2514

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL-2514
CENTRAL FILES NUMBER

65-8-11

DATE: August 4, 1965

COPY NO. 44

SUBJECT: Radioactive Waste Disposal Operations

TO: Distribution

FROM: J. F. Manneschmidt
L. C. Lasher

ChemRisk Document No. 2514

Publicly Releasable

This document has received the necessary patent and technical information reviews and can be distributed without limitation.

INVENTORY OF TOTAL ACTIVITY DISCHARGED

A summary of releases to the environment through the Laboratory's radioactive waste disposal system is given in Table 1. These data were derived from samples taken at twelve stations located on the principal liquid and gaseous waste streams; locations of the seven stream monitoring stations are shown in Figure 1.

A total of 8.8 curies of activity, mainly ^{106}Ru from the intermediate level waste pit area, was discharged to the stream system. The strontium discharge for the month was 0.35 curie of which 0.1 curie was released in the process waste stream. The greater part of the Laboratory's strontium release continues to be unidentifiable and is assumed to come from scouring of the White Oak Creek bed and similar sources. The concentration of activity in the Clinch River resulting from the total release is calculated to be 0.8% of MPC. This value is presented in Figure 2 and may be compared with the % of MPC for past months and years. Total activity and strontium activity releases are similarly plotted in Figures 3, 4, and 5.

The activity release to the gaseous waste system was 1.4 curies for the month (Figure 6). As in the past, the primary activity was gaseous ^{131}I with lesser amounts of ^{137}Cs accounting for the filterable species (Figure 7).

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Operation of the process waste system was normal during the month. Ten million gallons of waste were processed at the treatment plant and

an activity removal efficiency of 85% was achieved. Another 8.8 million gallons from the 4500 Complex contained insignificant quantities of activity and was discharged directly to White Oak Creek. A summary of operational data for the month is given in Table 2; Table 3 lists the major contributors to the system. A plot of the volumes generated is presented in Figure 9.

INTERMEDIATE LEVEL WASTE

Transfers of ILW to the disposal trenches totalled 352,400 gallons (Table 4) and were distributed, as follows:

		Gallons
1.	Trench 5	152,300
2.	Trench 7A	87,800
3.	Trench 7B	112,300

Major contributors to the system were, as follows:

		Gallons
1.	Building 3019	82,200
2.	Reactor Complex	56,900
3.	4500 Complex	49,100
4.	Fission Products Development Laboratory	28,000
5.	Radioisotopes Processing Area	25,900

Volumes of intermediate level waste generated are plotted in Figure 8.

TABLE 1

ACTIVITY RELEASED IN LIQUID AND GASEOUS WASTES

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	Total[2]
Liquid Waste to White Oak Creek					
Process waste	1	0.10	none detected	0.08	0.20
Miscellaneous discharges from east end of plant	2	0.02	< 0.01	< 0.01	0.02
Total discharge from Bethel Valley area	3	0.33	0.02	0.09	0.44
Total discharge from Melton Valley area	4	0.02	< 0.01	< 0.01	0.02
East waste pit seepage	5	< 0.01	5.98	0.19	6.87
West waste pit seepage	6	< 0.01	1.35	0.01	1.50
Total discharge from all sources	3,4,5.6	0.35	7.35	0.29	8.83
White Oak Dam to Clinch River (Health Physics measurement)	7	0.17	3.84	0.09	4.80
Gaseous Waste[3]					
2026 Stack					< 0.01
3039 Stack					1.40
3020 Stack					< 0.01
3018 Stack					< 0.01
MSRE Stack					< 0.01
Total activity in gases released					1.40

[1]Refers to Fig. 1
[2]Includes other nuclides not listed here
[3]Activity primarily ^{131}I as noted in text

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 10 x 10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.1 x 10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies	PLANT EFFLUENT AND SETTLING BASIN DIS-CHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[1]	0.68	0.10	85
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.03	0.02	33
^{137}Cs	0.25	0.08	68
Gross Beta Analysis	26 c/m/ml	4 c/m/ml	85

[1]Past analyses indicate that "Total Sr" is greater than 90% ^{90}Sr

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1]		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	10^2	0.380	57.4	2.84	37.4
2.	Radioisotope Processing Area	6	0.084	12.7	1.02	13.4
3.	Buildings 3503 and 3508	18	0.162	24.5	0.68	9.0
4.	Buildings 3025, 3026 and 3550	0	--	--	1.32	17.4
5.	Building 3019	3	0.036	5.4	0.89	11.7
6.	Fission Products Development Laboratory	2	< 0.001	--	0.01	0.1
7.	4500 Area	--	--	--	--	--
8.	Building 3525	0	--	--	0.68	9.0
9.	Building 2026	0	--	--	0.16	2.1

[1]Approximation - The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

[2]The bulk of this activity is from contaminated ground water which is seeping into the pipeline in the vicinity of Building 3047.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1964	Total to Date	This Month	Year to Date	Year 1964	Total to Date	This Month	Year to Date	Year 1964	Total to Date
Total Sr	406	2098	5303	15891	120	2777	10583	18914	151	1585	6867	15289
^{106}Ru	7	32	118	6005	2	35	189	1820	3	25	126	1482
^{137}Cs	1375	9749	58688	150482	708	14774	53398	104756	897	7870	35876	77161
^{60}Co	14	55	110	1192	5	60	131	587	6	38	88	534
TOTALS	1802	11934	64219	173570	835	17646	64301	126077	1057	9518	42957	94466

