rods.

σ_h = 9.0 cm

Water ht = 27.60 cm
8 + Per.
t = 65.19 sec = 13.6 f = 1.5 f/cm
1552 Water ht = 18.60 cm
System just critical
Drain.

Temp °C
24.1 °C

added 1 rod. 16
38 rods removed
rod removed from
of 329 rod.

$\Delta h = 7.65$ cm

Water ht = 27.60 cm Temp °C
7 + Per 23.9°C
τ = 171.68 cm = 6.3 ℓ = .82
1517 Water ht = 19.95 cm
System just critical
Drain.

Now have an 20×20 array, with 18 rods removed from each corner. Total of 328 rods.

$\Delta h = 9.0$ cm

Water ht = 27.60 cm Temp °C
8 + Per. 24.1°C
τ = 65.19 cm = 13.6 ℓ = 1.5 ℓ/cm
1552 Water ht = 18.60 cm
System just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SET	START-UP RANGE
K-1	3 X 10 -12	Meter	lower clockwise	1 "	10 X 10 -12
	"	Fast		"	"
K-2	"	Meter		"	3 X 10 -12
	"	Fast		"	"
R-1					
R-2					
PM-1	700 V	Alarm		.5 "	500 V
PM-2	1200 V	Low		10 "	900 V
	"	Alarm		1 "	"

LOG N CALIBRATE _____ OPERATE _____ SOURCE No. B-90

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

Equipment checked by F.D.C. R.K.N Personnel check by F.D.C

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

Source in checked by R.K.N Source No. M-43

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

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

Red light on by R.K.N Time 0800

Start-up OK'd by F.D.C R.K.N Date 9-24-69

130 "rods.
1,530 cm separation c-c,
30 cm length.

Repeat of last experiment (p-85).

Have an 20x20 array, with 18 rods removed from each corner. Total of 328 rods.

$\Delta t = 9.0$

Water lvl = 27.60 cm Temp °C
1st Per 23.6° 23.6 C
$\epsilon = 60.8 \pm$ rec = 14.3 ϕ = 1.6 ϕ/cm
0843 Water lvl = 18.60 cm
System just critical
Drain.

Removed 2 rods. 1 each from opposite corners.
Have an 20x20 array, with 18 rods removed from 2 corners, and 19 rods removed from 2 corners. Total of 326 rods.

Water lvl = 27.60 cm Temp °C
2nd Per 23.7 C
$\epsilon = -1673.2$ rec = -.80 ϕ
0917 Drain

over

48

0.963" rods.
1.530 cm separation C-C.
30 cm lengths.

added 1 rod. Now have an 20 x 20 array, with 19 rods removed from 1 corner, and 18 rods removed from 3 corners. Total of 327 rods.

$D_4 = 7.65$

Water ht = 27.600 cm Temp °C

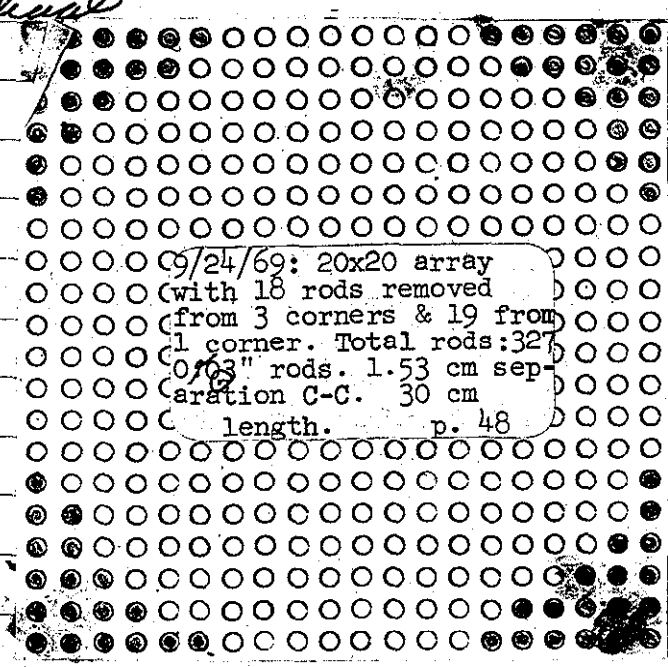
^{3} + Per 23.7 °C

$T = 176.01$ in = 6.2 ℓ = .81 ℓ/cm

0940 Water ht = 19.95 cm

System just critical

Drain.



1/8" rods.
2/ 1.530 cm separation c-c.
60 cm length.

