BOOK25R 10147 on bottom edge

Notes:

"DFC" wrote on tape attached to front

Blank pages: inside front cover opposite page 1, 2, 5-19, 27-30, 33-39, 46-49, 62, 68-152, inside back cover.

-page 23 has 8.5x11 pink sheet taped to it
-page 25 has sheet stapled to it
-page 53 has 8.5x11 sheet taped to it

Scanned by:
Sheila Finch
RSICC /Oak Ridge National Lab.
August 3, 1999

10147

SECRET

SECRET

14-2-7

Note Book #22

Solution Experiments -
Material Balance - 54a

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This document consists of 152 pages.
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Calc. of Areas:

Storage Cylinders:

$A_1 \approx$ I. D. 3" Pipe (stor. cyl.)

$A_1 = \frac{(3.068)^2}{4}\pi = 7.392\ \square''$

A_2 = Total cross sectional Area of 1/4" Pipe

$A_2 = \frac{(.54)^2}{4}\pi = .229\ \square''$

A_3 = inside A. 1/4" Pipe $= \frac{(.364)^2}{4}\pi = .104\ \square''$

A_4 = Area of Pipe section: $A_2 - A_3$

$A_4 = .229 - .104 = .125\ \square''$

To convert $\square''$ to cm^2 multiply by 6.452

$A_1 = 47.693\ cm^2$

$A_2 = 1.477$ "

$A_3 = 0.671$ "

$A_4 = 0.806$ "

Reaction cylinder Areas:

10 inch cyl.,	$A_{10''}$	=	78.540 $\square''$	=	506.74 cm^2
9 " "	$A_{9''}$	=	63.617 $\square''$	=	410.44 cm^2
8 " "	$A_{8''}$	=	50.265 $\square''$	=	324.31 cm^2
7 " "	$A_{7''}$	=	38.489 $\square''$	=	248.30 cm^2
6 " "	$A_{6''}$	=	28.274 $\square''$	=	182.42 cm^2
5 " "	$A_{5''}$	=	19.635 $\square''$	=	126.68 cm^2
4 " "	$A_{4''}$	=	12.566 $\square''$	=	81.07 cm^2

4

Reaction Cylinder vs. Storage Cylinder Area Ratios:

Net Area storage Cy. When filling Reactor is $A_1 - A_2 = 7.163D'' = 46.215\ cm^2$

Ratio 10" Reactor = $\frac{506.74}{46.215} = 10.965$

Ratio 9" " = $\frac{410.96}{46.215} = 8.881$

Ratio 8" " = $\frac{324.31}{46.215} = 7.017$

Ratio 7" " = $\frac{248.30}{46.215} = 5.373$

Ratio 6" " = $\frac{182.42}{46.215} = 3.947$

Ratio 5" " = $\frac{126.68}{46.215} = 2.741$

Ratio 4" " = $\frac{81.07}{46.215} = 1.754$

CYLINDER TARES

Measured F.O.S. on other Balance.

#	1	—	13.661 Kg (Locks on)
#	2	—	13.725
#	3	—	13.824 (Readings 29m low compared to Elmer's Amend Wts.)
#	4	—	13.600
	5	—	13.875
	6	—	13.553
	7	—	14.106
	8	—	13.770
	9	—	13.608

Gross Weights, at 4-12, of filled cylinders -

	8/25/47 Measured at 4-12 on F-05	Net wts ←	Balance using F-05 wt.	8/25/47 at F-05 - gross wts.
#1	~~16.6788~~ Kg. 16.6788	3.018 Kg	3.017	16.678
#2	16.8488	3.124 Kg	3.123	16.848
#3	16.9348	~~3.111~~ 3.111	3.109	8/29 at F-05 16.933
#4	16.6515	3.052	3.051	16.651
#5	17.0352	3.160	3.160	17.035
#6	16.6069	3.054	3.055 ~~3.0578~~	16.6098
#7	17.8554	3.749	3.751	17.859
#8	17.6790	3.909	3.912	17.682
#9	16.7233	3.115	3.113	16.721
		29.292	29.291 ✓ total wt.	

