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Radioactive Contamination in Liquid Wastes Discharged to Ground at Separation Facilities Thru June 1955

AUTHOR
H. J. Paas and K. R. Heid

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RADIOACTIVE CONTAMINATION IN LIQUID WASTES DISCHARGED

TO GROUND AT SEPARATION FACILITIES THRU JUNE 1955

H. J. Paas and K. R. Heid
 Radiological Administration and Communications Section
 Radiological Sciences Department

August 9, 1955

Hanford Atomic Products Operation
 Richland, Washington

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* Alternate nomenclature 216 U #1 and 2 Cribs.

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INTRODUCTION

This document summarizes the amounts of radioactive contamination discharged to ground from separation facilities through June, 1955. Detailed data for individual disposal sites is presented on a month to month basis for the period July, 1954 through June, 1955. Previous publications (HW-28121 and HW-33591) of this series may be referred to for specific information on measurements and totals prior to July, 1954.

Tables I and II list the major disposal sites in separation facilities and show the gross amounts of plutonium and fission products discharged to ground since startup; volume data are also included. Tables III through XXXVII present this same data on a month to month basis and also include information on the source of the waste stream and the settling facility. Isotopic data are included for all disposal sites from which the waste was analyzed for specific contaminants. Estimates of contamination and volumes discharged to the swamps are also included. Maps showing the location of major disposal sites in respect to monitoring wells are presented for the B, T, and S facilities.

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ABSTRACT

Nearly 600,000 curies of fission products have been discharged to ground from separation facilities since the startup of the Hanford operation. Approximately 19 kilograms of plutonium were contained in this waste. Exclusive of open waste disposal sites, the estimated volume of waste admitted to ground was 4.6×10^9 liters.

Principally due to the TBP scavenging program (78,000 curies) and the large amounts of fission products in redistilled condensate from the redox process (250,000 curies), over 50% of the total fission product activity entered the ground during the fiscal year covered by this report.

Open waste disposal sites in the separation areas have received over 7×10^{10} liters since startup. Approximately 1500 curies of fission products and 22 grams of plutonium were contained in this waste. The redox and U swamps which contain 1050 curies of fission products and 16 grams of plutonium respectively, accounted for the bulk of contamination discharged to open waste sites.

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TABLE I

SUMMARY OF RADIOACTIVE WASTES DISCHARGED TO MAJOR
DISPOSAL SITES IN THE 200 EAST AREA THRU JUNE 1955

| DISPOSAL SITE | VOLUME IN LITERS | PLUTONIUM GRAMS | BETA PARTICLE EMITTERS-CURIES |
|-------------------------------------|-----------------------|-----------------|-------------------------------|
| <u>"B" FACILITY</u> | | | |
| 5-6 Crib and Tile Field* | 3.60×10^7 | 174. | 7,800. |
| 216 ER #1,2,&3 Cribs | 2.54×10^8 | 226. | 453. |
| 241 B #1 & 2 Cribs | 4.38×10^7 | 4240. | 5,180. |
| 241 B #3 Crib | 2.72×10^7 | 29. | 710. |
| 241 B-361 Reverse Well | 3.06×10^7 | 4280. | 3,800. |
| 241 BX Trenches #1,2,4, 5,6, & 7 | 8.99×10^6 | 4.75 | 7,800. |
| 241 BX Trench #3 | 4.29×10^6 | 0.91 | 3,190. |
| 241 BX Trench #8 | 1.51×10^6 | ** | 4,800. |
| 241 BY #1,2,&3 Cribs | 1.26×10^7 | 22.0 | 77,700. |
| 242 B #1 & 2 Cribs | 2.96×10^7 | 3.73 | 38.9 |
| B Swamp | 1.70×10^{10} | 1.44 | 10.5 |
| <u>"C" FACILITY</u> | | | |
| 216 C #1 Crib | 1.85×10^7 | 2.52 | 733. |
| 216 C #5 Crib | 3.89×10^4 | 0.00 | 93.9 |

* Alternate nomenclature 241-B-361 Crib and Tile Field.

** Plutonium measurements were not made for this waste.

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TABLE II

SUMMARY OF RADIOACTIVE WASTES DISCHARGED TO MAJOR

DISPOSAL SITES IN THE 200 WEST AREA THRU JUNE 1955

| DISPOSAL SITE | VOLUME IN LITERS | PLUTONIUM GRAMS | BETA PARTICLE EMITTERS-CURIES |
|------------------------------|-------------------------|-----------------|-------------------------------|
| <u>"S" FACILITY</u> | | | |
| 216 S #1 & 2 Cribs | 1.25 x 10 ⁸ | 657. | 417,000. |
| 216 S #3 Crib | 3.98 x 10 ⁶ | 0.26 | 208. |
| 216 S #5 Crib | 2.60 x 10 ⁹ | 248. | 657. |
| 216 S #6 Crib | 5.53 x 10 ⁸ | 76.7 | 228. |
| 216 SL #1 & 2 Cribs | 2.22 x 10 ⁸ | 51.1 | 189. |
| 216 SX #1 Crib | 1.43 x 10 ⁶ | 0.05 | 9.77 |
| Redox Swamp | 6.35 x 10 ⁹ | 3.27 | 1,050. |
| <u>"T" FACILITY</u> | | | |
| 241 T #1 & 2 Cribs | 2.90 x 10 ⁷ | 3720. | 1,500. |
| 241 T #3 Crib & TF | 9.17 x 10 ⁷ | 120. | 3,060. |
| 241 T #1,2,3&4 Trenches | 3.85 x 10 ⁶ | 2.66 | 3,300. |
| 241 T #5 Trench | 2.65 x 10 ⁶ | 175. | 125. |
| 241 T #17 Crib | 9.68 x 10 ⁵ | 1.43 | 840. |
| 241 T - 361A Reverse Well | 1.13 x 10 ⁷ | 3350. | 2,800. |
| 241 TX #1,2,3&4 Trenches | 5.03 x 10 ⁶ | 6.50 | 19,300. |
| 241 TX #5 Trench | 2.99 x 10 ⁶ | 0.60 | 14,200. |
| 241 TX-153 Crib & Tile Field | 3.50 x 10 ⁷ | 4.37 | 5.59 |
| 361 T #1 & 2 Cribs | 4.50 x 10 ⁷ | 275. | 15,000. |
| T Swamp | 2.73 x 10 ¹⁰ | 2.05 | 83.3 |
| <u>"U" FACILITY</u> | | | |
| 216 U #3 Crib | 7.50 x 10 ⁵ | 0.038 | 0.412 |
| 216 WR #1, 2 & 3 Cribs | 2.16 x 10 ⁸ | 224. | 379. |
| 361 WR #1 & 2 Cribs | 9.26 x 10 ⁶ | 37.6 | 947. |
| U Swamp | 2.02 x 10 ¹⁰ | 16.1 | 377. |
| <u>"Z" FACILITY</u> | | | |
| 231 #1 & 2 Cribs | 3.08 x 10 ⁷ | 340. | DECLASSIFIED |
| 231 W Trench | 4.12 x 10 ⁷ | 438. | |
| 231 W-150 Reverse Well | 1.00 x 10 ⁶ | 50. | |
| 234-5 #1,2,3&4 Cribs | 7.72 x 10 ⁷ | 573. | |

TABLE III

DISPOSAL SITE: 216 ER #1, #2 AND #3 CRIBS

WASTE STREAM: 221-224 U CONCENTRATOR CONDENSATE,
SEPTEMBER 1952 TO DATE

SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|--------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of kg. | Units of Grams | Units of Curies |
| July 1954 | 94.1 | 245. | 1.16 | 10.9 |
| August | 115. | 56.9 | 0.72 | 8.54 |
| September | 95.3 | 91.5 | 1.01 | 20.9 |
| October | 43.5 | 27.3 | 0.43 | 8.70 |
| November | 32.1 | 8.65 | 0.29 | 10.8 |
| December | 14.0 | 150. | 2.17 | 0.79 |
| January 1955 | 53.3 | 1,210. | 40.3 | 4.10 |
| February | 54.8 | 1,660. | 22.2 | 15.3 |
| March | 76.4 | 862. | 1.09 | 56.3 |
| April | 93.0 | 161. | 1.61 | 146. |
| May | 56.7 | 318. | 4.64 | 42.9 |
| June | 87.3 | 521. | 6.80 | 35.8 |
| TOTAL 7/54-6/55 | 816. | 5,310. | 82.4 | 361. |
| PREVIOUS TOTAL (2) | 1,720. | 10,300. | 144. | 92.0 |
| TOTAL TO DATE | 2,540. | 15,600. | 226. | 453. |

Isotopic analysis for ruthenium performed on weekly composite samples collected during April, May, and June showed values of 18.8, 2.68, and 13.4 curies, respectively.

