BOOK96R

Notes:
"UO_2F_2 Solution #6" on spine

Blank pages: inside front cover, page opposite page 1, 27, 119-308, inside back cover sheets

-1 half sheet between blank and page 1
-pages 25/26 have paperclip at top
-pages 38/39 have calendar sheet (11/1/72) between pages

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
September 9, 1999

14-2-1

SHAW'S

PIONEERS SINCE 1831

Account Book

No. S 149

NO UNITS

Journal . . . . . .

Ledger, Single Entry . .

Ledger, Double Entry .

Record Ruled (27 Lines)

Made in 150, and 300 Pages

MADE IN U. S. A.

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

Plastic Cross in Syz

Nom. 11.250 in. ID p. 80

Nom. 11.0 in. ID p. 78

Nom. 10.750 in. ID p. 58

10.50 in. ID p. 41

" " p. 29

Al tank: 37.75 ID x 35.75 lin p. 2

[See p. 115 of Log #5 for vessel diagram]

Crit. refl. p. 7, p. 15

" w/o refl p. 20? (see p. 22)

Log #6 U(5) O_2F_2 soln

37.750" I.D X 35.750" Lt.

At Lamb.

See p 119 Log book # 5. for diagram of vessel.

Solution zero = 12.7 cm

H_2O zero = 0.0 cm. outside bottom of tank.

Solution	H_2O
½" feed rate = .9 cm/min	1.5" feed rate = 9.8 cm/min
½" Drain rate = 1.5 cm/min	3" dump = 10.5 cm/min
3" dump rate = 35.0 cm/min.	3" Drain = 10.7 cm/min

added – 170 l of 774 g%/l : Drain the 796 g%/l from manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ~	3"	~	3×10^{-12}
	"	Fast ~	1"	~	"
K-2	"	Meter ~	3"	~	"
	"	Fast ~	1"	~	"
R-1					
R-2					
PM-1	700 V	Alarm ~	.5"	~	500 V
PM 2	1200 V	Low ~	1 4"	~	900 V
	"	Alarm ~	2"	~	"

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKC

Source in checked by RKC Source No. M-93

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

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

Red light on by RKC Time 0930

Start-up OK'd by I.D.C RKC Date 9-16-70

4

37.750" at Tank.

1117 Solution ht = 39.60 cm Water ht = 89.70 cm

System sub critical

Drain: (all solution in manifold).

added ~25 l of very dilute solution (Washing from K-25 30°Y.)

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10^{-12}	Meter ✓	3"	✓	3X10^{-12}
	"	- + ✓	1"	✓	"
K-2	"	Meter ✓	3"	✓	"
	"	Scale ✓	1"	✓	"
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. D-8 ✓

DUMP WELL FROGE LIGHT ✓

0 cm

ing

START-UP CHECK LIST

Equipment checked by ~~RKH~~ E.O.C Personnel check by E.O.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. N-43

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

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

Red light on by RKH Time 0830

Start-up OK'd by E.O.C, RKH Date 9-17-70

Solution ht = 36.65 cm Water ht = 89.70 cm
+Per H_2O Temp = 25.5°
τ = 128.21 sec = 8.1¢
1034 Solution ht = 36.65 cm Water ht = 89.70 cm
System just critical
Drain

1400 Added ~ 25 l of very dilute solution.
(Washings from storage bottles.)

9-24-70 added ~ 25 l of H_2O.

6

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE RANGE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	2"	✓	3 X 10 -12
	"	Fast ✓	.5"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Fast ✓	.5"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	.5"	✓	500 V
PM-2	1200 V	Low ✓	14"	✓	900 V
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKK

Source in checked by RKK 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 RKK Time 0800

Start-up OK'd by F.D.C, RKK Date 9-25-70

Solution Temp°c = 25.0°c. Removed thermocouple #3 & 4 from vessel.

Δh = .10cm

Solution ht = 41.10 cm Water ht = 89.90 cm
+1 Per H_2O Temp = 25.5°c
C = 106.4 $ sec 9.4 ¢ =

1020 Solution ht = ± 41.00 cm Water ht = 89.90 cm
System just critical

Δh = .05

Solution ht = 41.30 cm Water ht = 29.40 cm
+2 Per
C = 182.53 sec = 6.0 ¢

1110 Solution ht = ± 41.25 cm Water ht = 29.40 cm
System just critical
Drain.

Δh = .10cm

Solution ht = 41.30 cm Water ht = 44.60 cm
+3 Per H_2O Temp = 25.5°c
C = 104.30 sec = 9.6 ¢

1132 Solution ht = ± 41.20 cm Water ht = 44.60 cm
System just critical
Drain H_2O.

1140 Solution ht = 41.20 cm No H_2O: Reflector
System seeb critical
Drain. dry.

Installed thermocouple @ 3 & 9'.
Solution Temp = 25.0°C
Drain Solution:

Solution sample taken:
@ 2 - 37.75 gal.

Y-12 Reg @
684-607
C = 170.0 gm/g = .394361
T = 20.2 Sp. gr = 1.6467
N = 149.8 Temp = 25°C
= 567.1
avg = 568.7

X-10 Reg @
A-5481
C = 170.6 gm/g = .3949
T = 20.4 Density = ~~1.6536~~ 1.64491
N = 150.2 Sp. gr = 1.6536
= 570.09 gm/l Temp °C = 20.0°C

1600 Added ~ 125 l H_2O.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10-12	Meter ~	2"		
	"	Fast —	.5"		
K-2	"	Meter ~	2"		
	"	Fast —	.5"		
R-1					
R-2					
RM-1	700 cpm	Alarm ~	.5"		
RM-2	1200 cpm	Low ~	19"		
	"	Alarm —	2"		

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKK

Source in checked by RKK Source No. M-43

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

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

Red light on by RKK Time 0930

Start-up O.K'd by I.D.C. RKK Date 9-29-70

Solution Temp c° = 24.0°c Removed thermocouple II 3 & 4 from vessel.

g/l = 46.60 cm
= 18.35"

1230 Solution ht = 59.30 cm Water ht = 89.80 cm
System cold critical H_2O Temp °C = 24.2°C
Drain H_2O. Installed thermocouples #3 & 4.

1245 Solution Temp °C = 25.0°C

Solution sample taken
#3

Y-12 Reg II	X-10 Reg II
684-610	A-5482
C = 156.2 g g%/g = .271030	C = 175.4 g g%/g = .2707
T = 19.9 g density = 1.4489	T = 20.0 g density = 1.4499
N = 136.3 g Temp = 25°C	N = 155.4 g sp.gr = 1.4528
= 392.7 g%/l	393.3 g%/l
	avg = 393.0 g%/l

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10⁻¹²	Meter	2"	✓	3X10⁻¹²
	"	Fast	5"	✓	"
K-2	"	Meter	2"	✓	"
	"	Fast	5"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm	5"	✓	500 V
PM-2	1200 V	Low	19"	✓	900 V
	"	Alarm	1"	✓	"

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 in checked by AKH 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 AKH Time 12:30

Start-up OK'd by F.D.C & AKH Date 10-15-70

12

Buckets of last run: p-10

1515 Solution ht = 59.40 cm Water ht = 89.80 cm
System sub critical
Drain

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 - 12				
	1-1				
K-2	11				
	1-1				
R-1					
R-2					
PM-1	700 V				
PM-2					
		Alarm			

LOG N CALIBRATE _____ OPERATE _____ SOURCE No. _____

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKL

Source in checked by BKL Source No. M-93

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

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

Red light on by BKL Time 0945

Start-up OK'd by I.D.C BKL Date 10-16-70

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	2"	✓	3 X 10 -12
	"	Fast ✓	5"	✓	"
K-2	"	Meter ✓	2"	✓	"
		Fast ✓	5"	✓	"
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-8C

DUMP WELL PROBE LIGHT ✓

14

added ~ 100 ℓ H_2O.

o/f = 60.50 cm = 23.82"

1510 Solution lift = 73.20 cm Water lift = 89.80 cm

System sub critical

Drain.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	2"	~	3×10^{-12}
	"	Fast	,5 2"	~	"
K-2	"	Meter	2" ~~5"~~	~	"
	"	Fast	,5"	~	"
R-1					
R-2					
PM-1	700V	Alarm	,5"	~	600V
PM-2	1200V	Low	14"	~	900V
	"	Alarm	1"	~	"

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

Equipment checked by T, D.C Personnel check by T.D.C RKH

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

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

Instruments in trip circuit: K-1-2 A4-1-2

Red light on by RKH Time 0930

Start-up OK'd by T.D.C RKH Date 10-19-70

added ~125 l H_2O and ~55 l of ~ 910 g U/l to manifold.

1537 Stopped wiping.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10-12	Meter ✓	2"	✓	3X10-12
"	"	Fast ✓	.5"	✓	"
K-2	"	Meter ✓	2"	✓	"
"	"	Fast ✓	.5"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	.5"	✓	500 V
PM-2	1200 V	Low ✓	1.4"	✓	900 V
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. M-43

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

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

Red light on by AKK Time 0800

Start-up OK'd by F.D.C AKK Date 10-20-70

Solution Temp°c = 23.8°c. Removed thermocouples # 3 & 4 from vessel.