12/1/48 29.292 × 0.4641 = 13.594 kg D (analysis on freezing pt.)
K = 12.697 kg K

Samples taken from Cylinders 1-9 inc. for Run 8 Lab D.
8/29/47

	Net wts. #1	#2	Bartlett-Calleton #3
Cylinder #1	~~2.4370~~ 2.3749	0.6880 gm.	0.5661 gm
Cylinder #2	0.5165	0.5128	
Cylinder #3	0.7574	0.6885	1.3565
Cylinder #4	0.6749	0.7801	
Cylinder #5	0.9310	0.6534	
Cylinder #6	0.3977	0.5678	
Cylinder #7	0.6094	0.6221	
Cylinder #8	0.6726	0.6402	
Cylinder #9	0.5907	0.5679	1.6622

Total 16.8307 ✓ gm

7.8106 ✓ gm T

TRANSFER OF URANIUM MATERIAL

CARBIDE AND CARBON CHEMICALS CORPORATION
K-25 PLANT

ACCOUNT CODES			
C-2870	96	65	1
MATERIAL CODE	FROM	TO	TRANSFER NUMBER

FROM V-8A

TO F-05

DATE 8-29-47 TIME 2:PM

DATE 8-29 TIME 3:00 PM

LEAVING SENDER
SHIPPERS SIGNATURE John Turner

RECEIVED
RECEIVER'S SIGNATURE A Cantrell

MATERIAL DESCRIPTION C-2870

DOCUMENT CLASSIFICATION F.R.

CONTAINER NO.	OPERATOR'S GROSS	OFFICIAL GROSS	OFFICIAL TARE	OFFICIAL NET	SAMPLE REQ. NO.
1	16678	16679	13661	3018	
2	16848	16849	13725	3124	
3	16933	16935	13824	3111	
4	16651	16652	13600	3052	
5	17035	17035	13875	3160	
6	16608	16607	13553	3054	
7	17857	17855	14106	3749	
8	17682	17679	13770	3909	
9	16721	16723	13608	3115	
TOTALS					

UNITS OF MEASUREMENT: CIRCLE ONE: Pounds Kilograms (Grams) Liters Gallons Pints

DISTRIBUTION: White Copy - Coded Chemicals K-303-8, Canary Copy - Sender, Pink Copy - Receiver.

WCX-703 (Aug 47) SENDER RESPONSIBLE FOR SIGNATURES AND DISTRIBUTION

(93.3 %+ U wet).

[redacted]

K-25 Analyses:

TOTAL I	ASSAY % X
46.60%	
46.49	Av. of Three samples: 92.91 ± 0.28%
46.56	
46.45	
46.13	
46.08	
46.76	
46.07	
46.33	

6/1/49 Flanders reports records. shows 9/17/47

Cylinder 1	90.39
3	92.44
9	91.76

Rerun on ~ 9/26/47

#1	92.95
#3	92.96
#9	92.85

} 92.9

Probably after purification of samples -

Av. 46.407% T

→ $H/X = 24.0$

(43.3% X by wt.)

WCX-703 (AUG 47)

24

Y-12 Data

[redacted] T Analyses [redacted]

	%	Kg T	AU. ASSAY	Kg. X	
#1	46.58	1.406	.934	1.313	1313
#2	46.60	1.456	.934	1.360	1360
#3	46.39	1.443	.934	1.348	1348
#4	46.67	1.424	.934	1.330	1330
#5	46.20	1.460	.935	1.364	1365
#6	45.97	1.404	.935	1.311	1313
#7	46.69	1.750	.934	1.363 1.364	1635
#8	46.13	1.803	.935	1.684	1684
#9	46.31	1.443	.934	1.348	1348
	Total	13.589 Kg T		12.692 Kg X	12681 12694

Ave 46.39%

Material Charge

✓	Cylinder	1	2
✓	Gross	16,678	16,84
✓	Tare	13,661	13,72
✓	Net	3,018	3,12
		✓	✓
	Batch #	11-7821	11-781
		11-7848	11-784
		11-7798	11-779
		11-7801	11-780
	K-25 →	.4660	4649
✓	T g/g	.4658	.4660
	T	1,406	1,456
	X	1,313	1.360
	N_H/N_x	~~32.07~~	~~32.05~~
		23.53	23.51
✓	Req. #	808440	808439
	Assay	935	935
		934	934
		934	934
		933	933
✓	Ave	934	934

