

BOOK104R

Notes:

"U(4.9) Rods #2 Log" on spine

Blank pages: page opposite page 1, 141, 281, 300, inside back cover sheets

-1 drawing on each page: 2, 3, 4, 6, 7, 11, 13, 15, 16, 20, 23, 25, 27, 28, 30, 31, 33, 36, 37, 39, 42, 44, 46, 47, 48, 49, 53, 55, 57, 60, 61, 63, 67, 69, 71, 72, 74, 76, 77, 79, 80, 83, 87, 89, 91, 92, 96, 99, 101, 104, 107, 108, 110, 111, 121, 123, 125, 126, 130, 133, 144, 146, 149, 150, 154, 155, 159, 161, 163, ~~166~~, 169, 171, 173, 179, 181, 184, 187, 188, 191, 196, 197, 201, 204, 205, 207, 208, 211, 214, 217, 221, 224, 225, 227, 230, 234, 237, 240, 245, 251, 252, 253, 254, 256, 257, 261, 263, 264, 266, 267, 271, 274, 278, 280, 299

-2 drawings on each page: 54, 115, 176, 180, 198

- pages 81/82 have plastic paper clip at side
- page 105 has 2 small pieces of paper stapled
- page 118 has 1 small piece of paper stapled
- page 181 has small yellow post-it-note on page
- page 224 has small yellow post-it-note on page with "lattice #2" on it
- pages 245/246 have plastic paper clip at top
- page 276 has medium post-it-note on page
- pages 277/278 have plastic paper clip at side
- pages 297/298 have plastic paper clip at side
- pages 298/299 have envelope between pages which contains 13 photos

Scanned by:

Sheila Finch

RSICC /Oak Ridge National Lab.

September 13, 1999

14-2-1

4.89% Rad. #2

Well

1/67 - 2/17/67

$$\text{Feed rate} = 0 \text{ cm} - 3.7 \text{ cm} = 3.7 \text{ cm/min.}$$

$$3'' \text{ Drain rate} = 78.0 \text{ cm} - 49.6 \text{ cm} = 28.4 \text{ cm/min.}$$

$$4'' \text{ Dump rate} = 78.0 \text{ cm} - 40.5 \text{ cm} = 37.5 \text{ cm/min.}$$

$$\text{Scrammed drain-dump rate} = 78.0 \text{ cm} - 14.3 \text{ cm} = 63.7 \text{ cm/min.}$$

$$\left\{ \begin{array}{l} \text{Max feed rate} \\ \text{manual valve} \\ \text{fully open} \end{array} \right. = 0 \text{ cm} - 7.8 \text{ cm} = 7.8 \text{ cm/min.}$$

AKK



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.

Index

V(5) Rods

0.8-in.-diam (2cm from top #1)

2

1-in.-diam

5

→ Sketch of setup in small reflector tank

("HFIR Tank")

81

Comparison of lattice (0.5" rods) in Nell & this tank

83, 85

Boron + H₂O: 0.5-in., 1-in., 0.3-in. diam rods

87

↓
H₃BO₃

0.3-in.-diam rods in water (small tank)

143

H₃BO₃ (small tank) - 0.3-in.-diam rods

247

Water (small tank) - 0.3-in.-diam rods

243

(replacement experiments)

0.092-in.-diam rods in water (small tank)

283

Add wetting agent

293

→ Diagram of support structure (horizontal)

298

2

4.8 cm separation center - center. 30 cm length. .80" rods.

12/5/66

cont. from #1

Continued from 4.89 Rods Log Boats #1 page 299.

L0

Removed 2 rods. Now have an 9x9-4=77 rods. See array as shown.

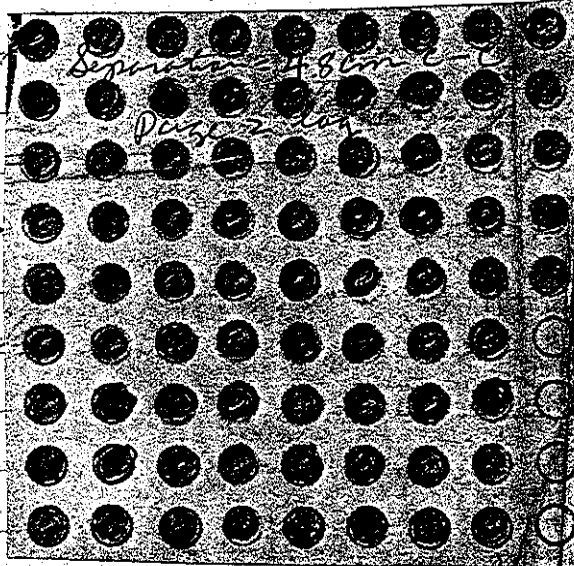
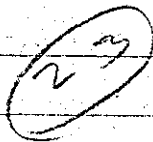
Water ht = 45.40 cm
+ Per $\Delta h = 5.00$

$$\tau = 319.43 \text{ sec} = 3.7 \text{ f} = .7 \text{ f/cm}$$

1106

Water ht = 40.40 cm

System just critical
Drain.



Now have an 9x9-4. 1 rod removed from each corner.

Water ht = 35.20 cm
+ Per $\Delta h = 1.40$ cm

$$\tau = 71.71 \text{ sec} = 12.7 \text{ f} = 31.8 \text{ f/cm}$$

Water Temp °C

#1 = 24.7

2 = 25.0

12.55

Water ht = 34.80 cm

System just critical
Drain.

2

4.8 cm separation center-center. 30 -
length. .80" rods.

12/5/66

cont. from #1

Continued from 4.8
299.

L0

Removed 2 rods. 7
rods. low array

Water ht = 45.40 cm

3 + Per

$\Delta h = 5.0$ cm

$\tau = 319.43 \text{ sec} = 3.74 = .74/\text{cm}$

Water Temp °C

#1 = 24.7

#2 = 25.0

1106

Water ht = 40.40 cm

System just critical

Drain 2

Now have an 9x9-4. 1 rod removed from
each corner.

Water ht = 35.20 cm

4 + Per

$\Delta h = 1.40$ cm

$\tau = 71.71 \text{ sec} = 12.74 = 31.84/\text{cm}$

Water Temp °C

#1 = 24.7

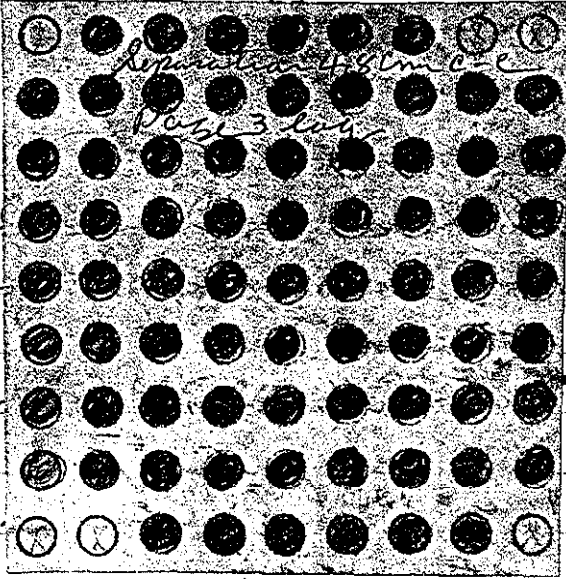
#2 = 25.0

1255

Water ht = 34.80 cm

System just critical

Drain.



Remain
her on

75 rods.
(24)

Water
5
+ Per
T = 76.06

Water Temp °
#1 = 24.7
2 = 25.0

1320 Water ht = 37.60 cm
System just critical
Drain

Now have an 10 x 10 - 24.6 rods removed
from each corner. 4.8 cm separation c-e. 30
cm length. 40 rods. Total of 76 rods.

Water ht = 35.50 cm, 0.4 = .40 cm Water Temp °
+ Per #1 =
T = 67.36 sec = 13.3 f = 33.3 f/cm #2 =

1517 Water ht = 35.10 cm
System just critical
Drain to ~ 15.8 cm.

avg.

Removed 2 rods, now have 75 rods.
see array or shown. 24

Water ht = 45.30 cm $d_h = 7.7$ cm Water Temp °C
 5 + Per #1 = 24.7
 $\tau = 76.06 \text{ mm} = 12.24 = 1.64 \text{ f/cm}$ #2 = 25.0

1320 Water ht = 37.60 cm
 system just critical
 Drain:

Now have an 10 x 10 - 24, 6 rods removed
 from each corner. 4.8 cm separation c-c. 30
 cm length. 80" rods. Total of 76 rods.

Water ht = 35.50 cm, $d_h = .40$ cm Water Temp °C
 6 + Per #1 =
 $\tau = 67.36 \text{ mm} = 13.3 \text{ f} = 33.3 \text{ f/cm}$ #2 =

1517 Water ht = 35.10 cm
 system just critical
 Drain: to ~ 15.0 cm.

arr.

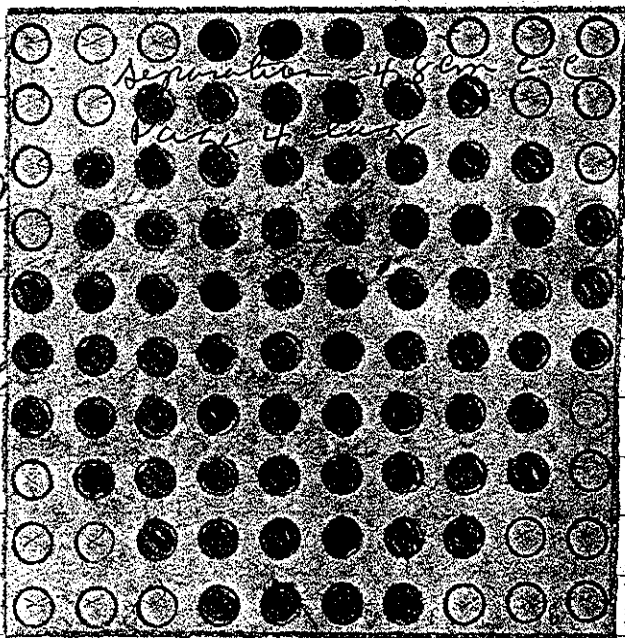
Removed 1 rad. Now have on 10x10-25. See array or shown. Total of 75 rad.

Water ht = 38.00 cm, $\Delta h = 1.9$ cm Water Temp: °C
 7 Per $\#1 = 25.0$
 $t = 65.19 \text{ sec} = 13.66 = 9.74/\text{cm}$ $2 = 25.0$

15.35 Water ht = 36.60 cm
 System just critical
 Drain to ≈ 15.0 cm

1
2

Removed array at



10-26 See

15.50 Water h
 - Per
 Drain:

Removed 1 rod. Now have an 10x10-25 see array as shown. Total of 75 rods.

Water ht = 38.00 cm, $\Delta h = 1.9$ cm Water Temp $^{\circ}$ C

7 per

$E = 65.19$

#1 = 25.0

2 = 25.0

1535

Water
System
Drain

(1
2)

Removed 1 rod. Now have an 10x10-26 see array as shown. Total of 74 rods.

1550

Water ht = 45.70 cm

- Per. $E = -543.25$ see = -2.6 f.

Drain:

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹² Meter	✓	2"	✓	10x10 ⁻¹²
	"	✓	"	✓	"
K-2	"	✓	"	✓	"
	"	✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont	✓	5000
PM-2	1200 V	Low ✓	6"	✓	9000
	"	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 AKH
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH Source No. M-03
 Emergency equipment in control room checked by FID.C
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKH Time 0930
 Start-up OK'd by FID.C AKH Date 12-16-66

6

12-16-66

4.8 cm separation center-center.
.80" rods.
60 cm lengths.

12

(24)

Now have arr 7x7-4. Total of 45 rods. 4.8 cm separation c-c, .80" rods, 60 cm lengths. See array shown.

Water ht = 75.40 cm

1 - Per:

C = -95.61 mm 728f

Water Temp °C

#1 = 24.7

2 = 25.0

10 53

Drain.

(2)

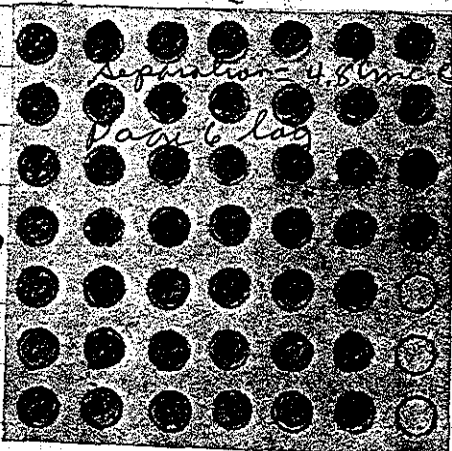
Added 1 rod, now have arr 7x7-3. Total of 46 rods.

Water ht = 61.50 cm

2 + Per

dh: 90 mm

C = 63.02 mm = 14.0 f



1 30 4

Water ht = 60.60 cm

System just critical.
See page 7

1

6

4.8 m separation center-center.
.80" rods.
60 cm lengths.

12-16-66

(24)

Now have an 7x7-4, total of 45 rods. 4.8
cm separation c-c, .80" rods, 60 cm lengths. See
array shown.

Water ht = 75.40 cm
- Per:
C = -95.61 sec 728f

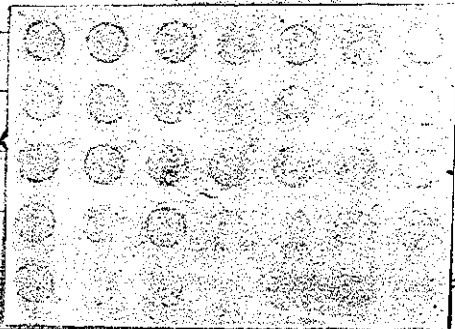
Water Temp °C
#1 = 24.7
2 = 25.0

10.53

Drain.

(25)

Added 1 rod, now
of 46 rods.



Water ht = 61.50 cm
+ Per $\Delta h = .906$
C = 63.02 sec = 14.0 f

Water Temp °C
#1 = 24.7
2 = 25.0

1.30.9

Water ht = 60.60 cm.
System just critical.
See page 7.

12-16-66

1305

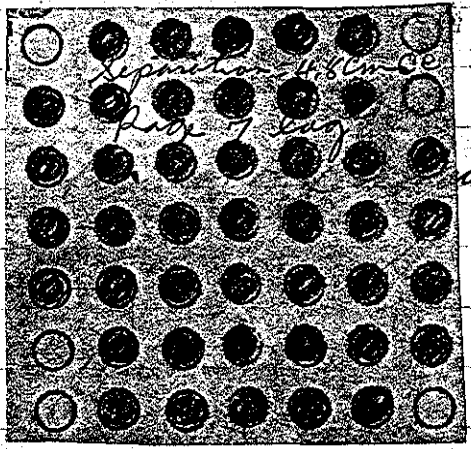
Intentionally screamed system, by holding switches in feed position. System screamed by K-1. (see charts.) $K-1 = \sim 60$ of 3×10^{-10} watts. This intentionally screams was demonstrated on 11-28-66 for the O.R.N.L. Safety Review Committee.

Now have an 7×7 array with 1 rod removed from each column. Total of 45 rods. 4.6cm separation e-c. 60cm length. 80 rods.

1455

Water ht = 58.60cm
System just critical
Drain:

Removed 2 rods.
Total of 43 rods



1530

Water ht = 75.20
- Per
 $\tau = -84.75$ sec. 7307
Drain:

Stopped on start ups

12-16-66

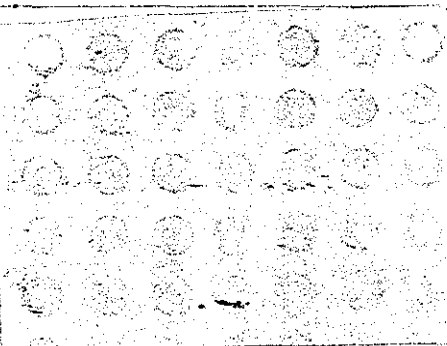
1305

Intentionally screened system, by holding
switches in feed position. System screened
by K-1. (see charts.) $K-1 = -60$ of 3×10^{-10}
note: This intentionally screened was
demonstrated on 11-28-66 for the
O.R.N.L. Safety Review committee.

Now have an 7×7 array with 1 rod
removed from each corner. Total of
45 rods. 4.6 cm separation, c-c. 6.0 cm
length. 80 rods.

1455

Water ht = 58.6
System just in
Drain.



28

Remained 2 rods. See array shown.
Total of 43 rods.

1530

Water ht = 75.20 cm.
- Per.
 $T = -84.75$ cm. 730 g
Drain.

Stopped or
start up

1/4/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SEE	START-UP RANGE
K-1	10 X 10 ⁻¹⁴	Motor ✓ Fast ✓	Contact	✓	10 X 10 ⁻¹⁴
K-2	3 X 10 ⁻¹²	Motor ✓ Fast ✓	2"	✓	3 X 10 ⁻¹²
R-1	—				
R-2	—				
PM-1	7000	Alarm ✓	Contact	—	5000
PM-2	12000	Alarm ✓	8" 1"	✓	9000
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DANGER 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. 17-43
 Emergency equipment in control room checked by IDC
 Instruments in trip circuit: K-1, K-2, PM-1, PM-2
 Red light on by IDC 1500
 Start-up call by EJ, IDC Date 1/4/67

K-1 amplifier is the "spare" and is noisy. E not CH1 borrowed our amplifier.
 B22 tube in PM-1

1" Rods of U(5) Metal
30 cm high lattice

- 9

1/4/67

1" (0.98") rods of U(5) metal. Triangular pattern
4.27-cm center separation. 4 rings with 20
corners missing. Total 55 rods

Switch on outside gate would not activate. Fixed.

1530

Water at 30.6 cm. + Period #1

#1 24.5°

$T = 49.9 \text{ sec} = 16.9 \text{ f}$

#2 24.5°

1536

Water at 30.55 cm. Critical.

Drain

Removed 1 rod from position adjacent to
corner. Now use 54 total.

1557

Water at 31.3 cm. + Period #2

$T = 47.8 \text{ sec} = 16.9 \text{ f}$

1600

Water at 31.25 cm. Critical

Drain

10

1/5/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10 X 15 ^{-IV}	Meter ✓ Fist ✓	Contact; Sluggish	✓	10 X 15 ^{-IV}
K-2	3 X 15 ^{-IV}	Meter ✓ Fist ✓	2"	✓	3 X 15 ^{-IV}
R-1	—				
R-2	—				
PM-1	700V	Alarm ✓	Contact	✓	500V
PM-2	1200V	Low ✓ Alarm ✓	10" 1"	✓	900V

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by EQ IDC Personnel check by IDC

Instruments and safeties checked and reset by EQ

Source in checked by EQ Source No. M-43

Emergency equipment in control room checked by IDC

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

Red light on by EQ Time 0900

Start-up OK'd by EQ IDC Date 1/5/67

K-1 extremely sluggish and erratic in response. Removed from trip.

1/5767

Remove

2 rods

. Now have

total 49 rods.

0930

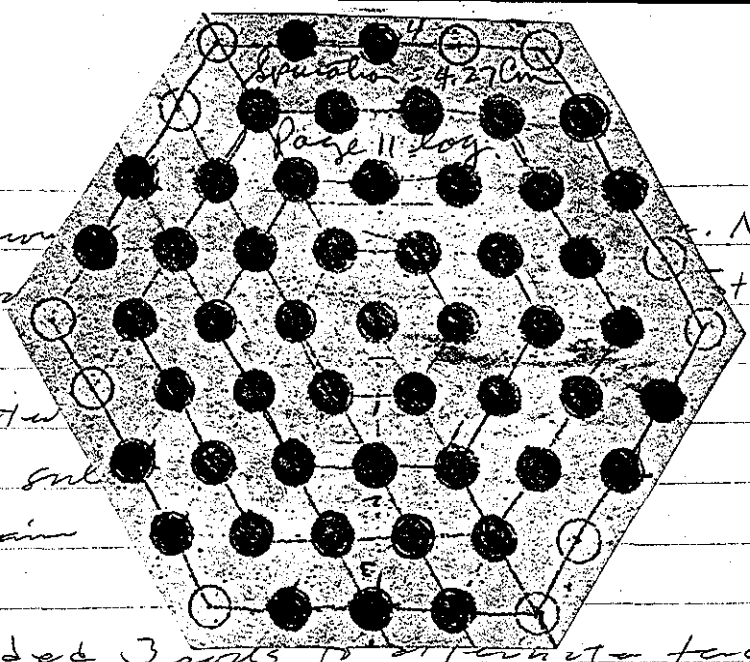
Water

100 gals

Drain

#1 24.5°

#2 24.5



Added 3 rods to alternate faces. Total 52.

1010

Water at 33.1 cm. + Perim #1 #1 24.5

E = 160.8 cm = 6.7 f

#2 24.5

1015

Water at 33.0 cm. Critical.

Drain

Removed 1 rod. Two opposite faces have 3 rods. The other 4 have 2 each. Total 51.

1040

Water at 34.5 cm. + Perim #2 #1 24.5

E = 52.2 cm = 15.9 f

#2 24.5

1047

Water at ~~34.5~~ 34.15 cm. Critical.

Drain

1114

Removed 1 rod. Now have 50 total. See top of page.

Water at 38.05 cm. + Perim #3

E = 52.2 cm = 15.9 f

1118

Water at 36.5 cm. Critical. Drain

115767

Removed 5 rods, one from each face. Now have
2 rods on each face in outer ring. Total 49 rods.

0930

W₂₁W at 45.3 cm. Subcritical.

#1 24.5° 2

Too subcritical for veg. points.

#2 24.5

Drain

Added 3 rods to alternate faces. Total 52.

1010

W₂₁W at 33.1 cm. + Pen¹ #1

#1 24.5

$E = 160.8 \text{ cm} = 6.7 \text{ f}$

#2 24.5

1015

W₂₁W at 33.0 cm. Critical.

Drain

Removed 1 rod. Two opposite faces have 3 rods,
the other 4 have 2 each. Total 51.

1040

W₂₁W at 34.5 cm. + Pen¹ #2

#1 24.5

$E = 52.2 \text{ cm} = 15.9 \text{ f}$

#2 24.5

1047

W₂₁W at ~~34.5~~ 34.15 cm. Critical.

Drain

1114

Removed 1 rod. Now have 50 total. See top of
page.

W₂₁W at 38.05 cm. + Pen¹ #3

$E = 52.2 \text{ cm} = 15.9 \text{ f}$

1118

W₂₁W at 36.5 cm. Critical. Drain

12

0.98 in. diam rods
60 cm high
4.27 cm center spacing

1/5/67

60 cm high lattice of a total of 37 rods, ^{3 rings}
triangular pattern, 4.27 cm center separation

1540

W & W at 51.45 cm. Critical

41 24.5

42 24.5

Drain

Removed 3 rods, from alternate corners. Total
rows 34.

1/9/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	Out. of service				
K-2	3 x 15" ⁱⁿ	Motor <input checked="" type="checkbox"/>	2"	<input checked="" type="checkbox"/>	3 x 15" ⁱⁿ
R-1	—	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
R-2	—	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	
PM-1	7000 <input checked="" type="checkbox"/>	Alarm <input checked="" type="checkbox"/>	Critical	<input checked="" type="checkbox"/>	5000
PM-2	12000 <input checked="" type="checkbox"/>	Low <input checked="" type="checkbox"/>	10"	<input checked="" type="checkbox"/>	9000
		Alarm <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	
LOG N CALIBRATE <input checked="" type="checkbox"/>		OPERATE <input checked="" type="checkbox"/>		SOURCE No. B-80	
DUMP WELL PROBE LIGHT <input type="checkbox"/>					

START-UP CHECK LIST

1/9/67

Equipment checked by EJ IDC Personnel check by IDC

Instruments and safeties checked and reset by EJ

Source in checked by EJ Source: M-43

Emergency equipment in control room checked by IDC

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

Red light on by EJ Time 0915

Start-up OK'd by EJ IDC Date 1/9/67

Bad tube in PM-1. Changed.
K-1 out for repair. Too noisy to use.

Total rods 34. Supp. 12.

(2)

0947

Water at 75.1 cm. Subcritical. #1 24.0

Too negative for period. #2 24.3

Drawn

Replace one rod. Now $k_{eff} = 1.3$
Opposite corners vacant

1043

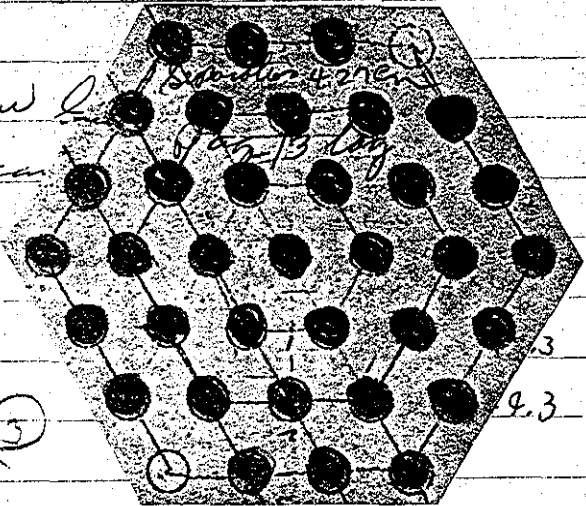
Water ht = 62.95 cm.

+ Per.

$E = 76.1 \mu = 12.2 \mu$

Water ht = 62.00 cm.

System just critical



START-UP CHECK LIST

1/9/67

Equipment checked by EQ, IDC Personnel check by IDC

Instruments and safeties checked and reset by EQ

Source in checked by EQ Source M-43

Emergency equipment in control room checked by IDC

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

Red light on by EQ Time 0915

Start-up OK'd by EQ, IDC Date 1/9/67

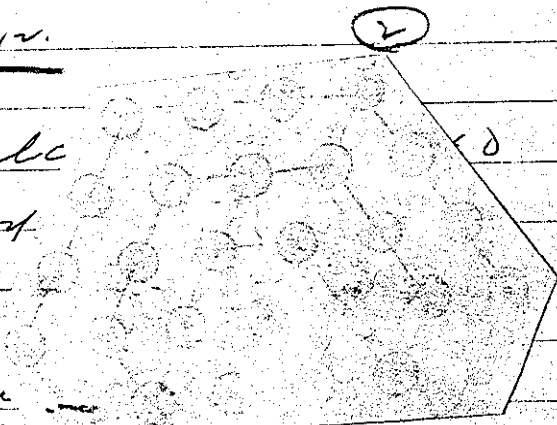
Bad tube in PM-1 changed.
K-1 out for repair. Too noisy to use.

Total rods 34, 5 comp. 12.

0947

Water ht 75.1 cm. Subc
Too negative for period
Drain

Replace one rod. Now
Appropriate corners vacant.



1043

Water ht = 62.95 cm.
+ P. ht.

Water Temp °C
H1 = 29.3
2 = 29.3

$E = 76.1 \text{ cm} = 12.2 \text{ f}$
Water ht = 62.00 cm. (3)
System just critical

INSTRUMENT CHECK

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-83

Emergency equipment in control room checked by EAC

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

Red light on by AKH Time 0835

Start-up OK'd by EAC AKH Date 1-10-67

1.10" rods.
4.72 cm separation c-c.
Triangular array's. 30 cm length.

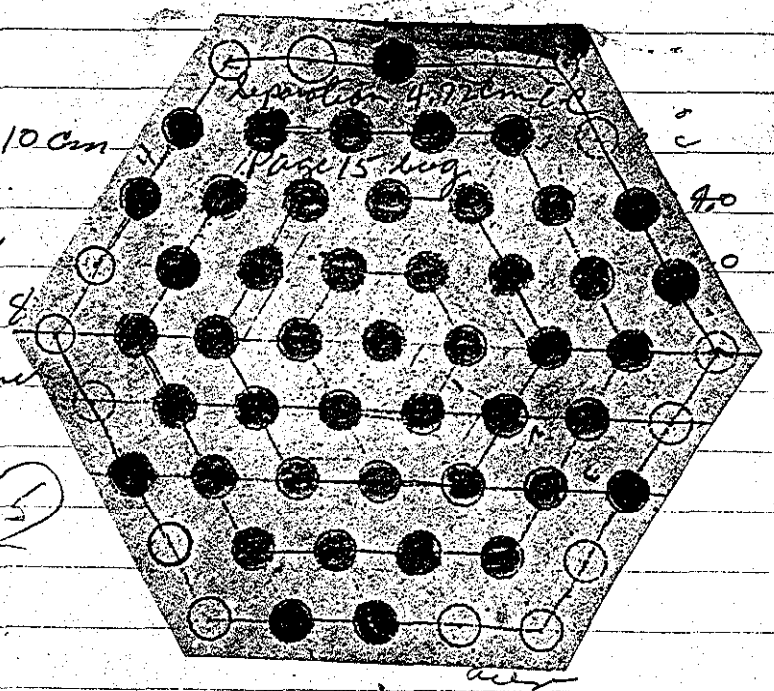
Now have 3 full rings, plus 2 rods on 4 faces
in 4th row. Total of 45 rods. 30 cm
lengths.

0910 Water ht = 45.40 cm Water Temp °C
System sub critical (4) #1 = 29.0
Drain. #2 = 29.0

added 1 rod, see array or shown. 2 rods
on 3 faces and 1 rod on 3 faces. Total of
46 rods.

1018 Water ht = 38.10 cm
(1) + Per
E = 95.6 cm = 10.24

1026 Water ht = 36.8
System just and
Drain.



1.0" rods.
 4.72 cm separation c-c.
 Triangular arrays. 30 cm lengths.

Now have 3 full rings, plus 2 rods on 4 face
 in 4th row. Total of 45 rods, 30 cm
 lengths.

0910

Water ht = 45.40 cm
 System sub critical
 Drain.

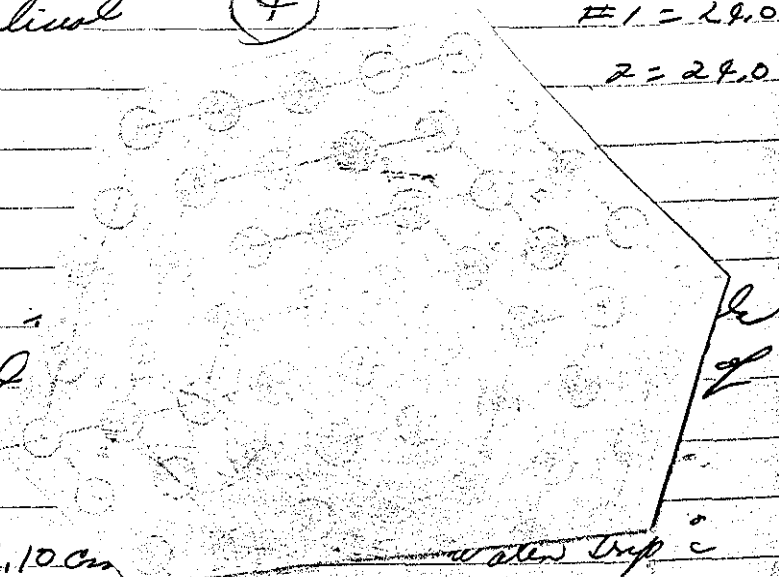
(4)

Water Temp °C

#1 = 29.0

#2 = 29.0

Added 1 rod, is
 on 3 face and
 46 rods.



1018

Water ht = 38.10 cm

(1) + Per

$E = 95.6 \text{ cm} = 10.2 \text{ ft}$

Water Temp °C

#1 = 29.0

#2 = 29.0

1026

Water ht = 36.85 cm

System just critical
 Drain.

(5)

over

16

1.0 rods
4.72 cm separation c-c.
Triangular array; 60 cm length

Now have 2 full rings, plus 2 rods on each
face in 3 ring. Total of 31 rods. 60 cm
lengths

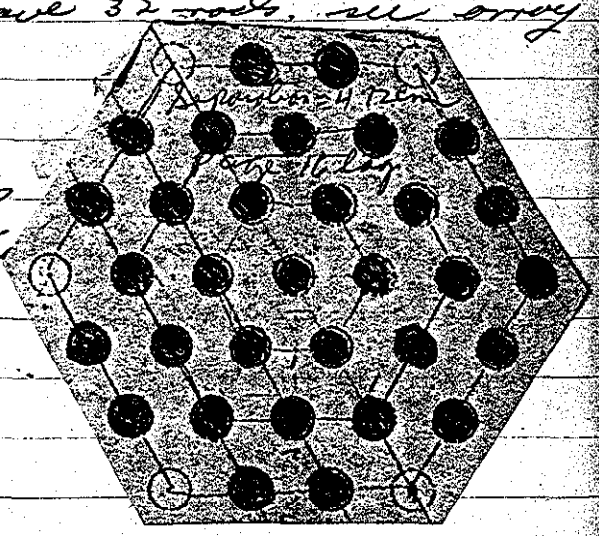
13 30 Water ht = 75.50 cm
- Per.
E = -173.8 au = -9.84

Water Temp °C
#1 = 24.0
#2 = 24.2

13 42 Drain.

Added 1 rod, now have 32 rods. see array
or diagram.

14 38 Water ht = 59.0 cm
System just critical
Drain



16

1.0 rods
 4.72 cm separation c-c.
 triangular array: 60 cm lengths

Now have 2 full rings, plus 2 rods on each
 face in 3 rings. Total of 31 rods. 60 cm
 lengths.

13 30

Water ht = 75.50 cm

Water Temp °C

- Per.

T1 = 29.0

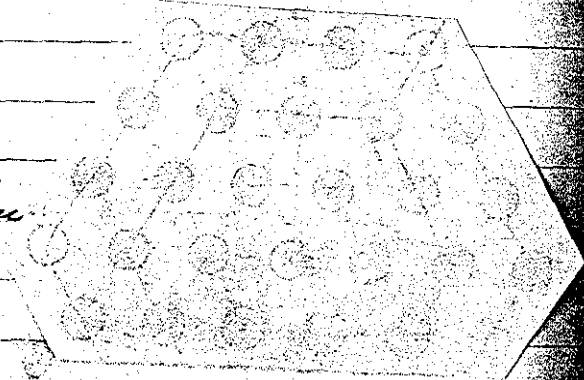
E = -173.8 mm = -9.84

T2 = 29.2

13 42

Drain.

Added 1 rod, now have
 as shown.



1438

Water ht = 59.0 cm

System just critical
 Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10 ⁻¹²	Meter ✓	1"	✓	10X10 ⁻¹²
	"	F-st ✓	"	✓	"
K-2	"	Meter ✓	4"	✓	"
	"	F-st ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	8"	✓	900V
	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE OPERATE SOURCE No. B-50
 DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by FIDC Ruff Personnel check by FIDC
 Instruments and safeties checked and reset by AKV
 Source in checked by AKV Source No. M-93
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKV Time 1445
 Start-up OK'd by FIDC Ruff Date 2-11-67

See in of from cover for flow & dump rates.
 cells.

1.0" Rods
 5.22 cm separation c-c.
 Triangular array.
 30 cm lengths.

Now have 3 full rings, plus 2 rods on 4 faces
 and 3 rods on 2 faces. Total of 51 rods, 30 cm
 lengths.

Water ht = 32.50 cm ?
 + Pres.

Water Temp $^{\circ}$

H1 = 23.2

2 = 23.2

1545 System critical water ht unknown, due
 erroneous readings on manometer.
 Drain:

1600 Found manometer line some what plugged
 with plastic.

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 ✓	"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	✓	Alarm ✓	ent	✓	700-V
PM-2	✓	Low ✓	10"	✓	1200-V
	✓	Alarm ✓	2"	✓	"

LOG IN 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-93
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKM Time 0810
 Start-up OK'd by FIDC AKM Date 2-21-67

over

1.0" rods.
 5.22 cm separation c-c.
 Triangular array, 30 cm length.

Have 3 full rings, plus 2 rods on 5 faces,
 and 3 rods on 1 face. Total of 50 rods. 30 cm
 length.

0845. Water ht = 33.6 cm
 System just critical.
 Drain.

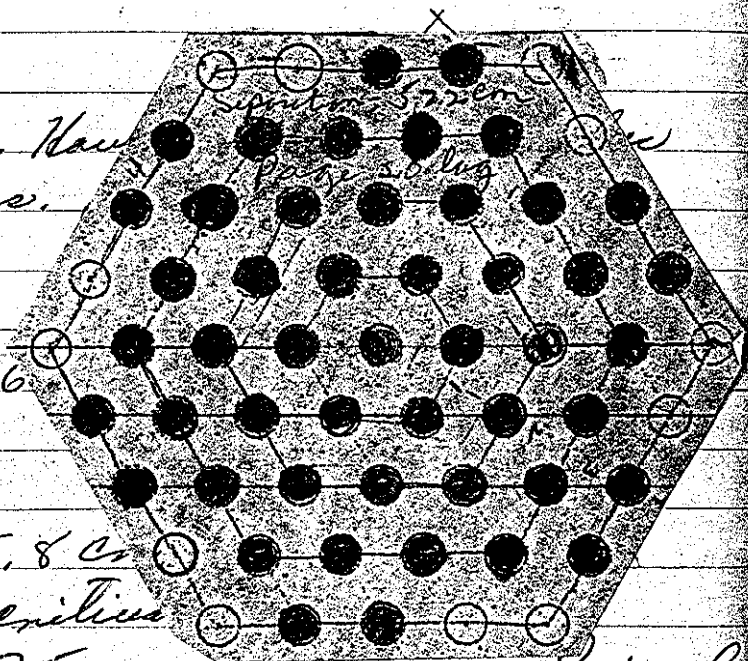
Remained 1 rod. Now
 2 rods on 6 faces.
 length

1003 Water ht = 36.6
 + Per.

1010 Water ht = 35.8 cm
 System just critical
 Drain to ~25 cm and removed 1 rod.
 Now have 48 rods.

1019 Water ht = 45.3 cm
 System sub critical
 Drain

Water Temp °C
 #1 = 22.5
 2 = 22.7



1.0" rods.

5.22 cm separation c-c.

Triangular array, 30 cm length.

Have 3 full rings, 1 f
and 3 rods on 1 face
lengths.

0845. Water ht = 33.6

System just over
Critical.

Remained 1 rod. Have 3 full rings, plus
2 rods on 6 faces. Total of 49 rods. 30 cm
length.

1003

Water ht = 36.6 cm.

+ Per.

1010

Water ht = 35.8 cm

System just critical

Drain to ~25 cm and removed 1 rod

Now have 48 rods.

1019

Water ht = 45.3 cm

System sub-critical

Chairs -

Water Temp °C

#1 = 22.5

#2 = 22.7

1.0" Rods, - 21
 5.22 cm separation c-c
 Triangular array: ^{60 cm} 60 cm length.

Have 3 full rings, with 4 rods removed from 4 corners. Total of .33 rods.

1554 Water ht = 54.0 cm
 system just critical
 Drain.

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

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

COUNTERS				Date _____			
Channel	Detector	Amplifier	Gain	Range	Time	PHS	HV
C-1	_____	_____	_____	_____	_____	_____	_____
C-2	_____	_____	_____	_____	_____	_____	_____
C-3	_____	_____	_____	_____	_____	_____	_____
C-4	_____	_____	_____	_____	_____	_____	_____

START-UP CHECK LIST

Equipment checked by AKM Personnel check by E.D.C.
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Copy of Ps. M-43
 Emergency equipment in control resp checked by E.D.C.
 Instruments in trip circuits: N-1-2 P14-1-2
 Red light on by AKM Time 0820
 Start-up OK'd by E.D.C. AKM Date 2-22-67

Now have 2 full rings, with 2 rods on each face in third ring. Total of 31 rods.

2-22-66

1" rods: 5.22 cm separation c-c

- 23

0910 Water ht = 75.90 cm
System ^{sub}critical
Drain: 69

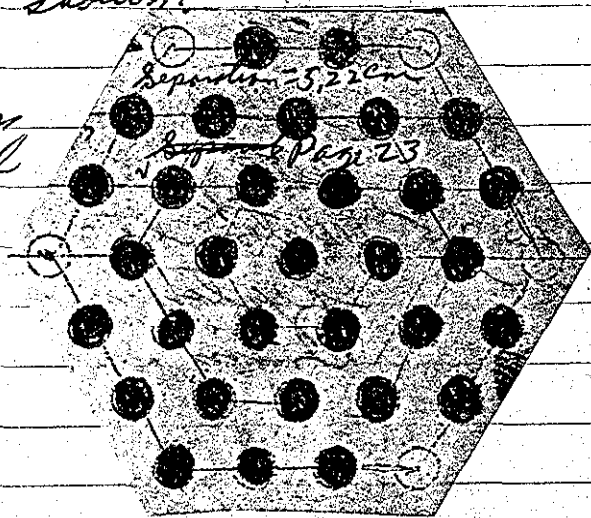
Water Temp °C

#1 = 22.0

#2 = 22.5

Added 1 rod. Now have a total of 32 rods. See array shown.

0950 Water ht = 59.45 cm
System just critical
Drain:



6.02 cm c-c

Triangular Array, 1" rods.

30 cm length.

Now have 3 full ring, plus 2 rods on each face in 4th ring. Total of 49 rods. 30 cm length.

1126 Water ht = 45.2 cm
System sub critical
Drain:

arr:

6.02 cm c-c.
Triangular array:

2-22-66

Added 6 rods. Now have 3 full rings, plus
3 rods on each face in 4th ring. Total of
55 rods. 30 cm length.

1257 Water ht = 45.4 cm Water Temp °C
System sub critical #1 = 22.7
Drain 2 = 22.7

Added 6 rods. Now have 4 full rings.
Total of 61 rods. 30 cm length.

1325 Water ht = 45.4 cm
System sub critical
Drain.

Added 6 rods. Now have 4 full rings,
plus 1 rod on each face in 5th ring.
Total of 67 rods. 30 cm length.

1435 Water ht = 45.6 cm Water Temp °C
System sub critical #1 = 22.7
Drain 2 = 22.7

7-22-66

6.02 cm separation e-e.
Triangular array.

25

added 6 rods.

2 rods on ea

73 rods. 3

Water ht

+ Per

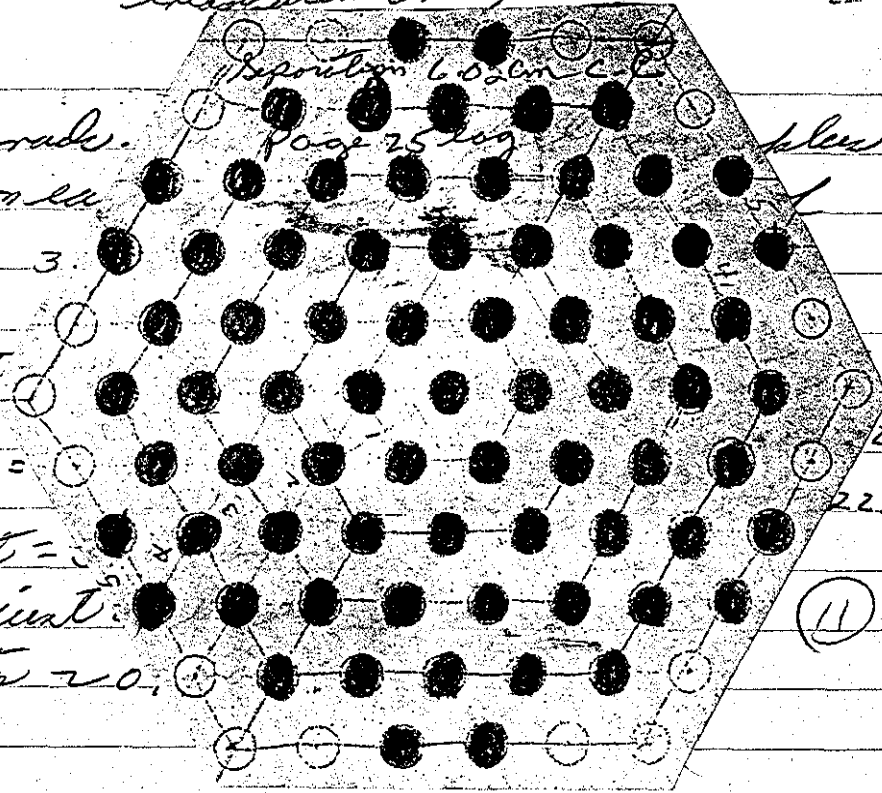
$$C = 97.8 \text{ cm} =$$

1505

Water ht =

feet per foot

Drain to 20.



Removed 1 rod. from 1 face in 5th ring. Total
of 72 rods. 30 cm. length.

1528 Water ht = 45.4 cm

2-Per

$$C = -484.6 \text{ cm} = -2.9 \text{ f}$$

(12)

1534

Drains

2-22-66

added 6 rods. Now have 4 full ring, plus
2 rods on each face in 5 ring. Total of
73 rods, 30 cm length.

Water ht = 38.3 cm.

Water Temp °C

7 Per
5 = 97.8 sec = 10.14

#1 = 22.7

#2 = 22.7

1505 Water ht = 37.05 cm.

system just critical
Drain to 20.0 cm

(11)

Removed 1 rod, from 1 face in 5th ring. Total
of 72 rods, 30 cm length.

