

## **BOOK95R**

*Notes:*

"U (4.98)O<sub>2</sub>F<sub>2</sub> #5 Cylinders in steel shells" on spine

Blank pages: page opposite page 1, 80, inside back cover sheets

- page 1 has 2 post-it-notes on it
- pages 31/32 have paper clip at top
- pages 51/52 have plastic clip at side
- page 64 has photo glued to it
- pages 87/88 have plastic clip at side
- pages 139/140 have paper clip at top

*Scanned by:*

*Sheila Finch*

*RSICC /Oak Ridge National Lab.*

*September 9, 1999*

14-2-1



# 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.

P.127 684597 A-643

37" tank

P.135 684598 {A-2050  
A-644

P.151 684600 {A-646  
A-2052

P.156 684601 {A-647  
A-2053

P.159 684602 {A-648  
A-2054

P.164 684603 {A-649  
A-2055

167-168

H5

P.8 Y-12 684507  
908.31 2.0287

P.20 684508 (steel shells)

74 684546  
910.24 2.0312

(17" sample)  
A-631  
910.14 2.0361

95 684594

20' sample A-640  
913.3 2.0361

117 684596 A-642

20" sphere diluted

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+ Cd	23
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2

U(4.9)O<sub>2</sub>F<sub>2</sub> Solution in Cylinders with  
Fe-H<sub>2</sub>O Reflectors

9 U(4.9)O<sub>2</sub>F<sub>2</sub> solution experiments in 13.0" and  
15.0" in thin wall stainless steel vessels. With  
a composite of steel and water reflectors.  
Each vessel will be supported with a low-mass  
aluminum grid 6.0" in high.

Solution:

Feed rate = 4.6 cm<sup>3</sup>/min

1/2" drain rate = 10.2 cm<sup>3</sup>/min

Dump rate = 88.4 cm<sup>3</sup>/min

Water:

Feed rate = 6.7 cm<sup>3</sup>/min

3.0" drain = 9.5 cm<sup>3</sup>/min

3.0" dump = 9.5 cm<sup>3</sup>/min

3.0" dump & drain = 12.4 cm<sup>3</sup>/min

(15.39" in) (39.10 cm) F.D, 0.031" in - thick wall  
 stainless steel vessel (cylinder) 3

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by AKH F.I.C. Personnel check by F.I.C.  
 Instruments and safeties checked and reset by AKH  
 Source in checked by AKH Source No. 1493  
 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 1510  
 Start-up OK'd by F.I.C. AKH Date 6-19-67

I have 15.36" stainless steel (0.031" wall thickness)  
 mounted in Bib lid. Purpose is to  
 check & have critical lit. over.  
 (no H<sub>2</sub>O collection)

4 15.0" vessel  
55

Solution zero = 1.7 cm on scale.

Have 1 thermocouple in vessel. and 1 in  
big side for H<sub>2</sub>O temp.

16.15 Solution ht = 95.0 cm

System sub critical. System not made  
critical due to time factor, and this run  
was also a wiping run for the solution. and  
set - set - set.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	8"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	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.D.C.  
 Instruments and safeties checked and reset by AKH  
 Source in checked by AKH Source No. M-43  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by AKH Time 0830  
 Start-up OK'd by F.D.C. AKH Date 6-15-6

*6-15-6*



6

solution zinc = 1.7 cm

15.0" steel  
SS15.0" in stainless steel vessel in big lid.  
Bore.

15.0" steel

0930 Solution ht = 102.0 cm  $\Delta h = 1.50$  cm Solution Temp  $^{\circ}\text{C}$   
 (1) + Per = 25.0  $^{\circ}\text{C}$   
 $\tau = 132.55 \text{ sec} = 7.9 \text{ s} = 5.0 \text{ s/cm}$

11

0945 Solution ht = 100.50 cm  $\Delta h = 98.80$  cm.  
 $= 38.90$ "  
 System just critical. Drain to  $\approx 90.0$  cm.

0955 Solution ht = 103.0 cm  $\Delta h = 2.50$  cm Solution Temp  $^{\circ}\text{C}$   
 (2) + Per = 25.0  $^{\circ}\text{C}$   
 $\tau = 69.54 \text{ sec} = 13.0 \text{ s} = 5.2 \text{ s/cm}$

11.4

1010 Solution ht = 100.5 cm  $\Delta h = 99.80$  cm.  
 $= 38.90$ "  
 System just critical  
 Drain.

12

15.0" vessel

Solution zero = 1.7 cm.  
Reflector water = 0.0 cm on back scale 15.0" vessel  
has 6.0" bottom reflector. H<sub>2</sub>O even with solution zero.

Water Reflected apparent in 15.0" vessel.  
(No Top Lamp)

113.7  $\Delta h = 1.5 \text{ cm}$   
Solution ht = 44.3 cm. Water ht = 63.7 cm  
+ Per.  
 $t = 63.02 \text{ cm} = 13.9 \text{ ft} = 92.7 \text{ ft cm.}$

Temp °C  
Solution = 24.5 °C  
H<sub>2</sub>O = 22.2 °C

114.5  $\Delta h = 42.45 \text{ cm.} = 16.71"$   
Solution ht = 44.15 cm. Water ht = 63.7 cm  
System just critical

added ~~the~~ water to a height of 100.0 cm

1200  $\Delta h = 42.40 = 16.69"$   
Solution ht = 44.10 cm. Water ht = 100.0 cm  
System just critical.  
Drain.

Temp °C  
Solution = 24.1 °C  
H<sub>2</sub>O = 22.2 °C

over.

15.0"  
S-S <sup>8</sup> <sub>seal.</sub>

(Styrene foam void)

Filled the low-nose aluminum grid with ~~styrene foam~~ styrene foam. This gives an 58% water void under vessel. (9" x 12" x 6")

1440 <sup>oh = .25</sup> solution ht = 46.15 cm Water ht = 102.0 cm  
A + P  
T = 63.02 au = 13.94 = 55.6 f/cm.

Temp °C  
solution = 29.5  
Water = 22.5

1455 <sup>oh = 44.20 cm = 17.40"</sup> solution ht = 45.90 cm Water ht = 102.0 cm  
System just critical  
Ureim

Temp °C  
solution = 29.5  
Water = 23.0

2 solution samples taken from vessel.

Y-12  
#1 Reg # 684507

X-10  
#2 Reg # A-615

G = 156.7 g     $\rho_f = 0.447730$   
T = 19.4 g     $\rho_{gr} = 2.0287$   
N = 139.3 g     $\rho_{gr} = 40$   
 $\rho_{1/2} = 908.31$

G = 156.6  
T = 19.7  
N = 139.9

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE	
K-1	$3 \times 10^{-12}$	Motor -	1"	-	$3 \times 10^{-12}$	
"	"	Stop ✓	"	-	"	
K-2	"	Motor ✓	4"	✓	"	
"	"	Stop ✓	"	-	"	
R-1						
R-2						
PM-1	700V	Alarm ✓	cont	✓	500V	
PM-2	1200V	Low ✓	10"	✓	900V	
"	"	Alarm ✓	3"	✓	"	
LOG N CALIBRATE		✓	OPERATE		✓	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT		✓				

START-UP CHECK LIST

- Equipment checked by AKK F.I.C. Personnel check by F.I.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.I.C.
- Instruments in trip circuit: K-1-2 PM-1-2
- Red light on by AKK Time 1220
- Start-up OK'd by F.I.C. AKK Date 6-16-67

*AKK*

## (Styrefoon Void)

15.0"  
S.S. vessel

Now have ~ 96% styrefoon void under vessel. Have the low-mass aluminum grid filled with styrefoon as described on page 8, plus additional styrefoon pie taped and bonded to same. (styrefoon + al grid = 15.25" O.D. x 6.0" thick).

1311  $z_h = .20 \text{ cm}$   
 Solution ht = 46.60 cm    Water ht = 102.0 cm  
 + Per.  
 $C = 108.65 \text{ cm} = 9.3\% = 46.50 \text{ cm}$

Temp °C

Solution = 23.5°C

 $z_h = 44.70 \text{ cm} = 17.60"$ 

Water = 23.0°C

1325 Solution ht = 46.40 cm    Water ht = 102.0 cm  
 System just critical  
 Drain to ~ 45.6 cm; Repeat + Per.

1330  $z_h = .20 \text{ cm}$   
 Solution ht = 46.60 cm    Water ht = 102.0 cm  
 + Per.  
 $C = 78.2 \text{ cm} = 11.9\% = 59.5 \text{ cm}$

Temp °C

Solution = 23.7

 $z_h = 44.70 \text{ cm} = 17.60"$ 

Water = 23.0

1344 Solution ht = 46.40 cm    Water ht = 102.0 cm    Water = 23.0  
 System just critical  
 Drain.

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by AKM FIDC Personnel check by FIDC

Instruments and safeties checked and reset by AKL

Source in checked by AKM Source No. M-43

Emergency equipment in control room checked by FIDC

Instruments in trip circuit: \_\_\_\_\_

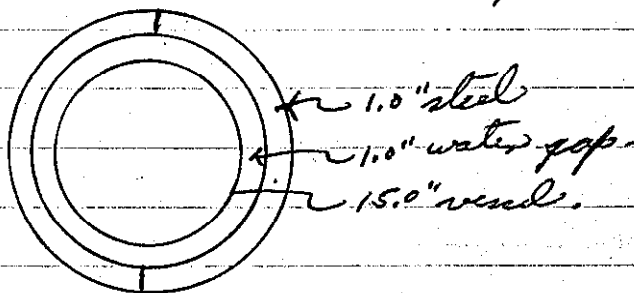
Red light on by AKM Time 0940

Start-up OK'd by FIDC AKM Date 6-20-67

*over*

15" S.S.  
Vessel.

Now have 1.0" steel reflector (2-1/2" dia) spaced 1.0" from vessel. The styrofoam void is still in place, (~ 96% void) under bottom of vessel. The steel shells (~~conductive~~ mild steel) are 47 1/16" long. The shells are set on 1/8" plastic to ~~allow~~ let water in at bottom. They are 6.5" down from top of vessel.



1100 Solution ht = 47.00 cm <sup>dh = .15 cm</sup>  
 + Per { Water ht = 106.5 cm  
 (even with top of steel)  
 $t = 136.90 \text{ cm} = 7.7 \text{ f} = 51.28 \text{ f/cm}$

Temp °C  
 Solution = 23.5 °C  
 Water = 23.5 °C

1112 Solution ht = 46.85 cm <sup>dh = 45.15 cm = 17.23" 17.78</sup>  
 System just critical  
 Crisis.

Recheck of zero after removing support ring.

15" S-S  
vessel

Zero = 1.7 cm on scale. (solution.)

"Note" (see p - 15.16.18.19)

Now have .250" steel reflector around vessel. The steel shells are in contact with vessel. (+.051" - 0.00"). The ~~shells~~ rest on <sup>the</sup> support plate or 6.0" below vessel.

1526 Solution ht = 51.40 cm

$h_1 = .30 \text{ cm}$

Water ht = 106.20 cm

27 Per

$t = 106.48 \text{ cm} = 9.44 = 31.30 \%$

water even with top of steel shells.

Temp °C

Solution = 24.0 °C

Water = 23.6 °C

1540 Solution ht = 51.10 cm

$h_1 = 49.45 \text{ cm} = 19.45 \%$

Water ht = 106.20 cm

System just critical

Drain water to ~~51.10 cm~~ <sup>51.10 cm</sup>. (Water even with solution.)

1545 Solution ht = 51.10 cm

$h_1 = 51.10 \text{ cm}$

Water ht = ~~51.80 cm~~

- Per:

1556 Drain: Last reading on solution ht = 50.50 cm?  
Leak in solution system. ??



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Motor ✓	1"	3 X 10 <sup>-12</sup>
"	"	Fast ✓	"	"
K-2	"	Motor ✓	4"	"
"	"	Fast ✓	4"	"
R-1				
R-2				
PM-1	700V	Alarm ✓	cut	500V
PM-2	1200V	Low ✓	10"	900V
"	"	Alarm ✓	3"	"

LOG IN CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

Lim  
08:  
089  
091  
093  
094  
100

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. M-43

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

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

Red-light on by AKK Time 0845

Start-up OK'd by F.I.D.C. AKK Date 6-21-67

1:  
14

Seal check of solution system. (see bottom of page 13).

Time	sol ht (cm)	Time	sol ht	H <sub>2</sub> O
0825	11.4	1010	45.40	0.0
		1035	40.70	106.2
0845	11.4	1044	40.70	42.1
		1059	44.70	42.1
0914	42.5	1113	44.80	106.1
		1123	44.70	44.8
0935	42.5	1130	44.60	0.0
		1243	45.40	0.0
0940	59.8	1310	45.60	106.2
		1325	45.50	45.6
1000	59.8			

No visible leaks found. and ~~also~~ the above checks show that valves are holding. Will "try" repeat experiments described on page 13. Believe trouble due to air.

1347 Solution ht = 50.80 cm <sup>sol = 40 cm</sup> Water ht = 106.2 cm

(1) + Per

$$v = 58.67 \text{ cm} = 19.74 = 36.75 \text{ } \frac{\text{cm}}{\text{hr}}$$

Temp °C

Solution = 24.2 °C

Water = 23.8 °C

1402 Solution ht = 50.40 cm <sup>sol = 44.70 cm = 19.17"</sup> Water ht = 106.2 cm

System just critical

over.

1403 Drain Water for - Res.

1407 Solution ht = 50.40 cm

(2) - Res

$$E = -187.96 \text{ m} = -8.9 \text{ f}$$

- 04:55:00  
Water ht = 50.40 cm

Temp °C

Solution = 24.0 °C

Water = 23.7 °C

1419

Drain.

INSTRUMENT CHECK

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

55, 80m  
40cm

1.0 C  
1.7 C

START-UP CHECK LIST

Equipment checked by AKW Personnel check by F.D.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 F.D.C  
 Instruments in trip circuit: K-2 PM-1-2  
 Red light on by AKW Time 0810  
 Start-up OK'd by F.D.C AKW Date 6-22-67

over

Repeat of experiment described on latter pages  
13, 15, 16.

0911 <sup>zh = 30 cm</sup> Solution ht = 50.70 cm Water ht = 106.2 cm  
+ Per  
 $\tau = 76.06 = 12.27 = 40.634/cm$   
Temp °C  
Solution = 24.0 °C  
Water = 23.8 °C

0924 <sup>zh = 48.70 cm = 19.12"</sup> Solution ht = 50.40 cm Water ht = 106.2 cm  
System just critical

0930 <sup>2</sup> Solution ht = 50.40 cm Water ht = 50.40 cm  
- Per  
Temp °C  
 $\tau = -199.92 \mu = -8.27 =$   
Solution = 23.7  
Water = 23.7

0940 Over:

1

1.1

12

120

1.

12

12

1100 added ~~to~~ 1 more <sup>rod</sup> steel shell: 250" thick.  
Steel thickness now = .50"

6.2 cm 1146 Solution ht = 51.50 cm  $z_h = .40 \text{ cm}$  Water ht = 106.2 cm  
3 + Per Temp °C  
 $\tau = 84.75 \text{ cm} = 11.2 \phi = 28.0 \text{ g/cm}$  Solution, 24.0 °C  
Water, 24.0 °C

1200 Solution ht = 51.10 cm  $z_h = 49.40 \text{ cm} = 19.45"$  Water ht = 106.2 cm  
System just critical.  
Drain val ~ 6.0 cm. needle + Per + Pl.

40 cm 1206 Solution ht = 51.30 cm  $z_h = .20$  Water ht = 106.2 cm  
4 + Per Temp °C  
 $\tau = 144.50 \text{ cm} = 7.3 \phi = 36.50 \text{ g/cm}$  Solution = 24.1 °C  
Water = 23.8 °C

1215 Solution ht = 51.10 cm  $z_h = 49.40 \text{ cm} = 19.45"$  Water ht = 106.2 cm  
System just critical

1222 Solution ht = 51.10 cm Water ht = 51.10 cm  
5 - Per Temp °C  
 $\tau = -295.53 \text{ cm} = -5.1 \phi$  Solution = 24.1 °C

1230 Drain: Water = 23.8 °C

20

1.5" S.S.  
vent

added 1 more pair shells, .250" thick. Steel  
thickness now = .750"

1400  
~~1300~~

$\Delta h = .50 \text{ cm}$

Solution ht = 61.50 cm Steel only  
+ Per.

$\epsilon = 101.04 \text{ mm} = 9.8 \text{ f} = 19.6 \text{ g/cm}$

Temp °C  
solution = 24.5°C

$q_h = 59.30 \text{ cm} = 23.35 \text{''}$

1415

Solution ht = 61.0 cm Steel only  
system just critical  
Drain to ~ 30.0 cm.

Steel + H<sub>2</sub>O

$\Delta h = .35 \text{ cm}$

1450

Solution ht = 51.00 cm Water ht = 106.2 cm

+ Per

$\epsilon = 77.14 \text{ mm} = 12.0 \text{ f} = 34.24 \text{ g/cm}$

Temp °C  
solution = 24.3  
Water = 24.0

$q_h = 49.95 \text{ cm} = 19.27 \text{ g/cm}$

1503

Solution ht = 50.65 cm Water ht = 106.2 cm  
system just critical

1510

Solution ht = 50.65 cm Water ht = 50.65 cm

8 - Per

$\epsilon = -402.00 \text{ mm} = -3.6 \text{ f}$

1518

Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		Meter			
		Fast			
R-2	3X10 <sup>-12</sup>	Meter	3"	✓	3X10 <sup>-12</sup>
	"	Fast	3"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm	Cont	✓	500V
PM-2	1200 V	Low	10"	✓	
	"	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 FID.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 FID.C  
 Instruments in trip circuit: K-2 PM-1-2  
 Red light on by AKK Time 0915  
 Start-up OK'd by FID.C AKK Date 6-23-67

4.5°

2.0m

4.3

2.0

3.2m

6.5m

am



22

15" S.S.  
vessel.

Removed 1 pair <sup>.250"</sup> steel shells. Steel thickness = .50". Purpose to check critical ht with "steel only".

0955 Solution ht = 67.0 cm

$\Delta h = 1.55 \text{ cm}$

+ Per

$t = 83.66 \text{ sec} = 11.34 = 20.5 \text{ ft/cm}$

Temp °C  
Solution = 24.0°C

1015 Solution ht = 66.45 cm

$\Delta h = 64.75 \text{ cm} = 25.49"$

System just critical  
Drain.

Removed 1 pair steel .250" steel shells. Steel thickness = .250". Purpose to check critical ht with "steel only".

1310 Solution ht = 77.4 cm

$\Delta h = 1.05 \text{ cm}$

+ Per

$t = 84.75 \text{ sec} = 11.2 = 11.84 \text{ ft/cm}$

Temp °C  
Solution = 29.5°C

1321 Solution ht = 76.35 cm

$\Delta h = 74.65 \text{ cm} = 29.39"$

System just critical  
Drain.

Now have 4 pair .250" steel shells. Steel thickness  
 = 1.0". Purpose to check critical ht with  
"steel only."