TABLE IV

DISPOSAL SITE: 241 B #1 AND #2 CRIBS

WASTE STREAM: 224 B OCTOBER 2, 1946 TO MARCH 1953;
221 B 5-6 WASTE FROM OCTOBER 3, 1947 TO
AUGUST 12, 1948 AND DECEMBER 1954 TO
DATE

SETTLING FACILITY: 201 TANK OCTOBER 1946 TO OCTOBER 1948;
204-203-202 CASCADE FROM OCTOBER 1948
THRU MARCH 1953

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|-----------------------------------|--------------------------|--------------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| October 1954** | 1.77 | 0.06 | 0.26 |
| December (3) | 0.57 | 0.02 | 0.09 |
| January 1955 | 0.00 | | |
| February | 0.36 | 0.16 | 4.75 |
| March | 1.52 | 4.27 | 45.6 |
| April | 2.74 | 0.486 | 8.20 |
| May | 1.26 | 0.648 | 10.3 |
| June | 1.05 | 0.28 | 9.46 |
| TOTAL 7/54-6/55 PREVIOUS TOTAL | 9.27 429.(2) | 5.96 4,230.(1)* | 78.7 5,100.(1)* |
| TOTAL TO DATE | 438. | 4,240. | 5,180. |

* This value was partially calculated on the basis of amounts sent to the settling tank and may be an overestimate of the actual amount to ground; a review of previous disposal data by H. V. Clukey indicated that about 10% of the settling tank activity actually goes to cribs.

** Represents disposal of 224-B waste on October 21 - 25 via 202-B tank. (3)

TABLE V

DISPOSAL SITE: 241 BX TRENCHES 1, 2, 4, 5, 6, AND 7

WASTE STREAM: FIRST CYCLE SUPERNATANT TRENCHING FROM THE 110 BX, 111 BX, 112 BX, 106 BY AND 110 BY TANKS

SETTLING FACILITY: TANKS AS INDICATED ABOVE

| TRENCH | VOLUME | UNITS OF GRAMS | | UNITS OF CURIES | | | | TANK NUMBER | DATE | |
|--------|----------------------------|----------------|---------|-----------------|--------|-----------|----------|-------------|---------|---------|
| | Units of 10 ⁵ L | Plutonium | Uranium | Gross Beta | Cesium | Strontium | Antimony | | Filled | Emptied |
| BX 1 | 9.62 | 0.48 | 1,330. | 500. | 558. | 1.8 | 26. | 110 BX | 1/26/50 | 2/18/54 |
| BX 2 | 17.7 | 0.32 | 1,270. | 1,030. | 1,010. | 6.2 | | 111 BX | 5/31/50 | 4/27/54 |
| BX 4 | 15.0 | 1.20 | 45,000. | 3,000. | 6.3 | 1,850. | | 110 BY | 7/52 | 7/17/54 |
| BX 5 | 7.80 | 1.38 | 2,220. | 905. | 430. | 11.7 | 21. | 112 BX | 12/6/51 | 12/1/53 |
| BX 5 | 7.60 | 0.13 | 3,990. | 350. | 450. | 0.38 | 44. | 106 BY | 8/29/51 | 11/1/54 |
| BX 6 | 11.3 | 0.90 | 34,000. | 1,040. | 2.4 | 280. | | 110 BY | 7/52 | 8/54 |
| BX 6 | 5.86 | 0.10 | 3,080. | 270. | 350. | 0.29 | 34. | 106 BY | 8/29/51 | 4/1/54 |
| BX 7 | 15.1 | 0.24 | 7,940. | 700. | 890. | 0.76 | 88. | 106 BY | 8/29/51 | 11/1/54 |
| TOTAL | 89.9 | 4.75 | 98,800. | 7,800. | 3,700. | 2,150. | 213. | | | |

Although radiochemical analysis of samples from BX 1 showed no detectable quantities of ruthenium, samples from BX 5 (112 BX) indicated 210 curies of Ru were discharged in this waste. Cerium was not detected in waste sent to BX 1 but 94 curies were discharged to BX 5 (112 BX).

Discrepancies in the balance between gross beta particle emitters and the total of the activity contributed by individual isotopes in the above table were recognized in the analytical data and were associated with differences in sampling and analytical techniques.

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TABLE VI

DISPOSAL SITE: 241 BX TRENCH #3

WASTE STREAM: FIRST CYCLE EVAPORATOR BOTTOMS
FROM TANKS 107 B, 108 B, AND 109 B

SETTLING FACILITY: TANKS AS INDICATED

| VOLUME Units of 10 ⁵ L | UNITS OF GRAMS | | UNITS OF CURIES | | | TANK NUMBER | DATE EMPTIED |
|--------------------------------------|----------------|---------|-----------------|--------|-----------|----------------|-----------------|
| | Plutonium | Uranium | Gross Beta | Cesium | Strontium | | |
| 12.1 | 0.05 | 1780. | 992. | 992. | 9.0 | 107B | 8/31/54 |
| 17.0 | 0.33 | 690. | 1000. | 952. | 1.7 | 108B | 9/54 |
| 13.8 | 0.53 | 1280. | 1200. | 1130. | 5.1 | 109B | 8/8/54 |
| TOTAL 42.9 | 0.91 | 3750. | 3190. | 3070. | 15.8 | | |

TABLE VII

DISPOSAL SITE: 241 BX TRENCH #8

WASTE STREAM: TBP PRODUCTION SCAVENGED WASTE

SETTLING FACILITY: 110 BY TANK

The fourth tank of TBP scavenged waste sent to ground was directed to the 241 BX Trench #8 from the 110-BY tank. On February 18, 1955 pumping was completed; 1.51×10^6 liters were disposed. A tank sample collected from 110 BY on January 18 and 23, 1955 showed that approximately 4800 curies of beta particle emitters were contained in the waste; isotopic analysis showed 96 curies of cesium and 1040 curies of strontium. Although no samples were collected directly from the trench, a review of the results obtained from analyzing other scavenged waste samples indicates that significant quantities of Ru, Sb, Ce, RE, and Zr-Nb were present.*

* Five tanks of TBP scavenged waste were sent to the BY Cribs (See Table VIII).

