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RADIOACTIVE CONTAMINATION IN LIQUID WASTES DISCHARGED TO GROUND AT THE SEPARATIONS FACILITIES THROUGH DECEMBER, 1966

B. J. McMurray

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CONTENTS

	Page
INTRODUCTION	3
ABSTRACT	4
SUMMARY OF CONTAMINATION DISCHARGED TO GROUND AT 200 EAST AREA	5
SUMMARY OF CONTAMINATION DISCHARGED TO GROUND AT 200 WEST AREA	6
DATA FOR INDIVIDUAL ACTIVE DISPOSAL SITES	
200 EAST AREA	
216 - A - 3 Crib (Silica gel waste from 203-A)	7
216 - A - 5 Crib (Condensate from F cell fractionator)	8
216 - A - 8 Crib (Tank farm condensate and cooling water)	9
216 - A - 10 Crib (Condensate from F cell fractionator)	10
216 - A - 24 Crib (Tank farm condensate and cooling water)	11
216 - A - 27 Crib (Caustic scrubber waste)	12
216 - A - 30 Crib (Purex coil and jacket steam condensate)	13
216 - A - 31 Crib (Organic waste)	14
216 - A - 36A Crib (Dissolver scrubber waste)	15
216 - A - 36B Crib (Dissolver scrubber waste)	16
216 - B - 7 Crib (B Plant construction wastes)	17
216 - B - 50 Crib (In-tank-solidification condensate)	18
216 - C - 10 Crib (Strontium semi-works waste)	19
200 WEST AREA	
216 - S - 6 Crib (Redox jacket and coil condensate and cooling water)	20
216 - S - 9 Crib (D-2 wastes)	21
216 - S - 13 Crib (Aqueous waste from 276-S)	22
216 - S - 20 Crib (Redox laboratory wastes)	23

0 0 0 3 8 3

CONTENTS (Continued)

	Page
DATA FOR INDIVIDUAL ACTIVE DISPOSAL SITES (Continued)	
216 - S - 21 Crib (SX tank farm condensate)	24
216 - T - 19 Crib (242-T evaporator condensate)	25
216 - T - 28 Crib (T Plant wastes)	26
216 - T - 28 Crib (Summary of all wastes)	27
216 - T - 34 Crib (300 Area waste)	28
216 - U - 1&2 Crib (UO_3 Plant concentrator condensate)	29
216 - U - 12 Crib (UO_3 Plant concentrator condensate)	30
216 - Z - 1A Crib (Plutonium reclamation wastes)	31
216 - Z - 1&2 Crib (Plutonium reclamation wastes)	32
216 - Z - 7 Crib (300 Area waste)	33
216 - Z - 12 Crib (234-5 laboratory and process waste)	34
LARGE VOLUME WASTES TO OPEN DISPOSAL SITES	35
SWAMPS CURRENTLY IN USE	36
216 - A - 25 Purex Cooling Water	37
216 - A - 29 Purex Chemical Sewer	38
216 - S - 16 Redox Cooling Water	39
216 - S - 19 Redox Lab Chemical Sewer	40
216 - U - 10 UO_3 Plant Cooling Water	41
SWAMPS NO LONGER IN USE	42
BIBLIOGRAPHY	43 & 44

0 0 0 2 3 0 1 2 8 4

INTRODUCTION

This document summarizes the amounts of radioactive contamination discharged to ground from chemical separations and laboratory facilities through December, 1966. Detailed data for individual disposal sites are presented on a month-to-month basis for the period of January through December, 1966. 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 January, 1966. Several changes in crib nomenclature were made during 1965. 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 XXX 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 XXXI through XXXVII.

ABSTRACT

SWAMPS

Open disposal sites at the separation areas have received 272 x 10^9 liters since start-up. Approximately 21,200 curies of fission products and 1,070 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 22.5 x 10^9 liters. Included in this is over 3.0 x 10^6 curies of fission products and 81 kilograms of plutonium.