Have an 18 X 18 array, with 15 rods removed from each corner. Total of 264

1300 Water lvl = 25.60 cm — Temp °C 23.8°C
System just critical
Drain.

Removed 24 rods. 6 from each corner.
Have an 18 X 18 array with 21 rods removed from each corner. Total of 240 rods.

1336 Water lvl = 35.80 cm — Temp °C 23.7°C
System just critical
Drain.

Removed 15 rods. Now have an 17 X 17 array with 16 rods removed from each corner. Total of 225 rods.

1419 Water lvl = 57.60 cm — Temp °C 23.7°C
System sub critical
Drain

ave:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3×10^{-12}	Main	1"		10×10^{-12}
	"		"		"
K-2	"	Main	"		3×10^{-12}
	"		"		"
R-1					
R-2					
PM-1	700%	Alarm	5"		500%
PM-2	1200%	Low	11"		900%
	"	Alarm	1"		"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKK

Source in checked by BKK Source No. M-83

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

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

~~Red light on by~~ BKK Time 1025

~~Start-up~~ OK'd by F.O.C BKK Date 9-25-69

2) 0.3" rods.
1.530 cm separation c-c
60 cm length.

added 9 rods. Have an 17x17 array, with 15 rods removed from each corner. Total of 229 rods.

$\Delta\ell = 11.85$ cm

Water ht = 57.60 cm Temp 24.0°C

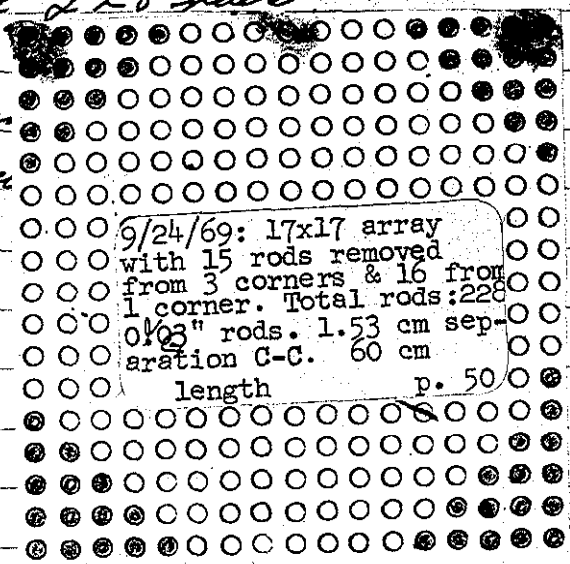
k_{eff}

$\Sigma = 71.71$ cm $= 12.7\ell = 1.1\ell$/cm.

1514 Water ht = 45.75 cm
System just critical
Drain.

Removed 1 rod. Have an 17x17 array with 15 rods removed from 3 corners and 16 rods removed from 1 corner. Total of 228 rods

1537 Water ht = 57.55 cm
System just critical
Drain.



2 1.03" rods.
1.530 cm separation c-c
60.cm length.

added 9 rods. Have an 17 X 17 array, with 15 rods removed from each corner. Total of 229 rods.

Water ht = 57.60 cm $\Delta\ell$ = 11.85 cm Temp °C
9 + Pu 24.0°C
Σ = 71.71 cm ÷ 12.7 ℓ = 1.1 ℓ/cm.

1514 Water ht = 45.75 cm
System just critic
Drain.

Removed 1 rod. Le
with 15 rods remo
corners and 16
1 corner. Total g

1537 Water ht = 57.55 cm Temp °C
System just critical 24.1°C
Drain.

.03" rods.
1.30 cm separation c-c.
30 cm length.

Have an 22 X 22 array, with 21 rods removed from each corner. Total of 400 rods.

1105 Water ht = 27.50 cm Temp °c
System Sub Critical 23.6 °c
Drain.

added 84 rods. Have an 22 X 22 array. with Total of 484 rods. (Full grid plate).

Water ht = 27.60 cm Δt = 9.15
1 + ρ Temp °c
47.81 mm = 10.9 ¢ = 1.8 ¢ 23.7 °c
1255 Water ht = 18.45 cm
System just critical
Drain.

p-53

Removed 10 rods, 2 each from 2 opposite corners and 3 each from 2 opposite corners. Now have and 22 x 22 array with a total of 474 rods.

1320 Water ht = 27.65 cm — Temp °C 23.8°C
System sub critical
Drain.

~~Removed~~ added 2 rods. 1 each to opposite corners. Now have an 22 x 22 array, with with 2 rods removed from each corner. Total of 476 rods.

