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RADIOACTIVE CONTAMINATION IN LIQUID
WASTE DISCHARGED TO GROUND
AT THE SEPARATIONS FACILITIES THROUGH DECEMBER, 1964

BY

R. H. Wilson

NOTICE: PRELIMINARY REPORT

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INTRODUCTION

This document summarizes the amounts of radioactive contamination discharged to ground from chemical separations and laboratory facilities through December, 1964. Detailed data for individual disposal sites are presented on a month-to-month basis for the period of January through December, 1964. Previous publications of this series are listed in the bibliography and may be referred to for specific information on measurements and radioactivity totals prior to December, 1964. Several changes in crib nomenclature were made during 1964. These changes are noted on the individual tables so reference may be made to them in previous reports.

Tables I and II list the major disposal sites in the separation facilities, total volume of waste discharged to each location, and the gross amounts of plutonium and beta particle emitters discharged to ground since start-up. Tables III through XXIV present this same data on a monthly basis for cribs still in use, and also include information on the source of the waste stream and the settling facility if used.

Isotopic data are included for disposal sites from which the waste was analyzed for specific contaminants. Estimates of contamination and volumes discharged to swamps are also included in Tables XXV and XXVI.

ABSTRACT

SWAMPS

Open disposal sites at the separation areas have received 2.05×10^{11} liters since start-up. Approximately 20,000 curies of fission products and 959 grams of plutonium were contained in this waste.

OTHER DISPOSAL SITES

Exclusive of large volume open waste disposal sites, the estimated volume of waste discharged to ground since start-up was 2.11×10^{10} liters. Included in this is over 2.8×10^6 curies of fission products and 75 kilograms of plutonium.

TABLE I

SUMMARY OF RADIOACTIVE WASTES DISCHARGED
TO MAJOR DISPOSAL SITES IN 200 EAST AREA THROUGH 1964

<u>Disposal Facility</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (Grams)</u>	<u>Units in Curies Beta Particle Emitters</u>
<u>"A" Facility</u>			
216-A-2-Crib (Abandoned)	< 1	130	590
216-A-3-Crib	2.8	0.2	490
216-A-4-Crib	6.2	140	270
216-A-5-Crib	1,800	63	3,400
216-A-6-Crib	2,800	21	4,000
216-A-7-Crib	-	-	17
216-A-8-Crib	1,000	49	10,000
216-A-9-Crib	1,300	-	54
216-A-10-Crib	1,300	101	100,500
216-A-21-Crib	79	82	2,500
216-A-24-Crib	780	< 1.0	4,500
216-A-28-Crib	-	-	31
216-A-30-Crib	1,700	44	3,000
216-A-31-Crib	< 1	-	95,000
<u>"B" Facility</u>			
5 and 6 Cribs	40	170	7,800
216-BC-Cribs	40	50	320,000
216-BC-Trenches	80	63	600,000
216-BX-Trenches	15	6	16,000
216-BY-Cribs	34	61	410,000
216-ER-Cribs	370	370	2,600
241-B-1 and 2 Cribs	45	4,300	5,400
241-B-3-Crib	27	29	710
241-361 Reverse Well	30	4,300	3,800
242-B-1 and 2 Cribs	30	4	39
<u>"C" Facility</u>			
216-C-1-Crib	32	8	11,000
216-C-4-Crib	< 1	1	120
216-C-5-Crib	< 1	-	94
216-C-6-Crib	< 1	-	2,000
216-C-10-Crib	< 1	-	11
200 East Area Excluding Swamps	11,500	9,990	1,604,000