ORNL-DWG 63-1338RA

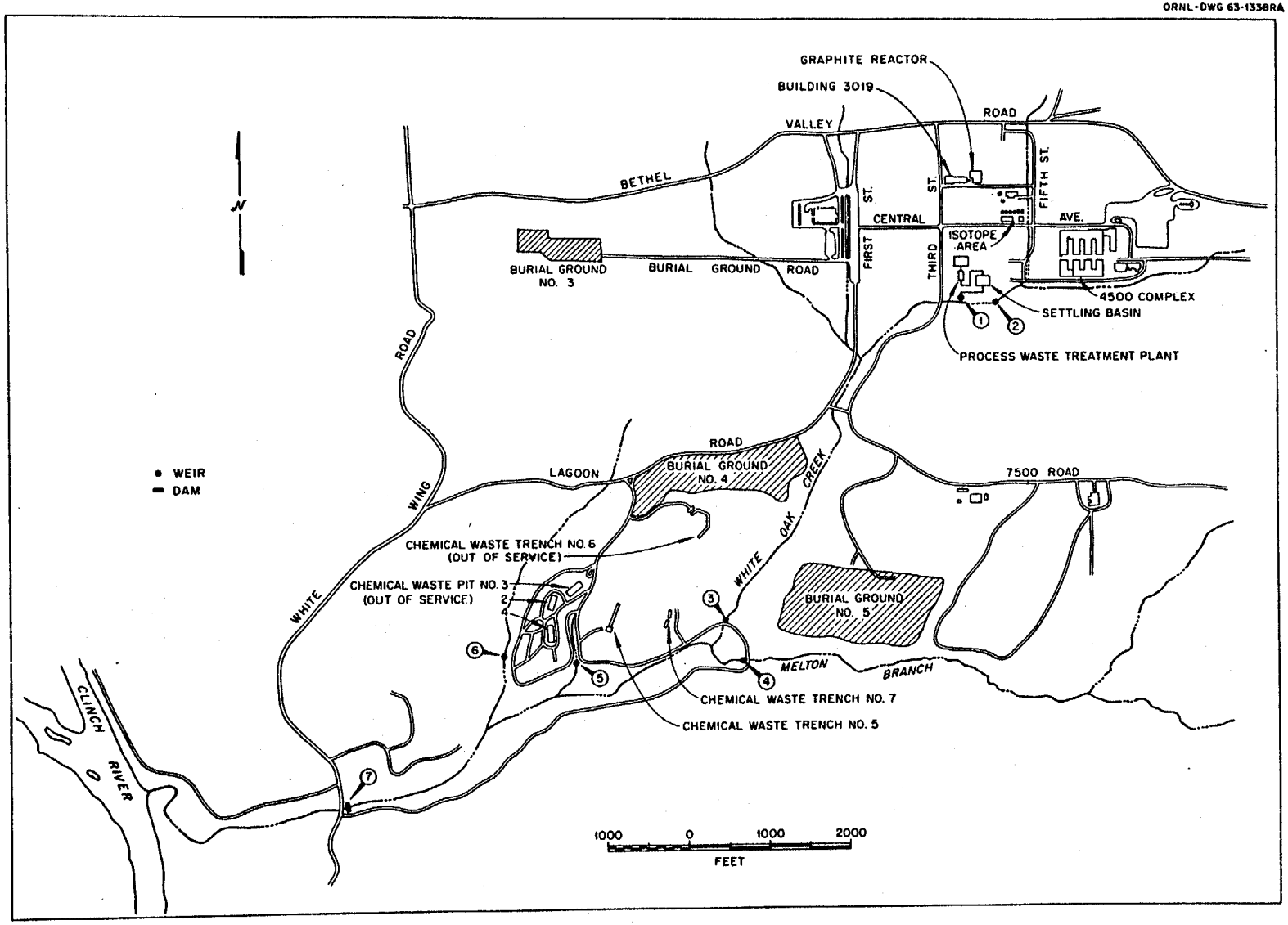

Fig. 1. Location Plan for White Oak Creek Sampling Stations.