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TABLE VIII

DISPOSAL SITE: 241 BY CRIBS #1, #2, AND #3
 WASTE STREAM: TBP SCAVENGED WASTE
 SETTLING FACILITY: TANKS AS INDICATED

| TANK NUMBER | DATE EMPTIED | DISPOSAL SITE | VOLUME N ⁵ LITERS | Pu GRAMS | URANIUM kg. | UNITS OF CURIES | | | | | | | | pH |
|-------------|--------------|---------------|------------------------------|----------|-------------|-----------------|--------|--------|---------|--------|---------|---------|---------|------|
| | | | | | | TOTAL B | Cs | Sr | Ru | Sb | Ce | RE | Zr-Nb | |
| 1-110-BY | 11-10-54 | BY 1 | 21.1 | 0.40 | 12.5 | 3,140. | 45.9 | 1,340. | 48.2 | 15.0 | 314. | 1,570. | | 9.7 |
| 2-107-BY | 12-11-54 | BY 2 | 15.7 | 0.48 | 1.64 | 5,880. | 13.9 | 1,810. | 407. | 370. | 79.8 | 2,350. | 524. | 8.9 |
| 3-108-BY | 12-24-54 | BY 2 | 15.2 | 0.11 | 0.41 | 3,560. | 192. | 332. | 440. | 480. | 1,400. | 340. | 356. | 9.0 |
| 5-107-BY | 3-11-55 | BY 2 | 25.3 | 10.5 | 0.32 | 12,100. | 446. | 670. | 4,560. | 174. | 1,010. | 637. | 1,140. | 10.0 |
| 7-106-BY | 4-11-55 | BY 3 | 26.7 | 9.07 | 0.64 | 22,100. | 410. | 2,210. | 5,510. | 850. | 4,450. | 4,210. | 3,560. | 9.4 |
| 10-108-BY* | 6-20-55 | BY 3 | 22.4 | 1.44 | 4.71 | 30,900. | 1,080. | 582. | 11,200. | 2,020. | 6,500. | 1,120. | 4,480. | 9.2 |
| TOTAL | | | 126. | 22.0 | 20.2 | 77,700. | 2,190. | 6,940. | 22,200. | 3,910. | 13,800. | 10,200. | 10,100. | |

* Tabulated values were based on results of tank samples; the stream was not sampled at time of discharge.

Tank 4-110-BY was discharged to the 241 BX 8 trench.
 Tanks having prefix 6, 8, and 9 were not sent to ground.

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TABLE IX

DISPOSAL SITE: 242 B #1 AND #2 CRIBS

WASTE STREAM: 242-B WASTE EVAPORATOR CONDENSATE,
DECEMBER 1951 TO NOVEMBER 1, 1954⁽⁴⁾

SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|---------------------------------------|--------------------------|----------------|------------------------|
| 1954 | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July | 10.2 | 0.077 | 0.63 |
| August | 7.86 | 0.060 | 2.58 |
| September | 8.96 | 0.090 | 0.48 |
| October | 8.12 | 0.047 | 0.29 ⁽⁴⁾ |
| TOTAL 7/54-6/55 PREVIOUS TOTAL (2) | 35.1 261. | 0.27 3.46 | 3.98 34.9 |
| TOTAL TO DATE | 296. | 3.73 | 38.9 |

(4) This facility was shut down after run number B-10-E-36 during October 1954.

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TABLE X

DISPOSAL SITE: 216 C-1 CRIB

WASTE STREAM: CONDENSATE FROM 201-C FROM DECEMBER 1952 THRU APRIL 1954 AND FROM FEBRUARY 1955 TO DATE. COIL AND CONDENSER COOLING WATER FROM 201-C FROM JUNE 1953 TO APRIL 1955 AND FROM FEBRUARY 1955 TO DATE.

SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|-------------------|--------------------------|--------------|----------------|------------------------|
| 1955 | Units of 10 ⁵ | Units of kg. | Units of Grams | Units of Curies |
| February | 7.69 | 10.0 | | 0.18 |
| March | 9.98 | 63.9 | | 1.28* |
| April | 9.05 | 162. | | 0.68 |
| May | 9.95 | 35.6 | | 111.0 |
| June | 9.48 | 0.45 | 1. | 292. |
| TOTAL 7/54-6/55 | 46.2 | 272. | 1. | 405. |
| PREVIOUS TOTAL ** | 139.0 | 16.5 | 1.52 | 328. |
| TOTAL TO DATE | 185. | 289. | 2.52 | 733. |

* No analyses for beta activity were performed during this period; results were estimated from samples representing adjacent months.

** Previous totals were obtained from letter G. C. Oberg to H. J. Paas June 14, 1955.

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TABLE XI

DISPOSAL SITE: 216 C-5 CRIB
 WASTE STREAM: HIGH-SALT COLD-RUN WASTES FROM
 201-C FROM MARCH 1955 TO DATE
 SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | NaNO ₃ | BETA PARTICLE EMITTERS |
|-----------------|--------------------------|--------------|-------------------|------------------------|
| 1955 | Units of 10 ⁵ | Units of kg. | Pounds | Units of Curies |
| March | .227 | 40.5 | 13,000. | 54.8* |
| April | .043 | 11.9 | 6,130. | .032 |
| May | .050 | None | 4,130. | 12.1* |
| June | .069 | 0.45 | 745. | 27.0 |
| TOTAL 7/54-6/55 | .389 | 52.9 | 24,000. | 93.9 |
| TOTAL TO DATE | .389 | 52.9 | 24,000. | 93.9 |

* No analyses for beta activity were performed during this period; results were estimated from samples representing adjacent months.

TABLE XII*

DISPOSAL SITE: 216 3 CRIBS #1 AND #2
 WASTE STREAM: 202-S BUILDING CELL DRAINAGE
 (D-1 WASTE) FROM JANUARY 1952
 TO DATE
 SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 0.46 | 0.3 | 32. |
| August | 0.20 | 6.3 | 14. |
| September | 0.40 | 17.8 | 42. |
| October | 1.25 | 25.5 | 578. |
| November | 1.55 | 9.7 | 284. |
| December | 2.29 | 6.9 | 305. |
| January 1955 | 2.55 | 3.5 | 130. |
| February | 1.07 | 1.8 | 55. |
| March | 0.69 | 3.5 | 31. |
| April | 0.24 | 0.17 | 22.6 |
| May | 0.17 | 0.59 | 18.8 |
| June | 0.04 | 0.01 | 0.06 |
| TOTAL 7/54-6/55 | 10.9 | 76.1 | 1,510. |
| PREVIOUS TOTAL (2) | 9.93 | 112. | 18,500. |
| TOTAL TO DATE | 20.8 | 188. | 20,000. |

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* Data for D-2 waste to same location is summarized in Table XIII.

TABLE XIII*

DISPOSAL SITE: 216 S. CRIBS #1 AND #2
 WASTE STREAM: 202-S BUILDING REDISTILLED
 CONDENSATE (D-2 WASTE) FROM
 JANUARY 1952 TO DATE
 SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 26.0 | 44.5 | 46,900. |
| August | 38.8 | 47.7 | 50,500. |
| September | 42.2 | 47.6 | 36,200. |
| October | 41.3 | 19.0 | 4,400. |
| November | 47.1 | 16.5 | 4,100. |
| December | 53.1 | 28.1 | 46,700. |
| January 1955 | 14.7 | 71.9 | 30,300. |
| February | 39.7 | 31.3 | 12,300. |
| March | 48.6 | 6.20 | 2,500. |
| April | 4.23 | 1.16 | 1,160. |
| May | 49.8 | 5.46 | 7,730. |
| June | 35.1 | 38.6 | 7,420. |
| TOTAL 7/54-6/55 | 441. | 358. | 250,000. |
| PREVIOUS TOTAL (2) | 788. | 111. | 147,000. |
| TOTAL TO DATE | 1,230. | 469. | 397,000. |

188,800 ✓
 62,000 ✓

* Data for D-1 waste to same location is summarized in Table XII.

