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RHO-RE-NB-142

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	NOTEBOOK NUMBER RHO-RE-NB-142
	DATE OF ISSUE 3-22-84	SERIES AND COPY [redacted]
	TITLE (INDICATE SUBJECT CONTENT) Historical Waste Information

AUTHOR (S) - DEPARTMENT AND SECTION
FM Jungfleisch
Program Engineering Dept
Environmental Engineering Group

PERIOD COVERED (INCLUSIVE - MONTH, DAY, YEAR)
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ROUTE TO	P. R. NO.	LOCATION	ROUTE DATE	SIGNATURE & DATE
FM Jungfleisch	65487			

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RES[redacted]TED [redacted]
THIS DO[redacted] CONTA[redacted]ESTRICTED AS D[redacted] IN THE [redacted]IC ENERGY [redacted] TRANS[redacted]L OR THE [redacted]URE [redacted] CONT[redacted]IN ANY M[redacted] TO AN [redacted]AUTHORI[redacted]RSON IS PR[redacted]ED.

[redacted]

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By Authority of CA Bauman, 8-7-92, PR-24 & CG-PR-2
By TL Birkstie, 8-10-92
Verified By PM Eck 8-10-92

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[redacted]

Date	Source		Batches[c] 221B	221T	Comb.	224B	224T	Comb	231	221B	[cut off] 2
~~12/44~~	2455	7-1144 [1-10-45]	3 (and Btracer)		3						
1/45	2649	7-1243 [2-14]	3		3		6	6	6		
2/45	2802	7-1388 [3-13]	6		6		7 (1R)		9		8
3/45	3048	7-1514 [4-18]	6		6		~~8~~ (1R)				5.
4/45	3225	7-1649 9(1) [5-14]	21		30		23 (1R)		10	12.5	2.
5/45 [6-14]	3409	7-1793	24 (20)	22 (16)	46	24	28 (6R)	52 (6R)	41		7.
6/45 7-14	3532	7-1981	10 (10)	10 (12)	~~20 (22)~~				20 (22)		
7/45 8-13	3704	7-2177	13	8	21	11	10	21	21		
8/45 9-18	3864	7-2361	21 ~~18~~	28	49	18	23	41	41	3.0	
9/45 10-17	3990	7-2518	25	24	49	23	25	48	48	3.4	3
10/45 11-7	4102	7-2706	38	37	75	37	34	71	71	3.4	3.
11/45 12-7	4234	7-2457	36	40	76	34	41	75	75	3.9	1.
12/45 1-8	4334	7-3171	34	36	70	39	38	77	77		3.
1/46 2-8	4478	7-3378	28	39	67	26	38	64	64		
2/46 3-8	4623	7-3566	31	31	62	31	32	63	65		
3/46 4-5	4762	7-3751	31	25	56	27	22	49	49		
4/46 5-9	4923	7-4004	32	31	63	~~37~~	~~29~~	66	66		
5/46 6-10	5050	7-4193	41	23	64	37	27	64	64		
6-46 7-10	5154	7-4313	31	26	57	39	30	64	64		
7-46 8-12	5297	7-4512	36	15	51	31	13	44	44		
8-46 9-19	5395	7-4739	46	13	59	47	14	61	61		
9-46	5516	7-5194 10-16	26	4	30	26	3	29	29		
10-46	5692	7-5362 11-18	33	6	39	36	4	40	40		
11-46	5899	7-5505 12-18	27	13	40	21	6	27	27		
12-46	6089	7-5630 1-17	29	18	47	33	23	56	56		
1-47	6262	7-5802 2-20	18	14	32	20	13	33	33		
2-47	6459	7-5994 3-14	15	15	30	15	16	31	31		
3-47	6684	7-6048 4-14	29	20	49	25	16	41	41		
~~4-47~~	~~15334~~	~~HW 9962 (5-12-47)~~									
4-47	6901	7-6184 [5-12]	19	18	37	18	18	36	36		
5-47	7152	7-6391 [6-13]	18	18	36	22	21	43	43		
6-47	7454	HEW-7096 [7-15]	20	11	31	20	12	32	32		
7-47	7793	HEW-7283 [8-13]	22	22	44	21	16	37	37		
8-47	8083	HEW-7504 [9-11]	17	16	33	20	20	40	40		
9-47	8408	HW-7795 [10-15]	22	18	40	19	19	38	38		
10-47	10367	HW-7997 [11-10]	15	14	29	14	14	28	28		

(3)

[redacted]

c Hanford Engineering Monthly Report Month-year
1 doesn't include 1 special charge (B5-04-IP) for Np237 Recovery
2 All starts except 231 which is completed ( ) indicated completed in 221B or 221T

(3)
(4)

 [redacted]

	Waste Loss (% of Analyzed Starting Product)						G DF (log)						waste l…
	221T	Avg	224B	224T	Avg	~~231~~ in waste	221B	221T	Avg	224B	224T	Avg	231
	(Assume accurate to within 1%)												
	8.6			26.0 (~~16.4~~)				6.0			7.8		
	5.0			3.0		7.6		5.5			7.92		
	2.0			6.0		8.1		5.34			7.53		
5	7.7	8.0	10.5	3.1 (~~13.7~~)	10.0	7.9	4.96	5.41	5.08	7.5	7.5	7.50	
			6.4	8.3		7.3				7.22	7.36	7.28	
			7.7	7.0	(4)	7.3				7.20	7.19	7.20	
			6.8	7.3	(.56)	7.0				7.29	7.36	7.32	
0	3.2		6.2	6.3	(.13)	6.3	5.28	5.35		7.25	7.27	7.26	
4	3.8		6.4	7.0	(.24)	6.7	5.32	5.37		7.32	7.20	7.26	0.03
4	4.2		6.8	7.5	(.26)	7.2	5.20	5.29		7.22	7.20	7.21	0.06
7	3.7		7.2	6.9 (~~[illegible]~~)	(.20)	7.0	5.11	5.23		7.33	7.15	7.23	0.11
			6.8	6.7	(.19)	6.8				7.20	7.16	7.18	0.08
			6.8	7.1	(.16)	~~6.8~~ 7.2				7.31	7.22	7.26	0.15
			6.2	7.7	(.18)	7.0				7.45	7.05	7.25	0.16
			6.2	6.7	(.16)	6.4				7.54	7.25	7.42	0.15
			6.2	5.6	(.14)	6.1				7.64	7.51	7.58	.09
			6.8	5.4	(.23)	6.3				7.48	7.45	7.47	.12
			6.2	5.1	(.19)	5.6				7.30	7.29	7.29	.1[illegible]
			6.1	6.8	(.25)	6.3				7.09	6.97	7.06	.09
			6.2	5.7	(.46)	6.1				7.18	7.21	7.19	.15
			5.7	4.8	(.24)	5.5				7.17	7.17	7.17	0.05
			5.5	6.4	(.97)	5.6				7.35	7.07	7.32	0.12
			5.7	5.2	(.21)	5.6				6.96	7.08	6.99	0.13
			5.5	5.0	(.19)	5.3				7.16	7.32	7.21	0.17
		(5)	5.0	(5) 5.0	(.05)	5.0				7.38	7.32	7.36	0.08
		(0.09)	4.4	(.00) 4.8	(.104)	4.6				7.04	7.19	7.11	0.10
	(3)	(.03)	4.0	(.06) 4.2		4.1				7.34	7.18	7.27	0.09
		(0.03)	3.8	(0.05) 3.3		3.5				7.18	7.39	7.43	0.05
		(0.013)	3.2	(0.04) 3.0		3.1				7.59	7.46	7.53	0.05
		(0.008)	3.2	(0.008) 2.8		3.0				7.62	7.06	7.33	0.002
		(0.0015)	3.0	(0.035) 2.6		2.9				7.61	6.96	7.23	0.02
		(0.028)	2.7	(0.018) 2.8		2.7				7.62	7.58	7.60	0.009
		(0.0017)	2.6	(0.022) 2.5		2.5				7.74	7.55	7.64	0.05
		(0.0)	2.7	(0.022) 2.5		2.6				7.91	7.69	7.79	0.002

[redacted]

(3) Cumulative to date 0.22% T Plant, 0.001% B Plant
(4) Avg waste loss both ~~[illegible] steps in %~~ (5) ~~Waste losses~~ for recycle (5) loss for recycle each plant

[redacted]

Date	Source	Charges Started			Charges Completed		
		B Plant	T Plant	Combined	B Plant	T Plant	Combined
11/97	HW-82677 [12-17]	14	16	30	15	14	29
12/97	HW-84138 [1-4-18]	16	19	35	17	18	35
1/98	HW-89371 [2-20]	21	15	36	17	17	34
2/98	HW-91971 [3-23]	21	19	40	23	19	42
3/98	HW-95951 [4-24]	18	18	36	19	18	37
4/98	HW-99221 [5-28]	18	19	37	17	19	36
5/98	HW-101661 [5-21]	15	22	37	22	19	41
6/98	HW-103781 [7-26]	27	25	52	16	23	39
7/98	HW-107141 [8-20]	30	23	53	28	25	53
8/98	HW-109931 [9-24]	24	20	44	27	21	48
9/98	HW-112261 [10-25]	18	20	38	22	17	39
10/98	HW-114991 [11-26]	22	23	45	22	20	42
11/98	HW-118351 [12-23]	24	27	51	20	29	49
12/98	HW-120861 [1-26]	39+	32	~~39~~ 66	34	31	65
Cumulative through 12/98							
1/99	HW-123911 [2-25]	35	40	75	33	37	70
2/99	HW-126661 [3-18]	11	26	37	17	30	47
3/99	HW-129371 [4-19]	39	50	89	32	50	82
4/99	HW-131901 [5-18]	23	18	91	33	19	52
5/99	HW-135461 [6-17]	23	21	44	17	27	44
6/99	HW-137931 [7-18]	21	14	35	25	17	42
7/99	HW-140931 [8-18]	17	21	38	18	13	31
8/99	HW-143381 [9-19]	12	28	40	12	29	41
9/99	HW-145961 [10-18]	27	26	53	23	28	51
10/99	HW-149161 [11-16]	33	34	67	29	29	53
11/99	HW-152671 [12-16]	30	33	63	31	39	70
12/99	HW-155501 [1-20-50]	40	36	76	39	36	75
Cumulative through 12/99							
1/50	HW-158931 [2-20]	36	39	75	39	37	76
2/50	HW-161561 [3-20]	34	34	68	32	33	65
3/50	HW-174901 [4-20]	40	41	81	39	42	81
4/50	HW-174601 [5-19]	38	42	80	40	44	84
5/50	HW-179771 [6-20-50]	39	36	75	36	36	72
6/50	HW-182211 [7-20-50]	35	35	70	36	33	69
7/50	HW-184731 [8-18-50]	51	50	~~99~~ 101	49	51	100
8/50	HW-187901 [9-18-50]	60	60	120	60	60	120

[redacted]

(R) Recycle - cumulatives to date for 12/99 0.17% T-Plant, 0.0039% B Plant

[redacted]

% 1 Starting Material in Waste			Log Df			Loss / Incoming Product
B Plant (R)	T Plant (R)	Combined	B Plant	T Plant	Combined	at Isolation
2.1 (0.024)	2.6 (0.018)	2.6	7.73	7.67	7.70	- 0.002%
2.9 (0.022)	2.5 (0.028)	2.7	7.54	7.64	7.59	0.009
2.6 (0.021)	2.5 (0.026)	2.5	7.58	7.63	7.60	0.05
2.6 (0.016)	2.4 (0.021)	2.5	7.62	7.72	7.66	0.03
2.4 (0.008)	2.2 (0.011)	2.4	7.65	7.59	7.62	0.05
2.7 (0.026)	2.3 (0.025)	2.5	7.78	7.61	7.67	0.12
2.8 (0.037)	2.4 (0.026	2.7	7.52	7.65	7.59	0.13
3.0 (0.017)	2.6 (0.027)	2.7	7.50	7.75	7.64	0.06
2.5 (0.21)	2.6 (0.17)	2.5	7.72	7.83	7.77	0.04
2.5 (0.025)	2.7 (0.020)	2.7	7.73	7.66	7.70	0.007
2.7 (0.024)	2.7 (0.032)	2.7	7.70	7.83	7.76	0.01
2.5 (0.023)	2.7 (0.038)	2.6	7.70	7.89	7.78	0.08
2.7 (0.013)	2.4 (0.019)	2.6	7.70	7.90	7.82	-0.03
2.9 (0.013)	2.8 (0.020)	2.6	7.67	7.74	7.71	0.04
4.8 (0.008)	4.6 (0.128)	4.7	7.34	7.31	7.33	0.09
2.7 (0.012)	2.5 (0.017)	2.6	7.73	7.69	7.71	0.07
2.7 (0.011)	2.4 (0.022)	2.6	7.74	7.63	7.66	-0.04
2.7 (0.015)	2.4 (0.012)	2.5	7.73	7.53	7.59	0.01
2.5 (0.010)	2.5 (0.010)	2.5	7.51	7.64	7.57	0.001
2.3 (0.012)	2.3 (0.017)	2.3	7.53	7.72	7.64	0.007
2.9 (0.0125)	2.9 (0.010)	2.9	7.64	7.48	7.56	~~0.08~~ 0.10
2.9 (0.0107)	2.9 (0.01)	2.9	7.56	7.59	7.55	0.007
2.7 (0.019)	2.5 (0.002)	2.5	7.27	7.95	7.46	0.07
2.4 (0.013)	2.7 (0.011)	2.6	7.59	7.52	7.55	0.027
2.7 (0.009)	2.7 (0.014)	2.7	7.50	7.52	7.51	-0.035
2.7 (0.006)	2.7 (0.010)	2.7	7.95	7.98	7.96	-0.028
2.9 (0.009)	2.9 (0.010)	2.9	7.32	7.30	7.31	0.10
4.3 (0.009)	4.1 (0.095)	4.2	7.36	7.35	7.35	0.06
3.1 (0.008)	3.1 (0.010)	3.1	7.34	7.52	7.43	0
3.1 (0.014)	3.1 (0.012)	3.1	7.92	7.56	7.99	-0.12
3.2 (0.008)	3.1 (0.012)	3.1	7.39	7.48	7.43	0.02
3.4 (0.001)	3.2 (0.020)	3.3	7.37	7.44	7.41	-0.16
3.2 (0.008)	3.1 (0.013)	3.2	7.41	7.42	7.41	0.13
3.1 (0.013)	3.3 (0.012)	3.2	7.50	7.44	7.47	0.004
2.9 (0.012)	3.9 (0.007)	3.4	7.32	7.39	7.36	~~0.010~~ -0.10
2.9 (0.012)	2.9 (0.022)	2.9	7.17	7.32	7.24	-0.17

[redacted]

Cladding 94. [redacted]

Date	Source ① Issued	Charges Started B Plant	T Plant	Combined	Charges Completed B Plant	T Plant	Combined
9/50	HW 19021 10-20-50	53	53	106	53	53	106
10/50	HW 19325 11-20-50	58	59	117	60	62	122
11/50	HW 19622 (12-20-50)	65	56	121	64	52	116
12/50	HW 19892 (1-22-51)	74	56	130	70	62	132
1/51	HW 20161 (2-16-51)	69	53	122	70	32	102
2/51	HW 20438 (3-20-51)	61	61	122	61	60	121
3/51 *	HW 20671 (4-20-51)	66	75	141	67	73	140
4/51	HW 20991 (5-21-51)	62	62	124	61	63	124
5/51	HW 21260 (6-21-51)	64	65	129	63	71	134
6/51	HW 21506 (7-20-51)	33	64	97	44	60	104
7/51	HW 21802 (8-24-51)	32	51	83	35	59	94
8/51	HW 22075 (9-24-51)	57	61	118	45	55	100

Date	Source ① Issued	B Plant Chgs start	Chgs complete	Avg waste loss	Avg MWD/T	T Plant Chgs start	Chgs complete	Avg waste loss	Avg MWD/T
8/51	HW 22075 (9-24-51)								
9/51 **	HW 22304 (10-19-51)	64	66	2.1	583	65	64	2.2	577
10/51	HW 22610 (11-21-51)	77	76	2.2	567	66	68	2.5	570
11/51	HW 22875 (12-21-51)	73	74	2.6	590	80	78	2.7	579
12/51	HW 23140 (1-22-52)	71	71	2.7	572	73	80	2.7	580
1/52	HW 23437 (2-21-52)	63	68	2.6	563	70	62	2.6	568
2/52	HW 23698 (3-21-52)	57	56 Redox	2.5	594	3 41	3 49	2.5	585
3/52	HW 23992 (4-18-52)	46	52	2.7	599	76	72	2.7	588
		66 → 43.1 Redox		0.74(U) 3.55%(Pu)			107.6	1.26	586
4/52	HW 24337 (5-20-52)	57 → 107.6	94	2.7	602	59	65	2.9	568
		105.0 → Redox		0.99(U) 1.26(Pu)		~~65~~	66	3.55(Pu)	610
5/52	HW 24605 (6-20-52)	7	5	3.4		18	19	3.2	
~~6/52~~		R = 110	102	1.08(U) 1.58(Pu)					
6/52	HW 24928 (7-21-52)	9	10	3.6		20	17	2.7	
		R = 70	82	1.57(U) 2.51(Pu)					
7/52	HW 25227 (8-15-52)	5	6	3.9		36	31	2.6	
		R = 126	99	1.42 U 1.05(Pu)					
8/52	HW 25533 (9-29-52)	0	3	5.8		44	49	3.0	
		R = 149.8	158 [redacted]	1.14%(U) 0.87%(Pu)					

① Hanford Works Monthly Report For Month Year (Secret)

* % of starting material in waste is being estimated at 50% of total alpha - %Pu

% Plutonium Stuck (Holdup) in Waste

B Plant (R)	T Plant (R)	Combined
3.0 (0.017)	2.9 (0.025)	3.0
3.9 (0.015)	3.0 (0.025)	3.2
3.2 (0.015)	3.6 (0.010)	3.4
3.9 (0.019)	4.4 (0.011)	3.9
3.3 (0.022)	3.7 (0.0002)	3.4
3.4 (0.017)	3.3 (0.017)	3.4
2.3 (0.012)	2.2 (0.013)	2.3
1.8 (0.027)	1.8 (0.036)	1.8
1.9 (0.023)	1.7 (0.020)	1.8
2.1 (0.053)	2.1 (0.026)	2.1
2.2 (0.016)	1.9 (0.020)	2.0

Log Df

B Plant	T Plant	Combined	Loss of Uranium Product To Isolation
6.91	7.20	7.03	−0.08
7.03	7.27	7.14	0.05
7.05	7.32	7.14	0.05
7.15	7.25	7.20	−0.06
7.11	7.35	7.20	−0.01
7.14	7.08	7.11	−0.10
6.95	7.06	6.97	0.04
6.70	7.32	7.28	0.002
6.57	7.14	6.69	0.15
6.75	6.93	6.83	0.19
6.60	6.82	6.74	−0.08

Waste Evaporation

Month gallons	Month % WVR	Cumulative gallons	Cumulative % WVR	
610,502	72.4	1,795,199	73.5	
538,980	72.3	2,284,179	73.2	
382,732	74.8	2,666,911	73.4	
562,230	79.4	3,229,181	73.5	
469,079	71.9	3,698,260	73.3	[West
280,500	79.3	289500	79.3	East]
611,000	72.00	4,309,260	73.2	West
430,000	76.2	710,500	75.3	East
535,188	73.3	4,894,448	73.2	W
283,799	73.1	990,299	79.7	E
543,125	74.2	5,387,573	73.3	W
459,322	72.9	1,953,621	79.1	E
402,000	72.5	5,794,573	73.2	W
442,000	72.4	1,895,621	73.1	E
297,937	68.9	6,092,510	73.0	W
390,500	75.5	2,286,121	79.0	E
522,585	72.6	6,625,095	72.9	W
279,125	63.6	256,524	72.8	E
516,000	72.3	7,141,095	72.9	W
646,000	65.8	3,211,246	71.4	E
154,000	70.8	7,309,000	73.16	W
630,000	67.2	3,705,000	70.5	[redacted]

Reserve Capacity in Batches

B Plant MW	B Plant IC	T Plant MW	T Plant IC	Cool Time (R) Avg Dim (Days)
820	365	525	907	
1014	410	628	1069	48 41
935	344	561	1137	46 40
868	281	477	1276	49 42
802	300	392	1372	48 40
733	287	322	1545 (360)	49 40
				47 40
679	300	281	1664 (357)	
				49 40
632	254	206	931 (259)	55 53 / 45 40
627	405	790	1020 (290)	
		Adds 2.7% Tanks		53 / 56
618	531	682	938 (290)	CC 60
				Redox: 56/50
613	613	664	1036 (248)	55/40
				R= 58/54
608	87	625	1217 (276)	53/46
Space Assigned to T&P				R= 79/59
598	72	290*	997* (258)	58/50
		Space Reassigned		79/59

% Pu 290 is being reviewed

** Increased in Reserve Capacity based upon Assured WVR.

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[redacted]

Notes

5/45 Reduction in charge volume - Increased tons of metal per charge has resulted in ~ 30% less waste sol'n / ton of metal processed

5/45 Increase in charge size - All chgs in T Plant increased from 1.15T to 1.655T on May 8. Last chg to B Plant in April - charge 9 - increased from 1.15T to 1.325T. 15th charge to B Plant in May increased to 1.655T

5/45 Reference describes tests that reduce volume concentration Feed to 60% and Number of strikes from 3 to 2.

Recycle is handled in 229T at 40% of previous volumes - waste losses are generally less than 1%

5/45 Dry Well at Isolation Bldg filled with solids to about the height of the top of the perforations in the tube - it was abandoned. A temporary drainage basin about 50 yds east of dry well used - Permanent alternate is two underground drains consisting of 12' X 12' X 4' timber cribbing built on gravel about 25' below ground level. They are North of the previous dry well within the Isolation Bldg fence

5/45 Dry Wells serving T Plant Control Laboratory and Concentration Bldg are filled to ~ 90% of the height of the perforations. Cribs similar to those described for support of the Isolation Bldg are being built in the T-Plant area. B Plant wells are clear.

6/45 Routine T Plant Concentration now provides for blending recycle from two isolation charges to each new charge, as it comes to section D of the Concentration Bldg. No additional La is added for the recycle

6/45 Acid rings of B Plant to evaluate product hold up - [redacted] showed 8% of preceding production run in all sections but 14 + 17 14 (1C prod) was 15% + 17 (2C prod) was 38%. Coolants rate to acid recirculation system

6/95 metal heel in B+T dissolvers are ~ 2550 lbs.

6/95 waste loss in extraction about 0.6% for a 1.65ST batch.

6/95 Metal Waste temp in T from 108°F (max to date) This is a rise of about 31°F since March 15. Possibly due to use of steam jetting rather than siphoning. Increased activity also a possibility.

6/95 Waste loss in B Concentrator 5/dy 1.8%. in T they averaged 1.4% for 60% of standard charge + 161 pptn. A third centrifuge run is used when value exceeds 1½%.

6/95 F-7-WS waste from centrifugation of the 15% KOH methysis runs from ½ to 1%. This is ~~an isotopic waste~~ concentration waste.

6/95 Pu(IV) peroxide solubility increases with La conc. La concs of 0.23M (present isolation level for 1st peroxide pptn) 0.46M, 0.69M ~~g~~ give 41, 48, 65 mg Pu/L after 4 hrs.

6/95 First peroxide pptn change to 1.5N HNO_3 / 0.5N H_2SO_4 rather than 2.0N HNO_3 / 0.25 $(NH_4)_2SO_4$

6/95 Peroxide supernatants pptn change to ~~ox~~ Lanthanum oxalate pptn without prior destruction of H_2O_2, dissolution of the ppt in HNO_3 + $KMnO_4$.

6/95 224 ~~Methasis~~ Methesis shows that Ca has an adverse effect (Fe does not) on product quality when La/Pu product ppt is washed.

6/95 $Fe(NH_4)_4SO_4$ used in 1C + 2C.
Fluosilicate used in decon of B.Pu product
Si F_6 = (0.05M) used in decon during 2C.
it is known that decon of Zr-Cd is increased + La [redacted] decreased by the addn of Si F_6 =

7/45 Solids in 101-T - one foot with less compacted sludge to a depth of 1½ ft.

7/45 Sample from 101-T - 40 mr/hr at 4" from waste (50 mr/hr) with no shielding. 39 gm Product (Pu Alpha) filter in supernate. About the same product concentration as found in supernates after laboratory centrifuging of the same product. First cycle waste

7/45 Sample from 115-T - 2 mr/hr @ 4" from waste (5 mr/hr) with no shielding. 15 gm Product / liter - Size as with the same sample ~~separate~~ supernate after laboratory centrifuging. Second cycle waste

7/45 Solids in 361 Tank (224B or 224T - Not specified) measured on June 9. Are depth of 2'4" - not compact - probably can be sluiced to permanent waste tanks. This is a 4" increase since May 13.

7/95 Isolation Procedure Change - use 95% instead of 60% HNO_3 for dissolving peroxide (P-2) cake to reduce volume of solids undissolved in vacuum receiver and increase concentration of AT solids from 225 to 250 g/l to avoid intermediate evaporation steps.

8/95 Avg Cly size - 1.30 ST (1.18 MT)

8/45 Acidity in ~~H2O2~~ by product oxidations. Acidity increased to 6.5 N in both B, BY cycles in both Canyon bldgs (221-B + 221-T) for by product oxidation.

8/45 24% $B.(NO_3)_3$ standard Canyon Bldg Solution for first time

8/45 Metal Waste Temperature - Temperature of metal waste in 101-T + 101-B continue to increase at about 15°F/month. On August 21, 132°F in 101-T + 136°F in 101-B

8/45 Cooling Removal + IC Waste Temperature - ON August 21, 102°F in 107T + 90°F in 107B

8/45 Summary / Waste Temperatures - All in °F

From	Date	MW(101)	104(Empty)	Cont's+IC(107)	2C(110)
T	4-18-45	77	61	80	80
T	5-21	93	62	83	83
T	6-19	108	67	90	88
T	7-17	118	70	94	88
T	8-21	132	78	102	96
B	4-23	62	51	57	60
B	5-15	75	52	68	58
B	6-19	97	55	75	71
B	7-17	110	57	80	78
B	8-21	136	65	90	84

8/45 Product Solubility in Waste - At pH 10 solubility of Bi PO_4 + product are 20 to 30 times higher than at pH 6 to 7. This is consistent with IC/2C drain tanks and Concentration Bldg data on waste discharged to cribs at pH 6-7.

8/45 Concentration Bldg Flowsheet Change - A standard 5.5 lb lanthanum carr is in use at B224-B (Avg waste losses 1.2%) In 229-T, 8.5 lbs of lanthanum in the LaF_3 by product is added completely as recycle (Avg waste losses to 0.84%). The lanthanum added in 224-B is from the gallery.

9/45 pH of 2C waste - reduced from pH 9-10 to 7 to reduce amount of residual product in supernate.

9/45 Isolation Bldg cribs - rate of liquor decrease from 1st crib slowing but still has not overflowed into 2nd Crib. [redacted]

[redacted]

9/45 Extraction waste losses at 221-T - Avg during May, June + July ~ 0.6%. For August + 1.0% + Sept October 1.3%. Probably due to increased product concentrations - Acceptable increase when Bismuth / Product ratio falls below 85.

9/45 Waste Temperature - First cycle waste temps seem to be leveling off at ~100°F, second cycle ~ 90°F. Neutralized metal waste - 101T - 138°F & ~~Hot~~ 101B - 143°F on Sep 20.

9/45 2nd Cycle Caustic - Reduced to about 90% - should drop pH from 9-10 to 6-7.

9/45 Isolation bldg Procedure - Use of oxalate to reduce recycle volume has been used 9 times and will be used indefinitely.
Procedure involves:
1) Partial Neutralization w KOH to ~0.5N)
2) Destruction of peroxide w $NaNO_2$
3) Addn of oxalic acid to ppt Lanthanum oxalate
4) Complete Neutralization w KOH to complete settling of ppt which draws the product
5) Removal of supernate by decantation (contains ~ 0.16% of starting material)
6) Washing of ppt - settle - decant
7) Dissolution of ppt in HNO_3
8) Destruction of oxalate with $KMnO_4$

Volumes recycled to concentration bldg vary from 30 to 93 liters / run.

10/45 Waste losses at extraction - 1.2% for October & is 0.5% better than any previous month

10/45 IC waste pH - reduced to 7 like that for 2C

10/45 All drywells in waste disposal area gave readings below surface background.