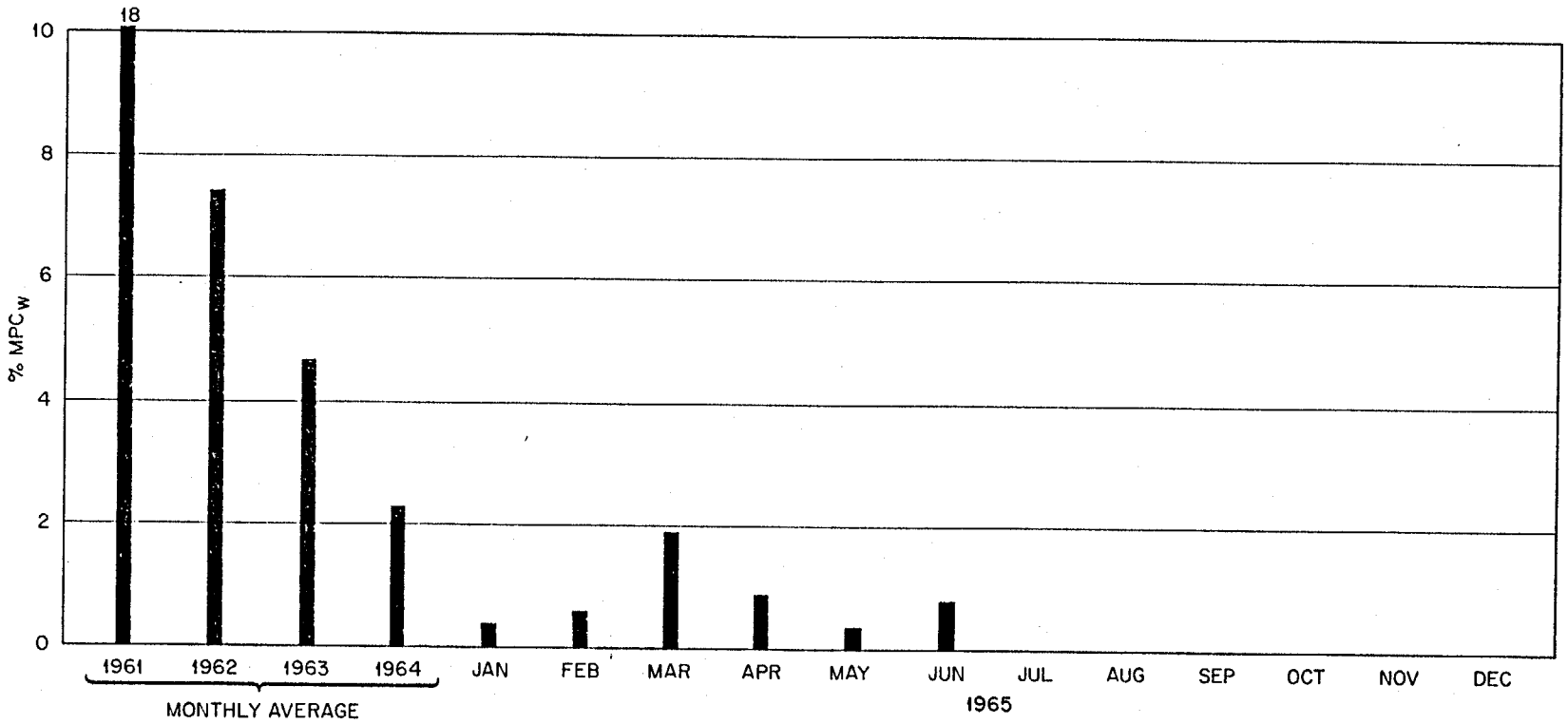

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

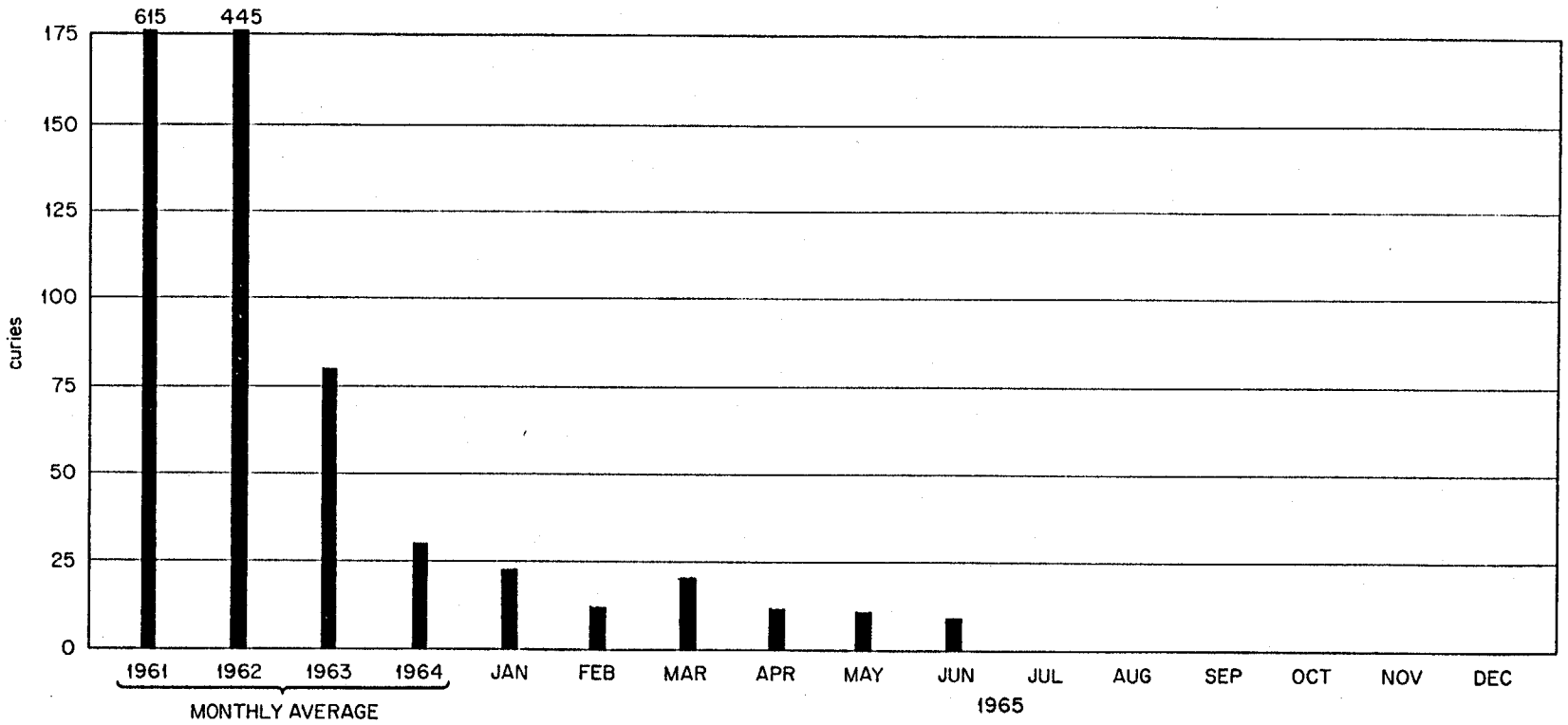

Fig. 3. Total Activity Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3, 