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64-10-57

DATE: October 27, 1964

COPY NO. 42

SUBJECT: Radioactive Waste Disposal for the month of September 1964

TO: Distribution

FROM: L. C. Lasher

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This document has been approved for release
to the public by:

Pam R Hamrin 8/23/95
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of data obtained from a network of stations which monitor Laboratory liquid waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 and 3 compare the releases of radioactive waste on a monthly basis. Figure 4 shows a comparison of the volumes of waste handled.

Approximately 15 curies of radioactive waste were discharged into White Oak Lake this month. Most of the activity was ruthenium (13.7 curies) which was discharged from the waste pit area. The total release of radioactivity from the Bethel Valley area was 420 millicuries, of which 300 millicuries was strontium, 100 millicuries was cesium and 20 millicuries was ruthenium.

Only 20 millicuries of strontium was discharged from the Melton Valley area; the total release from this area amounted to 80 millicuries.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 17.3 million gallons of contaminated water was processed by the Process Waste Treatment Plant this month. It was necessary to by-pass the treatment plant several times during the month because of excessive influent volumes. As a result, 2.7 million gallons of slightly contaminated water was discharged directly to White Oak Creek without chemical treatment. Table 2 is a summary of plant operation during the period and Table 3 lists the principal sources of waste discharged into the system.

INTERMEDIATE-LEVEL WASTE

A total of 412,044 gallons of waste was pumped into the disposal trenches this month. The distribution between the trenches was as follows:

		Gallons
1.	Trench 5	172,432
2.	Trench 7A	146,735
3.	Trench 7B	92,877

Major contributors to the system were as follows:

		Gallons
1.	4500 Complex	169,248
2.	Building 3019	65,900
3.	Reactor Complex	35,410
4.	Radioisotopes Processing Area	26,370
5.	Fission Products Development Laboratory	11,940
6.	Building 3026-C	8,420

Table 4 is an inventory of the nuclides transferred to the disposal area.

GASEOUS WASTE SYSTEM

The 3039 air-handling system discharged a total of 1.9 curies of gaseous activity which was identified as I^{131}. Only 3 millicuries of particulate activity were detected. The total release from the 3020 stack was 7 millicuries of I^{131}. Figure 3 compares the stack releases on a monthly basis.

TABLE 1

ACTIVITY RELEASED IN LIQUID AND GASEOUS WASTES

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	Ru^{106}	Cs^{137}	Total[2]
Liquid Waste to White Oak Creek					
Process waste	1	0.2	0.001	0.2	0.4
Miscellaneous discharges from east end of plant	2	0.02	None detected		0.02
Total discharge from Bethel Valley area	3	0.3	0.02	0.1	0.4
Total discharge from Melton Valley area	4	0.02	0.06	<0.01	0.08
East waste pit seepage	5	<0.001	10.8	<0.001	11.4
West waste pit seepage	6	<0.001	2.8	<0.001	3.0
Total discharge from all sources	3,4,5,6	0.32	13.7	0.1	14.9
White Oak Dam to Clinch River (Health Physics measurement)	7	0.25	2.25	0.15	3.46
Gaseous Waste[3]					
3039 Stack	8				1.9
3020 Stack	9				<0.01
3018 Stack	10				
Total activity in gases released					1.9

[1]Refers to Fig. 1.

[2]Includes other nuclides not listed here.

[3]Activity primarily I^{131} as noted in text.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 17.3×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 20.6×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^1	0.7	0.2	71
$Ru^{103,106}$	<0.1	<0.001	--
Co^{60}	None detected	--	--
Cs^{137}	0.6	0.2	67
Gross Beta Analysis	28 c/m/ml	10 c/m/ml	64

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1] CURIES	GROSS BETA ACTIVITY[1] % OF TOTAL	VOLUME GAL x 10^6	VOLUME % OF TOTAL
1. Reactor Operations	10	0.420	45.8	3.12	16.9
2. Radioisotope Processing Area	12	0.216	23.5	1.35	7.3
3. Buildings 3503 and 3508	5	0.055	6.0	0.79	4.3
4. Buildings 3025, 3026 and 3550	4	0.052	5.7	0.96	5.2
5. Building 3019	1	0.028	3.1	2.04	11.1
6. Fission Products Development Laboratory	4	$<$0.001	- -	0.02	0.1
7. 4500 Area	1	0.128	13.9	9.47	51.4
8. Building 3525	2	0.019	2.1	0.69	3.7

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

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 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date
Total Sr	664	4073	4851	12242	1737	9796	5250	15350	1002	6262	6628	13099
Ru^{106}	12	104	1096	5953	13	180	1130	1776	7	118	981	1449
Cs^{137}	2799	23399	48108	104686	5356	28976	26296	65560	3090	18244	25947	51659
Co^{60}	25	97	837	1111	22	123	365	519	13	81	385	489
TOTALS	3500	27673	54892	123992	7128	39075	33041	83205	4112	24705	33941	66696

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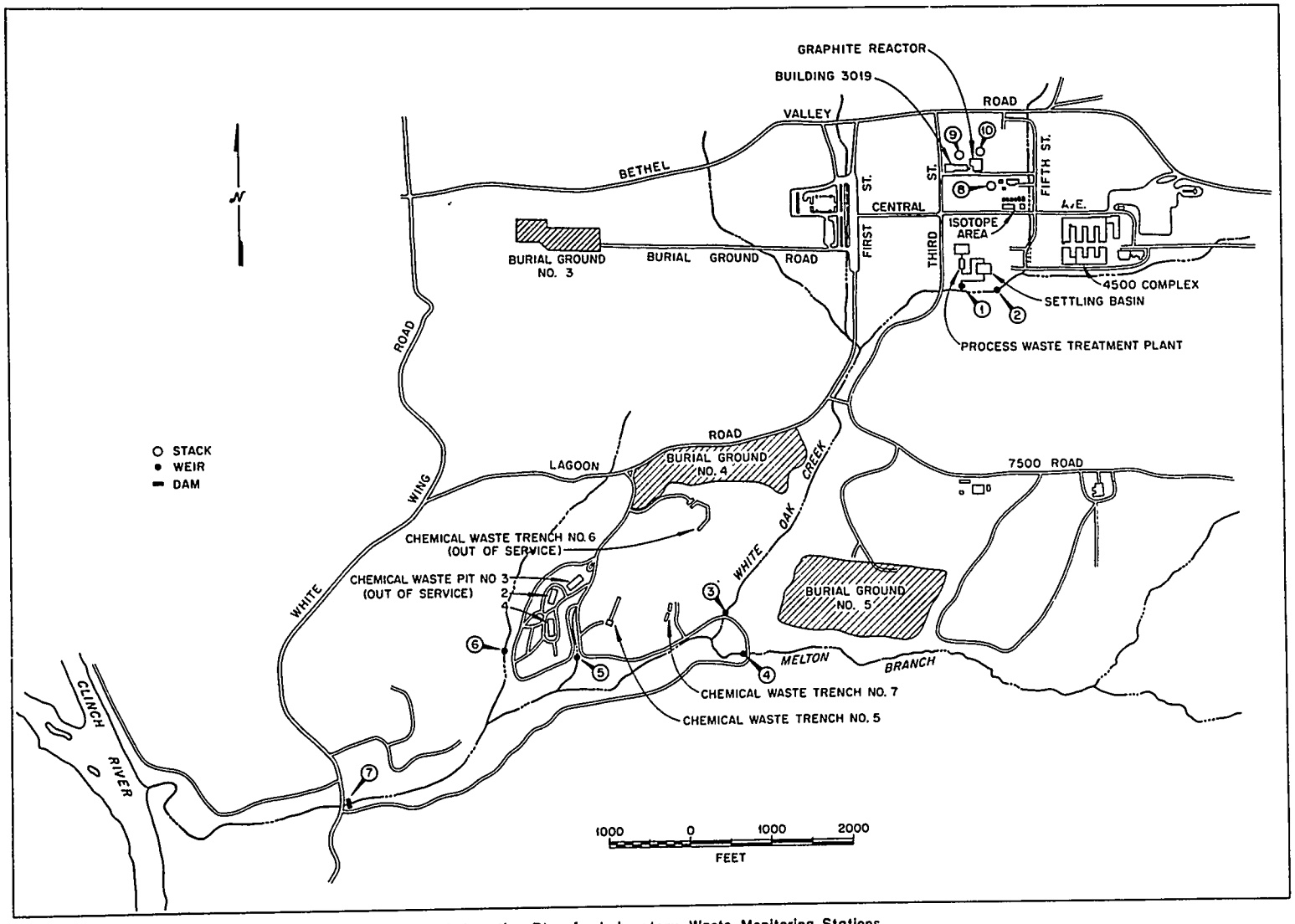

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

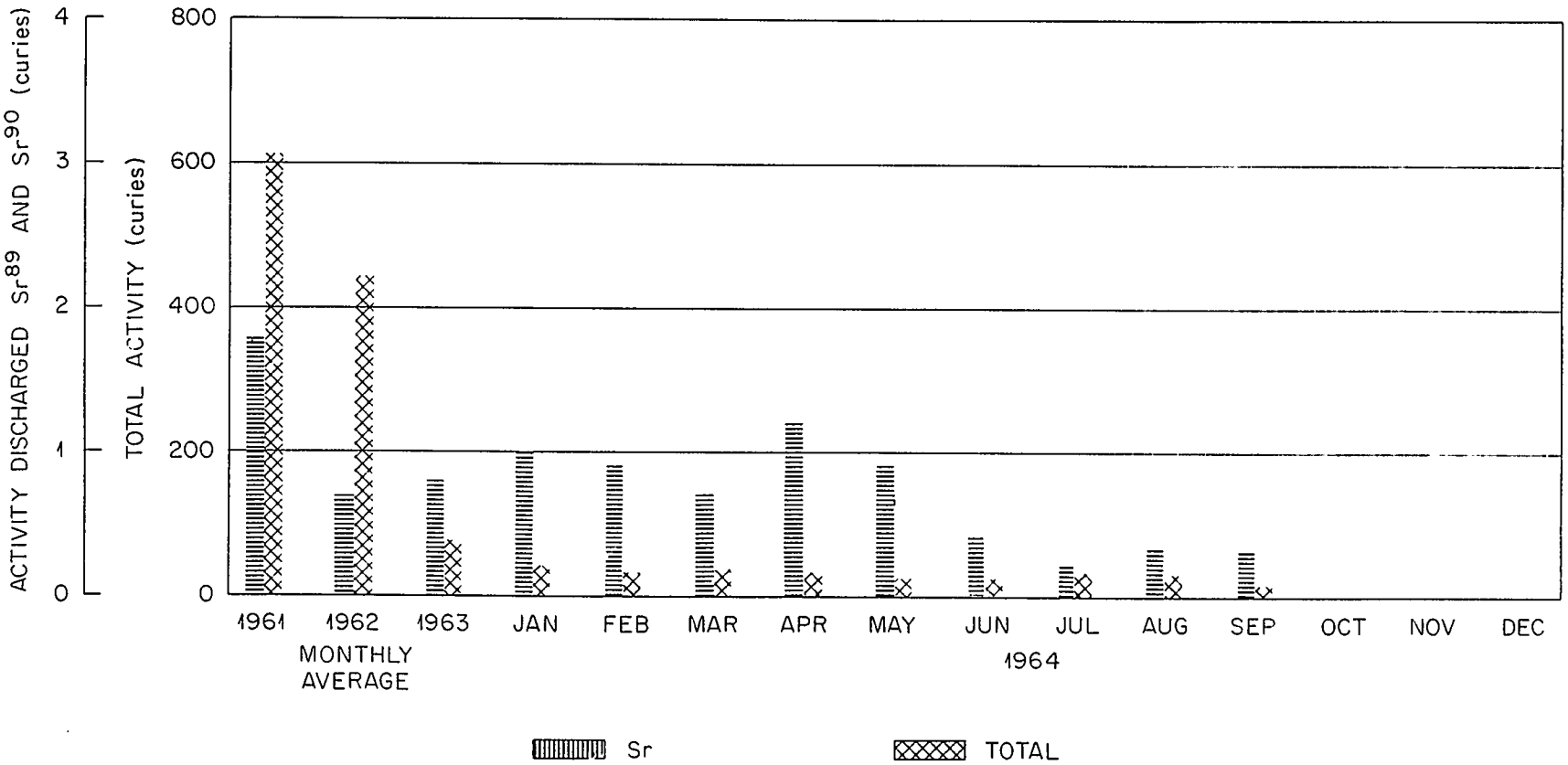

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

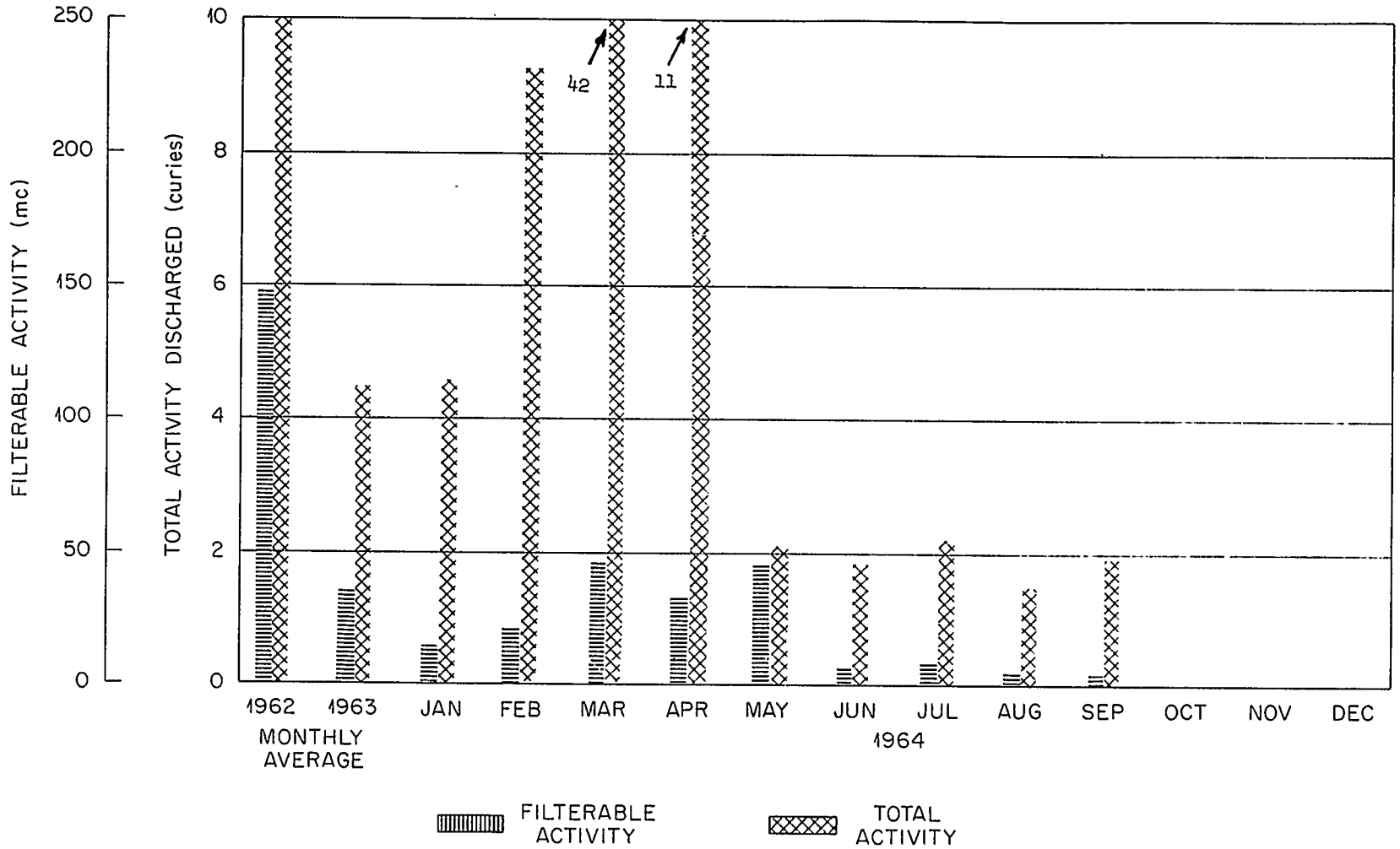

Fig. 3 Activity Release in Gaseous Waste

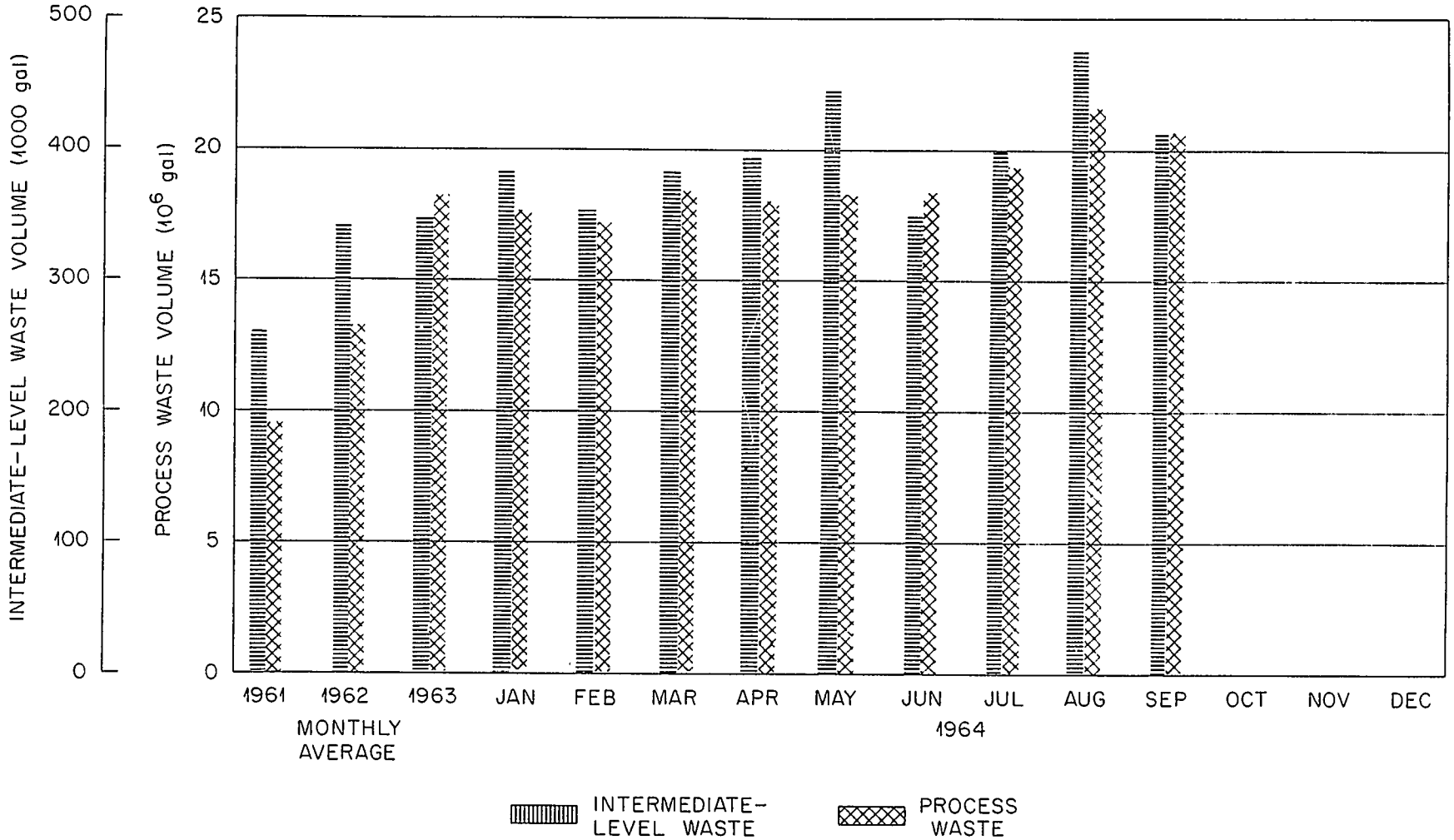

Fig. 4 Liquid Waste Volumes

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OAK RIDGE, TENNESSEE 37831

ORNL
CENTRAL FILES NUMBER
64-12-15

DATE: December 11, 1964 COPY NO. 42

SUBJECT: Radioactive Waste Disposal for the month of October 1964

TO: Distribution

FROM: L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 8/23/95
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of data obtained from a network of stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 and 3 compare the releases of the radioactive waste on a monthly basis. Figure 4 shows a comparison of the volumes of liquid wastes handled.

A total of 44 curies of activity was discharged into White Oak Lake this month. Most of it was ruthenium from the soil disposal areas. The total strontium discharge into the lake was 380 millicuries. Of this amount, 360 millicuries were released from the Bethel Valley drainage system and the remaining 20 millicuries from the Melton Valley drainage system.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Waste Treatment Plant was shut down for 11 days for maintenance of the sludge removal equipment and removal of sludge accumulated in the flocculation and settling basins. The extended shut-down period and the high volume of waste generated this month necessitated a discharge of 10 million gallons of slightly contaminated, untreated waste directly to the creek.

Two 170,000 gallon waste ponds, constructed to handle the waste effluent from the 4500 Complex, were put in service late this month. The ponds normally collect all of the process waste discharged from the 4500 area. The waste may be pumped from the ponds to the Waste Treatment Plant or diverted directly to the creek, depending upon the degree

of radioactive contamination. A total of 1.5 million gallons of waste was diverted into the creek this month by isolating the 4500 effluent in this manner. Continued use of the ponds is expected to reduce the load on the Waste Treatment Plant by approximately 50 percent.

Table 2 is a summary of plant operations during the period and Table 3 lists the principal sources of waste discharged into the system.

INTERMEDIATE-LEVEL WASTE

A total of 416,647 gallons of waste was pumped into the disposal trenches this month. The distribution of waste between the trenches was as follows:

		Gallons
1.	Trench 5	169,464
2.	Trench 7A	144,918
3.	Trench 7B	102,265

Major contributors to the system were as follows:

		Gallons
1.	4500 Complex	122,170
2.	Building 3019	67,570
3.	Reactor Complex	31,700
4.	Radioisotopes Processing Area	27,100
5.	Fission Products Development Laboratory	23,350

Table 4 is an inventory of the nuclides transferred to the disposal area. The total of 73,000 curies of Cs^{137} shown as transferred during this month, as well as other Cs^{137} transferred in previous months, cannot be reconciled with the analyses of wastes of the Fission Product

Development Laboratory, the main source of Cs^{137}. Arrangements have been made to isolate and to sample and analyze the FPDL wastes prior to their transfer to the trenches in the future.

GASEOUS WASTE SYSTEM

The stacks released a total of 3.02 curies of gaseous I^{131} this month. The amount of particulate activity identified was negligible. The bulk of the activity (3.0 curies) was discharged from the 3039 stack. Figure 3 compares the stack releases on a monthly basis.

Over the past two months, the monitoring efficiency of the 3020 stack system has been improved by the installation of new equipment, identical to that employed at the 3039 stack. The instrumentation includes beta/gamma and alpha tape monitors and an iodine monitor. Data from these instruments are telemetered to the control room at building 3019 and the Waste Monitoring Center at building 3105. An "in-stack" sampling system now provides inventory measurements.

TABLE 1

ACTIVITY RELEASED IN LIQUID AND GASEOUS WASTES

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	Ru^{106}	Cs^{137}	Total[2]
Liquid Waste to White Oak Creek					
Process waste	1	0.28	∠0.03	0.22	0.5
Miscellaneous discharges from east end of plant	2	0.01	None detected		0.01
Total discharge from Bethel Valley area	3	0.36	0.01	0.07	0.4
Total discharge from Melton Valley area	4	0.02	∠0.01	∠0.01	0.02
East waste pit seepage	5	∠0.01	35.	∠0.01	37.
West waste pit seepage	6	∠0.001	7.	∠0.01	7.
Total discharge from all sources	3,4,5,6	0.38	42.	0.07	44.
White Oak Dam to Clinch River (Health Physics measurement)	7	0.44	4.71	0.05	7.61
Gaseous Waste[3]					
3039 Stack	8				3.0
3020 Stack	9				0.03
Total activity in gases released					3.0

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

[3]Activity primarily I^{131} as noted in text

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.6×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 19.9×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)[2]	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[1]	0.47	0.28	40
$Ru^{103,106}$	0.08	<0.03	>62
Co^{60}	0.09	0.10	--
Cs^{137}	0.70	0.22	69
Gross Beta Analysis	30 c/m/ml	6 c/m/ml	80

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

[2]Includes activity carried in waste discharged to the creek through the settling basin, bypassing the Treatment Plant.

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	9	0.414	63.8	3.43	19.6
2.	Radioisotope Processing Area	6	0.120	18.5	1.45	8.3
3.	Buildings 3503 and 3508	3	0.031	4.8	0.78	4.4
4.	Buildings 3025 and 3026	3	0.063	9.7	1.53	8.7
5.	Building 3019	2	0.010	1.5	0.39	2.2
6.	Fission Products Development Laboratory	3	0.001	0.2	0.03	0.2
7.	4500 Area	<1	--	--	9.17[2]	52.3
8.	Building 3525	1	0.010	1.5	0.76	4.3

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

[2]Includes 1.5 million gallons of waste discharged directly to White Oak Creek through the new pond system.

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 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date
Total Sr	354	4427	4851	12596	622	10418	5250	15972	440	6702	6628	13539
Ru^{106}	3	107	1096	5956	3	183	1130	1779	2	120	981	1451
Cs^{137}	33640	57039	48108	138326	23280	52256	26296	88840	16490	34734	25947	68149
Co^{60}	6	103	837	1117	6	129	365	525	5	86	385	494
TOTALS	34003	61676	54892	157995	23911	62986	33041	107116	16937	41642	33941	83633

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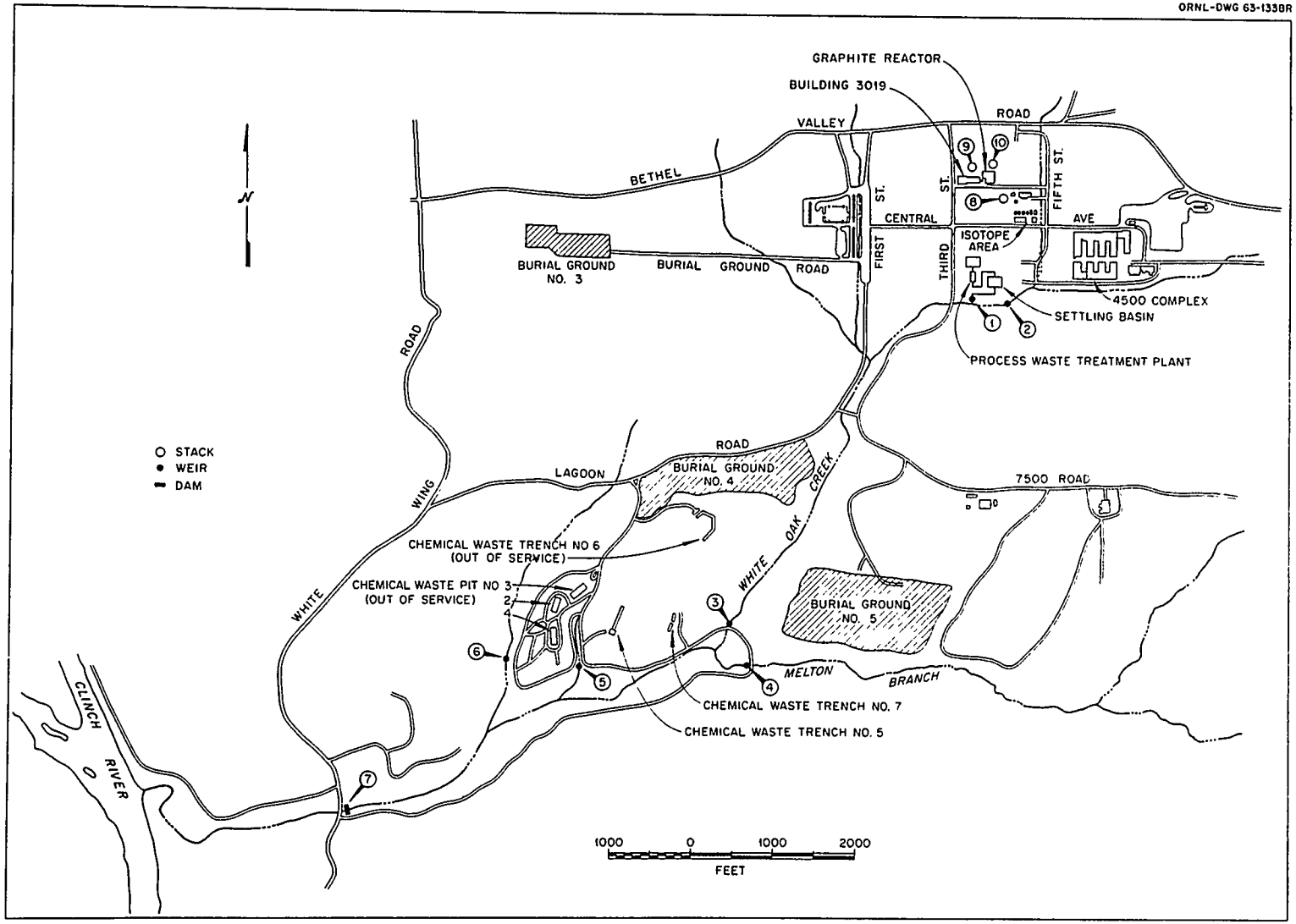

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

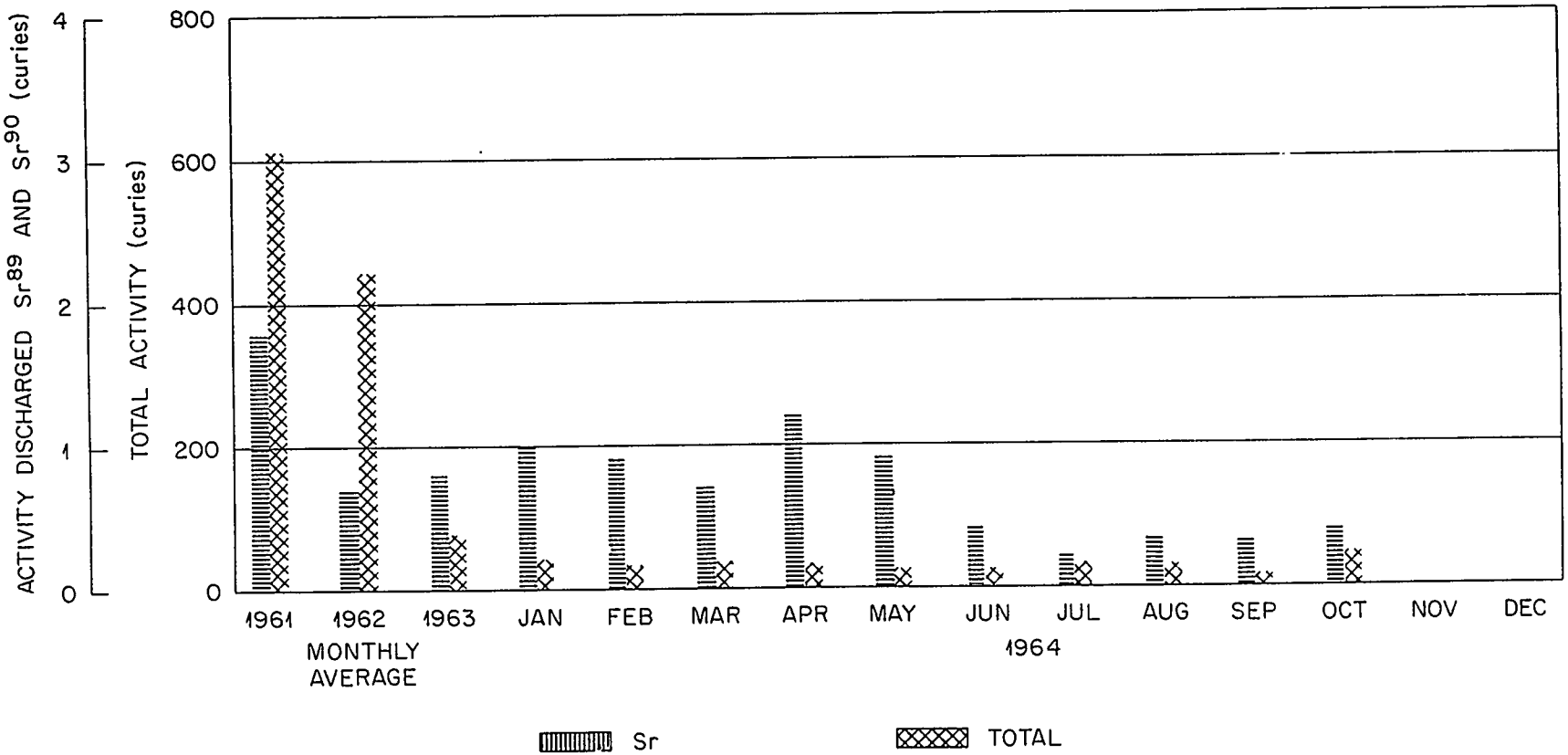

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

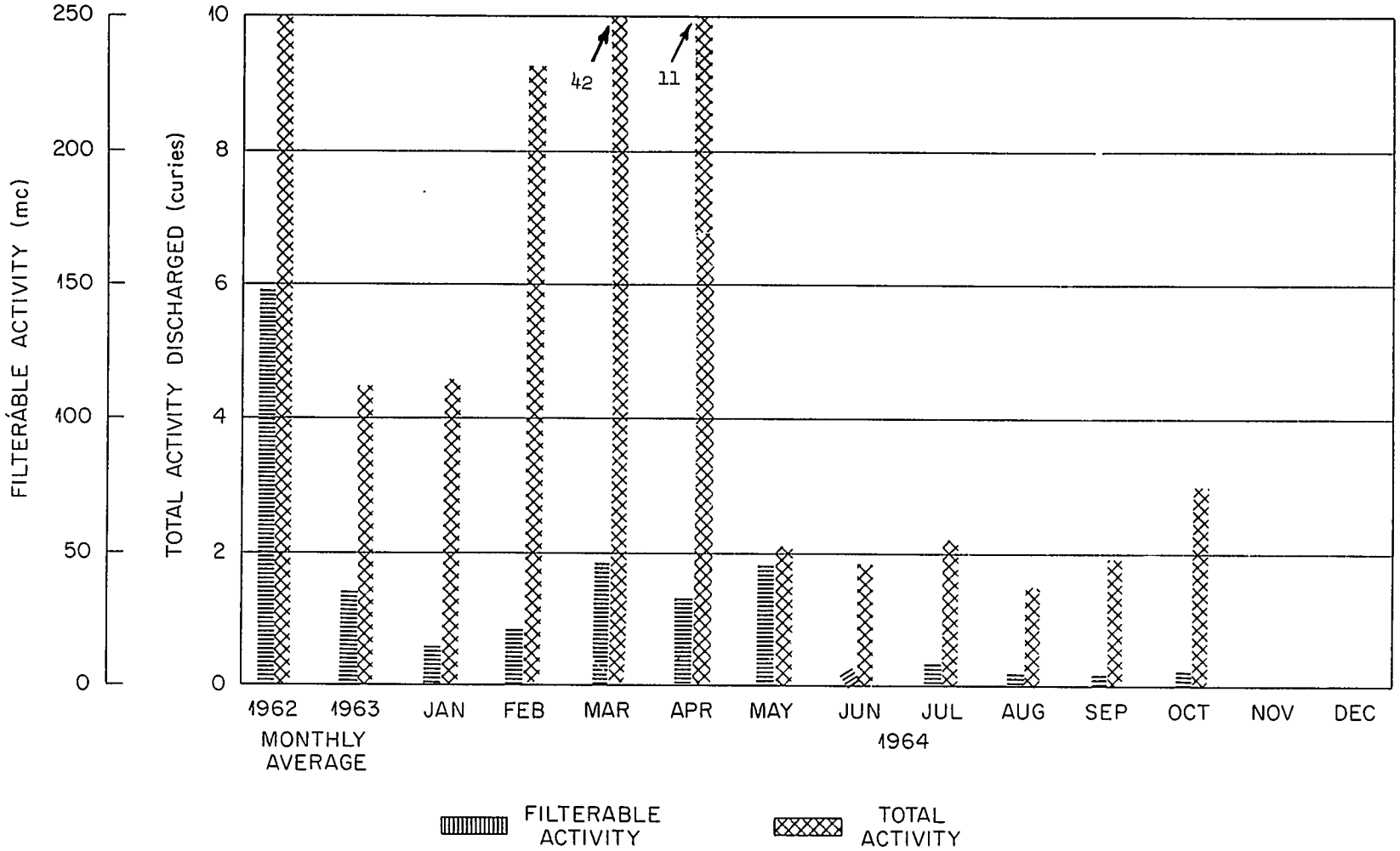

Fig. 3 Activity Release in Gaseous Waste

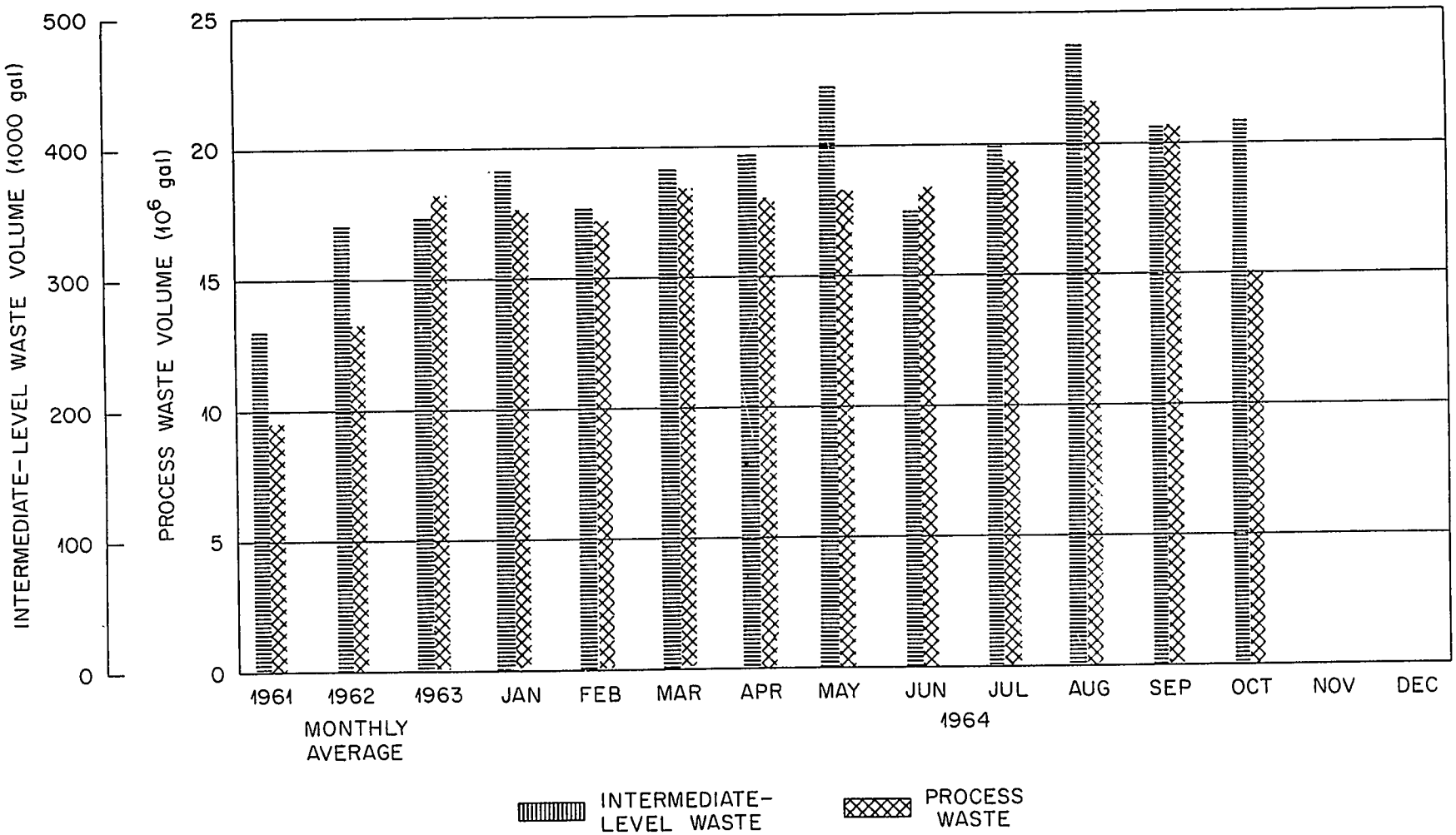

Fig. 4 Liquid Waste Volumes

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OAK RIDGE, TENNESSEE 37831

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CENTRAL FILES NUMBER
64-12-47

COPY NO. 42

DATE: December 30, 1964

SUBJECT: Radioactive Waste Disposal Report for November, 1964

TO: Distribution

FROM: L. C. Lasher

COPY

This document has been approved for release to the public by:

David R Hamrin 8/23/95
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of data obtained from a network of stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 and 3 compare the releases of the radioactive waste on a monthly basis. Figure 4 shows a comparison of the volumes of liquid wastes handled.

The total amount of radioactive waste discharged into White Oak Lake was 41 curies. Most of the activity was ruthenium (37 curies) and cobalt (3 curies) from the soil disposal areas.

The strontium discharge to the lake was 240 millicuries. Only 80 millicuries or one-third of the total was released in process wastes (monitoring station 1). The discrepancy of 130 millicuries between the total strontium measured at stations 1 and 2 and that measured at station 3 again suggests the possibility of old deposits of activity being scoured from the creek bed or being released from the burial ground areas. This subject was covered in detail in a special report titled "Investigation of Radioactivity Releases to White Oak Creek", by J. F. Manneschmidt, ORNL CF No. 64-9-81.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 12 million gallons of treated waste, containing 160 millicuries of activity, was discharged to the creek. The decontamination achieved by the plant, shown in Table 2, was the highest since last February. The improvement may have resulted from the lower flows through the plant that were made possible by the 4500 Area pond in-

stallation that permits a large portion of the uncontaminated waste to be released directly to the creek without treatment and the fact that a portion of the waste effluent (50 gal/min) was recirculated through the plant. At the high flows which exceeded the plant capacity before the installation of the ponds, recirculation of the effluent was not possible.

The principal sources of waste discharged to the system are listed in Table 3. All of the waste (7 million gallons) from the 4500 Area, containing 700 microcuries of strontium activity, was released directly to the creek through the new ponds.

INTERMEDIATE-LEVEL WASTE

Approximately 300,000 gallons of waste was pumped to the soil disposal area this month. Distribution between the trenches was as follows:

	Gallons
1. Trench 5	136,703
2. Trench 7A	81,771
3. Trench 7B	81,451

Major contributors to the system were as follows:

	Gallons
1. Building 3019	76,360
2. 4500 Complex	63,070
3. Reactor Complex	35,640
4. Radioisotope Processing Area	26,400
5. Fission Products Development Laboratory	21,090

The waste from the Fission Products Development Laboratory is currently stored separately at the South Tank Farm.

Table 4 is an inventory of the nuclides transferred to the disposal area.

GASEOUS WASTE SYSTEM

A total of 3.3 curies of gaseous activity, identified as I^{131}, was discharged by the air handling systems this month. Virtually all of this activity was released from the 3039 stack. The total discharge of particulate activity was 5 millicuries. Table 3 compares the stack releases on a monthly basis.

TABLE 1

ACTIVITY RELEASED IN LIQUID AND GASEOUS WASTES

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	Ru^{106}	Cs^{137}	Total[2]
Liquid Waste to White Oak Creek					
Process waste	1	0.08	None detected	0.08	0.16
Miscellaneous discharges from east end of plant	2	0.01	None detected		0.01
Total discharge from Bethel Valley area	3	0.22	0.22	0.06	0.50
Total discharge from Melton Valley area	4	0.02	0.01	0.01	0.02
East waste pit seepage	5	0.001	20.	None detected	22.
West waste pit seepage	6	0.001	17.	None detected	18.
Total discharge from all sources	3,4,5,6	0.24	37.	0.06	41.
White Oak Dam to Clinch River (Health Physics measurement)	7	0.20	6.14	0.11	7.97
Gaseous Waste[3]					
3039 Stack	8				3.25
3020 Stack	9				0.03
3018 Stack	10				—
Total activity in gases released					3.28

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

[3]Activity primarily I^{131} as noted in text

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.0×10^6 gallons

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

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^1	0.58	0.08	86
$Ru^{103, 106}$	None detected		—
Co^{60}	None detected		—
Cs^{137}	0.45	0.08	82
Gross Beta Analysis	25 c/m/ml	4 c/m/ml	84

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1] CURIES	GROSS BETA ACTIVITY[1] % OF TOTAL	VOLUME[2] GAL x 10^6	VOLUME[2] % OF TOTAL
1. Reactor Operations	9	0.342	76.9	2.84	39.1
2. Radioisotope Processing Area	1	0.013	2.9	0.98	13.5
3. Buildings 3503 and 3508	3	0.033	7.4	0.80	11.0
4. Buildings 3025, 3026 and 3550	0	——	——	0.96	13.2
5. Building 3019	1	0.014	3.1	1.05	14.4
6. Fission Products Development Laboratory	1	0.001	——	0.01	0.1
7. Building 3525	5	0.043	9.7	0.63	8.7

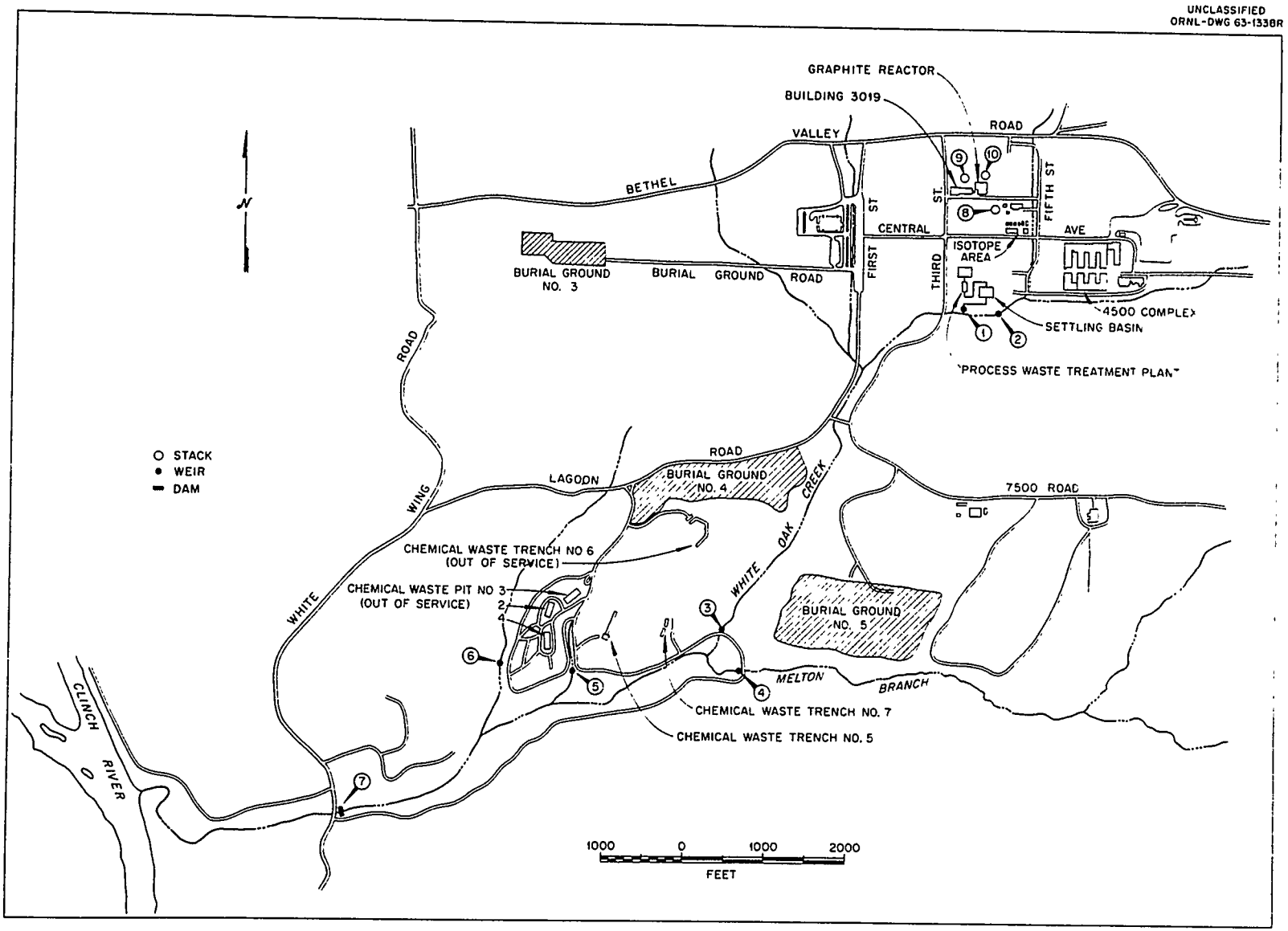
[1]Approximation - The method of analysis used in determining gross beta activity is not completely sensitive to energies below that of Sr^{90}.

[2]Not listed is 7 million gallons of uncontaminated waste released to the creek from the 4500 Area ponds.

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 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date	This Month	Year to Date	Year 1963	Total to Date
Total Sr	876	5303	4851	13472	165	10583	5250	16137	165	6867	6628	13704
Ru^{106}	11	118	1096	5967	6	189	1130	1785	6	126	981	1457
Cs^{137}	1649	58688	48108	139975	1142	53398	26296	89982	1142	35876	25947	69291
Co^{60}	7	110	837	1124	2	131	365	527	2	88	385	496
TOTALS	2543	64219	54892	160538	1315	64301	33041	108431	1315	42957	33941	84948



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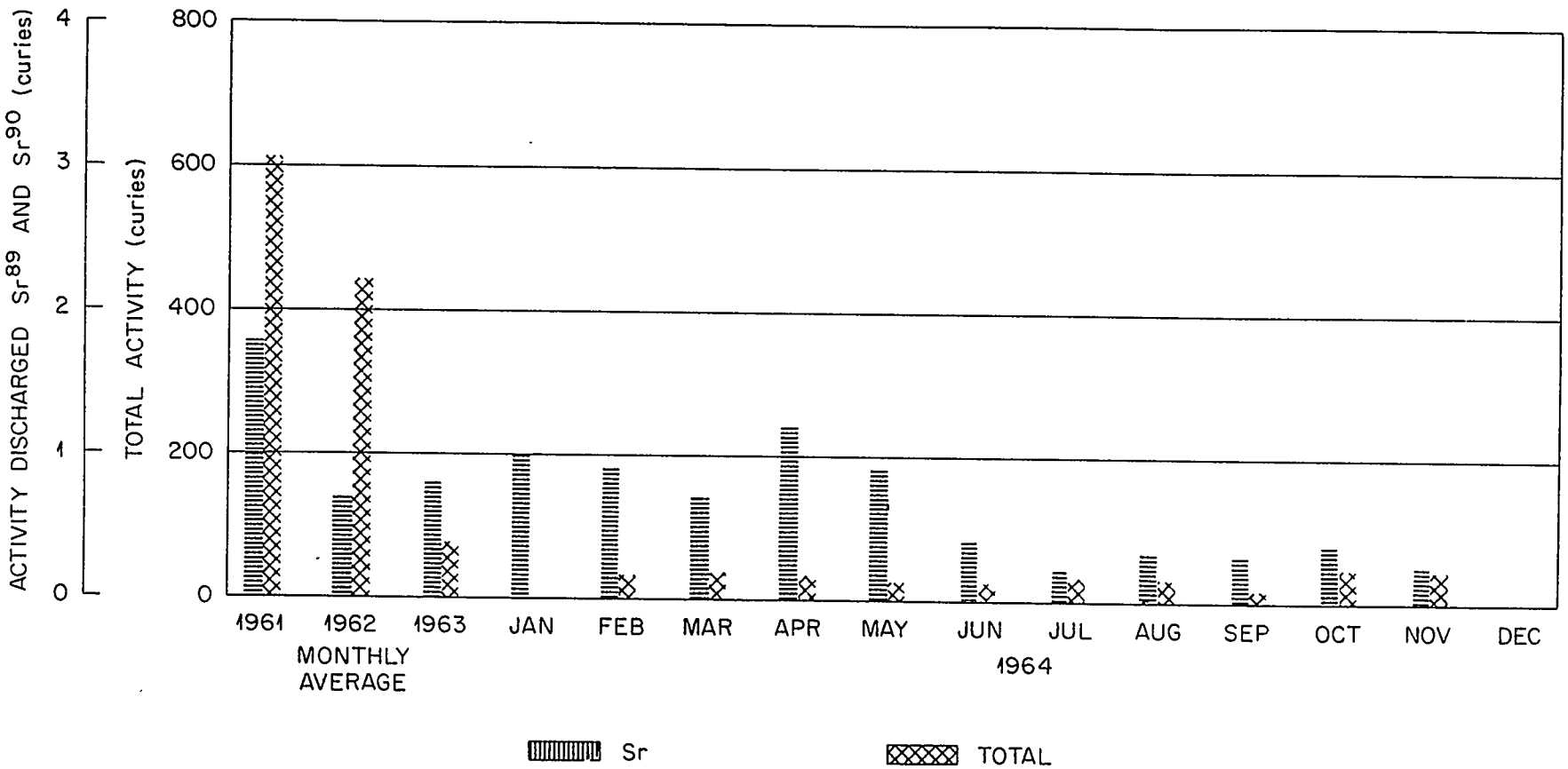

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

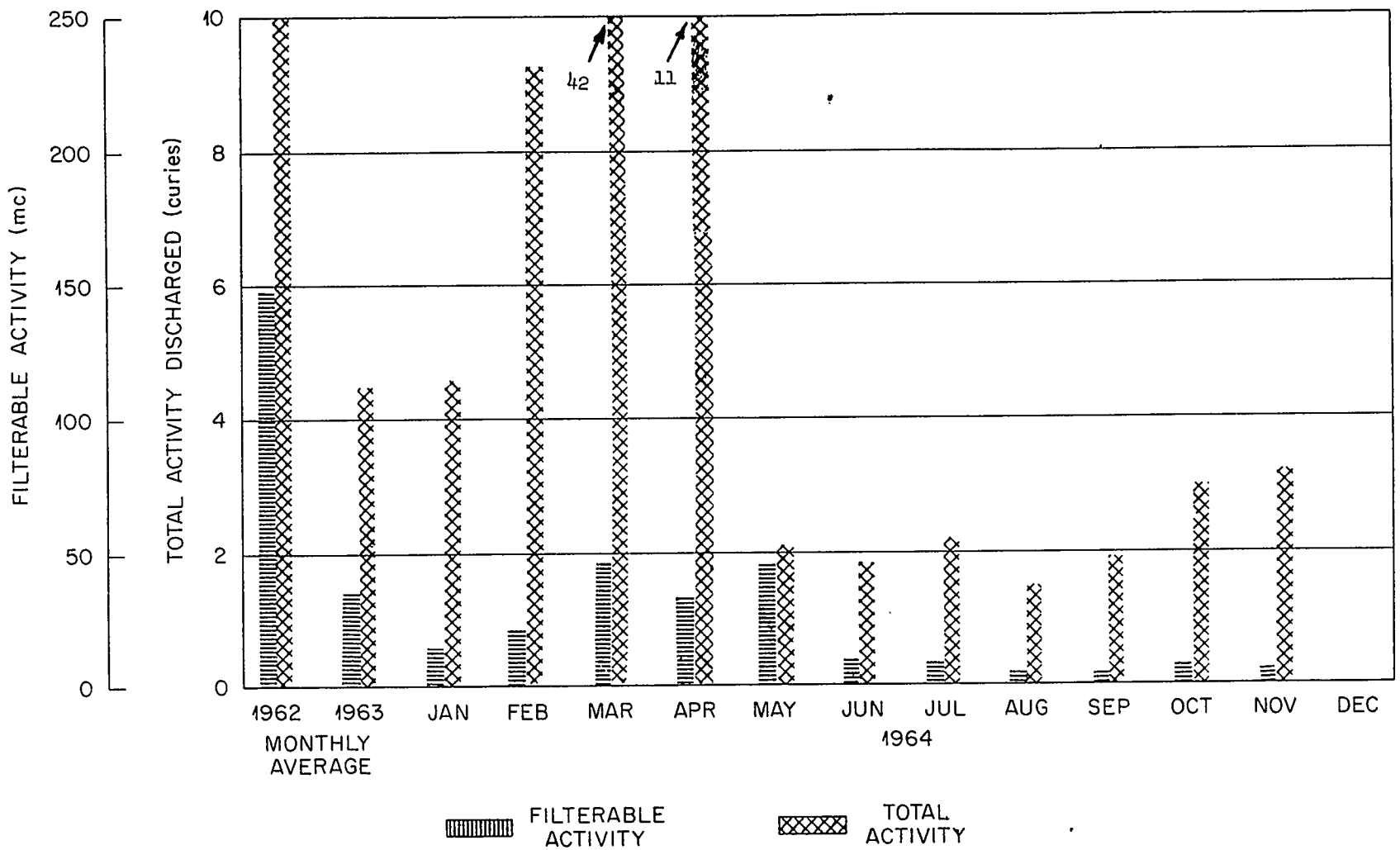

Fig. 3 Activity Release in Gaseous Waste

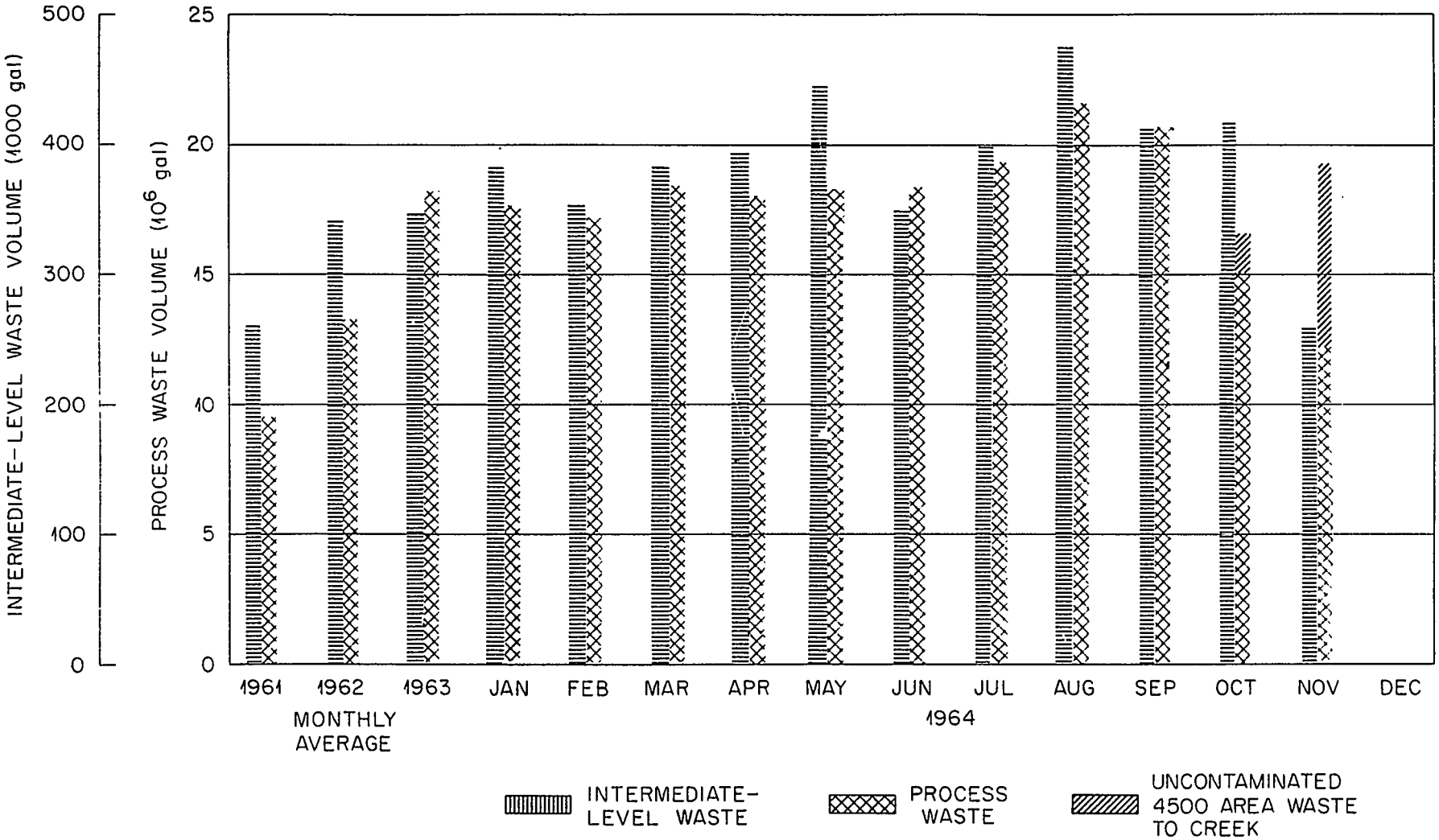

Fig. 4 Liquid Waste Volumes

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65-1-57

DATE: January 28, 1965

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SUBJECT: Radioactive Waste Disposal Operations Report for December, 1964

TO: Distribution

FROM: L.C. Lasher

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of data obtained from a network of stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 and 3 compare the release of radioactive waste on a monthly basis. Figure 4 shows a comparison of the volumes of liquid wastes handled.

A total of 17 curies of radioactivity was discharged into White Oak Lake this month. The bulk of this was ruthenium which seeped from the waste pit disposal areas. The strontium release was 420 millicuries; 370 millicuries of this amount came from the Bethel Valley area.

The 300 millicurie difference between the total strontium measured at stations 1 and 2 and that measured at station 3 is more apparent this month because of the low discharge from the process waste system measured at station 1. The difference, however, is not unusual. During the year 1964, the average monthly difference was 270 millicuries.

The average monthly release of strontium to White Oak Lake in 1964 was 600 millicuries as compared to an average of 800 millicuries in 1963. In 1964 the process waste discharges (station 1) accounted for 250 millicuries, or 42% of the total. Another 20 millicuries per month, average, was measured at station 2 and 60 millicuries at station 4 to account for 330 millicuries or 55% of all strontium released to White Oak Lake. The balance of 270 millicuries, cannot be accounted for by measurements made at the monitoring stations and appears as the difference between the total measured at station 1 and 2 and the

measurement at station 3. It is estimated that approximately one-half of the 270 millicuries was released from known sources, such as the laundry (probably less than 10%) and storm sewers, that are not routinely sampled, and it is speculated that the other half came from the creek bed itself--from old deposits left there years ago when the Laboratory releases were relatively high.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 13.3 million gallons of waste carrying 250 millicuries of radioactivity was discharged into White Oak Creek. The process waste flow did not exceed plant capacity this month and it was possible to recycle part of the plant effluent at a continuous rate of 50 gallons per minute. As a result, the decontamination achieved by the plant continued to be very good (Table 2). This was made possible by the separation of 4500 area waste so that the contaminated waste could be treated more intensively.

The principal sources of waste discharged into the system are listed in Table 3. An additional 6.1 million gallons of waste from the 4500 area were discharged directly to the creek and are not included in the table.

INTERMEDIATE-LEVEL WASTE

A total of 315,890 gallons of waste was pumped to the soil disposal area this month. Distribution between the trenches was as follows:

		Gallons
1.	Trench 5	182,850
2.	Trench 7A	63,320
3.	Trench 7B	69,720

Major contributors to the system were as follows:

		Gallons
1.	Building 3019	59,610
2.	4500 Complex	51,510
3.	Reactor Complex	45,640
4.	Radioisotopes Processing Area	23,470
5.	Fission Products Development Laboratory	16,660

The waste from the Fission Products Development Laboratory is currently stored separately at the South Tank Farm for possible future reprocessing.

Seep streams draining the Trench 5 and Trench 7 areas were sampled during the month. Estimates of discharges of several nuclides are tabulated below:

	Nuclides	Curies Discharged in 31 Days
1.	Strontium 89-90	336×10^{-5}
2.	Cesium 137	2×10^{-3}
3.	Ruthenium 106	2
4.	Cobalt 60	1

Table 4 is an inventory of the nuclides transferred to the soil disposal area.

GASEOUS WASTE SYSTEM

The total discharge from the air handling systems was 1.9 curies. The activity was practically all I^{131} released from the 3039 stack. Only 2 millicuries of filterable activity was discharged. Table 3 compares the stack releases on a monthly basis.

The release of I^{131} from the main gas disposal systems increased from a monthly average of 4.5 curies in 1963 to 7.0 curies in 1964. The 1964 increase resulted from discharges made in February, March and April. The releases during the other nine months were all below the 1963 average (Figure 4). The filterable activity released in gases averaged 10 millicuries per month in 1964 and 35 millicuries per month in 1963.

TABLE 1

ACTIVITY RELEASED IN LIQUID AND GASEOUS WASTES

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	Ru^{106}	Cs^{137}	Total[2]
Liquid Waste to White Oak Creek					
Process waste	1	0.06	< 0.1	≈ 0.07	≈ 0.25
Miscellaneous discharges from east end of plant	2	0.01	0.01	none detected	0.02
Total discharge from Bethel Valley area	3	0.37	0.03	0.65	1.05
Total discharge from Melton Valley area	4	0.05	< 0.01	0.05	0.10
East waste pit seepage	5	< 0.001	8	none detected	9
West waste pit seepage	6	0.002	6	none detected	7
Total discharge from all sources	3,4,5,6	0.42	14	0.70	17
White Oak Dam to Clinch River (Health Physics measurement)	7	0.39	12.82	0.15	15.46
Gaseous Waste[3]					
3039 Stack	8				1.83
3020 Stack	9				0.08
3018 Stack	10				< 0.01
Total activity in gases released					1.91

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

[3]Activity primarily I^{131} as noted in text

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.1×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.3×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[1]	0.83	0.06	93
$Ru^{103,106}$	0.64	≈0.07	--
Co^{60}	≈0.06	≈0.05	--
Cs^{137}	0.13	≈0.07	--
Gross Beta Analysis	35 c/m/ml	3 c/m/ml	91

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

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	40	1.51	53.2	2.80	35.1
2.	Radioisotope Processing Area	23	0.33	11.6	1.06	13.3
3.	Buildings 3503 and 3508	16	0.12	4.2	0.54	6.8
4.	Buildings 3025, 3026 and 3550	26	0.33	11.6	0.93	11.7
5.	Building 3019	19	0.22	7.7	0.85	10.7
6.	Fission Products Development Laboratory	12	0.002	0.07	0.01	0.1
7.	4500 Area	6	0.072	2.5	0.89	11.1
8.	Building 3525	21	0.26	9.2	0.90	11.2

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

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 1964	Year 1963	Total to Date	This Month	Year 1964	Year 1963	Total to Date	This Month	Year 1964	Year 1963	Total to Date
Total Sr	502	5805	4851	13974	88	10671	5250	16225	105	6972	6628	13809
Ru^{106}	6	124	1096	5973	2	191	1130	1787	2	128	981	1459
Cs^{137}	6510	65198	48108	146485	3070	56468	26296	93052	3684	39560	25947	72975
Co^{60}	9	119	837	1133	2	133	365	529	3	91	385	499
TOTALS	7027	71246	54892	167565	3162	67463	33041	111593	3794	46751	33941	88742

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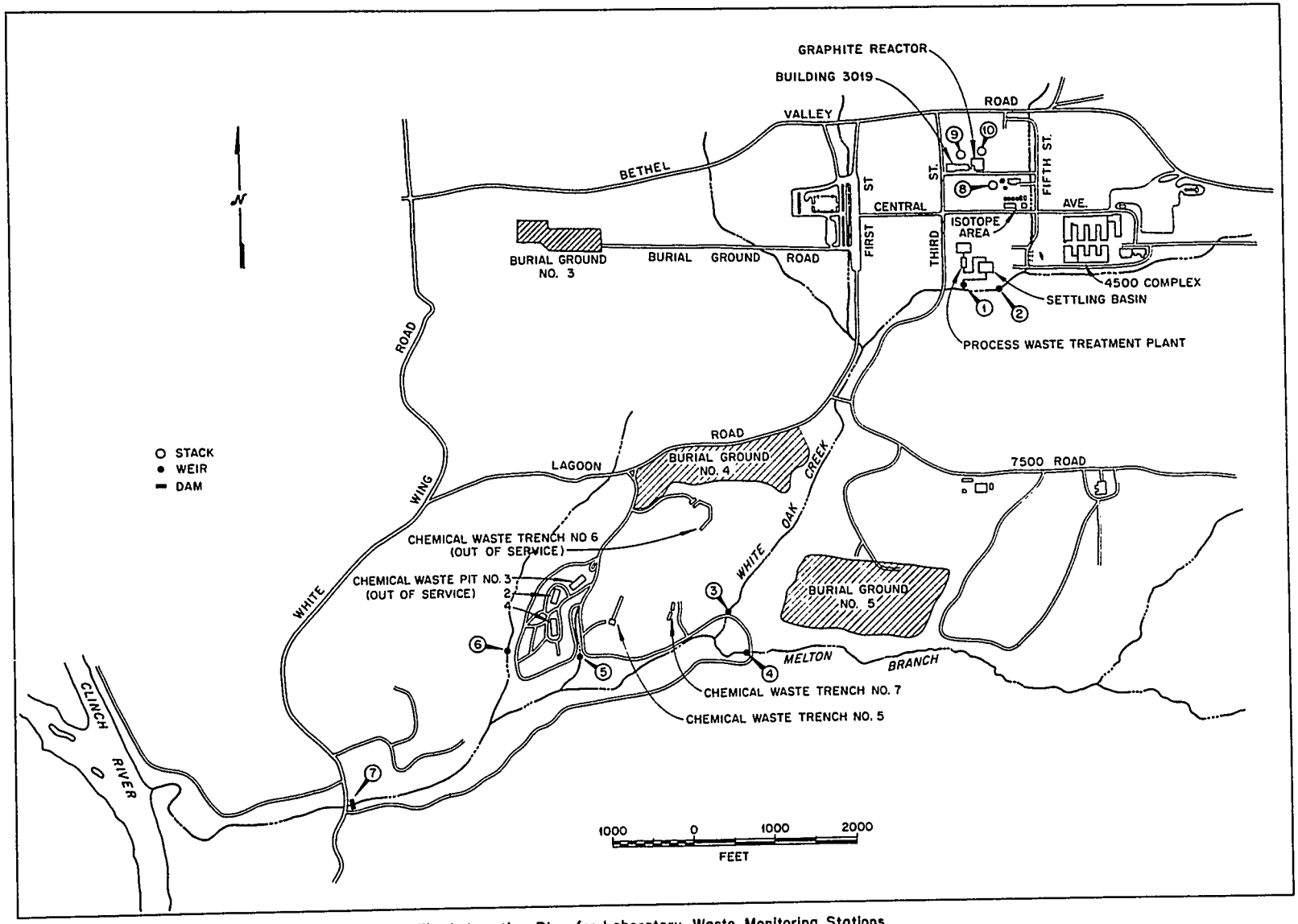

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

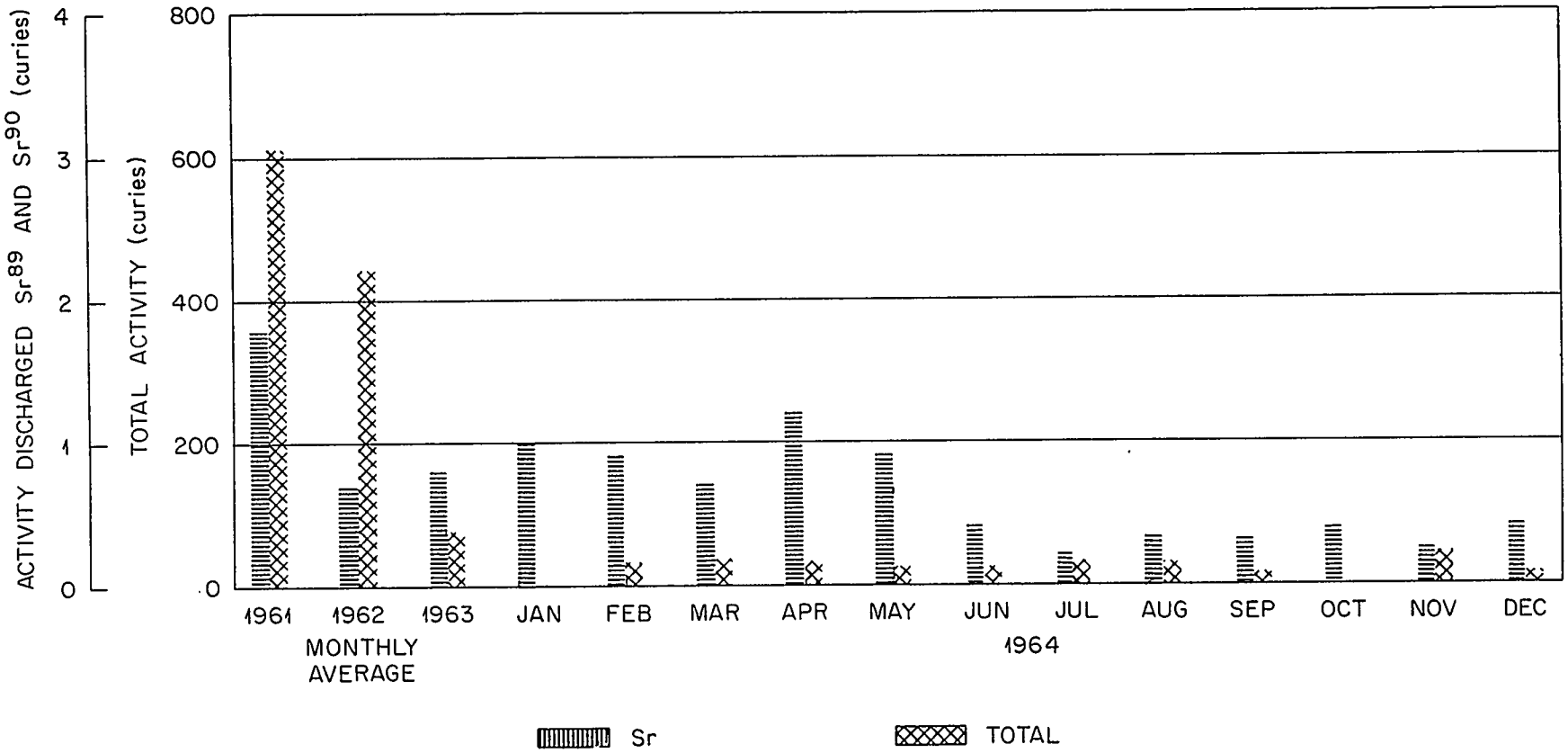

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

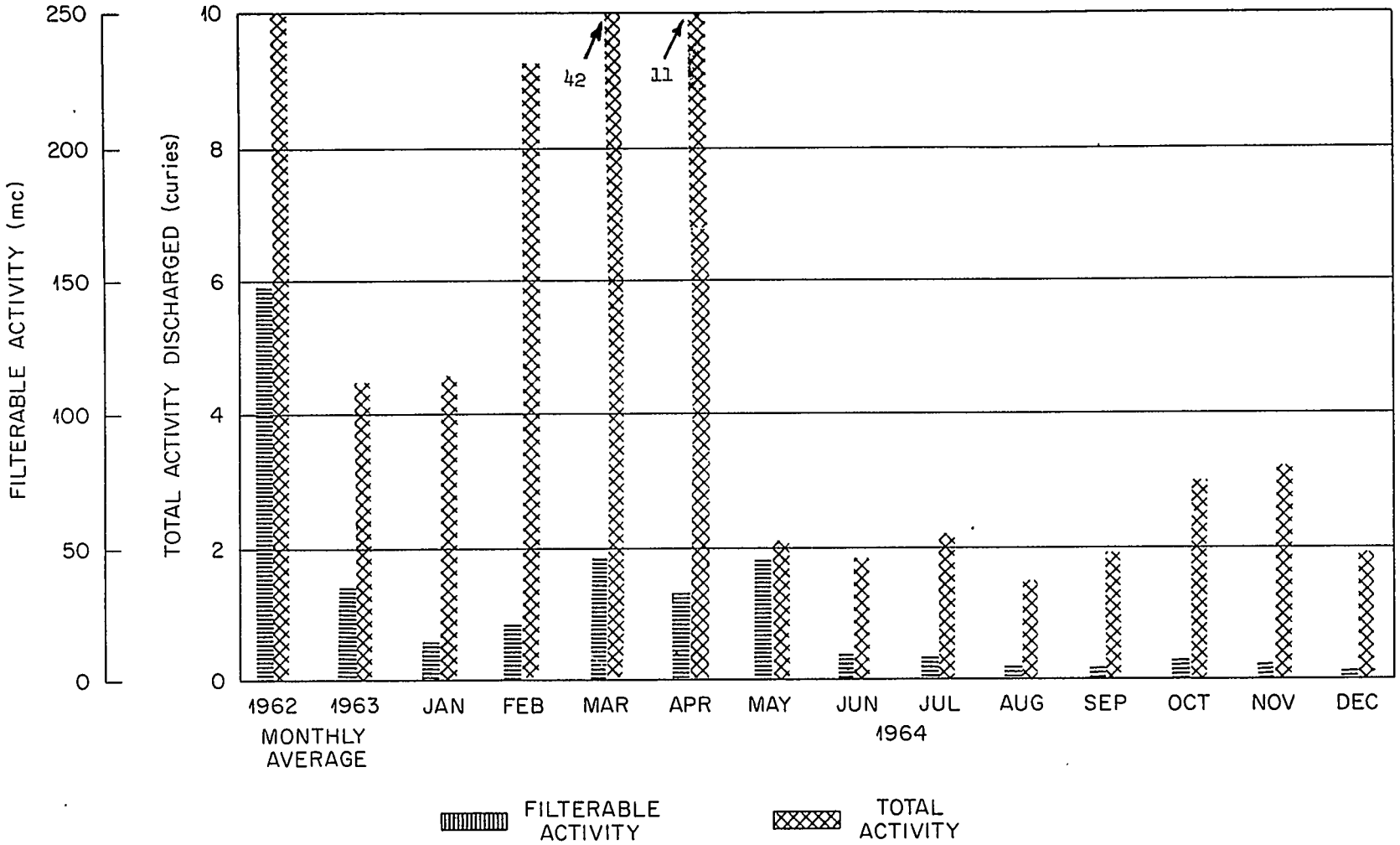

Fig. 3 Activity Release in Gaseous Waste

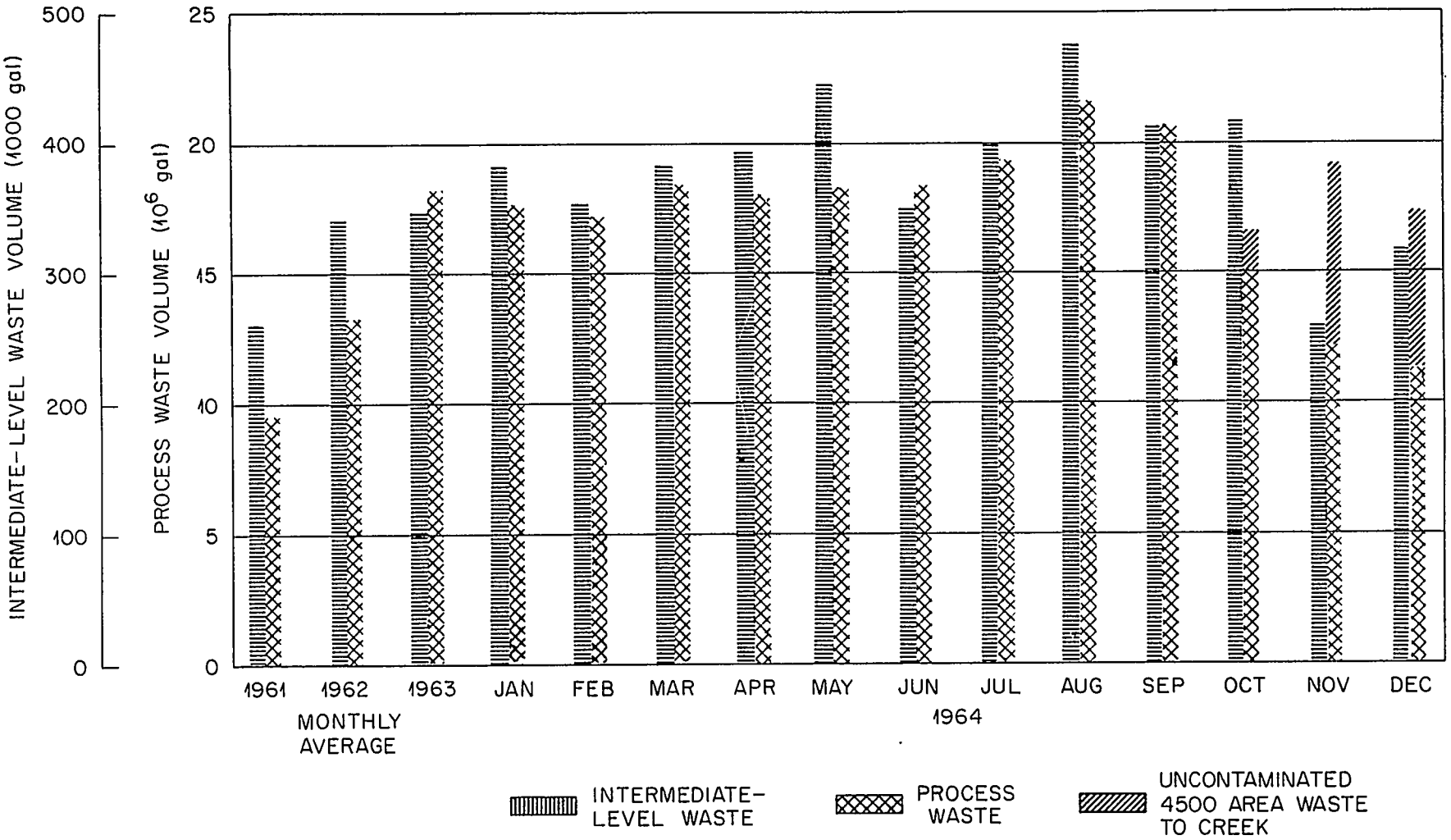

Fig. 4 Liquid Waste Volumes

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
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65-6-53

DATE: June 25, 1965

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of data obtained from a network of sampling stations which monitor Laboratory waste effluents. The physical locations of the liquid waste samplers are shown in Figure 1. Figures 2 through 9 compare the releases of waste on a monthly and annual basis. The data on the concentrations of activity in the Clinch River, shown in Figure 2, was obtained from the Health Physics Division which operates sampling station 7 at White Oak Dam.

The total release of radioactivity into White Oak Lake remained low at 10.78 curies. The activity was primarily ruthenium (9.45 curies) and cobalt (0.92 curie) which seeped from the disposal trenches. The Bethel Valley area discharge was 0.43 curie, of which, 0.29 curie was strontium and 0.11 curie cesium. The release from the Melton Valley area was insignificant.

A total of 680 millicuries was released in gaseous waste. All of the gaseous activity was identified as ^{131}I. The discharge of particulate activity was very low (4 millicuries) and this was also identified as ^{131}I.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Operation of the process waste system was normal this month. Decontamination achieved by the Waste Treatment Plant was 88% (determined by gross beta analyses).

A summary of plant operations is shown in Table 2. Table 3 lists the main sources of waste discharged into the system. Figure 5 shows

the amounts of strontium released into the creek each month, and Figure 8 compares the volumes of liquid handled.

INTERMEDIATE-LEVEL WASTE

A total of 349,187 gallons of waste was pumped to the ground disposal area this month. In addition, 36,000 gallons were pumped to the Shale Fracturing site for experimental disposal. The distribution between the trenches is tabulated below:

		Gallons
1.	Trench 5	149,426
2.	Trench 7A	110,413
3.	Trench 7B	89,348

Major contributors to the system were as follows:

		Gallons
1.	Building 3019	76,852
2.	4500 Complex	56,410
3.	Reactor Complex	40,320
4.	Radioisotope Processing Area	21,150
5.	Fission Products Development Laboratory	7,210

Curium-242 was detected this month in the east seep stream from trench 7 and in the White Oak Dam discharge to Clinch River. Although the amount released was not significant and will not become serious because of the small amount (62 curies) put into that trench, it has become apparent that the trench cannot be used for disposal of large quantities of curium. Arrangements have been made to hold curium-bearing wastes in storage tanks until the waste evaporator is put into operation and trench disposal of wastes is discontinued.

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	0.09	< 0.01	0.03	0.14
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	0.01
Total discharge from Bethel Valley area	3	0.29	0.02	0.11	0.43
Total discharge from Melton Valley area	4	< 0.01	< 0.01	< 0.01	< 0.01
East waste pit seepage	5	< 0.01	7.99	< 0.01	8.80
West waste pit seepage	6	< 0.01	1.44	< 0.01	1.55
Total discharge from all sources	3,4,5,6	0.29	9.45	0.11	10.78
White Oak Dam to Clinch River (Health Physics measurement)	7	0.18	3.76	0.05	4.79
Gaseous Waste[3]					
3039 Stack					0.67
3020 Stack					0.01
3018 Stack					< 0.01
2026 Stack					< 0.01
MSRE Stack					< 0.01
Total activity in gases released					0.68

[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: 10.2×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.2×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[1]	0.59	0.09	85
$^{103,106}Ru$	none detected	none detected	--
^{60}Co	0.09	0.02	78
^{137}Cs	0.35	0.03	91
Gross Beta Analysis	34 c/m/ml	4 c/m/ml	88

[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] CURIES	GROSS BETA ACTIVITY[1] % OF TOTAL	VOLUME GAL x 10^6	VOLUME % OF TOTAL
1.	Reactor Operations	11[2]	0.440[2]	75.6[2]	2.81	36.1
2.	Radioisotope Processing Area	5	0.050	8.6	0.98	12.6
3.	Buildings 3503 and 2508	2	0.020	3.4	0.54	6.9
4.	Buildings 3025, 3026 and 3550	2	0.040	6.9	1.37	17.6
5.	Building 3019	1	0.010	1.7	0.65	8.3
6.	Fission Products Development Laboratory	2	< 0.001	- -	0.01	0.1
7.	4500 Area	1	0.010	1.7	0.53	6.8
8.	Building 3525	1	0.010	1.7	0.80	10.3
9.	Building 2026	2	0.002	0.4	0.10	1.3

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

[2]Most of this activity came from contaminated ground water which seeped into the Reactor Process line from the Radioisotopes Processing Area.