0935 Solution Ht = 56.70 cm Found solution leak in manifold # 2. Drain: An estimate of amount of solution that leaked is ~ 20 cc, of which over 90% was contain in drip pans. Leak was found to be in a Swagelok tubing fitting connecting the manometer tube to # 2 manifold. The fitting was cleaned and re-tightened and # 2 manifold put back in service.

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INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10-12	Meter ✓	2"	✓	3X10-12
	"	Feet ✓	1"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Feet ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm ✓	.5"	✓	500V
PM-2	1200V	Low ✓	19"	✓	900V
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. Ra-43

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

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

Red light on by RKH Time 0810

Start-up OK'd by E.D.C RKH Date 10-21-70

Solution temp °c = 23.6°c. Removed thermocouples # 3 & 4 from vessel.

sol = .50 cm

Solution ht = 80.20 cm   Water ht = 89.90 cm
+ Per C = 58.67 in = 14.64 = 29.24 cm H_2O temp °c = 22.4°c
9h = 67.0 cm = 26.4"

1058 Solution ht = ±79.70 cm   Water ht = 89.90 cm
System just critical
Drain.
Solution temp °c = 23.5°c
Sample taken from vessel:
#4

Reg # Y-12	Reg # X-10
684612	A-5483
G = 172.5	G = 161.1
T = 20.3	T = 20.3
N = 152.2	N = 140.8
orb for	orb for plane
1. g U/g = .264790	1. g U/g = .2651 = 381.4 g U/l
2. sp. gr. = 1.43479	2. sp. gr. = 1.4388
3. density	3. density = 1.4369
4. Temp °c	4. Temp °c

over.

Solution temp °c = 23.5°c. Removed thermocouple
#3 & 4 from vessel.

$\Delta h = .30$ cm

Solution ht = 86.50 cm.

2 + Rep τ = 171.67 sec = 634 = 21.0 ¢/cm

C/L = 73.50 cm = 28.94"

15.33 Solution ht = ± 86.20 cm

System just critical

Drain: No H_2O.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10⁻¹²	Meter ✓	2"	✓	3x10⁻¹²
	"	Fast ✓	.5"	✓	"
K-2	"	Meter ✓	2"	✓	"
	"	Fast ✓	.5"	✓	"
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	.5"	✓	500 ✓
PM-2	1200 ✓	Low ✓	1"	✓	900 ✓
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. 19-93

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

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

Red light on by RKH Time 0920

Start-up OK'd by I.D.C. RKH Date 10-29-70

22 Repeat of ups (see p 19-20)

Solution temp°c = 24.2°c. Remove thermocouple #3 & 4 from vessel.

1240 Solution ht = 97.90 cm
System sub critical.
No H_2O

1310 Solution ht = 97.90 cm
System sub critical
Drain.

Water ht = 89.90 cm

Temp °c
H_2O = 20.9°c

Sample taken from vessel:

Y-12 Reg 684613 #5
G = 156.3 g
T = 20.2
N = 136.1

sub for:
1. g U/g = .227880
2. sp. gr. = 1.353
3. density
4. Temp °c
5. assay.
6. Pyrex #0

X-10 Reg 12 5484
G = 159.7 g
T = 20.4
N = 139.3

sub for
1 - g U/g = .2281
2. sp. gr. = 1.3577
3. density = 1.3539
4. Temp °c

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		Meter			
		Fast			
K-2	3 X 10 -12	Meter	2"	~	3 X 10 -12
	"	Fast	5"	~	"
R-1					
PM-2					
PM-1	700 V	Alarm	5"	<	500 V
PM-2	1200 V	Low	14"	<	900 V
		Alarm	1"	~	"

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

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKK

Source in checked by BKK Source No. M-43

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

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

Red light on by BKK Time 14:00

Start-up OK'd by I.D.C BKK Date 11-4-70

added 20 l ~~H2O~~ H_2O to system.

Mixing.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE DISTANCE	SET	START-UP RANGE
K-1	—	Meter				
	—	Fast				
K-2	3 X 10 -12	Meter	✓	2"	✓	3 x 10 -12
	"	Fast	✓	.5"	✓	"
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 E.D.C. RKR Personnel check by RKR

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. M-47

Emergency equipment [illegible] checked by E.D.C.

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

Red light on by RKR Time 0800

Start-up OK'd by E.D.C., RKR Date 11-5-70

0800 Continued mixing:

1526 Solution ht = 93.75 cm Water ht = 89.90 cm
System sub critical
Drum.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1		Meter			
		Fast			
K-2	3 X 10 -12	Meter ~	2"	~	3 X 10 -12
	"	Fast —	.5	~	"
R-1					
R-2					
PM-1	700 ~	Alarm ~	.5"	~	500 ~
PM-2	1200 ~	Low ~	1.9"	~	900 ~
	"	Alarm ~	1"	~	"

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKK

Source in checked by BKK Source No. M-93

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

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

Red light on by BKK Time 0820

Start-up OK'd by I.D.C BKK Date 11-6-70

0800 Continued mining.

1300 Samples taken; One from vessel #6 and one from manifold #6-A.

Y-12 Reg # 684614	X-10 Reg # A-5485
Sample #6	Sample #6-A
C = 152.0	C = 147.2
T = 18.4	T = 18.8
N = 133.6	N = 128.4

orb for:

g U/g 0.22-1363	g U/g = 0.2215
Sp. gr.	Sp. gr = 1.3492
Density 1.339 296.4 g U/l	Density = 1.3412
Temp °C 25°C	297.1 g U/l

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SET	START-UP RANGE
K-1	3x10-12	M... ✓	9"	—	3x10-12
	"	F... ✓	1"	—	"
K-2	"	M... ✓	9"	—	"
	"	F... ✓	1"	—	"
R-1					
R-2					
PM 1	7000 ✓	Alarm ✓	.5"	—	.500 ✓
PM 2	1200	Low ✓	12"	—	900 ✓
	"	Alarm ✓	1"	—	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by F.W.C. B.K.W. Personnel check by F.W.C.

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

Source in checked by B.K.W. Source No. M-43

Emergency equipment ... checked by F.W.C.

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

Red light on by B.K.W. Time 0825

Start-up OK'd by F.W.C., B.K.W. Date 2-18-71

Plastic Core:

10.50" I.D.

Solution Zero = 7.9 cm (see p 35 for new zero)
H_2O zero = 22.0 cm (on side scale). This is outside bottom of vessel. (see p 35 for new zero.)

Solution feed rate = 7.5 cm/min
" ½" Drain rate = 18.6 cm/min.
" 3" Drain rate = 35.6 cm/15 sec

H_2O feed rate = 9.6 cm/min.
" 3" Drain = 10.2 cm/min.
" 3" dump = 12.0 cm/min.

added ~ 250 l of ~ 910 g U/l solution to manifold.

Solution ht = 141.05 cm
System sub critical (H_2O reflector).
Drain.

added ~ 75 l of ~ 910 g U/l solution to manifold

Solution ht = 216.0 cm
System sub critical (no H_2O reflection,
Drain.

Note: "When solution ht = 216.0 cm solution
is even with bottom of top flange on
plastic vessel."

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	4"	✓	3 X 10 -12
"	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	4"	✓	"
"	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	7000 ✓	Alarm ✓	5"	✓	5000 ✓
PM-2	12000 ✓	Low ✓	12"	✓	8000 ✓
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKH

Source in checked by BKH 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 BKH Time 0805

Start-up OK'd by F.D.C BKH Date 2-19-71

1015 Solution ht = 216.10 cm. H_2O ht = 131.40 cm
System just critical.

c/h = 115.30 cm = 45.39

1043 Solution ht = 123.20 cm H_2O ht = 140.80 cm
System just critical
Drain.

These are approximate only. Do not use { (H_2O zero: 22.3 cm (side scale) outside bottom
23.5 cm inside bottom

1420 Soln 124.0 cm H_2O { #1 23.2 / 2 23.2
H_2O 143.2 cm
Close to critical; a little + Soln { #3 25.5 / 4 25.5

1425 H_2O 140.85
Draining Soln to ≈ 110 cm
~~Rem~~ Removed thermocouples from soln.

1450 H_2O 140.8 cm H_2O { #1 23.2 / #2 23.2
Soln 124.5 cm + Point #1
8.54/cm

1500. Soln 123.4 cm ≈ 115.5 cm | Mechanical level indicates Soln large in respect to H_2O
H_2O 140.8 cm ≈ 117.5 cm | ∴ add H_2O, remove soln

1508	H_2O = 141.7 cm / Mechanical limit indicates same height. Calc = 123.35 cm Critical.
15-5	H_2O = 132.6 cm (6" reflector - Natural) Calc = 123.0 cm Critical.
	Drain