[redacted]

[redacted]

10/95 Isolation waste loss - oxalate method of treating recycle material give waste losses that Avg. 0.12% of product change. Infrequently a value as high as 0.5% is seen

11/95 Extraction waste losses - Process improvements have lowered waste losses in 221 T from an average of 1.3% to 0.9%. 221-B remains at 0.9% to 1.0%

11/95 Product hold up in process - Acid washes have recovered 12% of the product in a current normal run for 221-T and 10.4% for 221-B. Maximum pickup was 3.5% from storage tank 12-G in 221-T. A 9.3% hold up was found in 224 T (8.1% from the F-1 methyss tank) A 4.3% was seen for 224-B. (most in F1 Tank) see also p32 where higher values are reported - 5.1% for F cell / 222B. Overall for 221 T + 224 T 21% And for 221B + 224B / 14.6%

11/95 Oxalate method for Isolation Bldg recycle - 3.7% of handled product to waste is 0.14% of initial product.

12/15/95 ~~Test~~ Lanthanum Ammonium Nitrate in Bi Product Step (224) Standard of 6lb / La precharge for by product step maintained (D-4-BP). for 224T Also.

12/95 Project for Process Waste Tie lines from 291-T to 291-U and 291-B to 291-C Authorized

1/96 H_3PO_4 Reduction - in extraction (Section 7) from 2625 lbs / batch (0.8M) to 1970 lbs / batch (0.6M). in 2C decon (Section 17) from 1719 lbs / batch (0.6M) to 1200 lbs (.4M)

1/96 HNO_3 Normality in cell C of concentrator Bldg reduced from 7.5 to 6.5 for oxidation

[redacted]

[redacted]

1146 Preoxidation of recycle in 224-T - used 0.02 mol/l $KMnO_4$

1946 pH of stream 1C + 2C for ets to West - pH varied from 6.15 to 9.3. β & γ drops for supernatant with pH (pH 2.0) 8111 @ pH = 6.5, β = 58 counts/min/ml for supernatant soln. This is consistent with value for Concentration of dilute waste currently being discharged to the dry well.

1146 Reduced Phosphoric Acid - 221B extraction @ 0.6 M.
221T 2C decon at 0.4 M.

1146 HNO_3 in $Bi PO_4$ By Product step of concentration - reduced from 7.5 N to 6.5 N.

2146 Reduced Phosphoric Acid - H_3PO_4 reduced in all 3 cycles at both 221T & 221B. Extraction at 0.5 M. Decontamination at 0.4 M. Result in waste losses of Extraction - 0.68% (vs 0.72% @ 0.8 M)
First Cycle Decontamination 0.28% (vs 0.32% @ 0.6 M)
Second Cycle Decontamination 0.26% (vs 0.39% @ 0.6 M)
Conditions result in savings of 1680 lbs H_3PO_4, 1025 lbs of NaOH and 135 lbs of Na_2CO_3 per batch.

2/96 Waste from Isolation to Cribs - Waste overflowing from first sump tank and to the second at the Isolation bldg. Measurements at underground cribs at T Plant and dry wells at B Plant showed satisfactory performance with no plugging

2196 Concentration Building waste settling tanks - 361 tanks equipped with liquid level instruments.

2196 361 Tank at 224-T - sludge at 8½ ft with 6½ ft freeboard to overflow. This is a 6¼ ft increase for last 250 runs or 0.3 in/run

[redacted]

2/96 Impurities in Uranium – Mg, Mn, Pb, Fe, Ni, Cu, Cr analyzed for – extraction process – No feeds data yet seen in records on impurities

3/96 H_3PO_4 in extraction – 221T extraction @ 0.6M for last 14 runs

4/96 Rework of wastes normally discarded from organic treatment/recycle – Analyses exceeded limits. Method temporarily discontinued at older Nitrate method used organic method reintroduced when scaling was controlled

4/96 Capacity of underground tanks @ T solution – gradually decreasing due to blockage of drainage. A temporary underground tank has been installed and will be used if necessary. Permanent waste disposal tanks are being planned.

4/96 H_3PO_4 in decontamination – 221B reduced from 0.9M to 0.3M for 2nd cycles beginning in 6th Run of April. Aroumic in extraction reversed from 0.5M to 0.6M for 221B and 0.6M to 0.5M for 221-T (Waste loss ~0.80%)

4/96 Material blocking HW transfer line – $UO_2CO_3 \cdot 2Na_2CO_3$ soluble in $NaHCO_3$ soln. Soluble at reduced temperature (blockage formed @ 65°C)

5/96 I^{131} retention – 10% in metal soln with 90% going up the stack

5/96 TC & ZC Tanks for neutralization – neutralization conducted on total batch rather than 1/2 batches as before in Tanks 15-8 & 15-9 of 221B & 221T.

7/96 Oxalic method of strip solution recycle – full $KMnO_4$ addition required.

7/96 Project 2-31 Bldg waste disposal facility – addit – authorized

[redacted]

8/96 Sludge level in Concentration Bldgs settling tank reached baffle in both tanks

8/96 H_3PO_4 conc in extraction - Standard set at 0.5M. Saving 1040 lbs of Al_2O_3, 1680 lbs of H_3PO_4, 150 lbs Na_2CO_3 and ~ Two gallons of neutralized waste storage volume per run

8/96 Addn'l Waste Facilities. Project C-92, Addn'l facilities For 231 is 65% complete. Project C-104 Addn'l facilities for Concentrations Bldg is 45% complete

8/96 Work began to bypass 361 tanks in 229B+224T - Concentration waste will go to one of 200 series tanks. Sludge in 361 tanks had high density + removal - [redacted] found to be impractical. Work nearly done in 229B in Sep. + should be done in Oct. for 224T. It is planned that waste will overflow from the 200 series tanks to underground cribs.

9/96 Sludge levels - by Ionization Chamber. T Farm T107 ~1/2 full. T110 ~1/4 full, T111+T112 gave No significant readings. T111+T112 samples taken for α, β, γ, pH + Bi measurements

9/96 ~~Re~~ Jetting of 361 solids - Top 10" of solids in 361-B Tank jetted to some 200 series tank

9/96 Uranium Quality. - 26 tons of TX billets found to be high in silicon (220 ppm), some billets high in specific impurities. Molybdenum (120 ppm) Silicon (640 ppm) Aluminum (900 ppm) Statistical Study initiated

9/96 Projects - C104 addn'l Conc Bldg Waste Facilities (Soil by Pass) 80% complete. Reroute waste lines From Section 9 of 221-B 15% complete

[redacted]

10/96 Combining of 2C Supernates - activity no higher than concentrate Attack Bldg waste

10/96 2C Waste sludges - T 110, 111 + 112 checked with ion exchange. In T 110 sludge was 38" deep + uniformly distributed. No indication of sludge in T 111 or T 112.

10/96 By pass of Tank 361 - At months end 361 tanks used exclusively to handle canyon cell drainage. Such drainage neutralized with 19 lbs of 50% NaOH per batch jetted to 361 tanks. Concentration Bldg waste routed to 201 tanks that will be used for settling + overflow to underground cribs for 224T + 224B

10/96 Metal waste to C - from - Waste in C103 raised to a point 6" below the overflow on 10/29. Metal waste rerouted to C104.

10/96 Project C112 provides for added underground waste tank facilities in the 291-B Plant Tank Farm.

10/96 Isolation Waste to Crib - Bulk of product in neutralized sump tank sludge, only 0.4% of sludge in sump solution.

10/96 Analysis of supernates from T 110 T 111 + T 112. α 26 to 80 c/m/ml, β 400 to 650 c/m/ml γ 4 to 180 c/m/ml. For Con. Pond to Concentration Waste. These wastes have less α, comparable β + 7 times greater γ.

10/96 Deep Sewer Cell 5-7 Waste Canyon - B Cell Canyon bldg. waste that accumulates in the deep sewer cell 5-7 is at pH 2 + is neutralized before jetting to the 361 Tank. Previously it was just mixed with the alkaline concentrate waste bldg wastes that no danger pre to Tank 361.

[redacted]

10/96 Density of Pu/U waste sludge - 1.385 after 21 days of settling. After concentration - 1.595 Gal 69.5.

10/96 Semi-works waste storage - of the 120,000 gal capacity - 57,000 gallons remains. One tank is ½ full, two are ½ full and one is empty

11/96 $Bi(NO_3)_3$ prepared by dissolution of Bi metal in Tank M-903 for T Plant

11/96 Four settings of 5000 lbs each of 10% $NaHCO_3$ to 2-9-CD to clear blocked filter. An additional 10,000 lbs were flushed - 60% HNO_3 followed by 10% $NaHCO_3$ + 30% Na_2CO_3 - Then 5% H_2SO_4 followed by $NaHCO_3$ + Na_2CO_3. Further 2500 gallons of water was flushed. Line replaced with a substitute - Metal waste disposal

11/96 Drop in Decontamination Factors - Lower decontamination factors in both canyon + concentration bldgs seem to be tied to an increase in total β activity due to two cesium isotopes.

12/96 Log DF fluctuation in Section 13 of first cycle Decontamination factor varies 4 to 19. All bottom ~~sections~~ sections relatively consistent in DF except have ~~not~~ in the first MIF of the first cycle decon.

12/96 Sludge measurements - No appreciable amount of sludge in T-105. Sludge level in T-101 is about 2 3/4 feet, and ~~has~~ supernatant has a "product alpha" of 10^4 ~~counts~~ (?) counts/min. It is suspected that the bulk of product sent to Tank farm tanks remains in solution. This is about 85% (calculated) of the product sent to these tanks in solution

[redacted]

 [redacted]

12/46 Probably 15% less product recycled back to the concentration Bldg when H_2O_2 is increased by 35% in Isolation Bldg.

12/46 Precision of fuel impurity measurements - ± 7.02% for iron, ± 12.82% for silicon, ± 17.85% for Nitrogen. Manganese also routinely measured for.

1/47 Extraction waste losses - remain about 1% with excursions to 1.5%

1/47 pH of stored 2nd Cycle wastes - remain at about 6.5 to 7.5 for 2nd Cycle wastes with contributions of acidic waste from stack drainage.

1/47 Isolation Building Cribbing - Current underground cribs that receive Isolation bldg supernatants abandoned. Reserve waste disposal cribbing system - installed some months ago - placed in service.

1/47 Project C-120 - Cribs for 2nd Cycle waste supernatants - Field release in late January. Waste from T-110 will be diverted to the crib facility in February

1/47 2nd Cycle waste supernatants - pH 6.0 to 7.7 for T Plant tanks. α + β activities normal - No γ activity found. Only about 1% of the product sent to the tanks is in supernatant. I.E. 99% of the product precipitates in 2nd Cycle waste.

1/47 $(NH_4)_2SO_3$ reduction in Isolation - Standard quantity insufficient. Some runs require 2½ times the quantity.

1/47 Decrease in uranium quality due to density, iron + nitrogen content

[redacted]

[redacted]

1/47 Fuel Analyses

	Lead End	Center of Rod	Butt end
Nitrogen	81.27 ppm	27.91 ppm	82.00 ppm
Iron	118.05	112.09	117.05
Silicon	151.17	162.64	171.95

details in Doc 3-5252 issued Jan 17, 1947

1/47 Projects - C112 241-B(BX) Waste Storage tanks
C120 Divert 2c Waste to ground from 241-110-T-B + install condensers on 241-112-T-B
C133 Special Test Wells 200E+W

2/47 Nitric Adjustment in Oxalate kill - The weight of 50% KOH added to the oxalate kill prior to the addition of oxalic acid was reduced to permit closer adherence to the desired normality of 0.5N in HNO_3. Previously 0.091 gms of product to waste/run. Now 0.055 gms of product/run.

2/47 241 T 2nd Cycle Waste Cribs - Excavation began in Feb 47 for underground crib system and tile field adjacent to the 241 T farm for 2nd Cycle waste supernatants. Lines to cascade series tanks + project condenser for T-112 will not be installed yet.

2/47 2nd Cycle Waste (Probably Supernate) fro B-110 - 160 product α c/m/ml, 3600 β c/m/ml + no gammas. At pH 7.2. Except for higher β, same as T 110. α measurement indicates that 98% of product is in sludge

2/47 Isolation Bldg Recycle to B Plant - recycle material is being handled by alternatively filling E-9 tanks in the B + T concentration bldgs. First run @ B is B-7-01-D-10. First run without recycle at T is T-7-01-F-9

[redacted]

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2/47 Washing of By-Product Cake - Waste losses from bismuth phosphate by-product cake (A-2) have been reduced by increased washing of the lanthanum fluoride by-product cake. 224B losses from .60% down to 0.40%. 224T losses from 0.55% down to 0.41%.

2/47 Uranium impurities - some "speckled" slugs contained 2400 ppm of carbon

Fe, Si, N, Hg will be by wet methods and B and MN by spectrochemical methods in the future.

3/47 Recirculation of Metathesis Wash Waste - All metathesis wash centrifugation waste in the 224B Bldg will be recirculated from (F-9WS) to the precipitator tank for the succeeding run

3/47 Isolation Bldg Recycle to T-Plant - An improvement of about 0.06% noted in lanthanum fluoride by product cake solution waste loss by performing in B was T. In April, Both concentration Buildings will process recycle solutions from the nitrate instead of the oxalate kill method. Conversion made during latter part of March to eliminate descending product to underground cribs in Isolation Building wastes.

3/47 $(NH_4)_2SO_3$ continued (since February) to be run at 0.2 M in the pre reduction stage prior to the first cycle precipitation during isolation.

3/47 Second Cycle Cribbing Facilities at T - ~ 45% of excavation is complete. First test well drilled under project 133, went to 88 feet about 40 feet from crib originally used to support isolation - No contamination found.

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3/97 pH of U-110 supernate - value from 9-10 checks with other IC waste receivers confirmed value. Analysis of supernatants indicates satisfactory separation of product from supernatant.

3/97 First Cycle Waste Storage Tanks - C-112 full. Waste diverted to C-107 Cascade.

3/97 Reduction of Carbonate by Isolation - With 75% of all product handled by lab returning to process AND replacing existing method with nitrate method for testing recycle supernatants - process wastes are eliminated entirely as is the need for recycling product to the cascade system.

3/97 pH of Neutralized Wastes - pH of IC waste increased from a range of 6.5 to 8.5 to an average of 9.3 when combined with Aluminum Cooling Waste. Adjustment will be made to reduce caustic addition to IC waste to decrease final value in mixed waste to from 6.5 to 7.5.

4/97 Section 14 product cake Wash Water - About 1000 lbs (120 gallons) of water are used each run to wash the Section 14 product cake in the canyon bldg. Product and fission product activity are being studied to determine if the wash water can be returned to section 13 for dilution water on each subsequent run. Rather than combine it with the IC waste as has been standard.

4/97 LaF_3 by-product cake rework - Effective w.o. B-7-03-D24 + T-7-03-D20 - Cell D LaF_3 by-product cake is reoxidized, digested and reprecipitated to recover product (~0.40%)

[redacted]

4/47 Concentration in Cell E - Procedure changed from two strikes + three centrifugations to three separate precipitations and three centrifugations. Waste losses reduced to about 0.15% to 0.20%

4/47 $(NH_4)_2SO_3$ in Isolation Prereduction - No advantage seen for $(NH_4)_2SO_3$ above 0.05M.

4/47 Flush of 8A/1 waste lines in 224U - 10,000 lbs of 10% NH_4HCO_3 used to flush lines.

4/47 Rework of extraction cakes - As time permitted extraction cakes were reworked with 1/4 amount of $NaNO_3$ and 1/10 the amount of $Bi(NO_3)_3$ about 0.7% of the extraction waste for each run.

4/47 Rework of LaF_3 by-product concentration - New procedure - Waste slurry is returned to Precipitator D-1, made 1.0N in HNO_3 and treated with $KMnO_4$, $K_2Cr_2O_7$ + HF - then recentrifuged. The effluent is sent to Cell E for combination with the main effluent. D-4-BP losses are reduced from about 0.45% to less than 0.1%

4/47 Recommended addition of a semi works to replace the pilot plant for Redox development - such work as was conducted in 321 Bldg. Demonstration is planned for 321. Hot reproducibility work should be done in the new semi works.

5/47 ~~Strike extraction~~ Rework of Extraction cakes - 16 charges reworked - Average waste reduction in product loss 0.62%

5/47 pH of IC waste - The second reduction of caustic in IC waste - made in split - further toward the pH of IC waste. Product 2 + Fission product activity [redacted] lowered as well in separation.

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5/97 Concentrator Methods Procedure - 70% of Start up standard for volume Now standard. ~~5/97 Concentrator~~ pound more titanium in methods waste rework. Has lowered total CaHF losses to about 0.14% for both plants.

5/97 Isolation Activity - less than 0.2% of total Ø in recycle is due to isotopes (Cm + Am) that do not precipitate with reported LaF3 ppt's in the laboratory

5/97 Uranium impurities - Recast metal averages 15 ppm of Cu. TX briquettes contain about twice the iron as virgin briquettes - caustic results.

6/97 Recycle of Section 14 Product Cake Wash Water at 221-T - Recycle from Section 14 to Section 13. No longer will 120 gal of this water wash be combined with IC waste for each run

6/97 Leak in line 9-1 metal waste transfer line from 221-T - Contamination found 10 to 11 feet beneath surface. This is the third failure of an underground line.

6/97 Graphite Impurities - 300 ppm Ash, 14 ppm Vanadium, 0.8 ppm boron, 5 ppm iron Vanadium method gives 90% recovery.

-/97 Section 13 Scavenger Reduction - A test was made on Run B-7-07-F15 that reduced the weights of Cerium + 2 uranium scavengers by 50% in Section 13 of 221 B. Resulted in the reduction of by product cake waste losses by 0.2 to 0.3% with no appreciable lowering of decontamination efficiency (Average waste loss in the by-product

7/97 B Plant acid wash - 26% ~~Product~~ in Normal chg recovered - Normal

[redacted]

7/97 A test to improve oxidation before Cl decontamination - The test involves reoxidizing the plutonium after it is dilluted with recycle by-product cake wash from the preceding run. This relates to the first TBP contaction reduction of Ce + Zr scavengers.

7/97 Uranium impurities - "significant" downward trend in Al, Iron, Silicon content of uranium metal running scrap. These turnings are converted to TX briquettes + ultimately TX billets by the Metal Hydride process.

8/97 Decrease in amount of scavengers - Run B-7-08-F13 reduced the levels of Ce/Zr ~~Nb~~ scavengers to 25% since previous reductions of Ce+Zr to 50% lowered waste losses + didn't lower the D.F.

8/97 Cribbing of 2C supernatant - 229-T test well work acceptable. Supernatant from T111 will be disposed of at a rate which will allow absorption to the ground from the crib without spilling over into the underground tile field!

8/97 Metal Quality - See HEW-7269 + HEW-7395

8/97 Dry well at stack gas experimental laboratory - ~~was~~ construction complete

8/97 ~~The~~ Extraction & Extraction Modifications - Phase I, Phase II and a modification of the ~~phosphoric~~ phosphoric acid addn have been incorporated. Phase I involves the water flushing of the centrifuge. The strong acid heel in the centrifuge have adversely affected waste losses. Phase II provides for an additional reduction with nitrite prior to the reverse strike clean up of the original centrifuge effluent. This is after the dilut strike during 1st half of ~~[redacted]~~ H_3PO_4 added at 18 lbs/min + 6 lbs/min in second half. All work in first decontamination cycle.

(by product collection in TANK 13-1 (Recycle) instead of centrifuge 13-2.)

[redacted]

Extraction losses in both plants have been reduced from 0.8-0.9% to 0.4 to 0.5%.

9/47 Scavenger Reduction in 13-4BP - Reduction of Cc + Zr to 25% of standard MS not reduced waste losses and MS only slightly reduced Dfs. A single test is planned in 221 B to see the effect of complete elimination of these scavengers.

9/47 $BiONO_3$ Mfgr - 600 lbs of Bi metal dissolved in 60% Nitric acid + diluted with water to specifications. Two batches made + used without adverse effects. Eases a procurement problem.

9/47 Cribbing of 2C Waste - Tank T-111 supernatant was disposed of in crib system of Project C-120 No overflow to tile field. Failure of percolation for dry wells around crib-tile field makes precludes simple recovery to evaluate disposal

9/47 ~~Work on~~ MW to 200 series Tanks 291-C - work complete to permit disposal of MW in these tanks of C-farm.

9/47 Disposal of B Canyon cell floor drainage waste (5-6 gal) - Previously sent to ground through tank 361-B + and perforated dry well system which was previously used for 224-B waste disposal. (The 224-B wastes have been diverted to a separate settling and crib system in the 291-B Tank farm.) In late September, an unconfirmed report indicated the presence of Pu in a water table sample taken from a well in the 291-B area. The 361 dry well was originally drilled to 302 feet - within 25 feet of the water table.
Remedy: Install piping to 224 B building waste line at a point near the drywell.

[redacted]

9/97 Disposal of T Canyon Cell floor drainage waste (5-6 w). — (Ventilation) At T Plant, since the 361-T crib was installed some time ago when the dry well and tank became inadequate due to sludge build up, it will only be necessary to by pass the tank and the dry well. This work will be undertaken in October.

9/97 A shallow dry well has been dug for disposal of Active waste solutions of Stock Tank waste. Flow capacity of this test well is adequate for the disposal of wastes from present equipment and the projected bubble cap tower.

9/97 Pu loss from separation sticks — 0.8 to 2.2 mg per day. One mg assumed as standard.

10/97 Section 8 Extraction Waste losses — Phase 6 provides for changing the relative amounts of Bismuth added during the direct strike + during the reverse strike. Current 87:13 Changed to 75:25 starting with Run T-7-10-F7 at T Plant.

10/97 Project C-160/Health Instrument shift for B Plant 2C waste crib system — will be finished in December.

10/97 ~~First~~ Project C-160/ Additional process Waste Transfer facilities between U Canyon and 241-T, U and TX Tank Farm. Leak Tests of U-Plant and 241-U Tank farm revealed leaks in all lines.

10/97 Disposal of B canyon floor drainage Waste (5-6 w) — Last month this waste diverted to 201-B and crib system bypassing 361-B and its dry well. This "fix" disturbs the sludge in 201-B and therefore A separate crib system in the vicinity of 361-B dry well [redacted] is planned.

10/47 Disposal of T Canyon cell floor drainage waste (5-6W) - Necessary piping connections made to bypass 361 tanks and Drywell. The 201T tank & crib are not required since A separate 361-T crib system is available.

10/47 Contribution to (5-6W) waste volume from faulty section of Precipitator Tank jackets - T Plant leak 5000 lbs H_2O/hr B Plant leak 8000 lbs H_2O/hr. This is over 50% of the total volume. Replaced tanks and pressure of water reduced to 20 lbs/sq in.

10/47 Stack gas disposal - Sampling by trapping iodine in A sodium carbonate scrub solution made difficult by the rapid acidification of the solution by iodine and nitrogen oxides. Recovery of iodine was at least 50% of the theoretical quantity in the slugs. Three samples were taken directly from the deadener off gas from one of two cuts. Sampling periods were 15-20 minutes long with flows of about 0.3 cfm.

10/47 Projects & Area Reports - Project C120 / Divert 2C waste from X-110 60% complete. Project C133 / Special Test Wells 200E&W 77% complete. Project C160 / H.T. Shaft at 241-B 38% complete. Project C-163 / Addn'l Waste storage and Tie Lines 200W 1% complete. Project C112 / Addn'l Underground Waste Tank Facilities 65% complete Area report 2305 / Study & Recommended Facilities & Procedures for Working Diversion Boxes 65% complete. Area report A-2355 / Additional Process Waste Storage Facilities - 291TX 10% complete Area report A-2365 / Bypass 361-T Settling Tank & Drywell from Line 5-6 to Underground Cribs. 70% complete Area report A-2366 / Diversion of Uncontaminated Water (Waste) to Effluent Sewers 0% complete

[redacted]

11/4-7 Section 8 Extraction Waste Loss - 75:25 ratio for direct and reverse Bi strikes returned for testing in 221T Increasing reverse strike from 13% of Bi to 21% of standard for reverse strike and 82% of standard for direct strike continues in 221B for two more runs in November (First use in 221B was B-7-10-D8 in October) - Ten runs total.

11/4-7 Scavenger Reduction - stepwise reduction of Bi(OH)3 Scavenger in Section 13 - not satisfactory. Run B-7-11-D10 had A higher than usual waste loss (1.23%) and A lower log of (4.85)

11/4-7 Section 14 Make wash water recycle to Section 13 - Run for T-7-11-D3 and T-7-11-D12. Saves ~150 gallons of underground storage. Wash water is substituted for dilution water.

11/4-7 Cell A bz product cake removal with water - ~1000 lbs of water removed the cake without any nitric acid.

11/4-7 Cribbing of 2C Waste - 20,000 gallons of supernatant settled to 2C waste crib in T Plant from T-112.

11/4-7 Volume reduction by recycled ~~Sect~~ wash water in Sect 8 - Wash water in first by-product step used to flush first cycle by product section rather than as diluting water for first cycle by product precipitation. This reduced volume advantage to 95 gal/run as compared to 150 gal/run. After the flush, water is combined with runs in product section. Iron + fluo-silicate in wash decreased DF in canyon when water used for dilution.

11/9-7 Phosphonic Acid + Ic by product (B-4-BP) losses - Problem has nothing to do with phosphonic acid or the [redacted] 2% HNO3 used to stabilize it. Problem has to due with high heel volume in B-1 precipitation tank which returned to B-2 centrifuge as before.

11/97 Impurities in Complex [redacted] 0.1 ppm Boron

12/97 Section 8 Extraction Waste losses - Phase 6A Bismuth Strike - direct & reverse - temporarily abandoned.

12/97 Scavenged Reductions in Section 13 - Ce, Zr scavengers held to 25% of standard in 221B & 221T - No mention of level of Bi scavenger.

12/97 Section 14 Waste Volume Reduction - Df back to 5.4 from 4.8 in section 14 for product cake wash water. No longer used as dilution water in Section 13

12/97 Cell A Byproduct Cake Removal - use of water reduces HNO_3 usage per batch from 1400 lbs to 900 lbs

12/97 Additional Projects & Area Reports - No new projects A-2376 / Cathodic Protection to Underground Waste lines (Survey work & As Built Drawing) 60% Complete. A-2378 / Design Precipitation Tanks with longer life jackets (5% complete A-2383 / Crib & Tile field for Disposal of 5-6 Waste Near 361 B Tank 60% Complete

~~12/97~~ 1/98 Scavenger Reduction in Section 13 - Plant 25% of Ce/Zr continued with 50% reduction in H_2O_2 used in cake solution. - B Plant 25% of Ce/Zr and cake removal acid to centrifuge (Since no improvement - Add'l of cake removal acid to precipitation will be reviewed)

1/98 Section 14 Waste Volume Reduction - Resumption of recycle of Wash water from Section 14 to Section 13 as dilution water. - Saving over standard is 150 gal/batch.

1/98 Acid Wash - Remains normal -- product hold-up of 29.8%.

[redacted]

1/48 Water Removal of Cell A By Product Cake - discontinue use of water - institute 50% of standard 60% HNO_3 (200 lbs/batch)

1/48 Waste Disposal - MW diverted to 241 BX (101 BX Tank) from on Jan 17, 1948 Through 159-B and 151-B diversion boxes.

1/48 Reduction in HNO_3 in Removal of Bi_2PO_4 cake in concentration Bldg - Tests to reduce 60% HNO_3 from standard 1400 lbs/batch to 900 to 700 lbs/batch proceeding in T Plant. By product (A-4-BP) cake.

1/48 Stack gas disposal. over 1/2 the Activity in stack gas is due to fission products other than Iodine.

2/48 Disposal of 2C Supernatants in Ensines - 39,000 gal disposed of in crib. low activity waste found in test well connected to intervals 9 + 15 ft under crib. Waste from B-112

2/48 Crib + Tile Field for 221-B Cell Drainage Water - Project C-225 submitted to AEC for approval Provides for A crib + Tile field in the vicinity of 361-B tank for disposal of 221-B Cell drainage waste. Will relieve 2018 tank + 201-B cribs.

2/48 MW sample from T-103 - 2.5 gallon sample of supernate taken for waste recovery development.

2/48 Scavenger Reduction in Section 13 - B Plant - NO Ce/Zr & "Reduced" Na Bismuthate. Reduced ~~effect~~ DF (4.78 vrs 5.15) at section 13 but NO loss at end of Concentration (7 mc/hr for final PR can vrs 1 mc/hr).

 [redacted]

2/48 Redox Scale Up Studies - waste crib + water well ~ 5 miles north of 300 area for disposal of uranium - NH_4NO_3 tail waters from Scaleup. 5500 lbs of NH_4NO_3 will be used each week.