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	887	1692	5303	15485	83	2657	10583	18794	66	1434	6867	15138
^{106}Ru	10	25	118	5998	16	33	189	1818	13	22	126	1479
^{137}Cs	3380	8374	58688	149107	2248	14066	53398	104048	1770	6973	35876	76264
^{60}Co	22	41	110	1178	3	55	131	582	3	32	88	528
TOTALS	4299	10132	64219	171768	2350	16811	64301	125242	1852	8461	42957	93409

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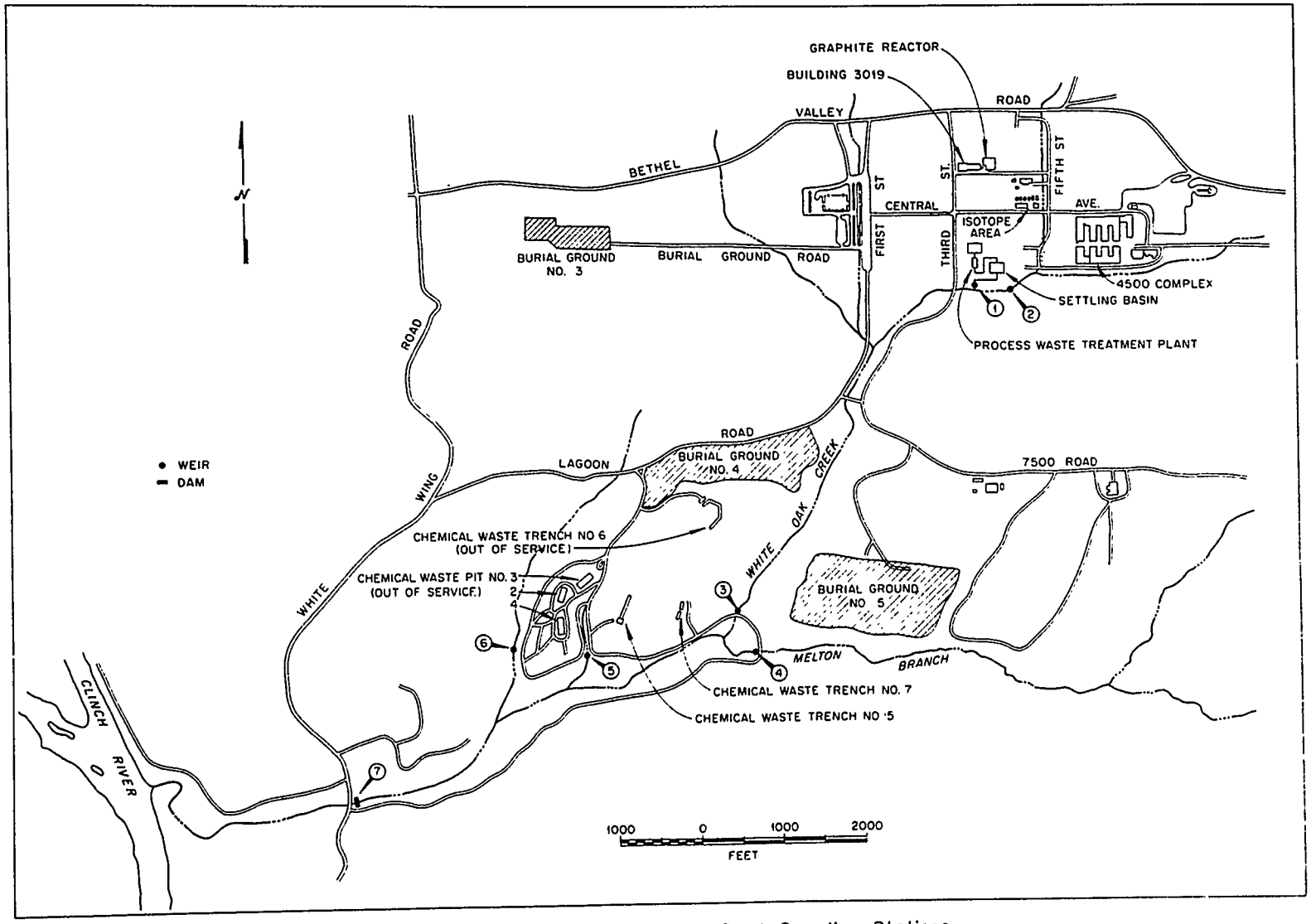

Fig. 1. Location Plan for White Oak Creek Sampling Stations.

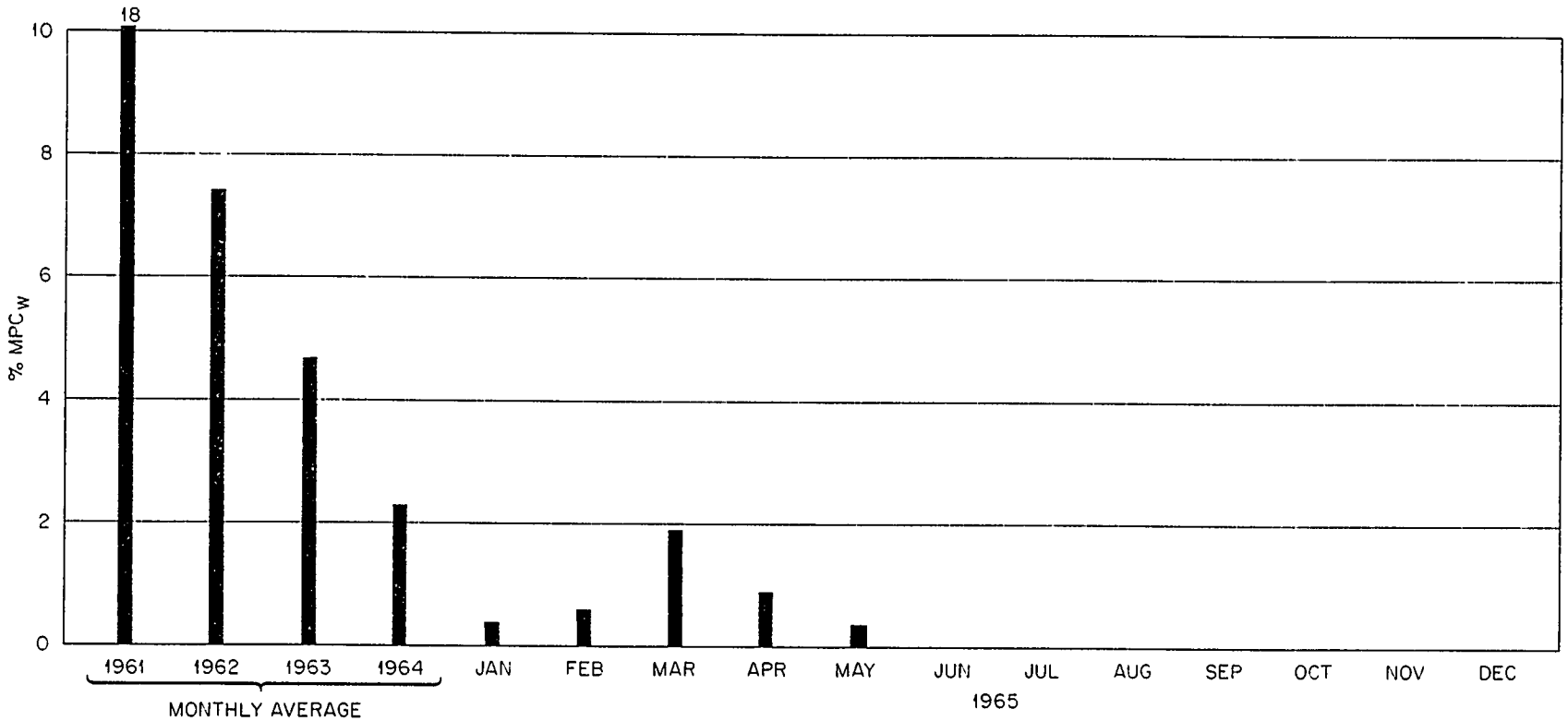

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

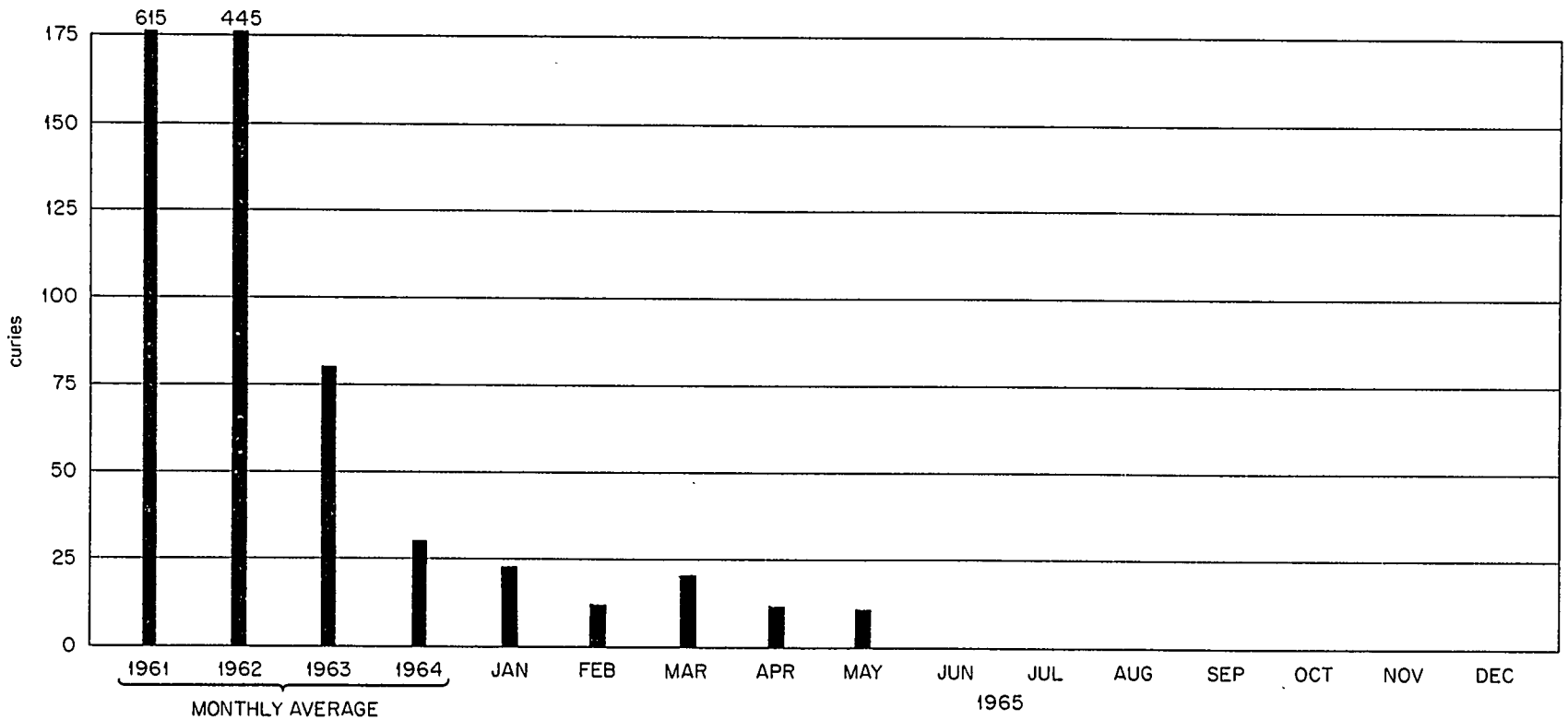

Fig. 3. Total Activity Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3, 4, 5 and 6, Shown in Fig. 1).

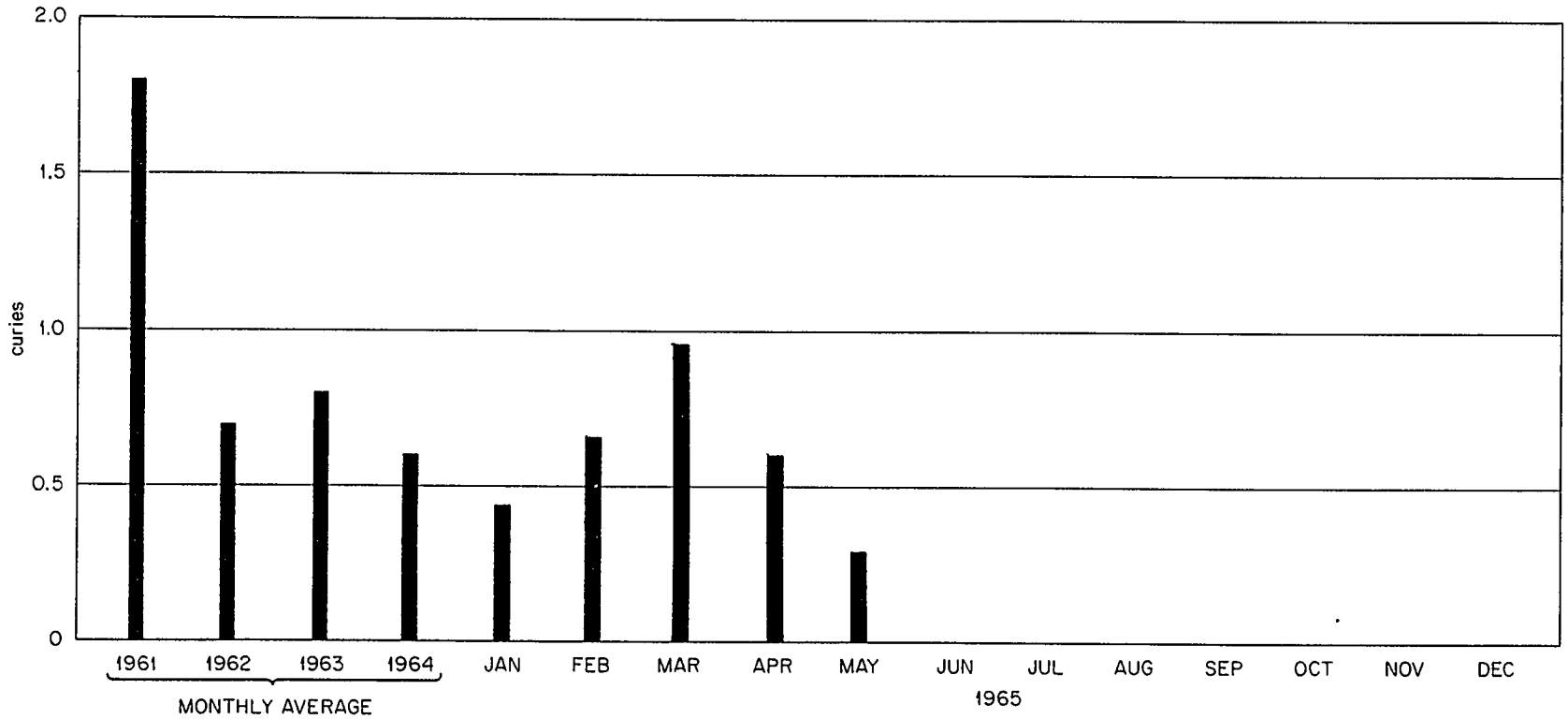

Fig. 4. ^{89}Sr and ^{90}Sr Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3,4,5 and 6, Shown in Fig. 1).

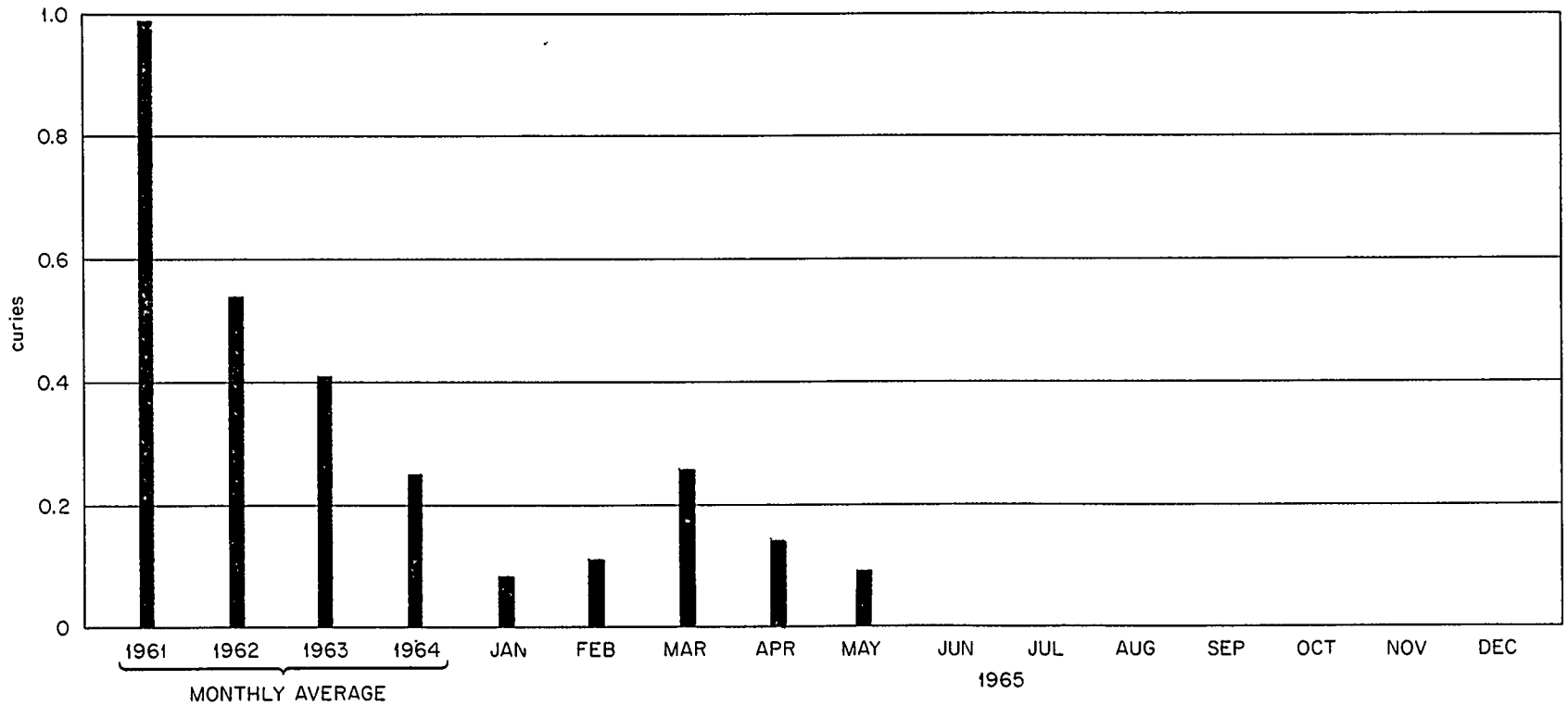

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

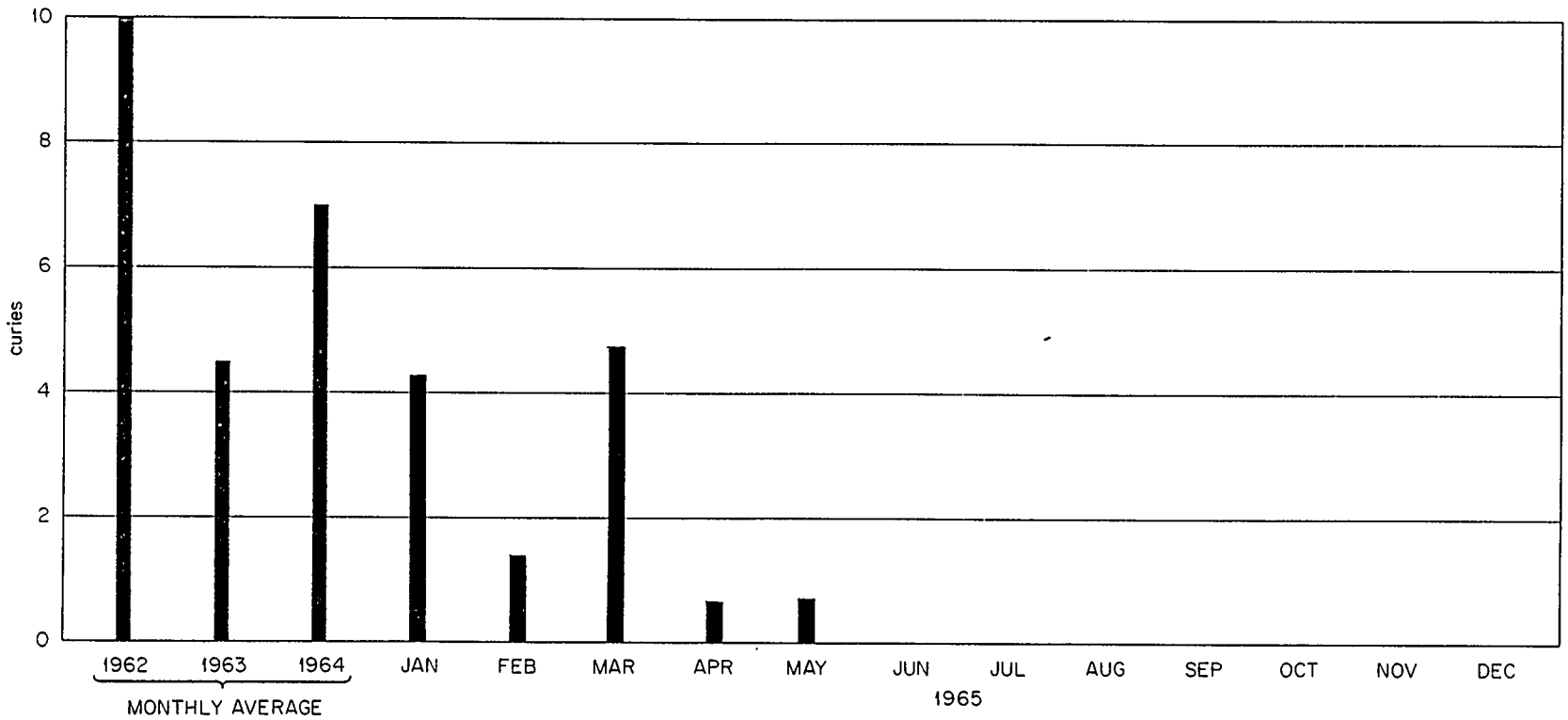

Fig. 6. Total[1] Activity Released in Gaseous Waste

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

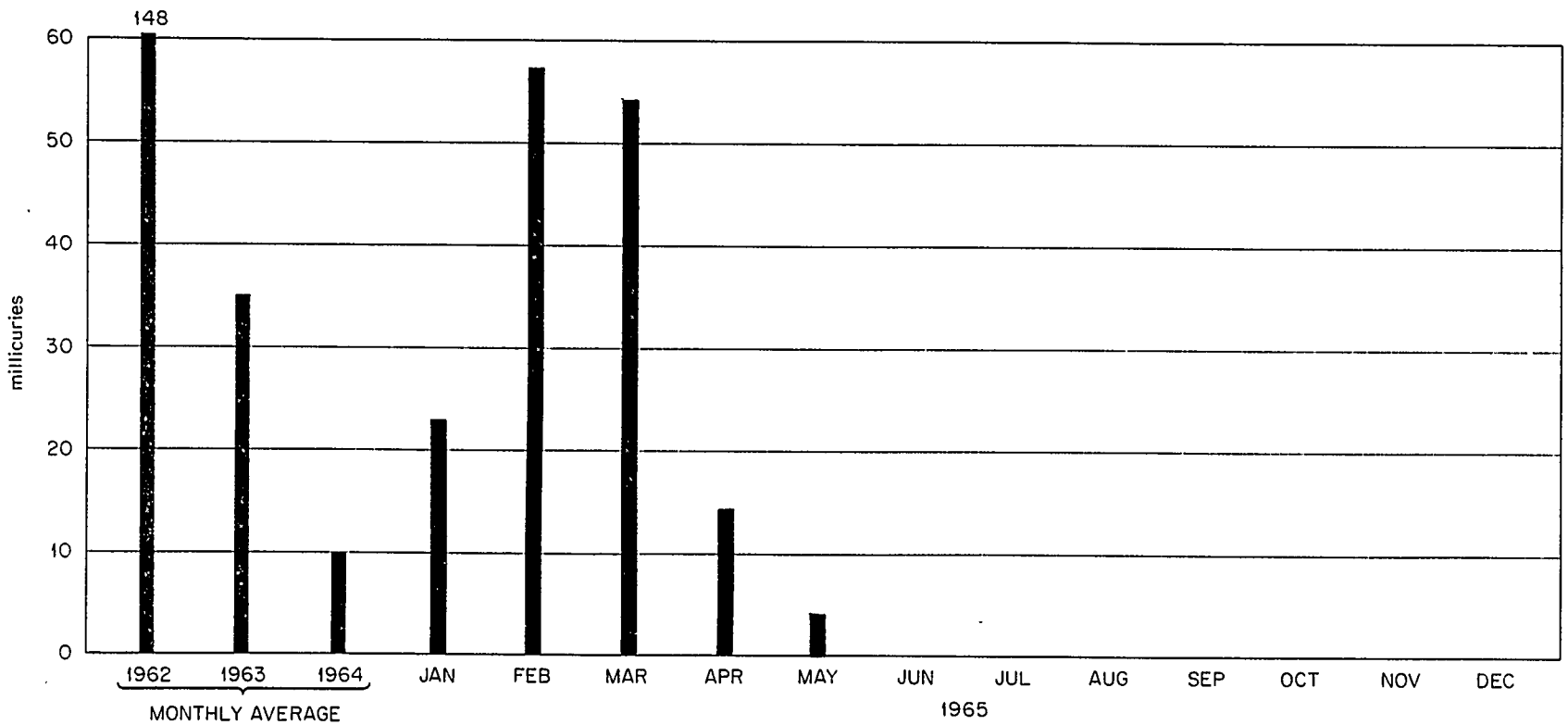

Fig. 7. Filterable Activity Released in Gaseous Waste

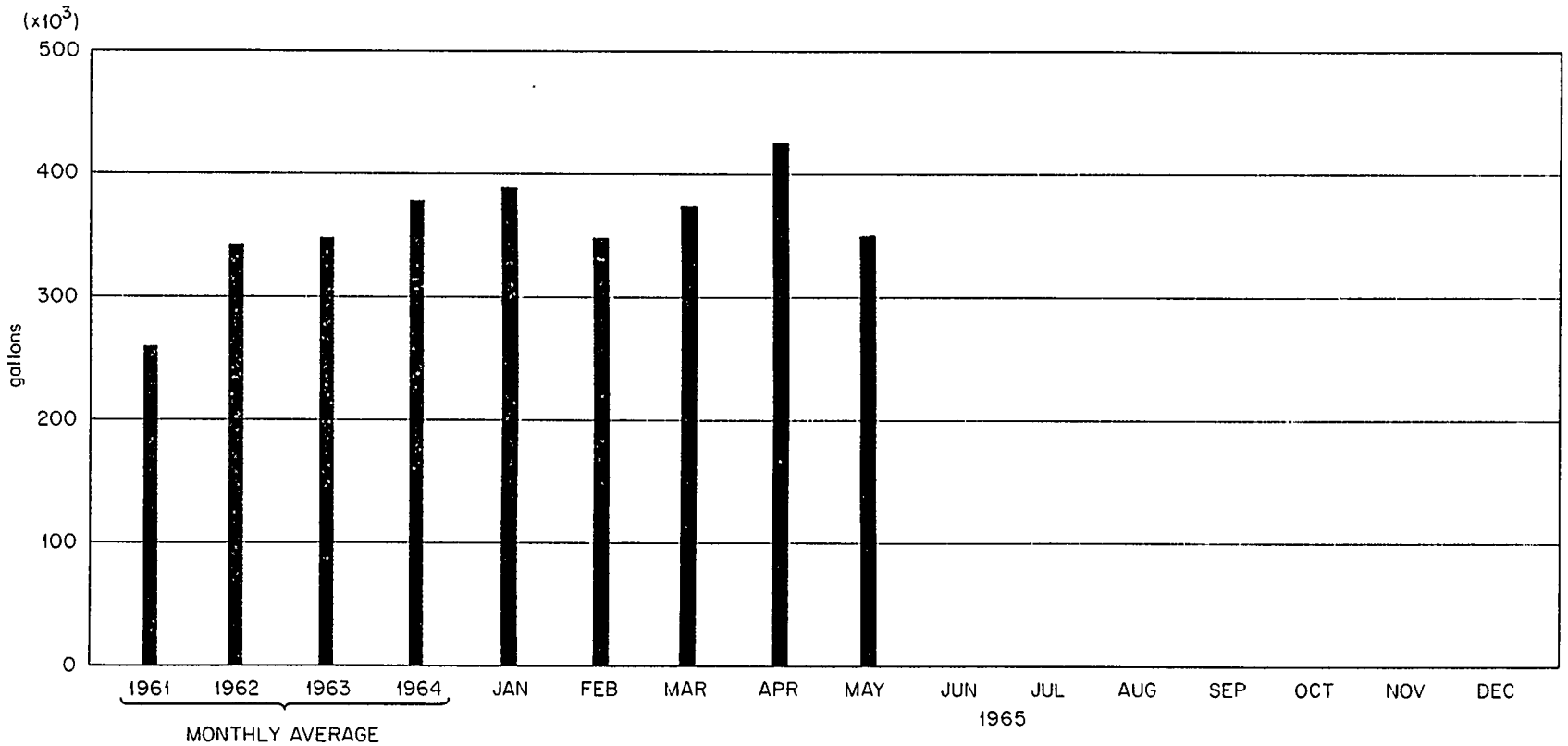

Fig. 8. Intermediate Level Waste Volumes

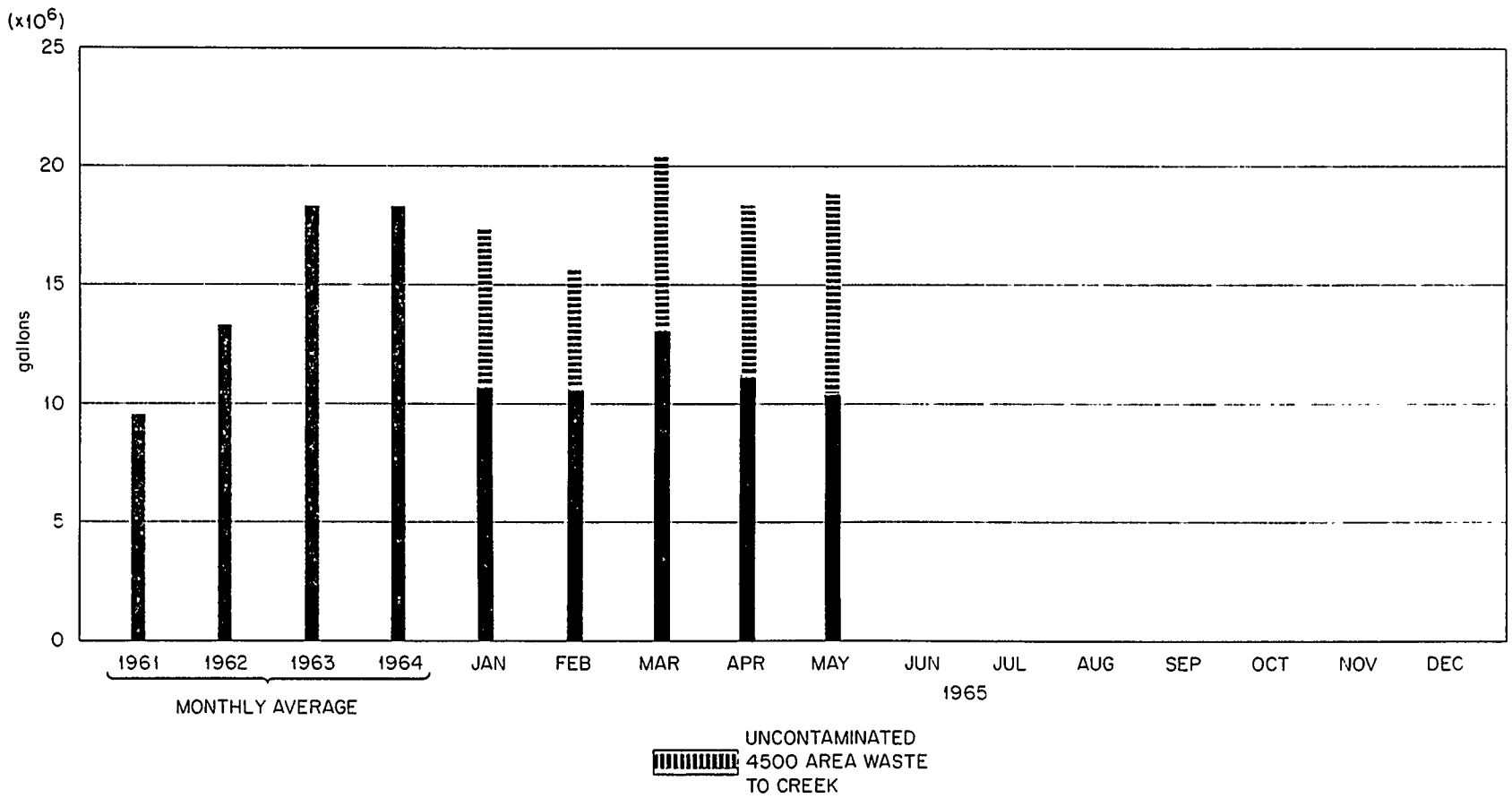

Fig.9. Process Waste Volumes

Distribution:

1. H. H. Abee
2. T. A. Arehart
3. S. E. Auerbach
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SUBJECT: Radioactive Waste Disposal Operations

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FROM: J. F. Manneschmidt
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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 DISCHARGE (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] CURIES	GROSS BETA ACTIVITY[1] % OF TOTAL	VOLUME GAL x 10^6	VOLUME % 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

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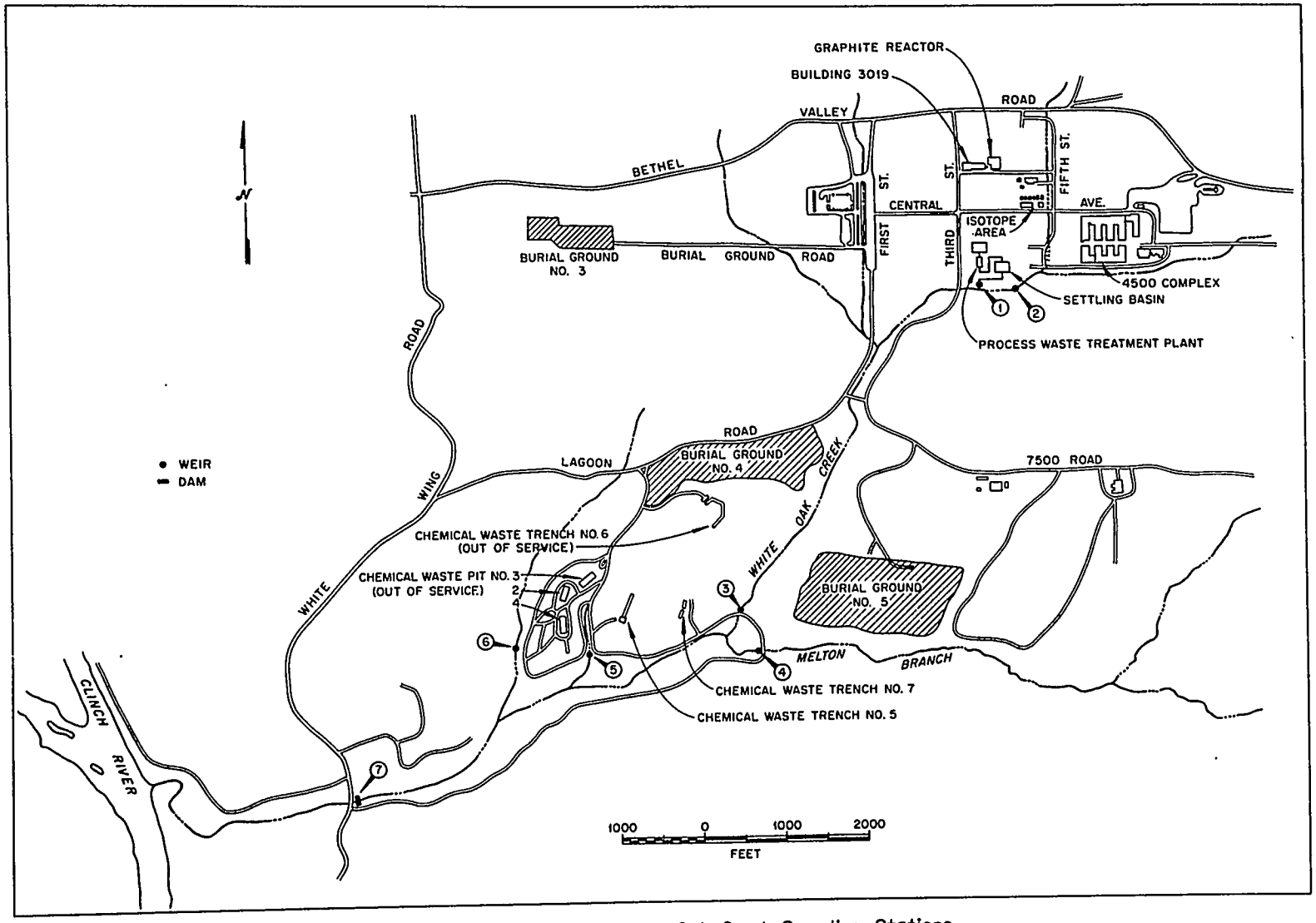

Fig. 1. Location Plan for White Oak Creek Sampling Stations.

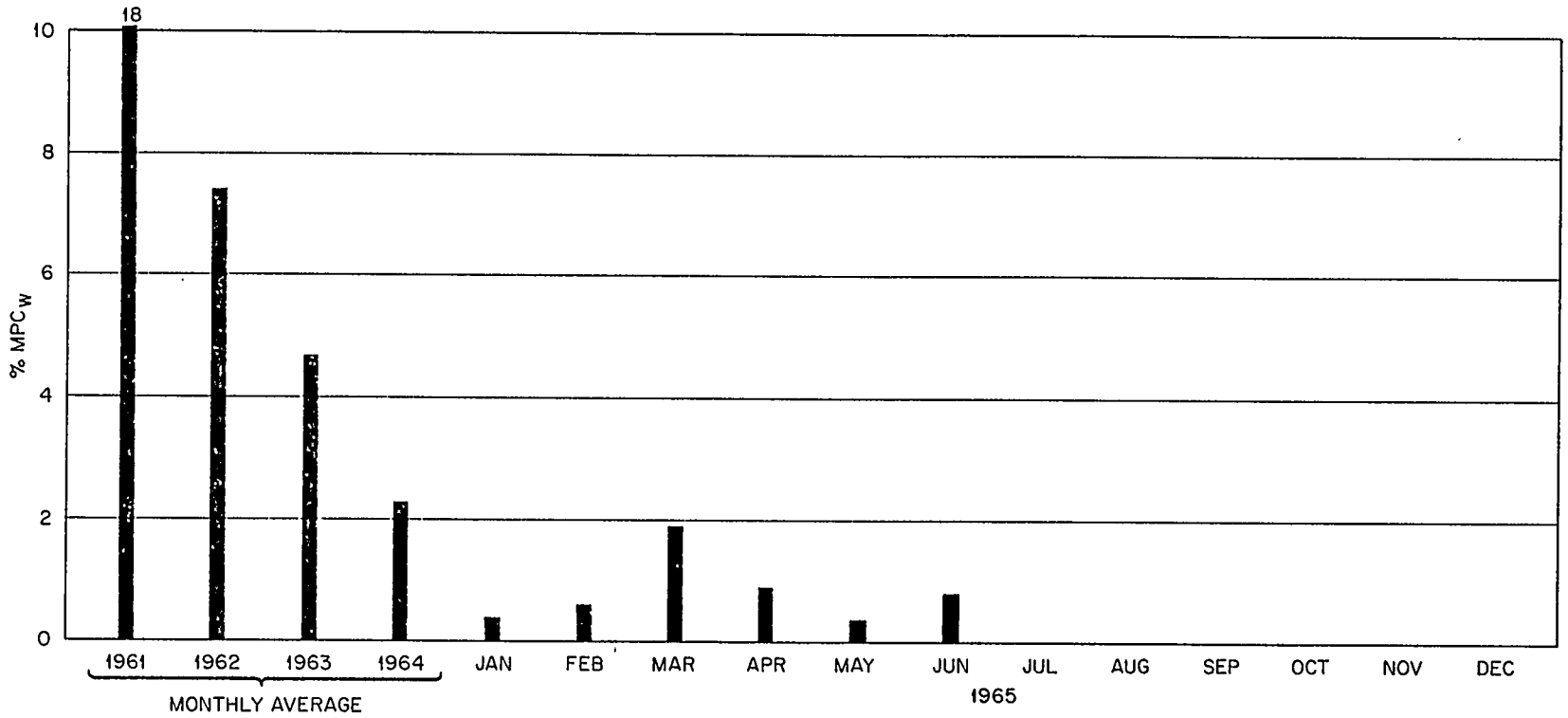

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

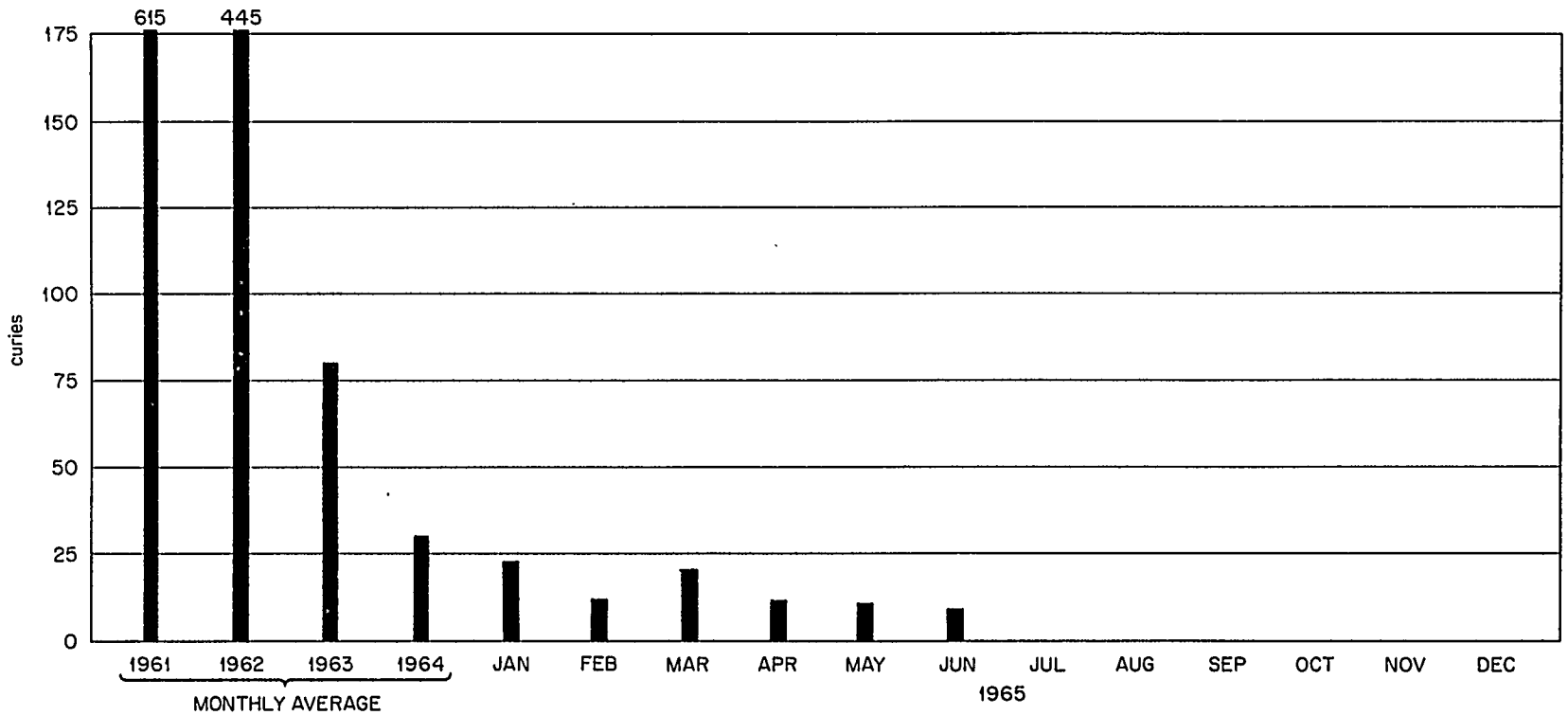

Fig. 3. Total Activity Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3, 4, 5 and 6, Shown in Fig. 1).

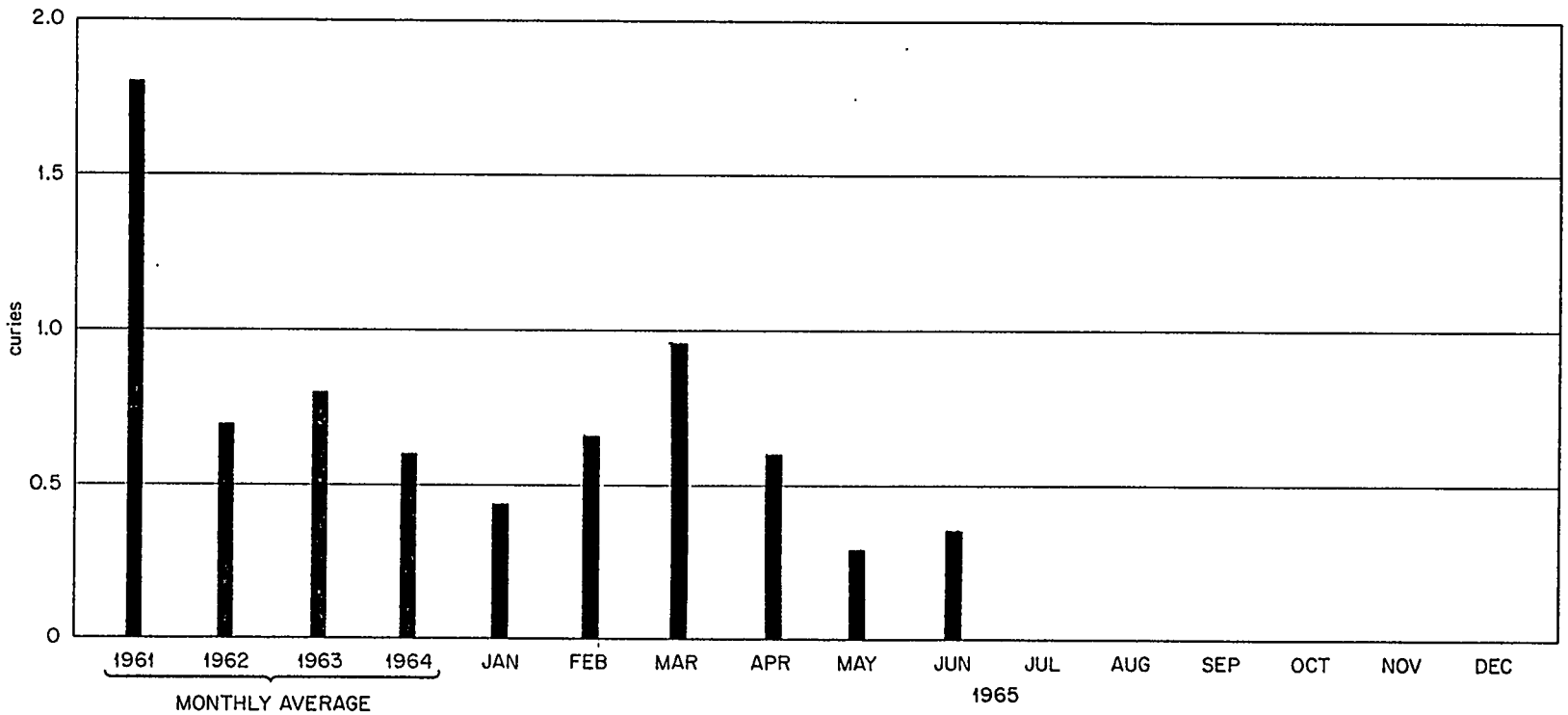

Fig. 4. ^{89}Sr and ^{90}Sr Discharged to White Oak Creek from all Sources (Measured at Sampling Stations 3,4,5 and 6, Shown in Fig. 1).

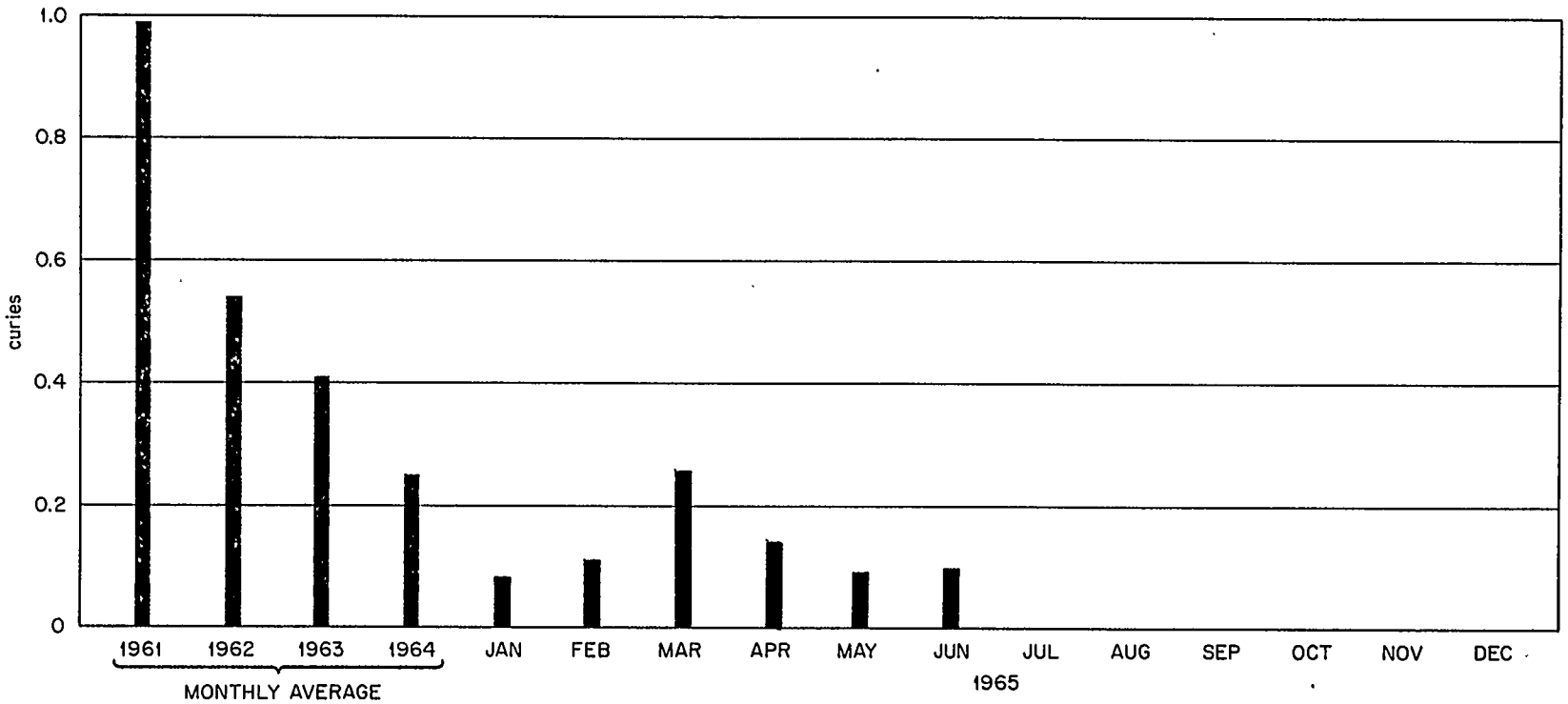

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

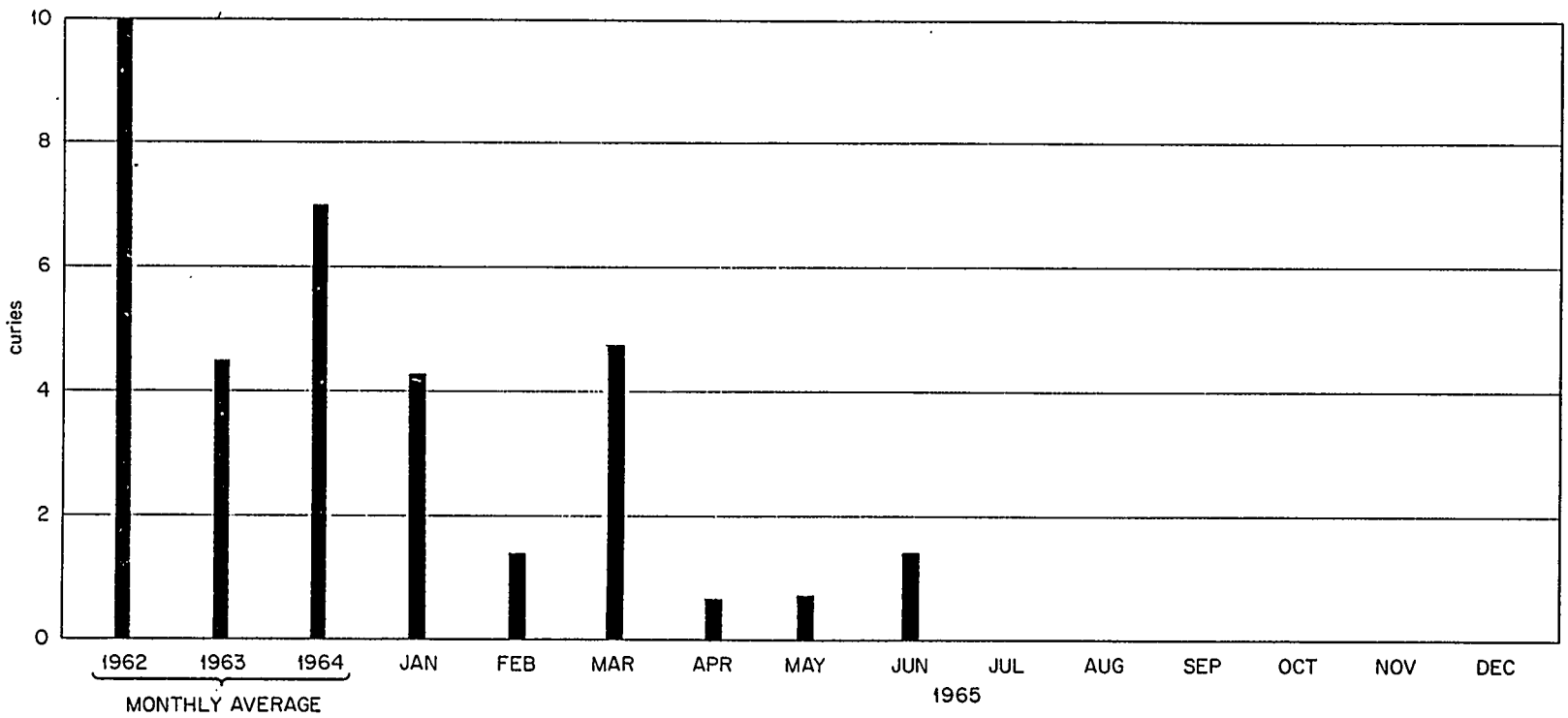

Fig. 6. Total[1] Activity Released in Gaseous Waste

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

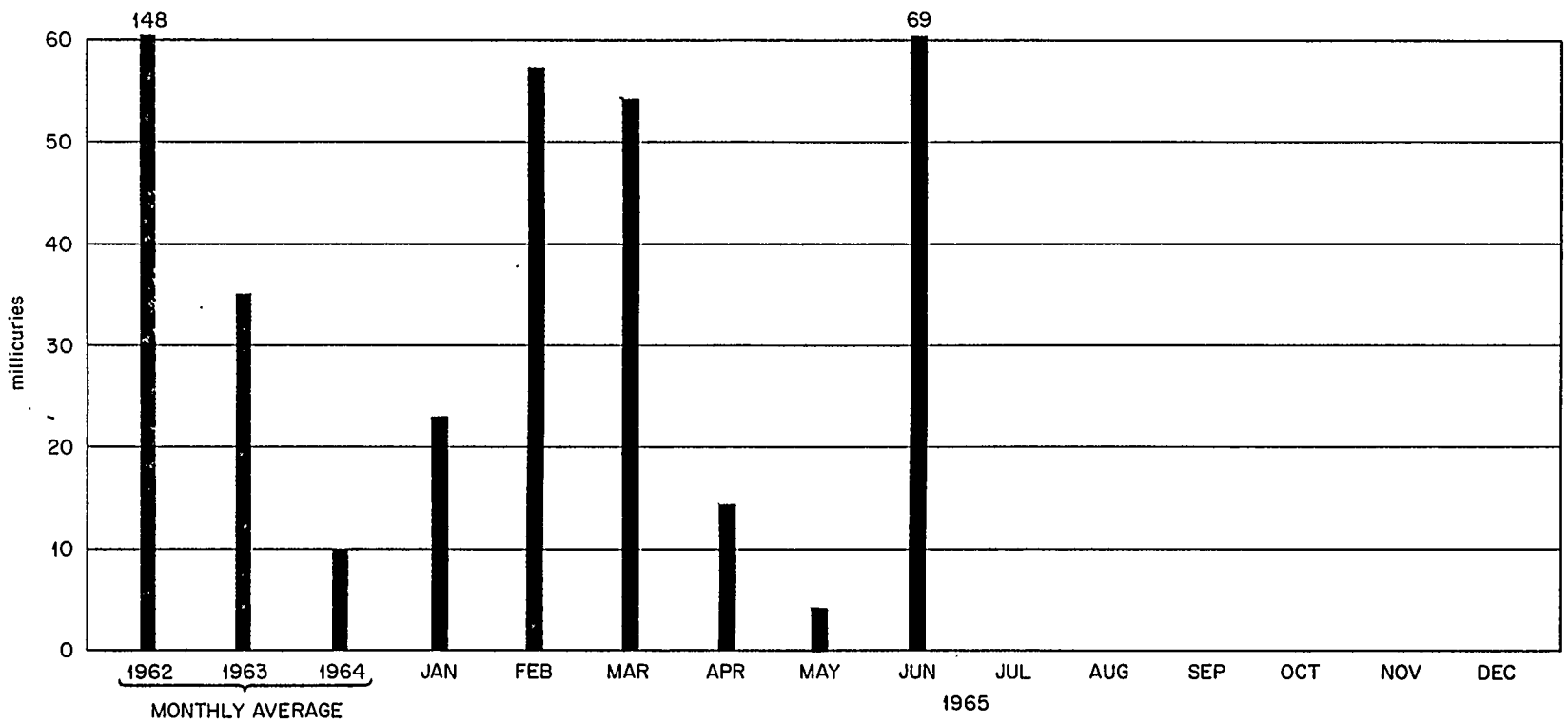

Fig. 7. Filterable Activity Released in Gaseous Waste

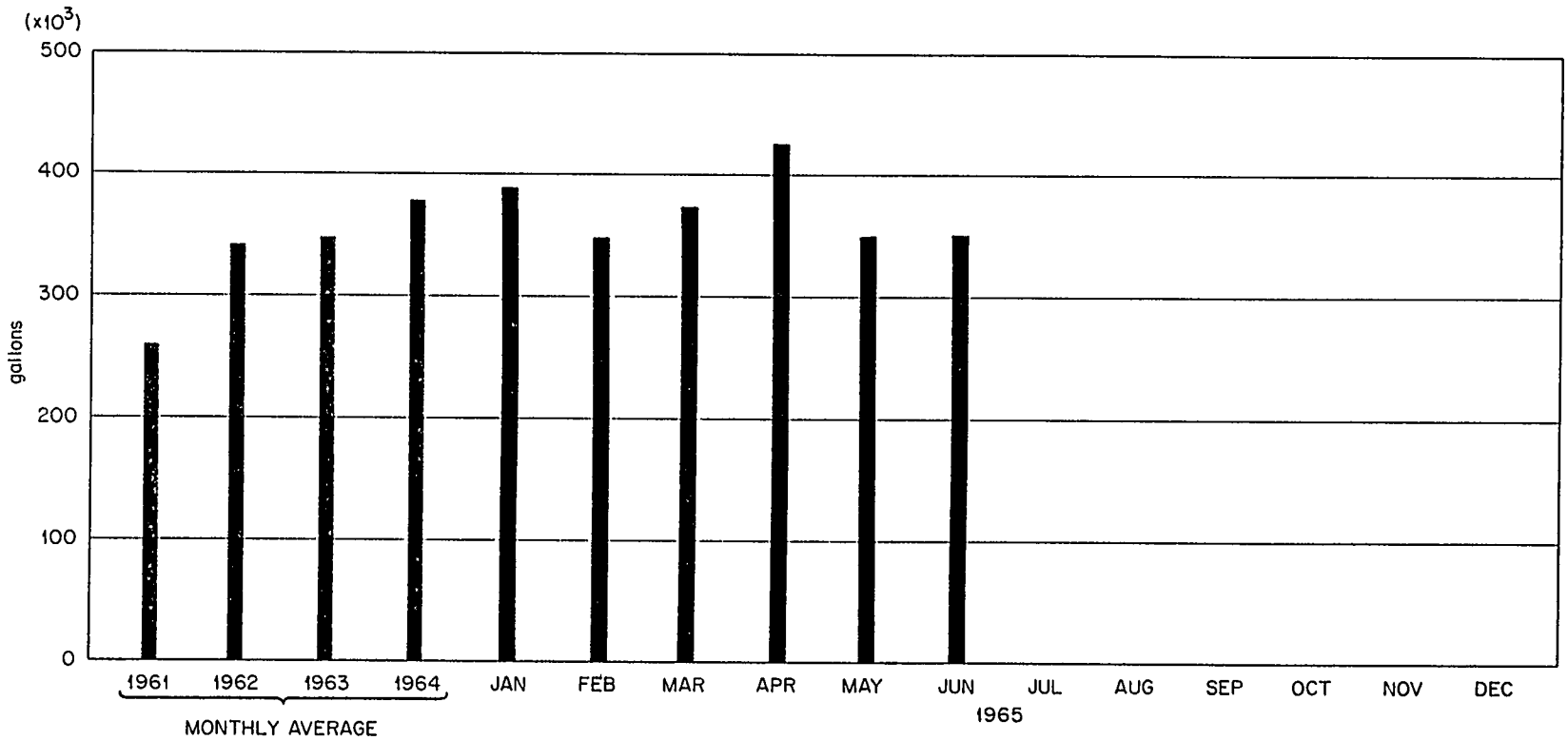

Fig. 8. Intermediate Level Waste Volumes

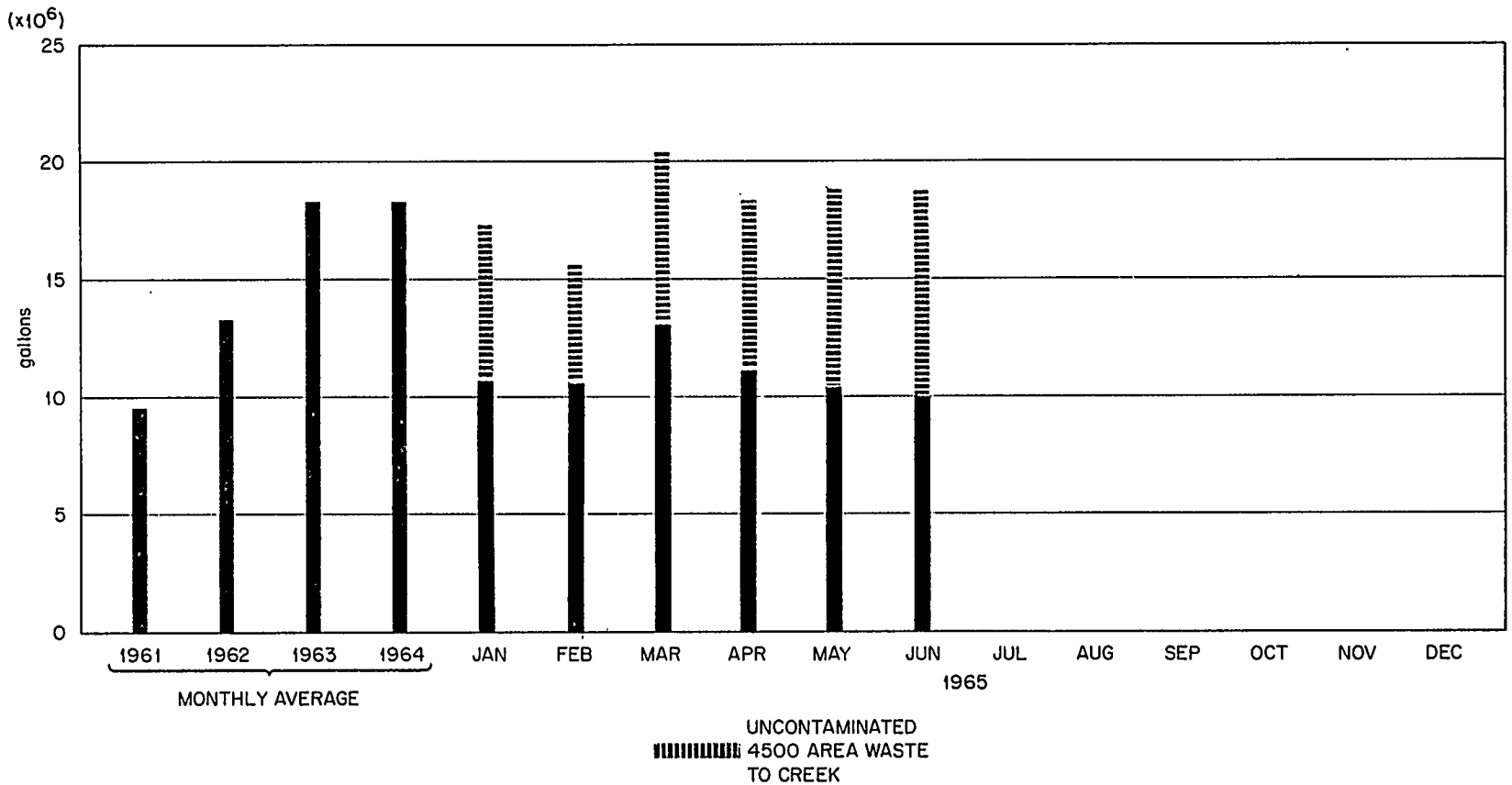

Fig.9. Process Waste Volumes

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FROM: L. C. Lasher

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of the amounts of radioactivity measured by sampling stations along White Oak Creek. The physical locations of these stations are shown in Figure 1. Figures 2, 3, 4, and 5 compare data obtained from these stations over extended periods of time. Figures 6 and 7 compare the volumes of liquid waste handled.

The total amount of radioactivity released to White Oak Lake was 9.04 curies. Ruthenium (7.29 curies), cesium (0.48 curie), and cobalt (0.99 curie) comprised the bulk of the release. A smaller amount of strontium (0.28 curie) was also present. Of this total, only 0.12 curie was discharged from the process waste system. The balance came from sources not routinely monitored.

The radioactivity released from the air handling systems was 0.65 curie. The activity was primarily in the gaseous state and consisted of 344 millicuries of ^{131}I, 46 millicuries of ^{197}Hg and 251 millicuries of ^{203}Hg. Only 9 millicuries of filterable activity was measured. Table 2 lists the releases from all of the operating stacks. Figures 8 and 9 compare gaseous releases on a monthly and yearly basis.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Approximately 10 million gallons of waste was treated this month; 9 million gallons of uncontaminated water was diverted by the 4500 ponds and dumped into the creek without chemical treatment.

The operation of the Process Waste Treatment Plant was erratic. There were several failures of the chemical feeding systems, and the recycle system was down several days because of a plug in the suction

header to the transfer pump. During this outage, the plant effluent by-passed the Settling Basin and was discharged directly to the creek. Strontium decontamination achieved by the plant was about normal; however, clean-up of cobalt and cesium was poor.

A summary of plant operations is shown in Table 3; the major contributors to the system are listed in Table 4.

INTERMEDIATE-LEVEL WASTE

A total of 334,800 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	173,690
2.	Trench 7A	60,470
3.	Trench 7B	100,640

Major contributors to the ILW system are listed below:

		Gallons
1.	Reactor Complex	57,600
2.	4500 Complex	50,960
3.	Building 3019	37,730
4.	Fission Products Development Laboratory	21,500
5.	Radioisotopes Processing Area	18,450

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Total Sr	^{106}Ru	^{137}Cs	Total[b]
Process waste	1	0.12	none detected	0.19	0.34
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	0.01	0.02
Total discharge from Bethel Valley Area	3	0.26	0.01	0.13	0.40
Total discharge from Melton Valley Area	4	0.02	< 0.01	< 0.01	0.02
East waste pit seepage	5	< 0.01	4.48	0.24	5.44
West waste pit seepage	6	< 0.01	2.80	0.11	3.18
Total discharge from all sources	3,4,5,6	0.28	7.29	0.48	9.04
White Oak Dam to Clinch River (Health Physics measurement)	7	0.16	1.64	0.06	2.44

[a]Refers to Fig. 1

[b]Includes other nuclides not listed here

TABLE 2

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.01
Central Radioactive Gas Disposal Facilities	3039	0.64
Radiochemical Processing Pilot Plant	3020	$<$ 0.01
Graphite Reactor Building	3018	$<$ 0.01
MSRE	7512	$<$ 0.01
Total activity in gases released		0.65

[a]Activity primarily ^{131}I as noted in text

TABLE 3

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.6×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.5×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.64	0.12	81
$^{103,106}Ru$	none detected	none detected	-
^{60}Co	0.05	0.03	50
^{137}Cs	0.38	0.19	40
Gross Beta Analysis	26	5	81

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

TABLE 4

PROCESS WASTE DISCHARGES

		GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[a]		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	16[b]	0.53	21.2	2.45	23.3
2.	Radioisotope Processing Area	154[c]	1.91	76.4	0.92	8.8
3.	Buildings 3503 and 3508	2	0.06	2.4	2.11	20.1
4.	Buildings 3025, 3026 and 3550	< 1	--	--	--	17.2
5.	Building 3019	0	--	--	2.13	20.3
6.	Fission Products Development Laboratory	0	--	--	0.03	0.3
7.	4500 Area	None	None	None	None	None
8.	Building 3525	0	--	--	0.93	8.8
9.	Building 2026	< 1	--	--	0.13	1.2

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

[c]This activity was identified as ^{137}Cs.

TABLE 5

ACTIVITY TRANSFERRED TO WASTE 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	56,840	78,524	5,303	92,317	185	4,953	10,583	21,090	315	5,921	6,867	19,625
^{106}Ru	293	379	118	6,352	5	51	189	1,836	8	48	126	1,505
^{137}Cs	13,543	35,419	58,688	191,253	3,760	26,367	53,398	116,349	6,392	25,495	35,876	98,933
^{60}Co	1,583	1,815	110	2,952	5,460	5,564	131	6,091	9,282	9,403	88	9,899
Totals	72,259	116,137	64,219	292,874	9,410	36,935	64,301	145,366	15,997	40,867	42,957	129,962