1528 Water ht = 45.4 cm

2-Per
5 = -484.6 sec = -2.94

(12)

1534 Drains

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKH Personnel check by FIDC
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH source No. M-93
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKH Time 0900
 Start-up OK'd by FIDC AKH Date 2-73-67

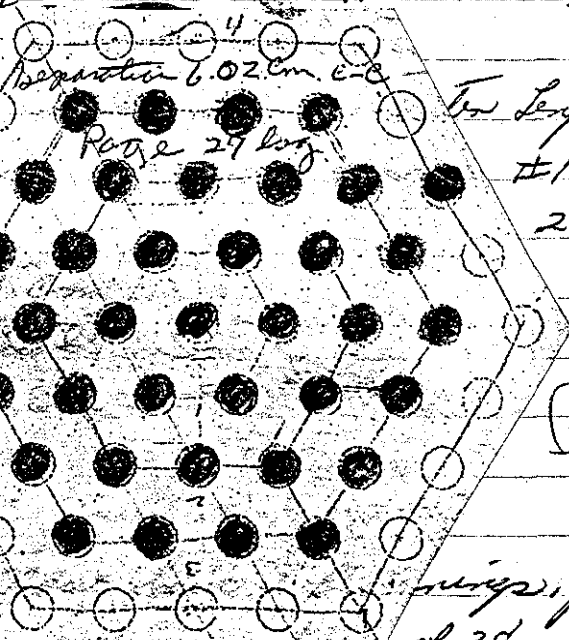
2.23-67

6.02 cm separation e-e - 27
Triangular array. 60 cm length...

Now have 3 full rings, plus 1 rod on
2 faces. Total of 39 rods. 60 cm length.
(Note: This is all of the middle 1.0" rods.)

Water ht = 75

7 per
E = 10 \times 3 m = 9.6



Water Temp °C

#1 = 21.5

2 = 22.5

0.995

Water ht = 16.5

System just
Drain

Remained 1 rod.

1 rod on 1 face in rings, plus
of 38 rods.

10.2.7

Water ht = 75.2 cm

System sub critical
Drain

14

Water Temp °C

#1 = 22.0

2 = 22.5

over

2.23-67

6
Fri

27
Sat

Now have
2 ^{rods} faces in 4 ft
(note: this is

on
length.
act.)

Water ht = 75.3 cm
1" + Per
C = 10 @ 3 m = 9 ft

Water Temp °C
#1 = 21.5
2 = 22.5

0945 Water ht = 65.3 cm
System just critical
Drain:

13

Remained 1 rod. Now have 3 full rings, plus
1 rod on 1 face in 4 ft ring. Total of 38 rods.

1027 Water ht = 75.2 cm
System sub critical
Drain:

14

Water Temp °C
#1 = 22.0
2 = 22.5

act

28

2-23-67

1.0" Rods Square Pattern.

3.96 cm separation c-c.

30 cm height

Now have an 7x7 array. Total of 49 rods
3.96 cm separation c.c.

1332 Water ht = 45.9 cm.
system sub critical
Drain to = 0.0 cm

Water Temp °C
#1 = 22.7
2 = 22.5

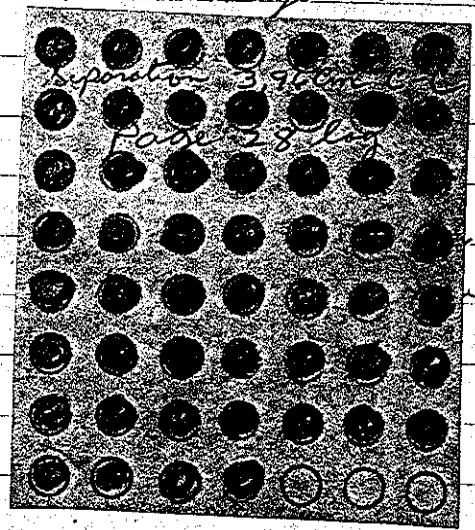
1355 Added 3 rods to 1 face. Now have 52 rods.
Water ht = 45.3 cm
- Pen.
 $\tau = -165.1 \text{ sec} = -10.6 \phi$ (1)

1400 Drain to = 0.0 cm.

added 1 rod. Now have 4 rods on 1 face.
Total of 53 rods.

Water ht = ^{35.5}35.4 (2)
3 + Pen
 $\tau = 176.0 \text{ sec} = 6.2 \phi$

1457 Water ht = 35.35
system just critical
Drain



28
2-23-67

1.0" Rods Square Patterns,
3.96 cm separation c-c.
30 cm height

Now have an 7x7 array. Total of 49 rods
3.96 cm separation c-c.

1332 Water ht = 45.9 cm. Water Temp °C
System rule critical #1 = 22.2
Drain to 20.0 cm 2 = 22.5

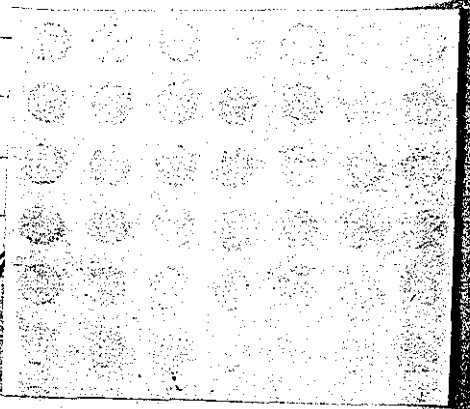
added 3 rods to 1 face. Now have 52 rods
1355 Water ht = 45.3 cm
2 - Perm. ①
 $\tau = -165.1 \text{ sec} = -10.6 \phi$

1400 Drain to 20.0 cm.

added 1 rod. Now have 4
Total of 53 rods.

Water ht = ^{35.5}35.4 ②
3 + Perm. Water Temp °C
 $\tau = 176.0 \text{ sec} = 6.2 \phi$ #1 = 22.5
2 = 22.5

1457 Water ht = 35.35
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}
	"	Feet ✓	4"	✓	"
K-2	"	Meter ✓	11"	✓	"
	"	Feet ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	900V
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AMM

Source in checked by AMM Source No. M-43

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

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

Red light on by AMM Time 0830

Start-up OK'd by E.D.C. AMM Date 2-29-67

out

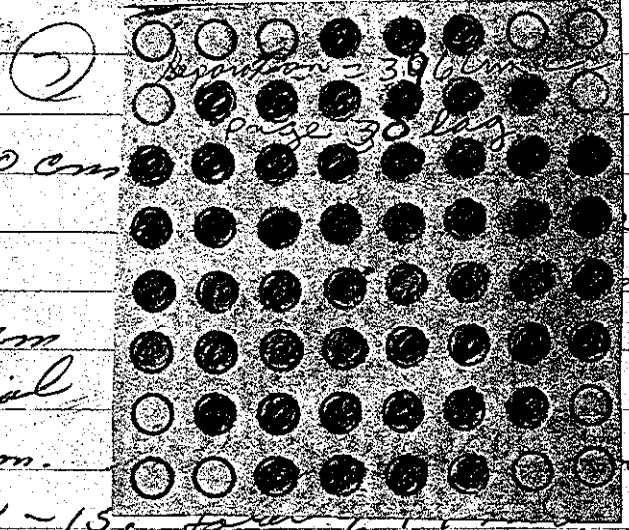
2-24-67

1.0" Rad. square array:
 3.96 cm separation c-c.
 Rounded array. 30 cm length

Now have an 8x8 - 12. Three rods removed from each corner. Total of 52 rods. 30 cm length

Water ht = 33.70 cm
 + Per
 $\tau = 95.6 \text{ sec} = 10.2 \phi$
 Water Temp °C
 #1 = 21.8
 2 = 22.0

0925 Water ht = 33.60 cm
 System just critical
 Drain to 20.0 cm and removed 1 rod from 1 corner.



Water ht = 35.90 cm
 + Per
 $\tau = 36.9 \text{ sec} = 20.0 \phi$

Water ht = 35.2 cm
 System just critical
 Drain to 20.0 cm.
 Now have an 8x8 - 15. Same as before.

Water ht = 45.4 cm
 System sub critical
 Drain to 20.0 cm and added 1 rod.

30

2-24-67

1.0" Rad. square array:

3.96 cm separation c-c.

Round array. 30 cm length.

Now have on 8 X 8 - 12. Upper rods removed from each corner. Total of 52 rods. 30 cm length

Water ht = 33.70 cm

+ Per

$\tau = 95.6 \text{ sec} = 10.2 \text{ f}$

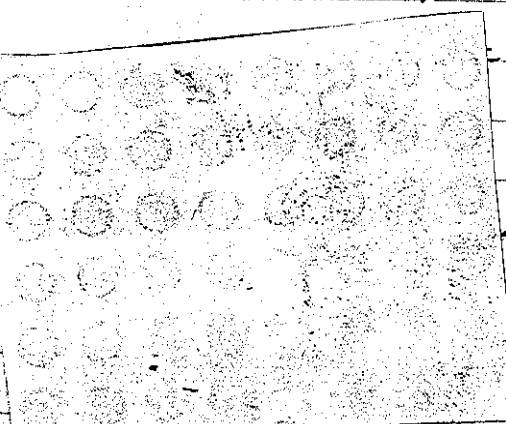
Water Temp $^{\circ}\text{C}$

#1 = 21.8

22.0

0925 Water ht = 33.60 cm

System just critical
Drain to 20.0 cm from 1 corner.



Water ht = 35.90 cm

+ Per

$\tau = 36.9 \text{ sec} = 20.0 \text{ f}$

Water Temp $^{\circ}\text{C}$

#1 = 21.3

#2 = 22.1

Water ht = 35.2 cm

System just critical

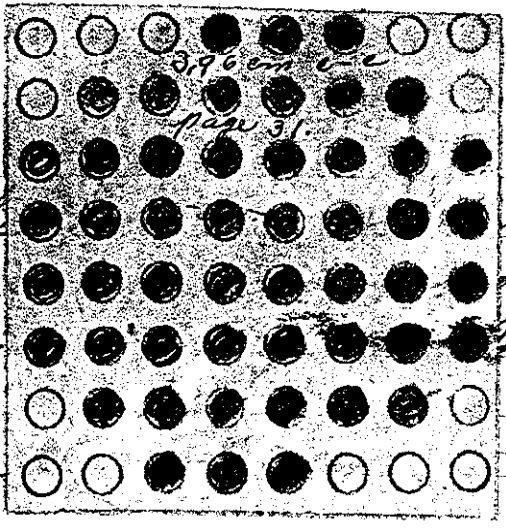
Drain to 20.0 cm. and removed 2 rods.
Now have on 8 X 8 - 15. Total of 49 rods.

Water ht = 45.4 cm

System sub critical

Drain to 20.0 cm. and added 1 rod.

2-29-67



Now h
from 2
2 corners

ack removed
to removed from

(4)

1035 Water
3⁺ Per
 $\tau = -669.3 \text{ sec} = -2.1 f$

Water Temp °C
#1 = 21.5
2 = 22.2

1040 Drain

1510 Repeat of above: after working on log-21. (Changed tubes in amplifier)
Water ht = 45.4
4⁺ Per
 $\tau = -760.6 \text{ sec} = 1.8 f$

Water Temp °C
#1 = 21.5
2 = 22.2

1534 Drain

2-29-67

Now have on 8x8 = 14. 3 rods remained
from 2 corners, and 4 rods remained from
2 corners. Total of 50 rods. (D)

1035 Water ht = 45.3 cm. Water Temp °C
³- Per #1 = 21.5
 $C = -669.3 \text{ sec} = -2.1 f$ 2 = 22.2

1040 Drain.

1510 Repeat of above: after working on log - 21. (Changed
tubes in amplifier) Water Temp °C
 Water ht = 45.4 #1 = 21.5
⁴- Per 2 = 22.2
 $C = -760.6 \text{ sec} = 1.8 f$

1534 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	10×10^{-12}	Meter -	1"	-	"
	10×10^{-12}	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700v	Alarm ✓	cont	-	500v
PM-2	1200v	Low -	10"	-	900v
		Alarm -	2"	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by AKM F.P.C. 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 AKM

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

Red light on by AKM Time 1330

Start-up OK'd by F.J. AKM Date 2-27-67

2-27-67

1.0" Rods, square array 33
 3.96 cm separation c-c
~~Standard~~ array, 60 length.

Now have an 6x6 array, total of 36 rods, 60 cm length.

Water ht = 75.20 cm.

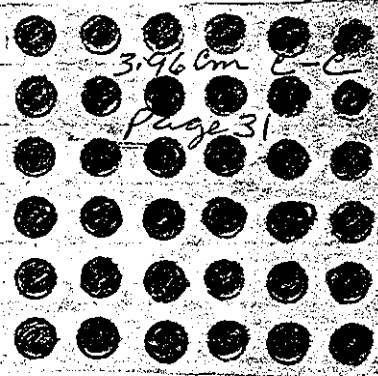
Water Temp °C

① of Per

#1 =

$t = 217.3 \text{ cm} = 5.2 \phi$

1435 Water ht = 66.6 cm
 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 ✓	"	✓	"
	"	Fast ✓	" <small>check</small>	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1000V	Low ✓	10"	✓	900V
	"	Alarm ✓	2"	✓	"

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.O.C.Instruments and safeties checked and reset by AKHSource in checked by AKH Source No. M-93Emergency equipment in control room checked by F.I.O.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKH Time 0810Start-up OK'd by F.I.O.C. AKH Date 2-28-67

1.0" Rads. square array.
 3.96 cm separation e-e.
 60 cm length.

6x6-1 array. Removed 1 rad from corner
 of array. Total of 35 rads. 60 cm length.

0840 Water ht = 75.5 cm
 System sub critical
 Drain:

Water Temp °C
 T1 = 21.0
 T2 = 21.0

2-28-67

3.96 cm separation c-c -35

Now have on 7X7-16. 4 rods removed from each corner. Total of 33 rods.

0924	Water ht = 75.2 cm	Water Temp °C
	System sub critical	#1 = 21.0
	Drain	2 = 21.0

Added 1 rod. Total of 34 rods.

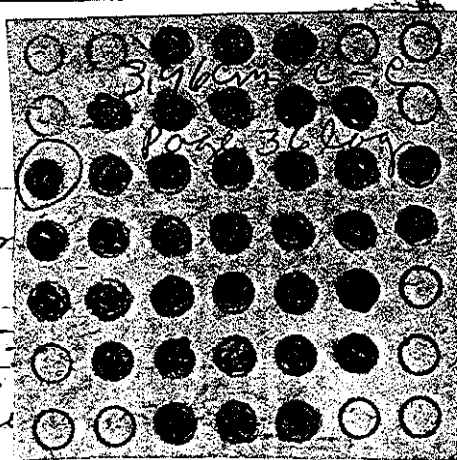
1021	Water ht = 75.0 cm	Water Temp °C
	System sub critical	#1 = 21.0
	Drain	2 = 21.2

Added 1 rod. Total of 35 rods.

	Water ht = 75.3 cm	Water Temp °C
	Per	#1 = 21.0
	G = -273.8 sec - 5.54	2 = 21.2

11.17 Drain

cur.



added 1 →
Water ht.
system ju
Drain.

3.96 cm separation
c-c.
60 cm length

rods.

②

Water Temp °C
#1 = 21.0
#2 = 21.2

4.39 cm separation c-c.
1.00 m square array. 30 cm length.

Now have an 7×7 array, with $\frac{4}{3}$ rods
removed from 1 face. Total of $\frac{45}{33}$ rods. 30 cm
length.

15-10 Water ht = 45.2 cm
system sub critical
Drain.

Water Temp °C
#1 = 21.2
#2 = 21.5

Added 2 rods. Now have an 7×7 array
with 2 rods removed from 1 face. Total
of 47 rods. 30 cm length.

3.96 cm separation
c-c.
60 cm length

added 1 rod. Total of 36 rods.

Water ht = 58.10 cm
System just critical
Drain

Water Temp °C
#1 = 21.0
#2 = 21.2

4.39 cm separation c-c.
120 x 2 square array. 30 cm length.

Now have an 7×7 array, with $\frac{4}{3}$ rods removed from 1 face. Total of $\frac{45}{33}$ rods. 30 cm length.

15-10 Water ht = 45.2 cm
System sub critical
Drain

Water Temp °C
#1 = 20.2
#2 = 21.5

Added 2 rods. Now have an 7×7 array with 2 rods removed from 1 face. Total of 47 rods. 30 cm length.

1528 Water ht = 45.5 cm

2 - Per

$U = -245.5 \text{ mm} = -6.3 \text{ ft}$

Drain to 20.0 cm; and added 1 rod.
Now have an 7x7 array with 1 rod removed
from 1 face. Total of 48 rods, 30 cm length

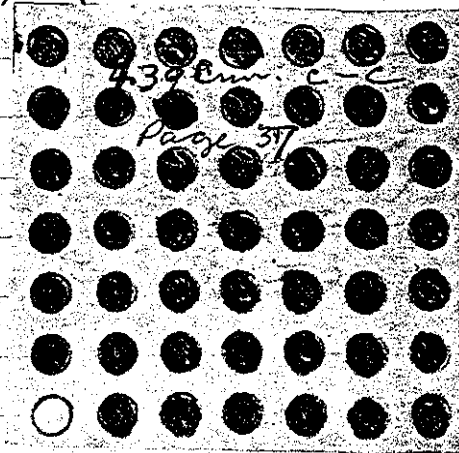
Water ht = 35.60 cm

3 + Per

$U = 89.1 \text{ mm} = 10.8 \text{ ft}$

1.555 Water ht = 35.20 cm

System just critical
Drain.



1528 Water ht = 45.5 cm

2 - Per

$$C = -245.5 \text{ mm} = -6.3 \text{ ft}$$

Drain to 29.0 cm

Now have an 7x7 mm
from 1 face. Total of

Water ht = 35.60 cm

3 + Per

$$C = 89.1 \text{ mm} = 10.8 \text{ ft}$$

Water top

$$\#1 = 21.2$$

$$\#2 = 21.5$$

1555 Water ht = 35.20 cm

System just critical
Drain.

(9)

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROCSE LIGHT

START-UP CHECK LIST

Equipment checked by AKH Personnel check by FIDC
 Instruments and safeties checked and reset by AKH
 Sources in checked by AKH Source No. M-43
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuits: K-1-2 PM-1-2
 Red-light on by AKH Time: 0915
 Start-up OK'd by FIDC AKH Date: 3-1-67

3-1-67

4.39 cm separation c-c 39

Now have an 8x8 array, with 4 rods removed from each corner. Total of 48 rods. 30 cm length.

Water ht = 34.0 cm.

Water Temp °C

① + Per

#1 = 21.5

$t = 78.2 \text{ sec} = 11.9 \text{ f}$

2 = 21.5

0995

Water ht = 33.8 cm

system just critical

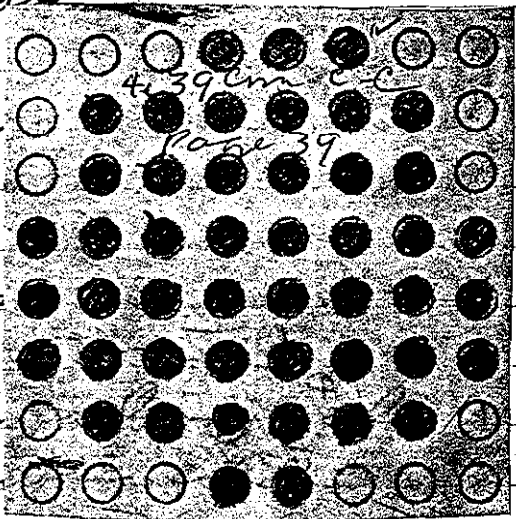
Drain to ~ 20.0 cm and remove 1 rod. Total of 47 rods

Water ht = 36.8 cm.

⑩

+ Per

$t = 41.3 \text{ sec} = 18.3 \text{ f}$



0956

Water ht = 35.65 cm.

system just critical.

Drain to ~ 20.0 cm

2 rods. Total rods = 46

1006

Water ht = 45.2 cm

Water Temp °C

system sub critical

#1 = 21.5

Drain

2 = 21.5

over

3-1-67

4.39 cm separation c-c. 39

Now have an 8x8 array, with 4 nodes removed from each corner. Total of 48 nodes. 30 cm length.

Water ht = 34.0 cm.

Water Temp °C

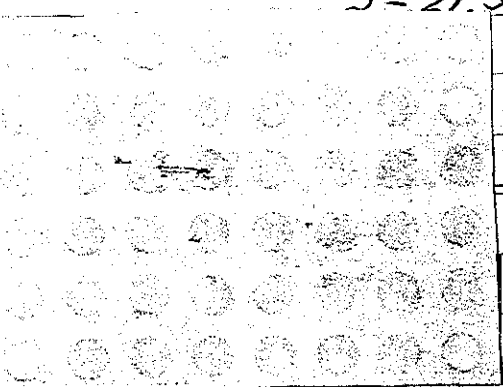
(9) 7 per

#1 = 21.5

$C = 78.2 \text{ cm} = 11.9 \text{ f}$

2 = 21.5

0945 Water ht = 33.8 cm
system just critical
Drain to ~ 20.0
1 node. Total of 47 nodes



(10) Water ht = 36.8 cm.

(10) 4 per

$C = 41.3 \text{ cm} = 18.3 \text{ f}$

0956 Water ht = 35.65 cm
system just critical.
Drain to ~ 20.0 cm and remain
2 nodes. Total nodes now = 45.

1006 Water ht = 45.2 cm

Water Temp °C

system sub critical

#1 = 21.5

Drain

2 = 21.5

over.

4.39 cm separation c-c.
30 cm length.

Added 1 rod. Now have 46 rods.

1310 Water ht = 45.3 cm. 11 water temp °C
 System still critical.
 3 - Per #1 = 21.5
 $E = -149.9 \text{ cm} = -12.2 \text{ f}$ #2 = 21.5

1322 Drain:

4.39 cm separation c-c
60 cm length.

Now have an 6x6 array, with 3 rods removed from 1 face. Total of 33 rods.

Water ht = 64.6 cm. water temp °C
9 + Per #1 = 21.5
 $C = 76.1 = 12.2 \text{ f}$ #2 = 21.7

1550 When trying to level, open and closing of drain valve caused power supply to drain valve to disconnect on turn causing loss of water. Shut down.

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 ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm	cont		500V
PM-2	1200V	Low ✓	10"	✓	900V
"	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by AKH Personnel check by E.D.CInstruments and safeties checked and reset by AKHSource in checked by AKH Source No. M-43Emergency equipment in control room checked by E.D.CInstruments in trip circuit: K-1-2 PM-1-2Red light on by AKH Time 0815Start-up OK'd by E.D.C AKH Date 3-2-67

over

42

3-2-67

4.39 cm separation c-c.
60 cm lengths.

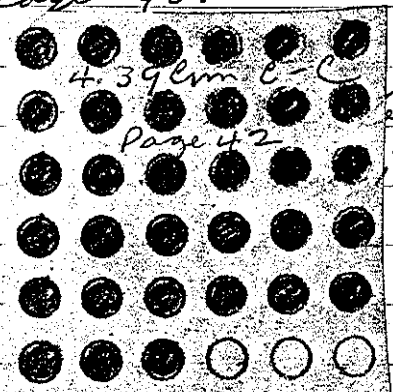
Have an 6x6 array, with 3 rods removed from 1 face. Total of 33 rods. Report of defect described on bottom of page 40.

Water ht = 64.7 cm

Q + Per

t = 71.7 sec = 12.74

(12)



0.854 Water ht = 63.1 cm

System just critical
Drain.

Remaind 1 rod. Now have 6x6 with 4 rods removed from 1 face. Total of 32 rods.

(13)

0.925 Water ht = 75.3 cm

System sub critical
Drain.

Water Temp °C

#1 = 21.5

2 = 22.0

42

3-2-67

4.39 cm separation c-c.
60 cm length.

3

Have an 6x6 array, c
from 1 face. Total of
described on bottom of 1

removal
of depth

Water ht = 64.7 cm

Water Temp °C

4-Per
C = 71.7 cm = 12.7 f (17)

#1 = 21.5

2 = 22.0

0854 Water ht = 63.1 cm

System just critical
Drain.

Removal 1 rod. Now have 6x6 with
4-rod removed from 1 face. Total of 32
rods. (17)

0925 Water ht = 75.3 cm

Water Temp °C

System sub critical
Drain.

#1 = 21.5

2 = 22.0

3-2-67

4.39 cm separation c-c
60 cm length.

43

Have an 6x7 array, with 3 rods removed from each corner. Total of 30 rods. 60 cm length (Rounded array.)

10.55 Water ht = 75.3 cm
System sub critical
Drain.

added 2 rods. Now 3 rods removed from 2 opposite corners and 2 rods removed from the other opposite corners. Total of 32 rods.

Water ht = 75.5 cm,
(2) + Per
 $\tau = 352.0 = 3.4 \phi$

(14)

Water level

#1 = 22.0

#2 = 22.0

11.35 Water ht = 66.8 cm
System just critical
Drain.



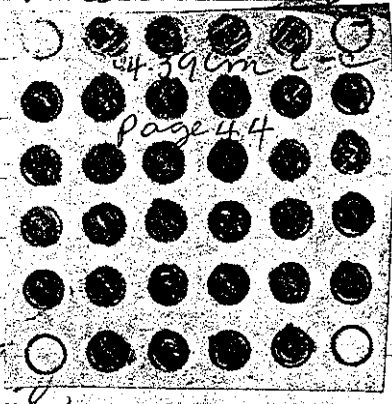
arr.

44

3-2-67

4.39 cm separation c-c
60 cm lengths.

Now have an 6x6 array. With 1 rod removed from each corner. Total of 32 rods.



Water ht = 61.4
 (3) + Per.
 $5 = 121.7 \text{ m} = 8.5$

Water Temp °C
 $T_1 = 22.0$
 $T_2 = 22.7$

1335 Water ht = 60.95 cm
 System just critical
 Drain

Removed 1 rod. Now have 31 rods.

1407 Water ht = 75.1 cm
 System sub critical
 Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10	Meter	1"	-	10 K10-02
"	"	Prot	"	-	"
K-2	"	Meter	2"	-	"
"	"	Prot	"	-	"
R-1					
R-2					
PM-1	700V	Alarm	10"	-	500V
PM-2	1200V	Low	10"	-	900V
"	"	Alarm	2"	-	"

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

START-UP CHECK LIST

Equipment checked by AMV Personnel check by FIDC
 Instruments and safeties checked and reset by AMV
 Source in checked by AMV. Source No. M-43
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AMV Time 0820
 Start-up OK'd by FIDC AMV Date 3-3-67

46

3-3-67

1.0" Rads
4.84 cm separations c-c.
30 cm lengths. Square array c.

Now have an 7x7 array. Total of 49 rads.

Water ht = 45.3 cm
④ - Per
 $\bar{v} = 100.0 \text{ cm} = -27.84$

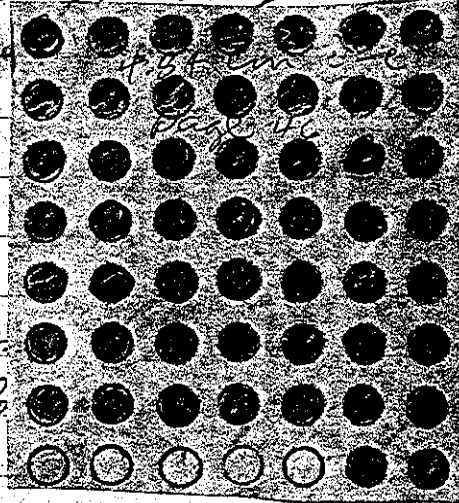
Water Temp °C
 $T_1 = 22.7$
 $T_2 = 22.7$

0848 Drain.

added 2 rads. Now have an 7x8 array with 5 rads removed from 1 face total of 54 rads.

17

Water ht = 38.6 cm
② - Per
 $\bar{v} = 47.8 \text{ cm} = 16.94$



Water ht = 36.45 cm
Drain to = 20.0 c.

18

7x8 array with 6 rads
Total of 50 rads.

Water ht = 45.3 cm
③ - Per.
 $\bar{v} = 223.8 \text{ cm} = -7.14$

0937 Drain.

46

3-3-67

1.0" Rads
4.84 cm separation C-C.
30 cm lengths. Square array.

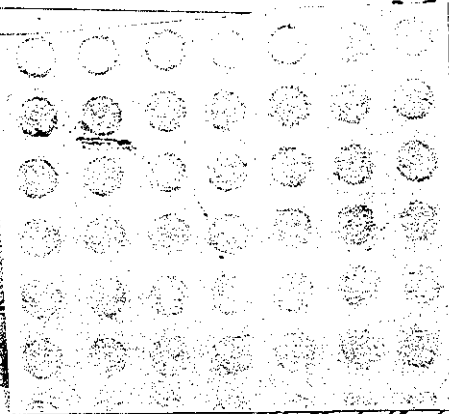
Now have an 7x7 array. Total of 49 rads.

Water ht = 45.3 cm
1-per
 $\bar{c} = 100.0 \text{ cm} = 27.84$

Water Temp. °C
II = 22.7

0848 Drain.

added 2 rads. Now
with 5 rads remain
5x6 rads.



17 Water ht = 38.6 cm.
2-per
 $\bar{c} = 47.8 \text{ cm} = 16.94$

Water Temp. °C
22.7
22.7

Water ht = 36.45 cm
Drain to ~ 20.0 cm. Remain 1 rad.
10 7x8 array with 6 rads remove from 1 face.
Total of 50 rads.

Water ht = 45.3 cm
3-per
 $\bar{c} = 223.8 \text{ cm} = 7.14$

0937 Drain.

3-3-07

4.89 cm separation c-c. 47
30 cm length. Rounded array.

Now have an 8x8 array with 4 rods removed from each corner. Total of 48 rods.

Water ht = 45.3 cm.

(18)

q = Per.

C = -119.5 mm = -17.9 f

10:34 Drain to ~ 15.0 cm and added 1 rod to 1 face. Now have a total of 49 rods.

(15)

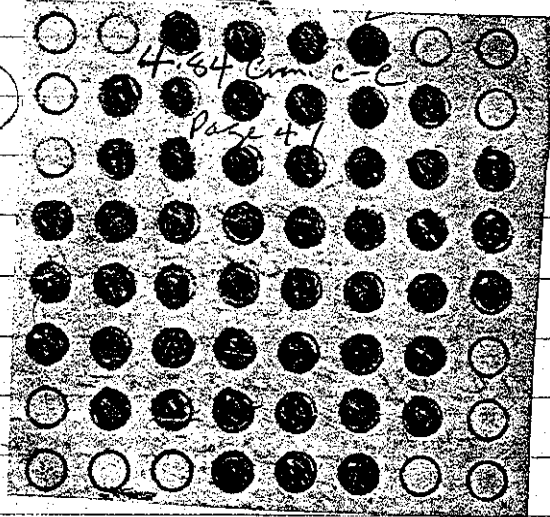
Water ht = 36.8 cm

5 + Per

C = 58.7 mm = 14.7 f

Water ht = 35.9 cm

System just critical
Drain



Now an 7x7 with 1 rod removed from 1 corner. Total of 48 rods.

1:30

Water ht = 45.3 cm

System sub critical
Drain

over.

4.84 cm separation c-c.
60 cm lengths.

Now have an 6x6 array with 3 rods removed from 1 face. Total of 33 rods.

(6) Water ht = 64.8 cm.

+ Per

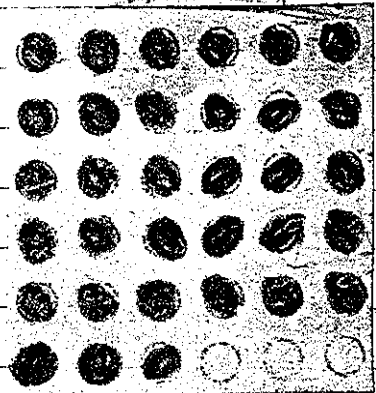
$$5 = 104.3 \text{ cm} = 9.64 \text{ m}$$

(D)

1408
~~78~~

Water ht = 63.45 cm

System just critical
Chassis



Removed 1 rod. Total rods = 32. 6x6
with ⁴ rods ~~on~~ removed from 1 face.

1498 Water ht = 75.2 cm

System sub critical
Chassis.

(M)

4.84 cm separation c-c - 49
60 cm length. Rounded array.

Now have an 6x6 array with 1 rad
removed from each corner. Total of
32 rods.

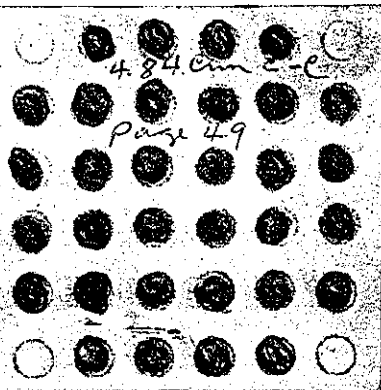
Water ht = 61.1 cm

7 Per

5:00 $\phi = 95.6$ new = 10.2 ϕ

1530 Water ht = 60.55 cm

System just critical
Drain.



Removed 1 rod. Total rods = 31.

1:400

Water ht = 75.2 cm.

System sub critical
Drain.

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by AKM FIDC Personnel check by FIDC
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-9-3
 Emergency equipment in control room checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKM Time 1510
 Start-up OK'd by FIDC AKM Date 3-8-67

10" Rods.

5.62 cm separation c-c,
square array w.
30 cm length

51

Have an 8x8 array: total of 64 rods;
30 cm length.

1540 Water ht = 45.5 cm
System sub critical,
Drain.

INSTRUMENT CHECK

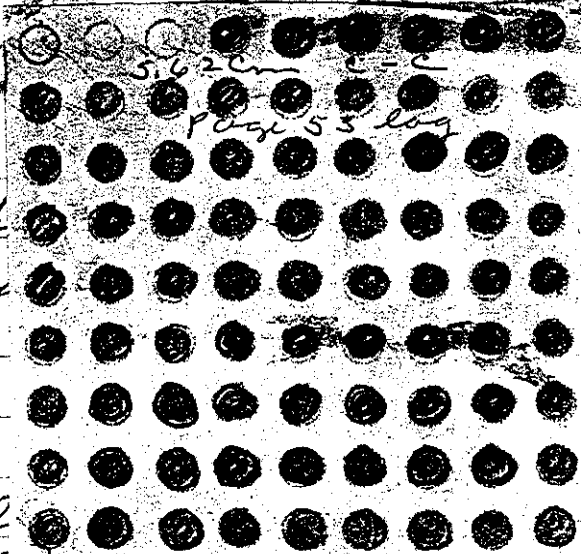
INSTRUMENT	RANGE	TRIP	SOURCE-DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	10×10^{-12}
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont	✓	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE ✓

OPERATE ✓

SOURCE No. B-80

DUMP WELL PROBE LIGHT _____



0927 Water h₁
 system y
 Drain.

Water h₂ c
 = 22.2
 with 7 rods.

(33)

Removed
 removed from 1 face. total of 7.7 rods.

0948 Water ht = 45.3 cm

² - Per.
 - Due to erratic for good measurement.

0950 Drain.

Rounded away, 5.62 cm c-c.

Now have on 9x9 array with 1 rod
 removed from each corner. Total of 77 rods.

Water ht = 38.1 cm

³ + Per
 $E = 78.2 \text{ sec} = 11.9 \text{ f.}$

Water ht = 36.45 cm

system just critical

Drain to ~ 20 cm and removed 1 rod.

act.

0927 Water ht = 39.2 cm
 System just critical
 Drain.

Water Temp $^{\circ}$
 $= 22.2^{\circ}$
 with 2 therm.

(33)

Removed 1 rod. Now an 9×9 with 4 rods
 removed from 1 face. Total of 77 rods.

0945² Water ht = 45.3 cm

- Per.

- Due to erratic for good measurement.

0950 Drain.

Rounded away. 5.62 cm c-c.

Now have an 9×9 away with 1 rod
 removed from each corner. Total of 77 rods.

Water ht = 38.1 cm

³ + Per

$E = 78.2 \text{ m} = 11.9 \text{ f}$

Water ht = 36.45 cm

System just critical

Drain to ~ 20 cm and removed 1 rod.

over.

START-UP CHECK LIST

Equipment checked by AKH Personnel check by E.D.C.Instruments and safeties checked and reset by AKHSource in checked by AKH Source No. M-93Emergency equipment in control room checked by E.D.C.Instruments in trip circuit: K-1-2 AM-1-2Red light on by AKH Time 0815Start-up OK'd by E.D.C. AKH Date 3-9-67

1" Rods.

5.62 cm operation a-c
square array.Now have an 9x8 array: Total of 72 rods.
30 cm lengths.0845 Water ht = 45.1 cm
System rule critical
Drain.Now have an 9x9 array with 3 rods
removed from 1 face. Total of 78 rods. (note
this is all of the usable 1.0" rods.)Water ht = 45.3 cm
+ Res
 $I = 260.8 \text{ cm} = 4.4 \text{ f}$

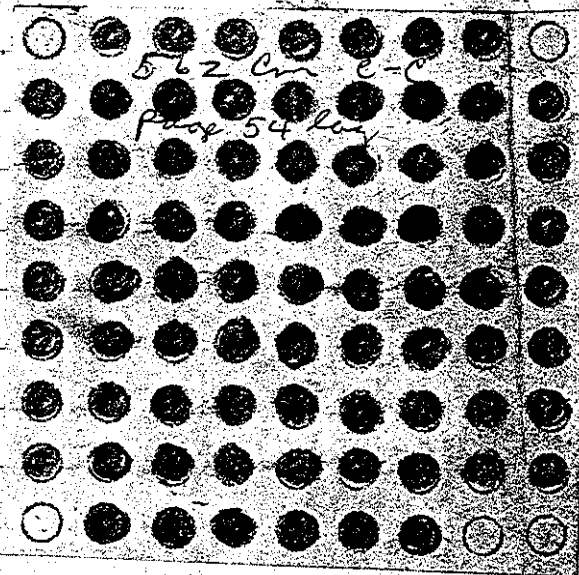
5.62 cm separation c-c
30 cm length.

now have an 9x9 with 1 rod removed
from 3 corners and 2 rods removed
from 1 corner. Total of 76 rods.

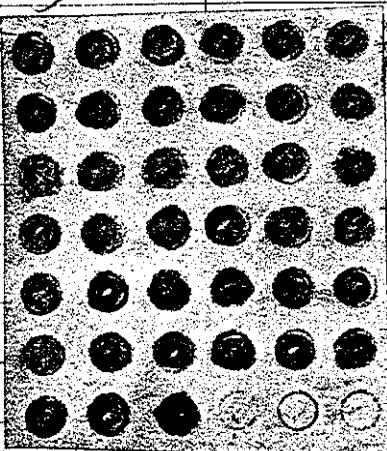
Water ht = 45.3 cm
+ Per
 $G = 462.8 \text{ sec} = 2.6 f$

1111 Water ht = 40.4 cm
system just critical
Drain.

(34)



(35)



5.62 cm separation c-c
60 cm length.

have an 6x7 array with 3 rods
id from 1 face. Total of 39 rods.
All available rods

ht = 75.8 cm
system sub critical
Drain.

$\log n = 1.01$

5.62 cm separation c-c
30 cm length.

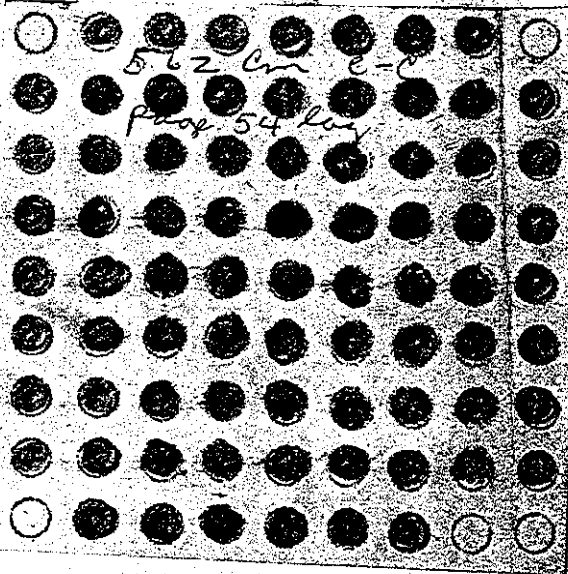
Now have an 9x9 with 1 rod removed
from 3 corners and 2 rods removed
from 1 corner. Total of 76 rods

Water ht = 45.3 cm
+ Pie

$$G = 462.8 \text{ sec} = 2.6 f$$

1111 Water ht = 40.4 cm
System just critical
Drain.

(34)



5.62 cm separation c-c
60 cm length.

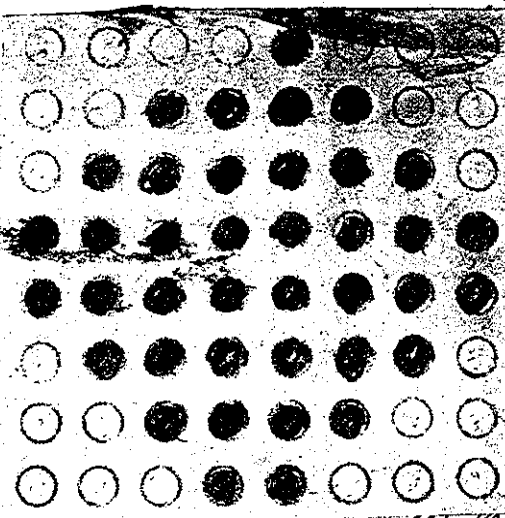
Now have an 6x7 array with 3 rods
removed from 1 face. Total of 39 rods.
All available rods

1345 Water ht = 75.8 cm $\log \eta = .01$
System sub critical
Drain.

5.62 cm separation c-e
 60 cm lengths.
 Bundled wires

(36)

Now have an 8x8
 from 3 corners, &
 1 corner, total



around
 from

9527 Water h₀ = 75.1 cm
 System sub critical
 Down

Water Logic

INSTRUMENT CHECK

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

LOG-N CALIBRATE OPERATE SOURCE No. B-8

DUMP WELL PROBE LIGHT

5.42 cm separation c-c
60 cm lengths.
Bundled array's

(36)

5

Now have an 8x8 array, with 6 rods removed from 3 corners, and 7 rods removed from 1 corner. Total of 39 rods.

7527 Water hts = 75.1 cm

Log $\eta = .018$

System sub critical
Down

Water Temp

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

LOG N CALIBRATE OPERATE SOURCE No. B-8

DUMP WELL PROB LIGHT

.80 "Rods.

START-UP CHECK LIST

Equipment checked by F.D.C. RKL Personnel check by F.D.C.
 Instruments and safeties checked and reset by RKL
 Source in checked by RKL 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 RKL Time 1050
 Start-up OK'd by F.D.C. RKL Date 3-10-67

.80 "Rods.

3.2 cm separation c-c.

Triangular array. 30 cm length.

Now have 4 full rings, plus 3 rods on each face in 5th ring. Total of 79 rods.

11.18 Water ht = 45.2 cm
 System sub critical
 Drain.

Added 12 rods. Now have 5 full rings.
 Total of 91 rods. 30 cm length.

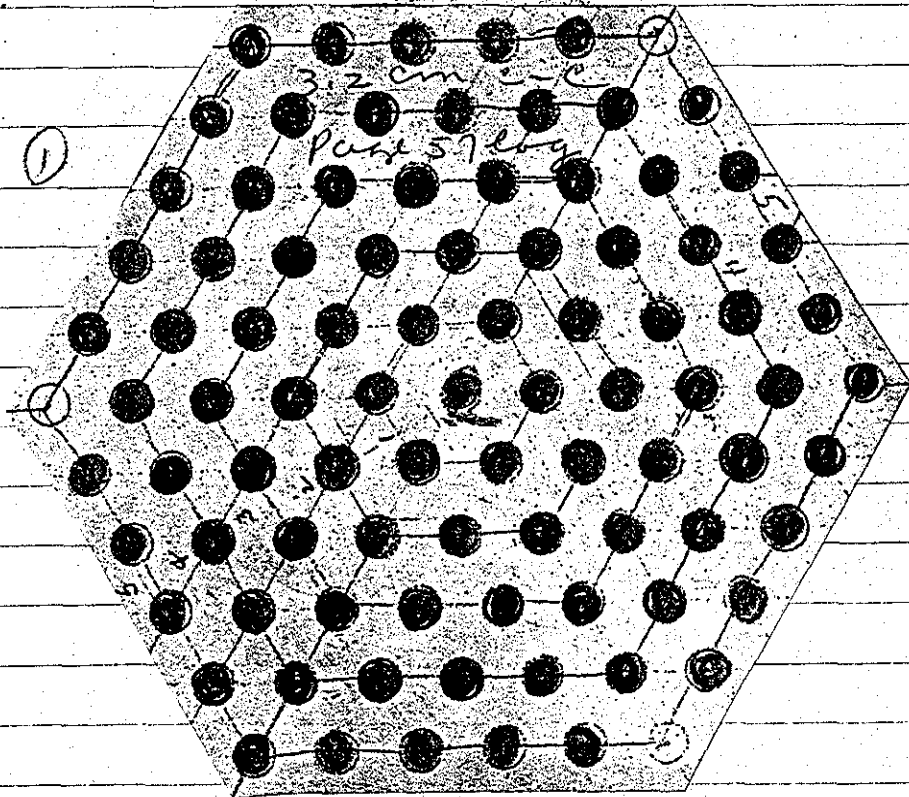
34.55
 Water ht = ~~34.55~~ cm
 D + P
 $T = 56.5 \text{ sec} = 15.1 \text{ f}$

3-10-67

1315 Water ht = 34.10 cm.
System just critical
Drain

Removed 3 rods. 1 from every other face.
now have 88 rods. see array shown below.

1339 Water ht = 45.5 cm
System just critical
Drain



ans

58

180" Rads
3.2 cm separation e-e

3-10-67

Triangular array, 60 cm lengths.

Have 4 full rings. Total of 61 rods,
60 cm length.

1555 Water ht = 75.3 cm.

² - Per.

(✓)

$E = -178.2 \mu = -9.5 \phi$

1602

Drains:

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

PM-1

700V

Alarm ✓

cont ✓

500V

PM-2

1200V

Low ✓

10" ✓

900V

"

Alarm ✓

2" ✓

"

LOG N CALIBRATE ✓

OPERATE ✓

SOURCE No.