3/48 Section 8 Extraction Waste Losses - Chg to Standard Procedure
Phase 1 - Water flush of 8-2 centrifuge following cake solution
Phase 3 - omission of effluent recycle following centrifugation
Phase 4 - Additional $NaNO_2$ reduction preceding the reverse strike during precipitation
Phase 5D - Adding ½ of H_3PO_4 @ 18 lbs/min followed by add'n @ 6 lbs/min in second half - then one hour of digestion
Cooling - reduce during centrifugation from 50°C to 35°C to lower viscosity
Waste losses reduced to about 0.4%

3/48 Section 13 Scavenger Reduction - Two T Plant tests with no Ce or Zr and normal Bi add'n ~~amounts~~ Amounts of sodium bismuthate + $Na_2Cr_2O_7$ increased other T Plant ~~tests @~~ runs at 25% for Ce + Zr + 50% of H_2O_2. Same for all at B Plant

3/48 Section D Product Cake Removal - one run @ 1500 lbs (standard is 2000 lbs) of water/batch. Three runs at 1000 lbs water/batch for satisfactory removal of LaF_3 by product cake from Section D centrifuge. Previous reduction of amount of oxidant for precipitation unsatisfactory + standard add'n amount restored. First run at 1500 lbs of water was T-8-02-F-18.

3/48 East Area ZC Waste Disposal to Cribs - 67,350 gal total disposed of to cribs from B-112.

3/48 Section D Product Cake Removal - sampling problem at 1000 lbs water - cake removal with 1000 lbs HNO_3 planned - will save 400 lbs/batch [redacted]

3/48 Projects / Area Reports - C225 / 5-6 Waste Disposal to Ground. Area report 2387 / Piping Changes E-I-T Trn 229-T 20% complete Area report 2345 / Bismuth Solvent Ext Rep Facilities 80% complete Area report A 23481 Industrial Pond / Ground 221 T+B 30% complete

4/48 Volume Reduction by reduction of acid used to dissolve product cake in 1C+2C Decontamination by 10% in 221-B. ~~Testing and startup~~ one run

4/48 Process Changes for Section 13 Scavenger Reduction - Weight of Ce+2r reduced to 50%. H_2O_2 used in cake removal reduced to 50%. 3000 lb water slurry wash of precipitate in precipitator followed by two 500 lb water displacement washes of the ppt after its transfer to the centrifuge. Recycle of wash water from 1C ppt wash to Section 13 precipitation has been discontinued.

Above for 221-T. Same for 221-B except Ce+2r reduced to 25% of original Standard.

4/48 Waste Disposal - 360,000 gallons of 2C waste supernate from T-105 cribbed. / Continued jetting of 2C waste supernate from B-112 has continued - a total of 319,000 gal removed so far.

5/48 Volume Reduction in 221-T Reduction in cake dissolving Acid in 1C+2C that was started last month for 221-B extended to 221-T. T+M runs starting with T-8-05-F-1.

5/48 Process of Class C Material in 221-B. Six tons of Class C metal averaging 386 gm/T Pu were processed in 9 batches to isolate Np-237 from the extraction wastes. ~~Ex~~ Product extraction performed in Section 7 AN waste transferred to Section 8 for Np recovery. Np Soln accumulated in section 12. [redacted] Extraction losses averaged 1%.

[redacted]

5/98 Waste Disposal - Caribing of B-112 2C supernate complete on 5/13/98. 2C waste diverted to B-111-112 on 5/14/98 after filling B-106.

5/98 Oxidation Product of Hexone - Nitrous acid catalyzed oxidation of hexone to methyl isobutyl ketone by HNO_3 / occurs at room temperature with 0.1M $NaNO_2$. Separation of the diketone from unreacted hexone can be done by extraction or steam destillation from a strong KOH soln

5/98 Stack Gas Disposal - It is estimated that with water scrubber in operation during dissolution only 10% of the filterable stack gas activity is from dissolver activity (less than 2% on a 24 hr basis)

6/98 Volume Reduction in 221-T - 1C & 2C reduction in volume of cake dissolution acid by 20% for 10 runs and 30% for one run

6/98 Waste Disposal - Four samples of MW sludge taken from T-101 on 6/25/98

6/98 Projects & Tech Reports - A2419 / Separation & Control of 231-W flowing wastes 75% complete

6/98 Diversion of Cont. waste to neut. solution from dissolver - Run B-8-06-Dd-25 caustic cont. waste inadvertently pulled to neut. solution from dissolution of Runs B-8-06-Dd-22 & Dd-23. Contaminated neut. solution worked off at rate of 30%. Extention waste losses normal.

6/98 Stack Gas Disposal - Water scrubbers at 221-B remove about 9% of Mercaptans.

7/98 Volume Reduction at end of 1C, 2C extraction steps - 221-T reduced by 30% + in 221-B by 20%. The reduction in dissolution acid. Also results

[redacted]

 [redacted]

in a decreased All essential chemicals in decontamination and cross over steps are reduced in the same proportion as the acid except sodium bismuthate and lanthanum. At a 30% reduction, ~~1C~~ 1C + 2C waste volumes are reduced 23% + 26% respectively

7/48 Project C-163 /241-TX farm - work continuing. Catch tank 302-X (?) (or 302-TX) and crib + tile field included

7/48 Waste Disposal - 202, 203 + 204 Tanks in 241B + 241T are being piped to permit their use in the future as cascade receivers of 224B + 224T waste from 201B + 201T before release to the cribs.

2nd cycle waste supernates from T106 + B104 are being cribbed. Cribbing of T-112 + B105 supernates are planned.

7/48 Typical Waste volumes per batch

	221 B	221 T
MW	5,900 gal	5900 gal
1C	4138 gal	3700 gal
2C	2995 gal	2700 gal

7/48 Projects / Status Reports - C 262 / Bismuth substitute Preparation Facility 0% complete. JC 1022 5/ Stack Filtration / facilities 2 E + W Additional Thermo 10% Complete

8/48 ~~He~~ Volume Reduction at end of 1C + 2C extraction steps - 30% less HNO_3 used in both 221B + 221T

8/48 Project C 225 / Crib + Tile Field for 221-B cell Drainage water. - Complete on August 17, 1948 + put in service for 221-B. Consideration is being given to [redacted] using the drainage without prior neutralization. I.C on the acid side of 7.0

[redacted]

8/98 Waste Disposal 200 series tanks ie 241 BY 241 T have been piped to provide 201-202-203 cell-cask cascades

2nd Cycle waste Calcining - Tank T-106 calcining completed on 8/3/98. Tank T-112 calcining began on 8/9/98 and was nearly complete by month's end. Tank B-104 calcining discontinued on 8/2/98 after 312,000 gal of separate had been received - flow from the cell became restricted. The restricted flow may be due to the removal of some suspended sludge from Tank B-104. Tank B-105 calcining was begun but proceeded slowly due to the restriction.

MW Sludge Depths - T-101 has 4' of sludge of which 2' are extremely dense. T102 & T103 have negligible amounts of sludge. Data from soundings. A core sample from the inlet sleeve of T101 was secured & sent to K-25 at Oak Ridge.

8/98 Typical waste values / batch -

	B	T
MW	5900 gpb	5900 gpb
1C	3650 gpb	3700 gpb
2C	2800 gpb	2700 gpb

8/98 Isolation Bldg Cells - Two cells put in service on 2/11/97. No 1 became plugged in ~~7/98~~ 7/98 and waste began to spill into No 2. Currently, residual liquor in No 2 is increasing slowly.

8/98 Project Area Reports. Area Report A 2925 Utilization of Tanks 241-U 107, 108 + 109 for total waste 90% complete

[redacted]

A-2937 1 Purex Project for the Study of Process Waste Separation 200 B-T-U 0% complete

8/98 Graphite Impurities - Rare earth impurities are europium, and possibly samarium and neodymium. "Graphitization" reduces Eu by a factor of 4. Purification as mentioned in July 2600. Graphitization also reduces ash & V by a factor of 4 with no effect on B. Flame Activation are found after a limited exposure irradiation

9/98 Volume reduction & extraction - Ten runs in 221-T were run with 40% less HNO_3 than standard.

9/98 Waste Disposal - 2nd cycle waste Caribbing - T-112 tank caribbing discontinued after about 9-50,000 gallons settled. Tank B105 cribbed & bot + 130,000 gal intermittently during month. A 5 molar 10% (HNO_3) flushes (see page 40) of 1500 gal 99% nitric acid failed to increase flow through this crib. While liquor remains in the crib, no waste was permitted to overflow to the trench. [116 gal removed from B105]

With C-109 filled 221-B to waste diverted to B-X-107.

With U-106 full, NW waste diverted to U-107, 108, 109.

Metal Waste Sludge soundings revealed that in the first tank of a cascade, sludge depth varied from 2 1/2 to 4". In the second tank, it varied from 0 to 1 3/4". A negligible amount was found in the third tank for all cascades.

9/98 Typical waste volume batch - same as 8/98

[redacted]

A review of the Medical Department section before Feb. 1948 and the Health Instrument Department section beginning February 1948 gives detail to ground disposal.

8/47 #6 well at 361-T 100 μg Pu/kg @ 22', 46 μg Pu/kg @ 25'. Max. B @ 27' 7 μc/kg. Pu contamination persists to 40' and fission products to 75'. One well near 361-T had contamination to 120'.

9/47 Three samples taken 20' beneath #3 crib in 291-T area. After waste jetted into the crib from T-111 tank. Last sample taken after about 4,000,000 lbs of soln jetted into the crib. No Pu or fission product activity found in samples.

Activity of fission products in one well near 361-T extended to 195'.

2/48 Health Instruments - water samples taken from the excavation table 500 ft from 361-B. Maximum results found in 361-B-1 test well to the east of the drywell. B @ 7.7×10^{-3} μc/ml, & CB 186 dis/min/l

In general the Medical & Health Instrument Department Sections deal with test well data in the vicinity of 361-B drywell and 291-B and 291-T cribs. Species by Nuclide relevant give migration rate data. 361-B contamination of the water table to 1000 feet shows β but not α (Could the contamination be due to the drilling operations?)

9/48 Waste Disposal - continued when the 2nd cycle separate from tank B109 was jetted "to the crib", turbid samples were obtained in the interval 10' - 20' below the crib bottom, and [redacted]

 [redacted]

the crib appeared to be plugging. Investigation resulted in an estimate of seven inches of sludge having been deposited in the crib.
Interval beneath crib – B activity of 0.6 μC/liter before + 5.7 μC/liter after sludge accumulation.
5-6 line disconnected from 224 waste line and tied into the new 361-B crib and tile field.

Test well 241-T-1 drilled directly through crib #3 indicates no contamination 20' below the crib bottom. (#3 crib synonymous w/ 2nd Cycle crib)

9/48 Health Instruments – A well drilled between "107-waste disposal trench" and the river – no contamination to 67'.

Restart normal logging

10/48 Volume reduction in extraction – 30% reduction in HNO_3 + chemicals as previously described continues in both 221B + 221T

10/48 Waste Disposal – T-112 cribbing complete. B-105 cribbing at about 6,000 gal/day (3,000 gal/day last month) for a total of 211,000 gal. Test wells are being drilled in the tile field associated with the 291-B crib and the 2nd Cycle supernate will be permitted to overflow to the tile field when the wells are in place.

Sounding of T-201 indicates that it can receive 2375 batches before diversion to the 202, 203 + 204 tanks is necessary

224-B wastes were diverted to B 204-203-202 when an increase in suspended solids (slight) in the effluent from B-201 resulted in an increase in crib drainage time. Diversion through 242-B [redacted] diversion box

[redacted]

The 5-6 crib used to dispose of 221-B canyon Bldg cell drainage wastes was permitted to overflow to the tile field because of a reduction in drainage rate from the crib.

10/98 Typical waste volume/batch

	D	T
MW	5400	5400
1C	3600	3700
2C	2500	2700

10/98 Bismuth dissolver/Project C-262- complete. Preparation of Bismuth subnitrate ($BiONO_3$) satisfactory & routine

10/98 Graphite impurities - 5 ppm @ 2 ppm in unpurified graphite. Europium @ 0.1 ppm (previously reported - in error - as 5ppm). After purification no rare earths exist in concentrations higher than 0.1 ppm

10/98 Health Instruments - Sediment Analysis of A Sample from 20 feet below #3C (2nd cycle) crib gave fission products ~ 8×10^{-2} μc/kg & less than 4×10^{-2} μc/kg. First time significant contamination found at 20' below the crib. Since it was placed in service Sept 2, 1997. 2,000,000 gal of 2nd cycle supernate have been changed to the crib.

11/98 Extraction Waste Losses - Waste losses from 1C extraction in B & T canyons have shown a waste loss increase of 0.6% - Probably Am^{241} that grew in during extended 100-B shutdown

11/98 Waste Disposal - ON Nov 12, 1998, 2C waste was permitted to overflow from the B Plant 2C waste crib to its tile field. Total waste removed from B-105 to crib is 418,000 gal

[redacted]

11/48 MW samples for K-25 (Oak Ridge) ten 200ml sludge samples from the T 106 series of MW storage tanks and 28 gallon sample of supernate from T103 on Nov 26, 1948.

11/48 Waste loss in Section 17 of 221B - About 2.5% of product from a normal run was lost to cell drainage as the result of a leak in the 2nd cycle decontamination - section 17.

11/48 Projects/Area Reports - A 2446/Mile A composite map of 200W with Health Instrument Features 100% complete. A Z 4491 Locate Shallow Wells in Waste Disposal Tile Fields 40% complete. A 2950/1 Design Disposal sumps for 224-B waste 25% complete. A 2952/ Prepare map of 200 E Area for H.I. Division 50% complete.

11/48 Uranium solubility Because of the volume of Uranium carbonate metal wastes, efforts to find an alternative complexant were initiated. Citrate is stable at pH up to 10 - but not in the presence of phosphate. Hydroxyline is stable at the pH in the presence of phosphate.

11/48 Health Instruments - Eight samples from 200W Retention basin averaged 8×10^{-5} μc/l of β + 9 d/min/l of α activity. Maximum α activity for "T" swamp (19.5 d/m/l), "U" swamp (320 d/m/l), Laundry ditch (835 d/m/l) and 231 ditch (35 d/m/l). β in Laundry ditch at 0.012 μc/l. "T" swamp mud activity at 4.8×10^{5} d/m/kg α + 0.15 μc/kg of β.

~~11/48~~ 2nd Cycle Cribs - Sludge is still in samples 10' below crib in 241-B Area but not in the later [redacted] 0' below the crib. β activity 20' under the 241-T Area #3 crib confirmed

[redacted]

12/48 Waste Disposal — 2nd cycle separate - B-105 cribbing completed 12/8/48 to A total of 522,800 jetted to the crib system from the tank. B-106 cribbing began on 12/19/48 A total of 2-35,100 gal cribbed.

~~12/48~~ The 9-4 tank was removed from 221U and installed in 231 to permit segregation of solution and chemical wastes. The tank is 5' in diameter & 7' high. Cells 4, 5 & 6 ~~were tied~~ to will be tied to the tank in January.

12/48 Projects/Area Reports C-305/ Separation + Control/ 231 Process wastes 100% complete

12/48 Graphite Inspection - Spectrochemical analysis indicates 0.1 ppm Eu by fail to detect Gd or Sm in the graphite ash.

12/48 Health Instruments - B 109 + 105 empty except for sludge + B 106 Separate is being cribbed.

Samples from 200 Area retention basins - max B Activity 2.9×10^{-4} μc/l in West Basin. Max S in mouth of 200 Area swamps was 1100 μc/l in "U" Swamp. Max B was 6.7×10^{-4} d/m/l in "T" swamp

Lateral 10' below 241-B Area 2nd Cyc. crib Activity has dropped from a high value of 13.3 μc/l to 1 μc/l since this field of private Service.

Fission product activity found 20' below #3 (second cycle) crib of 241-T Area

1/49 Waste Disposal - T-106 full of 1C waste. Sodium Sent to T X 109

[redacted]

 [redacted]

2nd Waste Catching B-106 - total of 958,000 gal jetted to crib

Adding sump tank in 231 completed with cells 4, 5, 6A, 6B + 6C tied to new tank.

1149 Projects/Area Reports - A-2966 / Design Curves for 222-B waste 50% complete

1149 Graphite Impurities - Gd in impurified graphite at 0.1 ppm - high absorption cross section, very little moderation

1149 Extraction waste loss - 78% waste loss from run B-9-01-B-2. Remarked to 0.8% waste loss and product solution divided and combined with first precipitation wastes from runs B-9-1-B-2 + B-2A

2149 Volume reduction / extraction - 30% reduction retained in 221-B + 221-T. Increase in DF in 221-T countered by increase in CC + Zr scavengers.

~~Reference~~

Zr + CC scavenger amounts in centrifuge skimming test of Fe First Decontamination Cycle Product Cycle of 221-T increased from 50% to 100% of original amount. Log DF increased from 4.09 for January to 4.65 for February for 221-T

From 11.2% to 17.6% of Product from run B-9-01-B-30 was lost from the Second cycle product precipitation to cell drainage waste tank - Waste to MW receiver tanks

MW Sludge samples taken from U-101, 102 + 103 for Analysis at K-25, ORNL

2nd Cycle supernate catching - B-106 catching complete during month. 5 31,025 gal jetted. [redacted]

 [redacted]

2/49 5-6 cell drainage waste at 221B - jacket for second cycle byproduct ppte. tank leakage rate 10,000 lbs/hr exchanged with unused 10-3 catch tank on 2/23/49

Isolation Bldg waste jet - replaced with air jet to reduce waste volume to crib

222-B laboratory cribs. - Two cribs were installed at 222-B to accept contaminated liquid waste. The waste had been going to a dry well which had become clogged up

222-T dry waste crib - New crib put into service to replace a similar unit that has become filled from use

2/49 Project (Area Reports) - A 2969/2 - Special Test Wells 95% complete

2/49 Graphite impurities - 1/2 of Sm, Gd + Dy removed by gas baking + graphitization

2/49 Health Instruments - No significant contamination beneath 5-6 tile field from 221B through crib to field

Wells below 2nd Cycle crib of 221-B shows 0.27 μc/l @ 10' + 0.35 μc/l + no significant alpha activity (~1,800,000 gal disch.) Its tile field showed no significant contamination after 700,000 gal of supernate has been jetted to crib since the crib was permitted to overflow

3/49 Decrease in Extraction Volume 221B + 221T - As Pu content increases, batch size (+ uranium content) decreases. A reduction in the process volume in the extraction step by a reduction in dilution water ~~[illegible]~~ [redacted] saving 600 gal/batch + a small savings in chemicals - Drop by 10%.

 [redacted]

3/49 MW Samples - 2 100 gal MW supernate samples & A 4 gal sample taken from U-103 for K-25 + local waste feed prep studies.

2C Samples 4 @ 15 gal 2C supernate samples taken from T-112 + sent to Mound Lab

3/49 Cribbing of 2C supernate. T-112 cribbing of 151,250 gal from March 17 to month's end. Analysis Total α 100c/m/ml, β 1730c/m/ml, γ 10 c/m/ml, pH 7.1, suspended solids 0.10% - no uranium. Average waste age 9 months.

3/49 Scavengers - Amt of Ce + Zr increased from 25 mg/l to 50 mg/l at 13-4BP - first cycle by product precipitate wash

4/49 Extraction - All material processed originated at 100 D and 100 F Piles

4/49 2nd C supernate Cribbing - T-112 cribbed a total of 319,000 gallons jetted during this month.

4/49 Projects / Area Reports - A2482 Design + Install Drain Line from 292-B to Waste Cribs 75% complete

4/49 Σ Activity in oxidized metal + metal waste from 100-B - A 3 month period of decay gave a weighted average half life of 174 days (A range of 139 to 234 days were observed). The mix is assumed to result from Cm^{242} ($t_{1/2}$ = 150 days) and Am^{241} ($t_{1/2}$ ~500 years). Both are expected to be carried by the LaF_3 pptn as these wastes are.

4/49 300 Area Planned Release - A total of 417 lbs of U has been discharged to the 300 Area pond of which 42 lbs were [redacted] released in 4/49 - Source Cold Semi works. Total uranium to 300 North Area Crib was 63 lbs with 1 lb being released in 4/49

[redacted]

4/49 5-6 Crib in East Area - Contaminated with ~~Co~~ contamination decreasing to suggest water table dilution + Contamination. Well 24, directly below crib, filled with sediments. Its was due to a break in the test well casing - presumably due to the acid used to maintain the crib after it was partially blocked by sludge. The two test holes nearest to the crib are heavily contaminated. Wells 36/-B-1, -3 + -9, 500 feet laterally from the crib, are being used to follow the diminishing contamination, due to waste destribution to the water table

5/49 Volume reduction at extraction - 30% volume reduction adopted as standard

5/49 Extraction Waste Losses - Avg extraction waste losses for T Plant (2 runs 0.61%) And B Plant (19 runs, 0.59%) are similar for 100-B fuel and fuel from 100-D and 100-F. Avg MWD/T is 293 for T + 227 for B. Avg throw away losses are 0.99 for T + 0.91 for B Plant

5/49 Waste Disposal - Dissolver off gas is directed to tanks through a special line.

2nd Cycle Supernate Combined - T-112 Cribbing complete with 525,000 gal cribbed

~~Feb~~ Feb. 224T waste disposal - Waste directed from T-201 and crib to T-204 - 203 - 208 to crib, on 5/29/49. T-201 contains 20' of compact sludge and 3' of light sludge. Overflow is at 29'. 643 standard runs, and 13 acid runs have been cribbed through the T-201 settling tank since it was placed in service during October 1946.

[redacted]

5/49 Project/Area Reports — A2490 / Prepare project for Iodine removal 0% complete. A 2491 / Design Evaporation facilities for First Cycle waste 0% complete

5/49 α activity in stored metal waste — An Argonne analysis indicates that about 50% of α activity in these tanks is from non Pu nuclides.

5/49 An estimate places 50% of I-131 released during metal dissolution of which 3/4 is captured by scrubbers and placed in waste. Samples were ~450 days out of reactor when counted.

5/49 Graphite Impurities — high quality — no evidence of contamination found.

5/49 Canyon Bldg Batch Size — MW volume basis changed from 5800 gal/batch to 3850 gal in a storage tank / ton of fuel processed. This change permits downsizing of waste and chemicals as ~~Pu cont~~ Pu / Content (U content decreases for a fixed amount of Pu) increases.

5/49 Peroxide in Isolation Bldg — ~~to be reduced~~ to 50% ~~of standard for testing~~ solution used instead of 27.5%

5/49 Pu(III) oxalate solubility in Process — 0.020 g/l of Pu

5/49 α Activity loss in 8-3-WS + 8-3-WS-2 Solns — Cm242 activity ~ 4X as much as Am241 activity in $BiPO_4$ Extraction step.

5/49 231-5 Building Process — Conditions for Pu oxalate ppts same for 231-5 as 231 except a decrease in $(NH_4)_2SO_3$ and those associated with higher Pu concentrations. Hydrofluorination of peroxide ppt based on a Los Alamos procedure rather than [redacted] proceed to fluoride through an oxalate intermediate. Metal reduction same for direct fluoride as for fluoride from oxalate

[redacted]

5/4-9 B-Plant Burial Trench - A new B-Plant Burial Trench Excavated

5/9-9 300 Area Planned Release Pond through 5-27 (662 kBq U ~~245 lbs~~ Total - 245 lbs in May) 300N Cribs (63 lbs U total - none in May)

5/4-9 Health Instruments. - Contamination from ponds Est near 5-6 cribs MS stabilized at previous levels. Concentration of fission products in mud and gravel at this crib is about 60 times higher than found in waste liquid. Factor is 100 times higher for Pu.

5/~~4~~-9 Groundwater level in 2W increasing about 2.5' per year ~~at~~ with no increase in the level between Yakima River + 2W. 2E level remains unchanged. With river rise ∑ activity in 300 Area test well 30B-2 decreases as waste is in communication with river.

6/4-9 Waste losses - Higher waste losses reflect no PUS from higher burn. eg. for TPlant 270 MWD/T in June and 293 MWD/T in May. No correction factors yet applied to months. Throw away waste losses at TPlant 0.95 % and at B Plant 0.53 %.

6/4-9 Waste Disposal - 291-T evaporator development begun

~~6/29~~ A large amount of contaminated failed equipment was removed from 221B & Buried

Silver Nitrate reactor for iodine removal was 75% installed.

6/4-9 Projects/Area Reports - C337 / Dissolver off Gas Filtration Facilities (T-Plant only) 0% Complete

[redacted]

Area Report 2996 / Prepare Dwg. - Flow Sheet for waste Evaporation 100% complete. Area report 2497 / Additional Waste Facilities 241-BY - GE portion of Project C-271 0% complete

6/49 Batch Size - Based on total α counts in metal solution (6-MS) previously implemented in B Plant, now used in T Plant as well.

6/49 Waste loss. - Pulse height analysis for ~~solution~~ ~~[illegible]~~ waste solutions from a single plant run were run for extraction wastes. Waste 8-3-WS loss was 0.67% (Pu239 0.418%, Am241 0.069%, Cm242 0.180%). ~~[illegible]~~ waste 8-3-WS-2 was from rework. Its loss was 0.35% (Pu239 0.089%, Am241 0.067% + Cm242 0.199%) [It is assumed that Pu239 is α from Pu239, Pu240 + 1% of Pu241]

6/49 Stack gas disposal - A line from 292-B bldg to the 222-B crib installed

6/49 300 Area Planned Releases. Pond through 6-27, total uranium 872 lbs (210 lbs in June. 300 North crib still at 63 lbs of uranium

6/49 East area 361-B purge well - activity curves follow that predicted for depletion of ruthenium

7/49 Extraction Waste losses

	T Plant		B Plant	
Original analysis	0.71	0.73	0.84	0.75
Thoron[illegible] analysis	0.95	0.45	0.52	0.53
Avg MWD/T	287	270	262	253
	July	June	July	June

7/49 Acid Wash at T Plant - Pick up of product equal to 38.4% of a normal batch - sent to Isolation

[redacted]

7/49 234-5 - work begun - processing standard

[redacted]

7/4-9 Filled Sec. 8 Precipitator tank in 216 - Replaced - Tank bulged upward at bottom + jacket leaked badly to 5-6 waste

7/49 Silica content of Uranium - Reduced from standard 2.5 ppm to 10 for trial period

7/49 Product hold up in extraction - about 6-7% /run

7/49 In Plant Uranium recovery - Development consisting Sodium Uranate ppt'n - caustic metathesis - uranyl phosphate clean up to give a dilute ISF. Reagent consumption: 2 lbs NaOH + 1 lb HNO_3 per pound of uranium pptd. OC - one liter of 5 Molar NaOH for ppt'n + 0.1 l of 70% HNO_3 for sodium uranate dissolution for each liter of feed CMW. This neglects recycling of uranyl phosphate only.

Sodium uranate ppt can alternatively be produced by Acid dissolution and uranium peroxide ppt'n rather than metathesis + uranyl phosphate ppt'n (H_2SO_4 in solution (rather than HNO_3) provides improved peroxide ppt'n.

7/49 Contaminants in Accumulated 300 Area Cuttings both Oil Scraps - Ash is 0.7% U, 0.5% Sn, 0.2% Fe
T.W. Recovery Crystals: 10.7% Cu, 90 ppm Fe, 0.9% U
Bronze: 46.7% Cu, 670 ppm Fe, 0.07% U

7/49 Planned 300 Area Release - To Pond 998 lbs U total + 76 lb in July - No change to 300 N Cribs

8/49 Extraction waste losses -

	T Plant	P Plant
Original Analysis	0.8	0.8
Thorex Agency Analysis	0.55	0.98
Avg TWI	276	298

[redacted]

[redacted]

8/49 Acid Washes through Canyon & Concentrator. T Plant - 43.57% of a normal run. B-Plant 33.29%. Both washes to isolation bldg.

8/49 Tritium extraction begun Aug 26 in pilot plant in bldg 108

8/49 Waste loss in coating waste - Previously discarded w/o analysis. Limited data suggest that the loss is ~ 0.5%

8/49 Uranium Impurities - Mn 20ppm, Ni 50ppm, Pb 10ppm Cr 20ppm, Cu 50ppm, Sn 10ppm used as a basis for some Redox Development. Silicon high & variable

8/49 Solvent Extraction Feed from MW - Development

8/49 Process Improvements at Isolation - oxalate destruction by addn of potassium bromate (also oxidizes Pu to VI state) and removal of BrO_3 (as Br_2 + I_2 residuals as well as volatiles) by addn of slight excess of Cr III nitrate. This work would be performed in 231 before recycle.
Possible addn of Fe(III) as well - leads to Fe III SO_4)

8/49 Uranium Grain Refiners - B & Al, as well as Cr are recommended for future studies as grain refiners. Cu has no effect

8/49 Planned 300 Area Releases - Pond Total uranium 1188 lbs (290 lbs in August) 300-N crib still @ 67 lbs

9/49 Extraction Waste losses

	T Plant	B Plant
Original Analysis	0.99	0.89
Thorough Analysis	0.69	0.58
Avg DWD	324	346

[redacted]

[redacted]

9/99 Waste Disposal - overflow lines from BX to By / Aans completed

Cooling Waste losses - Samples of 12 CW's obtained from waste neutralization tank in Section 15 (5 from T, 7 from B) showed product content from 0.21% to 1.80% + 0.50% on the average. Studies from early inventory showed losses of about 0.30%

1C decon Precipitation Tank in 221B leak - 1200 lbs/month from jacket - in service since 4/99

9/99 2E/2W Evaporators - 500 GPH capacity

9/99 MW Samples - 2 100 gal Samples supernate from U-103 to K-25 @ Portsmouth

9/99 Planned 300 Area Uranium Pond 12 Solids / U total - 300N Crib sludge 63 lbs total

10/99 Extraction Waste loss

	TPlnT	PPlnT
Original Analysis	1.06	0.94
Throw away loss	0.69	0.77
Avg MWD	378	333

10/99 HF Quality - Essential Material Specs Relaxed to permit purchase of single destilled HF.