INSTRUMENT-CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10^{-12}	Meter ✓	4"	✓	3X10^{-12}
	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	4"	✓	"
	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	700V	Alarm	6"	✓	500V
PM-2	1200V	Low ✓	18"	✓	900V
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 0830

Start-up OK'd by F.D.C. AKH Date 2-22-71

Using mechanical level

Solution Zero = 6.0 cm "

H_2O Even with solution = 23.5 cm. "

Thermocouples in solution and H_2O

H_2O	43.4 cm	15.5
Solution	26.1 cm	20.1
H_2O	62.5 cm	35.4
Solution	45.2 cm	35.2
H_2O	78.8 cm	55.3
Solution	61.0 cm	55.0
H_2O	93.0 cm	65.5
Solution	75.35 cm	65.35
10:00 H_2O	104.2 cm	80.7
Solution	86.6 cm	80.6
H_2O	110.0 cm	86.5
Solution	92.25 cm	86.25

H_2O #1 23.0, #2 23.0

Sol'n #3 24.2, #4 24.2

#2 - 23.1, #3 - 24.4, #4 - 24.6

Thermocouples removed from vessels

end

H_2O - 117.15

117.3

1522 Solution ht = 123.15 cm H_2O = 140.80 cm
System just critical

ol = 1.15

Solution ht = 124.35 cm H_2O = 140.80 cm
+ Per H_2O Temp °C
τ = 67.36 sec = 13.1¢ = 11.64/cm 23.1°C

H_2O 117.2 ✓ 117.3

1535 Solution ht = 123.20 cm H_2O = 140.80 cm
System just critical
Drain: H_2O
Solution Temp °C = 25.0°C

Sample taken from vessel: #1
Y-12 Reg # 684624 X-10 Reg # A5486
ask for

1. g U/g = .444345	1. g U/g = .443795
2. Sp. gr. = 2.0190	2. Sp. gr. = 2.0194
3. Density = 2.0130	3. Density = 2.0167
4. Temp = 25°C	4. Temp = 20.5°C
#1 = 897.1 g U/l	#1-A 855.0
C = 296.5 g	C = 286.9 g
T = 28.3	T = 28.2
N = 268.2 g	N = 253.7

Av 856.1 g U/l
δ = -.015

3-23-70 Drain the ~910 g/l from manifold:
added ~96 l of ~~910~~ 897.1 g/l and ~207 l
of 796.7 g/l: This results in an
estimate of 333 l at a
concentration of 828.5 g/l.

3/24/71 Calc. of above experiment (Bob Hilton)
w. Hansen-Roach cross sections
K = 0.5521 ± 0.0049

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	STARTING RANGE
K-1	3×10^{-11}	Meter ✓	4"	✓	10×10^{-11}
	"	✓	1"	✓	"
K-2	"	Meter ✓	4"	✓	"
	"	Test ✓	1"	✓	"
R-1					
R-2					
PM-1	700 V	Alarm ✓	5"	✓	500 V
PM-2	1200 V	Low ✓	14"	✓	900 V
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-43

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

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

Red light on by AKM Time 0905

Start-up OK'd by F.O.C. AKM Date 7-29-71

WEDNESDAY

1972 NOVEMBER 1972						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

1

NOV. 1972

9501 0000 1

57700000 1

11/1/72

306 WED., NOVEMBER 1, 1972 60

~ 10:30 Found that the plastic cross was floating in tank.
Drain solution and H_2O.

1330 Water sample taken from Bil hid dump tank: One from top surface and one from drain on out-side tank.

Top of tank	Bottom of tank
Req #694401	Req # 694402
ask for	ask for
g/g = .00001057	g/g = .00001020

2-26-71

Repeat of water sample: completed tank.
Y-12 Req # 694403
Ask for
g/g = .00001056

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10^-12	Meter ✓	4"	✓	3 x 10^-12
	"	Fast ✓	1"	✓	"
K-2	"	Meter ✓	4"	✓	10 x 10^-12
	"	Fast ✓	1"	✓	"
R-1					
R-2					
PM-1	700 v	Alarm ✓	5"	✓	500 v
PM-2	1200 v	Low ✓	12"	✓	900 v
	"	Alarm ✓	2"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source-in checked by RKH Source No. M-83

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

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

Red light on by RKH Time 1005

Start-up SO's by F.O.C RKH Date 3-17-71

Scop...
10.0 ...
all ...
with ...
5.5 ...
H...
up
10.0 ...

Plastic Cross:
10.50" F.O.

Solution zero = 6.8 cm
H_2O zero = 23.0 cm (on side scale) This is outside bottom of vessel.

Solution feed rate = 8.5 cm/min in lower station
" ½ chain rate = 21.5 cm/min. } 31.2 cm/min from filler
" 3" dump rate = 50.3 cm/1.5 sec
= 361.2 cm/min

H_2O feed rate = 4.1 cm/min.
" 3" ~~drain~~ drain rate = 12.3 cm/min
" 3" dump rate = 12.4 cm/min

Scope:
10.0 cm when all empty and with H_2O up
5.5 cm with H_2O & Soln up.
10.0 empty.

Water at 235.1 cm (side scale).
Solution (est. p. 37) added to end fill and check and leak check. Cross now has 55 guy cables from gussets to both top & bottom of side (4 each). Meter stick at top of cross, viewed thru south window with telescope to check movement of cross and/or stretching of cables. None observed with H_2O up and cross empty.

1455 Solution 217.1 cm, effectively same weight as water. Very sub critical.
1510 Measured dram & dump rates. During

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"		Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	.5"	✓	600 ✓
PM-2	1200 ✓	Low ✓	12"	✓	900 ✓
"		Alarm ✓	2"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-93

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

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

Red light on by AKM Time 1245

Start-up OK'd by E.D.C. A.KM Date 3-19-76

0900 Removed ~ 75 l of 828 g/l sol added ~ 25 l of 897 g/l. to manifold.

1938 Solution lvl = 217.5 cm Water lvl = 235.1 cm
System sub critical
Drain. Slope = 9.9 cm

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3X10~12	Meter ✓	4"	✓	3X10-10
"	"	Test ✓	1"	✓	"
K-2		Meter			
		Test			
R-1					
PM-1	700V	Alarm ✓	5"	✓	500V
PM-2	1200V	Low ✓	1"	✓	900V
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by F.I.C. BKH Personnel check by R.K.H

Instruments and safeties checked and reset by BKH

Source in checked by BKH Source No. Cs-93

Emergency equipment in control room checked by Elec.

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

Red light on by BKH Time 1220

Start-up O.K'd by F.I.C. BKH Date 3-22-71

1000 Removed ~75 l of ~835.3 g U/l and added ~75 l of 897 g U/l to manifold.

1428 Solution ht = 217.1 cm Water ht = 235.1 cm
System sub critical Leaps = 9.8 cm.
Drains.

1520 Removed ~75 l of 853.3 g U/l and added ~75 l of 897.0 g U/l to manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10^{-12}	Meter	✓	9"	✓	3 x 10^{-10}
	"	Fast	✓	1"	✓	"
K-2	"	Meter	✓	3"	✓	—
	"	Fast	✓	1"	✓	—
R-1						
R-2						
PM-1	700 V	Alarm	✓	5"	✓	500 V
PM-2	1200 V	Fast	✓	14"	✓	900 V
	"	Alarm	—	1"	✓	"

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

SCRAM PROOF LIGHT ✓

START-UP CHECK LIST

Equipment checked by ~~AKH~~ Filoc Personnel check by Filoc

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. 14-43

Emergency equipment in control room checked by FiBc

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

Red light on by AKH Time 1008

Start-up OK'd by Filoc AKH Date 3-23-71

1400 Solution ht = 217.2 cm Water ht = 235.1 cm
System sub-critical Head = 9.8 cm
Drain.

1515 Removed ~ 75 l of ~ 806.2 g Yl and added
~ 75 l 897.0 g Yl. to manifold.

48

INSTRUMENT CHECK

IINSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3x10 -2	Meter ✓	9"	✓	3x10 -0
"	"	Plat ✓	1"	✓	"
K-2		Meter			
		Plat			
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	15"	✓	500 ✓
PM-2	1200 ✓	Low ✓	14"	✓	900 ✓
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKH

Source in checked by BKH 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 BKH Time 0934

Start-up O.K'd by F.D.C. BKH Date 3-28-76

Solution ht = 147.90 cm Water ht = 235.1 cm
1st Pour Leage = 9.9 cm
N.G.