B-90

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 AKHSource in checked by AKH Source No: M-93Emergency equipment in control room checked by F.I.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKH Time 0820Start-up OK'd by F.I.C. AKH Date 3-13-67

1.80" Rods

3.2 cm separation c-c

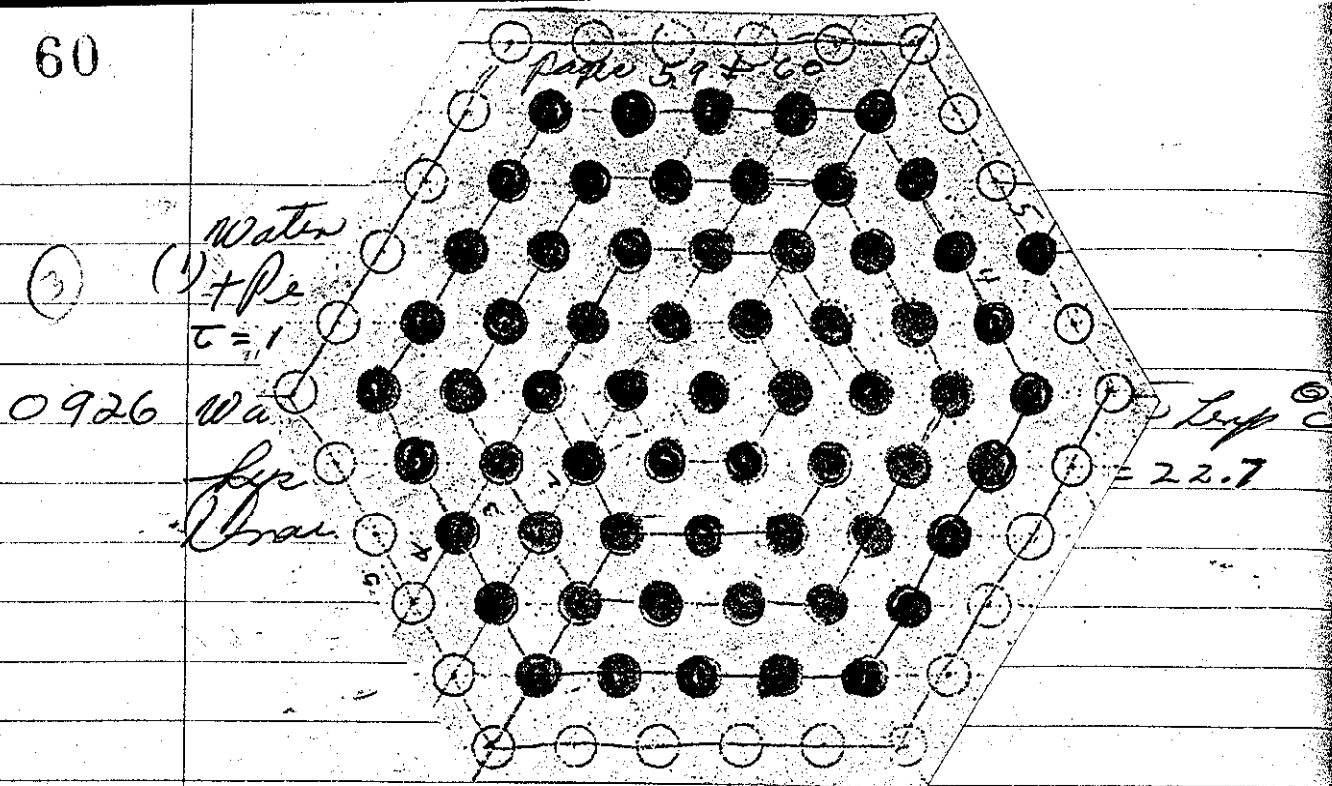
Triangular array, 60 cm length

Have 4 full full rings, with 2 rods
on opposite faces in 5 ring. Total of
63 rods.

0850 Water ht = 57.9 cm
System just critical
Drain

Removed 1 rod from 5 ring. Now have a
total of 62 rods. 60 cm length.

see



~~50~~ .80" Rods.

3.45 cm separation c-a

30 cm length

Have 4 full rings, plus 2 rods on each face in 5th ring. Total of 73 rods.

Water ht = 33.7 cm

(2) + Per

$u = 60.8 \text{ sec} = 14.3 \text{ ft}$

1320 Water ht = 33.55 cm.

System just critical

Chain to ~ 20.0 cm

Water ht = 62.4 cm.
 (1) + per
 $\tau = 115.2 \text{ sec} = 8.8 \text{ f}$

0926 Water ht = 61.8 cm Water temp $^{\circ}\text{C}$
 System just critical = 22.7
 Drain

~~30"~~ .80" Rods.
 3.45 cm separation c-a.
 30 cm length.

Have 4 full rings, plus 2 rods on each
 face in 5th ring. Total of 73 rods.

Water ht = 33.7 cm
 (2) + per
 $\tau = 60.8 \text{ sec} = 14.3 \text{ f}$

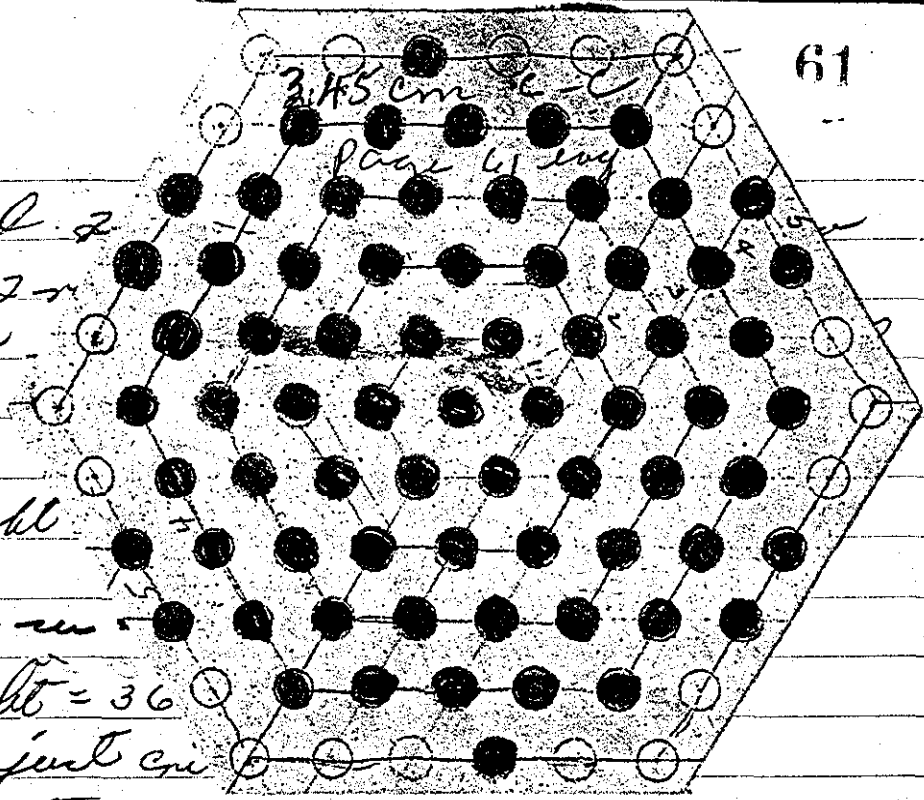
1320 Water ht = 33.55 cm.
 System just critical.
 Drain to ~ 20.0 cm

Removed 2
have 2 on
2 faces

(4)

Water ht
+ Per
 $\bar{L} = 91.3 \text{ cm}$

1335 Water ht = 36
system just en
Drain to ~ 20.0 cm



(5) Removed 1 rad from 5th ring. Now have
2 rad on 3 faces and 1 rad on 3 faces
in 5th ring. Total of 70 rods.

1350 Water ht = 45.3 cm

(4) Per: system to - neg for good - Per.

1355 Drain:

Removed 2 rods from 5th ring. Now have 2 rods on 3 faces and 1 rod on 2 faces in 5th ring. Total of 7 rods.

(4)

Water ht = 37.6 cm

(3) + Per

$T = 91.3 \text{ cm} = 10.6 \text{ f}$

1335 Water ht = 36.55 cm

System just critical

Drain to $\approx 20.0 \text{ cm}$

(5)

Removed 1 rod from 5th ring. Now have 2 rods on 3 faces and 1 rod on 3 faces in 5th ring. Total of 7 rods.

1350 Water ht = 45.3 cm

(4) Per: System to - neg for good - Per.

1355

Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	10×10^{-12}
"	"	Fast ✓	"
K-2	"	Meter ✓	"
"	"	Fast ✓	"
R-1	"		
R-2			
PM-1	700 V	Alarm ✓	500 V
PM-2	1200 V	Low ✓	9000
"	"	Alarm ✓	"
LOG N CALIBRATE		✓	OPERATION
DUMP WELL PROBE LIGHT		✓	SOURCE No. B-80

START-UP CHECK LIST

Equipment checked by AMM Personnel check by FIDC
 Instruments and safeties checked and reset by AMM
 Source in checked by AMM Source No. M-93
 Emergency equipment in case checked by FIDC
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AMM Time 1400
 Start-up OK'd by FIDC AMM Date 3-19-67

.80" Rods.
 3.45 cm separation c-c
 60 cm length. 63.

Have 3 full rings, plus 2 rods on each face in 4th ring. Total of 49 rods
 60 cm length.

1500 Water ht = 75.7 cm
 System sub critical
 Drain.

Added ~~to~~ 2 rods. Now have 3 full rings, plus 2 rods on 4 faces and 3 rods on 2 faces. Total of 51 rods.

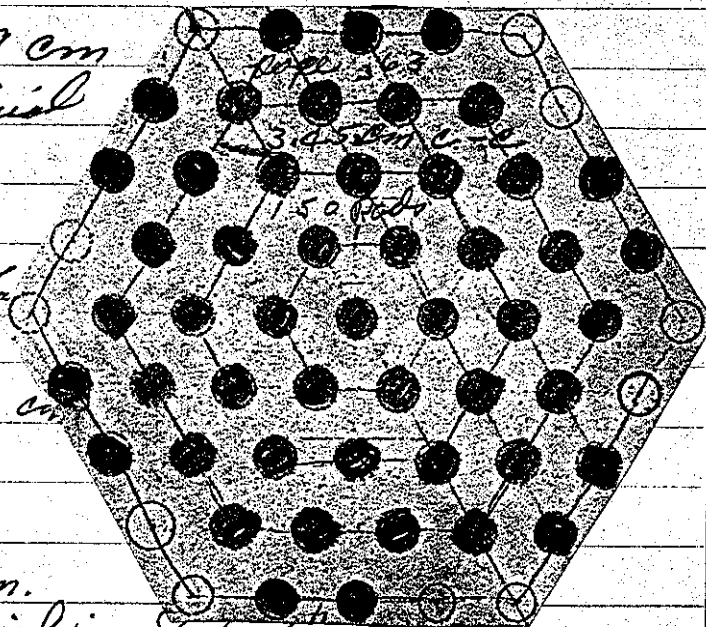
1533 Water ht = 58.9 cm
 System just critical
 Drain.

Remained 1 rod. To array as shown.

Water ht = 65.9 cm
 + Per

$$E = 847 = 11.24$$

Water ht = 63.9 cm.
 System just critical. Drain.



.80" Rods.
3, 4, 5 cm separation c-c
60 cm length. 63

Have 3 full rings, plus 2 rods on each
face in 4th ring. Total of 49 rods.
60 cm length.

1500 Water ht = 75.7 cm
System sub critical
Drain.

Added ~~to~~ 2 rods. Now
rings, plus 2 rods on
rods on 2 faces. I

1533 Water ht = 58.9
System just critical
Drain.

Remained 1 rods. Total rods = 50. See
array as shown.

Water ht = 65.9 cm.
① + Rev

$$C = 847 = 11.2 \phi$$

Water

Water ht = 63.9 cm.

System just critical. Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	1"	✓	10x10 ⁻¹²
	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700v	Alarm ✓	cont	✓	500
PM-2	1200v	Low ✓	10"	✓	900
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by AKL Personnel check by FID.C
 Instruments and safeties checked and reset by AKL
 Source in checked by AKL Source No. 19-43
 Emergency equipment in control room checked by _____
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKL Time 1523
 Start-up OK'd by FID.C AKL Date 3-15-67

130" Rods.
 5.15 cm separation c-c. 65
 Triangular array: 30 cm length.

Have 4 full rings, plus 2 rods on 4 faces
 and 3 rods on 2 faces in 5th ring.
 Total of 75 rods. 30 cm length.
 (Note zero = 2.54 cm for this array.)

1415 Drain: Experiment was not completed due
 to time factor.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter -	1"	-	10×10^{-12}
	"	Feet ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Feet -	"	✓	"
R-1					
R-2					
PMA-1	700V	Alarm ✓	Cont	✓	500V
PMA-2	1200V	low ✓	10"	✓	900V
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE	✓	OPERATE	✓	SOURCE No.	B-60
DUMP WELL PROCSE LIGHT					

66

3-20

3-20-67

START-UP CHECK LIST

Equipment checked by AKH Personnel check by E.D.C.Instruments and safeties checked and reset by AKHSource in checked by AKH Source No. M-43Emergency equipment in control room checked by I.V.C.Instruments in trip circuit: K-1-2 DM-1-2Red light on by AKH Time 0820Start-up OK'd by E.D.C. AKH Date 3-20-67

Same array as described top of page 65,
(Zero = 2.54 cm.)

Water ht = 33.1 cm

+ Per

$$E = 104.3 \text{ m} = 9.16 \text{ f}$$

0900

Water ht = 32.85 cm

Drain to ~ 20 cm, and removed
2 rods.

Now have 4 full rings, plus 2 rods
on each face in 5th ring, total of
73 rods.

Water ht = 36.2 cm.

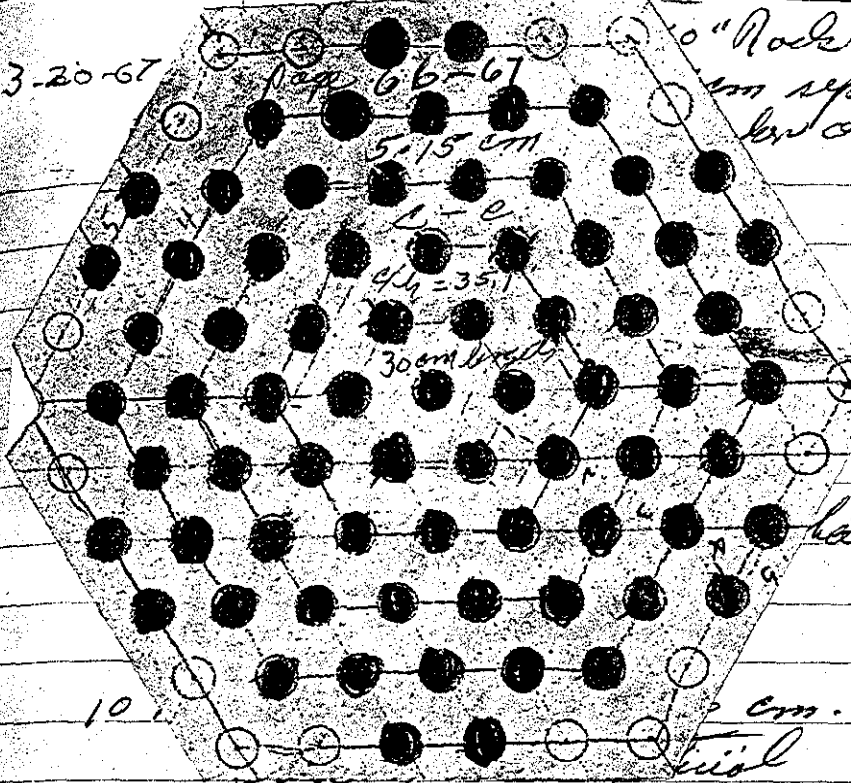
2 + Per

$$E = 82.6 \text{ m} = 11.4 \text{ f}$$

3-20-67

Exp. 66-67

10" Rods.
5 cm separation e-e. 67
low corrug. 30 cm length.



opposite faces in
have a total of

Drain to ~ 15 cm; added 1 rod.
Now have 2 rods on 5 faces and 1 rod
on 1 face in 5th ring. Total of 72 rods.

Water ht = 48.4 cm

³ - Per - to sub for good - per.

1043

Drain:

adv.

"Node.

5.15 cm separation e-e. 67
triangular orrags. 30 cm length.

0917 Water ht = 35.1 cm

System just critical
Drain

(15)

Removed 2 rods from opposite faces in
in 5th ring. Now have a total of
71 rods.

1020 Water ht = 48.6 cm.

System sub critical

Drain to ~ 15 cm; added 1 rod.

Now have 2 rods on 5 faces and 1 rod
on 1 face in 5th ring. Total of 72 rods.

Water ht = 48.4 cm

³ - Per - to sub for good - per.

1043

Drain

acc.

1.80" Rock.
5.15 cm separation c-c. 67
triangular cross. 30 cm length.

Water ht = 35.1 cm
System just critical
Drain

(15)

Removed 2 rods from opposite faces in
in 5th ring. Now have a total of
71 rods.

1020 Water ht = 48.6 cm.

System sub critical

Drain to ~ 15 cm; added 1 rod.

Now have 2 rods on 5 face and 1 rod
on 1 face in 5th ring. Total of 72 rods.

Water ht = 48.4 cm

³ - Per - to sub for good - per.

1043

Drain

see

68

3-20-68

.80" Rods. 5.15 cm separation c-c

60 cm lengths.
Triangular array.

12

Now have 3 full rings, plus 1 rod on
3 opposite faces in 4th ring. Total 40 rods.

13 4.5 Water ht = 78.5 cm.

System sub critical
Drain.

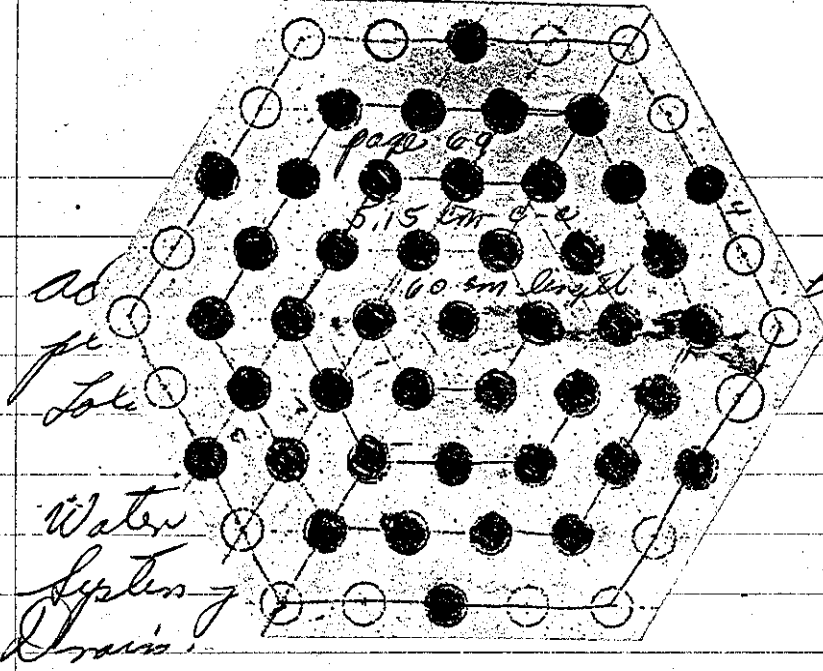
Added 1 rod. Now have 3 full rings, plus
1 rod on 4 opposite faces in the 4th ring.
Total of 41 rods.

14 18 Water ht = 78.5 cm.

System sub ~~critical~~ critical
Drain.

over

3-20-67



bull rings,
& et. ring.

(17)

3-20-67

added 2 rods. Now have 3 full rings,
plus 1 rod on each face in 4th ring.
Total of 43 rods.

(17)

1.515 Water ht = 78.5 cm.
System just critical
Drain.

Luc

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	START RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	"	10 X 10 ⁻¹²
"	"	Fast ✓	"	"
K-2	"	Meter ✓	"	"
"	"	Fast ✓	"	"
R-1				
R-2				
PM-1	700 V	Alarm ✓	Cont	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 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 F.D.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKH Time 1245Start-up OK'd by F.D.C. AKH Date 3-22-67

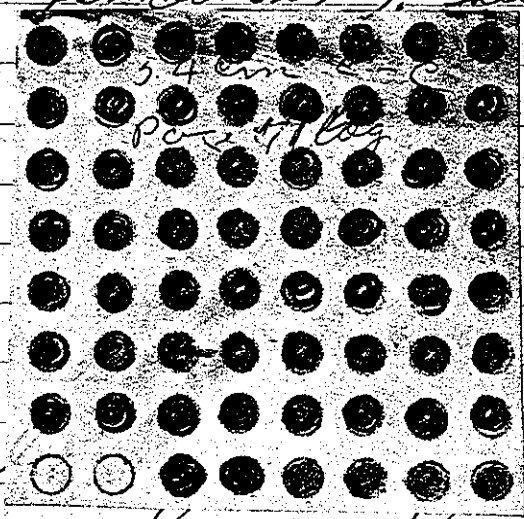
1.0" Rods.
 5.4cm separation c-c.
 Square pattern.
 30 cm length.

Have an 8x8 array. ~~64 rods~~. 30 cm length.

Water ht = 34.9 cm.
 ① + per
 $C = 102.1 \text{ sec} = 9.7 \phi$

1322 Water ht = 34.65 cm
 System just critical
 Drain to ~ 20 cm and removed 2 rods. Now have an 8x8 - 2: total of 62 rods. (Rod removed from corner), see array shown.

~~#2~~
 (24)

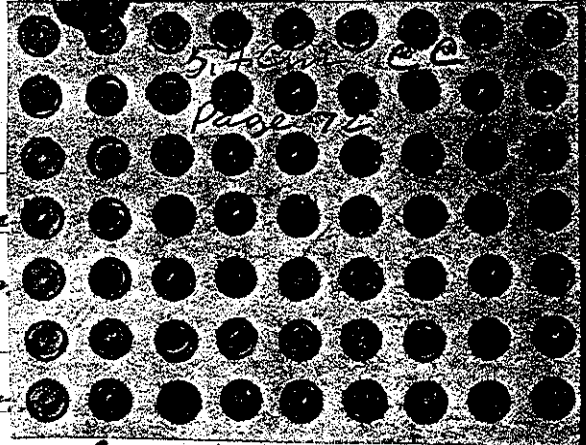


Water ht = 45.2 cm
 2 + per
 $304.2 \text{ sec} = 3.9 \phi$

1343 Water ht = 39.4 cm
 System just critical
 Drain to ~ 25 cm and removed 1 rod. Now have an 8x8 - 3: total of 61 rods.

1400 Water ht = 45.4 cm
 System sub critical.
 Drain to 0.0 cm.

over



Now have an 9 X 7
30 cm length. 5.9 cm

1915¹⁰ Water ht = 45.3 cm
- Per - To sub for good - per.

1918 Drains:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Meter ✓	1"	✓	10 X 10 ⁻¹²
	"	Foot ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Foot ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	exit	✓	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT _____					

New have an 9x7 array. Total of 63 rods.
30 cm length. 5.4 cm separation c-c.

1975¹⁰ Water ht = 45.3 cm
- Per - To sub for good - per.

1918 Drains:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	1"	✓	10x10 ⁻¹²
	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	level	✓	500 V
PM-2	1200 V	Low ✓	10"	✓	900 V
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERAT	✓	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

Source in checked by AKH Source M-93

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

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

Red light on by AKH Time 1410

Start-up OK'd by F.I.C AKH Date 3-23-67

1.0" Rods.

5.4m separation core
Rounded array. 30 cm length.

Have an 8x8 array, with 1 rod removed
from each corner. Total of 60 rods.

Water Alt = 45.75

(*) - Per - to sub for goal - Per.

~~1452~~

1452 Drain to ~ 10 cm and added 1 rod,
Now have 8x8 with 1 rod removed from
3 corners. Total of 61 rods.

over:

Water ht = 45.3 cm

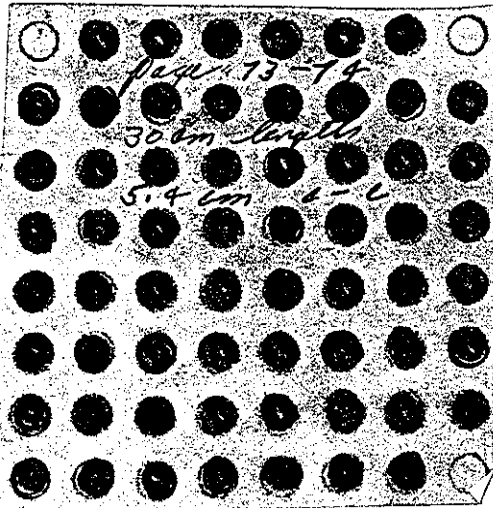
² + Per.

$$I = 629.0 \phi = 2.0 \phi \text{ (2.0)}$$

1536 Water ht = 40.7 cm

System just critical

Drain



Now have an 9x9 array, with 6 nodes removed from each corner. Total of 57 nodes

1600 Water ht = 45.4 cm
System sub critical
Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter		✓	10×10^{-12}
	"	Fast	"	✓	"
K-2	"	Meter	"	✓	"
	"	Fast	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm	cont	✓	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 AKV Personnel check by FIDC

Instruments and safeties checked and reset by AKV

Source in checked by AKV Source No. M-43

Emergency equipment in control room checked by FIDC

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

Red light on by AKV Time 0815

Start-up OK'd by FIDC AKV Date 3-27-67

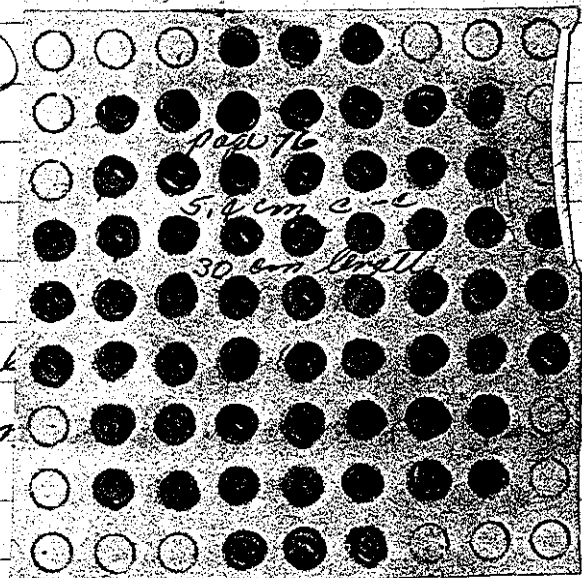
1.0 Node.
 5.4 cm separation c-c.
 Rounded array's, 30 cm length

Have an 9x9 array with 6 nodes removed from 2 corners and 5 nodes removed from 2 corners. Total of 59 nodes.

0845 Water ht = 45.2 cm
 System sub critical
 Drain to 20.0 cm and added 2 more nodes. Now have an 9x9 array with 5 nodes removed from each corner. Total of 61 nodes.

0915 Water ht = 39.0 cm
 4 Per
 $t = 65.2 \text{ sec} = 13.6$
 36.7 cm

0920 Water ht = ~~36.7~~
 System just critical
 Drain, to 20.0 cm
 Total of 60 nodes.



Water ht = 45.3 cm
 2-Per - for sub for good - Per

0938 Drain.

1.0 Rods.
 5.4 cm separation c-c.
 Rounded array's, 30 cm length

Have an 9x9 array with 6 rods removed
 from 2 corners and 5 rods removed
 from 2 corners. Total of 59 rods.

0845 Water ht = 45.2 cm
 System sub critical
 Drain to 20.0 cm and added 2
 more rods. Now have an 9x9
 array with 5 rods removed
 each corner. Total

0915 Water ht = 39.0 cm

(1) 4 Per

$$T = 65.2 \text{ sec} = 13.66$$

0920

Water ht = ~~36.7~~ 36.7 cm

System just critical

Drain, to 20.0 cm and removed 1 rod
 Total of 60 rods.

Water ht = 45.3 cm

²- Per - for sub for good - Per

0938

Drain:

1.0 rods.
5.4 cm separation C-C. 77
Square arrays. 60 cm lengths.

Now have an 6x6 array. 3.6 rods. 60 cm lengths.

Water ht = 76.5 cm (28)
- Per. - to suit for grade - pr.
to

1529. Drain.

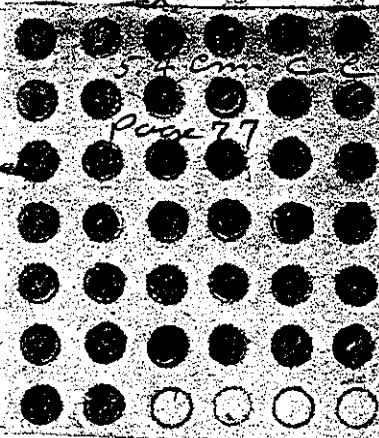
Added 2 rods to 1 face; see array as shown. Total of 38 rods.

1558 Water ht = 60.1 cm

System just critical
Drain.

E.O.M

(30)



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 ✓	1"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700v	Alarm ✓	cont	✓	500v
PM-2	1200v	Low ✓	10"	✓	900v
		Alarm ✓	2"	✓	"
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-93

Emergency equipment in control room checked by FIDC

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

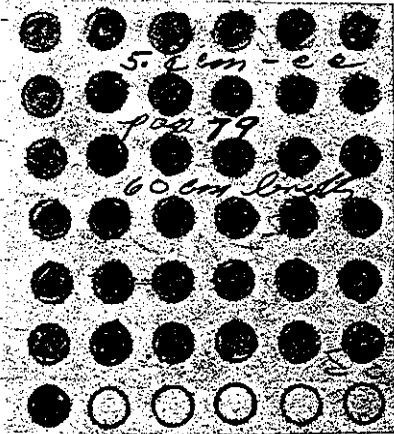
Red light on by AKM Time 0815

Start-up OK'd by FIDC AKM Date 3-28-67

1.0" Rods. 79
5.4 cm separation c-c.
Square array's. 60 cm length.

Have an 6x6 with 1 rods on top. Total of 37 rods. See array on shown.

Water ht = 75.3 cm
+ p.e.
 $\tau = 130.4 \text{ m} = 8.0 \text{ f}$



0855 Water ht = 65.10 cm (29)
System just critical
Drain.

1.0" Rods.
5.4 cm separation c-c
Roundel array's 60 cm length.

Have an 7x7 array with 4 rods removed from 2 columns and 3 rods removed from 2 columns. Total of 35 rods.

0954 Water ht = 75.4 cm
~~System just critical~~
System sub critical.
Drain.

(32)

over.

Added 1 rod. Now have an 7x7 with
 3 rods removed from 3 corners and
 4 rods removed from 1 corner. Total
 of 36 rods.

Water ht = 62.9

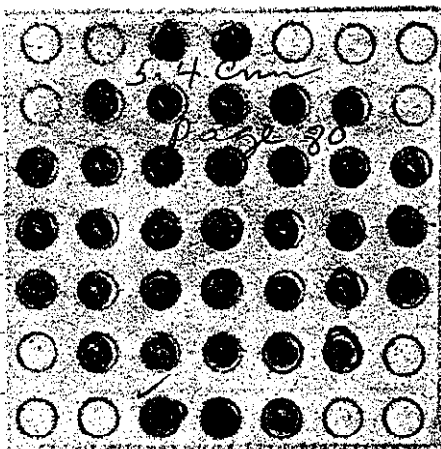
²+ Per

$E = 93.4 \text{ mm} = 10.4 \text{ mm}$

(31)

1033 Water ht = 62.0

Septum just critical
 Drain.



Small Tank Reflector H_2O . (after running H.F.I.R. elements).

Reg # 684522.

$g^{2/9} = 1.6$ ppm.

Pyo 40

10/18/67

9.98% rods in small reflector tank.

Feed rate = 3.5 cm/min

$3/4$ " dump rate = 8.7 cm/min

3.0" dump rate = 111.67 cm/min

30.0 cm rods.

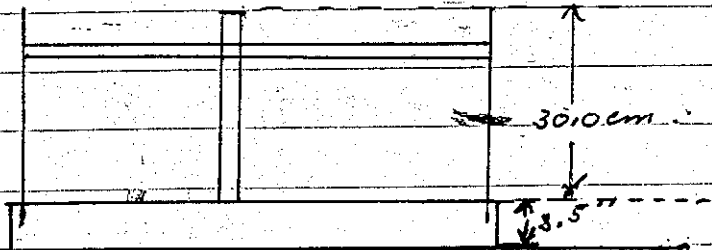
Top of fuel = 12.2 cm

on mirror scale.

0.0 cm on mirror

scale, H_2O is 12.7 cm

below top of fuel.



Top of rods - 30 cm height, = 12.7 cm

60 cm height = 42.7 cm

60 cm height = 30 cm height = 27.5 cm

60 cm height = 57.9 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D I S T A N C E	SET	START-UP RANGE	
K-1	3×10^{-12}	Meter -	2"	-	3×10^{-12}	
"	"	Fast ^	"	-	"	
K-2	"	Meter -	"	-	"	
"	"	Fast ^	"	-	"	
R-1						
R-2						
PM-1	700V	Alarm -	Cont	-	500V	
PM-2	1200V	Low -	12"	-	900V	
"	"	Alarm -	3"	-	"	
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 Z.P.C. AKH Personnel check by I.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 I.P.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKH Time 1345
 Start-up OK'd by I.P.C. AKH Date 10-18-67

30.0 cm lengths.

Check point: .50" rods. (See pages 125-6-7 log book
#1 U(459) Rods.

.50" rods. 2.99 cm center-center.
Have on 12 x 12 array with 12 rods removed
from each corner. Total of 96 rods.

$\sigma_d = 7.90 \text{ cm}$

Water ht = 27.60 cm

Temp °C

① + Per

23.5 °C

$\tau = 106.48 \text{ cm} = 9.4 \text{ ft} = 1.24 \text{ /cm}$

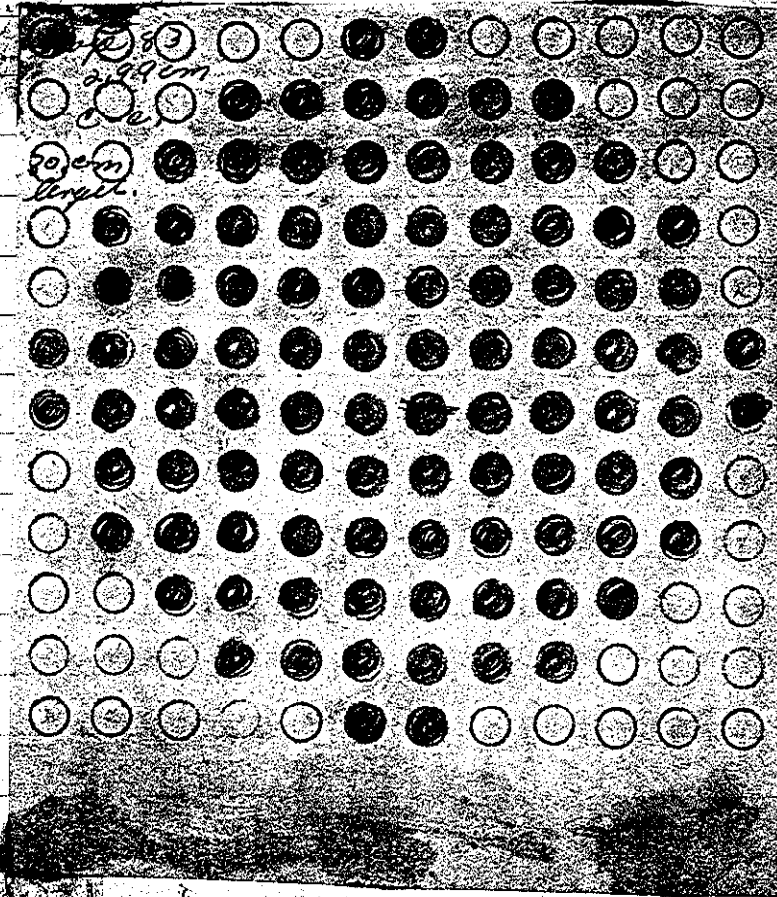
Water ht = 19.70 cm = 7.8 cm Top infiltration.

Log #1

6.2 cm
Rise

System just critical

Drain



INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. 13-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments in trip circuit: K-1 - 2 D19-1-2

Red light on by AKK Time 0810

Start-up OK'd by E.D.C. AKK Date 10/1967

.50" rods.
30.0 cm length.
2.99 cm - c-c separation.

85

Repeat of experiment described on page 83.

Water ht = 27.55 cm $\Delta h = 7.85$ cm
+ Per. Temp $^{\circ}$ C
 $\tau = 96.70$ sec = 10.14 = 23.0 $^{\circ}$ C

0953 Water ht = 19.70 cm
system just critical
Down.

1100 added 520.6 g of H_3BO_3 to dump tank.
(volume = 455.5 L). = ~ .20 g $^{\circ}$ /L

1300 Now have an 12x12 array with 3 rods
removed from each corner. Total of 132 rods.

Water ht = 14.30 cm $\Delta h = 1.10$ cm
+ Per. Temp $^{\circ}$ C
 $\tau = 154.28$ sec = 6.94 = 23.5 $^{\circ}$ C

1330 Water ht = 14.20 cm
system just critical
Down.

over:

Removed 4 rods. Now have on 12x12 with
9 rods removed from each corner. Total
of 128 rods.

Water ht = 15.60 cm $d_1 = 1.5$ cm

$$^3 + \text{Per} \\ C = 108.65 \text{ cm} = 9.34 = 61.9 \text{ ft/cm}$$

13.55 Water ht = 15.45 cm

System just critical
Drain.

Removed ⁴ rods. Now have on 12x12 with
5 rods removed from each corner. Total of
124 rods.

Water ht = 20.10 cm $d_1 = 2.20$ cm

$$^4 + \text{Per} \\ C = 64.10 \text{ cm} = 13.84 = 6.34 \text{ ft/cm}$$

14.35 Water ht = 17.90 cm

System just critical
Drain.

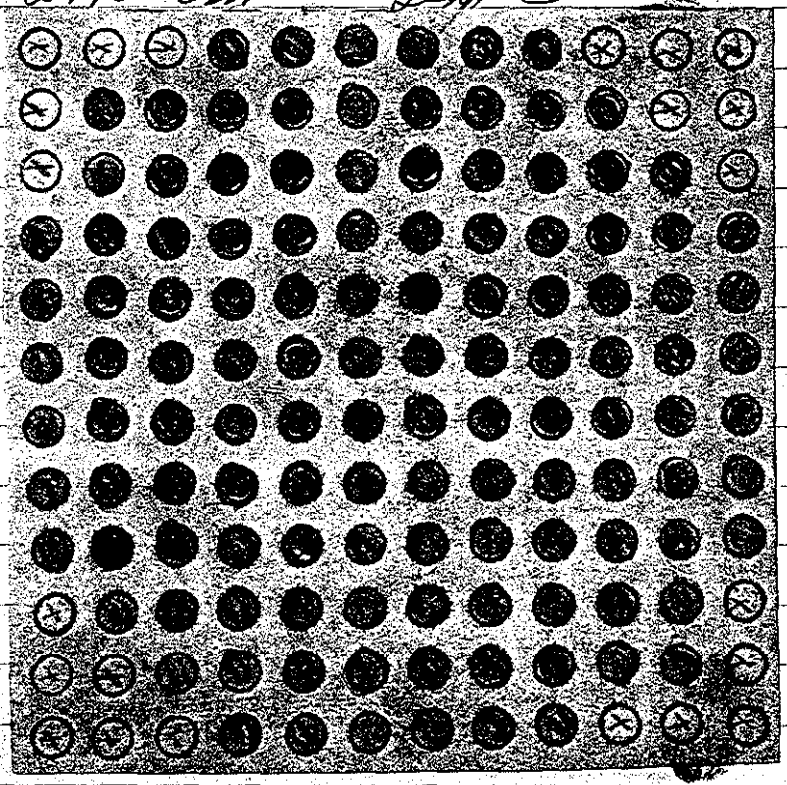
Removed 9 rods. Now have an 12x12 with
6 rods removed from each corner. Total
of ~~120~~¹²² rods.

1450 Water ht = 27.50 cm
System sub critical
Drain

Added 2 rods. Now have an 12x12 with
5 rods removed from 2 corners, and 6 rods
removed from 2 corners. Total of ¹²²~~120~~ rods.

Water ht = 27.50 cm Temp ° = 23.5 °C

5 - Per
C₂ - 109.74 mm
z = 21.67
1515 Drains



INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKK Personnel check by Fiv. C
 Instruments and safeties checked and reset by AKK
 Source in checked by AKK Source No. M-43
 Emergency equipment in each of room checked by Fiv. C
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKK Time 0815
 Start-up OK'd by Fiv. C AKK Date 10/20/67

1.50" rods.
 30 cm length.
 2.99 C-C separation.

Have an 13 x 13 array, with 12 rods removed from each corner. Total of 121 rods.

0850 Water ht = 27.50 cm Temp °C
 System sub critical 23.3 °C
 Drain.

Added 1 rod. Now have an 13 x 13 with 12 rods removed from 3 corners and 11 rods removed from 1 corner. Total of 12

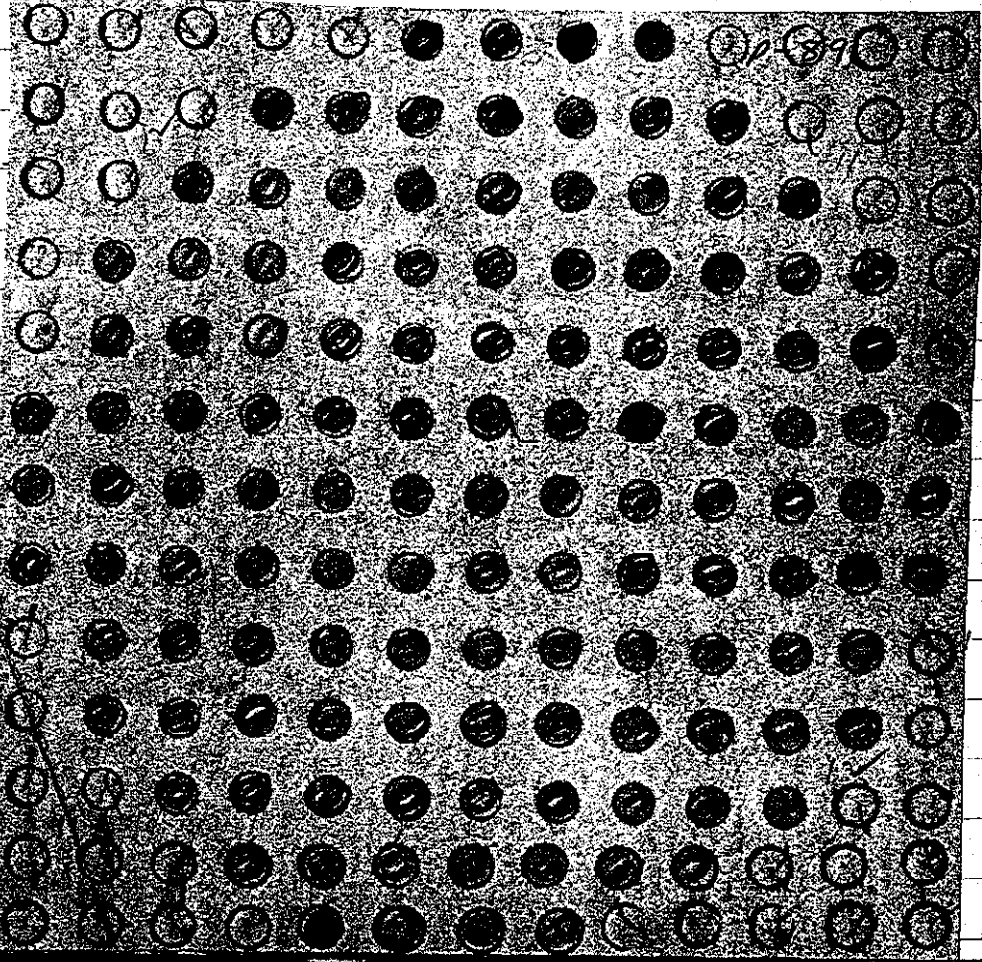
(17)

Water
 - Per

0925 Drain

Added
 12 rods
 rods
 rods
 Water
 + Per
 C = 380

1005 Water
 System



1.50" rods.
30 cm length.
2.99 c-c separation.

89

Have an 13 x 13 array, with 12 rods removed from each corner. Total of 121 rods:

0850 Water ht = 27.50 cm Temp °C
System sub critical 23.3 °C
Drain.

Added
12 rods
removed
of 12

(12)

Water
- Per

0925 Drain

Added 1 rod. Now have an 13 x 13 with 12 rods removed from 2 corners and 11 rods removed from 2 corners. Total of 123 rods.

Water ht = 27.65 cm $z_h = 6.30$ cm Temp °C
+ Per. 23.5 °C
 $c = 380.28 \text{ sec} = 3.14 = .494 \text{ sec}$

1005 Water ht = 21.35 cm
System just critical
Drain.

over.

50 rods,
30 cm length.
2.99 cm c-c separation.

Now have an 10×14 array with 9 pins
removed from 1 corner. Total of 136 pins.

Water ht = 16.20 cm $sl = 1.60$ cm Temp $^{\circ}C$
3 + Per 23.5 $^{\circ}C$
 $C = 43.46 \text{ sec} - 18.04 = 29.94 \text{ sec}$

10.50 Water ht = 15.60 cm
System just critical
Drain.

Removed ⁴ rods. Now have an 10×14 array. Total
of ¹³² rods.