DISPOSAL SITE: 216 S-3 CRIB
WASTE STREAM: CONDENSATE FROM 101-S AND 104-S TANK
CASCADES FROM AUGUST 1953 TO DATE
SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|-----------------|--------------------------|----------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Grams | Units of Curies |
| July 1954 | 2.61 | 29.7 | 0.02 | 38.9 |
| August | 1.78 | 20.3 | 0.007 | 16.9 |
| September | 1.17 | 19.4 | 0.005 | 15.2 |
| October | 1.97 | 23.7 | 0.111 | 18.3 |
| November | 1.06 | 12.1 | 0.016 | 3.07 |
| December | 1.02 | 49.2** | 0.016** | 5.71 |
| January 1955 | 0.91 | 43.8** | 0.014** | 3.09 |
| February | 0.42 | 20.0 | 0.006 | 0.76 |
| March | 0.23 | 10.9** | 0.004** | 1.68 |
| April | 0.22 | 10.8** | 0.003** | 5.02 |
| May | 0.53 | 70.2 | 0.01 | 8.67 |
| June* | 0.65 | 5.75 | 0.003 | 1.84 |
| TOTAL 7/54-6/55 | 12.6 | 316. | 0.215 | 119. |
| PREVIOUS TOTAL | 27.2 | 87.8*** | 0.046*** | 89.2*** |
| TOTAL TO DATE | 39.8 | 404. | 0.261 | 208. |

98 ✓
✓
221 ✓

* Volume data through June 30; activity data through June 14.
** Samples were not analyzed for Pu during these periods. Values were estimated from analytical data prior and subsequent to the subject month.
*** Represents only May and June of 1954. No samples were analyzed between August 1953 and May 1954.

SPECIAL ANALYSES

Selected samples which were analyzed for specific isotopes showed that to date 18.7 curies of Cs were discharged in 7.72 x 10⁵ liters of this waste. Sr in 1.24 x 10⁶ liters totaled 44.7 curies. The percentage of salts was measured during seven months since the facility was used; values ranged from <0.01% to 0.03%. pH values measured over a five month period ranged from 6.0 to 9.8.

TABLE XV

DISPOSAL SITE: 216 S-5 CRIB

WASTE STREAM: 202-S PROCESS VESSEL COOLING WATER AND HEATING CONDENSATE FROM MARCH 1954 TO DATE

SETTLING FACILITY: RETENTION IN 207-S BASIN

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|-----------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 1,670. | 14.4 | 63.1 |
| August | 3,160. | 21.1 | 27.1 |
| September | 3,060. | 16.3 | 31.4 |
| October | 2,150. | 31.5 | 293. |
| November | 1,210. | 29.2 | 16.4 |
| December | 700. | 3.76 | 18.0 |
| January 1955 | 399. | 4.13 | 6.55 |
| February | 477. | 3.84 | 2.41 |
| March | 585. | 3.82 | 64.5 |
| April | 580. | 13.9 | 7.90 |
| May | 645. | 6.45 | 13.5 |
| June | 221. | 1.11 | 0.99 |
| TOTAL 7/54-6/55 | 14,900. | 150. | 545. |
| PREVIOUS TOTAL | 11,100. | 98.2 | 112. |
| TOTAL TO DATE | 26,000. | 248. | 657. |

98

TABLE XVI

DISPOSAL SITE: 216 S-6 CRIB

WASTE STREAM: 202-S PROCESS VESSEL COOLING
WATER AND HEATING CONDENSATE
FROM OCTOBER 1954 TO DATE

SETTLING FACILITY: RETENTION IN 207-S BASIN

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|---------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| October 1954 | 715. | 10.5 | 97.5 |
| November | 1,210. | 29.2 | 16.4 |
| December | 700. | 3.76 | 18.0 |
| January 1955 | 399. | 4.13 | 6.55 |
| February | 477. | 3.84 | 2.41 |
| March | 585. | 3.82 | 64.5 |
| April | 580. | 13.9 | 7.90 |
| May | 645. | 6.45 | 13.5 |
| June | 221. | 1.11 | 0.99 |
| TOTAL TO DATE | 5,530. | 76.7 | 228. |

~132 ✓

✓
~96

TABLE XVII*

DISPOSAL SITE: 216 SL CRIBS #1 AND #2

WASTE STREAM: WORKS LABORATORY WASTE IN 300 AREA FROM JULY 1953 TO DATE.

SETTLING FACILITY: STORED IN 340 WASTE TANKS PRIOR TO DISPOSAL

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 1.89 | 0.079 | 2.27 |
| August | 1.89 | 0.078 | 5.33 |
| September | 2.27 | 0.161 | 25.7 |
| October | 1.89 | 0.063 | 6.05 |
| November | 3.21 | 0.215 | 8.58 |
| December | 3.59 | 0.538 | 27.6 |
| January 1955 | 1.89 | 0.475 | 3.97 |
| February | 2.65 | 0.145 | 1.35 |
| March | 2.65 | 0.852 | 5.56 |
| April | 3.40 | 0.657 | 30.6 |
| May | 1.70 | 1.37 | 11.9 |
| June | 2.27 | 1.39 | 18.8 |
| TOTAL 7/54-6/55 | 29.3 | 6.02 | 148. |
| PREVIOUS TOTAL (2) | 6.72 | 1.06 | 10.9 |
| TOTAL TO DATE | 36.0 | 7.08 | 159. |

* Refer to Table XX for summary.

TABLE XVIII*

DISPOSAL SITE: 216 SL CRIBS #1 AND #2
 WASTE STREAM: 222-S CRIB WASTES FROM JANUARY 1952 TO DATE
 SETTLING FACILITY: 102-S TANK

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 0.171 | 0.177 | 1.80 |
| August | 0.282 | 0.446 | 1.04 |
| September | 0.281 | 0.620 | 0.301 |
| October | 0.208 | 0.352 | 1.40 |
| November | 0.00 | | |
| December | 0.174 | 0.071 | 0.072 |
| January 1955 | 0.347 | 0.306 | 0.118 |
| February | 0.356 | 0.347 | 0.075 |
| March | 0.328 | 0.877 | 0.229 |
| April | 0.321 | 1.88 | 0.183 |
| May | 0.450 | 0.993 | 0.527 |
| June | 0.335 | 0.398 | 0.173 |
| TOTAL 7/54-6/55 | 3.25 | 6.47 | 5.92 |
| PREVIOUS TOTAL (2) | 11.3 | 13.2 | 6.90 |
| TOTAL TO DATE | 14.6 | 19.7 | 12.8 |

* Refer to Table XX for summary.

TABLE XIX*

DISPOSAL SITE: 216 SL CRIBS #1 AND #2
 WASTE STREAM: 207-SL RETENTION BASIN WATER
 SETTLING FACILITY: 207-SL BASIN

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 82.0 | 0.849 | 0.351 |
| August | 82.0 | 0.628 | 0.455 |
| September | 79.4 | 0.608 | 0.453 |
| October | 82.0 | 1.00 | 0.533 |
| November | 79.4 | 0.882 | 0.667 |
| December | 82.0 | 1.10 | 0.624 |
| January 1955 | 68.1 | 1.25 | 0.216 |
| February | 82.0 | 0.628 | 1.25 |
| March | 82.0 | 1.26 | 2.47 |
| April | 79.4 | 1.74 | 1.60 |
| May | 40.7 | 0.643 | 0.357 |
| June** | 20.4 | .00390 | .00475 |
| TOTAL 7/54-6/55 | 859. | 10.6 | 8.98 |
| PREVIOUS TOTAL (2) | 1,310. | 13.8 | 8.08 |
| TOTAL TO DATE | 2,170. | 24.4 | 17.1 |

* Refer to Table XX for summary.

** Changes in analytical procedures starting June 1955 account for general decrease by factor of $\sim 10^2$. Ref. letter R. P. Knight to H. J. Paas 7/17/55.