10/99 Semi Parallel Operation in TPlnT

	Step	Section 6(s)
	Reduction	6-3
	Extraction	§ 7 § 8
Extraction Prod Soln to TNK		§ 12(TK12-7) § 12(TK12-8)
1st C By Product		§ 13 § 16
1st C Product		§ 14 § 17
2nd C By Product		§ 18
2nd C Product		§ 19

[redacted] Conc. Oxidizer

10/99 MW 241 V + 241 C instruments - instruments for monitoring these MW lines have been dismantled & returned for storage since MW tanks are full

10/99 239-S Process Development - experimental to adjust pH to desired final (1.2 to 2.4 N). Add H_2O_2 slowly (to 16-20%). Digest @ 20° C for 1 hr. Settle ppt for 10 min. Wash & settle twice C. 2N Acid wash to for 2 min followed by (on) settling

10/99 Uranium impurities - Hanford Cust billets variable 5% content from 129 to 159 ppm. Virgin Electro Met + Millinckrodt are 30 ppm less.

10/99 Planned 300 Area Discharge - Pond 1272 lbs U total

11/99 Extraction Waste losses

	Plant	Plant
Original Analysis	1.18	1.02
Typewriting loss	0.74	0.71
Avg w/ D	358	375

11/99 Semi Quality Operation in B Plant - identical to those of T Plant

11/99 Volume Reduction in 224 T Methods - Reduction of volume of caustic solution 80% of standard for 1 A-EN neutral. 25% of volume from wash of previous batch combined with Centrifuge effluent.

11/99 Cribbing of 2nd Cycle supernate - T-112 ~~tank~~
Cribbing resumed 11/18/99. 215,000 gal cribbed
A total of 2,598,000 gal of 2nd Cycle supernate cribbed to date in current tank.

11/99 222-S Lab Waste - Lab will have independent retention basin & independent cribs for low level waste. Wastes of higher activity will go to A small waste neutralization and transfer [redacted] by between 2025 & 2225. Operations personnel will neutralize & jet to 291-S fan.

[redacted]

11/49 MW Separate Samples - 2 more 100 gal samples (one last month) taken from U-103 + sent to X-25

11/49 Projects Area Reports - C-399 / Hot Semi-Works Eng. Nuclear Costs 5% complete

11/49 Development: TBP processes for Metal Recovery and ION exchange clean up / 221 Bldg. cell drainage ~~not~~ development begun

11/49 P-10 Facilities - Document HW-15210

11/49 Sodium Uranate Process for Metal/Oxide recovery - HW 19879
involves preparation of solvent extraction feed (SF)
results in the document results from 7 semi works runs. Centrifugation techniques + 0.2M NaOH
washes and ~~+~~ Surface Active Agent (Igepon AP-78)
@ 0.01 wt %.

11/49 TBP Studies - Preliminary data indicates 1/4 to 1/2 of the HNO_3 can be recovered from 1st column TBP waste by evaporation. The volume reduction does not destroy TBP which is volatilized.

11/49 Development - The distribution ratio of Pu(IV) in 15% TBP - 85% Dodecane/Kerosene (1:1) improved with 1% by volume of equimolar mixture of mono- + di-butyl Acid phosphate against 3M HNO_3.

Fluosilicate complexes with Pu(IV) at a level of 2.5 g/l of Ammonium fluosilicate with 3M (HNO_3 + 15% TBP - 85% Dodecane. Improved with Uranium content. Distribution ratio increased 40-80 fold in presence of complexer. Fe(III) sulfamate not required. Uranium doesn't complex below 1 g/l of complexant

To remove by volatilization with As + Sb oxide using O_3 [redacted] examining catalysts and treatments

Zr removal by [redacted] at head end of pptn / recovery shown process to not be dependent on ppt

Volume reduction of recycle from CT-1 to 229 bldg by catalytic decomposition of $H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2$ — block / Pt catalyst used (effect of catalyst is not great)

Optimization of peroxide level + pH of P-150 in 239-S for stirring ppt in progress

11/97 Planned 300 Ind Releases Pond to 1380 lbs U total
300N Curb from 63 to 96 lbs of U total

12/99 Extraction losses

	TPlnT	OPlnT
Original Analysis	1.30	1.23
Throw Away losses	0.88	0.83
Avg rad	396	400

12/99 Waste Disposal - 2nd C. Supernate Catching B-112
Supernate ~~catched~~ catching resumed + will continue until tank is empty. T-112 catching of 578,000 gal completed Dec 19, 1997 (Total of 2,955,000 in W)

12/99 TBP decision for metal recovery - HW-15369
eliminates need for dual purpose Redox process

12/99 MW Samples 2 more 100 ml samples of supernate from U-103 sent to K-25

12/99 Development Topics - with the decision to go to a separate TBP Process + Redox Process, development activities will stabilize. ~~At the~~ In 12/99 activities included Redox development, TBP development and sodium uranate development), 321 bldg modifications for Redox hot testing and hot Metal waste development, ozonation of extraction for removal from dissolver solution, Zirconium scavenging with filtered for Redox head end, Decomposition of H_2O_2 in recycle to 224 bldgs, Coupling of 224 bldg products to 234-5 isolation, Pu recovery from slag + crucible pieces in 234-5, Treatment by [redacted] ion exchange of Non uranium 200 area wastes, and various stack / gas disposal projects.

[redacted]

12/49 Planned 300 Area Releases - Pond 1396 lbs U total
300N Caib from 96 to Anew total of 157 165 lbs U total

1/50 Extraction Waste tossed — B Plant — T Plant
Original Analysis — 1.27 — 1.90
Thorium Assay loss — 0.48 — 0.45
Avg MW'D — 391 — 377

1/50 Waste Disposal 2nd Cycle Separate Cribbing - B-12 cribbed for a total of 360,000 for December + January

Metal Waste in east lines has filled the BX104+ BX101 cascades - to keep sludge in minimum Number of tanks. The BX104 cascade that has just filled has been connected to the 3 tank BX104 cascade to form A 6 tank cascade with BX104 - 105 - 106 to BX-104 - 105 - 106. On January 27 Metal waste was diverted to BX101 - 102 - 103 - BX 101, -102 - 103. (See page 72) (Also see page 74)
Metal waste in West lines has overflowed to TX102

1/50 Redox Support Facilities - 211-S (buried reagent tanks) 270-S (Possibly will share caib with 202-S) 2726-S and 289-W (Emergency generator)

1/50 DR Pile Modification Plan - A Plan to load 450 Kgs of ~~U-Al alloy~~ U235 in U-Al alloy into 1600 tubes of DR Pile for irradiation of P-10 targets. Figure could be 260 Kgs. [reduced to 200 kgs in 400 tubes]

1/50 Disposal of Waste in tank W-11/W14 - W-11 is an underground tank in the 321 Bldg Area Used for the past 2½ years for Redox Uranium waste that contain too much uranium for cribbing.

[redacted]

 [redacted]

Rodding + sample analysis of wastes in ~~W-14~~ the remaining three tanks indicates that 20,000 gal of ~~waste~~ solution can be removed from W-14 ~~The tank will then be used~~ and disposal of it 200 area cribs. The tank would then be used for future "cold" semiworks wastes. The tank contains 2nd Cycle BiPO4 process waste. The other two tanks also contain BiPO4 wastes from semiworks studies.

1/50 Head End Scavenger Development - Filtrate can be recycled

1/50 Planned 300 area releases Pond ~~1423 tot~~ 1423 pounds total U 300 N cribs 200 pounds

2/50 Extraction Waste losses

	B Plant	T Plant
Analysis before rework	1.18	1.65
Analysis after rework (Throwaway)	1.08	1.06
Avg MWD/T	391	397

2/50 Waste Disposal 2nd Cycle Supernate B-112 cribbed 137,000 gal during month - Tank is essentially empty. Total of 497,000 gal since cribbing began in December.

Plug in 291-BZ line from B Plant Canyon cleared with 10,000 gal of 10% $NaHCO_3$

Concentration Waste settling tank for T Plant - T-204 contains 2' 2" of relatively compact sludge from 226 runs.

Metal Waste Sludge from U101 - 165 pounds removed & shipped to K-25

2/50 Planned 300 area releases Pond 1995 Pounds 300 N Crib 273 Pounds

[redacted]

  [redacted]

2-50 Crib Name 201-B Crib receives 224-B waste

3/50 Extraction Waste losses

	B Plant	T Plant
Analysis before rework	1.58	1.69
Analysis after rework (throwaway)	1.22	1.23
Avg AWD IT	412	368

3/50 Waste Disposal - Cribbing of 2C waste supernate B-106 to crib started late in the month - 165,000 gallons disposed of.

First Cycle waste began to cascade to 111-TX. Avg volume of waste 3917 for 1C, acid wash + coating waste. or 3000 gal per standard run.

Disposal of 300 Area 2C Waste - 27,300 gal of waste to T-112 from 300 Area semi works. See 1-50

3/50 Retention Basin 207-S in design

3/50 Transfer of waste from W-14 to T-112 completed during month - 3" water heel remains with 50 d/m/ml, no β, no γ. After transfer to T112 + water wash (150 gms [illegible] 112) ~20,000 gal of waste see 1-50 + 3-50

3/50 Analysis of U 101 Sludge - 28.8% U, 5.3% PO_4, 0.11% SO_4, 18.0% CO_2, 0.953 ppm Pu (60% Pu (VI))

3/50 234-5 Cribs #1 + #2 at least partially sealed + much of waste liquid overflowing to tile field. First overflow in January after 4 million liters of waste liquids had been released. Tile field is at a depth of only 4 inches.

[redacted]

 [redacted]

4150 Extraction Waste Losses -

	B Plant	T Plant
Analysis before Rework	1.82	1.70
Analysis after Rework (throwaway)	1.28	1.15
Avg MWD/T	363	357

4150 Acid Wash - consider this a typical run 74

	Extraction	12-7 4 1C	2C	221 Total	224	T Plant
For T-10-03-AW-1	9.3%	20.7%	12.1%	42.1%	10.8%	52.9%

4150 Waste Disposal 2nd Cycle supernate to Crib
B 106 + B 110 contributed a total of ± 89,500 gal to Crib
T 112 cribbing began late in month after tank became 85% full.

Piping being installed to permit Canyon Cell drainage to be routed to cribs through the T 110 + B 110 tanks. These have been used for 2C waste.

4150 ~~MW~~ Waste Samples - • 210 lbs of sludge from U-101 (MW) to K-25
• 100 ml of metal sol'n (221T) to Berkley Rad Lab
• 500 ml ea of 1C neutralized + 1C unneutralized + 1C sludge to Mound Labs
• 100 ml of dissolver sol'n from 221T to 300 Area Lab
• 4 lbs MW sludge from U 101 to 300 Area lab

4150 U distribution in Non MW Wastes 0.04% in CW, 0.25 to 0.50% in 1C, 2C + 5-6 (cell drainage) 0.001 to 0.003

4150 321 Bldg Scale op - Minimum amount of waste disposed of to 300 Area Pond during this period (contains NO ANN - Aluminum Nitrate Nonahydrate)

4150 Pb^{2+} in 221 dissolver - 0.0002M Pb^{2+} (from lead dipped slugs) No problem. 0.0027M Pb^{+2} Ppts as [redacted] chromate as pH increases (Acid deficient - Approaching neutral)-

[redacted]

4/50 Cl^- in metal waste in U-101 sludge
0.05 to 0.007% Cl^- by weight.
U-103 supernate 0.5 to 0.8 g/l Cl
supernate-sludge composite value of 0.6 g/l
is consistent with content of caustic.

4/50 Solubility of Pu(IV) monobutyl phosphate - monobutyl phosphate (A hydrolysis product of TBP)
1 vol% MBP in a 3M HNO_3 soln
ppts 99% or more Pu(IV) if the initial Pu conc. is 30 μg/ml to 0.5 g/l. The ppt is probably $Pu(C_4H_9PO_4)_2 \cdot xH_2O$ analogous to $Pu(HPO_4)_2 \times H_2O$ cmpd. Solubility in 0.6M HNO_3 is 0.3 μg Pu/ml + in 10M HNO_3 3.9 μg Pu/ml. For 1 vol% MBP + room temp. Solubility @ rm temp in 1 vol% MBP + 3M HNO_3 is 0.95 μg Pu/ml. for 0.05% MBP + 20 μg Pu/ml - no ppt formed.

4/50 Continuous dissolution of U-Al slugs - dissolvn test solution 6M HNO_3 + 0.002M $Hg(NO_3)_2$ @ 9 g/hr will provide 3500 g U/day in a 1.5M ANN solution

in caustic 0.02M $Ba(NO_3)_2$, ~~[redacted]~~
1.5/0.5/1.0 mole ratio of NaOH/$NaNO_3$/Al to give a 4M Al(III) soln residue was mostly acid soluble aluminum. Silicon went into soln with uranium as silicate.

4/50 Am/Pu separation w Ce(IV) Ce III is used to oxidize Pu to the VI state and Am is co precipitated with Ce(III + IV) as the fluoride - Fission products follow the Am. Separation is essentially quantitative - No pH stated. Probably ~ on acid side.

4/50 222 S crib disposal system - Planned system enlarged to accept Hanford Works Lab wastes.

[redacted]

 [redacted]

4-50 Planned 300 Area Releases - 1692 pounds U to Pond
295 pounds to 300N Crib

5-50 Extraction Losses — B Plant — T Plant
Analyses before rework — 1.62% — 1.78%
Analyses after rework (throw away) — 1.11% — 1.16%
Avg MWD/T — 378 — 379

5-50 Waste Disposal - 2nd cycle Supernate
B-109 + B-110 328,000 gal combined cribbed during month in east area
T-112 462,000 gal total for April and May

5-50 Sand Filter - ~~sand filter~~ 20-30,000 gal of water pumped from filter in 4-50. Destination not identified

5-50 Piping Changes - Diversion box changes made to permit 221B 1C waste to go to 104B series tanks + free B112 series tanks for 5-6W settling.

5-50 Samples to Sep Technology - • 2,000 ml unneutralized 221 5-6W • 200 ml 2C sludge from T-110 • 500 ml unneutralized 2C from 221 ~~B~~ • 100 ml of dissolver sol'n from 221-T

5-50 Scavenging of 2C/5-6W Wastes. Decontamination of 2C/5-6W wastes were tested by 1) adjusting pH of each sol'n to 7 2) mixing wastes in expected ratio 3) adding a 10^{-3}M $Fe(OH)_3$ carrier. Contamination of mixed supernate dropped to 3×10^{-5} µg Pu/cc & 3×10^{-2} µc gross β/cc. (This corresponds to a discharge to cribs per run - 41,000 l 5-6 + 9,050 l 2C - of 1.3 mg Pu + 1.7 ci of β.) This compares to 17 mg Pu and 6 Ci β for separate settling and 160 mg Pu + 40 Ci β cribbed under current practice. Solids formed are 9.3% of 2C liquid vol + 0.9% of 5-6 liquid volume. [redacted] Assuming a volume ratio of 5 for 5-6/2C, sludge accumulation will be 1.5 times faster than for 2C alone. -- 5 yrs of operation will fill a 530,000 gal tank with solids.

[redacted]

5-50 234-5 Process - Los Alamos H_2O_2 / SO4 = ppt of Pu peroxide followed by 5% H_2O_2 with F (possibly Ammonium bifluoride) & metathesis with F (possibly Ammonium bifluoride) gave encouraging results with + without iron spiking - H_2SO_4 process resembles that in 231 bldg except its reduced from 0.9M (231) to 0.15M for this test

5-50 Planned 300 test Releases Pgh'd 1671 Pounds U
300N Crib 292 pounds U

5-50 Σ Activity at 321 waste crib - located 50' N-NW of 300 area, Sampling at well #321-1 No activity in 1999 when operations terminated. Activity now is 80 dis/min/l

6-50 222-S Waste Disposal - Project C-187-E, includes these 116 facilities

6-50 U slug enrichment - most recent comment on test U235 content of U slug U was in ~ 4-50 7.5% of U is U235.

6-50 Extraction Waste losses

	B Plant	T Plant
Analyses before rework	1.59%	1.72%
Analyses after rework (throw away)	1.16%	1.39%
Avg MWD/TON	390	477

Last 14 runs @ T with an Avg burn of 525 MWD/T. Extraction loss of 1.91 after rework and an increase of about 0.30% + Normal chg in losses from the UC product ppt'n step for same material. I.E. All Am + Cm are not removed from Pu in extraction ppts

6-50 Master clean out ~~of F.K. Reagete storage~~ recycle from 224-B - All recycle reprocessed

[redacted]

[redacted]

to A single cky to 224-B (Cr 55.21% of standard cky) for A master recycle run with no fresh material.

Analyses	% of Standard Cky
Product Content/ run @ start (LAF by-product rpte)	55.29
Final Prod. Soln (shipped to 231)	62.30
LAF by Product loss	0.16
LAF prod loss	0.15
Methasus loss	0.03

6-50 224-T Storage Tank Clean out - Flushed with 30% H_2O_2 to remove MnO_2 accumulation - total product discarded as waste was 0.16% of 1 standard cky.

6-50 Waste Disposal - 2nd C Supernate Cribbing - B105 cribbing of 86,000 gal. This completes cribbing of B104-105-106 Tanks.
T T-12 cribbed 129,000 gal during month.

Settling Tanks for 224T - T209 will probably fill to capacity (20') by September. Sludge less dense than T201. 410 runs for T209 + 693 runs for T201. Fill rates were 11½ mo for T209 & 33 mo for T201. It is assumed that once solids begin to cascade to T203 - the overflow line will block.

6-50 241-WR Diversion Vault Tanks - Design basis letter provides 95,000 gal Tanks for Acidified waste feed, TBP waste, nitric acid + process condensate.

6-50 Uranium Grain Modification - 0.3 atomic % Cr selected for test.

6-50 HW Sludge Dissolution - HW 18199 "Sludge Acidification" - Progress Report.

[redacted]

[redacted]

6/50 ~~HB~~ HNO_3 Dissolution of U-Al Alloy – Studies w. Hg HNO_3 / ANN / Hg Catalyst Procedure

Caustic Dissolution of U-Al Alloy – NaOH / $NaNO_3$ / Al dissolution studies procedure

6/50 Am / Cm Analysis Procedure – Irradiated uranium solutions oxidized, Am, Cm + R.E. fission products carried down by LaF_3 ppt. Anions by NaOH removes fluoride, ppt dissolved in HCl + Am / Cm removed by ion exchange + mounted for counting. Several mounts of 8-1-MR samples have been prepared. ~3% correction made for foreign α emitters. % of foreign α emitters as Am-241 (55.6%), Cm-242 (44.4%)

High waste losses beyond Am241, Cm242 explainable due to incomplete Pu oxidation.

6/50 Planned releases in 300 area. Pond 1716 lbs total 300-N crib 319 pounds total) Uranium

Note: Complete extract of Company internal reports continued on page ___. The extraction will be limited to summary data on pps 4-9, Fuel + Graphite impurities, Waste Disposal, and Health Instruments. Future work should focus on S-Division, Technical Operations, Technical Support for Process Development and Improvements, Maintenance, projects and changes to standard process conditions.

6/50 Waste Disposal – B209 contains ~ 20% sludge from 698 standard 22 + B runs, and 160 acid wash runs. B203 contains ~ 4% sludge

7/50 Am/Cm Analysis Procedure – 8-3-MR samples from batches B-10-09-F-1X (404 g/T) + B-10-05-F-13 (273 G/T) were 1.7% + 0.90% respectively. Waste losses [redacted] in these runs (8-3-WS2) Ewins were 1.06% + 0.99%.

9/50 Waste Disposal - 1C reported from B-104 to BX 107 Cascade after B-105 filled. B-106 will be reserved as A feed tank for the evaporator.

10/50 Note: DR Pile returned to service on 10-3-50 as part of Project H-10 for the manufacture of P-10 targets by P-10 (T slugs) fuel

10/50 Waste Disposal - Both T-112 + B-112 became full during the month + Cribbing of 2C waste from each was required. A total of 327,250 gal from T Plant + 507,200 gal from B Plant had been cribbed by month's end.

The sludge layer in T-204 reached 2 inches below the overflow and 229-T waste was diverted to T-203 (T-203 to T-202 for settling and then to crib T-32)

9/50 TANK WASTE DATA

200E Tanks	Waste	% Full B	C	BX	BY	Reserve in Bitches B	C	BX	BY	Total
BX 101, 2, 3	MW	100	100	100	54.8	0	0	0	294	294
X 104, 5, 6	MW	—	100	100	0.5	—	0	0	697	697
X 201, 2, 3, 4	MW	—	100	—	—	—	—	—	—	—
X 111, 112	MW	—	—	—	0	—	—	—	433	433
X 104, 5, 6	1C	67.2	—	—	—	149	—	—	—	149
X 107, 8, 9	1C	100	100	66.7	0.5	—	0	151	699	797
X 110	1C				0				217	217
X 110, 11, 12	1C	—	100	66.7	—	—	0	151	—	151
X 110, 11, 12	2C	92.6	—	—	—	40	—	—	—	40

200W		T	U	TX	T	U	TX	Total
X 101, 2, 3	MW	100	100	—	0	0	—	—
X 101, 2, 3, 4	MW	—	—	66.5	—	—	292	292
X 104, 5, 6	MW	—	100	—	—	0	—	—
X 105, 6, 7, 8	MW	—	—	0	—	—	866	866
X 107, 8, 9	MW	—	100	—	—	0	—	—

[redacted]

9150 Tank Waste Data Continued

200 W		T	U	TX	T	U	TX	Total
X 104, 5, 6	1C	100	—	—	0	—	—	—
X 107, 8, 9	1C	100	—	—	0	—	—	—
X 109, 10, 11, 12	1C	—	—	82.7	—	—	153	153
X 110, 11, 12	1C	—	100	—	—	0	—	—
X 115, 116	1C	—	—	0	—	—	433	433
X 110, 111, 112	2C	97.2	—	—	14	—	—	14
X 113, 114, 116, 117	2C	—	—	0	—	—	1096	1096

By Assignment

	B	C	BX	BY	T	U	TX
X 101, 102, 103	M	M	M	M	M	M	
X 101, 102, 103, 104							M
X 104, 105, 106	1C	M	M	M	1C	M	
X 105, 106, 107, 108							M
X 107, 108, 109	1C	1C	1C	1C	1C	M	
X 109, 110, 111, 112							1C
X 110				1C			
X 110, 111, 112	2C	1C	1C		2C	1C	
X 111, 112				M			
X 113, 114, 116, 117							2C
X 115, 116							
X 115, 118							1C
X 117, 118							
X 201, 202, 203, 204		M					

10/50 Tank Assignment Changes.

B 106	from	1C	to	Waste Evap. Reserve
BY 109	from	1C	to	TBP Reserve
TX 115	from	1C	to	TBP Reserve
TX 116	from	2C	to	Waste Evap Reserve
TX 117	from	2C	to	Waste Evap Reserve
TX 118	from	1C	to	Waste Evap Reserve

[redacted]

[redacted]

10/50 K Gallons in storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
M/A/1	1579	3374	3158	1490	9601	1579	4737	2226	8542
IC	2695	3170	2299	0	8114	3170	1585	2725	7480
2C	1127	0	0	0	1127	1382	0	0	1382
~~FEP~~									

10/50 Recvr Capacity in Gallons

	B	C	BX	BY	Total	T	U	TX	Total
M/A/1	0	0	0	1514	1514	0	0	1091	1091
IC	0	0	218	434	652	0	0	516	516
2C	—	—	—	—		—	—	—	
TBP (gal x 10^3)	~~570~~			758	758			758	758
Waste Evp (gal x 10^3)	570				570			2,274	2,274

10/50 Σ error due to Cm + Am — HW-19375 points to estimation to within 10% for up to 500 MWDT

11/50 Waste Disposal — ~~T-20~~ T-112 supernate cribbed. 3.49,250 gal in month

11/50 Tank Assignment Changes.

B 106 has been dropped as A Waste Evp Recvr Tank (it has not been included in another category)

TX 117 From Waste Evp Recvr to IC

TX 118 From Waste Evp Recvr to IC

11/50 K Gal in Storage

	E					W			
	B	C	BX	BY	Σ	T	U	TX	Σ
M	1579	3374	→ 3180	→ 1675	9808	1579	4737 → 2386		8702
IC	2695	3170	→ 2515	0	8330	3170	1585 → 2894		7649
2C	→ 1275	0	0	0	1275	→ 1154	0	0	1154

[redacted]

[redacted]

11/50 Reserve Capacity in Batches

	B	C	BX	BY	Σ	T	V	TX	Σ
M	0	0	0	→ 1295	1245	0	0 →	1095	1095
IC	0	0	→ 189	→ 647	836	0	0 →	902	902
2C	—	—	—	—		—	—	~~758~~	~~758~~
TBP(10^3 gal)				758	758			758	758
WasteEvap(10^3 gal)	→ ?				?		→	750	~~758~~ 758

12/50 Waste Disposal

2C Supernate Cribbing - B-112 299,000 gal
T-112 118,200 gal

Kgal in storage

	B	C	BX	BZ	Σ	T	V	TX	Σ
M	1579	3374	3180 →	1918	10051	1579	4737 →	2567	8883
IC	2695	3170 →	2695 →	106	8566	3170	1585 →	3092	7897
2C	→ 1200	0	0	0	1200	→ 1073	0	0	1073

Reserve Capacity in Batches

	B	C	BX	BZ	Σ	T	V	TX	Σ
M	0	0	0	→ 1175	1175	0	0 →	993	993
IC	0	0 →	152	→ 616	768	—	—		
2C	—	—	—	—				758	758
TBP(10^3 gal)				758	758			758	758
WasteEvap(10^3 gal)	?								

1/51 Waste Disposal

Cribbing 119,000 gal 2C cribbed from B-Farm

Kgal in storage

	East					West			
	B	C	BX	BZ	Total	T	V	TX	Total
Depleted V	1574	3374	3180 →	2146	10279	1579	4737 →	2800	9116
IC	2695	3170	2695 →	354	8814	3170	1585 →	3260	8015
2C	→ 1294	0	0	0	1294	→ 1297	0	0	1297
TBP Reserve	—	—	—	—	—	—	—	—	—
Waste Evap Reserve	—	—	—	—	—	—	—	—	—

[redacted]

[redacted]

Reserve capacity in Batches

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
Depleted U	0	0	0	→1110	1110	107	0	→926	926
1C	0	0	152	→546	698	0	0	→797	797
2C	—	—	—	—	—	—	—	—	—
TBP(10³gal)	—	—	—	758*	758*	—	—	758**	758**
WasteEvap(10³gal)	—	—	—	—	—	—	—	758***	758***

* 109 BY ** 115 TX *** 116 TX

Ground Disposal Sites - Planning of 216 EK, 216 CW & +36/-U cribs in progress. Also 207-S retention basin and 216-S cribs planned with ground/Redox work. 211-S chemical storage, 276-S organic treatment facility, 277-S mock-up building progressing

2151 Waste Disposal

Uranium loss to ground - It is estimated that 22.9 tons of uranium in 91,650 gal of neutralized, depleted uranium solution were lost to ground in east area - (Note: specific tanks, trains, or dates not mentioned)
- Further details on next page.

Kgal in Storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
Depleted U	1579	3374	3180	→2196	10329	1579	4737	→3006	9320
1C	2645	3170	2645	→552	9012	3170	1585	→3466	8221
2C	→1431	0	0	0	1431	→1998	0	0	1998
TBP reserve	—	—	—	—	—	—	—	—	—
Waste Evap reserve	—	—	—	—	—	—	—	—	—

Reserve Capacity in Batches

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
Depleted U	0	0	0	→1096	1096	0	0	→868	868
1C	0	0	152	→489	641	0	0	→738	738
2C	—	—	—	—	—	—	—	—	—
TBP(10³gal)	—	—	—	758*	758*	—	—	758**	758**
WasteEvap(10³gal)	—	—	—	—	—	—	—	758***	758***

[redacted]

[redacted]

2-51 cont. Uranium loss - continued from page 71. - (see also page 58 for BX 103 piping to BX 101).