1117 Solution ht = 147.90 cm Water ht = 235.1 cm
System just critical
Drain.

Solution ht = 147.95 cm. Water ht = 235.1 cm
2nd Pour Leage = 9.9 cm
NG

1424 Solution ht = 143.90 cm Water ht = 235.1 cm
System just critical

1435 Solution height = 143.8 cm; Water ht = 161.7
Critical.

1446 Drain: Solution and H2O. level is drifting up.
Drain: Seems that solution is not mixed.
Drain and continue mixing solution.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-10}
"		Fwt ✓	1"	✓	"
K-2		Meter			
		Fwt			
R-1					
PM-1	700 ✓	Alarm ✓	5"	✓	500 ✓
PM-2	1200 ✓	Low ✓	14"	✓	900 ✓
"		Alarm ✓	1"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-10

BUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

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

Source in checked by R.K.D. 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 R.K.D. Time 0910

Start-up OK'd by F.D.C. R.K.D. Date 3-25-71

after more mixing:

Solution ht = 148.30 cm Water ht = 235.1 cm
[1] Ther 104.4 in = $\frac{9.54}{7.1 cm}$ = $\frac{1.344}{cm}$ Slope = 9.9 cm

1126 Solution ht = ± 141.20 cm Water ht = 235.1 cm
System just critical
Drain.

Solution ht = 151.40 cm Water ht = 235.1 cm
[2] Ther 110.6 cm = 9.14 = $\frac{1.034}{cm}$ Slope = 9.9 cm

1430 Solution ht = 142.60 cm Water ht = 235.1 cm
System just critical
Drain H_2O: H_2O Temp °C
1 = 23.2 °C
2 = 23.2 °C
1445 Measured Solution Temp
#3 = 26.0 °C
4 = 26.0 °C

1451 Drain Solution:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SET	START-UP RANGE
K-1	3×10^{-12}	" ~	9" ~	3×10^{-10}
	"	~	1" ~	"
K-2				
R-1				
R-2				
PM-1	700V	~	15" ~	500V
PM-2	1200V	~	14" ~	900V
	"	~	1" ~	"

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

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

Instruments and safeties checked and set by BKC

Source in checked by BKC Source No. M-43

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

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

Red light on by BKC Time 0900

Start-up OK'd by E.O.C. BKC Date 3-26-71

0945 Solution ht - 98.10 solution temp = #3 = 24.2°c and
#4 = 24.5°c. Removed thermocouple #3 & 4.
H_2O temp #1 = 23.2°c #2 = 23.5°c

o.r. = 6.6 cm
Solution ht = 147.4 cm Water ht = 235.1 cm
+ Por Sepe = 9.9 cm
t = 104.3 m = 9.64 = 1.44/cm

1030 Solution ht - 140.80 cm Water ht = 235.1 cm
System just critical

c/c = 132.20 cm
10.53 Solution ht = 141.0 cm Water ht = 158.8 cm
System just critical Sepe = 9.9 cm
Drain solution to 107.5 cm. Installed thermocouple
#3 & 4.

Solution temp °c	Water temp °c
#3 = 24.9°c	#1 = 23.1°c
#4 = 24.9°c	#2 = 23.1°c

1108 Drain!
Solution sample taken from well: #2
Y-12 Reg # 694404 X-10 Reg # A-5487
Vol for?

1. gU/g = .434273	1. gU/g = .4332
2. Sp. gr = 1.9740 = 857.2 g U/l	2. Sp. gr 1.9752 = 855.6 g U/l
3. density = 1.9682	3. density 1.9712
4. Temp = 25.0°c	4. Temp 20°c
#2	#2A
G = 184.0	G = 222.2
T = 18.9	T = 19.4
N = 165.1 grams	N = 202.8 grams

3-29-71 Drain ~275 l of ~875.0 g/l from manifold and added ~275 l of ~897.0 g/l to manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	2×10^{-12}	Meter ~	4"	~	3×10^{-10}
	"	Fast —	1"	~	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700V	Alarm ~	Cast	~	500V
PM-2	1200V	Low ~	14"	~	900V
	"	Alarm ~	1"	~	"

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

DUMP WELL PROBE LIGHT ~

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-63

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

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

Red light on by RKH Time 0912

Start-up OK'd by F.D.C. RKH Date 3-30-71

Solution ht = 105.3 cm Solution temp's #3 = 24.0°c
#4 = 24.0°c. Removed thermocouples #3 & 4.
H_2O Temp #1 = 22.7°c #2 = 22.7°c

Δh = 1.05 cm
Solution ht = 123.40 cm Water ht = 235.1 cm
'+ Rx Scope = 10.0 cm
t = 56.60 sec = 15.0¢ = 14.3 ¢/cm

1041 Solution ht = 122.35 cm Water ht = 235.1 cm
System just critical

1110 Solution ht = 122.80 cm Water ht = 140.40 cm
System just critical
Drain:
Drain solution to 104.50 cm and installed
thermocouples #3 & 4.

Solution temp °c	Water temp °c
#3 = 24.2°c	#1 = 22.6°c
#4 = 25.0°c	#2 = 22.6°c

1125 Drain solution.

Solution ht = 105.0 cm, Solution temp's #3 = 25.6°c
#4 = 25.6°c. Removed thermocouple #3 & 4.
H_2O Temp #1 = 22.7°c #2 = 22.7°c

°C Solution ht = 123.50 cm ... Water ht = 235.1 cm
2 + Per ... Scope = 9.4 cm

τ = 60.8 sec = 14.3 ¢ = 14.3 ¢/cm

1400 Solution ht = 122.50 cm ... Water ht = 235.1 cm

1 cm — System just critical

1418 Solution ht = 122.90 cm ... Water ht = 140.50 cm

cm — System just critical.

Drain solution to 108.0 cm and installed thermocouples #3 & 4

cm

Solution temp °C	Water temp °C
#3 = 25.7°C	#1 = 22.7°C
#4 = 25.7°C	#2 = 22.7°C

Sample taken from vessel #3

Y-12 Req #694405	K-10 Req # A-5488
Only for:	
1. g U/g = .446783	1. g U/g = .4470
2. Sp. gr. = 2.0287	2. Sp. gr. = 2.0210
3. Density = 2.0227	3. Density = 2.0176
4 temp °C = 26°C	4. Temp °C = 19°C
= 906.3 g U/l	= 903.4 g U/l
G = 214.8	G = 219.6
T = 19.5	T = 19.0
N = 195.3 grams	N = 200.6 grams

Plastic Core
Non 10.750" I.D.

4-22-71 Solution zero = 6.9 cm
H_2O zero = 23.1 cm = to outside bottom of vessel.
When H_2O = 235.10 cm H_2O is even with bottom of top flange on plastic core.
Cage zero = 10.0 cm. No solution or H_2O in or around vessel.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
	"	Fast —	1"	—	"
K-2	—	Meter			
	—	Fast			
R-1					
R-2					
PM-1	700V	Alarm —	.5"	—	500V
PM-2	1200V	Low ✓	14"	✓	900V
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT —

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-83

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

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

Red light on by AKH Time 0915

Start-up OK'd by F.D.C, AKH Date 4-23-71

Solution ht = 98.0 cm Solution Temp °c =
#3 = 25.2°c #4 = 25.2°c : Removed thermocouples #3 & 4 from vessel. H_2O temp °c
#1 = 23.0°c #2 = 23.0°c

Δ_4 = .65 cm

Solution ht = 117.30 cm Water ht = 235.1 cm
1 + Per Slope = 8.9 cm
$\bar{c}$ = 56.50 cm = 15.1 ¢ = 23.2 ¢/cm

1105 Solution ht = ± 116.65 cm water ht = 235.1 cm
System just critical.
Drain solution to = 105.0 cm : Installed thermocouples #3 & 4.

Solution Temp °c	Water Temp °c
#3 = 25.2°c	#1 = 22.7°c
#4 = 25.7°c	#2 = 23.0°c

Drain solution :

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 V	Alarm ✓	Cont	✓	500 V
PM-2	1200 V	Low ✓	16"	✓	900 V
	"	Alarm ✓	2"	✓	"

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

DUMP WELL PROBE LIGHT _____

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BZH

Source in checked by BZH Source No. M-93

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

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

Red light on by BZH Time 0910

Start-up OK'd by F.D.C BZH Date 4-26-71

Solution ht = 103.20 cm: Solution temp °c
= #3 = 23.7°c #4 = 24.2°c. H_2O temp °c #1 = 23.0°c #2 = 23.2°c. Removed thermocouple #3 & 4 from vessel.

Solution ht = 117.0 cm Δh = .5 cm Water ht = 235.1 cm
+Per Slope = 10.0 cm
r = 86.92 cm = 11.0 ϕ = 22.0 ϕ/cm.

1040 → Solution ht = ±116.5 cm Water ht = 235.1 cm
System just critical

1103 Solution ht = ± 117.50 cm Water ht = 135.1 cm
System just critical
Drain solution to 107.0 cm and installed thermocouples #3 & 4 in vessel.