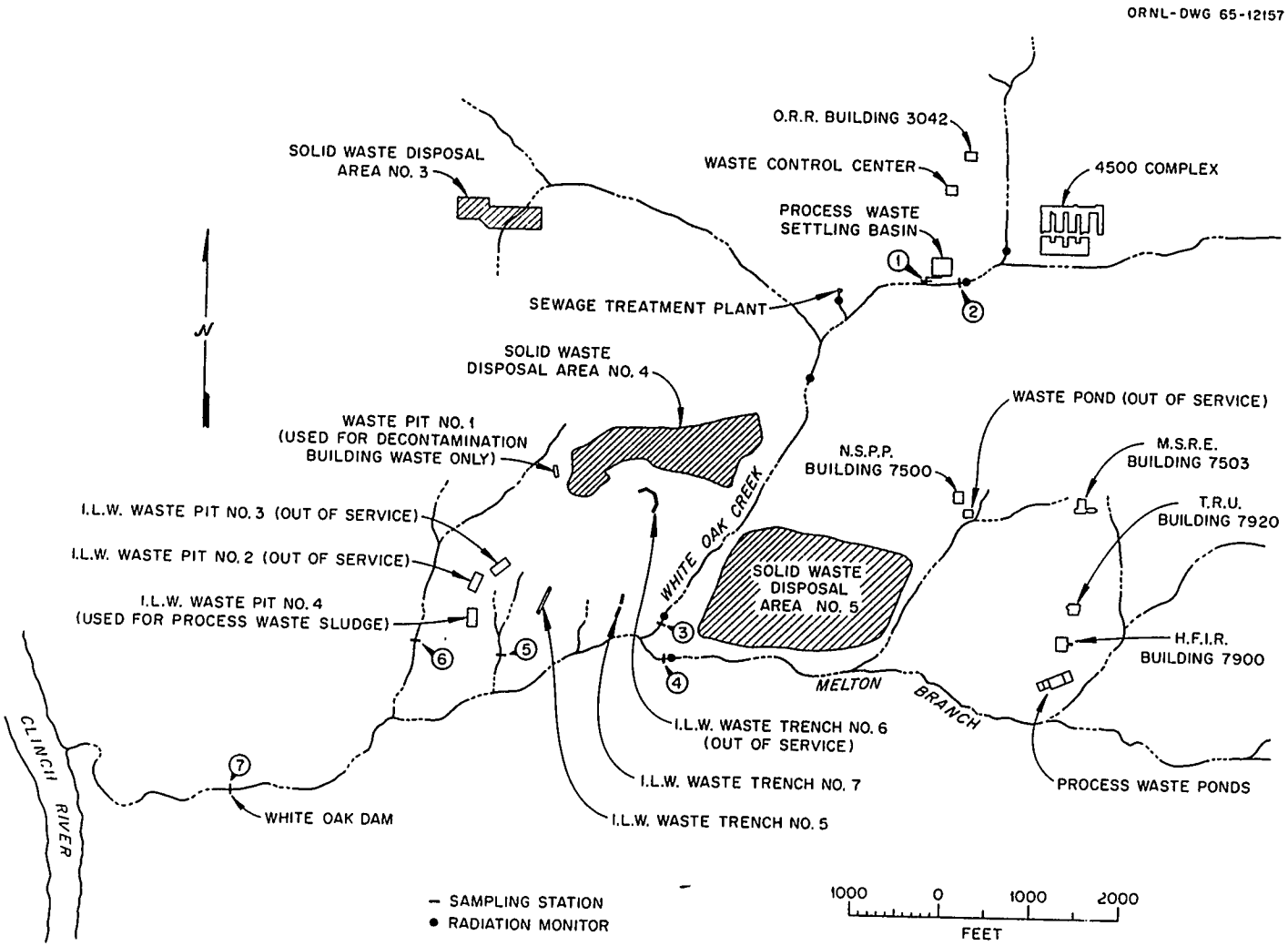

Fig. 1. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

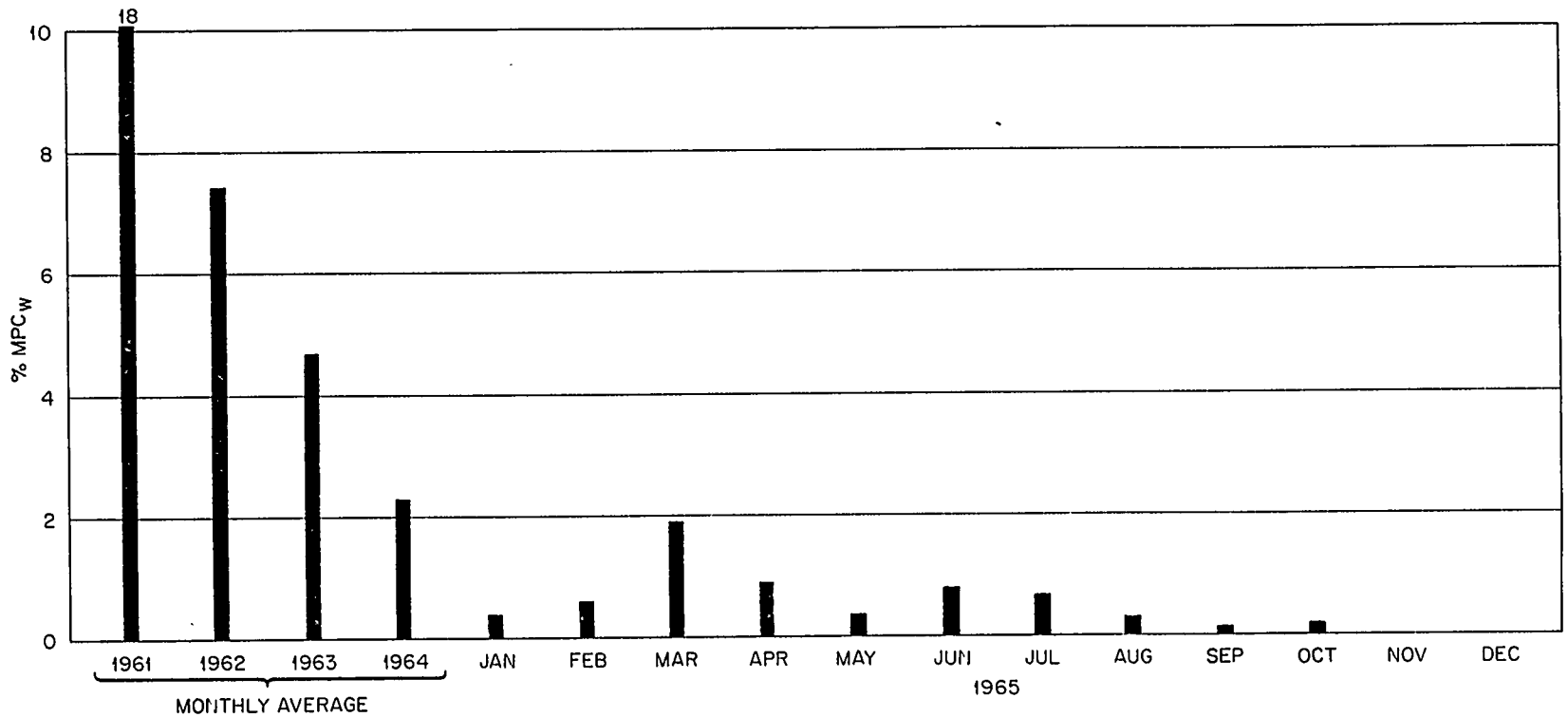

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

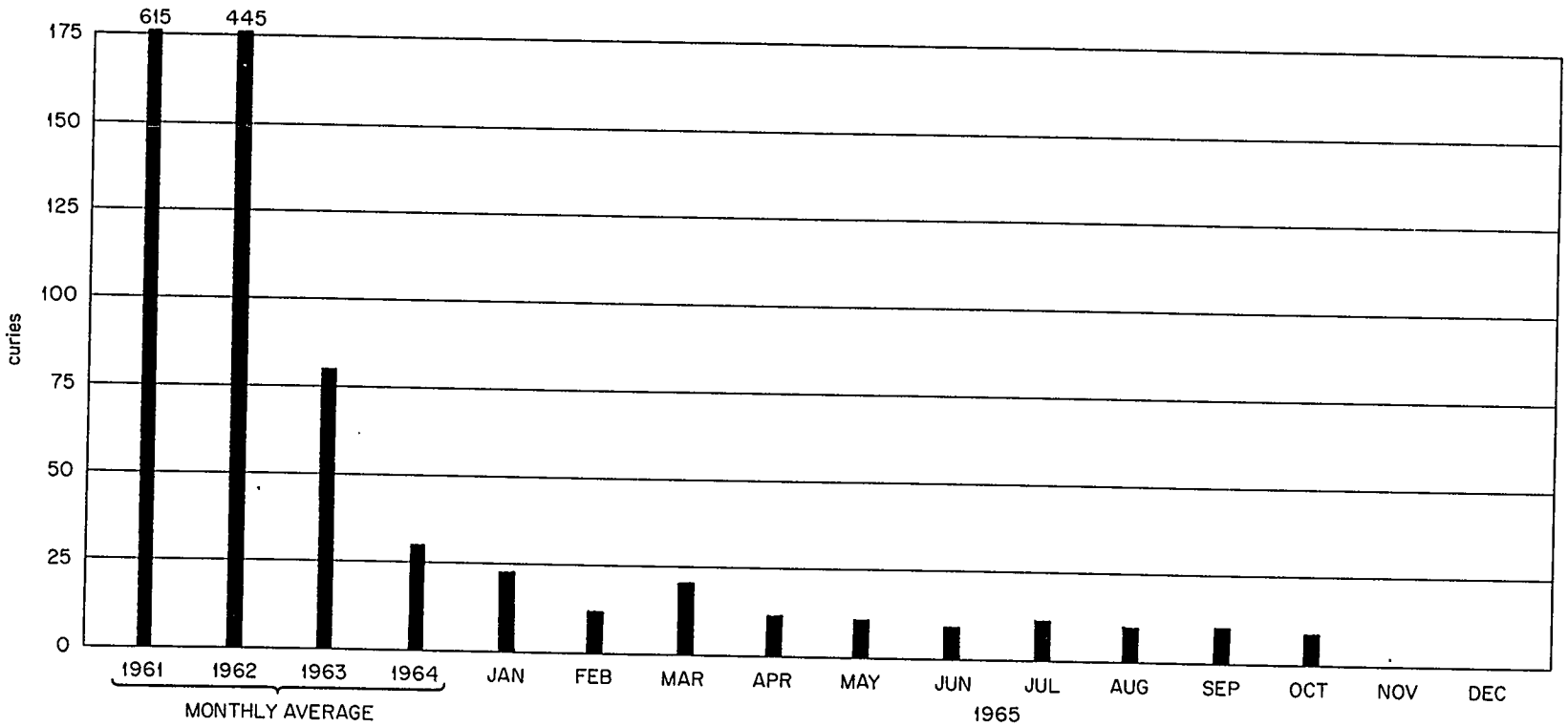

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

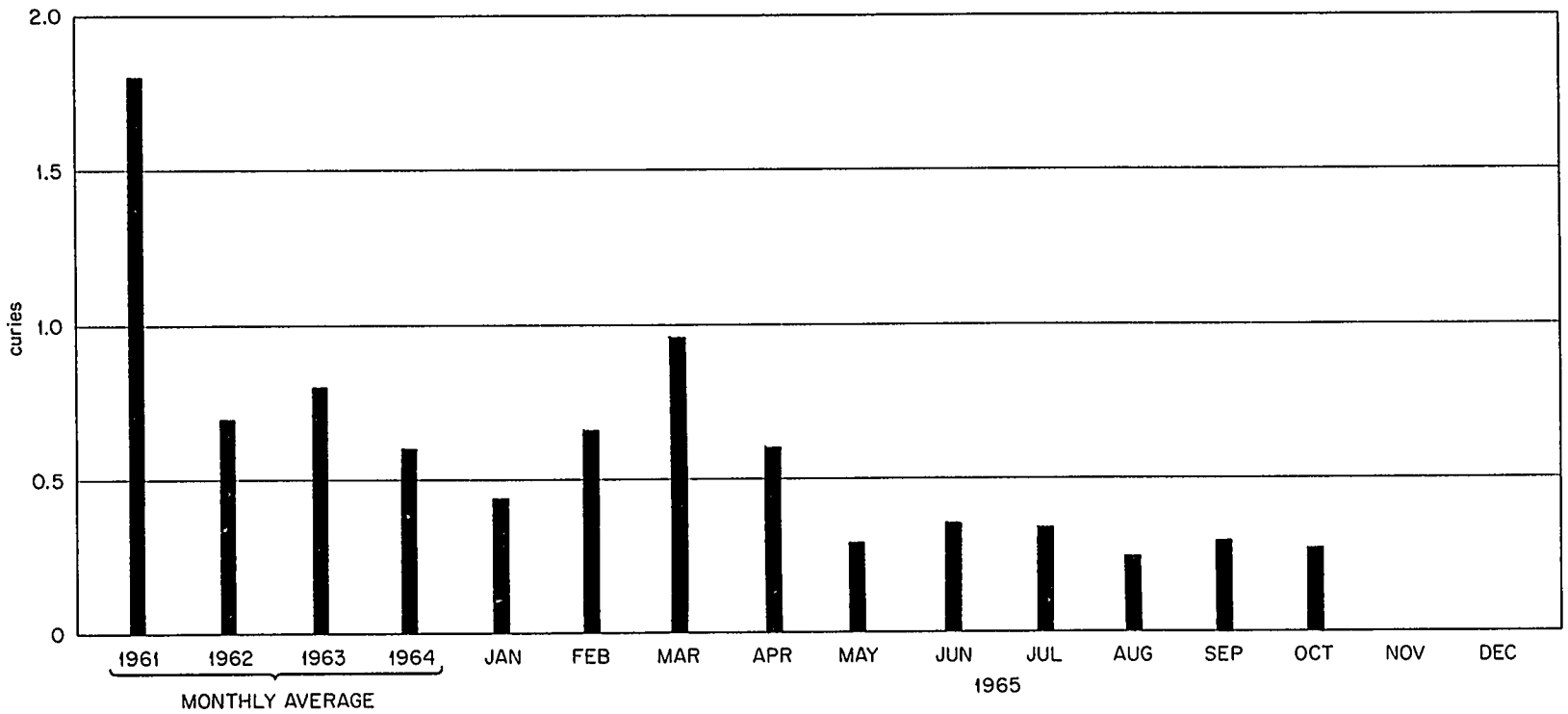

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

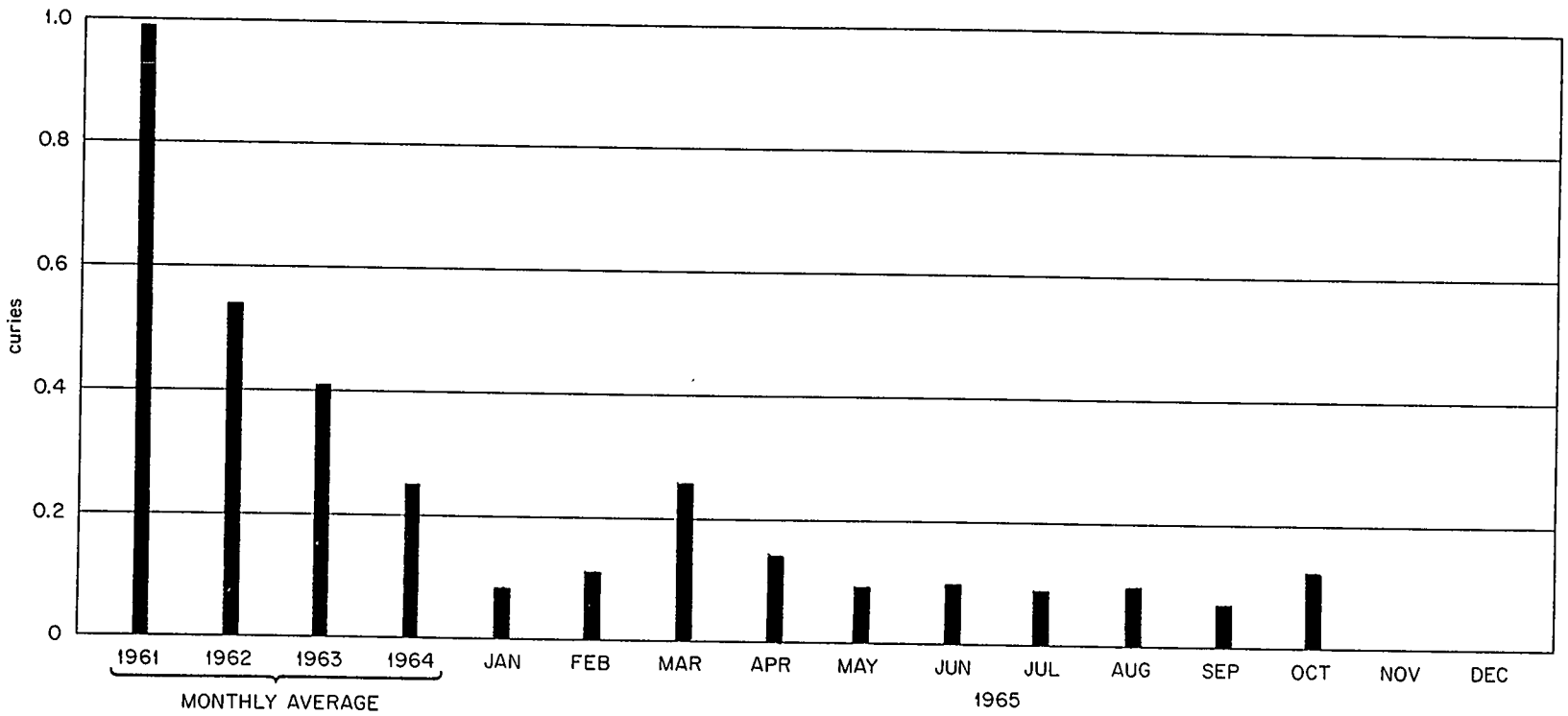

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

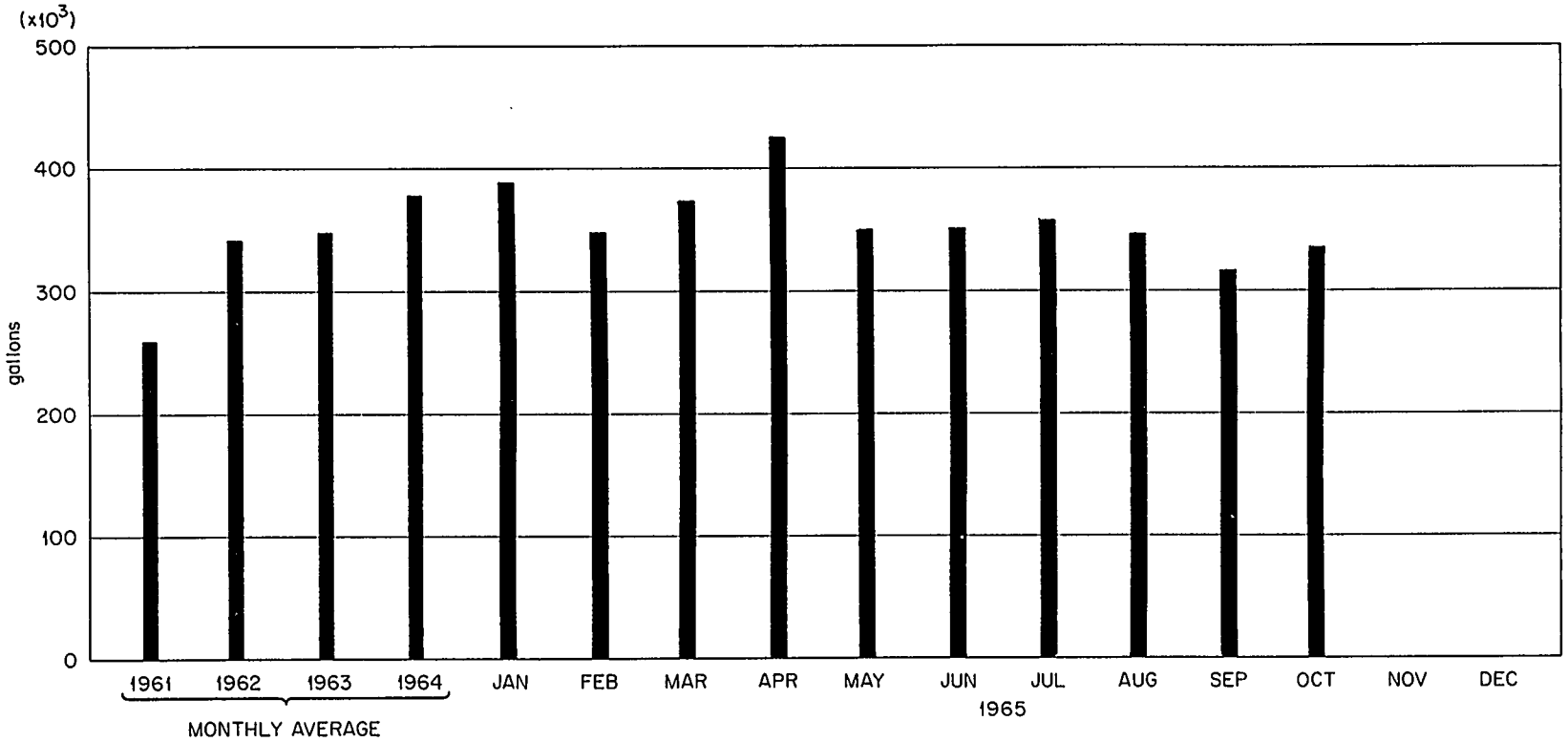

Fig. 6. Intermediate Level Waste Volumes

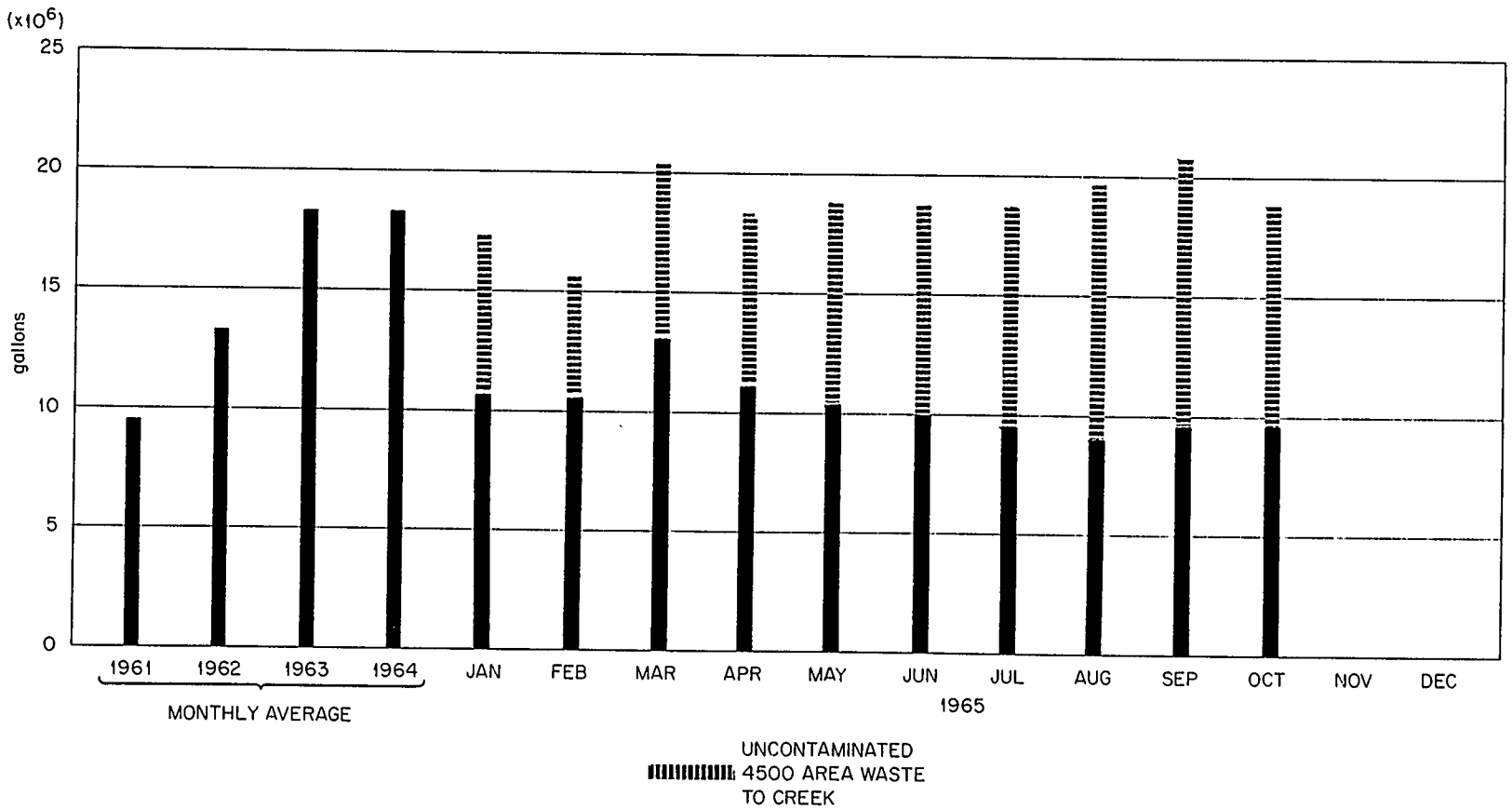

Fig. 7. Process Waste Volumes

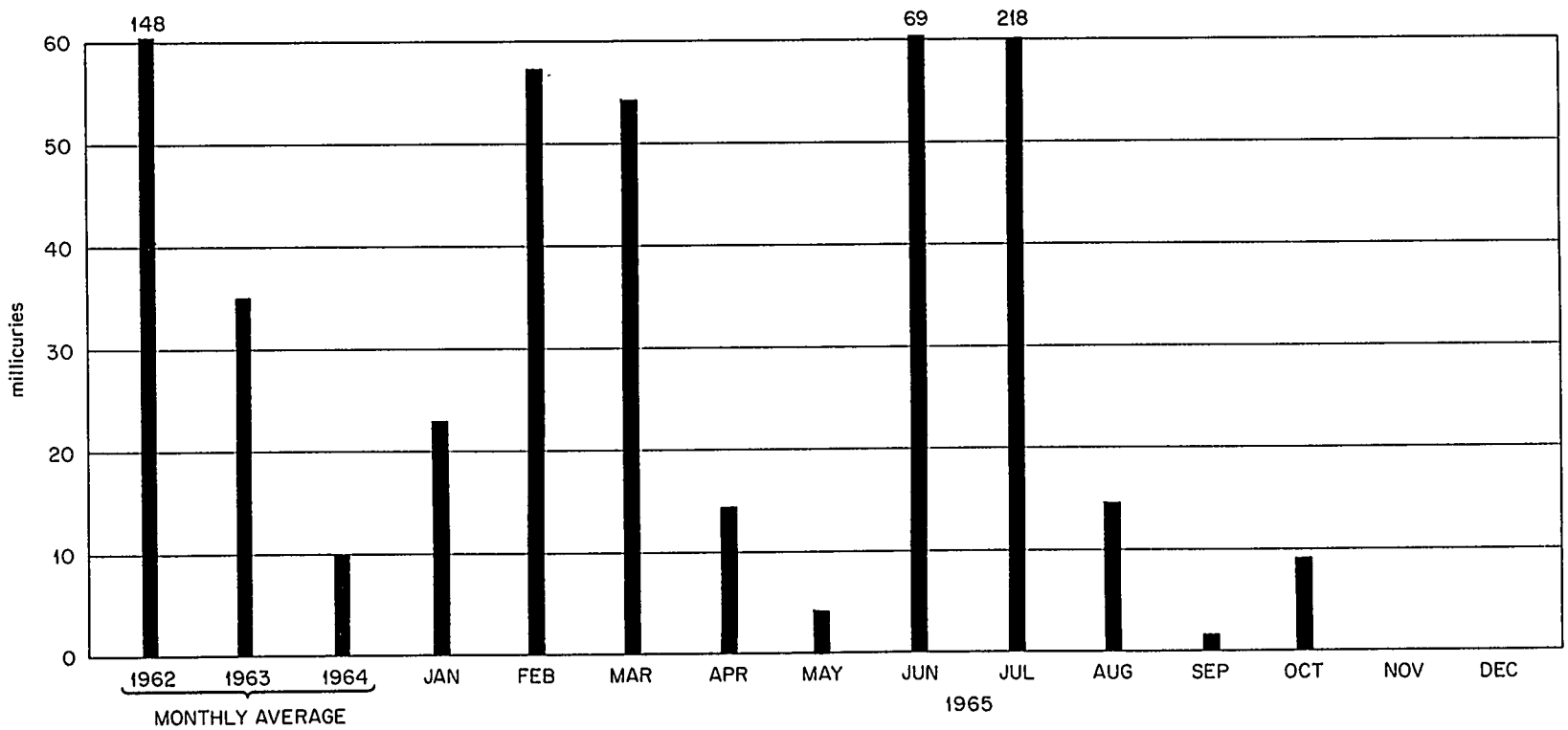

Fig. 8. Filterable Activity Released in Gaseous Waste

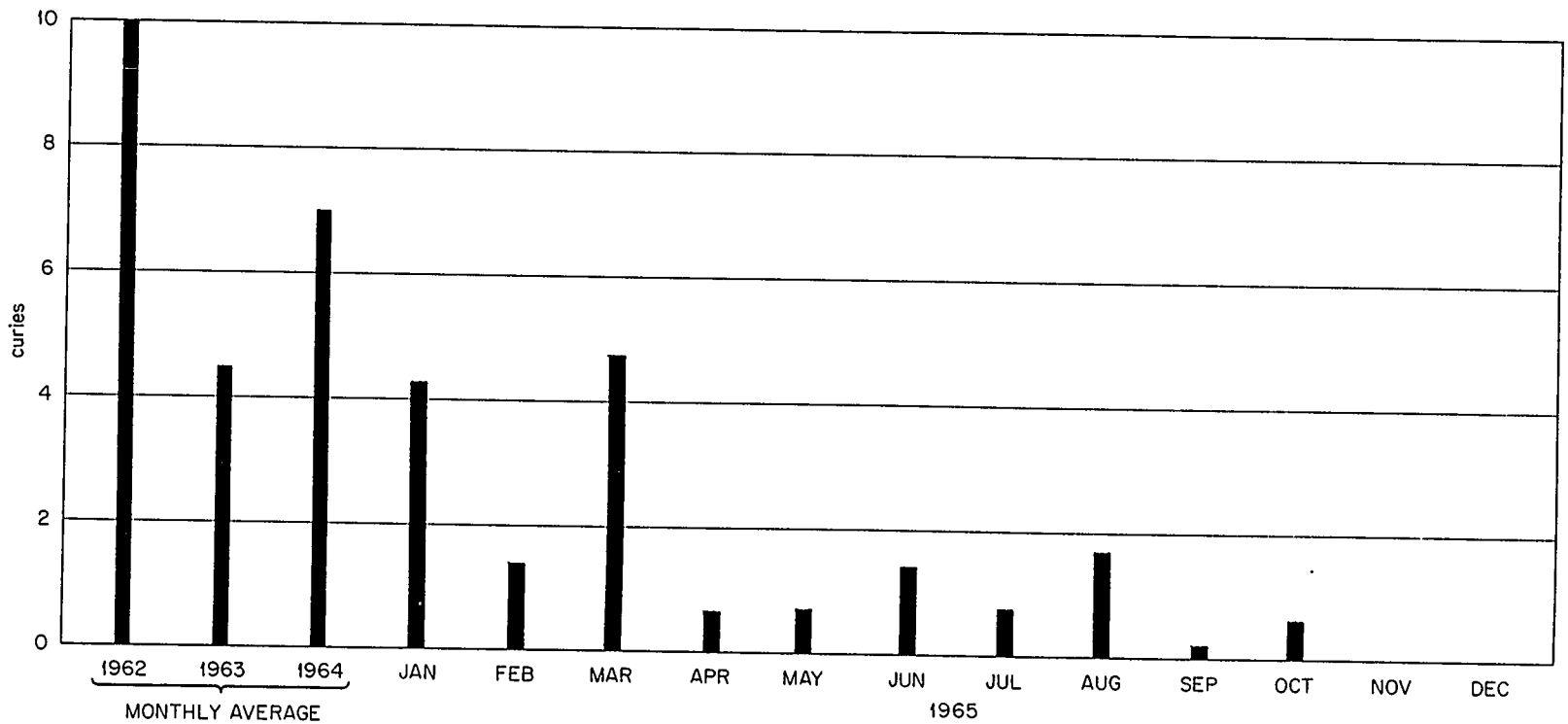

Fig. 9. Total[1] Activity Released in Gaseous Waste

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

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 summarizes the amounts of radioactivity measured by sampling stations along White Oak Creek. The physical locations of these stations are shown in Figure 1. Figures 2, 3, 4, and 5 compare data obtained from these stations over extended periods of time. Figures 6 and 7 compare the volumes of liquid waste handled.

A total of 7.77 curies of activity was discharged to White Oak Lake. Ruthenium (5.53 curies), cobalt (1.14 curies), and cesium (0.47 curie) made up the bulk of the release. Most of the ruthenium and cobalt originated in the soil disposal area. The strontium discharge was 0.63 curie with the process waste system contributing only 0.19 curie of the total. The remainder of the strontium came from sources not routinely monitored and probably from the creek bed itself.

The gaseous waste released amounted to 0.75 curie. This activity was primarily ^{131}I released by the 3039 air-handling system. Small amounts of ^{197}Hg (0.02 curie) and ^{203}Hg (0.01 curie) were also detected. The particulate discharge was insignificant (0.002 curie). Table 2 lists the releases from the operating stacks; Figures 8 and 9 compare stack releases on both monthly and yearly bases.

Summary of Releases For The Year 1965

The amount of radioactivity released in liquid waste to the environment continued the downward trend in 1965. The average monthly release of strontium to White Oak Lake in 1965 was 450 mc as compared to an average of 600 mc in 1964. Ruthenium, accounting for 84% of the total release, was reduced from an average of 30 curies per month in 1964 to 12 curies per

month in 1965.

The strontium discharged in process wastes was 120 mc per month or 27% of the total. The remainder came from several small sources not routinely monitored and probably from the White Oak Creek bed which was contaminated years ago when the Laboratory discharges were relatively high.

The ^{131}I released from the gaseous waste systems was an average of 1.4 curies per month in 1965 and 7.0 curies per month in 1964. The particulate activity in 1965 averaged 39 mc per month in 1965 and 10 mc per month in 1964. Eighty-seven percent of the particulate activity in 1965 was ^{137}Cs and the remainder ^{131}I.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Waste Treatment Plant processed 9.1 million gallons of contaminated water this month. An additional 8.2 million gallons of uncontaminated water was diverted by the 4500 ponds and dumped directly to the creek without chemical treatment. The chemical treatment system operated normally during the month; the decontamination achieved was 92%.

The waste system was inadvertantly contaminated with abnormal amounts of ^{90}Sr (approximately 2 curies) and ^{137}Cs (approximately 3 curies) when contaminated liquid from a valve-pit sump was pumped into the system. Chemical processing at the Waste Treatment Plant removed the bulk of this activity.

Table 3 is a summary of plant operations; Table 4 lists the major contributors to the waste system.

INTERMEDIATE-LEVEL WASTE

A total of 304,000 gallons of waste was pumped into the soil disposal trenches this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	169,000
2.	Trench 7A	39,000
3.	Trench 7B	96,000

Major contributors to the system are listed below:

		Gallons
1.	Reactor Complex	71,000
2.	4500 Complex	57,000
3.	Building 3019	46,000
4.	Radioisotopes Processing Area	19,000
5.	Fission Products Development Laboratory	17,000

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	Total[b]
Process waste	1	0.19	none detected	0.39	0.58
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	0.02
Total discharge from Bethel Valley Area	3	0.62	0.05	0.33	1.00
Total discharge from Melton Valley Area	4	0.01	< 0.01	< 0.01	0.01
East waste pit seepage	5	< 0.01	4.16	0.14	5.30
West waste pit seepage	6	< 0.01	1.32	< 0.01	1.46
Total discharge from all sources	3,4,5,6	0.63	5.53	0.47	7.77
White Oak Dam to Clinch River (Health Physics measurement)	7	0.18	1.50	0.06	2.49

[a]Refers to Fig. 1

[b]Includes other nuclides not listed here

TABLE 2

ACTIVITY RELEASED IN GASEOUS WASTES

	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.74
Radiochemical Processing Pilot Plant	3020	0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
Total activity in gases released		0.75

[a]Activity primarily ^{131}I as noted in text

TABLE 3

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.1×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.98	0.19	90
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.06	none detected	100
^{137}Cs	2.77	0.39	86
Gross Beta Analysis	115 c/m/ml	9 c/m/ml	92

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

TABLE 4

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[a]		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Seepage from Radioisotopes Area	18[b]	0.630[b]	69.9	2.48	24.3
2.	Radioisotope Processing Area	11	0.154	17.1	1.02	10.0
3.	Buildings 3503 and 3508	4	0.116	12.9	2.10	20.6
4.	Buildings 3025, 3026 and 3550	< 1	--	--	1.69	16.5
5.	Building 3019	< 1	--	--	2.02	19.8
6.	Fission Products Development Laboratory	0	--	--	0.06	0.6
7.	4500 Area	--	--	--	--	--
8.	Building 3525	0	--	--	0.78	7.6
9.	Building 2026	1	0.001	0.1	0.06	0.6

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 5

ACTIVITY TRANSFERRED TO WASTE 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	1,500	80,243	5,303	94,036	490	5,534	10,583	21,671	1,224	7,327	6,867	21,031
^{106}Ru	5	388	118	6,361	1	53	189	1,858	3	54	126	1,511
^{137}Cs	1,650	42,334	58,688	198,168	558	28,451	53,398	118,433	1,394	29,941	35,876	103,379
^{60}Co	4	1,827	110	2,964	1	725	131	652	3	91	88	654
Totals	3,159	124,792	64,219	301,529	1,050	34,763	64,301	142,614	2,624	37,413	42,957	126,575

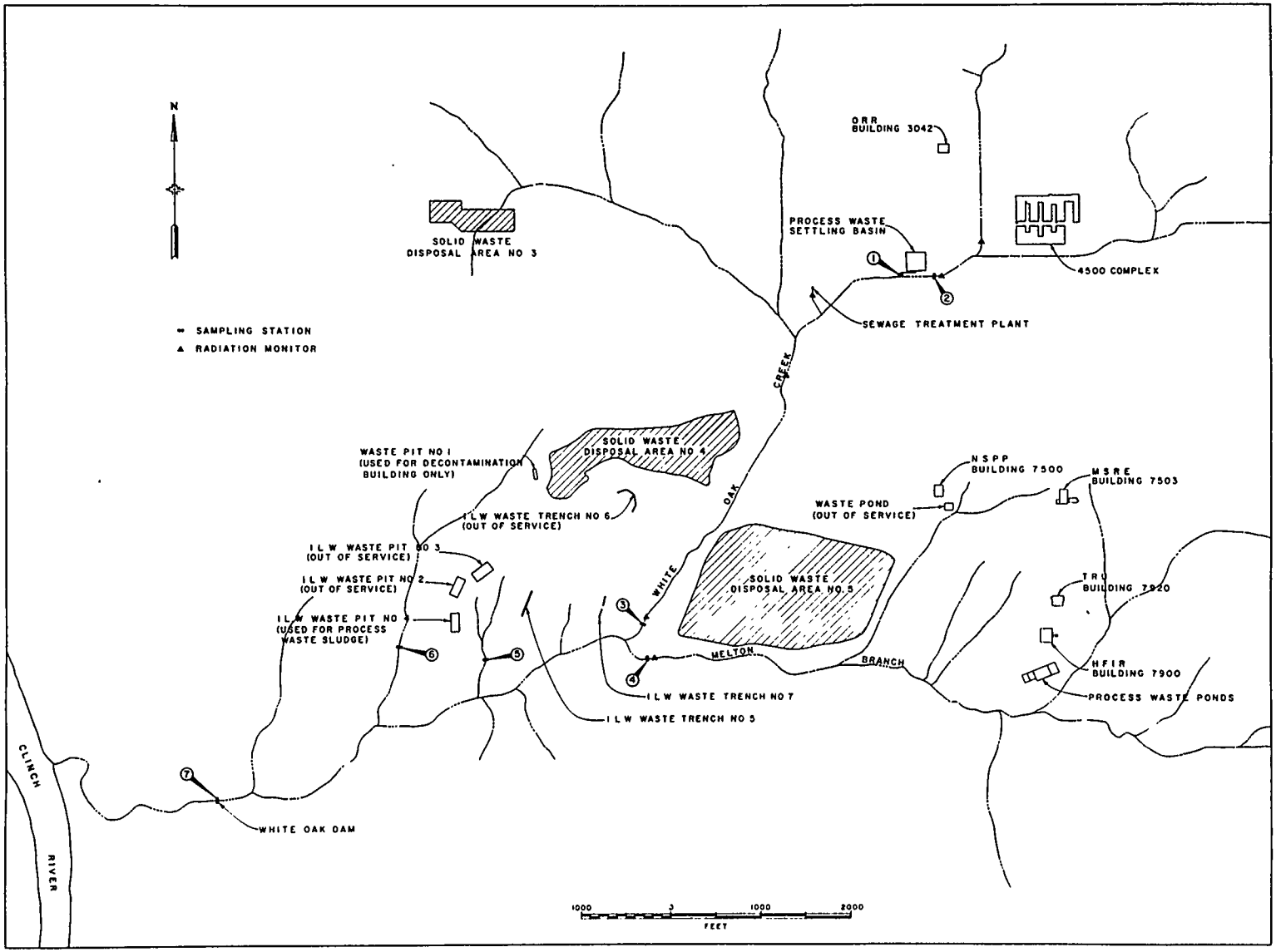

Fig 1 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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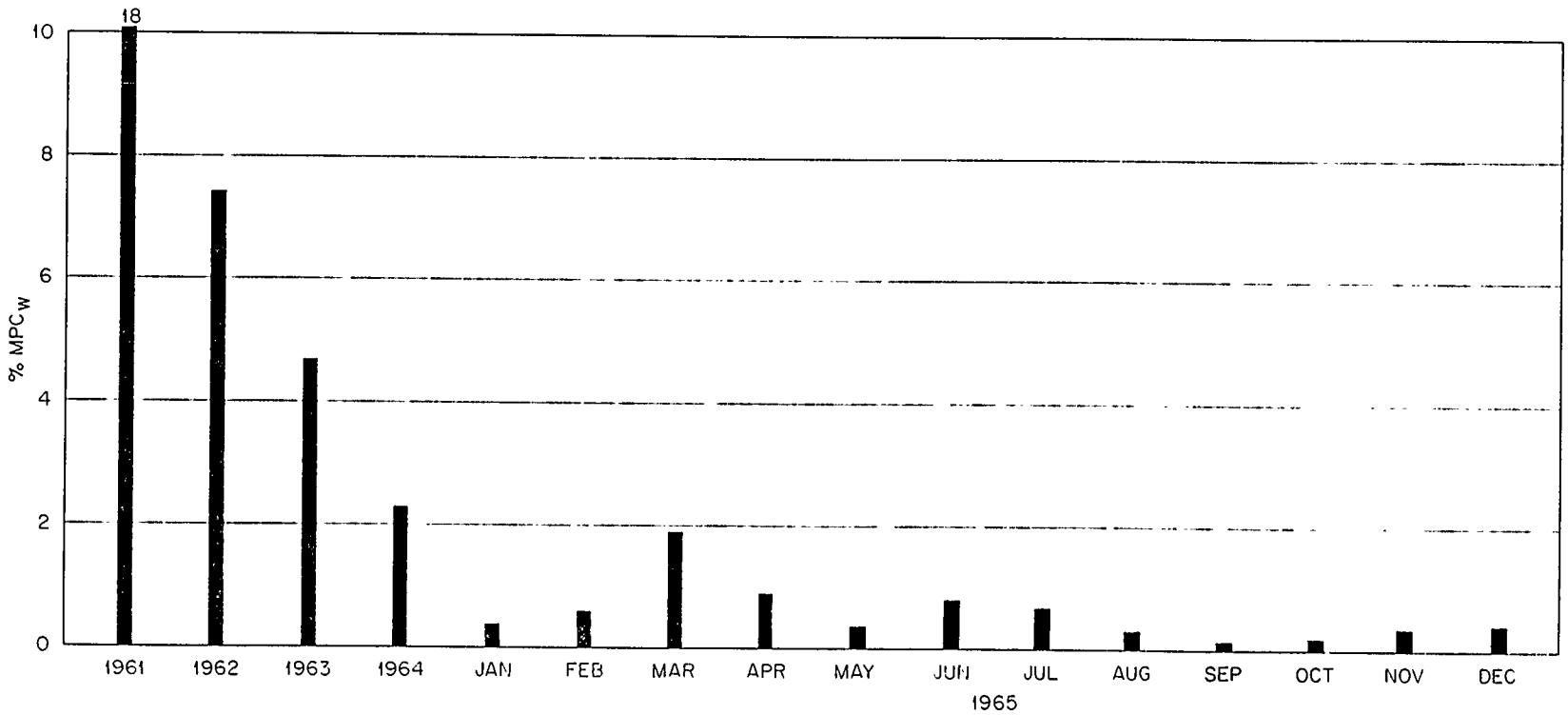

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

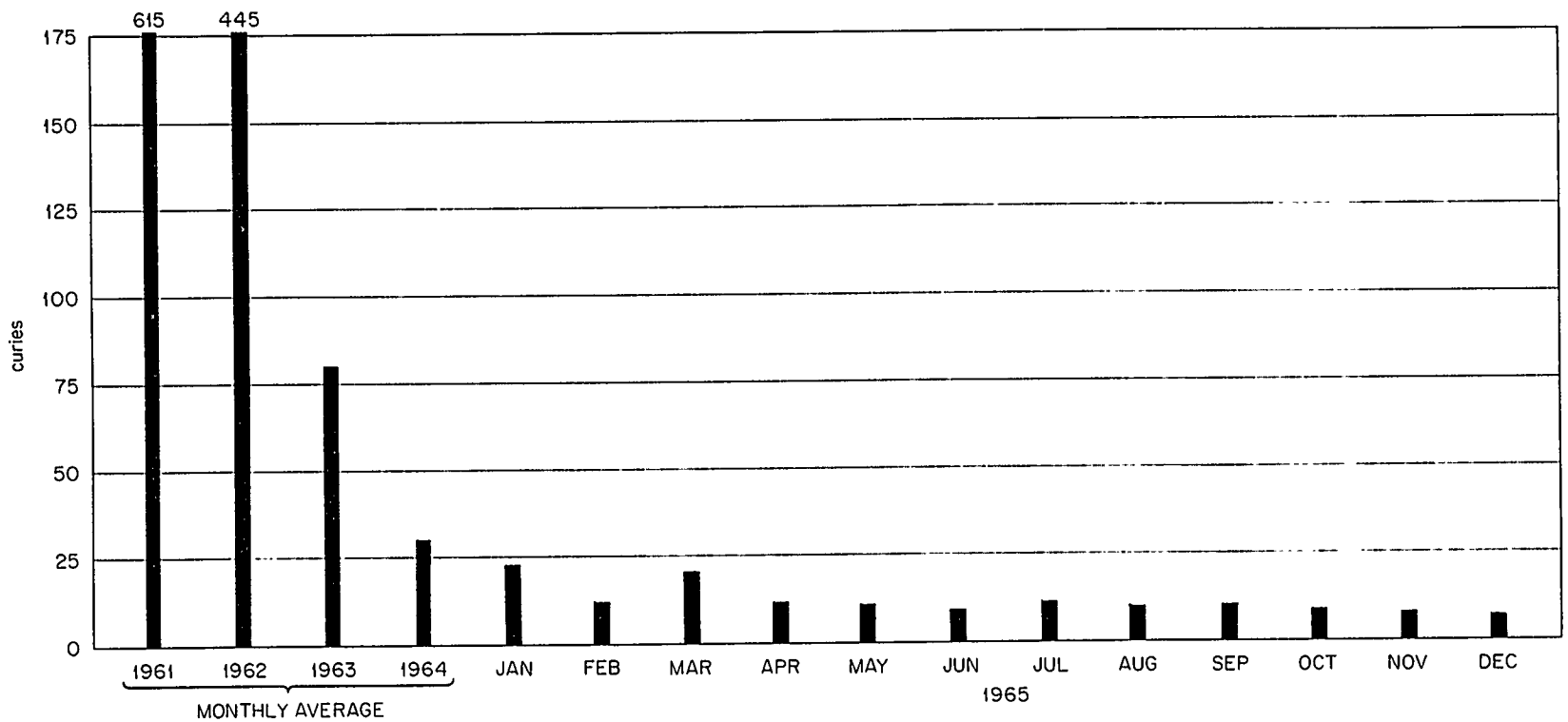

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

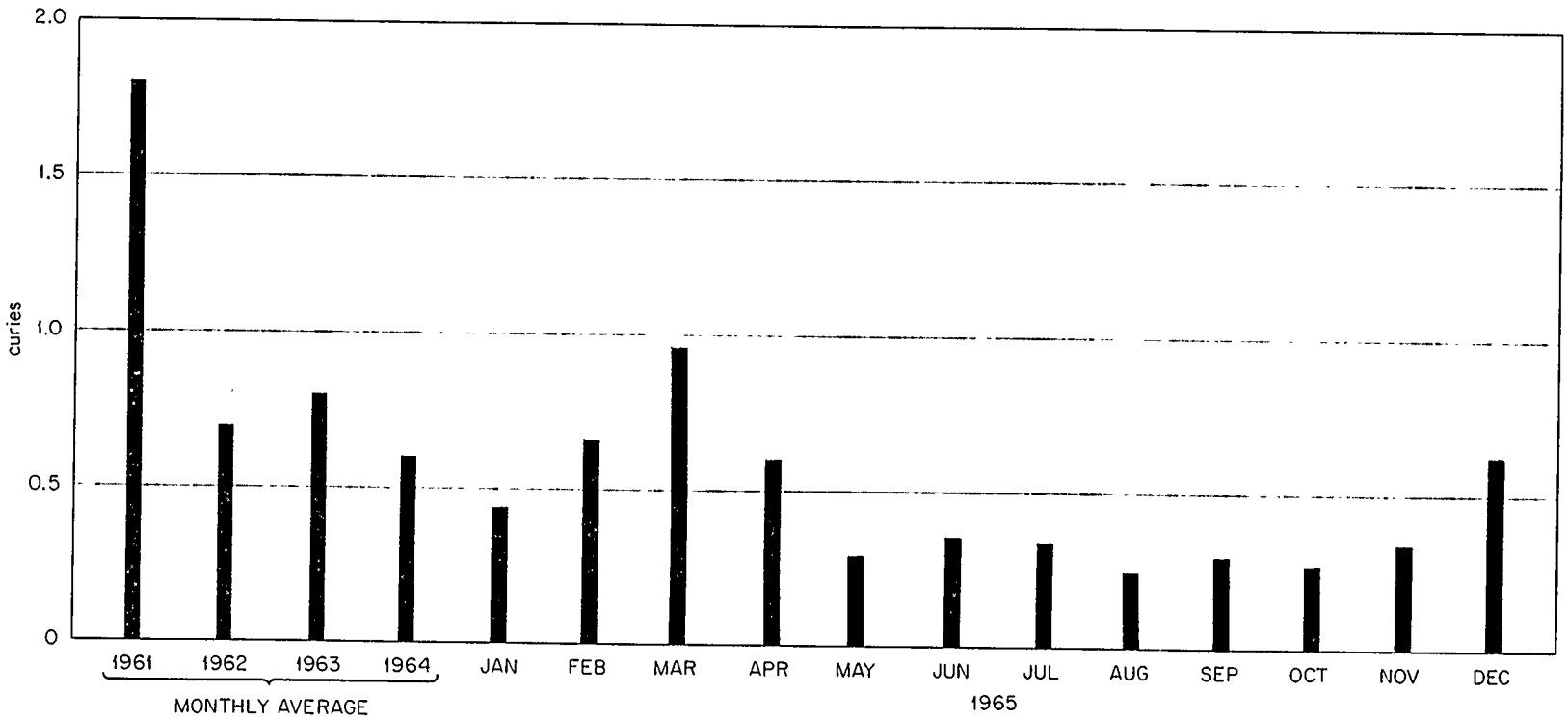

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

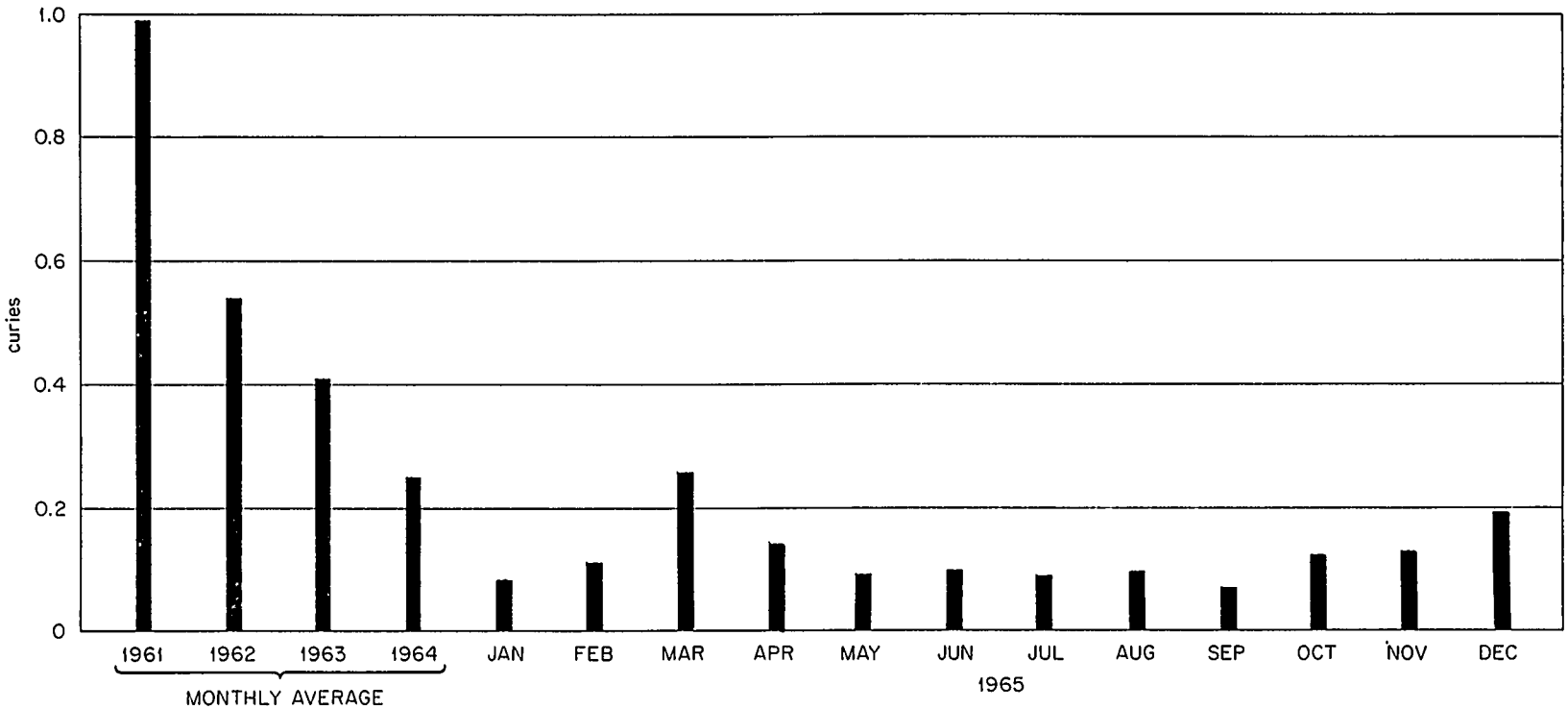

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

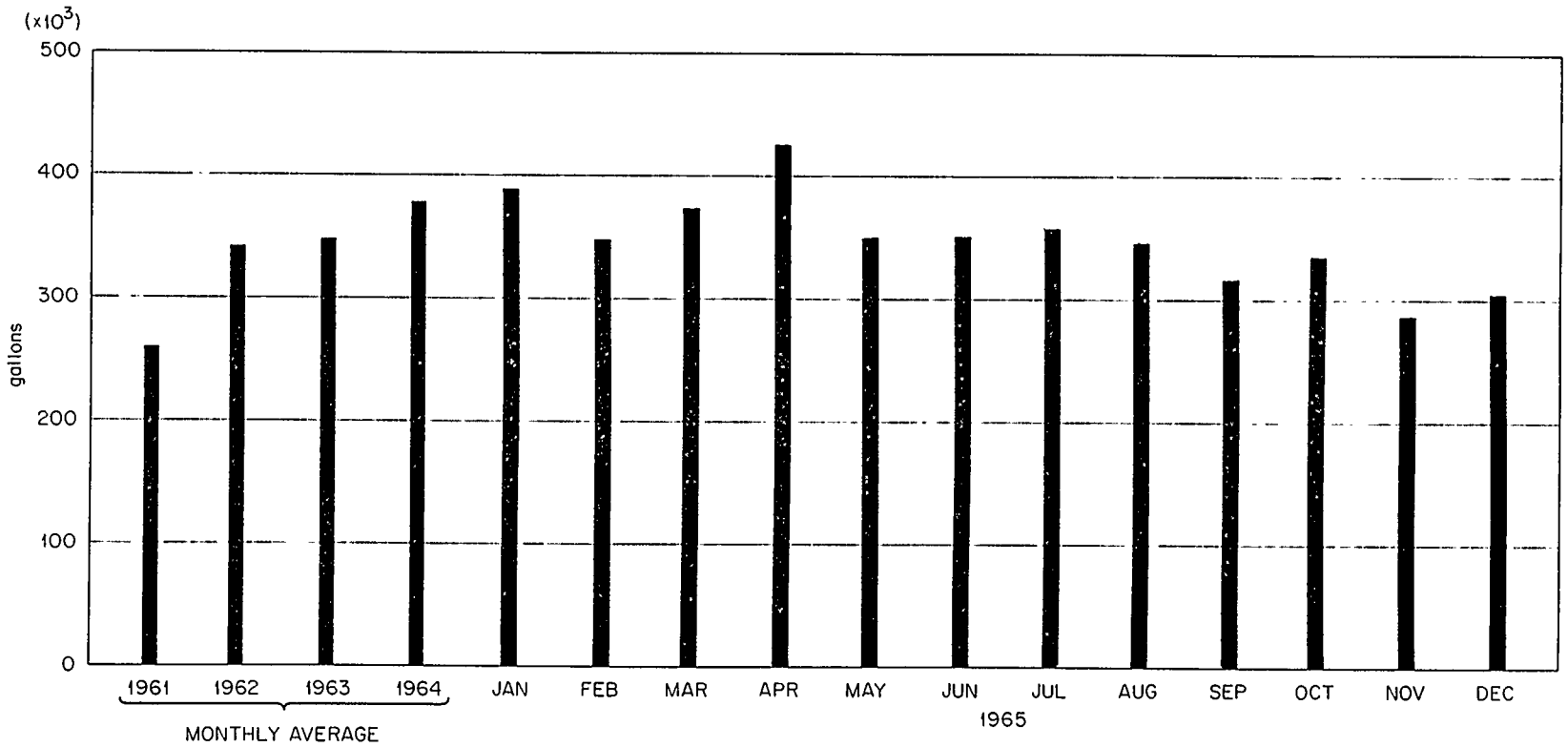

Fig. 6. Intermediate Level Waste Volumes

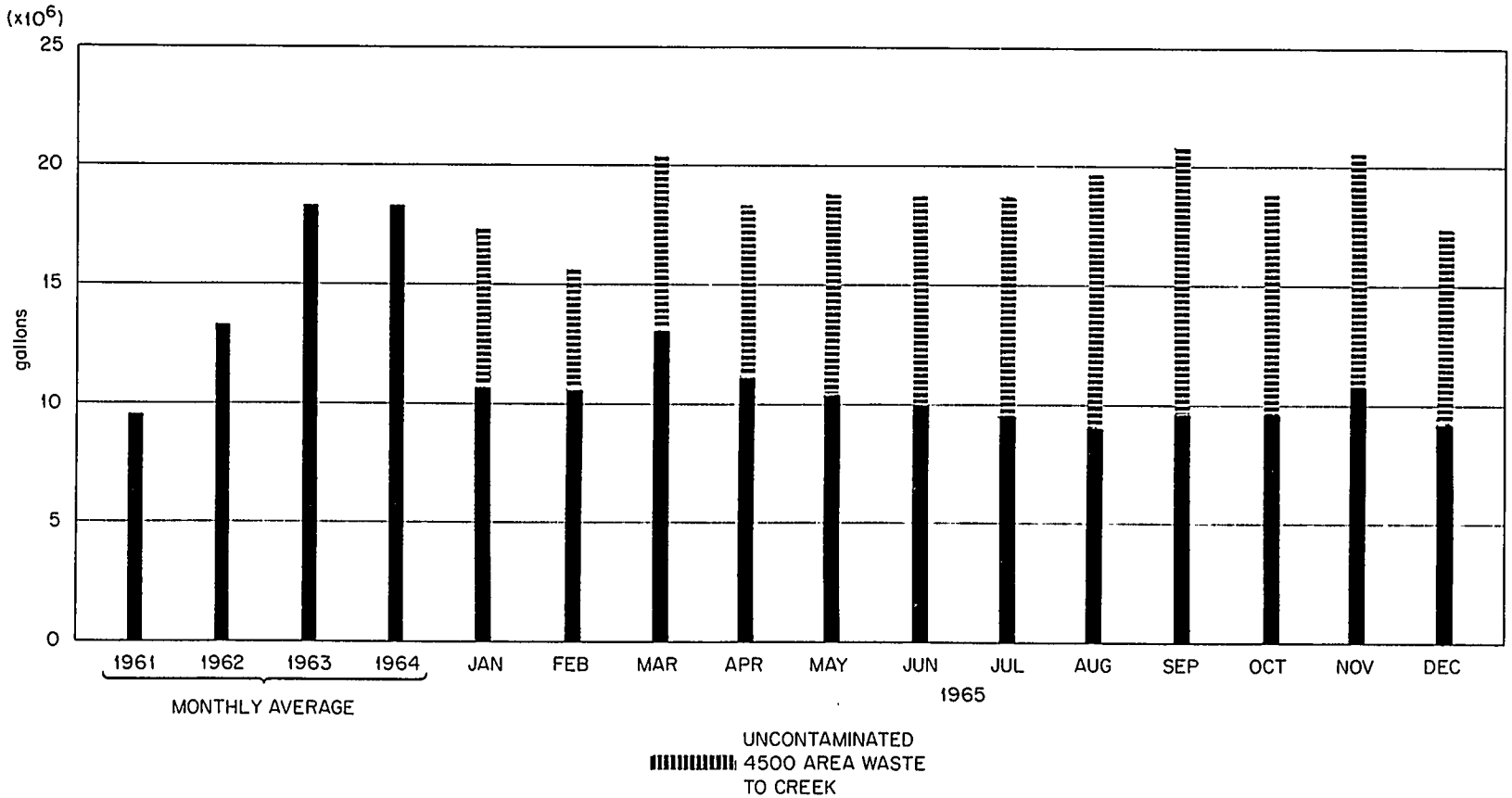

Fig. 7. Process Waste Volumes

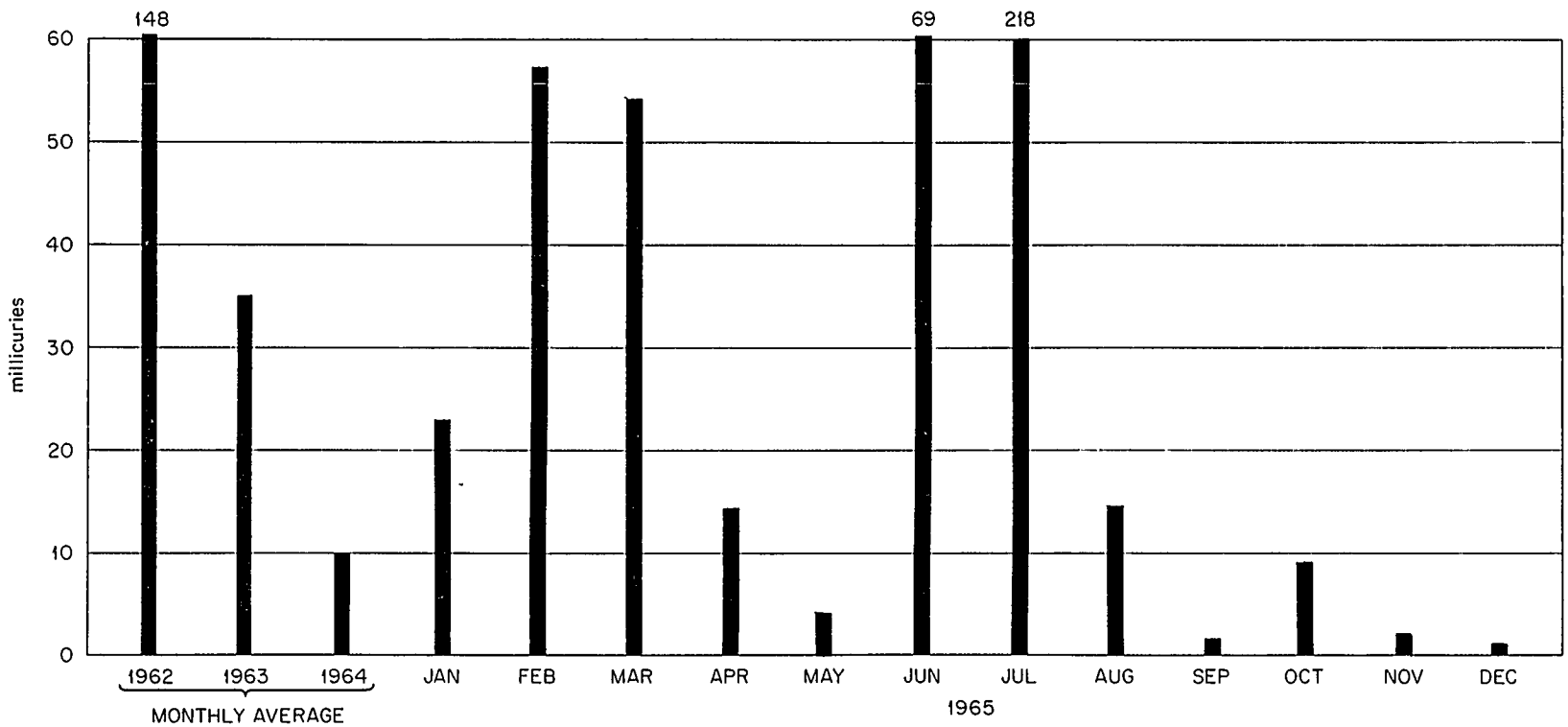

Fig. 8. Filterable Activity Released in Gaseous Waste

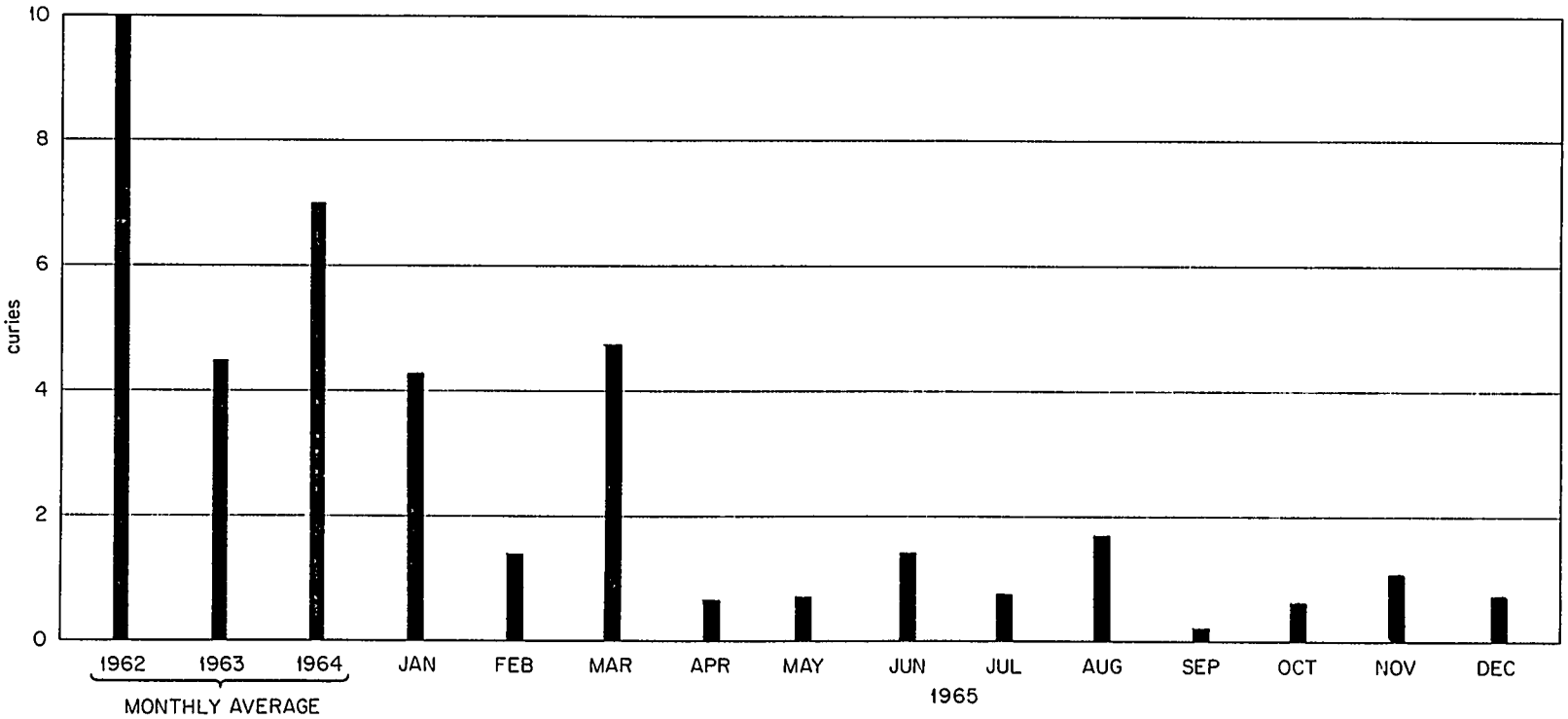

Fig. 9. Total[1] Activity Released in Gaseous Waste

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

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66-6-32

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TO: Distribution

FROM: L.C. Lasher

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This document has been approved for release to the public by:

David R Hamrin 8/31/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The radioactive contamination in the Clinch River resulting from ORNL waste discharges was 0.89% of MPC_w. Main contaminants were strontium and ruthenium, contributing 72% and 23% respectively, to the 0.89% MPC_w in the river. A monthly comparison of MPC_w values is shown in Figure 1. The lower concentration of activity this month was due mainly to the river flow returning to normal after a period of very low flow. All of the data pertaining to the Clinch River and White Oak Lake were provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 5.18 curies of radioactivity was released into White Oak Lake. Fifty-six percent of the contamination was ruthenium (2.90 curies) which seeped from the soil disposal area. Cobalt (0.89 curie), cesium (0.83 curie), and strontium (0.55 curie) were also present. Most of the strontium and cesium was released by the ORNL process waste system. Virtually all of the cobalt came from the soil disposal area. Table 1 lists data accumulated by the monitoring system during the period. Figures 2 and 3 show comparisons of monthly releases into the creek.

Process Waste

The release of strontium and cesium to the creek through the process waste system was higher than normal as a result of faulty operation of the new intermediate-level waste evaporator (see section on Intermediate-Level Waste). The increase in the discharge to the creek is reflected in Figure 4, Table 2, and Table 3.

A total of 10.2 million gallons was processed through the Waste Treatment Plant. Plant efficiency, based on gross beta analyses, was 92%. A comparison of the volume processed to those of previous months is shown in Figure 5.

Intermediate-Level Waste

At the end of the month, the evaporator completed 33 days of operation. During this period, a number of operating difficulties were experienced which prevented the processing of all of the waste generated. None of them, however, could be considered serious for a startup of a new plant.

The worst of the difficulties was excessive foaming of some of the waste, which led to an accidental discharge of approximately 10 curies of activity to the process waste system. The operator, not having experienced the great variation in the amount of foam that could be produced by different wastes, applied too much heat at the start of a run of waste that had not been previously processed. The contents of the evaporator foamed up so suddenly that some of the waste was carried over to the condensate catch-tank even though the steam to the evaporator coils was automatically cut off before the foam reached the top of the evaporator tank. The catch-tank drain valve, which is supposed to automatically close when excessive activity is measured, failed to operate. It was later found that the valve was made inoperable for testing other equipment prior to the startup of the plant, and it had not been returned to service.

The evaporator operation was begun with a large backlog of waste stored in the tank farm; all tanks were practically full. The total volume processed through the evaporator in April was 340,000 gallons, which is roughly equal to the average volume of waste received each month (see Figure 6). During the month of April, however, the volume was approximately 100,000 gallons above normal so that it became necessary to pump 95,000 gallons of waste to the seepage trenches.

Near the end of the waste transfer to the trenches, a section of plastic pipeline ruptured and approximately 3,000 gallons of waste were spilled in an area just north of trench 7. The total activity was estimated at 100 curies, consisting mainly of cesium and cerium and about 10 curies of strontium. The contamination was covered with approximately five feet of soil and the area was contoured to prevent leaching by surface water. None of the contamination was permitted to reach the creek.

The significant data for the intermediate-level waste operation is given below. Table 5 is an inventory of the activity in the seepage trenches.

	Gallons
Total Volume Generated	443,000
Volume Transferred to Evaporator	344,000
Volume Transferred to Trench 5	67,000
Volume Transferred to Trench 7	28,000
Tank Farm Free Space at Beginning of Month	105,000
Tank Farm Free Space at End of Month	101,000
Volume of Concentrate Returned to Tank Farm	10,000

Gaseous Waste

Only 0.79 curie of activity was released through the five operating stacks. Only one millicurie of the total was filterable. Figures 7 and 8 show comparisons of gaseous releases on a monthly basis. Table 5 lists individual stack discharges.

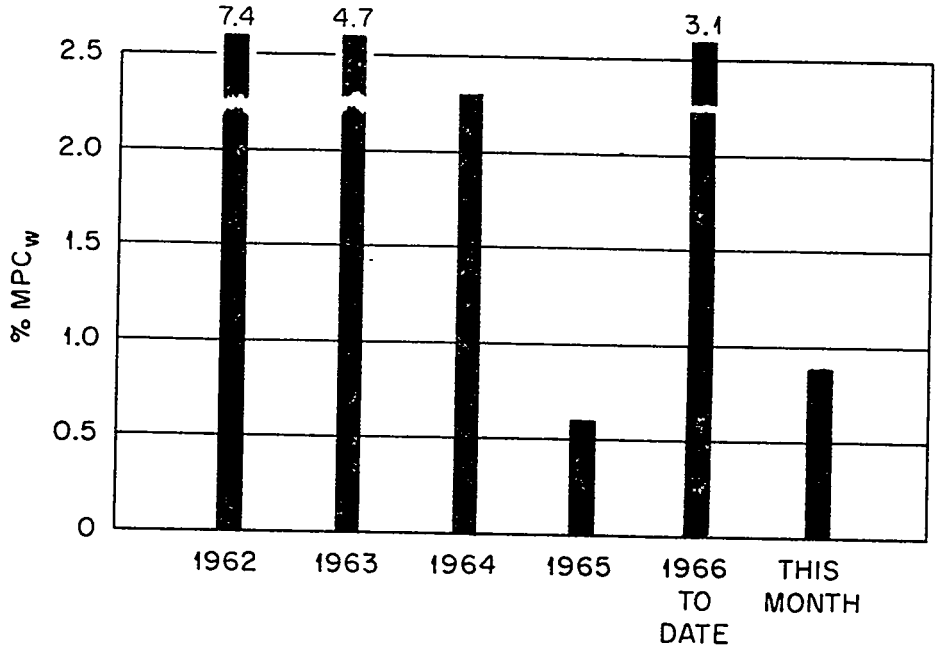

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Health Physics Measurements at White Oak Dam)

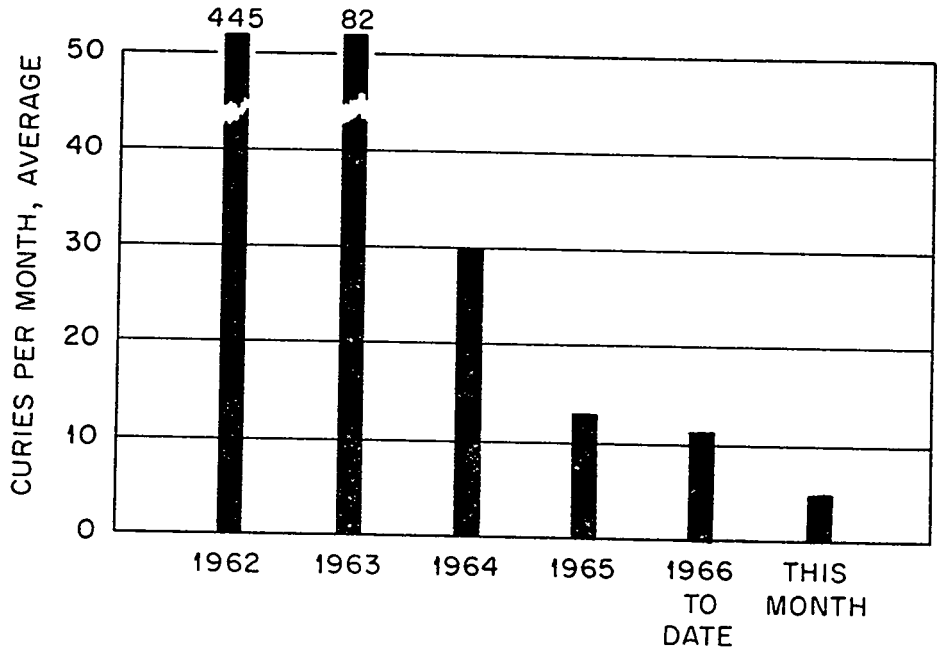

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

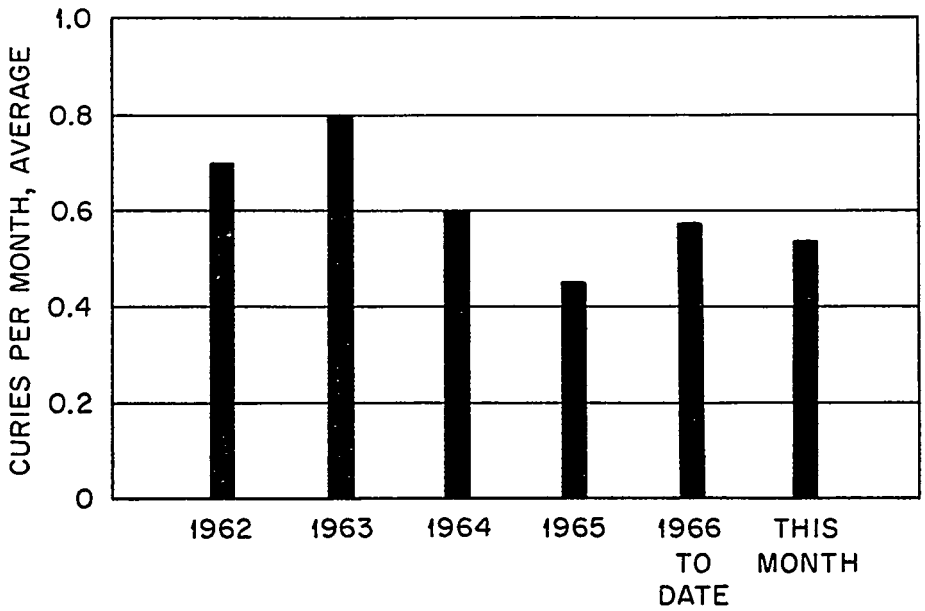

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

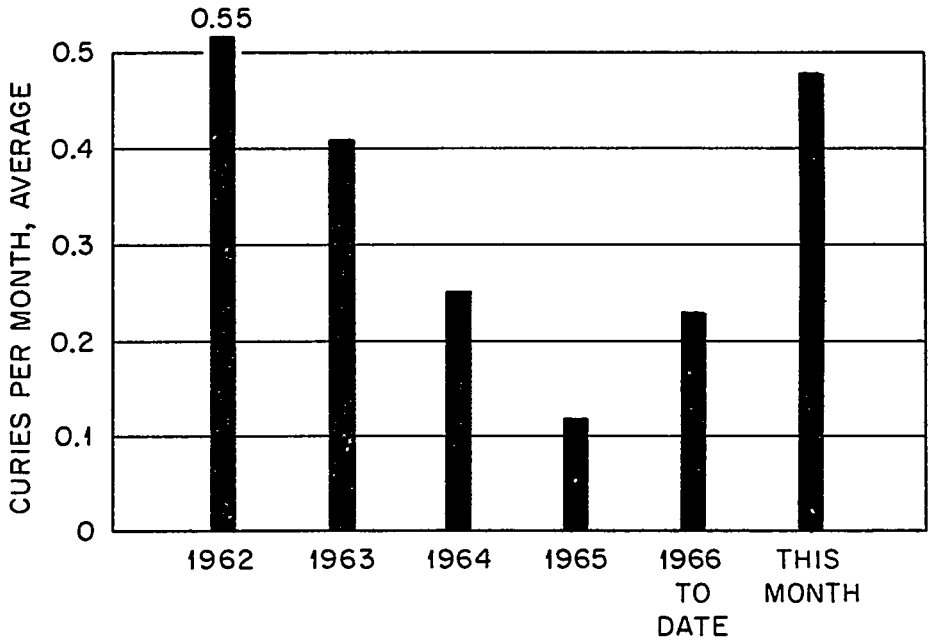

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

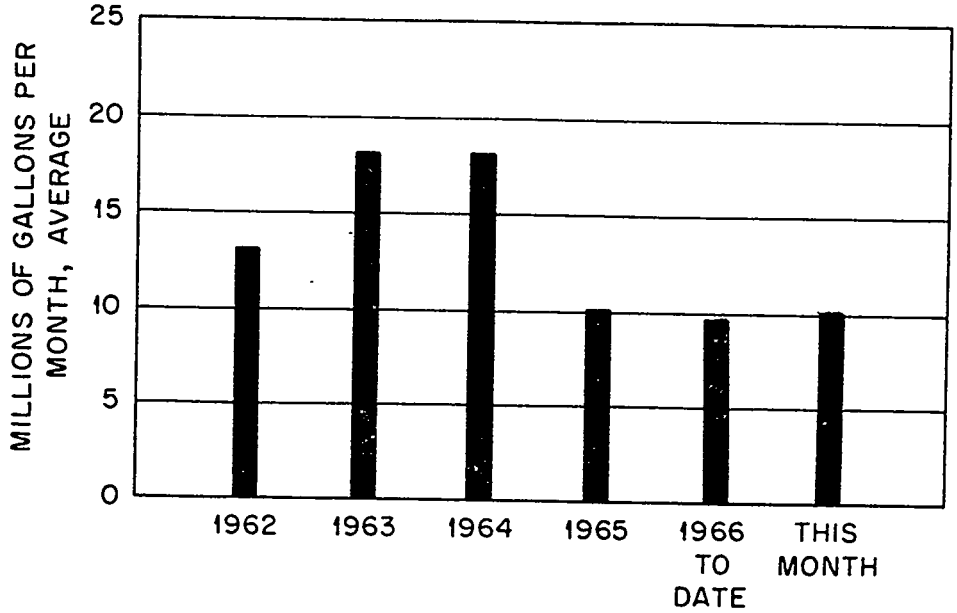

Fig. 5. Process Waste Volumes

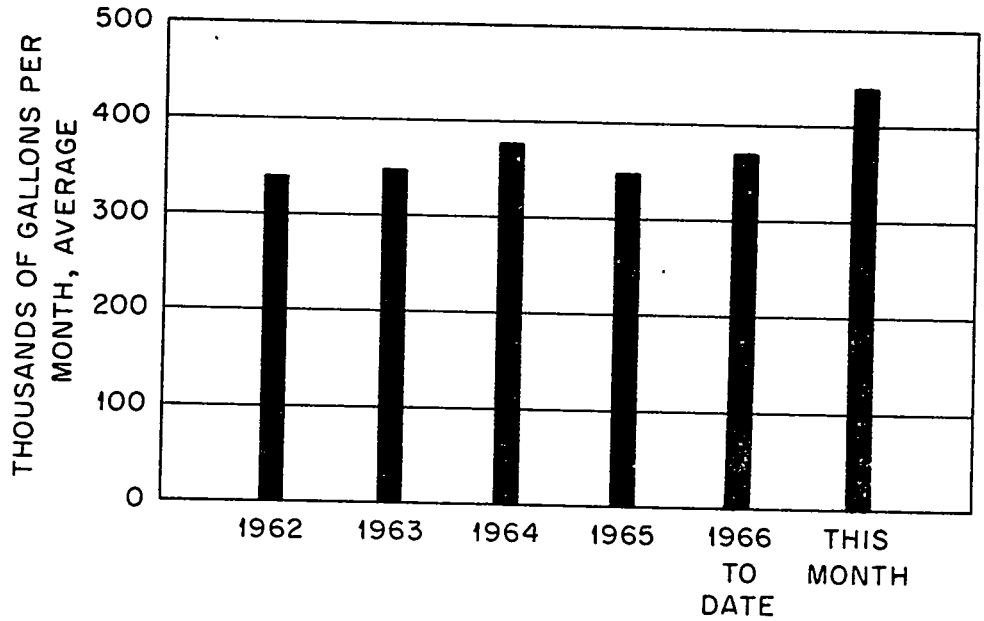

Fig. 6. Intermediate Level Waste Volumes

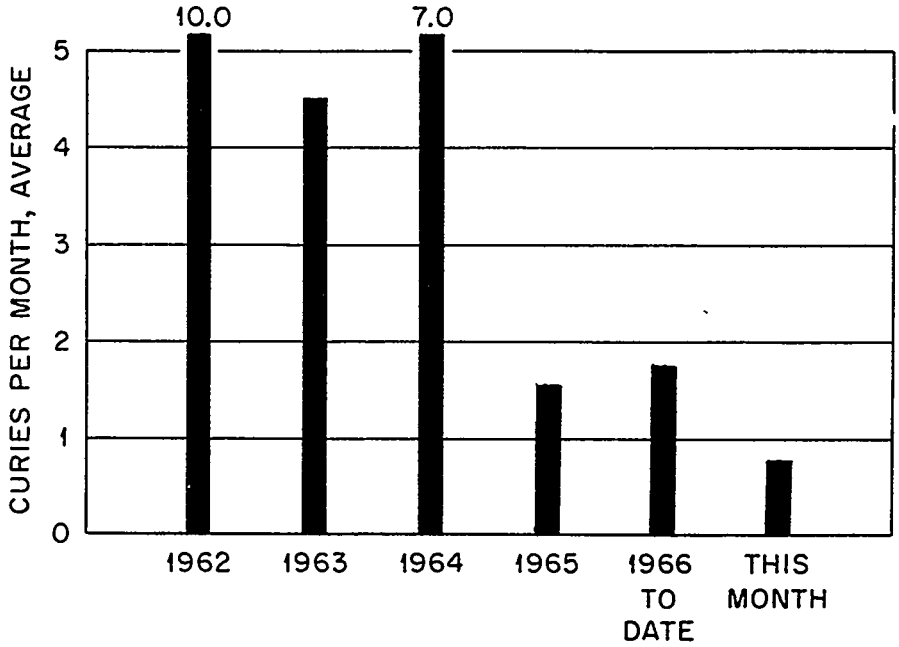

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

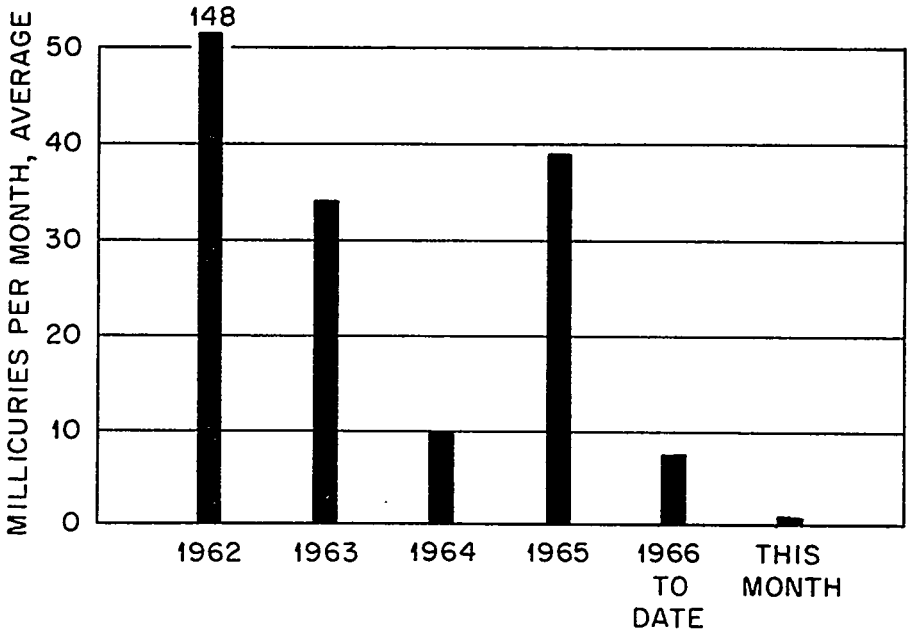

Fig. 8. Filterable Activity Released in Gaseous Waste

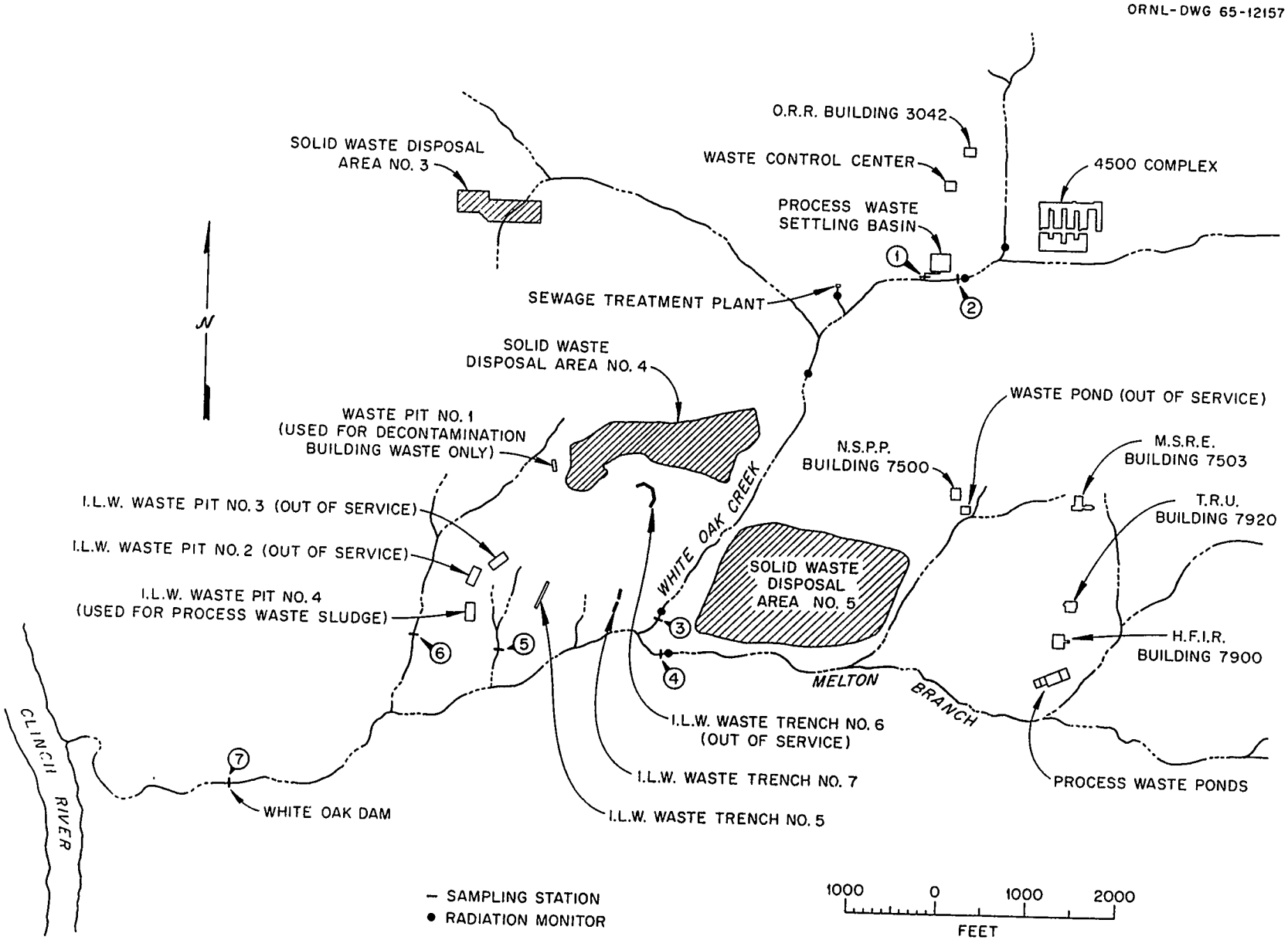

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.48	none	3.20	0.05	3.73
Miscellaneous discharges from east end of plant	2	<0.01	<0.01	<0.01	none	0.02
Total discharge from Bethel Valley Area	3	0.51	0.01	0.83	none	1.35
Total discharge from Melton Valley Area	4	0.04	<0.01	<0.01	none	0.05
East waste pit seepage	5	<0.01	2.68	none	0.86	3.54
West waste pit seepage	6	<0.01	0.21	none	0.03	0.24
Total discharge from all sources	3,4,5,6	0.55	2.90	0.83	0.89	5.18
White Oak Dam to Clinch River (Health Physics measurement)	7	0.33	3.23	0.19	1.35	5.62

[a]Refers to Fig. 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 10.2×10^6 Gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.8×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTING BASIS
Total Sr[a]	8.22	0.48	94
$^{103,106}Ru$	none	--	--
^{60}Co	0.36	0.05	86
^{137}Cs	9.67	3.20	67
Gross Beta Analysis	571 c/m/ml	45 c/m/ml	92

[a]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[a] CURIES	GROSS BETA ACTIVITY[a] % OF TOTAL	VOLUME GAL x 10^6	VOLUME % OF TOTAL
1. Reactor Operations	9	0.29[b]	4.4	2.35	23.0
2. Radioisotope Processing Area	14	0.34	5.1	1.80	17.6
3. Buildings 3503 and 3508	2	0.05	0.8	1.76	17.3
4. Buildings 3025 and 3026	< 1	< 0.01	-	2.24	22.0
5. Building 3019	1	< 0.01	-	0.24	2.3
6. Fission Product Development Laboratory	1	< 0.01	-	0.06	0.6
7. Building 2531	423	5.92	89.3	1.06	10.4
8. Building 3525 and 3550	< 1	< 0.01	-	0.64	6.3
9. Building 2026	25	0.03	0.4	0.05	0.5
10. Melton Valley Facilities	-	-	-	None	-

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

[b]The Bulk of this activity is from contaminated ground water which is seeping into the pipelines in the vicinity of Building 3047 in the Radioisotopes Area.

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 1965	Total to Date	This Month	Year to Date	Year 1965	Total to Date	This Month	Year to Date	Year 1965	Total to Date
Total Sr	650	2719	80243	96755	152	3010	5534	24681	228	2602	7327	23633
^{106}Ru	4	24	388	6385	1	15	53	1873	1	12	54	1523
^{137}Cs	2920	7471	57435	205639	580	4576	28451	123009	870	4339	34088	107718
^{60}Co	14	81	1827	3045	3	136	125	788	4	112	158	766
TOTALS	3588	10295	139893	311824	736	7737	34163	150351	1103	7065	41627	133640

TABLE 5

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.01
Central Radioactive Gas Disposal Facilities	3039	0.76
Radiochemical Processing Pilot Plant	3020	0.01
Graphite Reactor Building	3018	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.78

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.23% of the maximum permissible concentration. The main contaminants were strontium and ruthenium, contributing 88.8% and 7.8%, respectively, to the percent of MPC_w. Figure 1 compares the river contamination on a monthly basis. The year-to-date concentration (2.2%) is comparatively high because of a low river flow during the first half of the year. Information pertaining to the Clinch River was provided by the Health Physics Division.

White Oak Creek Monitoring

The activity in waste discharged into White Oak Lake was 7.84 curies. Ruthenium (6.09 curies) and cobalt (1.10 curies), seeping from the soil disposal area, comprised the bulk of the activity. The strontium and cesium releases were 0.32 curie and 0.33 curie, respectively. Most of this activity came from the process waste system. A summary of creek monitoring data is shown in Table 1. Figures 2 and 3 compare waste releases into the creek on a monthly basis.

Process Waste

A total of 10.2 million gallons of low-level waste was chemically treated at the Waste Treatment Plant. Plant efficiency was low; only 61% of the beta activity was removed. The cause of the poor decontamination is not known at this time. Several minor mechanical failures occurred during the period; however, plant operations should not have been grossly affected. A summary of plant operation is shown in Table 2.

Table 3 lists the principal sources of activity discharged into the

process waste system. A monthly comparison of the strontium releases into White Oak Lake is shown in Figure 3. Figure 4 compares the strontium releases from the process waste system. The volumes of waste handled by the system are shown in Figure 5.

Intermediate-Level Waste

The evaporator operated at an average rate of 380 gph. A table of significant operating data is given below:

	Gallons
Total volume generated	245,000
Volume transferred to evaporator	273,000
Volume of concentrate returned to tank farm	19,000
Tank farm free space at the beginning of month	334,000
Tank farm free space at end of month	343,000

Main contributors to the ILW system were as follows:

	Gallons
Building 3019	72,000
Fission Products Development Laboratory	27,000
Reactor Complex	26,000
4500 Complex	20,000
Radioisotopes Processing Area	7,000

Figure 6 compares the volumes of waste handled on a monthly basis.