TABLE XX

DISPOSAL SITE: 216 SL CRIBS #1 AND #2

WASTE STREAM: SUMMARY OF INDIVIDUAL SOURCES
ITEMIZED IN TABLES XVII, XVIII,
AND XIX.

SETTLING FACILITY: REFER TO TABLES XVII THRU XIX.

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 84.1 | 1.11 | 4.42 |
| August | 84.2 | 1.15 | 6.83 |
| September | 82.0 | 1.39 | 26.5 |
| October | 84.1 | 1.42 | 7.98 |
| November | 82.6 | 1.10 | 9.25 |
| December | 85.8 | 1.71 | 28.3 |
| January 1955 | 70.3 | 2.03 | 4.30 |
| February | 85.0 | 1.12 | 2.68 |
| March | 85.0 | 2.99 | 8.26 |
| April | 83.1 | 4.28 | 32.4 |
| May | 42.9 | 3.01 | 12.8 |
| June | 23.0 | 1.79 | 19.0 |
| TOTAL 7/54-6/55 | 892. | 23.1 | 163. |
| PREVIOUS TOTAL (2) | 1,330. | 28.0 | 25.9 |
| TOTAL TO DATE | 2,220. | 51.1 | 189. |

TABLE XXI

DISPOSAL SITE: 216 SX-1 CRIB

WASTE STREAM: CONDENSATE FROM SX TANK FARM
(101 SX AND 104 SX CASCADE)
FROM NOVEMBER 1954 TO DATE

SETTLING FACILITY: 106 SX TANK

(The near complete absence of analytical data for this waste stream prompts presentation of summary in discussion rather than tabular form.)

Volume measurements reviewed by the Exposure Illustrator show that 1.43×10^6 liters have been discharged to the crib; 4.44×10^5 liters represented one pumping of the 106 SX tank during March 1955.

Uranium was only measured in June during which period 4.38 grams were sent to the crib.

Gross beta particle emitters measured during March, May, and June showed curie values of 9.7, 0.01, and 0.005, respectively.

Plutonium analyses confined to June showed 0.007 grams sent to ground in that month.

Estimations of the total activity discharged to the 216 SX-1 crib during the period November 1954 thru June 1955 were made by the authors by applying the June analytical results to the measured volume data for all other periods in which there were no analytical results. In summary the total discharge to this facility, calculated on the above basis, was:

| | |
|-------------------------|---------------------------|
| Total Volume: | 1.43×10^6 liters |
| Beta Particle Emitters: | 9.77 curies |
| Plutonium: | 0.05 grams |
| Uranium: | 34.7 grams |



TABLE XXII*

VOLUMES DISCHARGED TO THE 241 T-3 CRIB

| PERIOD | UNITS OF 10 ⁵ LITERS | | | |
|--------------------|---------------------------------|---------------------|--------------|-------|
| | 224 Wastes | Second Cycle Wastes | "5-6 Wastes" | Total |
| July 1954 | 7.4 | 5.7 | 10.3 | 23.4 |
| August | 6.9 | 5.8 | 11.5 | 24.2 |
| September | 7.6 | 6.3 | 10.9 | 24.8 |
| October | 8.3 | 5.5 | 8.0 | 21.8 |
| November | 8.5 | 6.9 | 7.3 | 22.7 |
| December | 9.2 | 6.5 | 11.0 | 26.7 |
| January 1955 | 9.9 | 8.2 | 13.7 | 31.8 |
| February | 9.2 | 7.7 | 9.5 | 26.4 |
| March | 7.1 | 5.4 | 14.6 | 27.1 |
| April | 4.7 | 3.6 | 13.8 | 22.1 |
| May | 7.8 | 7.9 | 14.1 | 29.8 |
| June | 9.1 | 9.1 | 14.4 | 32.6 |
| TOTAL 7/54-6/55 | 95.7 | 78.6 | 139. | 313. |
| PREVIOUS TOTAL (2) | 125. | 313. | 214. | 652. |
| TOTAL TO DATE | 221. | 391. | 353. | 965. |

*Refer to Table XXIII for contamination data.

TABLE XXIII

DISPOSAL SITE: 241 T-3 CRIB

WASTE STREAM: SECOND CYCLE FROM APRIL 1948 TO DATE; 224-T WASTES FROM JUNE 1952 TO DATE; AND "5-6" WASTE FROM JUNE 1951 TO DATE

SETTLING FACILITY: THROUGH THE 110-111-112-T TANK CASCADE PRIOR TO DISCHARGE

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 23.4 | 0.37 | 0.56 |
| August | 24.2 | 0.30 | 0.62 |
| September | 24.8 | 0.47 | 2.98 |
| October | 21.8 | 0.23 | 1.08 |
| November | 22.7 | 1.64 | 16.0 |
| December | 26.7 | 0.45 | 1.24 |
| January 1955 | 31.8 | 1.06 | 2.72 |
| February | 26.4 | 0.20 | 0.63 |
| March | 27.1 | 0.41 | 106. |
| April | 22.1 | 0.45 | 1.09 |
| May | 29.8 | 6.62 | 76.8 |
| June | 32.6 | 0.44 | 1.17 |
| TOTAL 7/54-6/55 | 313. | 12.6 | 211. |
| PREVIOUS TOTAL (2) | 604. | 108. | 2,850. |
| TOTAL TO DATE | 917. | 120. | 3,060. |

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TABLE XXIV

DISPOSAL SITE: 241 T TRENCHES #1, #2, #3, AND #4

WASTE STREAM: FIRST CYCLE SUPERNATANT TRENCHING FROM THE 104-T, 105-T, AND 106-T TANKS

SETTLING FACILITY: TANKS AS INDICATED

| TRENCH | VOLUME Units of 10 ⁵ L | UNITS OF GRAMS | | UNITS OF CURIES | | | TANK NUMBER | DATE | |
|--------|--------------------------------------|----------------|---------|-----------------|--------|-----------|----------------|----------|---------|
| | | Plutonium | Uranium | Gross Beta | Cesium | Strontium | | Filled | Emptied |
| T 1 | 4.60 | 0.36 | 14,500. | 547. | 230. | 1.01 | 104T | 8/51 | 1/15/54 |
| T 1 | 5.46 | 0.42 | 14,700. | 437. | 229. | 4.75 | 105T | 10/26/51 | 1/22/54 |
| T 2 | 9.15 | 0.75 | 23,300. | 686. | 403. | 20.1 | 105T | 10/26/51 | 1/29/54 |
| T 2 | 1.27 | 0.08 | 2,850. | 108. | 610. | 1.00 | 106T | 12/22/51 | 2/4/54 |
| T 3 | 10.2 | 0.58 | 21,400. | 878. | 510. | 8.67 | 106T | 12/22/51 | 2/10/54 |
| T 4 | 3.48 | 0.21 | 9,400. | 278. | 157. | 0.42 | 106T | 12/22/51 | 2/13/54 |
| T 4 | 4.37 | 0.26 | 10,100. | 367. | 208. | 2.54 | 106T | 12/22/51 | 6/10/54 |
| TOTAL | 38.5 | 2.66 | 96,300. | 3,300. | 2,350. | 38.5 | | | |

TABLE XXV

DISPOSAL SITE: 241 T TRENCH #5

WASTE STREAM: SECOND CYCLE SUPERNATANT*

SETTLING FACILITY: 112-T TANK

| TRENCH | VOLUME Units of 10 ⁵ L | UNITS OF GRAMS | UNITS OF CURIES | TANK NUMBER | DATE |
|--------|--------------------------------------|----------------|-----------------|----------------|---------|
| | | Plutonium | Gross Beta | | EMPTIED |
| T 5 | 26.5 | 175. | 125. | 112T | 5/5/55 |

* 750,000 liters represented current waste discharged during supernatant removal.