Water ht = 27.60 cm $sl = 8.3$ cm Temp $^{\circ}C$
4 + Per 23.6 $^{\circ}C$
 $C = 109.74 \text{ sec} - 9.24 = 1.14 \text{ sec}$

11.22 Water ht = 19.30 cm
System just critical
Drain.

(17) Removed 1 rod. Now have an $10 \times 14 - 9$.
Total of 131 rods.

Water ht = 27.50 cm $b_h = 5.3$ Temp $^{\circ}C$
 5 + Per 23.5
 $C = 673.63 \text{ sec} = 1.6 \phi = 1.33 \phi / \text{cm}$

1317 Water ht = 22.20 cm
System just critical
Drain.

Removed 1 rod. Now have on 10 x 13. Total
of 130 rods. 13.

1355 Water ht = 27.50 cm

6 - Per
 $C = -608.44 \text{ sec} = -2.3 \phi$

Drain.

Now have on 11 x 12 - 2 array. with 2 rods
removed from 1 corner. Total of 130 pins.

Water ht = 16.80 cm $b_h = .30 \text{ cm}$

7 + Per
 $C = 208.61 \text{ sec} = 5.4 \phi = 18.0 \phi / \text{cm}$

1503 Water ht = 16.50 cm

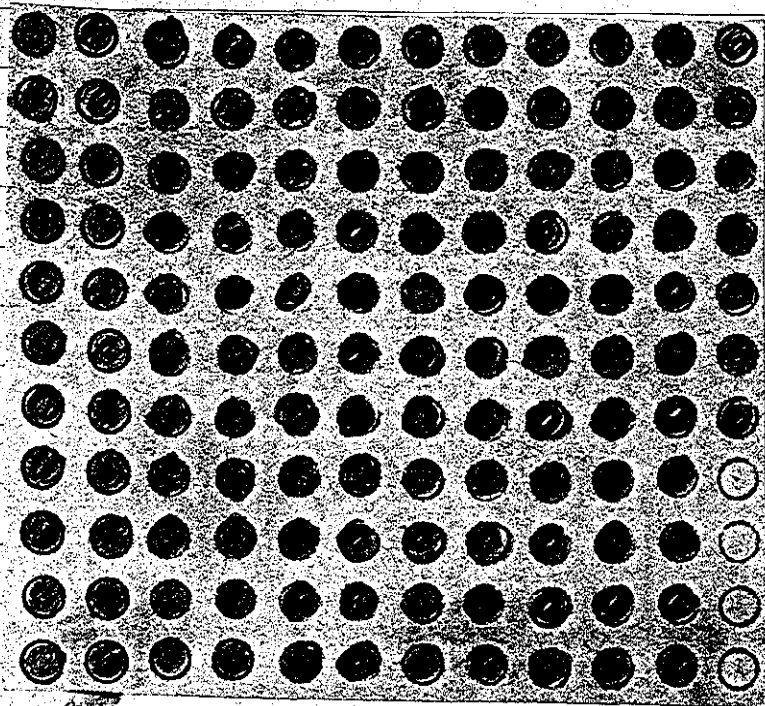
System just critical
Drain.

over.

Removed 2 rods. Now have an 11x12 - array.
Total of 128 rods.

Water ht = 27.70 cm, $\Delta L = 7.8$ Temp $^{\circ}C$
 $\frac{1}{2} + P_{er}$
 $C = 147.76 \text{ m} = 7.2 = .929 \text{ cm}$

Water ht = 19.90 cm
 System just critical
 Drain.



10/23/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3 X 15" ¹²	Water ✓ Frost ✓	2"	✓	3 X 15" ¹²
K-2	3 X 15" ¹²	Water ✓ Frost ✓	2"	✓	3 X 15" ¹²
R-1	—	—	—	—	—
R-2	—	—	—	—	—
PM-1	780V	Alarm ✓	Constant	✓	575V
PM-2	1200V	Low ✓ Alarm ✓	12" 3"	✓	900V

LOG IN CALIBRATE ✓

OPERATE ✓

SOURCE No.

B-80

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by EJ, DC, IDC 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 0845

Start-up OK'd by EJ, IDC Date 10/23/67

10/23/67

Same B concentration. Array 60 cm high
 $9 \times 9 = 81$ rods @ 2.99 center separation.

0919

Water at 27.5 cm. Subcritical.

Temp. 23.0°C

Drain

Now have $9 \times 10 = 90$ rods.

0952

Water at 27.5 cm. Subcritical.

Drain

Now have $10 \times 10 = 100$ rods.

1027

Water at 24.9 cm. + period ^{at = 30 cm} 27

Temp. 23.2°C

$\tau = 89.09 \text{ cm} = 10.84 = 36.0 \text{ ft/cm}?$

Water at 24.6 cm. Slight + period

1040

" " 24.55 cm. Slight - period.

Drain

Now have $9 \times 9 = 81$ rods. Will check "end".

Water at 12.2 cm is at top of rods in bottom tier. Now have $9 \times 9 = 81$ rods.

1141

Water at 57.2 cm. Subcritical.

Top of top tier is 41.9 cm.

Drain.

Now have $9 \times 9 + 5 = 86$ pins (each 60 cm long)

$sh = .60$

1315

W_{st}w at 40.1 cm. + Period #2

Temp. 23.5°C

$$C = 110.82 \text{ cm} = 9.1 \text{ ft} = 15.1$$

1327

W_{st}w at 39.5 cm. Critical.

Drain

Removed 1 pin from row. Now have $9 \times 9 + 4 = 85$ pins.

$sh = .60$

1355

W_{st}w at 42.7 cm. + Period #3

$$C = 126.03 \text{ cm} = 8.2 \text{ ft} = 13.6 \text{ ft/cm}$$

1407

W_{st}w at 42.1 cm. Critical.

Drain.

Removed 1 pin from row. Now have $9 \times 5 + 3 = 48$ pins.

$sh = 10.6 \text{ cm}$

1452

W_{st}w at 57.2 cm. + Period #4

Temp. 23.5°C

$$C = 97.79 \text{ cm} = 10.1 \text{ ft} = 19.5 \text{ ft/cm}$$

1506

W_{st}w at 46.4 cm. Critical.

(15)

Drain.

W_{st}w sample i

96

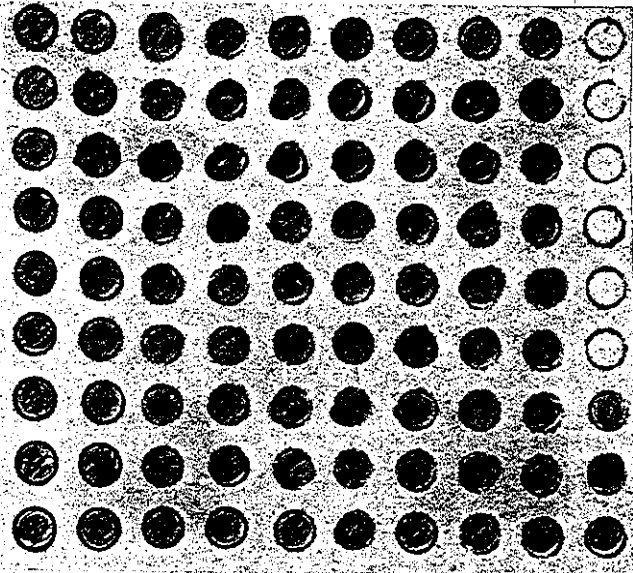
10/23/67

Removed 1 pin. Now have $9 \times 9 + 2 = 83$ pins

1625' Water at 501 cm. Substantial
Drain

(15)

5



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	Meter ✓	2"	✓	3x10 ⁻¹²
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
		Alarm ✓	"	✓	"
LOG N CALIBRATE		OPERATE		SOURCE No. P-80	
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by AKW ^{I.P.C} Personnel check by E.P.C

Instruments and safeties checked and reset by AKW

Source in checked by AKW Source No. M-43

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

Instruments in trip circuit: K-1-2 PM-12

Red light on by AKW Time 0850

Start-up OK'd by I.P.C AKW Date 10/24-67

1.50" rods.
60 cm lengths.
2.99 cm spacing c-c.

Have an 10x10 array with 6 rods removed from each corner. Total of 76 rods.

0933 Water ht = 57.50 cm
System sub-critical
Drain.

Added 4 rods. Now have an 10x10 array with 5 rods removed from each corner. Total of 80 rods.

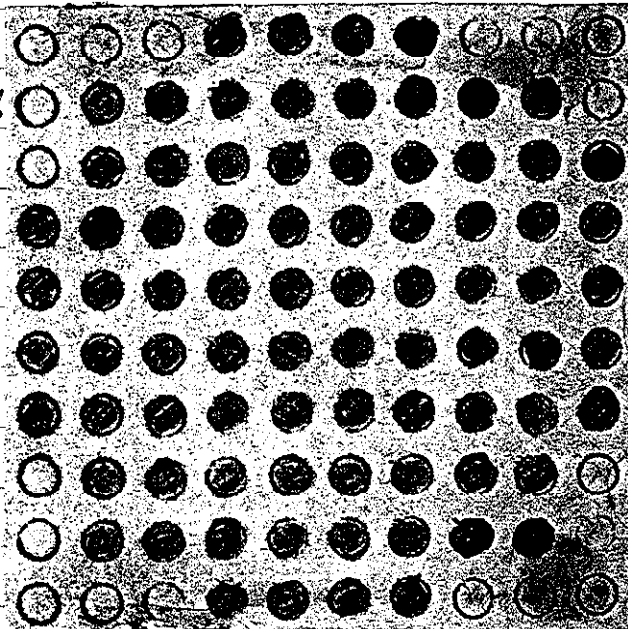
1029 Water ht = 57.50 cm Temp °C
- Pres 7.8. 23.5°

1034 Drain.

Added 1 rods. Now have an 10x10 array with 5 rods removed from 3 corners, and 4 rods removed from 1 corner. Total of 81 rods.

Water ht = 44.00 cm 04:20 Temp °C
+ Pres 3.8 23.5°
C = 152.11 su = 7.04 = 35.04/cm

1116 Water ht = 43.80 cm
 System just critical
 Drain.



(15)

.50" nodes.

30 cm length.

Triangular array, 3.21 cm c-c

$\approx 20 \frac{2}{3}$

Now have an triangular array. Five full
 rings + 4 nodes on each face in 6th rings.
 Total of 115 nodes.

1336 Water ht = 27.50 cm
 System sub critical
 Drain.

added 6 nodes. Now have 5 full rings +
5 nodes on each face in 6th ring. Total of
121 nodes.

1405 Water ht = 27.50 cm
System just critical
Drain.

added 3 nodes. Now 6 full rings - 3 nodes
at points on every other face in 6th ring.
Total of 124 nodes.

Water ht = 18.1 cm $0.4 = 1.05 \text{ cm}$

³ + Per

$$T = 67.36 \text{ sec} = 13.3 \text{ ft} = 12.7 \text{ ft/cm}$$

13.37 Water ht = 17.05 cm
System just critical
Drain.

Removed 1 node. Now have 123 nodes. See
array as shown on page 101.

$D_h = 111 \text{ cm}$

Water ht = 19.10 cm

4 + P_{ss}

$\bar{v} = 86.92 \text{ mm} = 11.0 \text{ ft} = 10.0 \text{ ft/cm}$

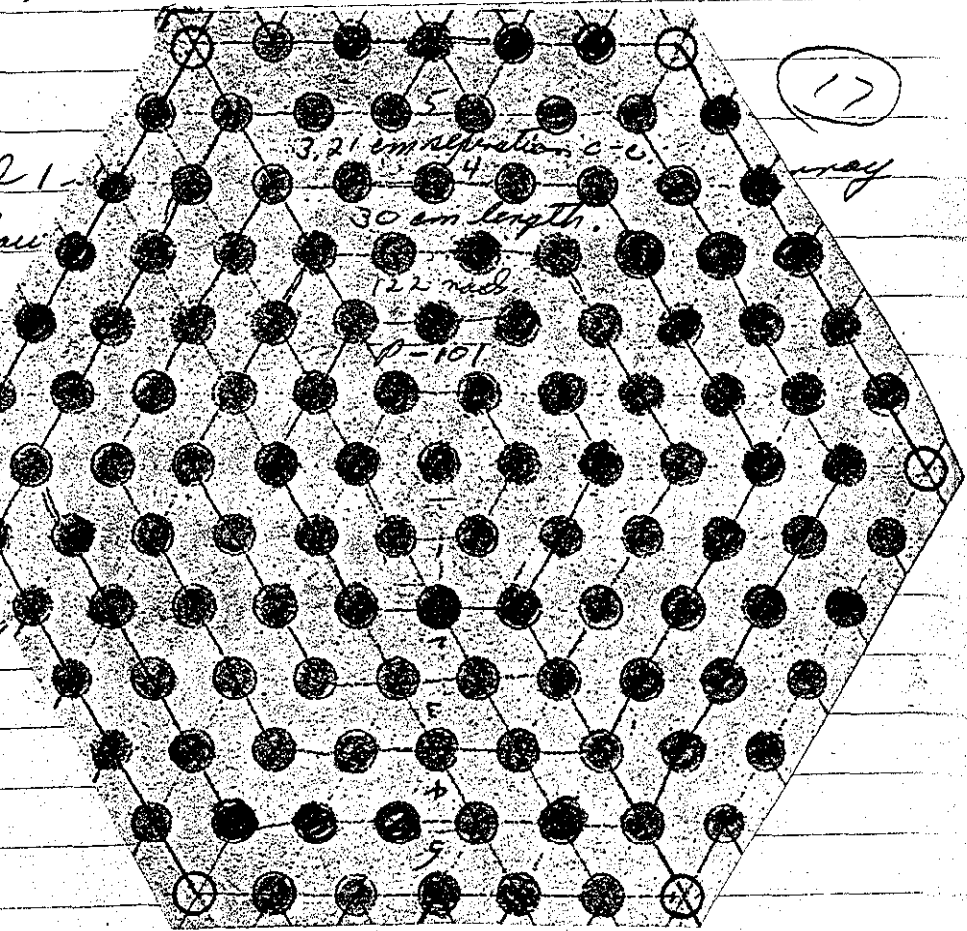
1458 Water ht = 18.00 cm

System just critical
Drain

Remaind 1-
as show

Water
5 + P_{ss}
 $\bar{v} = 2$

1525 Water
System
Drain



Water
 $4 + P_{15}$
 $5 = 8$

1458

Wa
 hyper
 Drain

Remained 1 rad. Now have 122 rads. see array
 as shown.

Water ht = 27.50 cm $0.2 = 7.00$
 $5 + P_{15}$
 $5 = 223.82 \text{ sec} = 5.1 \text{ \& } 2.73 \text{ H/cm}$

Temp $^{\circ}$
 23.6 $^{\circ}$

1525

Water ht = 20.50 cm
 system just critical
 Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	X10 ⁻¹²	Master ✓	2"	-	3-110 ³⁻¹²
"	"	Fast ✓	"	-	"
K-2	"	Master ✓	"	-	"
"	"	Fast ✓	"	-	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont 500V		
PM-2	1200V	Alarm ✓	12" 900V		
"	"	Alarm ✓	3" "		
LOG-N CALIBRATE		✓	OPERATE	✓	SOURCE No. D-50
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by Z.P.C. AKV Personnel check by Z.P.C.
 Instruments and safeties checked and reset by AKV
 Source in checked by AKV Source No. M-93
 Emergency equipment in control room checked by Z.P.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKV Time 0825
 Start-up OK'd by Z.P.C. AKV Date 10/25/67

1.50" rods.
60 cm length.
Triangular array. 3.21 cm separation c-c
~ 20 g/pl

103

Now have an ~~triangular~~ triangular array; ~~total~~
Have 4 full rings, plus 3 rods on each
face in 5th ring. Total of 79 rods.

0910 Water ht = 57.50 cm
System sub critical.
Drain.

Added 2 rods. Now have 4 rods on opposite
face and 3 rods on 4 faces in 5th ring.
Total of 81 rods.

Water ht = 43.70 cm ^{D_h = 160 mm} Temp °C
+ Pen 23.3 °C
C = 134.73 = 7.84 = 12.94 mm

0956 Water ht = 43.10 cm
System just critical
Drain.

over.

104

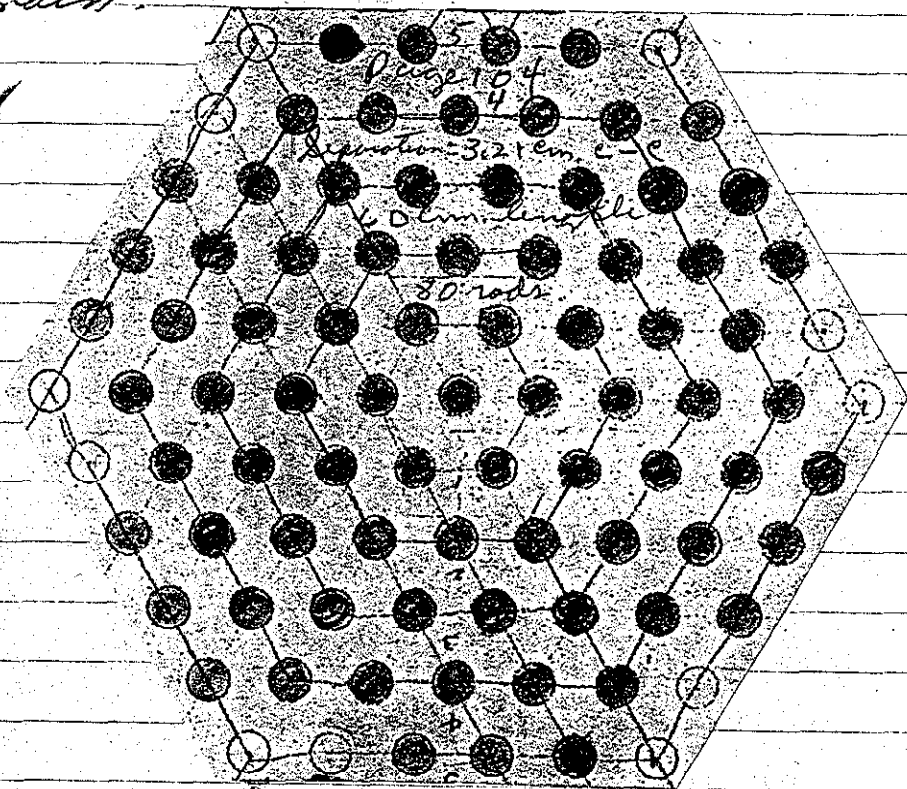
.50" rods. 60 cm length,
3.21 cm c-c separation
Triangular array.

Removed 1 rod. Now have 9 full rings
plus 3 rods on 5 faces and 4 rods on 1
face. Total of 80 rods.

10.42 Water ht = $\frac{57.6 \text{ cm}}{5.5}$

System just critical
Drain.

18



10/25/67

B solution samples:

Avg: 0.1425 g B/L

(10/19/67)

(10/23/67)

#1 Y-12 Ref # 684525

#2 Y-12 Ref 684526

ask for:

ask for:

1 = g B/L = 0.143

1 = g B/L = 0.141

2 = density = .9967

2 = density = .9979

3 = temp °C = 76°F

3 = temp °C = 76.5°F

(10/19/67)

(10/23/67)

#1-A X-10 A-625

#2-A X-10 A-625

ask for:

ask for:

1 = wt% B = 0.139 g B/L

1 = wt% B = 0.139 g B/L

2 = density = 0.9968

2 = density = .9967

3 = temp °C = 24.0°C

3 = temp °C = 24.0°C

REQUISITION 684525

OK

DATE: 10/25/55
 TIME: 8:29 PM

L.S.P.L.

L.D.B.

X-10 PRIORITY

REPORT TO: *R. A. Reed*
 BUILDING NO.: 9213
 PHONE NO.: 3-5237

REQUISITION 684526

OK

DATE: 10/25/55
 TIME: 3:27 PM

L.S.P.L.

L.D.B.

X-10 PRIORITY

REPORT TO: *R. A. Reed*
 BUILDING NO.: 9213
 PHONE NO.: 3-5237

					g U/g
					g Ay/g
					g D/g
					g H/g
					g Mo/g
					g F/g
					ASSAY

0.143gB/L

Density - Temp

.9967

76.0 F

REPT. BY

DATE 11-7-67

DEPT.

OT TROMER

OT TROMER

OT TROMER

					g U/g
					g Ay/g
					g D/g
					g H/g
					g Mo/g
					g F/g
					ASSAY

0.141gB/L

Density - Temp

.9979g/L

76.5 F

REPT. BY

DATE 11-7-67

DEPT.

OT TROMER

OT TROMER

OT TROMER

INSTRUMENT CHECK

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

LOG IN CALIBRATE OPERATE SOURCE No. B-80

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-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 AKM Time 0940

Start-up OK'd by F.D.C. AKM Date 10/26/67

1.0" Rods.

4.39 cm separation c-c.

30 cm length.

Square array.

≈ 20792

Have an 8x8-6 array. Total of 58 rods.

1012

Water ht = 27.50 cm

Temp $^{\circ}C$

System sub critical

23.5 $^{\circ}C$

Drain.

added 1 rod. Now have an 8x8-5. Total of 59 rods.

1035

Water ht = 27.60 cm

System sub critical

Drain.

(1)

added 1 rod. Now have an 8x8-4. Total of 60 rods.

Water ht = 27.60 cm

~~System sub~~ + Per.

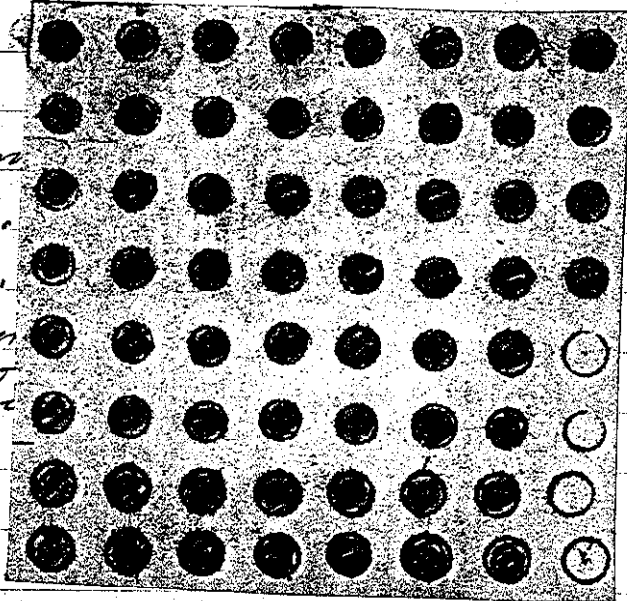
$E = 199.92 \text{ sec} = 5.64 =$

1057

Water ht = 20.10 cm

System just critical

Drain.



1.0" Rods.

4.39 cm separation c-c.

30 cm lengths.

Square array.

$\approx .20792$

Have an 8x8-G array. Total of 58 rods.

1012

Water ht = 27.50 cm

Temp °C

System sub critical

23.5 °C

Drain.

added 1 rod. Now have an 8x8-5. Total of 59 rods.

1035

Water ht = 27.60 cm

System sub critical

Drain.

added 1 rod. Now of 60 rods.

Water ht = 27.60 cm 7.5

Temp °C

~~System sub~~ + Per.

23.6 °C

$E = 199.92 \text{ cm} = 5.64 = 1.75 \text{ ft/cm}$

1057

Water ht = 20.10 cm

System just critical.

Drain.

1.0" Rads.
 4.39 cm separation e-c.
 30 cm lengths. ~ 20% 4L
 rounded array.

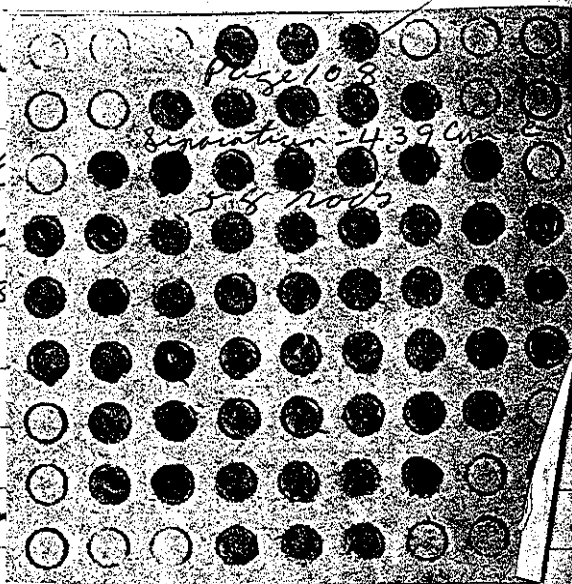
Now have an 9x9 array with 6 rods removed
 from each corner. Total of 57 rods.

1.300 Water ht = 27.70 cm
 System sub critical
 Drain.

Added 1 rod. Now 6
 rods removed from 3 c
 1 corner. Total of 58

Water ht = 27.50 cm
 + P.S.
 $S = 73.88 \text{ cm} = 12.44 = 19.44 \text{ cm}$

1.322 Water ht = 18.70 cm
 System just critical
 Drain.



1.0" Rods.
 4,39 cm separation c-c.
 30 cm lengths. ~ 20 g/l
 rounded array.

Now have an 9x9 array
 from each corner. La

1.3.00 Water ht = 27.70 cm
 System sub critical
 Drain.

Added 1 rod. Now have an 9x9 with 6
 rods removed from 3 corners and 5 from
 1 corner. Total of 58 rods.

Water ht = 27.50 cm $\Delta h = 8.5 \text{ cm}$ Temp $^{\circ}\text{C}$
 + P.H.
 $E = 73.88 \text{ mm} = 12.44 = 1.94 \text{ H cm}$ 23.5 $^{\circ}\text{C}$

1.3.22 Water ht = 18.70 cm
 System just critical
 Drain.

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by E.D.C./AKH Personnel check by Z.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 Z.P.C.
 Instruments in trip circuit: K-1 PM-1-2
 Red light on by AKH Time 10 45
 Start-up OK'd by Z.P.C./AKH Date 10/31/67

and

110

1.0" Rods

4.39 cm separation c-c

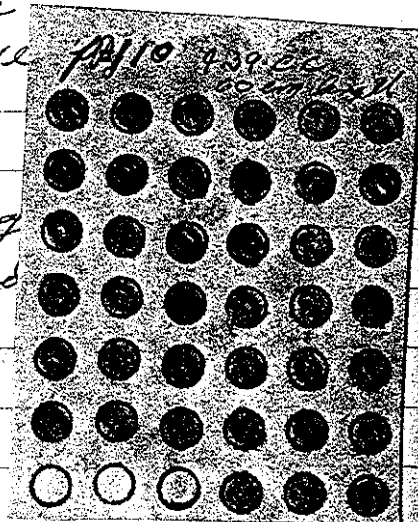
60 cm length. $\approx 20\% \text{ H}_2\text{O}$

square array.

Now on $6 \times 7 = 3$ array. Total of
 water (this is all of the ^{available} ~~available~~ rods)

1120

Water ht = 57.50 cm

System sub-critical
 Drain.

Rounded array.

Now have an 7×7 array, with 3 rods removed
 from 2 corners and 2 rods removed from
 2 corners. Total of 39 rods.

1315

Water ht = 40.85 cm

System just critical
 Drain.Temp $^{\circ}\text{C}$ 23.2 $^{\circ}\text{C}$

Removed 1 rod. Now have 7×7 array, with 3
 rods removed from 3 corners and 2 rods
 removed from 1 corner. Total of 38 rods.
 Temp = 111

1111.

110

1.0" Rods

4.39 cm separation c-c

60 cm length. ≈ 209 rods

square array.

Have an $6 \times 7 = 3$ array. Total of 39 rods.
 Note: (this is all of the ^{available} rods.)

1120

Water ht = 57.50 cm

Temp °C

System sub critical

23.1 °C

Drain.

Rounded array.

Now have an 7×7 array, with 3 rods removed
 from 2 corners and 2 rods removed from
 2 corners. Total of 39 rods.

1315

Water ht = 40.85 cm

Temp °C

System just critical

23.2 °C

Drain.

Removed 1 rod. Now have 7×7 array, with 3
 rods removed from 3 corners and 2 rods
 removed from 1 corner. Total of 38 rods.
 hup - 111.

1111.

Water ht = 57.50 cm

(1) T.P.S.

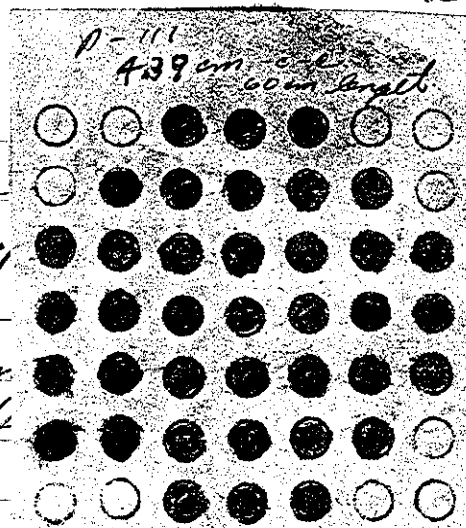
$$C = 86.92 \text{ sec} = 11.04 = .9151$$

1365 Water ht = 46.20 cm

System just critical

Drain.

(3)



Removed 1 nod. Now have on 7x7 array with 3
nodes removed from each corner. Total of
37 nodes.

1436 Water ht = 57.50 cm.

System sub critical

Drain.

Temp °C

23.5 °C

Water ht = 57.50 cm Δ ht = 11.3 cm

(1) + P.S.

$C = 86.92 \text{ cm} = 11.04 = .914/\text{cm}$

1355 Water ht = 46.20 cm

System just critical

Drain

3

Temp °C

23.5°C

Removed 1 rod. Now have on 7x7 array with 3 rods removed from each corner. Total of 37 rods.

1436 Water ht = 57.50 cm.

System sub critical

Drain.

Temp °C

23.5°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	3×10^{-12}	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"
LOG-N CALIBRATE		✓	OPERATE	✓	SOURCE No.
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. 19-93

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

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

Red light on by AKK Time 0812

Start-up OK'd by F.D.C. AKK Date 11/1/67

1.0" rods.
4.72 cm separation c-c.
30 cm length. ~.20 g/l.
Triangular array.

113

Have on Triangular array, with 2 rods removed from the 4th ring, on opposite points. Total of 59 rods.

Water ht = 15.00 cm $\delta h = .25$ cm

1 + Per

$$C = 84.25 \text{ sec} = 11.2 \phi = 44.8 \text{ H cm}$$

0845 Water ht = 14.75 cm.

System just critical
Drain.

Removed ~~two~~ 2 rods from opposite points in 4th ring. Now have a total of 57 rods.

Water ht = 17.00 cm $\delta .35$

Temp °C

2 + Per.

23.2 °C

$$C = 154.28 \text{ sec} = 6.9 \phi = 19.7 \text{ H cm}$$

0911

Water ht = 16.65 cm

System just critical
Drain.

aver.

Removed 3 rods. Now have 3 full rings,
with 3 rods on 5 faces, and 2 rods on 1 face
in the 4th ring. Total of 54 rods.

0940 Water ht = 27.60 cm

Temp °C

System sub critical
Drain.

23.5 °C

added 1 rod. Now have 3 full rings,
with 3 rods on each face in the 4th
ring. Total of 55 rods.

1004 Water ht = 27.50 cm

System slightly sub critical
Drain.

added 1 rod. Now have 3 full rings, with 3
rods on 5 faces and 4 rods on 1 face in the
4th ring. Total of 56 rods.

Water ht = 27.60 cm

³ + Per

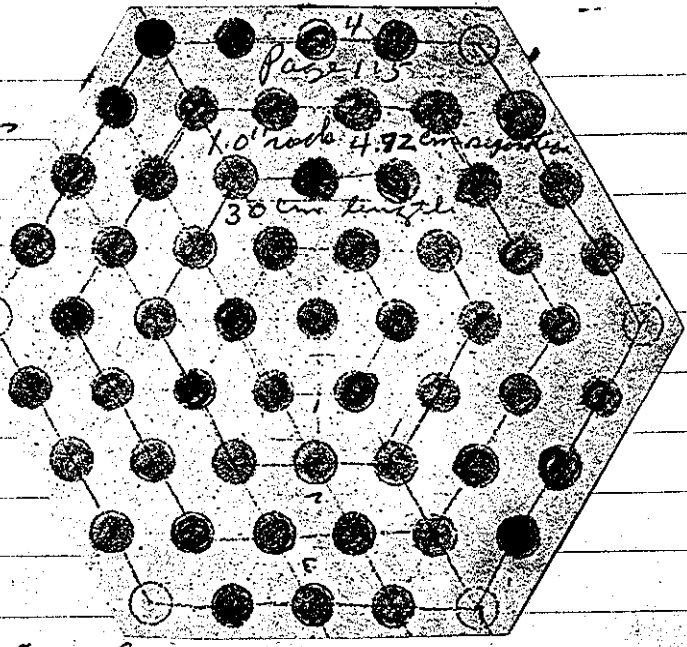
$C = 130.38 \text{ mm} = 8.04 = 1.0$

1030

Water ht = 19.1

System just critical
Drain.

(4)



1.0" rods.

4.72 cm separation c-c

60. cm lengths.

Triangular array.

Have an triangular array. 3 full rings
Total of 37 rods.

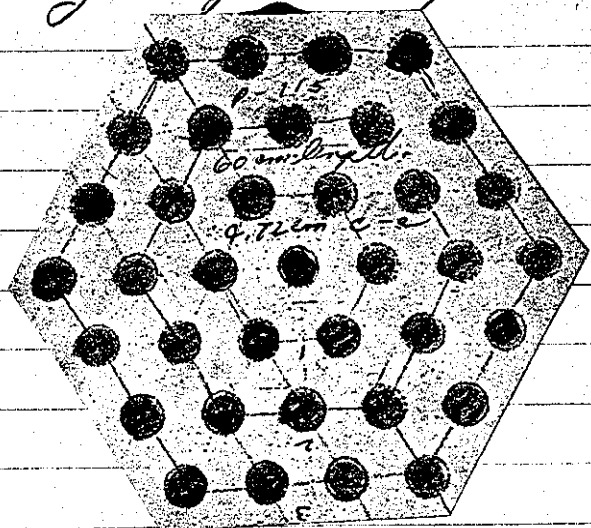
1330

Water ht = 57.90 cm.

³ Per

System just critical
Drain.

(5)



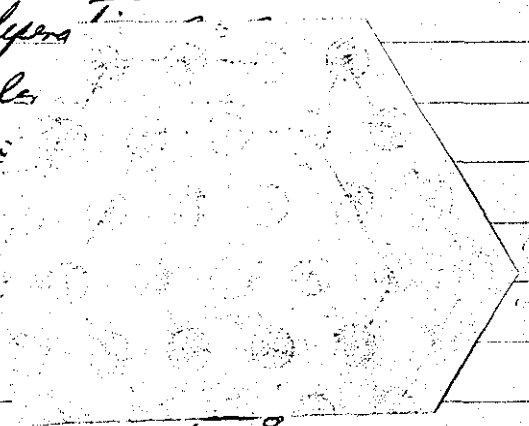
Water ht = 27.60 cm
3 + per - Dh = 7.9 cm

$C = 130.38 \text{ mm} = 8.04 = 1.01 \text{ Ham}$

1030 Water ht = 19.70 cm.
System just critical
Drain. (4)

1.0" rods.
4.72 cm Spers T.
60. cm ls
Triangular

Have an Triangular
Total of 37 rods.



1330 Water ht = 57.90 cm. Temp °C
3 per 23.7e

System just critical
Drain (5)

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by F.A.C. AKM Personnel check by r

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. 19-23

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

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

Red light on by AKM Time 1045

Start-up OK'd by F.A.C. AKM Date 11/3/67

Run For O.R.I.N.S.

117

Repeat of experiment described on p 114-115.

Triangular array: 30 cm length. Total of 56 rods.

Water ht = 27.60 cm

¹ + h_{cr}
 $C = 217.30 \text{ sec} = 5.2 \text{ \&}$

11.20

Water ht = 20.30 cm

System just critical

Water ht = 27.60

² + h_{cr}
 $C = 230.34 \text{ sec} = 4.9 \text{ \&}$

11.40

Water ht = 20.60

System just critical:

System screwed with screw button: + K-1
monitored

Sample taken 11-1-67.

11-6-67

Reg # 68 4527 -Y-12

Reg A A-626.

sub for:

sub for:

$\rho_{B/L} = .142$

$\rho_{B/L} = .140$

Temp °C = 9980

Temp °C

Density = 24.9°C

Density

INSTRUMENT CHECK

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

LOG N CALIBRATE _____

OPERATE _____

SOURCE No. 0-80

DUMP WELL TROBE LIGHT _____

REQUISITION

684527 79

E.D.B.

EX-10 PRIORITY

SSK

SIL

REPORT TO

R. X. Radey

BUILDING NO.

9213

PHONE NO.

35237

START-UP CHECK LIST

Equipment checked by E.P.C. R.H.H. Personnel check by E.P.C.
 Instruments and safeties checked and reset by R.H.H.
 Source in checked by R.H.H. Source No. 12-43
 Emergency equipment in control room checked by E.P.C.
 Instruments in trip circuit: K-1-2 P.M.-1-2
 Red light on by R.H.H. Time 0815
 Start-up OK'd by E.P.C. R.H.H. Date 11/7/67

.30" rods.

30.0 cm length.

Square array: 2.05 cm separation c-c.
~ .14 g/l

Have on 15x15 array. Total of 225 rods.

0850

Water ht = 27.50 cm
System sub critical
Drain

Temp $^{\circ}$
22.0 $^{\circ}$

Added 15 rods. Now have an 15x16 array.
Total of 240 rods.

0926

Water ht = 27.50 cm
System sub critical
Drain

over

added 16 rods. Now have an 16 X 16 array.
Total of 256 rods.

0948 Water ht = 27.90 cm
System sub critical
Drain

added 16 rods. Now have an 16 X 17 array.
Total of 272 rods.

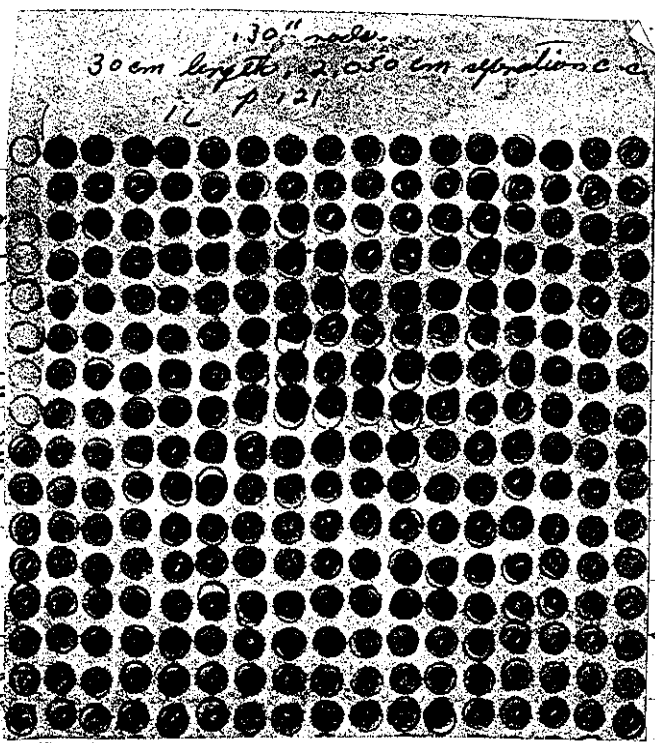
Water ht = 16.00 cm $\Delta h = .20$ Temp $^{\circ}\text{C}$
+ Per 21.9 $^{\circ}\text{C}$
 $C = 43.46 \text{ cm} = 18.0 \text{ ft} = 90.0 \text{ ft/cm}$

1016 Water ht = 15.80 cm.
System just critical
Drain

Remaind 6 rods. Have an 16 X 16 + 10 on 1
face. Total of 266 rods.

Water ht = 18.90 cm. $\Delta h = .115$ Temp $^{\circ}\text{C}$
+ Per 22.0 $^{\circ}\text{C}$
 $C = 71.71 \text{ cm} = 12.7 \text{ ft} = 11.0 \text{ ft/cm}$

1035 Water ht = 17.75 cm.
System just critical
Drain



Removed 3 rods
 1 face. Total
 water ht =
 system slg
 Drain

des on

19

16

added 1
 1 face. Total

des on

1125 Water ht = 27.70 cm Temp °C
 system just critical 22.9 °C
 Drain.

Rounded array:

30" rods. 30 cm lengths.
 7.050 cm separation c.c.

We have an 17x17 array, with 7 rods removed from
 7 corners and 6 rods removed from 2 corners.
 Total of 263 rods.

Water ht = 16.40 cm, $oh = 0.55$ Temp °C
³+ Per 22.5 °C
 $U = 60.84 \text{ sec} = 14.34$

1350 Water ht = 15.85 cm
 system just critical; Drain.

Removed 3 rods. Have an $16 \times 16 + 7$ rods on
1 face. Total of 263 rods.

Water ht = 27.60 cm
System slightly sub critical.
Drain.

19
6

Added 1 rod. Have an $16 \times 16 + 8$ rods on
1 face. Total of 264 rods.

1125 Water ht = 27.70 cm Temp °C
System just critical 22.9 °C
Drain.

Rounded array:

30" rods. 30 cm length.

2.050 cm separation c.c.

Have an 17×17 array, with 7 rods removed from
2 corners and 6 rods removed from 2 corners.
Total of 263 rods.

Water ht = 16.40 cm, 0.4255 Temp °C
³+ Per 22.5 °C
 $\zeta = 60.84 \text{ cm} = 14.34$

1350 Water ht = 15.85 cm
System just critical: Drain.

Remained 6 rods. Now have on 17x17 array, with
 8 rods removed from each corner. Total of
 257 rods.

Water ht = 19.60 cm $\Delta h = 1.70$ cm

4 + Per.

$\tau = 73.88 \text{ sec} = 12.44 = 7.34 \text{ cm}$

14:15 Water ht = 17.90 cm

System just critical
 Drain.

Remained 2 rods. Now have on 17x17 array, with
 9 rods removed from 2 corners, & 8 rods removed
 from 2 corners. Total of 255 rods.

Water ht = 27.50 cm $\Delta h = 7.55$

5 + Per

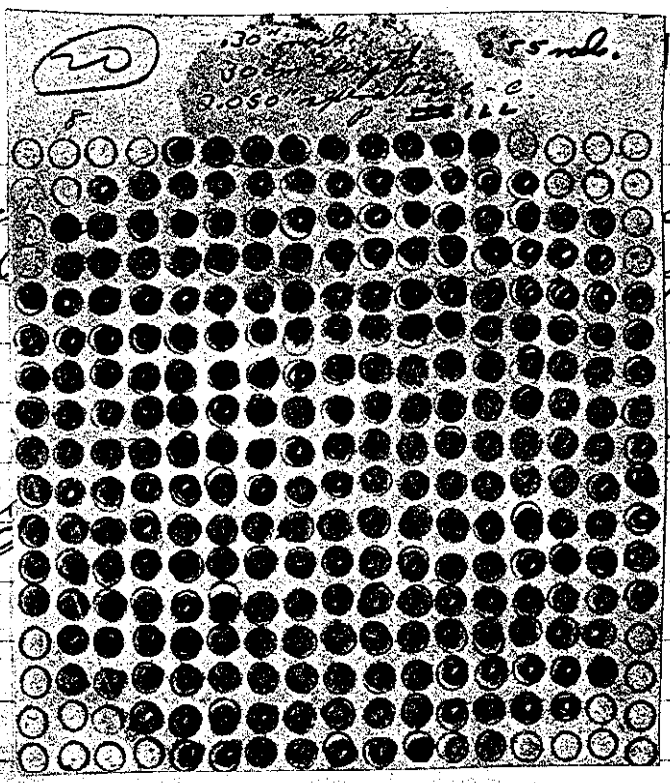
$\tau = 171.67 \text{ sec} = 6.44 = 8.54 \text{ cm}$

Temp °C

22.8 °C

14:40 Water ht = 19.95 cm

System just critical
 Drain.



Removed 2 rods
 9 rods removed
 253 rods.

1500

Water ht =
 System slight
 Drain.

with
 of
 2
 4

Removed 2 rods. Now have an 17x17 array, with
9 rods removed from each corner. Total of
253 rods.

1500

Water ht = 27.60 cm

252

System slightly sub critical.

Drain.

DUMP WILL TRUDE LIGHT

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-13X10-12	12	Master	2"	-	3X10-12
"	"	Fast	"	-	"
K-2	"	Master	"	-	"
"	"	Fast	"	-	"
"	"	Master	"	-	"
"	"	Fast	"	-	"
"	"	Master	"	-	"
"	"	Fast	"	-	"

SOURCE No. 8-80

OPERATE

LOC N CALIBRATION

INSTRUMENT CHECK

START-UP CHECK LIST

Equipment checked by FID.C AKH Personnel check by FID.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 FID.C

Instruments in trip circuit: K-1-2 PM9-1-2

Red light on by AKH Time 0910

Start-up OK'd by FID.C AKH Date 11-9-67

130" rods,
60.0 cm length.
Square array, 2.05 cm separation, c-c, 725
~ 14792.