TABLE II

SUMMARY OF RADIOACTIVE WASTES DISCHARGED
TO MAJOR DISPOSAL SITES IN THE 200 WEST AREA THROUGH 1964

<u>Disposal Facility</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (Grams)</u>	<u>Units in Curies Beta Particle Emitters</u>
"S" Facility			
216-S-1 and 2 Cribs	150	1,180	750,000
216-S-3 Crib	4	0.4	270
216-S-5 Crib	4,100	580	960
216-S-6 Crib	3,600	462	2,100
216-S-7 Crib	360	434	277,000
216-S-20 Crib	130	170	7,000
216-S-21 Crib	54	2	220
216-S-13 Crib	4	8	300
"T" Facility			
216-T-28 Crib	29	40	28,000
216-TC-1 Crib	11	59	29,000
241-T-1 and 2 Cribs	29	3,700	1,500
241-T-3 Crib	110	130	3,100
241-T-Trenches	7	180	3,400
241-T-17 Crib	1	1	840
T-361-A Reverse Well	11	3,400	2,800
241-TX Trenches	8	7	34,000
241-TX-153 Crib	46	14	2,000
361-T-1 and 2 Cribs	45	390	18,000
"U" Facility			
216-U-1 and 2 Cribs	2	4	240
216-U-3 Crib	1	0.04	< 1
216-U-8 Crib	380	370	2,700
216-U-12 Crib	69	-	80
222-U-Dry Wells	-	0.6	1
361-WR-Crib	9	38	950
"Z" Facility			
216-Z-1A Crib	< 1	2,100	
216-Z-3 Crib	210	5,700	
216-Z-8 Crib	0.01	48	
216-Z-9 Crib	4	28,000	
216-Z-12 Crib	190	17,300	
231-W-Trench	42	480	
231-1 and 2 Cribs	31	340	
231-W-150 Reverse Well	1	50	
200 West Area Excluding Swamps	9,600	65,200	1,164,000

TABLE III

Disposal Site: 216-A-3 Crib

Waste Stream: Silica gel waste for 203-A from March, 1952 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	0.012	6.36	-	-			
February	-	-	-	-			
March	0.012	3.18	-	-			
April	0.012	2.73	-	0.008			
May	0.012	2.73	-	0.02			
June	0.492	154.98		0.38			
July	0.024	10.45	-	-			
August	-	-	-	-			
September	0.012	6.36	-	-			
October	-	-	-	-			
November	-	-	-	-			
December	-	-	-	-			
12-Month Total	0.576	186.79	-	0.408			
Previous Total	2.18	1,346	0.17	487	< 1	< 1	< 1
<hr/>							
Total to Date	2.76	1,533	0.17	487	< 1	< 1	< 1

TABLE IV

Disposal Site: 216-A-5 Crib

Waste Stream: Process condensate from 202-A from November 1955 to date

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964							
February							
March							
April							
May							
June							
July							
August							
September							
October							
November							
December							
12-Month Total	-	-	-	-	-	-	-
Previous Total	1,300	240	63.01	3,400	-	4	4
Total to Date	1,800	240	63.01	3,400	-	4	4

TABLE V

Disposal Site: 216-A-10 Crib

Waste Stream: Condensate from F Cell Fractionator

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies</u>			
				<u>Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964.	34.82	2.73	-	763			
February	9.80	1.82	-	1,234			
March	48.87	4.09	1.0	205			
April	18.17	2.27	1.0	290			
May	24.71	1.36	1.0	1,960			
June	44.62	4.54	2.0	876	0.16	1.86	0.60
July	17.56	1.36	1.0	886			
August	52.46	5.0	1.0	2,800			
September	30.88	1.36	4.0	4,347			
October	50.98	5.0	1.0	4,164			
November	36.94	8.2	1.0	2,330			
December	7.08	-	-	748	-	3.66	0.90
12-Month Total	376.89	37.73	13.0	20,603	0.16	5.52	1.50
Previous Total	948	69	88.2	79,900	103.4	90.6	5.5
<hr/>							
Total to Date	1,325	107	101.2	100,500	103.2	96	7

TABLE VI

Disposal Site: 216-A-21 Crib

Waste Stream: I^{131} caustic scrubbing waste from October, 1957 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	1.29	5.0	1.0	9.83			
February	0.66	0.9	1.0	8.41			
March	1.71	1.82	-	21.0			
April	1.07	3.64	5.0	15.95			
May	1.37	5.45	8.0	78.9			
June	1.58	9.1	7.0	61	0.05	1.02	24.0
July	1.12	10.91	1.0	57.5			
August	1.23	8.18	2.0	186.3			
September	1.29	4.09	2.0	11.28			
October	1.82	1.36	6.0	15.3			
November	1.38	1.82	5.0	20.7			
December	0.78	1.82	2.0	33.6	-	3.60	37.2
12-Month Total	15.3	54.09	40.0	519.77	0.05	4.62	61.2
Previous Total	64	117	42.1	2,023	-	5	100
<hr/>							
Total to Date	79	171	82.1	2,540	0.05	9.6	161

TABLE VII

Disposal Site: 216-A-24 Crib

Waste Stream: Tank farm condensate and cooling water from May 19, 1958 to date.