On 2/9/51 it was found that the level in the last tank (BX 103) of the 6 tank cascade (BX 101-102-103 + BX 101-102-103) was not rising. Waste level measurements in all six tanks indicated that the BX 102 level had risen to 16' (above the normal cascade overflow level). The level in the tank was permitted to rise to 17' in an effort to unplug the line on 2/20/51. (17' is one foot below the top of the steel liner.) A few days later, it was observed that the levels in BX 102 was dropping without a corresponding increase in BX 103, BX 101, -102 or -103. ~~A few days later~~ A day later positive readings were seen in a dry well adjacent to BX 102. The level in BX 102 had dropped 6" on 9,600 gal and an estimate of depleted uranium loss was made - 22.5 lbs. The excess waste in BX 102 was relieved by an alternative line to BX 103. The level in BX 102 was lowered to 15'9". Failure is assumed to have occurred in one of the spare BX 102 ~~nozzles~~ nozzles.

No permanent note on MW rerouting has been mentioned.

2-51 Tank assignment change - Field release for Project C-415 to make tie-ins in tank farms for disposal of 5-6 waste through settling tanks. Work will be done in conjunction with waste evaporator projects in both farms.

2-51 Isolation Bldg - solid levels in sumps - ~~impulse~~ impulse and manometer readings indicate that sump sludge has reached the manometer level. Lines removed and d[redacted] shortened.

2-51 Tank Assignment Changes - Project C-36c provides diversion boxes for 101 Metal Waste Tank cascade (CV101, 102, 103) and 104 + 107 metal waste tank cascades.

241 TXR facilities for TX107, TX108 begun

241 CR Tank Farm facilities (152 CR + 153 CR Diversion boxes and 299 CR Blend Vault) begun.

216 WR Cribs work in progress
216 U Cribs work in progress

2-51 Uranium Impurities - several Hanford billets produced in January and February contained from 20 to 100 ppm of lead. Specifications call for not more than 10 ppm.

2-51 Uranium canning - It is not clear when enriched fuel canning terminated at Hanford. But the need to determine uranium content of +1-5 alloy has been eliminated

2-51 Impurities in irradiated metal and product - Bias between make-up amounts of 6-3-MR (standard metal) and product (P-1) and analytical responses have been obtained.

			Method	Make up*	Found*	Freq.
6-3-MR	Pu outside/lb		CA-2a	6.29E+6	6.29E+6	87
	Pu	222-B	CA-6b	2.00E+5	2.01E+5	12
	Pu	222-T	CA-6b	2.00E+5	2.00E+5	23
	Am	222-B	—	3.99E+3	4.05E+3	14
	Am	222-T	—	3.99E+3	3.96E+3	21
P-1	Pu	231	CA-6a	1.508E+9	1.593E+9	19
	Ba, Cr, K, Mn	234-5	Spectrog.	Normal	Low	7
	Al	234-5	"	Normal	High	7
	Be, Ca, Cd, Ce	234-5	"	Normal	V-Good	7
	Co, In, La, Li					
	Mg, Na, Pb, Sr					
	Th, Zn	[redacted]		within a factor of 2 of	within a factor of 2	

14

[redacted]

2-51 Waste Disposal - Preliminary investigation levels. A plugged line between 202-T and the crib

3-51 Waste Disposal - Partial plugging of line from T-202 to crib continues. Waste loss from tank BX-102 last month measured to 10.7 tons of uranium and 10 to 12 units of plutonium. Wastes currently deposited through BX-101, -102, -103, BX-101, -102, -103 have been diverted to BX-104, -105, -106, BY-104, -105, -106. In the interim, supernate in BX-102 will be transferred to the BY-101 crib via the BX-103 tank by means of a special jet assembly. Eventually the BX-102 tank will be drained by diversion back to the BX-101 tank. See also page 58

Kgal in storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	1579	3374	3180 → 2418		10551	1579	4737 → 3298		9564
1C	2645	3170	2645 → 765		9225 → 3115	1585 → 3700			8730
2C	→ 1195	0	0	0	1195	→ 1467	0	0	1467
TBRM.	—	—	—	—	—	—	—	—	—
W.Engrhes	—	—	—	—	—	—	—	—	—

Reserve Capacity in Batches

	East					West			
	B	C	BX	BY	TOTAL	T	U	TX	Total
MW	0	0	0	→ 1033	1033	0	0	→ 799	799
1C	0	0	152	→ 428	580	→ 7	0	→ 671	678
2C	—	—	—	—	—	—	—	—	—
TBP Res (Kgal)	—	—	—	758[b]	758[b]	—	—	758[c]	758[c]
WE Res (Kgal) → 530[a]	—	—	—	—	530[a]	—	—	758[d]	758[d]

a) B-106 b) BY-109 c) TX-115 d) TX-116

Disposal to Cribs 377,072 gal of supernate from B-112
143,000 gal from [redacted] T-112. Cribbing in west terminated at month's end as work proceeded for a constant overflow facility

[redacted]

Waste Evaporator Feed – Waste (Aged IC supernate) transferred from T farm to +x-116. Evap. start up scheduled for May.

3-51 Am-Cm Correction Factor – Beginning this month, A correction factor will be applied to product measurements for extraction and both 1st and 2nd Cycle decontamination. Total apparent Pu content of process waste assayed to be 50%. It is further assayed that 65% of the Am and Cm is accounted for in extraction while the balance is removed in the decontamination cycles. Total waste losses through concentration amount to approximately 1.8% as compared to the 3.9% previously cited. See HW 20581 Supp 114

3-51 Tank Assignment Change – Extraction waste diverted from TX101-102, -103, -104 cascade to TX-105, -106, -107 -108(?) cascade.

Waste lines installed for disposal & retrieval of metal waste in TX101 and 102.

3-51 Segregation of Redox + TBP feed to V03 Plant – ~~Facility~~ Facility involves two 8'x30' stainless steel tanks; one for 76% UNH from TBP and one for 60% UNH from Redox – Cancelled in 7-51

3-51 Pu/Am/Cm content of IC Decon Waste – Analysis of two samples indicate Cm242 @ 70-80%, Am 20-30%, Pu @ twice to 5% of total & energy analysis value

4-51 Waste Disposal

2C Calcining: 123,052 gal calcined from B-112 Waste Evaporation for IC waste – ~~was not specified~~ in westfalen.

Evaporator startup involved transfer of 1,115,000 gal of IC supernate [redacted] from T104/105+106 to TX-117 and-118. About 470,000 gal of 2C+IC sludge remain in the T109 cascade

  [redacted]

4-51 Tie in line from T-112 to 241-T crib (Crib T-5) allows constant overflow of settled second decon cycle waste in conjunction with Section 5 waste. Work is almost completed on Project C-415 which provides for Sections Waste Disposal in West Area. Upon completion, construction activities will be moved to 200 East.

4-51 Kgal in Storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	1579	3374 →	3117 →	2688	10 758	1579	4737 →	3452	9768
1C	2645	3170	2645 →	955	9415	→ 2055	1585 →	4912	8552
2C	→ 1250	0	0	0	1250	→ 1596	0	0	1596
TBP Res	—	—	—	—	—	—	—	—	—
W Evap Res.	—	—	—	—	—	—	—	—	—

4-51 Reserve Capacity in Batches

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	0	0 →	18 →	955	973	0	0 →	741	741
1C	0	0 →	151 →	374	525	→ 319	0 →	326	615
2C	—	—	—	—	—	—	—	—	—
TBP Res (10^3 gal)	—	—	—	758[b]	758	~~758~~	—	758[c]	758[c]
W Evap Res (10^3 gal)	530[a]	—	—		530	—	—	758[d]	758[d]

Footnotes see pg 79

Note: Balances for 1C in T probably in error as well as W. Evap in West. TX 117 + TX 118 received supernate waste from T 104, 105, 106.

4-51 BX/BY MW cascades - "In the B-Plant, the above ground jet assembly from the 102-BX tank to the 103-BX tank being used to by-pass the plugged line showed dosage rates up to 17.5 R/hr at 2 inches during jetting.

[redacted]

5-51 Waste Disposal

Kgal in storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	1579	3374	3117 → 2902		10972	1579	4737 → 3677		9993
1C	2695	3170	2695 → 1183		9693	→ 1270	1585 → 5219		8574
2C	→ 1428	0	0	0	1428	→ 1629	0	0	1629
TOPHos	—	—	—	—	—	—	—	—	—
WCHos	—	—	—	—	—	—	—	—	—

Reserve Capacity in Batches

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	0	0	18	893	911	0	0	677	677
1C	0	0	151	309	460	400	0	239	639
2C	61	—	—	—	—	—	—	—	—
TOPHos (UO_3/D)	—	—	—	758	758	—	—	758	758
WEHos (kgU/m^3)	530	—	—		530	—	— → 716		716

Footnotes see pg 79

5-51 Cribbing 1 2C Supernate - None from East, estimate of 185,600 from T 112 by cascade to T-5
It is expected that the section 5 effluents, originating in the canyon bldgs, will be combined with 2C supernates at both B & T in June or July.

5-51 1C Waste Evaporation - Since the April 1 189,046 gal of 1C Supernate have been processed through the west area evaporator at an average rate of 511 gallons per hour. A volume reduction of about 80% and a β Df of 3.7×10^3 was observed. System shut down to replace parts that were attacked by an unexpectedly large NH_4^+ concentration in the feed.
To date 1,379,000 gal of 1C supernate have been transferred from 241-T to 241-TX for [redacted] feedstock.

[redacted]

5-51 Reported 297-T Stick Drainage Waste - on May 28, the drainage waste was rerouted to the TX 113, 114, 115 cascade concurrent with IC waste

5-51 Qualifying MW / IC Waste Temperatures - Temperatures in 1st tank of 6 tank (101 BX-BY) and 2nd tank (101 TX) cascades are approaching the boiling point of the supernates.
- Coolers will be installed on thermally hot tanks
- Large cascades will be ripped to limit the number of tanks in a cascade to two or three

6-51 Waste Disposal

Kgal in storage

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	1579	3374	3117	→5000	11070	1579	4737→8894		10210
IC	2695	3870	2695	→1282	9742	→1395	1585→5371		8301
2C	→1555	0	0	0	1555	1629	0	0	1629
TBP Res	—	—	—	—	—	—	—	—	—
WE Res	—	—	—	—	—	—	—	—	—

Reserve Capacity in Tanks

	East					West			
	B	C	BX	BY	Total	T	U	TX	Total
MW	0	0	18	→866	884	0	0→615		615
IC	0	0	151	→281	432	→521	0→~~458~~197		718
2C	→—	—	—	—	—	—	—	~~458~~ —	—
TBP Res (10^3 gal)	—	—	—	758[b]	758[b]	—	—	758[c]	758[c]
WE Res (10^3 gal)	530[a]	—	—	—	530[a]	—	—	716[d]	716[d]

Footnotes: see p79

6-51 Cribbing of 2C supernate + 5-6 waste — Piping complete and management initiated to combine Section 5-6 waste with 2C to the B-110 and T-110 cascades and constant overflow to cribs from B-112 + T-112

[redacted]

[redacted]

6-51 IC supernate Evaporation -

	June	To Date
Gallons Evaporated	406,568	595,614
% WVR	70.0	72.8

To date, a total of 1,806,625 gal of supernate have been removed from 241-T Farm. A 30,000 pound slit level MS accumulated in the evaporator tank.

6-51 TBP Feed Plans - Minor revision to CWC Vault and East West blend tank to permit direct receipt of Bismuth Phosphate metal Waste to TBP. Previously, it was assumed that the waste needed a 2 year aging period.

6-51 Pu 240 content - Spontaneous Fission Counting has indicated lower % Pu 240 content than that estimated from pile data. At 300 MWD, Pu 240 is 10% lower At 600 MWD, Pu 240 is 7.5% lower

6-51 Uranium Purity - HW-21424 compares U/C/Fe impurities in Hanford and Mallinckrodt Uranium - No significant differences

7-51 IC Supernate Evaporation - Plant -

	July	To Date
Gallons Evaporated	539,093	1,134,697
% WVR	79.8	79.1

To date 2,296,125 gal of supernate have been transferred from 241-T Farm. This completes the transfer of the supernates from T Farm

7-51 Ground Disposal - The overflow ~~line~~ line from 202-T to Crib ~~was~~ partially blocked.

7-51 Am-Cm to MW - A tentative figure of 75% of the total Am-Cm goes to MW at 6-1-MS for 600 MWD material [redacted]

[redacted]

7-51 Kgal in storage

	East					West			
	B	C	BX	BZ	Total	T	U	TX	Total
MW	1579	3379	3117 → 3102		11172	1579	4287 → 4056		10372
1C	2695	3170	2695 → 1372		9833	→ 792	1585 → 5586		7923
2C	→ 1621				1621	1629			1629
T Bl Res	—								
WE Res	—								

7-51 Reserve capacity in Kgals

	East					West			
	B	C	BX	BZ	Total	T	U	TX	Total
MW	0	0	18	836	→ 854	0	0 → 568		568
1C	0	0	151	259	→ 905	→ 679	0 → 54		733
2C	—	—	—	—	—	—	—	—	—
75 Pkg (U³/gal)	—	—	—	758[b]	758[b]	—	—	758[c]	758[c]
WE Pkg (U³/gal)	530[a]	—	—	—	530[a]	—	— → 460[d]		460[d]

Footnotes: see pg 79

7-54 Combustion of 2 C + 5 C wastes - Wastes were combined at B on 7/7/51 and at T on 6/25/51

7-51 Removal of sludge from 292-T evaporator tank - Two 4000 gal water flushes with constant steam sparging were ineffective - As were two flushes of fresh feed that had been evaporated to ½ reduction. A 4000 gal flush of 0.5% Citric Acid at 80°C was effective when used with air sparging

8-51 Waste losses and Burnup As % of Total & counts -

Push	Runs	Extraction	1C By-Product Pad	1C By-Prod Pad	2C By-Prod Pad	2C By-Prod Pad	% AM-CM-TC
6-6 DR (571 mwd)/T	6	2.20	0.80	0.45	0.15	0.28	2.07
6-12 H (697 mwd)/T	6	5.17	0.89	0.76	0.28	0.21	5.36

[redacted]

8-51 Evaporator operations - % WVR varied from 68% to 82% and Condensate β was in the range 0-17 counts/min/ml. 0.5% by wt of citric acid removed ~ 20% of accumulated sludge. A second flush with 1.0% citric acid removed another 20%.

8-51 Recouple x Development Begins - Process will be a TBP solvent in ~~hyd~~ hydrocarbon or CCl4 diluent to couple 224 and Redox plutonium products to 2 59-5 operations. The process would also be used to recover Pu from slag + crucible wastes. In general A typical run consists of contacting A diluted feed ~~[illegible]~~ with 30% TBP in CCl4 followed by a water scrub and a strip by 0.6M $(NH_4)_2SO_4$ - 0.05M H_2SO_4. PPt'n of the +3 oxalate of Pu followed by hydrofluorination and reduction to metal give a 96% yield in one study.

Raffinate from the first contactor is CAW waste - is gelatinous, voluminous + has solids that settle slowly. It contains about 10 times more fissility than any other waste emptied @ Hanford

9-51 Waste Disposal Piping - late in August, IC waste diverted from BY 109 to BX 112 as the former was filled to capacity.

9-51 Fuel Impurities - A low conc. of Be^{2+} (~0.005 M) in the Al-Si Bath reduces dross on at the surface of the bath - impact on fuel unknown.

9-51 Process Volume Reduction (Standard as Sept 1996 values) Extractant 2.5g Bi/liter. IC volume at 92% of standard 2C at 99% of standard. Standard Bi before production test was 95:1 for Bi:Pu (or ~ 4.5 gm Bi/liter @ 1000 MWD/T

9-51 Cooling Waste loss - 0.29% for 600 MWD/T and 0.21% at 920 MWD/T [redacted]

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[redacted]

9/51 Activity of Cribbed Waste - Effluents from B 112 + T 112 (2C 1/5-6 wastes combined) At 16 uci/l vrs 22 uci/l for last month for B and 29 uci/l for this month and 25 uci/l for last month for T.

9-51 IC Evaporator (292T) Sludge content increased by 700 gallons to 2100 gallons

9-51 Recouplex Flowsheet - revised

9-51 Decontamination studies of feed to in Plant Redox evaporator in progress

9-51 Activity of oxide product from UO3 plant - 50,000 ci/m from U-233 (B), 800 ci/m from UX1 + UX2 (B) and a maximum of 1500 ci/m from fission products (6) for a sample.

9-51 Isotope Correction Factors as a function of "Total Plutonium Count" - Conversion from the ASP instrument (old instrument that reads each of ten 10/11 sections individually) to the ASVP (new instrument that reads all 10 10/11 sections at one time) programming - each shows a different deviation from 50% of the total Σ.

9-51 Pu yields for 400-420 MWD/T irradiations - HW-22167, see also HW-12163

10-51 Batch Size - increased starting size by 10% final size by 8.7% see HW-22295 start 10/19/51 B-11-10-D-46 + T-11-10-F-36

10-51 IC Evaporator (292T) - 32 batches prepared @ 900 gph, 392,511 gal of IC supernate evaporated to a volume of 102,440 gal of concentrate and 290,071 gal of condensate discharged to cribs WR = 74.6%

Sludge heel measured 2300 gal, overheated to condenser blocked and four flushes (13,690 gal total) of 60% HNO_3 used to reduce the heel to 400 gal. Acid flush slurry [redacted] to TX116.

Second Less Test of Supernate ~~tank~~ UNH of 1C evap. bottoms made on Solution from 116-TX (assure it was diverted through TX117 and/or TX118) to the 242-T evaporator tank and then to 116-TX 30,250 gallons of feed were reduced in volume by 49.2%. The sludge heel increased 158 gallons which is considered normal.

10-51 Sludge in 5-B tank is at 8000 lbs and the dip tube to the 5-6 jct was shortened and baffled to preclude jetting the solids

10-51 Piping - Metal Waste diverted to 111-BY

10-51 Uranium Impurities - Tests + sensitivities

	old	New
Cd	1 ppm	0.2 ppm
Co	100	10
Hg	10	1
MN	5	2
MO	20	10

~~Fe~~ Si not listed but Fe is ~ 50 ppm

10-51 Isotype Connection Fiction - Geometry for AS P counting instrument should be changed from 50.5% to 50.0% when Stainless Steel discs are substituted for the platinum discs.

11-51 Redox Cold Startup - 21.6 tons of "cold" (canned slugs) uranium metal was charged on 11/19/51 to coating removal. Dissolving began + stopped on 11/20/51 as mechanical problems appeared.

11-51 300 Area Essential Materials - HW 22594

11-51 100 Area Wastes. Aluminum sulfate (alum) coagulant to 100-F Area filtration plant reduced from 29 ppm to 7 ppm - waste to retention basins. Bldg 107 retention + Bldg 105 storage basin water indicates that [redacted] Sludge from ruptured slugs is settling in basins - ruptured slug report - HW 22730 and HW 22859

[redacted]

11/51 IC Supernate transfer to 118-TX- pump failure interrupted the transfer from TX 110 to TX 118. Transfer completed during month. Pump had an impeller transfer after transferring about 3,000,000 gal - on about 12 way through TK 110

11-51 Isolation Bldg Still - The still in 231 had a reduction in cooling time from 60 min/batch to 15 min/batch

11-51 Flowsheets - Recouplex HW-22604 for HW#1 & HW#2 Redox material balances under ORM L June 1949 Conditions HW 22034 Uranium Recovery Technical Manual HW 19140

11-51 Uranium Impurities - Limits & Sensitivity

Element	Present (old) Limit	New	Goal
B	1 ppm	0.5 ppm	
Cd	1	0.2	
Co	100	2	
Cr	10	1	
Cu	20	0.5	
Mg	10	1	
Mn	5	2	
Mo	20	2	
Sn	5	1	
Ag	0.1 ppm		0.05 ppm
B	0.2		0.1
Cd	1.0		0.05
K	50		2.0
Li	5		0.1
Na	5		0.5
Ni	10		1.0
Pb	5		1.0
Sn	5		1.0
Zn	100		10.0

[redacted]

11-51 Crib Plumes - [redacted] waste liquid from the crib that receives 229-T 1st second cycle 5-6 waste solution moved southeastward toward the 241-TY tank farm at a depth of ~ 30 feet below the bottom of the excavation

12-51 UNH to UO_3 Plant - About 7,200 lbs of UNH was transferred to tank 5-203 AND then to the UO_3 plant - steam jet dilution high (13-15%) + standard pump installed 5% of standard HW conc.

12-51 Hot Redox start up - (1) irradiated Slugs introduced to dissolver - cancer studies will begin in January 815 lbs of low level Clinton slugs + 1½ buckets of full level Hanford Slugs.

12-51 Documents HW-23076 Billet Specifications
HW-22827 Essential Materials Requirements, 300 Area

12-51 100 area waste - use of activated Silica as a coagulation aid for aluminum sulfate for 100-F area Filtration Plant.

12-51 HW Storage Temps TX-105 238°F (sludge) 210° (Supernate)

12-51 Change to E+W 4 Tank Cascades - cascades upped to two tank cascades.

12-51 Water to C-106 - 8½" of water inadvertently added on 11-20-51. Tank overflow did not occur

12-51 Log storage of UNH - A shielding wall is being erected around the X-1 + X-2 feed tanks to the UO_3 plant and UNH will be stored about 40 days after receipt from Redox. The total time since reaction discharge of 80 days is required for the U-237 activity to drop to an acceptable level. X-1 + X-2 at the UO_3 with the C-1 Tank waste transfers from the Redox 202-S tank farm (tanks 151-S + 152-S) U-237 t½ is 6.8 days

[redacted]

[redacted]

12-51 UNH to C-1 of UO3 plant 1116 gal pumped on 12-22-51.

12-51 Waste Piping - Tanks 105 TX + 106 TX were by passed because of high MW temps. T-Plant MW is now flowing directly into TX 107

12-51 Am-Cm assays - For June through mid November Am + Cm content of 16 pushes or mixtures of pushes averaged ~ 3.6% for T + 3.2% for B From mid November to mid December, values are 4.3% for B + 9.1% for T. Extraction losses For that month were 4.46% for B + 4.50% for T

12-51 242 T evaporator - Runs T-11-11-W-31 through T-11-12-W-25 gave a UVR factor of 75.7% & a log B DF of ~4.0. ~~Sludge~~ Sludge volume in evaporator unchanged at ~ 1400 gal.

12-51 242-B evaporator - started on 12-13-51. 217,390 gal of Feed have been separated into 47,928 gal of concentrate and 169,412 gal of condensate (UVR factor 77.9%) Condensate to crib and concentrate to B-108 tank. Several "foam-overs" were controlled with additions of Nonesol at 20 ppm.

12-51 Redox Concentrator distillate decontamination - in development

12-51 IC Waste Evaporation - A volume reduction of 4:1 by evaporation of cold Synthetic Bi_3PO_4 IC waste supernate gave 130 g of solids per liter of concentrate. Crystals contain Bi^{+++} Na^+, $PO_4^{\equiv}$ and a little Al^{+++}. They are soluble in HCl, conc. HNO_3 + Citric Acid - but not soluble in H_2O, Caustic or dilute HNO_3

12-51 Document on Revised Isotope Correction Factor HW 23100

[redacted]

12-51 Crib locations - the Test well 241-T-15 is 90 feet South of 229 T crib and 65 feet North of second cycle crib.

1-52 MW storage Temp 195 TX 200°F (12-4-51) 238°F (1-10-52) Actual temperature prob. exceeded 290°F because instrument had a max value of 290°F. These are maximum temps. At 6" below liquid surface temps are 210°F for dec. 17 [redacted] to Jan 13 and dropped to 205°F by months end.

Predicted MW Temps in °F)

Tank	Max Temp / Date	Temp on 1-1-52	Predicted temps 1-1-53	1-1-54	1-1-55	no/hr @ 135#
101 AX	216 7-1-51	192	157	135	121	1-54
109 AX	210* 2-1-52*	205	167	141	125	5-54
101 TX	190 7-1-51	178	144	127	116	6-53
105 TX	290 2-1-52*	290	190	155	139	12-54

*Issued

1-52 Waste Evaporators
242-T: Sludge vol fluctuates between 1200 +/- 500 gal during dec + Jan. 625 g/h
WVR fctr = 75.6% log Df 4.0
242-B: Sludge 820 gal - 582 gph
77.5% = WVR fctr No Df given

1-52 241-U Tank from ops - Supernates in 101-U discarded "homogenized" and supernate transfer from 103-U to 115-TX [redacted] prior to sludge sluicing.

2-52 Waste Evaporators
242-T: heel 1200 to 1400 gal 750 gph,
105 B Df 4.0
242-B: 865 gph, to 385 gph Effectively + 4000 gal [redacted] flush 1 2% HNO_3 then dumped to B 108, four more flushes @ 1000 lbs / 60% HNO_3 (the 1st flush was a dilution of 1000 lbs / 60% HNO_3) Four flushes had a starting heel of 1615 gallons

[redacted]

2-52 MW Temp. 107TX (98% full) 198°F.

2-52 242-U Farm Ops. Sluicing began Feb 5 on 101-U. About 15 tons of sludge was sluiced to the slurry accumulator

3-52 Waste Evap.
242-T: Feed from TX113. 700gph
Sludge rose from 875gal to 1600gal WVR fell to 7.6
log DF 4.0
242-B Poor operation Flushed twice
left 540 gal of sludge. Feed from C Farm
at end of month

3-52 242 Farm ops - no technical info.

4-52 MW Sluicing - Sluicing in 101-U is down to bottom of tank near sludge pump in several places.

4-52 Tons of U from Redox to storage 75.0 for April
43.1 for March.

4-52 Waste Evap 242T one hot water flush
Reduced head from 1280gal to 980gal.

4-52 241-U TK Farm Ops. Practice sluicing from 101 to 103. Removal of about 15 tons of sludge (8 tons of U in sludge plus supernate) removed per shift. This is twice the capacity of acidification + blending.

5-52 241-U TK Farm ops - About 55 to 60 tons of sludge - equivalent to 25 tons of U moved from U101 to U103.

[redacted]

[redacted] U-236 Content of Enriched Uranium Receipts From 1/69 Thru 6/69

Month	95-Metal I+E		95+12.5 Metal	
	Avg U-236 ppm	Tons Rcvd as Cores	Avg U-236 ppm	Tons Rcvd as Billets
JAN	401	169.0	.451	33.8
Feb	410	206.9	427	30.3
Mar	401	109.8	411	28.1
APR	378	98.0	416	22.2
May	394	161.2	420	35.6
JUN	416	129.3	438	19.6
Avg	401.48	145.70	427.52	28.17
Total	—	874.2	—	169.0

Source: DUN-6160, Average U-236 Content of Incoming Enriched I+E Cores and NPR Billets, K.R. Milner, August 14, 1969
Douglas United Nuclear, Inc.
Originally classified as Secret - Restricted Data
Reviewed

[redacted]

[redacted]

6/52 Waste Disposal -

Waste Evap - 242 T heel increased fm 515 gal to 1378 WVR fctr 75.2%

- "Sludge" represents ~ 50% of the total volume in Evaporator Bottoms Tanks

- 242B WVR fctr 72.8% Heel increased to 2316 gal before removal to 987 gal with four shots of 60% Nitric Acid. Evap rate before flushes 553 gal/hr + after 782 gal/hr

- Redox - Tons of U processed ~ 44.8, Pu processed 74.4 (batch equiv) % U to Waste 1.57, % Pu to waste 2.5)
Full list of DF's + % Waste losses for two typical runs (DF's for β, γ + Ru)

7/52 ~~Waste Disposal~~ Metal Waste Removal - 21,438 pounds of U transferred from U Tank to TBP. This transfer and the one transferred last month fills the available space in the plant. Sluicing activities continue in an effort to remove all sludge from V101 to V103 and blending activities will be temporarily discontinued.

7-52 Waste Disposal - 155,140 gal of cold uranium waste from TBP has been added to a special ditch. Because the rate of absorption in the ground has decreased - A second ditch was provided to dispose of the remaining cold run waste

7-52 221-B + 224-B ~~Stand~~ stand down - Dissolver heels have been removed from 221-B (equivalent to five runs) A product should be removed by acid washes by August 29, 1952. During September the are will be prepared for water runs in 221-B and decon of Sections 16 + 17. 224-B will be placed on complete stand by. [redacted] Three waters flushes Actually used for dilution water for 2C by product pan

 [redacted]

7-52 U101 sludge removal - sludge pump failed.

7-52 221-T Np recovery - June 19, 1952 thru July 19, 1952 13 Np extractions from 19 plutonium extraction wastes 11.7 gm of Np recovered.