GASEOUS WASTE

A total of 0.72 curie of radioactivity was discharged from the ORNL stacks. Most of the activity was ^{131}I (0.70 curie). The particulate activity, primarily ^{137}Cs, amounted to 0.02 curie. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

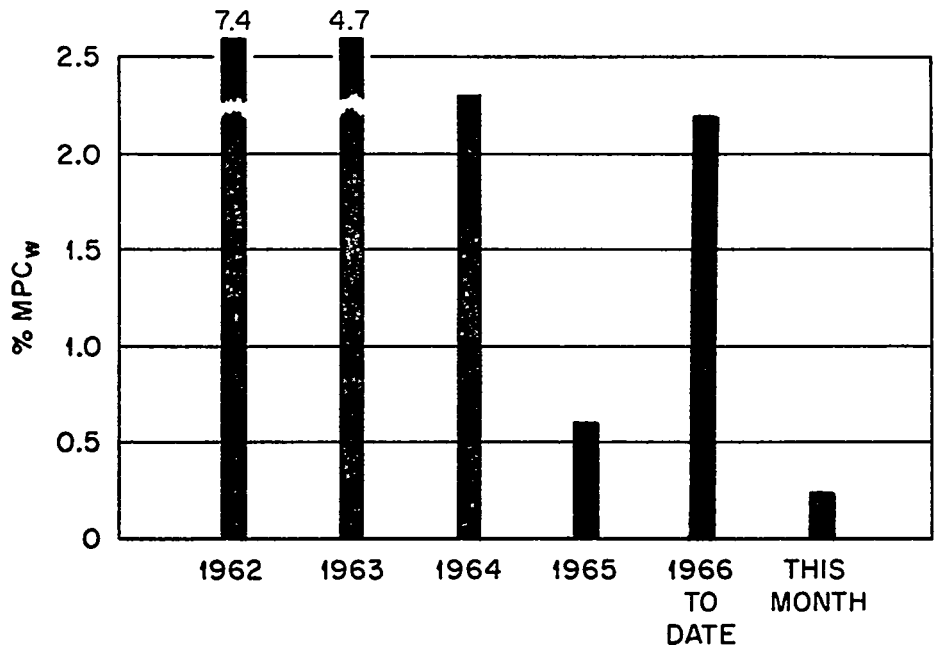

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

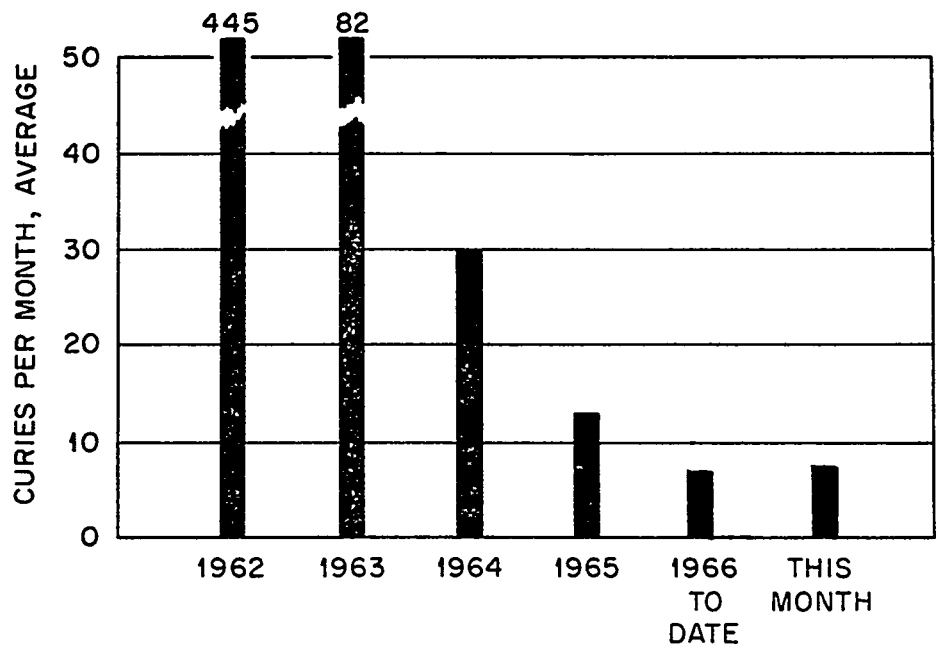

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

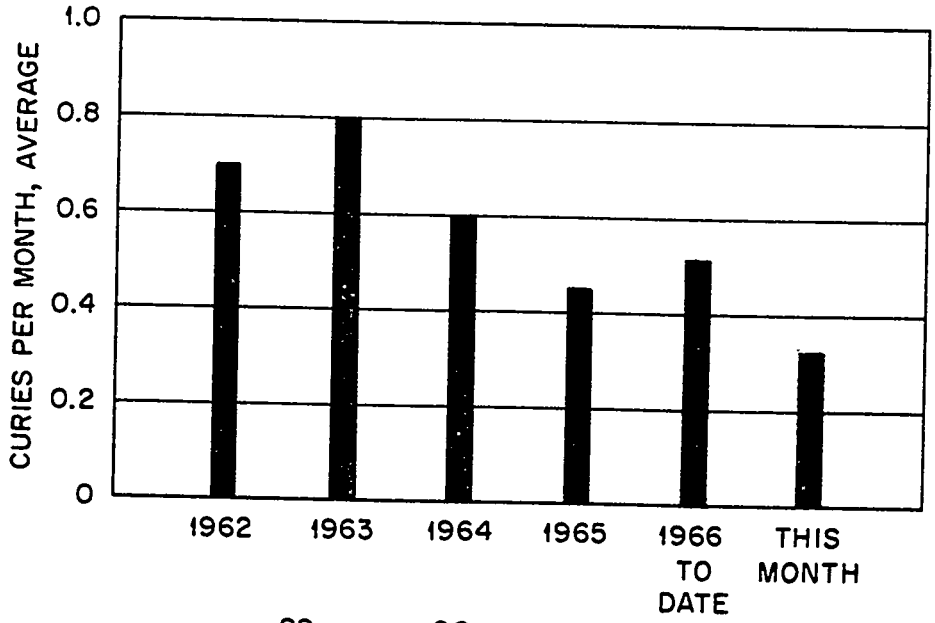

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

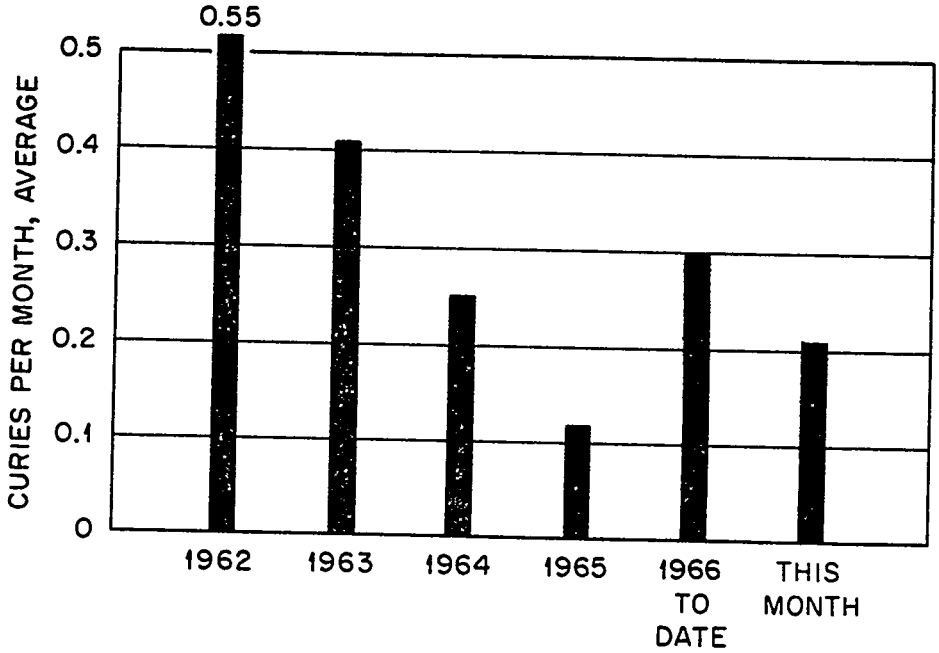

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

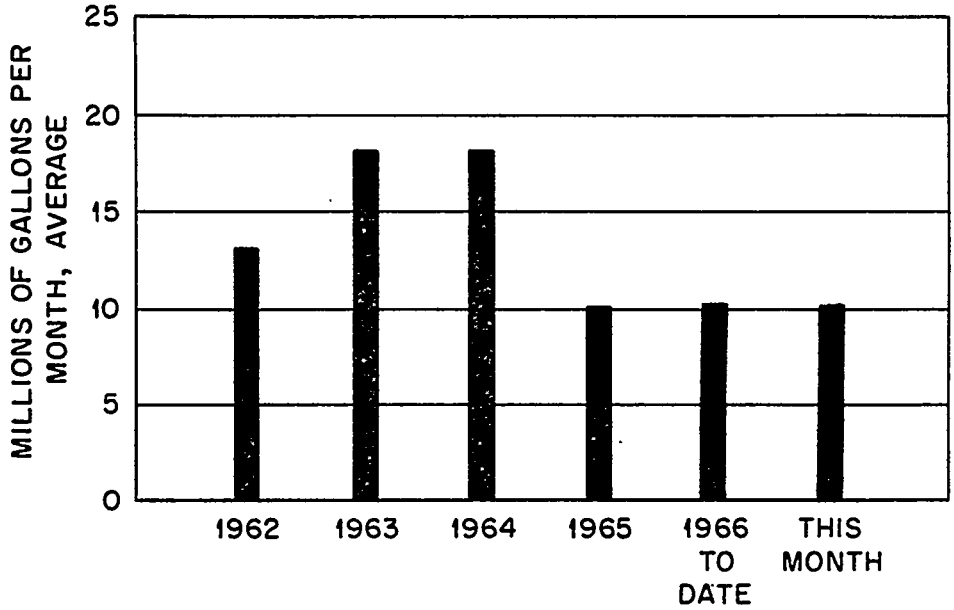

Fig. 5. Process Waste Volumes

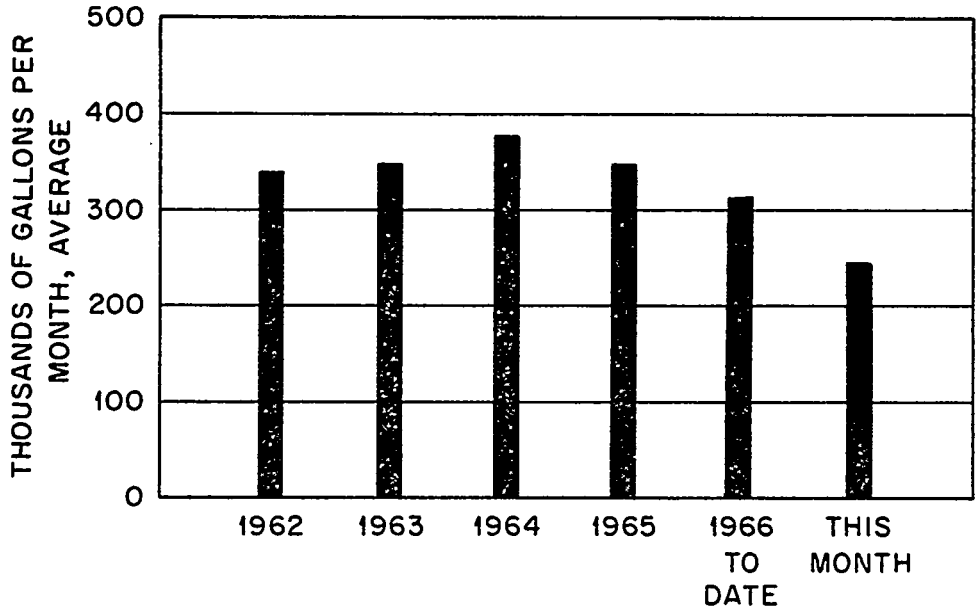

Fig. 6. Intermediate Level Waste Volumes

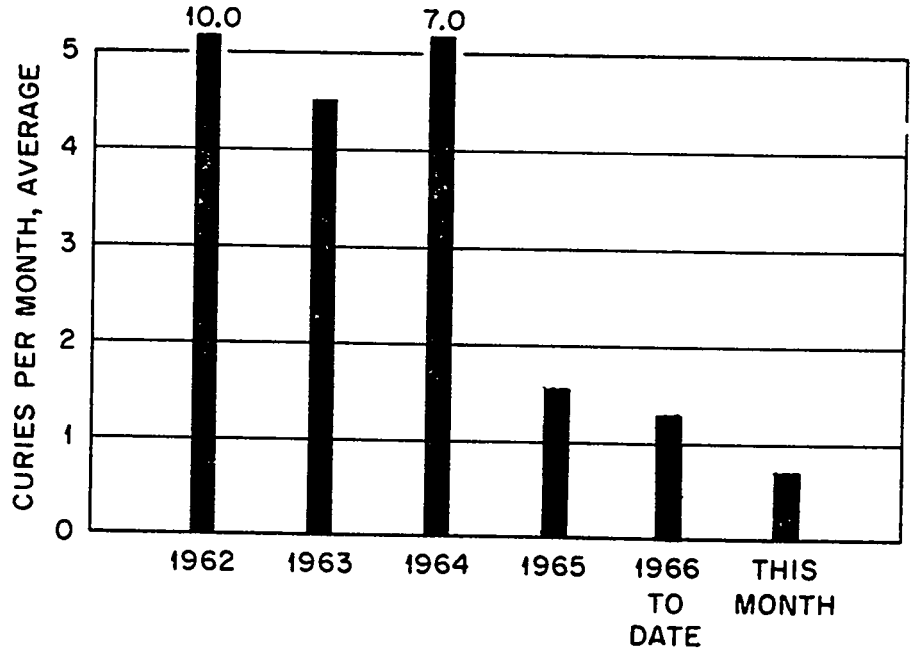

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

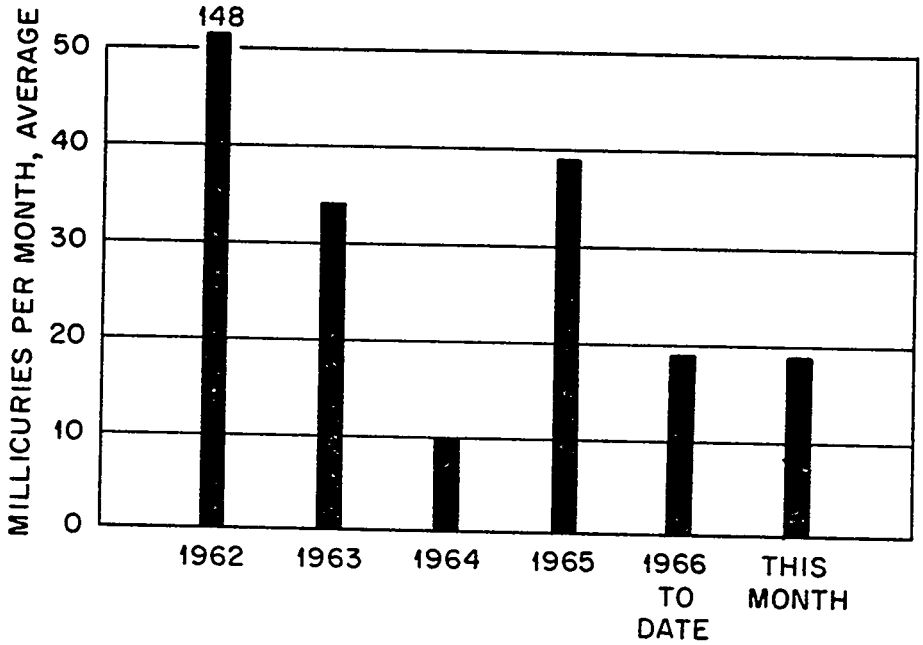

Fig. 8. Filterable Activity Released in Gaseous Waste

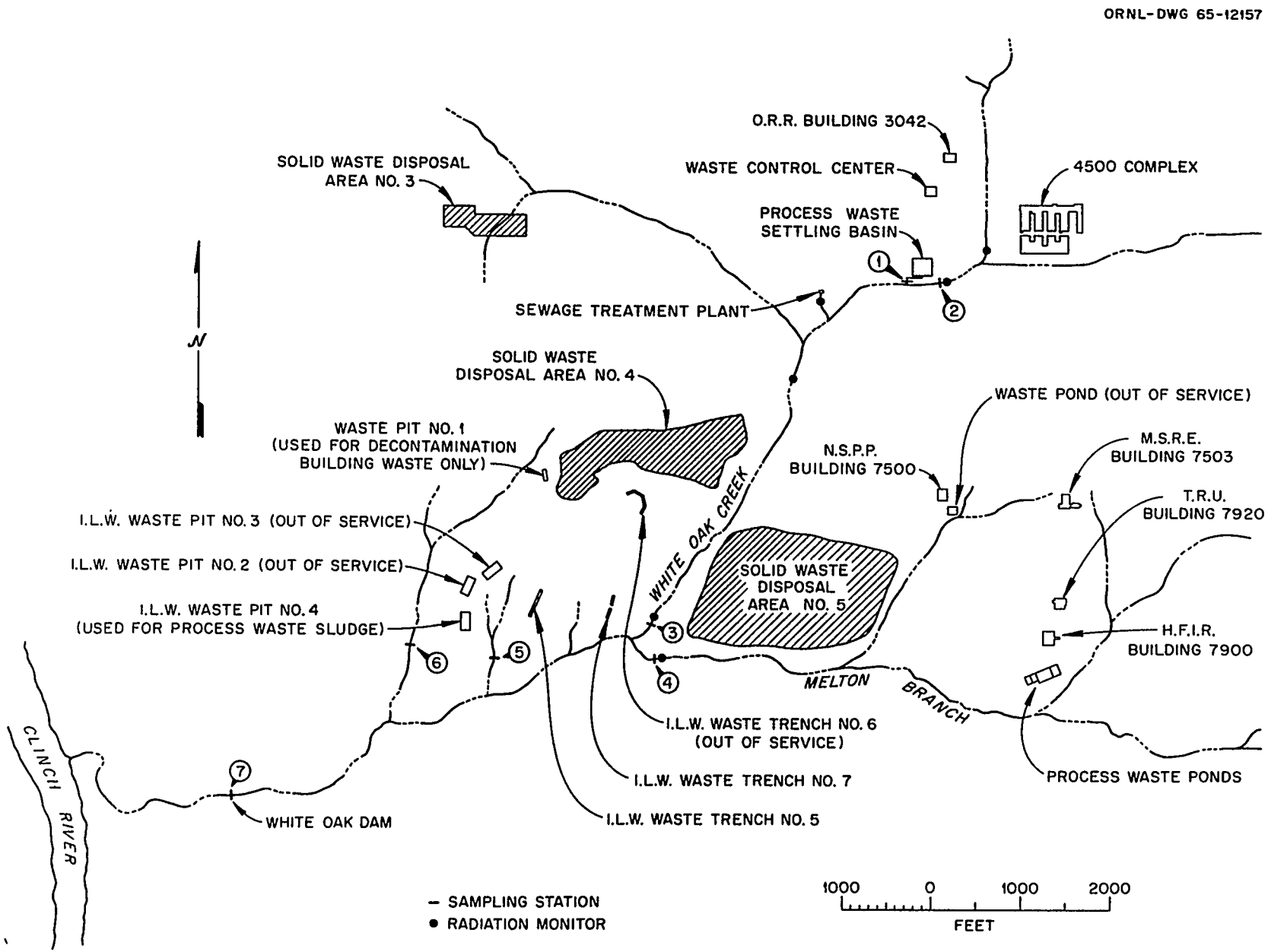

Fig. 9 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.21	None	0.56	0.03	0.80
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	None	< 0.01
Total discharge from Bethel Valley Area	3	0.29	0.01	0.21	None	0.51
Total discharge from Melton Valley Area	4	0.03	< 0.01	< 0.01	< 0.01	0.03
East waste pit seepage	5	< 0.01	2.67	0.09	0.61	3.37
West waste pit seepage	6	< 0.01	3.41	0.03	0.49	3.93
Total discharge from all sources	3,4,5,6	0.32	6.09	0.33	1.10	7.84
White Oak Dam to Clinch River (Health Physics measurement)	7	0.22	0.90	0.06	0.11	1.54

[a]Refers to Fig. 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 10.2×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.78	0.21	73
$^{103,106}Ru$	None	--	--
^{60}Co	0.04	0.03	25
^{137}Cs	1.11	0.56	50
Gross Beta Analysis	36 c/m/ml	14 c/m/ml	61

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	12	0.48[b]	37.8	2.5	25
2.	Radioisotope Processing Area	5	0.15	11.8	1.8	18
3.	Buildings 3503 and 3508	9	0.27	21.3	1.9	19
4.	Buildings 3025 and 3026	2	0.06	4.7	1.8	18
5.	Building 3019	< 1	< 0.01	--	0.1	1
6.	Fission Products Development Laboratory	37	0.11	8.7	0.2	2
7.	Waste Evaporator, Building 2531	10	0.20	15.7	1.1	11
8.	Buildings 3525 and 3550	< 1	< 0.01	--	0.5	5
9.	Building 2026	2	< 0.01	--	0.1	1
10.	Melton Valley Area	None	--	--	None	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.68
Radiochemical Processing Pilot Plant	3020	0.03
Graphite Reactor Building	3018	< 0.01
MSRE	7512	0.01
HFIR	7911	< 0.01
Total activity in gases released		0.72

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 1.92% of the maximum permissible concentration. The main contaminants were strontium and ruthenium, contributing 90.7% and 6.7%, respectively, to the percent of MPC_W. Figure 1 compares the river contamination on a monthly basis. The comparatively high concentrations shown for this month and that for the year-to-date were caused by low river flows. The average flow this month was one-third of normal.

White Oak Creek Monitoring

A total of 3.27 curies was released to White Oak Lake. The activity consisted of 2.0 curies of ruthenium, 0.49 curie of cobalt, 0.46 curie of strontium, and 0.32 curie of cesium.

The ruthenium, cobalt, and approximately 30% of the cesium came from the waste pits and trenches that are no longer used. The discharge from the process waste system accounted for 40% of the total strontium release. Approximately 10% of the strontium came from the Melton Valley area, but the operation responsible for the discharge could not be identified. The remainder of the strontium (50%) was probably scoured from the creek bed which was contaminated by relatively high releases years ago.

A summary of creek monitoring data is given in Table 1. Figures 2 and 3 compare releases of activity into White Oak Lake on a monthly and annual basis.

Process Waste

A total of 11.8 million gallons of low-level waste was chemically

treated at the Waste Treatment Plant. The efficiency of the treatment process was normal; gross analysis indicates that 86% of the beta emitters were removed. A summary of plant operation is shown in Table 2.

Table 3 lists the principal sources of activity discharged into the process waste system. Figure 4 compares the strontium releases from the process waste system to the creek on a monthly basis. The increase in the strontium release this year is due mainly to the intermediate-level waste evaporator operation begun in March. A project is now under way to install an ion-exchange column at the evaporator to reduce the activity in the waste condensate discharged to the process waste system. Figure 5 compares the volumes of process waste handled on a monthly basis.

Intermediate Level Waste

The evaporator operated at an average rate of 385 gph. A table of significant operating data is given below:

	Gallons
Total volume generated	267,000
Volume transferred to evaporator	277,000
Volume of concentrate returned to tank farm	12,000
Volume of concentrate transferred to shale fracturing	40,000
Tank farm free space at beginning of month	323,000
Tank farm free space at end of month	361,000

Main contributors to the ILW system were as follows:

	Gallons
Building 3019	59,000
Fission Products Development Laboratory	59,000

	Gallons
4500 Complex	36,000
Reactor Complex	29,000
Radioisotope Processing Area	13,000

Figure 6 compares the volumes of waste handled on a monthly basis.

Gaseous Waste

A total of 0.89 curie of gaseous radioactivity was discharged from the ORNL stacks. The activity was identified as ^{131}I. The total discharge of particulates was less than 0.01 curie. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

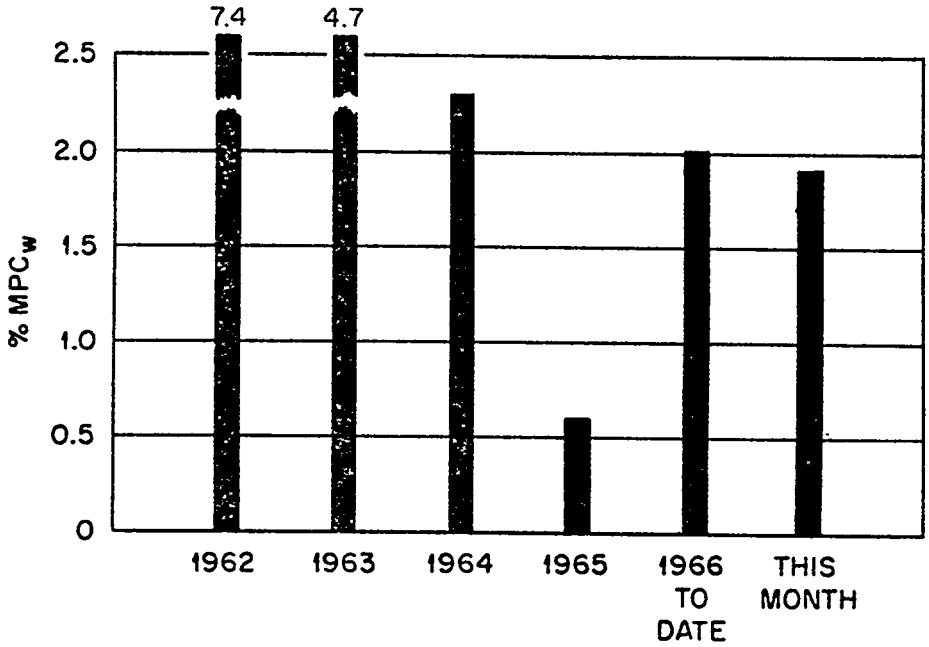

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

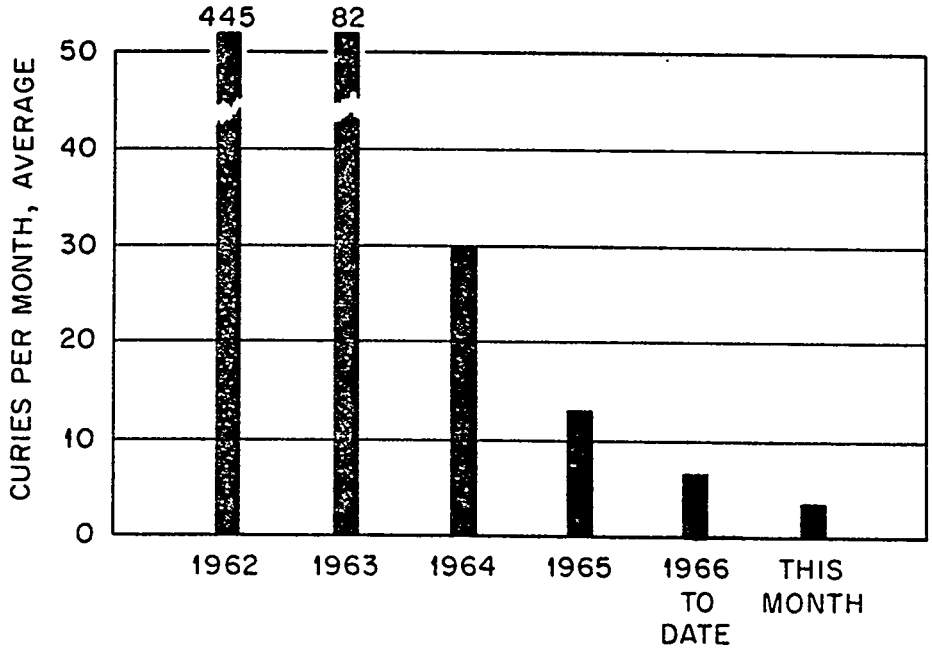

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

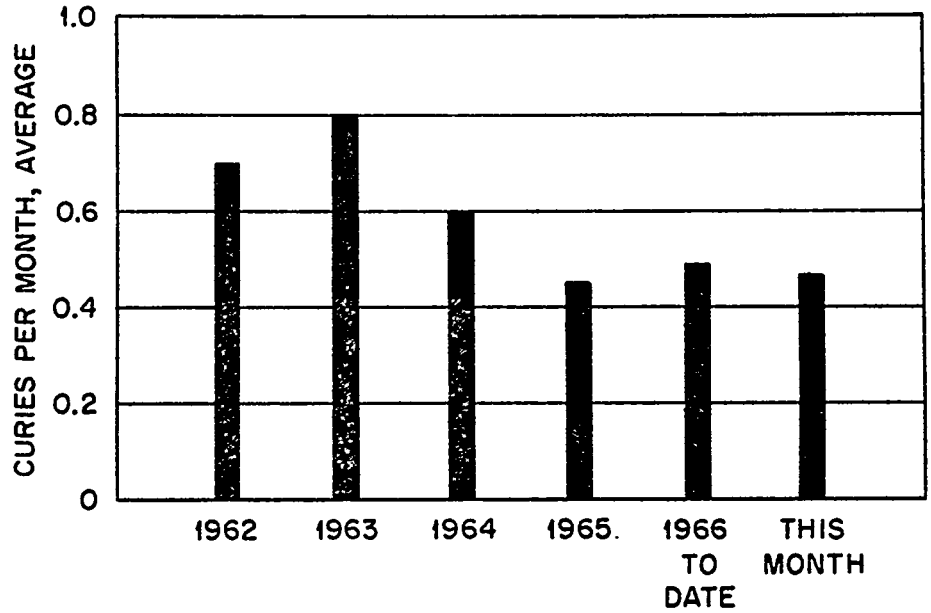

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

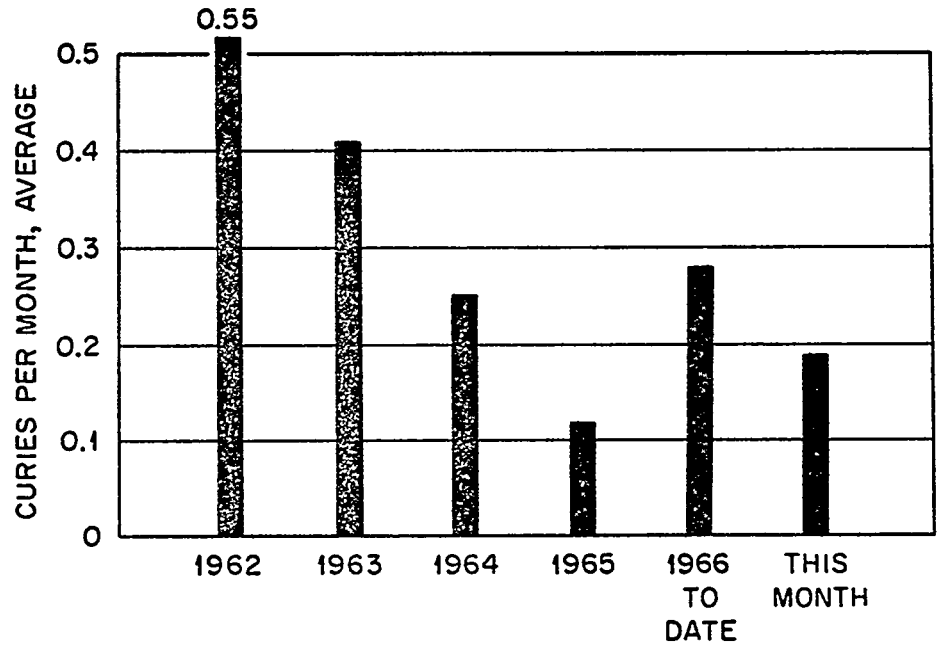

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

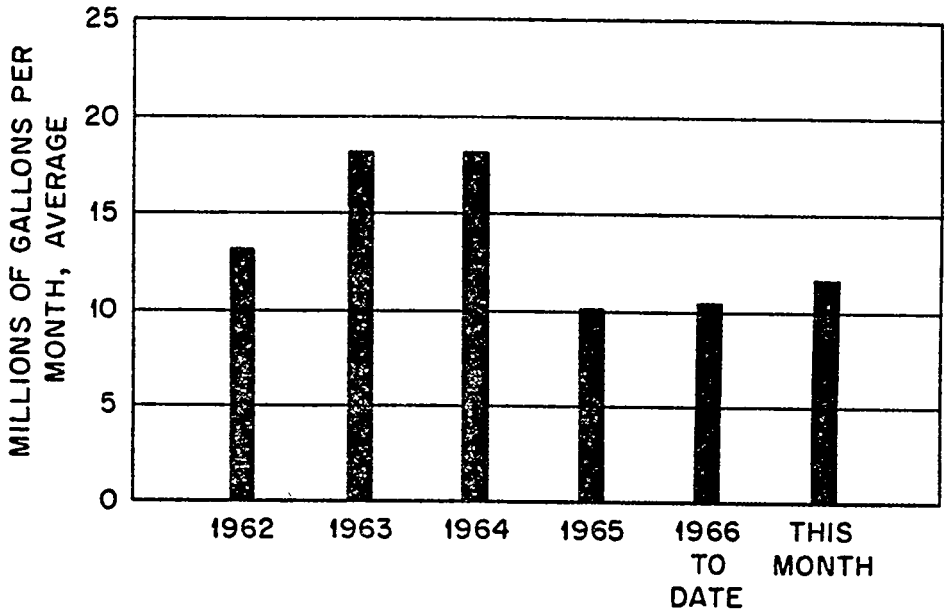

Fig. 5. Process Waste Volumes

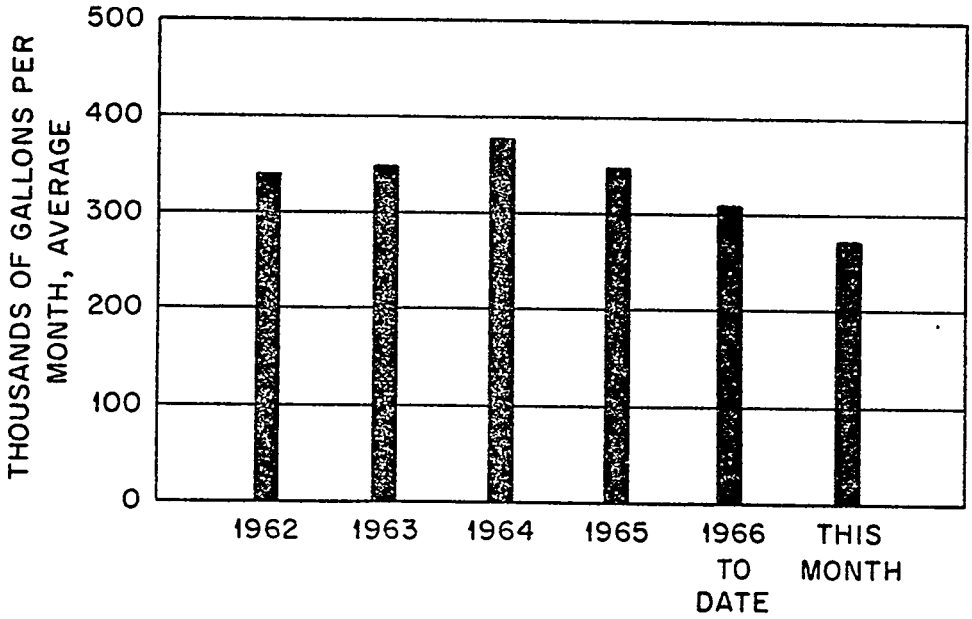

Fig. 6. Intermediate Level Waste Volumes

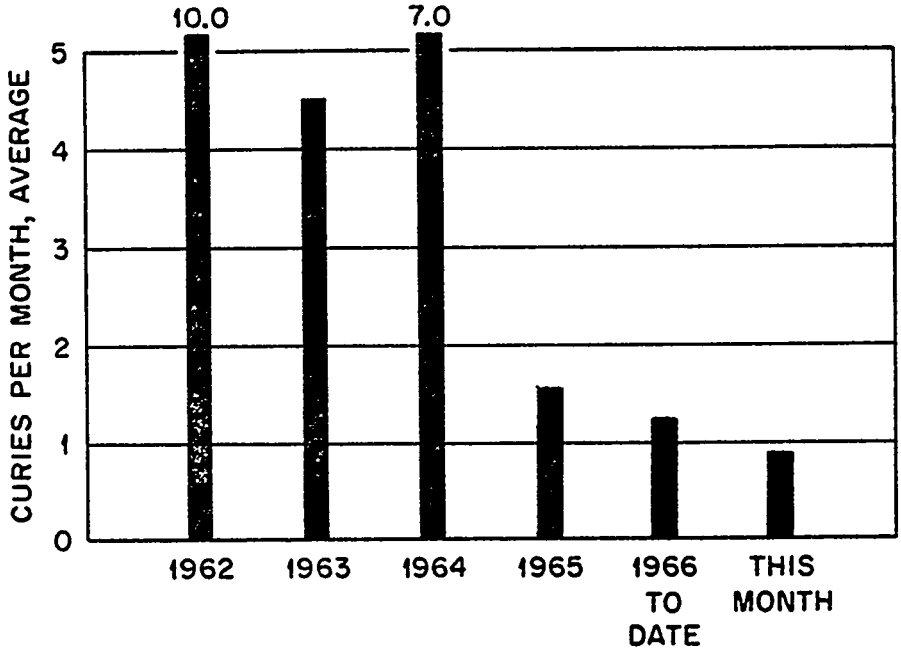

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

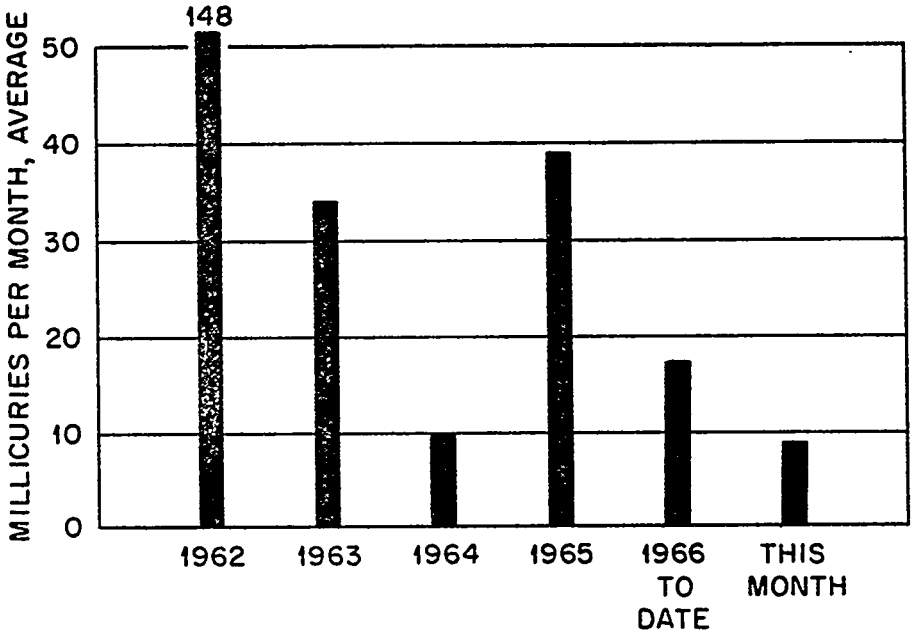

Fig. 8. Filterable Activity Released in Gaseous Waste

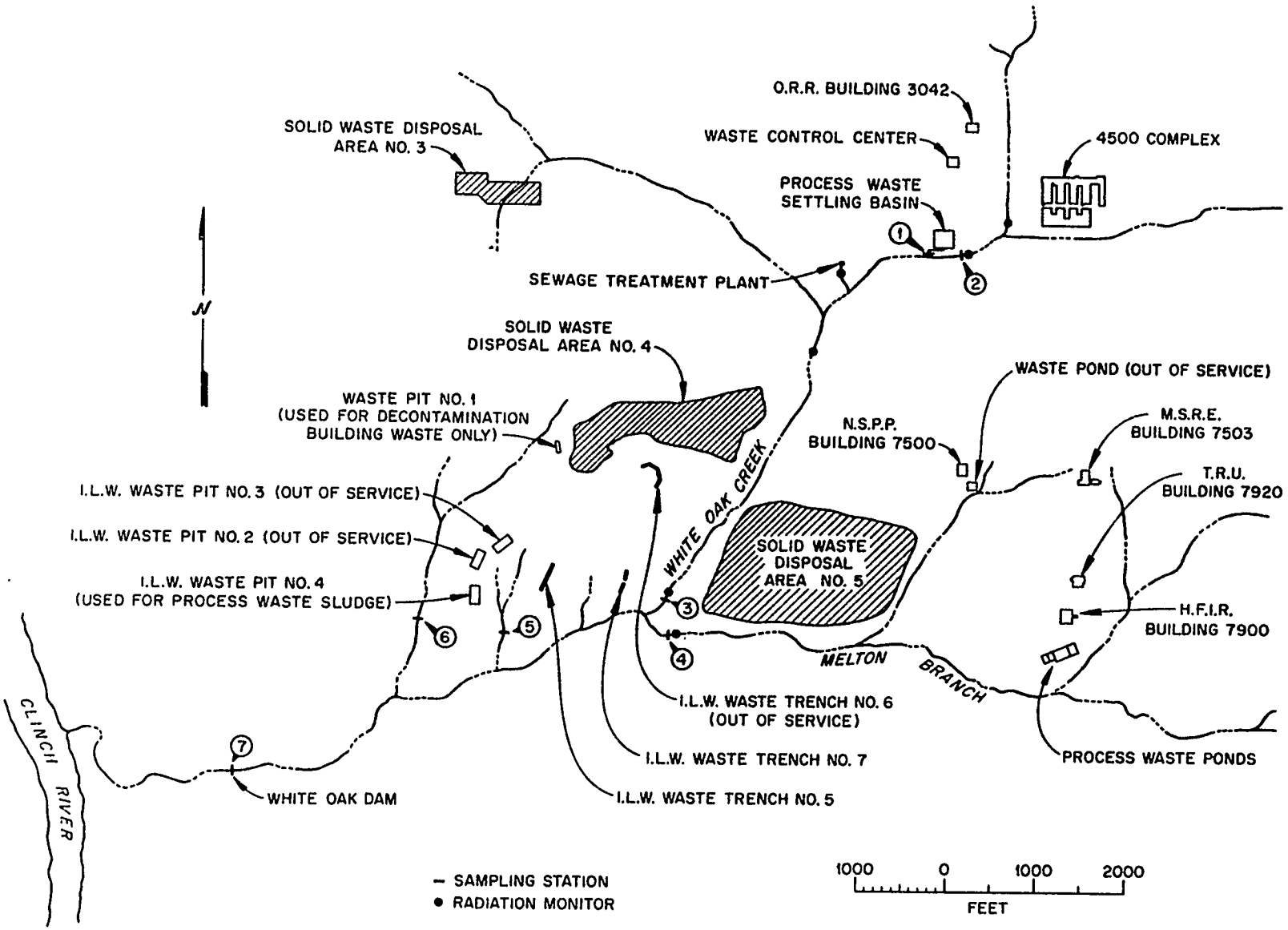

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.19	None	0.13	None	0.32
Miscellaneous discharges from east end of plant	2	< 0.01	None	< 0.01	None	< 0.01
Total discharge from Bethel Valley Area	3	0.41	0.02	0.21	None	0.64
Total discharge from Melton Valley Area	4	0.05	< 0.01	< 0.01	None	0.05
East waste pit seepage	5	< 0.01	1.34	0.09	0.47	1.90
West waste pit seepage	6	< 0.01	0.64	0.02	0.02	0.68
Total discharge from all sources	3,4,5,6	0.46	2.00	0.32	0.49	3.27
White Oak Dam to Clinch River (Health Physics measurement)	7	0.44	2.66	0.06	0.33	3.97

[a]Refers to Fig. 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.8×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.93	0.19	80
$^{103,106}Ru$	None	None	--
^{60}Co	0.06	None	100
^{137}Cs	0.91	0.13	86
Gross Beta	44 c/m/ml	6 c/m/ml	86

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	17	0.61[b]	53.5	2.77	23.5
2.	Radioisotope Processing Area	7	0.16	14.0	1.85	15.7
3.	Buildings 3503 and 3508	4	0.11	9.6	2.11	17.9
4.	Buildings 3025 and 3026	3	0.10	8.8	2.50	21.2
5.	Building 3019	2	0.08	7.0	0.27	2.3
6.	Fission Products Development Laboratory	Not sampled	--	--	0.41	3.5
7.	Waste Evaporator, Building 2531	4	0.06	5.3	1.20	10.2
8.	Buildings 3525 and 3550	1	0.01	0.9	0.56	4.7
9.	Building 2026	4	0.01	0.9	0.12	1.0
10.	Melton Valley Area	None	--	--	--	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.04
Central Radioactive Gas Disposal Facilities	3039	0.81
Radiochemical Processing Pilot Plant	3020	0.03
Graphite Reactor Building	3018	< 0.01
MSRE	7512	0.01
HFIR	7911	< 0.01
Total activity in gases released		0.89

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Contamination of the Clinch River which resulted from radioactive ORNL waste discharges was 1.26% of MPC_w. The main contaminants were strontium and ruthenium, contributing 93.0% and 4.8%, respectively, to the percent of MPC_w. The percent of river MPC_w measured during January was 0.16%. The increase in February was caused by a lower river flow (approximately 50% of the flow measured during January) and a higher strontium release. Figure 1 compares the river contamination on a monthly basis. Data pertaining to White Oak Dam and the Clinch River were provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 3.81 curies was discharged into White Oak Lake. About one-half of the activity was ruthenium which seeped from the soil disposal areas. The cobalt and cesium releases amounted to 0.74 curie and 0.44 curie, respectively. Virtually all of the cobalt came from the soil disposal areas. The bulk of the cesium was discharged from the process waste system. The strontium release was 0.79 curie; most of it also came from the process waste system.

A summary of creek monitoring data is given in Table 1. Figures 2 and 3 compare the releases of activity into White Oak Creek on a monthly basis.

Process Waste

A total of 9.4 million gallons of waste was chemically treated this month. Decontamination (beta activity) achieved by the plant was 73%. Cesium decontamination was poor (35%) during the period. A

summary of plant operations is shown in Table 2.

Table 3 lists the principal sources of activity discharged into the process waste system. Figure 4 compares the strontium releases from the process waste system on a monthly basis. Figure 5 compares the volumes of waste handled.

Intermediate Level Waste

The evaporator operated at an average rate of 493 gph. A summary of operating data is given below:

	Gallons
Total volume generated	228,000
Volume transferred to evaporator	331,000
Volume of concentrate returned to tank farm	21,000
Tank farm free space at beginning of month	368,000
Tank farm free space at end of month	450,000

The main contributors to the ILW system were as follows:

	Gallons
Building 3019	44,000
Transuranium Processing Plant	36,000
4500 Complex	23,000
Fission Products Development Laboratory	21,000
Reactor Complex	19,000
Radioisotopes Processing Area	11,000

Gaseous Waste

A total of 0.82 curie of gaseous radioactivity, identified as ^{131}I, was discharged from the ORNL stacks. The particulate activity amounted to 2 millicuries. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

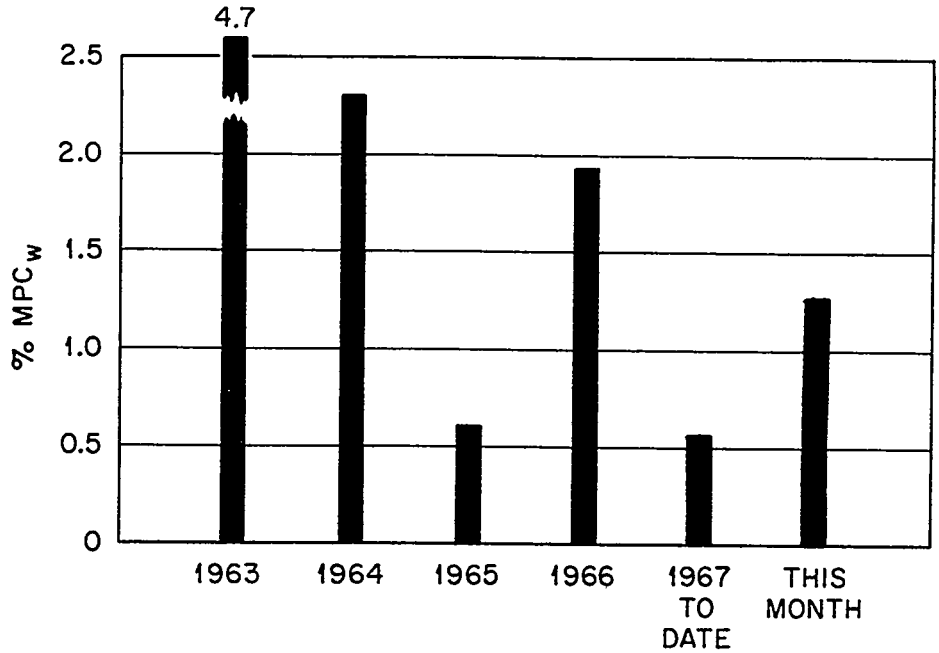

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

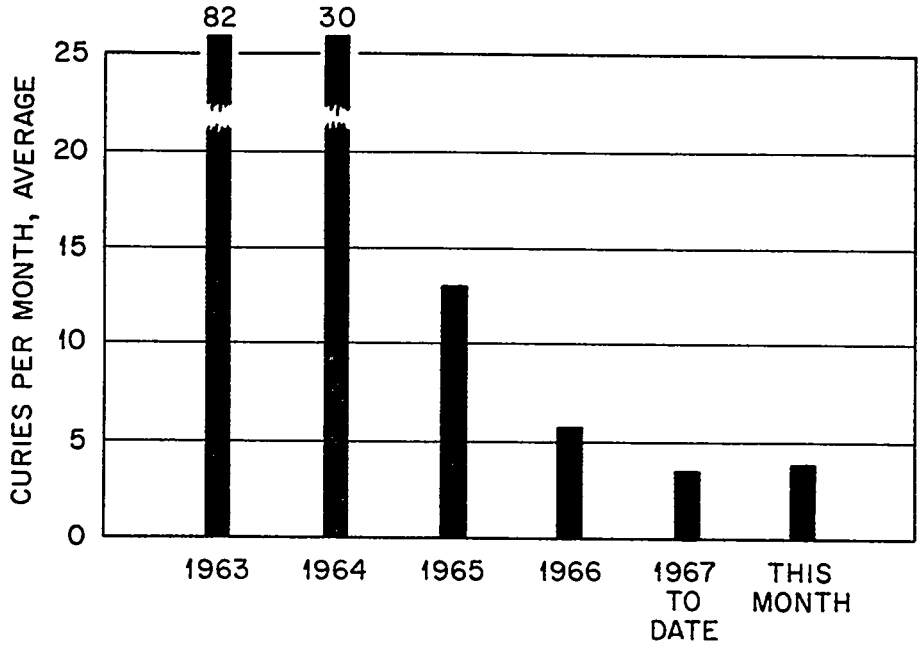

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

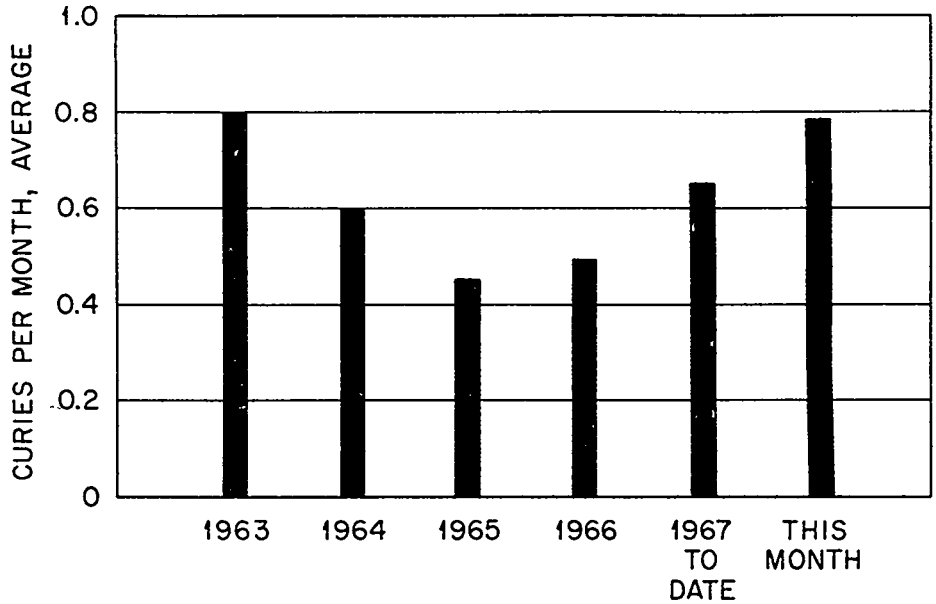

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

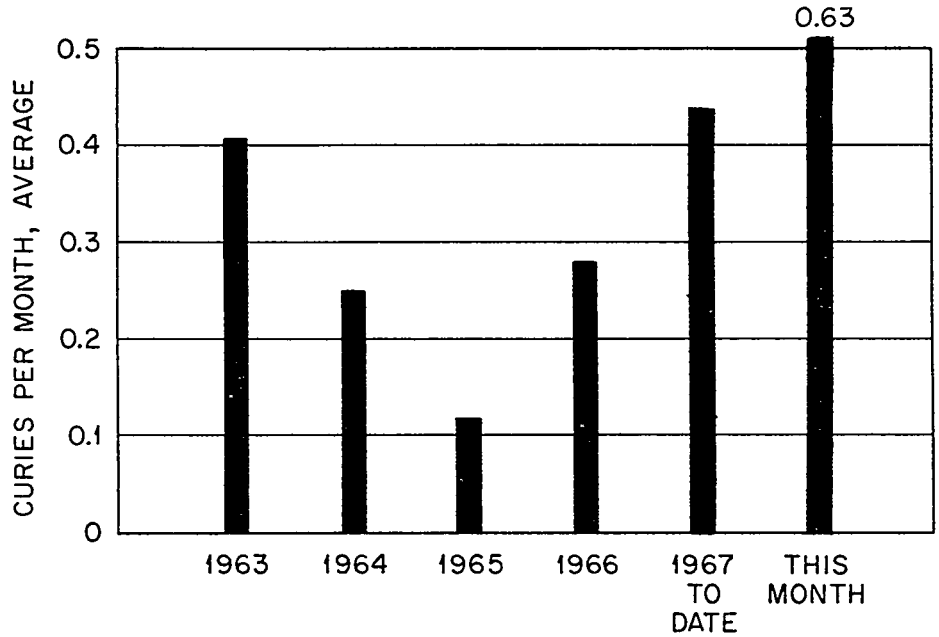

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

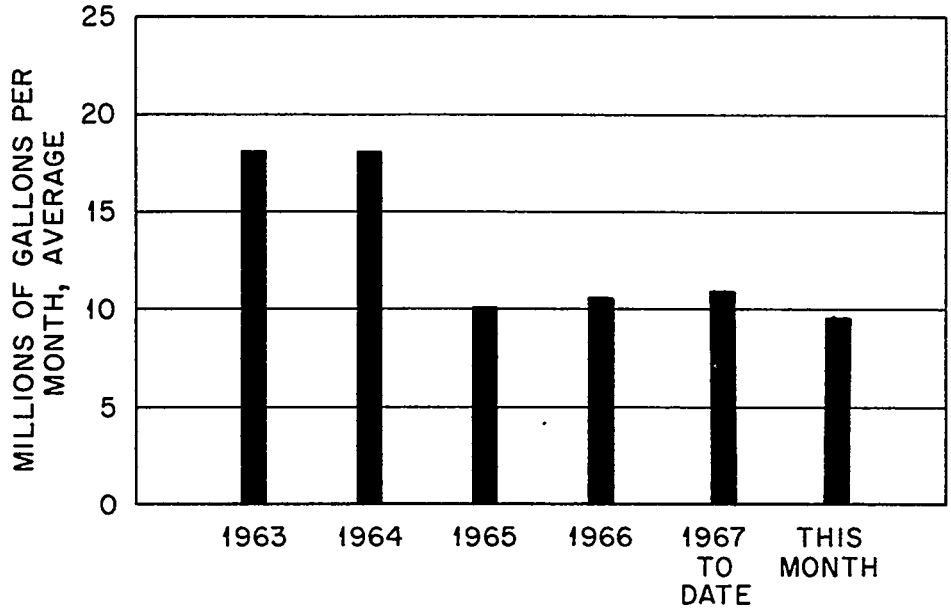

Fig. 5. Process Waste Volumes.

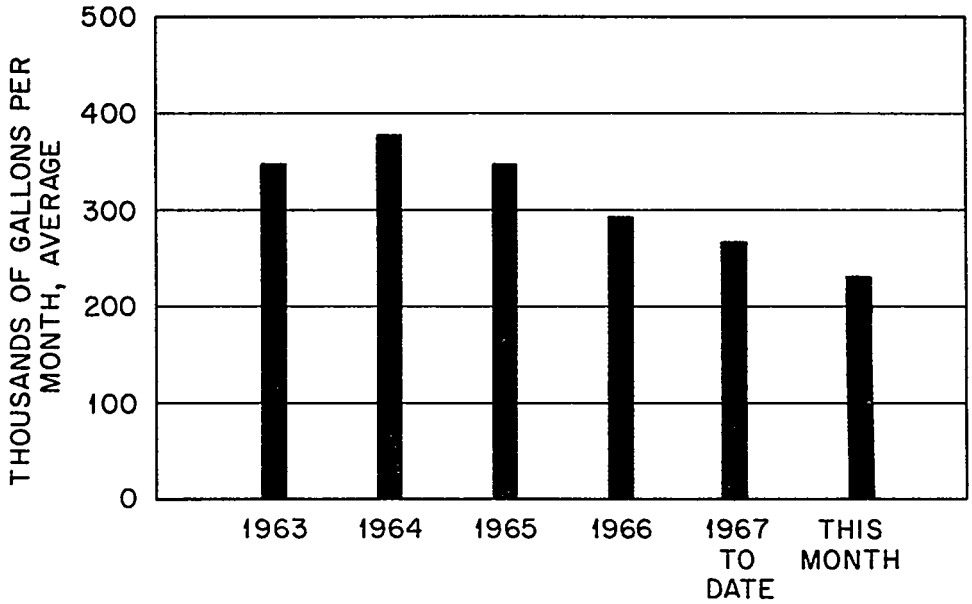

Fig. 6. Intermediate-Level Waste Volumes.

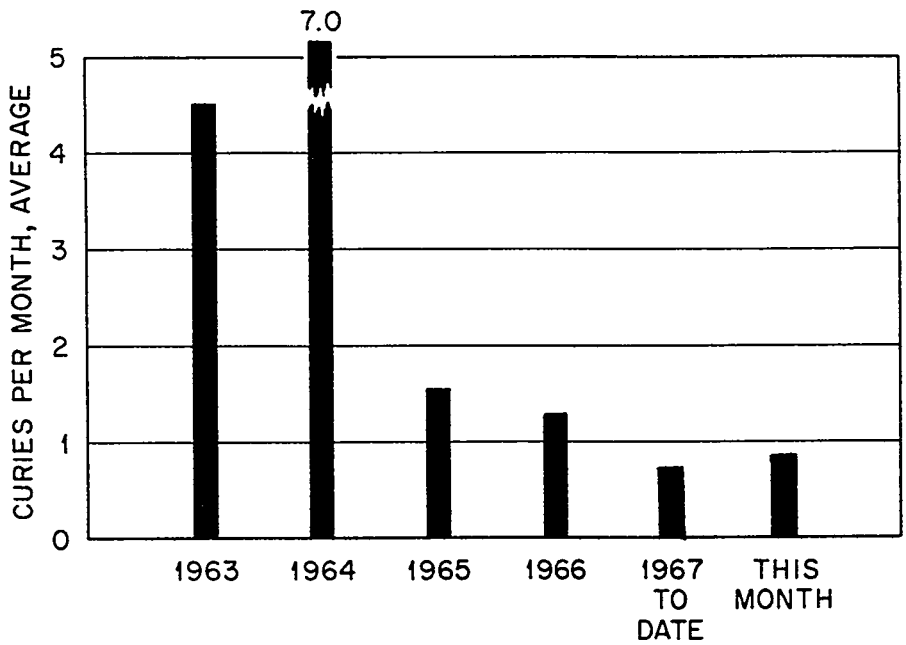

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

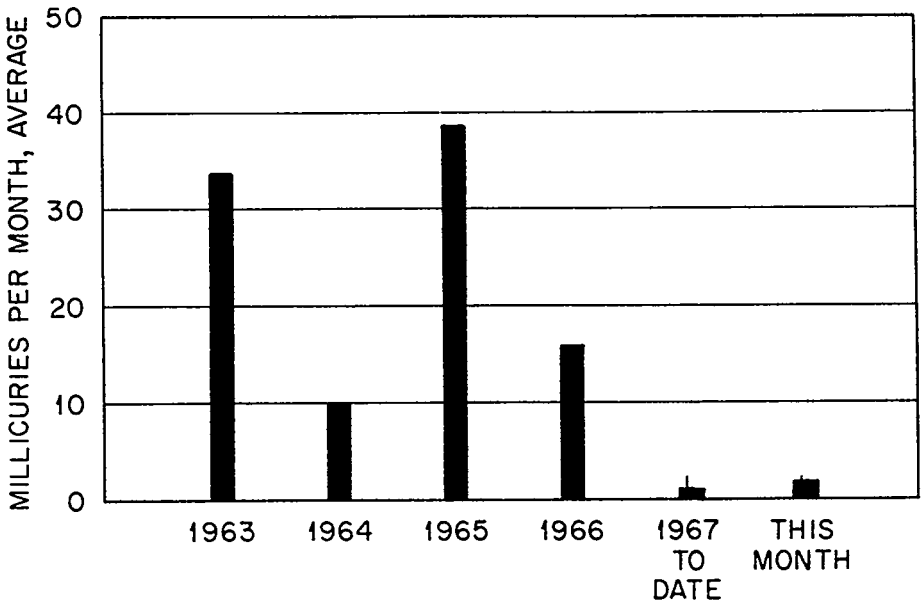

Fig. 8. Filterable Activity Released in Gaseous Waste.

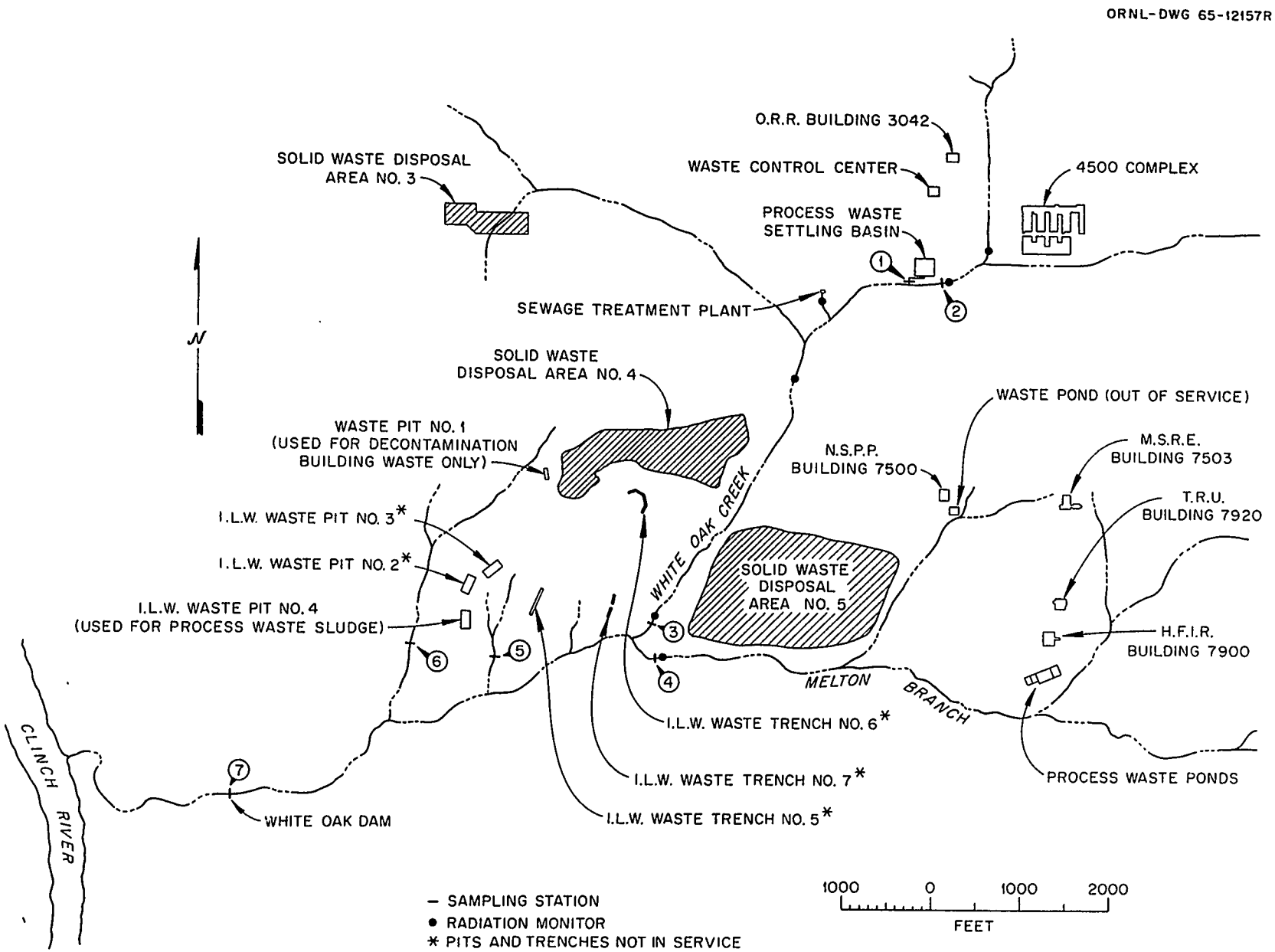

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.63	None	1.08	0.05	1.76
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	0.03	< 0.01	0.04
Total discharge from Bethel Valley Area	3	0.71	0.02	0.34	None	1.07
Total discharge from Melton Valley Area	4	0.08	< 0.01	0.03	None	0.11
East waste pit seepage	5	< 0.01	1.37	0.06	0.62	2.05
West waste pit seepage	6	< 0.01	0.45	0.01	0.12	0.58
Total discharge from all sources	3,4,5,6	0.79	1.84	0.44	0.74	3.81
White Oak Dam to Clinch River (Health Physics measurement)	7	0.43	1.74	0.21	0.33	3.56

[a]Refers to Fig. 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.4×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.8×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	2.18	0.63	71
$^{103,106}Ru$	0.05	None	100
^{60}Co	0.04	0.05	--
^{137}Cs	1.65	1.08	35
Gross Beta Analysis	121 c/m/ml	33 c/m/ml	73

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	45[b]	0.16	59	2.11	22.3
2.	Radioisotope Processing Area	55	0.11	41	1.10	11.7
3.	Buildings 3503 and 3508	1	< 0.01	--	1.79	19.0
4.	Buildings 3025 and 3026	0	--	--	2.21	23.4
5.	Building 3019	< 1	--	--	0.08	0.8
6.	Fission Products Development Laboratory	14	< 0.01	--	0.13	1.4
7.	Waste Evaporator, Building 2531	4	< 0.01	--	1.33	14.1
8.	Buildings 3525 and 3550	1	< 0.01	--	0.67	7.1
9.	Building 2026	0	--	--	0.02	0.2
10.	Melton Valley Area	--	--	--	None	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.12
Central Radioactive Gas Disposal Facilities	3039	0.70
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.82

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 1.97 percent of the MPC_w for release to uncontrolled areas. This comparatively high percentage (Figure 1) was caused by a low river flow (17% of average) during the period. The primary contaminant was strontium, contributing 90.9%, to the percent of MPC_w. Figure 1 compares the river contamination on a monthly basis. Data pertaining to White Oak Dam and the Clinch River were provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 2.90 curies of radioactive waste was discharged into White Oak Lake. About 50% of the activity was ruthenium (1.17 curies) and cobalt (0.51 curie) which seeped from the soil disposal areas. The cesium release amounted to 0.46 curie; 0.16 curie of this amount came from the process waste system. The strontium release was 0.76 curie. Of this amount, 0.31 curie came from the process waste system. An additional 0.07 curie of strontium was released from the Melton Valley area. The balance (0.38 curie) is attributed to the White Oak Creek bed and several unmonitored sources which discharge into this drainage system.

The creek monitoring date is summarized in Table 1. Figures 2 and 3 compare the releases of activity into White Oak Creek on a monthly basis.

Process Waste

A total of 9.6 million gallons of process waste was chemically treated this month. The treatment plant was shut down five days for the

purpose of cleaning sludge accumulations from the precipitation and settling basins; about 2.5 million gallons of waste were discharged directly into White Oak Creek during this interval. The treatment system removed 84% of the gross activity received during the month. A summary of plant operations is shown in Table 2.

Table 3 lists the principal sources of activity discharged into the process waste system. Figure 4 compares the strontium releases from the process waste system on a monthly basis. Figure 5 compares the volume of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 364 gph. A summary of operating data is given below:

	Gallons
Total volume generated	307,000
Volume transferred to evaporator	271,000
Volume of concentrate returned to tank farm	16,000
Tank farm free space at beginning of month	567,000
Tank farm free space at end of month	515,000

The main contributors to the ILW system were as follows:

		Gallons
1.	4500 Complex	52,000
2.	Fission Products Development Laboratory	45,000
3.	Transuranium Processing Plant	45,000
4.	Building 3019	44,000
5.	Reactor Complex	28,000
6.	High Flux Isotope Reactor	28,000
7.	Radioisotope Processing Area	23,000

Gaseous Waste

A total of 2.03 curies of radioactive gaseous waste was released from the ORNL stacks. This activity was primarily ^{131}I. The release of particulate activity amounted to 3 millicuries. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

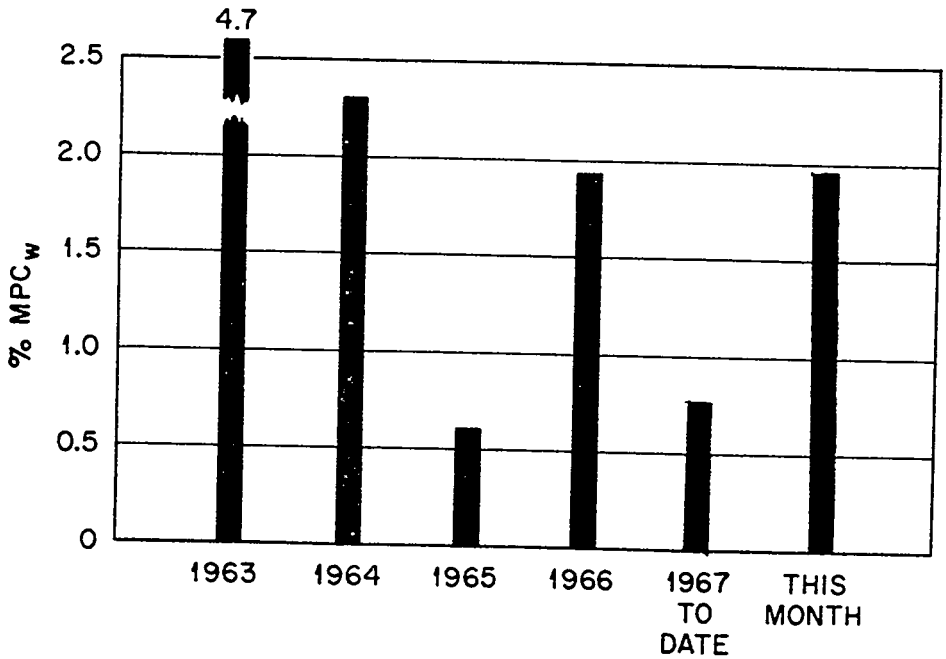

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

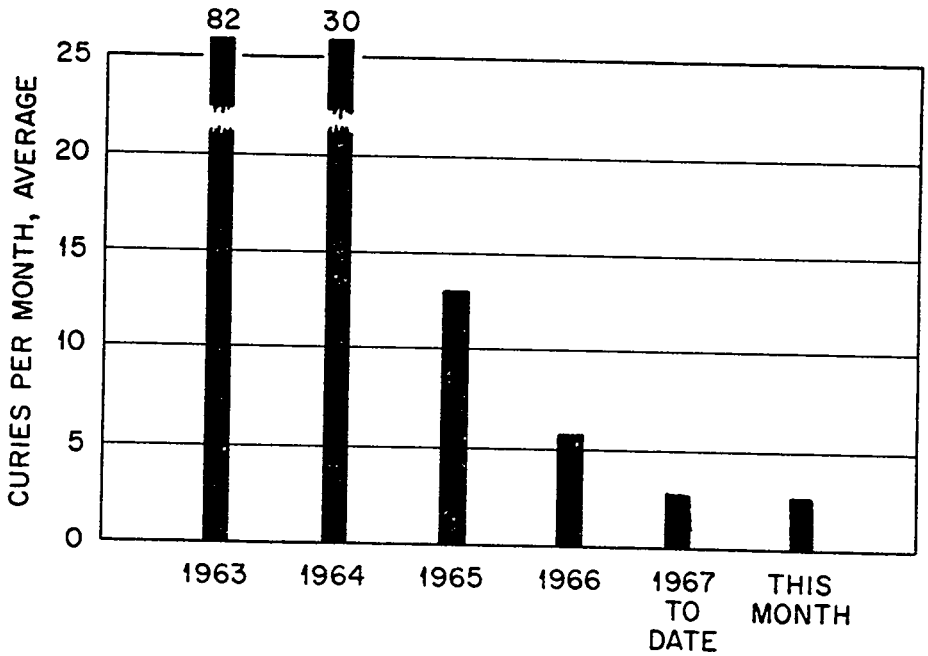

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

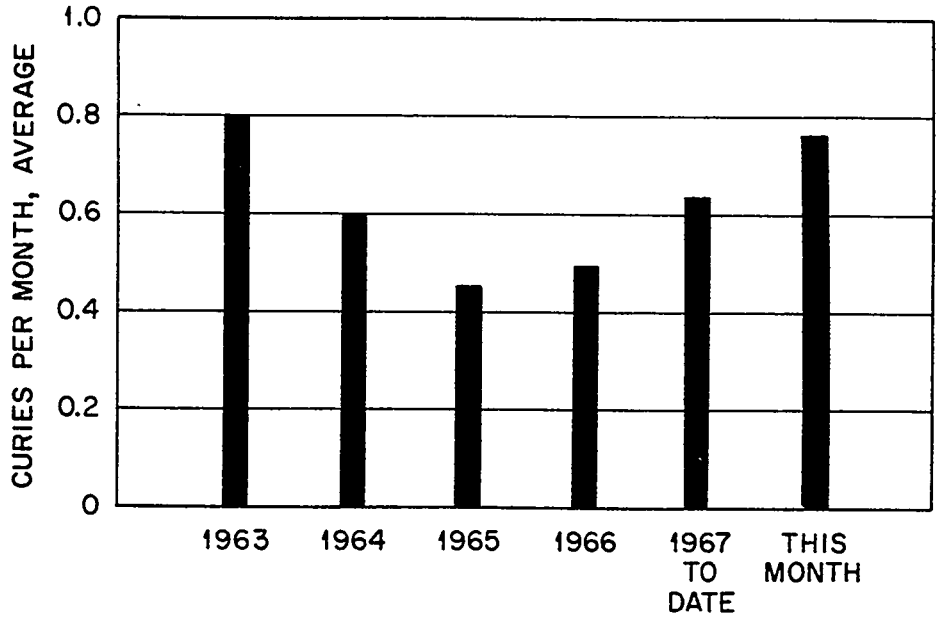

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

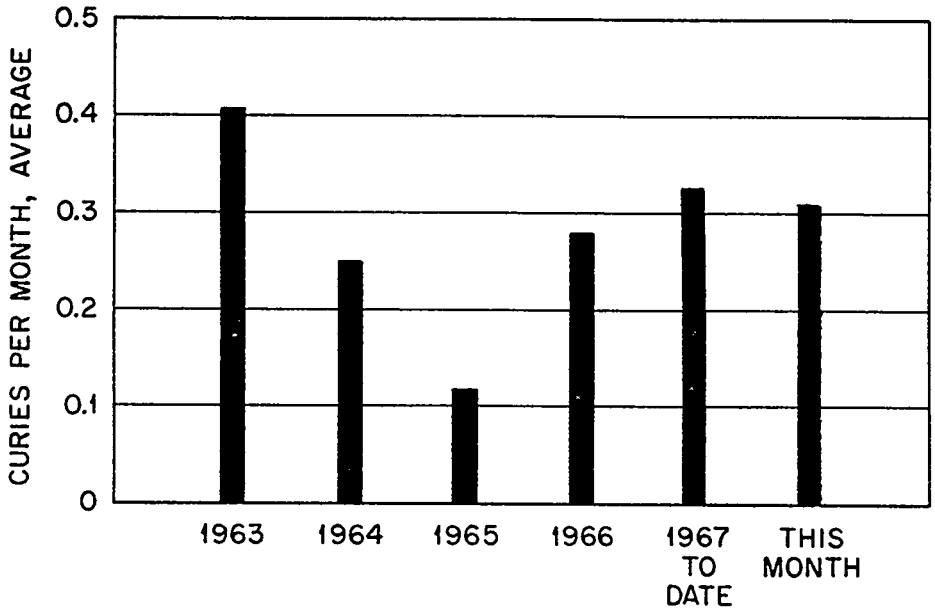

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

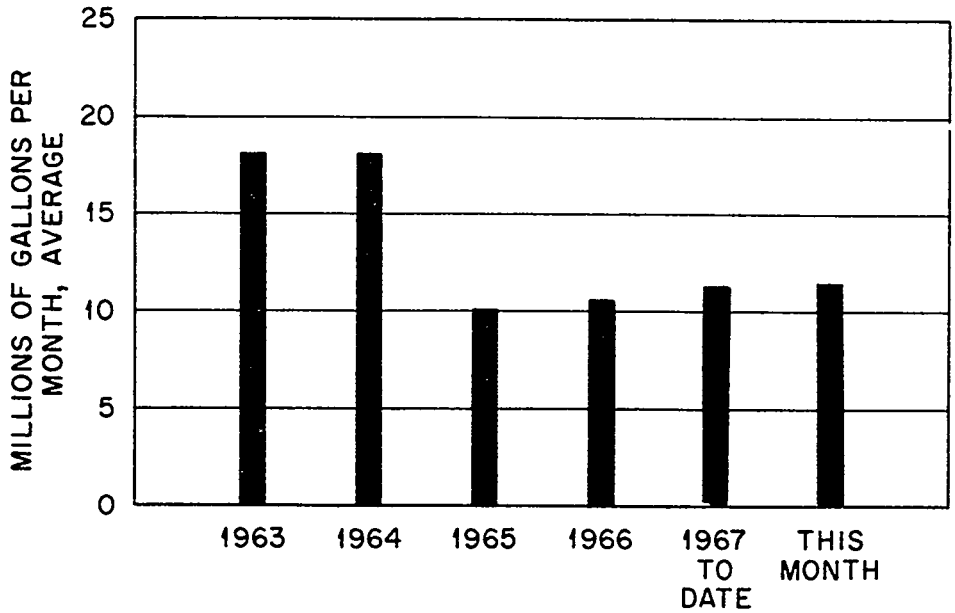

Fig. 5. Process Waste Volumes.

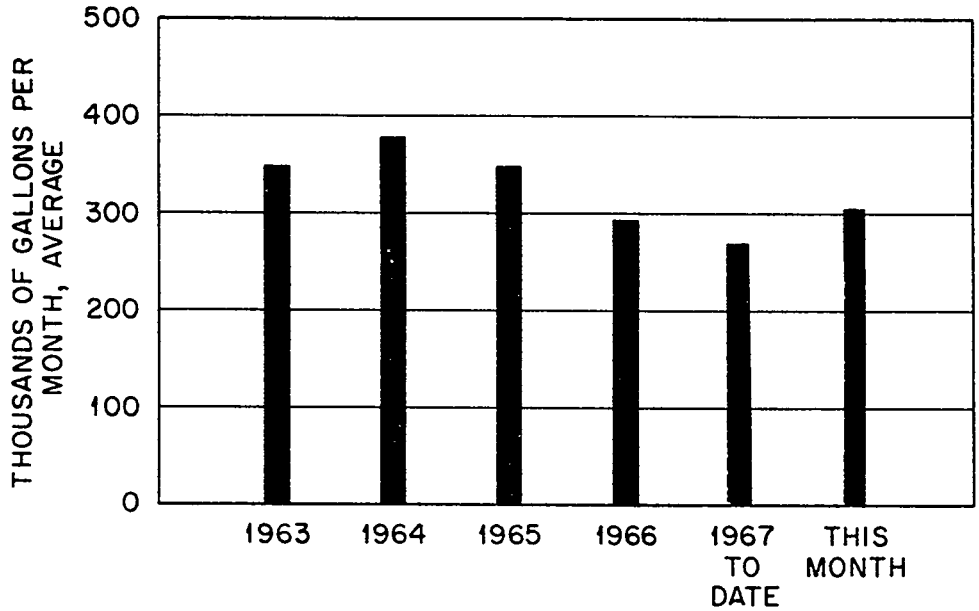

Fig. 6. Intermediate-Level Waste Volumes.

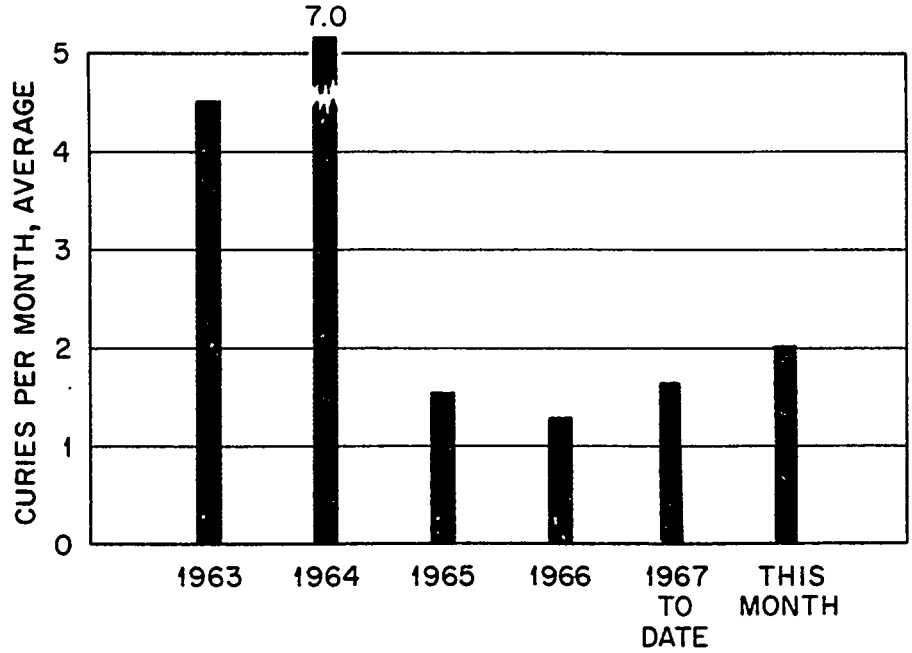

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

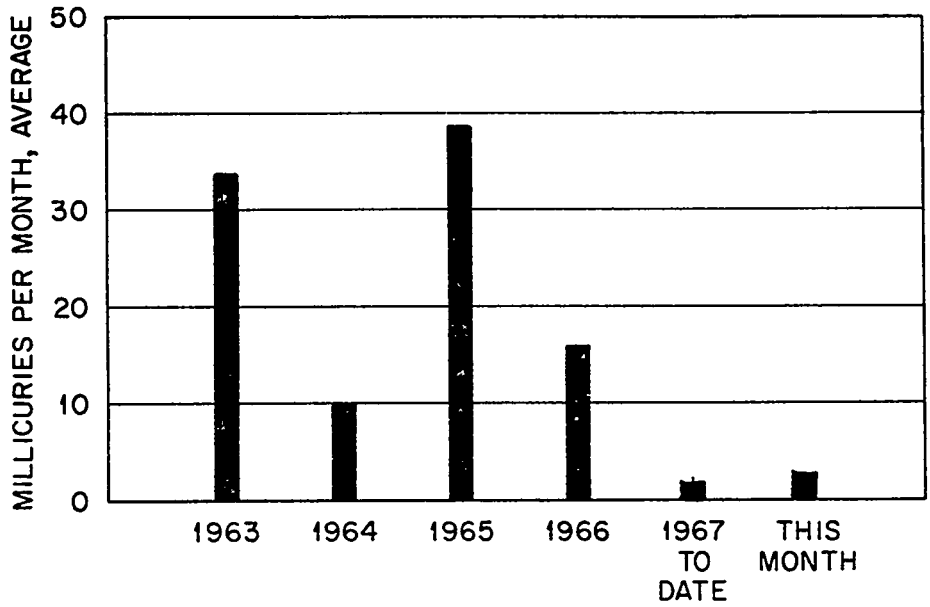

Fig. 8. Filterable Activity Released in Gaseous Waste.