1430 Solution ht = 57.80 cm <sup>oh = .400 cm</sup> Temp °C  
 3 + Per Solution = 25.0 °C  
 $C = 90.18 \text{ cm} = 10.7 f = 26.6 f/cm$   
 $q/h = 55.70 \text{ cm} = 21.93"$

1445 Solution ht = 57.40 cm  
 System just critical  
 Drain solution to ~ 35.0 cm

1.0" steel + H<sub>2</sub>O

1520 Solution ht = 50.20 cm <sup>oh = .300 cm</sup> Water ht = 106.2 cm  
 4 + Per Temp °C  
 $C = 89.09 = 10.8 f = 36.0 f/cm$  Solution = 25.0 °C  
 $q/h = 48.20 \text{ cm} = 18.98"$  Water = 24.0 °C

1529 Solution ht = 49.90 cm Water ht = 106.2 cm  
 System just critical  
 Drain ~ 5.0 cm, necked critical ht.

Solution ht = 50.20 cm <sup>oh = .300 cm</sup> Water ht = 106.2 cm  
 5 + Per Temp °C  
 $C = 90.18 \text{ cm} = 10.7 f = 35.7 f/cm$  Solution = 24.7 °C  
 $q/h = 48.20 \text{ cm} = 18.98"$  Water = 23.7 °C

1540 Solution ht = 49.90 cm Water ht = 106.2 cm  
 System just critical. over.

24.0 °C

24.5 °C

24

15.55  
vent

15  
2.50

1550 solution ht = 49.90 cm  
6 - Per.  
C = - 758.38 cm = - 1.8 f

Water ht = 49.90 cm

1600 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10 <sup>-12</sup>	Meter ✓	2"	✓	3 x 10 <sup>-12</sup>
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	3"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1206V	Low ✓	10"	✓	900V
	"	Alarm ✓	3"	✓	"

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

DUMP WELL PROBE LIGHT ✓

10

10

15" SS.  
Vessel.

START-UP CHECK LIST

Equipment checked by AKK Personnel check by F.P.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.P.C.  
 Instruments in trip circuit: K-1-2 P.M.-1-2  
 Red light on by AKK Time 0940  
 Start-up OK'd by F.P.C. AKK Date 6-26-67

added 1 pair, 50" steel shells. Steel thickness  
now = 1.50"

"Steel only"

Solution ht = 52.90 cm  $\Delta h = .30$  cm Temp °C  
 + Per Solution = 23.6 °C  
 $\tau = 107.56 \text{ cm} = 9.34 = 30.9 \text{ g/cm}$

1025 Solution ht = 52.60 cm  $\Delta h = 50.90 = 20.04$ "

System just critical  
Over.

1.50" Steel & H<sub>2</sub>O.

1055 Solution ht = 48.55 cm  $\Delta h = .35$  cm Water ht = 106.2 cm

+ Per  
 $\tau = 47.81 \text{ cm} = 16.94 = 48.3 \text{ g/cm}$  Temp °C  
 Solution = 23.6  
 Water = 23.5

over.

26

1585  
Vened

1.5 steel + H<sub>2</sub>O

$q_h = 46.50 \text{ cm} = 18.31''$

1105 Solution ht = 48.20 cm      Water ht = 106.2 cm

System just critical

Drain solution ~ 15 cm, which critical ht.

1114 Solution ht = 48.20 cm      Water ht = 106.2 cm

$q_h = 46.50 =$

System just critical

Temp °C

Solution = 23.6 °C

Water = 23.5 °C

1125 Solution ht = 48.20 cm      Water ht = 48.20

~~System~~ System just critical

Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Meter ✓	1"	✓	3 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	10"	✓	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 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 PM-1-2  
 Red light on by AKH Time 0905  
 Start-up OK'd. by FID.C AKH Date 6-27-67

over.

5.2 @

06.20

-23.6

23.5

8.20

28  
15" S.S  
vessel

add 1 pair .50" stub shells. Steel thickness  
now = 2.0"

Stub only.

0940 Solution ht = 50.10 cm  $\Delta h = .20 \text{ cm}$  Temp  $^{\circ}\text{C}$   
+ Per Solution = 23.6  $^{\circ}\text{C}$   
 $\epsilon = 91.27 \text{ sec} = 10.6 \text{ f} = 53.0 \text{ f/min}$

0951 Solution ht =  $\neq 49.90 \text{ cm}$   $\Delta h = 48.20 \text{ cm} = 18.98''$   
System just critical  
Drain to 10.0 cm. purpose to reach critical ht  
and + per.

0955 Solution ht = 50.10 cm  $\Delta h = .20 \text{ cm}$  Temp  $^{\circ}\text{C}$   
+ Per Solution = 23.6  $^{\circ}\text{C}$   
 $\epsilon = 86.92 \text{ sec} = 11.0 \text{ f} = 53.0 \text{ f/min}$

1010 Solution ht =  $\neq 49.90$   $\Delta h = 48.20 \text{ cm} = 18.98''$   
System just critical  
Drain to  $\approx 28.5 \text{ cm}$

15

2.0" steel + Hz<sup>o</sup>

29

lower

1105 Solution ht = 47.00

sh = .20 cm

Water ht = 106.2 cm

<sup>3</sup> + p<sub>ex</sub>

$$\tau = 86.92 \text{ cm} = 11.0 \text{ f} = 55.0 \text{ f/cm}$$

Temp °C

Solution = 23.6 °C

Water = 23.6 °C

ch<sub>2</sub> = 45.10<sup>cm</sup> = 17.76"

23.6 °C

1120 Solution ht = 46.80 cm

Water ht = 106.2 cm

System just critical

1126 Solution ht = 46.80 cm

Water ht = 46.80 cm

id ht

System just critical  
Drain.

Water gap + steel shells.

1430

Removed the .250" ~~gap~~ inner pair steel shells.  
Now have .250" water gap, plus 1.750" steel shells.

.6 °C

47.20 cm sh = .15 cm

1510 Solution ht = 47.30

Water ht = 106.2 cm

<sup>4</sup> + p<sub>ex</sub>

$$\tau = 116.26 \text{ cm} = 8.7 \text{ f} = 57.9 \text{ f/cm}$$

Temp °C

Solution = 24.0 °C

Water = 24.0 °C

ch<sub>2</sub> = 45.35 cm

= 17.85 cm

1530

Solution ht = 47.05 cm

Water ht = 106.2 cm

System just critical  
Drain.

aver.



30

15" ss  
vessel

1400

Solution sample taken.  
Two held for analysis.

#1 Reg # (X-12) 684508

SFA-616 (X10)

G = 134.0 g

G = 143.2 g

T = 20.0 g

T = 19.1 g

N = 114.6 g

N = 124.1 g

INSTRUMENT CHECK

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

LOG-N CALIBRATE \_\_\_\_\_ OPERATE \_\_\_\_\_ SOURCE No. B-80

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

Equipment checked by AKL F.I.C Personnel check by F.I.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.C

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

Red light on by AKL Time 1300

Start-up OK'd by F.I.C AKL Date 6-29-67

over

13.0"  
3.5. Vessel

Now have the 12.989" I.O. X .031" wall thickness  
X 1.13" ht stainless steel vessel in big lid.  
Vessel is supported with a low mass al  
grid 6.0" in high. Reflector water even with sol zero.

Solution zero = 1.3407<sup>cm</sup> scale.

Reflector water = 0.0 cm on back scale, 13.0"  
vessel has 6.0" bottom reflector.

$$y_h = 83.00 \text{ cm} = 32.68''$$

1510 Solution ht = 84.30 cm      Water ht = 84.30 cm  
System just critical.      Temp °C  
sol = 23.7 °C

$$y_h = 83.00 = 32.68''$$

1530 Solution ht = 84.30 cm      Water ht = 99.50 cm  
+ Per.  
E = 1064.8 m = 1.2 φ = 15.2 cm H<sub>2</sub>O above fuel

$$y_h = 83.00 \text{ cm} = 32.68''$$

1545 Solution ht = 84.30 cm      Water ht = 138.0 cm  
+ Per  
E = 505.2 m = 2.4 φ = 53.7 cm H<sub>2</sub>O above fuel.      Temp °C  
sol = 28.0 °C  
Water = 29.0 °C

$$y_h = 82.65 \text{ cm} = 32.54''$$

155.7 Solution ht = 83.95 cm      Water ht = 138.0 cm  
System just critical

$\Delta L = .85 \text{ cm.}$

1400 Solution ht = 84.80 cm.

Water ht = 138.0 cm

<sup>3</sup>+ Per

$\tau = 158.63 \text{ sec} = 6.87 = 8.74 / \text{cm}$

$4/4 = 82.65 \text{ cm} = 32.54''$

1408 Saturation ht = 83.95 cm

Water ht = 138.0 cm

System just critical  
Drain.

2.00  
3.  
2.  
3.30  
3.00  
4.30  
7°  
7°  
9.50  
8.00  
0°  
0°  
8.00

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	Mid	✓	3X10 <sup>-12</sup>
"	"	Full	✓	"
K-2	"	Mid	✓	"
"	"	Full	✓	"
R-1				
R-2				
PM-1	700V	High	✓	500V
PM-2	1100V	Low	✓	900V
"	"	Mid	✓	"

LOG IN CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKK <sup>50.C</sup> Personnel check by ZID.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 ZID.C

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

Red light on by AKK Time 1030

Start-up OK'd by ZID.C AKK Date 6-30-67

13.0"  
S.S. vessel

now have ~ <sup>95.9%</sup> ~~94%~~ styrofoam void under vessel.  
Now the low-nose al grid filled with styrofoam,  
plus additional styrofoam piece taped to the  
al grid. (styrofoam + al grid = <sup>112.96</sup> ~~112.96~~ 1100 x 6.0  
thick).

Rechecked zero: 1.30cm on scale.

$\Delta h = .90 \text{ cm}$   
1155 Solution ht = 86.80 cm Water ht = 162.0 cm  
' + Per  
 $T = 143.4 \text{ sec} = 7.44 = 8.24 / \text{cm}$  Temp °C  
Solution = 24.0 °C  
Water = 24.0 °C

$\Delta h = 84.60 \text{ cm} = 33.31''$   
1209 Solution ht = 85.90 cm Water ht = 162.0 cm  
hepten just critical 77.4 cm above full  
Cross ~ 6.0 cm solution. Repeat + Per and  
check critical ht.

$\Delta h = 1.40 \text{ cm}$   
1215 Solution ht = 87.30 cm Water ht = 167.0 cm  
' + Per  
 $T = 79.31 \text{ sec} = 11.84 = 8.4 / \text{cm}$  Temp °C  
Solution = 24.0 °C  
Water = 24.0 °C

$\Delta h = 84.60 \text{ cm} = 33.31''$   
1226 Solution ht = 85.90 cm Water ht = 162.0 cm  
hepten just critical. 77.4 cm above full:  
over.

$$4h_2 = 84.60 \text{ cm.} = 33.31''$$

1235<sup>3</sup> Solution ht = 85.90 cm. Water ht = 85.90 cm  
 - Per  
 $E = -310.74 \text{ new} = -4.8 \text{ f}$

1251<sup>4</sup> Solution ht = 87.70 cm. Water ht = 85.90 cm  
 + Per  
 $E = 99.96 = 9.9 \text{ f} = 7.04 \text{ / cm}$

Temp °C  
 Solution = 24.0°C  
 Water = 24.0°C

1300<sup>5</sup> Solution ht = 86.30 cm. Water ht = 85.90 cm  
 $4h_2 = 85.00 \text{ cm} = 33.46''$   
 kept in just artificial  
 Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Meter ✓	1"	✓	3 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700 v	Alarm	act		
PM-2	1200 v	Low ✓	6"	✓	900 v
"	"	Alarm ✓	3"	✓	"

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

START-UP CHECK LIST

Equipment checked by AMV Personnel check by F.I.C  
 Instruments and safeties checked and reset by AMV  
 Source in checked by AMV Source No. M-43  
 Emergency equipment in control room checked by F.I.C  
 Instruments in trip circuit: K-1-2 PM-2  
 Red light on by AMV Time 0810  
 Start-up OK'd by F.I.C AMV Date 7-11-67

over



Now have 1 pair .250" shells. Total length of shells = 94.0". The shells are 5.750" above bottom of vessel. Solution zero still = 1.30 cm on scale.

11

The shells fit tight around vessel (+0.30 - 0.100"). When H<sub>2</sub>O ~~reads~~ on side scale reads 243.90 cm, H<sub>2</sub>O even with top of stub shells.

11

1103,  $d_h = 5.35 \text{ cm}$   
 Solution ht = 166.50 cm      Water ht = 243.9 cm  
 + Per

1

$$\tau = 139.07 \text{ cm} = 7.6 \phi = 1.4 \text{ f/cm}$$

Temp °C

Solution = 24.2°

Water = 23.2°

1123,  $d_h = 1.5885 \text{ cm} = 62.54"$   
 Solution ht = 160.15 cm      Water ht = 243.90 cm

14

System just critical

Drain to ~ 147.0 cm. Purpos to report + Per & critical ht.

15

$h = 7.95 \text{ cm}$

1136 Solution ht = 168.10 cm Water ht = 243.90 cm

$2 + \text{PE}$   
 $5 = 108.65 \text{ cm} = 9.3 \text{ ft} = 1.2 \text{ ft/cm}$

Temp °C  
Solution 29.5 °C  
Water 23.5 °C

$q_h = 158.85 \text{ cm} = 62.5 \text{ ft}$

1159 Solution ht = 160.15 cm Water ht = 243.90 cm

System just critical

$q_h = 158.85$

1212 Solution ht = 160.15 cm Water ht = 178.60 cm

System just critical  
even with sol  
Drain.

Steel only, (.250" shells)

$q_h = 224.15 \text{ cm} = 88.25 \text{ ft}$

1440 Solution ht = 225.45 cm: (sol even with top of steel.)

System sub critical, very little  $\gamma_m$ .

$q_h = 238.90 \text{ cm} = 94.06 \text{ ft}$

1515 Solution ht = 240.20 cm: still ~~no~~  $\gamma_m$ .

System sub critical.  
Drain.

Temp °C  
sol = 24.5 °C  
stop

INSTRUMENT-CHECK

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	2"	$3 \times 10^{-12}$
"	"	Fast ✓	"	"
K-2	"	Meter ✓	"	"
"	"	Fast ✓	"	"
R-1				
R-2				
PM-1	700V	Alarm ✓	cont	500V
PM-2	200V	Low ✓	8"	900V
"	"	Alarm ✓	2"	"
LOG-N CALIBRATE ✓		OPERATE ✓		SOURCE NO. B-30
DUMP WELL PROBE LIGHT ✓				

START-UP CHECK LIST

Equipment checked by R.K.L. Personnel check by R.K.L.  
 Instruments and safeties checked and reset by R.K.L.  
 Source in checked by R.K.L. Source No. M-92  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by R.K.L. Time 1230  
 Start-up OK'd by F.D.C. R.K.L. Date 7-12-67

13<sup>4</sup> 5.5.9  
vms

added 1 more pair steel shells. 2.50" thick.  
Steel thickness now = .50"

1500  $d_h = 10.30$   
Solution ht = 213.20 cm      Water ht = 243.90 cm  
+ Per  
 $\tau = 195.57 \text{ mm} = 5.74 = .154 \text{ /cm}$       Temp °C  
Solution = 24.5 °C  
Water = 23.6 °C

1525  $cl = 201.60 \text{ cm} = 79.37''$   
Solution ht = ~~202.90~~ 202.90 cm      Water ht = 243.90 cm  
System just critical  
Drain to ~ 143 cm; Reason to report + Per  
and critical ht.

1538  $d_h = 15.60 \text{ cm}$   
Solution ht = 218.50 cm      Water ht = 243.90 cm  
+ Per  
 $\tau = 126.03 \text{ mm} = 4.24 = .194 \text{ /cm}$       Temp °C  
Solution = 24.5 °C  
Water = 23.7 °C

1555  $cl = 201.60 \text{ cm} = 79.37''$   
Solution ht = 202.90 cm      Water ht = 243.90 cm  
System just critical

over

42

W.S.S. *well*

$h/h = 201.60 \text{ cm} = 79.37''$

102.50

260.50

Solution bit = 202.90 cm

Water ht = 259.10 cm

System still just critical  
Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	$3 \times 10^{-12}$
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	2"	<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"/>	8"	<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 checked="" type="checkbox"/>					

2.56  
.506  
10cm  
13" 45  
usual

START-UP CHECK LIST

Equipment checked by AKM F.P.C Personnel check by F.P.C  
 Instruments and safeties checked and reset by R.H. R  
 Source in checked by AKM Source No. M-43  
 Emergency equipment in control room checked by F.P.C  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by AKM Time 1225  
 Start-up OK'd by F.P.C AKM Date 7-13-63

added 1 more pair steel shells .250" thick.  
shell thickness now = .750"

1410  $\Delta h = 8.40 \text{ cm}$   
 Solution ht = 182.50 cm Water ht = 243.90 cm  
 + Per  
 $C = 129.29 \text{ cm} = 8.14 = .964 \text{ cm}$   
 Temp °C  
 Solution = 24.5  
 Water = 23.7

1425  $\Delta h = 172.90 \text{ cm} = 68.03$   
 Solution ht = 174.10 cm Water ht = 243.90 cm  
 System just critical.  
 Drain ~ 15 cm. Prepare to repeat + over and  
 recheck critical ht.

over

44

13" ss  
- record

1440 Solution ht = 184.10 cm

Water ht = 243.90 cm

<sup>2</sup> + P<sub>es</sub>

E = 114.09 cm = 8.9 ft = 1.14 m

Temp °C

Solution = 24.2 °C

Water = 23.5 °C

44 = 172.80 cm = 68.03"

1450 Solution ht = 174.10 cm

Water ht = 243.90 cm

Septum just critical

44 = 172.80 cm = 68.03"

1456 Solution ht = 174.10 cm

Water ht = 192.0 cm

Septum still just critical

Drain water

Steel only, 750" thick

44 = 224.15 cm = 88.24"

1535 Solution ht = 225.45 cm

Solution even with

Septum sub critical.

Top of steel.

very little fan.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	1"	✓	$3 \times 10^{-12}$
	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	8"	✓	700V
	"	Alarm ✓	2"	✓	"

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

START-UP CHECK LIST

Equipment checked by AKH <sup>I.D.C.</sup> Personnel check by I.D.C.

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. 19-93

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

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

Red light on by AKH Time 0940

Start-up OK'd by I.D.C. AKH Date 7-18-67



1355  
vond.

added 1 more pair steel shells, .250" thick.  
Steel thickness now = 1.00"

1112 Solution ht = 150.10 cm <sup>h<sub>2</sub> = 5.90 cm</sup> Water ht = 243.90 cm  
+ Per Temp °C  
C = 104.30 mm = 9.6 f = 1.7 H/cm Solution = 24.5 °C  
Water = 23.7 °C

1127 Solution ht = 144.30 cm <sup>h<sub>2</sub> = 143.00 cm = 56.30"</sup> Water ht = 243.90 cm  
Oxygen just critical  
O<sub>2</sub> rain.

added 1 more pair steel shells, .500" thick.  
Steel thickness now = 1.50"

1481 Solution ht = 113.10 cm <sup>h<sub>2</sub> = 2.70 cm</sup> Water ht = 243.90 cm  
+ Per Temp °C  
C = 95.61 mm = 10.2 f = 3.8 H/cm Solution = 24.7 °C  
Water = 23.7 °C

$\frac{1}{4} = 109.10 \text{ cm} = 42.95''$   
~~1455~~ Solution ht = 110.40 cm      Water ht = 243.90 cm  
 hepten just critical.

steel only. 1.50" thick.

$\frac{1}{4} = 224.15 \text{ cm} = 88.25''$   
 1557 Solution ht = 225.45 cm.      Temp °C  
 hepten sub critical.      Solution = 25.0°C  
 very little foam.