7-52 Waste Evap. 242-T heel varied from 1378 to 1908 gal. Avg. instantaneous evap rate was 732 gph. overall rate 600 gph log dF = ~4.0 WVR factor 74.1%

7-52 Redox 77.2 Tons of U processed, 119.1 Batch equivs of Pu processed %U in Waste 1.4% % Pu in waste 1.1%

7-52 241-U Farm Ops - ~2 to 3 tons of U removed per day. First ten blend batches transferred to 241-WR Process Vault made from a slurry high in supernate. Feed diluted by a factor of one or more.

7-52 ~~TBP~~ E 221-U Net Df of concentrator 3.2 x 10^5.

8-52 TBP Testing - continued use of cold feed from UO3 Plant Waste losses range from 2% at start of month to ~20% at end of month.

8-52 MW Removal Blends 1016 + 1017 currently being held in 241-U farm. Sluicing intermittent for first two weeks then terminated. Supernate from U 102 pumped into U101 to disperse fog.

8-52 221-B Ten acid washes then Plant on stand by. Final Flush was 1% Na_3 Citrate + 5% NaOH.

8-52 Evaps. 242-T normal except for a 10 day delay to repair feed pump to 118-TX heel at ~2000 gal WVR F 75.3% LB DF ~4.0 ~~242-B~~

First pass of IC through evaps should be completed [redacted] by Sept 1, 1952 with 2,250,000 gal of concentrate stored in TK 113, 117, 116

[redacted]

8-52 241-U ops. Blending continued from 7-28 thru 8-2 at which time ops discontinued due to filling of 241-UX valves 2 blend tanks - A total of 8.5 tons of U was/was blended at an avg. rate of one ton per day. Six blend batches at start #4 comp of TBP-HW.

8-52 Solid settling from EB- lab studies show that at 25°C, solids occupy 50-60% of the original EB volume if 1) 27% excess water is first removed by evaporation and the recycle is cooled.

7-52 Redox Tons of U processed 75.0 Pu Prod (Oxide equiv.) 107.6
% U to Waste 1.1 % Pu to waste 1.3

8-52 Redox Tons of U processed 106.8 Pu Processed (Oxide equivalents) 157.2 g, % U to Waste 1.1
% Pu to waste 0.82

9-52 Waste Evap - 241-W ICS evaporated except TK109→104 (being aged) and TK109-TK (filling) Supernate from TK104 to Hanford TK118 for feed. 242-T sheet to 99 gal. (Technology says 1750 gal left)

9-52 Am241 in Redox - ~ 0.3% of all Z activity

9-52 Metal Waste Removal - Sluicing of U(o) contaminant - blending operations descontinued on 8-2-52 due to lack of storage space

10-52 TBP Processing - finished cold testing

10-52 HW Removal - OPS started at 241 CR with supernate homogenization + transferal of 500,000 gal to 109-C Refined solid removal [redacted] were. As high as 500 lbs/hr. at first but fell off quickly as hard gummy residual

11-52 TBP Process - Started 11-1-52 with feed from V-101 aside. Sludge blends fed to line from 241-CR on 11-23-52 at ~2.0 T/D (raised to ~4.0 T/D on 11-29-52). Started line A on 11-5-52 with some feeds as to line B. Terminal rate 2.75 T/D with poor performance. After V101 feed exhausted, work continued on C from feed.

11-52 NW Removal - Normal at ~~this~~ 241-UR + 241-CR locations. ~~Plugged line + sludge pump failure at 241-~~ Pump failure at 241-CR had negligible effect. Plugged line at 241-UR caused some delay. Sluicing activities @ V-101 had terminated because of minimal amount of sludge + the difficulty ~~encountered~~ encountered in removing it. Sluicing activities moved to V103

11-52 Fuel Contents - Production test requirement to allow for 2% of Sr in 11-5, both rather than previous test condition of 5%.

11-52 Evaporators - Ops resumed at 242-B after a 33 day delay for purchase of pump from B-106. 242-T steam coils being repaired.

11-52 V-Tank Ops - Sluicing of V101 began on 10-25 and ran to 11-13. Blend batches through 1036 were pumped during the period. Blend supernate from V102 was used in a further attempt to remove the "hard-pan" sludge from V-101. On 11-13 the first supernate blend (1036V) was pumped to the 241-WR vault.

A total of 25 blends were processed + shipped to the 241-WR consisted of slurry from the 101 tank. Blend volumes averaged about 8500 gal with a uranium content of ~0.2665 per gal. Additionally, a total of 30 supernate blends from 102 tank were processed with average volumes of 10,300 gal and a uranium content of [redacted] 0.14 pounds per gallon

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[redacted] HW Report - Summary Information (Hanford Works Monthly Reports)

Date	Document	Issued	B. Pow (west) Chgs Stat.	Chgs Cryst.	%UL	Cool (days) Avg	Cool (days) Min	Product Chgs (Tons) St.	Product Chgs (Tons) Cryst.	%Loss U	%Loss Pu	Cool Avg	Cool Min
9-52	HW25781	10-20-52	8	8	3.03	64	62	149.8	*145.3	1.28	1.14	73	66
10-52	HW26047	11-20-52	22	22	2.97	71	61	123	109.4	1.69	1.09	83	75
11-52	HW26376	12-23-52	24	23	3.03	63	41	163.8	168.1	1.23	.87	81	72
12-52	HW26720	1-23-53	40	39	3.0	454	45	126.4	129.3	1.23	1.23	96	84
1-53	HW26946	2-24-53	10	15	2.85	70	68	151.2	151.2	0.58	1.01	82	55
2-53	HW27288	3-18-53	34	27	2.55	84	70	79.3	79.3	1.42	1.17	95	80
3-53	HW27624	4-22-53	42	47	2.1	84	64	176.9	177.3	1.21	2.05	91	83
4-53	HW27932	5-20-53	13	15	1.7	56	46	189.8	185.7	0.78	1.68	83	75
5-53	HW28267	6-19-53	17	15	2.1	66	56	144.9	159.4	0.72	1.98	82	75
6-53	HW28576	7-22-53	38	40	2.2	65	55	148	136.4	0.98	1.05	80	73
7-53	HW28906	8-20-53	20	20	2.3	53	45	205.2	221.1	1.23	1.26	73	64
8-53	HW29229	9-18-53	21	18	2.4	68	59	174.2	157.7	1.21	1.22	79	63
9-53	HW29513	10-21-53	26	30	2.1	74	65	173.1	165.8	1.43	1.53	83	77
10-53	HW29794	11-20-53	25	21	2.3	70	56	259.4	267.9	0.89	0.79	74	67
11-53	HW30130	12-21-53	31	32	2.4	66	51	20.6	10.9	1.7	2.1	—	—
12-53	HW30423	1-22-54	45	42	2.34	91	70	262.2	268.2	1.13	0.85	83	64
1-54	HW30724	2-25-54	68	68	2.50	66	53	97.0	97.5	1.16	1.17	83	77
2-54	HW31006	3-23-54	55	51	2.47	89	75	119.0	119.0	0.29	0.40	94	77
3-54	HW31267	4-23-54	55	66	2.18	96	82	246	252	0.81	0.69	85	71
4-54	HW31734	5-21-54	12	3	6.1	98	81	230	224	0.88	0.53	85	75
5-54	HW31964	6-22-54	54	54	2.3	88	69	256	256	0.90	0.66	82	70
6-54	HW32317	7-26-54	60	62	2.3	99	82	41.7	41.7	1.7	2.15	80	74
7-54	HW32604	8-20-54	61	61	2.6	98	74	144.0	138.5	0.97	0.73	106	76
8-54	HW32889	9-17-54	50	51	2.7	96	70	182.2	188.9	1.43	0.84	109	82
9-54	HW33200	10-25-54	74	75	2.39	91	60	291.8	244.4	1.71	0.60	102	90
10-54	HW33585	11-29-54	81	79	3.07	89	60	299.7	296.0	1.45	0.58	139	101
11-54	HW33962	12-20-54	81	80	3.57	102	73	277.8	288.5	0.80	0.67	145	107
12-54	HW34197	1-25-55	92	90	4.01	100	88	315.2	320.8	0.37	0.66	116	69
1-55	HW34631	2-21-55	97	102	3.67	104	60	28.0	59.7	0.88	2.91	103	97
2-55	HW35530	3-18-55	98	100	3.97	100	67	109.2	95.6	0.33	0.79	92	75
3-55	HW35891	4-20-55	56	56	4.30	119	64	133.9	127.8	0.96	0.82	82	76
4-55	HW36440	5-23-55	44	44	3.2	90	75	265.7	229.0	0.90	1.30	147	82
5-55	HW36928	6-23-55	102	97	3.9	99	92	442.2	469.0	0.93	0.87	123	106
6-55	HW37658	7-29-55	108	108	3.6	112	101	311.1	307.7	0.99	0.96	100	86

Continue page 122-123 [redacted]

* 288.2 to Date - probably added to uranium in HW from 11-52 + 12-52, 19.9 is old
** 90 tons

Cool Ivy Min	TAP U (Tons) Rcvd	% WL	V return V removed	Evaporation W Feed (gal)	W WVR%	E Feed (gal)	E WVR%	Avg Daily Mile (Tons) Reboil	TAP
73.66				66,000	54.5	537,000	69.8	3.72	
83.75	19.4 ***			17,000	—	201,000	68.2	3.56	
81 72	133.8	2.90	1.58 ~~0.96~~	No ops	est too →	~~137,608~~	~~67~~	3.95	4.4
96 84	154.6 ⊕	5.46	1.41	No ops		637,680	67	~~4.39~~ 3.03	~~5.74~~ 4.91
32 55	168.36	3.59	1.17 (1.29)	No ops		490,000	69.3	3.60	5.78
5 80	120.03	2.48	1.20	165,560	23.2	241,312	62.1	1.73	3.99
71 83	182	3.39	1.29	613,252	27.6	793,250	~~73~~ 34.6	4.10	5.33
53 75	218	2.94	1.0	535,562	(30.0)	564,529	30.1	4.4	6.19
2 75	235	3.45	1.14	352,000	31.6	485,375	29.0	3.8	7.10
73	277	4.36	1.07 Rcvd	509,438	41.4	204,875	46.2	3.4	8.51
3 69	223	4.43	1.22	354,794	45.9	119315	54.0	5.1	6.83
69 63	173	4.09	1.31	522,237	53	No op		4.0	5.35
3 77	216	3.58	1.28	476,284	42	254,000	37	3.96	6.99
76 67	230	1.91	1.38	491,563	33.0	604,312	73.0	6.0	7.42
— —	146	3.24	1.19	439313	31.8	437251	32.4	0.19	4.59
3 69	91	2.74	1.96	441401	36.5	572490	31.4	4.2	2.92
3 77	192	1.28	1.40	361810	39.2	320375	39.7	2.2	5.98
77	172	1.48	1.03	123635	78.2	507375	34.5	3.1	5.92
71	226	1.65	1.00	382250	24.1	~~744~~ 495000	31.9	5.99	7.18
5 75	303	0.81	1.03	322000	30.0	295625	34.9	4.50	10.03
2 70	350	0.81	0.99	393365	34.3	525937	33.6	5.66	10.96
74	203	1.40	1.21	376750	32.1	499045	37.0	1.4	6.73
76	182	1.56	1.22	485925	27.1	620812	39.1	2.2	5.52
82	~~219~~ 249.23	0.65	1.12	495,000	29.7	424188	42.0	3.6	8.15
2 90	158.22	0.75	1.39	293187	29.2	429000	41.3	5.1	5.51
101	71.25	1.24	1.73					5.0	2.34
5 107	59.20	1.32	1.28	—	NO	OPS	—	6.1	2.17
6 69	20.50	4.74	1.17					7.0	0.41
3 97	87.77	3.41	2.01						
2 75	139.86	3.48	0.98						
2 76	169.79	2.39	0.63						
7 82	151.12 ⊕	2.14	~~0.59~~						
3 106	159.19	4.85	0.56						
0 86	153.65	3.85	0.60						

[redacted]

*** 10.5 TU rcvd in 7-52, 8.5 TU rcvd in 8-52 - in Plant feed storage till

⊕ Total to date 5262.79 TU on 4-55

[redacted]

12-52 TBP Processing - 31.63 tons of Uranium Reprocessed during December. 1300 lbs stored in BX III for later recovery

12-52 MW Removal - good rate at U 103 (101.7 tons of Uranium Transferred to TBP Plant - Slicing (24-UR) supernate recirculated by recirculating supernate in second cascade and transferring ~50,000 gallons of this material to U 101

Removal rate in C101 reduced due to two pump failures. 44.5 tons of metal removed from C Farm to TBP during months (24/WK)

12-52 TBP waste disposal - Two waste tank cascade failures and two plugged East-West lines (2nd + 3rd since startup) have seriously affected disposal of TBP waste in East area. Waste currently is being received in C-110 + pumped overland to C-111

12-52 TBP Processing.

	Prod. Rate T.U./day	Σ U Proc. (tons)	U Remark Proc (T)	Lb. Insoluble U/cTU/day
Line	2-4.5	70.6	16.5	2.4
Line	2 (12.5% TBP) 4 to 5 (30% TBP	87.3	11.7	3.5

12-52 241 Tank Farm Ops. UR (95.2 TU) + CR (45.1 TU) for a total Inst. Proc'd 191 blends. 683,067 gal of slurry + 216,710 gal of 60% HNO_3 in 91 blends.

Metal recovery waste stored in A, C + T farms totaling about 890,000 gal for an apparent volume increase of ~30%

1-53 TBP Processing - Operating difficulties in farms forced the use of supernate blends [redacted] for most of the months

[redacted]

1-53 Metal Removal - about 122 tons transferred through UR 47 through CR due to sludge pump failures. Sluicing finished in V-103 + V-102 - both empty. Sluicing began in V-104

1-53 Waste Evap - BX 108 + 109 emptied

1-53 Metal Recovery Feed Prep - A total of 1,569,000 gal of dilute, acidified feed from CR + UR were concentrated to 876,000 g RAF during the month.

1-53 Lab Test on V101 Sludge Solubility. 50 grs dissolve in 150 grs of a solns of 5% in Na_2CO_3, 5% in $NaHCO_3$ or just hot water. Sludge dissolves in water @ 80°C in 5 min. In the other solvents at 20°C - 25 to 40 hrs.

2-53 Metal Removal - ~89 tons from U farm. 31 tons from C farm

2-53 Metal Recovery Feed Prep 827,000 gal of acidified blend from CR + UR contains 121.2 TU / + was concentrated to 499,000 gal for RAF feed.

Waste neutralized to pH 9.0-9.5 @ 0-10°C + transferred to 109 BX + 105 TX - volume equals 634,000 gal (~1.1 gal / gal processed)

3-53 Metal Removal 76 TU - 241 UR ~~49.2 TU 241 CR~~ 56.8 TU 241 CR, 49.2 TU 241 BXR (Total 182 TU

During month ~911,600 gal (188.2 TU) of waste removed from B, C + T farms. 214,000 gal of water used for sluicing + softening (softening in V101 + C101). Acidification final concentration given < 857,000 gal of feed to RAF.

[redacted]

[redacted]

3-53 TBP Waste ~ 902,000 gal / MeU/M load, Concentrated waste (C-1 TU) / sent to 109 BX + 107 BY. This is 0.99 gal waste / gal / MW removed. pH @ ~ 9 to 10

Solvent consumption at 8.3 gal / TBP + 23 gal / diluent / Ton / U processed.

3-53 Waste Evap 242 T 444,125 gal / concentrate + 209,100 gal of condensate @ DF at 40 (ca) wt% 31.3%. 1 at 242 A 299,125 gal / concentrate + 175,811 gal / condensate. Time / DF + wt% @ ~~30 hr~~ ~ 38%

4-53 Metal Removal - final U101 sluicing with water. Switch to U-109. MW supernate, temporarily stored in TX115 - returned to 241-U East for production ~~to~~ Augmented with supernate Supernate blend from C106. C101 calculated to be empty. Sluicing continues in B101 water also used to sluice C101 sludge.

4-53 IC Waste Reevaporation (gallons)

	Feed	Sludge**	Condensate	Space Made*
242 T	1,225,825	921,950	412,280	29.8%
242 B	1,000,000	481,938	258,774	27.1%

* by in tank measurement ** Reilly EB

4-53 Metal Recovery Feed Prep. 690,000 gal stored waste (224.4 TU) removed from / B C + T farms Last 55 TU in U101 removed with water.

Volume returned to tanks ~ 1.1 times volume removed and on a basis of 3530 gal per ton / new uranium processed.

[redacted]

4-53 Waste Evap 242 B 279,867 gl of concentrate, 120,582 gl of condensate. 242-T 120,112 and 179,939 resp.

5-53 Metal Removal V101 empty + redesignated as MW RCVR Most sluicing by water supplemented by MW supernate. Production supplemented by blending supernate from MV109.

5-53 TBP pH - Reduced to 8.0 ± 0.5.

5-53 Redox Waste Transfer - pumped / not jetted saves ~ 3% in waste volume

5-53 Metal Waste Prep - 892,200 ml of alkaline waste (247 TV) from B, C, U sluicing by water + supernate from 109-U.

Concentrated waste volume gave 112% of feed volume on 9370 gl per TV / based on new unions.

5-53 Waste Evap - Eng reports WVR @ 31.1% for 242 B and 40.0% for 242-T.

6-53 Waste Evap. 242 T conc. 112,062, cond 92,813
242-B 289,381 conc. 211,057 cond.

6-53 Metal Removal - Emptied 101 B, 102 C, 104 U operation in 241 TXR started 6-12 with MW supernate from T-103. TX105 started to receive TBP waste TX104 MW to V 101 on 6-3.

Running content of T101 slurry is about 2 times greater than previously experienced. Sluicing started 6-22.

[redacted]

6-53 Metal Removal Feed Prep - All four tanks ~~sluiced~~ averaged 4200 gal of stored MW per ton of Uranium. An average of 3360 gal of water were used per ton of Uranium for sluicing.
~~On~~
ON C-13 103 T MW supernate used to sluice T101
ON C-20 102 T " " " " " "

Water sluicing used in 109-U until storage capacity in C 102 until CR shutdown
One batch of BX101 - sluiced with BX102 MW supernate being pumped.

Return volume 101.3% of removed volume
4260 gal per ton of new uranium

7-53 TBP Process One 5TU Batch processed from BX101

7-53 Metal Removal - Complete in C102, U105.
~~T~~

7-53 TBP Waste TX103 receiving.

7-53 Waste Evap 292 T 191,813 conc 162 981 cond
292 B 54 923 conc 64 392 cond

Feed to 292 T is TBP sup from TX109

7-53 Waste Removal - water used in TX101 U105 Sluicing with MW supernate blended to sluiced solution. Supernate from T103 & U108.

About 4000 gal of stored alkaline waste removed by supernate sluicing, water sluicing and direct transfer of supernate for each ton of uranium removed. Water sluicing increases volume of waste feed by 1840 gallons per TU.

[redacted]

[redacted]

7-53 Waste Disposal About 4300 gal of conc. neutralized waste returned to tanks per ton of uranium processed. About 167% of volume removed. pH 8-9.

About 18,600 gal of low activity waste containing 0.3% of new uranium feed sent to tanks for each ton of new uranium processed.

7-53 Waste Evap - Eng. reports

242-B	240,625 Proc.	103,125 conc.	195,489 cond	57.1%
242-T	253,750 "	140,250 "	109,679 "	45.2%

8-53 TBP Processing - Included ~41.5 TV from Redox that was "high Y"

8-53 Metal Removal - U 102, U 103, C 103 complete
Ty ~~103~~

8-53 TBP Waste Disposal Ty 103 full. C 102 + Ty 104 receiving these wastes.

8-53 Waste Evap - Feed from T 107, T 108, T 109

8-53 Metal Waste Feed Prep - About 3500 gal of stored metal waste per ton. Water sluicing increased volume of feed by about 1820 gal / TV.

Acidification required about 12,500 pounds of 100% HNO_3 per TV.

Boil off ~47% in 221-U ~~evap~~ concentration gave the following in molarities

	U	SO_4	PO_4	HNO_3 (b)	Na
Feed	0.21	0.18	0.225	2.9 (d)	2.8
HW # 4	0.27	0.26	0.26	2.6	4.06

[redacted]

(b) Titratable acidity includes 2H for SO_4 = 2H for PO_4 =
(d) Titratable HNO_3 above ever 2.6 because additional acid used to minimize uranyl acid phosphate ppt.

[redacted]

8-53 Waste Disposal ~4200 gal / conc. Next waste returned to storage for each new TV.
(+20%) 120% / removed volume.

8-53 Uranium ~~Recovery~~ Product - 76% TBP + 24% Redox

8-53 Waste Evap - Engineering

242 T 486,063 Prod 293,375 conc, 262,695 cond 50%
Source 107-108-109 T

9-53 Metal Removal - T101 empty.

9-53 TBP Waste To C101 then over head to C~~102~~ C103 since cascade line to C102 is plugged

9-53 Metal Waste Feed Prep. ~4400 gal / stored waste per TV. 1430 gal / water sluice per TV
Acidification 12,700 pounds / 100% HNO3 per TV. Avg boil / 36% in 22 T
Concentrations gives Avg feed of
6.23 M in U

9-53 Waste Disposal - ~4340 gal / conc. next waste to tanks per / new TV.
99% / volume returned. 18,300 ~~#~~ gal
Condensate containing 0.1% / New uranium
cribbed per new TV.

9-53 Waste Evap - Engineering

242 B 210,375 feed 112,063 conc 105,273 cond 46.7%
242 T 499,729 feed 272,001 conc 265,587 cond 45.6

242 B feed from C112 242 T feed from TY 106

9-53 TBP solvent loss 6.7 + 30 gal / TBP + diluent per TV proc. Estimate 10 gal / TBP under new flowsheet [redacted]

10-53 Metal Removal Principal products U107, C104, T102 - B102 empty. Four Tanks in V B T+C 10 yr

10-53 Waste Evap

242-B	604 312 Fuel	404,937 pounds	199375 cond	33.0%
242-T	491563	329,513	162250	33.0%

10-53 Metal Removal Nitric acid consumption for new sluicing process (C104 with new supernate blended from C106) essentially the same as for separate sluicing

10-53 Scavenging - 515,000 gal dilute waste scavenged with Ni ferrocyanide (0.005M)

10-53 Metal Removal Feed Prep. ~ 4700 gal stored metal per TV. Increased by 3300 gal per TV by sluicing water. 102-B, 102-T empty. Final cleanout of B-101 in progress.

12,550 pounds of 100% HNO_3 per TV. Avg boil off 59% gives Feed of 0.25M HNO3

10-53 TBP waste - ~ 503K gal of neutralized waste per TV. (includes 506,000 gal of scavenged waste) 115% volume fraction Uranium content is about 1.9% of original. Average pH 9.3. Combined waste at 18,100 gal per TV containing about 0.1% of the uranium.

10-53 Scavenge Test 506,000 gal of unconcentrated waste treated in 221-U & transferred to T-101. Has 250,000 gal combined excess caustic (pH 11.5). Balance neutralized to pH 5.6 to 10 to reduce overall improve Scavenging. [redacted] in tank pH was 9.79 (3 ft) 9.73 (8 ft) and 11.95 (13 ft) below surface. 5 days after transfer. Plant test with Nickel ferrocyanide (HW-29383)

[redacted]

11-53 Waste Metal Removal - most material from CRC + UR

11-53 Waste Evap

242B	437251 Feed	295780 Bottoms	Cond 141971 Cond		32.4%
242T	439313	299750	Ht.	139563	31.8%

Feed current TBP waste TX105, TX106 + BX109

11-53 Scavenge - pH of waste in T101 9.8 + uniform

11-53 metal Feed Prep 5900 gal / alkaline waste per TU
Slicing adds 2900 gal / of water About 12%
of aluminum from BX101 (via BX103)
and BX102 which is used only 37 months.
Weighted Avg. age of remainder 70 months.

14,060 pounds of 100% HNO3 per TU
Boil off 56% / U content of feed 0.228M

11-53 TBP waste - 5200 gal of neutralized
concentrated waste per TU returned for
about 90% of volume removed.
Contains ~ 7.3% of orig. U mass.

25,700 gal / of conc. per TU contains
0.22% of original U.

11-53 Solvent Consumption 9 gal TBP 37 gal diluent
per TU processed.

12-53 Metal Removal T102, T103 + B101 empty.
Current operations in V108, C109, C105 + BX101

12-53 Waste Evap

242-B	572990 Feed	392565 Bottoms	179925 Cond		31.4%
242-T	491401	221155	161246		36.5%

[redacted]

12-53 Sewage Test 255,000 gal from supernate from ~~T-Pan~~ T101 pumped to 100 sq ft crib. Remainder skimmed to another tank leaving only 7% of original waste volume as sludge.

12-53 TBP feed 60% of feed from tanks and remainder from Redox as newark. Waste acidified and concentrated by a 57% boil off. Returned waste contained 4.7% of original uranium & about 92% of removed volume.

6300 gal waste removed per TV. 5800 gal water per TV. (4% from 8X101)
16,950 tons, 100% HNO3 per TV.
Concentration by 57% Boil off. Feed U 0.260 M

12-53 TBP Waste 5800 gal neutralized, Concentrated waste per TV.
34,300 gal of cond. containing 0.52% of orig U per TV.

12-53 Solvent Consumption 8.7 gal TBP + 17 gal diluent per TV used.

1-54 Metal Removal - Production from BX, TX tanks (supernate) and 200 series tanks

1-54 Waste Evap

242 B	220 375 feed	193188 Bottoms	127187 cond	39.7%
242 T	361810	220,000	141,810	39.2%

1-54 Sewage Test - Tests in crib show at least 6000 gal of supernate can be cribbed per sq. ft. of crib bottom. Saves about 2400 gal of sewage per TV instead of concentrating waste. Probably settle in By 106, 107 & 116 [redacted] crib just north of BY farm.

[redacted]

2-54 Waste removal – Activities in B×T×, operations essentially complete in C farm.

2-54 Waste evap

242 B	507375 feed	332500 Bottoms	179875 Cond	34.5%
242 T	123635	76483	47152	38.2%

Feed Current TBP Waste
116-TX-117 TX Bottoms tanks reached capacity 2-9 on 2-26 Bottoms transferred from TX117 to T108

2-54 Metal Feed Prep 5300 gal stored waste per TV
3800 gal of sluice water per TV

2-54 Waste About 4200 gal of neutralized concentrate waste containing 1.3% of orig. U per TV processed.

21,200 gal of waste oxidized per TV processed contains ~0.24% of original U.

2-54 Solvent losses: ~~79 (TBP) + 11.~~ 15.5 (TBP) and 79 (diluent) gal/ton losses per TV

2-54 Aluminum impurities – it is now possible to det'n Mg Cu Fe Si Zn Ni Pb Sn Co B. Mn Cr Ti + B Quantitatively and Li semi quantitatively.

Recent months have shown activity in fuels areas: Silicon content of U-Si fuels. Lead ~~Pb~~ ~~and~~ dipping of U-billets, U-slugs. Nickel plating of coating of U-slugs with Nickel carbonyl. Sn content of 2% or so in Al-Si Batch.

[redacted]

3-54 Metal Removal - from U, BX + TX trans (more from Source 2-4-52.)

3-54 Waste Evap

292-B	495,000 Feed	336 875 Bottoms	19812 5 Cond		71.9 %
292-T	382,250	282 563	.99687		26.1

3-54 Metal Feed Prep - Combined water sluicing and direct supernatant transfer to blend tanks led to the removal of about 4450 gal of stored waste PTV precoat. Water sluicing increased the above volume by 3250 gal PTV. 97% of the removed uranium was aged a minimum of 3.2 years since pile discharge. The balance produced by the final clean out of C-201, was aged 5.5 years

Acidification required 11,880 pounds of 100% HNO_3 PTV and was followed by about 62 volume percent dilution in 221-U evaporators. Non-routine feed handling included processing through feed evaporators with concentration to about one pound of uranium per gallon (0.5M) and adjustment to one pound of HNO_3 per gallon (2M) and increasing the K from feed HNO_3 normality to 3.7 to maximize HNO_3 use in attempt to improve the dF of Ru106.

3-54 Waste ~4270 gal TBP PTV precoat at an average pH of 8.6. It contained about 1.7% of the original uranium ~26,800 gal of concentrate. PTV precoat was discarded. It contained about 0.39% of the new feed uranium precoat.

[redacted]

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[redacted]

3-54 Solvent consumption - dropped to 5 gal (diluent) and 8.7 gal (TBP) for pTU

3-54 Redox Feed Exposure - 595 Mwd (573 - 621) MWD/T

3-54 241-S Temps - 241-S-101 temp. 2' from bottom 120 to 130° C (Probably 4th supernate temp)

4-54 Waste removal from BX + TX farms - principally TX101 + BX101

4-54 Waste Evap -

2426	295625 feed	192500 gallons	10312 second	34.9%
292T	322000	225342	96658	30.0%

4-54 CASUAL NOTE - "At the present time T plant first Cycle wastes are being discharged to trenches in the ground. Since the possibility of contaminating ground water with fission products in the waste exists, trench discharge must be discontinued. Possibly scavenging + settling in tanks before supernate discharge."