d to F-05

	3	4	5	6	7	8	9		ta C
8	16,9348	16,6515	17,0352	16,606.9	17,8554	17,6790	16,7233		
.	13,824.	13,600	13,875	13,553	14,106	13,770	13,608		
E.	3,111.	3,052	3,160	3,054	3,749	3,909	3,115		29,292
	✓	✓	✓	✓	✓	✓			
4	11-7808	11-7804	11-7846	11-7841	11-7739	11-7826	11-7812		
4	11-7810	11-7819	11-7832	11-7855	11-7853	11-7828	11-7806		
7	11-7833	11-7802	11-7842	11-7830	11-7850	11-7791	11-7824		
	11-7835	11-7817	11-7818	11-7823	11-7839	11-7837	11-7799		
					11-7851	11-7857			
	.4656	.4665	.4613	.4608	.4676	.4607	.4633		
	.4639	.4667	.4620	.4597	.4669	.4613	.4631		.4644
	1,443	1,424	1,460	1,404	1,750	1,803	1,443		13,589
	1.348	1.330	1.364	1.311	1.634	1.684	1.348		12,692
	~~32.37~~	~~31.95~~	~~32.56~~	~~32.86~~	~~31.72~~	~~32.65~~	~~32.42~~		
	23,78	23.42	24,03	24,33	23,40	24,12	23,89	23.78 AU.	
	808438	808437	808436	808435	808434	808433	808432		
	931	935	935	935	932	935	934		
	934	933	936	935	935	936	933		
	935	933	935	936	936	935	935		
	935	933	934	935	935	935	934		
			935		934	936			
	934	934	~~934~~	935	934	935	934		

Material Charged to F-05

	Y-12 Data	K-25 Data
Total T	13.589 Kg	13.593 Kg
" X	12.692	X 0.9292 12.631 Kg

26

10/8/47

Sample taken from cyl #3 after dilution to density 1.47 in 7/x 60

	net wt.
dish #36	4.5445 gms

Inventory of Evaporated Solution

(correction for paper on cylinders ≈ 70 gm

Cylinder #3 (into #3 in pit)
gr. 15.970
Tare 13.820
net 2.150 ≈ 1.114 l ≈ 858 gm X
Sp. gr. 1.93 ≈ 29.0 H/X ≈ 770 gm/l

Cylinder #4 (Full - too heavy for balance) - 50# on scales
(into #2 in pit) Contains 4.25 liters ≈ 3485 gm X
Sp. gr. 2.00 ≈ 26.5 H/X
≈ 820 gm/l. (X)

Cylinder #5 gr. 18.030
(into #1 in pit) Tare 13.875
net 4.155 gm ≈ 1.997 l ≈ 1757 gm X
Sp. gr. 2.08 ≈ 29.0 H/X
≈ ~~880~~ 880 gm/l. (X)

Cylinder #7 (Full - 50# on large scales)
(into #1 in pit) Contains 4.25 liters ≈ 3443 gm X
Sp. gr. 1.98 ≈ 27 H/X
≈ 810 gm/l (X)

Cylinder #8 gr. 16.463
(into #2 in pit) Tare 13.770
net 2.693 gm ≈ 1.367 l. ≈ 1073 gm X
Sp. gr. 1.97 ≈ 27 H/X
≈ 810 gm/l (X)

~~Cylinder #9~~

Total 12.978 l. ≈ 10.616 gm X

329-21-48

ROUGH SOL. INVENTORY

P.T.	Cyl. #1	2	3	5	6	7	8
liter	3.48	3.80	5.62	6.34	5.98	6.46	6.12
Kg Sol.	3.98	4.34	6.43	7.23	6.84	7.39	7.00
Kg X	0.405	0.440	0.653	0.734	0.694	0.750	0.710

Total X 4.386 4386

Samples Sent To Lab. During Solution Experiments

(weights etc. entered in Sol. Expt Book)

(See also pp. 22-23 for analyses of solutions as received from Y-12.)