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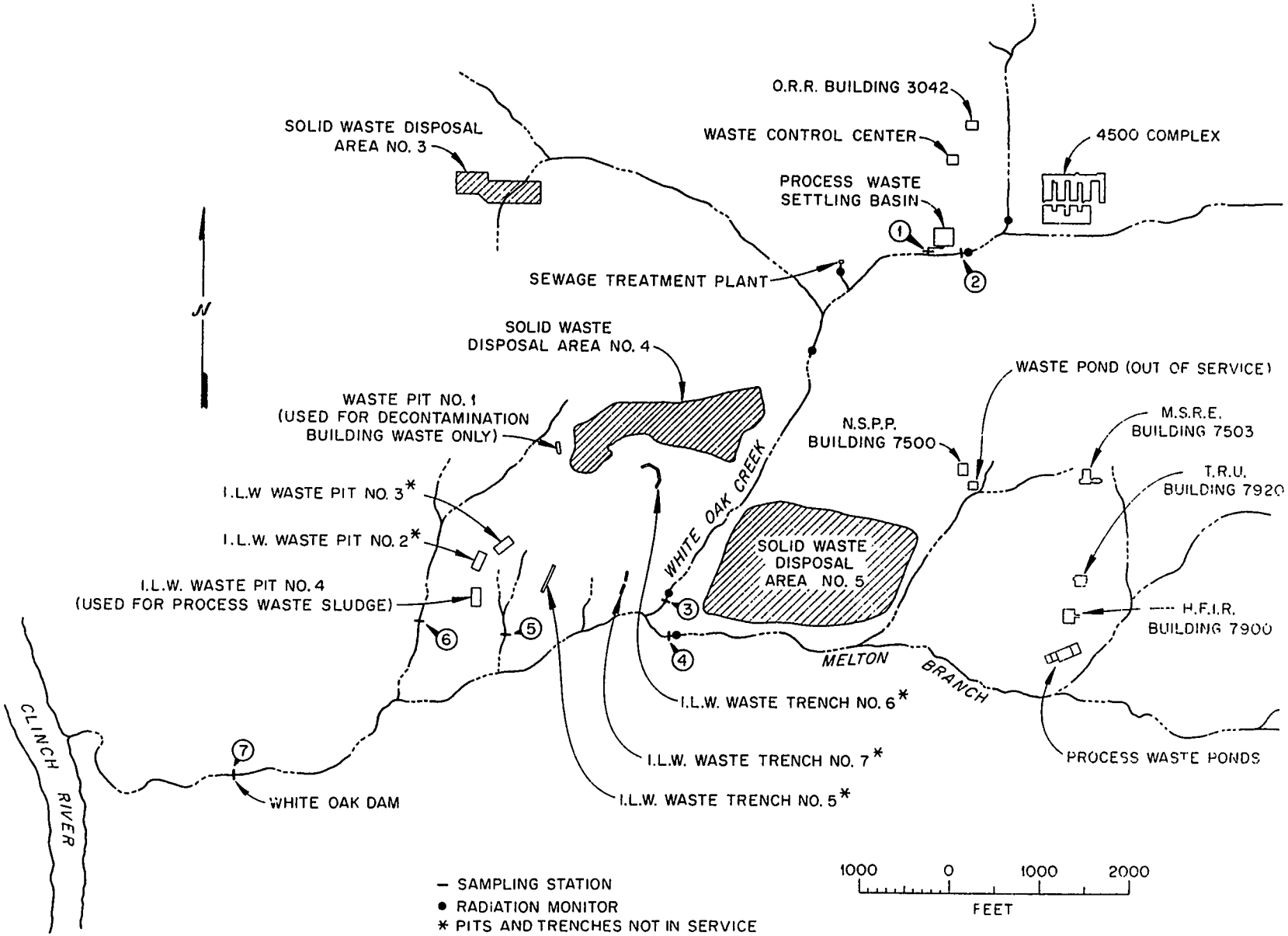

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.31	0.03	0.16	None	0.60
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	0.02	None	0.03
Total discharge from Bethel Valley Area	3	0.69	< 0.01	0.40	None	1.09
Total discharge from Melton Valley Area	4	0.07	< 0.01	< 0.01	None	0.07
East waste pit seepage	5	< 0.01	0.90	0.05	0.42	1.37
West waste pit seepage	6	< 0.01	0.27	0.01	0.09	0.37
Total discharge from all sources	3,4,5,6	0.76	1.17	0.46	0.51	2.90
White Oak Dam to Clinch River (Health Physics measurement)	7	0.43	1.69	0.17	0.32	3.37

[a]Refers to Figure 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.6×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.39	0.31	78
$^{103,106}Ru$	None	0.03	--
^{60}Co	0.07	None	100
^{137}Cs	0.88	0.16	81
Gross Beta Analysis	55 c/m/ml	9 c/m/ml	84

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	14[b]	0.63[b]	58.3	3.2	27.6
2.	Radioisotope Processing Area	18	0.27	25.0	1.1	9.5
3.	Buildings 3503 and 3508	2	0.06	5.6	2.1	18.1
4.	Buildings 3025 and 3026	0	--	--	2.1	18.1
5.	Building 3019	0	--	--	0.6	5.2
6.	Fission Products Development Laboratory	11	0.04	3.7	0.3	2.6
7.	Waste Evaporator, Building 2531	4	0.08	7.4	1.4	12.1
8.	Buildings 3525 and 3550	0	--	--	0.7	6.0
9.	Building 2026	< 1	< 0.01	< 0.01	0.1	0.8
10.	Melton Valley Area	none	--	--	None	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.14
Central Radioactive Gas Disposal Facilities	3039	1.75
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	0.14
Total activity in gases released		2.03

[a]Activity primarily ^{131}I as noted in text

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Technical Information Officer Date
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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.53% of the MPC_w for release to uncontrolled areas. The primary contaminant was strontium which contributed 89.8% to the percent of MPC_w. Figure 1 compares the river contamination on a monthly basis. Data pertaining to White Oak Dam were provided by the Health Physics Division.

White Oak Creek Monitoring

The radioactive waste discharge into White Oak Lake was 2.1 curies. Most of the activity was ruthenium and cobalt which came from the soil disposal areas. The strontium release was 0.49 curie. About one half (0.23 curie) of this contamination is attributed to a number of unmonitored sources along White Oak Creek and the leaching of the creek bed itself. The balance of the strontium came from the process waste system (0.19 curie) and the Melton Valley area (0.06 curie). Cesium activity, released mainly from the process waste system, amounted to 0.11 curie.

The creek monitoring data is summarized in Table 1. Figure 2 and 3 compare the releases of activity into White Oak Creek on a monthly basis.

Process Waste

A total of 13.5 million gallons of waste was chemically treated this month. A summary of plant operations is shown in Table 2.

Table 3 lists the principal sources of activity discharged into the process waste system. Figure 4 compares the strontium releases from the process waste system on a monthly basis. Figure 5 compares the volume of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 495 gph. A summary of operating data is given below:

	Gallons
Total volume generated	306,000
Volume transferred to evaporator	356,000
Volume of concentrate returned to tank farm	28,000
Tank farm free space at the beginning of month	515,000
Tank farm free space at end of month	537,000

The main contributors to the ILW system were as follows:

		Gallons
1.	4500 Complex	61,000
2.	Building 3019	57,000
3.	Reactor Complex	36,000
4.	Fission Products Development Laboratory	32,000
5.	High Flux Isotope Reactor	32,000
6.	Radioisotope Processing Area	19,000
7.	Nuclear Safety Pilot Plant	10,000
8.	Transuranium Processing Plant	9,000

Gaseous Waste

The gaseous waste release was 4.17 curies. The activity was primarily ^{131}I. A total of 16 millicuries of particulate activity (^{137}Cs) was also released. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

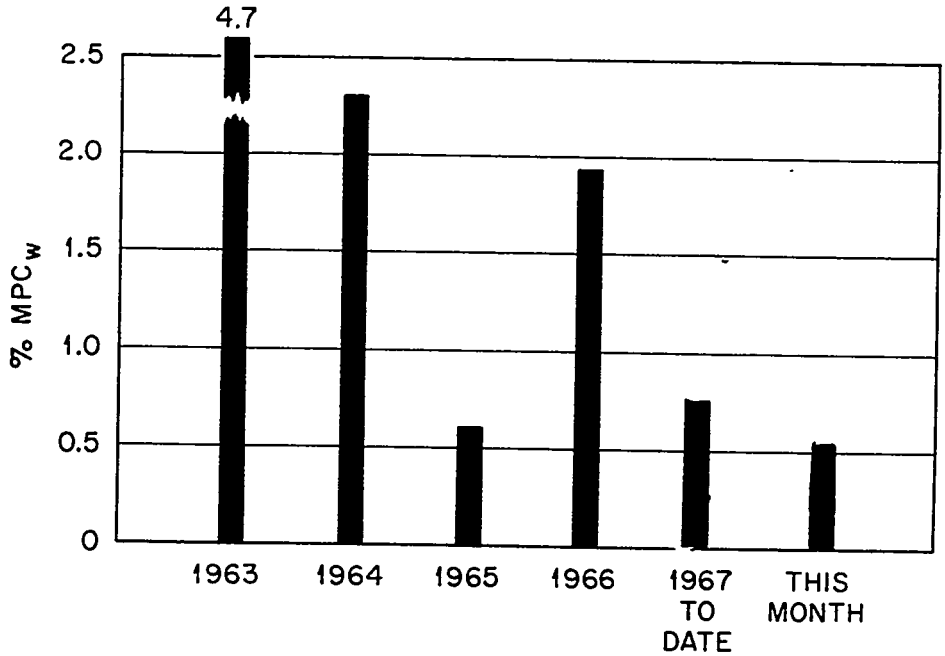

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

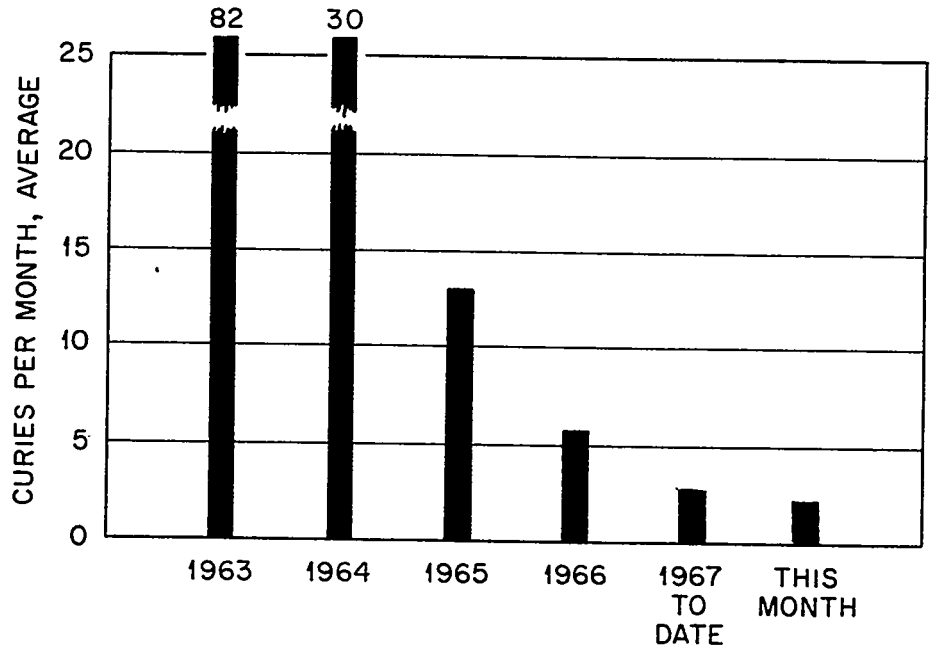

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

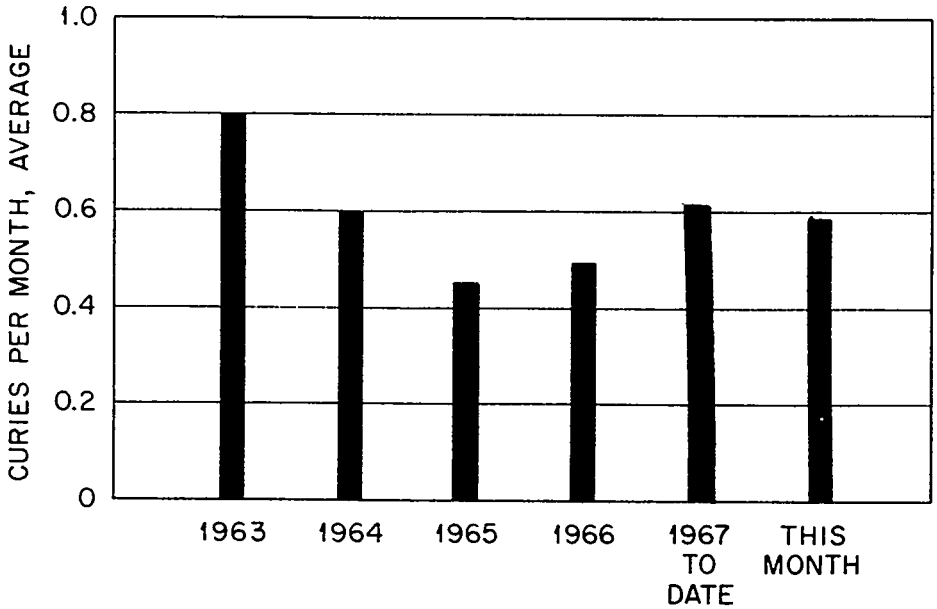

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

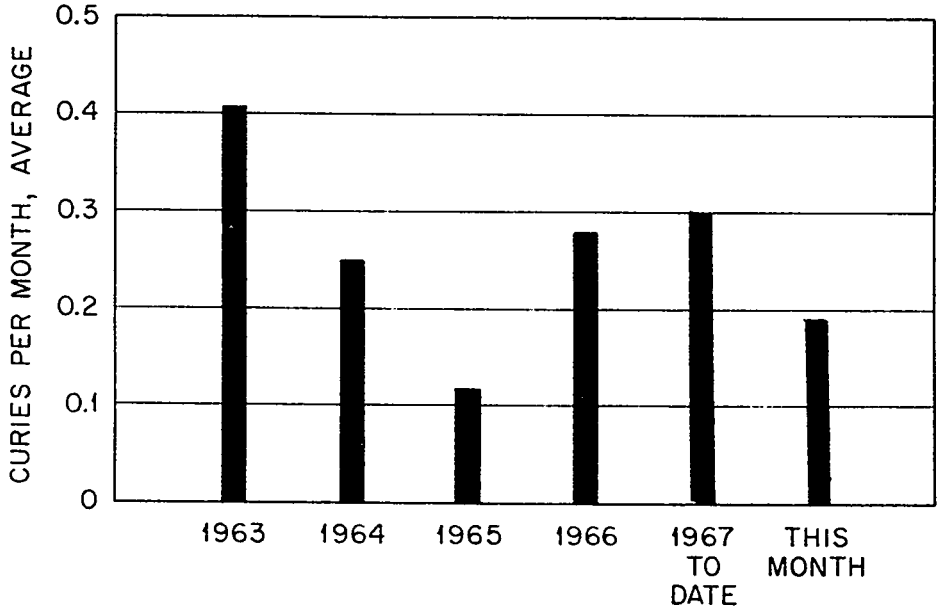

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

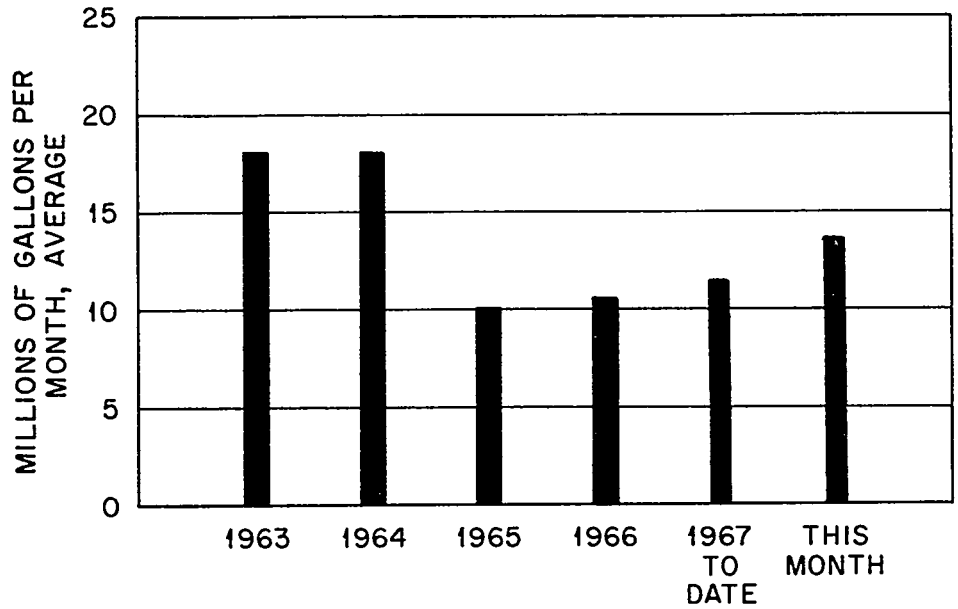

Fig. 5. Process Waste Volumes.

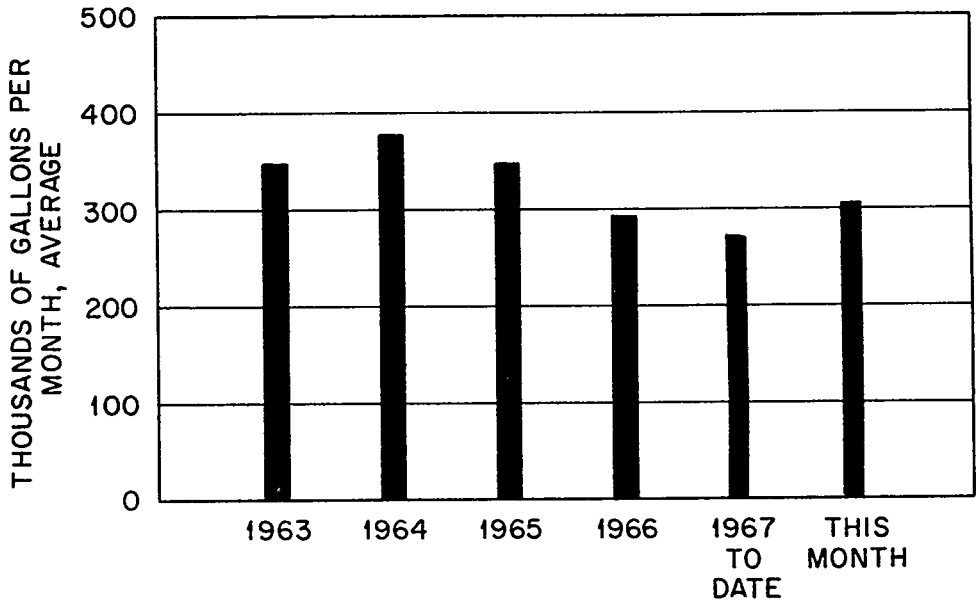

Fig. 6. Intermediate-Level Waste Volumes.

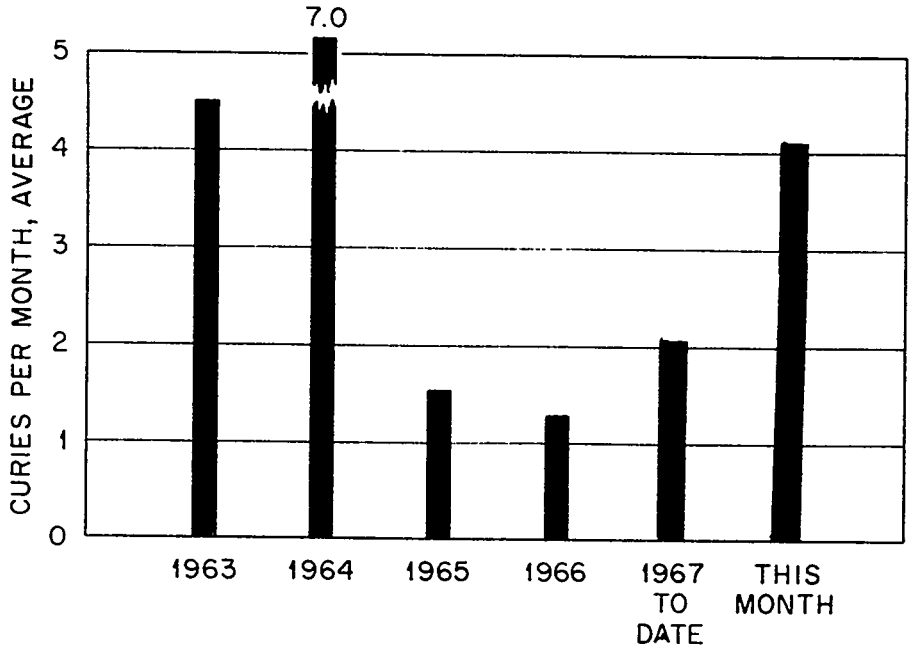

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

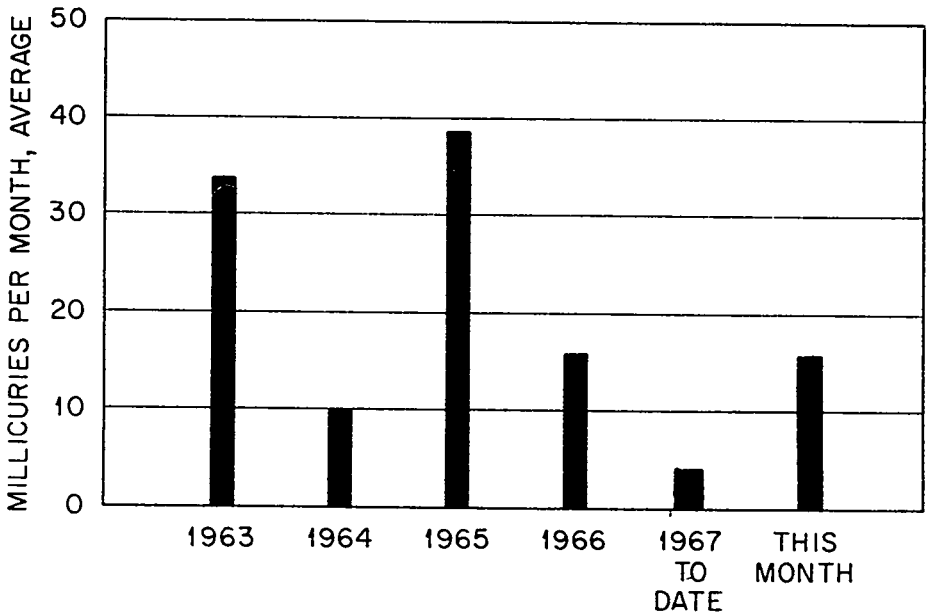

Fig. 8. Filterable Activity Released in Gaseous Waste.

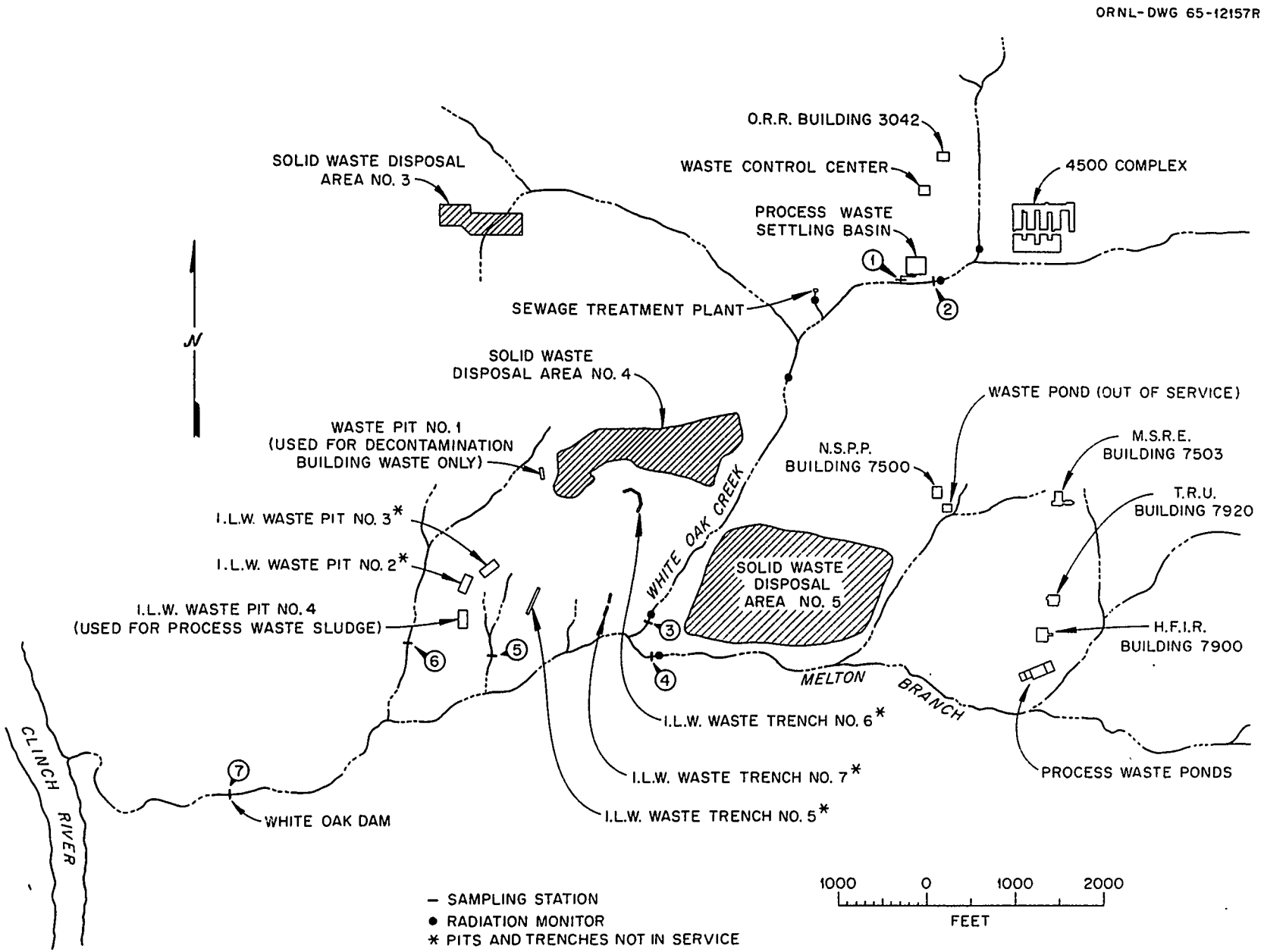

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.19	0.02	0.15	None	0.70
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	None	0.01
Total discharge from Bethel Valley Area	3	0.43	0.11	0.04	None	0.58
Total discharge from Melton Valley Area	4	0.06	< 0.01	< 0.01	None	0.06
East waste pit seepage	5	< 0.01	0.80	0.06	0.32	1.18
West waste pit seepage	6	< 0.01	0.18	0.01	0.05	0.24
Total discharge from all sources	3,4,5,6	0.49	1.09	0.11	0.37	2.06
White Oak Dam to Clinch River (Health Physics measurement)	7	0.27	1.01	0.12	0.12	2.01

[a]Refers to Fig. 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 13.5×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.8×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.44	0.23	84
$^{103,106}Ru$	0.09	0.03	67
^{60}Co	0.03	None	100
^{137}Cs	0.48	0.17	65
Gross Beta Analysis	35 c/m/ml	6 c/m/ml	83

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	11[b]	0.64[b]	35.6	4.22	31.1
2.	Radioisotope Processing Area	14	0.24	13.3	1.25	8.9
3.	Buildings 3503 and 3508	9	0.24	13.3	1.91	14.1
4.	Buildings 3025 and 3026	0	--	--	1.99	14.8
5.	Building 3019	12	0.07	3.9	0.43	3.0
6.	Fission Products Development Laboratory	12	0.13	7.2	0.77	5.9
7.	Waste Evaporator, Building 2531	20	0.48	26.7	1.70	12.6
8.	Buildings 3525 and 3550	0	--	--	1.14	8.1
9.	Building 2026	1	< 0.01	--	0.20	1.5
10.	Melton Valley Area	None	--	--	None	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.04
Central Radioactive Gas Disposal Facilities	3039	3.94
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	0.19
Total activity in gases released		4.17

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river resulting from ORNL waste discharges was 0.67% of the MPC_W for a release to an uncontrolled area. The primary contaminant was strontium, contributing 93% of the measured percent of MPC_W. Figure 1 compares the river contamination on a monthly basis. Data pertaining to the White Oak Dam were provided by the Health Physics Division

White Oak Creek Monitoring

The radioactive waste discharged into White Oak Lake amounted to 2.03 curies. More than one-half of the activity, primarily ruthenium and cobalt, came from the ground disposal areas. Cesium, released primarily from the process waste system, totaled 0.37 curie. The strontium contamination amounted to 0.50 curie; 0.25 curie was released as process waste, 0.16 curie is attributed to the creek drainage system and 0.09 curie came from the Melton Valley environs. There was no significant release of alpha contamination to the creek.

The creek monitoring data are summarized in Table 1. Figures 2 and 3 compare the releases of activity into White Oak Lake on a monthly basis.

Process Waste

Approximately 11 million gallons of process waste were chemically treated this month. A summary of plant operation is shown in Table 2.

Table 3 lists the principal sources of radioactivity discharged into the system. Figure 4 compares the strontium releases on a monthly basis and Figure 5 compares the volume of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 389 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	261,000
Volume transferred to the evaporator	280,000
Volume of concentrate returned to tank farm	20,000
Tank Farm free space at beginning of month	551,000
Tank Farm free space at end of month	550,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Reactor Complex	52,000
2.	Building 3019	40,000
3.	4500 Complex	31,000
4.	Building 3026	26,000
5.	Radioisotopes Processing Area	26,000
6.	Fission Products Development Laboratory	18,000
7.	Building 3525	10,000

Shale Fracturing Disposal of Intermediate-Level Waste (ILW), Injection 3

A total of 83,000 gallons of concentrated ILW was disposed of by the hydraulic fracturing method. The isotopic content, in amounts greater than 100 curies, of the waste was as follows: cesium, 17,000 curies; strontium, 9,000 curies; cobalt, 200 curies; and ruthenium, 400 curies. The waste was injected at a depth of 862 feet - the same slot also used for disposal of 163,000 gallons of ILW in injections 2a and 2b. The slot was closed off with a cement plug at the termination

of injection 3. The material used in the injection and other pertinent data are as follows:

Liquids		Gallons
Concentrated waste		83,000
Water for start-up and wash-down		4,000
Water for disposal of excess solids		12,000
Tributyl phosphate		50
Total volume of liquid injected		99,050
Solids	**Weight, lb.**	**lb/gal**
Portland cement, type 2	200,000	2.02
Fly ash	200,000	2.02
Attapulgite	95,000	0.96
Grundite	50,000	0.50
Total weight of solids	545,000	5.50

Gaseous Waste

The ORNL stack systems discharged 1.61 curies of activity. This activity was primarily ^{131}I, and most of it was released from the 3039 stack. The amount of activity associated with particulates was negligible; 12 millicuries (cesium) were detected. There was no significant release of alpha activity.

The stack releases are given in Table 4. Figures 7 and 8 compare discharges on a monthly basis.

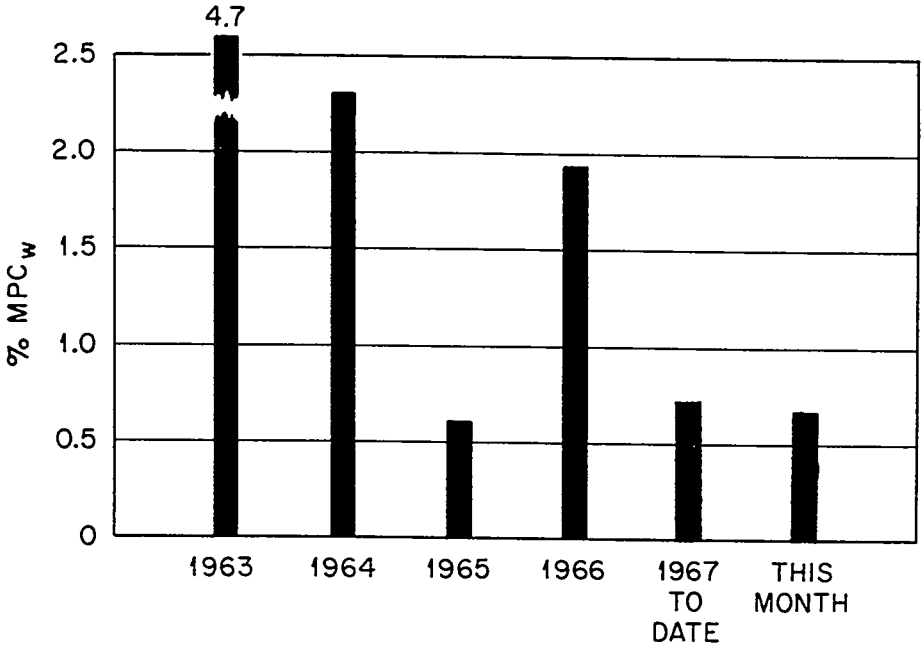

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

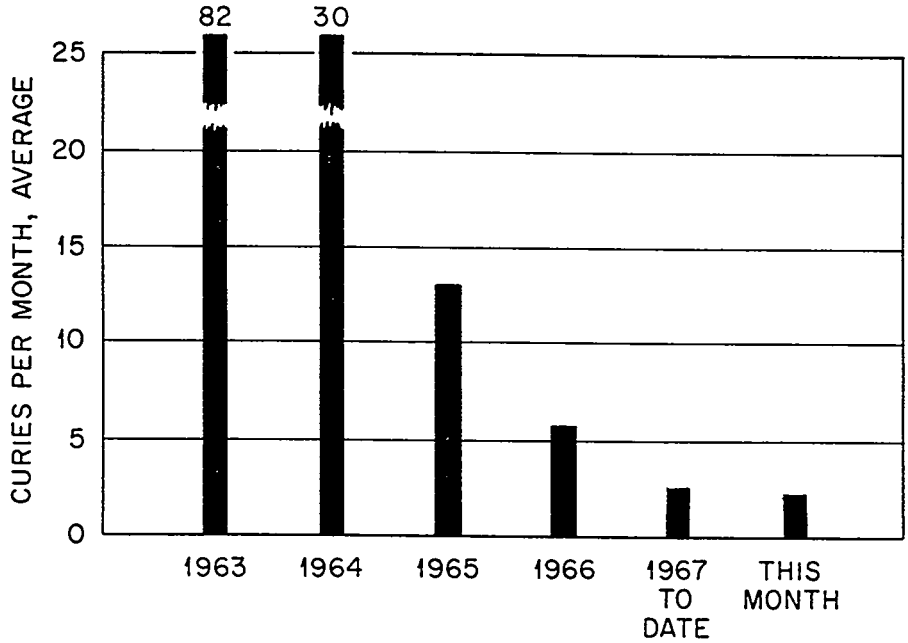

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

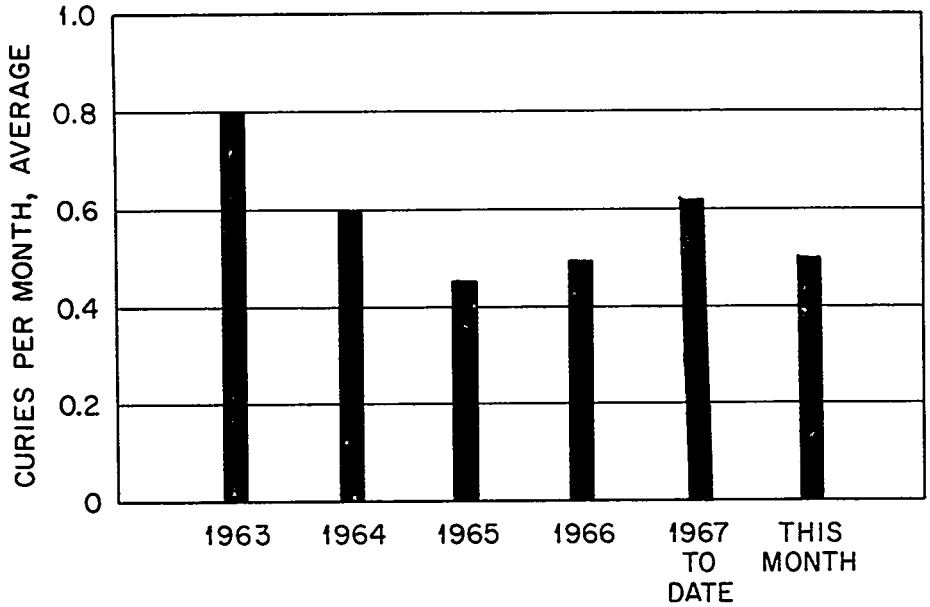

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

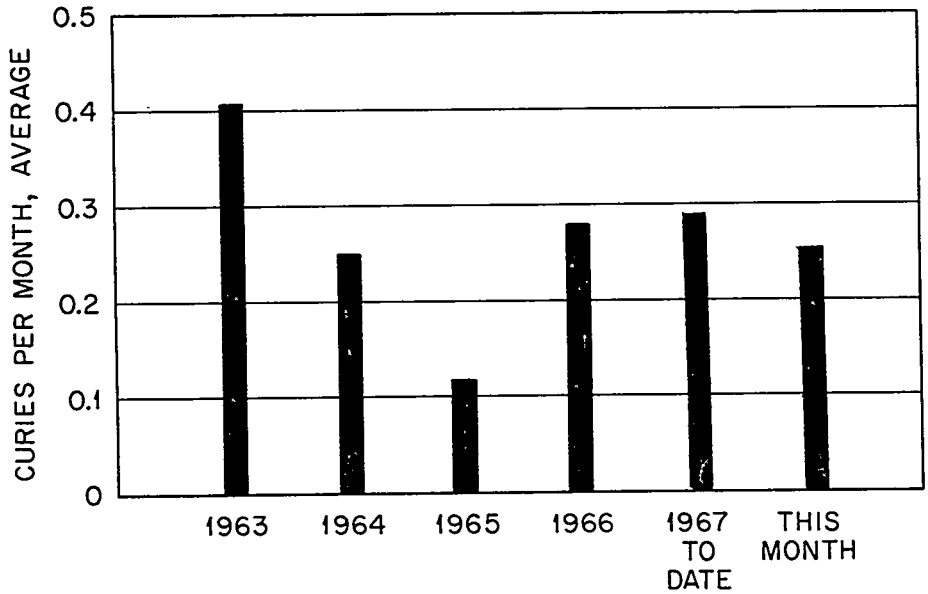

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

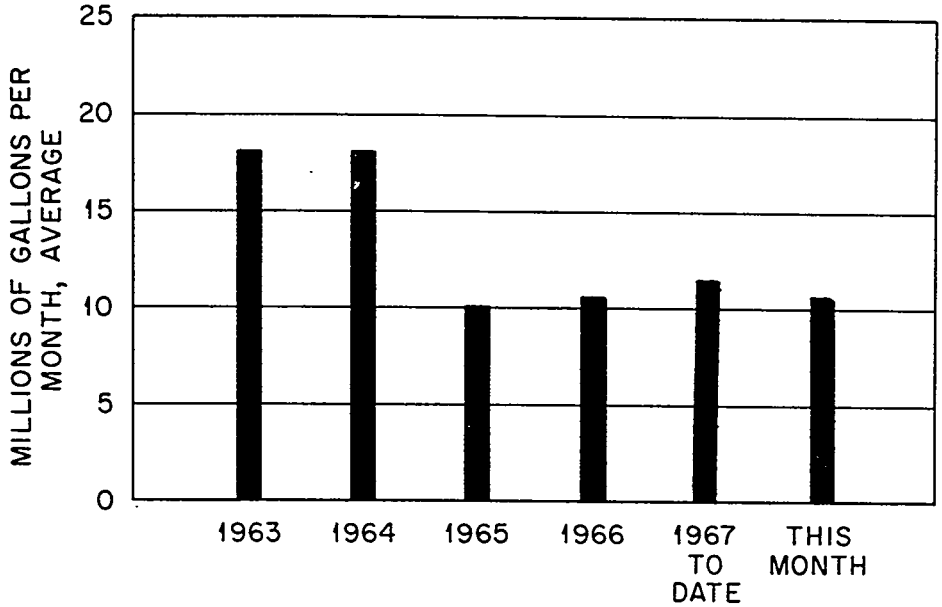

Fig. 5. Process Waste Volumes.

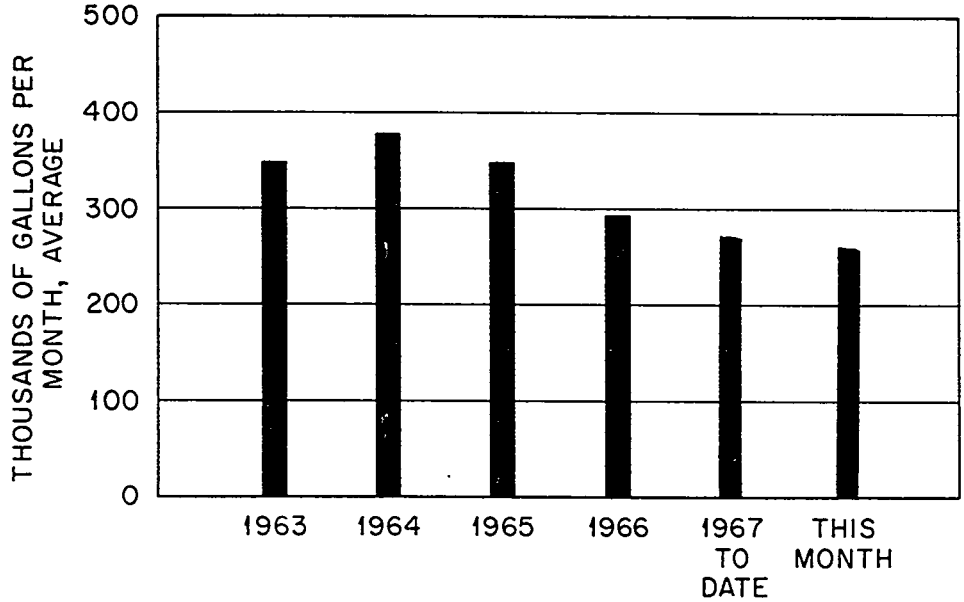

Fig. 6. Intermediate-Level Waste Volumes.

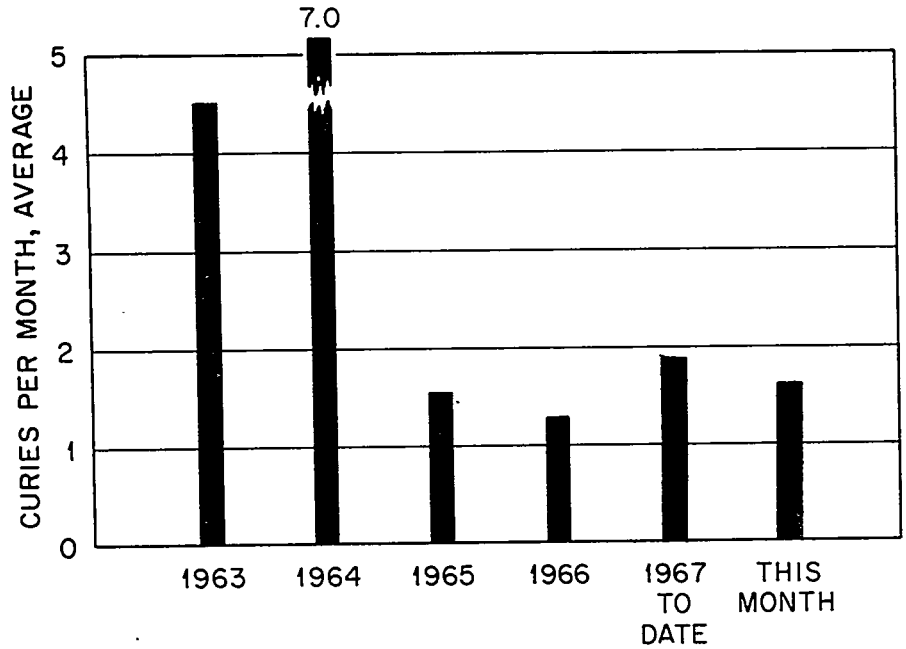

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

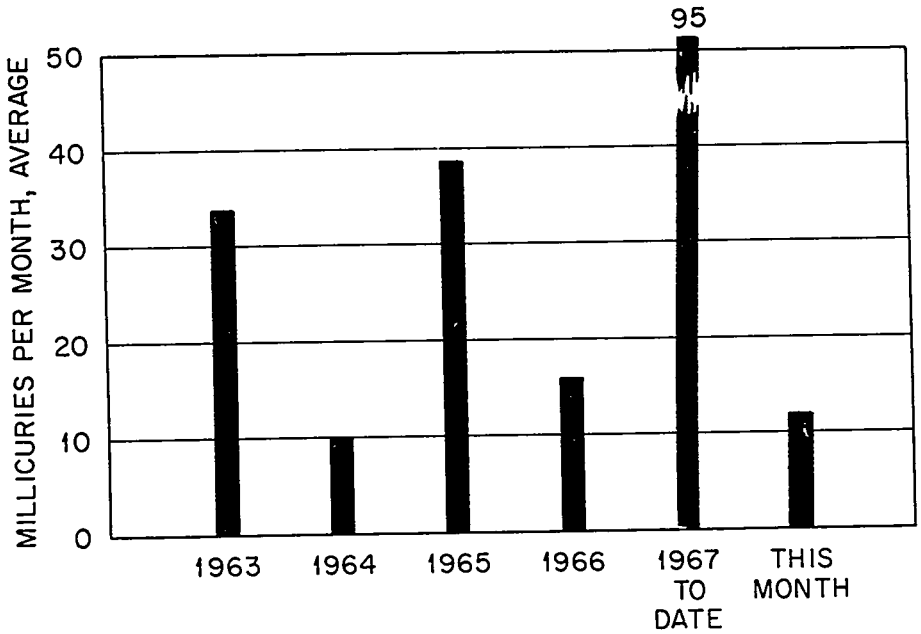

Fig. 8. Filterable Activity Released in Gaseous Waste.

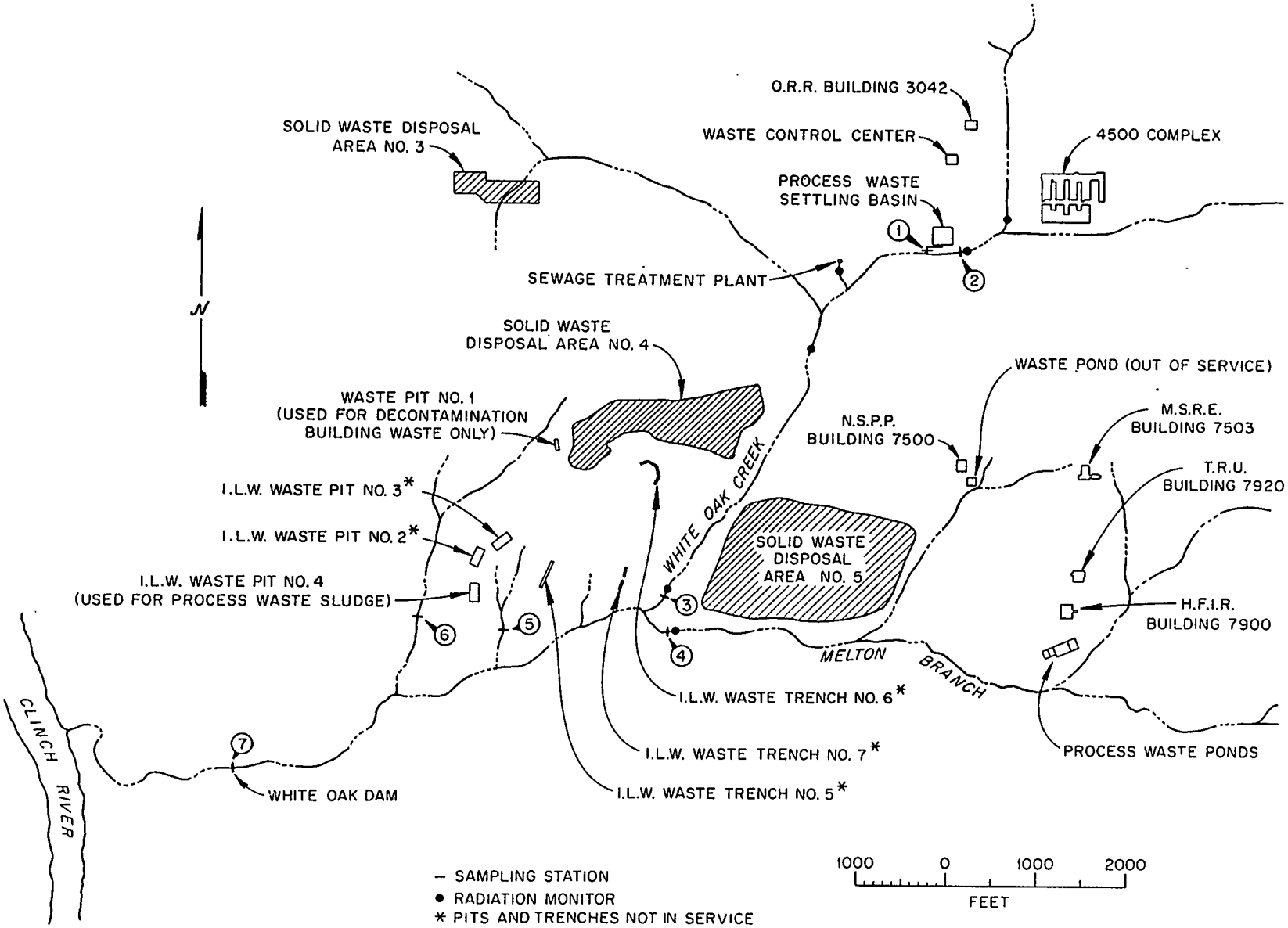

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total
Process waste	1	0.25	0.06	0.50	0.01	0.82
Miscellaneous discharges from east end of plant	2	< 0.01	0.03	0.01	0.03	0.07
Total discharge from Bethel Valley Area	3	0.41	0.01	0.33	none detected	0.75
Total discharge from Melton Valley Area	4	0.09	< 0.01	< 0.01	none detected	0.09
East waste pit seepage	5	< 0.01	0.48	0.02	0.33	0.83
West waste pit seepage	6	< 0.01	0.25	0.02	0.09	0.36
Total discharge from all sources	3,4,5,6	0.50	0.74	0.37	0.42	2.03
White Oak Dam to Clinch River (Health Physics measurement)	7	0.66	0.41	0.32	0.26	2.84[b]

[a]Refers to Figure 9.

[b]Includes other nuclides not listed here.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 10.9×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEEK THIS MONTH: 12.3×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.11	0.25	78
$^{103,106}Ru$	0.06	0.06	0
^{60}Co	None detected	0.01	-
^{137}Cs	2.26	0.50	78
Gross Beta Analysis	67 c/m/ml	13 c/m/ml	81

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	15[b]	0.59[b]	51.3	2.81	25.9
2.	Radioisotope Processing Area	9	0.17	14.8	1.35	12.4
3.	Buildings 3503 and 3508	2	0.03	2.6	1.22	11.2
4.	Buildings 3025 and 3026	1	0.03	2.6	2.09	19.2
5.	Building 3019	1	0.01	0.9	0.40	3.7
6.	Fission Products Development Laboratory	8	0.01	0.9	0.05	0.5
7.	Waste Evaporator, Building 2531	17	0.29	25.2	1.22	11.2
8.	Buildings 3525 and 3550	1	0.02	1.7	1.72	15.8
9.	Building 2026	2	< 0.01	--	0.01	0.1
10.	Melton Valley Area	No waste processed		--	--	--

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.25
Central Radioactive Gas Disposal Facilities	3039	1.35
Radiochemical Processing Pilot Plant	3020	0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		1.61

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination in the river caused by ORNL waste discharges was 1.96% of the MPC_W for releases to uncontrolled areas (see Figure 1). The increase in concentration over previous months was due to a low river flow which was one-half of the long-term average flow. Strontium contributed 97% to the calculated percent of MPC_W. Data pertaining to White Oak Dam were provided by the Health Physics Division.

White Oak Creek Monitoring

The main contaminants released to White Oak Lake are given in Table 1. The 0.72 curie of strontium measured at monitoring station No. 4 in Melton Branch, which accounts for 70% of the total strontium released to the lake, came from a drilling of an observation well at the Shale Fracturing site. The activity was washed out of the well when the drill cut through the layers of grout from the Shale Fracturing ILW waste disposal operation. The remainder of the strontium (0.32 curie) was discharged to the creek through the process waste system. Comparison of this month's discharges into White Oak Lake to those of previous months are shown in Figures 2 and 3. There were no significant releases of alpha activity.

At the request of the Health Physics Division, an effort was made to determine the source of relatively large quantities of tritium that are being released to the Clinch River. Analyses of monthly composite samples taken at White Oak Dam have shown that during the year ending June 30, 1968, an average of 1,056 curies per month had been released to the river. Although the contamination of the river resulting from

the tritium discharges is not considered serious, since it only amounts to about 0.05% of the calculated MPC of tritium in the river, the request to locate the source was made because of the large quantity of activity involved.

Information gathered from sampling White Oak Creek and from discussions with people knowledgeable in the Laboratory's tritium handling practices has revealed that the bulk of the tritium, possibly 90% of the total, has been released from Burial Ground No. 5 where large quantities of tritium contaminated waste from Mound Laboratory have been buried. The burial of this waste continues at the present time and the leaching of tritium to the creek will continue for years to come. The other source of tritium released to the river, which probably accounts for most of the remaining 10%, is the MSRE which uses a lithium compound as a corrosion inhibitor in its cooling system. The waste from the MSRE goes into the ILW system. Since all ILW is processed through the waste evaporator, the tritiated water from the MSRE is evaporated and is discharged into the creek with the evaporator condensate.

Process Waste

A total of 11.7 million gallons of waste was chemically treated this month. Poor decontamination achieved by the process is attributed to recurring mechanical failures of the chemical feeders. A summary of operations is given in Table 2.

Figure 4 compares the monthly strontium discharges into White Oak Creek. Figure 5 compares the volumes of waste handled.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 350 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	273,000
Volume transferred to evaporator	252,000
Volume of concentrate returned to tank farm	8,000
Tank Farm free space at beginning of month	537,000
Tank Farm free space at end of month	508,000

The main contributors to the ILW system are listed below. The total volume of waste generated is compared to those of previous months in Figure 6.

		Gallons
1.	Building 3019	43,000
2.	ORR, LITR, and BSR	37,000
3.	High Flux Isotope Reactor	32,000
4.	Fission Products Development Laboratory	32,000
5.	4500 Complex	30,000
6.	Building 3026	23,000
7.	Radioisotope Processing Area	20,000
8.	Transuranium Processing Area	10,000

Gaseous Waste

A total of 760 millicuries of radioiodine was released from the ORNL stacks. The bulk of this activity came from the 3039 system. The individual stack releases are listed in Table 4; Figures 7 and 8 compare

these discharges to those of previous months. There was no significant release of alpha activity during the period.

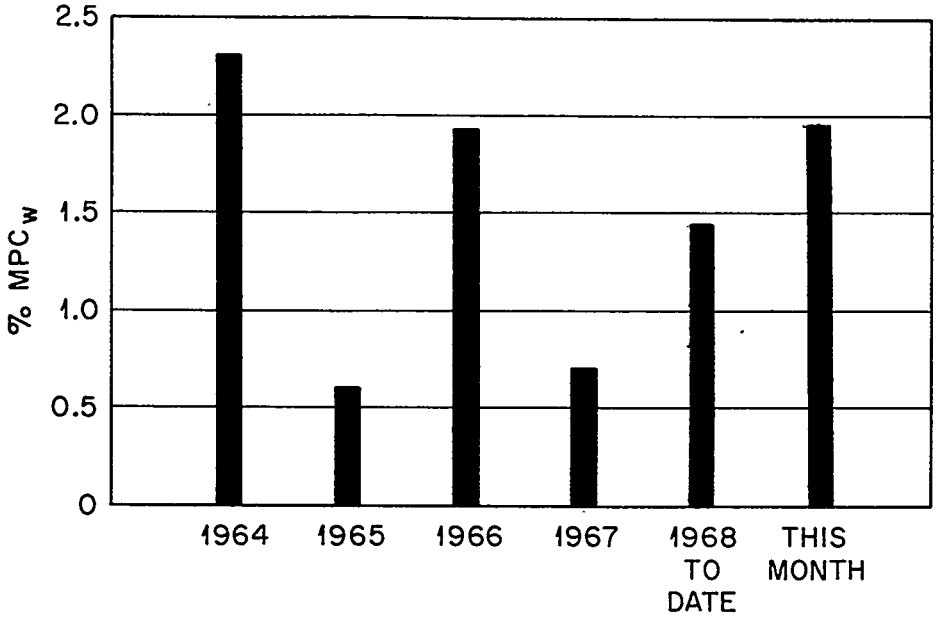

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

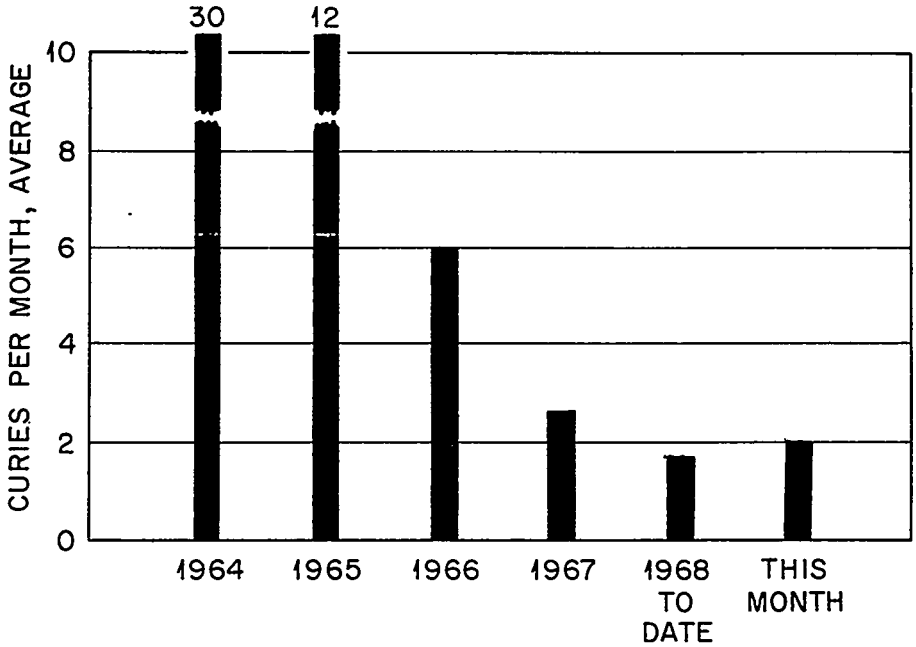

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

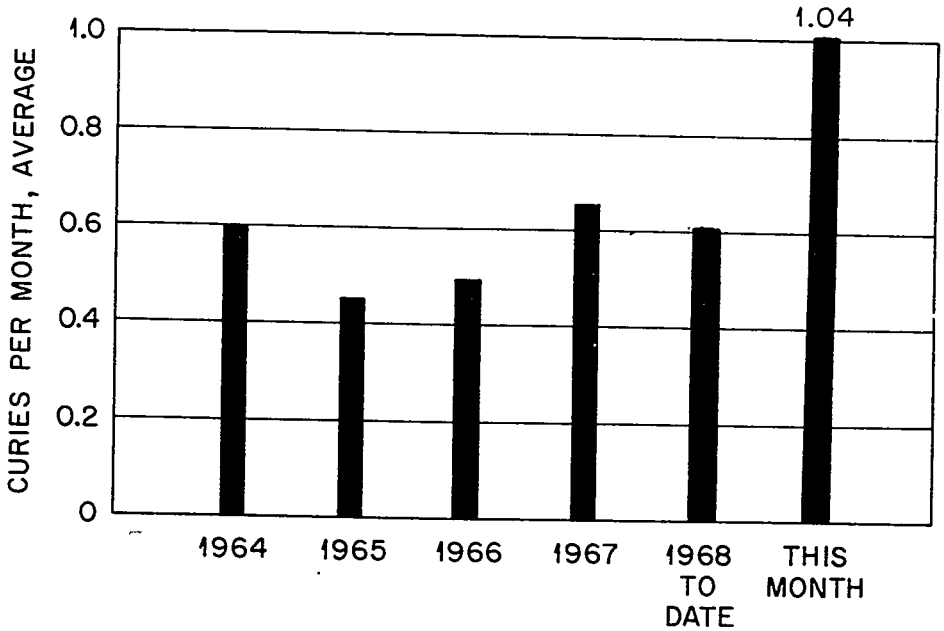

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

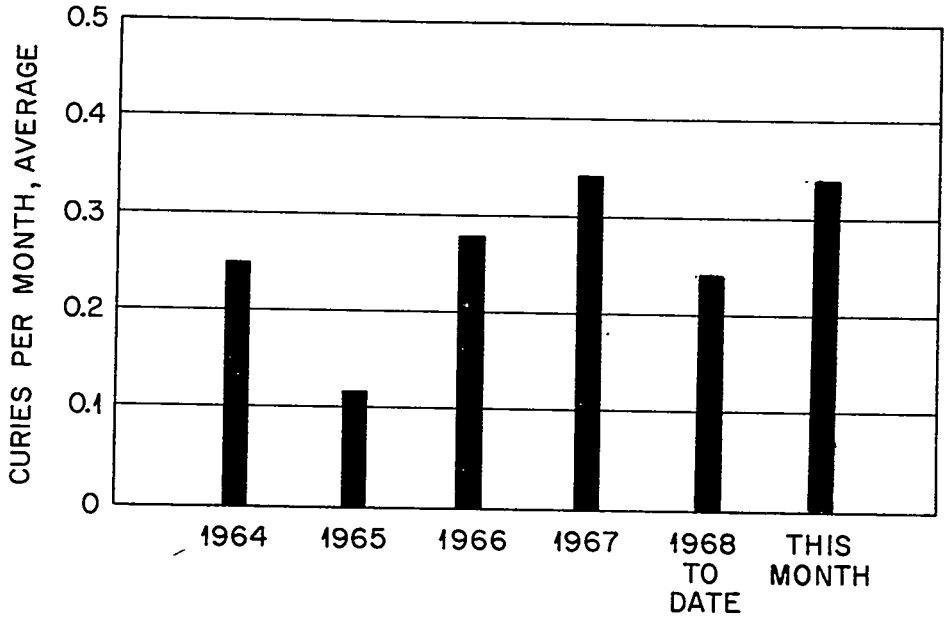

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

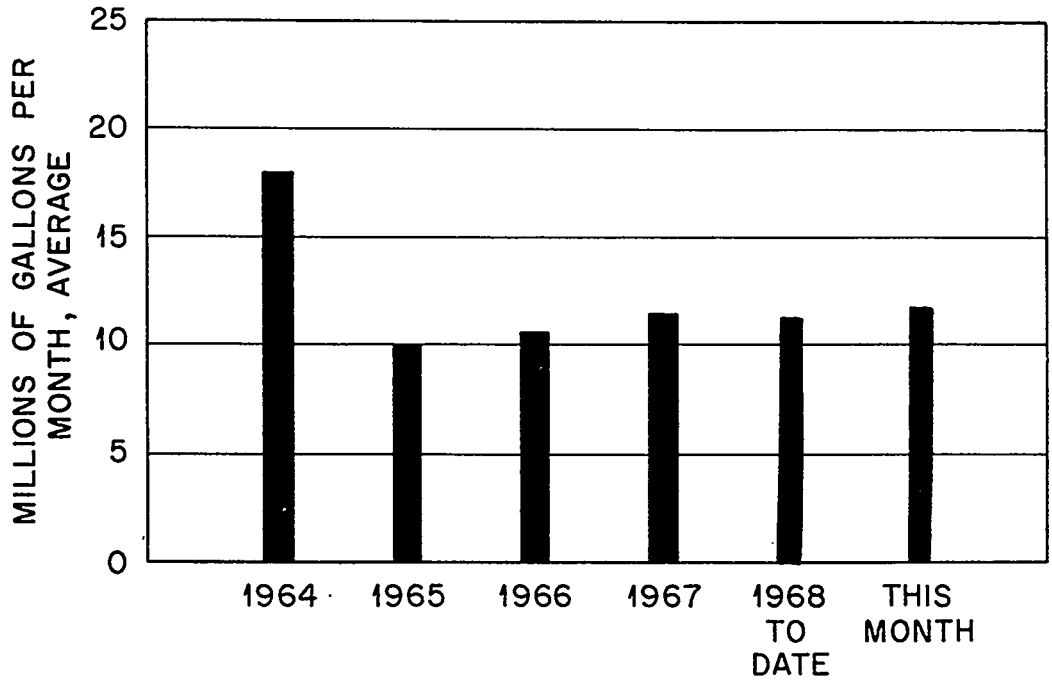

Fig. 5. Process Waste Volumes.

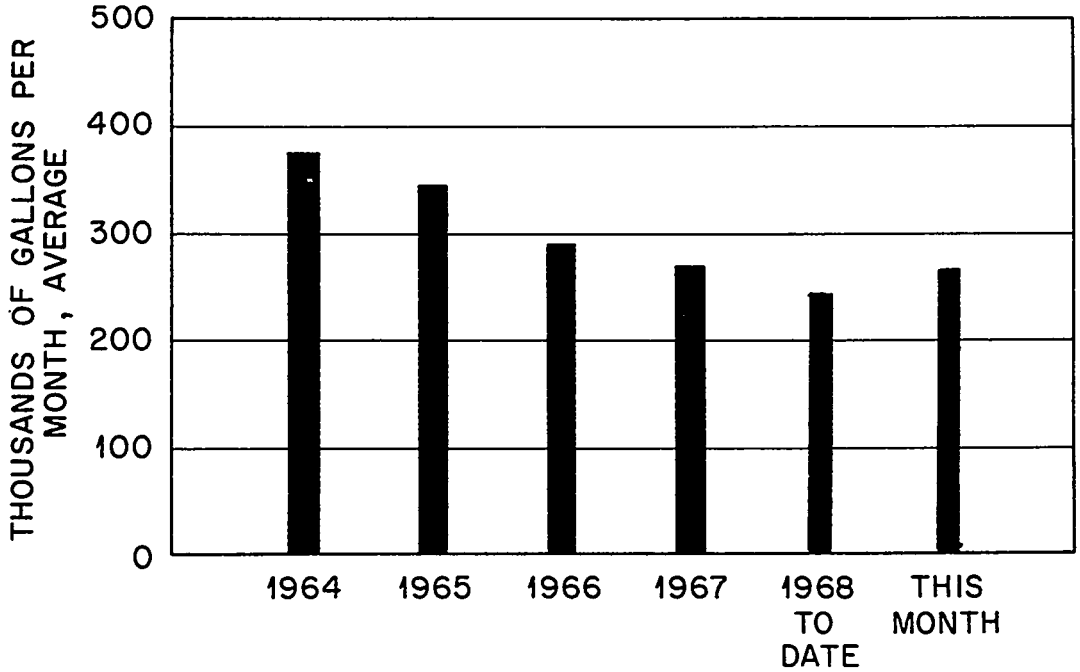

Fig. 6. Intermediate—Level Waste Volumes.

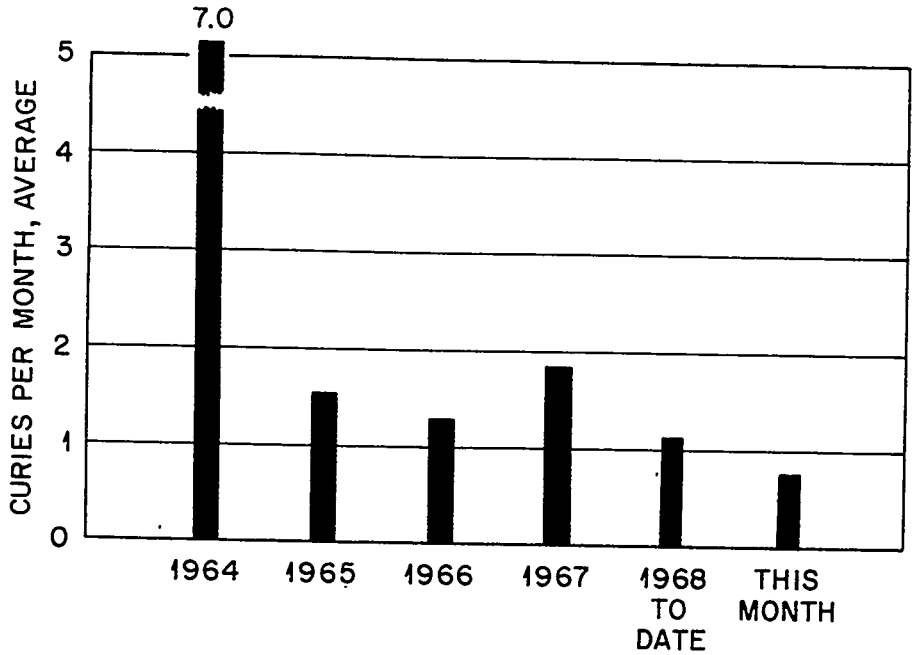

Fig.7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

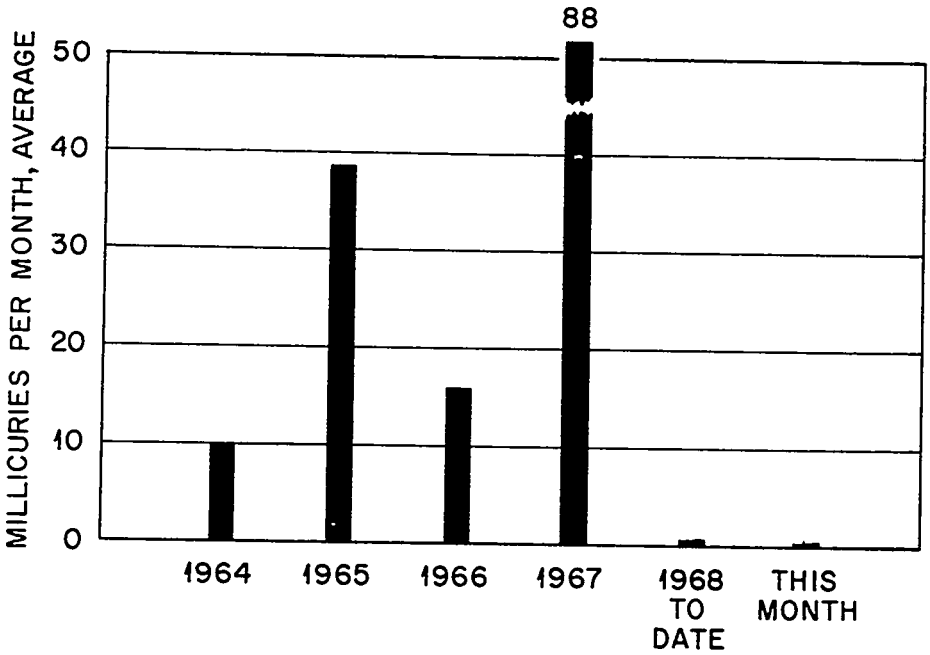

Fig. 8. Filterable Activity Released in Gaseous Waste.

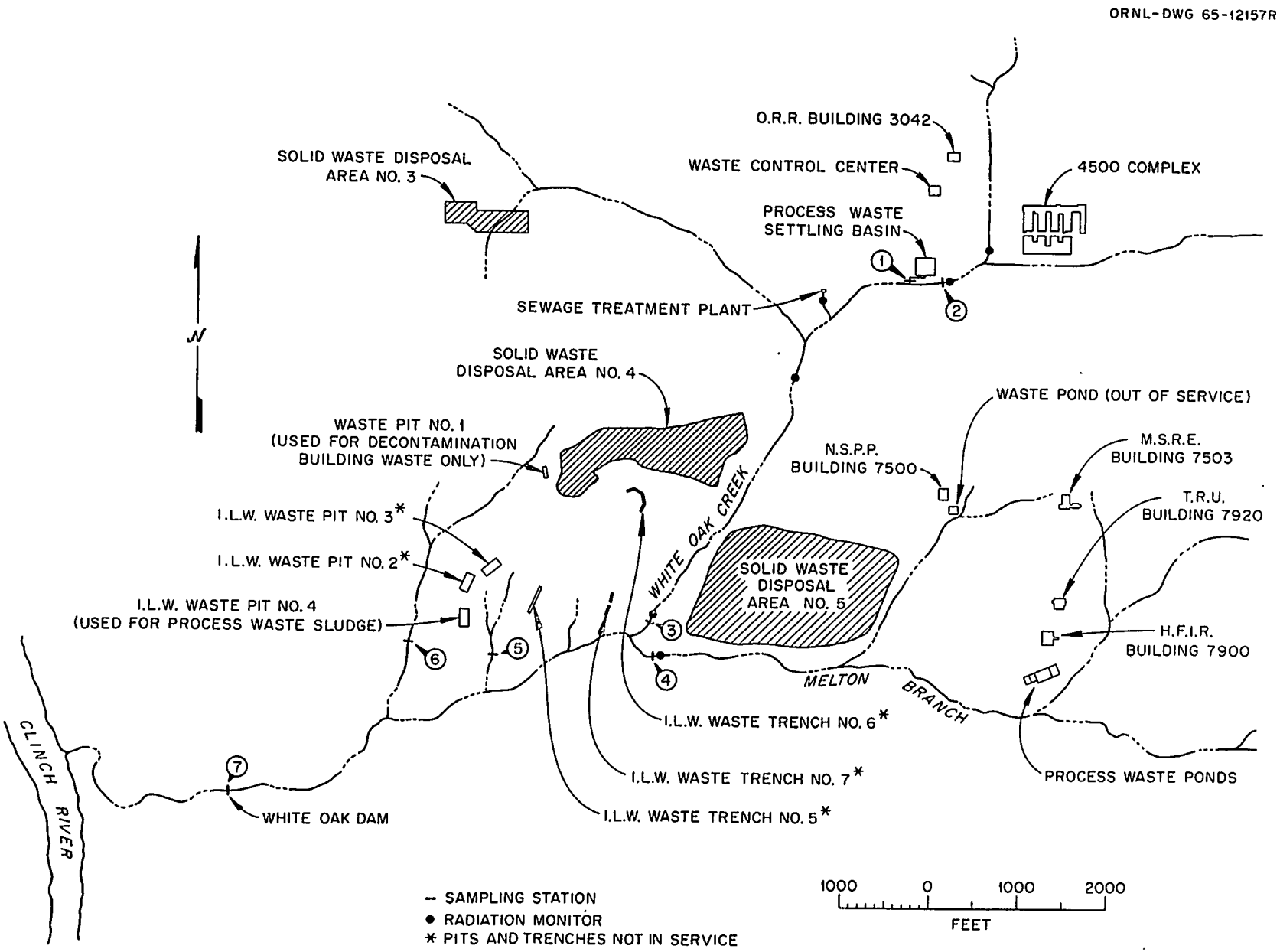

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total
Process waste	1	0.34	0.05	0.49	none detected	0.88
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	--
Total discharge from Bethel Valley Area	3	0.32	< 0.01	0.17	none detected	0.49
Total discharge from Melton Valley Area	4	0.72	0.01	0.01	none detected	0.74
East waste pit seepage	5	< 0.01	0.28	0.02	0.24	0.54
West waste pit seepage	6	< 0.01	0.18	0.01	0.10	0.29
Total discharge from all sources	3,4,5,6	1.04	0.47	0.21	0.34	2.06
White Oak Dam to Clinch River (Health Physics measurement)	7	0.34	0.30	0.09	0.10	1.33[b]

[a]Refers to Figure 9

[b]Includes other nuclides not listed here

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.7×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.4×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.81	0.34	58
$^{103,106}Ru$	0.07	0.05	29
^{60}Co	none detected	--	--
^{137}Cs	0.51	0.49	4
Gross Beta Analysis	28 c/m/ml	14 c/m/ml	50

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	44	0.75[b]	47.5	1.15	12.3
2.	Radioisotope Processing Area	8	0.19	12.0	1.72	18.4
3.	Buildings 3503 and 3508	4	0.12	7.6	2.08	22.2
4.	Buildings 3025 and 3026	0	< 0.01	--	2.13	22.7
5.	Building 3019	0	< 0.01	--	0.40	4.3
6.	Fission Products Development Laboratory	14	< 0.01	--	0.03	0.3
7.	Waste Evaporator, Building 2531	37	0.52	32.9	1.04	11.1
8.	Buildings 3525 and 3550	0	< 0.01	--	0.49	5.2
9.	Building 2026	2	< 0.01	--	< 0.01	--
10.	Melton Valley Area	No waste processed				
11.	Building 2001	2	< 0.01	--	0.33	3.5

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.03
Central Radioactive Gas Disposal Facilities	3039	0.73
Radiochemical Processing Pilot Plant	3020	$\leq$ 0.01
MSRE	7512	< 0.01
HFIR, TRU, TUFCDF	7911	< 0.01
Total activity in gases released		0.76

[a]Activity primarily ^{131}I as noted in text

ORNL 2056

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river resulting from ORNL waste discharges was 0.2 percent of the MPC_W for a release to an uncontrolled area (see Figure 1). Strontium contributed 97.5% to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the main contaminants released to White Oak Lake. Significant, in terms of river MPC_W, are the strontium releases from Bethel Valley (0.17 curie) and Melton Valley (1.35 curies). The strontium from Melton Valley is attributed to a contaminated seep from an uncapped observation well at the Shale Fracture area (explained in last month's report). Most of the strontium released from Bethel Valley came from the process waste system. Figures 2 and 3 compare, on a monthly basis, the strontium releases into White Oak Lake and White Oak Creek. There was no significant release of alpha activity.

The routine sampling of seeps from the waste pit area at station 5 and 6 (see Figure 7) has been discontinued because the activity measured at these stations has decreased to an insignificant level since the use of the waste pits was discontinued several years ago. In the future, the seeps will be sampled at six-month intervals to check on possible movement of strontium.

Mentioned in last month's report was the fact that during the year ending June 30, 1968, the average monthly release of tritium into the river was 1,056 curies; also, that the bulk of the tritium appeared to

be seeping into White Oak Creek from Burial Ground No. 5 where large quantities of tritium contaminated wastes were buried. Samples of water taken from Melton Branch of the creek (station 4, Figure 7) have shown that 1,052 curies of tritium were released from that burial ground in June and 486 curies in July. The drop in July was undoubtedly due to the low rainfall (less than one-half of normal) experienced during that month.

Process Waste

About 10 million gallons of waste were treated this month. An additional one million gallons of waste was diverted into White Oak Creek without treatment when the plant was shut down to clean out sludge accumulation from the collection basins. A summary of operations is given in Table 2.

Table 3 lists the individual waste discharges into the system; Figure 4 shows a monthly comparison of the volume of waste handled.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 332 gph. The evaporator was down for a period of 48 hours to repair a leak in a chemical addition line; a defective Thermocouple was also replaced during the shutdown. A summary of operations is listed below.

	Gallons
Total volume generated	257,000
Volume transferred to evaporator	231,000
Volume of concentrate returned to tank farm	8,000
Tank Farm free space at beginning of month	502,000
Tank Farm free space at end of month	468,000

The main contributors are listed below:

		Gallons
1.	4500 Complex	36,000
2.	Building 3019	32,000
3.	Fission Products Development Laboratory	30,000
4.	High Flux Isotope Reactor	28,000
5.	ORR, LITR, and BSR	28,000
6.	Radioisotopes Processing Area	12,000

The volume of waste handled this month is compared to volumes of previous months in Figure 5.

Gaseous Waste

A total of 1.17 curies of ^{131}I was released from the ORNL stacks (see Figures 6 and Table 4). The bulk of the activity (1.01 curies) came from the Transuranium Processing Area. There was no significant release of alpha or particulate activity.

Since January, 1968, there has been no significant release of particulate activity from any of the stacks. For this reason, comparisons of particle discharges, which had been shown in previous reports in Figure 8, have been discontinued with this report. Sampling for particulate activity however, will be continued and significant releases will be reported in the future.

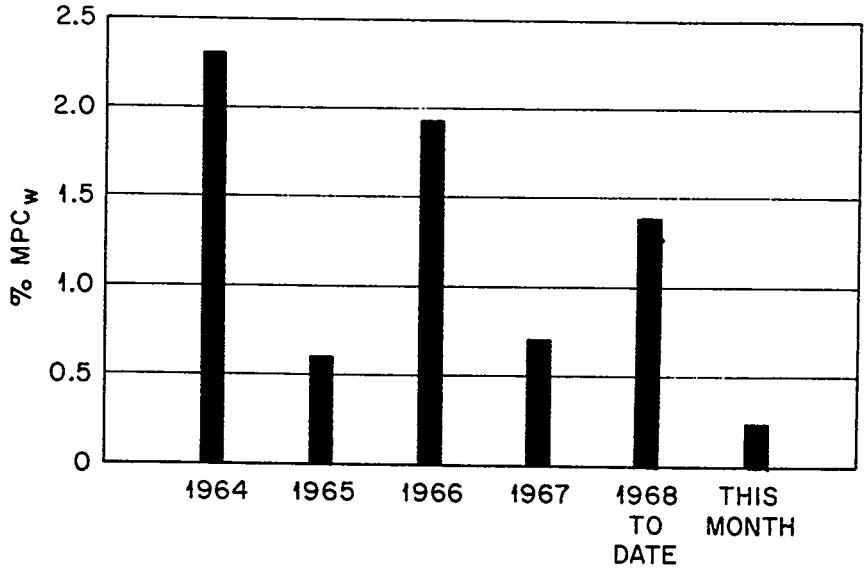

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

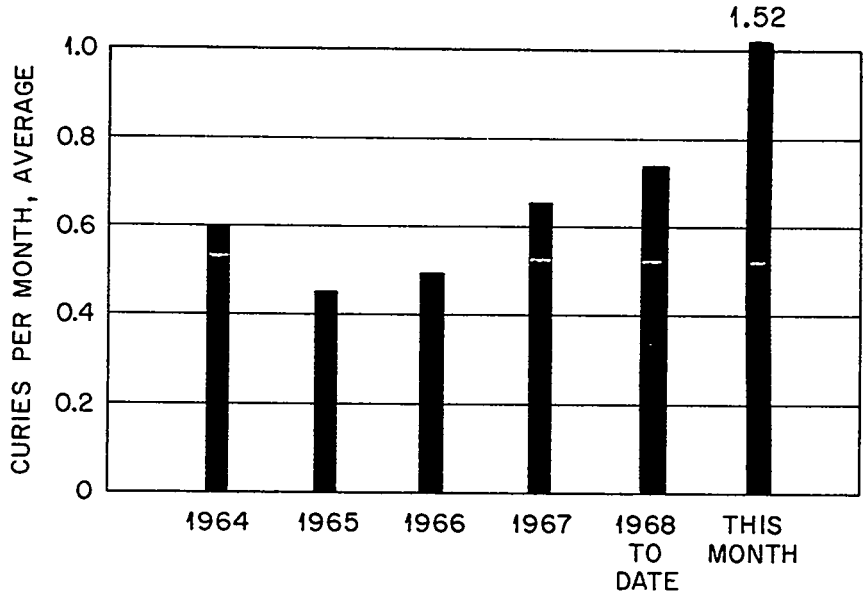

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

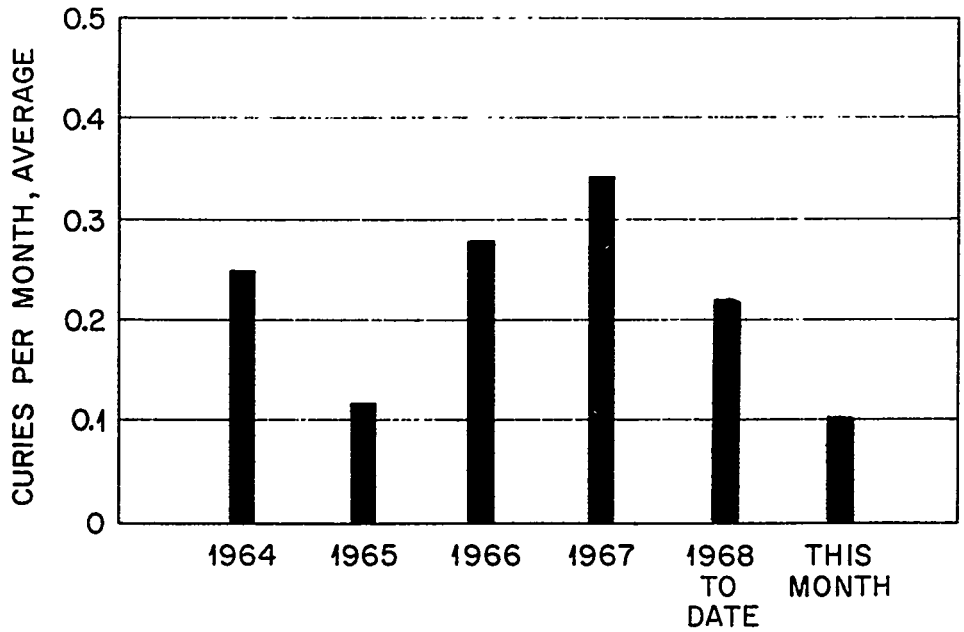

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

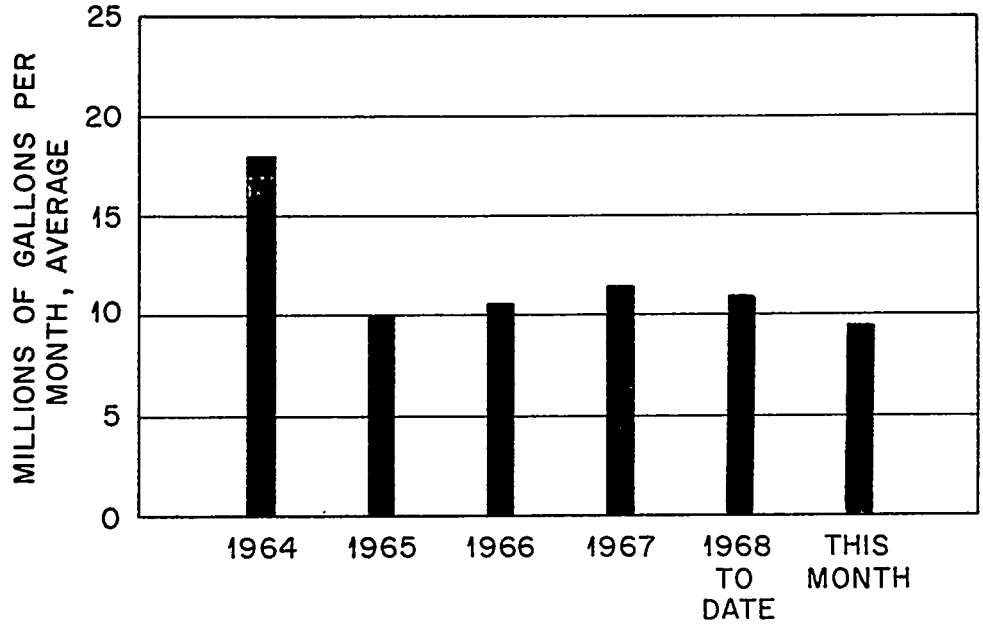

Fig. 4. Process Waste Volumes.