4, 5 and 6, Shown in Fig. 1).

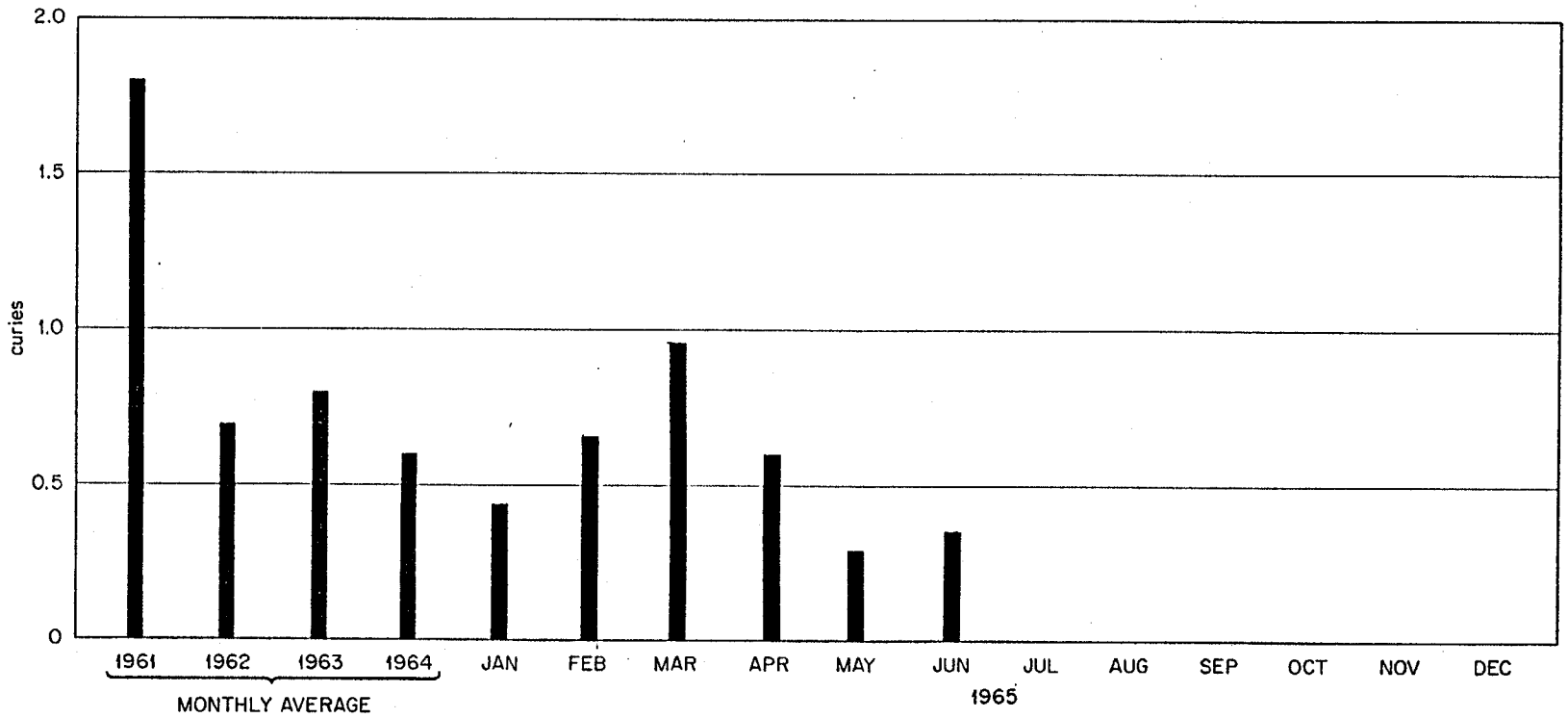

Fig. 4. ^{89}Sr and ^{90}Sr Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3,4,5 and 6, Shown in Fig. 1).