900m

2.7°C

-7°C

7/17/67

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	DATE	TIME	START-UP RANGE
K-1	3x10 <sup>-14</sup>	Alarm ✓	11	✓	3x10 <sup>-12</sup>
		Fast ✓	"	✓	"
K-2	3x10 <sup>-14</sup>	Meter ✓	"	✓	"
		Fast ✓	"	✓	"
R-1					
R-2					
PM-1	500V ✓	Alarm ✓	10 <sup>1</sup>	✓	500V
PM-2	1200V ✓	Low ✓	10 <sup>1</sup>	✓	500V
		Alarm ✓	3"	✓	
LOG IN CALIBRATE ✓		OPERATE ✓	SOURCE No. B-82		
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by RKR Personnel check by RKR

Instruments and safeties checked and reset by EG

Source in checked by RKL Source No. M-43

Emergency equipment in control room checked by EG

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

Red light on by ERT Time 0930

Start-up OK'd by EG, RKL Date 7-17-68

added 1 more pair steel shells .500" thick.  
 steel thickness now = 2.00"

1043 solution ht = 94.90 cm  $\Delta h = 1.65 \text{ cm}$  water ht = 243.90 cm  
 + Per  
 $\bar{c} = 95.61 \text{ cm} = 10.2 \text{ ft} = 6.24 \text{ ft/cm}$

1100 solution ht = 93.25 cm  $c/h = 91.95 \text{ cm} = 36.20$  water ht = 243.90 cm  
 system just critical. Temp °  
 Drain = 2.0 cm solution. solution = 23.6  
 To reduce critical ht. water = 23.4

1108 solution ht = 93.25 cm  $c/h = 91.95 \text{ cm} = 36.20$  water ht = 243.90 cm  
 system just critical

1121 solution ht = 93.00  $c/h = 91.70 \text{ cm} = 36.10$  water ht even with  
 system just critical solution ht.  
 Drain H<sub>2</sub>O.

2.0" steel only

1140 solution ht = 147.40 cm  $\Delta h = 5.9 \text{ cm}$  No H<sub>2</sub>O.  
 + Per  
 $\bar{c} = 88.00 \text{ cm} = 10.9 \text{ ft} = 1.85 \text{ ft/cm}$   
 $c/h = 140.20 \text{ cm} = 55.20 \text{ cm}$   
 solution ht = 141.50 cm  
 system just critical

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	1"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	8"	✓	900V
"	"	Alarm ✓	Cont	✓	"
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE NO. B-80
DUMP WELL PROSE LIGHT		✓			

## START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.I.C.  
 Instruments and safeties checked and reset by AKM  
 Source in checked by AKM Source No. 19-43  
 Emergency equipment in control room checked by F.I.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by AKM Time 0940  
 Start-up OK'd by F.I.C. AKM Date 7-18-67

13" s.s  
vessel



vessel  
2.00" steel shells  
.056" cl

Have 2.00" steel shells, + .056" cl sheet  
around vessel. The cl extends 5.750" below  
bottom of vessel. ~~and~~ the over-all length  
= 54.250" or 48.50" above bottom of vessel.  
(cl is around the 2.00" steel shells.)

1051 Solution ht = 96.20 cm. <sup>dh = 2.90 cm.</sup> Water ht = 243.90 cm.  
① + per Temp °C  
t = 43.46 sec = 18.0 f = 6.24 ft/min. Solution = 23.5 °C  
Water = 23.7 °C

$gh = 92.00 \text{ cm} = 36.22''$

1105 Solution ht = 93.30 cm Water ht = 243.90 cm  
hepten just critical  
Orain ~ to ~ 90.00 cm, hepten critical  
ht.

1109 Solution ht = 95.10 cm <sup>dh = 1.75 cm</sup> Water ht = 243.90 cm  
② + per Temp °C  
t = 73.89 sec = 12.4 f = 7.0 ft/min Solution = 23.5 °C  
Water = 27.7 °C

$gh = 92.05 \text{ cm} = 36.24''$

1118 Solution ht = 93.35 cm Water ht = 243.90 cm  
hepten just critical  
Orain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3 x 10 <sup>-12</sup>	Meter ✓	1"	✓	3 x 10 <sup>-12</sup>
"	"	✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	✓	"	✓	"

P-1

P-2

PM 700V	Alarm ✓	Cont ✓	500V
PM 90-1200V	low ✓	cont ✓	900V
"	Alarm ✓	g" ✓	"

LOG IN CALIBRATE  OPERATE  SOURCE No. B-80  
 DUMP WILL TRIP LIGHT

START-UP CHECK LIST

Equipment checked by AKK <sup>FIDC</sup> Personnel check by R.K.H.  
 Instruments and safeties checked and reset by AKK  
 Source in checked by AKK Source No. M-43  
 Emergency equipment in control room checked by FIDC  
 Instruments in trip circuit: K-1-2 DM-1-2  
 Red light on by AKK Time 1230  
 Start-up OK'd by FIDC, AKK Date 7-19-67

13" S-5  
Vessel



vessel  
.032" CD,

53

Now ~~the~~ have the 13.0" S-5 vessel wrapped  
with .032" CD. The CD extends 6.0" below  
vessel, and to width is 4.125" of the top.  
Total length of CD = 114.50" "No steel"  
CD 108.6 in. below bottom of cylinder  
 $4 1/4 = 266.10 \text{ cm} = 104.76"$

1515 Solution ht = 267.40 cm Water ht = 286.0 cm.

System very sub-critical. Water is 8.25" below  
No  $\text{H}_2\text{O}$  (Sol +  $\text{H}_2\text{O}$  even ht.) Top of vessel.

Drain:

Temp °C

I

Solution = 25.0 °C

Water = 23.7 °C



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-3	X10 <sup>-12</sup>	Altor ✓	1"	✓	3 X 10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Mator ✓	2"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont	✓	500V
PM-2	1200V	Low ✓	8"	✓	900V
"	"	Alarm ✓	Cont	✓	"

LOG-N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by AKL Personnel check by AKL

Instruments and safeties checked and reset by AKL

Source in checked by AKL Source No. M-93

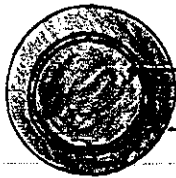
Emergency equipment in control room checked by I.O.C

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

Red light on by AKL Time 1420

Start-up OK'd by I.O.C AKL Date 7-20-67

13" s.s.  
vessel



vessel  
cd  
steel shells,

New have 13.0" s.s. vessel wrapped with .032" cd. Plus  
2.00" thick steel shells. The steel shells extend  
5.750" below bottom of vessel. Total length of  
shells = 94.0". The cd extends 5.750" below bottom  
of vessel, and extends 3.0" above top of steel  
shells.

1529  $4h = 224.15 \text{ cm} = 88.24''$   
Solution ht = 225.45 cm Water ht = 243.90 cm  
System sub critical.  
Solution even with top of steel shells.

Temp °C  
Solution = 24.2  
Water = 23.8

1607  $4h = 266.10 \text{ cm} = 104.76''$   
Solution ht = 267.40 cm Water ht = 286.0 cm  
System just critical  
On air.

INSTRUMENT-CHECK

INSTRUMENT	RANGE	TRIP	SOURCE E X A M P L E	SET	START-UP RANGE
K-13	X10 <sup>-12</sup>	Meter ✓	1"	✓	3 X10 <sup>-12</sup>
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast ✓	"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	Cont ✓	✓	500V
PM-2	1200V	Low ✓	8" ✓	✓	900V
"	"	Alarm ✓	Cont ✓	✓	"
LOG N CALIBRATE		✓	OPERATE		✓
DUMP WELL PROBE LIGHT		✓	SOURCE No.		B-80

15

START-UP CHECK LIST

Equipment checked by AKH/FDR Personnel check by AKH  
 Instruments and safeties checked and reset by AKH  
 Source in checked by AKH Source No. M-73  
 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 1415  
 Start-up OK'd by FID.C AKH Date 7-29-67

15

15" S.S. (see page 59 for correct eff.)

Vessel,

Sol zero = 2.00 cm

When H<sub>2</sub>O reads 0.0 cm on bulb scale, vessel has 6.0" bottom reflector. H<sub>2</sub>O runs with Sol zero. The vessel has ~ 96% styrofoam void at bottom. Purpose of the following apparatus to see effects of cd & steel shells.

Water reflected only

$\Delta h = .30 \text{ cm.}$

1513 Solution ht = 47.90 cm

Water = 107.0 cm

(1) + Per

Temp °C

$\sigma = 69.54 \text{ cm} = 13.0 \text{ f} = 43.3 \text{ \% cm}$

Solution = 23.98

Water = 24.00

$\Delta h = 45.60 \text{ cm} = (\text{See p. 55})$

1523 Solution ht = 47.60 cm

Water ht = 107.0 cm

System just critical.

Drain to ~ 45.0 cm. reads critical ht + Per.

$\Delta h = .20 \text{ cm.}$

Solution ht = 47.80 cm

Water ht = 107.0 cm

(2) + Per

Temp °C

$\sigma = 86.92 \text{ cm} = 11.0 \text{ f} = 55.0 \text{ \% cm}$

Solution = 23.60

Water = 23.60

$\Delta h = 45.60 \text{ cm}$

1544 Solution ht = 47.60 cm.

Water ht = 107.0 cm

System just critical

Drain.

See p. 59

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE	
K-1	3x10 <sup>-12</sup>	Meter	1"	—	3x10 <sup>-12</sup>	
	"	Fast	"	—	"	
K-2	"	Meter	2"	—	"	
	"	Fast	"	—	"	
R-1						
R-2						
PM-1	700V	Alarm	15"	—	500V	
PM-2	1200V	Low	8"	—	900V	
	"	Alarm	cont	—	"	
LOG N CALIBRATE		<input checked="" type="checkbox"/>	OPERATE		<input checked="" type="checkbox"/>	SOURCE No. B-80A
DUMP WELL PROBE LIGHT		<input checked="" type="checkbox"/>				

START-UP CHECK LIST

Equipment checked by AKM Personnel check by F.P.C.  
 Instruments and safeties checked and reset by AKM  
 Source in checked by AKM Source No. M-93  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1-2 P17-1-2  
 Red light on by AKM Time 0815  
 Start-up OK'd by F.P.C. AKM Date 7-25-67

Water refilled only

Repeat of experiments described on page 57 after  
checking ~~for~~ solution zero.

Solution zero now = 2.30 cm. Believe 9% difference  
and zero on page 57 due to air in line on 7-24-67.

0935 Solution ht = 47.05  $\pm h = 2.30 \text{ cm}$  Water ht = 106.80 cm  
 1st Per Temp °C  
 $C = 53.24 \text{ sec} = 15.9 \phi = 52.9 \text{ cm}$  Solution = 23.7 °C  
 avg of 1 + 2 = 47.94 cm Water = 24.0 °C

0945 Solution ht =  $\pm 46.75 \text{ cm}$   $\phi h = 44.45 \text{ cm} = 17.50''$  Water ht = 106.80 cm  
 System just critical  
 Drain to  $\sim 30.0 \text{ cm}$ . Prepare to repeat  
 critical ht.

0950 Solution ht = 47.20 cm  $\pm h = 2.45$  Water ht = 106.80 cm  
 2nd Per Temp °C  
 $C = 39.11 \text{ sec} = 19.3 \phi = 42.8 \text{ cm}$  Solution = 23.9 °C  
 Water = 24.1 °C

1003 Solution ht =  $\pm 46.75 \text{ cm}$   $\phi h = 44.45 \text{ cm} = 17.50''$  Water ht = 106.80 cm  
 System just critical  
 Drain to

over:

60

15" SS  
vessel.

Solution and reflector water samples taken.

Solution	Req # 684509 - X-12	S.F.A = 617 - X-10
	G = 123.6g	G = 133.75
	T = 19.4	T = 19.0
	N = 104.2g	N = 114.75g
	U(4.97)	
	0.447840 g U/g	
	~.0300 SC @ 25°C	

Reflector Water: Req # 684510 - X-12.

cd + H<sub>2</sub>O

1255 Now have vessel wrapped with .032" cd. The cd extends 6.0" below bottom of vessel, and to a ht of 4.150" above bottom. Total length = 47.50" (same length as steel shell.)

	$b_1 = .90 \text{ cm}$	
1337	Solution ht = 68.10 cm.	Water ht = 107.20 cm
	+ Per	
	$T = 59.76 \text{ cm} = 19.54 = 16.19 \text{ cm.}$	
		Temp °C
		Solution = 24.2 °C
		Water = 24.2 °C

15" s.s.  
vessel.

61

$$q_h = 64.90 \text{ cm} = 25.55''$$

1350

Solution ht = 67.20 cm

Water ht = 107.20 cm

System just critical.

Drain.

cl + steel shells + H<sub>2</sub>O

1500

Now have vessel wrapped with .032" cl + 2.00" steel shells. cl + steel shells extend 6.0" down from bottom of vessel and to a ht of 41.50" above bottom. Total length of cl and steel shells = 47.50"

1510

System screened by power failure.

107.20

7.2 °C

7.2 °C



## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Meter ✓	1"	✓	3 X 10 <sup>-12</sup>
"	"	Fst ✓	"	✓	"
K-2	"	Meter ✓	2"	✓	3 X 10 <sup>-12</sup>
"	"	Fst ✓	"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cont	✓	500 V
PM-2	1200 V	Low ✓	8"	✓	900 V
"	"	Alarm ✓	Cont	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PRGSE LIGHT		✓			

## START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-43

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

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

Red light on by AKH Time 0815

Start-up OK'd by F.D.C. AKH Date 7-26-67

See page 61 for description of this equipment.

15" s.s.  
result.

cd + 2.0" steel shells + H<sub>2</sub>O

63

D<sub>1</sub> = .30 cm

0.910 Solution ht = 53.40 cm. Water ht = 106.50 cm

1 + per

Temp °C

$\tau = 103.22 \text{ cm} = 9.6 f = 32.0 \text{ f/cm}$

Solution = 24.0 °C

Water = 24.2 °C

$C/h = 50.80 \text{ cm} = 20.00 \text{ ''}$

0.930. Solution ht = 53.10 cm Water ht = 106.50 cm

System just critical  
Drain

cd + 1.0" steel shells + H<sub>2</sub>O

Removed 1.0" thickness of the steel shells.

New shells .032" + 1.0" thickness of steel shells.

$\Delta L = .45 \text{ cm}$

13.15 Solution ht = 57.20 cm Water ht = 106.50 cm

2 + per

Temp °C

$\tau = 94.75 \text{ cm} = 11.2 f = 29.9 \text{ f/cm}$

Solution = 24.2 °C

Water = 24.1 °C

$C/h = 54.45 \text{ cm} = 21.44 \text{ ''}$

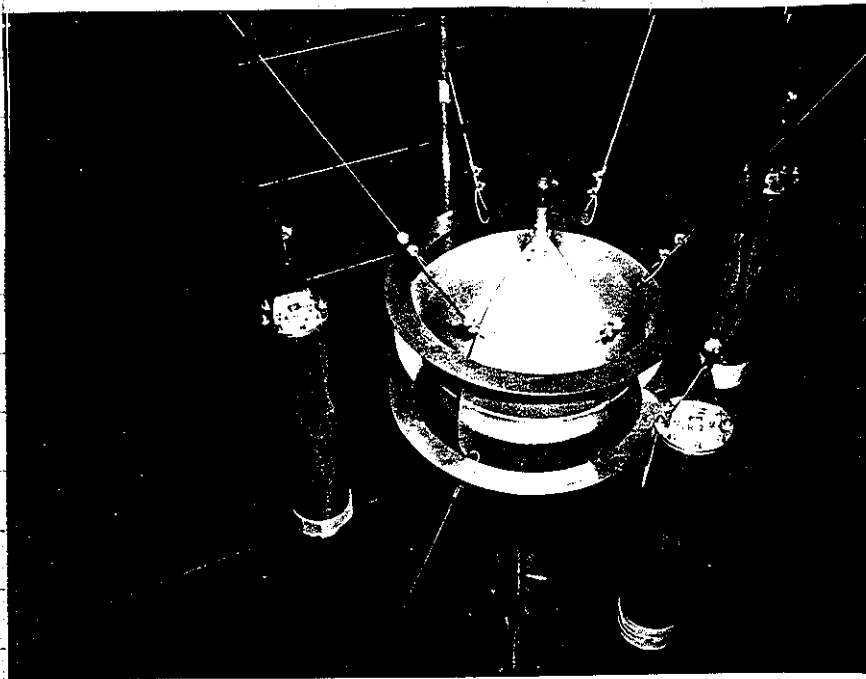
13.35 Solution ht = 56.75 cm Water ht = 106.50 cm

System just critical  
Drain

Stop

5-4-68 Water sample from Big Lidi. Reg # 684545  
sub for.

- 1 g<sup>4</sup>/<sub>7</sub>
- 2 Pyro 40.



6-18-68 17.303" inch sphere.

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	1.5"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1.0"	✓	"
"	"	Fast ✓	"	✓	"
P-1					
P-2					
PM-1	700V	Alarm ✓	cont	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

## START-UP CHECK LIST

Equipment checked by <sup>F.D.C.</sup> 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 1330

Start-up OK'd by F.D.C. AKK Date 6-18-68

17.303" stainless steel sphere.  
(.020" wall thickness)

Have 17.303" sphere mounted in "big kid."  
Vessel is supported by  $\frac{1}{8}$ " s-s cables. (See  
photo for page 64).

Purpose of this run is to check solution  
feed, drain and dump rates, and the  
amount of sticks in cables when vessel  
is full.

Solution zero = 65.70 cm

Seape making at zero = 20.00 cm.

" " when full = 19.90 cm.

Bottom of top spout = top of spl. suu = 109.7 cm.

Solution.

Water.

$\frac{1}{2}$ " Feed rate = 3.60 cm<sup>3</sup>/min.

Feed rate = 3.5 cm<sup>3</sup>/min

$\frac{1}{2}$ " Drain rate = 12.00 cm<sup>3</sup>/min.

3" Drain rate = 8.9 cm<sup>3</sup>/min

3" Dump rate = 60.00 cm<sup>3</sup>/min.

3" Dump rate = 9.0 cm<sup>3</sup>/min

14.45 Solution ht = 109.0 cm

System sub critical. (Bore).

Drain.

Sphere has 6.0" top reflector when H<sub>2</sub>O  
made ~~116.34~~ (101.1 cm = top of sphere)

INSTRUMENT CHECK

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

START-UP CHECK LIST

Equipment checked by F.O.C. / A.H.L. Personnel check by F.O.C.  
 Instruments and safeties checked and reset by A.H.L.  
 Source in checked by A.H.L. Source No. 19-93  
 Emergency equipment in control room checked by F.O.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by A.H.L. Time 0930  
 Start-up OK'd by F.O.C. / A.H.L. Date 6-19-68

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$$0.1 = 1.65 \text{ cm.}$$

$$\text{Solution ht} = 108.15 \text{ cm}$$

$$\text{Water ht} = 116.5 \text{ cm}$$

$$\text{Water Temp} = 20.1^\circ \text{C}$$

+Per

$$B = 74.97 \text{ m} = 12.34$$

$$= 18.9 \text{ ft/cm}$$

$$q_h = 41.8 \text{ cm}$$

$$\text{slope change} = \text{---} : 10 \text{ cm}$$

$$1105 \text{ Solution ht} = 107.50 \text{ cm}$$

$$\text{Water ht} = 116.5 \text{ cm}$$

System just critical.

$$c/h = 44.00 \text{ cm}$$

$$1116 \text{ Solution ht} = 109.70 \text{ cm}$$

$$\text{Water ht} = 102.8 \text{ cm}$$

System just critical  
Drain.

$$= 1.7 \text{ cm}$$

top reflector.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
"					
K-1	$3 \times 10^{-12}$	Meter ✓	1"	✓	$3 \times 10^{-12}$
"	"	Fest ✓	"	✓	"
K-2	"	Meter ✓	"	✓	"
"	"	Fest ✓	"	✓	"
P-1					
P-2					
PM-1	700V	Alarm ✓	best	✓	700V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	3"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No.   
 DUMP WELL PROSE LIGHT

START-UP CHECK LIST

Equipment checked by AKK; Personnel check by F.D.C.  
 Instruments and safeties checked and reset by AKK  
 Source in checked by AKK Source No. M-93  
 Emergency equipment in control room checked by F.D.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by AKK Time 0730  
 Start-up OK'd by F.D.C. AKK Date 6-20-68



Repeat of experiment shown on p-68

$$D_h = .70 \text{ cm}$$

$$\text{Solution ht} = 108.20 \text{ cm.}$$

$$\text{Water ht} = 116.50 \text{ cm}$$

+ Per

$$\text{Water temp } ^\circ\text{C} = 22.3$$

$$\begin{aligned} \epsilon &= 71.71 \text{ mm} = 12.74 \\ &= 18.13 \text{ f/cm} \end{aligned}$$

$$\text{Slope change} = .10 \text{ cm}$$

$$c/h = 41.80 \text{ cm}$$

$$10 \ 45 \ \text{Solution ht} = 107.50 \text{ cm}$$

$$\text{Water ht} = 116.50 \text{ cm}$$

System just critical.