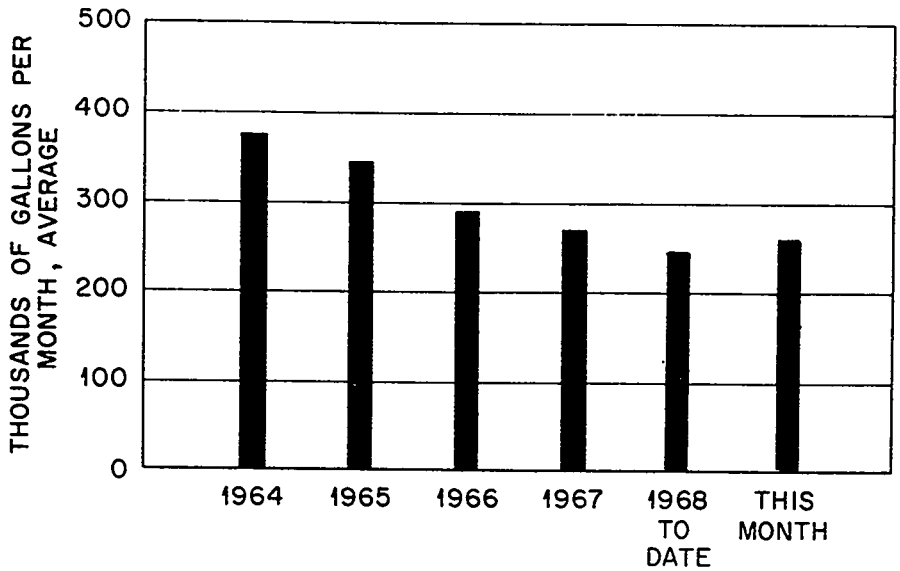

Fig. 5. Intermediate—Level Waste Volumes.

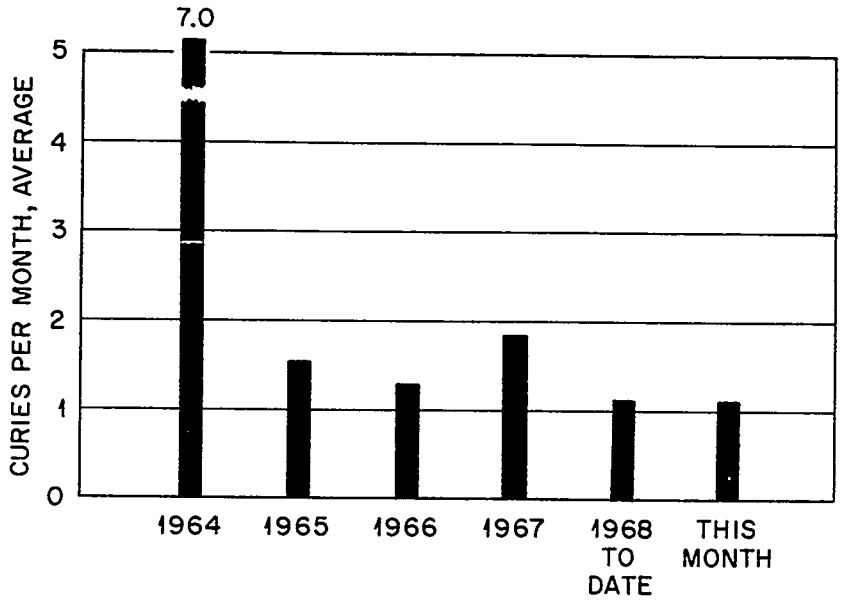

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

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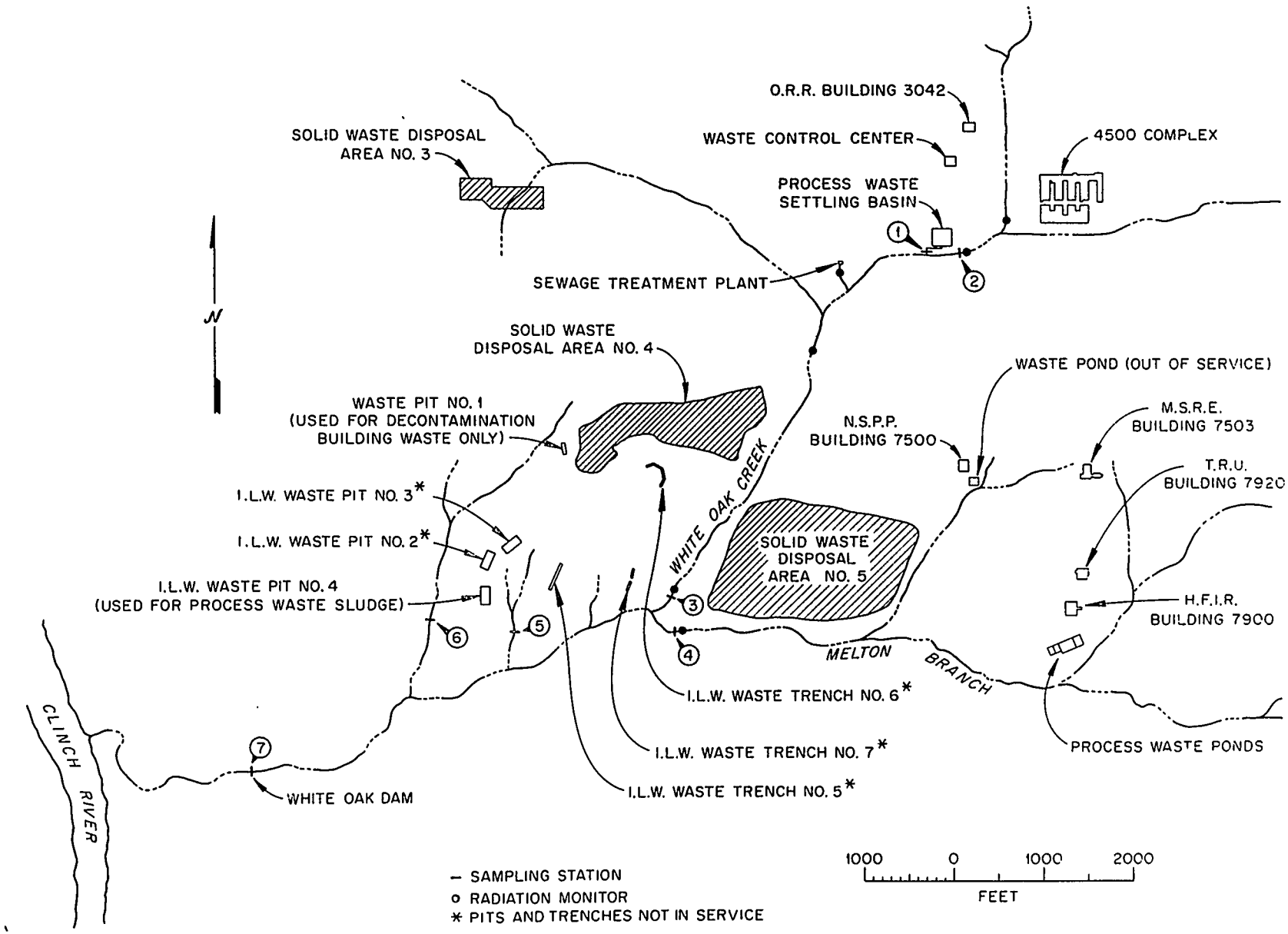

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.10	none detected	0.46	none detected
Miscellaneous discharges from east end of plant	2	0.02	< 0.01	0.03	none detected
Total discharge from Bethel Valley Area	3	0.17	0.04	0.06	none detected
Total discharge from Melton Valley Area	4	1.35	0.03	0.12	none detected
Total discharge	3 & 4	1.52	0.07	0.18	--
White Oak Dam to Clinch River (Health Physics measurement)	7	0.41	0.04	0.02	0.02

[a]Refers to Fig. 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.6×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.78	0.10	87
$^{103,106}Ru$	0.09	none detected	100
^{60}Co	none detected	none detected	--
^{137}Cs	0.78	0.16	80
Gross Beta Analysis	37 c/m/ml	6 c/m/ml	84

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	6	0.19[b]	31.1	2.19	21.6
2.	Radioisotope Processing Area	5	0.09	14.8	1.32	13.0
3.	Buildings 3503 and 3508	3	0.08	13.1	1.98	19.5
4.	Buildings 3025 and 3026	1	0.03	4.9	2.29	22.6
5.	Building 3019	2	0.01	1.6	0.50	4.9
6.	Fission Products Development Laboratory	13	0.04	6.6	0.16	1.6
7.	Waste Evaporator, Building 2531	12	0.17	27.9	1.03	10.1
8.	Buildings 3525 and 3550	1	< 0.01	--	0.33	3.3
9.	Building 2026	1	< 0.01	--	< 0.01	--
10.	Building 2001	< 1	< 0.01	--	0.35	3.4
11.	Melton Valley Area	No waste processed				

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.16
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR, TRU and TUFCDF	7911	1.01
Total activity in gases released		1.17

[a]Activity primarily ^{131}I as noted in text

2056

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river, caused by ORNL waste discharges, was 0.31% of the MPC_W for a release to an uncontrolled area (see Figure 1). Strontium contributed 96.2% to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the amounts of significant radionuclides discharged into White Oak Lake. For the second consecutive month, the total strontium (0.06 curies) discharged from the Bethel Valley area, as measured at station No. 3, was significantly lower than the strontium (0.27 curies) discharged from the process waste system alone. This was unusual since all previous measurements have shown the measurement at station No. 3 to be higher. The change may have been caused by revisions that have been made in sampling procedures in an effort to obtain samples that are more representative of the material flowing through the creek. A better appraisal of the effect of the new procedures will be possible after several more months' experience with the new procedure is gained.

A comparison of monthly strontium discharges into the creek from the process waste system is shown in Figure 2. A comparison of total strontium discharges into White Oak Lake is shown in Figure 3.

Process Waste

About 11 million gallons of contaminated water were chemically treated this month. A summary of plant operation is given in Table 2.

Table 3 lists the individual waste discharges into the system. Figure 4 shows a monthly comparison of waste volumes handled.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 368 gallons per hour. A summary of the operation is listed below:

	Gallons
Total volume generated	231,000
Volume transferred to evaporator	265,000
Volume of concentrate returned to tank farm	10,000
Volume of concentrate transferred to hydraulic fracturing site	49,000
Tank farm free space at beginning of month	503,000
Tank farm free space at end of month	576,000

The main contributors to the ILW system are listed below:

		Gallons
1.	High Flux Isotope Reactor	55,000
2.	Fission Products Development Laboratory	37,000
3.	ORR, LITR, and BSR	31,000
4.	Building 3019	28,000
5.	4500 Complex	18,000
6.	Radioisotope Processing Area	16,000
7.	Nuclear Safety Pilot Plant	10,000

Figure 5 shows a monthly comparison of the volumes of waste generated.

Gaseous Waste

A total of 0.25 curie of gaseous ^{131}I was discharged from the ORNL stacks. There was no significant release of alpha or particulate activity. Table 4 lists the individual stack releases; Figure 6 compares the stack releases on a monthly basis.

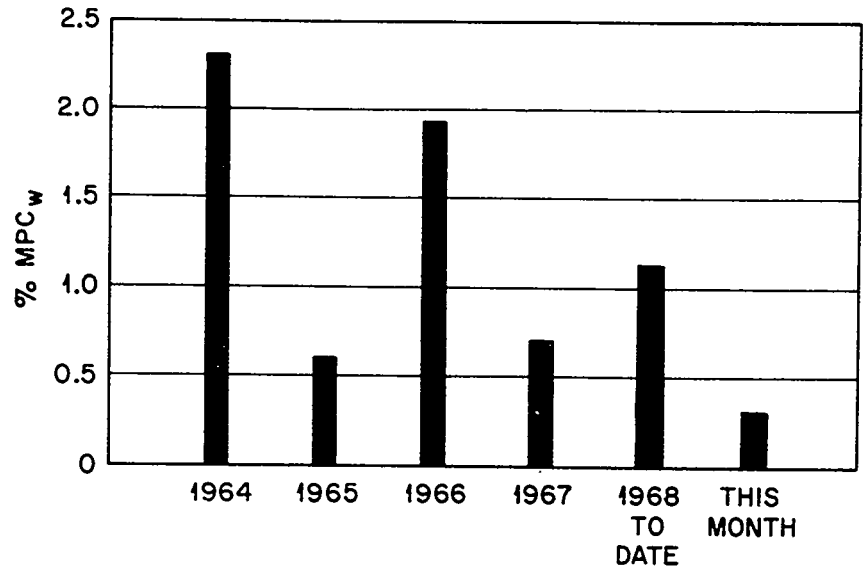

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

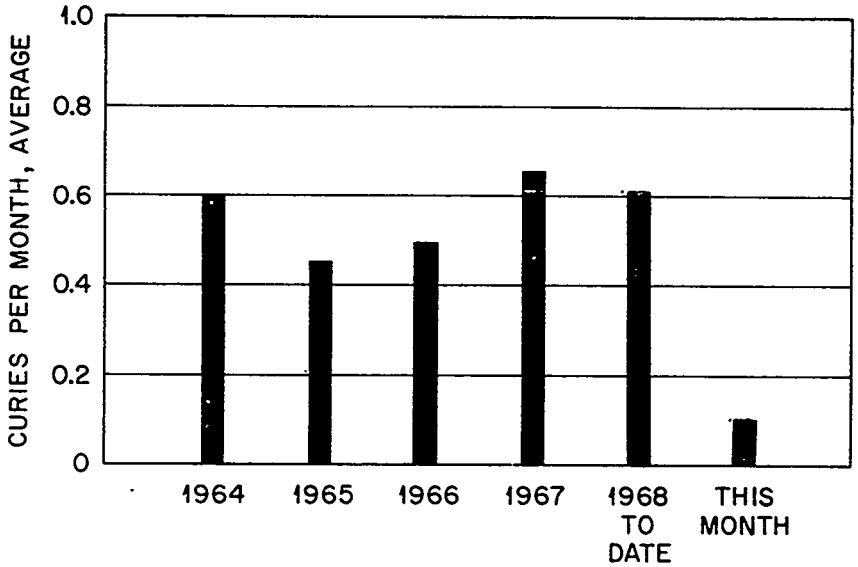

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7.).

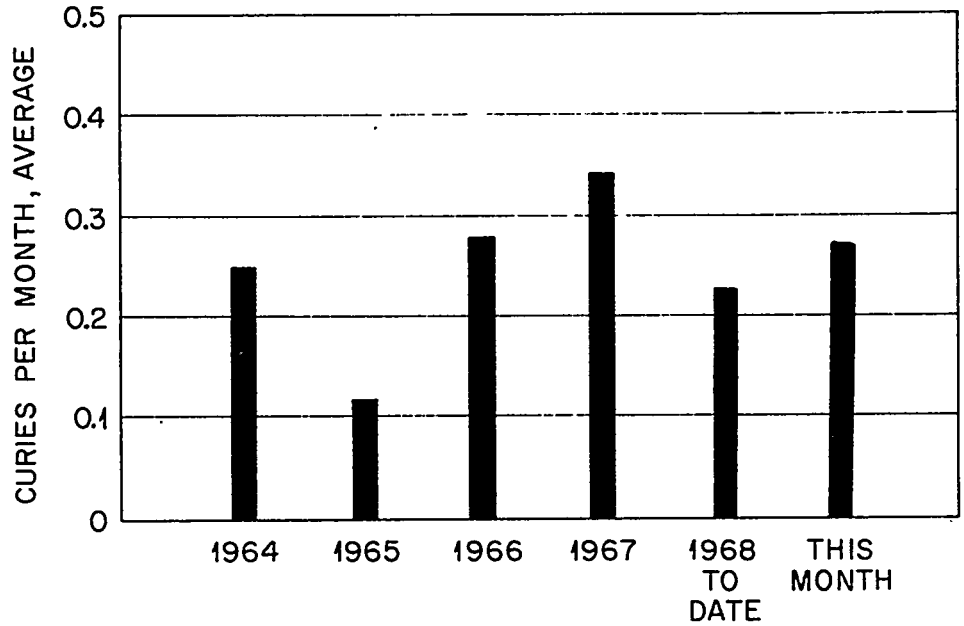

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

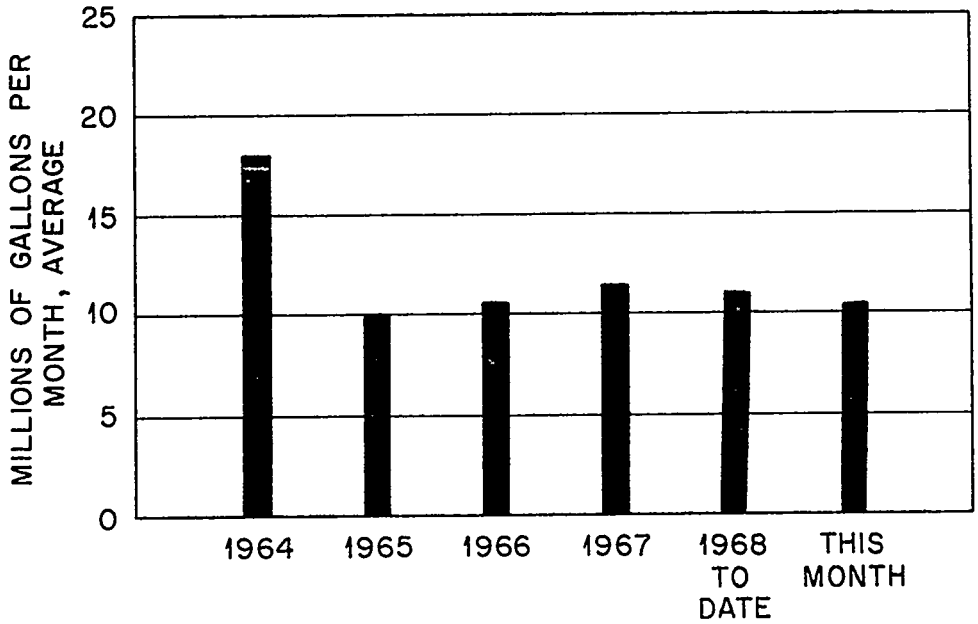

Fig. 4. Process Waste Volumes.

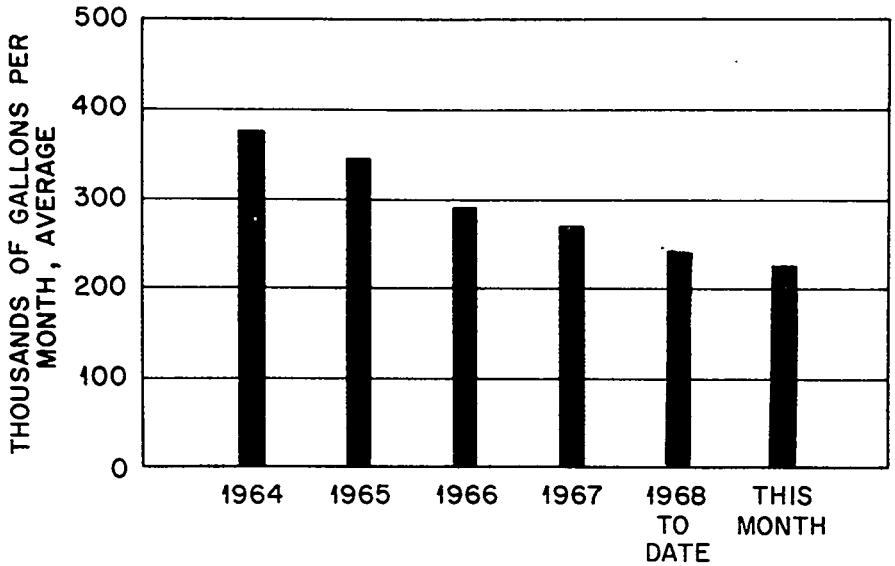

Fig. 5. Intermediate—Level Waste Volumes.

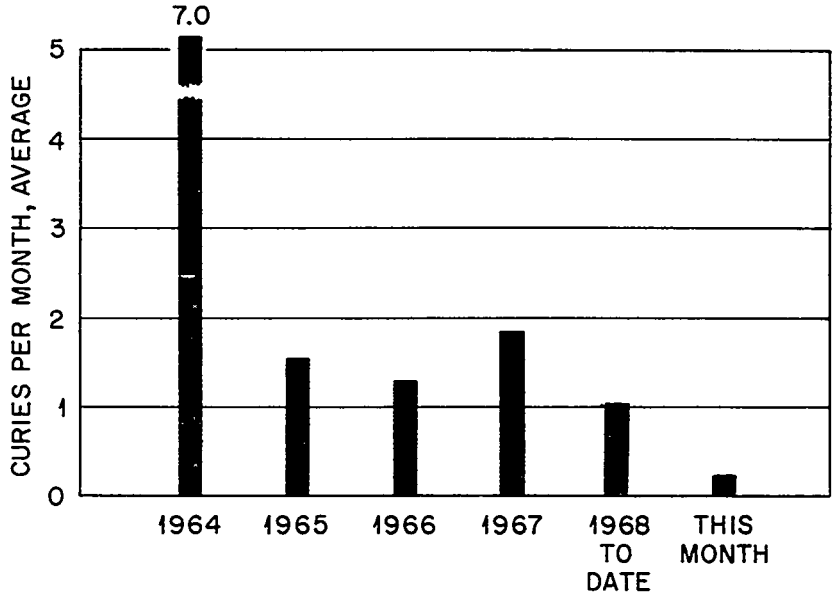

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

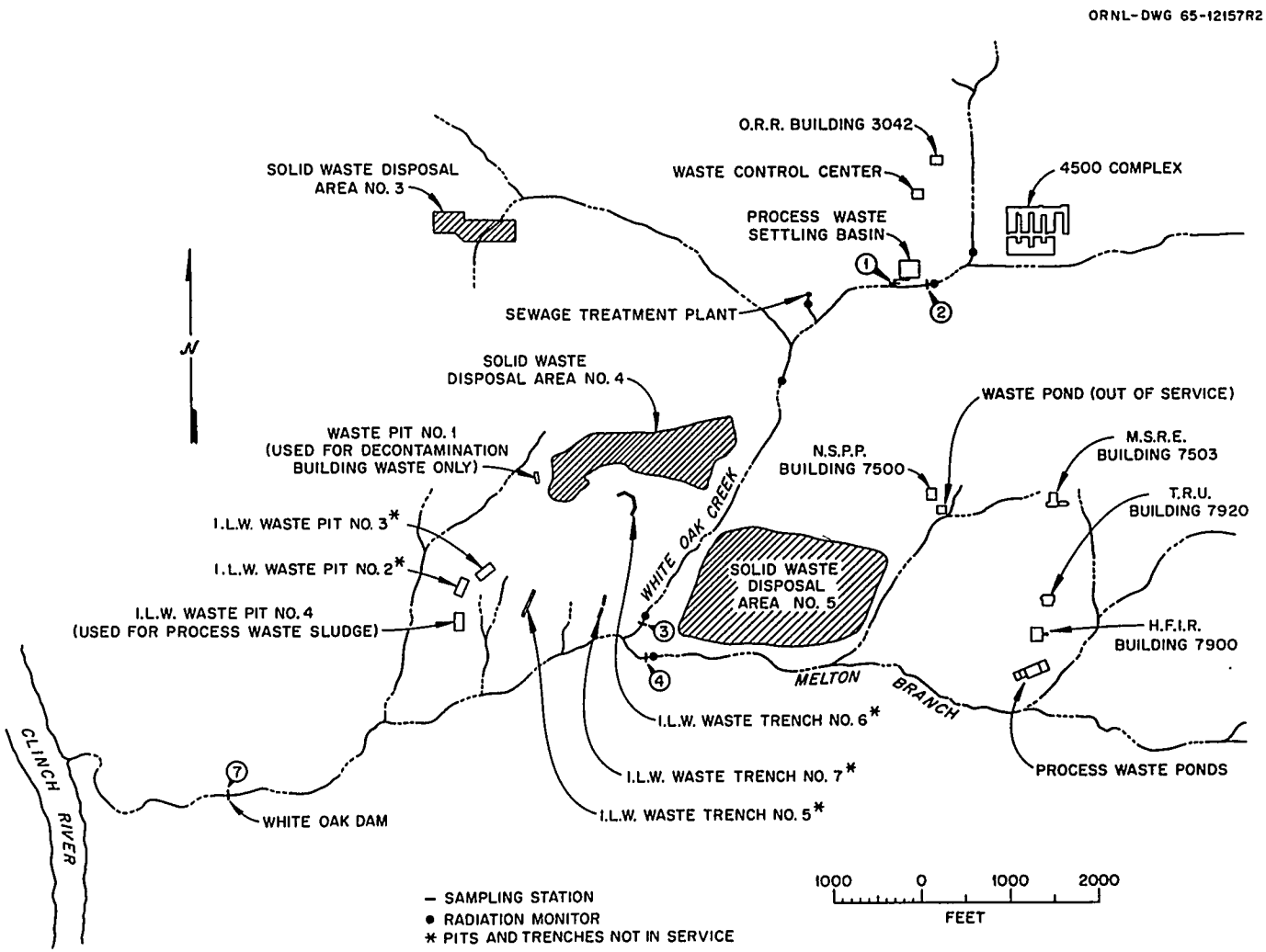

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Activity (Curies)			
		Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.27	0.06	0.22	none detected
Miscellaneous discharges from east end of plant	2	< 0.01	none detected	none detected	none detected
Total discharge from Bethel Valley Area	3	0.06	0.14	0.11	0.67
Total discharge from Melton Valley Area	4	0.04	0.03	< 0.01	none detected
Total discharge	3,4	0.10	0.17	0.11	0.67
White Oak Dam to Clinch River (Health Physics measurement)	7	0.16	0.19	0.05	< 0.01

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 10.5×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.90	0.27	70
$^{103,106}Ru$	0.13	0.06	54
^{60}Co	0.10	none	100
^{137}Cs	1.42	0.22	85
Gross Beta Analysis	54 c/m/ml	11 c/m/ml	80

[a]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[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	6	0.25[b]	29.7	2.95	29.8
2.	Radioisotope Processing Area	8	0.14	16.7	1.23	12.4
3.	Buildings 3503 and 3508	2	0.04	4.8	1.54	15.5
4.	Buildings 3025 and 3026	0	--	--	2.02	20.4
5.	Building 3019	< 1	< 0.01	--	0.34	3.4
6.	Fission Products Development Laboratory	7	0.02	2.4	0.19	1.9
7.	Waste Evaporator, Building 2531	23	0.39	46.4	1.16	11.7

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.25
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR, TRU and TURF	7911	< 0.01
Total activity in gases released		0.25

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.33% of the MPC_w for a release to an uncontrolled area (see Figure 1). The main contaminant was strontium which contributed 96% of the calculated percent of MPC_w.

White Oak Creek Monitoring

A total of 0.48 curies of strontium, 0.15 curies of cesium, and 0.05 curies of ruthenium was released to White Oak Lake (see Table 1). The 0.22-curie difference in the strontium measured at Station 3 and that measured in the process waste effluent at Station 1 may, in part, be explained by possible erratic sampling or analysis. The Waste Treatment Plant efficiency normally varies between 80% and 85%; whereas, the analytical data in Table 2 shows the plant to be 95% efficient. Another possible explanation for the difference between the measurements made at Stations 1 and 3 is the leaching of activity from Burial Ground 4. The only apparent source of the activity (0.22 curies) measured in the Melton Valley branch at Station 4 is Burial Ground 5. There was no significant release of alpha activity.

A comparison of this month's strontium releases to those of previous months is shown in Figures 2 and 3.

Process Waste

A total of 12 million gal of waste was treated this month. A summary of plant operations is given in Table 2. Table 3 lists the individual waste releases into the system; Figure 4 shows a monthly comparison of the volumes of waste handled.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 265 gph. A summary of operation is listed below:

	Gallons
Total volume generated	200,000
Volume transferred to evaporator	199,000
Volume of concentrate returned to Tank Farm	12,000
Volume of concentrate transferred to shale fracturing site	11,000
Tank Farm free space at beginning of month	576,000
Tank Farm free space at end of month	574,000

The main contributors to the ILW system were as follows:

	Gallons
1. High Flux Isotope Reactor	56,000
2. Fission Product Development Laboratory	29,000
3. ORR, LITR, and BSR	28,000
4. 4500 Complex	24,000
5. Building 3019	22,000
6. Radioisotope Processing Area	13,000
7. Transuranium Processing Plant	12,000

A monthly comparison of the volumes of ILW generated is shown in Figure 5.

Shale Fracturing Disposal of ILW Injection 5

A total of 81,800 gal of concentrated ILW was injected into a new fracture at a depth of 842 ft. The waste contained 500 curies of strontium, 69,400 curies of cesium, 300 curies of ruthenium, and 100 curies of cobalt. The slot was overdisplaced with water at the termination of the injection. Materials used in the injection are tabulated below. The mixtures are listed in the order of their injection.

Solids	Weight, lb	lb/gal
Portland cement, type 2	188,390	2.2
Kingston fly ash	176,580	2.0
Attapulgite	76,200	0.9
Grundite	46,800	0.5
Total weight of solids	487,970	5.6

Liquids	Gallons
Water only	1,140
Water with solids	490
ILW with solids	81,800
Water with solids	2,850
Water only	830
Total volume injected	87,110

Gaseous Waste

The ORNL stacks discharged a total of 0.21 curies of ^{131}I during the period. There was no significant amount of filterable activity detected. The individual stack releases are tabulated in Table 4; Figure 6 compares the stack releases on a monthly basis.

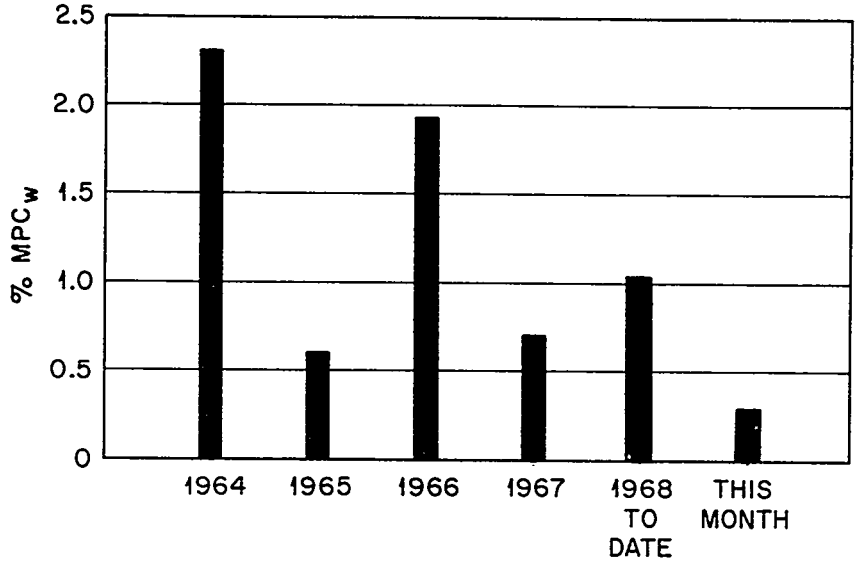

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

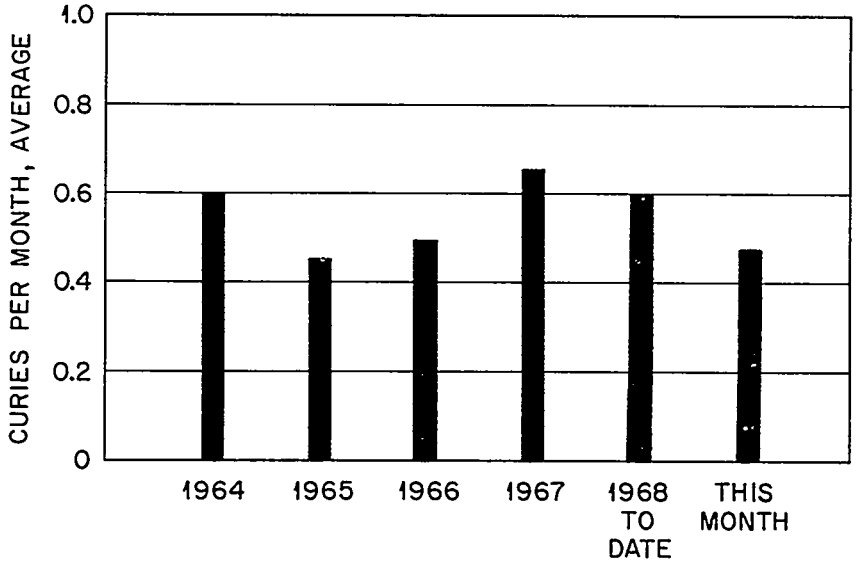

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7)

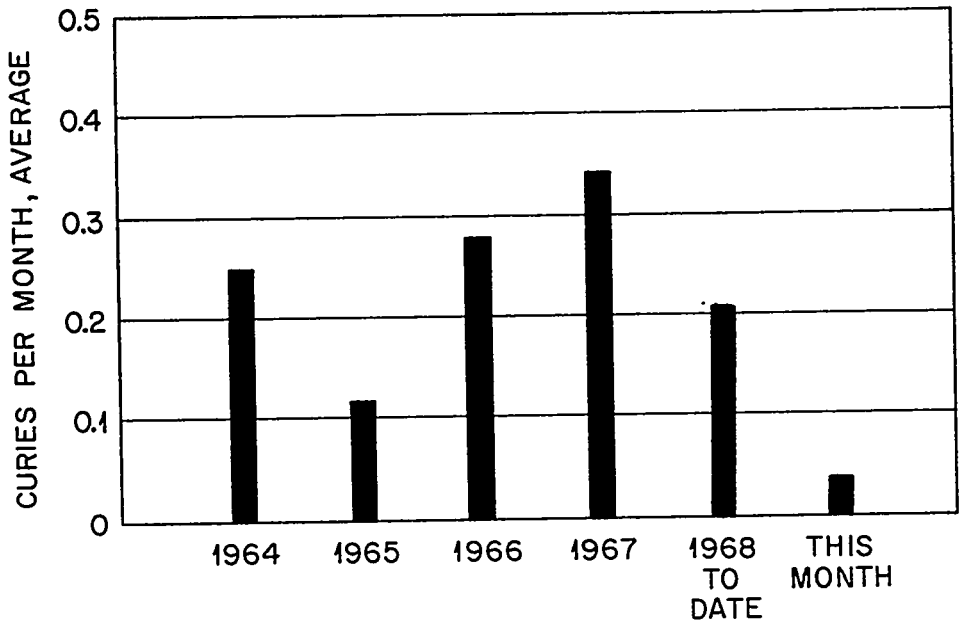

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

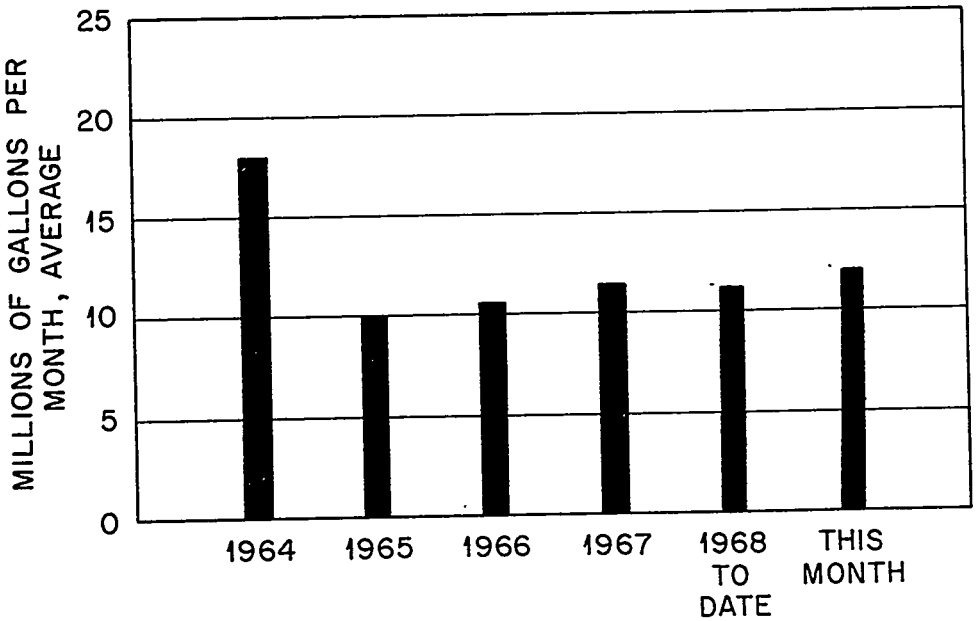

Fig. 4. Process Waste Volumes.

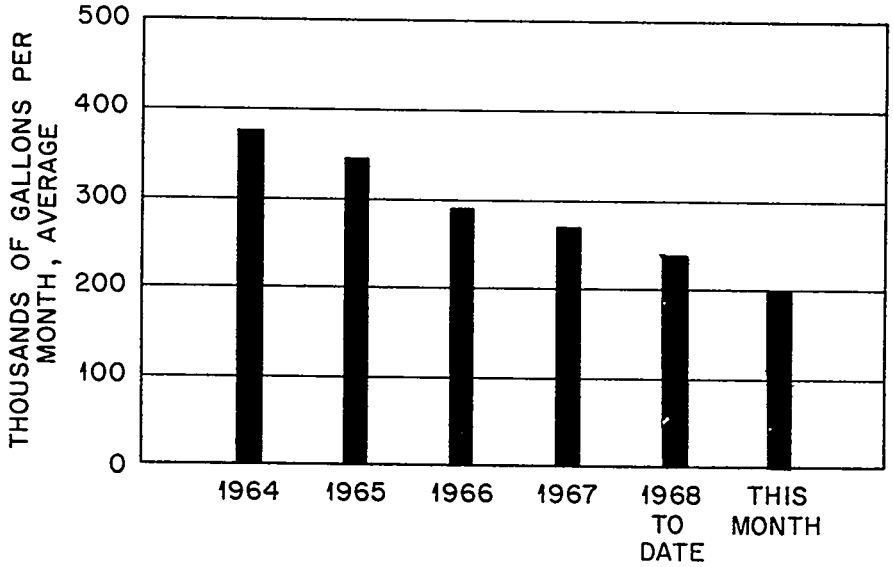

Fig. 5. Intermediate—Level Waste Volumes.

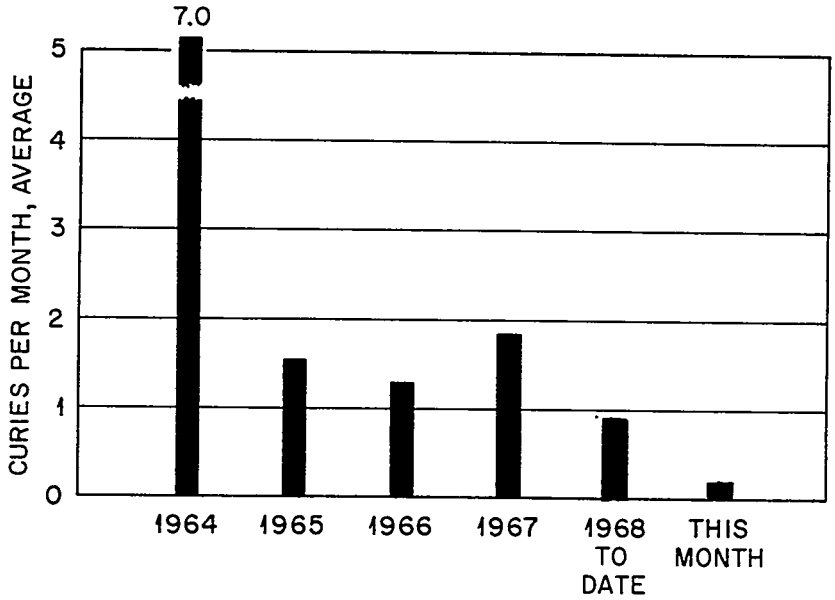

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

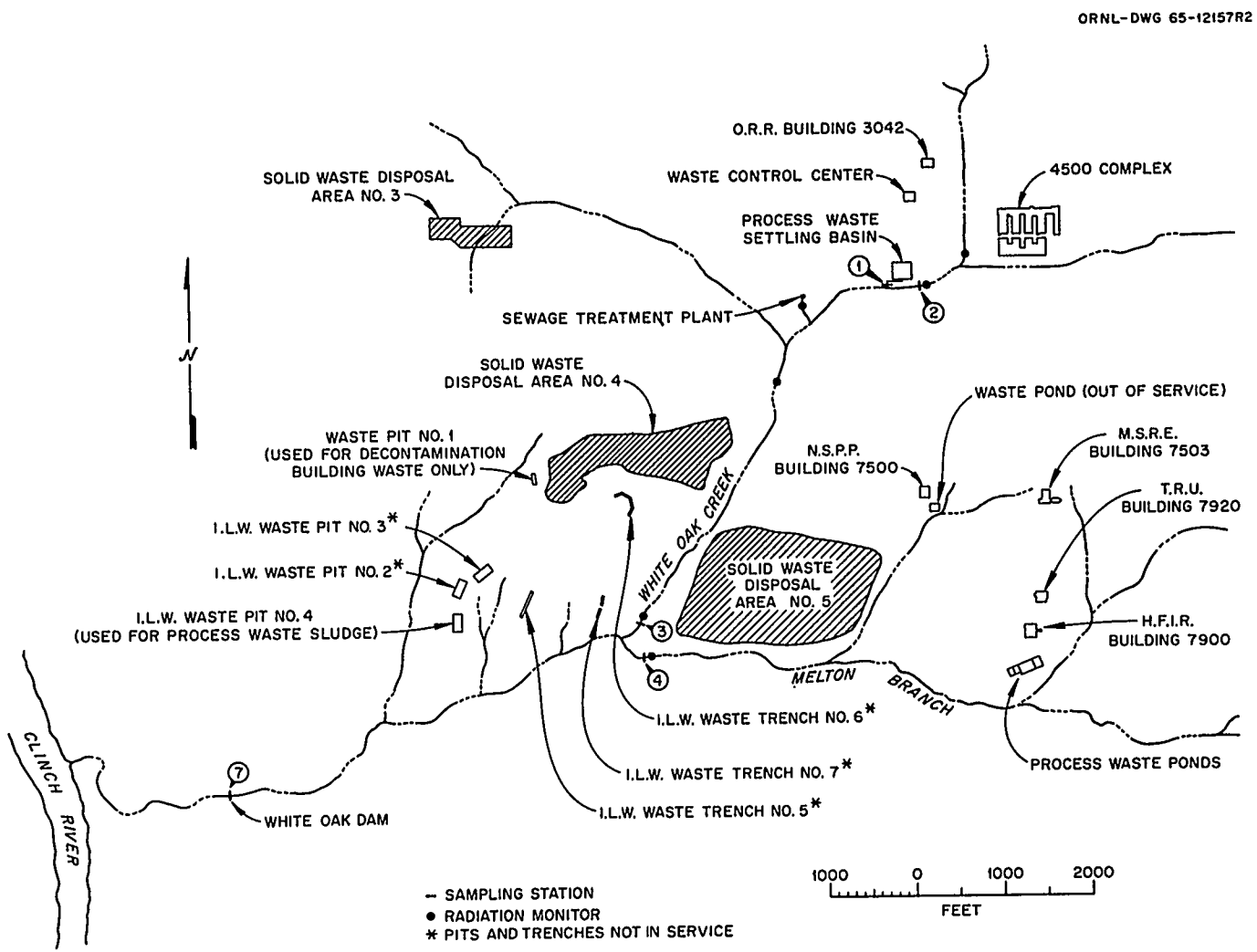

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[a]	Activity (curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.04	0.04	0.05	none detected
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	none detected	none detected
Total discharge from Bethel Valley Area	3	0.26	0.03	0.15	none detected
Total discharge from Melton Valley Area	4	0.22	0.02	< 0.01	none detected
Total Discharge	3,4	0.48	0.05	0.15	-
White Oak Dam to Clinch River (Health Physics measurement)	7	0.13	0.24	0.06	0.02

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 12×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15×10^6 gal

NUCLIDES	PLANT INFLUENT (curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.78	0.04	95
$^{103,\ 106}Ru$	0.08	0.04	50
^{60}Co	0.04	none detected	100
^{137}Cs	0.37	0.05	87
Gross Beta Analysis	39 c/m/ml	1 c/m/ml	97

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

TABLE 3

PROCESS WASTE DISCHARGES

	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[a]		VOLUME	
		CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1. Reactor Operations	14	0.48[b]	51.6	2.42	23.2
2. Radioisotope Processing Area	5	0.11	11.8	1.64	15.8
3. Buildings 3503 and 3508	7	0.15	16.1	1.50	14.4
4. Buildings 3025 and 3026	0	-	-	2.28	22.0
5. Building 3019	0	-	-	0.89	8.6
6. Fission Products Development Laboratory	17	0.05	5.4	0.16	1.5
7. Waste Evaporator, Building 2531	10	0.14	15.1	0.96	9.2
8. Buildings 3525 and 3550	0	-	-	0.48	4.6
9. Building 2026	0	-	-	0.06	0.6

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.21
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.21

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

The radioactive contamination in the river, resulting from ORNL waste releases, was 0.15% of the MPC_w for a release to an uncontrolled area. Strontium, contributing 93.4% to the calculated percent of MPC_w, was the major contaminant.

White Oak Creek Monitoring

Table 1 lists the radionuclides discharged in significant amounts to White Oak Lake. The main activities were strontium (0.29 curie) and cesium (0.33 curie) which came, primarily, from the Bethel Valley area. The amount of alpha activity detected during the period was insignificant. Figures 2 and 3 compare the strontium releases on a monthly basis.

Process Waste

A total of 11.7 million gal of waste was chemically treated this month. A summary of operations is given in Table 2. Table 3 lists the major contributors of waste into the system. Figure 4 shows a monthly comparison of the volumes of waste processed by the system.

Intermediate-Level Waste

The average boil-down rate of the waste evaporator was 214 gph. A summary of operation is given below:

	Gallons
Total volume generated	167,000
Volume transferred to evaporator	159,000
Volume of concentrate returned to Tank Farm	8,000
Tank Farm free space at beginning of month	574,000
Tank Farm free space at end of month	558,000

The main contributors to the ILW system are listed below:

		Gallons
1.	Building 3019	34,000
2.	High Flux Isotope Reactor	23,000
3.	4500 Complex	21,000
4.	ORR and BSR	21,000
5.	Fission Product Development Laboratory	20,000
6.	Radioisotope Processing Area	19,000

The total volume of waste generated this month is compared to the volumes in previous months in Figure 5.

Gaseous Waste

A total of 0.47 curie of ^{131}I was discharged from the ORNL stacks. There were no significant releases of alpha and particulate activities. A list of the individual stack releases is given in Table 4. The total stack releases are compared on a monthly basis in Figure 6.

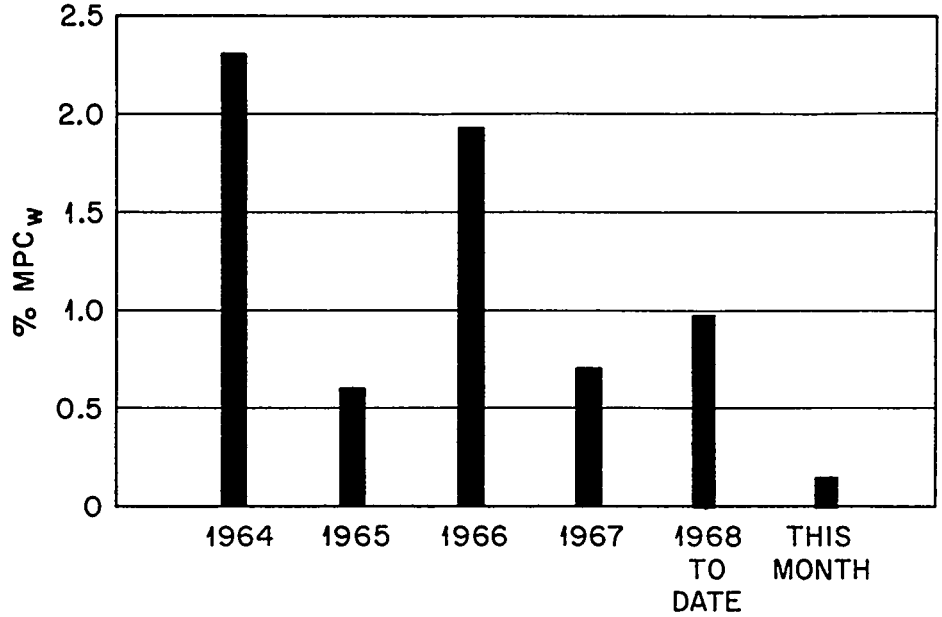

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharge (Health Physics Measurements at White Oak Dam)

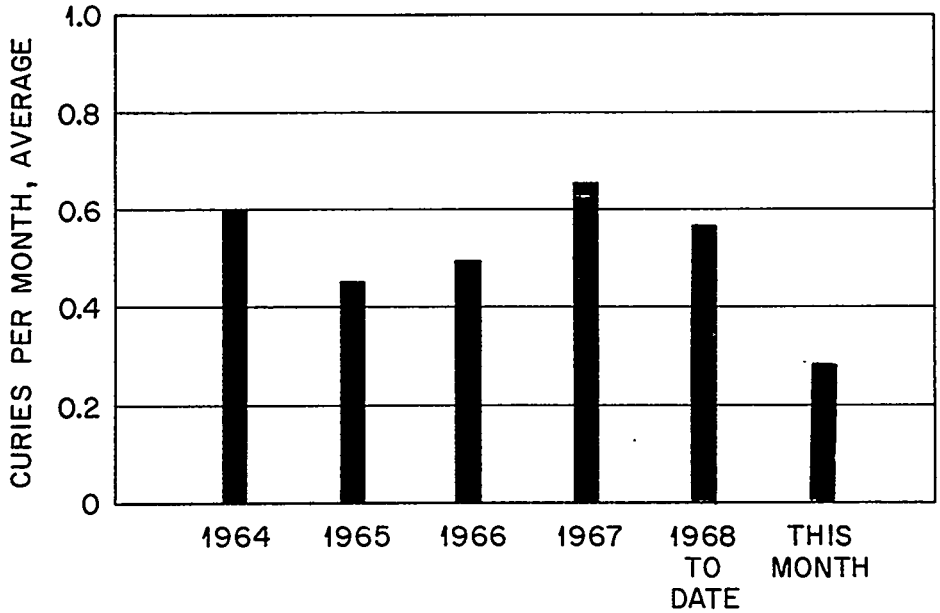

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

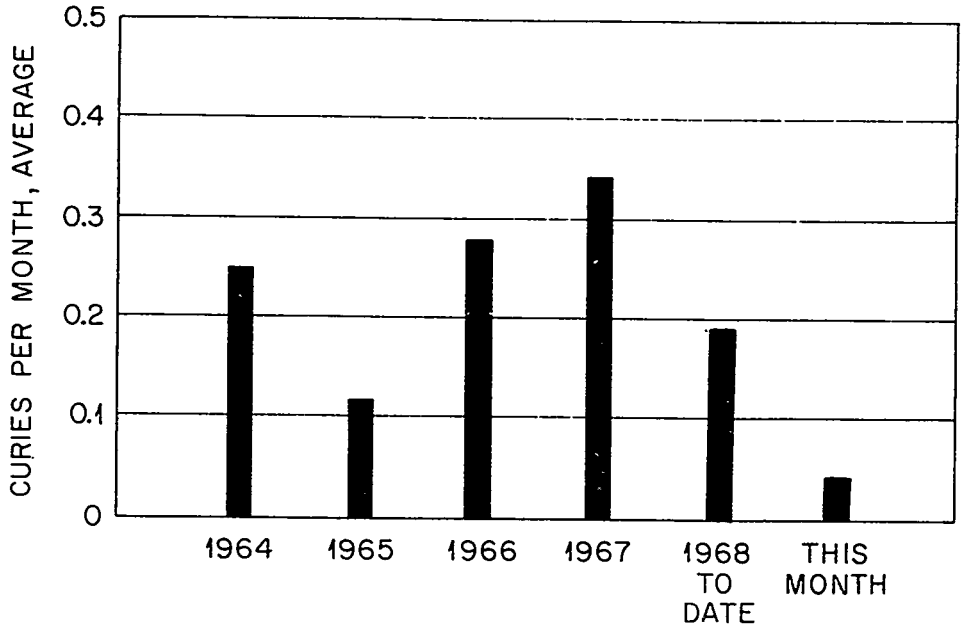

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

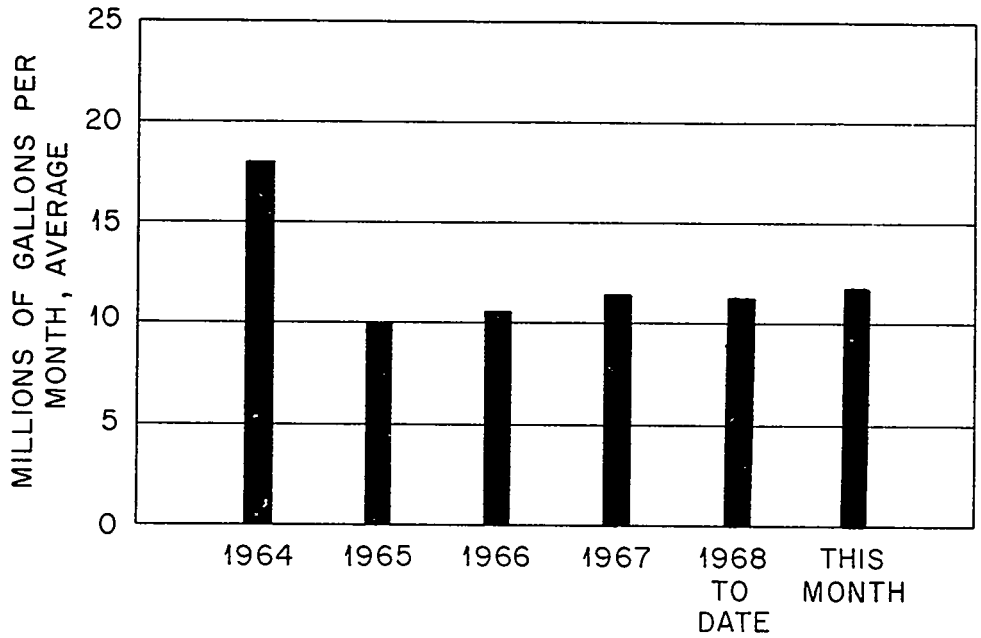

Fig. 4. Process Waste Volumes.

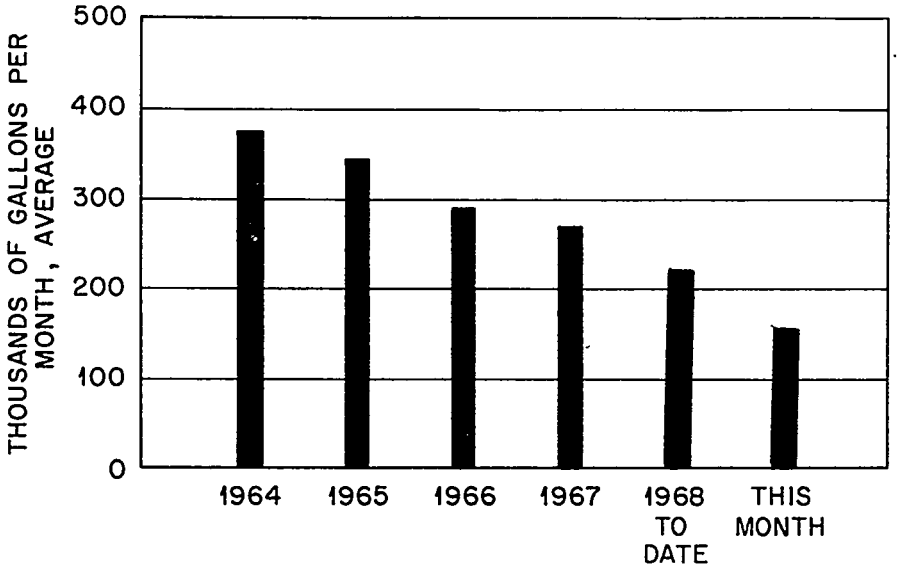

Fig. 5. Intermediate—Level Waste Volumes.

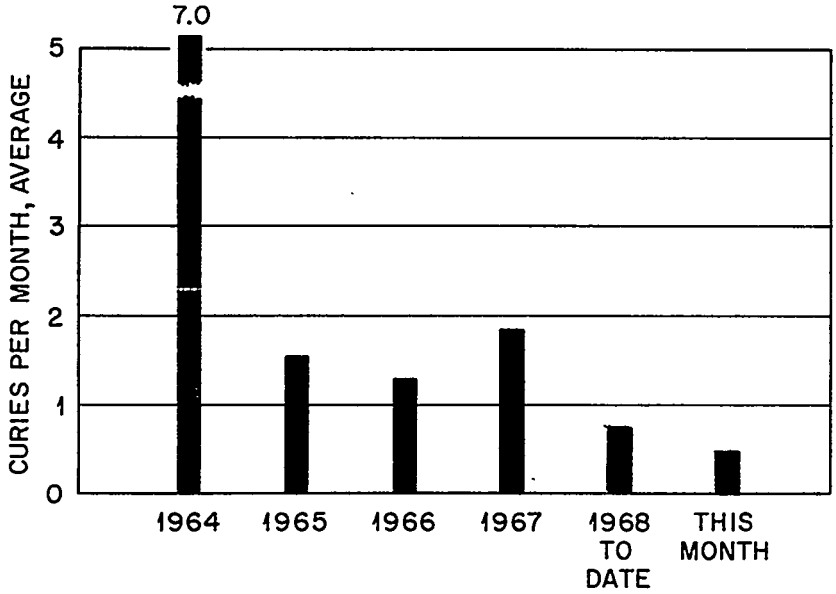

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

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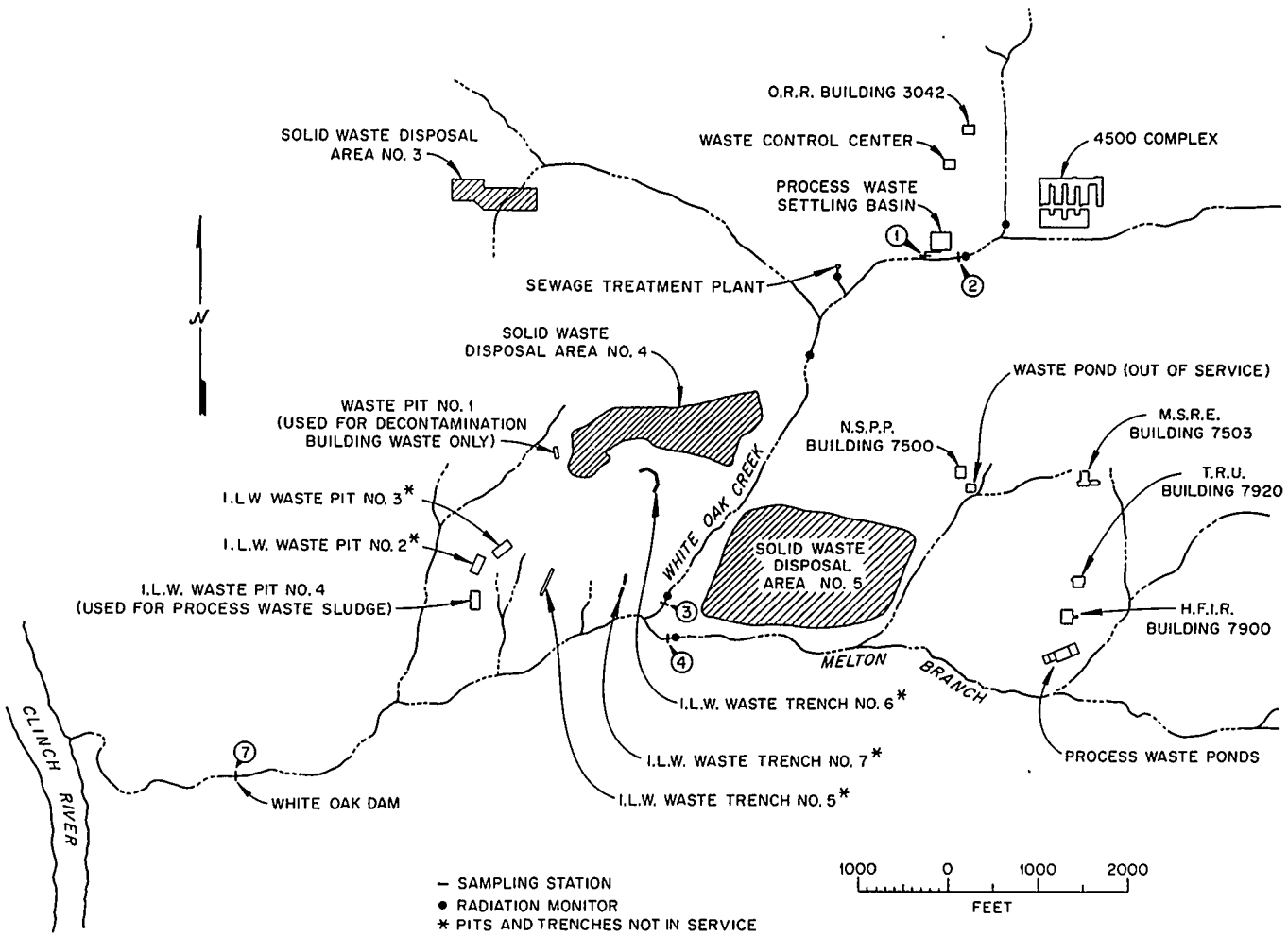

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Activity (Curies)			
		Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process Waste	1	0.04	none detected	0.16	none detected
Miscellaneous discharges from east end of plant	2	<0.01	none detected	none detected	none detected
Total discharge from Bethel Valley Area	3	0.27	0.15	0.33	none detected
Total discharge from Melton Valley Area	4	0.02	0.04	<0.01	none detected
Total discharge	3,4	0.29	0.19	0.33	-
White Oak Dam to Clinch River (Health Physics measurement)	7	0.17	0.13	0.07	0.03

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Waste Volume Treated this Month: 11.7×10^6 gal

Total Waste Volume Discharged to White Oak Creek this Month: 13.3×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.95	0.04	96
$^{103,106}Ru$	none detected	none detected	-
^{60}Co	none detected	none detected	-
^{137}Cs	2.53	0.16	94
Gross Beta Analysis	56 c/m/ml	4 c/m/ml	93

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[a]		VOLUME	
		CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1. Reactor Operations	6	0.14[b]	38.9	2.44	23.5
2. Radioisotope Processing Area	6	0.12	33.3	1.42	13.7
3. Buildings 3503 and 3508	2	0.04	11.1	1.38	13.3
4. Buildings 3025 and 3026	0	<0.01	-	1.92	18.5
5. Building 3019	0	<0.01	-	1.69	16.3
6. Fission Products Development Laboratory	1	<0.01	-	0.07	0.7
7. Waste Evaporator, Building 2531	5	0.06	16.7	0.83	8.0
8. Buildings 3525 and 3550	<1	<0.01	-	0.54	5.2
9. Building 2026	<1	<0.01	-	0.08	0.8

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

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack Number	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.46
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.47

[a]Activity primarily ^{131}I as noted in text

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.47% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants, strontium and iodine, contributed 88.3% and 9.6%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

The total strontium and gross beta activity measurements made at the White Oak Creek sampling stations are given in Table 1. Figure 2 compares the total strontium release to White Oak Lake to the releases measured in previous months.

Process Waste

Eight million gallons of contaminated water were chemically treated this month. The plant efficiency (determined by gross beta analysis) was 90%. Figure 3 compares, on a monthly basis, the amounts of strontium released by the process waste system to White Oak Creek. Figure 4 shows the volumes of waste handled. The main sources of process waste are listed in Table 2.

Intermediate Level Waste

The evaporator operated at an average boil-down rate of 308 gph. A summary of operating data is given below:

	Gallons
Total volume generated	223,000
Volume transferred to evaporator	229,000
Tank farm free space at beginning of month	465,000
Tank farm free space at end of month	465,000
Evaporator concentrate returned to tank farm	6,000

The major contributors to the ILW system are listed below. Figure 5 compares the volumes generated each month.

	Gallons
Building 3019	52,000
ORR and BSR	31,000
High Flux Isotope Reactor	31,000
4500 Complex	17,000
Fission Products Development Laboratory	16,000
Radioisotopes Processing Area	11,000
Transuranium Processing Plant	10,000

Gaseous Waste

A total of 0.63 curie of gaseous iodine was discharged by the ORNL stacks (see Table 3 and Figure 6). There were no significant releases of alpha or particulate activities.

Inert gases released from the 3039 and 7911 stacks averaged 1.91% and 0.34%, respectively, of the calculated Maximum Permissible Operating Level. The calculations were based on the assumption that all of the inert gases were ^{133}Xe.

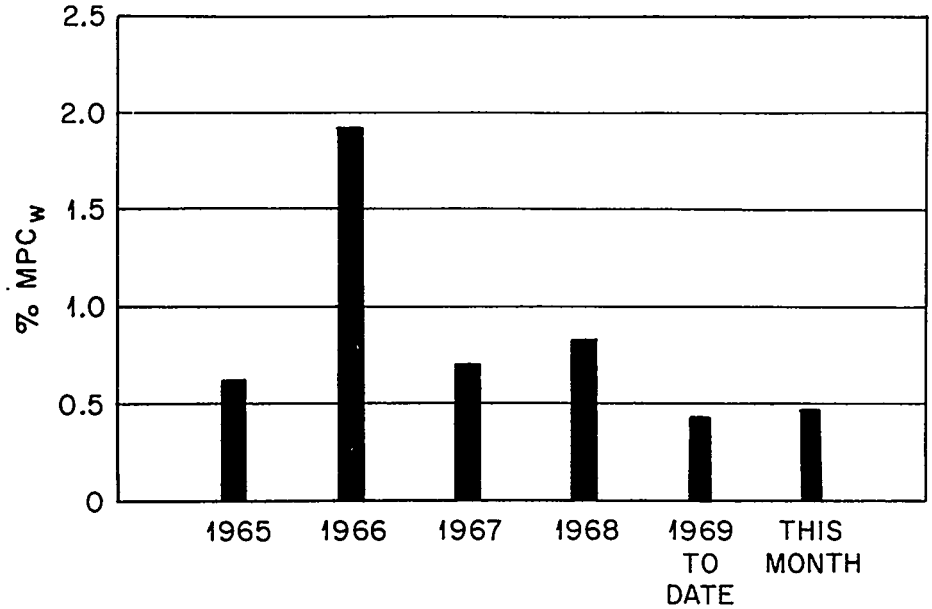

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

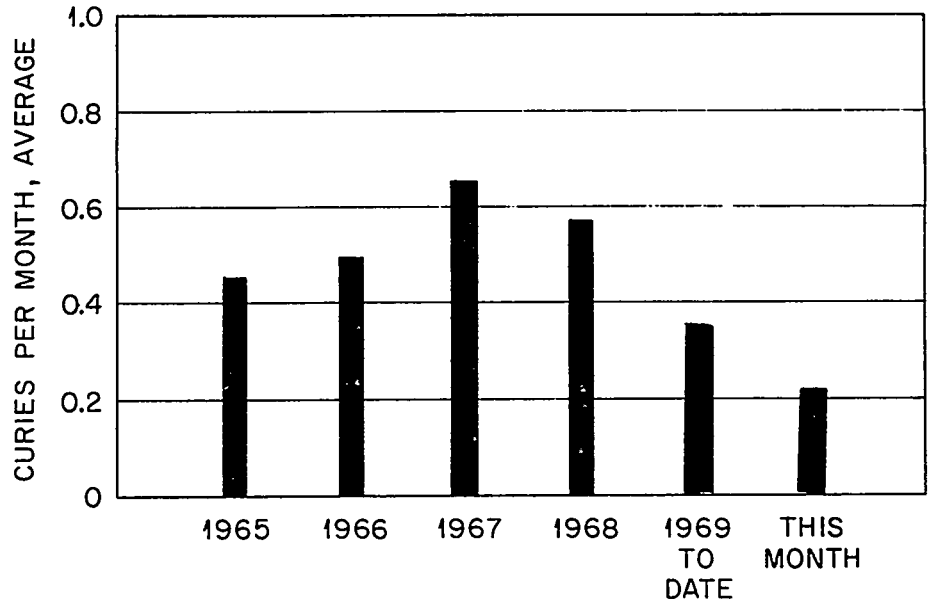

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

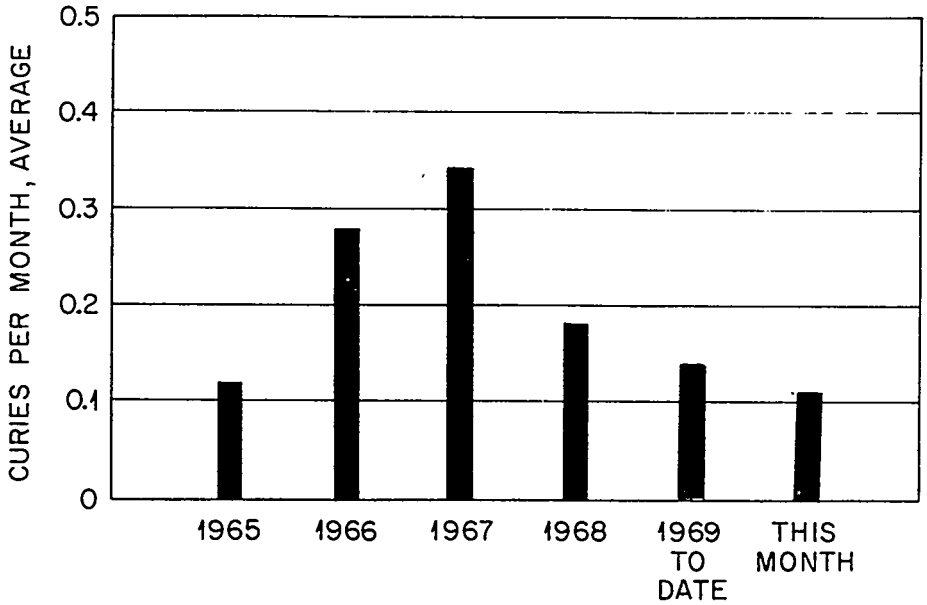

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

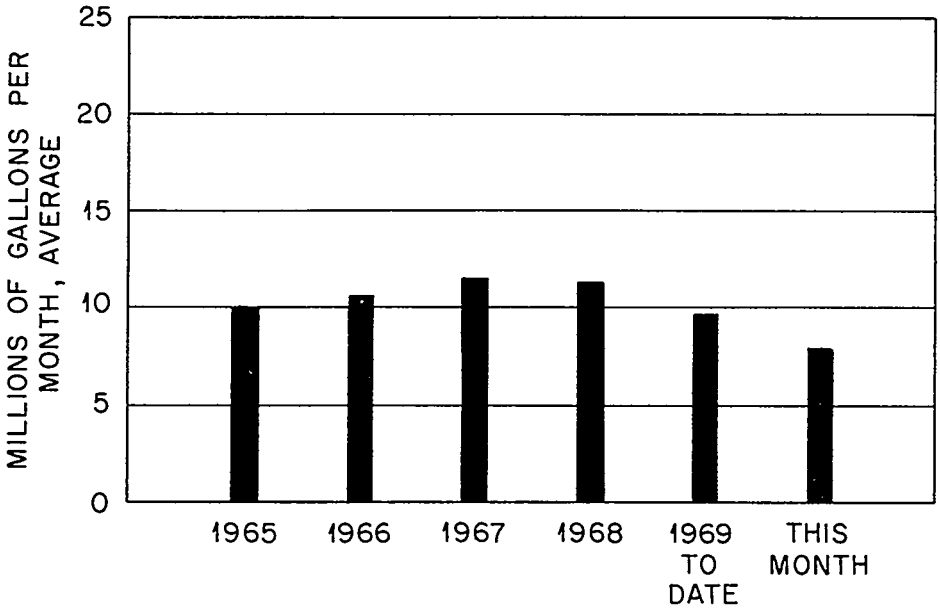

Fig. 4. Process Waste Volumes.

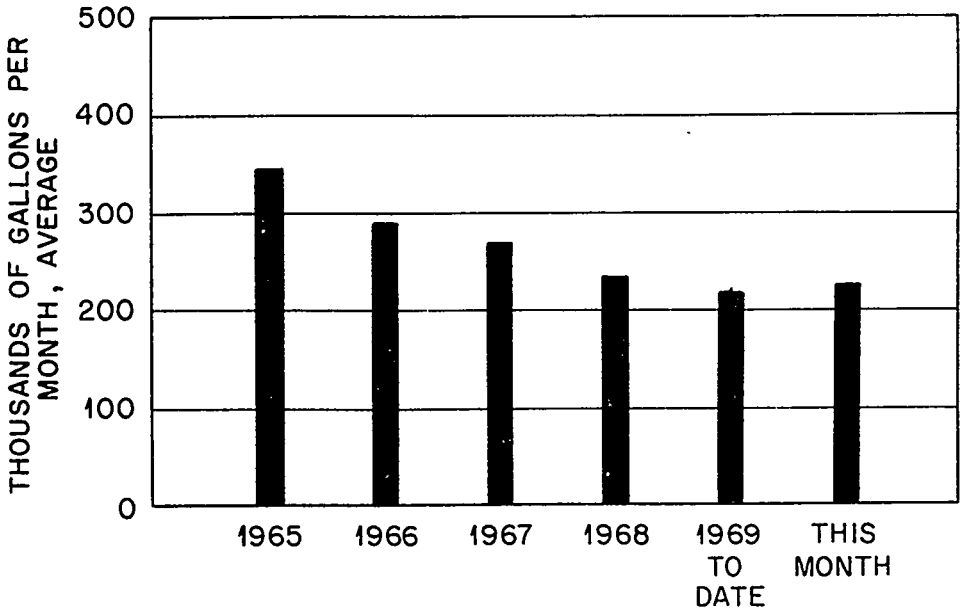

Fig. 5. Intermediate—Level Waste Volumes.

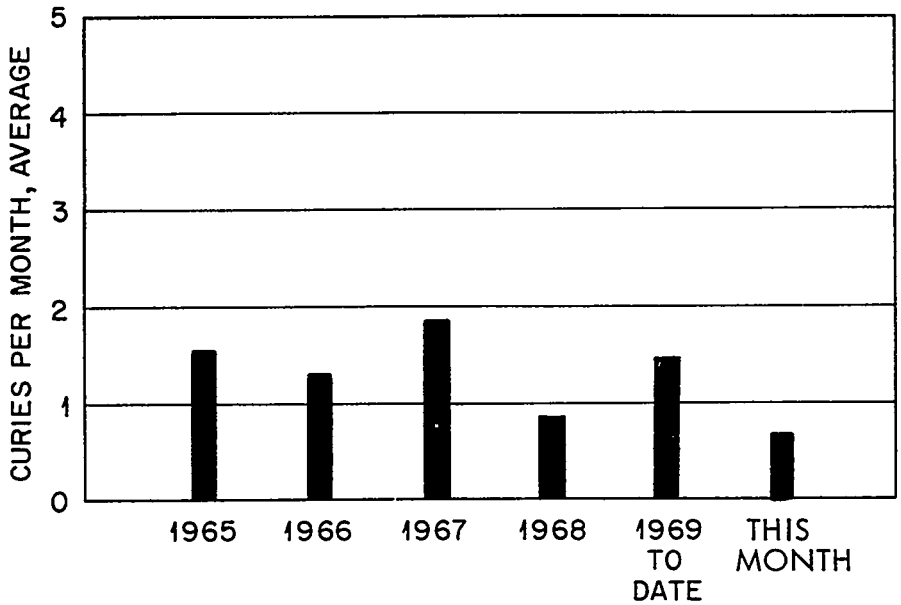

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

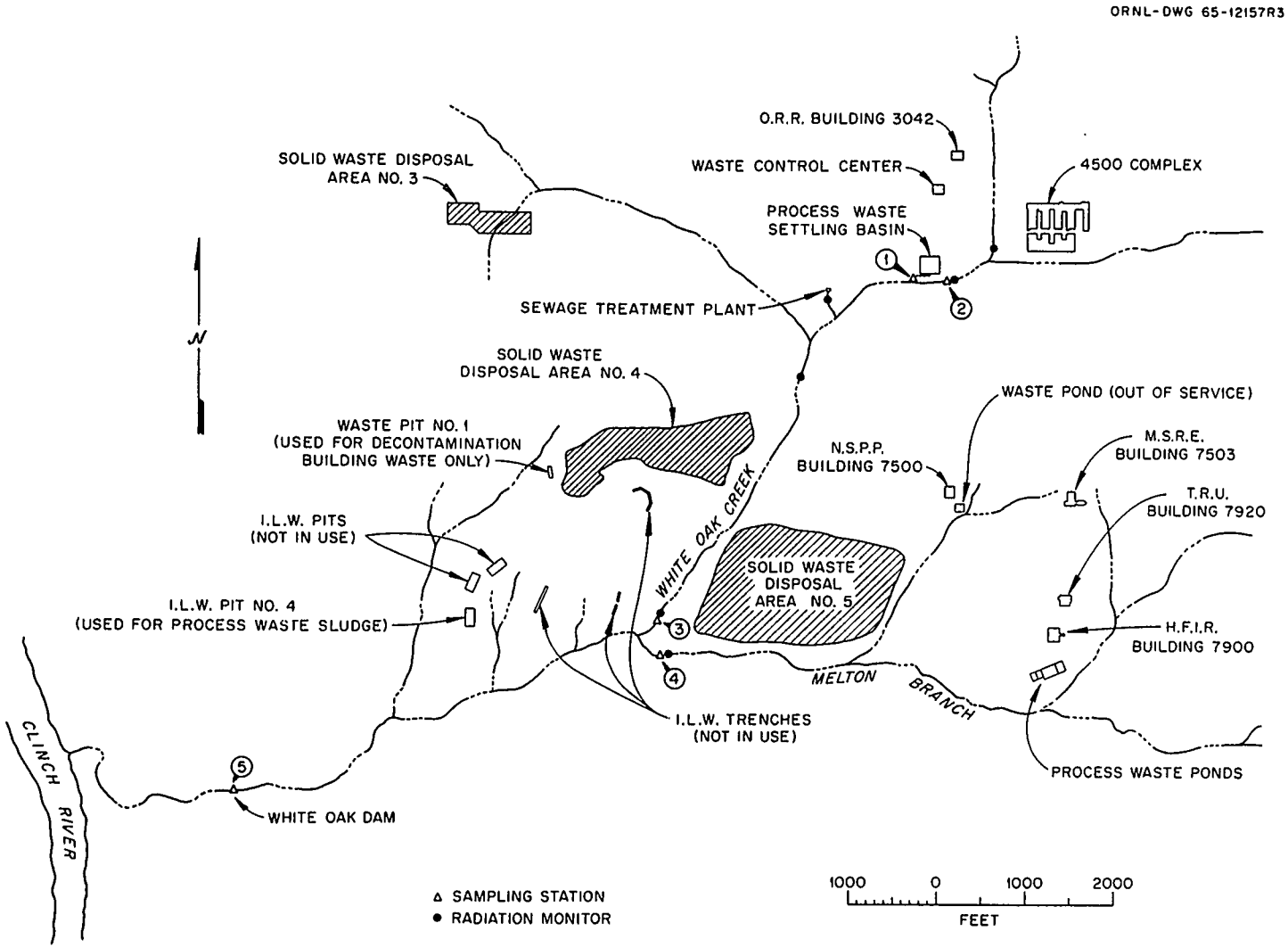

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.11	0.34
Miscellaneous discharges from east end of plant	2	0.01	0.20
Discharge from Bethel Valley Area	3	0.15	1.28
Discharge from Melton Valley Area	4	0.07	0.29
Total discharge from all sources	3,4	0.22	1.57
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.46

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	6	0.22[b]	59.5	2.62	32.3
2. Radioisotope Processing Area	13	0.13	35.1	0.70	8.6
3. Buildings 3503 and 3508	0	--	--	0.70	8.6
4. Buildings 3025 and 3026	0	--	--	2.10	25.8
5. Building 3019	0	--	--	0.29	3.6
6. Fission Products Development Laboratory	13	0.02	5.4	0.13	1.6
7. Waste Evaporator, Building 2531	0	--	--	1.15	14.2
8. Buildings 3525 and 3550	0	--	--	0.42	5.2
9. Building 2026	2	<0.01	--	0.01	0.1

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.40
Central Radioactive Gas Disposal Facilities	3039	0.19
Radiochemical Processing Pilot Plant	3020	0.01
MSRE	7512	<0.01
HFIR	7911	0.03
Total activity in gases released		0.63

[a]Activity primarily ^{131}I as noted in text.

2056

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FROM: L. C. Lasher

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.21% of the MPC_W for a release to an uncontrolled area (see Figure 1). The two main contaminants, strontium and iodine, contributed 90.0% and 5.8%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the strontium and gross beta activity measurements made at the five creek sampling stations. A monthly comparison of strontium releases into White Oak Lake is given in Figure 2.

Process Waste System

A total of 8.2 million gallons of contaminated water was chemically treated this month. Plant efficiency, based upon gross beta analysis of the influent and effluent streams, amounted to 88%. The amount of radioactivity discharged into White Oak Creek from this system is shown in Table 1 and Figure 3. The sources of wastes discharged into the system are listed in Table 2. Figure 4 compares the volumes handled each month.

Intermediate Level Waste

The evaporator operated at a boil-down rate of 335 gph--slightly greater than 50% of capacity. A summary of operations is given below:

	Gallons
Total volume generated	242,000
Volume transferred to evaporator	241,000
Tank farm free space at beginning of month	465,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	63,000

A list of the major contributors is given below. Figure 5 compares the volumes generated each month.

	Gallons
Building 3019	66,000
4500 Complex	35,000
ORR and BSR	31,000
Fission Products Development Laboratory	20,000
Nuclear Safety Pilot Plant	10,000

Gaseous Waste

A total of 1.15 curies of gaseous ^{131}I was released this month by ORNL stacks; 0.89 curie came from the 3039 system. There were no significant amounts of alpha or particulate activities discharged during the period. Table 3 lists the releases from individual stack areas. Figure 6 compares releases on a monthly basis.

Inert gases (calculated as ^{133}Xe) released from the 3039 and 7911 stacks averaged 1.73% and 0.39% of the calculated Maximum Permissible Operating Level.

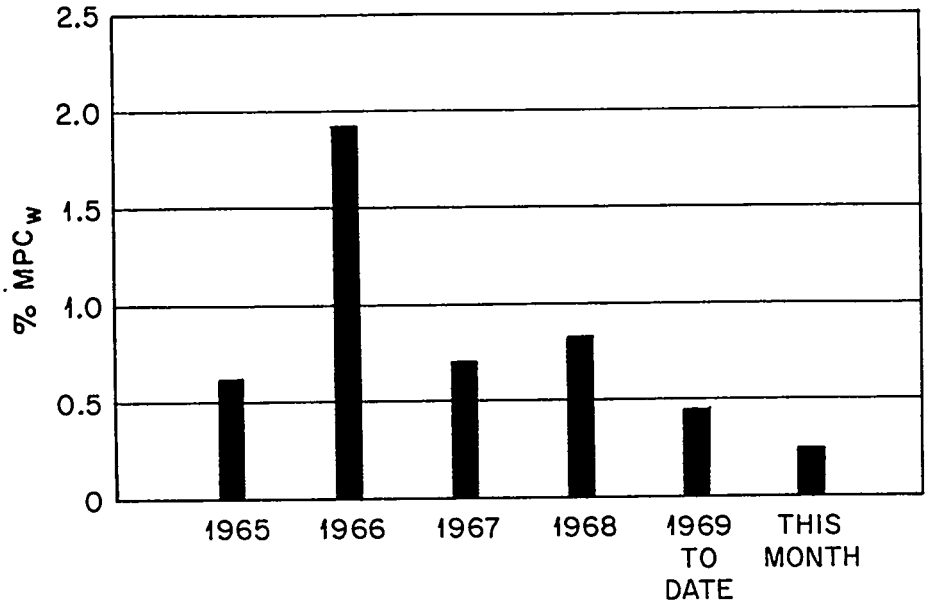

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

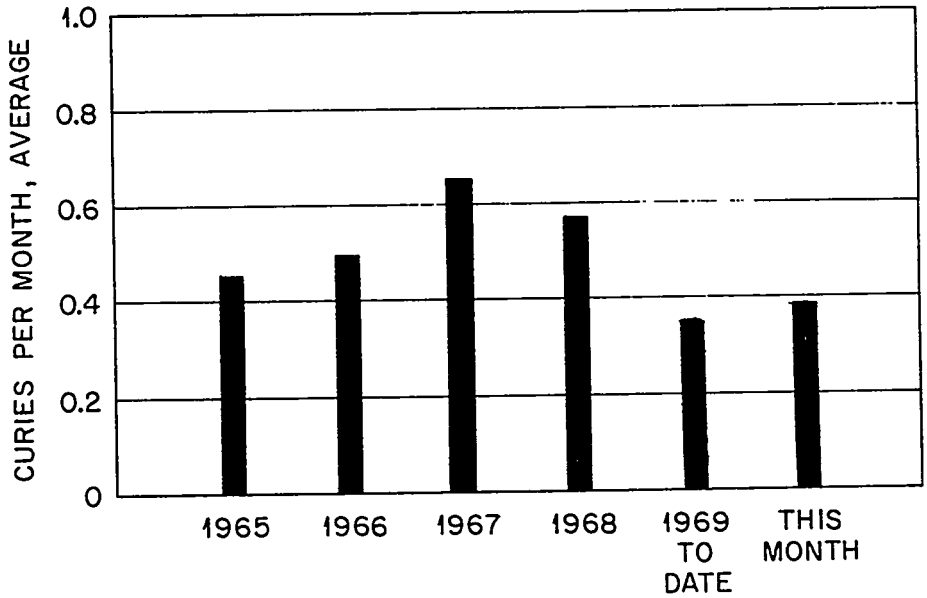

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

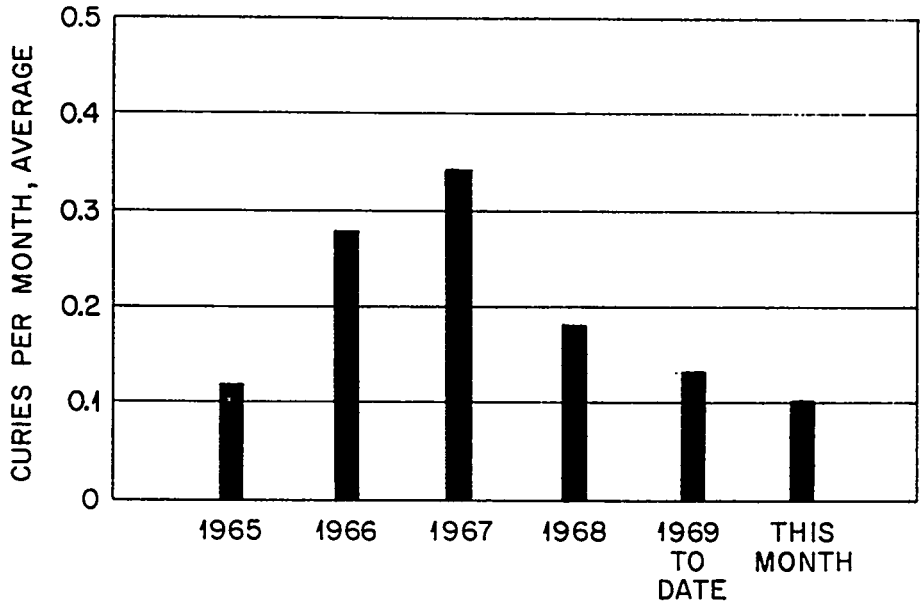

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

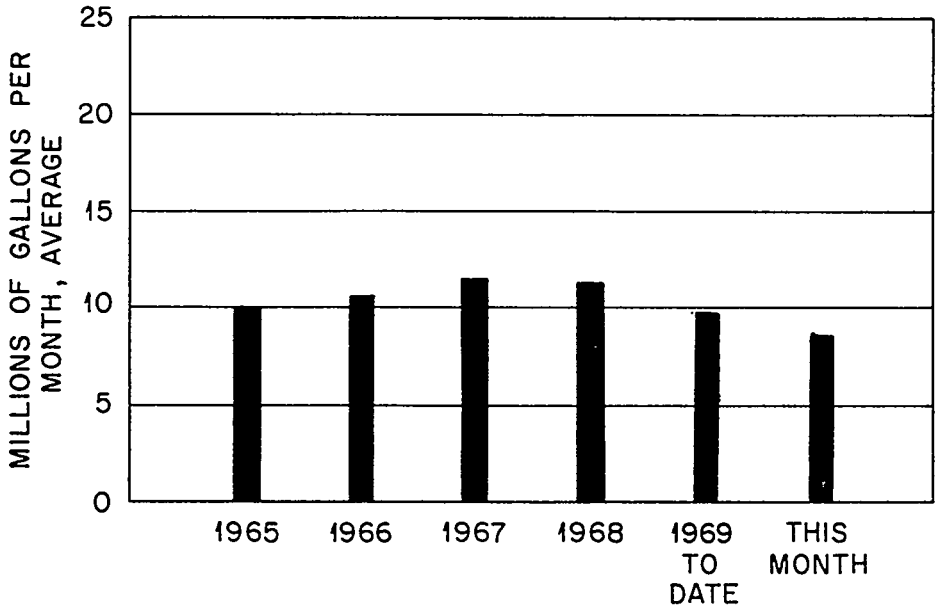

Fig. 4. Process Waste Volumes.