Water ht = 27.60 cm — Temp °C 23.8°C
2 - per
N.G
1340 Drain

54

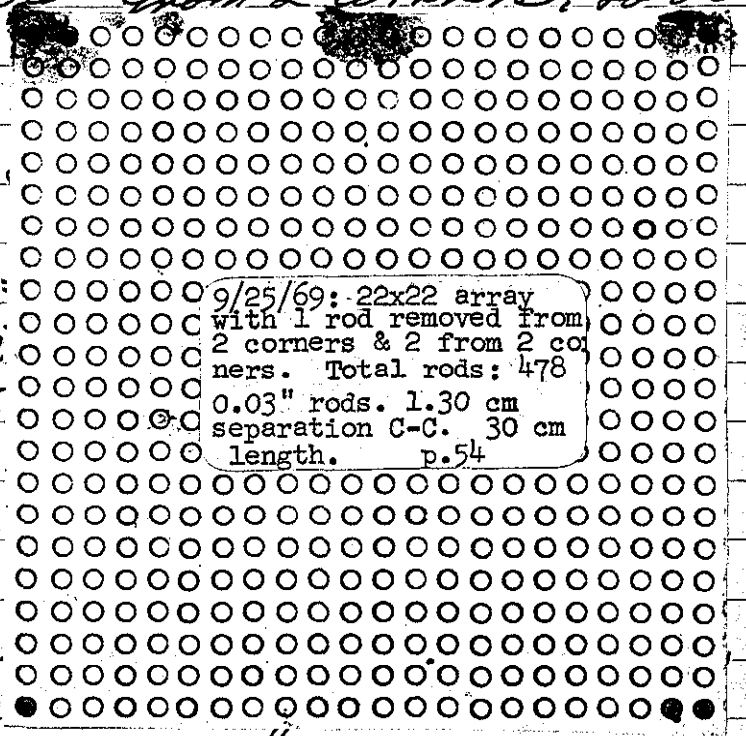
.03" rods.
1.30 cm separation C-C.
30 cm length.

added 2 rods. 1 each to opposite corners. Now have an 22x22 array. With 1 rod removed from 2 corners and 2 rods removed from 2 corners. Total of 478.

Water ht =
3 +Per

E = 1477.6 = .864 f

1409 Water ht = 2
System just Drain.



Removed 1 rod with 2 rods and 1 rod removed from 1 corner. Total of 477 rods.

1436 Water ht = 27.60 cm
4-Per

Temp °C
24.0°C

E = -2542.4 sec = -.52 f
Drain:

added 2 rods
Now have
1 rod rema
2 rods rema
of 478.

Water ht = 27.60 cm Δ2 = 3.8 cm Temp 23.9°C
3 + Per
ε = 1477.6 = .864 = .22 ¢/cm

1409 Water ht = 23.80 cm
System just Critical
Drain.

Removed 1 rod. Now have an 22 X 22 array
with 2 rods removed from 3 corners,
and 1 rod removed from 1 corner.
Total of 477 rods.

1436 Water ht = 27.60 cm Temp 24.0°C
4 - Per
ε = -2542.4 sec = -.52 ¢
Drain:

.03" rods.
1.30 cm separation c.c.
60 cm length.

Have an 18 X 18 array, with 12 rods removed from each corner. Total of 276 rods.

1595 Water ht = 57.60 cm
System sub critical
Drain.

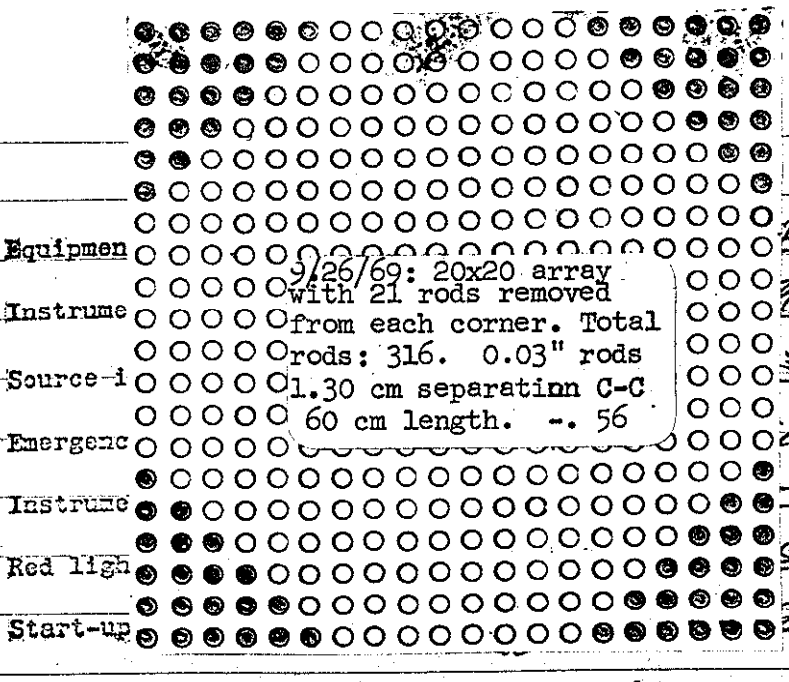
Temp °C
29.0°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 $^{-12}$	Meter	1"	10 X 10 $^{-12}$	
	"	Fast	"	4 "	
K-2	"	Meter	"	3 X 10 $^{-11}$	
	"	Fast	"	"	
R-1					
R-2					
PM-1	700 V	Alarm	15"	500 V	
PM-2	1200 V	Low	10"	900 V	
	"	Alarm	7"	"	