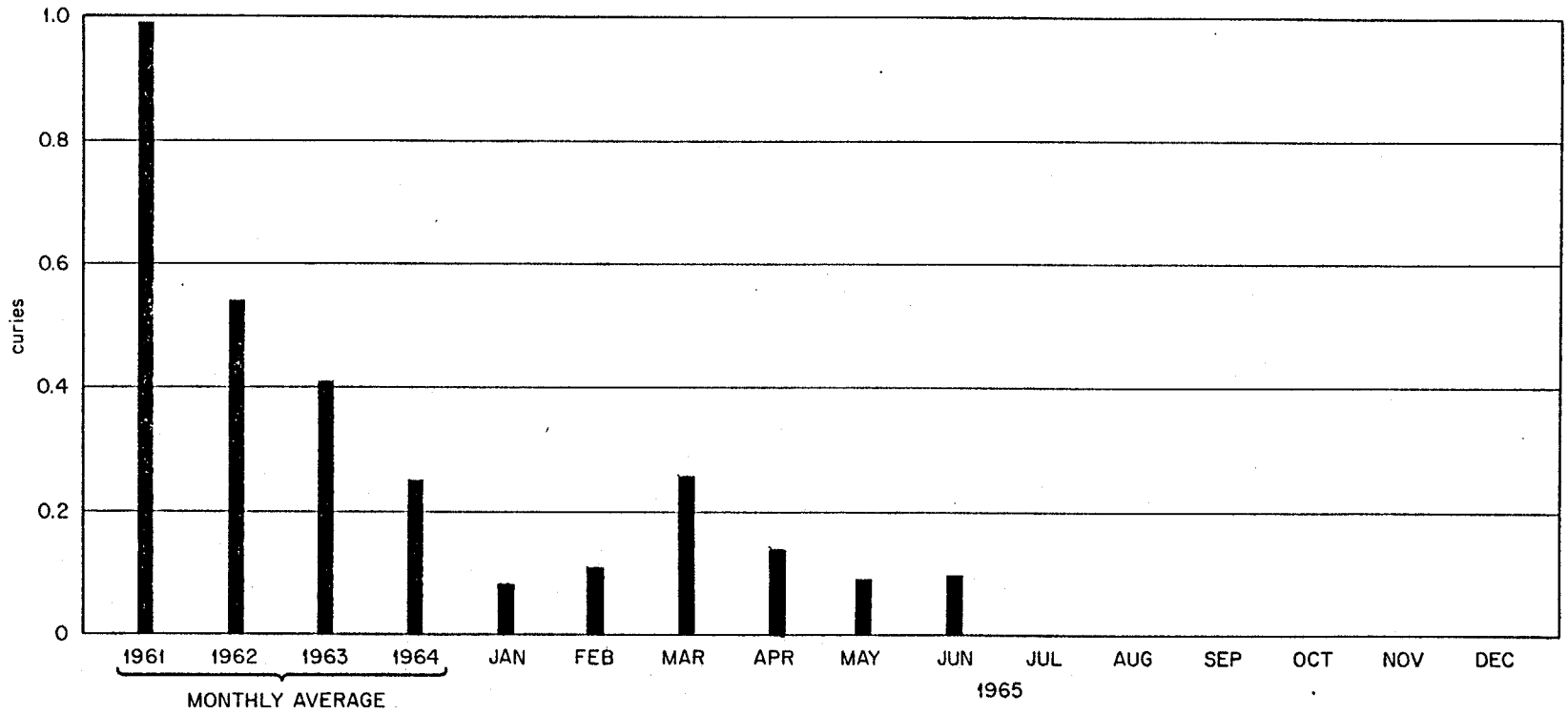

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

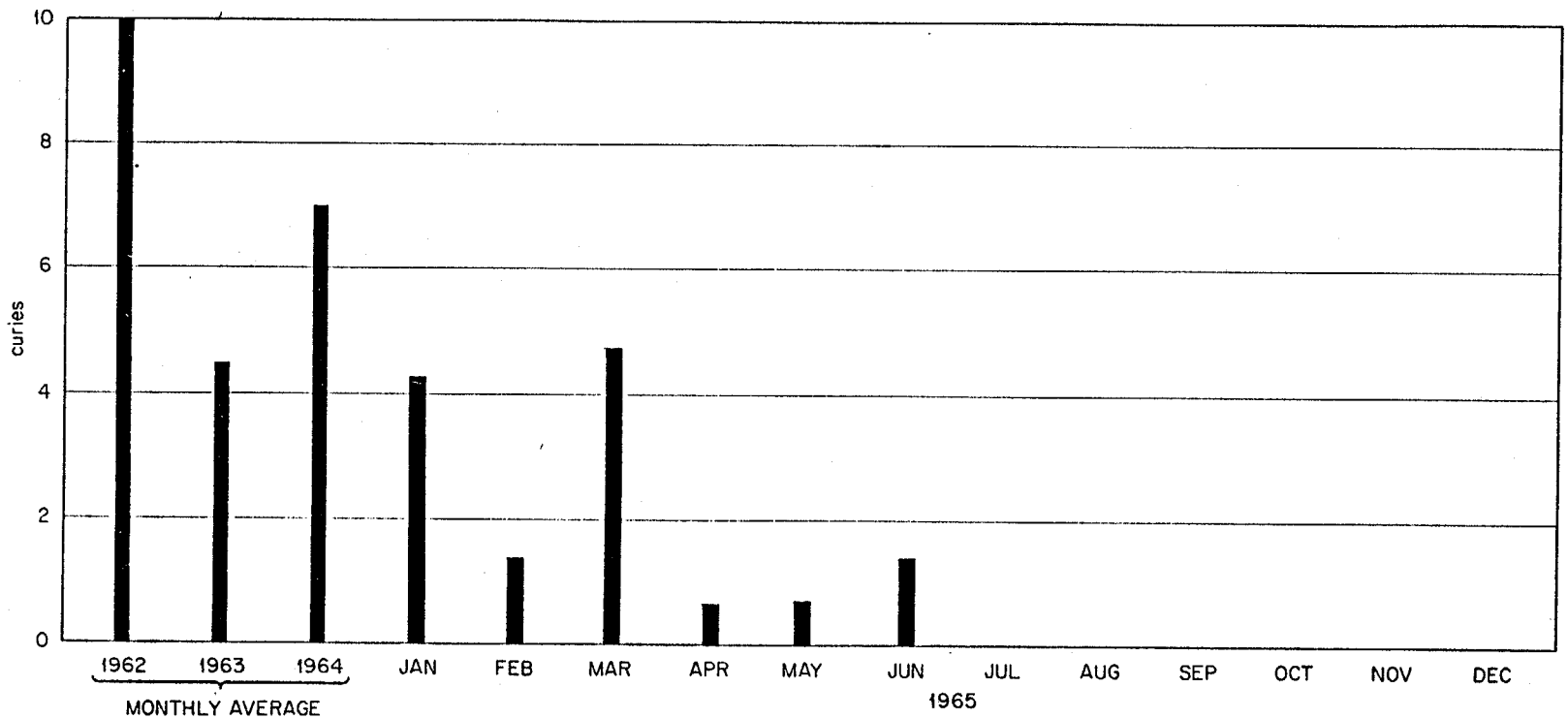

Fig. 6. Total[1] Activity Released in Gaseous Waste

[1]Does not Include Rare Gases or Other Non-adsorbable Species

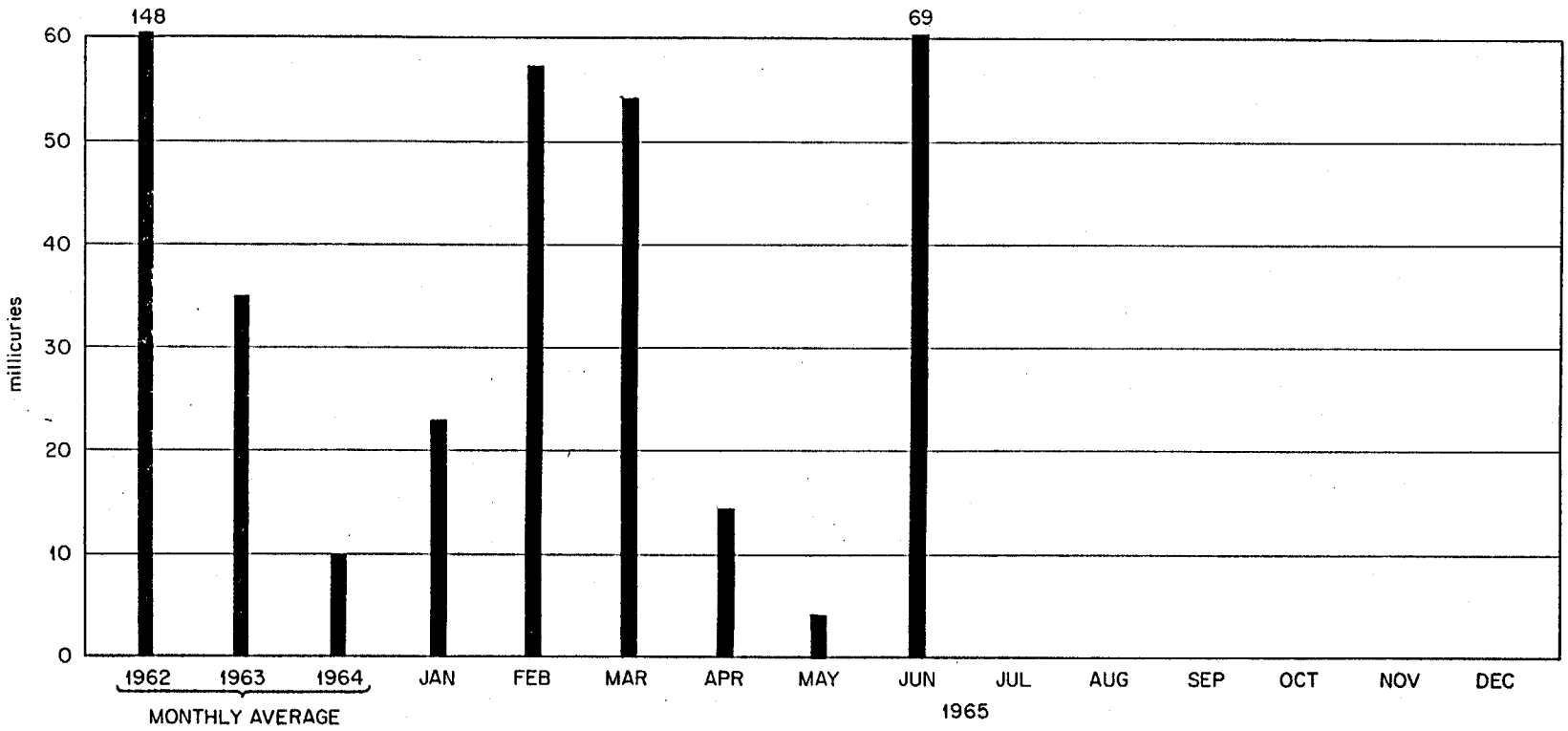

Fig. 7. Filterable Activity Released in Gaseous Waste