~~XXX~~

$$c/h = 44.00 \text{ cm.}$$

$$10 \ 58 \ \text{Solution ht} = 109.70 \text{ cm}$$

$$\text{Water ht} = 102.80 \text{ cm}$$

System just critical

Drain.

Installed 2 thermocouples #3 & #4. in sphere.  
#4 - about midplane of vessel. and #3  
about 3 inches below top plate.

$$D_h = .60 \text{ cm}$$

$$\text{Solution ht} = 108.20 \text{ cm}$$

$$\text{Water ht} = 116.50 \text{ cm}$$

+ Per

sol Temp

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

$$\epsilon = 105.39 = 9.56$$

$$\#3 = 24.0^\circ$$

$$22.5^\circ$$

$$= 15.83 \text{ f/cm.}$$

$$\#4 = 24.0^\circ$$

$$\text{Slope change} = .10 \text{ cm.}$$

1528 Salutation ht = 107.60 cm

Water ht = 116.50 cm

System just critical

Drain: (The 2 thermocouples one with 2.74)

50cm

.3

100cm

80cm

U.

16.50 cm

°C

cm

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	1"	$3 \times 10^{-12}$
"	"	Ft ✓	"	"
K-2	"	Meter ✓	"	"
"	"	Ft ✓	"	"
R-1				
R-2				
PM-1	700V	Alarm ✓	cut	500V
PM-2	1200V	Low ✓	12"	900V
"	"	Alarm ✓	3"	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80
DUMP WELL PROB. LIGHT ✓				

## START-UP CHECK LIST

Equipment checked by AKM Personnel check by AKM

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-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 AKM Time 0800

Start-up OK'd by F.D.C. AKM Date 6-21-68



$\Delta L = 17.00 \text{ cm}$ 

Solution ht = ~~124.60~~ <sup>124.60</sup> cm      Water ht = 116.50 cm  
 3 + Per

$\bar{v} = 32.59 \text{ cm} = 21.64$       Sal Temp  $^{\circ}\text{C}$       Water Temp  $^{\circ}\text{C}$   
 $= .794/\text{cm}$       #3 = 23.2      22.6  $^{\circ}\text{C}$   
 #4 = 23.4      heave change = .10 cm

1040 Solution ht = ~~124.60~~ <sup>107.60</sup> cm      Water ht = 116.50 cm  
 %h = 41.90 cm  
 System just critical  
 Drain

1100 Sample taken from well:

6-24-68 Y-12 Req # 684546      X-10-A-631

G = 201.0 g

G = 210.5

T = 19.7

T = 19.2

H = 181.3

H = 191.3

ask for  $g/g = 448130$

ask for = 911.52

dry = 4.85 = 910.24 g%

$g/g = 0.447$

sp. gr. (ppr 40)

sp. gr. = 2.0392

sp. gr. density = 2.0312

density = 2.0361

Temp.  $^{\circ}\text{C}$  25  $^{\circ}\text{C}$

Temp.  $^{\circ}\text{C}$  = 20.6  $^{\circ}\text{C}$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K1	$3 \times 10^{-12}$	Water	1"	<input checked="" type="checkbox"/>	$3 \times 10^{-12}$
"	"	Foot	"	<input checked="" type="checkbox"/>	"
K2	"	Water	"	<input checked="" type="checkbox"/>	"
"	"	Foot	"	<input checked="" type="checkbox"/>	"
R-1					
FA1	700V	Alarm	Cont	<input checked="" type="checkbox"/>	500V
FA2	1200V	Low	12"	<input checked="" type="checkbox"/>	900V
"	"	Alarm	3"	<input checked="" type="checkbox"/>	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

BUMP 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-93

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

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

Red light on by AKK Time 0950

Start-up OK'd by F.D.C. AKK Date 6-28-68

*over*



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	$3 \times 10^{-12}$
"	"	Fast <input checked="" type="checkbox"/>	"	<input checked="" type="checkbox"/>	"
K-2	"	Meter <input checked="" type="checkbox"/>	1"	<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"/>	19"	<input checked="" type="checkbox"/>	900V
"	"	Alarm <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	"
LOG IN CALIBRATE <input checked="" type="checkbox"/>		OPERATE <input checked="" type="checkbox"/>		SOURCE No. <input checked="" type="checkbox"/>	
E JUMP WELL PROBE LIGHT <input checked="" type="checkbox"/>					

START-UP CHECK LIST

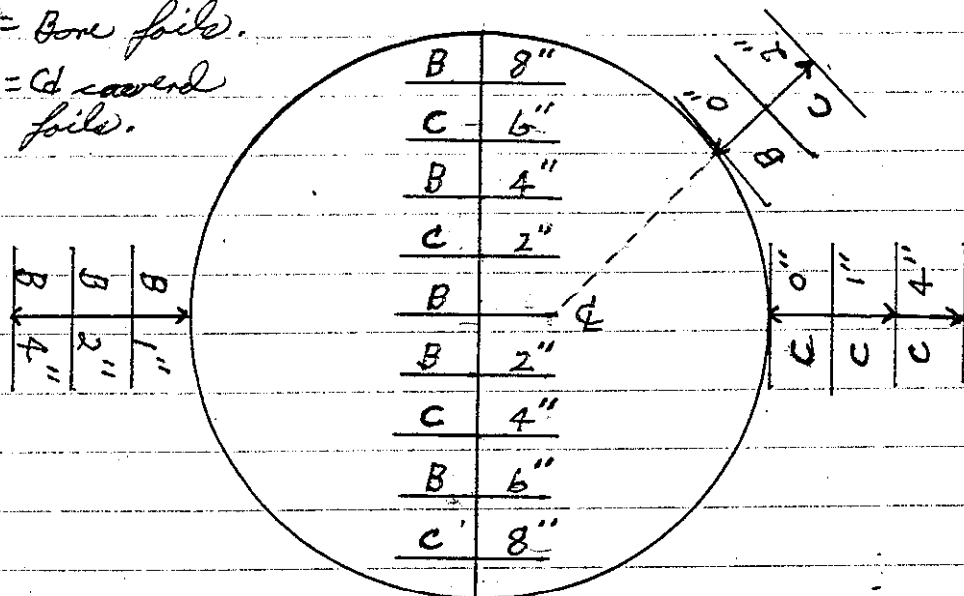
Equipment checked by F.I.D.C. AKM Personnel check by F.I.D.C.  
 Instruments and safeties checked and reset by AKM  
 Source in checked by AKM Source No. M-43  
 Emergency equipment in control room checked by F.I.D.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by AKM Time 0800  
 Start-up OK'd by F.I.D.C. AKM Date 6-27-68



Purpose of the following experiment is to expose  $O^{235}$  foils. Diagram below show position of foils inside vessel and outside about center. Foils are mounted on an .250" O.D., .028 wall thickness of tube. Have two foil attached to string for remote removal for exposure time.

B = Bare foils.

C = Cd covered foils.



Solution ht = 108.60 cm

Water ht = 116.60 cm

+ Per

Temp °C = 23.2 °C

$T = 141.24 \text{ sec} \approx 7.5 \text{ f}$

Scope Change = .01 cm

= 12.4 f/cm

0930 Solution ht = 108.0 cm  
system just critical

Water ht = 116.60 cm

$$K-1 = 45\% \ 10 \times 10^{-9}$$

$$K-2 = 25\% \ 10 \times 10^{-9}$$

$$\text{Log } N = 2.0$$

10.00 Removed fail #16 for effluent count rate.

10.30 Drain: Fuel rods only 150 m<sup>2</sup>/hr at  
contact in dump well, ~~start~~

0 cm

5

1 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	1"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	"	✓	"
K-2	"	Meter ✓	1"	✓	"
"	"	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-90
DUMP WELL FROSE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by ARKB Personnel check by F.D.C  
 Instruments and safeties checked and reset by ARKB  
 Source in checked by ARKB 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 ARKB Time 0805  
 Start-up OK'd by F.D.C ARKB Date 6-28-68



1355 Solution ht = 107.85 cm

Water ht = 116.50 cm

System just critical

Temp °C

Drain:

Temp °C

23.3 °C

#3 = 24.2 °C

#4 = 24.5 °C

Added 3 triangular pe to top of sphere. (see p 82)  
 pieces are adjacent to each other. Mass of 3 pe  
 = 530.5 gram. avg thickness = .0201 inches.

Solution ht = 124.00 cm

D<sub>2</sub> = 15.35 cm

Water ht = 116.70 cm

3 + Per

Temp °C

C = 277.06 sec = 4.24 Temp °C

23.9 °C

= .274/cm

#3 = 24.5 °C

shape change = .01 cm.

#4 = 24.6 °C

1556 Solution ht = 108.65 cm

Water ht = 116.70 cm

System just critical

Temp °C

Drain:

Temp °C

23.4 °C

#3 = 24.5 °C

#4 = 24.5 °C

7/1/68

INSTRUMENT CHECK

INSTRUMENT	RANGE	TYPE	TRIP	SET	START-UP RANGE
K-1	3x15 <sup>12</sup>	Meter	✓	1"	3x15 <sup>12</sup>
		Probe	✓		
K-2	3x15 <sup>12</sup>	Meter	✓	1"	3x15 <sup>12</sup>
		Probe	✓		
R-1					
R-2					
PM-1	500 <sup>v</sup>	Alarm	✓	Contact	500 <sup>v</sup>
PM-2	1200 <sup>v</sup>	Alarm	✓	14"	900 <sup>v</sup>
		Alarm	✓	3"	
LOG 'N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-8
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by EJ, IDC Personnel check by IDC

Instruments and safeties checked and reset by EJ

Source in checked by EJ Source No. 14-43

Emergency equipment in control room checked by IDC

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

Red light on by 850 IDC Time 850

Start-up OK'd by EJ IDC Date 7/1/68

Repeat of 1st run, p. 83: thermocouples in,  
3 sphere sections on top half, adjacent to  
each other.

10:45 WETW @ 116.9 cm  $T = 23.5^\circ\text{C}$  (#1 & 2)

11:10 Solution @ 115.3 cm  $\Delta h = 6.7\text{cm}$  #3:  $24.1^\circ\text{C}$   
T Period #4:  $24.2^\circ\text{C}$   
 $\sigma = 249.89\text{mm} = 4.64 = .694/\text{cm}$

11:20 Solution @ 108.6 cm. Critical.

Drain

As above, except the 3 sections are  
alternated with uncovered sections

14:10 WETW @ 116.7 cm

14:50 2/8	Temperatures	Water		Solution	
		TC #1	#3	#3	#4
		$\sqrt{3.5^\circ\text{C}}$	$24.7^\circ\text{C}$		
		#2 $\sqrt{3.5}$	#4 $\sqrt{4.3}$		

Solution Height: 125.35 cm Super critical

Period #1 71.68

108.4 Subcritical

108.95 Super

108.55 Sub

108.65 Critical

15:10

{Sag in sphere upon filling: 1mm}  
DRAIN-

86

7/2/68

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 <sup>-12</sup>	Meter ✓	1"	✓	3x10 <sup>-12</sup>
		Flt ✓		✓	
K-2	3x10 <sup>-12</sup>	Meter ✓	1"	✓	3x10 <sup>-12</sup>
		Flt ✓		✓	
R-1					
R-2					
PM-1	700V	Alarm ✓	Contact	✓	500 ✓
PM-2	1200V	Low ✓	14"	✓	900 ✓
		Alarm ✓	2"	✓	
LOG IN CALIBRATE ✓		OPERATE ✓		SOURCE No. 880	
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by IDC, DC 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-1, K-2, PM-1, PM-2

Red light on by IDC Time 1415

Start-up OK'd by EQ, IDC Date 7/2/68



Six additional ribs, each a half-circle, were spaced approximately midway between welded ribs. Thermocouples still in.

1510 WATW @ 116.5 am. #1 23.8 °C  
#2 23.8

1547 Solution @ 123.7 am. Subcritical #3 24.2  
#4 24.2  
Sag  $\approx$  0.1 cm when filled.  
veg. pair #1 T = 258.3 am  
= -5.9 °C

1604 Drain

\* Ribs are 2" wide x 0.0635 in. thick. I R is same as OR of Sphere. Cut to allow for top & bottom spouts, not for equatorial weld.

~~Installation 6 ribs as close as possible to existing ribs.~~

~~1245 WATW 116.4 am~~

~~#1 24.2 °C  
#2 24.6 °C~~

~~1325 Solution @ 124.3 am. Same cut. Slight  
veg. pair. #2 Same load in.  
Sag  $\approx$  0.1 cm.~~

~~#3 24.6  
#4 24.6~~

~~1345 Drain~~

~~Belongs on p. 85. Transcribed.~~

7/3/68

## INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	$70 \times 10^{-12}$	Meter ✓	3"	✓	
		✓		✓	
K-2	$3 \times 10^{-12}$	Meter ✓	4"	✓	
		✓			
R-1	—				
R-2	—				
PM-1	900V	Alarm ✓	contact	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
		Alarm ✓	2"	✓	
LOG IN CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

## START-UP CHECK LIST

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

Instruments and safeties checked and reset by D.C.

Source in checked by D.C. Source No. M-43

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

Instruments in trip circuit: K-1, K-2, PM1, PM2

Red light on by J.D.C. Time 08:15

Start-up OK'd by D.C. J.D.C. Date 7/3/68

Removed alternate additional ribs. Now have 3 left.

0910 Water @ 116.7 cm. #1 23.7 °C  
#2 23.7 °C

0935 Solution @ 116.0 cm.  $\Delta h = 7.4$  #3 24.1 °C  
#4 24.2 °C  
Gap  $\approx 0.1$  cm when filled.  
+ Point #1  $T = 228.1 \text{ gm} - 4.97 \text{ g} = .66 \text{ g/cm}$ .

0950 ~~Water~~ Solution @ 108.65 cm. Level  
Drain

Installed 6 ribs as close as possible to existing welded ribs.

1245 Water @ 116.6 cm #1 24.0 °C  
#2 24.1 °C

1325 Solution @ 124.3 cm. Subcritical. Source  
Lead in. Source out. #3 24.6 °C  
#4 24.6 °C  
Weg point #2  $763.5 \text{ gm} - 1.75 \text{ g}$   
Gap  $\approx 0.1$  cm

1345 Drain

Removed 3 alternate ribs. Have 3 left.

1515 Water @  $\Delta h = 15.55 \text{ cm}$  #1 24.0  
#2 24.2  
#3 25.0  
#4 25.1  
1548 #6 Solution @ 124.15 cm T Point #3 217.6 gm = 5.2 g  
= .33 g/cm.  
Gap  $\approx 0.1$  cm

1605 Solution @ 108.6 cm. Critical  
Drain

7/18/68

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Mater ✓ Fast ✓	2"	✓	$3 \times 10^{-12}$
K-2	$3 \times 10^{-12}$	Mater ✓ Fast ✓	1"	✓	$3 \times 10^{-12}$
B-1	—				
B-2	—				
PM-1	700V	Alarm ✓	Contact	✓	500V
PM-2	1200V	Low ✓ Alarm ✓	14" 3"	- ✓	900V

LOG N CALIBRATE  OPERATE \_\_\_\_\_ SOURCE No. B-60  
 DUMP WELL PROBE LIGHT \_\_\_\_\_

START-UP CHECK LIST

Equipment checked by 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  
 Reset time by IDC Time 0820  
 Start up time by CQ-IDC Date 7/18/68

Repeat of test vuv, p. 89.  
 Water @ 116.7 cm.  
 1043 Solution @ 109.6 cm.  $\Delta h = 1.3$   
 + Period  $\tau$   $E = 156.46 \text{ sec} = 6.94 = 5.34 / \text{cm}$

$\left\{ \begin{array}{l} \#1 \ 23.7 \\ \#2 \ 23.9 / 23.8 \\ \#3 \ 24.2 \\ \#4 \ 24.5 \end{array} \right.$

1100  $\delta y \approx 0.1 \text{ cm}$   
 Solution @ 108.3 cm. Critical.  
 Drain

Removed 3 remaining vibs. Sphere undecorated with thermocouples.

1335 Water at 116.6 cm.  $\delta h = 1.70 \text{ cm}$   
 $H_{2O} \begin{cases} \#1 & 24.2 \\ \#2 & 24.2 \end{cases}$

1408 Solution @ 108.55 cm.  
 + Period #2  $\tau = 104.30 \text{ sec}$   
 $= 9.6 \phi = 12.8 \phi / \text{cm}$   
 $\delta y \approx 0.1 \text{ cm}$   
 Soln  $\begin{cases} \#3 & 24.5 \\ \#4 & 24.7 \end{cases}$

1420 Solution @ 107.85 cm. Critical.  
 Drain Solution.

Thermocouples removed + tubing

1500 Solution @ 108.55 cm  $\delta h = .90 \text{ cm}$   
 + Period #3  $\begin{matrix} \#1 & 24.2 \\ \#2 & 24.2 \end{matrix}$   
 $\tau = 69.54 \text{ sec} = 13.0 \phi = 14.4 \phi / \text{cm}$

1507 Solution @ 107.6 cm. Critical.  
 Drain by screw insertion to test

Stopped  
 data history  
 12-16-68

1238

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	<input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	3X10 <sup>-12</sup>
"	"	<input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	"
K-2	"	<input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	"
"	"	<input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	"
PM-1	700 V	<input checked="" type="checkbox"/>	5"	<input checked="" type="checkbox"/>	500V
PM-2	1200 V	<input checked="" type="checkbox"/>	10"	<input checked="" type="checkbox"/>	900V
"	"	<input checked="" type="checkbox"/>	2"	<input checked="" type="checkbox"/>	"

LOG N CALIBRATE  OPERATE  SOURCE NO. B-80

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

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

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

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

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

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

Red light on by A.K.H. Time 1240

Start-up OK'd by F.D.C. A.K.H. Date 4/10/70

20.0" S.S. sphere (20 mil wall) 9.3  
Volume = 68.421 l

Solution zero = 62.00 cm.  
slope reading at zero solution ht = 6.0 cm.

Solution: Replenish water:

Leak rate = 73.5 - 76.5 = 3.0 cm/min      Feed rate = 3.8 cm/min  
1/2" drain rate = 112.8 - 102.5 = 10.3 cm/min  
3" drain rate = 9.4 cm/min  
3" dump rate = 9.8 cm/min

Have 20.0" S.S. sphere mounted in Big lid.  
Bottom of vessel ~ 31.5" from bottom  
of lid's floor. (to bottom of sphere.)

Log  $\eta = .055$

Solution ht = 113.1 cm      Slope = 6.1 cm  
1 - Per

$\tau = -365.06 \text{ sec} = -3.98 \text{ d}$

1410 Drain:

Repeat of above.

Log  $\eta = .042$

Solution ht = 130.2 cm      Slope = 6.1 cm  
2 - Per

NG

Solution ht = 150.0 cm      Slope = 6.1 cm  
3 - Per

NG

NG

1555 Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SEA RISE	SFT	START-UP RANGE
K-1	3X10 <sup>-12</sup>	—	3"	—	3X10 <sup>-12</sup>
"	"	—	1"	—	"
K-2	"	—	3"	—	"
"	"	—	1"	—	"
PM-1	7000	Alarm —	5"	—	5000
PM-2	12000	Low —	10"	—	9000
"	"	Alarm —	2"	—	"

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 F.D.C.