Period	Volume (n x 10 ⁶ L)	Uranium (kilograms)	Plutonium (grams)	Units in Curies	Co ⁶⁰	Sr ⁹⁰	Cs ¹³⁷
				Beta Particle Emitters			
January, 1964	1.17	-	-	4.5			
February	1.24	-	-	3.03			
March	1.63	-	-	3.64			
April	0.71	-	-	2.15			
May	1.25	-	-	2.37			
June	1.33	-	-	1.3	-	2.28	63.0
July	0.78	-	-	6.6			
August	0.73	-	-	4.9			
September	0.73	-	-	2.84			
October	0.99	-	-	7.2			
November	0.73	-	-	4.0			
December	0.28	-	-	1.3	-	8.4	136.2
12-Month Total	11.57			43.83		10.68	228.6
Previous Total	763	49	< 1	4,460	0.04	7.7	484
<hr/>							
Total to Date	775	49	< 1	4,500	0.04	18.4	712

TABLE VIII

Disposal Site: 216-A-30 Crib

Waste Stream: Coil and jacket steam condensate from 202-A January, 1961 to date.

Period	Volume (n x 10 ⁶ L)	Uranium (kilograms)	Plutonium (grams)	Units in Curies			
				Beta Particle Emitters	Co ⁶⁰	Sr ⁹⁰	Cs ¹³⁷
January, 1964	42.13	1.36	-	1.76			
February	19.26	-	-	16.1			
March	50.26	-	-	5.68			
April	32.74	-	-	1.5			
May	39.52	-	-	4.48			
June	44.06	-	-	47.2	-	1.08	3.36
July	29.90	-	-	25.4			
August	47.58	0.45	-	25.8			
September	38.99	-	-	6.45			
October	46.10	-	1.0	4.4			
November	43.81	-	-	3.5			
December	23.58	-	-	3.6	-	0.24	0.30
12-Month Total	457.93	1.81	1.0	145.87		1.32	3.66
Previous Total 1,201		15	43	2,820	0.03	19	57.5
<hr/>							
Total to Date 1,660		17	44	2,970	0.03	20.3	61.2

TABLE IX

Disposal Site: 216-A-31 Crib

Waste Stream: Specific retention crib

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Units in Curies Beta Particle Emitters</u>
January, 1964		
February		
March		
April		
May		
June		
July	0.004	94,720
August		
September		
October		
November		
December		
12-Month Total	0.004	94,720
Previous Total		
<hr/>		
Total to Date	0.004	94,720

TABLE X

Disposal Site: 216-C-4 and 216-C-6 Cribs

Waste Stream: Hot Semiworks crib wastes

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies</u>			<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
				Beta	Particle	Emitters			
January, 1964	0.014	-	-	1.33					
February	0.007	-	-	0.2					
March	0.021	-	-	1.65					
April	0.002	-	-	-					
May	0.014	-	-	2.5					
June	{ -	-	-	{ -					
July	{ 0.049	-	-	{ 5.87					
August	0.009	-	-	2.9					
September	{ -	-	-	{ -					
October	{ 0.034	-	-	{ 4.57					
November	-	-	-	-					
December	-	-	-	-					
12-Month Total	0.15			19.02					
Previous Total	0.56			1,830				180	
<hr/>									
Total to Date	0.71			1,850				180	

TABLE XI

Disposal Site: 216-C-10 Crib

Waste Stream: Hot Semiworks waste (Replaces the C-6 Crib)

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Units in Curies Beta Particle Emitters</u>
January, 1964		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November	0.024	11.1
December		
12-Month Total	0.024	11.1
Previous Total		
<hr/>		
Total to Date	0.024	11.1

TABLE XII

Disposal Site: 216-S-6

Waste Stream: 202-S Process vessel cooling water from October, 1954 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>			
					<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	16.276	0.52	0.101	1.290			
February	11.355	0.881	0.588	4.386			
March	15.519	2.013	0.015	7.708			
April	15.140	1.0	1.612	25.800			
May	20.818	23.25	0.726	5.258			
June	21.196	0.433	0.080	54.768	-	0.329	6.625
July	23.467	0.817	0.211	0.738			
August	22.332	5.632	0.058	1.522			
September	22.332	5.9	0.083	66.788			
October	22.710	2.182	0.043	7.140			
November	18.925	0.598	0.081	28.500			
December	24.603	1.445	1.664	4.570	-	22.01	9.23
12-Month Total	234.7	44.67	5.26	208.47		22.24	15.86
Previous Total	3,373	110	457	1,860	< 0.05	301	74
<hr/>							
Total to Date	3,608	155	462	2,068	< 0.05	323	90