→ H/X = 2797/W − 36.30 when W = % U in 93.4% $UO_2F_2 + H_2O$ ←

Approx. H/X	Dish No.	Cylinder No.	Sample Wt. (Net) (Solutions unless otherwise noted)	% U Wt U = W	WT U	Actual H/X.	Sent to	Date Sampled
30	25	9	1.2082	41.83	.51	31.0	Anal	9/10/47
"	34	5	0.9942	41.30	.39		Sect	9/16/47
37	35	6	2.1388	37.45	.80	38.1	"	9/16/47
"	37	8	2.4103	37.69	.91			9/16/47
45	~~31~~	9	2.8229	33.89	.96	46.2	"	9/17/47
"	36	7	3.1818	33.89	1.08			9/17/47
60	32	6	1.6201	28.79	.47	61.2		9/22/47
"	33	6 (DUP.)	2.2527	28.72	.65		"	9/24/47
"	19	2	2.8187	28.71	.81			9/24/47
"	29	2 (DUP.)	1.7393	28.77	.50			9/24/47
"	36	#2,5,1	4.5445	28.8	1.32		Optical Spec.	10/8/47
~~32~~	~~27~~	~~Composite~~	~~3.0480~~	~~28.8~~				~~10/21/47~~
	27	Composite.	0.25 g U_3O_8	—	0.21	—	Optical Spec.	10/21/47
	27	"	—	—	0.67		Works Lab.	10/21/47
	37	Purified oxide	0.25 g U_3O_8		0.21		Optical Spec.	10/21/47
	41+37?	"	1.72 g U_3O_8		1.46		Works Lab	10/21/47
	~~31~~							
	31	Composite Evap. Sol.	1.50 g U_3O_8		1.27		Opt. Spec	10/24/47
	37	Purif. Oxide	0.7657 g U_3O_8		0.648		Opt. Spec	10/24/47
Total	to date				(12.87)			
	# 26	Solution	0.4217 g U_3O_8		0.356		opt spec	11/7
	30	Residue from Ni evap. pan	0.3736 "		0.316		opt spec	11/10
	L-6	Recovered mat	0.1841 g U_3O_8				opt spec	11/14
	35	Soln	1.5217 g U_3O_8		1.29		Lab	12/12
	~~24~~	soln	1.0854		0.918		"	"
	38	soln	0.8897		0.753		opt. spec	"
	30	purif oxide	0.1127		0.095		opt spec	
material returned from lab		" "	0.4765 grams		0.403		opt spec	Reid Decomp.
Returned from opt. Lab. 12/30/47			0.7443 g U_3O_8		0.6584			

See page 42 for further samples.

$\frac{U_3}{U_3O_8} = \frac{705}{831} = 0.8463$

Reason

Report.

Audit

M/Y

M/Y

M/Y

M/Y { Also run on optical spec.

Attached.

Corrosion ck.

"

Isotope

Test of recovery procedure

Isotope.

Sample not reported - no results obtained

93.26 ± 0.11

Sample not reported - no results obtained

93.29 ± 0.13 (#3) 93.10 ± 0.22).

contaminants

"

Attached

Attached

S Contaminant.

V: contaminant.

for B + S;

~~for B, Ba, Fe~~ M/ % U

duplicate

Ni, Cr, Fe for corrosion check

contamination.

M23 Reported 34.98% U by wt in solution

M23 " 34.99% U " " - "

Date.	Dish No.	Wgt. Oxid	Wgt. X	Nature	To.	Remarks
1/9/48	40	1.2302	~~0.9324~~ ~~0.7750~~	Composite	Optical Spec.	For corrosion check
1/9/48	26	.6009	0.4750	Composite in duplicate	Analytical for % U.	
"	26	.5844	0.4619			Returned from Opt. Spec.
1/21/48	40	0.9842	0.7779	Returned sample		
Not shipped in Jan.		0.2116 gms U.	0.1672 gms	Not included in material Balance because less than 1 gm.		
2/4/48	40	0.7578		Composite from $Nat(NH_4)SO_4$ ppt	Optical Spec	for corrosion check for Fe, Cr etc. . .
	41	~~0.1335 sample wgt~~ 5.0465		from	Optical Spec	
	38	4.6785		extracted	Analytical	
	27	7.1327		raffinate	for % U	
	28	6.6816		Purified	for % U	
	25	0.7949		Oxide duplicate		
3/17/48	G.S. bottle					
	Gross	891.841				
	Tare	443.273				
	Net	448.568	353.563	Purified Oxide	Anal Chem.	% of Theoretical = 99.71% 84.40% U
		378.541 gms U				
3/22/48	30	0.1253		sample of oxide	analysis	
	31	0.1018				
	37	0.0725		"	Spec.	
	Bottle					
	Gross	715.382		This was reprocessed & shipped 6/17 -		
	Tare	315.446				
	Net	399.936				
		337.69 gm U.				

Returned wgt X

0.7779

44

Material Shipped

Date	Nature	Wgt.	% X	To.
5/8	Solid Sample (P-2)	.9950		Lab D
	" (P-3)	1.0170		Lab D
5/20	Solution #156	50 ml + U 1.044	.0353 gm/gm	Works lab "
	#157-8	1.044	.0353 gm/gm	"

5/4	Sol'n		~~50 ml~~	% U.		Total X
		F-2	50 ml	1.35	.006 gm/gm	Works lab
		F-3		1.24	.0091	
		F-4		1.32	.0115	
		F-5		1.27	.0145	
		F-6		1.36	.0088	
		F-7		1.37	.0066	
		S-1		1.27	.0058	
		S-3		1.28	.0023	
		F-8		1.38	.0046	
		F-9		1.39	.0121	

Total gms U = 5.347
Total gms X = 4.99 gms } Sent as samples

5/20		
	C-1	0.13 gm/site
	S-4	3.76 " "
	S-5	1.05 " "
	F-10	8.36 " "