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TABLE I

SUMMARY OF RADIOACTIVE WASTES DISCHARGED
TO MAJOR DISPOSAL SITES IN 200 EAST AREA THROUGH 1966

Disposal Facility		Volume In Millions Of Liters	Plutonium In Grams	Beta Emitters In Curies
"A" Plant				
216-A-2		<1	130	590
*216-A-3		2.8	0.2	490
216-A-4		6.2	140	270
*216-A-5		1,800	64	3,400
216-A-6		2,800	21	4,000
216-A-7		-	-	17
216-A-8		1,005	49	10,010
216-A-9		1,300	-	54
*216-A-10		2,000	173	118,000
216-A-21		88	150	2,750
*216-A-24		796	<1	4,900
*216-A-27		15	74	403
216-A-28		-	-	31
*216-A-30		2,540	47	4,700
*216-A-31		<1	9	95,000
*216-A-36A	(216-A-36)	1	80	150,000
*216-A-36B		4	67	4,210
"B" Plant				
216-B-5	(241-361 Reverse Well)	30	4,300	3,800
*216-B-7	(241-B-1 & 2 Cribs)	50	4,300	10,100
216-B-8	(241-B-3 Crib)	27	29	710
216-B-9	(5-6 Crib)	40	170	7,800
216-B-11	(242-B-1 & 2 Cribs)	30	4	39
216-B-12	(216-ER Cribs)	370	370	2,600
216-B-14--19	(216-BC Cribs)	40	50	320,000
216-B-20--34	(216-BC Trenches)	80	63	600,000
216-B-35--42	(216-BX Trenches)	15	6	16,000
216-B-43--49	(216-BY Cribs)	34	61	410,000
*216-B-50		11	-	91
"C" Plant				
216-C-1		32	8	11,000
216-C-4		<1	1	120
216-C-5		<1	-	94
216-C-6		<1	-	2,000
*216-C-10		1	-	58

TABLE II

SUMMARY OF RADIOACTIVE WASTES DISCHARGED
TO MAJOR DISPOSAL SITES IN 200 WEST AREA THROUGH 1966

Disposal Facility		Volume In Millions Of Liters	Plutonium In Grams	Beta Emitters In Curies
"S" Plant				
216-S-1 and 2		150	1,180	750,000
216-S-3		4	<1	270
216-S-5		4,100	580	960
*216-S-6		4,060	467	2,770
216-S-7		376	436	281,600
*216-S-9		29	10	9,120
*216-S-13		5	8	630
*216-S-20		125	169	6,620
*216-S-21		79	2	540
"T" Plant				
216-T-3	(216-T-361-A Reverse Well)	11	3,400	2,800
216-T-6	(361-T-1 & 2 Cribs)	45	390	18,000
216-T-7	(241-T-3 Crib)	110	130	3,100
216-T-14--17	(216-T Trenches)	7	180	3,400
216-T-18	(241-T-17 Crib)	1	1	840
216-T-19	(241-TX-153 Crib)	84	14	2,030
216-T-21--25	(216-TX Trenches)	8	7	34,000
216-T-26	(216-TC-1 Crib)	11	59	29,000
216-T-27	(216-TR-2 Crib)	6	13	2,000
*216-T-28	(216-TX-3 Crib)	12	70	58,500
216-T-32	(241-T-1 & 2 Crib)	29	3,200	1,500
*216-T-34		10	105	12,400
"U" Plant				
216-U-1	(361-WR Crib)	9	38	950
*216-U-2	(216-U-1 & 2 Crib)	2	4	240
216-U-3		1	<1	<1
216-U-8		380	370	2,700
*216-U-12				
"Z" Plant				
*216-Z-1A		3	5,357	-
216-Z-1 and 2		0.1	5,511	-
216-Z-3		210	5,700	-
216-Z-5	(231-1 & 2 Cribs)	31	340	-
216-Z-7	(231-W Trench)	48	483	1,880
216-Z-8		<1	48	-
216-Z-9		4	28,000	-
216-Z-10	(231-W-150 Reverse Well)	1	50	-
*216-Z-12		222	19,910	-

TABLE III

Disposal Site: 216-A-3 Crib

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

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	.011	15.9					
February	-						
March	-						
April	-						
May	-						
June	-						
July	-						
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	.011	15.9					
Previous Total	2.80	1,635	0.17	487.	<1	<1	<1
Total To Date	2.81	1,651	0.17	487.	<1	<1	<1