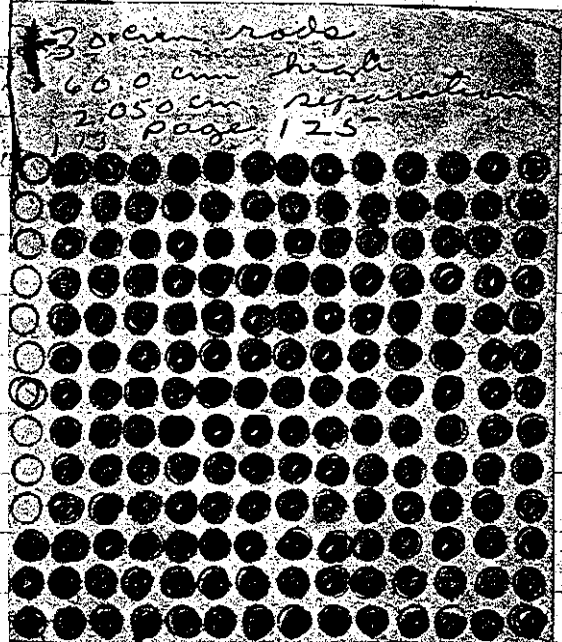
10.55 Have on 13x13 array. Total of 169 rods:
Water ht = 57.50 cm Temp °C
System sub critical 22.3 °C
Drain.

Added 7 rods. Now have on 13x14-6. Total
of 176 rods.

10.47 Water ht = 40.55 cm.
System just critical
Drain.

Removed 4 rods. Now have on 13x14-10, Total
172 rods.

1.407. Water ht = 57.60 cm
System just critical
Drain.



(21)

over.

130 rods.
60.0 cm length.
Square array. 2.050 cm separation c-c. -125
~ 149 rods.

1055 Have on 13x13 array. Total of 169 rods.
Water ht = 57.50 cm Temp °C
System just critical 22.3 °C
Drain.

added 7 rods. Now have on 13x14-b. Total
of 176 rods.

1047 Water ht = 40.55 cm.
System just critical
Drain.

Removed 4 rods. Now
172 rods.

1407. Water ht = 57.60 cm
System just critical 22.7 °C
Drain.

(21)

over

Rounded array:

Have on 17x14-28 array. 7 rods removed from each corner. Total of 168 rods.

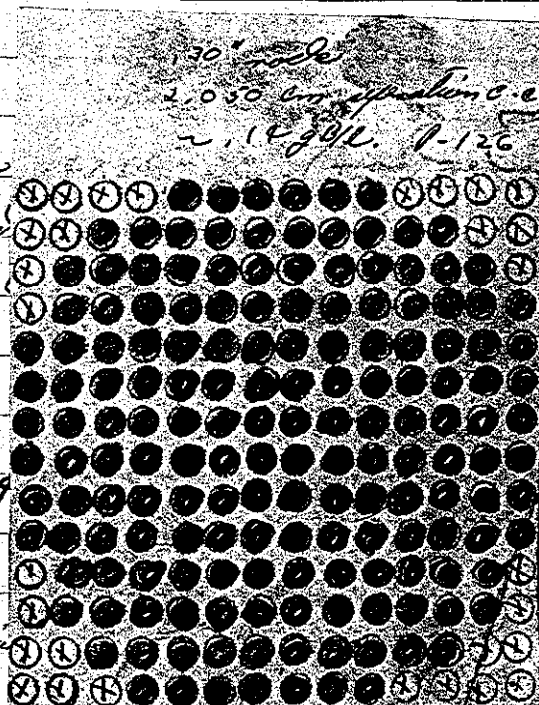
Water ht = 44.20 cm ^{2h = 1.15} Temp °C
 + Per 23.0 °C
 E = 67.36 m = 13.34

1515 Water ht = 43.05 cm
 System just critical
 Drain.

Removed 2 rods. Have from 2 corners, one corner. Total of 14.

(5) Water ht = 57.60 cm
 + Per
 E = 112.99 m = 9.04 = .809

1600 Water ht = 46.40 cm
 System just critical
 Drain.



Rounded array:

Have on 14x14-28 array. 7 rods removed from each corner.

Water ht = 44.20 cm

① + per

$$E = 67.36 \text{ cm} = 13.54$$

1515 Water ht = 43.05 cm

System just critical
Drain.

Removed 2 rods. Have 14x14-30. 7 rods removed from 2 corners, and 6 removed from 2 corners. Total of 166 rods.

②

Water ht = 57.60 cm

DL = 11.2 cm

Temp °C

+ per

23.5 °C

$$E = 112.99 \text{ cm} = 9.04 = 1.80 \text{ ft cm}$$

1600

Water ht = 46.40 cm

System just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3-110-12	Meter	2"	✓	3-110-12
	"	Fast	"	✓	"
K-2	"	Meter	"	✓	"
	"	Fast	"	✓	"
R-1					
R-2					
PM-1	7000	Alarm	50"	✓	5000
PM-2	12000	Low	10.0"	✓	9000
	"	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 R.H. RC

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-43

Emergency equipment in control room checked by AKM

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

Red light on by AKM Time 1230

Start-up OK'd by D.C. AKM Date 11/10/67

128

.30" nads.
60.0 cm length.
Rounded array: 2.050 cm separation c.c.
~.142 0/l.

Removed 1 nad; Now have on 14X18-3L.
8 nads removed from 3 corners; and 7
nads removed from 1 corner. Total of 165
nads.

1.305 Water ht = 57.70 cm
system sub critical
Drain.

11/13/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3x10 ⁻¹²	✓	2"	✓	3x10 ⁻¹²
K-2	3x10 ⁻¹²	✓	2"	✓	3x10 ⁻¹²
R-1					
R-2					
PM-1	300V	Alarm ✓	Contact	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
		Alarm ✓	2"	✓	
LOG	CALIBRATE ✓	OPERATE ✓	SOURCE No.	B-60	
DUMP WITH RED LIGHT	_____				

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR
 Instruments and safeties checked and reset by EQ
 Source in checked by RKR Source No. M-43
 Emergency equipment in control room checked by EQ
 Instruments in trip circuit: K-1, 2, PM-1, 2
 Red Light on by EQ Date 0840
 Start-up OK'd by RKR, EQ Date 11/13/67

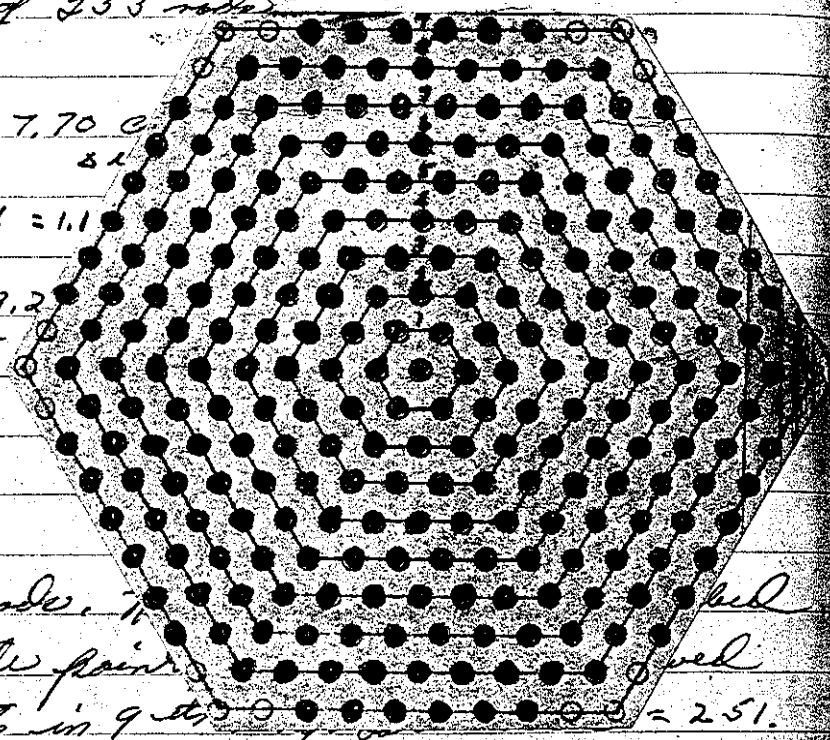
30" nodes. Triangular array.
 2,200 cm separation c-c.
 30 cm length. ~.14 g/l.

Have an Triangular array. 9 full rings, and
 3 nodes removed from each point in the 9th
 ring. Total of 253 nodes.

(M)
 (N)

Water ht = 27.70 cm
 + Per
 $t = 110.82 \text{ m} = 9.14 = 1.1$

0940 Water ht = 19.2
 System just
 Drain.



Removed 2 nodes
 from 2 opposite points
 from 4 points in 9th ring = 251.

Water ht = 27.65 cm
 2 - Per.
 7.5.

1008 Drain;

130

30" nodes. Triangular array.
2,200 cm separation c-c.
30 cm length. 2.11

Have an triangular array. 9
3 nodes removed from each
ring. Total of 253 nodes

(N)

Water ht = 27.70 cm
t. Per $\delta h = 9.5$ cm
 $c = 110.82 \text{ m} = 9.14 = 1.14/\text{cm}$

0940 Water ht = 19.20 cm
system just critical
Drain.

Removed 2 nodes. Now have 4 nodes removed
from 2 opposite points, and 3 nodes removed
from 4 points in 9th ring. Total nodes = 251.

Water ht = 27.65 cm
2 - Per.
7.6.

1008 Drain;

~~30~~ .30" Rods.
2.200 cm separation c-c.
60 cm lengths. ≈ 1.4281 .

131

Have an triangular array. 7 full rings. Total of
⁹
169 pins.

Water ht = 42.90 cm. $\Delta h = 1.0$ cm

³ + Per

$$C = 58.67 \text{ sec} = 14.74 = 14.74/\text{cm}$$

1325 Water ht = 41.90 cm

System just critical

Drain. Repeat + Per.

Water ht = 43.00 cm $\Delta h = 1.1$ cm

⁴ + Per

$$C = 54.33 \text{ sec} = 15.54 = 14.14/\text{cm}$$

1333 Water ht = 41.90 cm

System just critical

Drain.

INSTRUMENT CHECK

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

START-UP CHECK LIST

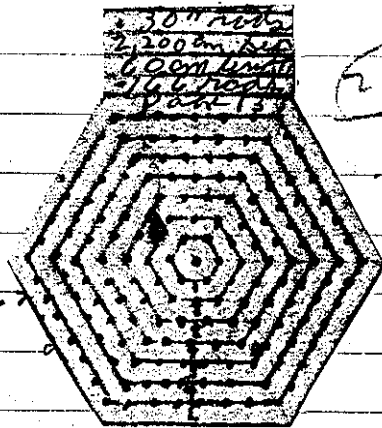
Equipment checked by F.D.C. RKL Personnel check by F.D.C.
 Instruments and safeties checked and reset by RKL
 Source in checked by RKL Source No. M-93
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by RKL Time 1235
 Start-up OK'd by F.D.C. RKL Date 11/15/67

Removed 3 rods, 1 from each outer corner.
 Total of 166 rods. (see page 131.)

Water ht = 57.60 cm $d_h = 11.55 \text{ cm}$ Temp $^{\circ}\text{C}$
 1 + Per. 24.8°C
 $C = 85.61 \text{ cm} = 10.24 = .88\%/\text{cm}$

1320 Water ht = 46.05 cm.
 System just critical
 Drains $\approx 5 \text{ cm}$, repeat + Per.

Water ht = 57.70 cm $d_h = 10.1$
 2 + Per
 $C = 108.65 \text{ cm} = 9.34 = .87\%/\text{cm}$



1350 Water ht = 46.95 cm ?
 System just critical
 Drains $\approx 5 \text{ cm}$, repeat + Per. and sub-critical
 ht.

Water ht = 57.90 cm Temp $^{\circ}\text{C}$
 3 + Per. 24.8°C
 $C = 391.14 \text{ cm} = 3.14$

1420 Drain to level: Then added water to level shown below.

1428 Water ht = 57.80 cm ?
 System sub-critical.
 4 Per $C = -2194.7 \text{ cm} = -.614$

1545: Drain
 cm:

Removed 3 rods, 1 from each outer corner.
Total of 166 rods. (see page 131.)

Water ht = 57.60 cm $dh = 11.55 \text{ cm}$

¹ + Per.

$$C = 25.61 \text{ m} = 10.24 = .884/\text{cm}$$

1320 Water ht = 46.05 cm.

System just critical

Drain = 5 cm. repeat + Per.

Water ht = 57.70 cm $dh = 10.75 \text{ cm}$

² + Per

$$C = 108.65 \text{ m} = 9.34 = .974/\text{cm}$$

Temp $^{\circ}$

24.8 $^{\circ}$

1350 Water ht = 46.95 cm?

System just critical

Drain = 5 cm. repeat + Per. and rods critical ht.

Water ht = 57.90 cm

³ + Per

$$C = 391.14 \text{ m} = 3.14$$

Temp $^{\circ}$

24.8 $^{\circ}$

1400 Drain to level. Then added water to level shown below.

1428 Water ht = 57.80 cm?

System sub critical.

⁴ Per $C = -2194.7 \text{ m} = -.614$

1545: Drain
ave:

Sample taken from dump tanks #4 (11/15/67)

Y-12 Reg # 684528

X-10 A-627

Sample # 1 (11/15/67)

Sample #2 (11/15/67)

sub for:

g B/l = 0.152?

g B/l = 0.144

density = .9972

density = .9988

Temp ° = 21.4°c

Temp = 21.8°c

INSTRUMENT CHECK
INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1					
K-2					
R-1					
R-2					
PM-1					
PM-2					

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

INSTRUMENT CHECK

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

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

START-UP CHECK LIST

Equipment checked by RK/F.C. Personnel check by F.O.C.Instruments and settings checked and reset by RK/F.C.Source in checked by RK/F.C. Source No. M-93Emergency equipment in stand-by mode checked by F.O.C.Instruments in trip circuit: K-1-2 PM-1-2Red-light on by RK/F.C. Time 1058Start-up OK'd by F.O.C. RK/F.C. Date 11/17/67

Repeat of experiments described on page 133-134.

Water ht = 57.70 cm. ^{sh = 11.20 am} Temp °C
 (1) + Per 24.2°C
 $t = 122.77 \mu = 8.44 = .75 \mu/\text{cm}$

1132 Water ht = 46.50 cm
 System just critical.

1138 Water ht = 46.50 cm
 System slightly sub critical
 Drain.

1306 Water ht = 57.70 cm. ^{sh = 11.15 am} Temp °C
 (2) + Per 24.5°C
 $t = 118.43 \mu = 8.64 = .77 \mu/\text{cm}$

1315 Water ht = 46.55 cm
system just critical

USE

1321 Water ht = 46.55 cm
system still just critical
Drain:

1445 Water ht = 57.70 cm, $dh = 10.800$
³+Per
 $E = 115.17 m = 8.84 = .814/cm.$

1455 Water ht = 46.90 cm
system just critical (very very slightly +)
Drain to 46.70 cm. air?

1500 Water ht = 49.50 cm system on slight + Per.

1507 Water ht = 49.55 cm air ???
system just critical

1510 system still just critical
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	10^{-12}	Meter ✓	2"	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. M-93
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by I.D.C. AKK Personnel check by I.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 I.D.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKK Time 1440
 Start-up OK'd by I.D.C. AKK Date 11/22/67

Repeat of experiment described on page
130. 30" rods, 30 cm length. Triangular
array. Total of 253 rods.

Water ht = 27.90 cm
 $\Delta h = 7.4$ cm
 $\tau = 249.99 \text{ cm} = 4.6 \text{ f} = .62 \text{ f/cm}$

Temp $^{\circ}\text{C}$
 24.1 $^{\circ}\text{C}$

1521 Water ht = 20.40 cm
 System just critical
 Drain. (all solution)

Water ht = 27.90 cm
 $\Delta h = 7.5$ cm
 $\tau = 210.78 \text{ cm} = 5.3 \text{ f} = .71 \text{ f/cm}$

Temp $^{\circ}\text{C}$
 24.1 $^{\circ}\text{C}$

1553 Water ht = 20.40 cm
 System just critical
 Drain.

12/4/67 Samples of B solution:

Y-12	#1	X-10	A-628
Req #684529 (10-19-67)		#1-A	10/19/67
\bar{g} B/L = 0.137		\bar{g} B/L = 0.138	Temp °C
		Density 0.9965	20.0
	#2		
Req #684530 (10-23-67)		#2-A	10/23/67
\bar{g} B/L = 0.139		\bar{g} B/L = 0.138	Temp °C
		Density 0.9985	20.0
	#3		
Req #684531 (11-1-67)		#3-A	11/1/67
\bar{g} B/L = 0.139		\bar{g} B/L = 0.139	Temp °C
		Density 0.9969	20.0
	#4		
Req #684532 (11-15-67)		#4-A	11/15/67
\bar{g} B/L = 0.143		\bar{g} B/L = 0.142	Temp °C
		Density = 9986	20.0

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by ^{RKR} F.D.C. 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 F.D.C.

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

Red light on by AKK Time 12:45

Start-up OK'd by F.D.C. AKK Date 12-7-67

top of fuel at
30.0 cm height - 12.2 cm
mirror rods

Water

.30" rods.
30.0 cm length.
2.050 cm separation c-c.
square pattern

143

First run, after cleaning small reflector
tanks, and .30" rods used in the past
experiments using H_2BO_3 . 145 - 140.

Have an $14 \times 14 - 9$ array. (9 rods removed
from one face. Total of 187 rods. (These
rods used in H_2BO_3 experiments).

1340 Water ht = 28.0 cm Temp °C
System sub critical 23.2 °C
Drain.

added 9 rods. Now have an 14×14 array.
Total of 196 rods.

1415 Water ht = 28.0 cm Temp °C
System sub critical 23.5 °C
Drain.

added 7 rods to 1 face. Now have on
 $14 \times 14 + 7$ array. Total of 203 rods.

Water ht = 28.60 cm $\Delta h = 9.25$ cm Temp °C
(1) + Per 23.7
 $T = 76.01 \text{ sec} = 12.24 = 1.34/\text{cm}$
aver.

144

Post 143 sheet
 30 cm rods long
 2,050 cm separation
 Total rods 203
 just cut.

1448 water ht = 19.35 cm
 system just critical
 Drain to 0.0 cm.

Removed 1 rod. Now has
 total of 202 rods.

1512 water ht = 28.10 cm

²-Per
 $\bar{v} = -649.73 \text{ m} = -2.14$

1520 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	STARTUP STARTUP RANGE
K-1	—	Meter			
	—	Fast			
K-2	3×10^{-12}	Meter <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	3×10^{-12}
	"	Fast <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	int	<input checked="" type="checkbox"/>	500V
PM-2	1200V	Low <input checked="" type="checkbox"/>	12	<input checked="" type="checkbox"/>	900V
	"	Alarm <input checked="" type="checkbox"/>	3	<input checked="" type="checkbox"/>	

LOG N CALIBRATE OPERATE SOURCE NO: B-4

DUMP WELL PROBE LIGHT

144

1448 water ht = 19.35 cm
 system just critical
 Drain to 0.0 cm.

Removed 1 rod. Now have an 14x14 + 6
 total of 202 rods.

1512 water ht = 28.10 cm
² - Per
 $\Delta = -649.73 \text{ m} = -2.1 \text{ f}$

1520 Drain:

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE NO. B-4

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 ARKV
 Source in checked by ARKV Source No. M-43
 Emergency equipment in control room checked by F.O.C
 Instruments in trip circuit: K-2 PM-1-2
 Red light on by ARKV Time 0810
 Start-up OK'd by F.O.C. h/arkv Date 12-8-67

Repeat of experiment described on bottom of p 123
 and top of page 124. 14 x 14 + 7 array. Total
 of 203 rods.

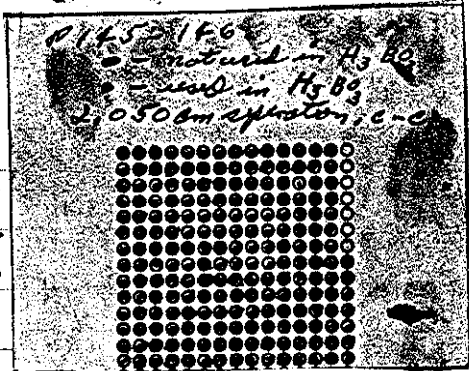
Water ht = 28.20 cm $\Delta h = 8.20 \text{ cm}$ Temp $^{\circ}\text{C}$
 + Per 24.0 $^{\circ}\text{C}$
 $\bar{c} = 77.14 \text{ sec} = 12.14 = 1.44 / \text{cm}$

0904 Water ht = 19.40 cm
 System just critical.
 Drain.

Replaced in the array above 100 rods that
 were not used in the H_2O_2 experiments.
 (a 10 x 10 section was replaced in center of
 array.)

avg.

(22)



Water ht = 28.20 cm $\Delta h = 1.85$
²+Per
 $T = 77.19 \text{ sec} = 12.1 \text{ f} = 1.44/\text{cm}$

1345 Water ht = 19.35 cm

Temp. 24.2

System just critical
 Drain

30 rods. (Round array).
 30 cm length
 2.050 cm separation c-c

Have an 15x15 array, with 6 rods removed
 from each corner. Total of 201 rods.

Water ht = 16.90 cm $\Delta h = 1.85$
³+Per.

$T = 41.29 \text{ sec} = 18.6 \text{ f} = 21.64/\text{cm}$

Water ht = 16.05 cm

System just critical
 Drain to 0-0 cm.

Removed 2 nodes, 1 each from opposite corners.
 Now have an 15×15 with 7 nodes removed
 from 2 corners and 6 nodes removed
 from 2 corners. Total of 199 nodes.

Removed 4 nodes, 1 from each corner.
 Now have a 15×15 array with 7 nodes
 removed from each corner. Total
 197 nodes.

Water ht = 20.50 cm. $\delta h = 2.2$ cm

+ Per

$C = 21.93$ sec = 14.14 = 6.4 ft/cm

1.5.55 Water ht = 18.30 cm - $\delta h = 6.1$ cm

System just critical
 Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D. RANGE	SET	START-UP RANGE
K-1		Meter			
		Fast			
K-2	3 X 10 ⁻¹²	Meter	2"		3 X 10 ⁻¹²
	"	Fast	"		"
R-1					"
PM-1	700 V	Alarm	5"		5000
PM-2	1200 V	Low	12"		9000
	"	Alarm	3"		"
E.G. 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 ^{F.P.C.} AKM Personnel check by ^{F.D.C.} AKM

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 - PM-1-2

Red light on by AKM Time 0820

Start-up OK'd by ^{F.D.C.} AKM Date 12-11-67

Repeat of experiment described on page 147.
 (15x15 array, with 7 nodes removed from
 each corner. Total of 197 nodes.)

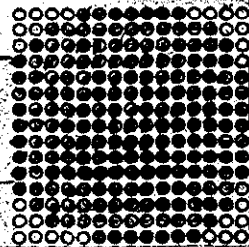
Water ht = 20.80 cm $2d = 2.50$ cm Surf $^{\circ}$
 + Pr 24.0°
 $E = 50.00$ cm $16.4 \phi = 6.6$ ft/cm

0959 Water ht = 18.30 cm

System just critical
 Drain.

Removed 2 nodes. Now ha
 with 8 nodes removed from
 7 nodes removed from 2 cor-
 nodes.

30" nodes
 30.0 cm length
 2.050 cm separation
 p - 149



0955 Water ht = 28.00 cm

System just critical
 Drain.

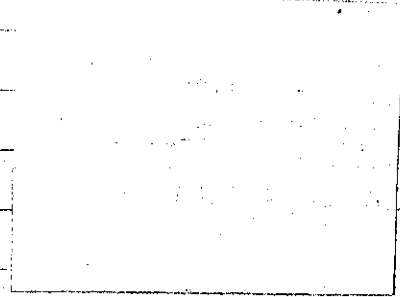
(23)

ives.

Repeat of experiment described on page 147.
(15x15 array, with 7 nodes removed from
each corner. Total of 197 nodes.)

Water ht = 20.80 cm $\Delta h = 2.50$ cm Surf $^{\circ}$ C
+ Δh 24.0 $^{\circ}$ C
 $\bar{c} = 50.00$ cm $16.4 \phi = 6.6$ ft/cm

0959 Water ht = 18.30 cm
System just critical
Down



Removed 2 nodes. Now have an 15x15 array
with 8 nodes removed from 2 corners, and
7 nodes removed from 2 corners. Total of 195
nodes.

0955 Water ht = 28.00 cm
System just critical
Down

(23)

etc.

150

.30" nodes;
60 cm length.
2.050 cm separation c-c

Have an 11x12 array; total of 132 nodes.
~~System~~

~~1500~~

1500

Water ht = 57.70 cm
System sub critical
Chain to 0.0 cm, and moved instruments
in small refletsor tanks.

N^o 1520
was

Water ht = 57.70 cm
System sub critical
Drain.

added 6 nodes. Now have an 12x12-6.
Total of 138 nodes.

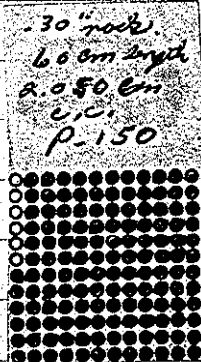
Water ht = 57.70 cm $dh = 10.90$ cm
+ Per
 $t = 111.91$ sec = $9.04 = 0.93$ H/cm

1607

Water ht = 46.80 cm
System just critical
Drain

u-152/3

u-152



INSTRUMENT CHECK

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

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKL

Source in checked by RKL Source No. M-93

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

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

Red light on by RKL Time 0810

Start-up OK'd by F.D.C. RKL Date 12/12/67

Repeat of experiment described on page 150.

12 x 12 - 6 array. Total of 138 rods.

6" Top reflector = 57.44 cm

Water ht = 58.25 cm

0.4

12.05

Temp °C

24.7 °C

+ P₂

$E_2 = 82.57 \mu = 11.44 = 0.944/cm$

0.900 Water ht = 46.20 cm.

Lepton just critical
Drain.

INSTRUMENT CHECK

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

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 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-2 PM-1-2

Red light on by AKM Time 0850

Start-up OK'd by F.D.C. AKM Date 12-14-67

Repeat of experiments described on page 150-152,
12x12-6 array, total of 138 rods.

Water ht = 58.10 cm $D_h = 11.70 \text{ cm}$ Temp $^{\circ}\text{C}$
+ Per 29.2 $^{\circ}\text{C}$
 $\epsilon = 89.09 \text{ cm} = 10.8\% = .92 \text{ \#}/\text{cm}$

0943

Water ht = 46.40 cm
System just critical
Drain.

Removed 1 rod. Now have an 12x12-5 array.
Total of 137 rods.

Water ht = 58.00 cm
Per N.G

1045

Drain.

.30" rods.
60 cm length.
2.050 cm separation c.c.
Rounded array's.

Now have an 12x12 array, with 3 rods removed from each corner. Total of 132 rods:

1.256 Water ht = 57.80 cm
System sub critical
Drain

Added 1 rod. Now on 12x12 with 3 rods removed from 3 corners and 2 rods removed from 1 corner. Total of 133 rods.

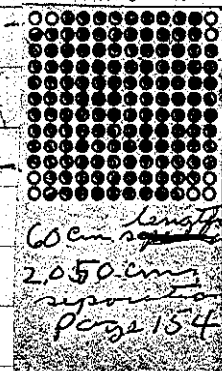
Water ht = 57.90 cm
System sub critical
Drain

Temp
25.0°C

Added 2 rods. Now on 12x12 with 2 rods removed from 3 corners and 3 rods removed from 1 corner. Total of 135 rods.

1.405 Water ht = 57.90 cm
System just critical
Drain

(1/2)



Now have an 12x13 array, with 6 rods removed from each corner. Total of 132 rods.

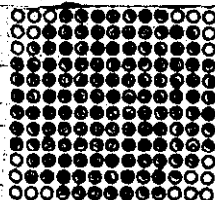
1529 Water ht = 57.90 cm Temp °C
 System sub critical 25.0 °C
 Drain:

Added 2 rods. Have a 12x13 array with 6 rods removed from 2 opposite corners, and 5 rods removed from 2 opposite corners. Total of 134 rods.

Water ht = 58.00 cm $D_h = 10.1 \text{ cm}$ Temp °C
 + Per 25.0 °C
 $\Gamma = 208.61 \text{ cm} = 5.44 = .534 \text{ cm}$

1600 Water ht = 47.90 cm
 System just critical
 Drain

(26)



60 cm high
 2.050 cm
 separation
 134 Pins
 Page 155

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		Meter			
		Fast			
K-2	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
"		Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	10"	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"		Alarm ✓	3"	✓	"
LOG-N CALIBRATE ✓			OPERATE ✓		SOURCE No. B-80
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-43

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

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

Red light on by AKM Time 0805

Start-up OK'd by F.D.C. AKM Date 12-15-67

.30" rods.
60 cm length.
2.050 cm separation c-c
Rounded array.

157

Removed 1 rod. Now have a 12x13 array with
6 rods removed from 3 corners, and 5 rods
removed from 1 corner. Total of 133 rods.
(See p 155)

Water ht = 58.00 cm Temp °C
- Per N.G. 25.0 °C

0850 Drain

.30 rods.
30 cm length.
1.800 cm separation c-c
Square array.

Have an 14x14 + 7 array. Total of 203 rods.

1.130 Water ht = 28.50 cm
System sub critical
Drain.

over.

added 7 rods. Now have an 14x15 array.
Total of 210 rods.

1255 Water ht = 28.50 cm
System sub critical
Drain.

added 5 rods. Now have an 15x15 - 7 array
Total of 218 rods.

Water ht = 18.70 cm $\Delta h = 1.05 \text{ cm}$
²+Per
 $T = 76.06 \text{ sec} = 12.2 \phi = 11.6 \text{ f/cm}$

1324 Water ht = 17.65 cm
System just critical
Drain.

Removed 2 rods. Now have an ^{15x15-9} 15x15 - 5 array.
Total of 216 rods.

1343 Water ht = 28.10 cm
³-Per

Temp °C
24.5 °C

$T = 1103.88 \text{ sec} = -1.2 \phi$

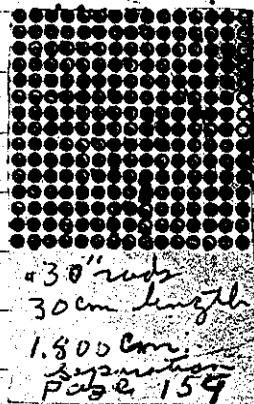
Drain:

added 1 rod. Now have an 15x15-8 array. Total of 217 rods.

Water ht = 28.40 cm $\sigma = 9.25\%$ Temp $^{\circ}C$
4 + Per 24.7 $^{\circ}C$
 $C = 64.10 m = 13.84 = 1.54/cm$

Water ht = 19.15 cm
System just critical
Drain.

(17)



Rounded array's. 30.0 cm length.

Have an 15x16 array, with 8 rods removed from each corner. Total of 208 rods.

Water ht = 28.00 cm
5 - Per N.G

1530 Drain:

over:

Added 1 rod. Now have on 15 X 16 array,
with 8 rods removed from 3 corners, and
7 rods removed from 1 corner. Total of
209 rods.

Water ht = 28.00 cm

$\frac{1}{2}$ per

$T = -447.63 = -3.2 \phi$

155.1 Drains

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by ^{I.P.C.} AKN Personnel check by F.P.C.

Instruments and safeties checked and reset by AKN

Source in checked by AKN Source No. M-93

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

Instruments in trip circuit: K-1-2 P.M-1-2

Red light on by AKN Time 0805

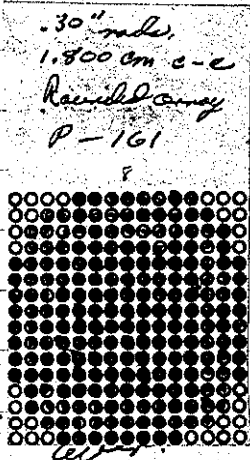
Start-up OK'd by I.P.C. AKN Date 12/15/67

Rounded array, 30 cm length. (See # 159-60)

Added 1 rod. Have an 15x16 array, with 8 rods removed from 2 corners, and 7 rods removed from 2 corners. Total of 210 rods.

Water ht = 28.10 cm h = 6.30 cm Temp °C
+ P_{ex} 23.5 °C
C = 257.50 cm = 4.5 f = .66 f/cm

0907 Water ht = 21.30 cm.
System just critical
Drain-



Have an 15 X 15 array, with 4 rods removed from each corner. Total of 209 rods.

System ^{sub} critical
Drain:

.30" rods.
60 cm length.
1,800 cm separation c-c.
Square array's.

Have an 12 X 12 array. Total 144 rods.

1312 Water ht = 58.10 cm Temp °
System sub critical 23.8°
Drain:

Added 6 rods to 1 face. Now have 150 rods.

1347 Water ht = 58.00 cm
System sub critical
Drain:

added 6 more rods. Now have an 12x13 array. Total of 156 rods.

1423 Water ht = 39.70 cm
System just critical
Drain.

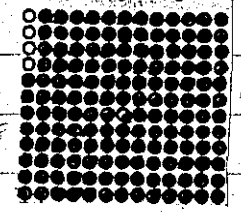
Removed 4 rods. Now have an 12x12, with 8 rods on 1 face. Total of 152 rods

Water ht = 47.90 cm $\Delta h = 2.95$
 $^2 + Per$
 $\tau = 64.10 \text{ cm} = 13.94 = 4.74/\text{cm}$

Temp °
29.3 °
60 rods
1.800 cm depth
152 rods
Page 163

1456 Water ht = 44.95 cm
System just critical
Drain.

(19)



Removed 1 rod. Now have an 12x12, with 7 rods on 1 face. Total of 151 rods.

1524 Water ht = 58.10 cm

(20)

$^3 - Per \tau = -447.63 \text{ cm} = -3.24$

1534 Drain:

INSTRUMENT CHECK

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

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKV ^{F.I.C.} Personnel check by F.I.C.Instruments and safeties checked and reset by AKVSource in checked by AKV Source No. M-93Emergency equipment in control room checked by F.I.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKV Time 0805Start-up OK'd by F.I.C. AKV Date 12-19-67

130 rods.
60 cm length.
1,500 cm separation c:c
Roundel array.

- 165

Have a 13x13 array, with 6 rods removed from each corner. Total 145 rods.

0843 Water ht = 58.60 cm Temp °C
System sub critical 24.3°C
Drain

added 2 rods. Now have on 13x13 array with 6 rods removed from 2 corners, and 5 rods removed from 2 corners. Total of 147 rods.

Water ht = 58.10 cm Temp °C
- Per N.G. 24.3°C

0927 Drain

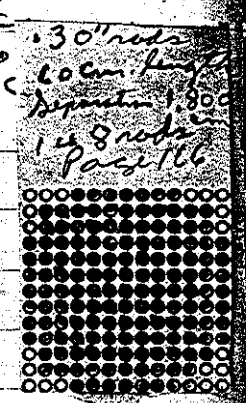
added 2 more rods. Now have on 13x13 array with 5 rods removed from each corner, total of 149 rods. (also changed pos of the last 4 rods addition).

Water ht = 45.80 cm $\Delta h = 1.20$ cm Temp °C
+ Per 24.5°C
 $t = 105.39 \text{ sec} = 9.5 = 7.94/\text{cm}$ avr.

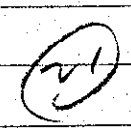
1029 Water ht = 44.60 cm
 System just critical
 Drain.

Removed 1 rod. Now have a 13 x 13 array, with
 5 rods removed from 3 corners and 6 rods
 removed from 1 corner. Total of 148 rods.

Water ht = 58.30 cm $b_h = 10.05 \text{ cm}$ Temp $^{\circ}\text{C}$
 + Pres. 25.0
 $\bar{v} = 253.12 \text{ cm} = 4.54 = 145 \text{ H/cm}$



1106 Water ht = 48.25 cm
 System just critical
 Drain to 0.0 cm. *



Removed 1 rod. Now have an 13 x 13 array,
 with 5 rods removed from 2 corners, and
 6 rods removed from 2 corners. Total of
 147 rods.

1129 Water ht = 58.00 cm
 System sub critical
 Drain.

Temp $^{\circ}\text{C}$
 25.0 $^{\circ}\text{C}$

.30" rods.
30 cm length.
2.453 cm separation c-c
Square Array.

-167

Have an $14 \times 14 + 7$ array: Total of 203 rods.

Water ht = 27.90 cm

Temp $^{\circ}$ C

System sub critical

25. $^{\circ}$ C

Drain.

.30" rods
 30.0 cm length.
 2.453 cm separation c-c
Square array.

169

now have an 14 X 15 array. Total of 210 rods.

0952 Water ht = 28.20 cm Temp °C
 System sub critical 24.2 °C
 Drain.

added 15 rods. Now have an 15 X 15 array.
 Total of 225 rods.

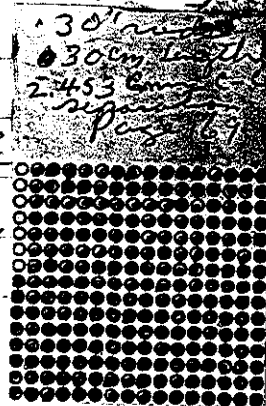
Water ht = 28.00 cm
 System sub critical
 Drain.

added 8 rods. Now have an 15 X 15 + 8 array.
 Total of 233 rods.

Water ht = 28.10 cm Temp °C
 + Per dh = 4.15 24.
 $C = 677.99 \text{ m} = 1.84 = .38 \text{ f/cm}$

Water ht = 23.35 cm
 System just critical
 Drain to 0.0 cm.

Removed 1 rod, now have 15 X 15 + 7, total of 228 rods
 Water ht = 28.20 cm
 2 - Per N-6



.30" rods
30.0 cm length.
2.453 cm separation c-c
Square array.

169

now have an 14 X 15 array. Total of 210 rods.

0952 Water ht = 28.20 cm Temp °C
System sub critical 24.2 °C
Drain.

added 15 rods. Now have an 15 X 15 array.
Total of 225 rods.

Water ht = 28.00 cm
System sub critical
Drain.

added 8 rods. Now have an 15 X 15 +
Total of 233 rods.

Water ht = 28.10 cm Temp °C
+ Pen 0.4 = 4.15 24.3 °C
 $C = 677.99 \text{ cm} = 1.84 = .38 \text{ f/cm}$

Water ht = 23.35 cm
System just critical
Drain to 0.0 cm.

Removed 1 rod, now have 15 X 15 + 7. Total of 232 rods.
Water ht = 28.20 cm
2 - Pen N-6

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by *F.P.C. AKM* Personnel check by *FIDC*

Instruments and safeties checked and reset by *AKM*

Source in checked by *AKM* Source No. *M-03*

Emergency equipment in control room checked by *FID.C*

Instruments in trip circuit: *X-1 PM-1-2*

Red light on by *AKM* Time *0845*

Start-up OK'd by *F.I.D.C. AKM* Date *12-20-67*

170

.30" node.
 30.0 cm length.
 2.453 cm separation c-c
Grounded array.

Have a 16 x 16 array, with 7 nodes removed from each corner. Total of 228 nodes.

Water ht = $\frac{18.30}{18.30}$ cm $dh = 180$ cm Temp $^{\circ}$ C
³+ Per 29.5 $^{\circ}$ C
 $\epsilon = 102.13 \mu = 9.74 = 12.1 f/cm$

1305 Water ht = 17.50 cm
 System just critical
 Drain.

Removed 2 nodes. Have 16 x 16 array, with 8 nodes removed from 2 corners, and 7 nodes removed from 2 corners. Total of 226 nodes.

Water ht = 20.90 cm $dh = 2.25$ cm Temp $^{\circ}$ C
⁴+ Per 24.5 $^{\circ}$ C
 $\epsilon = 73.88 \mu = 12.3 f = 5.54/cm$

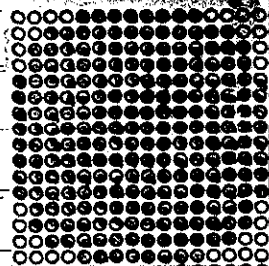
1330 Water ht = 18.65 cm
 System just critical
 Drain.

P-171

Removed 2 rods. Now have an 16x16 with
8 rods removed from each corner. Total
of 224 rods.

Water ht = 28.10 cm $\Delta h = 6.50$ cm
5 - Per
 $\tau = 302.05 \text{ cm} = 3.9 \phi = .60 \phi / \text{cm}$

.30" rods
30 cm. length
2.453 cm
superficial
Page 17



1400 Water ht = 21.60 cm
System just critical
Drain.

(28)

Removed 1 rod. Now have 16x16 array with
8 rods removed from 3 corners, and 9
rods removed from 1 corner. Total of
223 rods.

1421 Water ht = 28.10 cm
6 - Per
 $\tau = -545.42 \text{ cm} = -2.6 \phi$

(29)

Drain

172

1/5/68

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3x15 ⁻¹²	Meter ✓ Fart ✓	2"	✓	3x15 ⁻¹²
K-2	3x15 ⁻¹²	Meter ✓ Fart ✓	2"	✓	3x15 ⁻¹²
R-1					
R-2					
PM-1	700V	Alarm ✓	✓	✓	500V
PM-2	1200V	Alarm ✓	12"	✓	500V
		Alarm ✓	3"	✓	
LOG N	CALIBRATE ✓	OPERATE ✓	SOURCE No.	B-80	
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by E. J. IDC Personnel check by IDC
 Instruments and safeties checked and reset by E. J.
 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 E. J. Time 0920
 Start-up OK'd by E. J. IDC Date 1/5/68

0.30" rods
 60 cm height
 2.453 cm center separation
 Rectangular array

13x13 lattice = 169 rods

K-1 unit of Trip-Vising.

Temp. 22.2°C

1010

Water at 27.15 cm.

Critical.

Drain

12x13 lattice = 156 rods

1050

Water at 33.4 cm, Critical

Drain

Removed 14 double rods - now 144
 12x12 ~~rod~~

1120

Water at 43.1 cm Critical -

Removed 4 rods from north face beginning
 at NW corner. (140 total)

1148

Water at 58.25 cm. full critical.

Drain

Temp. 22.5°C

1235P

~~Removed~~ Added 1 double rod - north face, near center - 141 total

Water at 58.3 cm

$0.2 = 6.2\%$

Temp. 22.3°C

+ Period #1, $T = 1369 \text{ sec} = .93\%$ = .0154/cm

60 cm

2.453 cm

14

13

1320

Same as. Water at 50.1

(30)

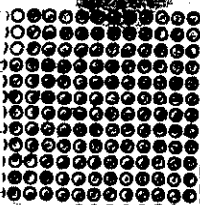
1330

Same as. Slightly subcritical

1335

Water at 52.1 cm. Critical

Drain



174

6.30 rods
60 cm height
2.453 cm center spacing
Rounded away square pattern

10x10 center with 8 on each face + 2 on each
face = 140 rods

1500 Water at 42.3 cm. Critical
Drain

10x10 center + 6 on each face + 3 on
each face = 136 rods

1535 Water at 58.5. Subcritical
Drain

Add 1 rod to opposite faces. 138 rods

1600 Water at 49.5 cm. + period

1610 Water at 46.75 cm. Critical
Drain

INSTRUMENT CHECK

175

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 ⁻¹²	Alarm ✓	2"	✓	3 X 10 ⁻¹²
"	"	Alarm ✓	"	✓	4
K-2	"	Alarm ✓	"	✓	"
"	"	Alarm ✓	"	✓	"
R-1					
R-2					
PIA-1	700V	Alarm ✓	cont	✓	500V
PIA-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"

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

START-UP CHECK LIST

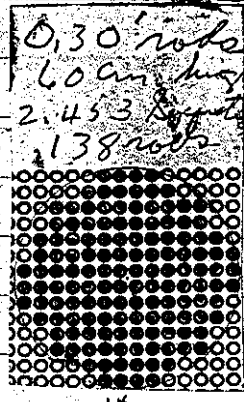
Equipment checked by AKAL Personnel check by I.D.C.
 Instruments and safeties checked and reset by AKAL
 Source in checked by AKAL Source No. M-43
 Emergency equipment in control room checked by I.D.C.
 Instruments in trip circuit: K-1-2 P19-1-2
 Red light on by I.D.C. Time 10:00
 Start-up OK'd by I.D.C. AKAL Date 1-8-68

ack

Repeat of experiment described on page 174.
 Total of 138 rods.

Water ht = 58.20 cm $\delta h = 10.70$ cm Temp °C
 + Per 22.0 °C
 $T = 162.98 \text{ sec} = 6.6 \phi = .60 \phi / \text{cm}$

1120 Water ht = 47.50 cm (3)
 System just critical
 Drain.



Now have an 13 X 13 - 32 array. Have 8 rods
 removed from each corner. Total of 137 rods.

~~1440~~
 1440 Water ht = 58.20 cm $\delta h = 9.40$ cm Temp °C
 + Per 22.2 °C
 $T = 367.24 \text{ sec} = 7.2 \phi = .34 \phi / \text{cm}$

1455 Water ht = 48.80 cm (3)
 System just critical
 Drain.



INSTRUMENT CHECK

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

LOG N. CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by RHK Personnel check by F.D.C.
 Instruments and safeties checked and reset by RHK
 Source in checked by RHK 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 RHK Time 0830
 Start-up OK'd by F.D.C. RHK Date 1-9-68

178

1.30" rods.
 1.530 cm separation c-c.
 30 cm length.
Aquifer array

0.930 Have an 16 x 16 array. Total 256 rods.
 Water ht = 28.20 cm Temp °C = 21.8°C
 System sub critical
 Drain.

added 33 rods. Now have an 17 x 17 array.
 Total of 289 rods.

Water ht = 14.60 cm $\rho_h = .45$ Temp °C = 21.5°C
 + Per
 $C = 26.08 \text{ sec} = 24.64 = 54.6 \text{ f/cm}$

1000 Water ht = 14.15 cm
 System just critical
 Drain.

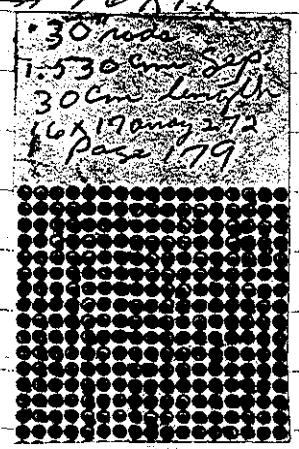
Removed 8 rods from 1 face. Now have an
 17 x 17 - 8. Total of 281 rods.