Instruments and safeties checked and reset by AKH

Source is checked by AKH Source No. M-93

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

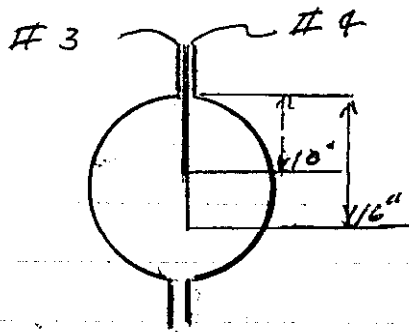
Instruments in ship circuits: K-1-2 PM-1-2

Sea light on by AKH Time 0905

Start-up OK'd by F.D.C. AKH Date 6-11-70

Repletter H<sub>2</sub>O sample:  
 Y-12 Ref # 684595  
 sub for  
 7/18  
 Repro 40





Installed 2 thermocouples #3 & #4  
as shown above, #3 ~ 10" from top  
and #4 ~ 16" from top.

$$\log \mu = .015$$

Solution ht = 115.20 cm

- Per

NG.

0.958 Drain:

Scp = 6.1 cm  
Sol Temp °C

#3 = 26.0 °C

#4 = 26.0 °C

Solution samples taken from vessel.

X-12 Reg # 684594

ask for

1.  $\rho$  g/cm<sup>3</sup>
2. density
3. Temp °C

#1

$\rho = 135.4$

T = 19.0

N = 116.4

X-10 A-640

ask for

1.  $\rho$  g/cm<sup>3</sup> 1.42855
2. density 2.0361
3. Temp °C  
= 913.27 °F

#1-A

$\rho = 140.4$

T = 19.3

N = 122.1

Over:

"20.0" S.S. sphere reflected"

"When  $H_2O = 103.90 \text{ cm}$ .  $H_2O$  even with top of sphere."

$$dh = 0.05 \text{ cm} \quad \text{slope} = 6.1 \text{ cm}$$

Solution ht = 96.20 cm    Water ht = 120.00 cm  
+ Per

$$C = 120.60 \text{ sec} = 8.54$$

1526 Solution ht = 96.15 cm  
System just critical

Temp °C

$$\left\{ \begin{array}{l} H_2O \quad 1 = 25.0^\circ C \\ \quad \quad 2 = 25.0^\circ C \\ \text{Solution } 3 = 26.0^\circ C \\ \quad \quad 4 = 25.7^\circ C \end{array} \right.$$

Repeat + Per.

$$dh = 0.15$$

Solution ht = 96.30 cm  
+ Per

Slope = 6.1

Water ht = 120.00 cm

$$C = 65.19 \text{ sec} = 13.64$$

1548 Solution ht = 96.15 cm  
System just critical  
Drain:

Temp: °C

$$\left\{ \begin{array}{l} H_2O \quad 1 = 25.0^\circ C \\ \quad \quad 2 = \text{"} \\ \text{Solution } 3 = 25.7^\circ C \\ \quad \quad 4 = 25.7^\circ C \end{array} \right.$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	✓	3"	✓	3 X 10 <sup>-12</sup>
"	"	✓	1"	✓	"
K-2	"	✓	3"	✓	"
"	"	✓	1"	✓	"
R-1					
R-2					
PAL 700 V		Alarm ✓	1.5"	✓	500 V
PAL 1250 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 <sup>F.I.C.</sup> AKV Personnel check by AKV

Instruments and safeties checked and reset by E.R.R. PTEV

Source in checked by AKV Source No. M-43

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

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

Red light on by AKV Time 0800

Start-up OK'd by F.I.C. AKV Date 6-12-70

Repeat of experiment described on p-96.

$\alpha = .15$       height = 6.1 cm  
 solution ht = 96.30 cm      Water ht = 120.00 cm  
 + Per  
 $t = 45.63 \text{ sec} = 17.4 \text{ ft} = 116.0 \text{ ft/cm}$   
 1000 solution ht = 96.15 cm  
 system just critical

Temp °C  
 $H_2O$  1 = 25.0°C  
 2 = 25.0°C

solution 3 = 25.7°C  
 4 = 25.7°C

Repeat of above:

$\alpha = .15$       height = 6.1 cm  
 solution ht = 96.30 cm      Water ht = 120.00 cm  
 + Per  
 $t = 41.3 \text{ sec} = 18.6 \text{ ft} = 124.0 \text{ ft/cm}$   
 1030 solution ht = 96.15 cm  
 system just critical

Temp °C  
 $H_2O$  1 = 25.0°C  
 2 = 25.0°C

solution 3 = 25.7°C  
 4 = 25.6°C

1106 Solution ht = 98.10 cm  
System just critical

Leq = 6.1  
Water ht = 89.20 cm

Solution and H<sub>2</sub>O heights  
or equal.

Temp °C

H<sub>2</sub>O 1 = 25.0 °C

2 = 25.0 °C

Solution 3 = 25.5 °C

4 = 25.5 °C

$\Delta h = 1.10$  cm

Solution ht = 98.20 cm  
3 + Per

Water ht = 89.20 cm

$\tau = 78.23 \text{ mm} = 11.94 = 119.0 \text{ f/cm}$

Water ht = 89.20 cm

1121 Solution ht = 98.10 cm  
System just critical

Temp °C

H<sub>2</sub>O 1 = 25.0 °C

2 = 25.0 °C

Solution 3 = 25.5 °C

4 = 25.1 °C

$\Delta h = 3.1$  cm

Solution ht = 98.10 cm

Water ht = 92.30 cm  
4 + Per.

$\tau = 115.17 \text{ mm} = 8.84 = 2.8 \text{ f/cm}$

1148 Solution ht = 98.10 cm

Water ht = 89.20 cm

System just critical  
Drain.

Temp °C

H<sub>2</sub>O

1 = 25.0 °C

2 = 25.0 °C

3 = 25.5 °C

Solution

4 = 25.1 °C

$$\Delta h = 10$$

Solution ht = 98.20 cm  
 Ther

h<sub>cap</sub> = 6.1  
 Water ht = 89.15

1300  $C = 52.15 \text{ sec} = 15.94 = 159.0 \text{ f/cm}$   
 Solution ht = 98.10 cm  
 System just critical.

Water ht = 89.20 cm

Temp °C

H<sub>2</sub>O 1 = 25.0 °C  
 2 = 25.0 °C

Solution 3 = 26.0 °C  
 4 = 25.7 °C

1330 } Solution ht = 112.80 cm  
 System just critical

Water ht = 39.60 cm

Reflected H<sub>2</sub>O 13.50 cm  
 below bottom of  
 shew.

Temp °C

H<sub>2</sub>O 1 = 25.0 °C  
 2 = 25.0 °C

Solution 3 = 26.0 °C  
 4 = 25.7 °C

$$d_s = .70 \text{ cm}$$

$$h_{\text{loop}} = 6.1 \text{ cm}$$

$$\text{Solution ht} = 109.30 \text{ cm}$$

$$\text{Water ht} = 53.10 \text{ cm}$$

6 + Per

$$C = 45.63 \text{ sec} = 17.4 \phi = 24.9 \text{ ft/cm}$$

Temp °C

$$1406 \text{ Solution ht} = 108.60 \text{ cm} \quad \text{Water ht} = 53.10 \text{ cm} \quad \text{H}_2\text{O} \quad 1 = 25.0^\circ\text{C}$$

$$2 = 25.0^\circ\text{C}$$

System just critical.

Solution

$$3 = 26.0^\circ\text{C}$$

$$4 = 26.0^\circ\text{C}$$

Reflector H<sub>2</sub>O even  
with bottom of ~~off~~ sphere.

Removed #3 & 4 thermocouple from sphere.

$$d_s = .30 \text{ cm}$$

$$\text{Solution ht} = 108.45 \text{ cm}$$

$$\text{Water ht} = 53.10 \text{ cm}$$

7 + Per

$$C = 117.34 \text{ sec} = 8.7 \phi = 29.0 \text{ ft/cm}$$

Temp °C

$$1455 \text{ Solution ht} = 108.15 \text{ cm} \quad \text{Water ht} = 53.10 \text{ cm} \quad \text{H}_2\text{O} \quad 1 = 25.0^\circ\text{C}$$

$$2 = 25.0^\circ\text{C}$$

System just critical

$$d_s = .15 \text{ cm}$$

$$\text{Solution ht} = 96.25 \text{ cm}$$

$$\text{Water ht} = 120.0 \text{ cm}$$

8 + Per

$$C = 36.94 \text{ sec} = 19.9 \text{ sec} \cdot 132.7 \phi / \text{cm}$$

$$h_{\text{loop}} = 6.1$$

$$1529 \text{ Solution ht} = 96.10 \text{ cm}$$

$$\text{Water ht} = 120.0 \text{ cm}$$

System just critical

Temp °C

$$\text{H}_2\text{O} = 1 = 25.0^\circ\text{C}$$

$$2 = 25.0^\circ\text{C}$$

Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE D. RANGE	SET	START-UP RANGE
K-13	3 X 10 <sup>-12</sup>	Meter ✓	3"	✓	3 X 10 <sup>-12</sup>
"	"	✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	✓	1"	✓	"
PA-1	700 V	Alarm ✓	5"	✓	500 V
PA-2	1200 V	Low ✓	12"	✓	900 V
"	"	Alarm ✓	2"	✓	"
LOG IN CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

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

Instruments and safeties checked and reset by A.T.M.

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

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

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

Red light on by A.T.M. Time 0825

Start-up OK'd by F.I.C., A.T.M. Date 6-15-70



Box run after lowering room temp.

$$\Delta h = .80$$

Solution ht = ~~112.80~~ cm  
+ Per.

Leq = 6.1 cm

$$C = 1781.86 \mu = 0.72 \phi = .90 \phi / \text{cm}$$

1000 Solution ht = 112.00 cm

Temp °C

System just critical

Solution  $T_3 = 22.8^\circ \text{C}$

1002 Drain to ~ 98.0 cm

$T_4 = 22.6^\circ \text{C}$

and removed thermometer from vessel.

$$\Delta h = 1.95 \text{ cm}$$

Solution ht = 112.85 cm

+ Per

$$C = 119.51 \mu = 8.6 \phi = 4.4 \phi / \text{cm}$$

1034 Solution ht = 110.90 cm

System just critical

Drain.

Repeat + Per. with solution ht ~ 25.29 cm  
in top spout.

$$\Delta h = 27.1 \text{ cm}$$

Solution ht = 138.00 cm

+ Per

$$C = 115.17 \mu = 8.8 \phi = .32 \phi / \text{cm}$$

1051 Solution ht = 110.90 cm

System just critical

Drain.

Replaced thermometer #3 & 4.

dia. = .10 cm

Solution ht. = 112.80 cm  
 # + per

liquid = 6.1 cm

$\bar{v} = 4,997.9 \text{ cc} = .26 \bar{v} = .37 \bar{v}/\text{cm}$

1445 Solution ht. = 112.10 cm

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

System just critical

#3 = 23.0  $^{\circ}\text{C}$

Crain.

4 = 23.0  $^{\circ}\text{C}$

~~START-UP CHECK LIST~~

INSTRUMENT	TYPE	UNIT	SOURCE RANGE	EFF	START-UP RANGE
KI 3X10 <sup>-12</sup>		mm	3"	✓	3X10 <sup>-12</sup>
"		mm	1"	✓	"
KI "		mm	3"	✓	"
"		mm	1"	✓	"
RAI					
RAI					
RAI 7000	Alarm	✓	5"	✓	5000
RAI 12005	Low	✓	10"	✓	9000
"	Alarm	✓	2"	✓	"
LOG IN CALIBRATE	✓	OPERATE	✓	SOURCE No.	B-80
DUMP VENT PROBE LIGHT	✓				

START-UP CHECK LIST

Equipment checked by E.P.C. / A.K.W. Personnel check by Z.P.C.

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

Source in checked by A.K.W. Source No. N<sub>2</sub>-93

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

Instruments in trip circuit: K-1-2 / D-1-1-2

Red light on by A.K.W. Time 1915

Start-up OK'd by E.P.C. / A.K.W. Date 6-16-70

1500  $\log \eta = .02$   
 Solution  $\Delta t = 132.00 \text{ cm}$   
 System sub critical  
 Drain

Temp:  
 Solution Temp  $^{\circ}\text{C}$   
 #3 = 26.2  $^{\circ}\text{C}$   
 #4 = 26.2  $^{\circ}\text{C}$

INSTRUMENT CHECK

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

LOG N CALIBRATE  OPERATE  SOURCE No. B-86  
 DUMP WELL PROBE LIGHT

19

## START-UP CHECK LIST

Equipment checked by F.P.C. Personnel check by F.P.C.  
 Instruments and safeties checked and reset by R.M.  
 Source in checked by R.M. Source No. M-93  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by R.M. Time 1315  
 Start-up OK'd by F.P.C. R.M. Date 6-17-70

added 10 l  $H_2O$  to  $\approx 85.0$  l of solution  
 $CO_2$   $F_2$  (4.89%). Prepare to change concentration  
 in order to make  $20.0$ " sphere critical when  
 full, and reflected.

1400 Solution ht = 97.05 cm       $h_{\text{refl}} = 6.0$   
 Water ht = 120.20 cm  
 System just critical  
 Temp:  $^{\circ}C$   
 $H_2O$  1 = 24.7  $^{\circ}C$   
           2 = 24.7  $^{\circ}C$   
 Solution 3 = 26.5  $^{\circ}C$   
           4 = 26.0  $^{\circ}C$

added 5 l  $H_2O$ . Total added = 15 l

over!

1555 Solution ht = 98.40 cm  
 System just critical  
 Drain

Leop - 6.1 cm  
 Water ht = 120.20 cm

Temp °C  
 H<sub>2</sub>O 1 = 24.7°  
 2 = 24.7°  
 isolation 3 = 28.0°  
 4 = 27.0°

**INSTRUMENT CHECK**

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	STP	START-UP RANGE
K1	3X10 <sup>-12</sup>	Meter ✓	3"	✓	3X10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	Fast ✓	1"	✓	"
PM-1	700V	Alarm ✓	5"	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	1"	✓	"
BY HANDS		✓	OPERATE	✓	SOURCE No. B-80
BURNING LIGHT		✓			

## START-UP CHECK LIST

Equipment checked by A.M.V. Personnel check by F.P.C.Instruments and safeties checked and reset by A.M.V.Source in checked by A.M.V. Source No. M-43Emergency equipment in control room checked by F.P.C.Instruments in trip circuit: N-1-2 / M-1-2Red light on by A.M.V. Time 0901Start-up OK'd by F.P.C. A.M.V. Date 6-18-70

Repeat of last experiment: see pp 107-108.

$x = 1.10 \text{ cm}$  slope =  $6.0 \text{ cm}$   
 Solution lit =  $99.10 \text{ cm}$  Water lit =  $120.0 \text{ cm}$   
 + Peri:

$$G = 67.36 \text{ rev} = 13.3 \text{ f} = 133.00 \text{ f/cm}$$

0921 Solution lit =  $99.00 \text{ cm}$  Water lit =  $120.0 \text{ cm}$

system just critical  
 Crisis.

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

$\text{H}_2\text{O} = 1 = 25.0^{\circ}\text{C}$   
 2 = "

Solution 3 =  $25.7^{\circ}\text{C}$   
 4 =  $25.7^{\circ}\text{C}$

added 4 l of  $\text{H}_2\text{O}$ . Total of 19 l

and:

$\Delta h = 1.30$        $h_{eq} = 6.0 \text{ cm}$

Solution ht = 100.20 cm      Water ht = 120.00 cm

<sup>2</sup> + Per

$$C = 56.50 \text{ mm} = 15.1 \phi = 50.3 \phi / \text{cm}$$

1052 Solution ht = 99.90 cm      Water ht = 120.0 cm

system just critical

Drain

Temp °C

$$H_2O 1 = 25.0^\circ \text{C}$$

$$2 = 25.0^\circ \text{C}$$

$$\text{Solution } 3 = 27.5^\circ \text{C}$$

$$4 = 26.6^\circ \text{C}$$

added 9 L  $H_2O$ . Total added = 23 L

$$\Delta h = 1.15 \text{ cm} \quad h_{eq} = 6.0 \text{ cm}$$

Solution ht = 101.15 cm      Water ht = 120.0 cm

<sup>3</sup> + Per

$$C = 45.63 \text{ mm} = 17.9 \phi = 15.1 \phi / \text{cm}$$

<sup>13</sup> / ~~15~~.30 Solution ht = 100.00      Water ht 120.0 cm

system just critical

Drain

Temp °C

$$H_2O 1 = 25.1^\circ \text{C}$$

$$2 = 25.1^\circ \text{C}$$

$$\text{Solution } 3 = 27.7^\circ \text{C}$$

$$4 = 27.7^\circ \text{C}$$

added 9 L  $H_2O$ . Total added = 27 L



$\Delta l = .05$

Leape =

Solution ht = 102.50 cm  
 3 + Per

Water ht = 120.0 cm

$E = 43.46 \text{ sec} = 18.0 \text{ f} = 360.0 \text{ f/cm}$

1410 Solution ht = 102.45 cm

Water ht = 120.0 cm

System just critical  
 Drain.

Temp °C

H<sub>2</sub>O 1 = 25.1 °C

2 = 25.1 °C

Solution 3 = 28.0 °C

4 = 27.0 °C

Removed thermocouple #3 & 4.

$\Delta l = .05$

Solution ht = ~~102.50 cm~~ 102.60 cm

Water ht = 120.0 cm

5 + Per

$E = 28.25 \text{ sec} = 23.5 \text{ f/cm} = 470.0 \text{ f/cm}$

1500 Solution ht = 102.55 cm

Water ht = 120.0 cm

System just critical  
 Drain.

Added 4 l H<sub>2</sub>O. Total added = 31 l

$\Delta l = .10 \text{ cm}$

Solution ht = 104.30 cm

Water ht = 120.0 cm

6 + Per

$E = 47.81 = 16.9 \text{ f} = 169.0 \text{ f/cm}$

Solution ht = 104.20 cm  
 System just critical: Drain.

Water ht = 120.0 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	REF	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Motor ✓	3"	✓	3 X 10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2	"	Motor ✓	3"	✓	"
"	"	Fast ✓	1"	✓	"

PM-1	700V	Alarm ✓	1.5"	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	1"	✓	"

LOG IN CALIBRATE  OPERATE  SOURCE No. **B-80**

DUMP WELL PROBE LIGHT

START-UP CHECK LIST

Equipment checked by <sup>E.D.C</sup> AKC Personnel check by AKC

Instruments and safeties checked and reset by AKC

Source in checked by AKC Source No. M-93

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

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

Red light on by AKC Time 0820

Start-up OK'd by E.D.C. AKC Date 6-19-70

Repeat of last experiment; see p. 111.

$$z_h = .20 \text{ cm} \quad h_{\text{cap}} = 6.1 \text{ cm}$$

$$\text{Solution ht} = 104.70 \text{ cm} \quad \text{Water ht} = 120.00 \text{ cm}$$

+ per

$$C = 91.27 \text{ sec} = 10.6 \phi = 53.0 \phi/\text{cm}$$

0950 Solution ht = 104.50 cm      Water ht = 120.00 cm

System just critical

Drain.

Temp °C

$$H_2O \quad 1 = 25.00$$

$$2 = 25.00$$

$$\text{Solution } 3 = 25.70$$

$$4 = 25.70$$

added 4L H<sub>2</sub>O, total added = 35L

$$z_h = .50$$

$$h_{\text{cap}} = 6.1 \text{ cm}$$

$$\text{Solution ht} = 106.80 \text{ cm} \quad \text{Water ht} = 120.00 \text{ cm}$$

+ per

$$C = 41.29 \text{ sec} = 18.6 \phi = 37.2 \phi/\text{cm}$$

1116 Solution ht = 106.30 cm      Water ht = 120.00 cm

System just critical

Drain.

Temp °C

$$H_2O \quad 1 = 25.10$$

$$2 = 25.10$$

$$\text{Solution } 3 = 27.20$$

$$4 = 27.00$$

again!

added 2 l  $H_2O$ . Total added = 37 l.