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TABLE XXVI

DISPOSAL SITE: 241 TX TRENCHES #1, #2, #3, AND #4

WASTE STREAM: FIRST CYCLE SUPERNATANT TRENCHING FROM THE 109-TX, 110-TX, AND 111-TX TANKS

SETTLING FACILITY: TANKS AS INDICATED

| TRENCH | VOLUME Units of 10 ⁵ L | UNITS OF GRAMS | | UNITS OF CURIES | | | TANK NUMBER | DATE | |
|--------|--------------------------------------|----------------|---------|-----------------|--------|-----------|----------------|---------|---------|
| | | Plutonium | Uranium | Gross Beta | Cesium | Strontium | | Filled | Emptied |
| TX 1 | 4.63 | 1.25 | 521. | 7,920. | 389. | 7.87 | 109 TX | 7/25/52 | 6/24/54 |
| TX 2 | 15.4 | 1.90 | 2,170. | 3,800. | 1,850. | 49.3 | 110 TX | 6/14/53 | 7/23/54 |
| TX 3 | 7.48 | 0.21 | 842. | 935. | 591. | 16.5 | 110 TX | 6/14/53 | 7/30/54 |
| TX 3 | 7.38 | 0.66 | 244. | 2,440. | 738. | 23.6 | 111 TX | 2/23/54 | 8/6/54 |
| TX 4 | 15.4 | 2.48 | 8,320. | 4,200. | 1,420. | 38.5 | 111 TX | 2/23/54 | 8/13/54 |
| TOTAL | 50.3 | 6.50 | 12,100. | 19,300. | 4,990. | 136. | | | |

TABLE XXVII

DISPOSAL SITE: 241 TX TRENCH #5

WASTE STREAM: FIRST CYCLE EVAPORATOR BOTTOMS FROM TANKS 101-TY AND 102-TY

SETTLING FACILITY: TANKS AS INDICATED

| TRENCH | VOLUME Units of 10 ⁵ L | UNITS OF GRAMS | | UNITS OF CURIES | | | TANK NUMBER | DATE EMPTIED |
|--------|--------------------------------------|----------------|---------|-----------------|--------|-----------|----------------|-----------------|
| | | Plutonium | Uranium | Gross Beta | Cesium | Strontium | | |
| TX 5 | 24.8 | 0.58 | 855. | 11,000. | 7,190. | 3.97 | 101 TY | 9/19/54 |
| TX 5 | 5.07 | 0.02 | 258. | 3,240. | 1,700. | 0.14 | 102 TY | 9/22/54 |
| TOTAL | 29.9 | 0.60 | 1,110. | 14,200. | 8,890. | 4.11 | | |

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TABLE XXVIII

DISPOSAL SITE: 241 TX-153 CRIB AND TILE FIELD
 WASTE STREAM: 242-T WASTE EVAPORATOR CONDENSATE
 SEPTEMBER 1951 TO DATE
 SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Curies |
| July 1954 | 6.80 | 0.026 | 0.302 |
| August | 6.16 | 0.047 | 0.027 |
| September | 3.97 | 0.031 | 0.118 |
| December* | 6.88 | 0.040 | 0.020 |
| January 1955 | 8.99 | 0.718 | 0.233 |
| February | 8.12 | 0.062 | 0.096 |
| March | 8.46 | 0.049 | 0.130 |
| April | 7.93 | 0.074 | 0.216 |
| May | 5.53 | 0.248 | 0.920 |
| June | 3.77 | 0.252 | 0.069 |
| TOTAL 7/54-6/55 | 66.6 | 1.55 | 2.13 |
| PREVIOUS TOTAL (2) | 283.3 | 2.82 | 3.46 |
| TOTAL TO DATE | 350. | 4.37 | 5.59 |

* The waste evaporator was not operating during October and November. Information via phone contact from M. L. Short 7/12/55.

TABLE XXIX

DISPOSAL SITE: 216.U-3 CRIB
 WASTE STREAM: CONDENSATE FROM 110-U TANK CASCADE
 MAY 1954 TO DATE
 SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|-----------------|--------------------------|----------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of Grams | Units of Grams | Units of Curies |
| July 1954 | 1.02 | 116. | 0.006 | 0.002 |
| August | 0.79 | 9.53 | 0.003 | 0.007 |
| September | 0.87 | 18.3 | 0.007 | 0.339 |
| October | 0.38 | 4.53 | 0.003 | 0.002 |
| November | 0.53 | 17,700. | 0.002 | 0.012 |
| December | 0.32 | 3.86 | 0.001 | 0.002 |
| January 1955 | 0.34 | 3.26 | 0.001 | 0.002 |
| February | 0.23 | 2.76 | 0.001 | 0.002 |
| March | 0.22 | 3.56 | 0.001 | 0.002 |
| April | 0.21 | 2.51 | 0.001 | 0.022 |
| May | 0.04 | 0.44 | < 0.001 | < 0.001 |
| June | < 0.01 | 0.01 | < 0.001 | < 0.001 |
| TOTAL 7/54-6/55 | 4.96 | 17,900. | 0.028 | 0.394 |
| PREVIOUS TOTAL | 2.54 | 49.4 | 0.010 | 0.018 |
| TOTAL TO DATE | 7.50 | 17,900. | 0.038 | 0.412 |

SPECIAL MEASUREMENTS:

Cs measured in 3.5×10^5 liters of this waste totaled 0.33 curies. Sr measured in 6.2×10^5 liters was 1.8 curies. pH values ranged from 9.8 to 11.7 over an eight month period. Salt content varied from 0.006% to 0.017% with the majority of values below 0.01%.

TABLE XXX

DISPOSAL SITE: 216 WR #1, #2, AND #3 CRIBS

WASTE STREAM: 221-U CONCENTRATOR CONDENSATES,
JULY 1952 TO DATE

SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|--------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of kg. | Units of Grams | Units of Curies |
| July 1954 | 62.4 | 152. | 0.72 | 5.89 |
| August | 82.0 | 42.8 | 0.87 | 7.41 |
| September | 62.4 | 41.4 | 0.58 | 13.9 |
| October | 25.3 | 18.2 | 0.29 | 6.18 |
| November | 15.5 | 5.0 | 0.15 | 4.72 |
| December | 4.2 | 50.5 | 0.72 | 0.28 |
| January 1955 | 7.6 | 201. | 0.81 | 0.62 |
| February | 46.9 | 1,570. | 20.6 | 11.6 |
| March | 76.4 | 862. | 1.09 | 26.3 |
| April | 93.0 | 161. | 1.61 | 146. |
| May | 56.7 | 318. | 4.64 | 42.9 |
| June | 87.3 | 521. | 6.80 | 35.8 |
| TOTAL 7/54-6/55 | 620. | 3,940. | 38.9 | 302. |
| PREVIOUS TOTAL (2) | 1,540. | 14,500. | 185. | 77.2 |
| TOTAL TO DATE | 2,160. | 18,400. | 224. | 379. |

Isotopic analysis for ruthenium performed on weekly composite samples collected during April, May, and June showed values of 18.8, 2.68, and 13.4 curies, respectively.