4-54 Metal Feed Prep 4750 gallons of stored waste removed by water sluicing and direct transfer of supernatant pTU precond. water sluicing increased the volume by a factor of 4370 g pTU. Continuous water sluicing with incremental blend batch removals gave dilute feeds at up to 0.35 lbs U per gallon. (Avg values have been 0.2 lbs U per gallon)

Acidification used 13230 pounds of 100% HNO_3 per ton of new uranium. Average boil was 66%. Feed - 0.271 M (UNH) & 3.66 M (HNO_3)

[redacted]

4-54 Waste Disposal ~ 4110 gal TBP ipTU pumped contained 0.89% of U in feed and ~ 3370 pounds of $NaNO_3$ per Ton of U through neutralization with an extra 1510 pounds of HNO_3 ipTU (575 gal of the 4110 was the extra $NaNO_3$) Avg pH 8.8. 18,600 gal of cond ipTU was cribbed. It contained ~ 0.04% of the original uranium.

4-54 Redox Feed Avg MWD/T 619 (554 to 629)

1-54 Redox Waste - on 1-9-54, salt waste routed to U-110, water cooled condensers have been installed in 291-U (1S, in 291-S) to confine contamination entrained in stack emissions from tanks

2-54 Redox Feed. A maximum of 125,165 (158" on 20, of 14" sl. 95) of 1.75% U235 can be blended with 15,000 to 20,000 lbs of natural uranium slugs per dissolver charge. This is U238/U235 which is not much different from natural abundance

4-54 Redox Waste - on 4-22-54 neutralized salt waste diverted from U-110 cascade to S-104 cascade. Coating wastes are still routed to S-101 cascade. Centrifuge bowl cleanout waste still go to S-107 cascade

5-54 Redox Waste - high salt waste diverted to 291-5X on May 19.

5-54 Waste Evap.

242-B	525 937	Feed	349250	Bottoms 176687	Cond 33.6
242-T	393 305		258778	139 987	34.3

[redacted]

[redacted]

5-54 TPlant Operations - Reduction of 1C (by 63%) + 2C (by 56%) volumes compared to standard. Process volume reduction of 49% would drop essential material costs by $12 per run and reduce cycle time. Principal improvement has been improved cake removal procedures

5-54 Improved NW Sluicing - Continuous sluicing with periodic removal of sludge from the accumulator after a suitable weight is in. An equivalent amount of water is added

5-54 Metal Feed Prep. 3810 net #1 of stainless removed by sluicing water and dissolvent trans fer per TU processed. 3760 gal increase per TU for sluicing water. 91% of uranium and a minimum of 3.3 years. 5.6% and a minimum of 2.6 years. Reduce to goal about six years at low exposure.

Acidification in 241-WR Vault and 222-U used tanks 10380 pounds of 100% HNO_3 per TU. Amount of U in feed increased from 0.27M to nearly its solubility limit ~~0.31M~~ 0.31M HNO_3 in feed at 3.47M. (Short for 3.2 to 3.5M). 63% boil-off in feed prep concentrator

5-54 TBP waste 3710 gal per TU @ pH of 9.2 contained 0.61% of the uranium processed. Caribbed 16,400 gal per TU containing 0.2% of the U.

5-54 Redox Feed 613 MWD/T Avg (533-734 MWD/T).

5-54 Redox Waste. H-2 Centrifuge cake waste combined with slit waste in D-9 waste sampler tank and routed to SX-101. A 3' diameter test tank inside SX101 has been filled and the temp. [redacted] 125F at 10' above the bottom of the column.

[redacted]

6-54 Metal Removal - Equipment transferred from 291-U to 291-TX

6-54 IC Supernant disposal. 105,000 gal "decanted" from T-106 to the open ditches and 123,000 gal from TX109 to an open trench.

6-54 Waste Evap

242-B	449045 Feed	314184 gallons	188857 Conc	37.0
242-T	376750	253750	121000	32.1

6-54 Metal Feed 5540 gal S. Wash (acid) removed by water sluicing + direct transfer of supernatant per TU. Sluice water adds 4660 gal per TU. 92% of U aged ≥ 2.9 yrs 2% aged ≥ 2.8 yrs. 6% aged ≥ 5.5 yrs

Temporary depletion of BX-B2 supernant in ~~not~~ ready storage (C-104) slowed operations. UR facility provided only 6% of feed. Five tanks (BX101, BX101-102-103, U109) were released as empty.

12,250 lbs of 100% HNO_3 per TU concentrated by boil off to about 68% volume. 2.2M HNO_3 in REAF.

6-54 TBP Waste 4430 gal neutralized, concentrated waste per TU contained 1.0% of U. 20,970 gal condensate per T.U contained 0.1% of U

6-54 Solvent Consumption 22 gal (TBP) and 55 gal (Diluent) per TU processed

6-54 Test Reboil Waste Temp - Temp in 3' well of SX101 at 190 F (???)

[redacted]

[redacted]

7-54 metal feed 104-BX, 101-TX

7-54 Waste Evap

242-B	680812 feed	409063 boil offs	211799 Cond	39.1%
242-T	485925	354000	131925.	27.1

7-54 Redox Waste temp - Profile in SX101 test well - 235 to 229°F At bottom 261-268°F (48' from bottom - maximum temp) 131 to 158° F (in supernate above 12' level) ~~at~~ total waste height 13' 9½".

7-54 metal feed prep. 6520 net gal of stored waste per T.U. / 5970 gal per TU / sluice water 5.4% used >12.9 yrs

BX101-102-103 + TX102 released as empty. At CR (BX supernant used ~~for~~ for blending), BXR + TXR active. UR inactive due to depletion of aged feed with the final clean out of U106.

16,120 lbs of 100% HNO_3 per TU gave HNO_3 of 3.94 M in the concentrate after an average 67 volume % boiloff was realized in routine concentration operations. Feeds from farms were supernant rich having phosphate and sodium to uranium ~~ratios~~ mole ratios of 2.0 + 29.4 respectively. (Flowsheet feed was 1 and 15.1)

7-54 ~~the~~ Metal Recovery waste - TBP @ 6200 gal per TU @ pH 9.0 and 1.7% of initial uranium. 23,800 gal cond per TU contained 0.3% of input uranium.

7-54 Solvent Consumption - 8 gal TBP + 55 gal diluent per TU.

[redacted]

[redacted]

8-54 Metal Removal from TX106 until late. Sluicing started in TX107. Final cleanout of TX106 will be concurrent with TX107 activities. 241-CR processing from 241-BX. TX103 released as empty.

8-54 SX101 Test Temps 223-255°F (bottom) 260°F (4' maximum temp) supernate 158-180°F. Liquid level almost 23' on 8-25. Temp in traverse in tank bottom 266°F - Avg (236 to 278°) which is about the boiling temp with available hydrostatic head.

8-54 Metal Feed prep 3890 gal stored waste per TU 5100 gal per Ton added from sluicing w/o 78% used 3 yrs 15% used 3.6 yrs 6% used 2.9 yrs. Wt used ~7 yrs

12060 pounds of 100% HNO_3 per TU gave 3.13M HNO_3 after about 68 volume % boil off.

Processing included 60% UNH from Redox (5% of TBP Feed) 224 (2.8% of TBP Feed) and 221-U sump materials (0.1% of TBP Feed)

8-54 Uranium Recovery Waste - 3870 gal of conc. neut. waste 0.99% of original U. @ pH of 8.5 21,250 gal cond per TU held 0.04% of original uranium.

8-54 Solvent Consumption 6 gal TBP + 19 gal diluent per TU.

9-54 Metal Removal - still in TX107

9-54 Essential Material Standards HW-27193 cost standards manual for Separation Sections list standards for 202S, 221, 224-T, TBP + 231

[redacted]

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[redacted]

9-54 Metal feed prep - 3690 net gallons of stored waste were removed per TU. 4920 gal of sluice water per TU required. 91% aged ≥ 23 yrs 5% blend of TX farm feeds aged ≥ 23.0 yrs 4% aged ≥ 22 yrs

12,190 pounds of 100% HNO_3 per TU gave titratable HNO_3 of 3.60 M following 65 volume % ~~boil off~~ of boil off. Non standard involved concentration of about of 17.3% of U feed to 0.5 M in U (1 lb/gallon) followed by boiling with one pound of HNO_3 per gallon (2 M HNO_3) and the pre mixing, blending of Redox UNH along with tank farm feeds.

4040 gal of conc. neut. waste per TU contained 0.72% of uranium & averaged a pH of 9.8. Volume increase due primarily to amount of rework & RCU. Cribbed waste contained 0.07% of the U & was 21,690 gal per TU.

9-54 Solvent consumption 7.7 gal TBP 11.3 gal diluent per TU

10-54 Redox Waste Temp. SX-101 temps 275°F (bottom) supernate is 211°F. Boiling caused the sludge temp to drop from 270 to 258°F. After boiling stopped ~~boiling temp~~ zero level temp rose to 273°F again

10-54 Waste Evap

242 B	422968 Feed	224625 Bottoms	193393 Cond	457
242 T	0	0	0	0

10-54 Metal Removal - Aged supernate (C104 from BX-BY) + TX-104 is TBP feed.

[redacted]

[redacted]

10-54 Scavenge - All wastes from TBPops scavenged
See HW 33536

10-54 Metal Feed Prep - 5770 gal SW per TU
41070 gal water for sluice per TU

13,570 pounds 100% HNO_3 per TU
Boil off @ 60%

Rework blended to 0.5M UNH, 2M...

10-54 Waste - 10,770 gal per TU containing ~2% of input U. Of the total ~25% was conc. neut waste + 75% was unconc. scavenged waste
About 25,060 gal containing 0.05% of new uranium, are routinely cribbed per TU processed.

10-54 Solvent Cons. 8 gal TBP 38 gal/d, 1/TU

11-54 Redox ops - Volume chg from 4150 gal/T to 3300 gal/T

11-54 Metal Removal mostly BX 104 (still holds ~40 tons

11-54 Scavenging - Cribbing of scavenged TBP supernants from BY 107 & BY108 precluded due to high Sr^{90} (5-6 μc/cc)

11-54 Waste losses from ~~[illegible]~~ 2025 0.4% U 0.6% Pu

11-54 Metal Feed Prep - 4850 gal SWaste per TU
5800 gal per TU sluicing water.

Acidification uses 14,030 lbs 100% HNO_3 per TU
Average 70 volume % Boil off times 1.3M HNO_3
Rework to 0.5M U @ HNO_3 of 3.8M.

[redacted]

[redacted]

11-54 U. Recovery Waste - ~ 10,020 gal / scrubber waste (contains ~ 1.7% of new feed U) sent to B7107 + B7108 at pH = 8.7

16,000 gal cond per TV cribbed with 0.03 #/gal U.

11-54 Solvent Cons. 3 gal / IBP 10 gal / diluent / TV

12-54 Metal Removal - Residual sludge in B7104 - ops to B7105.

12-54 Waste Evap

242-B no op

242-T 275,000 feed 122375 bottoms 152625 cond 55.5%

12-54 U Uranium Extrusion - Tests on extrusion of 3.5 a/o Chromium, 1.5 a/o silicon + 0.5 a/o titanium ~~alloy~~ ingots planned

~~Slugs~~ cored slugs being lead dipped - and Al-Si dipped

Integral Ni plated, diffusion bonded solid fuel elements declared.

- See Fuel Technology subsection of Pile Technology Section

Single + Triple Al dips.

[Nickel plating 0.2 to 1.3 mils]

Al. may be Anodized. [sulfuric, oxalic, or sulfamic acid films] - 0.01 mils on none SE or Anodic Etching

[redacted]

 [redacted]

12-54 Metal Removal ~~4~~ 4130 gal per TU of Stored waste [0.213 fm 104-C 0.579 fm 104-BX + balance 0.213 fm 101-109-TX]
4460 gal of water per TU for sluicing. Final cleanout of BX104

15 220 pounds of 100% HNO_3 per TU
70 vol % boil ⟹ 3.9M HNO_3 in feed
RCU uranium to 1.35M U + 2.0M HNO_3.

12-54 TBP Waste. ~8 500 gal per TU of scavenged waste. held 2.4% of uranium and pH = 8.8 went to BY 110. 400,000 gal of waste in BY 107 cribbed (1700 ci of SR^{90})

heels to BX105 (now on in line)

29,800 gal cond per TU contained 0.19% of U + was cribbed

12-54 Scavenged 1C - Sent from plant to TY101 where it mixed with untreated coating waste

~~1-55~~ - only TBP

1-55 204-C cleaned out

Evaps.

242B	0 Feed	0 Bott.	0 Cond	0% UK
242T	354,075	145375	209700	59.2%

2-55 Metal Removal Primarily BX-BT and TX sludge. 204-C empty 107-TX has considerable sludge by periscope inspection

[redacted]

[redacted]

Evaporators

Month	Feed	Bottoms	Cond.	%LOVR	Evap.
1-55	0	0	0	0	292B
1-55	354075	145375	209700	59.2	292T
2-55	0	0	0	0	292B
2-55	329000 (ICS)			59.9	292-T
3-55	0	0	0	0	292B
3-55	353,375 (ICS + TOR)			56.8	292T
4-55	0	0	0	0	292B
4-55	295,625 (TOR)			54.6	292T
5-55	263,312			94.6	292-T
~~5~~ 6-55	257,000 (ICS)			25.7	292-T
8-55 Both	292T + 292B are on standby				
7-55					

[redacted]

[redacted]

Total Recovery.

Evap.

Month	Stored Waste gal/ITV	Sluice Vol. gal/ITV	Acid lbs 100% HNO3 / TV	BO %	TBP Scavenged g/TV	Cond g/IT
1-55	5230	6900	19730	55	15,800	21,300 (2.17%
2-55					9,500	
4-55			11900	69	5,000	
5-55					6700	
6-55					5400	

F2B
F2T
F2B
F2-T
F2B
F2T
F2B
F2T
F2-T
F2-T

[redacted]

[redacted]

1-55 Status of Metal Feed Tanks

Tank	Fraction of Feed for month	Age (no smoothing)	Avg MWD/T
109-105 BX*	0.331	41	371
111-112 BY	0.140	32	582
109-TX	0.164	40	459
107-TX	0.325	29	582
209-C	0.040	84	201

* proceed Thru 109-C

1-55 Scavenge to Tank BY107 - Batch addn of $NiSO_4$ tank BY110 two cycle process. 0.009M Fe + 0.1M PO_4 and proceed with continuous $NiSO_4$ addn.

2-55 Status of MF Tanks

105 BX	0.026	41	371
111-112 BX	0.562	34	582
109-107 TX	0.363	31	582
209 C	0.049	84	201

2-55 Feed uranium back to 0.27M (as for HW 6) from temporary drop to 0.16M in uranium

3-55 Status of MF Tanks

109-111-112 BY	0.549	35	582
109-107-108 TX	0.448	32	582
104 C	0.003	86	203

3-55 TBP Flow sheet changes

4-55 Status of MF Tanks

104 C	0.002
109-111-112 BY	0.329
109-107-108 TX	0.588
105 TX	0.086

[redacted]

 [redacted]

MR
4-55 Complete in C Farm 4-1-55 (104-C empty) moved to U101

5-55 U101 sluicing began - one blend from U farm to 2 blends from TX farm.

5 55 Status of MF Tanks / metal removed

109-111-112 BY	0.028
109-105-106 BX	0.045
105-106-108 TX	0.830
101-102-103 U	0.097

MR in BX-BY farms essentially complete except for final clean out of 109 and 112-BY

6-55 M Removal mostly TXR + UR material

Status of MF Tanks / metal removed

		Age (mo)	MWD/Tang
109-112 BY	0.077	38	500
105-108 TX	0.521	27	506
101 U	0.402	19	~~449~~

7-55 Feed from TX only

7-55 Status of MF Tank / metal removed

109-112 BY	0.01
105-108 TX	0.99
101 U	None

8-55 Feed from supernate + water slurry from TXR farm - + supernate from BXR + UR. Final feed from 109-112 on 8-19-55

107 BY	0.062
105-115-TX	0.533
101 U	0.405

[redacted]

continued from page 14 [redacted]

Hanford Works Monthly Report - Summary Information

Date	Document	Issue	221-T / 224-T Cl2 St	Cl2 Comp	% WL	Cool Avg	Cool Min	Redox Cl2 St	Redox Cl2 Comp	Redox Weeks Pulses	Redox Cal Avg	Redox Cal Min
~~7-55~~	~~HW38375~~	~~8-26-55~~										
7-55	HW-38375	8-26-55	81	84	3.6	108	97	152.0	197.6	.96	.62	102 89
8-55	HW-38828	9-27-55	89	90	3.0	108	76	161.0	169.1	.79	.71	109 96
9-55	HW-39260	10-27-55	106	106	3.3	102	87	209.2	219.7	.93	.76	100 85
10-55	HW-39751	11-30-55	70	70	3.0	103	92	198.6	178.1	.43	.88	100 87
11-55	HW-40182	12-30-55	40	40	2.5	119	100	401.3	377.7	.63	.92	115 96
12-55	HW-40692	1-30-55	32	40	2.1	138	129	283.6	339.6	.87	1.82	101 77
1-56	HW-41205	2-24-56	18	16	2.3	167	157	115.5		.81	1.12	117 106
2-56	HW-41702	2(3)21-56	29	25	3.1	213	180					
3-56	HW-42219	4-20-56	3	12	5.07	—	—					
4-56	HW-42626	5-21-56	0	0								
5-56	HW-43137	6-21-56										
6-56	HW-43938	7-23-56										
7-56	HW-44580	8-23-56										
8-56	HW-45115	9-28-56										
9-56 ***	HW-45707	10-18-56										
10-56	HW-46432	11-21-56										
11-56 ***	HW-47056	12-21-56										
12-56	HW-47675	1-21-57										
1-57	HW-48132	2-21-57										
2-57	HW-48835	3-21-57										
3-57	HW-49503	4-22-57										
4-57	HW-50089	5-22-57										

[redacted]

*** Title change Chemical Processing Department Monthly Report for month, year

* Total TU to 7-56 7,331.08 ** Title Chg - Monthly Report - Chemical

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[redacted]

	TOP			GUP			
				2E		2W	
VLT) rev	WL%	Vent Rem	TOP GH/TU	Feed	WVR	Feed	WVR
104.36	3.83	0.70	10,100			137,000	13.9
147.53	3.25	0.79	6,000				
137.98	5.21	0.82	8,000				
111.19	3.62	0.86	7,900				
160.88	2.19	1.01					
144.38	2.59	0.78					
115.11	2.15	1.46					
79.51	0.93	2.55					
164.7	1.56	1.00					
151.32	0.97	1.27					
151.57	0.74	1.15					
175.81	1.52	1.00					
136.11	0.87	1.02					
161.45	0.86	—					
179.57	0.66	—					
166.72	0.59	—					
110.34	1.85	—					
66.72	1.81	—					
46.99	1.47	—					
35.83	4.30	—					
9.58	4.18	—					
Shut down							

Stand by

[redacted]

Processing Department for Month, Year. Compiled by Operation Managers

[redacted]

9-55 MR Slicing began on 102-UR + 106 TX
Discontinued on 101-UR + 105 TX

MF

101-102 U 0.68
105-106-115 TX 0.32

10-55 MR Clean out of UR + TX

102 U 0.401
107 U 0.401
103-106-115 TX 0.198

11-55

103 U 0.10
107 U 0.51
101 TX 0.39

12-55 Currently from 107 U - + 101 TX about 50/50

1-56 107-U finally cleaned out

2-56 Depletion of natural on 108-U + 101-TX
equip moves to 104-U + 102-TX

[redacted]

[redacted]

Fuel Notes starting with Nov. 1952

March 15-54 Production Facilities converted to lead dip. process.

March-54 Baths for Lead, Sn-Al-Si, returned to S.C. from Fe, which caused embedded black spots and bonding failures

April 54- 1900 Pounds of recycle Al-Si / week with normal consumption of 3,000 pounds / week A 25% Si Al alloy is used to renew the baths that are nominally at C (i.e. 1100 lbs / wk 12% Si Al goes out at 12%) with 160 + 833 TV caused by C.O. April

April 54 Lead dip canning has drastically reduced maintenance. "F" process specification replaces PT-25 extended test for Pb dip

0150

August 55 Disposal of all static and obsolete items in eventual materials inventory. Virgin Cu and reclaimed Sn to SRP. Cu-Sn Crystals and Bronze to National Lead in Ohio.

March 56- ~~Cu-Si Spec Chgs for U Sn-T~~ Cu-Si impurity spec chgs in U Cu fm 30 ppm to 65 ppm (55 ppm common) Sn fm 100 ppm to 175 ppm

Can Wall Thickness HW-36811 "Minimum Residual Can Wall Thickness for 8" Uranium Slugs, May 1954 to March 1955" May 23, 1955 D E Christensen. Purchased can wall 0.045" ± 0.005". After canning process, which erodes wall, wall is 0.0305" ± ~~0.001~~ 0.0010" within 99% probability.

[redacted]

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[redacted]

Uranium Impurities and MCW Specification Limits (FMPC is Feed materials Production Center and MCW is Mallinckrodt Chemical Works)

HW-36738 Evaluation of FMPC and MCW Ingot Chemical composition: Recommended May 17, 1955

Declassified

reference HW-30263, "Acceptance Specifications for HAPO Slug Cores; issued by HAPO Engineering Department, and HW-35481 "Proposed Changes to the HAPO Uranium Slug Core Specifications", T. N. Huff, March 28, 1955

Tech. Spec sheets: ~~Tech Spec Sheet~~

HW-30707 "Uranium Slug Core Specifications - Manufacturing Department" Atwill, 1954

Element	Technical Spec	Mfgr Spec - Recommended max of Reported
B	0.25 ppm	<.2 ppm 0.25
Cd	0.20 "	<.2 ppm 0.20
C	150-750 "	203-616 150-750
Cl	~~200~~ 20 "	2.1-5 15
Cr	65 "	19 25
Fe	150 "	95 110
Mg	20 "	6.7 10
Mn	25 "	13 18
Ni	100 "	76 90
N	100 "	74 85
Si*	125 "	— —
SiO_2*	(268 ppm)	91 125

(see p 145 for 7+5 values for each facility)

NO-H values reported

125 ppm Si is 268 ppm SiO_2

I+E Fuel Test - HW 39886A "Design of Production Test 105-615-A-63-MT Evaluation of I+E Slugs Caused by the Lead Dip Process" F W Van Wormen, W C Riley, November 10, 1955. Caps - HW material 303 For 8" Process slug with suitable modification Cans - HW material 302 Type I modified such that 1.474" OD and 0.375" ID. Provision made to insert tube through bore. Cores 8.4" ± 10 mils in length and 1.370" ± 0.002" O.D. and 0.479" ± 0.002" I.D. Quality consistent with HW-30263, Tube-material same as cans ID for 0.375", thickness 45 mils. Assembly - Lead Dip Process for β treated Uranium HW 29341

[redacted]

Process Spec - "A" Canning (replaced by "F" Canning HW 29341 and later by HW-47029) HW 23402 "Process specifications "A" Canning Process (Triple Dip Canning Process for Alpha Fabricated Uranium. Staff of Technical Section. Engineering Department Staff October 8, 1952

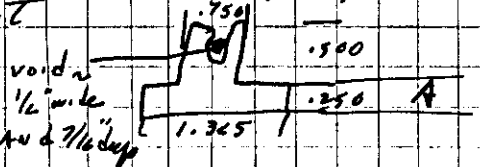
Slug size	Length	Diameter	
FM	4.095 ± 0.010"	1.350 +0.000 −0.002"	x x x
FZ	4.055" max	1.351" max	3.82165 min
M	8.900 ± 0.010"	1.330" +0.001 −0.002	x x x
Z	8.910" max	1.331" max	7.72165 min

Content per HW 19156 26-JAN-53

Pickling in HNO_3 is followed by water wash & air dry. to remove oxide film - although ~~the~~ the HNO_3 can contain 0.25 wt % Fe, & at % U ± 0.25 wt % other metals precipitated by OH^- and 0.1 at % $PO_4^{\equiv}$ - assure is cleared by water wash. maximum U wt loss 0.25% of slug.

Degreasing with trichloroethylene.

Cans & Caps (HW materials Nos. 302 & 303 resp.)
Can is 1.440" OD, 1.368" ID with 0.035" wall
Base is 0.175" ± 0.010"
0" can is 9.465" overall height - 4" can is 4.840"
Degreased - Washed twice (hot-cold) and etched (Dupont) Sodium pyrophosphate wash, Hot water rinse, Phosphoric acid etch - water rinse - Possible repeat of Degreasing (5) Trichloroethylene, 0.1-0.01% or Diversey etch
Cap is Fabricated by impact extrusion and is about



A is 0.175" for 4" slugs
And 0.340" for 8" slugs.

[redacted]

[redacted]

Triple dip includes:

Bronze Bath → Tin Bath → Centrifuge → AlSi Bath →

Quench ↑

Can Preheat → Can into AlSi ←

↑ Cap

Bronze Bath (HW material 322) Sn an (HW material No 311) Cu

730-750°C Cu in range 45% to 49% by wt

Bath impurities U, Fe, Ni, Cr.

Bath protected by Flux layer that contains

52.0% ± 5% $BaCl_2$	HW mat 308
28.6% ± 0.5% KCl	HW " 316
19.4% ± 0.5% NaCl	HW " 318

Sn Bath 5% Cu maximum

730-755°C Al Added as Needed to inhibit Surface oxidation

Bath impurities U, Cu, Fe, Cr, Ni

Al-Si dip made up from HW-Mat No. 306 11.5 to 10.9% Si, 0.3% Sn max.

585-600°C impurities U, Sn, Cu, Fe, Cr, Ni

AlSi Bath - same as dip with lower impurities

~~580~~ 596°C MAX

Quenching reduces temp of capped assembly.

Facing removes excess 0.500" by 0.750" portion of cap and makes AlSi area visible. A minimum of 0.040" of AlSi bond is acceptable. ~~Can base and AlSi~~ Distance from Can base to Slug base is 0.295" MAX (0.070" AlSi max). Distance from top of cap to top of slug 0.195" for 4" slug and 0.390" for 8" slug. ~~ie Max AlSi is~~

Weld 0.125 to .187 [redacted] penetrating 0.050" minimum

HW Tech Manual [redacted] HW-10475 Sections A, B, C.
Hanford Works Technical Manual, Sec. A
5-1-44 Work begun by duPont in late 1942.
pg 117 Sleeve can 455 y, tongs and spatulas
16-6 Stainless steel. baskets used to
hold sleeve can 155 y in canning with alcohol 16-6 55

Cu Bronze dip ©

Lead Dip Canning - HW28149 "Production Test
313-105-25 f-m Lead Dip Canning and
inspection of uranium slugs machined from alt-
both Heat-Treated Forged rolled rods,
see also HW29115 May 22, 1953 H.A. Johnson. 250 Tons of
uranium rods to be alt-both heat-treated
(see HW27946 "Specifications for β Heat
Treatment", W.T. Kattner 5/9/53) and
machined into slugs at Feed materials Production
Center near Fernald, Ohio. 0.325" ± 0.010" in
length and 1.336 " ± 0.001" - 0.002" in dia. All
pieces according to Procedure "A" except lead dip
Canning indexed to triple dip canning

U in Al Si HW28489 Uranium Content/Scrap Al Si.
W G Hudson August 10 1953 0.15% ± 0.03%

Uranium Impurity Specs. HW 30707 "Uranium Slug Core
Specifications Mfg Dept. April 1, 1954
Same as on Pg 126 except Ni reduced
to 65 ppm.

Al Si Impurities - HW32743 "Use of precleaned Al Si
in the lead dipped Canning process" J E Geckle +
J W Nicholas 8-13-54

Zn	Ti	Ni	Element	B	Bi	Cd	Cr	Cu	Fe	Mn
<0.02	<0.02	0.008	Virgin Al Si	<0.001%	<0.008	<0.002	<0.01	0.05	.65	0.01
<0.02	<0.02	0.01	Reclaimed Al Si	<0.001%	<0.008	<0.002	<0.01	0.02	.51	0.01

During July 1954 [redacted] 16,821 pounds of 12% Al Si used
in conjunction with lead dip canning Fuels F Procedure

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HW 3-10 [redacted] Start up Dip Counting. HW 3-10 Temporary Installations for Start-Up 1 Dipping + Counting
J T Geoghegan 3-7-44.