Water ht = 16.10 cm $\rho_h = .50$
 + Per
 $C = 49.99 \text{ sec} = 16.46 = 32.8 \text{ f/cm}$

1040 Water ht = 15.60 cm
 System just critical
 Drain.

Removed 9 rods. Now have an 16x17 array. Total of 272 rods.

1106 Water ht = 28.20 cm
System just critical
Drain.



(7)

.30" rods.
1.530 cm reparation c-c
30 cm length. Rounded array's

Have an 17x17 array, with 6 rods removed from each corner. Total of 265 rods.

12.55 Water ht = 29.50 cm Temp ° = 22.2 °C
3 - Pir
N.G

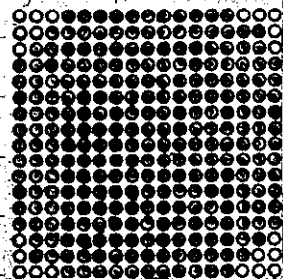
1305 Drain.

only.

added 2 rods. 1 to each opposite corner.
 Now have a total of 267

✓ Water ht = 28.20 cm $\Delta L = 6.50 \text{ cm}$
 4 + Per
 $E = 304.22 \text{ cm} = 3.94 = .60 \text{ ft/cm}$

30 rods
 1.530 cm separation
 300 cm length
 rounded array
 Total rods 267
 Page 180



1346 Water ht = 21.70 cm

system just critical
 Drain

(10)

Have an 17x18 array with 10 rods removed
 from each corner. total of ~~266~~ 267 rods.

✓ Water ht = 28.20 cm $\Delta L = 7.85 \text{ cm}$
 5 + Per

Temp °C = 22.3 °C

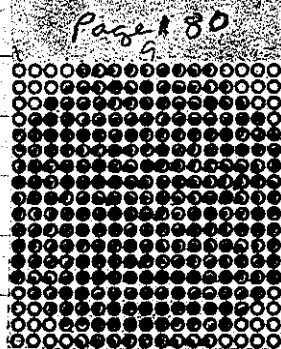
$E = 143.42 \text{ cm} = 7.44 = .94 \text{ ft/cm}$

30 rods
 1.530 cm separation
 30 cm length
 rounded array
 Total rods 266

1440 Water ht = 20.35 cm

system just critical
 Drain

(11)



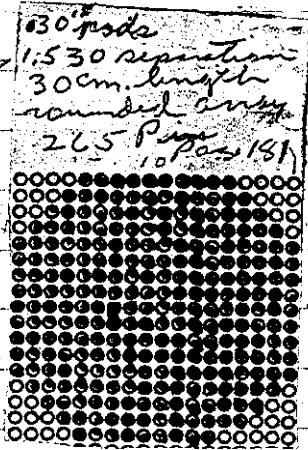
Remained 1 rod. The outer ring has 9 rods on 3 faces, and 10 rods on 1 face. Total of ~~255~~ ²⁶⁵

1530

Water ht = 28.30 cm

b-Per

$C = 1717 \text{ ml} = .77 \text{ f}$

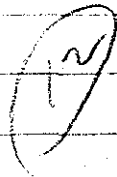


Temp °

22.5 °

1547

Drain:



9

INSTRUMENT CHECK

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

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKAL

Source-in checked by AKAL Source No. 19-23

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

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

Red light on by AKAL Time 0945

Start-up OK'd by F.D.C. AKAL Date 1-10-68

.30 rods.
1,530 cm separation c-c.
60 cm length.
Square array.

-183

Have an 13 x 13 array. Total of 169 array.

1040 Water ht = 58.30 cm Temp ° 22.0°
System sub critical
Drain.

added 13 rods. Now have an 13 x 14 array.
Total of 182 rods.

1115 Water ht = 58.00 cm
System sub critical
Drain.

added 14 rods. Now have an 14 x 14 array.
Total of 196 rods.

Water ht = 43.70 cm $b_L = .90$ cm Temp °
' + Per 32.3 °
 $E = 84.75$ cm = 11.24 = 12.44/cm

1305 Water ht = 42.80 cm
System just critical
Drain.

over

Removed 3 rods from 1 face. Now have a total of 193 rods.

Water ht = 58.20 cm

$\Delta h = 11.35$ cm.

$^2 + P_{ex}$

$$E = 106.48 = 9.14 = .834/cm$$

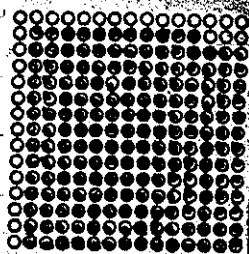
13.50

Water ht = 46.85 cm

System just critical

Drain to ~ 7.0 cm.

30" rods
60 cm length
1.53 cm depth
193 rods Crit
Page 184



Removed 1 rod. Have an 14x14 array with 4 rods removed from 1 face. Total of 192 rods.

14.23

Water ht = 58.20 cm

System sub critical

Drain:

Temp $^{\circ}$

22.6 $^{\circ}$

.30" rods.
1.530 cm separation c-c
60 cm length.
Rounded arrays.

185

Have an 14 X 15 array, with 6 rods removed
from each corner. Total of 186 rods.

Water ht = 58.10 cm
System sub critical
Drain:

added 1 rod. Now have a total of 187 rods.

1600

Water ht = 58.20 cm

Temp °

System sub critical

23.0 °

Drain:

see p - 187

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 K10 ⁻¹²	Meter ✓	2"	✓	3 K10 ⁻¹²
"	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fst ✓	"	✓	"
R-1					
P-2					
PM-1	700V ✓	Alarm ✓	cont	✓	500V
PM-2	1200V ✓	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"
LOG-N CALIBRA ✓		OPERATE ✓	SOURCE No. B-80		
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by EPC 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-1-2 PM-1-2

Red light on by AKH Time 0805

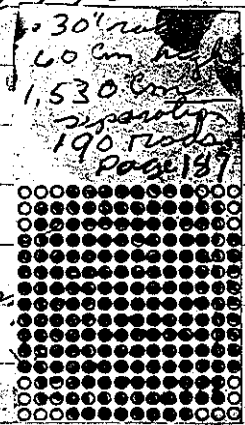
Start-up OK'd by E.D.C AKH Date 1/11/68

added 1 rod. Have an 14x15 array, with 5 rods removed from 2 opposite corners, and 6 rods removed from 2 opposite corners. Total of 188 rods.

0850 Water ht = 58.00 cm Temp °C
System sub critical 22.5 °C
Drain.

added 2 rods. Have an 14x15 array, with 5 rods removed from each corner. Total of 190

✓
Water ht = 58.20 cm $b_h = 8.90 \text{ cm}$
(14) + Per
 $\epsilon = 586.71 \text{ sec} = 2.14 = 0.249/\text{cm}$



0947 Water ht = 49.30 cm Temp °C
System just critical
Drain.

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

1104 Water ht = 58.10 cm.
System sub critical
Drain

Added 4 nodes, 1 to each corner. Have a 15 x 15 array, with 9 nodes removed from each corner. Total of 189 nodes.

Water ht = 58.10 cm $z_h = 9.80$ cm $Temp = 22.7^\circ C$

(13)

+ Per

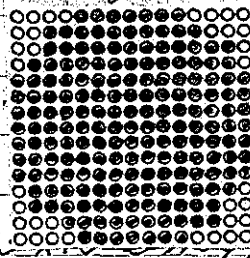
$t = 2 + 3.38 u = 4.74 = .487/cm$

130 nodes
6 Open length
1.53 Separator
189 nodes
Page 188

22.7°C

1320 Water ht = 48.30 cm

System just critical
Drain to ~ 3.0 cm



Remained 1 node. Have 1 node with 9 nodes removed from 3 corners, and 10 nodes removed from 1 corner. Total of 189 nodes

1399 Water ht = 59.00 cm

System sub critical
Drain

Added 4 nodes. 1 to each corner. Have a 15 x 15 array, with 9 nodes removed from each corner. Total of 189 nodes.

Water ht = 58.10 cm

oh = 9.80 cm

Temp °

⑮
✓
2 + Per

$$T = 2 + 3.38 u = 4.74 = .484/cm$$

130° nodes
6 cm length 22.7°

1320 Water ht = 48.30 cm

system just critical

Drain to ~ 3.0 cm

Removed 1 node. Have 15 x 15 array, with 9 nodes removed from 3 corners, and 10 nodes removed from 1 corner. Total of 189 nodes

1349 Water ht = 59.00 cm

system sub critical
Drain.

INSTRUMENT CHECK

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

LOG IN CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKL Personnel check by F.I.D.C.
 Instruments and safeties checked and reset by AKL
 Source in checked by AKL Source No. M-43
 Emergency equipment in control room checked by F.I.D.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKL Time 0850
 Start-up OK'd by F.I.D.C. AKL Date 1-12-68

30" rods.
 1.300 cm operation C.C.
 3.0-0 cm length
 have orange

18 X 18 array. Total of 324 rods.

0925 Water ht = 28.20 cm

System sub critical
Drain.

Now have an 19 X 19 array. Total of 361 rods.

1042 Water ht = 28.30 cm

System sub critical
Drain.

Now have an 20 X 20 array. Total of 400 rods

Water ht = 28.20 cm

Temp °C

System sub critical

23.0 °C

Drain.

added 5 rods. Now have an 20 X 20 array
with 5 rods on 1 fuel. Total of 405 rods.

Water ht = 28.20 cm

dh = 7.55 cm

Temp °C

+ Per

22.8 °C

$\epsilon = 144.50 \text{ cm} = 7.3 \phi = .91 \text{ g/cm}$

1243 Water ht = 20.65 cm

System just critical
Drain.

30" rods
 1.300 cm separation
 30 cm length
 404 total rods
 just list Page 191

Removed 1 rod. Have 20×20 array, with 3 rods on 1 face. Total of 403 rods.

Water ht = 28.30 cm
 $\epsilon = 592.36 \text{ cm} = 2.2 \phi = .42 \text{ ft/cm}$

1322 Water ht = 23.10 cm
 System just critical
 Drain.

Removed 1 rod. Have 20×20 array, with 3 rods on 1 face. Total of 403 rods.

1340 Water ht = 28.20 cm
 $\epsilon = 543.25 = 2.6 \phi$
 Drain.

30" rods.
1.300 cm separation c-c
 30 cm length. Rounded array

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

avr.

Removed 1 node. Have on 20x20 array, with 4 nodes on 1 face. Total of 404 nodes.

Water ht = 28.30 cm ^{2L = 5.20 cm}
2 + Per Temp 0
C = 592.36 cm = 2.24 = .424/cm 22.8°C
+4

1322 Water ht = 23.10 cm (1)
System just critical
Drain.

Removed 1 node. Have 20x20 array, with 3 nodes on 1 face. Total of 403 nodes.

1340 Water ht = 28.20 cm (2)
3 - Per C = -543.25 = -2.64
Drain.

.30" nodes.
1.300 cm separation c-c
30 cm length. Rounded array

Have an 22x22 array with 21 nodes removed from each corner. Total of 400 nodes.

avr.

Water ht = 18.55 cm

Temp °

⁴+ Per N.G.

22.8 °

O. H. M. C.

Did not level sea to log - n instrument trouble during + Per.

Drain to 7 16.0 cm. In order to repeat + per.

Water ht = 17.70 cm.

⁵+ Per

N. G.

1519

Water ht = 17.30 cm

System just artificial
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K1	3 X 10 ⁻¹²	Meter ✓	2"	✓	3 X 10 ⁻¹²
	"	Fast ✓	"	✓	"
K2	"	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
P-1					
P-2					
PN	700 V	Alarm ✓	0.2"	✓	500 V
PN	1200 V	Low ✓	12"	✓	900 V
	"	Alarm ✓	3"	✓	"
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>13-80</u>
DUMP WELL PROBE LIGHT					<u>7</u>

START-UP CHECK LIST

Equipment checked by IPC Personnel check by E.D.C.
 Instruments and safeties checked and reset by AKAD
 Source in checked by AKAD Source No. 14-43
 Emergency equipment in control room checked by E.D.C.
 Instruments in trip circuit: K-1-2 PM-12
 Red light on by AKAD Time 1045
 Start-up OK'd by E.D.C. AKAD Date 1-15-68

over

Repeat of experiments described on pages 191-192.

Water ht = 18.40 cm $\Delta h = .75$ cm Temp $^{\circ}$ C
 + Per 21.2 $^{\circ}$ C
 $\epsilon = 89.09 \text{ cm} = 10.8 = 14.44/\text{cm}$

1123 Water ht = 17.65 cm
 System just critical
 Drain to ≈ 9.0 cm repeat + Per and
 critical ht.

Water ht = 18.40 cm $\Delta h = .75$ cm Temp $^{\circ}$ C
²+ Per 21.4 $^{\circ}$ C
 $\epsilon = 76.06 = 16.24 = 21.54/\text{cm}$

1140 Water ht = 17.65 cm
 System just critical
 Drain:

1415 Repeat of above.

Water ht = 18.40 cm $\Delta h = .90$ cm Temp $^{\circ}$ C
³+ Per 21.7 $^{\circ}$ C
 $\epsilon = 69.54 \text{ cm} = 13.04 = 16.34/\text{cm}$

1445 Water ht = 17.60 cm
 System just critical
 Drain:

Remove 4 rods. Have an 22x22 array, with 22 rods removed from each corner. Total of 396 rods.

Water ht = 21.80 cm ^{0.4 = 2.65} Temp =
4 + Per
 $t = 71.71 \text{ m} = 12.74 = 4.8 \text{ f/cm}$

1517 Water ht = 19.15 cm
System just critical
Drain to 0.0 cm, and removed 4 rods.

Now have an 22x22 array, with 23 rods removed from each corner. Total of 392 rods.

Water ht = 28.20 cm
System sub critical
Drain to 0.0 cm and added 2 rods.

Now have an 22x22 array, with 23 rods removed from 2 opposite corners, and 22 rods removed from 2 opposite corners. Total of 394 rods.

aces:

Water ht = 28.20 cm $\Delta h = 7.10$ cm

Temp $^{\circ}$ C

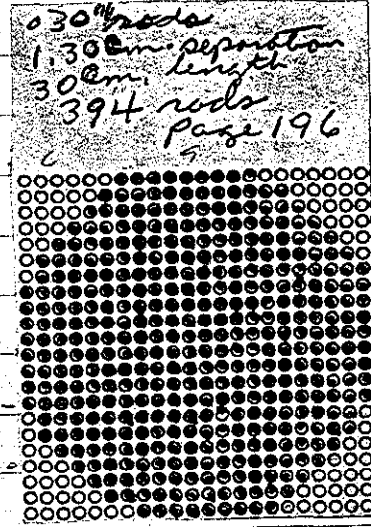
5 + Per

22.0 $^{\circ}$ C

$C = 171.67 \text{ m} = 6.4 = .90 \text{ g/cm}.$

1602 Water ht = 21.10 cm

System just critical
Train.



INSTRUMENT CHECK

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

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

START-UP CHECK LIST

Equipment checked by AKL Personnel check by E.C.C.
 Instruments and safeties checked and reset by AKR
 Source in checked by AKL Source No. KA-43
 Emergency equipment in control room checked by E.C.C.
 Instruments in trip circuit: K-1-2 DM-1-2
 Red light on by AKL Time 1005
 Start-up OK'd by E.C.C. AKL Date 1-16-68

Have on 21 x 22 array, with 17 rods removed from each corner. Total of 394 rods.

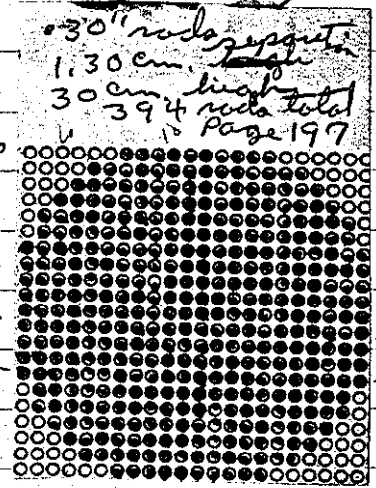
Water ht = 28.20 cm

$\Delta h = 5.9 \text{ cm}$

✓ + Per
 $\tau = 356.37 \text{ sec} = 3.34 = .564/\text{cm}$

1058 Water ht = 22.30 cm

System just critical
 Drain to 0.0 cm.



Removed 1 rod. Now have 21 x 22 with 17 rods removed from 3 corners, and 18 rods removed from 1 corner. Total of 393 rods.

11.6 Water ht = 28.50 cm

System sub critical
 Drain:

avg:

START-UP CHECK LIST

Equipment checked by AKM Personnel check by Ed.C.

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source-No. KA-93

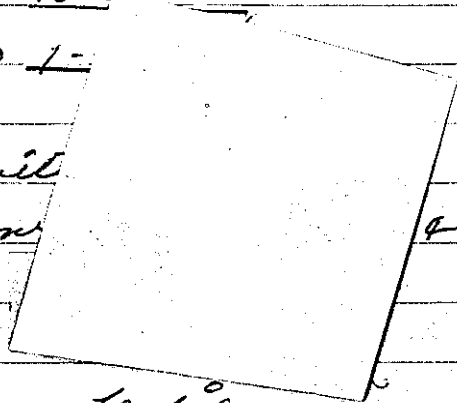
Emergency equipment in control room checked by Ed.C.

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

Red light on by AKM Time 1005

Start-up OK'd by Ed.C. AKM Date 1-

Have on 21 x 22 array, with
removed from each corner
rods.



Water ht = 28.20 cm $\Delta h = 5.90 \text{ cm}$ Temp $^{\circ}\text{C}$

✓ + Per $T = 356.37 \text{ sec} = 3.34 = .564/\text{cm}$ 21.9 $^{\circ}\text{C}$

1058 Water ht = 22.30 cm

System just critical
Drain to 21.0 cm.

(4)

Removed 1 rod. Now have 21 x 22 with 17
rods removed from 3 corners, and 18 rods
removed from 1 corner. Total of 393 rods.

116 Water ht = 28.50 cm

System sub critical
Drain:

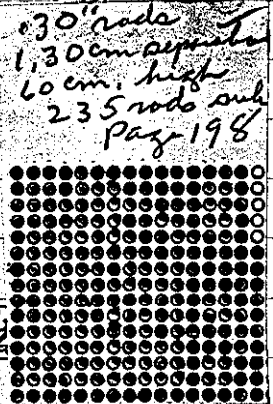
avg:

.30" rods.
 1.300 cm separation e-c
60 cm lengths. Square array:

Have an 15x15 array, + 10 rods on 1 face.
 Total of 235 rods. (all usable rods)

1445 Water ht = 58.30 cm

System very sub critical
 Drain.



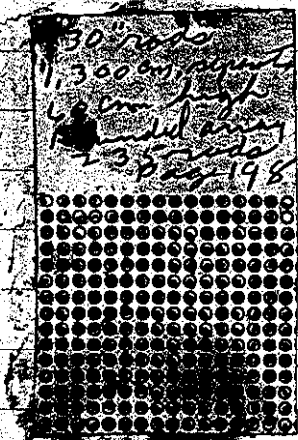
1,300 cm ^{separation} ~~separation~~
Rounded array:
60 cm lengths.

Have an 15x16 array with 1 rod removed from
 3 corners, and 2 rods removed from 1 corner.
 Total of 235 rods. (all usable rods)

1540 Water ht = 58.40 cm

System very sub critical
 Drain.

Temp. °C
 22.2 °C



198

30" nodes.
1.300 cm separation c-c
60 cm lengths. Square

Have an 15x15 array, + 10 nodes
Total of 235 nodes. (all usable)

1445 Water ht = 58.30 cm

System very sub critical
Drain.

Temp °C
22.2°

1.300 cm ^{separation c-c} ~~separation~~
Rounded array:
60 cm lengths.

Have an 15x16 array with 1 node removed from
3 corners, and 2 nodes removed from 1 corner.
Total of 235 nodes. (all usable nodes)

1540 Water ht = 58.40 cm

System very sub critical
Drain.

Temp °C
22.2°



INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-50

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by E.P.C. AKM Personnel check by E.P.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 E.P.C.

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

Red light on by AKM Time 0935

Start-up OK'd by E.P.C. AKM Date 1-17-68

200

130" rods.
2,900 cm separation c-c.
30. cm length.
Square array.

see p 239
To
245

I have an 17x17 array. Total of 289 rods.

1005 Water ht = 28.50 cm Temp °
System sub critical 22.2 °
Drain.

(The 17x17 array above is the largest that can be run in the small reflector tanks, and maintain a 6" reflector on sides of array.)

Flattened array. (2,900 cm c-c.)

Now have an 20x20 array, with 15 rods removed from each corner. Total of 340 rods.

1052 Water ht = 28.50 cm
System sub critical
Drain.

Now have an 21x21 array, with 15 rods removed from each corner. Total of 381 rods.

1255 Water ht = 28.30 cm Temp °
System sub critical 22.3 °
Drain.

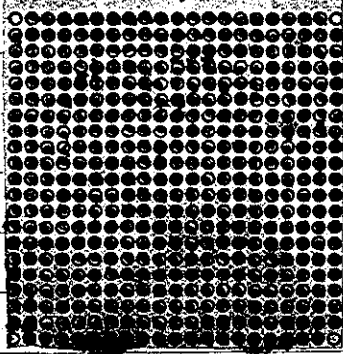
Added 20 rods. Have an 21×21 array, with
10 rods removed from each corner. Total
of 401 rods.

1325 Water ht = 28.30 cm
System sub critical
Drain.

Added 36 rods. Have an 21×21 array, with
1 rod removed from each corner. Total
437 rods. (The grid plate has only 437 holes.
Also in this small reflector tank the
9 rods on each corner has less than
6.0" of reflector, but minimum side reflector
on extreme corners is ~ 3.5 ".)

1353 Water ht = 28.50 cm Temp $^{\circ}\text{C}$
System sub critical 22.5 $^{\circ}\text{C}$
Drain.

30" rods
30 cm high
2.90 cm separation
437 rods subcrit
Page



INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by F.D.C. 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-1-2 PM-1-2

Red light on by AKK Time 0815

Start-up OK'd by F.D.C. AKK Date 1-18-68

.30"
2,900 cm separation e-e. - 203
50.0 cm length.
~~square array's.~~

Have an 13 X 13 array. Total of rods = 169 rods.

0852 Water ht = 58.40 cm

System sub critical
Drain

Added 27 rods. Now have an 14 X 14 array.
Total of 196 rods.

Water ht = 58.30 cm $D_h = 11.2 \text{ cm}$ Temp $^{\circ}\text{C}$
+ Per 22.5
 $\tau = 124.95 \text{ m} = 8.3 \text{ f} = .74 \text{ f/cm}$

0945 Water ht = 47.10 cm

System just critical
Drain.

Removed 2 rods. Have an 14 X 14 array, with
2 rods removed from 1 face. Total of 194
rods.

1035 Water ht = 58.20 cm

2-Per.

$\tau = -2173.0 \text{ m} = -.61 \text{ f}$

(37)

cur.

added 1 rod. Have an 14x14 array with
1 rod removed from corner. Total 195
rods.

Water ht = 58.30 cm $\Delta L = 10.30$ cm Temp $^{\circ}$ C

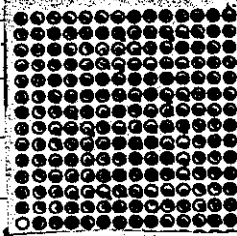
$\frac{3}{4}$ + Per 22.5 $^{\circ}$ C

$t = 210.78$ sec = 5.34 = .51 f/cm

11.18 Water ht = 48.00 cm

system just critical
Drain.

30 rods
60 cm high
2.90 cm gap
195 rods
pos 204



2.900 cm c - e

60 cm length

Rounded array 2

14x15 array with 5 rods removed from each corner. 190 rods

Water ht = 47.80 cm $\Delta L = 2.0$ cm Temp $^{\circ}$ C

$\frac{4}{4}$ + Per 22.7 $^{\circ}$ C

$t = 99.96$ sec = 9.94 = 4.95 f/cm

14.43 Water ht = 45.80 cm

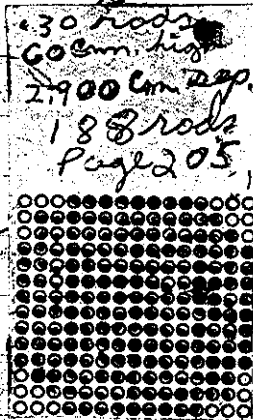
system just critical
Drain.

(38)

Removed 2 rods. Now 14x15 array with
6 rods removed from 2 opposite corners, and
5 rods removed from 2 opposite corners.
✓ Total of 188 rods.

1515 Water ht = 58.30 cm

System just critical
Drain



Temp
23.0°C

39

Order

DUMP WELL PROBE LIGHT

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1-3 X10 ⁻¹²	"	Meter	2"	✓	3 X10 ⁻¹²
"	"	Fast	"	✓	"
K-2	"	Meter	"	✓	"
"	"	Fast	"	✓	"
R-1	"	Fast	"	✓	"
R-2	"	Fast	"	✓	"
PM-1 7002	"	Meter	3"	✓	5005
PM-2 12002	"	Meter	12"	✓	9005
LOG N CALIBRATE	OPERATE	SOURCE No.	B-80		

INSTRUMENT CHECK

START-UP CHECK LIST

Equipment checked by F.I.D.C. AKR/ Personnel check by F.I.D.C.
 Instruments and safeties checked and reset by AKR/
 Source in checked by AKR/ Source No. M-93
 Emergency equipment in control room checked by F.I.D.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKR/ Time 10:10
 Start-up OK'd by F.I.D.C. AKR/ Date 1/19/68

Triangular Array

207

30.0 cm length

2.200 cm separation a.e

Triangular array, with 7 full rings, plus 2 rods on each face in 8th ring. Total of 181 rods.

1050 Water ht = 28.30 cm
System sub critical
Drain

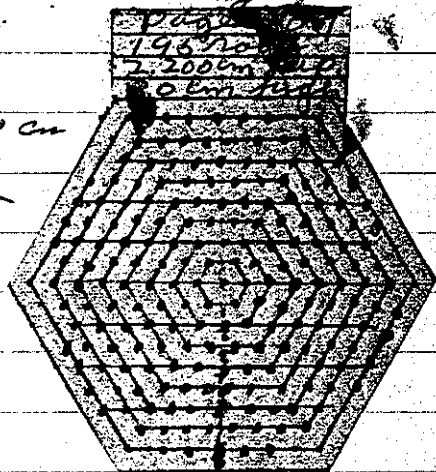
Temp °
22.5 °

Added 14 rods. Now have 7 full rings, plus 4 rods on 4 faces, and 5 rods on 2 faces in 8th ring. Total of 195 rods.

Water ht = 28.30 cm Dh 8.8 cm

+ Per

$\epsilon = 85.83 \text{ m} = 11.14 = .79 \text{ f/cm}$



1120 Water ht = 19.50 cm
System just critical
Drain.

Removed 1 rod. Now have 7 full rings, plus 4 rods on 5 faces, and 5 rods on 1 face in 8th ring. Total of 194 rods.

1255 Water ht = 28.30 cm
- Per. $\epsilon = -10650 \text{ m} = -1.34$

Temp °
23.0 °

1306 Drain.

Triangular Array

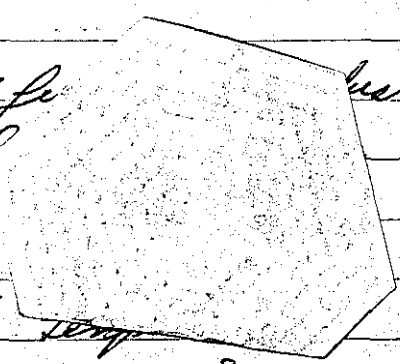
30.0 cm length,
2.200 cm separation a.e

Triangular array, with 7 full rings, plus
2 rods on each face in 8th ring. Total
of 181 rods.

1050 Water ht = 28.30 cm Temp °
System sub critical 22.5 °
Drain

added 14 rods. Now have 7 full
rings, plus 4 rods on 4 faces, and 5 rods
in 8th ring. Total of 195 rods.

Water ht = 28.30 cm $d = 8.8$ cm
+ Per $\text{⑨} \text{⑩}$ Temp 22.7 °
 $\tau = 85.83 \text{ m} = 11.14 = .794/\text{cm}$



1120 Water ht = 19.50 cm
System just critical
Drain.

⑫ Removed 1 rod. Have 7 full rings, plus
4 rods on 5 faces, and 5 rods on 1 face
in 8th ring. Total of 194 rods.

1255 Water ht = 28.30 cm Temp °
- Per. $\tau = -1065.0 \text{ m} = -1.34$ 23.0 °

1306 Drain.

Triangular Array
 60.0 cm length.
 2,200 cm - e - e.

Have a Triangular array, with 6 full rings,
~~plus~~ plus 1 rod on each face in the
 7th ring. Total of 133 rods

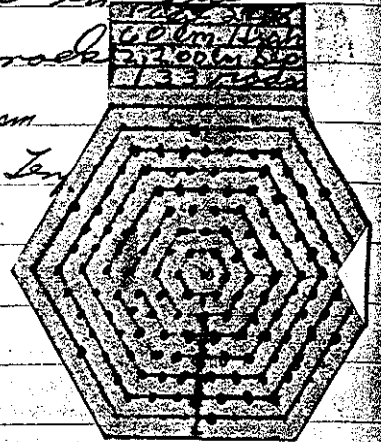
Water ht = 58.20 cm. $bl = 10.60 \text{ cm}$

³ + Res

$t = 191.2 \text{ sec} = 5.84 = .55 \text{ ft/cm}$

1539 Water ht = 47.60 cm

System just critical
 Drain.



Removed 1 rods from 7th ring. Total rods
 now = 132

1400 Water ht = 58.20 cm

System sub critical
 Drain.

208

Triangular array
 60.0 cm length.
 2.200 cm - e - e.

Have a triangular array, with 6 ft.
~~plus~~ plus 1 rod on each face in
 7th ring. Total of 133 rods

Water ht = 58.20 cm. ^{bl = 10.60 cm} Temp °C
 + Per 23.0 °C
 $t = 191.2 \text{ sec} = 5.84 = .55 \text{ ft/cm.}$

1539 Water ht = 47.60 cm
 System just critical
 Drain.

Removed 1 rod from 7th ring. Total rods
 now = 132

1900 Water ht = 58.20 cm
 System sub critical
 Drain.

INSTRUMENT CHECK

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

LOG N CALIBRATE

OPERATE

SOURCE No.

B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and report by RKAL

Source in checked by RKAL Service No. M-43

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

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

Red light on by RKAL Time 0920

Start-up OK'd by F.I.O.C RKAL Date 1/23/68

over

210

Triangular Array.

30.0 cm length

1.642 cm separation c-c.

Have a triangular array with 8 full rings.
Total of 217 rods.

10:00 Water ht = 28.50 cm Temp °C
System sub critical 23.1°C
Drain.

Added 24 rods, 4 to each face in 9th ring. Total of 241 rods.

Water ht = 28.20 cm
System sub critical
Drain.

Added 30 rods. Now have 9 full rings,
total of 271 rods.

Water ht = 16.95 cm $\Delta h = 14.5$ cm Temp °C
+ per 23.5°C
 $C = 93.44 \text{ m} = 10.47 = 22.9 \text{ g/cm}$

10:55 Water ht = 16.50 cm
System just critical
Drain.

Removed 1 rod from each corner. Total of 6 rods.
 Now have 8 full rings plus 8 rods on each
 face in 9th ring. Total of 265 rods.

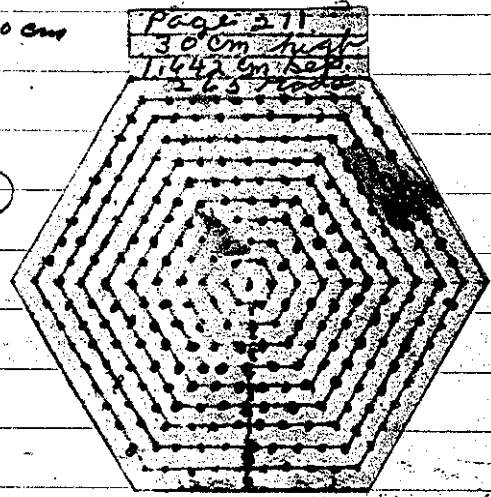
Water ht = 25.30 cm $\delta h = 7.20$ cm
² - per

$$C = 223.81 = 5.14 = .71 \text{ ft/cm}$$

1129

Water ht = 21.10 cm
 System just critical
 Drain.

(5)



Removed 1 rod from 1 face. Now have 8 full
 rings, plus 8 rods on 5 faces, and 7 rods on 1
 face in 9th ring. Total of 269 rods.

Water ht = 28.30 cm
³ - per

$$C = -510.65 \text{ cm} = -2.7$$

1325

Drain.

over

Triangular array.

60 cm length.1.642 cm separation c-c.

Have 7 full rings, plus 3 rods on each
face in 8th ring. Total of 187 rods.

1.495 Water ht = 58.90 cm

Temp °C

System sub critical

24.0°

Drain.

added 3 rods, reach to every other face in 8th
ring. Total of 190 rods. (6)

Water ht = 47.00 cm

 $z_L = 2.65 \text{ cm}$

+ per

 $\tau = 39.11 \text{ sec} = 19.3 \text{ s} = 173.3 \text{ f/cm}$

1.513 Water ht = 44.35 cm

System sub critical

Drain.

Removed 2 rods. Now have 7 full ring, plus
3 rods on 5 faces and 4 rods on 1 face in
8th ring. Total of 188 rods.

(6) (8)

Water ht = 58.30 cm

Temp °C

5 - per

24.1°

N.G.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
	3×10^{-12}	Fast ✓	"	✓	"
K-1	3×10^{-12}	Meter ✓	"	✓	"
	"	Fast ✓	"	✓	"
E-	700V	Alarm ✓	Cont	✓	500V
PF	1200V	Low ✓	12"	✓	900V
	"	Alarm ✓	3"	✓	"
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. 19-43

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

Instruments in trip circuit: N-1-2 OCG-1-2

Red light on by AKH Time 0845

Start-up OK'd by F.I.C. AKH Date 11/29/68

Repeat of last run p-212, after moving K-1 +
Log-in inside small refueling tanks.

0925 Water ht = 58.30 cm Temp °C
- Per 23.5 °C

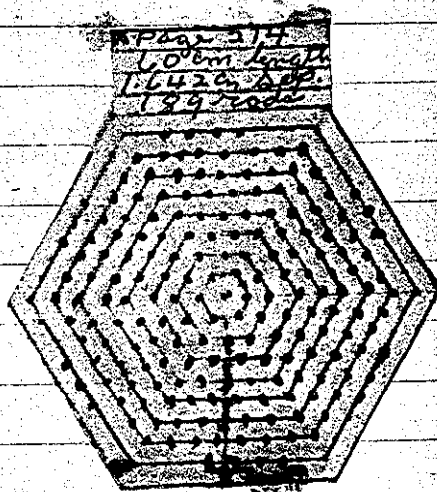
(4) $E = -1064.77 \text{ m} = -1.3 \%$
Drain. to 0.0 cm

added 1 rad. Now have 7 full rings,
plus 3 rads on 4 faces, and 4 rads on 2
opposite faces in the 8th ring. Total of 189
rads.

Water ht = 49.00 cm $\Delta h = 2.90 \text{ cm}$ Temp °C
+ Per 23.5 °C
 $E = 99.96 = 9.9 \%$ $= 3.9 \%$ / cm

1010 Water ht = 46.10 cm
system just equilib
Drain.

(4) (5)



.30 rods.
 Triangular array.
 1.933 cm separation c-c
 30 cm lengths.

Have 8 full rings. Total of 217 rods.

Water ht = 15.75 cm dh = .45 cm Temp °C
 + Per 23.2 °C
 $\tau = 80.40 = 11.7 f = 26.0 f/cm$

1346 Water ht = 15.30 cm
 System just critical
 Drain.

Removed 6 rods. 1 from each corner. Total of
 rods = 211

Water ht = 18.80 cm dh = 1.2 cm Temp °C
 + Per 23.2 °C
 $\tau = 69.54 = 13.0 = 10.8 f/cm$

1447 Water ht = 17.60 cm
 System just critical
 Drain. to 0.0 cm.

Removed 6 rods. 1 from each face. Total of
 205 rods.

1458 Water ht = 28.30 cm
 System sub critical
 Drain.

~~added 2 rods, 1 each to opposite faces.
Total of 207 rods.~~

added 1 rod. Now have 7 full rings,
plus 6 rods on 5 faces, and 7 rods on
1 face in 8th ring. Total of 206 rods.

1515 Water ht = 28.40 cm
System sub critical

added 1 rod. Now have 7 full rings, plus
6 rods on 4 faces, and 7 rods on 2 opposite
faces in 8th ring. Total of 207 rods.

1522 Water ht = 28.30 cm
System sub critical
DRAIN

added 1 rod. Have 7 full rings, plus 6 rods
on 3 opposite faces, and 7 rods on 3 opposite
faces in the 8th ring. Total of 208 rods.

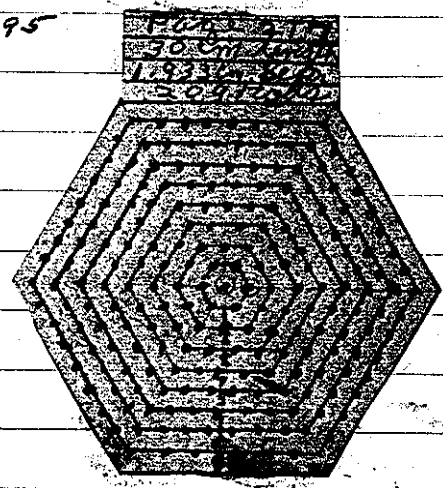
Water ht = 28.40 cm
- Per N.G

1549 DRAIN

added 1 rod. Have 7 full rings. plus 7 rods
on 4 opposite faces, and 6 ^{rods} on 2 opposite
faces in 8th ring. Total of 209 rods.

Water ht = 28, 40 cm $\sigma_2 = 7.95$
+ P₂
 $\tau = 180.36 = 6.14 = .774 \text{ cm}$

1607 Water ht = 20.45 cm (1)
system just critical (2)
Drain.



2
90

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
"	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"
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 F.D.C. 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-1-2 PM-1-2
 Red light on by AKM Time 0935
 Start-up CK'd by F.D.C. AKM Date 1/25/68

130 rods.
Triangular array
1.933 cm separation c-c:
60 cm length.

219

Triangular array, with 6 full rings, plus 2 rods
on each face in 7th ring. Total 139 rods.

0921 Water ht = 58.30 cm

Temp °

System sub critical
Drain.

23.0 °

added 6 rods. 1 to each face in 7th ring.
Total of 145 rods.

Water ht = 58.30 cm

System sub critical
Drain.

added 6 rods. 1 to each face in 7th ring.
Total of 151 rods.

1048 Water ht = 41.00 cm

System just critical
Drain.

arr.

Removed 2 rods, 1 each from opposite faces in 7th ring. Total rods now = 149.

Water ht = 44.20 cm $\Delta h = .65$ Temp $^{\circ}$
 + Per $^{\circ}$
 $C = 143.42 = 7.44 = 11.5 \text{ f/cm}$ 23.5°

11.16 Water ht = 43.55 cm
 System just critical
 Drain

Removed 2 rods, 1 each from opposite faces in 7th ring. Total rods now = 147.

Water ht = 58.30 cm Temp $^{\circ}$
 2 - Per = N.G. 23.5°
 *

1.310 Drain to 0.0 cm.

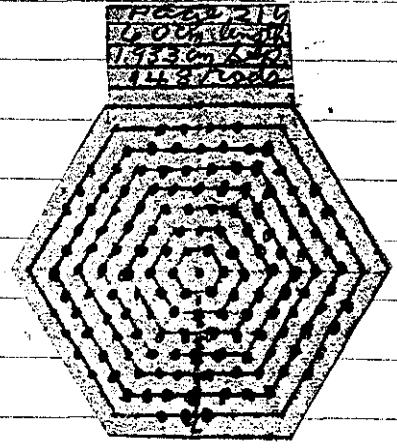
Added 1 rod. Now have 6 full ring, plus 3 rods on one other face, and 4 rods on one other face in 7th ring. Total of 148 rods.

Water ht = 49.10 cm $\Delta h = 3.45 \text{ cm}$ Temp $^{\circ}$
 + Per $^{\circ}$ 23.5°
 $C = 71.71 \text{ cm} = 12.74 = 3.74 \text{ f/cm}$

1344 Water ht = 45.65 cm.
System just critical
Drain.

49.

8 1/2



222

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2'	✓	3×10^{-12}
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	ant	✓	5000
PM-2	1100 V	Low ✓	8"	✓	9000
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by T.O.C. Personnel check by T.O.C.
AKM
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-93
 Emergency equipment in control room checked by T.O.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKM Time 0840
 Start-up OK'd by T.O.C. AKM Date 1/26/68

130" rods.

1.396 cm separation e-e

223

30 cm length.

Triangular array.

Have Triangular array, with 11 full rings.
Total of 397 rods.

Water ht = 22.50 cm $\Delta h = 3.60$ cm Temp $^{\circ}$ C
+ Per 23.0 $^{\circ}$ C

$$C = 15.19 \text{ sec} = 13.6 \phi = 3.8 \phi / \text{cm}$$

0920 Water ht. = 18.90 cm
System ~~is~~ ^{just} critical
Drain.

Removed 2 rods. 1 each from opposite corners.
Total of 395 rods.

Water ht = 28.30 cm $\Delta h = 8.00$ cm Temp $^{\circ}$ C
+ Per 23.0 $^{\circ}$ C
 $C = 113.0 \text{ sec} = 9.0 \phi = 1.1 \phi / \text{cm}$

10.00 Water ht = 20.30 cm.
System ~~is~~ ^{just} critical
Drain.

over.

① Removed 2 more rods, 1 each from opposite corners. Total of rods = 393.

Water ht = 28.20 cm

³ - Per

$C = -2173.0 \text{ sec} = -1.61 \text{ f}$

1040 Drain.

added 1 rod. Now have 1 rod removed from every other corner in 11th ring. Total of 394 rods.

Water ht = 28.30 cm

$D_2 = 6.70 \text{ cm}$

Temp °C

⁴ + Per

23.0 °C

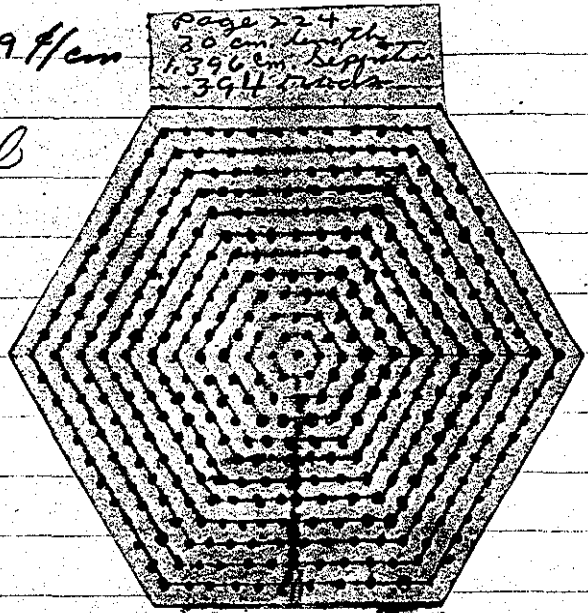
$C = 247.72 \text{ sec} = 4.6 \text{ f} = .69 \text{ f/cm}$

1116 Water ht = 21.60 cm

System just critical Drain.

②

Lattice #2

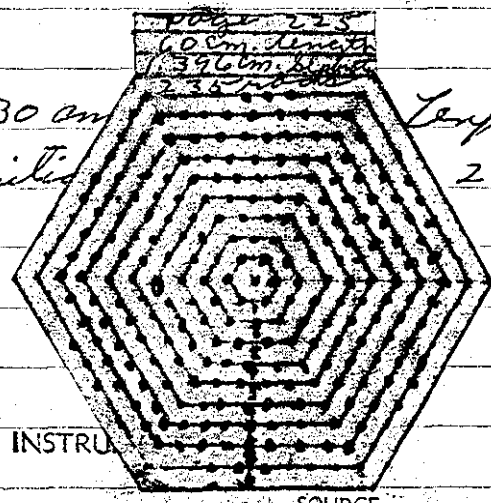


.30" rods.
 1,396 separation c-c.
 60 cm length.
 Triangular Array

225

Have a Triangular array, with 8 full rings, plus
 3 rods on each face in 9th ring. Total of
 235 rods.

Water ht = 58.30 cm
 System sub critical
 Drain.



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

LOG N CALIBRATE OPERATE SOURCE No. 13-50
 DUMP WELL FROSE LIGHT

START-UP CHECK LIST

Equipment checked by AKM Personnel check by E.D.C.Instruments and safeties checked and reset by AKMSource in checked by AKM Source No. M-43Emergency equipment in control room checked by E.D.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKM Time 0935Start-up OK'd by E.D.C. AKM Date 1-29-68.30" node.2,630 cm separation c-c.30 cm length.

Have an triangular array, with 8 full rings plus ² nodes on every other face, and 1 node on every other face in 9th ring. Total of 226 nodes.