TABLE XXXI

DISPOSAL SITE: 361 WR CRIBS (SOMETIMES CALLED
216 U-1 AND 2 CRIBS)

WASTE STREAM: 224-U, 276-U, 221-U, AND 5-6 FROM
NOVEMBER 1951 TO DATE

SETTLING FACILITY: NONE

| PERIOD | VOLUME IN LITERS | URANIUM | PLUTONIUM | BETA PARTICLE EMITTERS |
|--------------------|--------------------------|--------------|----------------|------------------------|
| | Units of 10 ⁵ | Units of kg. | Units of Grams | Units of Curies |
| July 1954 | 0.38 | 4.60 | 0.15 | 10.4 |
| August | 0.38 | 7.70 | 0.00 | 0.79 |
| September | 0.38 | 15.0 | 0.29 | 3.31 |
| October | 1.51 | 30.5 | 0.29 | 53.1 |
| November | 1.51 | 42.8 | 0.72 | 4.57 |
| December | 1.89 | 107. | 0.87 | 96.7 |
| January 1955 | 1.51 | 42.8 | 0.72 | 45.7 |
| February | 0.38 | 0.46 | 0.15 | 0.06 |
| March | 0.76 | 6.80 | 0.29 | 94.0 |
| April | 0.45 | 0.46 | 0.15 | 0.56 |
| May | 0.87 | 7.26 | 1.01 | 3.60 |
| June | 0.38 | 5.44 | 0.14 | 12.2 |
| TOTAL 7/54-6/55 | 10.4 | 270. | 4.78 | 325. |
| PREVIOUS TOTAL (2) | 82.2 | 2,850. | 32.8 | 622. |
| TOTAL TO DATE | 92.6 | 3,120. | 37.6 | 947. |

TABLE XXXII

DISPOSAL SITE: 231 W TRENCH

WASTE STREAM: STANDARDS LABORATORY WASTE AND
PROCESS WASTE, FEBRUARY 1947
TO DATE

SETTLING FACILITY: SUMPS #1 AND #2

| PERIOD | VOLUME IN LITERS | PLUTONIUM |
|---------------------------------------|--------------------------|----------------|
| | Units of 10 ⁵ | Units of Grams |
| July 1954 | .070 | 0.26 |
| August | .003 | 0.06 |
| September | .054 | 0.13 |
| October | .088 | 1.03 |
| November | .099 | 0.54 |
| December | .099 | 0.27 |
| January 1955 | .185 | 9.77 |
| February | .193 | 22.4 |
| March | .216 | 1.03 |
| April | .407 | 7.27 |
| May | .259 | 8.24 |
| June | .304 | 4.30 |
| TOTAL 7/54-6/55 PREVIOUS TOTAL (2) | 1.98 410. | 55.3 383. |
| TOTAL TO DATE | 412. | 438. |

TABLE XXXIII

DISPOSAL SITE: 234-5 #1, #2, #3, AND #4 CRIBS AND
TILE FIELD

WASTE STREAM: ANALYTICAL LABORATORY WASTE,
DEVELOPMENT LABORATORY WASTE AND
PROCESS WASTE FROM JUNE 1949 TO
DATE

SETTLING FACILITY: SUMP TANKS D4, D5, D6, D7, AND D8

| PERIOD | VOLUME IN LITERS | PLUTONIUM |
|--------------------|--------------------------|----------------|
| | Units of 10 ⁵ | Units of Grams |
| July 1954 | 5.71 | 11.8 |
| August | 9.21 | 6.72 |
| September | 9.48 | 4.86 |
| October | 10.5 | 7.47 |
| November | 12.1 | 12.6 |
| December | 14.0 | 9.20 |
| January 1955 | 4.49 | 22.3 |
| February | 1.95 | 15.4 |
| March | 3.54 | 23.2 |
| April | 16.3 | 30.2 |
| May | 22.5 | 37.1 |
| June | 64.9 | 17.9 |
| TOTAL 7/54-6/55 | 175. | 199. |
| PREVIOUS TOTAL (2) | 597. | 374. |
| TOTAL TO DATE | 772. | 573. |

LARGE VOLUME WASTES TO OPEN DISPOSAL SITES

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

Prior to this publication, volume data for these locations was estimated by J. W. Healy⁽¹⁾ for the period 1945-1953. Subsequent volume data was obtained from the Earth Sciences Unit in the Radiological Sciences Department and from the Separations Unit of the Manufacturing Department. Weekly liquid samples were collected from the inlet to these disposal areas by Regional Monitoring 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 from the above information by the Radiation Measurements Evaluation group⁽⁶⁾. Tables XXXIV thru XXXVII summarize these data for individual sites by periods in which the flow rates were relatively constant. Large fluctuations in volume and low sampling frequency necessitate re-emphasizing that the curie and gram values should be regarded as estimates only; tabulated values may be in error by as much as a factor of two.

TABLE XXXIV

DISCHARGE TO THE 200 EAST AREA B SWAMP

| PERIOD | | VOLUME | BETA PARTICLE EMITTERS | PLUTONIUM |
|--------|-------|-----------------------|---------------------------|----------------|
| From | To | N ⁸ Liters | Units of Curies | Units of Grams |
| 4-45 | 12-49 | 65.0 | 2.2 | 1.0 |
| 1-50 | 3-52 | 77.5 | 7.1 | 0.18 |
| 4-52 | 7-54 | 25.8 | 1.1 | 0.25 |
| 8-54 | 6-55 | 1.82 | 0.056 | 0.012 |
| TOTAL | | 170. | 10.5 | 1.44 |

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TABLE XXXV

DISCHARGE TO THE 200 WEST AREA S SWAMP

| PERIOD | | VOLUME | BETA PARTICLE EMITTERS | PLUTONIUM |
|--------|------|---------------------------|---------------------------|-------------------|
| From | To | Units of 10^8 Liters | Units of Curies | Units of Grams |
| 11-51 | 2-52 | 1.29 | 0.031 | 0.0073 |
| 3-52 | 7-52 | 5.78 | 0.042 | 0.051 |
| 8-52 | 1-53 | 20.9 | 330. | 1.6 |
| | 2-53 | 2.12 | 5.5 | 0.017 |
| 3-53 | 4-53 | 6.92 | 510. | 0.78 |
| | 5-53 | 4.69 | 8.9 | 0.064 |
| 6-53 | 3-54 | 21.8 | 200. | 0.75 |
| TOTAL | | 63.5 | 1,050. | 3.27 |

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TABLE XXXVI

DISCHARGE TO THE 200 WEST AREA T SWAMP

| PERIOD | | VOLUME | BETA PARTICLE EMITTERS | PLUTONIUM |
|--------|-------|---------------------------|---------------------------|-------------------|
| From | To | Units of 10^8 Liters | Units of Curies | Units of Grams |
| 11-44 | 12-49 | 105. | 0.47 | 1.2 |
| 1-50 | 12-51 | 69.2 | 2.6 | 0.28 |
| 1-52 | 5-53 | 29.3 | 3.2 | 0.19 |
| 6-53 | 7-54 | 32.2 | 48. | 0.26 |
| 8-54 | 10-54 | 10.4 | 2.1 | 0.036 |
| 11-54 | 1-55 | 12.2 | 3.8 | 0.030 |
| | 2-55 | 3.18 | 2.6 | 0.0093 |
| | 3-55 | 2.95 | 12. | 0.030 |
| | 4-55 | 1.70 | 1.0 | 0.0050 |
| | 5-55 | 2.95 | 2.7 | 0.0072 |
| | 6-55 | 3.97 | 4.8 | 0.0071 |
| TOTAL | | 273. | 83.3 | 2.05 |

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TABLE XXXVII

DISCHARGE TO THE 200 WEST AREA U SWAMP

| PERIOD | | VOLUME | BETA PARTICLE EMITTERS | PLUTONIUM |
|--------|-------|---------------------------|---------------------------|-------------------|
| From | To | Units of 10^8 Liters | Units of Curies | Units of Grams |
| 11-44 | 12-48 | 19.8 | 0.040 | 0.42 |
| 1-49 | 11-52 | 27.0 | 0.19 | 1.2 |
| 12-52 | 3-53 | 15.2 | 0.41 | 0.91 |
| 4-53 | 5-53 | 15.0 | 0.47 | 0.34 |
| 6-53 | 6-54 | 62.7 | 6.3 | 5.3 |
| 7-54 | 6-55 | 62.0 | 370. | 7.9 |
| TOTAL | | 202. | 377. | 16.1 |