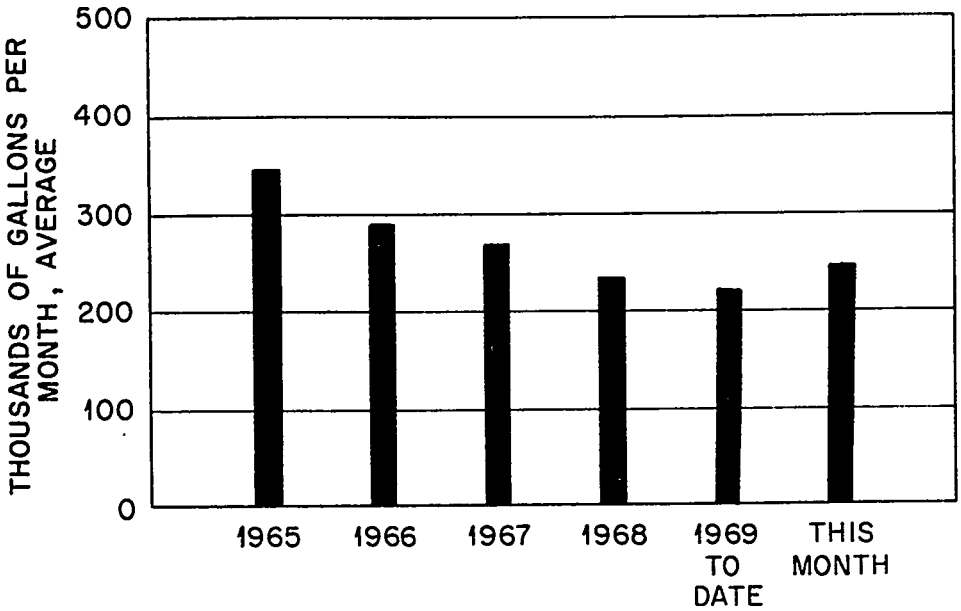

Fig. 5. Intermediate—Level Waste Volumes.

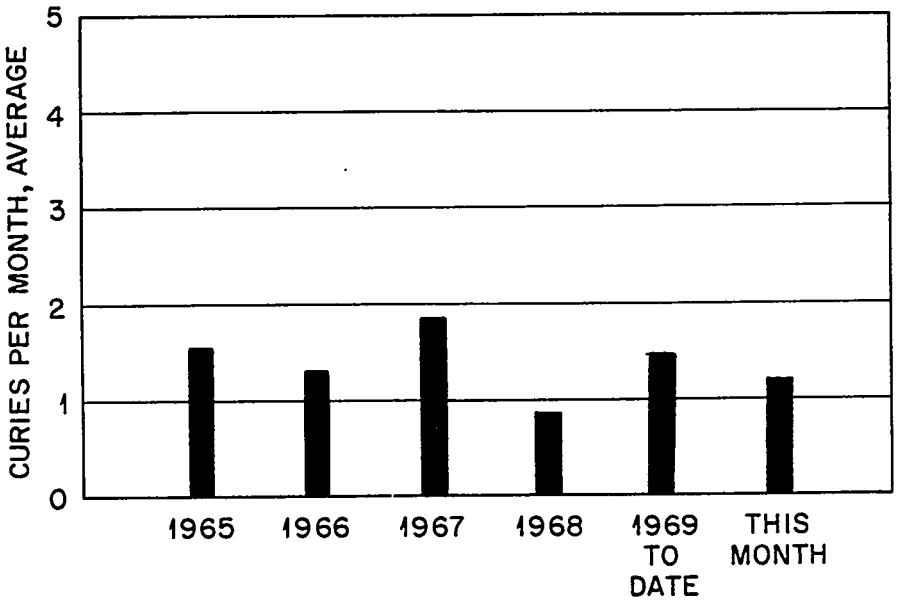

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

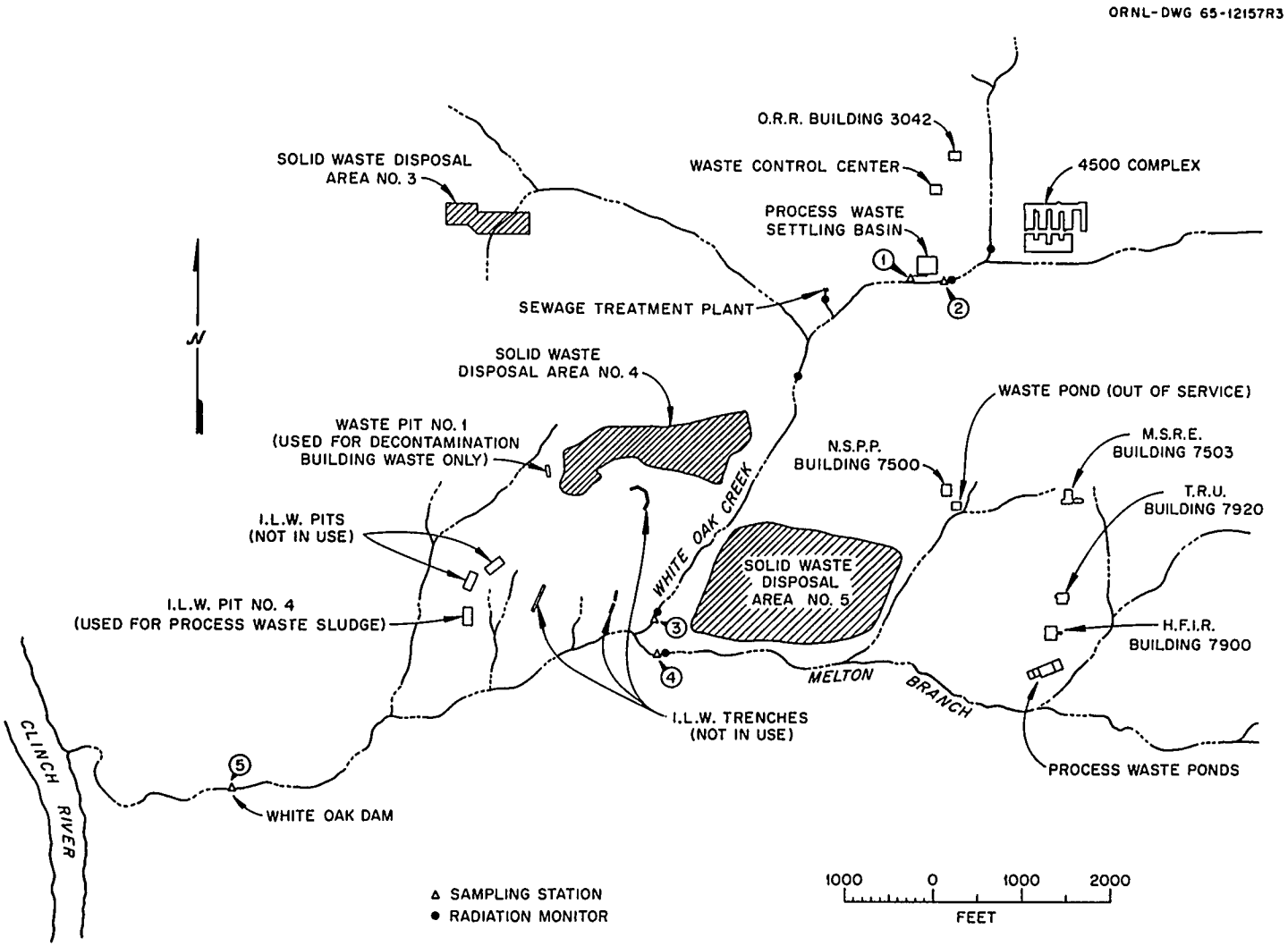

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.10	0.35
Miscellaneous discharges from east end of plant	2	0.04	0.40
Discharge from Bethel Valley Area	3	0.29	1.24
Discharge from Melton Valley Area	4	0.09	0.17
Total discharge from all sources	3,4	0.38	1.41
White Oak Dam to Clinch River (Health Physics measurement)	5	0.14	0.47

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations	.20[b]	0.42[b]	53.8	3.20	36.7
2. Radioisotope Processing Area	54	0.19	24.4	0.52	6.0
3. Buildings 3503 and 3508	11	0.04	5.1	0.59	6.8
4. Buildings 3025 and 3026	10	0.03	3.8	2.04	23.4
5. Building 3019	2	<0.01	--	0.24	2.8
6. Fission Products Development Laboratory	119	0.08	10.3	0.11	1.3
7. Waste Evaporator, Building 2531	2	0.02	2.6	1.45	16.6
8. Buildings 3525 and 3550	<1	<0.01	--	0.50	5.7
9. Building 2026	3	<0.01	--	0.06	0.7

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.26
Central Radioactive Gas Disposal Facilities	3039	0.89
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		1.15

[a]Activity primarily ^{131}I as noted in text.

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CENTRAL FILES NUMBER
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DATE ISSUED: AUG 5 - 1970

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DATE: July 21, 1970

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TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

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LIQUID WASTE

Release to Clinch River

Radioactive Contamination of the Clinch River resulting from ORNL liquid waste releases was 0.23% of the MPC_W for a release to an uncontrolled area (See Figure 1). The main contaminants were strontium, iodine, and tritium which accounted for 69.8%, 2.3%, and 26.2%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 is a summary of radioactive discharges into the Creek during the period. The amounts of strontium discharged into White Oak Lake are compared on a monthly basis in Figure 2.

Process Waste

A total of 10.8 million gallons of waste was processed this month. The process removed 85% of the gross activity. Sources of waste released into the system are listed in Table 2. Figure 3 shows a monthly comparison of the amounts of strontium released into White Oak Creek; the volumes handled during the month are compared in Figure 4.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 304 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	219,000
Volume transferred to evaporator	219,000
Tank farm free space at beginning of month	469,000
Tank farm free space at end of month	464,000
Evaporator concentrate returned to tank farm	5,000
Total volume of concentrate in tank farm	42,000

A list of the major contributors to the system is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
ORR and BSR	44,000
Building, 3019	21,000
High Flux Isotope Reactor	18,000
Building, 3026	17,000
Building, 3025	10.000

Gaseous Waste

The ORNL stacks released a total of 190 millicuries of ^{131}I this month. There was no significent release of particulate or alpha activity. Inert gases released from the 3039 and 7911 stacks averaged less than 2.0% and 0.2%, respectively, of the maximum permissible release for these stacks. Individual stack releases are listed in Table 3; Figure 6 compares the releases on a monthly basis.

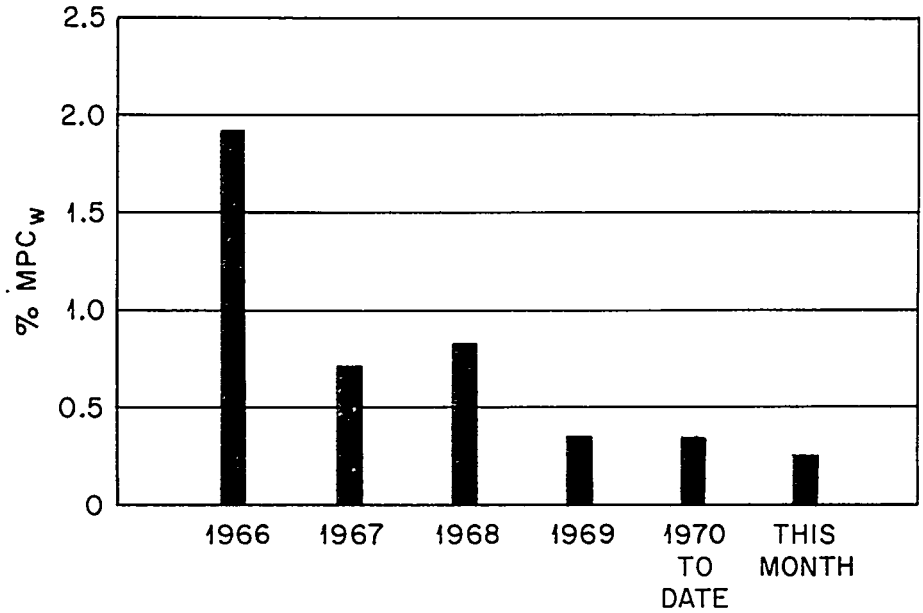

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

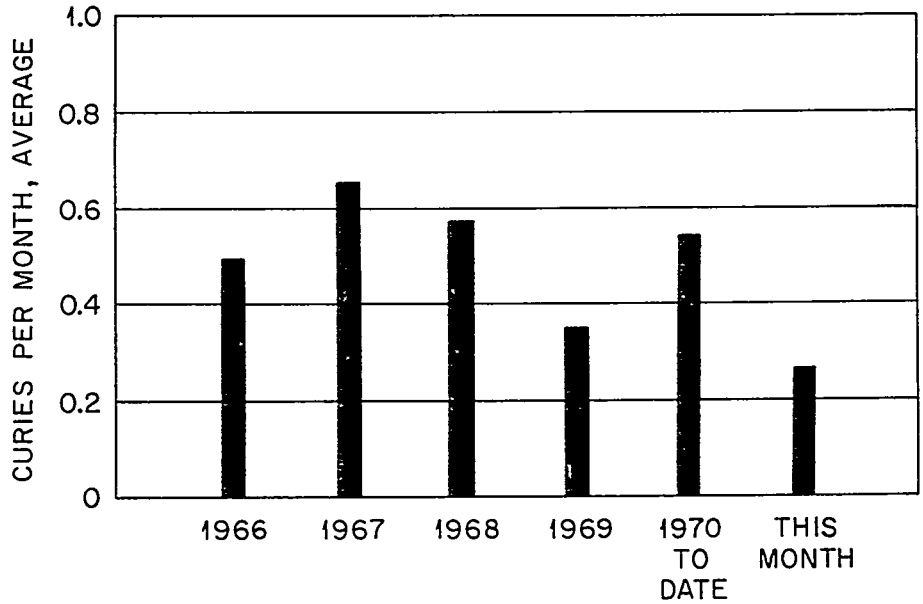

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

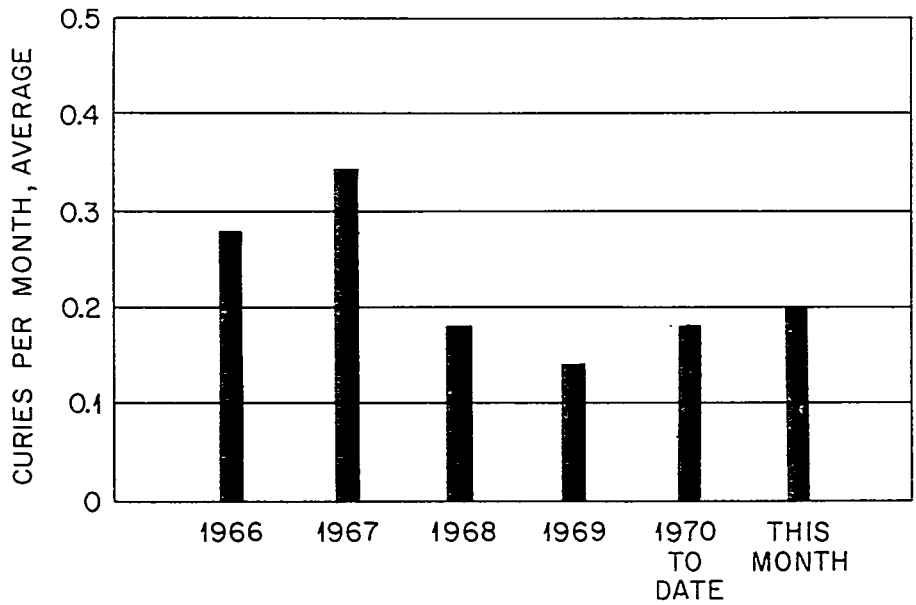

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

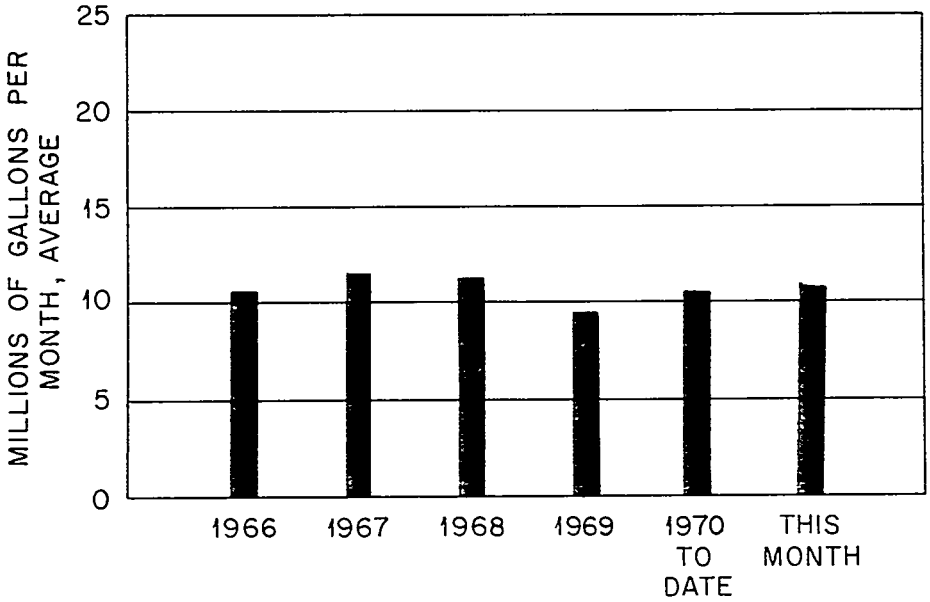

Fig. 4. Process Waste Volumes.

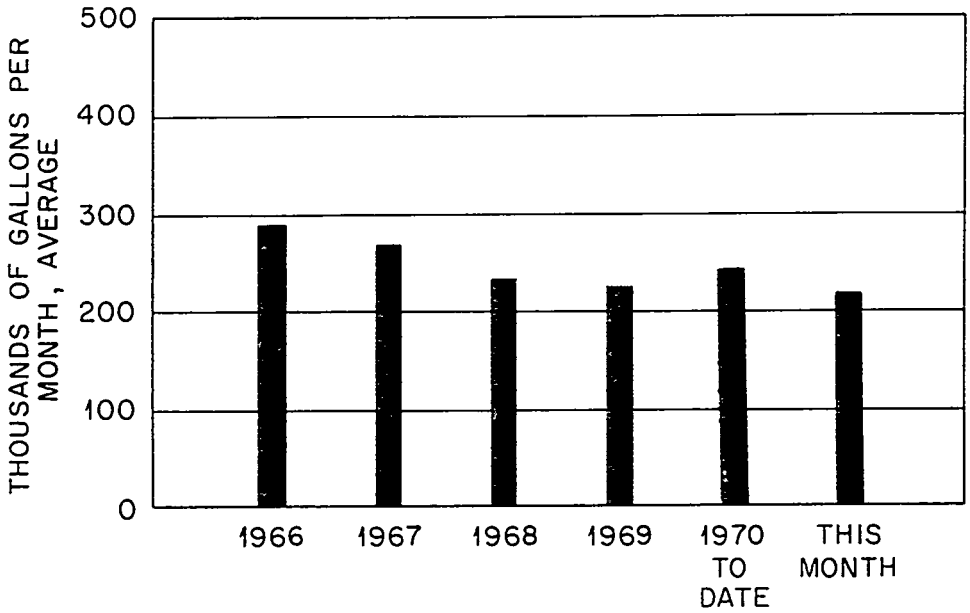

Fig. 5. Intermediate—Level Waste Volumes.

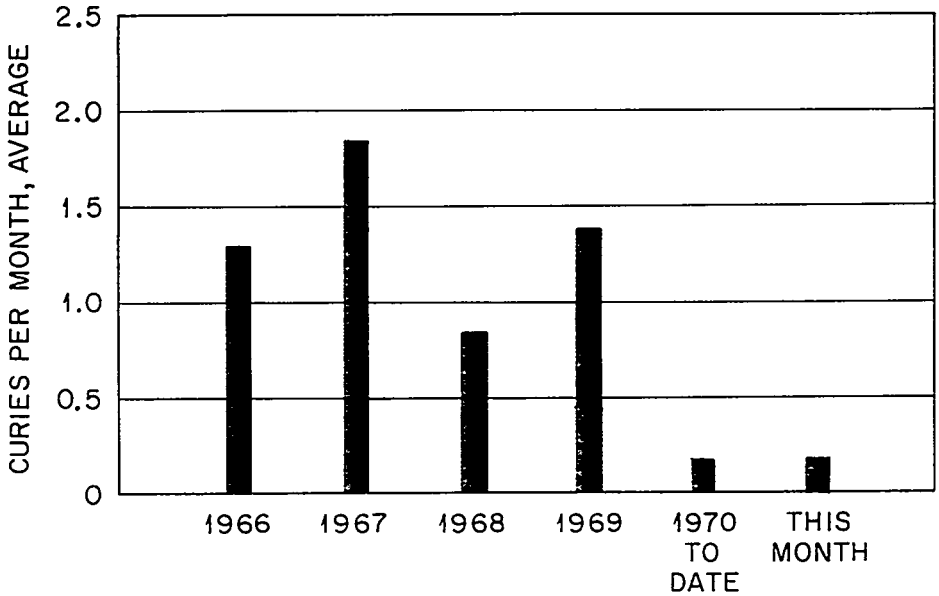

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

ORNL-DWG 65-12157R3

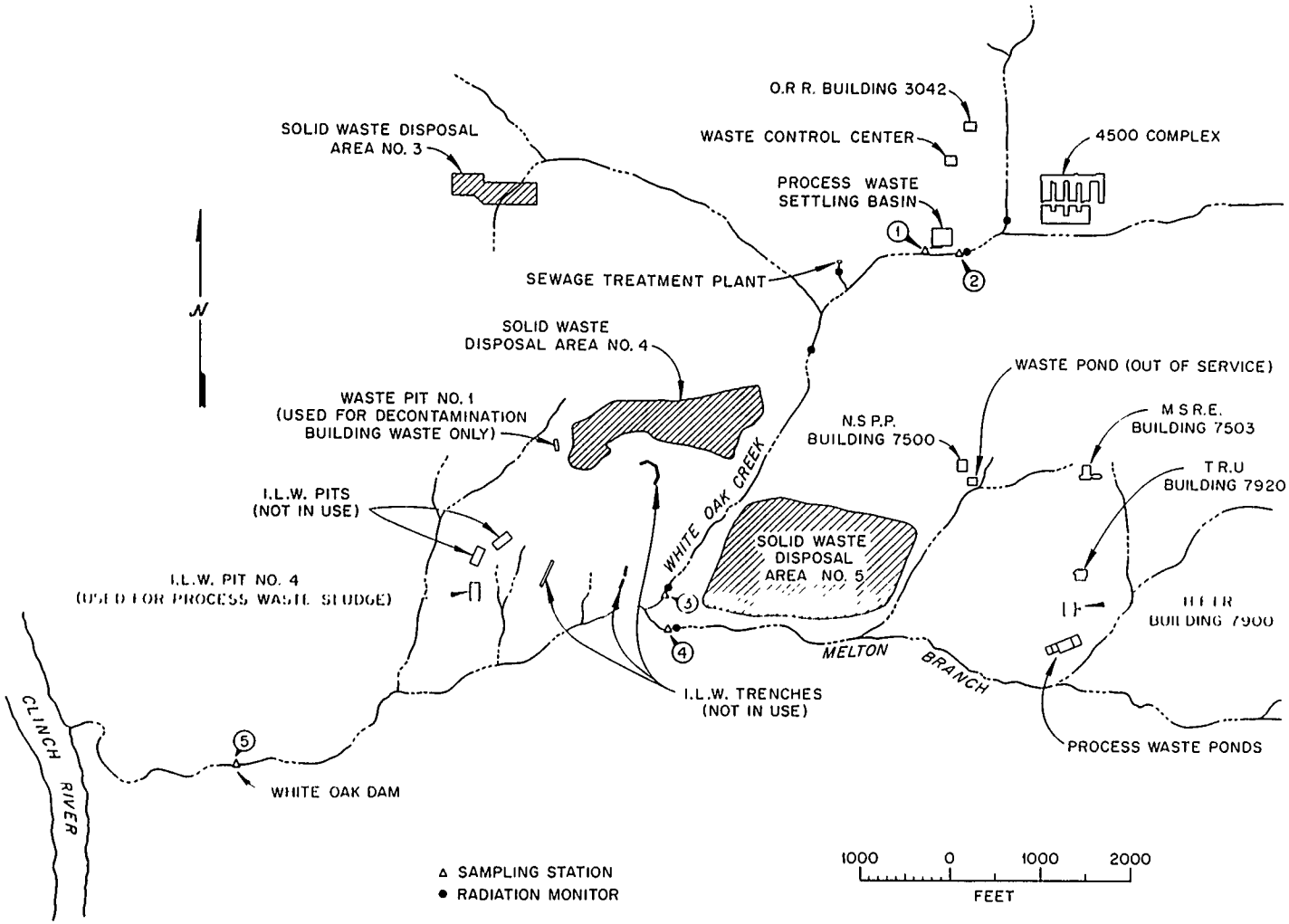

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
rocess Waste	1	0.20	0.56
iscellaneous discharges from east end of plant	2	0.01	0.04
ischarge from Bethel Valley Area	3	0.21	0.52
ischarge from Melton Valley Area	4	0.06	0.22
otal discharge from all sources	3,4	0.27	0.74
hite Oak Dam to Clinch River Health Physics measurement)	5	0.18	0.41

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides ormally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a]		Million Gallons	% of Total
		Curies	% of Total		
. Reactor Operations	28[b]	0.52	46.4	2.69	29.6
. Radioisotope Processing Area	78	0.44	39.3	0.82	9.0
. Buildings 3503 and 3508	5	0.03	2.7	0.80	8.7
. Buildings 3025 and 3026	1	0.02	1.8	2.41	26.5
. Building 3019	1	< 0.01	-	0.63	6.9
. Fission Products Development Laboratory	41	0.03	2.7	0.10	1.1
. Waste Evaporator, Building 2531	5	0.03	6.2	1.00	11.0
. Building 3525 and 3550	1	0.01	0.9	0.65	7.2

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides ormally present in White Oak Creek discharges to the Clinch River.

The bulk of this activity is from contaminated ground water which is seeping into the pipe in ne vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.17
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR	7911	0.02
Total activity in gases released		0.19

[a]Activity primarily ^{131}I as noted in text.

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LIQUID WASTE

Release to Clinch River

Radioactivity in the river resulting from ORNL waste discharges was 0.20% of the MPC_W for a release to an uncontrolled area (see Figure 1). Strontium, tritium, and iodine contributed 74.7%, 19.7%, and 2.9%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the amounts of radioactive waste released into White Oak Creek. Figure 2 compares the radiostrontium releases into the lake on a monthly basis.

Process Waste

A total of 11.4 million gallons was processed this month. The efficiency of the Process Waste Treatment Plant, based on gross beta analyses, was 91%. The discharge from the plant to White Oak Creek is listed with discharges from other sources in Table 1. Table 2 lists the main sources of waste. Figure 3 compares the releases of strontium from the process waste system to the creek on a monthly basis. Figure 4 compares the volume of waste generated.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 339 gph. A summary of operations is listed below:

	Gallons
Total volume generated	234,000
Volume transferred to evaporator	244,000
Tank farm free space at beginning of month	464,000
Tank form free space at end of month	469,000
Evaporator concentrate returned to tank form	5,000
Total volume of concentrate in tank farm	50,000

A list of the major contributors is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
High Flux Isotope Reactor	32,000
ORR and BSR	22,000
Building 3019	20,000
4500 Complex	19,000
Radioisotope Processing Area	15,000
Molten Salt Reactor Experiment	13,000
Building 3026	12,000
Nuclear Safety Pilot Plant	10,000

Gaseous Waste

Only 70 millicuries of ^{131}I were discharged from the ORNL stacks. Releases of alpha activity and of active particulates were not significant. Inert gases discharged from the 3039 and 7911 stacks averaged less than 1.7% and 0.1%, respectively, of the calculated maximum permissible release for these stacks. Table 3 lists the individual stack releases; Figure 6 compares the total stack releases on a monthly basis.

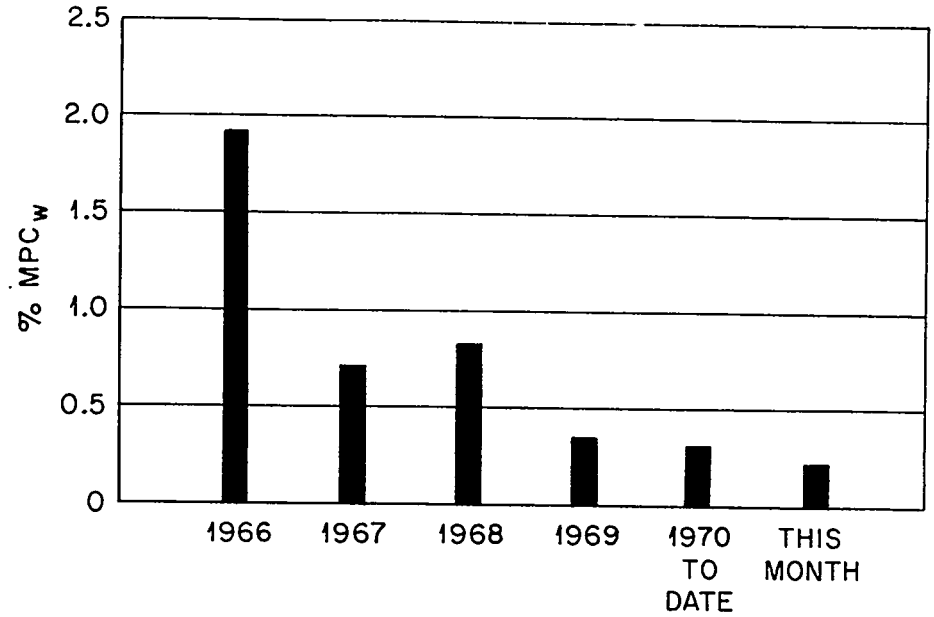

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

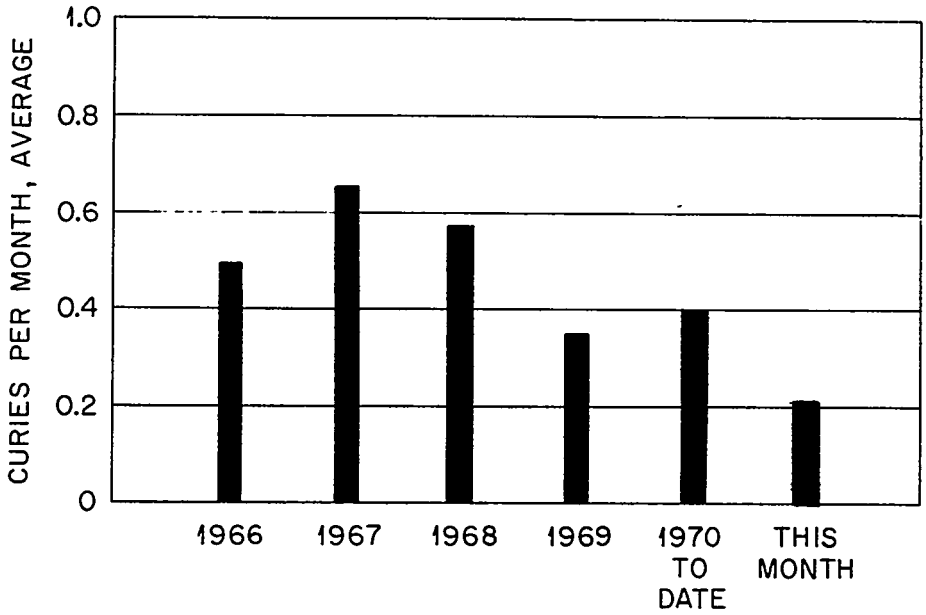

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

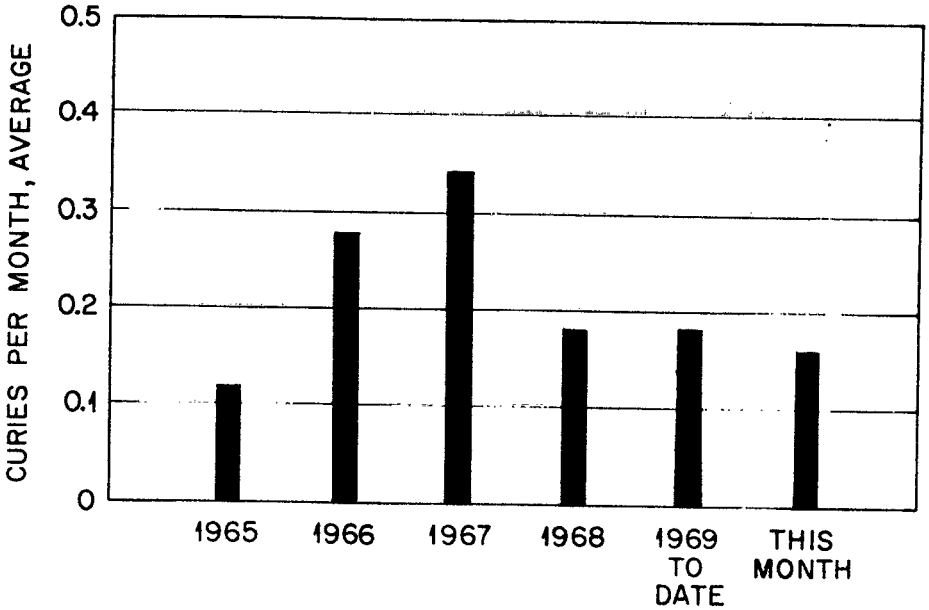

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

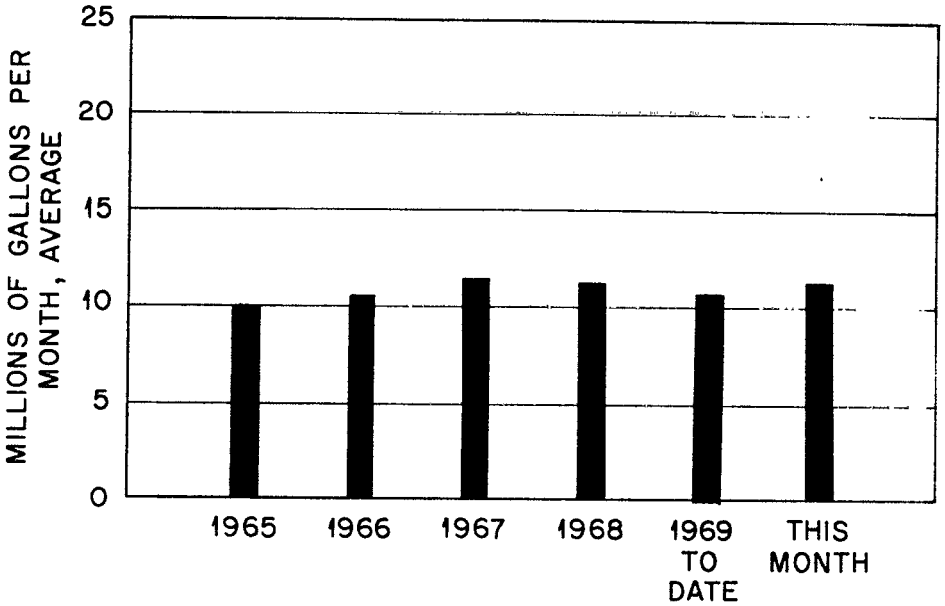

Fig. 4. Process Waste Volumes.

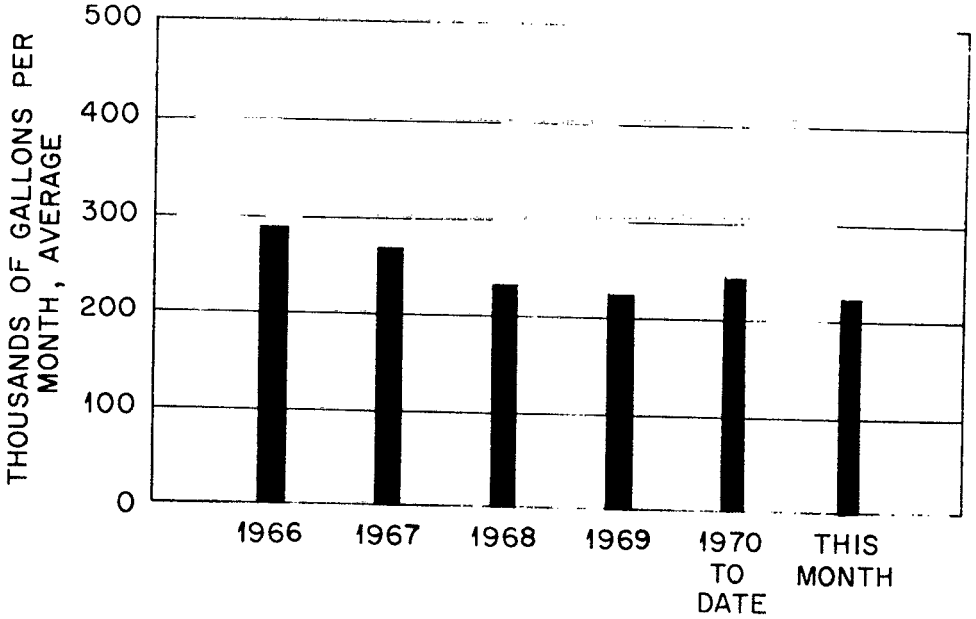

Fig. 5. Intermediate—Level Waste Volumes.

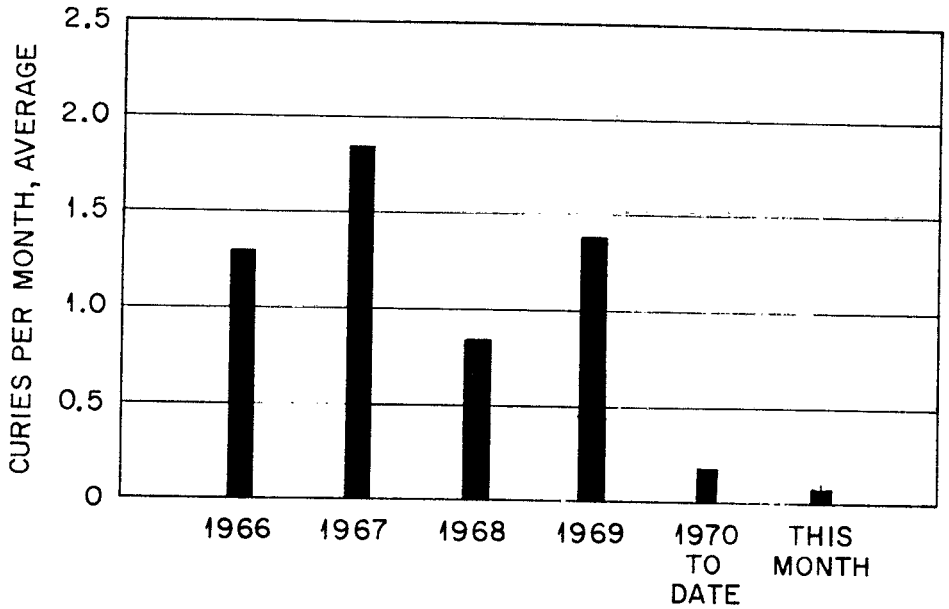

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

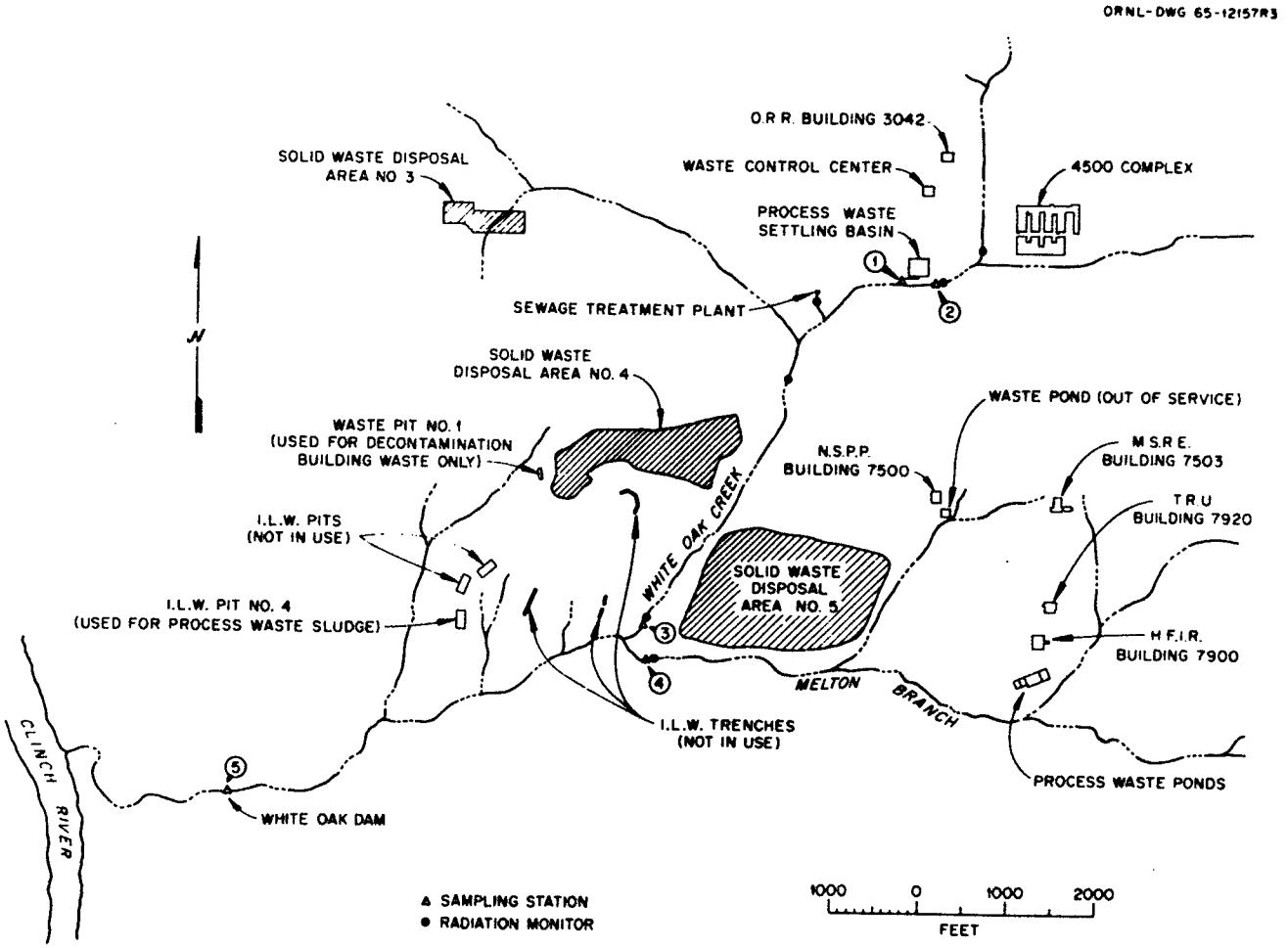

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.16	0.42
Miscellaneous discharges from east end of plant	2	0.01	0.09
Discharge from Bethel Valley Area	3	0.18	0.51
Discharge from Melton Valley Area	4	0.03	0.11
Total discharge from all sources	3,4	0.21	0.62
White Oak Dam to Clinch River (Health Physics measurement)	5	0.20	0.52

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations	32[b]	0.38[b]	43.2	1.21	16.1
2. Radioisotope Processing Area	64	0.44	50.0	1.03	13.8
3. Buildings 3503 and 3508	0	--	--	0.76	10.1
4. Buildings 3025 and 3026	2	0.02	2.3	2.01	26.8
5. Building 3019	1	<0.01	--	0.67	8.9
6. Fission Products Development Laboratory	49	0.04	4.5	0.13	1.8
7. Waste Evaporator, Building 2531	4	<0.01	--	0.99	13.2
8. Buildings 3525 and 3550	1	<0.01	--	0.70	9.3

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.06
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.07

[a]Activity primarily ^{131}I as noted in text.

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ORNL
CENTRAL FILES NUMBER
70-9-37

DATE ISSUED SEP 28 1970

DATE: September 15, 1970

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of July 1970

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

Technical Information Officer Date
ORNL

2056

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste releases was 0.14% of the MPC_W for releases to uncontrolled areas (see Fig. 1). The main contaminants were strontium, tritium, and iodine which contributed 79.5%, 14.5% and 2.9%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the amounts of radioactive waste released into White Oak Creek. Strontium releases to the lake are compared on a monthly basis in Figure 2.

Process Waste

A total of 9.4 million gallons of waste was chemically treated during this period. Based on gross beta analyses, 86% of the radioactive contamination was removed by the process. The discharge of activity from this system to the creek is listed, with the discharge from other sources, in Table 1. A monthly comparison of strontium releases is shown in Fig. 3. Table 2 lists the sources of waste collected in the process waste system and Fig. 4 gives a comparison of the volumes of waste generated each month.

Intermediate-Level Waste

Two leaks occurred in the transfer lines in Melton Valley, one on July 9 and the other on July 31. The first leak was in the line between the Melton Valley pumping station and the south tank farm at the entrance

to Burial Ground 5. The second leak occurred in the line between the Transuranium Processing Plant and the Melton Valley pumping station. Both failures occurred at mechanical, neoprene-gasketed, pipe joints.

The contamination in both locations was removed so that there was no significant release of activity into the creek. The main section of pipe, where the first leak occurred, was repaired, pressure tested, and returned to service. The line from the Transuranium Processing Plant could not pass the pressure test after the repairs were made and was removed from service. It is now being replaced, on an emergency basis, with a new line.

The evaporator operated at an average boil-down rate of 306 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	251,000
Volume transferred to evaporator	228,000
Tank farm free space at beginning of month	469,000
Tank farm free space at end of month	443,000
Evaporator concentrate returned to tank farm	3,000
Total volume of concentrate in tank farm	56,000

A list of the major contributors is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
1. Building 3019	34,000
2. High Flux Isotope Reactor	30,000
3. ORR and BSR	24,000
4. Building 3026D	19,000
5. Building 3508	18,000
6. Radioisotope Processing Area	16,000

Gaseous Waste

One hundred millicuries of ^{131}I were released from the ORNL Stacks. The amount of alpha and particulate beta-gamma activity detected was insignificant. Individual stack releases are listed in Table 3. Figure 6 shows a monthly comparison of the stack emissions. Inert gases released from the 3039 and 7910 Stacks averaged less than 1.7% and 0.1% of the maximum permissible operating levels for these stacks.

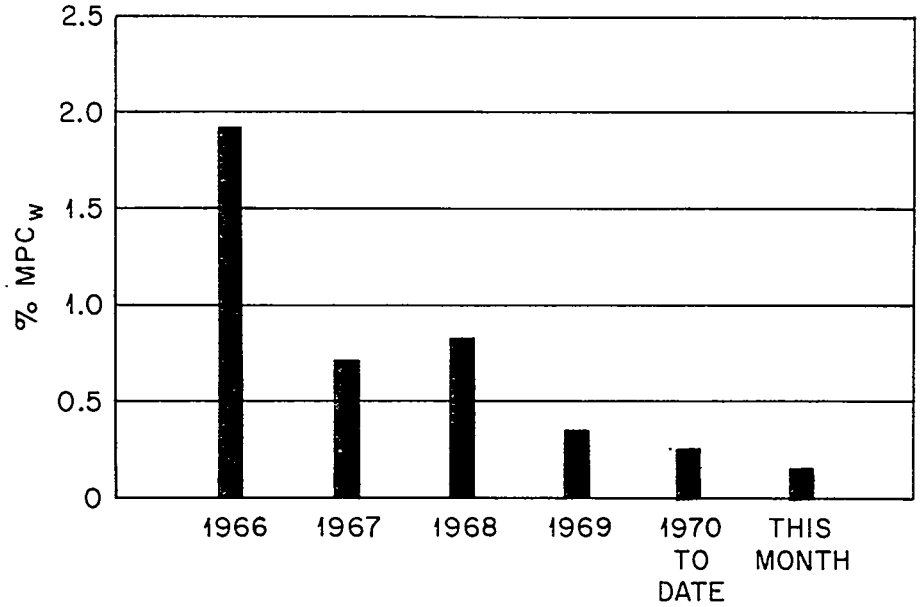

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

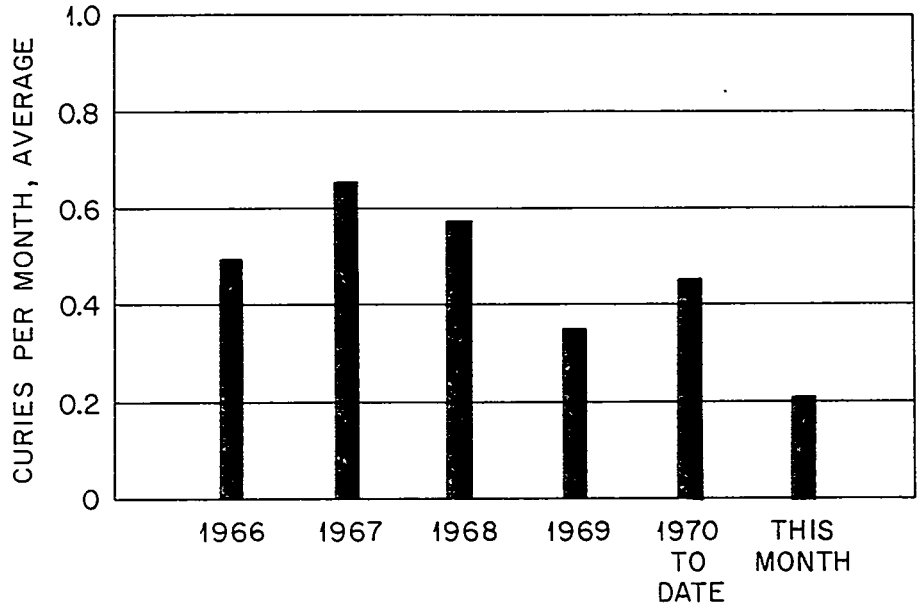

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

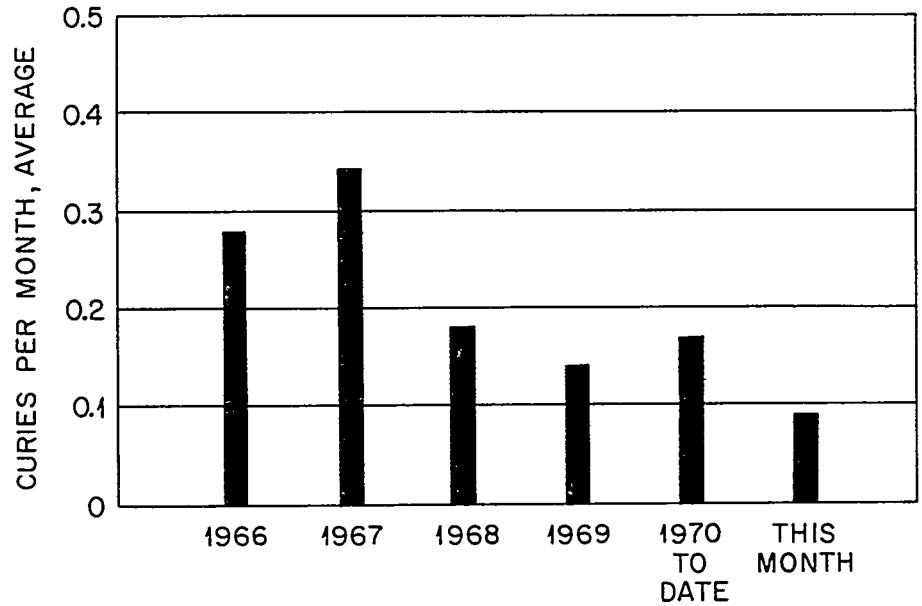

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

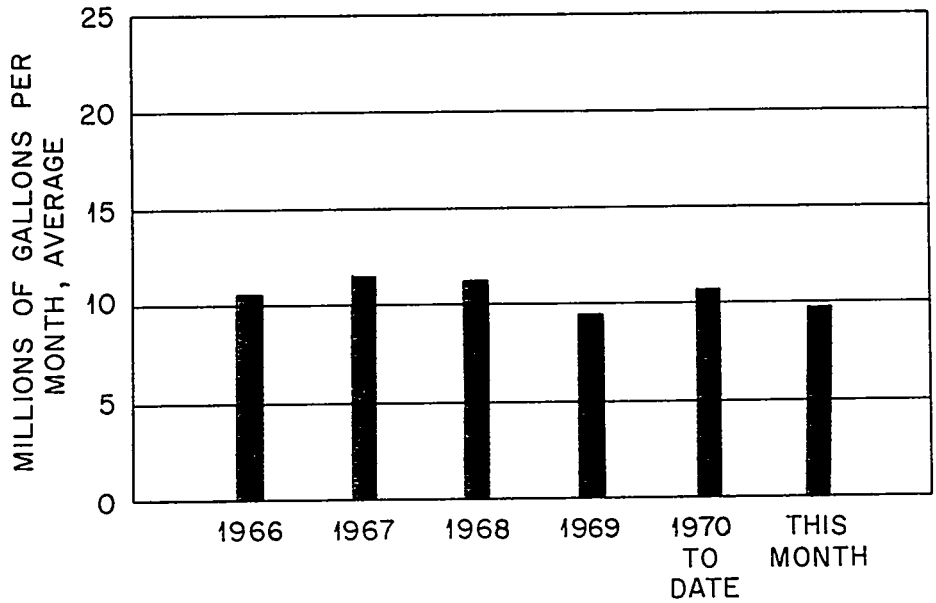

Fig. 4. Process Waste Volumes.

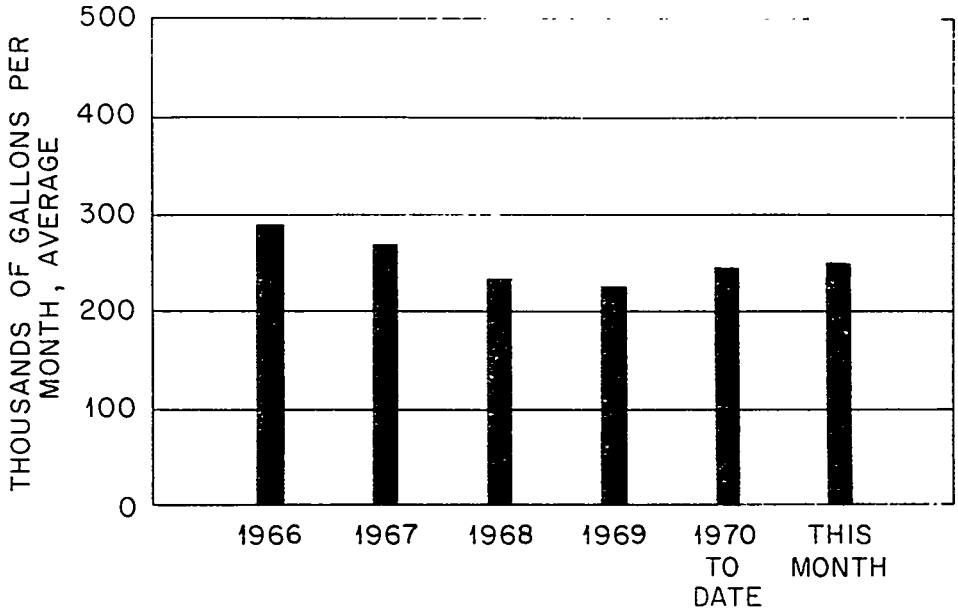

Fig. 5. Intermediate—Level Waste Volumes.

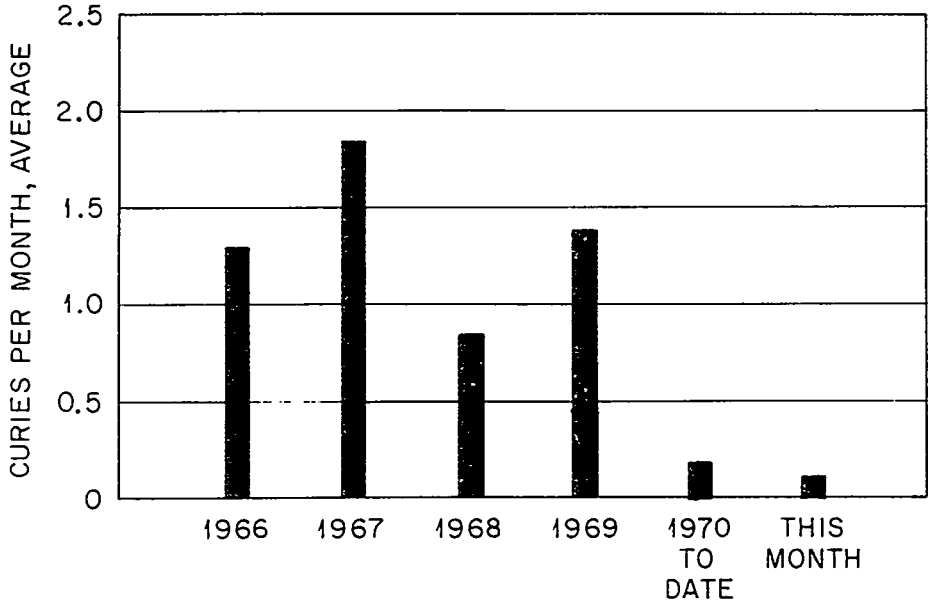

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

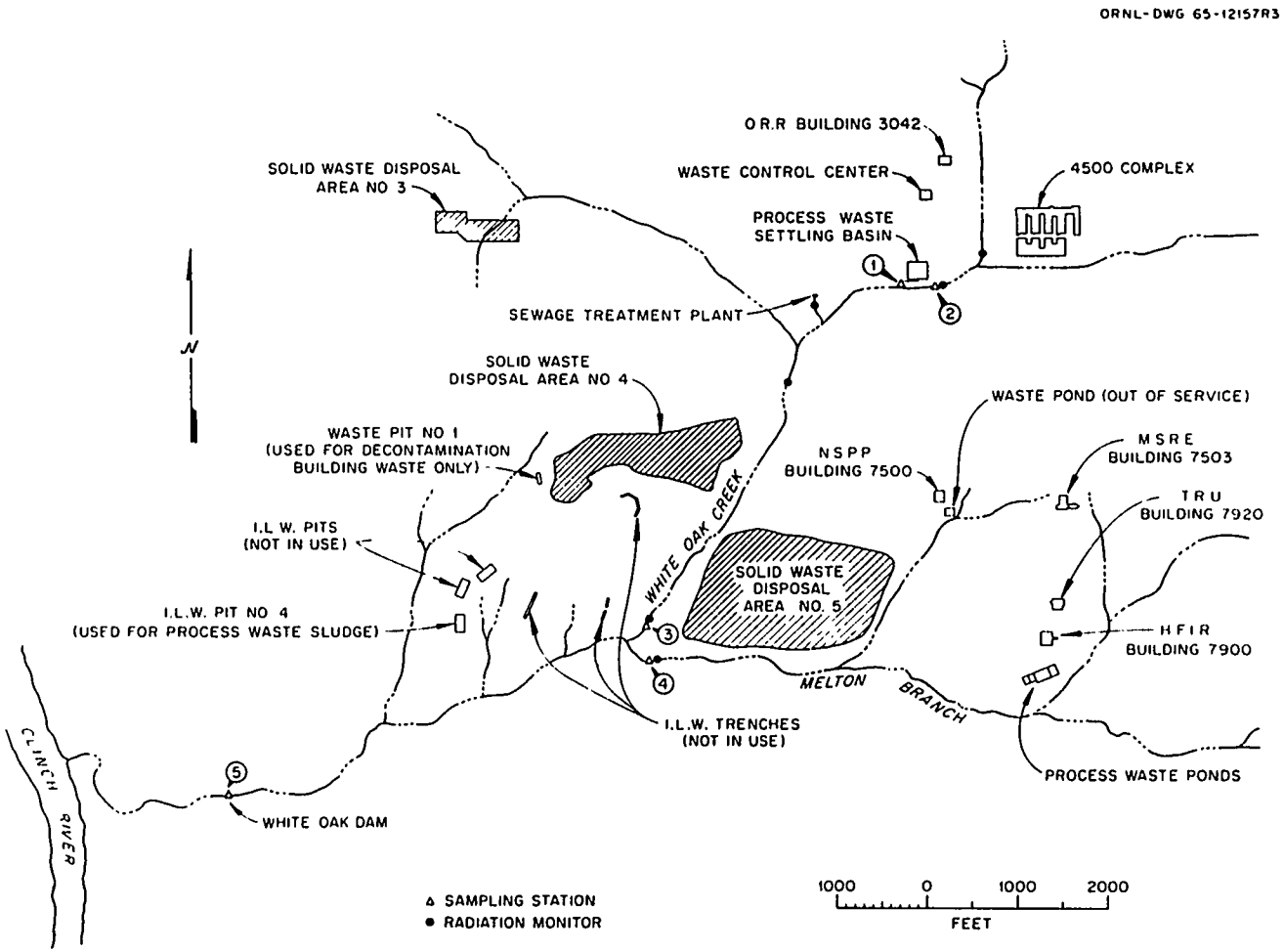

Fig 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.09	0.28
Miscellaneous discharges from east end of plant	2	0.01	0.04
Discharge from Bethel Valley Area	3	0.19	0.58
Discharge from Melton Valley Area	4	0.02	0.07
Total discharge from all sources	3,4	0.21	0.65
White Oak Dam to Clinch River (Health Physics measurements)	5	0.20	0.54

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	19	0.15[b]	39.5	1.19	18.9
2. Radioisotope Processing Area	49	0.18	47.4	0.51	8.1
3. Buildings 3503 and 3508	4	0.02	5.3	0.81	12.9
4. Buildings 3025 and 3026	1	0.01	2.6	1.39	22.1
5. Building 3019	1	< 0.01	---	0.52	8.3
6. Fission Products Development Laboratory	2	< 0.01	---	0.13	2.1
7. Waste Evaporator, Building 2531	3	0.02	5.2	0.98	15.6
8. Buildings 3525 and 3550	1	< 0.01	---	0.72	11.5
9. Building 2026	1	<0.01	---	0.03	0.5

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.10
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.10

[a]Activity primarily ^{131}I as noted in text.

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OCT 15 1970

DATE ISSUED:

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ORNL
CENTRAL FILES NUMBER
70-9-51

19

DATE: September 5, 1970

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of August 1970

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 3/12/96
Technical Information Officer Date

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.22% of the MPC_w for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, and tritium, which contributed 85.4 and 9.1 percent, respectively, to the calculated percent of MPC_w.

White Oak Creek Monitoring

Table 1 lists the amount of radioactive waste released into White Oak Creek. Strontium releases into the lake are compared on a monthly basis in Figure 2.

Process Waste

A total of 8.9 million gallons of waste was chemically treated this month. Based on gross beta analysis, 89% of the activity was removed by the process. A monthly comparison of strontium releases is shown in Figure 2. Table 2 lists the sources of the waste discharged into the system, and Figure 4 gives a comparison of the volumes of waste generated each month.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 308 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	196,000
Volume transferred to evaporator	229,000
Tank farm free space at beginning of month	443,000
Tank farm free space at end of month	470,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	62,000

A list of the major contributors to the system is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	35,000
ORR & BSR	18,000
Radioisotopes Processing Area	17,000
Building 3026	15,000
Building 3508	14,000
High Flux Isotope Reactor	11,000

Gaseous Waste

The stacks released 60 millicuries of gaseous iodine this month. There was no significant amount of Alpha or particulate beta-gamma activity detected during the period. Individual stack releases are listed in Table 3. Figure 6 is a monthly comparison of these releases. Inert gases released from the 3039 and 7910 stacks averaged less than 2.5% and 0.4% of the maximum permissible operating levels for these stacks.

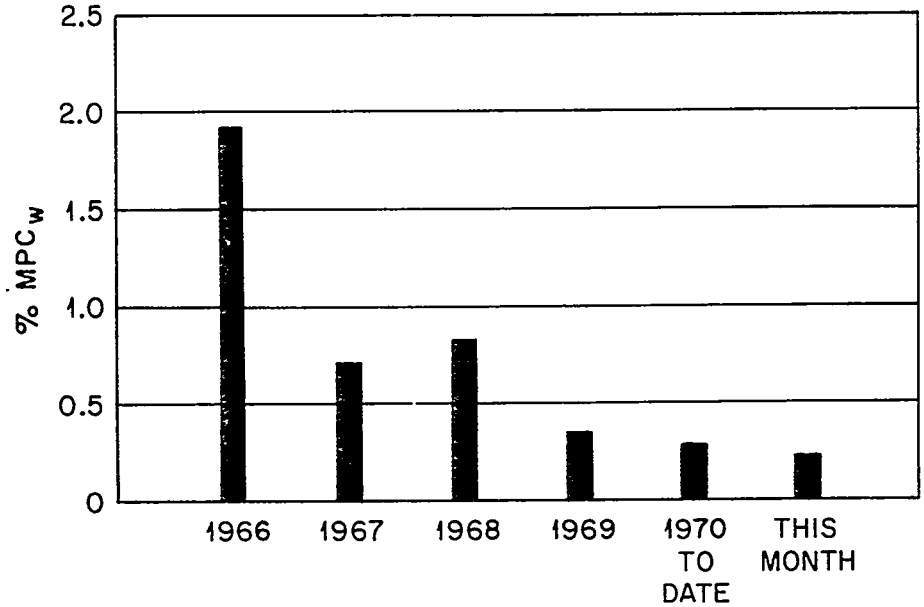

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

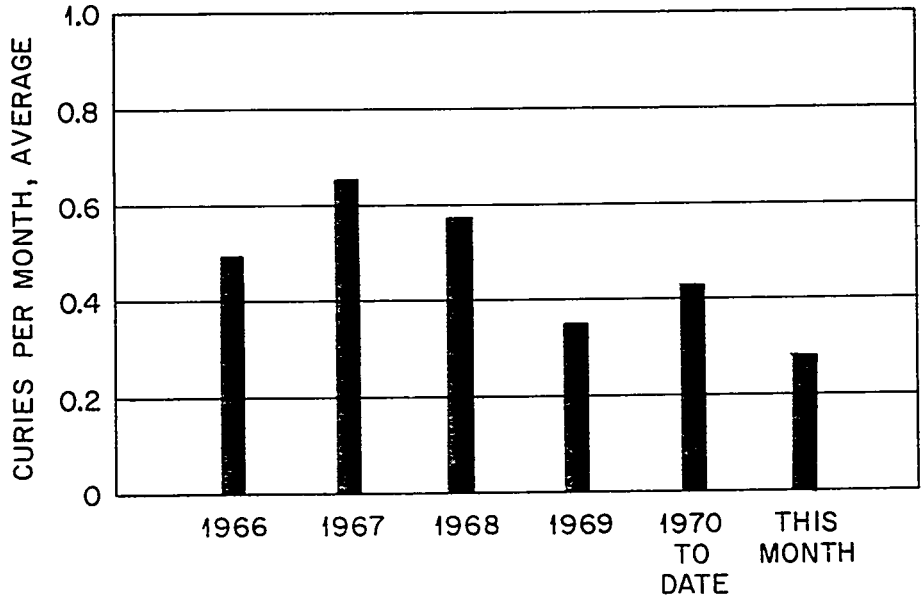

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

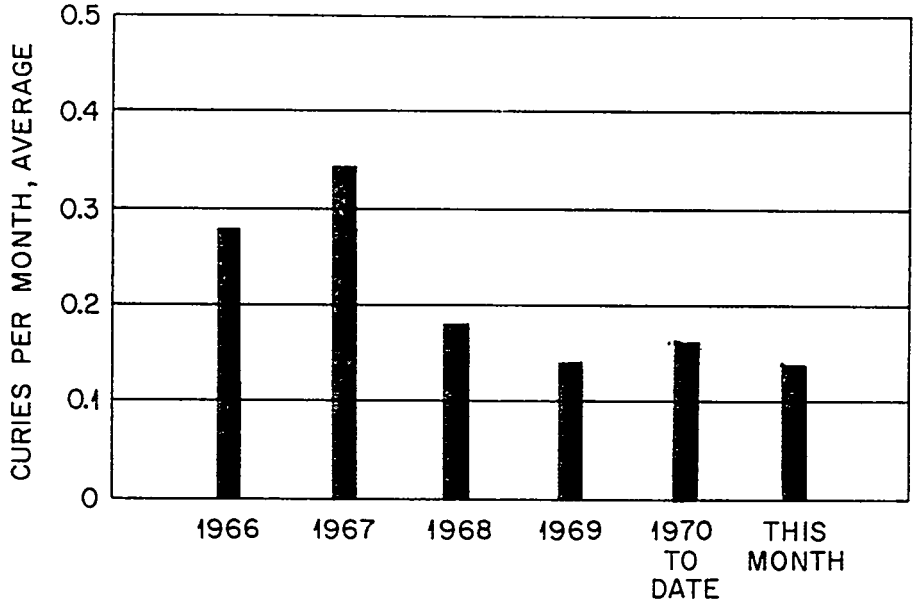

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

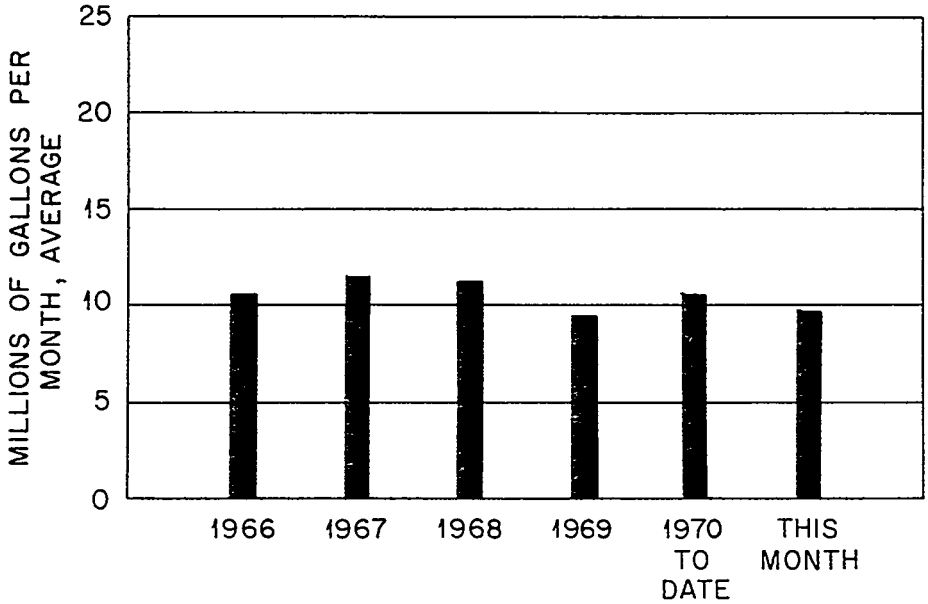

Fig. 4. Process Waste Volumes.

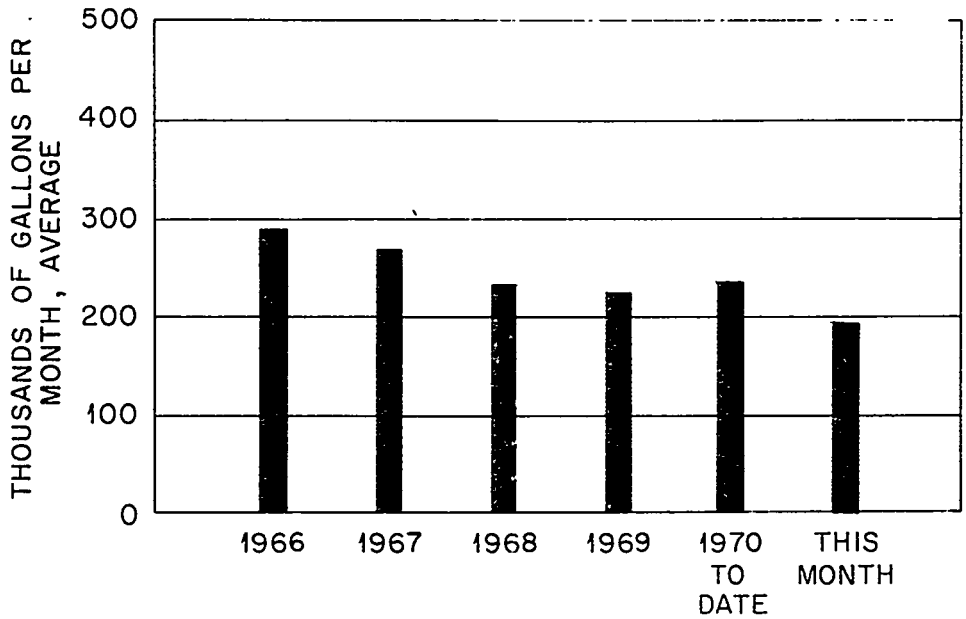

Fig. 5. Intermediate—Level Waste Volumes.

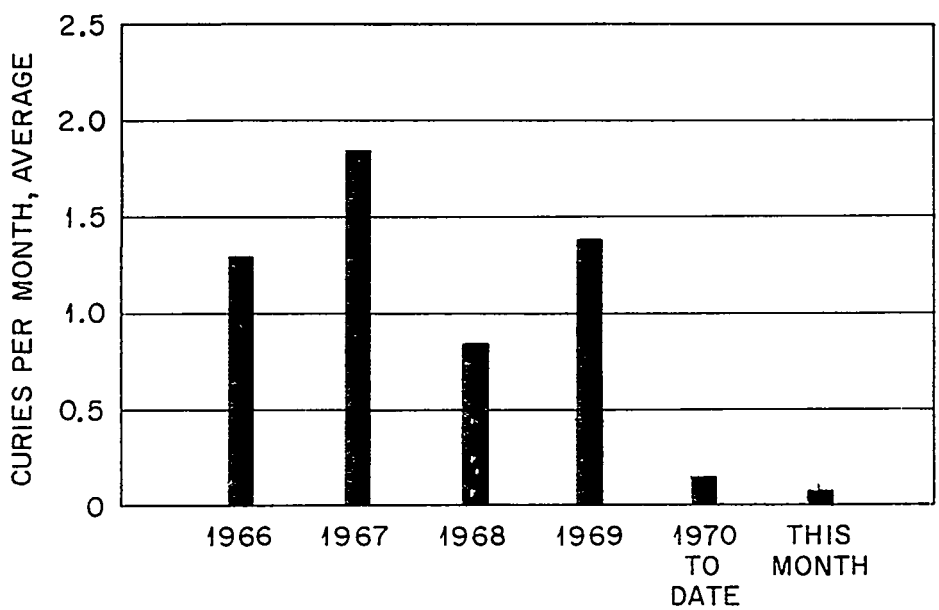

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

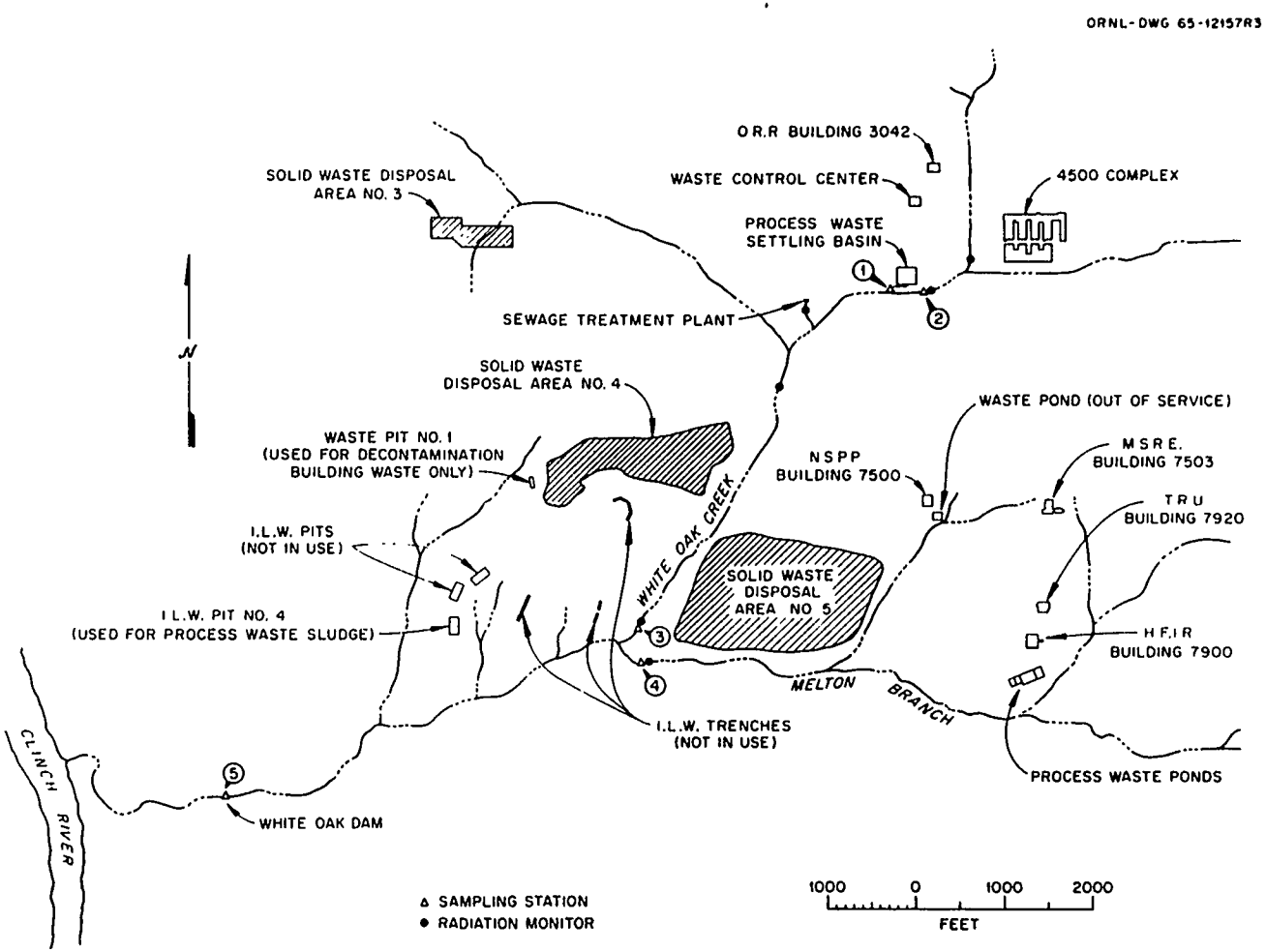

Fig 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.14	0.23
Miscellaneous discharges from east end of plant	2	0.09	0.38
Discharge from Bethel Valley Area	3	0.25	0.57
Discharge from Melton Valley Area	4	0.03	0.12
Total discharge from all sources	3.4	0.28	0.69
White Oak Dam to Clinch River (Health Physics measurement)	5	0.31	0.77

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	10[b]	0.11[b]	57.9	1.6	25.4
2. Radioisotope Processing Area	31	0.06	31.5	0.4	6.3
3. Building 3503 and 3508	2	0.01	5.3	1.0	15.9
4. Building 3025 and 3026	0	--	--	0.9	14.3
5. Building 3019	< 1	< 0.01	--	0.4	6.3
6. Fission Products Development Laboratory	10	0.01	5.3	0.2	3.2
7. Waste Evaporator, Building 2531	< 1	< 0.01	--	1.0	15.9
8. Buildings 3525 and 3550	< 1	< 0.01	--	0.8	12.7

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	$<$0.01
Central Radioactive Gas Disposal Facilities	3019	0.06
Radiochemical Processing Pilot Plant	3020	$<$0.01
MSRE	7512	$<$0.01
HFIR	7911	$<$0.01
Total activity in gases released		0.06

[a]Activity primarily ^{131}I as noted in text.

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ORNL Sc 4
CENTRAL FILES NUMBER
70-12-2

DATE ISSUED: DEC 9 1970

DATE: December 1, 1970

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of September

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by:

David R Hamrin 7/14/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The radionuclide concentration in the river resulting from ORNL waste release was 0.13% of the MPC_w for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine which contributed 78.5%, 15.4% and 3.1%, respectively, to the calculated percent of MPC_w.

White Oak Creek Monitoring

A summary of the strontium and the gross activity measurements made along White Oak Creek are given in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

Approximately 8.4 million gallons of contaminated water was chemically treated this month. The efficiency of the process (determined by gross beta analysis) was only 63%. Figure 3 compares, on a monthly basis, the amounts of strontium released by the process waste system into White Oak Creek. Figure 4 shows the volumes of waste handled. The main sources of process waste are listed in Table 2.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 192 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	141,000
Volume transferred to evaporator	138,000
Tank farm free space at beginning of month	470,000
Tank farm free space at end of month	463,000
Evaporator concentrate returned to Tank Farm	4,000
Total volume of concentrate stored in Tank Farm	64,000

The major contributors to the ILW system are listed below. Figure 5 compares the volumes generated each month.

	Gallons
1. Building 3019	24,000
2. ORR and BSR	22,000
3. Radioisotope Processing Area	19,000
4. Fission Products Development Laboratory	16,000
5. 4500 Complex	12,000

Shale Fracturing Disposal of ILW, Injection 7

A total of 83,000 gallons of concentrated ILW was injected into the existing slot at the depth of 842 feet. This waste contained 44,800 curies of ^{137}Cs, 2,700 curies of ^{90}Sr, 200 curies of $^{103-106}Ru$, 70 curies of ^{60}Co, 28.6 grams of ^{239}Pu, and 0.2 grams of ^{244}Cm. The slot was displaced with water at the termination of the injection. Materials used for the injection are listed below. The slurries are listed in the order of their injection.

Solids	Weight, lb	lb/gal
Portland cement, type 2	237,000	2.2
Kingston fly ash	227,000	2.1
Attapulgite	85,000	0.8
Grundite	51,000	0.5
Total weight of solids	600,000	5.6

Liquids	Gallons
Waste pit water with solids	3,250
ILW with solids	83,000
Storage tank rinse water with solids	12,975
Waste pit water with solids	7,920
Water with solids	855
Water only	840
Total volume of liquids	108,840

Gaseous Waste

A total of 40 millicuries of ^{131}I was released by the ORNL stacks this month. The amounts of alpha and particulate activity detected during the period were not significant. Inert gases released from the 3039 and 7910 stacks averaged less than 2.0% and 0.3% of the maximum permissible operating levels for these stacks. Table 3 is a list of the individual stack releases; Figure 6 compares the stack releases on a monthly basis.