TABLE IV

Disposal Site: 216-A-5 Crib

Waste Stream: Process condensate from F Cell fractionator, (backup for 216-A-10)

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	-						
March	-						
April	-						
May	-						
June	-						
July	-						
August	-						
September	-						
October	3.86	1.36	1	4.6			
November	-						
December	-						
12-Month Total	3.86	1.36	1	4.6			
Previous Total	1,800		64	3,400			
Total To Date	1,804		65	3,405			

TABLE V

Disposal Site: 216-A-8 Cribs

Waste Stream: Tank farm condensate and cooling water from March, 1955 to May 1958 and from August 1, 1966 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	-						
March	-						
April	-						
May	-						
June	-						
July	-						
August	0.38			0.9			
September	0.38			1.4			
October	0.38			0.5			
November	1.19			2.5			
December	1.33			3.19			
12-Month Total	3.66			8.5			
Previous Total	1,000.		49	10,000			
	1,004		49	10,010			

TABLE VI

Disposal Site: 216-A-10 Crib

Waste Stream: Condensate from Purex F Cell fractionator from January 1955 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}	Ru^{106}
January	25.25	1.36	1	35.8				
February	24.22	-	7	55.3				
March	23.92	0.45	-	6.6				
April	16.83	0.45	-	79.4				
May	14.16	-	-	67.6				
June	23.77	0.45	-	6.1	< .04	0.4	< .3	202.1
July	14.50	-	-	2.7				
August	1.82	-	-	4.5				
September	35.01	0.91	-	28.3				
October	51.48	17.25	14	206.0				
November	29.79	2.29	4	2,380.0				
December	25.40	4.09	1	35.0	-	5.5	23.0	8,730.0
12-Month Total	286.15	27.23	27	2,907.3	.04	5.9	23.3	8,732.0
Previous Total	1,713.	141.	146	114,800	169	57	22.2	-
Total To Date	1,999	168	173	117,707	169	63	45.5	

TABLE VII

Disposal Site: 216-A-24 Cribs

Waste Stream: Tank farm condensate and cooling water from May 1958 to August 1, 1966

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	0.92	-	-	2.3				
February	1.58	-	-	3.3				
March	1.70	-	-	8.9				
April	0.76	-	-	3.3				
May	0.33	-	-	1.3				
June	0.67	-	-	8.8	<0.0003	0.01	<0.006	<0.1
July	0.68	-	-	8.5				
August	-							
September	-							
October	-							
November	-							
December	-							
12-Month Total	6.64	-	-	36.4	<0.001	0.01	<0.001	<0.1
Previous Total	789	49	<1	4,535	0.17	6.38	500.3	<1
Total To Date	796.	49	<1	4,899	0.17	6.39	500.3	<1

TABLE VIII

Disposal Site: 216-A-27 Crib

Waste Stream: Laboratory and caustic scrubbing waste from June 1965 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters U233 gm		Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	0.71	7.23	2		21.2				
February	0.46	1.82	1		14.3				
March	1.01	3.63	1		28.4				
April	0.52	1.36	7		43.7				
May	0.89	-	4	21	24.6				
June	2.01	3.63	3	65	57.8	<.002	0.7	2.0	16.4
July	0.51	-	-	34	9.9				
August	0.38	-	-		13.5				
September	0.49	-	1		15.5				
October	0.57	-	1		14.6				
November	0.12	-	-		4.0				
December	0.45	0.45	3		5.8	-	3.8	2.6	6.0
12-Month Total	8.12	18.12	23	120	253.3	<.002	4.1	4.6	22.4
Previous Total	6.6	17	51	-	150.7	.12	.011	1.02	2.1
Total To Date	14.7	35.	74	120	403.	.12	4.1	5.6	24.5