Solution Temp °c	H_2O Temp °c
#3 = 24.2°c	#1 = 23.2°c
#4 = 24.7°c	#2 = 23.0°c

Drain:

Solution sample taken from vessel:

Sample # 4

~~outfor~~

Y-12 Reg # 694406 | X-10 Reg # A-5489

Y-12	X-10
out for	
1 = g U/g = .441735	1 = g U/g = .446
2 = sp. gr. = 2.0292	2 = sp. gr. = 2.032
3 = density = 2.0232	3 = density = 2.028
4 = Temp °c	4 = Temp °c = 20.8 °c
906.5 g U/l	906.3 g U/l
σ = 195.8 g	σ = 196.3 g
T = 19.5 g	T = 19.2 g
N = 176.3 g	N = 177.1 g

5.2(6.4) ρ = 2.0325

4 26/27/71 Drain ~ 275 l of ~ 906 g U/l from manifold and added ~ 275 l of ~ 857 g U/l to manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"		Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM 1	700V ✓	Alarm ✓	End	✓	500V
PM 2	1200V ✓	Low ✓	12"	✓	900V
"		Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by I.P.C. AKM/ Personnel check by E.V.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 E.V.C

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

Red light on by AKM Time 1230

Start-up OK'd by E.V.C. AKM Date 4-27-76

Solution ht = 105 cm ; Solution Temp °C = #3 = 24.1 °C
#4 = 25.2 °C ; ~~Research~~ Removed thermocouples
#3 & 4 from vessel. H_2O temp °C = #1 = 22.7 °C
#2 = 23.0 °C.

$\Delta t = 1.0$

Solution ht = 123.45 cm Water ht = 235.1 cm
1 + Per Slope = 10.0 cm
D = 58.62 cm = 14.6 ϕ = 14.6 ϕ cm

1404 Solution ht = ± 122.45 cm Water ht = 235.1 cm
System just critical
Drain solution to 109 cm and installed thermocouple #3 & 4 in vessel.

Solution Temp °C	H_2O Temp °C
#3 = 24.2 °C	#1 = 22.7 °C
#4 = 25.1 °C	#2 = 22.7 °C

Drain:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"	"	East ✓	1"	✓	"
K-2		Meter			
		East			
R-1					
R-2					
PM-1	700 V	Alarm ✓	Coin ✓		500 V
PM-2	1200 V	Low ✓	12" ✓		900 V
"		Alarm ✓	1" ✓		"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKR

Source in checked by BK Source No. M-43

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

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

Red light on by BKR Time 0900

Start-up OK'd by I.D.C. BKR Date 4-28-71

Solution ht = 105.0 cm; Solution Temp °C #3 = 23.7 °C #4 = 24.9 °C. Removed thermocouples #3 & 4 from vessel. H_2O temp °C #1 = 23.1 °C #2 = 23.2 °C

ah = 1.2 cm

Solution ht = 123.65 cm   Water ht = 235.1 cm

+Per   ~~to~~ slope = 10.0 cm

τ = 45.63 sec = 17.4¢ ± = 14.5¢/cm

10 44 Solution ht = ~~±~~ ±122.45 cm   Water ht = 235.1 cm

System just critical

1102 Solution ht = ±122.95 cm   Water ht = 140.60 cm

System just critical

Drain solution to ~105 cm and installed thermocouple #3 & 4 in vessel.

Solution Temp °C	H_2O Temp °C
#3 = 24.5 °C	#1 = 22.7 °C
#4 = 25.0 °C	#2 = 23.0 °C

Drain:

Solution sample taken from vessel. See p 68. Sample #5

Sample #5

Y-12 Req # 694407 | X-10 Req #45490

ack for	
1. g U/g = .434732	1. g U/g = 0.433
2. sp. gr. = 1.9753	2. sp. gr. = 1.977
3. density = 1.9695	3. density = 1.973
4. Temp °C 858.7 g U/l	4. Temp °C 856.0 g U/l
C = 198.3 g	C = 187.5 g
T = 18.6 g	T = 18.3 g
N = 179.7 g	N = 169.2 g

857.35 avg

ρ = 1.571

INSTRUMENT CHECK

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

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by [illegible] Personnel check by E.P.C.

Instruments and safeties checked and reset by [illegible]

Source in checked by [illegible] Source No. M-93

Swor.away equipment in control room checked by E.P.C

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

Red light on by [illegible] Time 0905

Start-up OK'd by E.P.C. [illegible] Date 5-14-71

Plastic Cross
Non 11.0" I.D.

Selection zero = 7.0 cm
H_2O zero = 23.2 cm to outside bottom
bottom of vessel.
When H_2O = 285.2 cm H_2O is even with
bottom of top flange on plastic cross
Scope zero = 10.0 cm

1101

1125

1,50

Lon

Solution ht = 92.5 cm Solution temp °C #3 = 24.0°C
& #4 = 24.0°C. Removed thermocouple #3 & 4
from vessel. H_2O temp °C #1 = 23.0°C #2 = 23.0°C

Solution ht = 117.20 cm $\Delta L = .2$ cm Water ht = 235.2 cm
1 + Per Scope = 10.0 cm
$\Sigma = 152.1$ cm = 7.0 ¢ = 35.0 ¢/cm.

1101 Solution ht = 117.0 cm $\Delta L = 110.0$ cm = 43.3" Water ht = 235.2 cm
System just critical

1125 Solution height = 117.55 cm Water Lt. = 135.8 cm
Critical (Solid + H_2O gamma det) Scope = 9.5 cm

Drain solution & install thermocouples #3 & 4.

#1 = 23.8° #2 = 23.0° (H_2O Temp)
#3 = 24.6° #4 = 24.6° (Solution temp)

1150 Drain for solution sample.

Solution sample taken from vessel
Sample #6 see p 72

Sample #6

Y-12 Reg # 694408 | X-10 ~~Reg~~ # 4-5491

ask for

1 ~ g U/g = .445190 | 1 g U/g = .435

2. sp. gr. = 1.9741 | 2 - sp. gr = 1.9778

3. density = 1.9683 | 3. density = 1.9744

4 temp = 25°c = 876.5 g U/l | 4 temp. = 20.5°c = 860.3 g U/l

avg = 868.3

C = 194.1 | C = 197.6

Γ = 19.3 | Γ = 19.0

N = 174.8 g | N = 178.6 g

5-17-71 Drain the 858.7 g U/l and added ~ 275 l of 906.4 g U/l to manifold.

INSTRUMENT CHECK

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

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 13-80 1

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKK

Source in checked by AKK Source No. M-93

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

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

Red light on by AKK Time 0900

Start-up OK'd by E.D.C AKK Date 5-18-76

Solution ht = 102 cm. Solution temp #3 = 24.7°C
#4 = 24.7°C, Removed thermocouples #3 & 4 from
vessel. H_2O temp °C. #1 = 23.1°C #2 = 23.2°C

Δ4 = .2 cm

Solution ht = 113.5 cm Water ht = 235.2 cm
+Per
5 - 106.5 cm = 9.3 # = 46.5 #/cm
± 113.3 cm Δ4 = 106.3 cm
11.00 Solution ht = ~~±113.3 cm~~ = 41.85" Water ht = 235.2 cm
System just critical Keff = 10.0 cm

1118 Solution ht = ± 114.9 cm Water ht = 132.6 cm
System just critical
Drain solution to ~ 102 cm and installed 5-
thermocouples #3 & 4.

Solution Temp °C	H_2O temp °C
#3 = 24.2°C	#1 = 23.0°C
4 = 25.0°C	2 = 23.2°C

Drain solution after taken sample #7
from vessel.

Sample #7.

Y-12 Reg # 69409	A-10 Reg # A-5492
orb for.	
1 - g²/g = .446892	1 g²/g = .444
2. ½ p. gr = 2.022	2 - ½ p. gr = 2.0306
3. density = 2.0223	3. density = 2.0266
4. Temp °C = 25. °C	4 temp °C = 20.5 °C
= 903.6 g	= 901.6 g ²/l
G = 202.5	G = 192.1
T = 18.6	T = 19.2
N = 183.9 g	N = 173.5 g

5-19-71 Drain ctr = 906 g²/l and added about 300 l of ~ 814 g²/l to manifold.

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INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	3"	✓	3X10-12
"	"	F ✓	1"	✓	"
K-2		Meter			
		F-t			
R-1					
R-2					
PM-1	700 V	Alarm ✓	Lost	✓	500 V
PM-2	1200 V	Low ✓	12"	✓	900 V
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

10

11

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

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

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

Red light on by RKH Time 0905

Start-up OK'd by F.D.C RKH Date 5-29-71

Solution ht = ~102 cm; Solution temp °C
#3 = 24.5°C ~~#4~~ #4 = 24.9°C. Removed
thermocouples #3 + 4 from vessel. H_2O temp °C
#1 = 23.2°C #2 = 23.5°C.

Solution ht = 124.9 cm ΔH = .9 cm Water ht = 235.2 cm
+ Per Slope > 10.0 cm
T = 84.7 sec = 11.1¢ = 12.34/cm

1049 Solution ht = 124.0 cm CR = 117.0 cm = 46.06" Water ht = 235.2 cm
System just critical

1105 Solution ht = 124.50 cm H_c = 117.5 cm Water ht = 142.2 cm
System just critical
Drain solution to ~108 cm and installed
thermocouples #3 + 4.