$dx = 1.00 \text{ cm}$  slope = 6.1 cm

Solution ht = 109.40 cm Water ht = 120.0 cm  
<sup>3</sup> + per

$\tau = 58.67 \text{ sec} = 14.67 = 14.67 \text{ sec}$

1339 Solution ht = 108.40 cm - Water ht = 120.0 cm

System just critical

Drain.

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

$H_2O$  1 = 25.2  $^{\circ}\text{C}$   
 2 = 25.2  $^{\circ}\text{C}$

Solution 3 = 27.5  $^{\circ}\text{C}$   
 4 = 27.2  $^{\circ}\text{C}$

added 2 l  $H_2O$ . Total added = 39 l.

$dx = 17.85 \text{ cm}$  slope = 6.1 cm

Solution ht = 128.05 cm Water ht = 120.0 cm  
<sup>4</sup> + per  
 $= 15.24 \text{ cm in top space.}$

$\tau = 113.00 \text{ sec} = 9.08 = 9.08 \text{ sec}$

1438 Solution ht = 110.20 cm Water ht = 120.0 cm

System just critical

Drain.

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

$H_2O$  = 1 = 25.2  $^{\circ}\text{C}$   
 2 = 25.2  $^{\circ}\text{C}$

Solution 3 = 27.7  $^{\circ}\text{C}$   
 4 = 26.6  $^{\circ}\text{C}$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	Meter ✓	5"	✓	3X10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	Fast ✓	5"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	5"	✓	500V
PM-2	1200V	Lcv ✓	12"	✓	900V
"	"	Alarm ✓	2"	✓	"
LOG N GALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
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 A.T.M.  
 Source in checked by A.T.M. 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 A.T.M. Time 0830  
 Start-up OK'd by F.I.D.C. A.T.M. Date 6-22-70

$d_2 = 17.15 \text{ cm}$   $h_{\text{eq}} = 6.1 \text{ cm}$   
 Solution ht = 128.00 cm. Water ht = 120.0 cm  
 + Per

$$C = 180.36 \mu\text{e} = 6.14 = .36 \text{ f/cm}$$

10.00 Solution ht = 110.85 cm Water ht = 120.0 cm

System just critical  
 Drain  $\sim 3.0 \text{ cm}$ .

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

H<sub>2</sub>O 1 = 25.1  $^{\circ}\text{C}$

2 = 25.1  $^{\circ}\text{C}$

Solution 3 = 25.5  $^{\circ}\text{C}$

4 = 25.5  $^{\circ}\text{C}$

$d_2 = 2.8 \text{ cm}$   
 Solution ht = 113.60 cm Water ht = 120.0 cm  
 + Per

$$C = 178.19 \mu\text{e} = 6.24 = 2.2 \text{ f/cm}$$

10.43 Solution ht = 110.80 cm Water ht = 120.0 cm

System just critical  
 Drain  $\sim 10.0 \text{ cm}$ .

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

H<sub>2</sub>O 1 = 25.1  $^{\circ}\text{C}$

2 = 25.1  $^{\circ}\text{C}$

Solution 3 = 25.5  $^{\circ}\text{C}$

4 = 25.5  $^{\circ}\text{C}$

Remained thermocouples: 3, + 4

$\Delta h = 17.80 \text{ cm}$   $h_{\text{sol}} = 6.1 \text{ cm}$   
 Solution ht = 128.00 cm Water ht = 120.0 cm  
 3 + Re

$C = 56.50 \text{ cm} = 15.14 = .85 \text{ f/cm}$  Temp  $^{\circ}\text{C}$   
 $T_1 = 25.1^{\circ}$   
 $T_2 = 25.1^{\circ}$

1107 Solution ht = 110.20 cm Water ht = 120.0 cm  
 System just critical  
 Drain.

Sample taken from vessel:

Y-12 Reg # 684596	X-10 - A-642
sub for.	sub for
1. $\rho$ = 0.372800 $\rho_{\text{avg}} = 0.37300$	1. $\rho$ = 0.3739
2. $\rho_{\text{sp}} = 40$	2. density = 1.7374
3. $\rho_{\text{sp}}$	3. $\rho_{\text{sp}} = 1.7402$ @ $24^{\circ}\text{C}$
4. density & $\rho_{\text{sp}}$ $\rho_{\text{sp}} = 1.7336 @ 25^{\circ}\text{C}$ $\rho_{\text{sp}} = 1.7364 @ 26^{\circ}\text{C}$	4. Temp. = 21.0 $^{\circ}\text{C}$
5. Temp. 647.40 f 4/2 $\rho_{\text{avg}} = 648.5$ 649.6 f 4/2	
#2	#2-A
G = 194.4g	G = 173.7
T = 19.1	T = 19.1
N = 175.3g	N = 154.6g

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	15"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	Fast ✓	15"	✓	"
R-1	"				
PM-1	700V	Alarm ✓	5"	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	2"	✓	"
LOS IN CALIBRATE		✓	OPERATE	✓	SOURCE NO. <u>B-80</u>
DUMP WELL FREEZE LIGHT _____					

START-UP CHECK LIST

Equipment checked by E.P.C. Personnel check by E.P.C.  
 Instruments and safeties checked and reset by A.T.H.  
 Source in checked by A.T.H. Source No. M-93  
 Emergency equipment in control room checked by E.P.C.  
 Instruments in trip circuit: K-1-2 PM-1-2  
 Red light on by A.T.H. Time 1400  
 Start-up OK'd by E.P.C., A.T.H. Date 7-23-70



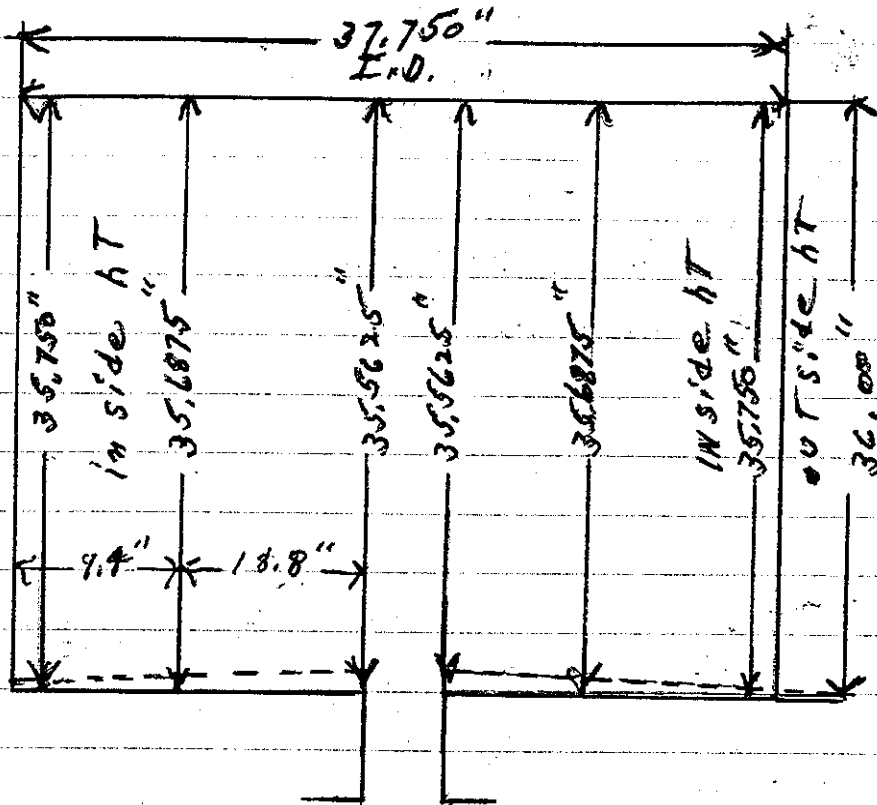
37.750" I.D. X ~~35.750~~<sup>35.750</sup>" h.T.

119

AL Tank.

assemble in big kiln.

UG(5) F2 solution



al tank is mounted 11.125" up from big side floor.

al tank:

Wall thickness = .250"

bottom " = .250"

3" sd 40 pipe center point:

solution zero = 12.30m on scale

H<sub>2</sub>O zero = 0.00m

on back scale over (outside bottom of tank)

Solution

$\frac{1}{2}$ " feed rate = 1.2 cm/min  
 $\frac{1}{2}$ " drain = 2.9 cm/min  
 3" dump = 34.8 cm/min

H<sub>2</sub>O

1.5" feed rate = 9.9 cm/min  
 3" drain rate = 10.5 cm/min  
 3" dump rate = 10.7 cm/min

Solution ht = 20.7 cm

System sub critical

Drain

Water ht = 90.8 cm

Temp H<sub>2</sub>O  
= 25.0 °C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 12 <sup>-12"</sup>	Meter ✓	2"	✓	3 x 10 <sup>-12"</sup>
		Fast ✓	1"	✓	"
K-2	3 x 12 <sup>-12"</sup>	Meter ✓	3"	✓	"
		Fast ✓	1"	✓	"
P-1	—				
P-2	—				
PA-1	7000 V	Alarm ✓	1/2"	✓	5000
PA-2	12000 V	Low ✓	12"	✓	9000
		Alarm ✓	2"	✓	"
LOG-N-CALIBRATE	—	OPERATE ✓	SOURCE No.	B-80	
CHAMP W/LL PRESS LIGHT	—	✓			

900 min  
0.500 min  
700 min

70.500

1.00

START-UP CHECK LIST

Equipment checked by <sup>E.O.T.</sup> BKL Personnel check by BKL

Instruments and safeties checked and reset by E.O.T.

Source in checked by BKL Source No. M-43

Emergency equipment in control room checked by BKL

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

Red light on by Eg Time 1320

Start-up OK'd by RKR, Eg Date 2/27/70

1512 Solution ht = 29.90 cm Water ht = 39.60 cm  
 System sub critical  
 Drain

**INSTRUMENT CHECK**

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	STARTUP RANGE
K1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	1"	✓	"
K2	"	Meter ✓	3"	✓	"
"	"	Fast ✓	1"	✓	"
R-1					
R-2					
PIA-1	700 V	Alarm ✓	5"	✓	500 V
PM-2	1200 V	Low ✓	14"	✓	900 V
"	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by F.P.C. ATK Personnel check by F.P.C.

Instruments and safeties checked and reset by ATK

Source in checked by ATK Source No. 14-93

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

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

Red light on by ATK Time 1215

Start-up OK'd by F.P.C. ATK Date 7-28-70

$\Delta L = .05 \text{ cm}$

Solution ht = 33.60 cm Water ht = 41.70 cm

24 hr

$\sigma = 147.76 \text{ sec} = 7.2 \text{ f} = 144.0 \text{ f/cm}$

1340 Solution ht = 33.55 cm Water ht = 41.70

System just critical

Drain:  $\Delta L = 21.25 \text{ cm} = 8.37 \text{ ''}$

$\Delta L = 41.06 \text{ cm} = 16.16 \text{ ''}$

Temp °C

H<sub>2</sub>O = 26.0 °C

Solution = 27.0 °C

$\Delta L = 2.10 \text{ cm}$

Solution ht = 33.60 cm Water ht = 29.10 cm

24 hr

$\sigma = 425.91 \text{ sec} = 2.8 \text{ f} = 1.3 \text{ f/cm}$

1440 Solution ht = 33.60 cm Water ht = 22.00 cm

System just critical

Drain:  $\Delta L = 21.30 \text{ cm} = 8.39 \text{ ''}$

Temp °C = 27.3 °C

H<sub>2</sub>O = 26.0 °C

Solution = 27.2 °C

over

$$d_2 = .05 \text{ cm}$$

Solution ht = 33.40 cm

Water ht = 90.90 cm

3  
+ Per

$$C = 93.44 \text{ cm} = 10.4 \text{ f} = 208.0 \text{ f/cm}$$

15.27 Solution ht = 33.35 cm

Water ht = 90.90 cm

System just critical

Temp °C = 35.53"

Drain

$$d_1 = 21.05 \text{ cm}$$

$$= 8.29"$$

$$H_2O = 26.0^\circ \text{C}$$

$$\text{Solution} = 27.2^\circ \text{C}$$

$$d_2 = .05 \text{ cm}$$

Solution ht = 33.60 cm

Water ht = 37.20 cm

4  
+ Per

$$C = 78.23 \text{ cm} = 11.9 \text{ f} = 238.0 \text{ f/cm}$$

15.50 Solution ht = 33.55 cm

Water ht = 37.20 cm

System just critical

$$d_1 = 36.56 \text{ cm}$$

$$= 14.39"$$

Drain

$$d_1 = 21.25 \text{ cm}$$

$$= 8.37"$$

Temp °C

$$H_2O = 26.0^\circ \text{C}$$

$$\text{Solution} = 27.2^\circ \text{C}$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
K-2	"	Fast ✓	1"	✓	"
PM-1	500V	Alarm ✓	.5"	✓	500V
PM-2	1200V	Low ✓	14"	✓	900V
PM-2	"	Alarm ✓	2"	✓	"

LOG CALIBRATE  OPERATE  SOURCE No. B-90

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

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

Instruments and safeties checked and reset by R.M.V.

Source in checked by R.M.V. Source No. 14-43

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

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

Red-light on by R.M.V. Time 0805

Start-up OK'd by F.I.C. R.M.V. Date 7-29-70

$$\Delta h = .05 \text{ cm}$$

Solution ht = 33.40 cm

Water ht = 90.90 cm

1 + Per

$$E = 95.61 \text{ cm} = 10.34 = 206.0 \text{ f/cm}$$

1021 Solution ht = 33.35 cm

Water ht = 90.90 cm

System just critical

Drain

$$\Delta h = 21.05 \text{ cm} \\ = 8.29 \text{ cm}$$

$$\Delta h = 90.20 \text{ cm} \\ = 35.50 \text{ cm}$$

Temp °C

H<sub>2</sub>O = 26.1 °C

Solution = 26.8 °C

$$\Delta h = 3.8 \text{ cm}$$

Solution ht = 33.60 cm

Water ht = 25.80 cm

2 + Per

$$E = 143.42 \text{ cm} = 7.44 = 19.4 \text{ f/cm}$$

1054 Solution ht = 33.60 cm

Water ht = 22.00 cm

System just critical

Drain

$$\Delta h = 21.30 \text{ cm} \\ = 8.39 \text{ cm}$$

$$\Delta h = 21.36 \text{ cm} \\ = 8.41 \text{ cm}$$

Temp °C

H<sub>2</sub>O = 26.1 °C

Solution = 26.5 °C

1220 Removed thermocouple from solution vessel:

$$\Delta h = .05 \text{ cm}$$

Solution ht = 33.40 cm

Water ht = 90.90 cm

3 + Per

$$E = 58.67 \text{ cm} = 14.64 = 292.0 \text{ f/cm}$$



1355 Solution ht = 33.35 cm  
 system just critical  
 Drain:

Water ht = 90.90 cm

Temp °C  
 H<sub>2</sub>O = 20.1 °C

33.65 cm  
~~33.60 cm~~  
 4 hr

r<sub>L</sub> = 4.50 cm  
 Water ht = 27.30 cm

c = 330.3 cc = 3.64 = .8 % cm

Solution ht = 33.65 cm  
 system just critical  
 Drain: 4h = 21.35 cm  
 = 8.40"

Water ht = 22.80 cm

4h = 22.16

Temp °C  
 H<sub>2</sub>O =

Solution sample taken from well:

Y-12 Reg # 684597  
 sub for.

X-10 Reg # A-643  
 sub for

1 - g/g = .447473

1 - g/g = .4467 = 906.24 ✓

2 - density = 5.06

2 - density = 2.0288 892

3 - density

3 - sp. gr. = 2.0333

4 - sp. gr. = 2.0258 ✓

4 - Temp. = 21.5 °C  
 8-21-70

5 - Temp. = 25 °C  
 = 906.49 g/g

avg = 906.36

G = 193.95 g

C = 207.8 g

T = 20.2

T = 20.0

N = 173.75 g

N = 187.8 g

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	F-ct ✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
"	"	F-ct ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	15"	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	2"	✓	"

LOG N CALIBRATE  OPERATE  SOURCE No. B-80

DUMP-WELL-PROBE-LIGHT

START-UP CHECK LIST

Equipment checked by F.D.C. P.K.V. Personnel check by F.D.C.

Instruments and safeties checked and reset by P.K.V.

Source in checked by P.K.V. 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 P.K.V. Time 1405

Start-up OK'd by F.D.C. P.K.V. Date ~~8-10-70~~  
8-10-70

Solution

$$\frac{1}{2}'' \text{ Feed rate} = 5.0 \text{ cm/min}$$

$$\frac{1}{2}'' \text{ Drain rate} = 15.0 \text{ cm/min}$$

$$3'' \text{ Dump rate} = 41.0 \text{ cm/10 sec}$$

Water

$$1.5'' \text{ Feed rate} = 2.3 \text{ cm/min}$$

$$3'' \text{ Drain rate} = 7.8 \text{ cm/min}$$

$$3'' \text{ Dump rate} = 7.8 \text{ cm/min}$$

$$\text{Solution zero} = 6.8 \text{ cm}$$

Water zero = 0.0 cm (this is outside bottom of vessel.) on back scale.

Water zero = "23.40 cm on side scale." (This is outside bottom of vessel)

H<sub>2</sub>O and corresponds to solution zero = ~~24.7~~ cm  
(bottom plate is 0.5 in. thick)

$$1.27 \text{ cm}$$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET SET	STARTUP RANGE
K13 X 10 <sup>-12</sup>		None	3"		3 X 10 <sup>-12</sup>
"		1"	1"		"
"		3"	3"		"
"		1"	1"		"
#11 700 V		Arm	5"		500 V
#11 1200 V		Low	14"		900 V
"		Alarm	2"		"

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

START-UP CHECK LIST

Equipment checked by <sup>F.P.C.</sup> A.K.V. Personnel check by B.K.V.  
 Instruments and safeties checked and reset by A.K.V.  
 Source in checked by A.K.V. Source No. M-93  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1-2 M-1-2  
 Red light on by A.K.V. Time 0815  
 Start-up OK'd by F.P.C. A.K.V. Date 8-11-70

1007  $H_2O = 234.60 \text{ cm}$ ; when adding added solution, system  
 "screw" by  $K-1. = 3 \times 10^{-11}$  fracture screw.

$\Delta L = .55 \text{ cm}$   
 Solution ht = 136.15 cm Water ht = 234.60 cm  
 + Per c/h = 129.35 cm c/h = 211.20 cm  
 = 50.92" = 87.15"  
 $\bar{v} = 71.71 \text{ sec} = 12.7\% = 23.1\%/\text{cm}$   
 = 32.23"  $H_2O$  on sides.

1209 Solution ht =  $\pm 135.60 \text{ cm}$  Water ht = 234.60 cm  
 System just critical  
 Drain: c/h = 128.90 cm c/h = 211.20 cm  
 = 50.71" = 80.15"  
 Temp = 32.42"  $H_2O$  on sides.  
 from same reference plate in  $H_2O = 26.5^\circ$   
 as solution height Solution = 26.2°

Repeat of above:

$\Delta L = .50 \text{ cm}$   
 Solution ht = 136.10 cm Water ht = 234.60 cm  
 2 Per c/h = 129.30 cm c/h = 211.20 cm  
 = 50.9 cm  
 $\bar{v} = 73.88 \text{ sec} = 12.9\% = 24.8\%/\text{cm}$

1329 Solution ht =  $\pm 135.60 \text{ cm}$  Water ht = 234.60 cm  
 System just critical  
 Drain: c/h = 128.70 cm c/h = 211.20 cm  
 Temp °  
 $H_2O = 26.3^\circ$   
 Solution = 26.6°

over.