Water ht = 17.30 cm $d_h = .80$ cm ~~Temp~~ ^{Temp} °C
 + Per 23.0 °C

$$E = 52.15 \text{ sec} = 15.94 = 19.94/\text{cm}$$

1026 Water ht = 16.50 cm

System just critical

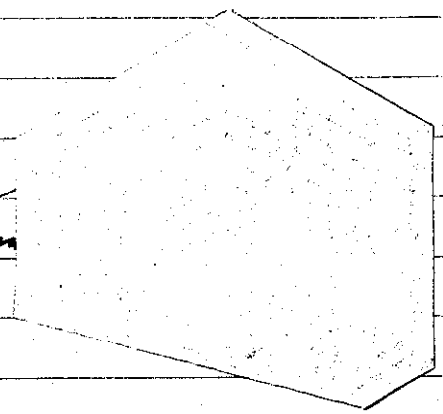
Drain.

Removed 3 rods. Have 8 full rings, plus 1 rod on each face in 9th ring. Total of 223 rods.

Water ht = 19.20 cm $\Delta h = 1.30$ cm
+ Per
 $t = 52.15 \text{ sec} = 15.9 \text{ s} = 12.2 \text{ ft/cm}$

1046 Water ht = 17.90 cm
System just critical
Drain.

Removed 2 rods from opposite faces
Water ht = 28.30 cm $\Delta h = 9.2$ cm
+ Per
 $t = 123.86 \text{ sec} = 8.3 \text{ s} = 1.01 \text{ ft/cm}$



1108 Water ht = 20.10 cm
System just critical (W)
Drain. (T)

Removed 2 more rods from opposite faces in 9th ring. Total rods = 219

1121 Water ht = 28.30 cm
System sub critical
Drain.

over!

Removed 3 rods. Have 8 full rings, plus
1 rod on each face in 9th ring. Total of
223 rods.

Water ht = 19.20 cm $\Delta h = 1.30$ cm

² + Per

$$C = 52.15 \text{ sec} = 15.9 \text{ d} = 12.2 \text{ f/cm}$$

1046 Water ht = 17.90 cm

System just critical
Drain.

Removed 2 rods from opposite faces in 9th ring. Total
rods = 221

Water ht = 28.30 cm $\Delta h = 8.2$ cm

³ + Per

$$C = 123.86 \text{ sec} = 8.3 \text{ d} = 1.01 \text{ f/cm}$$

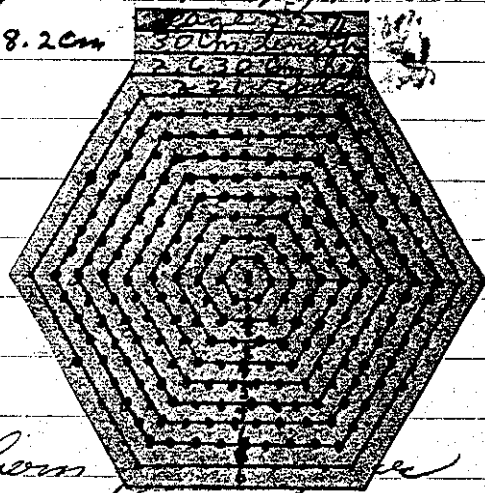
1108 Water ht = 20.10 cm

System just critical $\left(\frac{12}{14} \right)$
Drain.

Removed 2 more rods from
in 9th ring. Total rods = 219

1121 Water ht = 28.30 cm

System sub critical
Drain.



over!

Now have 8 full rings, plus 1 rod on
 over other face in 9th ring. Total of
 220 rods.

(3) Water ht = 28.30 cm

Temp °C

4-Per

23.2 °C

5 - 619.3 mm = 2.24

1357 Drain:

30" rod

2.630 cm separation c-c

60.0 cm length.

Triangular array with 6 full rings, plus
 1 rod on each face in 7th ring. Total of 133
 rods.

1425 Water ht = 58.30 cm

System sub-critical

Drain:

arr:

Added 1 rod to each face in 7th ring.
Total rods = 139 rods.

Water ht = 42.70 cm $\Delta h = 1.0$ cm Temp $^{\circ}$ C
5 + Per 23.5 $^{\circ}$ C
 $\epsilon = 58.67 \mu = 14.7\% = 14.7\%/cm$

1.500 Water ht = 41.70 cm
System just critical
Drain.

Removed 2 rods, 1 from opposite faces in 9th ring. Total ~~rods~~ = 137

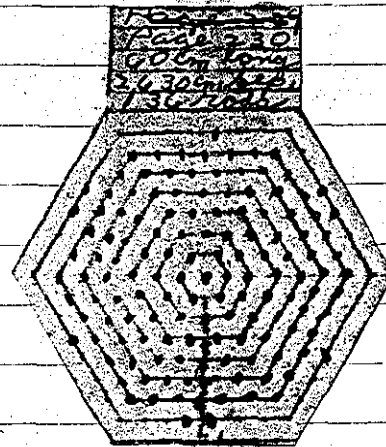
Water ht = 45.80 cm $\Delta h = 1.40$ cm Temp $^{\circ}$ C
6 + Per 23.5 $^{\circ}$ C
 $\epsilon = 78.23 \mu = 11.9\% = 8.5\%/cm$

1.530 Water ht = 44.40 cm
System just critical
Drain.

Removed 1 rod. Now have 1 rod on every other face, and 2 rods on every other face in 9th ring. Total rods = 136.

Water ht = 58.30 cm $\Delta h = 11.00$ cm Temp $^{\circ}$ C
7 + Per 23.8 $^{\circ}$ C
 $\epsilon = 165.15 \mu = 6.6\% = 6.6\%/cm$ over!

Water ht = 47.30 cm
 System just critical
 Drain.



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	2"	✓	3×10^{-12}
"	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	12"	✓	500V
PM-2	1200V	Low ✓	3"	✓	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 F.O.C.Instruments and safeties checked and reset by AKMSource in checked by AKM Source No. M-43Emergency equipment in control room checked by F.O.C.Instruments in trip circuit: K-1-2 D19-1-2Red light on by AKM Time 0810Start-up OK'd by F.O.C. AKM Date 1-30-68

Removed 1 rod. (See p 229/30.) Now have
 6 ~~X~~ full rings, plus 2 rods on opposite faces,
 and 1 rod on opposite face in 7th ring. Total
 rods = 13.5.

0843 Water ht = 58.50 cm

System sub critical

Drain.

Temp °

23.8°

over

232

.30" rods,
 3.110 cm separation c-c.
 60.0 cm length.
 Triangular array:

Have an triangular array with 7 full rings, plus 3 rods on each face in 8th ring. Total of 187 rods.

Water ht = 45.0 cm $D_h = .70$ cm Temp °C
 + Per. 23.5 °C
 $C = 119.51 \text{ sec} = 8.64 = 12.34/\text{cm}$

1.520 Water ht = 44.30 cm
 System just critical
 Drain.

Removed 3 rods. 1 from each other face in 8th ring. Total of rods 184.

Water ht = 58.40 cm Temp °C
 - Per. N.G. 23.7 °C

1.558 Drain.

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by E.I.O.C. Personnel check by E.I.P.C.

Instruments and safeties checked and reset by AKN

Source in checked by AKN Source No. M-83

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

Instruments in trip circuit: K-1-2 PM-12

Red light on by AKN Time 0810

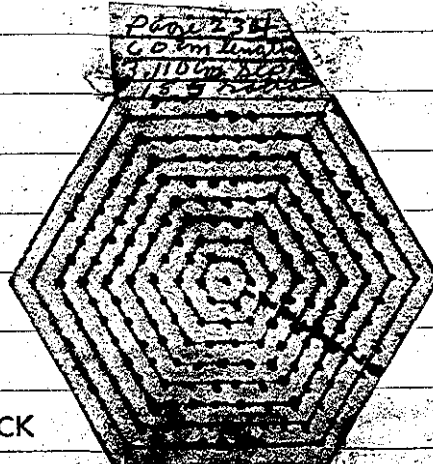
Start-up OK'd by E.I.O.C. AKN Date 11/31/68

Added 1 rod. Now have 7 full rings, plus
 3 rods on 4 faces, and 2 rods on 2 faces in
 8th ring. Total of ¹⁸⁵ ~~184~~ rods.

Water ht = 58.30 cm $\alpha = 10.90 \text{ cm}$ Temp $^{\circ}\text{C}$
 + Per 23.5 $^{\circ}\text{C}$
 $E = 1.49.94 \text{ cm} = 7.14 = .654/\text{cm}$

09.11 Water ht = 47.40 cm
 System just critical
 Drain

17 (h)



INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by AKK Personnel check by E.D.C.
 Instruments and safeties checked and set by AKK
 Source in checked by AKK Source M-43
 Emergency equipment in control room checked by E.D.C.
 Instruments in trip circuit: K-1-2 P-1-2
 Red light on by AKK Time 1005
 Start-up OK'd by E.D.C. AKK Date 2/1/68

"Note"

30" nodes.
 "Top of fuel in this 3.110 cm separation c-c
 run only = 15.55 cm" 30 cm length.
 Triangular array.

Have a triangular array with 12 full rings. Total of 469 nodes.

Water ht = 18.45 cm ^{24.35} - 15.1 | Temp °C
 + Per | 23.7 °C
 $\sigma = 60.84 \text{ cm} = 14.3 \text{ } \phi = 40.9 \text{ } \phi / \text{cm}$ | Old ref.

1045 Water ht = 18.10 cm - 14.75
 System just critical
 Drain.

over

Removed 18 rods. Now have 11 full rings,
plus 3 rods on each face in 12th ring. Total
rods = 415

Water ht = 31.30 cm = 28.0
4 - Per. $\frac{3.33}{15}$ Temp °C
T = -606.3 sec = -2.34 15 (14) 23.7 °C

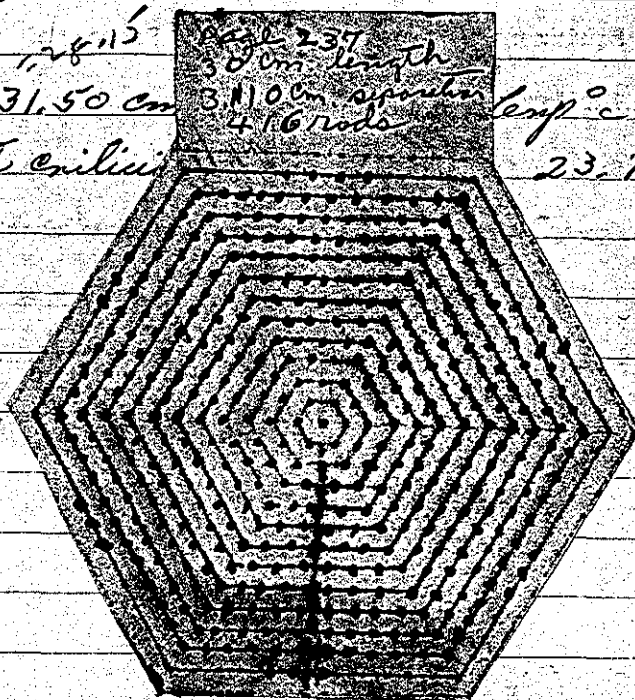
1329 Drain.

added 1 rod. Now have 11 full rings, plus
4 rods on 1 face, and 3 rods on 5 faces in the
12th ring. Total rods = 416.

1358

Water ht = 31.50 cm
System just critical
Drain. Temp °C 23.7

16 (14)



238

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter <input checked="" type="checkbox"/>	2"	<input checked="" type="checkbox"/>	3×10^{-12}
"	"	Fst <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
"	"	Fst <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
R-1					
R-2					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	alt	<input checked="" type="checkbox"/>	5000
PM-2	1200V	Low <input checked="" type="checkbox"/>	12"	<input checked="" type="checkbox"/>	9000
"	"	Alarm <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	11

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKJ

Source in checked by AKJ 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 AKJ Time 0955

Start-up OK'd by F.D.C. AKJ Date 2-7-68

"Note"

.30" rods.
2.900 cm separation e-c
30 cm length.
Square array.
See p 200 - 201

Top of fuel in this run = 15.10 cm.

after extended 2.900 cm tubes sheet.

Now have an 21 x 22 array. Total of 462 rods.

Note: 15.1 cm - 12.2 cm = 2.9 cm
New top all rods $h = 1.00$ cm

Water ht = 22.50 cm Temp °
+ Per $\frac{18.6}{2.9} = 6.41$ 23.1 °
 $T = 108.65 \text{ sec} = 9.34 = 9.34 / \text{cm}$

10.45 Water ht = 21.50 cm - 18.6 cm
system just critical
Drain

Remaind 4 rods. Now have an 21 x 21 full
17 rods on 1 face. Total of 458 rods.

Water ht = 23.10 cm $h = 1.10$ cm Temp °
+ Per $\frac{18.6}{2.9} = 6.41$ 23.1 °
 $T = 113.0 \text{ sec} = 9.04 = 7.54 / \text{cm}$

11.14 Water ht = 21.90 cm - 19.0
system just critical
Drain

aver:

Removed 10 rods. Now have an 21×21 plus 7 rods on 1 face. Total of 448 rods.

Water ht = 34.20 cm Temp $^{\circ}\text{C}$
³ - Per 23.5 $^{\circ}\text{C}$
 - N.G

12.55 Drain to 0.0 cm and added 2 rods.

Now have an 21×21 plus 9 rods on 1 face. Total of 450 rods.

(34)

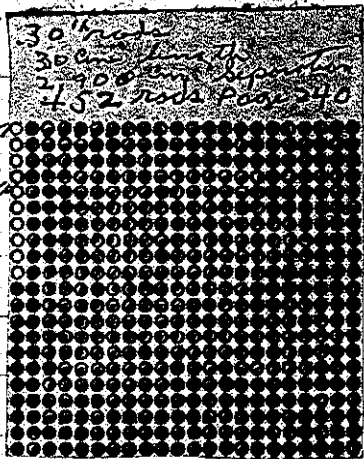
Water ht = 31.40 cm
⁴ - Per
 - 265.1 m = - 5.8 ϕ

13.19 Drain to 0.0 cm and added 2 rods.

Now have an 21×21 plus 11 rods on 1 face total of 452 rods.

13.38 Water ht = 31.50 cm

System just critical
 Drain $\frac{2.5}{28.6}$



$^{\circ}\text{C}$
 23.5 $^{\circ}\text{C}$
 21

(33)

30" rods
2,900 on separation c c
30 cm length.
Rounded array.

241

Have an 22 x 22 array, with 8 rods removed from each corner. Total of 452 rods.

Water ht = 20.70 cm $b_h = .30$ cm
Temp °C
t = Per. $\frac{2.9}{17.8}$
C = 228.16 sec = 5.04 = 16.64 cm 23.5°C

1443 Water ht = 20.40 cm
System just critical
Drain: 17.5

INSTRUMENT CHECK

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

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

START-UP CHECK LIST

Equipment checked by F.O.C. AKM Personnel check by F.O.C.
 Instruments and safeties checked and reset by AKM
 Source in checked by AKM Source No. M-23
 Emergency equipment in control room checked by F.O.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light op by AKM Time 0805
 Start-up OK'd by F.O.C. AKM Date 2/8/68

Remained 8 rods. Have an 22×22 array,
with 10 rods removed from each corner.
Total of 444 rods.

Water ht = 22.60 cm $\Delta h = 1.45$ cm Temp $^{\circ}$ C
 $\frac{2.9}{19.7}$
 $\epsilon = 89.09 \text{ m} = 10.8 \text{ f} = 7.4 \text{ f/cm}$ 23.0 $^{\circ}$ C

0842 Water ht = 21.15 cm - 2.9 = 18.25
 System just critical
 Drain.

Remained 8 rods. Have an 22×22 array, with
12 rods removed from each corner. Total of
436 rods.

Water ht = 27.10 cm $\Delta h = 4.45$ cm Temp $^{\circ}$ C
 $\frac{2.9}{14.2}$
 $\epsilon = 82.57 \text{ m} = 11.4 \text{ f} = 2.6 \text{ f/cm}$ 23.3 $^{\circ}$ C

0915 Water ht = 22.65 cm - 2.9 = 19.75
 System just critical
 Drain.

avg

Removed 4 rods. Have an 22×22 array
with 13 rods removed from each corner.
Total of 432 rods.

$$\begin{array}{r} \text{Water ht} = 31.50 \text{ cm} \\ \text{3 Per} \quad \begin{array}{r} 2.9 \\ \hline 78.6 \end{array} \\ \hline C = 223.86 \text{ sec} = 5.14 = .724/\text{cm} \end{array}$$

$\approx 4 = 7.05$
Temp $^{\circ}\text{C}$
23.3 $^{\circ}\text{C}$

0947 Water ht = 24.45 cm - 2.9 = 21.55
System just critical
Drain.

Removed 4 rods. Have an 22×22 array with
14 rods removed from each corner. Total of
428 rods.

$$\begin{array}{r} \text{Water ht} = 31.50 \text{ cm} \\ \text{4 Per} \quad \begin{array}{r} 2.9 \\ \hline 78.6 \end{array} \\ \hline C = -547.6 \text{ sec} = -2.34 \end{array}$$

1022 Drain:

added 1 rod. Have an 22x22 array, with 14 rods removed from 3 corners and 13 rods removed from 1 corner. Total of 429 rods.

$$\begin{array}{r}
 \text{Water ht} = 31.60 \text{ cm} \\
 + \text{Per.} \quad \quad \quad \frac{2.9}{28.7} \\
 \hline
 C = -1838.4 \text{ cm} = -.70 \text{ f}
 \end{array}$$

35

1050. Drain

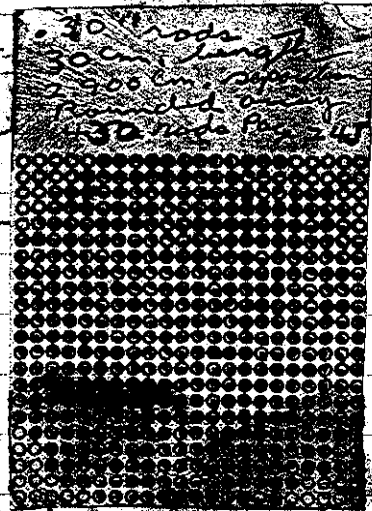
added 1 rod. Have an 22x22 array, with 14 rods removed from 2 corners, and 13 rods removed from 2 corners. Total of 430 rods.

$$\begin{array}{r}
 \text{Water ht} = 31.50 \text{ cm} \quad \quad \quad \text{sh} = 4.75 \text{ cm} \\
 + \text{Per.} \quad \quad \quad \frac{28.6}{28.6} \\
 \hline
 C = 869.20 \text{ cm} = 1.4 \text{ f} = .29 \text{ f/cm}
 \end{array}$$

Temp °C
23.5 °C

1115 Water ht = 26.75 cm - 2.9
System just critical
Drain

36



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-13	10^{-2}	Motor ✓	2"	-	3×10^{-12}
"	"	Fist ✓	"	-	"
K-2	"	Motor ✓	"	-	"
"	"	Fist ✓	"	-	"
R-1					
R-2					
PM-1	700V 50V	Alarm ✓	cont	-	500V
PM-2	1200V	Low ✓	12	-	900V
"	"	Alarm ✓	3"	-	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by F.D.C. Personnel check by RKLB
MMT
 Instruments and safeties checked and reset by RKLB
 Source in checked by RKLB 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 RKLB Time 1230
 Start-up OK'd by F.D.C. RKLB Date 2/14/68

H₃BO₃ solution.

247

v(4.89) rad.

added 520.60 gms of H₃BO₃ to small dump tank. Present volume of dump tank = 657.6 l of H₂O.

Purpose is to repeat experiment with .30" rods, and do min separation with the .80" rods.

Top of rods 30 cm ht .30" rods.
= 12.20 cm on .30.0 cm length.
mirror scale. 2.050 cm separation e-e.
Rounded array.

Have an 17x17 array, with 9 rods removed from 2 opposite corners and 8 rods removed from 2 opposite corners. Total of 255 rods.

Water ht = 28.00 cm $d_s = 9.05$ cm Temp °C
+ Per 22.9 °C
 $t = 82.57 \text{ sec} = 11.47 = .712 \text{ ft cm}$

1330 Water ht = 18.95 cm
System just critical
Drain. 2 of p. 122, this log

over.

Repeat of experiment described on p 247.

$D_2 = 9.15 \text{ cm.}$

Water ht = 28.10 cm

² + Per.

$t = 82.57 \text{ sec} = 11.47 = 1.24 \text{ sec}$

1437 Water ht = 18.95 cm

System just critical
Drain:

Sample taken from dump tank:

Y-12 Reg # 68-9537

X-10-A-629

$\rho_{B/L} = 0.140$

$\rho_{B/L} = 0.139$

Density = 0.99752 INSTRUMENT CHECK

Density = 0.9990

Temp °C = 23.4°C

Temp °C = 20.8°C

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Motor	2"	✓	3×10^{-12}
"	"	F-rt	"	-	"
K-2	"	Motor	2"	✓	"
"	"	F-rt	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm	cont	-	500 V
PM-2	7200 V	Low	3"	-	900 V
"	"	Alarm	12"	✓	"

LOG N CALIBRATE OPERATE SOURCE No. P-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by ^{Z.O.C} AKK Personnel check by E.I.O.C
 Instruments and safeties checked and rec'd by AKK
 Source in checked by AKK Source No. M-43
 Emergency equipment in control room checked by E.I.O.C
 Instruments in trip circuit: K-1-2 & M-1-2
 Red light on by AKK Time 0810
 Start-up OK'd by E.I.O.C AKK Date 2/15/68

H₂BO₃ solution

.814" rods.

4.14 cm separation c-c.

30 cm lengths.

Rounded array's

Have an 9x9 array, with 3 rods removed from each corner. Total of 69 rods.

Water ht = 27.80 cm

System sub critical
 Drain.

over.

Now have an 9×10 array with 4 rods removed from each corner. Total of 74 rods.

10.00 Water ht = 28.10 cm
System sub critical
Drain.

Added 2 rods. Now have an 9×10 array with 3 rods removed from 2 opposite corners, and 4 rods removed from 2 opposite corners. Total of 76 rods.

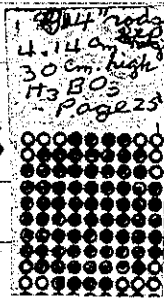
Water ht = 17.80 cm $b_h = 1.1$ cm Temp $^{\circ}$ C
+ Per 22.7 $^{\circ}$ C
 $T = 39.11 \text{ cm} - 19.34 = 17.54 \text{ cm}$

10.17 Water ht = 16.70 cm
System just critical
Drain.

1 Removed 1 rad. Now have a 9x10 array,
with 4 rads removed from 3 corners,
and 3 rads removed from 1 corner.
Total of 75 rads.

Water ht = 28.00 cm ^{oh}
+ Per

$E = 60.84 \text{ sec} = 14.3 \text{ } \mu = 1.54/\text{cm}$



Temp °C
22.9 °C

1038 Water ht = 18.80 cm
System just critical
Drain.

Now have an 10x10 array, with 6 rads
removed from each corner. Total of 76
rads.

Water ht = 17.60 cm ^{oh} = 1.95
+ Per

$E = 47.81 \text{ sec} = 16.9 \text{ } \mu = 17.84/\text{cm}$

Temp °C
22.8 °C

1245 Water ht = 16.65 cm.
System just critical
Drain.

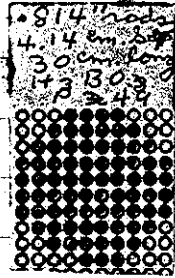
over!

Remained 1 rad. Have an 10x10 array, with
7 rads removed from 1 corner, and 6 rads
removed from 3 corners. Total of 75 rads.

Water ht = 28.10 cm $DR = 9.5$

4 + per

$$\bar{c} = 50.0 \text{ mm} = 16.4 \text{ ft} = 1.7 \text{ ft/cm}$$



1307 Water ht = 18.60 cm

System just critical
Drain.

Remained 1 rad. Have an 10x10 array, with
7 rads removed from 2 opposite corners, and
6 rads removed from 2 corners. Total of
74 rads.

1328 Water ht = 28.10 cm

System sub critical
Drain.

.814" rods.
4.14 cm separation c-c
30 cm length.
Square arrays.

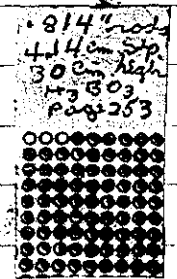
at
ads

I have an 9x9 - 4 array. Total of 77 rods.

1405 Water ht = 28.00 cm
System sub-critical
Drain

added 1 rod. Have an 9x9 - 3 array. Total of 78 rods.

Water ht = 19.80 cm $\epsilon = 2.35$
5 + per
 $\epsilon = 32.59 \text{ cm} = 21.64 = 9.24 \text{ cm}$



(7)

o
o

~~1445~~
~~75~~
1445 Water ht = 17.95 cm
System just critical
Drain

Sample taken from dump tank.

Y-12 - Run # 684538
 $\rho_{12} = 0.140$
Density = 0.99776
Temp °C = 23.4°

X-10 = A629
 $\rho_{10} = 0.140$
Density = 0.9991
Temp °C = 20.8°

ads

.814" rods
4.14 cm separation c-e
60 cm length.
Rounded array v.

I have an 8x9 array with 6 rods removed from each corner. Total of 48 rods.

Water ht = 58.10 cm. ^{OK = 11.3 cm} Temp °C
 6 + Per 23.1 °C
 $t = 123.86 \text{ cm} = 8.34 = .73 \text{ Ham}$

1605 Water ht = 46.80 cm
 System just critical
 Drain.

(4)



INSTRUMENT CHECK

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

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by A.K.H. Personnel check by F.D.C.
F.D.C.
 Instruments and safeties checked and reset by A.K.H.
 Source in circuit by A.K.H. Source No. 19-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1-2 PC-1-2
 Red light on by A.K.H. Time 1010
 Start-up OK'd by F.D.C. A.K.H. Date 2-16-68

Repeat of experiment described on page 254.

Water ht = 58.10 cm $DA = 10.8 \text{ cm}$ Temp $^{\circ}\text{C}$
 + Per 22.6 $^{\circ}\text{C}$
 $S = 197.74 \text{ m} = 5.6 \text{ f} = .52 \text{ Hcm}$

1100 Water ht = 47.30 cm Use \nearrow
 System sub critical
 Drain. to 0.0 cm.

Removed 1 rod. Have an 8x9 array, with 6 rods removed from 3 corners, and 7 rods removed from 1 corner. Total of 47 rods.

1125 Water ht = 58.00 cm
 System sub critical
 Drain.

over.

814" rods
 4.14 cm separation c-c
 60 cm length.
 Square array:

Have on 7x7 array. Total of 49 rods.

Water ht = 49.20 cm
² + Per
 $E = 52.15 \text{ sec} = 15.9 \text{ ft} = 3.94 \text{ cm}$



Temp °C
 22.7°C

1320 Water ht = 45.10 cm

System just critical

Drain to 0.0 cm. Removed 1 rod. Have on 7x7
 - 1 rod. Total of 48 rods.

Water ht = 58.10 cm

System sub critical

Drain.

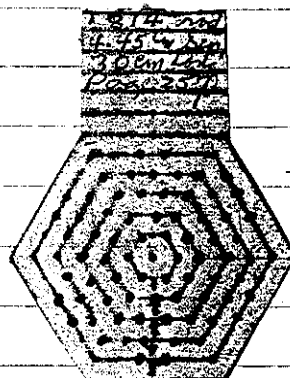
814" rods
 4.45 cm separation c-c
 30 cm length.
 Triangular array.

Have a triangular array with 4 full
 rings, plus 2 rods on 5 faces and
 3 rods on 1 face. Total of 79 rods.

Water ht = 28.10 cm $h = 9.0 \text{ cm}$ Temp $^{\circ}\text{C}$
³+Pen 23.0 $^{\circ}\text{C}$
 $V = 76.05 \text{ cm} = 12.2 \text{ f} = 1.34 \text{ cm}$

1.546 Water ht = 19.10 cm
 System just critical
 Drain.

Seep 25.8 cm ID
use



INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-50
 DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by F.D.C. Personnel check by F.D.C.Instruments and safeties checked and reset by AKWSource in checked by AKW Source No. M-43Emergency equipment in control room checked by F.D.C.Instruments in trip circuit: K-1-2 PM-1-2Red light on by AKW Time 0835Start-up OK'd by F.D.C. & AKW Date 2-19-68

Repeat of experiment described on bottom of
p 256-257.

P

Water ht = 28.10 cm $\Delta h = 7.5 \text{ cm}$ Temp $^{\circ}\text{C}$
+ Per 21.5
~~22.5~~
 $\tau = 202.09 \text{ sec} = 5.5 \text{ s} = 1.4 \text{ s/cm}$

0930 Water ht = 20.60 cm

system just critical

Drain: 0.0 cm Repeat + Per & critical ht.

(P)² Water ht = 28.20 cm $\Delta h = 7.6$ Temp $^{\circ}\text{C}$
+ Per 21.7
 $\tau = 210.78 \text{ sec} = 5.3 \text{ s} = 1.4 \text{ s/cm}$

1.035 Water ht = 20.60 cm

system just critical

Drain: 0.0 cm

Removed 1 rod. Now have a
 triangular array with 9 full rings, plus
 2 rods on each face in 5th ring. Total
 of 13 rods.

10.50 Water ht = 28.40 cm Temp °C
 System sub critical 21.7 °C
 Drain.

814" rods

4.45 cm separation c-c

60 cm length.

Triangular Array's.

Have an triangular array. Three full rings.
 Total of 37 rods.

ht. 13.00 Water ht = 58.30 cm Temp °C
 System sub critical 22.0 °C
 Drain.

over.

Added 8 rods. Now have an triangular array with 3 full rings, plus 1 rod on four faces and 2 rods on 2 opposite faces. Total of 45 rods in 4th ring.

1335 Water ht = 58.10 cm
System sub critical
Drain.

Added 4 rods. Now have an triangular array with 3 full rings, plus 2 rods on each face in 4th ring. Total of 49 rods.

1400 Water ht = 40.90 cm
System just critical
Drain.

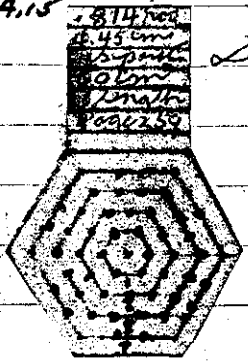
Removed 2 rods. Have an triangular array with 3 full rings, plus 2 rods on four faces and 1 rod on 2 opposite faces. Total in 5th ring. Total of 47 rods.

1428 Water ht = 57.80 cm
System sub critical
Drain.

Added 1 rad. Have an triangular array with 3 full rings, plus 2 rods on 5th full and 1 rod on 1st full in 4th ring. Total of 48 rods.

Water ht = 48.85 cm
 + Per
 $t = 36.94 \text{ cm} = 20.0 \text{ g} = 4.8 \text{ g/cm}$

ht = 4.15



Temp °
 22.5 °

1503

Water ht = 44.70 cm
 System just critical
 Drain.

(11)

1530

Samples taken from deep tanks

Y-12 Reg # 684539
 $\rho_{B/L} = 0.141$
 Density = 1.0165
 Temp = 24.0 °

X-10 Reg # 630
 $\rho_{B/L} = 0.140$
 Density = 0.9988
 Temp ° = 20.9 °

Stopped data summary
 2/29

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 ✓	"	✓	"
M-1	700 V	Alarm ✓	last	✓	500 V
M-2	1200 V	Low ✓	19"	✓	900 V
"	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE ✓		OPERATE ✓	SOURCE No. B-60		
DUMP WELL PROBE LIGHT					

START-UP CHECK LIST

Equipment checked by F.D.C. AKH Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKH
 Source in checked by AKH Source No. 14-43
 Emergency equipment in control room checked by F.D.C.
 Instruments in trip circuit: K-1-2 AM-1-2
 Red light on by AKH Time 0815
 Start-up OK'd by F.D.C. AKH Date 8-9-68

Top of fuel (30 cm length)
= 12.2 cm on narrow
~~scale.~~

130" rods,
30 cm length.
2.050 cm separation center-center.

Water - 263

Feed and dump rates are the same as shown on p-81.

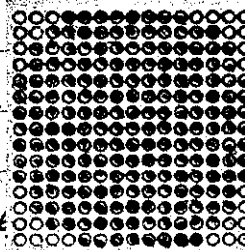
Have an 15 X 15 array, with 8 rods removed from 2 corners and 7 rods removed from 2 corners. Total of 195 rods, avg weight of the center 11 X 11 (121 rods) = 13.052 ^{0.235} each. Temp °C

0.940

Water ht = 28.0 cm
System just critical
Drain. See page 149

130" rods
30 cm long
2.050 cm sep.
195 rods
Page 263

23.5 °C



Replaced in center of array an 11 X 11 total of 121 rods used in past experiments with H_3BO_3 . (Avg weight of the 121 replacement rods = 13.042 ^{0.235} each.

1325

Water ht = 28.0 cm
System sub critical
Drain. Moved Log #1 + K-2 inside tank.

Temp °C 23.5 °C

1352

Water ht = 28.3 cm
- Per.

$L = -571.49 \text{ sec} = -2.4 \text{ f}$

Drain.

acc.

Top of fuel (30cm length)
= 12.2 cm on mirror
~~stat.~~ scale.

130" rods,
30 cm length.
2.050 cm separation center-center.

Water - 263

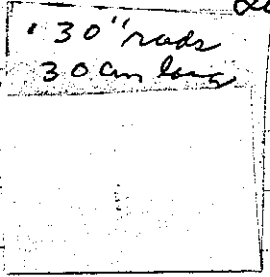
Feed and dump rates are the same as shown on p-81.

Have an 15x15 array, with 8 rods removed from 2 corners and 7 rods removed from 2 corners. Total of 195 rods. avg weight

of the center 11x11 (121 rods) = 13.05 g ^{0.235} each.

0.940

Water ht = 28.0 cm
system just critical
Drain. See page 149



Temp °C
23.5 °C

Replaced in center of above array, an 11x11 total of 121 rods used in past experiments with H₃BO₃. (avg weight of the 121 replacement rods = 13.04 g ^{0.235} each.

1325

Water ht = 28.0 cm
system sub critical
Drain. Moved Log #1 & K-2 inside tank.

Temp °C 23.5 °C

1352

Water ht = 28.3 cm
- Per.
L = -571.49 sec = -2.47
Drain.

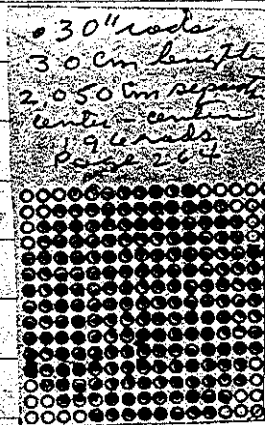
acc:

added 1 rad. Now have on 15 x 15 tray
with 7 rads removed from 3 corners and
8 rads removed from 1 corner. Total of 196
rads.

Water ht = 28.4 cm
2 + Per
 $\bar{v} = 130.38 \text{ cm} = 8.0 \phi$

Temp °C
23.3°

1.425 Water ht = 20.20 cm
system just critical
Drain.



● = .30" (old rads) used in H_2O_2
experiments.

● = New .30" rads, avg wt of the 167 = $\frac{262.08 \text{ g}}{167} = 1.57 \text{ g}$
= 12.82 g^{0.235} per rad.

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	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	3"	✓	"

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

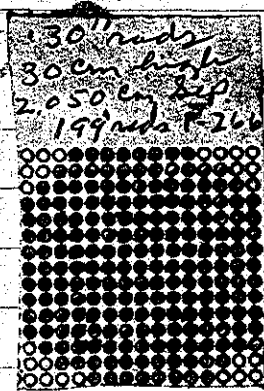
START-UP CHECK LIST

Equipment checked by F.P.C. [Signature] Personnel check by F.P.C.
 Instruments and safeties checked and reset by [Signature]
 Source in checked by [Signature] Source No. M-43
 Emergency equipment in control room checked by F.P.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by [Signature] Time 1245
 Start-up OK'd by F.P.C. [Signature] Date 8-12-68

Same array as described on pages 263-264,
 Except the center 11×11 is replaced with
 new .30" rods received from Y-12. Also
 added 1 rod to corner. Array now is
 15×15 with 7 rods removed from each
 corner. Total of 197. (dry weight of the 121
 replacement rods = 12.72×2235 each.
 Water ht = 28.00 cm Temp °C
 - Per N.C 23.0°C

1337 Drain to 0.0 cm: added 2 rods to opposite
 corners. Now have an 15×15 with 7
 rods removed from 2 corners and 6 rods
 removed from 2 corners. Total of 199 rods.

Water ht = 28.00 cm Temp °C
 27 Per 23.0°C
 $T = 110.82 \text{ sec} = 9.14$



1406 Water ht = 20.05 cm
 System just critical
 Drains.

Removed 1 rod. Now have an 15×15 array
 with 7 rods removed from 3 corners and 6
 rods removed from 1 corner. Total of 198

Water ht = 28.10 cm

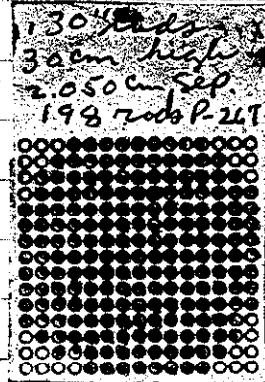
Temp °

³ - Per

: 23.2 °

$E = -1716.7 \text{ sec} = -.764$

1440 Drain:



le
2/
ach.

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

Equipment checked by F.I.C. 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-1-2 PM-1-2

Red light on by AKH Time 0810

Start-up OK'd by F.I.C. AKH Date 8-14-68

130" rods.
1.396 cm separation c-c
60 cm length.
Triangular array.

269

Have an Triangular array with 9 full rings.
Total of 271 rods. (see page 225)

0848 Water ht = 58.20 cm Temp °C
System sub critical 23.2°C
Drain.

Added 24 rods, 4 to each face in 10th
ring. Total rods now = 295

0945 Water ht = 33.20 cm
System just critical
Drain.

Removed 2 rods from each face in 10th ring.
Total rods now = 283

1020 Water ht = 39.70 cm
System just critical
Drain.

over:

Removed 1 rod from each face in 10th row.
 Total rods now = 277 rods.

Water ht = 45.30 cm $\Delta h = 1.05 \text{ cm}$ Temp $^{\circ}\text{C}$
 + Per 23.5 $^{\circ}\text{C}$
 $T = 97.78 \text{ sec} = 10.14 = 9.64 \text{ Hem.}$

1055 Water ht = 44.25 cm
 System just critical
 Chain.

Removed 3 rods. 1 from ever other face in
 10th row. Total rods now = 274 rods.

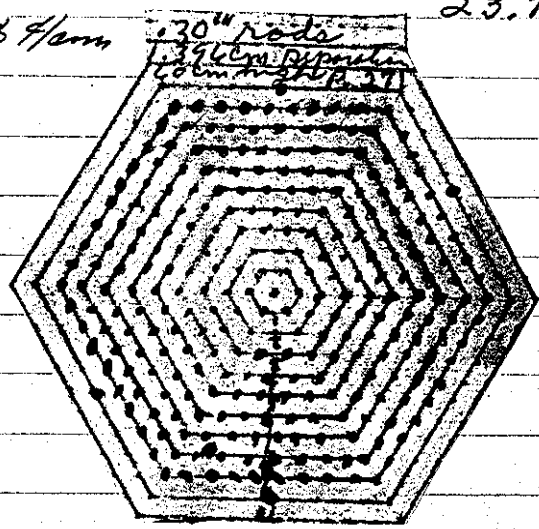
1310 Water ht = 58.20 cm Temp $^{\circ}\text{C}$
 System sub critical 23.7 $^{\circ}\text{C}$
 Chain.

added 1 rod in 10th row. Now have 9 full rings, plus 4 rod in 10th ring. Total of 275 rods.

Water ht = 58.00 cm D₄ = 8.90 cm
Temp °C = 23.7 °C
2 + Per.
S = 345.51 cm = 3.45 = .36 ft/cm

1405 Water ht = 49.10 cm
System just critical
Drain.

(3)



272

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by F.D.C. 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-1-2 PM-1-2
 Red light on by AKM Time 1010
 Start-up OK'd by F.D.C. AKM Date 8-15-68

30" rods. 273
1,300 cm separation c-c
60 cm length. Square array

Have an 17x17 ~~array~~ array, plus 5 rods
on 1 face. Total of 294 rods.

1095 Water ht = ~~38.50 cm~~ 38.30 cm Temp °C
System just critical 23.5 °C
Drain

Removed 5 rods. Now have an 17x17 array.
Total of 289 rods.

1108 Water ht = 41.00 cm
System just critical
Drain

Removed 4 rods. Now have an 17x17-4 array.
(The 4 rods removed from corner of 1 face.) Total
of 285 rods.

Water ht = 44.20 cm $0.4 = 1.0 f$ Temp °C
+ Per 23.7 °C
 $T = 76.05 \text{ m} = 12.24 = 12.2 f/\text{m}$

Water ht = 43.20 cm
System just critical
Drain

aver:

Removed 3 rods. Now have an 17x17 - 7 array.
 (The 7 rods are removed from corner of 1 face.)
 Total of 282 rods.

Water ht = 58.10 cm $\rho L = 1.7 \text{ cm}$ Temp $^{\circ}\text{C}$
 $\tau = 65.19 = 13.64 = 8.04 \text{ /cm}$ 23.7 $^{\circ}\text{C}$

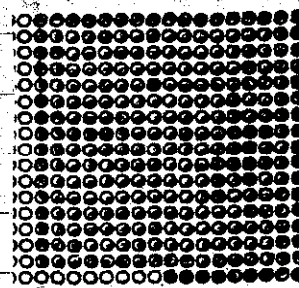
Water ht = 46.40 cm
 System just critical
 Drain.

Removed 1 rod. Now have an 17x17 - 8 array.
 (The 8 rods are removed from corner of 1 face)
 Total of 281 rods.

1440 Water ht = 58.10 cm
 $\tau = 65.190 \text{ sec} = 1.94 = .25 \text{ /cm}$

(5) Water ht = 50.50 cm.
 System just critical
 Drain.

0.30" rods
 1.300 cm spacing
 40 cm height
 291 rods
 page 274



Removed 1 rod. Now have on 17x17-9 array,
(The 9 rods are removed from corners of 1 face.)
Total of 280 rods.

1500 Water ht = 58.10 cm

System sub critical

Drain.

ENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	1"	✓	3×10^{-12}
	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700v	Alarm ✓	cont	✓	500v
PM-2	900v	Low ✓	14"	✓	900v
	"	Alarm ✓	3"	✓	"
LOG N. CALIBRATE		✓	OPERATE	_____	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT		_____	_____	_____	_____

START-UP CHECK LIST

Equipment checked by F.I.D.C. Personnel check by F.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 F.I.D.C.
 Instruments in trip circuit: K-1-2 PM-1-2
 Red light on by AKH Time 0835
 Start-up OK'd by F.I.D.C. AKH Date 8-16-68

130" rods.
1,300 cm separation c-c.
60 cm length.
Rounded array.

277

Now have an 18x18 array, with 11 rods removed from each corner. Total of 280 rods.

Water ht = 45.10 cm $\Delta h = .50$ cm Temp °C
+ Per 23.6 °C
 $\zeta = 241.20 \text{ cm} = 4.7\% = 9.4\%/cm$

0932 Water ht = 44.60 cm.
System just critical
Drain.

Removed 2 rods, 1 each from opposite corners.
Now have an 18x18 array with 12 rods removed from 2 corners, and 11 rods removed from 2 corners. Total of 278 rods.

Water ht = 58.10 cm $\Delta h = 1.30$ cm. Temp °C
+ Per 23.7 °C
 $\zeta = 86.92 \text{ cm} = 11.0\% = 8.5\%/cm$

1020 Water ht = 46.80 cm.
System just critical
Drain.

over!

Removed 2 rods. Now have an 18 X 18 array with 12 rods removed from each corner. Total of 276 rods.

1046 Water ht = 58.10 cm
 System sub critical
 Drain

Temp °C
 23.7 °C

Added 1 rod. Now have an 18 X 18 with 12 rods removed from 3 corners and 11 rods removed from 1 corner. Total of 277 rods.

Water ht = 58.10 cm
 + Per

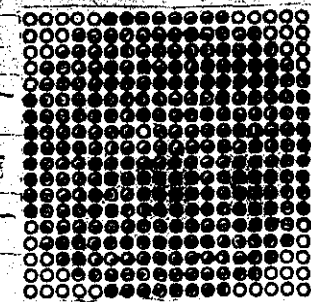
$\Delta h = 9.1 \text{ cm}$

Temp °C
 23.8 °C

$t = 367.24 \text{ sec} = 8.2 \text{ \–} = .35 \text{ \–/cm.}$

1120 Water ht = 49.00 cm
 System just critical
 Drain.

• 30" rods
 1.30 cm separation
 60 cm. length
 Rounded ends
 277 rods
 Page 278



(5)

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K1	3 X 10 ⁻¹²	Motor ✓	1"	✓	3 X 10 ⁻¹²
"	"	Fast ✓	"	✓	"
K2	"	Motor ✓	"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	19"	✓	900V
"	"	Alarm ✓	3"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT _____					

START-UP CHECK LIST

Equipment checked by ZTC Personnel check by F.D.C.
 Instruments and safeties checked and reset by AMV
 Source in checked by AMV 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 AMV Time 1355
 Start-up OK'd by F.D.C. AMV Date 8-19-68

280

.30" rods.
30 cm length.
Square array; Contact.

Have an 25x25 array. Total of 625 rods.