6/17/48

Sample	Vol.	Sp. Gr.	% U	% X	
S-6	100	1.29			to work lab
S-7	"	1.24			
S-8	"	1.25			
S-9	"	1.18			

total

Purified Oxide

P. 3 709.850
315.946
Net 384.904 80.07% U to Coled Chem.
394.406
307.792 gms U

P-3A 735.885 83.43% U to Coled Chem
275.205
Net 460.680
384.178 gms U

~~total oxide shipped to date = 1.198447 T~~

previous 378.591 gms U

107,056 1 gms U

999.904 gms X

50 Evaporation Tests 10-17-47

Sample from 1st Evap. Batch for H/X

UO_2F_2 Sol

8.5183
6.5010
2.0173

U_3O_8

7.6641
6.5010
1.1631
× .8482
.984 gm U

$\frac{U_3}{U_3O_8} = .8482$

$\frac{.984}{2.0173} = 48.80\%$ U, $1.298 \times 48.80 = 63.40\%$ UO_2F_2

$= \frac{45.55\%}{235} X = .1938$ moles × 100 gm

$\frac{H}{X} = \frac{2\,MOF}{A\,MW} \cdot \frac{\frac{MU}{MOF} - \frac{mu}{mw}}{\frac{mu}{mw}}$

100.00
63.40
36.60% H_2O
9

$= 4.167 \frac{\text{moles } H}{100 \text{ gm}}$

$\frac{H}{X} = \frac{4.167}{.1938} = 22.0$

Calibration of P-10 pipette: 10-17-51

Wt H_2O to Mark

#1) 10.3817 − 6.8597 = 3.5220

L-4 Dish.

#2) 10.3917 − 6.8597 = 3.5320

Av. 3.527 gm H_2O

Sp. Gr. of 1st Evap. Batch.

L-4 14.3457 − 6.8597 = 7.4860

$\frac{7.486}{3.527} = 2.14$

Sp Gr. 2nd Evap. Batch 10-20-47

13.8938 − 6.4783 = 7.4155 / 3.527 = 2.10

H/X 10.6350 − 6.4783 = 4.1567 gm O_3O_8

.8462

83134
24940 2
16626 8
33253 6
3.51739 9 5 4

47.43% U

$H/X = \frac{2797}{W} - 34.3$

$= 22.67$

52 U_3O_8 Samples For Corrosion Tests.

(10)-10-47

	M'.	
← Dish # 26	9.2696	General system
	8.8484	Corrosion
	.4212 net	sent to lab. 10-10-47

Dish # 30	9.4524	Corrosion of
	9.0788	nickel pan
	.3736 net	sent to lab 10-10-47

Samples for H/X

(10)-11-97 (2nd Solution series)

H/X = 30

		Dish 27	11.3078
Dish # 28	10.8665		8.7344
Cyl. # 1	8.5062	Cyl 9	2.5734
	2.3603		

U_3O_8	9.6571	9.9539
	8.5062	8.7344
	1.1509	1.2195
H/X	31.42	33.38

Department Analytical

Department Supervisor E. Olszewski Copy No.

SAMPLE	Description	Sequence No.	Date Rec'd.	Date Finished
U Salts	L6 and #26		1-9-48	1-15-48

RESULTS L6 U .5108 g./2.9675 = 13.60% X #/X = 126.03

26 U .4978 g./2.8758 = 13.68% X #/X = 125.57

Date Reported 1-15-48 Operator Marshall

Data Book No. HL 737 Page No. 143 Supervisor Shorten

REMARKS: These samples contained iron, and since analyses were run so as to include iron these figures for wgt of U may be slightly high. (DTC)

Work Requested and Reasons for Submission of Sample: Analyses of #L6 and #26 for total Uranium 235.

Date Submitted: 1-9-48 Submitted By: Cronin per E Callihan

Source of Sample Lab. B

SAMPLE HISTORY

WCX-227

Samples for H/X ratio

11/21/47

#28 10.3171 / 8.5061 / 1.8110 gms sol

#27 10.1596 / 8.7343 / 1.4253 gms.

A141
A142
A142

1.8861 gms Opiold
.7499 g T

0.6909 gms acid
.5897 g T

calc H/X = 31.12 31.82

27.07

(31.56)

11/11/47 Measurement of H/X = 43.87.
Sp Gr = 1.667.