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

DUMP WELL PROBE LIGHT ____



.03" rods
1.30 cm separation c-c
60 cm length.

New here an 20 x 20 array, with 21 rods removed from each corner. Total of 316 rods. (All useable rods)

0903 Water ht = 57.60 cm Temp °C
System sub critical; 23.7°C
Drain.

START-UP CHECK LIST

Equipment checked by I, D.C Personnel check by F.D.C.

Instruments and safeties checked and reset by RKA

Source in checked by RKA Source No. M-43

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

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

Red light on by RKA Time 0825

Start-up OK'd by F.D.C RKA Date 9-26-62

.03" rods

1.30 cm operation c-c

60 cm length.

Now have an 20 X 20 array, with 21 rods removed from each corner. Total of 316 rods. (all useable rods)

0903 Water Lt = 57.60 cm Temp °C

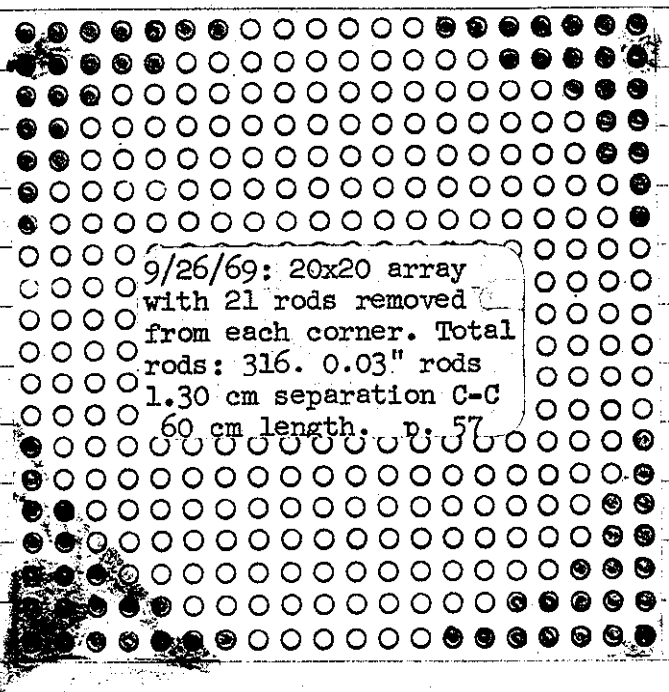
System sub critical. 23.7°C

Drain.

Moved 2 end rods on each corner, to center of each corner, (see diagram). (all rods)
Will have an 20 x 20 array, with 21 rods removed from each corner.

0955 Water lvl = 57.70 cm
System sub critical
Drain.

Temp °C
23.9°C



Sample:
Y-12 Reg II 684573
calc for.
$g^{B/l}$ = 0.209
density = 0.9972
Temp. °C = 25°C

X-10
13-14
calc for.
$g^{B/l}$ = 0.20
density = 0.9974
Temp °C = 25°C

10-1-69 H_3BO_3 boiler reamples.

	#13	#11
	Reg # Y-12-684574	Reg # Y-12-684575
ord for	g B/L = 0.208	g B/L = 0.202
	density = 0.9972	density = 0.9974
	Temp °c = 25°c	Temp °c = 25°c
	#13 - X-10 13-1A	#11 - X-10 11-1A
ord for	g B/L = 0.207	g B/L = 0.201
	density = .9971	density = .9975
	Temp °c = 25°	Temp °c 25°