Water ht = 31.0 cm

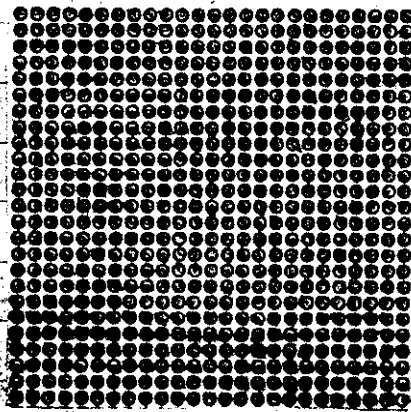
Temp °C

System sub critical.

23.3 °C

Drain

• 30" rods
30 cm length
Square array; Contact
625 rods Page 280



Free
Dye
Dye
Wk
L-s

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-13	10^{-12}	Master ✓	1"	✓	3×10^{-12}
"		Fast ✓	"	✓	"
K-2		Meter			
"		Fast			
R-1					
R-2					
PM-1	700V	Alarm ✓	Coast	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"		Alarm ✓	3"	✓	"
LOG N CALIBRATE		✓	OPERATE		✓
DUMP WELL PROBE LIGHT		_____ 1			
SOURCE No. <u>B-80</u>					

START-UP CHECK LIST

Equipment checked by F.D.C. MMT Personnel check by F.D.C.
 Instruments and safeties checked and reset by AKB
 Source in checked by AKB Source No. M-93
 Emergency equipment in control room checked by F.D.C.
 Instruments in-trip circuit: K-1-PM-1-2
 Red light on by AKA Time 0900
 Start-up OK'd by F.D.C. AKB Date 10-15-68

Feed rate = 3.6 cm/min.

Drain rate (1/2") = 8.8 cm/min.

Drain rate (3") = 147.0 cm/min.

When H₂O = 14.0 H₂O is at top

of rods 30 cm length.

.092" O (4.89) rods.

.753 cm separation c-c.

30 cm hts.

Have on 34 x 34 array. Total of 1156 rods.

0930

Water ht = 30.3 cm

Temp °C

System sub critical

23.5 °C

Drain.

added 288 rods. Now have on 38 x 38 array. Total of 1444 rods.

1115

Water ht = 30.30 cm

Temp °C

System sub critical

23.6 °C

Drain.

added 156 rods. Now have on 40 x 40 array, Total of 1600 rods.

Water ht = 15.80 cm

+ Per

1431

Water ht = 15.80 cm

System just critical

Drain.

avr.

Removed 20 rods. Now have an 40 x 40 - 20 array. (Rad removed from 1 fuel). Total rods = 1580.

Water ht = 16.55 cm
27 Per

Temp °
23.7 °

1524 Water ht = 16.30 cm
System just critical
Drain.

INSTRUMENT CHECK

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

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

START-UP CHECK LIST

20

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-23

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

Instruments in trip circuit: H-1 - AM-1-2

Red light on by AKH Time 0800

Start-up OK'd by I.O.C AKH Date 10-16-68

.092" rods.

.753 cm separation c-c.

30 cm length.

Now have an 39x39 + 19 array. The 19 rods
are on 1 face. Total of 1540 rods.

Water ht = 18.10 cm.

Temp °C

+ Per

23.5 °C

0839

Water ht = 17.65

System just critical

Drain

over

Removed 19 rods. Now have an 39×39 array.
Total of 1521 rods.

Water ht = 19.00 cm
2+ per

Temp $^{\circ}$ C
23.5 $^{\circ}$ C

0910 Water ht = 18.65
System just critical
Drain:

Removed 39 rods. Now have an 38×39 array.
Total of 1482 rods.

1110 Water ht = 30.20 cm
System sub critical
Drain.

Temp $^{\circ}$ C
23.6 $^{\circ}$ C

~~Observed~~ Observed air bubbles beneath
top grid plate and on .092" rod. ~~etc~~
Have added an stirrer to small ~~test~~
tank. No other change made.

array

Water ht = 34.00 cm.
Log n = .02. Turn stirrer on: Let run ~
2 min. Log n = .02: Stirrer did not remove
dissolvable.

1500 System sub critical
Drain.

array

h

array

... CHECK

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

START-UP CHECK LIST

Equipment checked by ARM Personnel check by F.I.C.
 Instruments and safeties checked and reset by ARM
 Source in checked by ARM Source No. 14-43
 Emergency equipment in control room checked by F.I.C.
 Instruments in trip circuit: K-1 PM-1-2
 Red light on by ARM Time 0805
 Start-up OK'd by F.I.C. ARM Date 10-17-68

.092" rods
.753 cm separation c-c - 289
30 cm length

Now have an 39 x 39 - 33 array. Total of 1488 rods.

Water ht = 30.10 cm Temp °C
1 - Per 23.7 °C

$$\tau = 326.0 \text{ sec} = -4.5 \text{ f}$$

0845 Drain:

added 3 rods. Now have an 39 x 39 - 30 array.
Total of 1491 rods.

Water ht = 30.00 cm Temp °C
2 - Per 23.7 °C

$$\tau = 408.5 \text{ sec} = -3.5 \text{ f}$$

0930 Drain:

added 4 rods. Now have an 39 x 39 - 26 array.
Total of 1495 rods.

Water ht = 30.05 cm $\Delta h = 5.85 \text{ cm}$ Temp °C
3 + Per 23.7 °C

$$\tau = 434.6 \text{ sec} = 2.8 \text{ f} = .48 \text{ f/cm}$$

1028 Water ht = ± 24.20 cm - 14.5 = 10.2 cm CH above
System just critical v. s

over:

290

1028 Stirrer on.

1031 Stirrer off. (Stirrer did not remove small air bubbles below top plate).

1035 Water ht = ~~23~~ ± 24.20 cm
System just critical
Drain.

Dumped system: Purpose to repeat last run.

Water ht = 30.10 cm $\Delta h = 6.4$ cm
 ± 16.1 cm above ± 16.1 cm
Temp $^{\circ}$ C
4 + Per

$t = 325.95$ sec = 3.6 $\phi = .56$ θ cm

1125 Water ht = ± 23.70 cm $-14.0 - 9.7$ cm above ± 16.1 cm
System just critical

1125 Stirrer on

1128 Stirrer off.

1130 Water ht = ± 23.70 cm
System just critical
Drain.

Repeat of + Per and critical ht.

Water ht = 30.10 cm b_h = 6.4 cm Temp °C
 5 + Per 23.7 °C

$$T = 336.91 \text{ sec} = 3.5 \text{ } \phi = .55 \text{ } \psi \text{ cm}$$

1325 Water ht = \pm 23.70 cm
 System just critical
 Drain.

Removed 2 rods. Now have on 39 x 39 - ²⁸ array
 Total of ¹⁴⁹³ ~~1486~~ rods.

1118 Water ht = 30.10 cm
 System just critical
 Drain.

This data should have been recorded on page 293. A.K.B.

10-18-68

It is repeated there (p. 293) at
 bottom of page 29

292

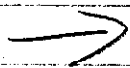
INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by AKC Personnel check by E.D.C.
 Instruments and safeties checked and reset by AKC
 Source in checked by AKC Source No. M-43
 Emergency equipment in control room checked by E.D.C.
 Instruments in trip circuit: N-1 - PM-1-2
 Red light on by AKC Time 0850
 Start-up OK'd by E.D.C. AKC Date 10-18-68

Note: Triton X-100 is a product of Rohm & Haas Co
Philadelphia 5, Pa. also analysis made on 9/18/63 293
reports 12 P.P.M. of B.



added 7.0 ml of Triton-X-100 to reflector
water. To see if this wetting agent will help
with air that traps on grid plates.

Repeat of experiments described on p. 290-1.

Water ht = 30.10 cm DL = 6.3 cm Temp °C
+ Per. 24.2 °C

$$E = 382.4 \text{ su} = 3.14 = .49 \text{ f/cm}$$

0945 Water ht = 23.80 cm - 14.0 = 9.8 above rods
system just critical
Drain.

Water ht = 30.00 cm Temp °C
+ Per. 24.3 °C

$$E = 332.5 \text{ su} = 3.54 = .55 \text{ f/cm}$$

1033 Water ht = 23.70 cm - 14.0 = 9.7 above rods
system just critical
Drain.

Removed 2 rods. Now have 39 x 39 - 28 array.
Total of 1493 rods.

1118 Water ht = 30.10 cm - 14.0 = 16.1 Temp °C
system just critical 24.4 °C
Drain over.

Repeat of last experiment. Balton of p-293

Water ht = 30.10 cm
³- Per

Temp °C
 24.9°C

$\tau = -999.6 \text{ new} = -1.3 \text{ f}$

1330

Drain:

Repeat of above after dumping water.

1415

Water ht = 30.10 cm
 System just critical
 Drain:

Temp °C
 24.5°C

Repeat of above after dumping water and
~~increasing gap on support plate to see~~
 if this would help the ~~elimination~~
 elimination of air trapped on halton plate.
 Top of red now = "17.35 cm"

1520

Water ht = 30.10 cm.
⁴- Per

$\tau = -1499.0 \text{ new} = -1.9 \text{ f}$ cf p. 298, just critical

1530

Drain:

INSTRUMENT CHECK

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

LOG N CALIBRATE OPERATE SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

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

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

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

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

Red light on by A.M.M. Time 1455

Start-up OK'd by I.P.C. A.M.M. Date 10-21-68

296

Top of fuel = 18.80 cm

.092" rods,
.753 cm separation c-c
30 cm length.

Now have array in the ~~top~~ for. To see if this will eliminate air bubbles that was trapped under support plates when in the vent for. ~~at 155 plepless plate removed~~
Have an 39 X 39 - 28 array. Total of 1493 rods.

Water ht = 34.30 cm

Temp °C

-Per

24.1 °C

G = -184.70 cm = -9.1 g

1550 Drain to 18.80 cm, and included array for air bubbles. Visual check could not see any bubbles.

See p. 268, 2nd critical

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Motor ✓	2"	✓	3×10^{-12}
	"	Set ✓	"	✓	"
K-2	—	Motor —	—	—	—
	—	Set —	—	—	—
R-1	—	—	—	—	—
R-2	—	—	—	—	—
PM-1	700 ✓	Alarm ✓	10ft ✓	—	500 ✓
PM-2	1200 ✓	Low ✓	12" ✓	—	900 ✓
	"	Alarm ✓	3" ✓	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 0-80

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

Equipment checked by ^{F.I.D.C.} AKA Personnel check by F.I.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.I.D.C.

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

Red light on by AKA Time 1025

Start-up OK'd by F.I.D.C. AKA Date 10-22-68

added 6 rods. Now have on 39x39-22 array.
Total of 1499 rods.

Water ht = 34.90 cm
2-Per
 $T = 934.39 \text{ sec} = -1.54$

Temp °C
24.1 °C

1357 Drain.

Replaced the .750" low plate with an .250"
x 24" x 24" plexiglass plate. (See top of p 298)

39x39-14 array 1505 rods
783 cm. approx. 30cm long

Water ht = 34.20 cm
3-Per
 $T = -169.49 \text{ sec} = -10.29$

1530 Drain.

added 6 rods. Now
Total of 1505 rods.

Water ht = 34.50 cm
4+Per
 $T = 1325.53 \text{ sec} = .967$

Water ht = ~~29~~ 30.05 cm - 18.8 = 11.2 cm @

System just critical
Drain.

1610

See Log # 3



added 6 rods. Now have on 39x39-22 array.
Total of 1499 rods.

Water ht = 34.90 cm

²-Per

$$E = -934.39 \text{ sec} = -1$$

1357 Drain.

Replaced the .750
x 24" x 24" plexiglass p.

Water ht = 34.20 cm

³-Per

$$E = -169.49 \text{ sec} = -10.2 \phi$$

1530 Drain.

added 6 rods. Now have on 39x39-16 array
Total of 1505 rods.

Water ht = 34.50 cm

⁴+Per

$$E = 1325.53 \text{ sec} = .96 \phi$$

Temp °C

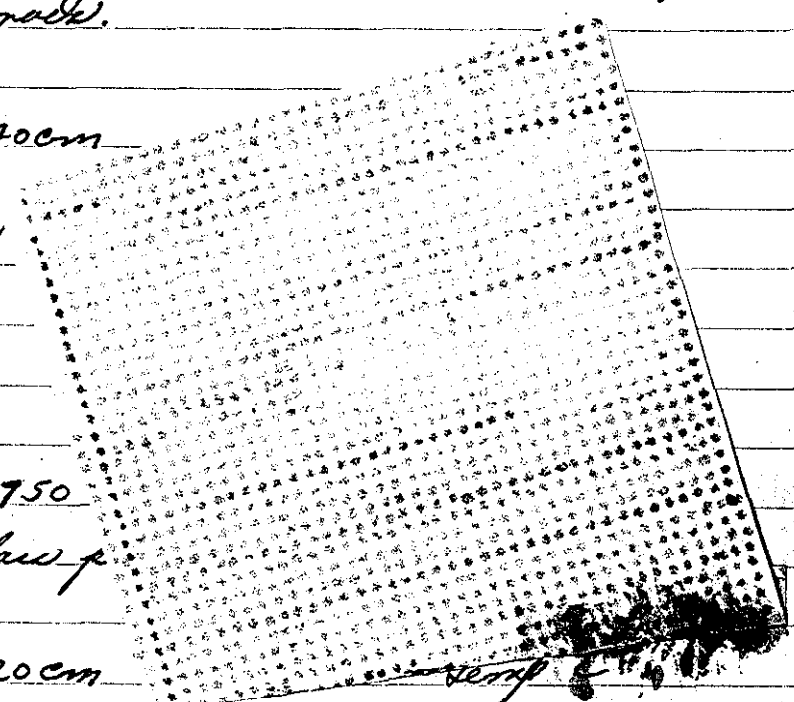
24.2 °C

Water ht = ~~29~~ 30.05 cm - 18.8 = 11.2 cm CW

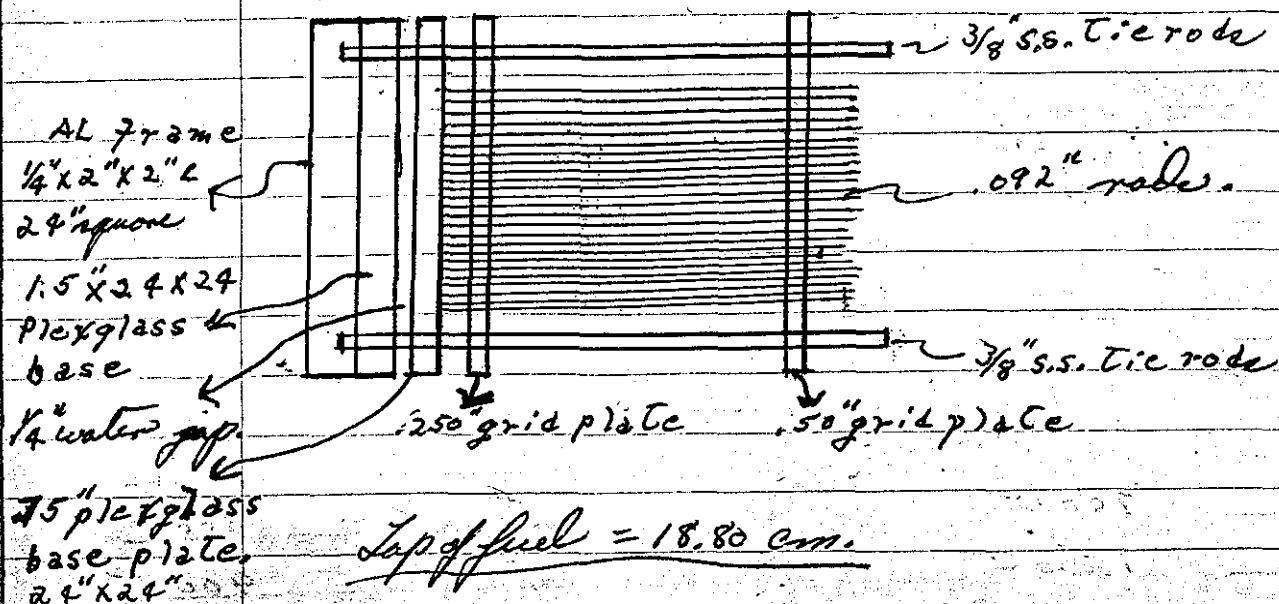
System just critical
Drain.

1610

See Log # 3



.092" rods.
 .753 cm separation c-c
 30 cm length.



Lap of fuel = 18.80 cm.

Repeat of last experiment described on page 294. Except array is now in ~~horizontal~~ position. 39x39-28 array. Total of 1493 rods.

1105

Water ht = 34.10 cm - 18.8 = 15.3 cm above fuel
 System just critical $\approx 1\% \text{ gain in reactivity}$
 Drain.

Removed the al frame and the 1.5" thick plexiglass plate. Repeat of shown on page 296. (The al frame and 1.5" thick plates was removed in this experiment) also moved Log η to within $\sim 7.0"$ of array to get better measure of $-P_{eff}$.

Water ht = 34.30 cm

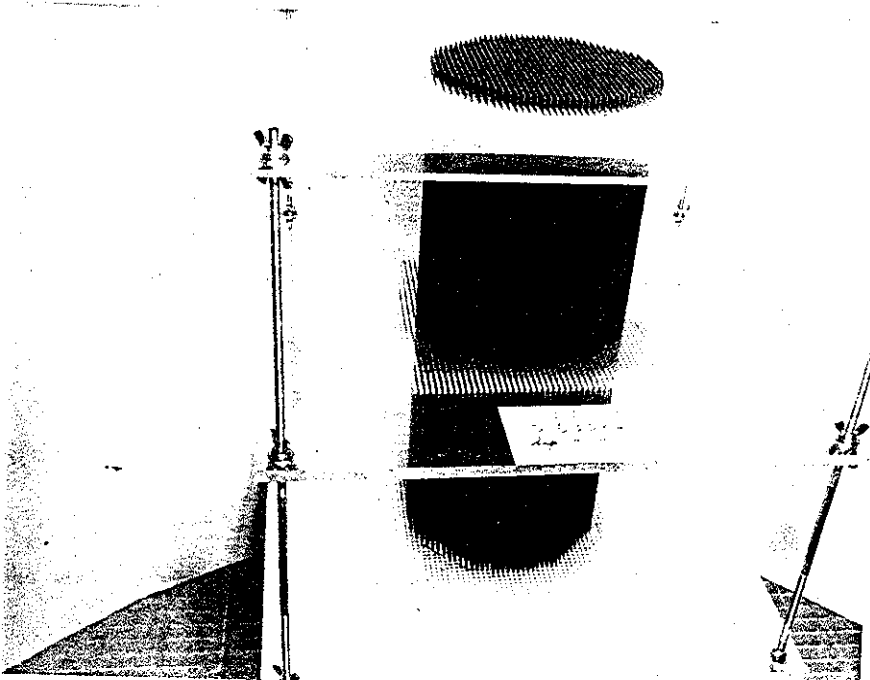
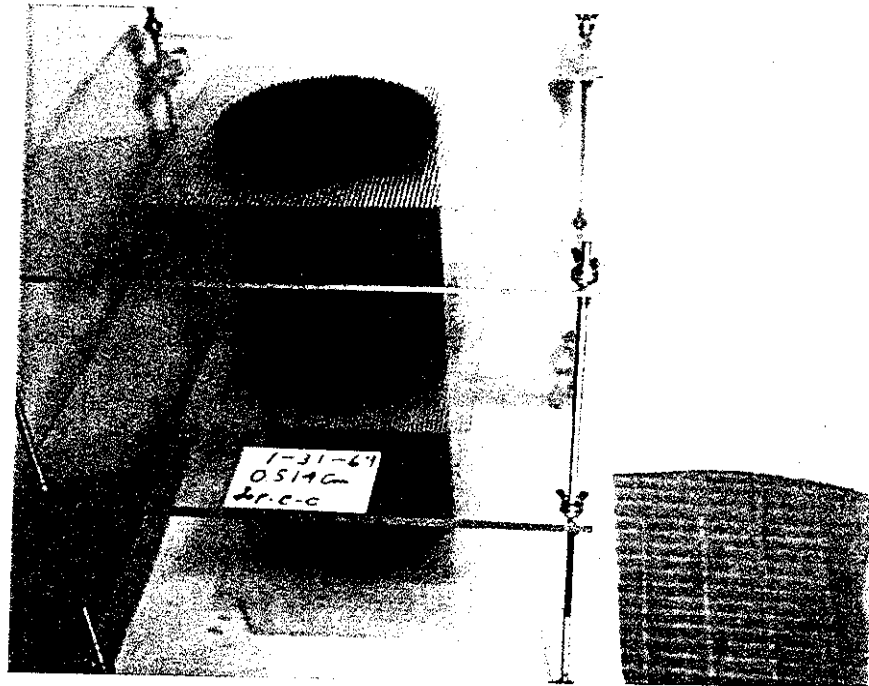
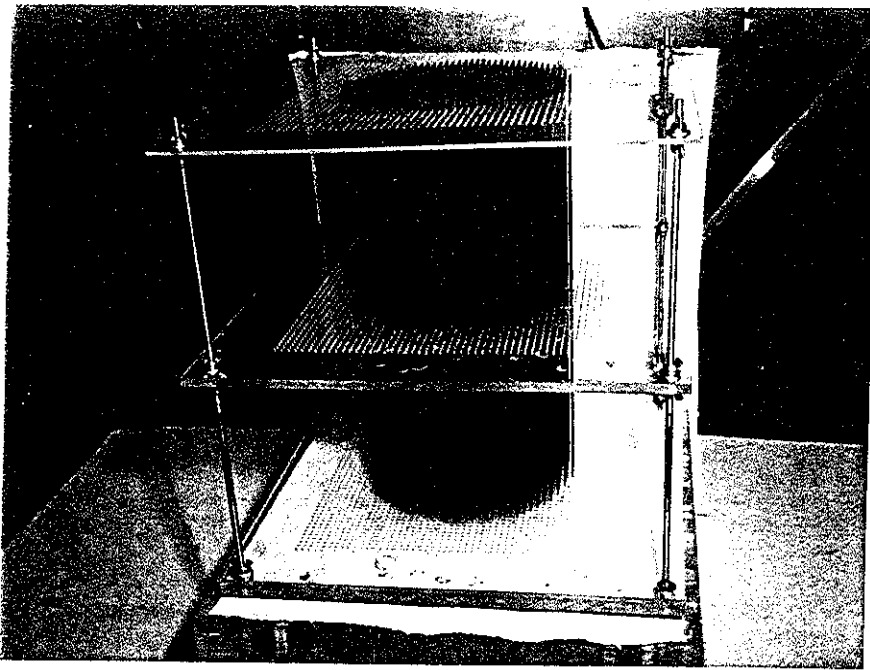
-Per

$$\Gamma = -173.84 \text{ sec} = -9.94$$

1315

Drain.

U(4.89) Rods
.092" dia.
Prints



12-3-68

35 X 35 array with 72 rods
removed from 1 corner and 71 rods
removed from 3 corners. Total 940
just crit Plus period .81 ϕ
Page 62

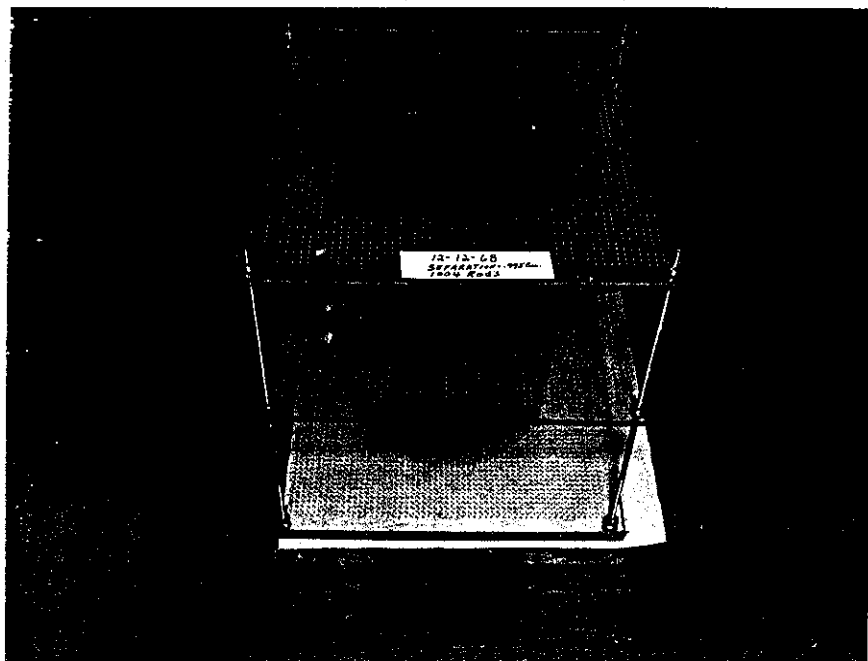
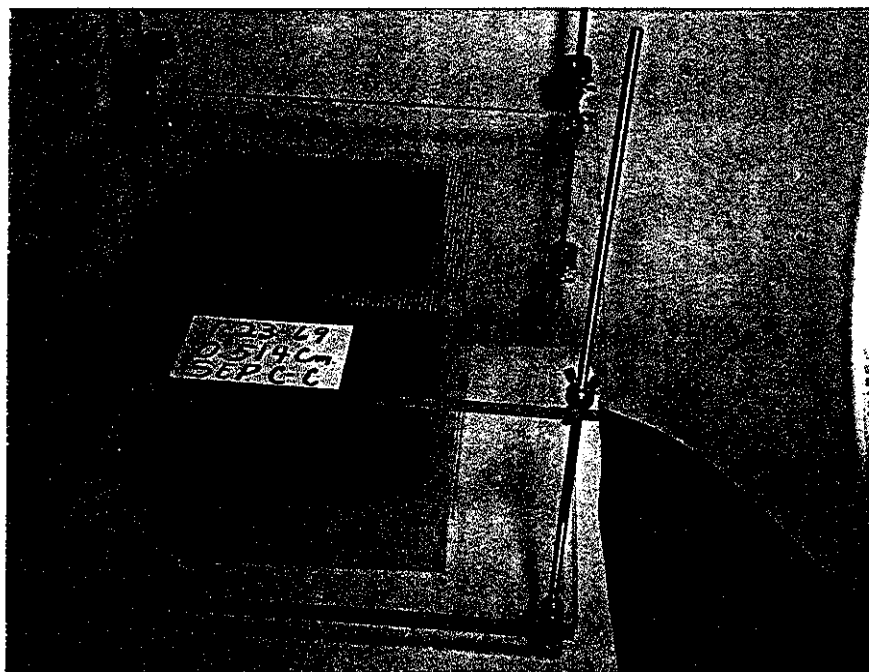
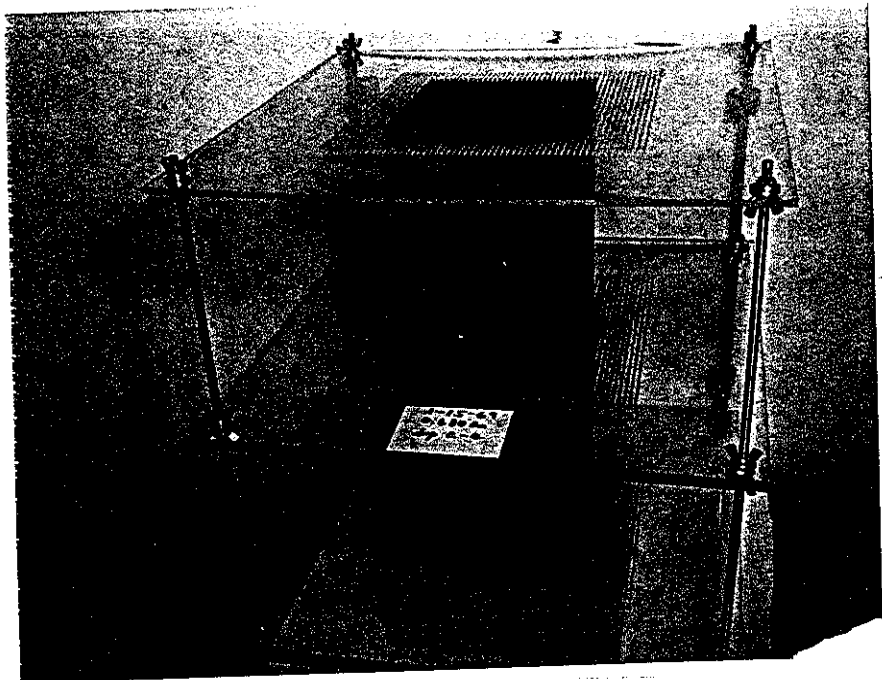
a total of 939 rods was
sub. critical by 1.8 ϕ .
Page 64

1-30-69

0.92" rods U (4.89)
0.514 cm. separation c-c
47 X 47 array with 127
rods removed from 2 corners
and 128 removed from 2 corners
60 cm rounded array
total rods 1499 P-133

1-17-69

0.92" rods (U (4.89)
60 cm length
0.630 cm separation c-c
Rounded array.
39 X 39 with 83 rods out
of 3 corners and 84 rods out
of 1 corner. Total rods 1188
Just crit. Page 111 log.



1/15/49

.092" rods 60 cm length

.630 cm separation e-e

35 x 35 square array
with 14 rods removed
from 1 face total rods:

1211. just crit.

Page 106 log

1-23-69

49 x 49 array square
30 cm length .092" rods

0.514 cm separation e-e

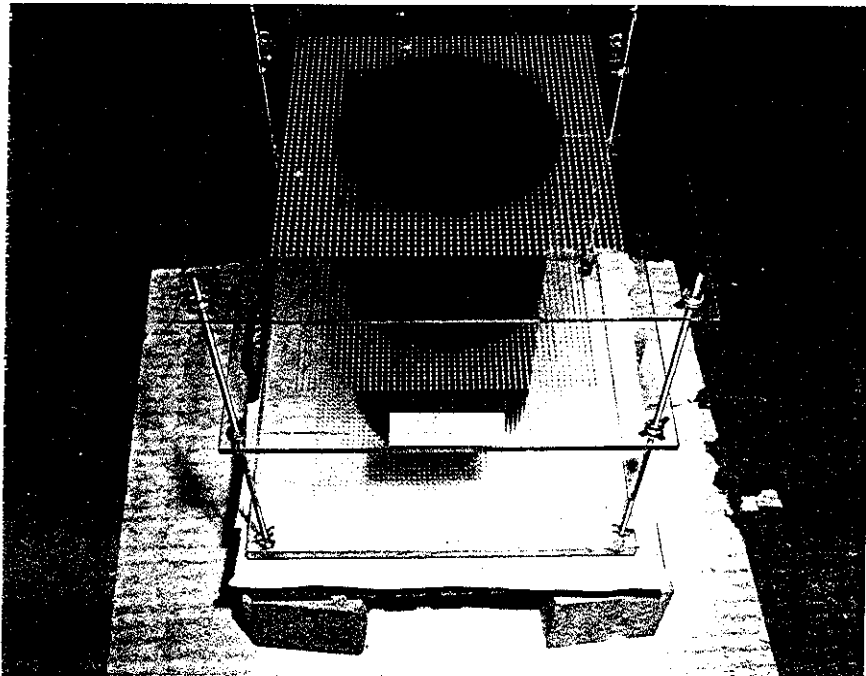
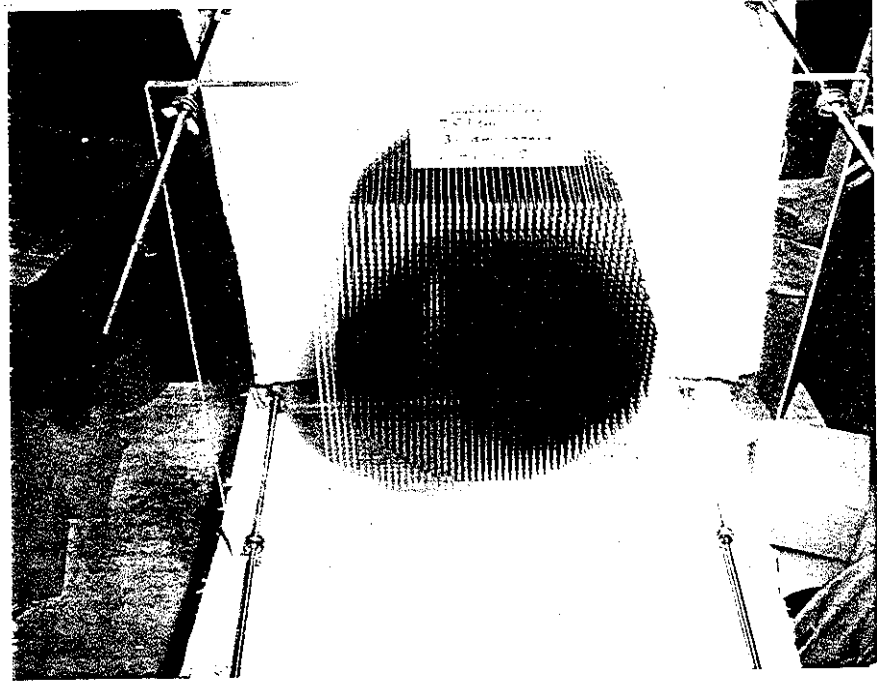
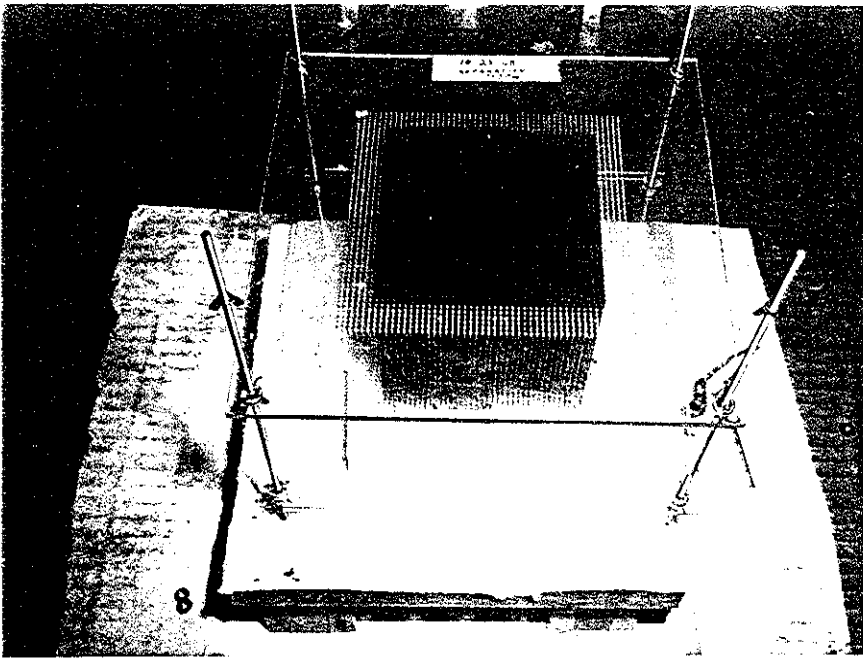
Total rods 2450.

just crit. Page 120 log.

12-17-68

36 x 36 array with 73 rods
removed from each corner
total of 1004 rods 60 cm
length. just critical

Page 79 log book



10/23/68

39 x 39 array - 16 rods

• 753 cm. separation

30 cm high

1505 rods

just cut 29.35 cm.

10/31/68

43 x 43 array with 98 rods
removed from 3 corners
and 97 rods removed from
1 corner total rods 1458

753 cm. separation

30 cm length

just cut . 36.20 cm,

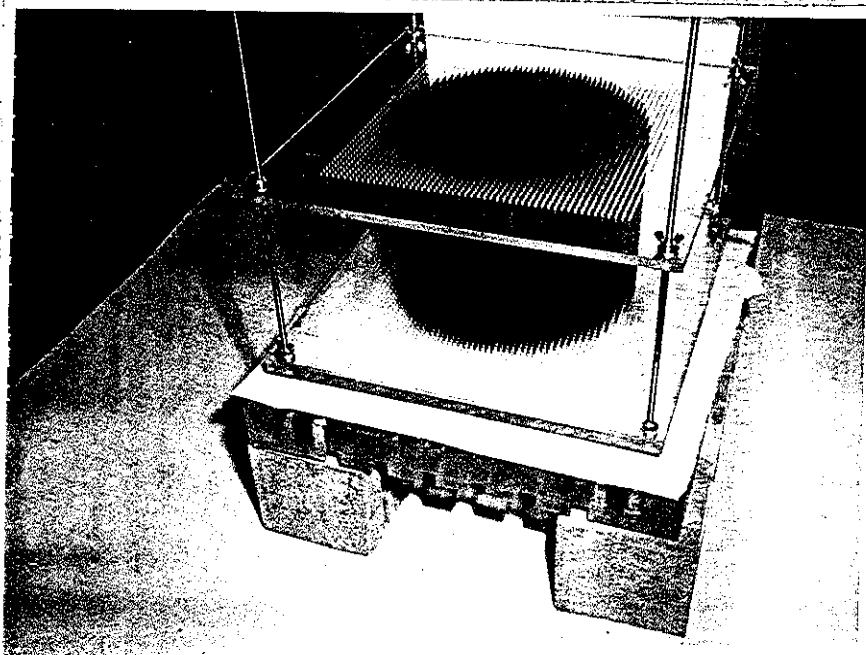
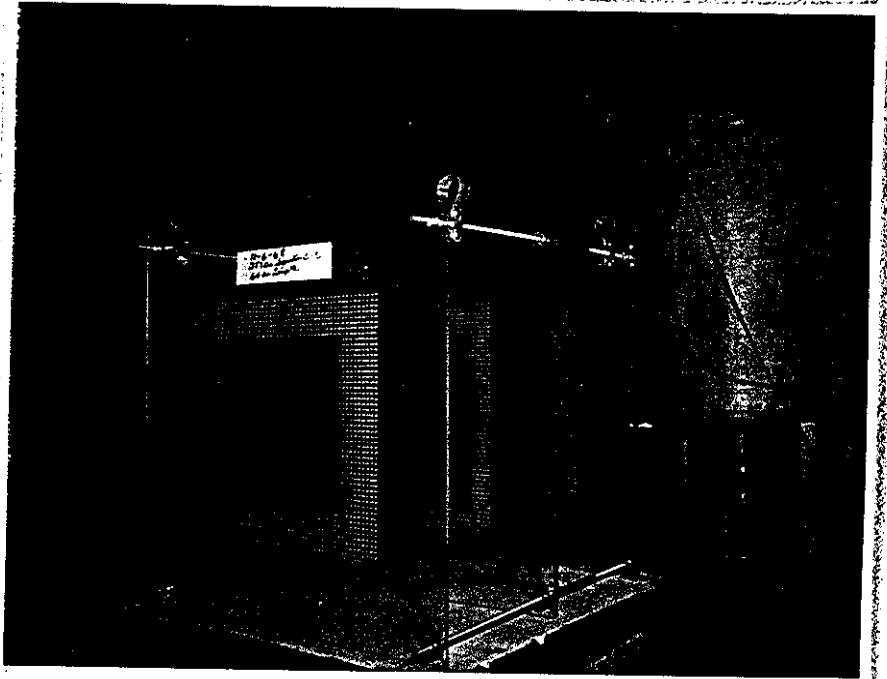
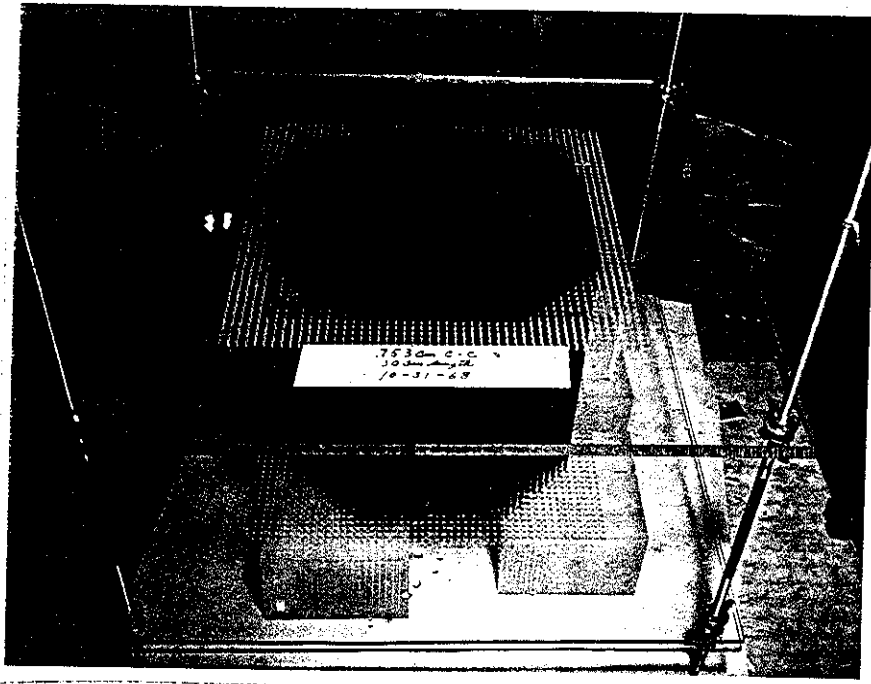
11/20/68

35 x 35 array with 72 rods
out of 2 corners and 71 rods
out of 2 corners.

Separation = . 845 cm.

60 cm. high. just cut

Page 43 log.



10/31/68

41 X 41 array with 15 rods
removed from each corner
total rods 1461

.753 cm. separation
30 cm. length
just cut, 28.60 cm.

11/6/68

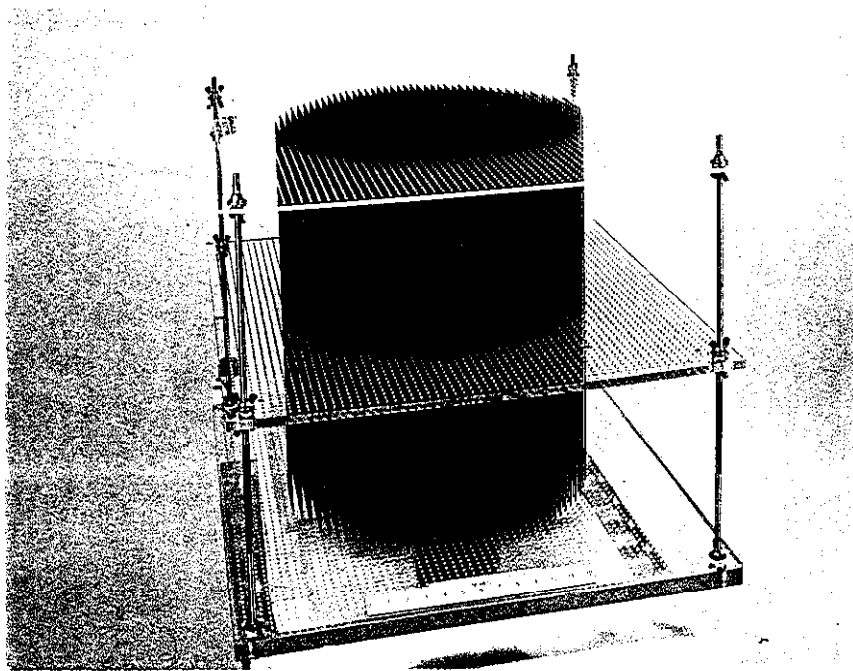
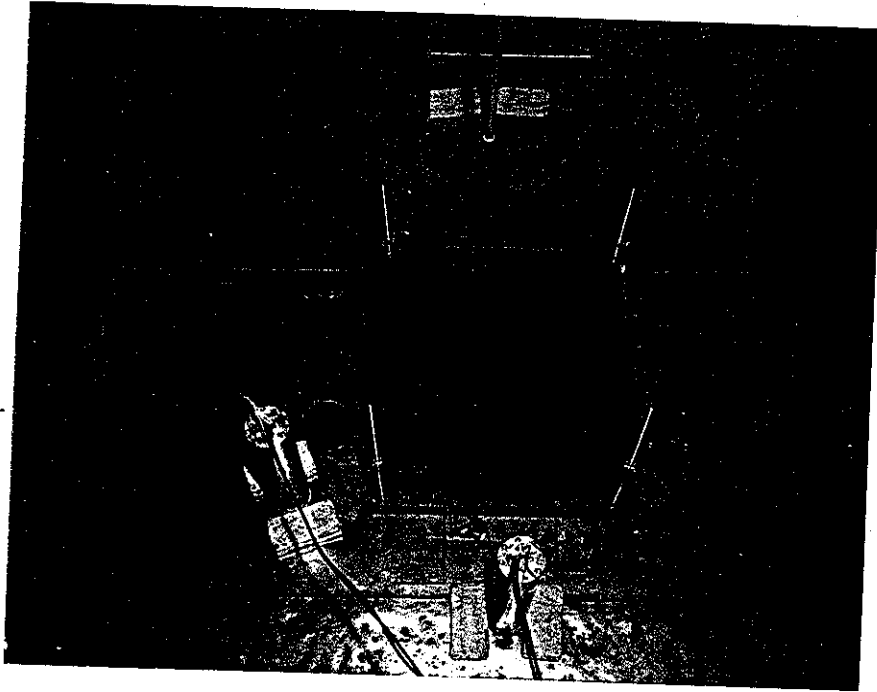
32 X 32 array with 13
rods removed from 1 face
.753 cm separation C-C,
60 cm. length,
just cut.

Page 22 log book #3

11/26/68

44 X 44 array with 109
rods removed from 2
opposite corners and
110 rods remained from 2
opposite corners total
rods 1498 30 cm long

Page 56 log



12-18-68

60 x 60 array with 10 rods
removed from each corner
(due to 3" tie rod for grid
plate). ⁸ total rods = 3560
Sub critical

Page 83 logbook

work

"Just Critical"

42 x 42 array, with 107
rods removed from 1
corner, and 106 rods
removed from 3 corners.
Total of 1339 rods.

.092" rods. U(4.89)

60 cm length.

1.150 cm esp c.c.

P. 90