11/14/47 Measurement of H/X = 62.6.
Sp Gr = 1.501

11/31/47 H/X = 86.3
Sp Gr = 1.353

3/8/47 Measurement H/X approx 125
Sp Gr. = 1.250

L6 2.9675 gms sol. 26 2.8758 gms sol.
.6009 gms opiod .5844 gms acid
H/X = 126.74 H/X = 126.16

avg = ~~127.45~~ 126.40

from lab. 126.03 125.16

avg = 125.57

54 1/24/48

$d = 1.1864$ H/X u 175

Weight Burette

96.8783

Dish # L2 6.4689 gm

" L3 6.4779 gm

Wgt Burette - L2 88.9175

Wgt Burette - L2&L3 81.5562

Wgt # L5 6.5003

Wgt L5 + Sample 7.1816

.6816

Wgt # 25 8.9456

9.7405

0.7949

L-3 7.6337

6.4779

wgt Oxid → 1.1558

wgt T = .9778

gu/g UO2 F2 = .1328

88.9175

81.5562

wgt soln → 7.3613

~~g U = 6.65~~

~~6.21 X~~ 13.28% U

12.41% X

$\frac{N_H}{N_X} = 173.96$

L-2 7.7189

6.4689

wgt Oxid → 1.2500

wgt. T = 1.058

gu/g UO2 F2 = .1329

96.8783

88.9175

wgt soln → 7.9608

13.29% U

12.41% X

$\frac{N_H}{N_X} = 173.95$

188

1/30/48

dish #38 15.2254 9.1267

H/X 8.2240 8.2240 Sp Gr. = 1.149

Sol'N → 7.0014 gms 0.9027 gms oxide N_H/N_X = 219.72

2/4/48 H/X u 250

dish #40 9.5415

8.7837 gms N_H/N_X = 225.63 Sp. Gr. = 1.145

① * wgt sol'n 6.0126 g 0.7578 gms Oxide = 9.96% X N_H/N_X = ~~225.63~~ 225.76 avg

wgt burette 97.3100

dish #41 9.5355 ① 91.2974

8.8260 6.0126

0.7095 gms oxide

② * wgt sol'n 5.6350 g = 9.95% X

N_H/N_X = 225.89 ② 85.6624

5.6350

dish #52 13.2700

8.2235

sol'n 5.0465

2/12/48 H/X u 325

7.4709 7.4942

dish # L-3 6.4790 dish # L-2 6.4695

wgt. Oxid = .9919 wgt. Oxid = 1.0247

wgt burette = 104.7333 wgt burette = 94.0248

94.0248 82.9723

gms sample = 10.7085 gms sample = 11.0525

Sp Gr. = 1.103

N_H/N_X = 320.11 N_H/N_X = 319.77 09

avg N_H/N_X = 319.94

% X = 7.32 % X = 7.33

avg % X = 7.32 %

* 11/26/48 DC: The values of 9.96% & 9.95% X do not follow from measured & pure U_3O_8; they are probably based also on some analysis, of which we find no record, showing impurity. These values (9.96 & 9.95%) are being assumed correct.

#40

96968
8.7840
wgt liquid .9128

112.7672
103.4462
wgt soln 9.3210

#41

97021
8.8265
wgt liquid .8956

103.4462
94.5087
wgt soln 8.9375

Specific Gr. = 1.110 @ $N_H/N_K \simeq 3/0$

500.80

3/28/48 9.9610
9.9610 Exp 121
#30 9.0789
.8821

N_H = 199.61

110.5691
101.5932
wgt soln 8.9758

Sp. Gr. = 1.108

Exp 122

3/28/48 7.0213
L2 # 6.4698
.5515

101.9120
97.2820
wgt soln 8.6300

sp. Gr. 1.108

240.95

283.13

7.0529
7.0530
L3 6.4788
.5742

287.57

101.5932
95.7405
5.8527

7.5802
7.5301
#L4 6.8601
.6700

97.2820
89.4557
7.8263

246.32

Sent to Rm 8 for analysis 3/5/48

10/26/49 - These materials probably returned to F.O.S by Lab after analysis - DC.

wgt burette alone = 75.3443 gm

3/5/48 By phone from lab.