1416 Solution ht =  $\pm 136.50 \text{ cm}$   
 System just critical:  
 $q_h = 129.70 \text{ cm}$   
 $= 51.06''$

Water ht =  $154.30 \text{ cm}$   
 $q_h = 130.90 \text{ cm} = 129.2 \text{ cm}$   
 $= 51.53''$   
 $\Delta h = 15.30 \text{ cm}$

Solution ht =  $136.50 \text{ cm}$   
 $q_h = 129.70 \text{ cm}$

Water ht =  $169.60 \text{ cm}$   
 $q_h = 146.20$   
 $\text{+ Per } C = 69.54 \text{ sec}$   
 $= 13.04 = .854/\text{cm}$

1428 Solution ht =  $\pm 136.50 \text{ cm}$   
 System just critical  
 Drain  $q_h = 129.70 \text{ cm}$   
 $= 51.06''$

Water ht =  $154.30 \text{ cm}$   
 $q_h = 130.90 = 129.2 \text{ cm}$   
 $= 51.53''$   
 Temp  $^{\circ}\text{C}$

$H_2^{\circ} = 26.3^{\circ}\text{C}$   
 Solution =  $26.5^{\circ}\text{C}$

Solution ht =  $136.50 \text{ cm}$   $\Delta h = .70 \text{ cm}$   
 ~~$136.40 \text{ cm}$~~   
 $\text{+ Per } q_h = 129.70 \text{ cm}$   
 $= 51.06''$

Water ht =  $169.60 \text{ cm}$   
 $q_h = 146.20 \text{ cm}$   
 $= 57.56''$   
 $= 144.9 \text{ cm}$

$C = 63.02 \text{ sec} = 13.94 = 79.94/\text{cm}$

$\frac{1503}{1503}$  Solution ht =  $\pm 135.80 \text{ cm}$   
 System just critical  
 Drain  $q_h = 129.00 \text{ cm}$   
 $= 50.79''$

Water ht =  $169.60 \text{ cm}$   
 $q_h = 146.20 \text{ cm}$   
 $= 57.56''$

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

$H_2^{\circ} = 26.2^{\circ}\text{C}$   
 Solution =  $26.3^{\circ}\text{C}$

Repeat of above; p 133



INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fast ✓	1"	✓	"
K-2	$3 \times 10^{-12}$	Meter ✓	3"	✓	"
"	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	5"	✓	500V
PM-2	1200V	Low ✓	12"	✓	900V
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by E.D.C. BTK Personnel check by R.K.R.B. E.D.C.

Instruments and safeties checked and reset by BTK

Source in checked by BTK 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 BTK Time 0910

Start-up CK'd by E.D.C. BTK Date 8-12-70



sh = .55 cm

Solution ht = 136.25 cm  
+ Pen  
4h = 129.40  
= 50.94"

Water ht = 169.60 cm  
4h = 146.20 cm  
= 57.56"  
= 144.9 cm

$\epsilon = 80.40 \text{ sec} = 11.7 \text{ f} = 21.3 \text{ f/cm}$

1110 Solution ht = 135.70 cm

Water ht = 169.60 cm  
4h = 146.20 cm  
= 57.56"

System just critical,  
Drain: 4h = 128.90 cm  
= 50.75"

Temp °C = 26.0 °C  
H<sub>2</sub>O = ~~75.0 °C~~  
Solution = 26.0 °C

Sample taken from well:  
#1 K-25-Y

Y-12 Reg # 684598

X-10 A-644

G = 202.9 g

G = 181.7 g

T = 20.9 g

T = 20.0 g

N = 182.0 g

N = 161.7 g

sub for

sub for

1 - g<sup>2</sup>/g = .447113

1 - g<sup>2</sup>/g = 0.447

2 - dry = 5.07

2 - sp. gr. = 2.0350

3 - sp. gr. = 2.0267

3 - density = 2.0311

4 - density

4 - Temp °C = 19 °C

5 - Temp °C = 25 °C

= 907.92 g<sup>2</sup>/l

= 906.29 g<sup>2</sup>/l

avg 927.0

avg:

$\Delta h = .55 \text{ cm}$ 

Solution  $h_0 = 136.25 \text{ cm}$   
 $q/h = 129.45 \text{ cm}$   
 $= 50.96''$

Water  $h_0 = 169.60 \text{ cm}$   
 $q/h = 146.20 \text{ cm}$   
 $= 57.56''$

$C = 71.71 \text{ sec} = 12.7 \text{ f} = 23.1 \text{ f/cm}$

12.55 Solution  $h_0 = 135.70 \text{ cm}$

Water  $h_0 = 169.60 \text{ cm}$

System just critical

$q/h = 146.20 \text{ cm}$   
 $= 57.56''$

Drain  $q/h = 128.90 \text{ cm}$   
 $= 50.75''$

Temp  $^{\circ}\text{C} = 144.9 \text{ cm}$

$\text{H}_2\text{O} = 26.0^{\circ}\text{C}$

Solution =  $26.1^{\circ}\text{C}$

13.11 Solution  $h_0 = 136.45 \text{ cm}$

Water  $h_0 = 154.10 \text{ cm}$

System just critical

$q/h = 130.70 \text{ cm}$   
 $= 51.46''$

Drain  $q/h = 129.65 \text{ cm}$   
 $= 51.04''$

Temp  $^{\circ}\text{C} = 129.4 \text{ cm}$

$\text{H}_2\text{O} = 26.0^{\circ}\text{C}$

Solution =  $26.1^{\circ}\text{C}$

 $\Delta h = .45 \text{ cm}$ 

Solution  $h_0 = 136.90 \text{ cm}$   
 $q/h = 130.10 \text{ cm}$   
 $= 51.22''$

Water  $h_0 = 154.10 \text{ cm}$

$q/h = 130.70 \text{ cm}$   
 $= 51.46''$

$C = 112.99 \text{ sec} = 9.0 \text{ f} = 20.0 \text{ f/cm}$

$= 129.4 \text{ cm}$

1339. Solution  $h_0 = 136.45 \text{ cm}$

Water  $h_0 = 154.10 \text{ cm}$

System just critical

$q/h = 130.70 \text{ cm}$   
 $= 51.46''$

Drain  $q/h = 129.65 \text{ cm}$   
 $= 51.04''$

1900 Removed thermocouples from solution vessel,

$dh = .50 \text{ cm}$

Solution ht = 135.85 cm      Water ht = 169.60 cm  
 $q/h = 129.05 \text{ cm} \quad \text{or } h = 146.20 \text{ cm}$   
 $= 50.81'' \quad \quad \quad = 57.76''$   
 $\tau = 73.88 \text{ sec} = 12.9 \text{ } \phi = 29.8 \text{ } H/\text{cm}$       Temp  $^{\circ}\text{C} = 144.9 \text{ } \text{cm}$   
 $H_2O = 26.0^{\circ}\text{C}$

~~Water ht =~~  $\pm$   
 1442 Solution ht = 135.35 cm      Water ht = 169.60 cm  
 System just critical       $q/h = 146.20 \text{ cm}$   
 Drain:  $q/h = 128.55 \text{ cm} \checkmark$        $= 57.57$   
 $= 50.63''$        $= 144.9 \text{ } \text{cm}$

$dh = .40 \text{ cm}$

Solution ht = 135.40 cm      Water ht = 234.80 cm  
 $q/h = 128.00 \text{ cm} \quad \quad \quad = 211.40 \text{ cm}$   
 $= 50.63'' \quad \quad \quad = 83.23''$   
 $\tau = 108.65 \text{ sec} = 9.3 \text{ } \phi = 23.2 \text{ } H/\text{cm}$       Temp  $^{\circ}\text{C} = 10.1 \text{ } \text{cm}$   
 $H_2O = 26.0^{\circ}\text{C}$

1523 Solution ht =  $\pm$  135.00 cm      Water ht = 234.80 cm  
 System just critical       $211.40 \text{ cm}$   
 Drain:  $q/h = 128.20 \text{ cm} \checkmark$        $83.23''$   
 $= 50.47''$        $= 10.1 \text{ } \text{cm}$

**INSTRUMENT CHECK**

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE	
K-1	3010	-12	Motor	✓	3"	3010-12
"	"	"	F-1	✓	1.5"	"
K-2			Motor			
R-1						
R-2						
PM-1	900V		Alarm	✓	1.0"	500V
PM-2	1200V		Low	✓	18.0"	900V
"	"		Alarm	✓	1.5"	"

LOG N CALIBRATE  OPERATE  SOURCE No.

DUMP WELL PROBE LIGHT

**START-UP CHECK LIST**

Equipment checked by P.C. R. Kelly Personnel check by B.K.L.

Instruments and safeties checked and reset by B.K.L.

Source in-checked by B.K.L. Source No. M-93

Emergency equipment in control room checked by B.K.L.

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

Red light on by P.C. R. Kelly Time 0800

Start-up OK'd by P.C. R. Kelly Date 8-13-70

K. 25  $\bar{e}$  Y.

Purpose of the following experiment is to see the effect of double support rings added 3 - .250"  $\bar{e}$  split rings to lower section of Y.

$\Delta L = .91 \text{ cm}$

Solution ht = 135.60 cm  
+ Per c/h = 128.80 cm  
= 50.71"

Water ht = 234.50 cm  
c/h = 211.10 cm  
= 83.11"  
= 205.8 cm

$t = 82.57 \text{ sec} = 11.4 \text{ s} = 28.5 \text{ ft/cm}$

0948 Solution ht = 135.20 cm

Water ht = 234.50 cm

System just critical  
Drain: c/h = 128.40 cm  
= 50.55"

c/h = 211.10 cm  
= 83.11"  
Temp  $^{\circ}\text{C}$   
H<sub>2</sub>O = 26.2  $^{\circ}\text{C}$

Drain solution to ~ 118.00 cm: Inserted thermocouple  $\bar{e}$  3 +  $\bar{e}$ , and recorded temp. Then removed them.

Solution Temp = 26.0  $^{\circ}\text{C}$

$\Delta L = .60 \text{ cm}$

Solution ht = 135.70 cm  
+ Per c/h = 128.90 cm  
= 50.75"

Water ht = 234.50 cm  
c/h = 211.10 cm  
= 83.11"  
= 205.8 cm

$t = 56.50 \text{ sec} = 15.1 \text{ s} = 25.2 \text{ ft/cm}$

1042 Solution ht = 135.10 cm

Water ht = 234.50 cm

System just critical  
Drain: c/h = 128.30 cm  
= 50.51"

c/h = 211.10 cm  
= 83.11"

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	1	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
P-1	700V	Alarm ✓	5"	✓	500V
P-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	1"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by IAC Personnel check by IAC  
 Instruments and safeties checked and reset by AKM  
 Source in checked by AKM Source No. M-43  
 Emergency equipment in control room checked by IAC  
 Instruments in trip circuit: K-1 P-1-1-2  
 Red light on by AKM Time 0940  
 Start-up OK'd by IAC AKM Date 8-18-70

No thermocouples in vessel:

$d_2 = .35 \text{ cm}$   
Solution ht = 135.60 cm; Water ht = 169.60 cm  
1 + Per

$\tau = 112.99 \text{ sec} = 9.0 \phi = 25.74 / \text{cm}$

1104 Solution ht = 135.25 cm; Water ht = 169.60 cm  
System just critical  
Chain  $q_L = 128.45 \text{ W}$   
 $= 50.51 \text{ W}$   
Temp  $^{\circ} = 57.56 \text{ }^{\circ}$   
 $H_2O = 25.9 \text{ }^{\circ}$   
 $q_L = 146.20 \text{ W}$

$d_2 = .55 \text{ cm}$   
Solution ht = 136.45 cm; Water ht = 154.10 cm  
2 + Per

$\tau = 91.27 \text{ sec} = 10.6 \phi = 19.3 \phi / \text{cm}$  Temp  $^{\circ}$   
 $H_2O = 25.9 \text{ }^{\circ}$

$q_L = 129.10 \text{ W}$   
 $q_L = 50.20 \text{ W}$   
1128 Solution ht = 135.90 cm; Water ht = 153.90 cm  
System just critical  
Chain  $H_2O$ : Installed thermocouples #3, 4, 5  
read;  $q_L = 135.50 \text{ W}$   
 $= 51.38 \text{ W}$   
 $= 128.4 \text{ W}$   
 $= 129.2 \text{ W}$

Solution Temp  $^{\circ} = 25.5 \text{ }^{\circ}$

1190 Drain solution;

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
"	"	Fst ✓	1"	✓	"
K-2		Meter			
		Fst			
K-1					
K-2					
M-1	700V	Alarm	1.5"	✓	500V
M-2	1200V	Low	14"	✓	900V
"	"	Alarm	2"	✓	"

LOG N. CALIBRATE  OPERATE  SOURCE No. B-80

DUMP WELL PROSE LIGHT

START-UP CHECK LIST

Equipment checked by <sup>I.D.C.</sup> AKA Personnel check by F.P.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 I.D.C.

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

Red light on by AKA Time 1305

Start-up OK'd by I.D.C. AKA Date 8-17-70



Drain the  $\approx 906$  g/l from manifold end  
 added  $\approx 130$  l of  $\approx 648.0$  g/l solution.

1442 Solution ht = 136.50 cm      Water ht = 173.5 cm  
 System sub critical  
 Lag  $\eta = .0011$       Temp  $^{\circ}$

H<sub>2</sub>O = 25.7  $^{\circ}$ C

Solution = 25.7  $^{\circ}$ C

1455 Solution ht = 136.50 cm      Water ht = 220.0 cm  
 System sub critical  
 Lag  $\eta = .0011$   
 Drain.

**INSTRUMENT CHECK**

INSTRUMENT	RANGE	UNIT	SCALE RANGE	SET	SCALE RANGE
K-1	3X10 <sup>-12</sup>	✓	3"	✓	3X10 <sup>-12</sup>
"	1	✓	1"	✓	"
K-2		Alarm			
		Alarm			
S-1					
PM-1	700V	Alarm ✓	15"	✓	500V
PM-2	1200V	Low ✓	19"	✓	900V
"		Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE		✓
DUMP WELL PROBE LIGHT		✓	SOURCE No.		B-80

**START-UP CHECK LIST**

Equipment checked by F.I.C. Personnel check by R.K.H.  
 Instruments and safeties checked and reset by R.K.H.  
 Source in checked by R.K.H. Source No. M-93  
 Emergency equipment in control room checked by F.I.C.  
 Instruments in trip circuit: R-1-2 PM-1-2  
 Red light on by R.K.H. Time 0945  
 Start-up OK'd by F.I.C. R.K.H. Date 8-18-70



146

INSTRUMENT CHECK

8/19/70

INSTRUMENT	RANGE	TRIP	SOURCE SPENTANCE	SET	START-UP RANGE
	3x10 <sup>12</sup>	Meter ✓	3"	✓	3x10 <sup>10</sup>
		Fast ✓	1"	✓	"
		Meter			
		Fast			
PA 1	700V	Alarm ✓	5"	✓	500V
PA 7	1200V	Low ✓	15'	✓	900V
		Alarm ✓	3'	✓	"
LOG IN CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROBE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by E.B.T. Personnel check by D.C.  
A.T.O.  
 Instruments and safeties checked and reset by R.M.C.  
 Source in checked by R.K.M. Source No. M-43  
 Emergency equipment in control room checked by R.K.M.  
 Instruments in trip circuit: K-1-P19-1-2  
 Red light on by E.B.T. Time 1450  
8-19-70  
 Start-up OK'd by E.B.T. R.K.M. Date 8-19-70

added ~125 l of ~906 g/l to manifold.

1540 Solution ht = 129.90 cm.      Water ht = 169.60 cm  
System sub critical  
Drain.

added ~25 l of ~906 g/l to manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	STARTUP RANGE
K1	3X10 <sup>-12</sup>		3"	C	3X10 <sup>-12</sup>
"	"		1"	-	"
K		Meter			
		Fast			
R-1					
	700V	Alarm	5"	-	500V
	1200V	Low	12"	-	900V
	"	Alarm	2"	-	"
LOG-N-CALIBRATE		<input checked="" type="checkbox"/>	OPERATE	<input checked="" type="checkbox"/>	SOURCE No. <u>B-80</u>
DUMP WELL PROBE LIGHT		<input checked="" type="checkbox"/>			

START-UP CHECK LIST

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

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

Source in checked by A.K.H. Source No. M-43

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

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

Red light on by A.K.H. Time 0700

Start-up OK'd by F.P.C. A.K.H. Date 8-20-70

sl = 1.50 cm

Solution ht = 136.70 cm      Water ht = 169.70 cm  
 + Per

$E = 82.56 \text{ cm} = 11.4 \text{ f} = 22.9 \text{ f/cm}$

1036 Solution ht =  $\pm$  136.20 cm      Water ht = 169.70 cm

System just critical       $q_h = 146.30 \text{ cm} = 57.60''$

Drain:  $q_h = 129.40 = 50.95''$

Temp °C

H<sub>2</sub>O = 26.1

Solution = 27.3

1110 added ~ 25L of ~ 774.0g gl to manifold.

sl = 1.50 cm

Solution ht = 139.50 cm      Water ht = 169.70 cm  
 + Per

$E = 102.13 \text{ cm} = 9.7 \text{ f} = 19.9 \text{ f/cm}$

1320 Solution ht = 139.00 cm      Water ht = 169.70

System just critical:

Drain:

Temp °C

H<sub>2</sub>O = 26.1 °C

Solution = 27.0 °C

over

1424 Solution Temp  $^{\circ}\text{C} = 26.5^{\circ}$   
 Removed thermocouple #3 & 4 from  
 solution.

dr = 50 cm

Solution ht = 138.65 cm      Water ht = 234.90 cm  
 3 + Pes = 211.50 cm

$$E = 91.27 \text{ cm} = 10.7 \phi = 21.2 \phi / \text{cm}$$

1443 Solution ht =  $\pm 138.15 \text{ cm}$       Water ht = 234.90 cm  
 System just critical 211.50  
 $\phi / h = 131.35 \text{ cm}$  ~~215.8~~  
 $= 51.71''$  210.7

1506 Solution ht =  $\pm 138.40 \text{ cm}$       Water ht = 171.90 cm  
 System just critical 148.50 cm  
 $\phi / h = 131.60$  ~~145.8~~  
147.4

1522 Solution ht = 139.00 cm      Water ht = 156.70 cm  
 System just critical 133.30  
 Drain  $\text{H}_2\text{O}$ .  $\phi / h = 132.20 \text{ cm}$  = 132.0 cm

1544 Installed thermocouples #3 & 4 in vessel:  
 Solution ht = 139.00 cm.  
 Temp  $^{\circ}\text{C} = 26.2^{\circ}$



Selection sample taken from seed:  
#3 H-25-Y.

Y-12 Reg II

X-10 Reg II

684600

8-28-70

plene  
949 = 1,441,513

646

A-646

49 = 2,0017

A-1052

obs for.

obs for:

1-g<sup>2</sup>/g = 1,441,513'

= 883.8992

1-g<sup>2</sup>/g = 0.441

0.441

2-sp. gr. = 2.0017'

avg = 884.992

2-sp. gr. = ~~1.441~~  
2.0094

2.0094

3-density

3 density = 2.006t

4-temp °C

4 Temp °C = 20.0°

= 886.1942

#3

#3-A

G = 205.4 g

G = 213.2 g

T = 20.1 g

T = 20.4 g

N = 185.3 g

N = 192.8 g

4.90cm

5.0cm

4.90cm

5.50

5.8cm

5.7

1.90cm

8.50cm

5.8

5.7

6.70cm

33.3°

1.0cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
3	$10^{-12}$	Meter ✓	3"	-	$3 \times 10^{-12}$
"	"	Fuse ✓	1"	-	"
X 9		Meter			
		Fuse			
PA-1	7005	Alarm ✓	5"	-	5005
PA-2	12005	Low ✓	10"	-	9005
		Alarm ✓	2"	-	"
LOG N. CALIBRATE ✓		OPERATE ✓		SOURCE No. B-80	
DUMP WELL PROSE LIGHT ✓					

START-UP CHECK LIST

Equipment checked by <sup>F.I.C.</sup> RAIL Personnel check by RAIL

Instruments and safeties checked and reset by RAIL

Source in checked by RAIL Source No. 04-93

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

Instruments in trip circuit: K-1-104-1-2

Red light on by RAIL Time 1330

Start-up OK'd by F.I.C., RAIL Date 8-21-70

K-25 al Y.

added ~ 25 l of ~ 77% g/l to manifold.