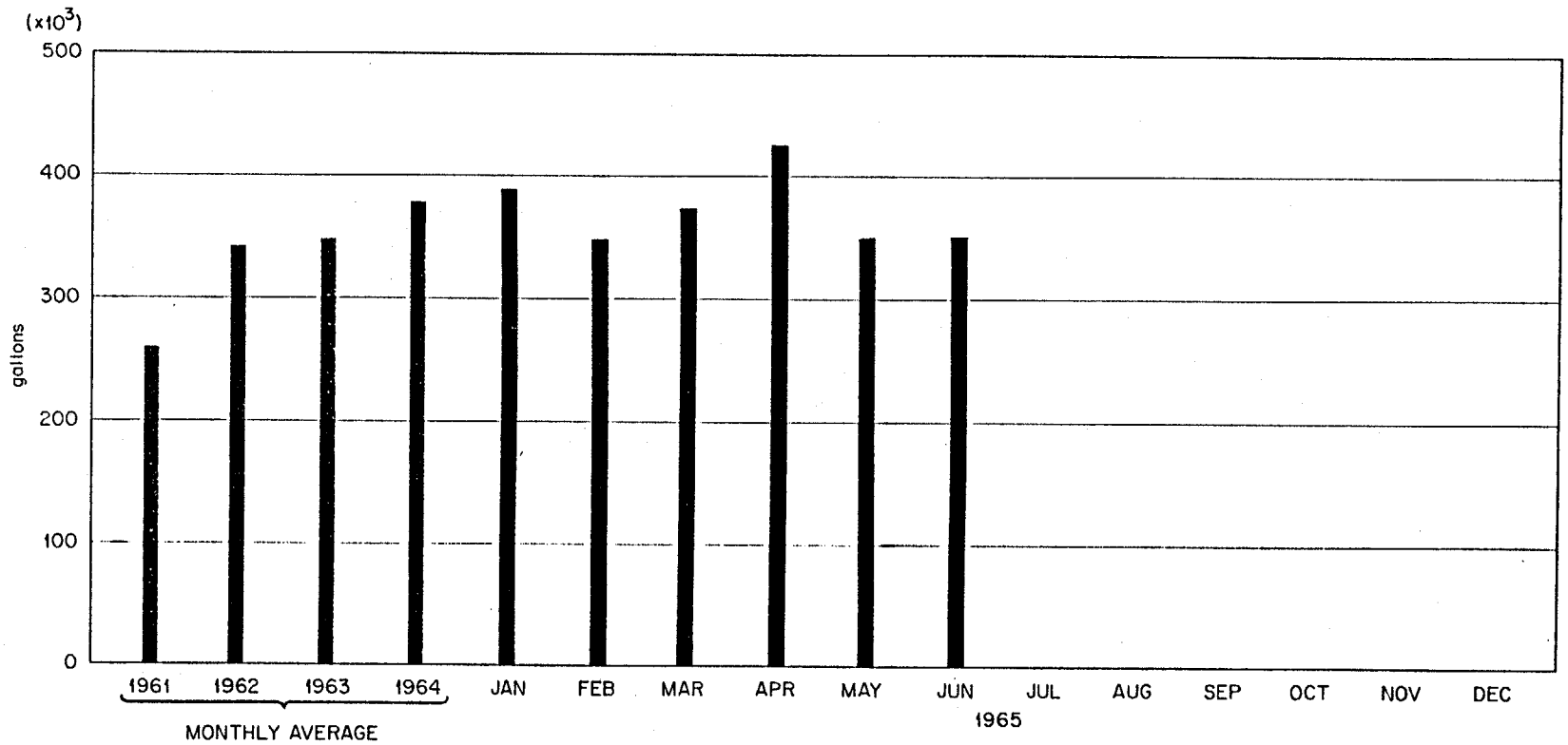

Fig. 8. Intermediate Level Waste Volumes

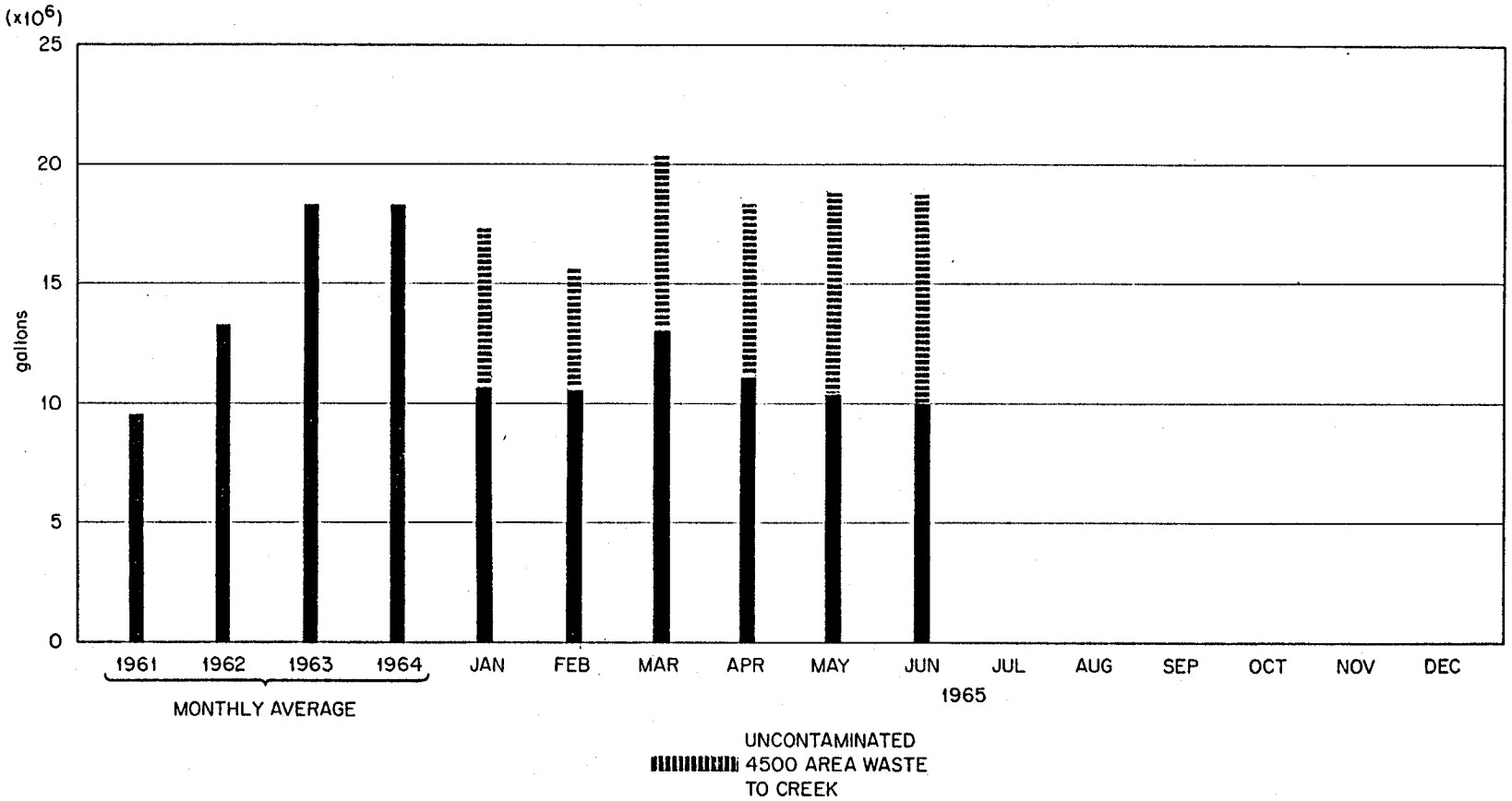

Fig.9. Process Waste Volumes

Distribution:

1. H. H. Abee
2. T. A. Arehart
3. S. E. Auerbach
4. C. L. Fox
5. Walter Belter, AEC-DRD, Washington, D. C.
6. F. N. Browder
7. F. R. Bruce
8. T. J. Burnett
9. G. C. Cain
10. K. E. Cowser
11. J. A. Cox
12. F. L. Culler
13. D. M. Davis
14. Wallace de Laguna
15. J. H. Gillette
16. P. N. Haubenreich
17. Howard V. Heacker, AEC-RDD-ORO
18. J. M. Holmes
19. D. G. Jacobs
20. C. V. Ketron
21. F. Kertesz
22. D. J. Knowles
23. L. C. Lasher
24. T. F. Lomenick
25. R. N. Lyon
26. J. F. Manneschmidt
27. F. L. Parker
28. M. E. Ramsey
29. S. J. Rimshaw
30. A. F. Rupp
31. R. W. Schaich
32. M. J. Skinner
33. W. S. Snyder
34. E. G. Struxness
35. T. Tamura - Building 3405
36. W. T. Thornton, AEC-R&D-ORO
37. E. J. Witkowski
38. W. C. Yee
39. Document Reference Section

40-41. Central Research
42-43. Laboratory Records
44. Laboratory Records - ORNL-RC