Ordered Bronze Bath - Bronze 3000# Katanium, electrotic electrolytic copper (47% Cu 53% Sn) KCl 800#
LiCl 1000# NaCl 200# Tin Baths: ~~Katanium~~
Katanium 3000# Aluminum (99.7%) 100#
Alsi Dip - Alcoa # 13 Al 3000# Na 100#
Nitrogen 30,000 ft³

Concentrations that reduce pile reactivity by 1 [redacted] in known
in 105 piles - HW-18950 "Subject: Effect on Reactivity of impurities in
Uranium" E.B. Montgomery July 28, 1950

Gd	.0040 ppm	Tm	1.30 ppm	Se	5.9 ppm	Sb	21.0 ppm	Rb	111 ppm
Sm	.0131	Lu	1.97	N	6.8	Fe	21.3	Al	112
B	.0138	Co	1.57	Ti	7.5	Ga	22.9	Ba	119
Cd	.031	Hf	1.58	Ta	7.7	Te	26	P	188
Eu	.078	Ag	1.65	W	9.4	Ge	29	Sn	190
Li	.094	Nb	1.89	V	9.8	Mo	36	Ce	196
Dy	.165	Re	2.02	Ba	11.3	Ru	38	Be	220
Ir	.38	Ho	2.25	Pr	11.4	Na	96	Si	280
Hg	.53	Tb	2.6	Os	11.7	Te	56	Mg	370
In	.55	Hf	2.9	Nd	11.9	Y	58	Be	960
Rh	.62	Sc	3.5	La	14.4	Zn	59	Pb	990
Br	.91	H	3.7	Pd	14.7	S	62	F	1700
Cl	.99	Mn	3.9	Cr	15.8	Se	69	C	2900
		Cs	4.2	As	16.4	Cb	80	Bi	5000
		Yb	4.4	Ca	16.7	Ca	89	O	14,000
				K	17.9				
				I	19.1				
				Pt	19.7				

Status of Fuel Element Development - "HW 27639 Status of Fuel Element Development at Hanford" E.A. Eschbach, P.H. Carlson, W.R. Snow February 2, 1953

Load Dipping - about 17,500 4" + 425 8" slugs to date

[redacted]

Fuel Development Status — HW-39041 "Quarterly Technical Activities Report Fuel Technology Subsection July, August, September 1955" Compiled by members of the Fuel Technology Subsection Engineering Department, October 8, 1955

Zircaloy-2 tubing for Slug Cladding Tests
0.50% Sn, 0.40% Fe and the balance reactor grade zirconium
Nominal size 1.440" OD by 0.020" wall thickness

Fuel Element Specs — HW-40437-RD, "Specified Dimensions and Derived Quantities" W G Houck December 17, 1955.

Specified Dimensions of Slug

Slug / Process	JSCP	Natural "S/EP	CSCP	4" Slug/BP	6" S/BP
OD (in)	1.430	1.438	1.430	1.430	1.430
Core Dia (in)	1.344	1.336	1.343	1.360	1.360
Core Length (in)	8.29	8.325	4.00	4.000	6.000
Canned Slug Length (in)	9.08	8.860	4.95	4.375	6.473
Nom Can Wall (in)	0.090	0.090	0.040	0.035	0.035
Wt of U, (lbs)		7.96 ± .04			
No of 8" slugs per tube	32	32	38		

Derived Quantities.

	B	D	E	H	C	K	KER *
Unmanwt (lbs/ft) (8" slugs) Avg for each tube	10.5				10.5	10.5	
Canned slugs: Wt (lbs/ft)	0.34						
Avg for entire tube (gms/ft)	157						
For 1 U / Tube, 8" slug.	0.1272				0.1272	0.151	
Tube length	41'7"				41'7"	47 1/2"	97 1/2"

* KER is Zinc Power Tube in Kneeland

continued in table — pps 132-133

[redacted]

Cont. from HW-40137-RD [redacted]

Slug Type	Status	Core Code	Enrichment	ID in	OD in	Length in
CIN	Obsolete	J	N	.481	1.370	8.325
CIE	"	G	E	"	"	6.000
CIIN		J	N	"	"	8.325
CIIE		G	N	"	"	6.000
KIN	Never Charged	N				
KIIN		K	N	"	1.385	8.325
KIIE		G	E	"	1.370	6.000
KIIIN		R	N	.491	1.370	8.325
KIIIE		S	E	.506	1.370	6.000
OIN	Never charged		N			
OIN		L	N	.416	1.356	8.325
OIIE		H	E	"	1.351	6.000
CID	Obsolete	P	D	.481	1.370	7.000
		M	N	"	"	6.000
		M	N	"	"	6.000

Provisional I+E Specs HW-47289 "Provisional Process Specifications for I+E Fuel Elements" EA Weakley December 19, 1956. Constitutes additions to the "F" Process Canning Process HW-29341 - Essential materials based on HW-19156 Rev 1 May 10, 1957 Rev 2 September 6, 1957

Bare Uranium Specs

	O	C	K	KER
OD	1.356"	1.370"	1.399"	1.696"
ID	0.419	0.479	0.464	0.680
Min. Recovery Wt.		7.11 lbs. Uranium		

Also specs on cans - Drawing numbers of all subassys.

Omits Lead Dip canning includes AlSi bath

Cap, Base, and AlSi bonding layer thickness 0.390 ± 0.040" overall assy length 8.594 ± 0.080" for enriched and 8.990 ± 0.080" for natural abundance

hole in center O (0.360") C (0.365") K (0.350") KER (0.566")

[redacted]

I think the wall AlSi Thickness remains 0.040" ??

[redacted]

	wt (U) Bare	wt (U) Canned
	165	165
.74	7.33	7.30
25	5.29	5.27
0	7.33	7.30
5	5.29	5.27
d		
25	7.51	7.98
30	5.29	5.27
25	7.28	7.25
00	5.21	5.19
25	7.92	7.89
00	5.34	5.32
00	6.15	6.19
00	5.29	5.27
00	5.29	5.27

	C	K	KC
Can			
OD	1.460	1.474	1.498 1.800
ID	1.370	1.384	1.408 1.710
Tube			
OD	0.040	0.445	0.450 0.666
ID	0.310	0.375	0.340 0.576
Cap Thickness	0.340	0.340	0.340 0.340
Can-Tube Wall Thickness	0.045	0.095	0.045 0.045
Can base Thickness	0.875	0.875	0.875 0.275

residual cap-base thickness after facing 0.268" thickness

Lengths 9.035" (nominal) 6.710" ±0.94% E 8.710" ±2.3%

Revised I+E Fuel Dimensions - HW 51921 "Revised Dimensions for C + K Reactor I+E Fuel Elements" JT Stringer Aug 12, 1957

Type Fuel	Core OD	Core ID	Can OD	Can ID	Can wall	Cap OD (nominal)
C/N	1.370	.481	1.459	1.378	0.040	1.377
C/E	1.370	.421	1.954	1.378	0.038	1.377
K/N	1.384	.481	1.479	1.394	0.040	1.393
K/E	1.370	.481	1.474	1.384	0.045	1.383

All dimensions in "

Nitrogen impurity in Uranium HW 52990 Sept-10-121957
Report of the working Committee of the fuel Element Development Committee S.D. Gill / Chairman Sept 1957

9000 ingots produced in February through part of July 1957, MCW Uranium Averaged 65 ppm N + H2O Avg'd 51.7 ppm

[redacted]

[redacted]

Test of Ni Plating of Al clad - HW-58179A Production Test IP-207-A F 3FP Evaluation of Effluent Contamination Problems Associated with Nickel-Coated Fuel Elements R E Hall + EB Hall - November 14, 1958. Recommends test with 0.5 to 1.0 mil ~~thick~~ thick coating of Nickel on X-8001, C-64 ~~Aluminum~~ Aluminum clad on CIIN elements clad by the "F" Process

Trichlor degrease

Zn Pretreatment — Solutions:

NaOH	525 gm/l
ZnO	100
Rochelle salts	9.7
$FeCl_3$	1.0

35 wt% HNO_3 Pickle

Plate in

	Alkaline	Acid commonly used
$NiCl_2 \cdot 6H_2O$	30 gm/L	~~30 gm/L~~
$NiSO_4 \cdot 7H_2O$		30 gm/L
NaCit	100 gm/L	
NH_4Cl	50 gm/L	
$NaH_2PO_2 \cdot H_2O$	10 gm/L	10 gm/L
organic additives (HOAc, Succinic acid, NaCit, NaOAcOH)	~~[illegible]~~	
pH	8-10 (w NaOH)	4-5 (w NaOH)

Similar for Uranium except Pickle in 50% wt HNO_3 + etch with H_3PO_4 35 wt% / $HClO_4$ 9 wt%

[redacted]

HW 65973 A Description of Hanford Reactor Fuel Elements, July 1, 1960 (UNC)

Hanford Reactors + Fuels

	B, D, F	DR, H	C	KG, KW	NPR
General					
Date Constructed	1944	H(1949) DR(1950)	1952	1956	1962
Output Thermal MW	1700	1800	1900	3700	4000
Core					
Size (inc. reflector)	36X36X28	36X36X28	36X36X28	41X41.5X33.5	33X33.5X3
Fuel Load (kg)	2.29E+5	2.15E+5	2.12E+5	4.13E+5	3.5E+5
Composition Vol%		D H			
Moderator	96.07	95.03 99.29	94.09	92.72	67.59
Fuel (w clad)	2.23	2.23 2.23	2.23	2.77	4.44
Coolant	.63	.63 .65	.71	1.10	3.75
Structural	.49	.49 .49	.51	.68	3.62
Diluent-Poison	.58	1.62 2.36	2.42	2.13	20.60
Lattice Arrangement	---8 3/8" X 8 3/8"		Square---	7 1/2" X 7 1/2"	9" X 9"
Fuel Element					
Type Fuel	---Straight unconnected columnar elemental units---				
Number Fuels/Core	2004	2004	2004	3200	1004
Enrichment	---.71% U235---				.95% U235
Configuration (sub assys)	Have walled U tube with H jackets				Jacketed Billets
Number Elements/units per Reactor	34	32	32	38	18
Size	1.4450D	1.445	1.460	1.460	O.Tube 2.398 X 1.76
	.310 id	.310	.375	.385	L Thp 1.214 X .933
	8.965 long	8.965	8.965	8.965	L in 24"
Composition	UNalloyed Uranium				UW 300 to 500 ppm Si Fe Ni
Met Dim	1.356 od	1.356	1.370	1.370	Same as above Zr-2
	0.916 id	0.916	0.981	0.991	
	8.325 long	8.325	8.325	8.325	
Clad	Aluminum Alloy X-8001				0.0225" Diffusion
Composition					
Thickness	0.049 to 0.053"				
Bonding	Also				
Temps					
Maximum + Avg reported for Fuel Center, Clad Surface, Bond Interface Coolant Temperatures at inlet, outlet + max rise					

++ 1-10% at .99% Assurance

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Lead Dip Process HW-45601RD Product Specifications
Lead Dip Canned Fuel Elements, Process Engineering
FRDP, June 13, 1960.

Specification number 105.1 Chemical Composition-Aluminum Cores

Boron	.25 ppm max
Iron	150
Magnesium	25
Manganese	25
Nickel	100
Nitrogen	100
Silicon	75
Carbon	750
Chromium	65
Hydrogen	2 ppm avg 3 ppm max

Natural U235 → 0.711 4% enriched 0.947 ± 0.003 %

Specification 202-1 Chemical Composition % - Aluminum Components

	X-8001 Alloy
Aluminum	97.51% min
Nickel	0.90-1.30
Iron	0.95-1.40
Silicon	0.17 max
Copper	0.15 max
A.H.um	0.008 max
Cadmium	0.003
Cobalt	0.001
Boron	0.001
Others each	0.05
Others total	0.15 max

Balance of spec good for physical testing - see HW 72029 for basic description of "F" Process

[redacted]

[redacted]

HW 29341 "Process Specifications ~~for~~ "F" Canning Program Lead Dip Canning Process for Beta Treated Uranium", compiled by Technical Section of Engineering Department December 28, 1953

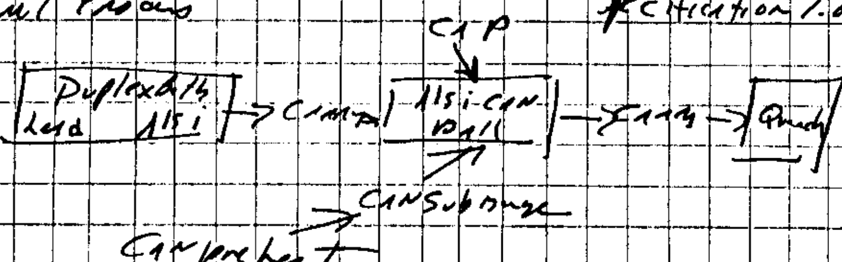
Ref HW-30263 (Spec. 1+2) Acceptance Specs for HAPO Slug Cores (Uranium Slug Cores for Lead Dip + Triple Dip Canning)

Specification 1.0 Bare Uranium Slug Specification

	4"	8"
Weight	3.82 lbs min	7.72
Length	4.055" max	8.410
Diameter	1.358" max	1.338

Ref HW 19156 Specs (HW materials 302 + 303)
HW 27402 "A" Canning Process

General Process — Specification 7.0 gives flow + timing



Duplex Bath - Specification 8.0

Lead as identified in HW19156 HW Material No 315
AlSi 10.4%, -11.2% Si in Al as in HW 19156

AlSi Bath - Specification 9.0
Same as above for AlSi in Duplex bath —
Impurities U, Sn, Cu, Fe, Cr + Ni

~~0.040" max bonding layer~~

Specification 13.0. Canned Assembly Specifications
0.040" maximum bonding layer
0.245" max from base [redacted] can to base of slug
4" slug 0.195" max from top of cap to top of slug
8" slug 0.340" " " " " " " " "

[redacted]

Lead Dip Fuel Tech HW 58115 "Technology of the Lead Dip Fuel Element Canning Program (Everett) Final Weekly" December 15, 1958. (Confidential)
107 references

Duplex Bath Comp Pg 58

Si	10.4 – 11.2%	Mid Eu 8.5 to 9.5% (9-58)
Al+Si	99.0% min	
Cu	0.10%	
Fe	0.50%	
Others EA	0.05%	
Others tot	0.20%	
Ni	0.5%	

Average saturation values / impurities.

a. Alsi Layer

Fe	1.0%
Pb	0.35%
U	0.13%
Ni	0.06%

b Pb layer

U	0.01%
Al	0.01
Bi	0.01
Mg	0.01
Sn	0.01
Mn	0.01

Aluminum Alloy Pg 18

For 1295 (C-64) Alloy ~~Mod~~ (1944 to mid 1957)

Fe	.35-.50%
Si	.17%
Ti	.05
Cu	.04
Mn	.03
Cr	.03
Zn	.03
Mg	.01

Sn	.01
Pb	.01
Bi	.01
Ni	.01
Li	.008
Cd	.003
Co	.001
B	.001
Al	Balance

Similar to 1100 (25) Alloy

[redacted]

For M-388 (X-8001) Alloy (mid 1957 and on)

Ni	0.9 - 1.3	Cd	0.003
Fe	0.45 - 0.70	Co	0.001
Si	0.17	B	0.001
Cu	0.15	others (each)	0.05
Li	0.008	others (total)	0.15
		Aluminum	balance

Uranium Impurities ppm

C	150 - 750 ppm
Cr	65 ppm
Fe	150 "
Mg	25 "
Mn	25 "
Ni	100 "
N	100 "
Si	75 "
H (Compounds/Unmoderated)	see below

I & G Fuel Sizes

	C/N	C/E	K/N	K/E	O/N
Can OD(")	1.474-1.460	1.474-1.454	1.498 - 1.474	1.474 - 1.454	1.460-1.44
Nominal Can Wall(")	0.045-0.040	0.045-0.038	0.045-0.040	.045-.038	045-.040
Core OD(")	1.370 ± .002	1.370 ± .002	1.394 - 1.385*	1.370 ± .002	1.356 ± .00
Core ID(")	0.481 ± 0.007	.481 ± .007	.466 - .481*	.481-.506	.416 ± .00
Sp. Rc ID(")	0.375 ± 0.003	.375 ± .003	.360 - .375*	.375 - .400	.310 ± .00
Core OD(")			1.370 ± .001 ++ .002		
Core ID(")			.491 ± .007 ++		
Spiral ID(")			.385 ± .003 ++		

* initial specification refined to ++

1) Above dimensional changes resulted in a change in the can ID to core OD gap. This gap (difference in diameters before canning) was reduced from 0.014 (nominal) to 0.008 to 0.010 inches.

2) Four inch elements canned before 1957 had can walls of 0.035" thickness. This was increased in 1957 to 0.045" while the core was reduced from 1.356 to 1.336 ± .002 inches.

[redacted] can be consistently maintained by these efforts.

*** Hydrogen content varied with the hydroxyl content of the hot-testing salt bath which, in turn, varies with the absolute humidity. An acceptable limit cannot be set ab

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[redacted]

3. Difference in spine OD and core ID is 0.016 in (± 0.002" before 1957 + ± 0.007" ~~after 1957~~ thereafter)

4. Difference in solid slip OD + can ID provides a 0.016" gap.

Pg 53 5. ~~Interstitials~~
Intermetallic compounds formed between Pb + U are quickly depleted in the Al Si layer of the D-plex bath.

Al Si bath Composition p 62

Al plus Si	99.0% min
Cu	0.10 max
Fe	0.50 "
others (ea)	0.50 "
others (tot.)	0.20 "

Si content 11.2 - 11.5% (1948) 10.9 to 11.5 % (1953)
10.5 - 11.5 (June 1956) 10.5 to 11.8 (June 1958)

Al Si bath Impurities p 69

Fe	1.0%
Pb	0.2
U	0.1
Cr	0.05
Ni *	0.03
Ti	0.02

* 1245 alloy only when using M-388 components or SCMP, Ni limit is controlled to less than 0.5 %.

In ~~1954~~ 1954 + 1955 Pb often > 0.25%

Can wall erosion p 89

Use of slow insertion canning method for solid canning caused erosion of 0.014 to 0.010 in.

For I+E, can + spine wall erosion is 0.008 + 0.010" respectively in [redacted] cents reduction of 45 received walls from 0.095 to 0.090 in 0.038 respectively. (Increase?)

[redacted]

Bibliography — HW-25365 (Parts 1, 2+3) "coating, Canning and Testing methods for natural Uranium Fuel Elements." R.J. Bergmeier August 18, 1952 (Secret) part 3 is unclassified

Pt 1 1-298pp Pt 2 # 29.9-963pp Pt 3 #64to69 with Author, Report number + subject index in part 3 (also a list of production tests)

Bronze Sn Dips. DuH-2629 Gmselli "Technological Research - Metallurgy - Report for Cooperating Laboratories for month of June 1949." The only important difference between specimens dipped directly in Al-Si and those developed in bronze and Sn are the thickness and structure of the compound layer

Letter EW Kelbol to FC Schlemmer "Hanford Analytical Results - Uranium Sample Exchange Program" 11-9-49
Data from reports on analysis (2 Trials) of Mallinckrodt Uranium

Box B125
B,N697
7-12Bldg

Fe	53	56	K	L50	L50
Sc	58	52	Li	L5	L5
N	94	93	Mg	L10	10
C	395	365	Mn	10	10
H	L10	L10	Mo	L20	L20
Ag	L.1	L.1	Na	L5	L5
As	L5	L5	Ni	L10	L10
Be	L.1	L.1	P	L5	L5
Cd	L1	L1	Pb	L5	L5
Co	L100	L100	Sb	L2	L2
Cr	L10	L10	Sn	L5	L5
Cu	L20	L20	Zn	L100	L100

Letter R. C. Hagemann (AEC/RL) to B.S. OLD (AEC/HQ) "Uranium Contaminated Scrap Al-Si Alloy" February 8, 1949.

Purchase comp. Si (11.5-12.5%) Cu (0.1) Fe (0.30) Mn (0.02) Mg (0.05) ~~Zn (0.10)~~ Zn (< 0.03) Ni (< 0.01) Sn (< 0.01) Al (balance)
Discarded when Sn .2% [redacted] Analyses of discarded ingots contain Sn (0.79%) Fe (0.80%) Ni (0.02%) U (0.60%)

[redacted] ORAL

Letter M.D. Robin, (AEC Chicago) to H.R. Freiling (AEC ML)
Transmittal of Analytical Data, August 31, 1948

Analysis of uranium, order NUC-327-6 of August 27, 1948
referenced GE-H-13,119 - August 11-1948 scrap & extruded slugs.

Fe	28-100 ppm	Ni	< 10
N	23-82	Co	< 10
B	< 0.2	C	460-550 ppm
Mn	4-12	Cl	5
Mg	< 1-2.2	Si	28-52
Ag	< 1	Cd	< 0.2

Letter R. Wurdack to Dr. Witzinn Argonne National Lab
Information on Alpha Rolled Uranium Rod" May 3, 1948

Rod varied by heat treating
Analysis of two samples gave

	G1700	G1735
Fe	225 ppm	60 ppm
N	85	50
Si	130	3

Letter E.W. Nebol to O.W. Pearce "Code for Deciphering Uranium Results" April 11, 1950.

Uranium Analysis Codes

Analysis	Code	Analysis	Code
Density	Roughness	Li	Z
C	1	Cu	15
Si	2	Na	16
H	3	Mg	17
Mg	4	Mo	18
Fe	5	P	19
As	6	Mn	20
N	7	Sb	21
Cd	8	Pb	22
Be	9	Ni	23
Cr	10	Zn	24
Bi	11	[redacted] B	V.t
K	12	Sn	26
Co	13		

All in ppm

LeHer E W Reed to [redacted] & R E Stafford Stanford Hanford

Analytical Results - Uranium Sample Exchange Program

April 12, 1950 (HW-17495)

	Q-7283-84	Q-7083-84	Q-6679-80	Q-6885-86	H-1625-26	H-1631-32	H-1455-56	Q-7180-81
Density	18.92	18.91	18.95	18.87	18.91	18.91	18.90	18.9
Fe	45 ppm	41 ppm	77 ppm	47 ppm	63 ppm	62 ppm	83 ppm	51 ppm
Si	44	42	56	44	75	80	86	36
N	58	96	84	82	47	44	33	85
C	362	379	464	532	478	696	573	493
H	5	6	5	10	10	11	6	5
Ag	<0.1	0.2	<0.1	<0.1	0.1	0.1	0.1	0.1
As	<5							<5
Be	<1	<1	<0.1	<1	<0.1	<0.1	<0.1	<1
Bi	<1							<1
Cd	<1							<1
Co	<100							<100
Cr	<10							<10
Cu	<20							<20
K	<50							<50
Li	<5							<5
Mg	<10				<10	20	<10	<10
Mn	<5							<5
Mo	<20							<20
Na	<5							<5
Ni	<10			<10	10	10	<10	<10
V	<5					<5	<10	<5
Pb	<5							<5
Sb	<2							<2
Sn	<50							<5
B	<0.2							<0.2
Zn	<100							<100

LeHer JJ Lange to TW Huff: "Uranium Sample Exchange - Statistical Analysis of Second Group of Results", March 22, 1950 - Data from HW-17019 Statement 12.

	Fe	N	C	H	B		Fe	N	C	H	B
13H	44	96	307	11	<.2	16H	80	70	822	15	<.2
13M	39	72	250	3	<.2	16M	52	98	650	2	.16
14H	57	109	427	8	<.2	17H	92	70	1086	15	<.2
14M	43	88	440	5	<.2	17M	72	51	870	5	.19
15H	27	48	496	6	<.2	18H	63	32	840	7	<.2
15M	59	36	650	8	.24	18M	49	24	390	8	.16

* All in ppm

[redacted]

	Fe	N	C	H	B		Fe	N	C	H	B
19H	65	97	457	11	<.2	22H	64	109	440	<10	<.2
19M	99	62	420	1	<.2	22M	44	78	430	4	<.2
20H	46	134	609	14	<.2	23H	68	87	520	13	<.2
20M	35	98	540	7	<.2	23M	93	73	420	5	<.2
21H	71	74	457	9	<.2	24H	48	103	481	3	<.2
21M	51	59	480	9	<.2	24M	33	74	450	3	<.2
25H	63	91	425	4	<.2	26H	65	110	522	4	<.2
25M	40	59	380	2	<.2	26M	47	81	470	1	<.2

Lohr EW Report to [redacted] (AECIRL) Hanford Analytical Results - Uranium Sample Exchange Program, March 7, 1950
Some Analyses HW-17495 rep 143 - only Less than Values typically the same as in HW-17495 and not reported here

Q4282-82	Q4783-89		Q4909-10	Q5197-98	Q5487-88	Q5723-24	H998-9	H116667	Q5907-8	Q6071-72
63	65	Fe	65	46	71	64	179	90	68	98
64	47	Si	42	36	71	28	22	44	71	42
91	110	N	97	134	74	109	52	32	87	103
425	522	C	457	609	457	440	497	602	520	481
4	4	H	11	14	9	<10	8	9	13	3
<5	<5	Mn	5	5	5	5	10	5	<5	<5
<.1	<.1	Ag	<.1	<.1	.2	<.2	<.1	0.1	<.1	<.1
<5	<5	Mn	5	5	5	5	10	5	<5	<5
<5	<5	Sn	<5	<5	<5	<5	<5	5	<5	<5

Pu Conversion

Dec 15, 1950 OIK Ridge comparison with Hanford results

At Hanford $\text{True Pu} = \frac{(\text{Apparent Pu}) * 2}{1 + (1 + .000812 \text{ Ap Pu})^{1/2}}$

70 slugs (279.4 lbs) of Fuel
U Metal at Hanford to 711 mwD/T. ORNL found 95.7 - 96.3 gms Pu. (@ 96 gms → 700 gm Ap Pu/ton)

ORNL-850 Hanford ~~Oxide Fuel~~ gives 622 gm/ton true Pu

" HW-12163 claims [redacted] 610 gm/ton true Pu

Reported 8.5% U235 burn up by calculation (549 gm/ton) ~~is~~ is low
~~HW~~ 752 gm/ton (11.6% expected based on Pu true.

Memo to F. C. Schlenker [redacted] Hanford Analytical Services
Uranium Ex Simple Exchange Program. Aug 22, 1949

Fe	202 ppm	Cu	< 20
Si	75	K	< 50
Na	28	Li	< 5
Ca	702	Mg	< 20
Al	15	Mn	5
Zr	< 10	Mo	< 20
Ag	< .1	Na	< 5
As	< 5	Ni	< 10
Be	< .1	P	< 5
Bi	< 1	Pb	< 5
Cd	< 1	Sb	< 2
Co	< 100	Sn	10
Cr	10	V	< .2
		Zn	< 100

Uranium impurities - continued from HW-36738 on p 126

	F in PC			MCW		
	n	$\bar{x}$	s	n	$\bar{x}$	s
B						
Cd						
C	333	479 ppm	81	325	295 ppm	54
Cl	334	2.1	2.2		5	
Cr	331	4	5		9	6
Fe	329	54	34	325	41.5	14.2
Mg	307	2.1	2.7	315	2.4	2.2
Mn	330	6	3	327	9	2
Ni	323	30	18	327	51	15
N	327	41	20	330	36	16
Si	329	22	7	324	62	16
SiO_2				323		

[redacted]

[redacted]

Charge Number	Date(s)	Key Number	MTU	Type	Exp. Time (Days)	Exposure MWD/MT
1	11-(3)-83	10201A	10,047147	4	542.6	1020
2	11-11-83	10201A	9.570911	4	542.6	1020
3	11-12→11-13	10201A	9.933020	4	542.6	1020
4	11-25→11-29	10201A	5.561476	4	542.6	1020
		10259A	4.450925	4	393.9	978
5	12-6→12-7	10259A	6.819005	4	393.9	978
		10294A	1.793807	4	458.0	942
6	12-22	10294A	9.966215	4	458.0	942
7	12-25→12-26	10294A	8.505361	4	458.0	942
		10350A	1.310447	4	422.2	953
8	12-28→12-29	10294A	4.452447	4	458.0	942
		10350A	5.854313	4	422.2	953
9	12-31→1-1	10385A	8.829458	4	398.7	1102
		10350A	1.637398	4	422.2	953

(Note 1.299152 MTU of 10385A + 111 of 10350A to be charged on 12-31-83)

Exposure/Key Data From [redacted] UNI-2915 June 22 1984
Response to Request for N Reactor and Purex Plant Data - P.T. Reardon
others from Dissolver charging Forms.

 [redacted]

posure D/MT	Discharge Date
020	8-30-72
1020	8-30-72
1020	8-30-72
1020	8-30-72
978	10-27-72
978	10-27-72
942	12-1-72
942	12-1-72
942	12-1-72
953	1-26-73
942	12-1-72
953	1-26-73
1102	3-2-73
953	1-26-73
)	

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