1495 solution temp °C = 26.0°C; Removed thermocouples # 3 & 4 from vessel.

0.2 = .55  
solution ht = 139.75 cm    Water ht = 234.80 cm  
+ Per ~~2.10~~  
~ 10.0

$5 = 95.61 \text{ cm} = 10.24 = 18.54 / \text{cm}.$

1516 solution ht = 139.20 cm    Water ht = 234.70 cm

System just critical  $2/H = 132.40 \text{ cm}$   
 $= 52.18"$

Chain. to ~ 128.0 cm. Installed thermocouples # 3 & 4 in vessel.

Temp °C

H<sub>2</sub>O = 26.1°C

solution = 26.5°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	Meter ✓	3"	✓	3X10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
PM-1	700V	Alarm ✓	5"		500V
PM-2	1200V	Low ✓	14"	✓	900V
"	"	Alarm ✓	2"	✓	"
LOG-N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PRGSE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by F.I.O.C. Personnel check by F.I.O.C.  
 Instruments and safeties checked and reset by A.K.H.  
 Source in checked by A.K.H. Source No. M-93  
 Emergency equipment in control room checked by F.I.P.C.  
 Instruments in trip circuit: H-1 PM-1-2  
 Red light on by A.K.H. Time 0815  
 Start-up OK'd by F.I.O.C., A.K.H. Date 8-29-70

Repeat of last experiment;

1000 Solution Temp  $^{\circ}\text{C} = 25.3^{\circ}\text{C}$ . Removed thermocouple #3 & 4 from vessel.

$d_1 = .65\text{ cm}$   
Solution ht = 139.55 cm Water ht = 234.90 cm.

+ Per

$$C = 76.05 \mu = 12.2 f = 18.8 f/\text{cm}$$

1027 Solution ht  $\pm 138.90\text{ cm}$  Water ht = 234.90 cm

System just critical ✓

$$d_1 = 132.10\text{ cm} \\ = 52.01''$$

$$\text{Temp } ^{\circ}\text{C} = 211.50 \\ = 213.5$$

$$\text{H}_2\text{O} = 26.0^{\circ}\text{C}$$

$$d_1 = .60\text{ cm}$$

Solution ht = 139.80 cm Water ht = 172.20 cm

+ Per

$$C = 97.78 \mu = 10.1 f = 16.8 f/\text{cm}$$

1053 Solution ht  $\pm 139.20\text{ cm}$  Water ht = 172.20 cm

System just critical ✓

$$d_1 = 132.40\text{ cm} \\ = 52.13''$$

$$\text{Temp } ^{\circ}\text{C} = 149.80 \\ = 147.5\text{ cm}$$

$$\text{H}_2\text{O} = 26.0^{\circ}\text{C}$$

Water  
aver.

$$p_h = 1.5 \text{ cm}$$

Solution ht = 140.50 cm      Water ht = 157.50 cm  
 + Per

$$b = 123.86 \text{ cm} = 8.3 \text{ ft} = 5.5 \text{ ft/cm}$$

1117 Solution ht = 139.00 cm      Water ht = 157.50 cm  
 System just critical       $h_c = 132.20 \text{ cm}$        $132.10 \text{ cm}$   
 Drain  $H_2O$       = 52.05"      = 132.8

Temp °C

$$H_2O = 26.0^\circ \text{C}$$

1138 Installed Thermocouple #3 & 4 in sand  
 Solution Temp °C = 25.8°

Sample taken: #4

V-12 Reg # 684601

orb for:

$$1. \text{ g/g} = 439267\% \quad 439269$$

2. Density

$$49.19912 \quad = 874.7842$$

$$3. \text{ Sp. gr.} = 1.9912$$

4. Temp °C

$$5. \text{ assay} = 5.06$$

$$C = 182.7 \text{ g}$$

$$T = 20.0 \text{ g}$$

$$N = 162.7 \text{ g}$$

X-10 Reg # A-697

orb for:

$$A-2053$$

$$1. \text{ g/g} = .440$$

$$2. \text{ Sp. gr.} = 1.9998$$

$$3. \text{ Density} = 1.9958$$

$$\text{avg} = 871.20 \text{ g/g} \quad 4. \text{ Temp } 20.0^\circ \text{C}$$

$$= 879.7842$$

$$C = 183.2 \text{ g}$$

$$T = 19.6 \text{ g}$$

$$N = 163.6 \text{ g}$$

1530 added 12 L of H<sub>2</sub>O to system.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter ✓	3"	✓	$3 \times 10^{-12}$
	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700V	Alarm ✓	.5"	✓	500V
PM-2	1200V	Low ✓	1.2"	✓	900V
	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. <u>D-80</u>
DUMP WELL PROBE LIGHT		✓			

500m  
10 L  
8  
-647  
2053  
0  
98  
58  
00  
7842

K-25 al Y

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 A.K.M.  
 Source in checked by A.K.M. Source No. M-43  
 Emergency equipment in control room checked by F.I.D.C.  
 Instruments in trip circuit: K-1-1 ME-1-2  
 Red light on by A.K.M. Time 0810  
 Start-up OK'd by F.I.D.C. A.K.M. Date 8-25-70

$d_1 = 1.3 \text{ cm}$   
 Solution ht = 151.30 cm      Water ht = 234.60 cm  
 + Per  
 $C = 91.27 \text{ cm} = 10.6 \text{ d} = 8.14 \text{ cm}$   
 1025 Solution ht = 150.00 cm      Water ht = 234.60 cm  
 System just critical  
 Drain:  $C/L = 143.20 \text{ cm}$   
 Temp °C  
 $H_2O = 26.0^\circ \text{C}$   
 Solution = 25.6 °C  
 Replaced thermocouples # 3 & 7 from vessel  
 $d_2 = 1.95 \text{ cm}$   
 Solution ht = 150.40 cm      Water ht = 234.60 cm  
 + Per.  
 $C = 58.67 \text{ cm} = 14.7 \text{ d} = 7.5$   
 1107 Solution ht = 148.45 cm      Water ht = 234.60 cm  
 System just critical  
 Drain  $C/L = 141.65$   
 $= 55.77''$   
 Temp  $C = 21.20 \text{ cm}$   
 $20.15 \text{ cm}$   
 $20.90 \text{ cm}$   
 $H_2O = 26.0^\circ \text{C}$



$\Delta h = 1.6 \text{ cm}$

Solution ht = 150.30 cm. Water ht = 182.20 cm  
3 + Per

$G = 73.88 \text{ cm} = 12.4 = 7.7\% / \text{cm}$

1137 Solution ht = 148.70 cm Water ht = 182.20 cm  
system just critical,  $q_l = 158.80 \text{ cm}$   
 $q_l = 141.90$  Temp  $^{\circ}\text{C} = 157.5 \text{ cm}$   
 $H_2O = 26.0^{\circ}\text{C}$

$\Delta h = 2.3 \text{ cm}$

Solution ht = 151.85 cm Water ht = 167.60 cm  
4 + Per

$G = 65.54 \text{ cm} = 13.6\% = 5.9\% / \text{cm}$   
 $q_l = 142.75 \text{ cm}$

1211 Solution ht = 149.55 cm Water ht = 167.90 cm  
system just critical  $q_l = 144.50 \text{ cm}$   
Invis: metal thermocouple # 3 & 4  
revel.

1220 Solution Temp  $^{\circ}\text{C} = 25.7^{\circ}\text{C}$

1300 Solution sample taken # 5

Y-12 Reg # 684602 X-10 Reg # A-648  
alt for 528.70 plates alt for A-2054

1 -  $g/g = 1.925639$   $g/g = 1.925637$  1 -  $g/g = 0.926$   
2 -  $sp. g. = 1.9336$   $sp. g. = 1.9336$  2 -  $sp. g. = 1.9427$   
3. Density  $= 823.019\%$  3. Density  $1.9392$

4. Temp  $^{\circ}\text{C}$  4. Temp  $^{\circ}\text{C} = 20.0$   
 $avg = 825.39\%$   $= 827.69\%$

G = 182.5 g G = 187.9 g  
T = 20.0 g T = 20.1 g  
N = 162.5 g N = 167.8 g

234.60 cm  
4.600  
9.600  
60 cm  
20 cm  
5.52  
29.09  
0 C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	$3 \times 10^{-12}$	Meter <input checked="" type="checkbox"/>	3"	<input checked="" type="checkbox"/>	$3 \times 10^{-12}$
"	"	Fast <input checked="" type="checkbox"/>	1"	<input checked="" type="checkbox"/>	"
K-2		Meter <input type="checkbox"/>			
		Fast <input type="checkbox"/>			
K-3					
PM-1	700V	Alarm <input checked="" type="checkbox"/>	5"	<input checked="" type="checkbox"/>	5000
PM-2	1200V	Low <input checked="" type="checkbox"/>	14"	<input checked="" type="checkbox"/>	9000
"	"	Alarm <input checked="" type="checkbox"/>	2"	<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 checked="" type="checkbox"/>					

START-UP CHECK LIST

Equipment checked by F.P.C. Personnel check by R.K.R.  
 Instruments and safeties checked and reset by R.K.R.  
 Source in checked by R.K.R. Source No. M-93  
 Emergency equipment in control room checked by F.P.C.  
 Instruments in trip circuit: K-1 PM-1-2  
 Red light on by R.K.R. Time 0758  
 Start-up OK'd by F.P.C. R.K.R. Date 8-26-70

added 2 l of  $H_2O$  to system:

Thermocouples #3 & 9 in head.

Solution ht = 156.35 cm  <sup>$\Delta h = 2.35$</sup>  Water ht = 234.80 cm

+ Per

$$t = 89.09 \mu = 10.8 = 4.6 \text{ f/cm}$$

1122 Solution ht = 154.00 cm Water ht = 234.80 cm

System just critical

Drain  $q_h = 147.20 \text{ cm}$   
 $= 57.95''$

Temp  $^{\circ}C$

$H_2O = 26.0^{\circ}C$

Solution =  $26.0^{\circ}C$

1215 added 2 l of  $H_2O$  to system:

Solution ht = 165.00 cm  <sup>$\Delta h = 4.6 \text{ cm}$</sup>  Water ht = 234.80 cm

+ Per

$$108.65 \mu = 9.3 \text{ f} = 2.02 \text{ f/cm}$$

1416 Solution ht = 160.40 cm Water ht = 234.80 cm

System just critical

Drain  $q_h = 153.60 \text{ cm}$   
 $= 60.47''$

1422 added 2 l of  $H_2O$  to system.

1613 Solution ht = 194.20 cm Water ht = 234.80 cm

System just critical

Drain  $q_h = 187.40 \text{ cm}$  Temp  $^{\circ}C$  27.5  
 $= 73.78''$

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 <sup>-12</sup>	Meter ✓	3"	✓	3 X 10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM 1	700 V	Alarm	.5"	✓	500 V
PM 2	1200 V	Low ✓	14"	✓	900 V
"	"	Alarm ✓	2"	✓	"
LOG N CALIBRATE		✓	OPERATE	✓	SOURCE No. B-80
DUMP WELL PROBE LIGHT		✓			

START-UP CHECK LIST

Equipment checked by <sup>F.D.C.</sup> A.K.M. Personnel check by F.D.C.

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

Source in checked by A.K.M. 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 A.K.M. Time 0820

Start-up OK'd by F.D.C. A.K.M. Date 8-27-70

START-UP RANGE

X10<sup>-12</sup>

"

"

"

"

"

"

"

005

005

005

005

005

005

Solution Temp ° = 25.7°C Removed  
thermocouples #3 & 4 from vessel:

$\Delta d = 6.1 \text{ cm}$

Solution ht = 168.15 cm Water ht = 234.80 cm  
+ Per

$C = 95.61 \text{ cm} = 10.2 \text{ ft} = 1.7 \text{ ft/cm}$

10.25 Solution ht = 162.05 cm Water ht = 234.80 cm  
System just critical

$CF = 155.25 \text{ cm}$   
 $= 61.12''$

$CF = 211.40 \text{ cm}$   
Temp ° = 10.11  
H<sub>2</sub>O = 26.0°C

$\Delta d = 3.65$

Solution ht = 165.80 cm Water ht = ~~196.60~~ cm  
+ Per

$C = 154.28 \text{ cm} = 6.9 \text{ ft} = 1.9 \text{ ft/cm}$

11.12 Solution ht = 162.15 cm Water ht = 196.60 cm  
System just critical

$CF = 155.35 \text{ cm}$   
 $= 61.16''$

$CF = 173.20$   
 $= 171.9 \text{ cm}$

$\Delta d = 7.35 \text{ cm}$

Solution ht = 170.00 cm Water ht = 180.60 cm  
+ Per

$C = 132.55 \text{ cm} = 7.9 \text{ ft} = 1.07 \text{ ft/cm}$

11.55 Solution ht = 167.65 cm Water ht = 180.60 cm  
System just critical  
Drain.

$CF = 155.85 \text{ cm}$   
 $= 61.36''$

$CF = 157.20 \text{ cm}$   
 $= 155.9 \text{ cm}$

Installed thermocouples #3 & 4 in vessel.  
Solution Temp ° = 25.9°C

over!

Solution sample taken: #6.

Y-12 Reg # 684603

X10 Reg # A649

1. g/g = 0.419583

1. g/g = 0.41972055

2. sp. gr. = 1.9093

2. sp. gr. = 1.9123

3. Density

3. Density 1.9112

4. Temp. °C 25°C

4. Temp. °C 20.5°C

5. assay. 5.10

801.1 g/l

801.2 g/l

6.  $G = 191.6 g$

20-17

7.  $T = 20.4 g$

avg = 801.1 g/l

$G = 191.2 g$

8.  $N = 171.2 g$

$T = 20.7 g$

$N = 170.5$

1230 added 1 l H<sub>2</sub>O to system.

Solution Temp °C = 26.8°C. Removed thermocouples #3 & 4 from vessel.

Solution ht = 189.85 cm

Water ht = 234.90 cm

4 + Per

N.G

170.00 cm

1457 Solution ht = ~~170.45~~ cm

Water ht = 234.90 cm

System just critical:

Drain:

Installed thermocouple #3 & 4 in vessel

Solution Temp = 26.7°C

1530 Added 500cc H<sub>2</sub>O to system!

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOFT	SET	START-UP RANGE
K-1	3X10 <sup>-12</sup>	Meter ✓	3"	✓	3X10 <sup>-12</sup>
"	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 <sup>25</sup>	Alarm	5"	✓	500 <sup>25</sup>
PM-2	1200 <sup>25</sup>	Low ✓	14"	✓	900 <sup>25</sup>
"	"	Alarm ✓	2"	✓	"
LOG N. CALIBRATE		✓	OPERATE		✓
DUMP WELL PROSE LIGHT		✓	SOURCE No.		B-80

255

no copy

4.90cm

4.90cm

K-25-Y

START-UP CHECK LIST

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

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

Source in checked by A.K.M. Source No. M-83

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

Instruments in trip circuit: X-1 P14-1-2

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

Start-up OK'd by F.I.O.C. A.K.M. Date 8-28-70

Solution temp  $t_c = 25.7^\circ C$ . Removed thermocouple #3 & 4 from vessel.

$d_2 = 33.60 \text{ cm} = 13.23''$

Solution ht = 209.50 cm Water ht = 239.80 cm

$d_1 = 202.70 \text{ cm} = 79.80''$

$t = 232.51 \text{ sec} = 4.94 = .154/\text{cm}$

1106 Solution ht = ~~175.90 cm~~ 175.90 cm Water ht = 239.80 cm

System just critical

$d_1 = 169.10 \text{ cm} = 66.57''$

$t = 223.53$   
 $= 211.40 \text{ cm}$   
 $= 209.7 \text{ cm}$   
 $= 210.1$

$d_2 = 9.2 \text{ cm}$

Solution ht = 184.00 cm Water ht = 210.20 cm

$t = 267.28 \text{ sec} = 4.34 = .47/\text{cm}$

1207 Solution ht = 174.80 cm Water ht = 210.20 cm

System just critical

$d_2 = 165.00 \text{ cm}$

$t = 196.86$   
 $= 185.5 \text{ cm}$



$\tau = 32.8 \text{ cm}$

Solution ht = 207.80 cm      Water ht = 192.80 cm

<sup>3</sup> Per

$\tau = 310.74 \text{ cm} = 3.8 = .124 \text{ cm}$

1328 Solution ht = 175.00 cm      Water ht = 192.80 cm

System just critical,  
 $\tau = 168.20 \text{ cm}$

$\tau = 169.40$   
- 168.20 cm  
168.1

1340 Solution ht = 177.00 cm      Water ht = 192.80 cm  
System very slightly per.

1350 Solution ht = 179.80 cm      Water ht = 192.80 cm  
System just critical,  
Praxis:  $\tau = 168.00$  ✓  
 $\tau = 167.7 \text{ cm}$

Installed thermocouples # 3 & 4 in use

Solution temp = 26.0°C

Solution sample taken # 7.

Y-12 Reg # 684604

X-10 Reg # A-650

Height	Y-12 Reg # 684604	X-10 Reg # A-650
20 cm	1. $\rho = 1.18150$	1. $\rho = 1.18150$
	2. Density	2. Density 1.9112 1.9039
	3. Sp. gr. = 1.9028	3. Sp. gr. 1.9123 1.9048
10 cm	4. Temp = 25°C	4. Temp = 20.5°C
80	5. Density 5.07 = 795.69	5. Density 796.79
5 cm	6. P. no 90. $\rho = 796.19$	6. P. no 90. $\rho = 796.79$
	aver: $\rho = 171.99$	

9-25-70: Duplicate samples: for K-25-30 Y.

Y-12 Reg # 684605

3-K-25-Y.

Net = 160.7g

$\frac{g}{g} = .441925 = 884.69\%$

Sp. gr. = 2.0017

Temp = 25.0°

X-10 Reg # A5477

3-A-K-25-Y

Net = 165.9g

$\frac{g}{g} = .4423 = 888.99\%$

Sp. gr. = 2.0097

Density = 2.0043

Temp = 20.0°

Y-12 Reg # 684606

4-K-25-Y

Net = 160.3g

$\frac{g}{g} = .439075 = 874.19\%$

Sp. gr. = 1.9909

Temp = 25.0°

avg = 875.8  
g%

X-10 Reg # A5478

4A-K-25-Y

Net = 166.7

$\frac{g}{g} = .4389 = 877.6$   
g%

Sp. gr. = 1.9995

Density = 1.9941

Temp = 20.0°

Y-12 Reg # 684609

5-K-25-Y

Net = 176.9g

$\frac{g}{g} = .428692 = 822.99\%$

Sp. gr. = 1.9332

Temp = 25.0°

avg = 824.38  
g%

X-10 Reg # 5479

5A-K-25-Y

Net = 168.6g

$\frac{g}{g} = .4254$

Sp. gr. = 1.9409 = 825.7  
g%

Density = 1.9357

Temp = 20.0°

Y-12 Reg # 684608

7-K-25-Y

Net = 150.8g

$\frac{g}{g} = .417961 = 795.59\%$

Sp. gr. = 1.9032

Temp = 25.0°

avg = 796.49  
g%

X-10 Reg # A5480

7A-K-25-Y

Net = 168.0g

$\frac{g}{g} = .4182 = 797.4$   
g%

Sp. gr. = 1.9119

Density = 1.9067

Temp = 20.0°

5477

✓

2

=888.9972

3

5478

✓

=877.6  
842

5479

✓

4

09-825.7

57 842

5

5480

✓

2

=797.4  
342

7

6

*Handwritten scribbles*