TABLE XIII

Disposal Site: 216-S-7 Crib

Waste Stream: D-1 and D-2 wastes from January 12, 1959 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	3.02	2.75	0.470	134.1			
February	3.44	3.17	0.705	324.3			
March	2.91	1.04	0.262	241.7			
April	3.32	2.39	0.835	543.9			
May	4.22	5.06	0.213	447.9			
June	3.07	1.81	0.189	691.6	-	14.67	46.13
July	4.16	5.49	0.255	355.7			
August	2.73	0.85	0.117	337.1			
September	4.82	1.27	0.057	299.6			
October	3.72	4.47	0.138	425.8			
November	3.72	0.92	0.069	20.4			
December	4.52	1.17	0.167	479.3	-	1.795	40.28
12-Month Total	43.65	30.39	3.48	4,301.4		16.5	86.4
Previous Total	315	2,634	430.6	273,000	2.3	2,929	278
<hr/>							
Total to Date	359	2,664	434.1	277,300	2.3	2,945	364

TABLE XIV

Disposal Site: 216-S-20 Crib

Waste Stream: 222-S and 207-SL basin wastes

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	0.038	0.136	0.088	0.016			
February	0.013	0.012	0.023	0.009			
March	0.028	0.116	0.149	0.009			
April	-	-	-	-			
May	0.050	0.008	0.056	0.014			
June	0.069	0.063	0.002	0.005		<0.001	0.001
July	0.051	0.040	0.046	0.003			
August	0.018	0.099	0.002	0.005			
September	0.038	0.064	0.002	0.003			
October	0.046	0.010	0.002	0.009			
November	0.031	0.034	0.003	0.062			
December	0.051	0.004	0.051	0.218		0.002	0.003
12-Month Total	0.433	0.586	0.424	0.353		<0.003	0.004
Previous Total	124	34.4	168.3	6,620	1.4	44.7	110.5
<hr/>							
Total to Date	124*	35	169	6,620	1.4	44.7	110.5

* In the past a total of 54.2×10^6 liters of waste, containing 9.15 grams of plutonium and 6.6 curies of beta particle emitters were discharged from the 207-SL basin to 216-S-20 Crib. These totals are included in the totals for the 216-S-20 Crib. The 300 waste is included to October, 1963 in the total amount of waste discharged to this crib.

The 222-S and 207-SL wastes were reported under disposal site 216-SL-1 and 2 Crib in the 1963 report (H-80277).

TABLE XV

Disposal Site: 216-S-21 Crib

Waste Stream: 241-SX tank farm condensate from November, 1954 to date

Period	Volume (n x 10 ⁶ L)	Uranium (kilograms)	Plutonium (grams)	Units in Curies		
				Beta Particle Emitters	Co ⁶⁰	Sr ⁹⁰ Cs ¹³⁷
January, 1964	0.276	0.001	0.021	0.285		
February	--	-	-	-		
March	0.153	0.001	0.001	0.171		
April	0.345	0.001	0.001	0.947		
May	0.693	0.036	0.002	0.038		
June	0.757	0.001	0.002	0.248	-	<0.001 1.0
July	0.631	0.001	0.001	1.208		
August	0.744	0.004	0.001	2.013		
September	0.431	0.005	<0.001	0.688		
October	0.752	0.005	<0.001	1.795		
November	0.783	0.003	<0.001	2.433		
December	0.824	0.017	<0.001	2.374		0.39 4.044
12-Month Total	6.44	0.075	0.033	12.95		0.39 5.04
Previous Total	47.5	3.6	2.22	210	0.04	13.6 96.4
<hr/>						
Total to Date	53.9	3.7	2.25	223	0.04	19 101

The 241-SX Tank farm condensate was reported under disposal site 216-SX-1 Crib in the 1963 report (HW-80877). Nomenclature was changed as of September, 1964.

TABLE XVI

Disposal Site: 216-S-13 Crib

Waste Stream: O-2 aqueous waste from 276-S Building from February, 1951 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	0.002	0.003	<0.001	0.081			
February	0.002	0.038	0.001	0.479			
March	0.004	0.383	0.007	1.194			
April	0.132	10.341	0.093	25.130			
May	0.028	0.641	0.068	4.530			
June	0.476	11.430	0.094	199.911	-	0.003	1.692
July	0.061	0.278	0.005	2.218			
August	0.016	0.031	0.001	3.620			
September	0.114	0.695	0.022	12.390			
October	0.047	10.796	0.016	3.300			
November	0.045	10.364	1.632	3.708			
December	0.045	1.178	0.023	18.720		0.009	0.395
12-Month Total	0.97	46.63	1.96	275.3		0.012	2.09
Previous Total	3.49	<3.5	6.19	25			
<hr/>							
Total to Date	4.46	50	8.15	300		0.01	2.1

The O-2 aqueous waste was reported under disposal site 276-S Crib in the 1963 report (HW-30877). Nomenclature was changed as of September, 1964.