Solution temp °C	H_2O temp °C
#3 = 24.9°C	#1 = 23.4°C
#4 = 25.0°C	#2 = 23.7°C

Drain solution

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INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 x 10-12	Meter ✓	3"	✓	3 x 10-12
"	"	Fast ✓	1"	✓	1
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	7000 ✓	Alarm ✓	Cent	✓	5000 ✓
PM-2	12000 ✓	Low ✓	12"	✓	9000 ✓
		Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKM

Source in checked by RKM Source No. M-93

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

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

Red light on by RKM Time 0900

Start-up OK'd by E.D.C, RKM Date 5-21-71

Solution ht = 102 cm. Solution temp °c #3 = 24.9°c
#4 = 24.6°c. Bernard thermocouple #3 & 4
from vessel. H_2O temp °c #1 = 23.4°c #2 = 23.6°c
Δ = .85 cm.

Solution ht = 124.85 cm Water ht = 235.2 cm
1 + Per Shape = 10.0 cm

C = 91.3 ml = 10.66 ϕ = 12.5 #/cm

1015 Solution ht = ± 124.0 cm d/2 = 117.0 cm = 46.06" Water ht = 235.2 cm
System just critical
Drain to = 108 cm and installed thermocouple
#3 & 4 in vessel.

Solution temp °c	H_2O temp °c
#3 = 24.9°	#1 = 23.5°c
#4 = 25.0°c	#2 = 23.5°c

Sample #8 taken from vessel.

Y-12 wg # 694410	X-10 wg # 5493
1 - g.w/g = .422157	1 - g.w/g = .4207
2, Sp. gr = 1.9239	2, Sp. gr. = 1.9258
3, density = 1.9182	3. density = 1.9220
4. temp °c = 25°c = 812.2 g/l	4. temp °c = 20.5°c = 810.2 g/l
C = 149.9	C = 183.1
T = 20.0 ✓	T = 19.3
N = 168.9	N = 163.8

Plastic Cross
Non 11.250" I.D.

Solution zero = 7.0 cm
H_2O zero = 23.1 cm to outside bottom of vessel.
When H_2O = 235.1 cm H_2O is even with bottom of top flange on plastic cross.
Stage zero = 10.0 cm.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
	3×10^{-12}	✓	4"	✓	3×10^{-12}
	"	✓	1"	✓	"
		Meter			
	700v	Alarm ✓	Cont	✓	500v
	1200v	Low ✓	20"	✓	900v
	"	Alarm ✓	2"	✓	"

LOCK ... ✓ OPERATE ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKK

Source in checked by RKK Source No. M-43

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

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

Red light on by RKK Time 0915

Start-up OK'd by I.D.C. RKK Date 6-10-71

Solution ht = 93.50 cm. Solution temp °C #3 = 25.6°C
#4 = 26.0°C. Remove thermocouple #3 & 4 from
vessel. H_2O temp °C #1 = 28.0°C #2 = 28.2°C

$\Delta h = .30$ cm

Solution ht = 118.30 cm Water ht = 235.1 cm
+Per Scope = 10.0 cm
$\epsilon = 141.2$ sec = 7.4 ℓ = 24.7 ℓ/cm.

1100 Solution ht = 118.0 cm $\pm$ $\Delta h = 111.0$ cm 43.7" Water ht = 285.1 cm
System just critical

$H_2 = 111.9$ cm

1117 Solution ht = 118.90 cm Water ht = 136.8 cm
System just critical

15

Drain solution to ~105 cm and install
thermocouple #3 & 4

Solution temp °C	H_2O Temp °C
#3 = 26.05°C	#1 = 27.7°C
#4 = 26.5°C	#2 = 28.0°C

Drain solution after taken sample #9
from vessel.

Sample # 9

Y-12 Reg # 699611

1 - g 4/g = .42240

2 - sp. gr = 1.9244

3. - density 1.9187

4 - temp °c 25°c. = 912.98 g/l

E = 214.3 g

T = 19.5 g

N = 194.8 g.

X-10 Reg # A-5494

1 - g 4/g = .422

2 - sp. gr = 1.9257

3. - density 1.9229

4 - temp 21.0°c

E = 203.3 g 912.64

T = 19.5 g

N = 183.8 g

Avg 912.81

1.9208

1500 added 10 l of H_2O to system:

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE [illegible]	SET	START-UP RANGE
K-1	3X10 -02	Meter	—	4"	✓	3X10 -12
	"	F	—	1"	✓	"
K-2		[illegible]				
		Fast				
R-1						
[illegible]	700v	Alarm	✓	cont	✓	500v
PA-2	1200v	Low	✓	14"	✓	900v
	"	Alarm	—	2"	—	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKW

Source in checked by AKW Source No. M-93

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

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

Red light on by AKW Time 0905

Start-up OK'd by I.D.C AKW Date 6-11-71

0905 Continued mixing:

1010 Solution ht = 122.2 cm; dumped solution to continued mixing:

Solution ht = 95.0 cm. Solution temp °C #3 = 27.5 °C #4 = 27.5 °C. Removed thermocouples #3 & 4 from vessel. H_2O temp °C #1 = 27.6 #2 = 28 °C

Δh = .4 cm

Solution ht = 123.25 cm Water ht = 235.1 cm

+ Res Scope = 10.0 cm

t = 67.4 cm = 13.3 ¢ = 16.6 ¢/cm

1419 Solution ht = ±122.45 cm H_2 = 115.45 Water ht = 235.1 cm

System just critical

Drain solution to 100.0 cm and installed thermocouples # 3 & 4 in vessel.

Solution temp °C	H_2O temp °C
3 = 27.5°	1 = 27.6 °C
4 = 27.5 °C	2 = 28.0 °C

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INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 K 10-12	Meter ✓	4"	✓	3 K 10-12
"	"	" ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 V	Alarm ✓	15"	✓	500 V
PM-2	1200 V	Low ✓	18"	✓	900 V
"		Alarm	2"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

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

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

Red light on by RKH Time 0900

Start-up OK'd by F.U.C, RKH Date 6-14-71

Solution ht = 98.0 cm, Solution temp #3 = 25.5°C
#4 = 25.6°C. Removed thermocouple #3 & 4 from
vessel. H_2O temp °C #1 = 27.0°C #2 = 27.5°C

Δx = .7 cm

Solution ht = 122.90 cm Water ht = 235.1 cm
7 Pos Slope = 10.0 cm

D = 89.1 cm = 10.0 ϕ = 15.7 ϕ/cm

1032 Solution ht = ± 122.20 cm Water ht = 235.1 cm
System just critical
Drain.

Repeat of above.

Δx = .5 ϕ

Solution ht = 122.90 cm Water ht = 235.1 cm
2 Pos Slope = 9.8 cm

D = 97.9 cm = 10.0 ϕ = 20.0 ϕ/cm Hc = 115.4

Solution ht = 122.40 cm Water ht = 235.1 cm
System just critical

1400 Solution ht = ± 122.95 cm Water ht = 140.6 cm
System just critical 123
Drain solution to 103 cm and installed
thermocouples #3 & 4.

Solution temp °C	H_2O temp °C
#3 = 27.1°C	#1 = 27.2°C
4 = 27.5°C	2 = 27.5°C

Over.

Solution sample #10 Taken from vessel.

Y-12 Reg # 694412	X-10 reg # 5495
1. g^2/g = .415049	1- g^2/g = .416
2. Sp. gr = 1.896	2. Sp. gr = 1.8987
3. Density = 1.890 786.93	3. Density = 1.8996 789.85
4. Temp° c 25°	4- Temp° c 20°
G = 200.1g	G = 211.0 g
T = 19.4 Avg 786.35	T = 19.5
N = 180.7 1.8943	N = 191.5

Resample of sample #6 page 72.

Y-12 Reg # 694413	X-10 Reg # 5496
1. g^2/g = .434470	1- g^2/g = .435
~~2.~~ Sp. gr = ~~1.968~~ 1.974 857.64	2. Sp. gr = 1.9782 860.52
3. Density = 1.968	3. Density = 1.9740
4. Temp° c = 25°	4 Temp = 20°
C = 204.7g Avg(3)	C = 205.1 g
T = 19.0 855.5	T = 19.5
N = 185.7 Avg(4) 1.9712	N = 185.6

Resample of sample # 7 page 75

Y-12 Reg # 694414	X-10 Reg # 5497
1 - g^2/g = .446134	1-g/g = .447 907.77
2 - Sp. gr = 2.028 504.76	2. Sp. gr. = 2.0308
3. Density = 2.022 Avg (4)	3. Density = 2.0264
4. Temp° c 25° 504.43	4. Temp° c = 20°
C = 219.1 Avg(4) 2.0243	C = 219.5 g
T = 19.5	T = 19.5
N = 199.6	N = 199.0

6/14/71 added 10 ℓ of H_2O to system.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP		SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter	✓	4"	✓	3×10^{-12}
		Fast	✓	1"	✓	"
K-2		Meter				
		Fast				
R-1						
R-2						
PM-1	700 V	Alarm	✓	cut	✓	500 V
PM-2	1200 V	Low	✓	12"	✓	900 V
	"	Alarm	✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by ~~AKR~~ F.D.C Personnel check by F.D.C

Instruments and safeties checked and reset by AKR

Source in checked by AKR Source No. M-43

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

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

Red light on by AKR Time 1220

Start-up OK'd by F.D.C. AKR Date 6-15-71

Solution ht = 100 cm: Solution temp °C #3 = 27.7°C
#4 = 28.0°C. Removed thermocouples #3 + 4 from
vessel. H_2O temp °C #1 = 27.2°C #2 = 27.5°C

Solution ht = 132.3 cm Δh = 1.4 cm Water ht = 235.1 cm
+Per Scope = 9.8 cm

τ = 115.2 sec = 8.84 = 6.34/cm h_c = 123.9

1453 Solution ht = 130.9 cm Water ht = 235.1 cm
System just critical
Drain solution to ~ 105 cm and installed
thermocouples #3 + 4 in vessel.