Samples sent to Rm 8 in wgt. burettes

Ex.		
121	.09113 gm/cc	These samples were pipetted out and material electrolyzed to remove Fe
122	.09136 gm/cc	
123	.26574 gm/cc	.2027 gm U/gm sln
124	.26947 gm/cc	

H/X's calculated using Sp. Gr. as detn'd at 27.05

	Sp. Gr	H/X
121	1.108	281.83
122	1.108	280.15
123	1.311	92.43
124	1.317 (?)	91.24
125	1.319	
126		

101.66 − 18.93% 20.27

100.45 20.45

(Sp. Gr. was assumed after confirmation)

20.80% U

20.58% U

20.60% U av of 123-126 inc

99.45 H/X av of 123-126 inc

58

3/8/48

Ex - 128

30 ml Sp. Gr. 1.319

3/22/48

Samples of purified Oxide

#30 9.2041
9.0788
0.1253

Lab analysis = 81.05%

#31 8.2526
8.1408
.1018

Lab analysis = ~~81.11%~~ 81.11%

95.87% U_3O_8

#37 8.9094
8.8369
.0725

8-12-46 Sample of Refined Oxide

16.4556
14.0770
2.3786

Bottle of refined Oxide (sample above)

552.093
282.008
270.085

6010-20-48 After addition of
12. Jab. sample to refined oxide

	570.535
	282.006
P-5	288.527

6-29-49

NORMAL UF_4 questionable Purity

842.521
449.814
392.707

N-1

%U in UF_4
75.8

~~Sample 19.715~~

NORMAL UF_4 (Presumed to be fairly Pure)

715.980 from
316.830 tare
399.150 net (gms)
5.237 sample
393.913

N-2

24.952 gm
sample 19.715
5.237

IMPURE NORMAL UF_4 + PTFE

~ 86.3 wt. % UF_4
13.7 " " PTFE

849.297 gm.
343.619 tare
555.673 gm net
6.514 sample
549.159

(Probably 10 gm impurity. HK7.)

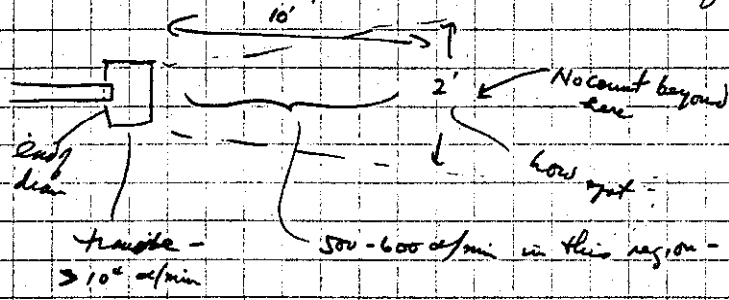
N-3

27.182 gm
sample 20.668
6.514

9/6/49
For
Cronin
Callihan.

Discovered evidence of leak in 8" al reactor:

① High α count in bottom of tamper tank - visible
② " α " bottom edge of al water cans.
③ Survey at exit of 3" tamper drain line -
10' from exit - 500-600 α/min on ground.
Several thousand α/min on trench at end of pipe



④ Stainless steel al
④ 6" water used in tamper tank Exp 261, 8/30 - no observed change in grid glass rdg. during Exp.
③ Stainless steel shells, used recently as follows -
(Shells numbered smaller → larger diameter).

#1	8/29	Exp 259	In all cases tamper tank filled to top with H₂O. If leak would be into reactor.
#2+#1	8/26	" 258	
#1,2,3,4	8/25	" 257	
#1 → 6 mc	8/24	" 256	
#1 → 16 mc	8/24	" 255	

Tamper tank

#26 A - no wipe test, concave side, area wiped = ~ ½ ft²
9 B - " " " "
5 B 600 α/m wipe " "
1 B 600 " " "
1 A > 1000 α/min. " "
7 B no wipe test. " "
6 B " " " " "
5 B ~ 100 α/min. convex side
(Later was verified that contamination was α)

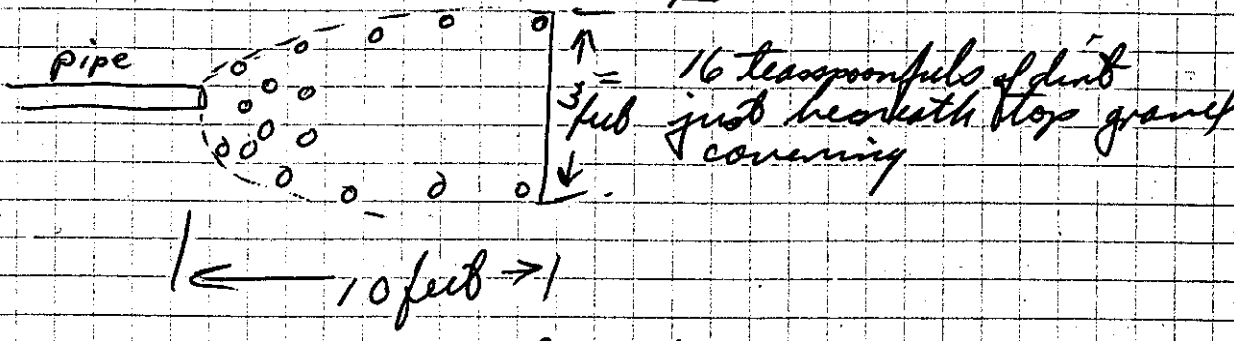
These indicate #1 → 4 were used during a leak - concave side #5 contaminated (from #4).