TABLE XVII

Disposal Site: 216-T-28 Crib

Waste Stream: 221-T waste handling and decontamination operation from February, 1960 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies</u>		
				<u>Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u> <u>Cs¹³⁷</u>
January, 1964	0.304	0.914	0.115	2,027		
February	-	-	-	-		
March	0.380	5.475	0.231	4,196		
April	-	-	-	-		
May	0.325	2.032	0.774	1,436		
June	0.190	1.414	0.311	2,042		
July	-	-	-	-		
August	0.269	1.649	1.110	1,152		
September	0.200	3.850	0.053	3,923		
October	-	-	-	-		
November	0.148	0.730	0.349	353		
December	-	-	-	-		
12-Month Total	1.82	16.1	2.94	15,129		
Previous Total	7.8	101.2	21.7	9,009		
<hr/>						
Total to Date	9.6	117	24.6	24,138		

The 221-T waste was reported under disposal site 216-TY Crib in the 1963 report (BW-80277). Nomenclature was changed as of September, 1964.

TABLE XVIII

Disposal Site: 216-T-28 Crib

Waste Stream: 300 Area Laboratories effluent (340 Facility) from October, 1963 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium (grams)</u>	<u>Units in Curies Beta Particle Emitters</u>	<u>Co⁶⁰</u>	<u>Sr⁹⁰</u>	<u>Cs¹³⁷</u>
January, 1964	1.495	1.728	0.94	158.8			
February	1.173	0.463	0.067	40.6			
March	1.328	0.635	1.5	212.7			
April	1.098	0.164	0.06	192.6			
May	1.433	0.490	1.8	626.2			
June	1.022	0.246	0.03	34.0			
July	1.136	2.160	3.51	420			
August	0.927	203.35	1.15	343			
September	1.060	23.0	1.31	372			
October	1.060	1.40	3.10	711			
November	1.098	0.560	1.30	287			
December	1.855	-	0.054	139			
12-Month Total	14.74	234.25	14.82	3,550			
Previous Total	4.2	1.36	0.9	351			
<hr/>							
Total to Date	19	236	15.7	3,901			

The 300 Area waste was reported under the disposal site 216-SL-1 and 2 Cribs (now 216-T-20 Crib) in the 1963 report (HW-00877). During the latter part of 1963, the 300 Area waste disposal site was changed to the 216-TY Crib. The nomenclature for the 216-TY Crib was changed to 216-T-28 in September, 1964. The 300 waste prior to October, 1963 appears in the total discharged to the 216-S-20 Crib.

TABLE XIX

Disposal Site: 216-T-28 Crib (Summary)

Waste Stream: 221-T Waste Handling and Decontamination, and 300 Area
Laboratories Effluent

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium grams</u>	<u>Units in Curies Beta Particle Emitters</u>
January, 1964	1.799	2.702	1.055	2,186
February	1.173	0.468	0.067	41
March	1.708	6.110	1.731	4,416
April	1.098	0.164	0.060	193
May	1.763	2.552	2.574	2,062
June	1.212	1.660	0.341	2,076
July	1.136	2.160	3.510	420
August	1.196	204.999	2.260	1,495
September	1.260	26.850	1.363	4,301
October	1.060	1.400	3.100	711
November	1.246	1.290	1.649	640
December	1.855	-	0.054	139
12-Month Total	16.5	250.36	17.76	18,680
Previous Total	12.0	102.56	22.6	9,360
<hr/>				
Total to Date	28.5	353	40.4	28,040

TABLE XX

Disposal Site: 216-U-1 and 2 Cribs

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium grams</u>	<u>Units in Curies Beta Particle Emitters</u>
January, 1964				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				
12-Month Total				
Previous Total	1.8	201	4.2	235
<hr/>				
Total to Date	1.8	201	4.2	235