Solution temp °C	H_2O temp °C
#3 = 28.0°C	#1 = 27.5°C
4 = 28.1°C	2 = 27.6°C

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	9"	✓	3×10^{-12}
	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 V	Alarm ✓	cont	✓	500 V
PM-2	1200 V	Low	14"	✓	900 V
		Alarm	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-23

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

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

Red light on by AKA Time 0855

Start-up OK'd by E.D.C. AKA Date 6-16-71

Solution ht = 97.0 cm. Solution temp °C #3 = 27.2 °C
#4 = 26.5 °C. Removed thermocouples #3 & 4 from vessel. H_2O temp °C #1 = 27.5 °C #2 = 27.8 °C

Solution ht = 131.75 cm $\Delta h = 2.75$ cm Water ht = 235.1 cm
+ Per Slope = 9.8 cm
C = 80.4 cc = 11.7 ¢ = 4.2 ¢/cm

1030 Solution ht = 129.0 cm Water ht = 235.1 cm
System just critical
Drain solution to ~ 104 cm and installed thermocouples #3 & 4 in vessel.

Solution temp °C	H_2O temp °C
#3 = 27.2 °C	#1 = 27.5 °C
4 = 27.0 °C	2 = 27.8 °C

1300 Drain H_2O: Purpose is to check thermocouples #1, 2, 3, 4, to see if they are responding to changes in temperature.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter —	4"	✓	3×10^{-12}
	"	Fast ✓	1"	—	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	cont	✓	500 ✓
PM-2	1200 ✓	Low ✓	14"	✓	900 ✓
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 0855

Start-up OK'd by F.D.C. AKH Date 6-17-71

Repeat of last measure $p = 9.2$,
Solution ht = 97.0 cm Solution temp °C #3 = 25.5
#4 = 25.7°C, Bernard thermocouples #3 & 4 from
vessel. H_2O temp °C #1 = 27.0°C #2 = 27.5°C

$\Delta h = 2.1$ cm

Solution ht = 131.75 cm Water ht = 235.10 cm
4 per Rope = 10.0 cm
$E = 65.2$ mv = 13.6 f = 6.5 #/cm.
10/7 Solution ht = 129.65 cm Water ht = 235.1 cm
System just initiated
Drain solution to 106 cm and installed
thermocouple #3 & 4 in vessel.

Solution temp °C	H_2O temp °C
#3 = 25.8°C	#1 = 27.0°C
4 = 26.0°C	2 = 27.1°C

INSTRUCTIONS

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
"	"	Test ✓	1"	✓	"
K-2		Meter			
		Test			
R-1					
R-2					
PM-1	700 ✓	Alarm	cont	✓	500 ✓
PM-2	1200 ✓	Low ✓	18"	✓	800 ✓
"	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 0907

Start-up OK'd by I.O.C. AKH Date 6-18-71

Repeat of last run p-94.
Solution ht = 99 cm, Solution temp °C #3 = 25.2°C
#4 = 25.5°C. Removed thermocouples #3 & 4
from vessel. H_2O temp °C = #1 = 26.8°C #2 = 27.2°C

Δ = 1.354
Solution ht = 131.0 cm   Water ht = 235.1 cm
+ Per   Slope = 10.0 cm
τ = 108.3 sec = 9.54 = [illegible]

0955 Solution ht = 129.65 cm   Water ht = 235.1
System just critical

1008 Solution ht = 130.15 cm   Water ht = 147.8 cm
System just critical
Drain solution to 106 cm and installed
thermocouples #3 & 4 in vessel.

Solution Temp °C	H_2O temp °C
#3 = 26.0°C	#1 = 26.7°C
4 = 26.0°C	2 = 27.0°C

Solution sample #11 taken from vessel.

Calibration sample #11

Y-12 Reg # 698415	K-10 reg # A-5498
1- g/g = .408500	1- g/g = .408
2. sp. gr = 1.869 763.45	2. sp. gr = 1.8750 765.00
3. density 1.864	3. density = 1.8676
4. temp °C 25°C	4. temp °C = 20.5 °C
G = 187.1 g	Avg 764.24 G = 188.0 g
T = 18.7	1.8658 T = 19.6
N = 168.4	N = 168.4

1245 added 10 l H_2O to system.

98

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	4"	✓	3 X 10 -12
"		Feet ✓	1"	✓	"
K-2					
R-1					
R-2					
PM-1	700 v	Alarm ✓	cont	✓	500 v
PM-2	1200 v	Low ✓	10"	✓	900 v
"	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 13-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKH

Source in checked by AKH Source No. M-93

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

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

Red light on by AKH Time 0855

Start-up OK'd by E.D.C. AKH Date 6-21-71

Solution ht = 100 cm, Solution temp °C #3 = 25°C
#4 = 25.1°C. Removed thermocouple #3 & 4
from vessel. H₂O temp °C #1 = 26.2°C #2 = 26.6°C.

1120 Solution ht = 217.1 cm Water ht = 235.1 cm
System sub critical Surge = 10.0 cm
Drain.

added ~ 1.0 l of 576.6 g U/l solution to
vessel.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	9"	✓	3 X 10 -12
"	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 ✓	Alarm ✓	cut	✓	500 ✓
PM-2	1200 ✓	Low ✓	18"	✓	900 ✓
"		Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKR

Source in checked by RKR Source No. M-93

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

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

Red light on by RKR Time 0900

Start-up OK'd by E.D.C. RKR Date 6-22-71

Solution ht = 100 cm, Solution temp °C #3 = 25.5°C
#4 = 25.5°C, Removed thermocouple #3 & 4
from unit. H_2O temp °C #1 = 26.5°C #2 = 26.6°C

1107 Solution ht = 217.1 cm Water ht = 235.1 cm
System sub critical Slope = 10.0 cm
Drain.

1230 added ~ 1.0 l of ~906 g TC solution to unit.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE CHANGE	SET	START-UP RANGE
K-1	3X10-12	Meter —	4"	✓	3X10-12
"	"	" —	1"	✓	"
K-2		Meter			
		Test			
R-1					
R-2					
PM-1	700V	Alarm	Vent	✓	500V
PM-2	1200V	Low ✓	14" —		900V
"		Alarm ✓	1" ✓		"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKM

Source in checked by AKM Source No. M-83

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

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

Red light on by AKM Time 0855

Start-up OK'd by F.D.C. AKM Date 6-23-71

Solution lvl = 100 cm. Solution temp °c # 3 = 25.7°c
4 = 25.5°c. Removed thermowells # 3 & 4 from
vessel. H_2O temp °c #1 = 26.5°c. #2 = 26.5°c.

1035 Solution lvl = 215.2 cm Water lvl = 235.1 cm
System sub critical
Drain.

Added 2 l of ~90 g/l solution to vessel.

INSTRUMENT	RANGE	TRIP	SOURCE	SET	START-UP RANGE
K-1	3x10-12	Man. ✓	4"	✓	3x10-12
	"	✓	1"	✓	"
K-2					
R-1					
R-2					
PM-1	700v	✓	15"	✓	500v
PM-2	1200v	✓	14"	✓	900v
	"	Man. ✓	1"	✓	"

LOG N CALIBRATE ✓ [illegible] ✓ SOURCE No. B-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by F.D.C. / R.K.M. [illegible] check by F.D.C.

Instruments and [illegible] set and reset by R.K.M.

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

Emergency equipment in [illegible] of room checked by F.D.C.

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

Red light on by R.K.M. [illegible] 0905

Start-up OK'd by F.D.C. R.K.M. Date 6-29-71

Solution ht = 101 cm, Solution temp °C #3 = 25.5°C
#4 = 25.5°C., Removed thermocouples #3 & 4 from
vessel. H_2O Temp°C #1 = 26.0°C, #2 = 26.2°C

1040 Solution ht = 217.4 cm Water ht = 235.1 cm
System sub critical
Drain.

1100 added 2 ℓ of 900 g/ℓ solution to vessel.

1400 Solution ht = 217.2 cm Water ht = 235.1 cm

1400 added 2 ℓ of 900 g/ℓ solution to vessel.