TABLE IX

Disposal Site: 216-A-30 Crib

Waste Stream: Coil and jacket steam condensate from January 1961 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	31.26	.45	-	1.9				
February	35.73	-	-	6.8				
March	45.42	-	-	4.2				
April	29.11	-	-	3.8				
May	20.86	-	-	7.4				
June	26.23	-	-	1.5	<.63	0.4	<.21	4.7
July	24.37	-	-	2.5				
August	33.50	-	-	1.5				
September	37.74	-	-	32.1				
October	45.57	-	-	61.0				
November	35.77	-	1	1,360				
December	29.18	-	-	3.4	-	.6	2.5	7.6
12-Month Total	394.74	.45	1	1,486.1	.63	1.0	2.7	12.3
Previous Total	2,142	24	46	3,203	10.96	27.35	99.2	<1
Total To Date	2,537	24.5	47	4,689	11.59	28.4	101.9	12.3

TABLE X

Disposal Site: 216-A-31 Crib

Waste Stream: Purex organic wastes from January 1963 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	-						
March	-						
April	-						
May	-						
June	-						
July	-						
August	-						
September	-						
October	-						
November	.006	20.43	9	55.3			
December	-	-	-	-			
12-Month Total	.006	20.43	9	55.3			
Previous Total	.018	-	-	95,000			
Total To Date	.024	20.43	9	95,055			

TABLE XI

Disposal Site: 216-A-36 A Crib*

Waste Stream: Multipurpose dissolver scrubber waste from October 1965 to March 11, 1966

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	.19	101.92	50	50,000		200	230
February	.39	24.97	18	12,600		50	55
March	-						
April	-						
May	-						
June	-						
July	-						
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	.58	126.89	68	62,600	-	250	285
Previous Total	.49	23.75	12.6	84,529			
Total To Date	1.07		80.6	147,129			

*Formerly designated 216-A-36 Crib. This crib was divided into two sections in March 1966. Wastes prior to this time went into the A section. Subsequent wastes go into the B section.

TABLE XII

Disposal Site: 216-A-36 B Crib

Waste Stream: Multipurpose dissolver scrubber waste from March 11, 1966 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	-							
February	-							
March	.44	1.36	1	750				
April	.11	-	1	40				
May	.30	-	-	25				
June	.75	-	-	65				
July	.04	-	-	3				
August	.11	.45	1	30				
September	.57	3.63	25	1,720				
October	.91	40.64	37	2,500				
November	.53	.45	1	20				
December	.42	1.36	1	55				
12-Month Total	4.18	47.89	67	4,208				
Previous Total	-	-	-	-				
Total To Date	4.2	48	67	4,208				

	U-233 gm.	Thorium kg.
May	3	3.63
June	7	9.08

TABLE XIII

Disposal Site: 216-B-7 Crib

Waste Stream: B Plant construction wastes from December 1964 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
*January	(0.20)	-		(25)	-	(35)	(5)
February	0.16	-		22.04		29.65	0.67
March	0.18	-		15.30		3.30	3.8
April	0.17	-		8.72		0.95	0.42
May	0.18	-		3.77		33.15	0.84
June	-						
July	-						
August	0.028	-		19.99		7.80	0.02
September	0.011	-		7.45		<.001	<.001
October	-						
November	-						
December	-						
12-Month Total	.93	-		102.17		109.85	10.75
Previous Total	49.	-	4,300	10,000	-		
Total To Date	50		4,300	10,000			

* No samples taken numbers are estimated

TABLE XIV

Disposal Site: 216-B-50 Crib

Waste Stream: In-Tank Solidification (ITS) condensate from January 1965 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	0.57	-		10.70			5.97
March	0.47	-		7.57			4.80
April	0.36	-		7.00			3.91
May	0.48	-		4.89			6.28
June	0.500	-		15.85			7.17
July	0.625	-		10.68			6.49
August	0.473	-		9.55			5.86
September	0.625	-		10.44			6.42
October	0.564	-		8.72			5.75
November	-						
December	0.625	-		1.44			0.66
12-Month Total	5.292			86.84			53.31
Previous Total	5.6			4.2			3.6
Total To Date	10.8			91.0			56.9