Spot chemical test of water from al shells, → U neg.

Removed top tamper - noted blisters in Bakelite on bottom of reactor & block corrosion where lateral (vertical) surface is welded to bottom.

9/6/49

Samples of dirt taken from end of drain line



Samples taken in tared beaker (377 grams tare) and placed in oven to get bone dry wgt.
Sample consists of limestone chips, organic matter, clay and cinder. ∝ Count over this area 500 → 10000 ∝/min - (See pg 66 for counts).

Removed Al shells - found heavy encrustation of yellow uranium salt - under them some black oxide deposit. Surfaces in contact with Al. Bakelite paint blistered on exterior & interior surfaces of reactor.

Found pin hole in reactor - side → bottom

on side towards control room.

Discharge end of 3" drain line - showed zero wipe test on upper surface (inside)

high count (~ 10^4) on bottom inside surface

It seems unlikely that the acid deposit under the Al H-O shells could have been formed in the presence of water - unless a precipitate occurred upon reaction of $UO_2(NO_3)_2$ with water. (The precipitate was rather less soluble in Na_2CO_3 than expected).

The bottom (inside) of the 8" reactor

is dished away from center:
due to poor manufacture & provides a
hold up (~100 cc) for solution. ~~It may be that~~
Upon examination the bottom was dry
& not incrusted - It may be that
the large leak developed at end of
EP 261 & this held ~~to up to~~
up drawn during the period of
inactivity 8/30 → 9/6.

—

9/7 - Sampled storage cylinders A & K in order to determine if significant amounts of water had leaked into solution during those times when sump water level was above solution line (& normalize for density differences).

Sp. gr. A = 1.549
K = 1.550

Removed & cleaned Al rings used to support S. steel & Al shells -

Removed 5' of 3" pipe & 45° ell from end of discharge (H_2O) line in order to fit pipe ~~cap~~ cap having 3/8" flare connection to 3" line. With S. steel centrifugal motor + P10 tubing circulated hot concentrated Na_2CO_3 through 3" line. Removed & replaced with fresh CO_3 solution which stood in pipe over night.

Took earth sample to lab.

Bonney & [illegible] here - they are to decontaminate shells and other parts we can take to 1410 & maintain material balance.

9/8 - Washed Al shells - HNO_3 - to ~ 3000 residual α. Took @ 1410
Checked S.Steel shells with poppy - maximum count from = ~ 1-2000.
Stenciled numbers on A.D. shells & took 1→6 Bac, 1-7A &c to 1410
Checked rest of A.D. shells - no contamination.
Completed working of 3" pipe - 2'nd carbonate wash -
followed by HNO_3 - 1:1 - followed by water.
Decontaminated inside of tongs tank -
Sampled solutions from decontamination.
Cleaned out 3" dump reactor - working fm inside - Removed reactor -

9/9 - Al & SS back from 1410 - S.S. not clean -
300 wipes -

Surveyed ground at 3" discharge - transite around
- 10⁴ α/min - with high pressure argon chamber - 0.15 gm/ft² -

Surface - 5000 α/min. No response on β chamber.
(Drip line beside K1095 - lower end ~ 5000 α/min

3" pipe above ~ β on high pressure argon chamber - (0.2 gm/ft²

[Surface of limestone drip line of gutter: 11x1 on 2 counts -
1/2" below surface 3x1 on 2 counts].

1" below surface 5' from at discharge of 3" line - no α

Indications are that the limestone strongly
absorbed the U.

8" reactor @ 1410 -

Removed gravel from ~ 75 ft² at discharge of
3" line - total of about 10 ft³. ≈ 10^3 lbs -

Results from analysis of gravel (see pg 64): 0.9 μg/gm rock (?)
On this basis the 10 ft³ removed today contains ~ 0.05 gm. 0.5 gm.

9/12 - men from 1410 helped decontaminate [illegible] shells + ~~[illegible]~~ al shells —

9/13 Decontamined + replaced 5' length of 3' pipe.

9/14 Grotune + Strang at FOS; reviewed spill; they suggested obtaining analyses [illegible] of samples taken from gravel —

Jock 20 } B
1 }

9 }
18 }

SECRET

24 }
4 } D

23 }
3 } A

SECRET

SECRET

SECRET