100

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3×10^{-12}	Meter ✓	4"	✓	3×10^{-12}
	"	Fast ✓	1"	✓	"
K-2		Meter			
		Fast			
R-1					
R-2					
PM-1	700 v	Alarm ✓	.5"	✓	500 v
PM-2	1200 v	Low ✓	1"	✓	900 v
	1'	Alarm —	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-43

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

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

Red light on by RKH Time 0905

Start-up OK'd by F.D.C. RKH Date 6-25-71

Solution = 100 cm. Solution temp°c #3 = 25.0°c
#4 = 25.2°c. Remarks thermocouples #3 & 4
from vessel. H_2O temp°c #1 = 26.0°c #2 = 26.2°c

1028 Solution ht = 217.1 cm Water ht = 235.1 cm
System super critical Leage = 9.8 cm
Drain and continued mixing.

Solution ht = 217.1 cm Water ht = 235.1 cm
1 - Per Leage = 9.8 cm.
E = -890 mv = 1.5 ϕ

1493 Drain.

Solution temp°	H_2O temp°c
#3 = 27.1°	#1 = 26.0°c
4 = 27.2°c	2 = 26.2°c

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE SET	START-UP RANGE
K-1	3 X10-12	Meter ✓	9" ✓	3X10-12
	"	Fast ✓	1" ✓	"
K-2		Meter		
		Fast		
R-1				
R-2				
PM-1	700 ✓	Alarm ✓	cont ✓	500 ✓
PM-2	1200 ✓	Low ✓	14" ✓	900 ✓
		Alarm	1" ✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. B-20

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by ~~F.V.C~~ ~~RKM~~ Personnel check by F.D.C

Instruments and safeties checked and reset by RKM

Source in checked by RKM Secured by IX-93

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

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

Red light on by RKM Time 0905

Start-up OK'd by F.D.C. RKM Date 6-28-71

Solution ht = 102.cm Solution temp °C #3 = 24.5°C #4 = 24.7°C. Removed thermocouples #3 & 4 from vessel. H_2O temp °C #1 = 26.0°C #2 = 26.2°C

ΔL = 60.05 cm

Solution ht = 217.1 cm Water ht = 235.1 cm

+Per Slope = 9.8 cm

t = 291.7 sec = 4.0% = .074/cm.

1020 Solution ht = 157.05 cm Water ht = 235.1 cm

System just critical

1040 Solution ht = 157.05 Water ht = 174.9 cm

System just critical

Drain solution to 106.7 cm and installed thermocouples #3 & 4 in vessel.

Solution temp °C	H_2O temp °C
#3 = 25.5°C	#1 = 26.0°C
4 = 25.7°C	2 = 26.5°C

Solution sample #12 taken from vessel.

aver.

Sample #12

Y-12 Reg # X-10 Reg #

~~[illegible]~~ 694416 A-5499

1, g U/g = .402656	1, g U/g = .4039
2. sp. gr. = 1.847	2. sp. gr. = 1.8474 746.16
3. density = 1.842	3. density = 1.8451
4. temp °C = 25°C = 743.7 g/L	4. temp °C = 20°C
G = 202.9 g	G = 194.2 g
T = 19.2	T = 19.0
N = 183.7	N = 175.2

avg 744.93
1.8435

Drain the 744 g U/g and added ~275 l ~~[illegible]~~ of 857 g U/l to manifold.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Alarm ✓	4"	✓	3 X 10 -12
	"	✓	1"	✓	"
K-2		Alarm			
R-1					
R-2					
PM-1	700 v	Alarm ✓	cent	✓	500 v
PM-2	1200 v	Low ✓	19"	✓	900 v
	"	Alarm ✓	1"	✓	"

LOG N CALIBRATE ✓ OPERATE ✓ SOURCE No. 13-80

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by BKH

Source in checked by BKH Source No. M-93

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

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

Red light on by BKH Time 0905

Start-up OK'd by I.D.C. BKH Date 6-30-71

Solution ht = 94 cm. Solution temp°c #3 = 25.6°c
#4 = 24.9°c. Remaud thermocouples #3 & 4
from vessel. H_2O temp°c #1 = 26.1°c #2 = 26.2°c,

$\Delta t = .25$ cm

Solution ht = 115.05 cm. Water ht = 235.1 cm
+ Pet Slope = 9.8 cm
C = 180.4 mc = 6.0 ¢ = 24 ¢/cm
1022 Solution ht = ~~114.8~~ 114.8 cm Water ht = 235.1 cm
System just critical

7

10.00 Solution ht = 116.10 cm Water ht = 133.90 cm
System just critical
Drain solution to 104 cm and installed
thermocouples #3 & 4 in vessel.

Solution Temp°c	H_2O Temp°c
#3 = 26.0°c	#1 = 26.2°c
4 = 25.4°c	2 = 26.5°c

Solution sample #13 taken from vessel.

Sample # 13

Y-12 Reg # 694417 — x-10 reg # A-5500

1. g/g = .933760 — 1. g/g = .4334

2. sp. gr. = 1.971 854.54 — 2. sp. gr. = 1.9727 854.97

3. density = 1.965 — 3. density = 1.9683

4. temp °C = 25°C — 4. temp °C = 20°C

G = 199.7 g Cu 854.54 G = 198.0 g = 854.9 g/l

T = 19.1 1.5467 T = 18.9

N = 180.6 N = 179.1

7-1-11 Drain the 858 g/l and added ~275 l of 906 g/l.

INSTRUMENT CHECK

INSTRUMENT	RANGE	TRIP	SOURCE DISTANCE	SET	START-UP RANGE
K-1	3 X 10 -12	Meter ✓	4"	✓	3 X 10 -12
	"	Fast ✓	1"	✓	"
K-		Meter			
		Fast			
P-1					
PM-1	700 V ✓	Alarm ✓	exit	✓	500 V ✓
PM-2	1200 V ✓	Low ✓	14"	✓	900 V ✓
	"	Alarm ✓	1"	✓	"

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

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

Instruments and safeties checked and reset by AKA

Source in checked by AKA Source No. M-43

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

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

Red light on by AKA Time 0910

Start-up OK'd by F.D.C. AKA Date 7-13-71

Solution ht = 90 cm. Solution temp° #3 = 24.5°C
#4 = 24.2°C. Bernard thermocouple #3 & 4
from wall. H_2O temp° #1 = 25.7°C #2 = 25.7°C

Δ = .15 cm

Solution ht = 111.60 cm Water ht = 235.1 cm
1 + Per Slope = 9.8 cm
τ = 117.3 ms = 8.7 f = 58 H/cm

10:00 Solution ht = 111.45 cm Water ht = 235.1 cm
System just critical

Δ = .2 cm

Solution ht = 111.65 cm Water ht = 235.1 cm
2 + Per
τ = 71.7 ms = 12.7 f = 63.5 H/cm, H_c = 104.45

11:00 Solution ht = 111.45 cm Water ht = 235.1 cm
System just critical

11:23 Solution ht = 112.70 cm Water ht = 130.4 cm
H_c = 105.7
System just critical
Drain. Installed thermocouples #3 & 4

Solution temp°C	H_2O temp°C
#3 = 26.2°C	#1 = 25.0°C
4 = 25.0°C	2 = 25.0°C

INSTRUMENT CHECK

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

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

DUMP WELL PROBE LIGHT ✓

START-UP CHECK LIST

Equipment checked by ~~RKH~~ F.D.C Personnel check by F.D.C

Instruments and safeties checked and reset by RKH

Source in checked by RKH Source No. M-93

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

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

Red light on by RKH Time 0825

Start-up OK'd by F.D.C, RKH Date 7-15-71

Solution ht = 92 cm. Solution temp°c #3 = 24.0°c
#4 = 23.7°c. Removed thermocouple #3 & 4 from vessel, H_2O temp°c #1 = 24.2°c #2 = 24.5°c.

10:00 Solution ht = 182.90 cm Water ht = 100.6 cm
System sub critical
Water ht is at bottom of cross intersection.

10:10 Solution ht = 182.90 cm Water ht = 102.9 cm
System sub critical
Water ht is at bottom of arms at the end of cross.

1025 Solution ht = 182.90 cm Water ht = 110.3 cm
System just critical.
Drain. Installed thermocouples #3 & 4 in vessel.

Sol temp°c	H_2O temp
#3 = 24.7°c	#1 = 24.2°c
4 = 25.0°c	2 = 24.6°c

Solution sample to #14 taken from vessel.

avm

Sample # 14.

Y-12 Reg # 694418	X-10 = A5451
1- g²/g = .446200	1- g²/g = .447
2- hyd. gr = 2.026	2- hyd. gr. = 2.0283
3- density = 2.020	3. density = 2.0255
4- temp° c	4 temp° c = 19.5° c
C = 202.4g	C = 193.3 g
T = 20.0g	T = 19.2 g
N = 182.4g.	N = 174.1 g

906.6 g²

Reflector water from Big Lid hold tank. Sample taken

Y-12 Reg # 694419

was for

g²/g. = .00000665