TABLE XV

Disposal Site: 216-C-10 Crib

Waste Stream: Strontium Semiworks waste from November 1964 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	0.07			1.10		1.10	
February	0.03			1.03		1.03	
March	0.13			0.37		0.37	
April	0.10			7.77		7.77	
May	0.03			2.30		2.30	
June	0.02			1.50		1.50	
July	0.01			0.07		0.07	
August	0.01			0.12		0.12	
September	0.02			0.57		0.57	
October	-						
November	0.05			3.01		3.01	
December	0.03			4.29		4.29	
12-Month Total	0.50			22.13		22.13	
Previous Total	0.295			36.		25.	
Total To Date	0.80			58		47	

TABLE XVI

Disposal Site: 216-S-6 Crib

Waste Stream: Redox process vessel cooling water from October 1954 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	6.59	0.10	0.1	0.9			
February	24.60	2.78	2.7	2.3			
March	22.73	3.55	0.02	20.5			
April	21.20	33.09	0.1	53.5			
May	24.60	3.25	0.4	4.4			
June	32.55	13.68	0.3	1.2		1.209	.667
July	13.25	3.98	0.01	1.1			
August	13.25	2.39	0.02	1.0			
September	18.93	1.59	0.31	42.5			
October	27.25	2.23	0.12	17.1			
November	18.92	1.54	0.13	397.0			
December	10.22	4.17	0.05	31.3		50.034	9.980
12-Month Total	234.09	72.35	4.26	572.8		51.2	10.6
Previous Total	3,827	170.	463.	2,201	<0.05	342.0	181.8
Total To Date	4,061	242.	467.	2,774.	<0.05	393.2	192.4

TABLE XVII

Disposal Site: 216-S-9 Crib

Waste Stream: D-1 and D-2 wastes from July 1965 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	2.35	0.82	1.0	395			
February	1.10	0.24	0.1	197			
March	1.20	4.04	1.8	103			
April	1.92	8.51	1.0	1,441			
May	1.35	0.99	0.3	1,119			
June	2.04	1.45	0.1	864		44.71	357.68
July	0.83	0.001	0.01	758			
August	0.40	0.51	0.03	194			
September	2.35	2.09	0.52	597			
October	1.93	1.30	1.19	1,230			
November	1.96	2.26	0.97	643			
December	1.05	1.07	0.43	71		49.072	3.962
12-Month Total	18.48	23.28	7.45	7,612		93.8	361.6
Previous Total	10.0	3.24	1.95	1,508		46.0	85.3
Total To Date	28.5	26.42	9.4	9,120		139.8	446.9

TABLE XVIII

Disposal Site: 216-S-13 Crib

Waste Stream: Aqueous waste from 276-S Building from February 1951 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	0.02	1.20	0.02	16			
February	-						
March	-						
April	0.01	0.29	0.001	9			
May	0.01	0.02	<0.001	10			
June	0.01	0.15	0.002	4		.001	.162
July	0.01	0.07	0.001	1			
August	0.01	0.01	0.001	1			
September	0.02	0.31	0.004	3			
*October	0.01	(1.00)	(0.02)	(15)			
*November	0.01	(1.00)	(0.02)	(15)			
December	-					(.001)	(.2)
12-Month Total	.11	4.25	.070	74		(.002)	(0.4)
Previous Total	4.90	85.	8.26	558.		.034	4.5
Total To Date	5.0	89.	8.33	632		0.04	4.9

*Sample lost

UNCLASSIFIED

TABLE XIX

Disposal Site: 216-S-20 Crib

Waste Stream: Redox Laboratory and 207-SL Basin wastes from January 1952 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	0.02	0.008	0.001	0.02			
February	0.02	0.003	0.001	0.05			
March	0.03	0.005	0.003	0.15			
April	0.01	0.003	0.002	0.01			
May	0.01	<0.001	<0.001	<0.01			
June	0.03	0.072	0.046	0.02		.002	.074
July	0.02	0.197	0.002	0.09			
August	0.02	0.008	0.005	0.02			
September	0.02	0.014	0.011	0.07			
October	0.02	0.002	0.004	0.03			
November	0.02	0.007	0.006	0.04			
December	0.02	0.002	0.014	0.02		.012	.005
12-Month Total	.24	.322	.096	.53		.014	.079
Previous Total	124.3	35.1	169.2	6,620	1.4	44.7	110.5
Total To Date	124.54	35.4	169.3	6,620	1.4	44.7	110.6