TABLE XXI

Disposal Site: 216-U-12 Crib

Waste Stream: 224-U Concentrator Condensate from April, 1960 to date

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Uranium (kilograms)</u>	<u>Plutonium grams</u>	<u>Units in Curies Beta Particle Emitters</u>
January, 1964	1.26	1.82		0.451
February	3.78	1.04		0.099
March	1.41	12.09		0.476
April	1.28	13.18		0.212
May	1.35	21.09		0.360
June	1.35	20.91		0.514
July	0.53	10.45		0.151
August	1.22	42.27		0.564
September	1.41	69.08		0.063
October	1.39	42.72		0.104
November	1.26	11.82		0.026
December	1.20	7.27		0.021
12-Month Total	17.4	253.7		3.04
Previous Total	51.6	1,054		76.8
<hr/>				
Total to Date	69	1,308		79.8

TABLE XXII

Disposal Site: Z-9 Crib

Waste Stream: Recuplex silica supernatant overflow since October, 1957

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (grams)</u>
January, 1964		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		
December		
12-Month Total		
Previous Total	4.02	27,511
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Total to Date	4.02	27,511

TABLE XXIII

Disposal Site: 216-Z-12 Crib

Waste Stream: Analytical laboratory wastes, development laboratory wastes and process wastes from March, 1959 to date.

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (grams)</u>
January, 1964	1.97	242
February	1.16	229
March	1.43	334
April	1.24	334
May	1.36	411
June	1.62	154
July	1.43	248
August	1.53	126
September	1.38	257
October	1.58	212
November	2.07	349
December	1.69	303
12-Month Total	18.5	3,199
Previous Total	171.3	14,081
<hr/>		
Total to Date	190	17,280

TABLE XXIV

Disposal Site: 216-Z-1-A Crib

Waste Stream: 880 Recuplex Facility, 234-5 Bldg. from June, 1964 to date

<u>Period</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (grams)</u>
January, 1964		
February		
March		
April		
May		
June	0.050	407
July	0.045	307
August	0.050	178
September	0.058	250
October	0.078	161
November	0.069	529
December	0.088	300
12-Month Total	0.44	2,132
Previous Total	-	-
<hr/>		
Total to Date	0.44	2,132

LARGE VOLUME WASTES TO OPEN DISPOSAL SITES

In addition to the radioactive waste discharged to the ground, large quantities of relatively uncontaminated water from the separations process were discharged to the open storage areas in and near to the separations facilities. Periodic difficulties allowed trace quantities of radioactive material to enter these streams and thus cause these locations to become disposal sites for radioactive waste.

Prior to this publication, estimates of volume and radioactivity were reported in documents HW-63646, HW-64375 and HW-69071. Subsequent volume data were obtained from the process and operating groups.

Monthly samples were collected by the Environmental Monitoring Operation and analyzed for the activity density of gross alpha and gross beta particle emitters. Estimates of the total activity discharged to these sites were calculated by the Radiological Chemical Analysis Operation when not supplied by the operating groups. Large fluctuation in volume and low sampling frequency necessitates re-emphasizing that the curie and gram values should be regarded as estimates only.

TABLE XXV

SWAMPS CURRENTLY IN USE

<u>Disposal Site</u>	<u>Volume (Liters)</u>		<u>Uranium</u>	<u>Plutonium (Grams)</u>		<u>Units in Curies</u>	
	<u>1964</u>	<u>Total to Date</u>	<u>(Kilograms)</u> <u>1964</u>	<u>1964</u>	<u>Total to Date</u>	<u>Beta Particle</u> <u>Emitters</u> <u>1964</u>	<u>Total to Date</u>
"B" Swamp & Chem. Sewer	2.66×10^9	6.07×10^{10}	16.3	7.0	168	2,701	4,080
"U" Swamp	1.25×10^9	5.04×10^{10}	148.0	-	145	5.3	656
202-S Swamp Number 2	4.65×10^9	2.27×10^{10}	31.5	6.04	355	40	800
222-S Swamp	3.44×10^7	3.16×10^8	10.5	0.12	19	0.1	12
Gable Mt. Swamp	1.2×10^{10}	7.1×10^{10}	31.4	34.0	269	8,876	13,163
Totals to Date		2.05×10^{11}			956		18,711

TABLE XXVI

SWAMPS NO LONGER IN USE

<u>Disposal Site</u>	<u>Volume (n x 10⁶ L)</u>	<u>Plutonium (Grams)</u>	<u>Units in Curies Beta Particle Emitters</u>
202-S-1	6.3 x 10 ³	3	1100
"T" Swamp	3.1 x 10	0.01	110
Totals	3.7 x 10 ⁴	3.0	1200

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