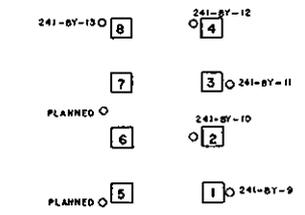
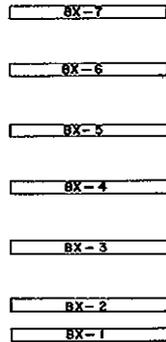
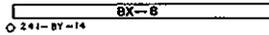
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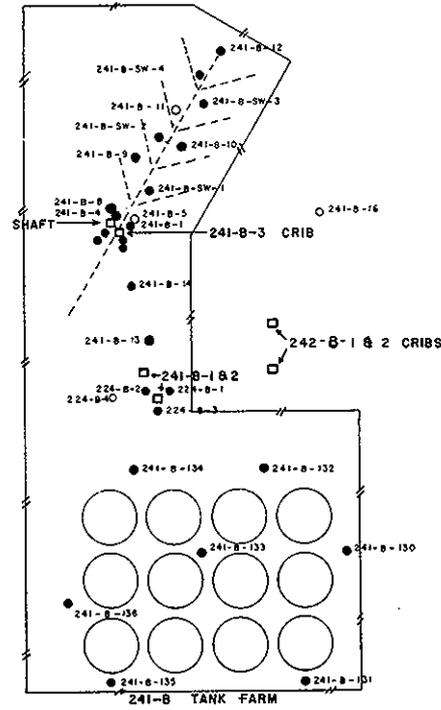
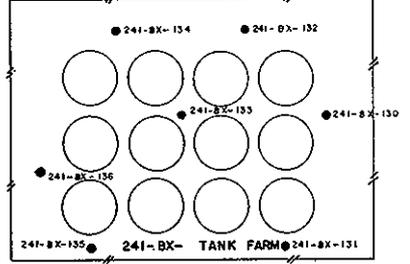
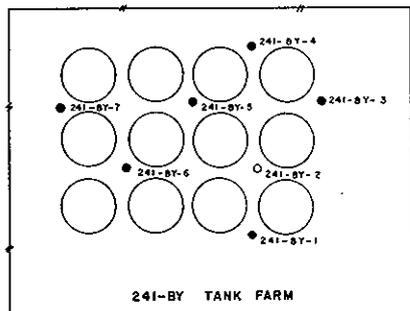
TEST WELLS

"B" FACILITY

WASTE TRENCHES



← 8 TBP CRIBS



LEGEND

- TEST WELL DRILLED TO WATER
- DRY TEST WELL

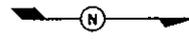
15 APRIL 1955
K.R. HEID

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REFERENCE DRAWINGS

- M-2-39804 — 241-SX WASTE DISPOSAL FACILITIES
- M-2-2430 — 200-WEST PROCESS WASTE SYSTEM
- M-2-1774 — TEST WELL LOCATION, 241-S TANK FARM
- NW-35305 — RADIOACTIVE LIQUID WASTE DISPOSAL FACILITIES



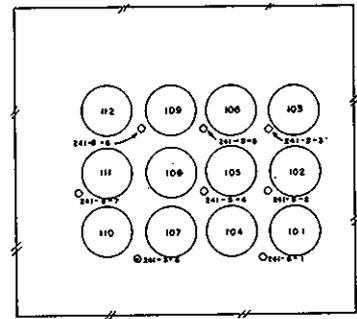
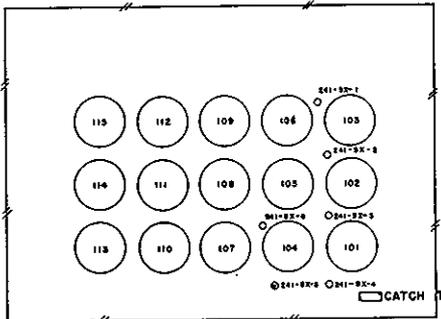
216-S-4 CRIB

216-SX-1 CRIB

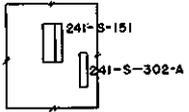
200 - WEST PERIMETER FENCE

241-SX TANK FARM

241-S TANK FARM



216-S-3 CRIB



LEGEND

- ⊙ Test well of water
- Dry test well

TEST WELLS

241-S, SX TANK FARM and 216-S, SX CRIB AREAS

5 MAY 1955 KKH

OFFICIAL USE ONLY

HW-30502

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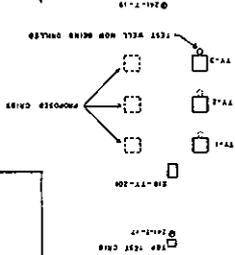
C43

TEST WELLS
241-T, TX, TY & 381-T AREAS
7-16-82
YCON

OFFICIAL USE ONLY

REFERENCE DRAWINGS
N-2-1124 - WELL LOCATION, 241-T, 241-TX, & 381-T AREAS
N-2-2400 - 300-WEST PROCESS WASTE SYSTEM
N-2-2401 - 300-WEST PROCESS WASTE TRENCHES
N-2-2402 - 300-WEST PROCESS WASTE TRENCHES
N-2-2403 - 300-WEST PROCESS WASTE TRENCHES
N-2-2404 - 300-WEST PROCESS WASTE TRENCHES
N-2-2405 - 300-WEST PROCESS WASTE TRENCHES
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N-2-2407 - 300-WEST PROCESS WASTE TRENCHES
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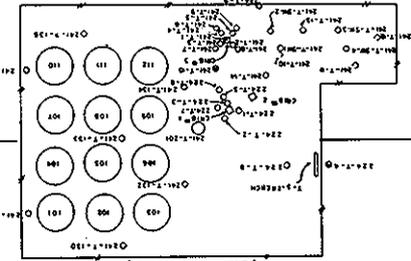
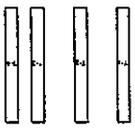
LEGEND
○ TEST WELL DRILLED TO WATER
○ TEST WELL NOT BEING DRILLED



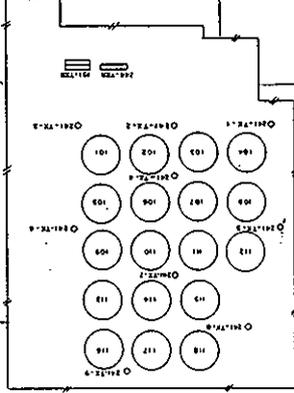
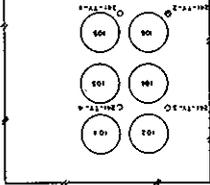
(381-T CHB AREA)



FIRST CYCLE WASTE TRENCHES



(241-TX TANK FARM)



(FIRST CYCLE WASTE TRENCHES)



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241-T-11 (N-2136)



DECLASSIFIED

HW-38562

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- (2) HW-33591 Ruppert, H. G. and Heid, K. R., Summary of Liquid Radioactive Wastes Discharged to the Ground - 200 Areas, July 1952 through June 1954.
- (3) Letter H. V. Clukey to H. J. Paas et al, Routing of B-Plant 5-6 Waste Through December 1954, dated Jan. 17, 1955.
- (4) Letter M. L. Short to H. J. Paas, Summary of Condensate Cribbed - 1st Cycle Evaporator - East Area, June 6, 1955.
- (5) Letter J. R. Raymond to H. J. Paas, June 10, 1955.
- (6) Letter H. T. Norton to H. J. Paas, June 25, 1955.

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