TABLE XX

Disposal Site: 216-S-21 Crib

Waste Stream: SX Tank Farm condensate from November 1954 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	0.98	0.003	0.004	18.0			
February	1.07	0.007	0.009	3.1			
March	1.15	0.025	<0.001	22.0			
April	0.88	0.002	<0.004	9.2			
May	1.05	0.002	0.002	18.4			
June	0.86	<0.001	0.001	5.7		2.359	1.852
July	1.25	0.006	0.001	11.4			
August	1.40	0.006	0.002	12.5			
September	1.08	0.002	0.009	8.7			
October	1.35	0.008	0.008	9.5			
November	1.09	0.004	0.006	8.1			
December	1.29	0.001	0.002	11.5		2.503	20.301
12-Month Total	13.45	.067	.049	138.1		4.862	22.153
Previous Total	65.9	4.0	2.29	397.	.04	20.6	130.5
Total To Date	79.4	4.1	2.34	535	.04	25.5	152.7

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TABLE XXI

Disposal Site: 216-T-19 Crib

Waste Stream: 242-T Evaporator condensate from December 1964 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	4.77			.04			.03
February	2.07			.03			.01
March	2.51			.01			.01
April	2.45			.65			.39
May	2.46			3.9			2.6
June	2.52			.2			.1
July	2.48			.1			.1
August	2.58			2.9			2.9
September	1.99			.02			.02
October	3.21			19.4			10.8
November	3.01			.97			.78
December	3.29			.11			.05
12-Month Total	33.36			29.33			
Previous Total	4.58			.04			.02
Total To Date	37.94			29.37			17.41
Prior Use Total	46		14	2,000			
	84		14	2,029			

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TABLE XXII

Disposal Site: 216-T-28 Crib

Waste Stream: T Plant wastes

Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	.32	3.10	0.9	63.1			
March	-						
April	-						
May	-						
June	-						
July	.31	4.79	0.1	91.5			
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	.63	7.89	1.0	154.6			
Previous Total	11.3	131	26.8	42,568			
Total To Date	11.9	139	27.8	42,723			

TABLE XXIII

Disposal Site: 216-T-28 Crib

Waste Stream: Summary of all wastes

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	.32	3.10	0.9	63.1			
March	-						
April	-						
May	-						
June	-						
July	.31	4.79	0.1	91.5			
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	.63	7.89	1.0	154.6			
Previous Total	41.6		69.3	58,292			
Total To Date	42.2		70.3	58,447			

TABLE XXIV

Disposal Site: 216-T-34 Crib

Waste Stream: Battelle Northwest Laboratory (340 Facility) wastes from 5-18-66 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	-						
March	-						
April	-						
May	.833	.38		308			
June	1.078	.06	.001	393			
July	.530	.50	1.4	280			
August	1.192	.50	94.5	3,150			
September	1.382	.60	4.7	4,380			
October	1.48	.06	2.0	3,159			
November	1.80	.35	4.75	665			
December	1.67			61			
12-Month Total	9.965			12,396			
Previous Total	-						
Total To Date	10.			12,400			

TABLE XXV

Disposal Site: 216-U-1 and 2 Cribs

Waste Stream: 221-U Canyon wastes from March 1952 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Thorium (kilograms)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	.02		3.3				
March							
April	.02		3.8				
May							
June							
July							
August							
September							
October							
November	.002	181.6	-				
December	-						
12-Month Total		181.6	7.1	-			
Previous Total	2	4.	-	240			
Total To Date	2	186	7.1	240			

TABLE XXVI

Disposal Site: 216-U-12 Crib

Waste Stream: UO_3 Plant concentrator condensate from April 1960 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	1.39	19.98		0.01			
February	0.29	17.71		0.03			
March	1.18	22.71		0.01			
April	1.08	23.88		0.01			
May	0.62	2.61		0.01			
June	0.75	2.61		0.01			
July	0.43	0.36		<0.01			
August	0.05	4.13		<0.01			
September	1.14	17.69		0.01			
October	1.40	59.02		0.01			
November	1.27	31.78		0.02			
December	1.10	3.41		0.003			
12-Month Total	10.70	205.89		0.14			
Previous Total	83.	1,517.		852.8		104.3	
Total To Date	93.70	1,722.89		852.94		104.3	

TABLE XXVII

Disposal Site: 216-Z-1A Crib

Waste Stream: Plutonium Reclamation wastes from June 1964 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	0.09		84				
February	0.08		59				
March	0.14		207				
April	0.13		165				
May	0.08		175				
June	0.09		150				
July	0.07		151				
August	0.09		190				
September	0.12		148				
October	0.14		124				
November	0.14		87				
December	0.11		45				
12-Month Total	1.28		1,585				
Previous Total	1.36		3,772				
Total To Date	2.64		5,357				

TABLE XXVIII

Disposal Site: 216-Z-1 and 2 Cribs

Waste Stream: Plutonium reclamation wastes from May 1966 through June 1966

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	-						
February	-						
March	-						
April	-						
May	.07		40				
June	.03		61				
July	-						
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	0.10		101				
Previous Total	0.5		5,410				
Total To Date	0.6		5,511				

TABLE XXIX

Disposal Site: 216-Z-7 Crib

Waste Stream: 300 Area Laboratories effluent (340 Facility) from November 17, 1965

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	1.363	0.5	0.1	104			
February	.965	0.2	0.4	433			
March	.596	0.7	2.32	864			
April	.833	0.3	0.55	195			
May	.662	0.44		78			
June	-						
July	-						
August	-						
September	-						
October	-						
November	-						
December	-						
12-Month Total	4.419	2.1	3.4	1,674			
Previous Total	44.		480	209			
Total To Date	48	2.1		1,883			

TABLE XXX

Disposal Site: 216-Z-12 Crib

Waste Stream: 234-5, 236 and Laboratory wastes from March 1959 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	1.16		53				
February	1.28		143				
March	1.50		98				
April	1.21		121				
May	1.11		38				
June	0.86		13				
July	0.68		97				
August	0.77		24				
September	1.22		23				
October	1.48		26				
November	1.43		58				
December	2.05		73				
12-Month Total	14.75		767				
Previous Total	207.		19,144				
Total To Date	222		19,911				

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 near 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.

Volume data are obtained from the process and operating groups.

Monthly samples are collected and analyzed for the activity density of gross alpha and gross beta particle emitters. Estimates of the total activity discharged to these sites are calculated 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.

0 0 0 2 3 4 0 1 3 1 8

TABLE XXI

SWAMPS CURRENTLY IN USE

Disposal Site	Volume (Liters) 1966	Volume (Liters) Total To Date	Uranium (Kilograms) 1966	Plutonium (Grams) 1966	Plutonium (Grams) Total To Date	Units in Curies Beta Particle Emitters 1966	Units in Curies Beta Particle Emitters Total To Date
"B" Swamp & Chem. Sewer	798×10^6	62.5×10^9	10.6	-	195	51	4,186
"U" Swamp	$1,204 \times 10^6$	53.0×10^9	62.1	-	145	10	677
202-S Swamp Number 2	793×10^6	26.4×10^9	43.5	5	362	135	960
222-S Swamp	35×10^6	$.38 \times 10^9$	4.7	0.1	20	6	22
Gable Mt. Swamp	$10,008 \times 10^6$	92.9×10^9	33.6	13	344	473	14,161
Totals To Date		235.2×10^9			1,079		20,006

TABLE XXXII

Disposal Site: (216-A-25) Gable Mountain Pond

Waste Stream: Purex cooling water from December 1957 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	775.93	2.72	1	31.8	-			
February	700.23	3.63	-	72.2	-			
March	847.84	2.27	1	48.2	-			
April	851.62	1.82	1	23.0	-			
May	836.49	7.72	1	25.7	-			
June	840.27	1.82	1	76.3	<1.5	3.06	<5.1	<109
July	715.37	1.36	1	25.0	-			
August	1,081.35	2.27	1	28.8	-			
September	1,143.07	3.18	3	52.7	-			
October	870.55	1.82	1	35.0	-			
November	643.45	1.36	1	32.0	-			
December	702.12	3.63	1	22.1	<1.6	3.26	<6.8	<115
12-Month Total	10,008.29	33.60	13	472.8	3.1	6.3	11.9	224
Previous Total	82,900		331	13,688				
Total To Date	92,908		344	14,161				

TABLE XXXIII

Disposal Site: (216-A-29) Chemical Sewer

Waste Stream: Purex Chemical Waste Drains from November 1955 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}	Ru^{106}
January	66.62	0.45	-	1.5				
February	49.96	-	-	3.6				
March	67.37	-	-	1.8				
April	45.11	-	-	1.7				
May	96.90	-	-	6.2				
June	63.21	0.45	-	16.4	<0.13	3.6	8.5	117.1
July	58.67	-	-	2.5				
August	72.67	-	-	7.4				
September	79.49	-	-	2.7				
October	79.86	1.36	-	4.0				
November	62.07	-	-	1.8				
December	56.40	-	-	1.8	<0.13	3.7	8.76	120.
12-Month Total	798.33	2.26	-	51.4	0.26	7.3	17.3	237
Previous Total	61,700		195	4,135				
Total To Date	62,498		195	4,186				

TABLE XXXIV

Disposal Site: 216-S-16 Redox Pond Number 2

Waste Stream: Redox Cooling Water from April 1954 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	427.40	30.28	1.0	39.9			
February	34.65	0.05	0.1	0.7			
March	34.24	2.96	0.05	38.4			
April	364.50	2.58	<0.2	34.0			
May	33.13	0.13	0.1	12.7			
June	47.84	0.16	0.05	0.2		4.7	3,167
July	48.51	0.50	0.02	0.04			
August	39.40	0.15	0.02	0.25			
September	48.07	0.20	0.27	1.18			
October	38.76	0.70	0.11	3.38			
November	43.38	0.57	2.70	2.67			
December	33.46	5.22	0.04	1.28			
12-Month Total	793.34	43.50	4.66	134.70			
Previous Total	25,600		357	825			
Total To Date	26,400		362	960			

TABLE XXXV

Disposal Site: (216-S-19) Redox Lab Pond

Waste Stream: Redox Laboratory Cooling Water from January 1952 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	2.93	0.02	0.02	0.2			
February	2.65	1.72	0.02	0.03			
March	2.93	0.30	0.005	4.45			
April	2.93	0.28	0.003	0.46			
May	2.93	<0.001	0.003	<0.01			
June	2.93	0.88	0.004	<0.01		0.011	.869
July	2.84	0.07	0.001	0.12			
August	2.93	0.34	0.006	0.09			
September	2.93	0.63	0.015	<0.01			
October	2.84	0.12	0.019	0.22			
November	2.74	0.15	0.009	0.10			
December	2.93	0.14	0.030	0.06			
12-Month Total	34.51	4.65	0.135	5.76			
Previous Total	351		20	16			
Total To Date	385		20.1	22			

TABLE XXXVI

Disposal Site: (216-U-10) "U" Pond

Waste Stream: "U" Plant and 241-SX Cooling Water from March 1952 to date

1966 Period	Volume ($n \times 10^6$ l)	Uranium (kilograms)	Plutonium (grams)	Units in Curies Beta Particle Emitters	Co^{60}	Sr^{90}	Cs^{137}
January	108.70	4.99		1.5			
February	108.96	6.36		0.9			
March	127.76	8.40		2.4			
April	112.04	21.25		0.1			
May	109.87	5.09		0.5			
June	79.86	5.02		0.1			
July	54.68	1.86		0.3			
August	69.83	1.27		1.0			
September	115.82	2.50		0.4			
October	110.96	3.50		1.8			
November	105.51	1.09		1.1			
December	100.99	.73		0.4			
12-Month Total	1,204.98	62.06		10.5			
Previous Total	51,800		145	667			
Total To Date	53,000		145	677			

TABLE XXXVII

SWAMPS NO LONGER IN USE

Disposal Site	Volume (Liters)	Plutonium (Grams)	Units in Curies Beta Particle Emitters
202-S-1	6.3×10^9	3	1100
"T" Swamp	31×10^9	0.01	110
Totals	37×10^9	3.0	1200

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