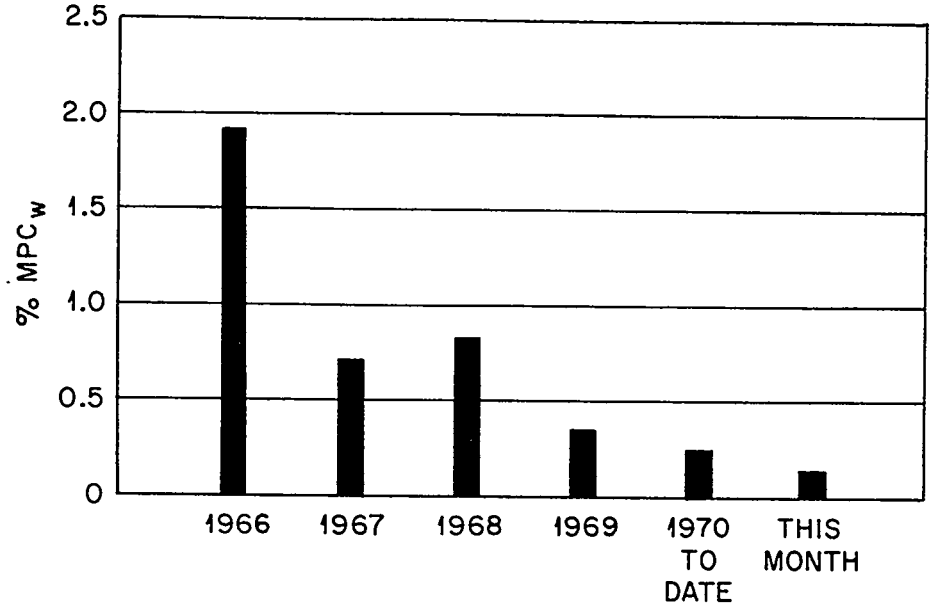

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

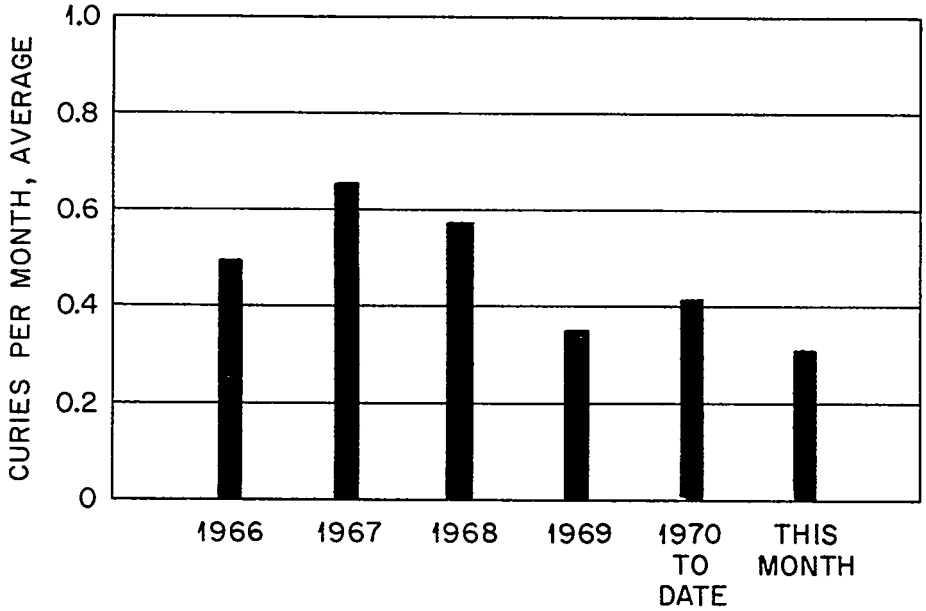

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

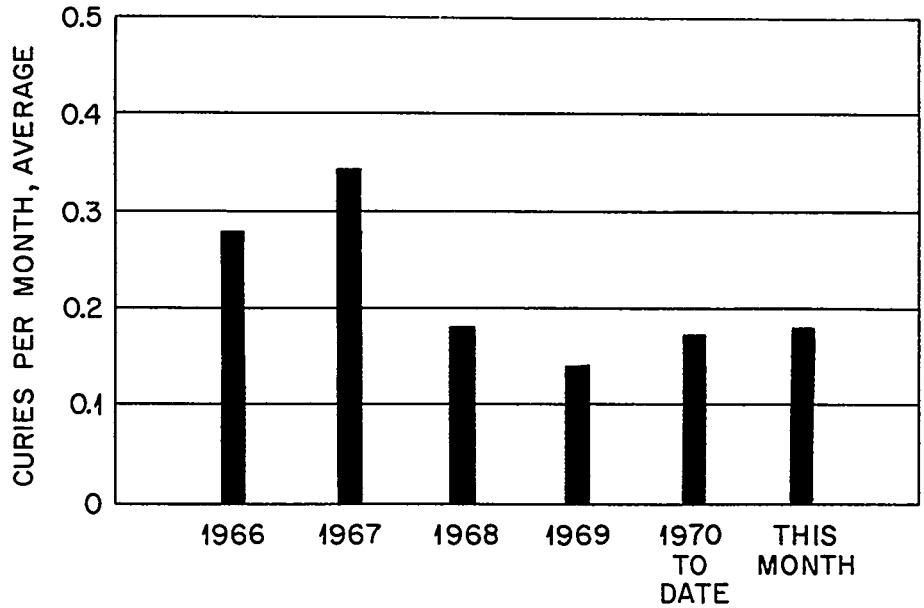

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

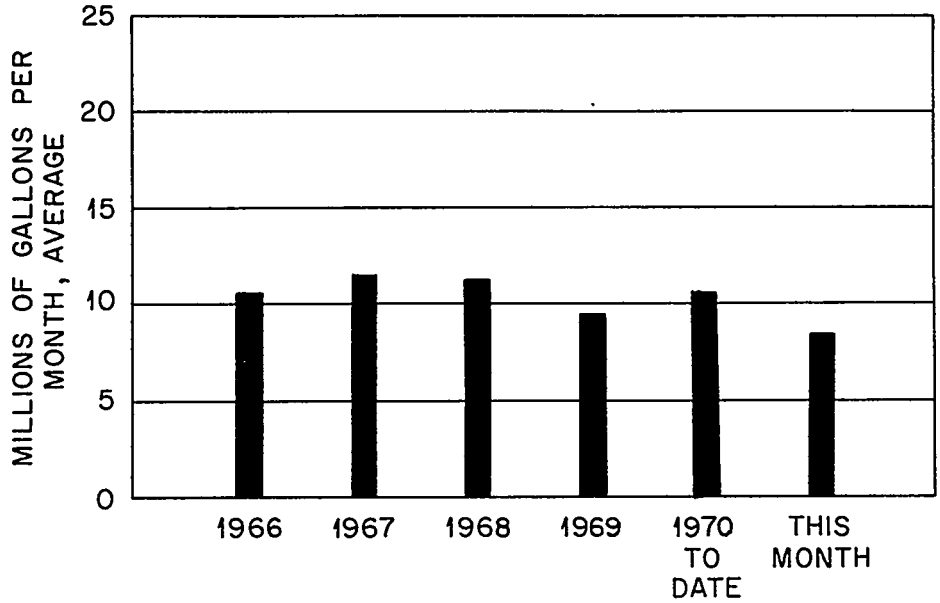

Fig. 4. Process Waste Volumes.

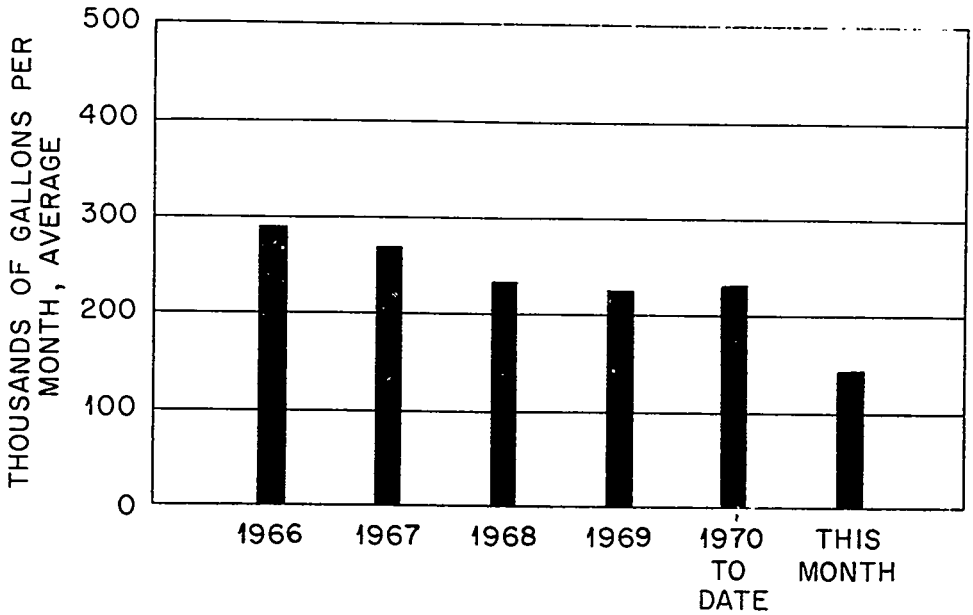

Fig. 5. Intermediate—Level Waste Volumes.

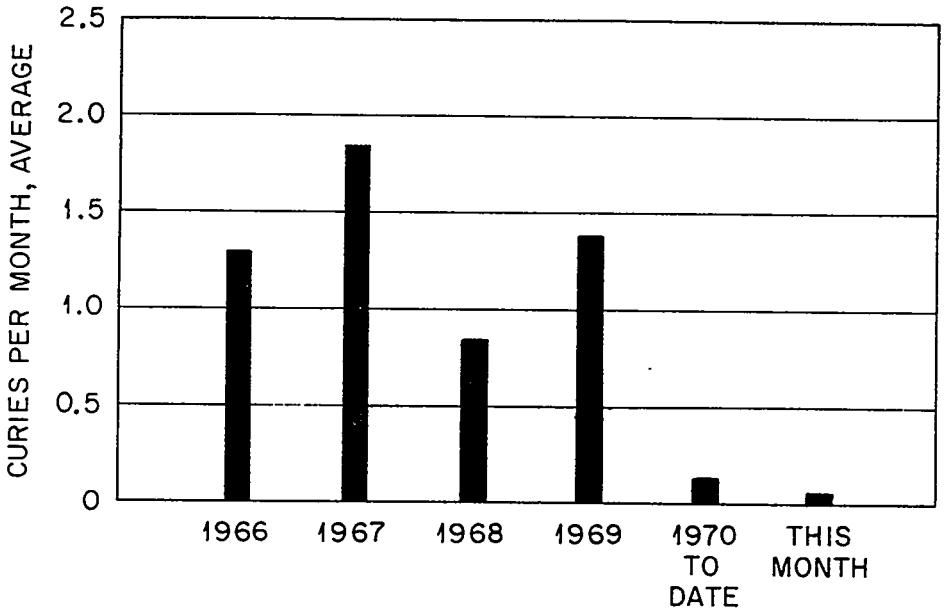

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

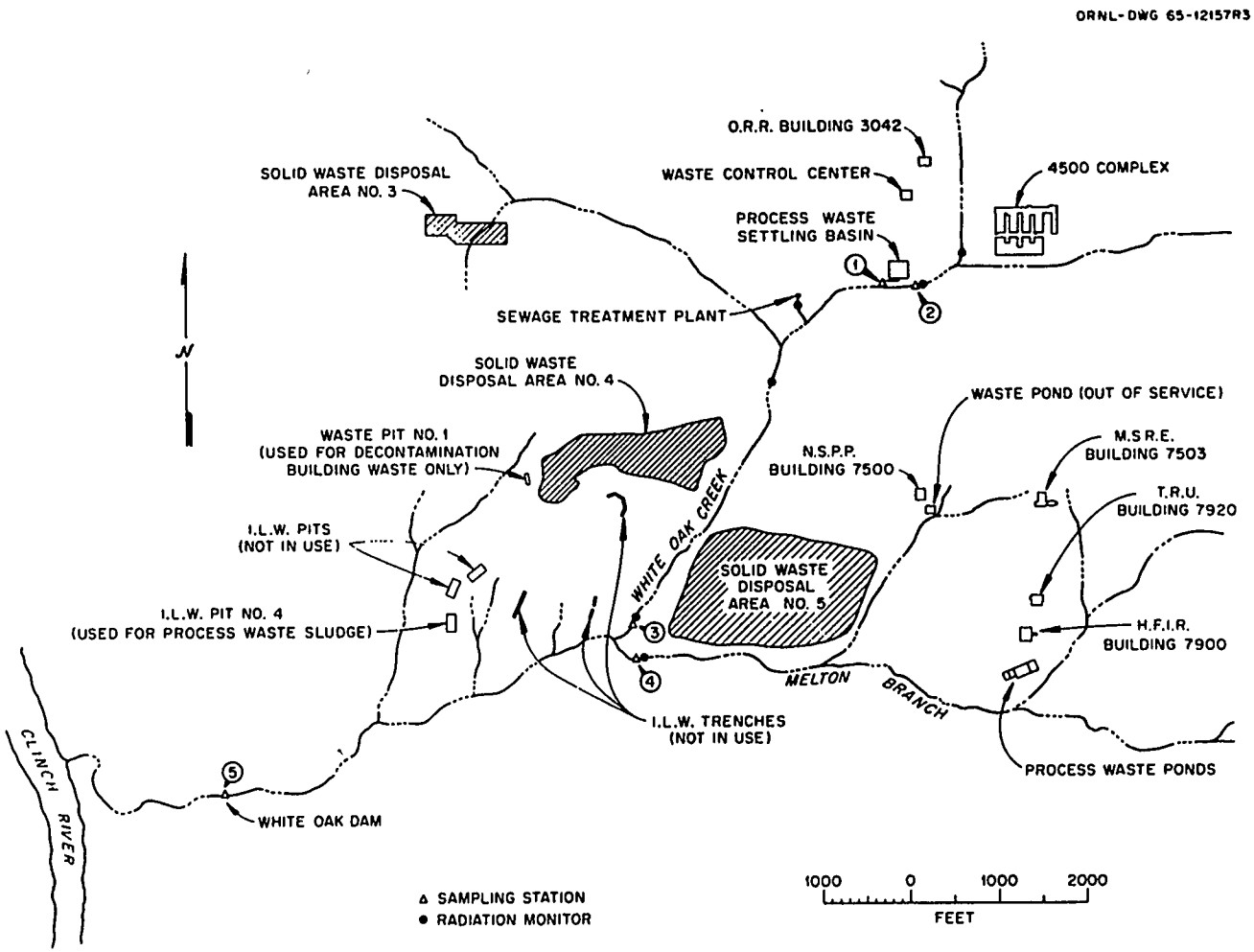

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.18	0.58
Miscellaneous discharges from east end of plant	2	0.03	0.07
Discharge from Bethel Valley Area	3	0.11	0.25
Discharge from Melton Valley Area	4	0.02	0.06
Total discharge from all sources	3,4	0.13	0.31
White Oak Dam to Clinch River (Health Physics measurement)	5	0.13	0.34

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	64	0.88[b]	78.6	2.0	37.7
2. Radioisotope Processing Area	87	0.17	15.2	0.3	5.7
3. Buildings 3503 and 3508	8	0.03	2.7	0.6	11.3
4. Buildings 3025 and 3026	1	0.01	-	0.5	9.4
5. Building 3019	1	< 0.01	-	0.2	3.8
6. Fission Products Development Laboratory	39	0.03	2.7	0.1	1.9
7. Waste Evaporator, Building 2531	2	0.01	0.8	0.7	13.2
8. Buildings 3525 and 3550	1	0.01	-	0.8	15.1
9. Building 2026	1	0.01	-	0.1	1.9

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping tnto the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.04
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.04

[a]Activity primarily ^{131}I as noted in text.

2056

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71-1-35

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SUBJECT: Radioactive Waste Disposal Operations Report for the Month of October, 1970

TO: Distribution

FROM: L. C. Lasher

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LIQUID WASTE

Release to Clinch River

The concentration of radioactivity in the river resulting from ORNL waste discharges was 0.25% of the MPC_W for a release to an uncontrolled area. Strontium, tritium, and iodine were the main contaminants, accounting for 81.3%, 12.3%, and 2.9%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 is a list of the amounts of radioactivity released into White Oak Creek. A monthly comparison of the strontium activity released to the creek is shown in Figure 2.

Process Waste

A total of 6.6 million gallons of contaminated water was chemically treated this month. Gross beta analyses of the inlet and outlet streams indicated that 88% of the radioactivity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system, and Figure 4 compares the volumes of waste handled each month.

The discharges of radioactivity from the process waste system to the creek, as given in Figure 3 and Table 1, are based on analyses of samples taken with the old trebler sampler which was reactivated after being out of service for many years. A study recently completed of the sampling equipment and techniques used during the last several years revealed that

the equipment and techniques were faulty and that the discharges that have been reported in previous reports were low.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 221 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	209,000
Volume transferred to evaporator	164,000
Tank farm free space at beginning of month	463,000
Tank farm free space at end of month	412,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	72,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	29,000
4500 Complex	27,000
Fission Products Development Laboratory	26,000
ORR and BSR	19,000
High Flux Isotope Reactor	18,000
Radioisotopes Processing Area	17,000

Gaseous Waste

The ORNL stacks discharged 30 millicuries of ^{131}I this month. The alpha and beta-gamma particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 2.3% and 0.1%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

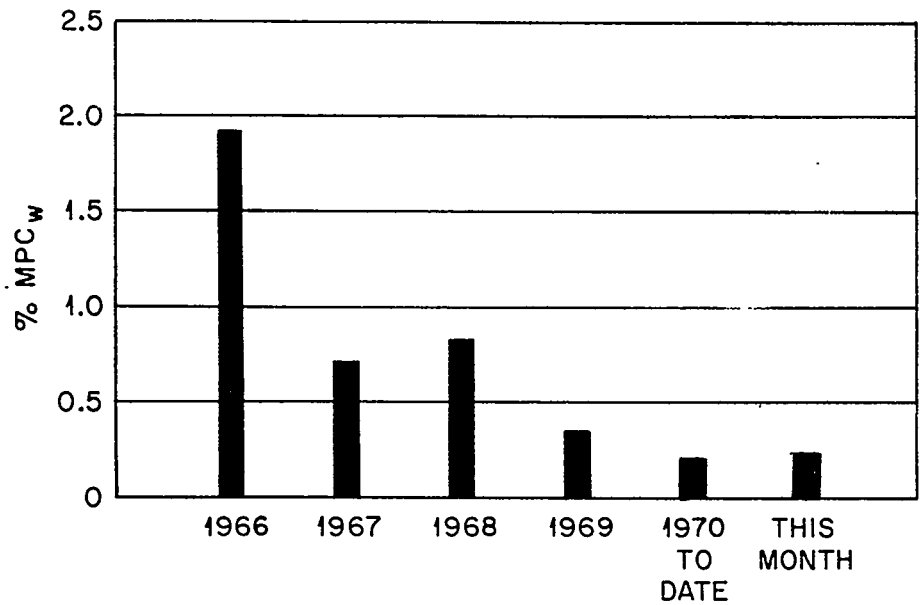

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

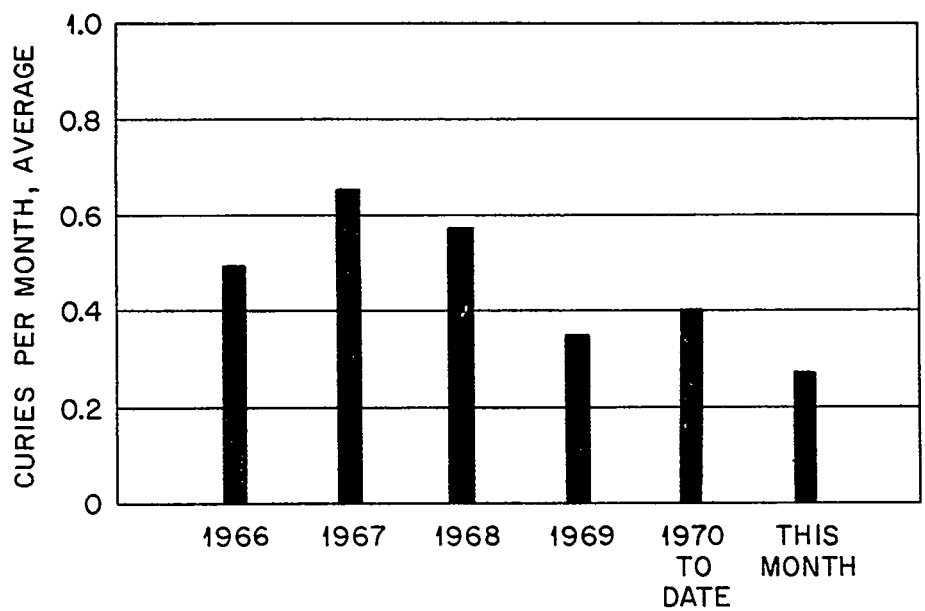

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

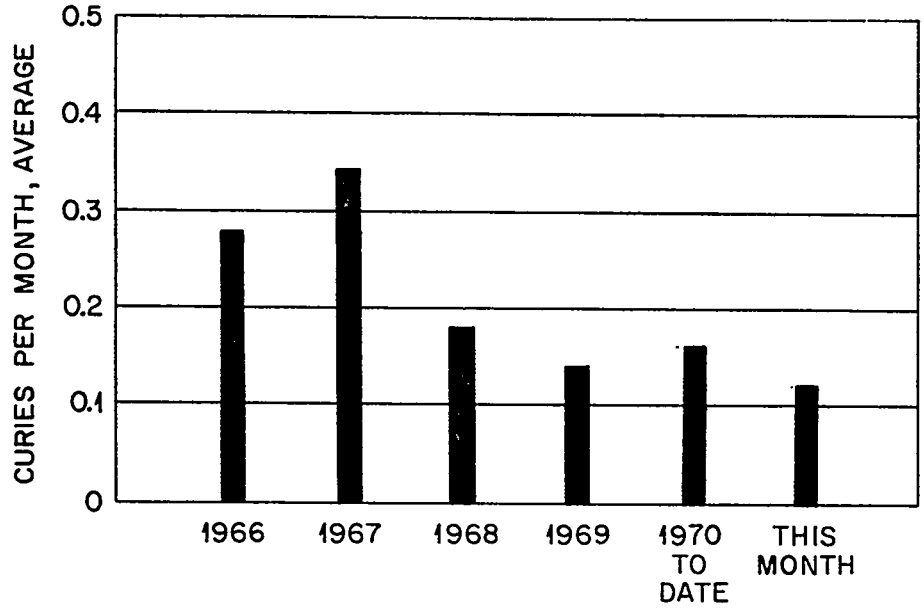

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

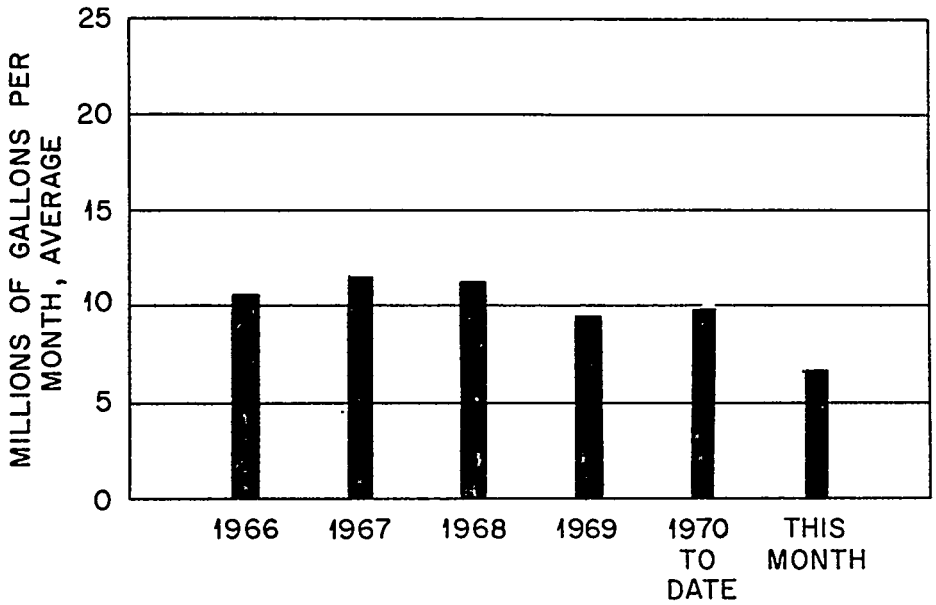

Fig. 4. Process Waste Volumes.

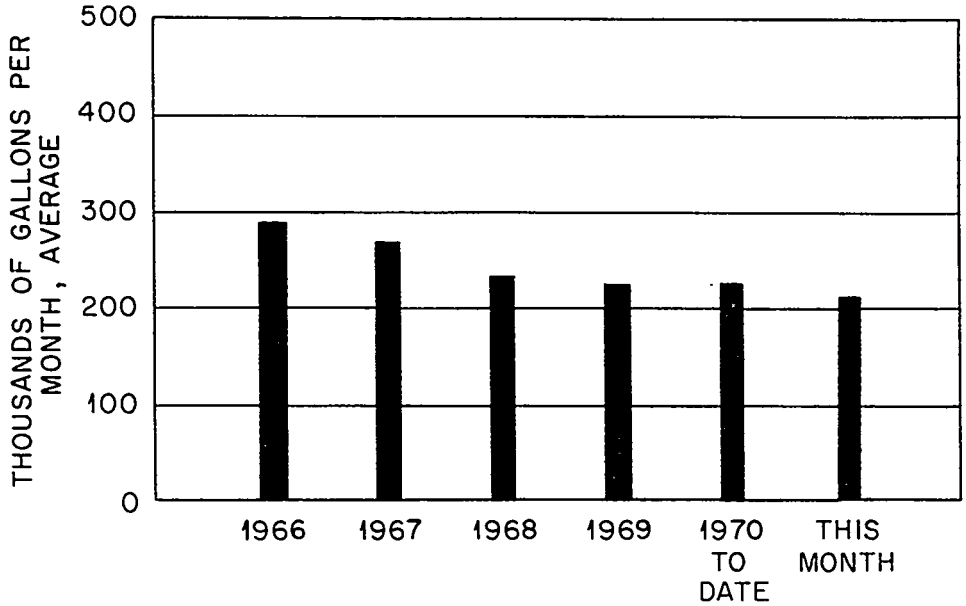

Fig. 5. Intermediate—Level Waste Volumes.

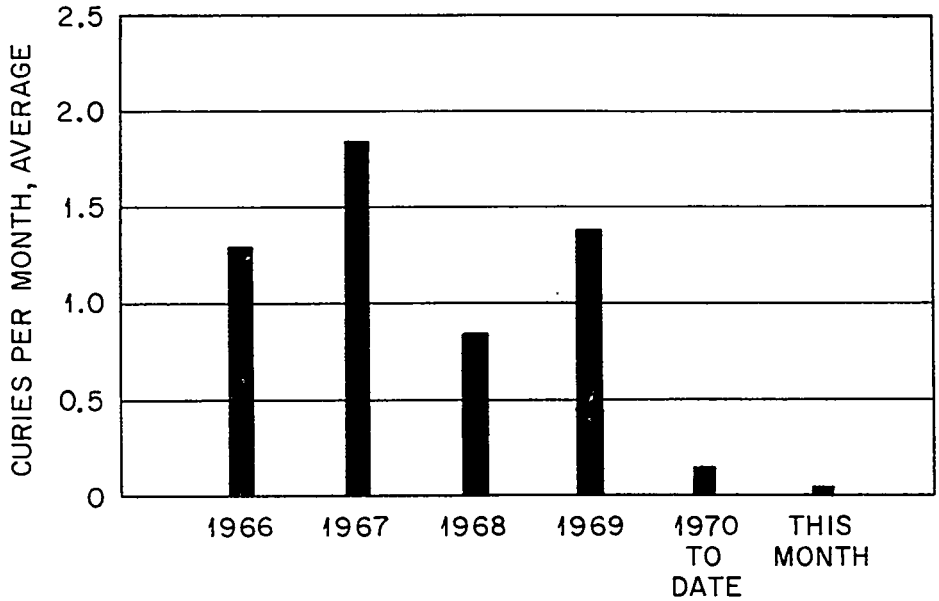

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

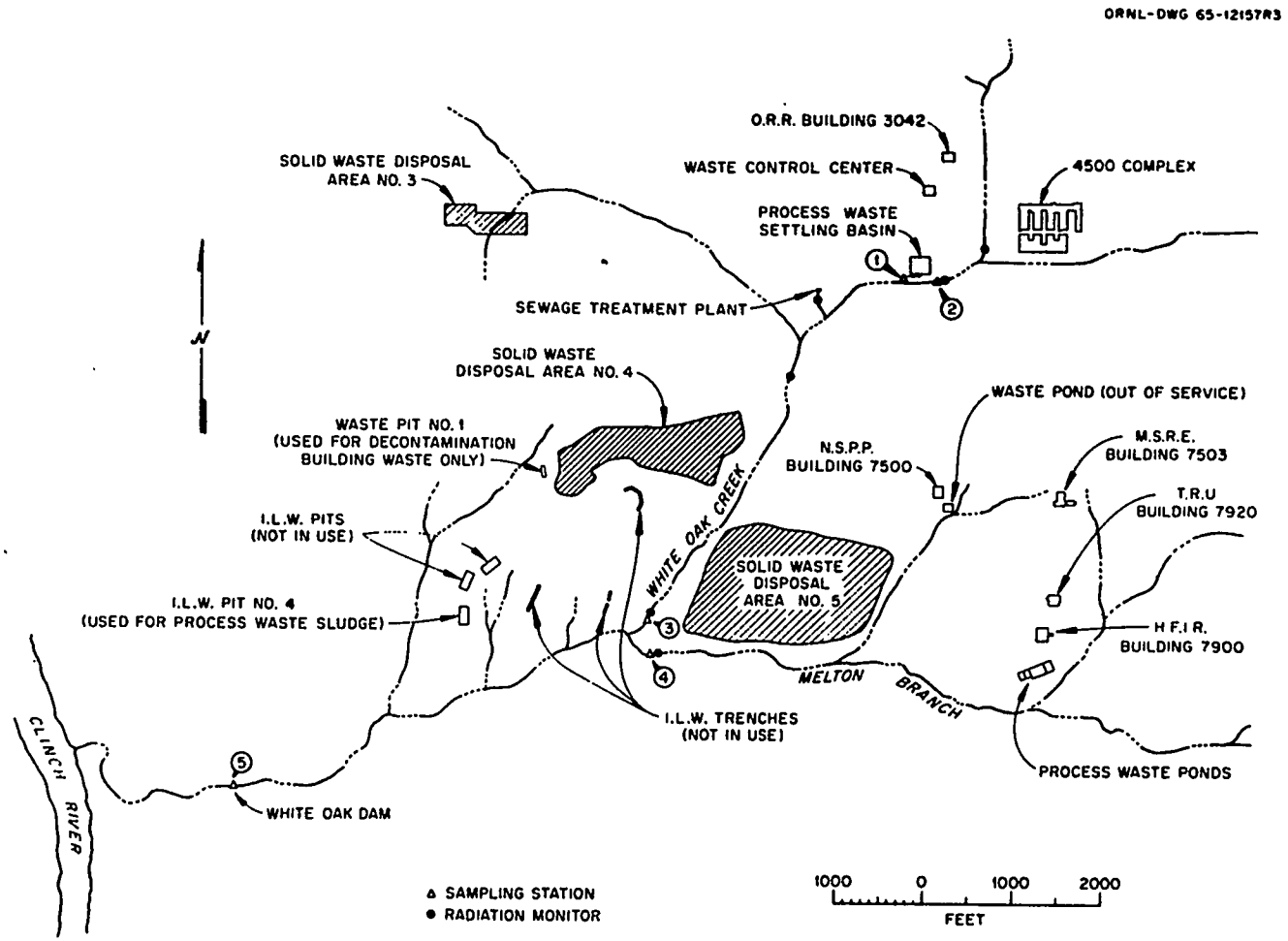

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Process waste	1	0.12	0.30
Miscellaneous discharges from east end of plant	2	0.03	0.04
Discharge from Bethel Valley Area	3	0.23	0.50
Discharge from Melton Valley Area	4	0.04	0.08
Total discharge from all sources	3,4	0.27	0.58
White Oak Dam to Clinch River	5	0.25	0.68

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	70[b]	0.99[b]	70.2	2.05	37.5
2. Radioisotope Processing Area	109	0.35	24.9	0.47	8.6
3. Buildings 3503 and 3508	9	0.04	2.8	0.58	10.6
4. Buildings 3025 and 3026	<1	<0.01	--	0.67	12.2
5. Building 3019	6	<0.01	--	0.07	1.3
6. Fission Products Development Laboratory	46	0.02	1.4	0.03	0.5
7. Waste Evaporator, Building 2531	2	0.01	0.7	0.72	13.2
8. Buildings 3525 and 3550	<1	<0.01	--	0.75	13.7
9. Building 2026	<1	<0.01	--	0.13	2.4

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.03
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.03

[a]Activity primarily ^{131}I as noted in text.

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TO: Distribution

FROM: L. C. Lasher

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.55% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, iodine, and tritium; they contributed 63.4%, 16.9%, and 18.1%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the White Oak Creek monitoring station are summarized in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 6.2 million gallons of contaminated water was chemically treated this month. The efficiency of the process (determined by gross beta analysis) was 84%. Figure 3 compares, on a monthly basis, the amounts of strontium released by the process waste system into White Oak Creek. Figure 4 shows the volumes of waste handled. The main sources of process waste are listed in Table 2.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 254 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	145,000
Volume transferred to evaporator	183,000
Tank farm free space at beginning of month	412,000
Tank farm free space at end of month	445,000
Evaporator concentrate returned to tank farm	5,000
Total volume of concentrate stored in tank farm	78,000

The major contributors to the ILW system are listed below. Figure 5 compares the volumes generated each month.

	Gallons
Building 3019	28,000
4500 Complex	19,000
Radioisotopes Processing Area	18,000
ORR and BSR	17,000
High Flux Isotope Reactor	14,000

Gaseous Waste

ORNL stacks released 130 millicuries of ^{131}I this month. The amounts of alpha and particulate activities detected during the period were not significant. Inert gases released from the 3039 and 7911 stack systems averaged less than 1.9% and 0.6%, respectively, of the calculated maximum permissible operating level for these stacks. The individual stack releases are listed in Table 3. Figure 6 compares the total releases of ^{131}I on a monthly basis.

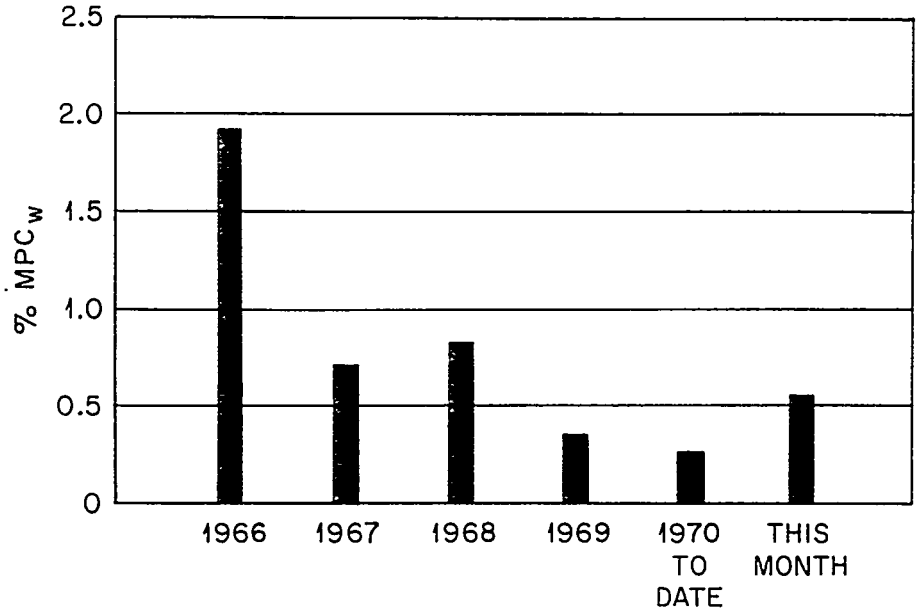

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

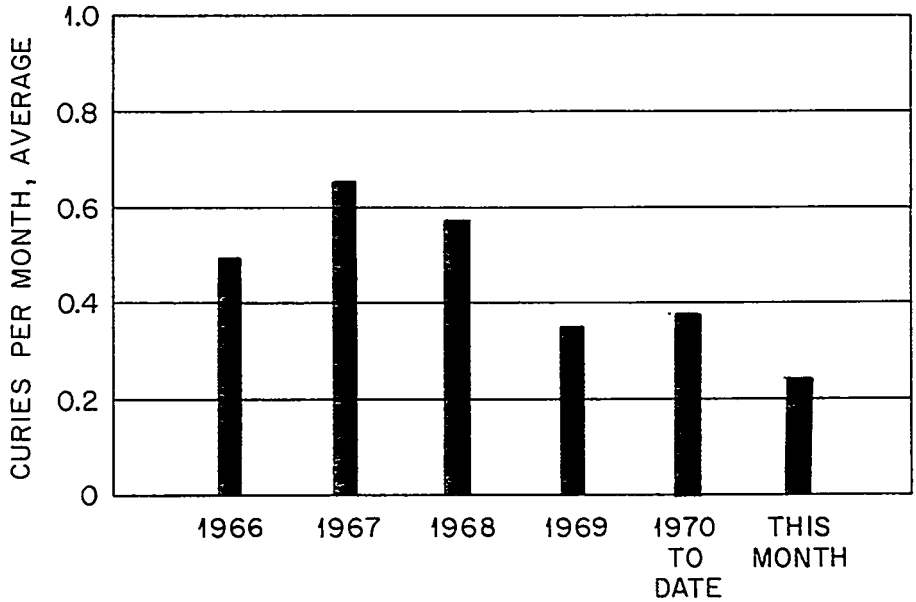

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

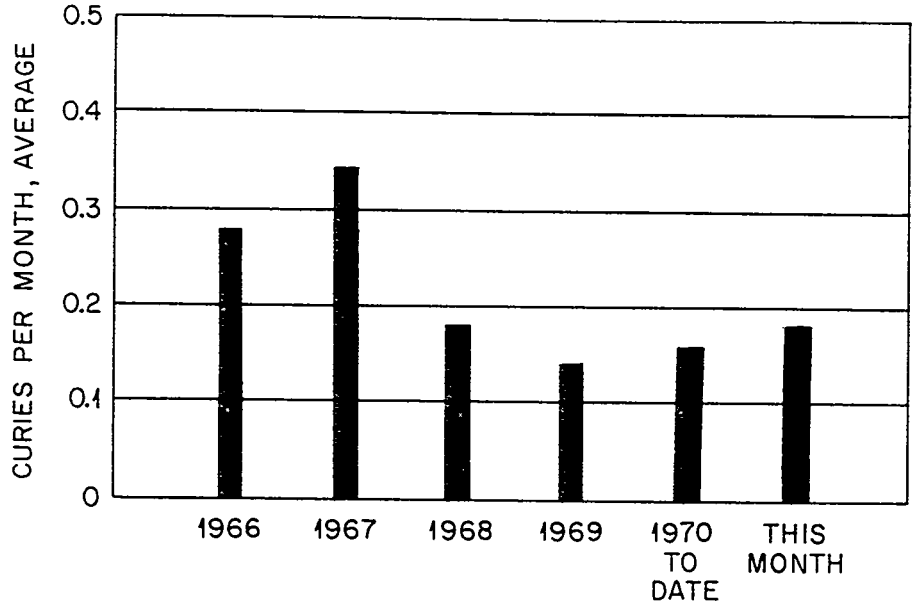

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

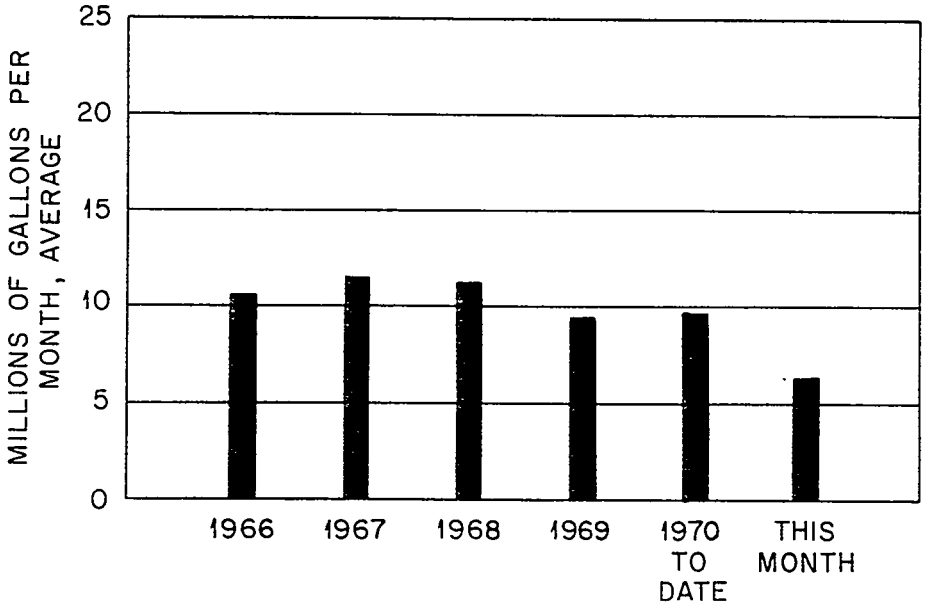

Fig. 4. Process Waste Volumes.

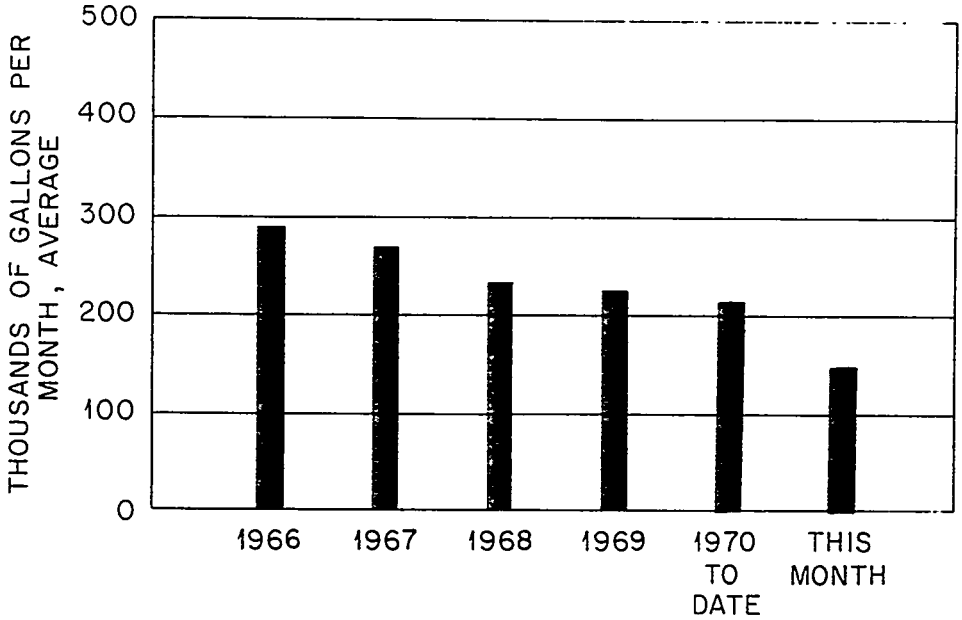

Fig. 5. Intermediate—Level Waste Volumes.

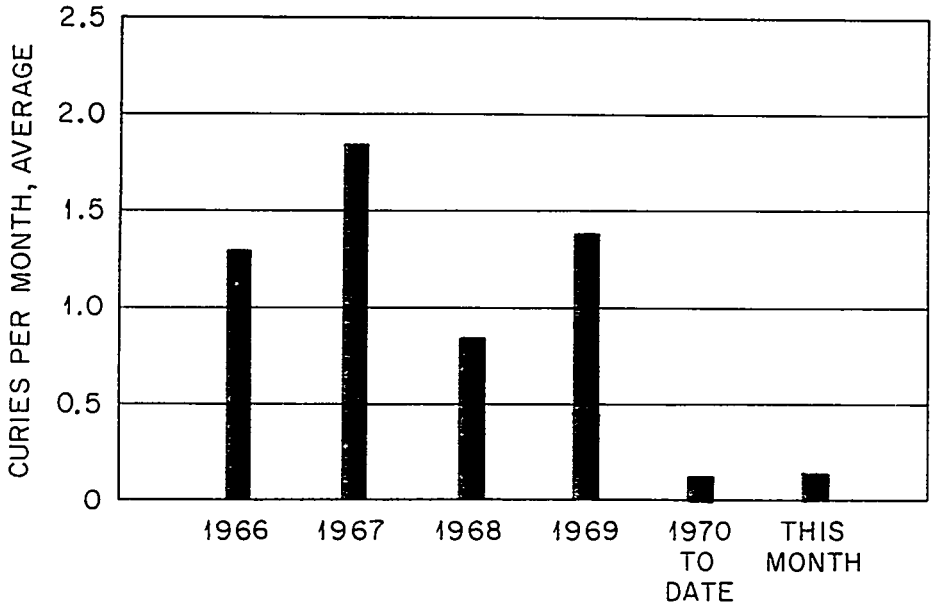

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

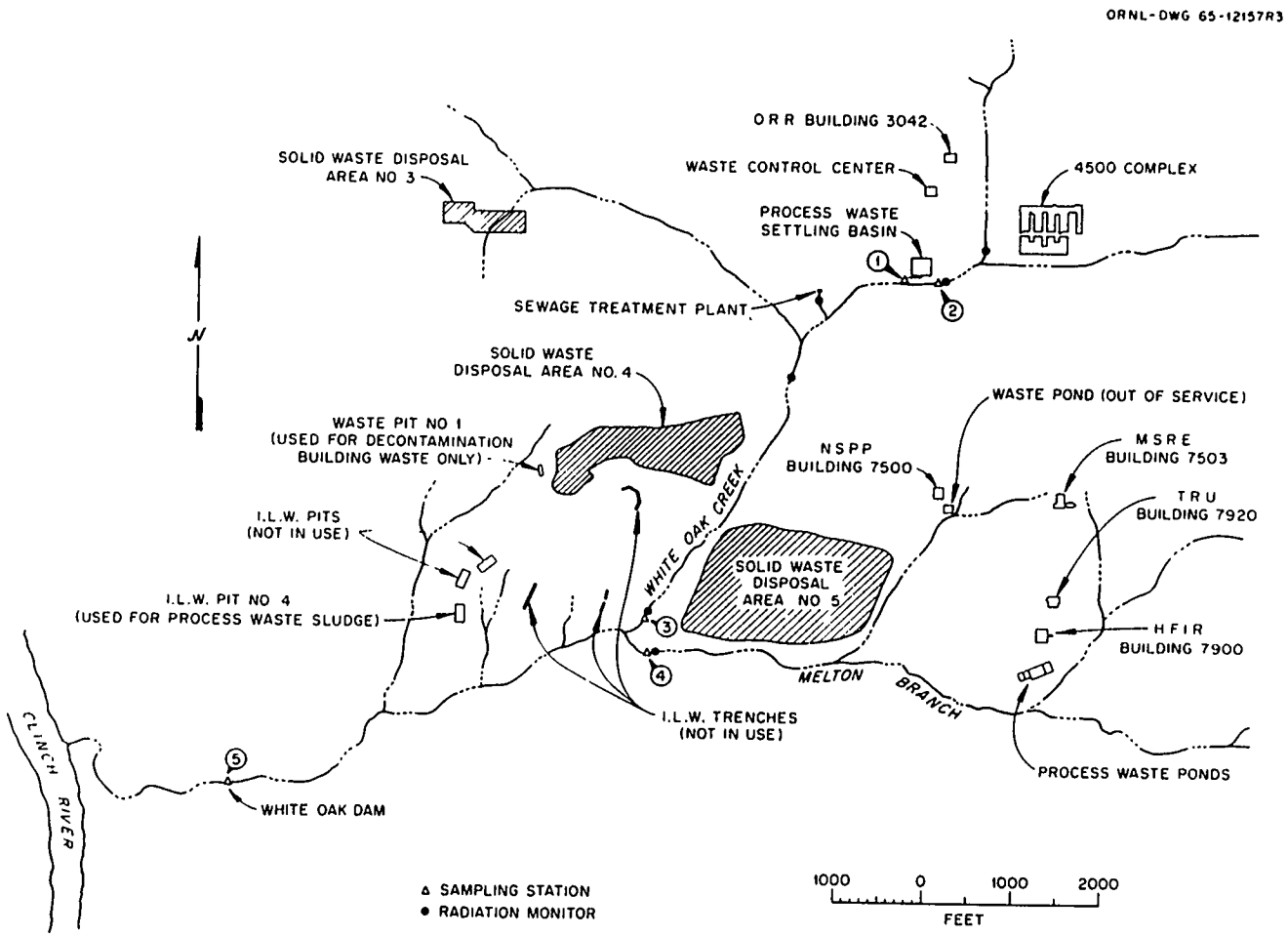

Fig 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.18	0.22
Miscellaneous discharges from east end of plant	2	0.04	0.11
Discharge from Bethel Valley Area	3	0.22	0.58
Discharge from Melton Valley Area	4	0.02	0.07
Total discharge from all sources	3,4	0.24	0.65
White Oak Dam to Clinch River (Health Physics measurement)	5	0.24	0.63

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a]		Million Gallons	% of Total
		Curies	% of Total		
1. Reactor Operations	65[b]	0.59[b]	60.2	1.34	29.6
2. Radioisotope Processing Area	86	0.33	33.7	0.56	12.4
3. Buildings 3503 and 3508	11	0.03	3.1	0.45	10.0
4. Buildings 3025 and 3026	1	<0.01	--	0.51	11.3
5. Building 3019	16	<0.01	--	0.07	1.5
6. Fission Products Development Laboratory	121	0.02	2.0	0.03	0.7
7. Waste Evaporator, Building 2531	4	0.01	1.0	0.71	15.7
8. Buildings 3525 and 3550	1	<0.01	--	0.67	14.8
9. Building 2026	<1	<0.01	--	0.18	4.0

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

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

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.13
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.13

[a]Activity primarily ^{131}I as noted in text.

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LIQUID WASTE

Release to Clinch River

The concentration of radionuclides in the river resulting from ORNL waste discharges was 0.33% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine, contributing 71.1, 21.1, and 6.1%, respectively, to the calculated percent of the MPC_W.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 8.6 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 87% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system, and Figure 4 compares the volumes of waste handled each month.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 241 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	167,000
Volume transferred to evaporator	179,000
Tank farm free space at beginning of month	445,000
Tank farm free space at end of month	453,000
Evaporator concentrate returned to tank farm	4,000
Total volume of concentrate in tank farm	89,000

A list of the major contributors to the ILW system is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	35,000
Radioisotope Processing Area	23,000
High Flux Isotope Reactor	19,000
ORR and BSR	17,000
4500 Complex	15,000
Fission Products Development Laboratory	14,000
Transuranium Processing Plant	10,000

GASEOUS WASTE

A total of 50 millicuries of ^{131}I was released from the stacks this month. The alpha and particulate discharges were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.7 and 0.3%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3. The total ^{131}I releases are compared on a monthly basis in Figure 6.

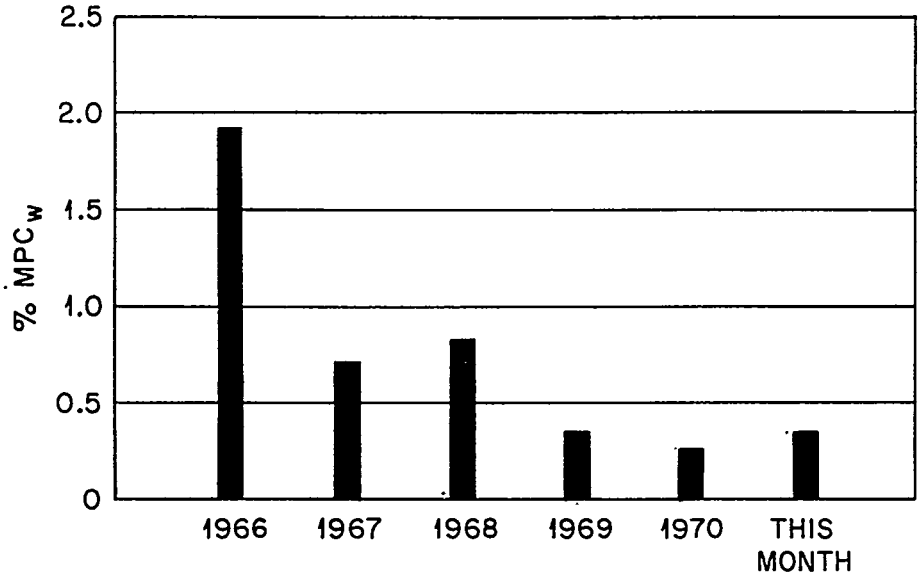

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

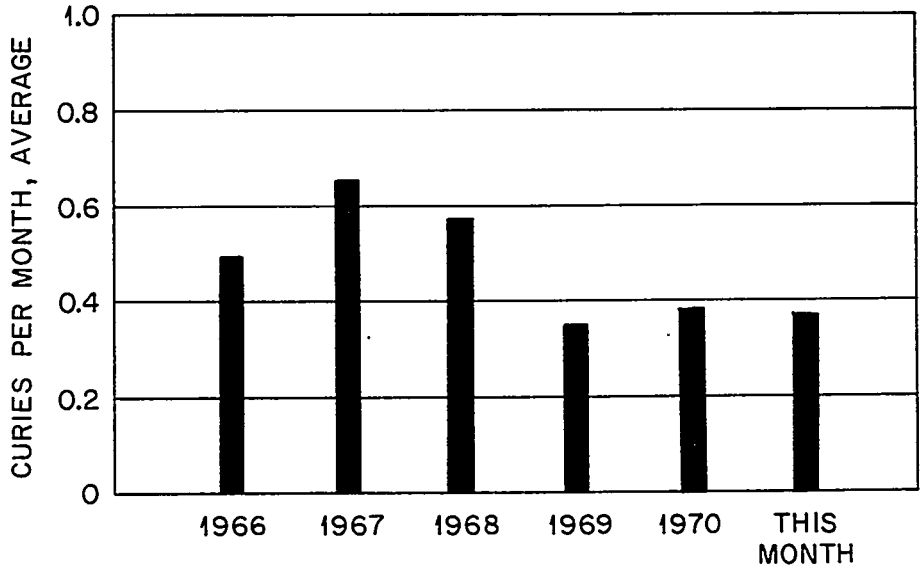

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

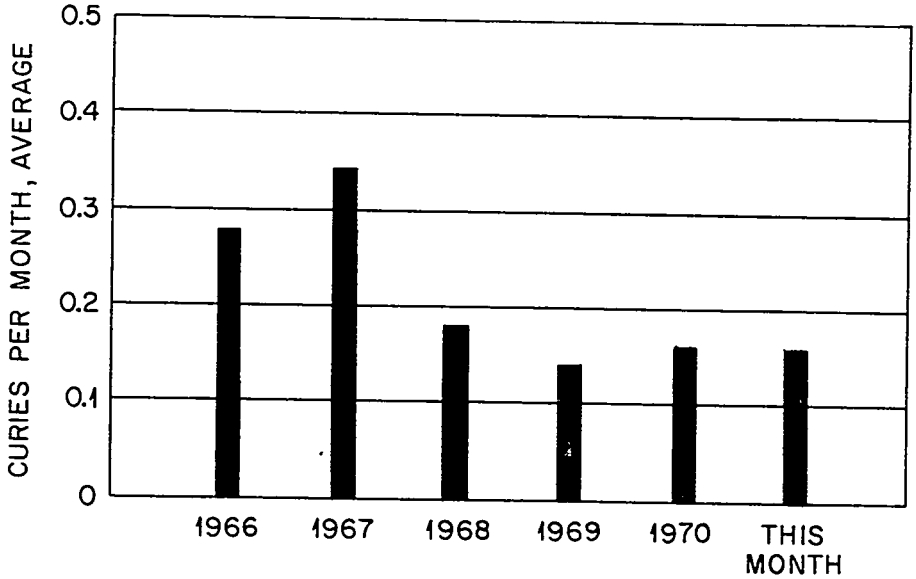

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

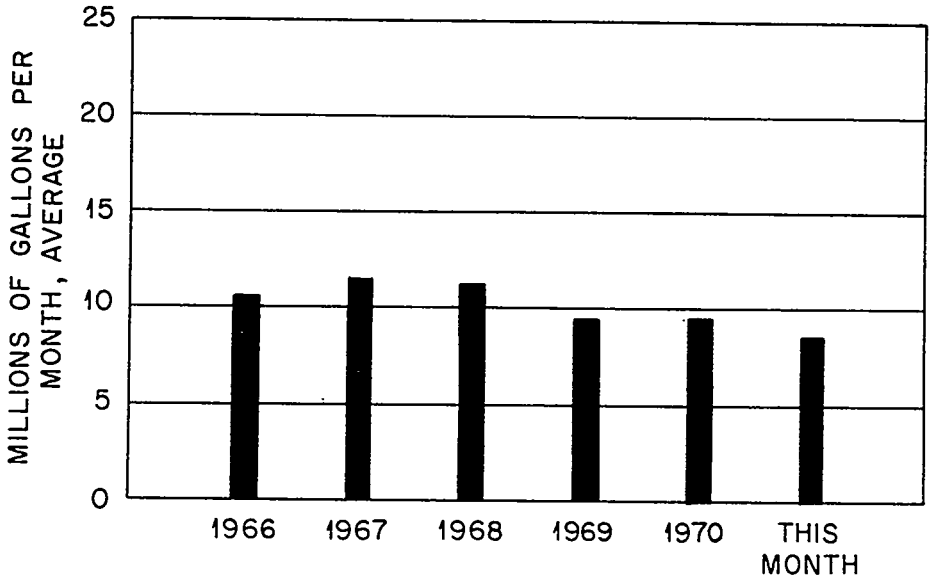

Fig. 4. Process Waste Volumes.

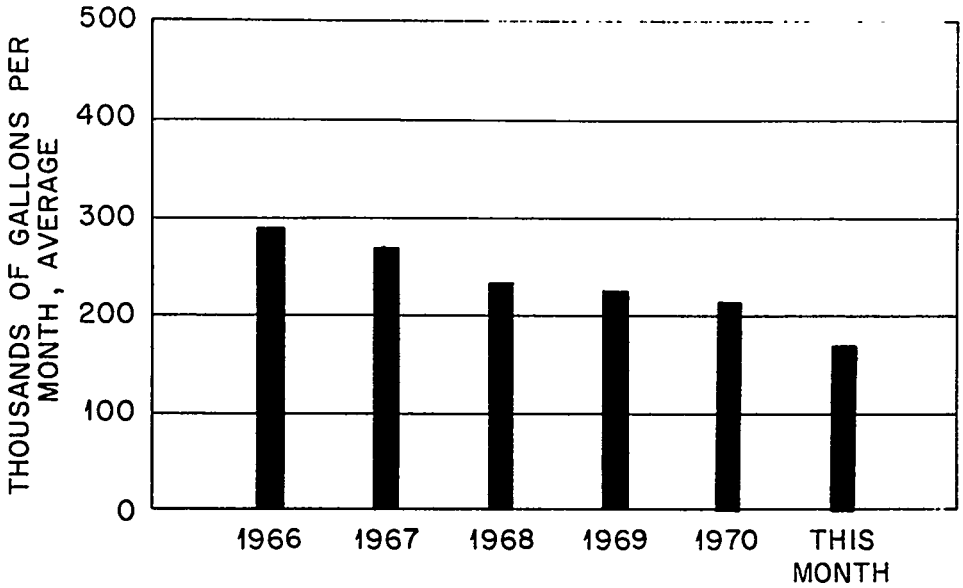

Fig. 5. Intermediate—Level Waste Volumes.

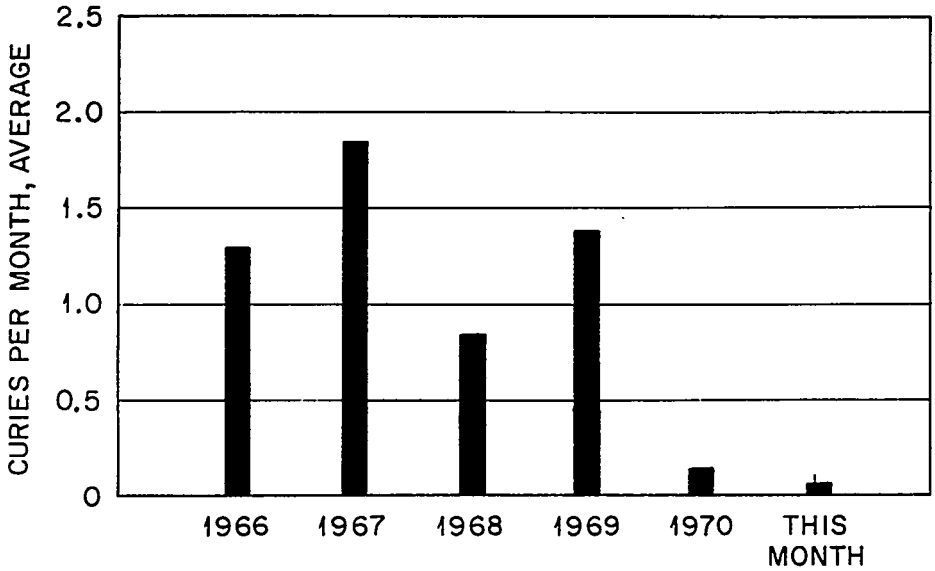

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

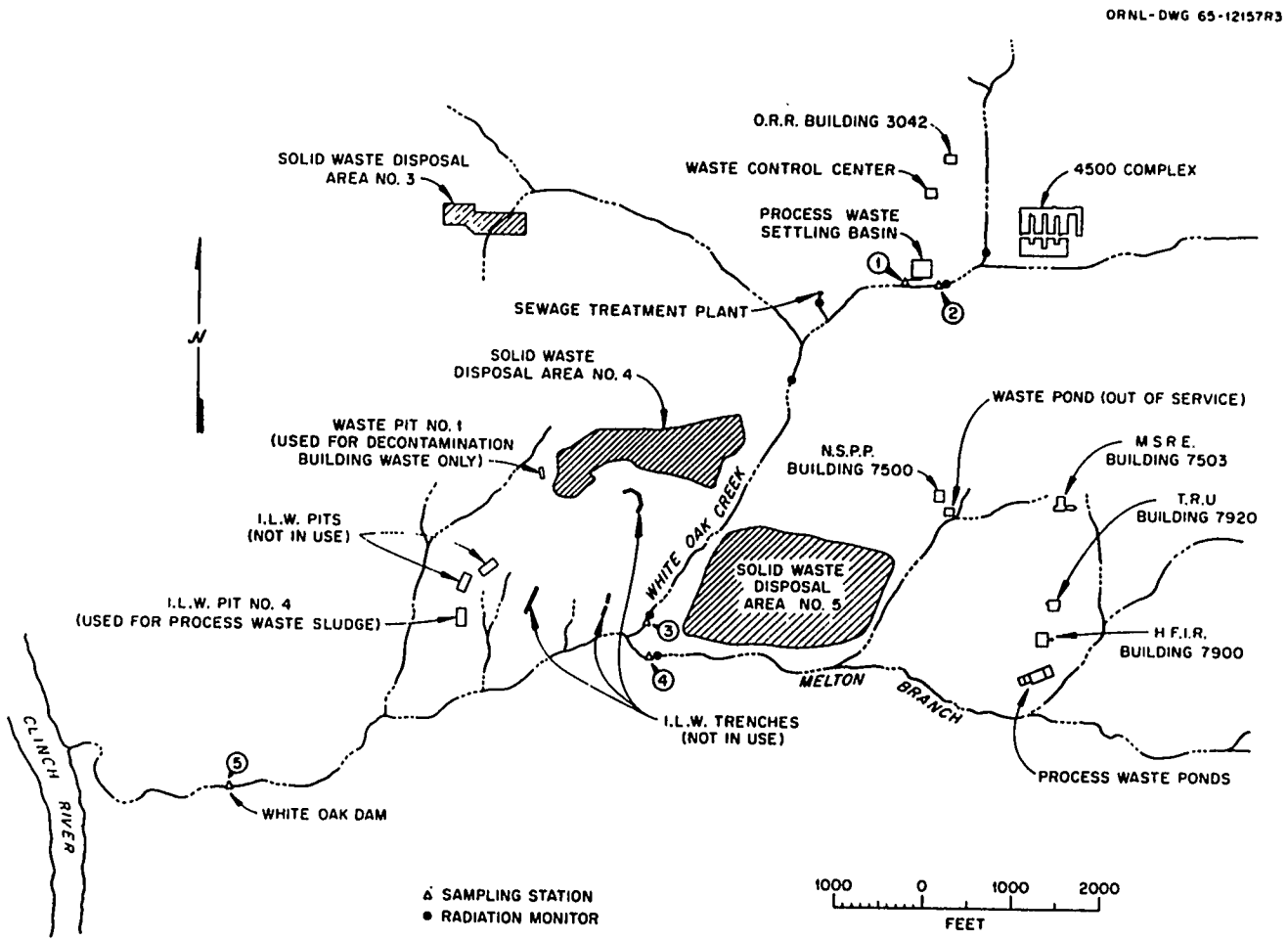

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.16	0.45
Miscellaneous discharges from east end of plant	2	0.04	0.16
Discharge from Bethel Valley Area	3	0.31	0.65
Discharge from Melton Valley Area	4	0.06	0.11
Total discharge from all sources	3,4	0.37	0.76
White Oak Dam to Clinch River (Health Physics measurement)	5	0.28	0.81

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations	87[b]	0.76[b]	59.4	1.30	29.2
2. Radioisotope Processing Area	98	0.35	27.3	0.51	11.5
3. Buildings 3503 and 3508	11	0.04	3.1	0.50	11.2
4. Buildings 3025 and 3026	1	0.01	0.8	0.46	10.3
5. Building 3019	48	0.01	0.8	0.02	0.4
6. Fission Products Development Laboratory	71	0.06	4.7	0.09	2.0
7. Waste Evaporator, Building 2531	7	0.05	3.9	0.75	16.9
8. Buildings 3525 and 3550	1	<0.01	--	0.59	13.3
9. Building 2026	1	<0.01	--	0.23	5.2

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.04
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.05

[a]Activity primarily ^{131}I as noted in text.

2056

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MAR 25 1971

Special Distribution

ORNL
CENTRAL FILES NUMBER
71-3-37

DATE: March 22, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of January, 1971

TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

This document has been approved for release to the public by:

David R Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The concentration of radionuclides in the river resulting from ORNL waste discharges was 0.72% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine, contributing 68.6, 19.5, and 9.7%, respectively, to the calculated percent of the MPC_W.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 8.4 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 82.7% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system, and Figure 4 compares the volumes of waste handled each month.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 218 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	185,000
Volume transferred to Evaporator	170,000
Tank Farm free space at beginning of month	453,000
Tank Farm free space at end of month	430,000
Evaporator concentrate returned to Tank Farm	8,000
Total volume of concentrate in Tank Farm	97,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	22,000
4500 Complex	15,000
Fission Products Development Laboratory	23,000
ORR and BSR	27,000
High Flux Isotope Reactor	14,000
Radioisotopes Processing Area	21,000
Transuranium Processing Area	12,000
Building 3508	10,000

On January 15, 1971, while liquid waste was being transferred from Melton Valley to the Tank Farm, a leak developed during the transfer operation and an area about 100 ft^2 west of the pumping station was contaminated. The area was subsequently excavated, the contaminated dirt disposed of, and the waste line repaired. There was no spread of contamination outside the immediate area and no contamination of personnel nor exposures beyond normal working limits.

GASEOUS WASTE

The ORNL stacks discharged 80 millicuries of ^{131}I this month. The alpha and beta-gamma particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.3%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

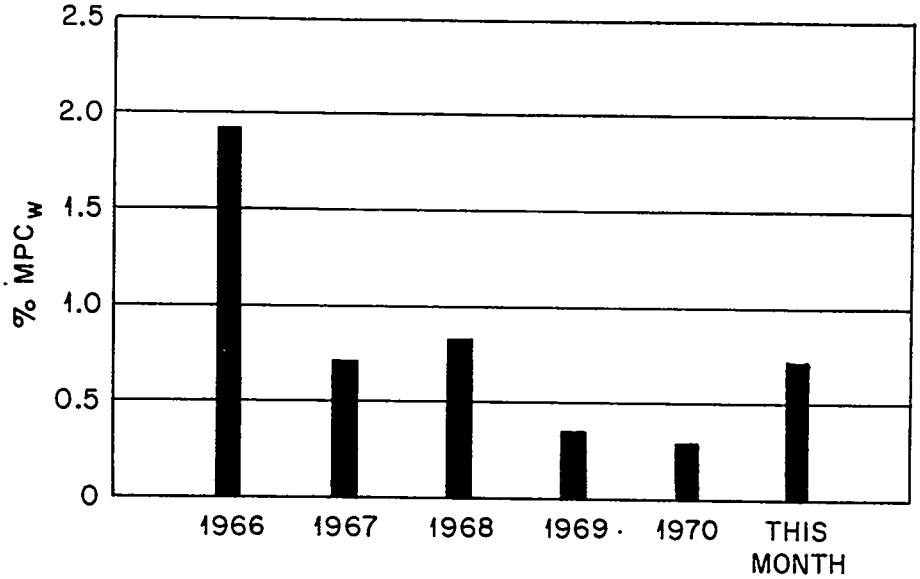

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

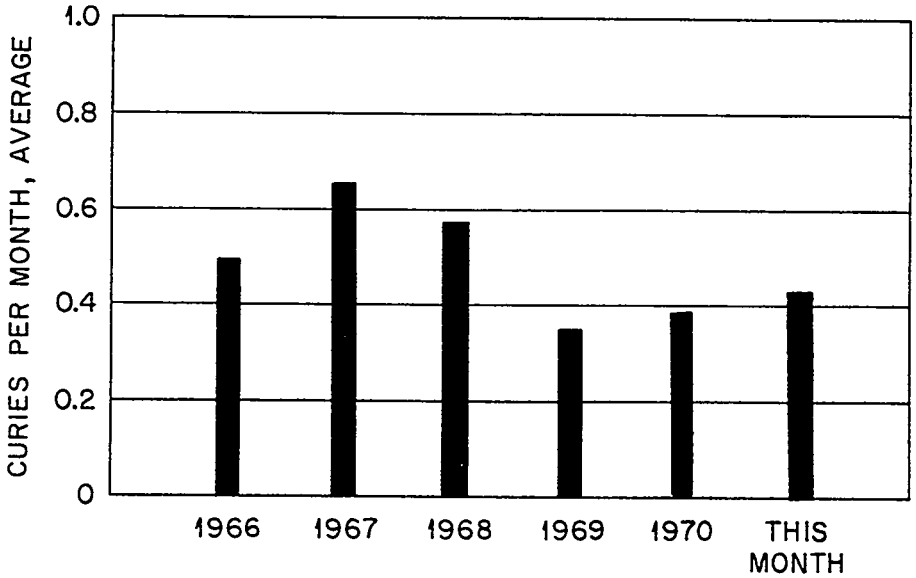

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

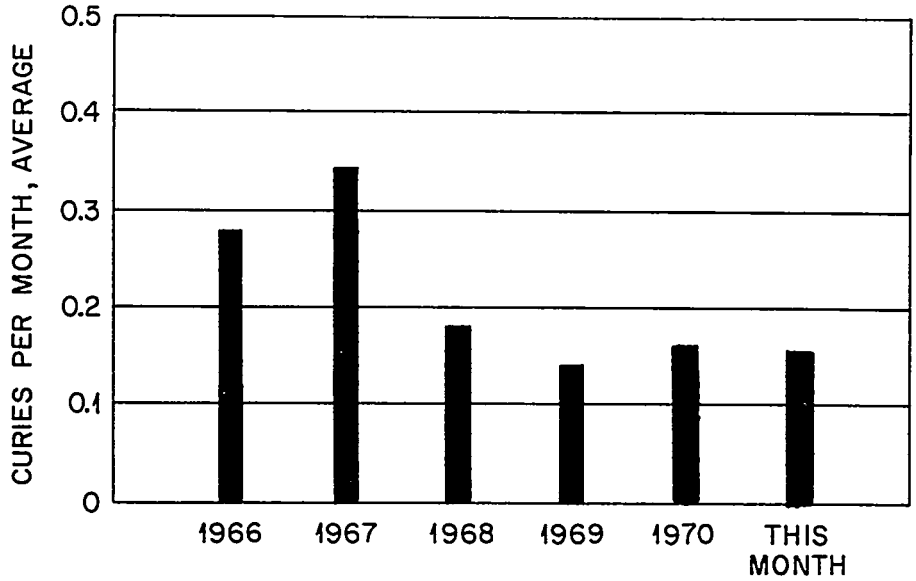

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

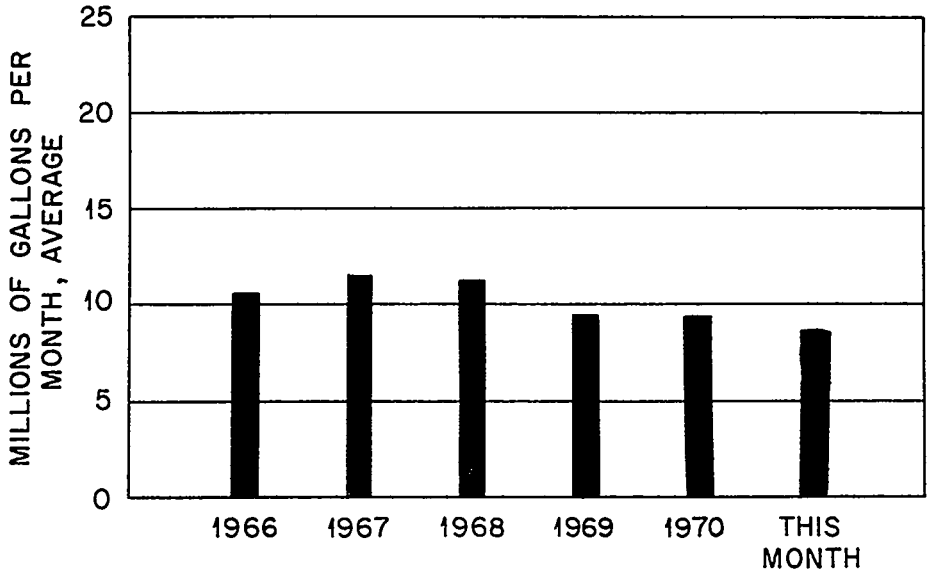

Fig. 4. Process Waste Volumes.

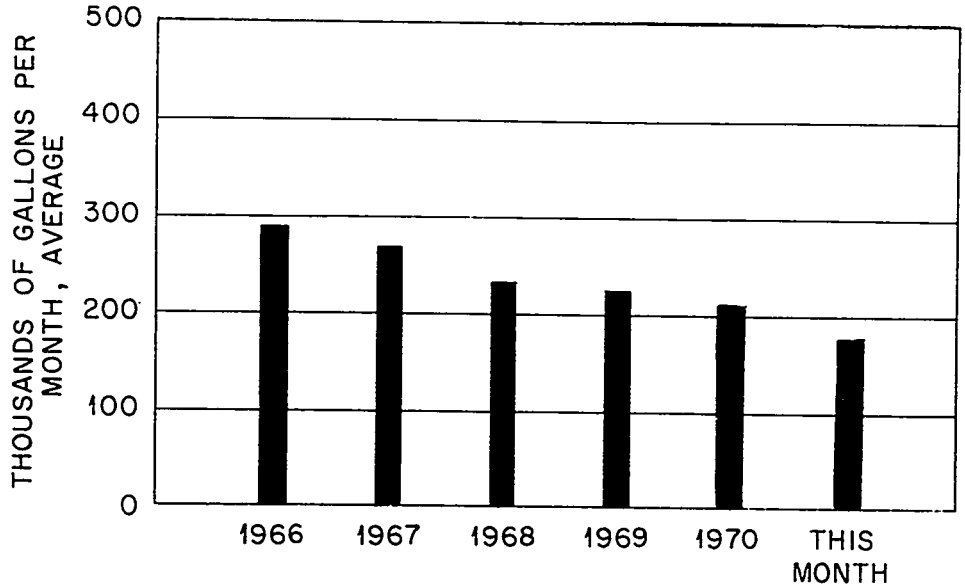

Fig. 5. Intermediate—Level Waste Volumes.

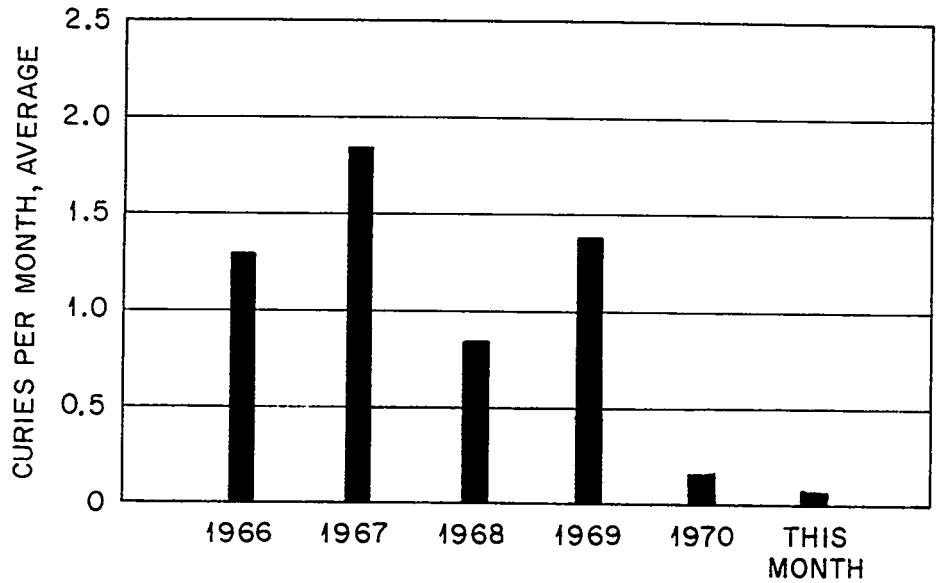

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

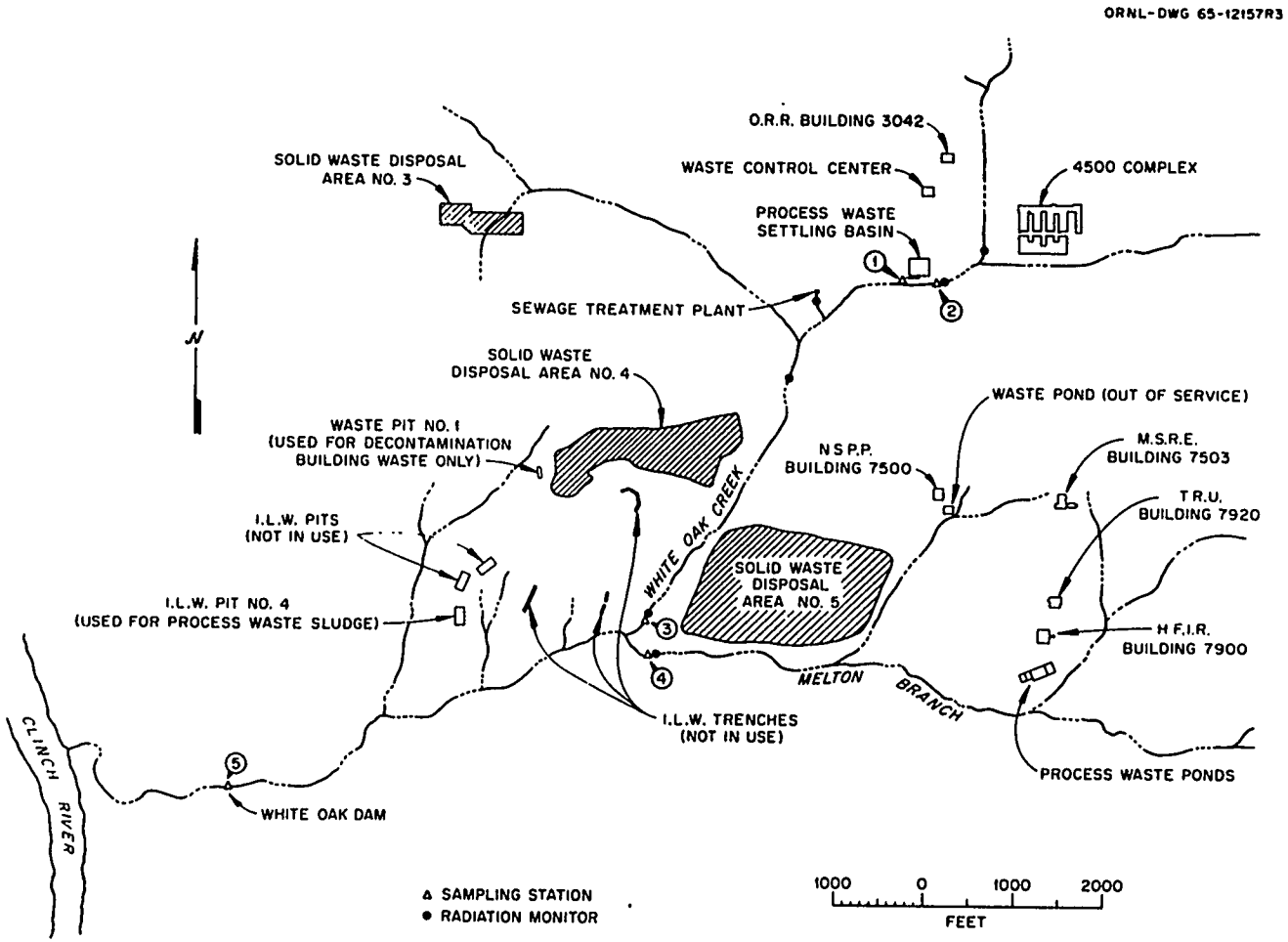

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.15	0.40
Miscellaneous discharges from east end of plant	2	1.12[c]	3.13[c]
Discharge from Bethel Valley Area	3	0.35	1.25
Discharge from Melton Valley Area	4	0.06	0.16
Total discharge from all sources	3,4	0.41	1.41
White Oak Dam to Clinch River (Health Physics measurement)	5	0.43	1.39

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[c]The accuracy of this measurement is questionable since it is not reflected in downstream measurements (station 3) and is out-of-line with all other previous measurements.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	64[b]	0.73	53.7	1.66	32.5
2. Radioisotope Processing Area	64	0.23	16.9	0.52	10.2
3. Buildings 3503 and 3508	10	0.03	2.2	0.51	10.0
4. Buildings 3025 and 3026	1	<0.01	--	0.61	12.0
5. Building 3019	30	0.01	0.7	0.06	1.2
6. Fission Products Development Laboratory	55	0.06	4.4	0.17	3.3
7. Waste Evaporator, Building 2531	67	0.3	22.1	0.70	13.7
8. Buildings 3525 and 3550	1	<0.01	--	0.62	12.2
9. Building 2026	1	<0.01	--	0.25	4.9

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.07
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.08

[a]Activity primarily ^{131}I as noted in text.

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ORNL
CENTRAL FILES NUMBER
71-4-46

MAY - 5 1971

DATE: April 19, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of February, 1971

TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

This document has been approved for release to the public by:

Technical Information Officer 3/13/96
ORNL Site Date

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LIQUID WASTE

Release to Clinch River

The concentration of radionuclides in the river resulting from ORNL waste discharges was 0.37% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine, contributing 73.2, 18.9, and 5.9%, respectively, to the calculated percent of the MPC_W.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. In addition to the strontium discharge shown in Table 1, approximately 1600 to 1800 curies of tritium were measured at monitoring stations 3 and 4. The bulk of this tritium came from Burial Ground No. 5 and only a small portion came from the process waste system. The tritium entered the process waste system via the evaporator condensate.

Process Waste

A total of 7.5 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 85% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system, and Figure 4 compares the volumes of waste handled each month.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 306 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	197,000
Volume transferred to Evaporator	206,000
Tank Farm free space at beginning of month	430,000
Tank Farm free space at end of month	428,000
Evaporator concentrate returned to Tank Farm	11,000
Total volume of concentrate in Tank Farm	108,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	33,000
4500 Complex	16,000
Fission Products Development Laboratory	20,000
ORR and BSR	28,000
High Flux Isotope Reactor	14,000
Radioisotopes Processing Area	19,000
Building 3026	18,000

A new route has been chosen for the new ILW transfer line from Melton Valley to the Tank Farm. Another proposal incorporating the new routing is being prepared for transmittal to the AEC.

GASEOUS WASTE

The ORNL stacks discharged 100 millicuries of ^{131}I this month. The alpha and beta-gamma particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.8% and 0.3%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.21	0.53
Miscellaneous discharges from east end of plant	2	0.20[c]	0.93
Discharge from Bethel Valley Area	3	0.34	1.58
Discharge from Melton Valley Area	4	0.07	0.24
Total discharge from all sources	3,4	0.41	1.82
White Oak Dam to Clinch River (Health Physics measurement)	5	0.45	1.3

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The validity of this figure is questionable since it is about 10 times as high as the average discharge measured in the past. Subsequent sampling has revealed that the current rate of release is at a normal level.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations	77[b]	0.98	75.4	1.88	33.2
2. Radioisotope Processing Area	84	0.19	14.6	0.33	5.8
3. Buildings 3503 and 3508	9	0.04	3.1	0.66	11.7
4. Buildings 3025 and 3026	2	0.01	0.8	1.12	19.9
5. Building 3019	21	<0.01	--	0.05	0.9
6. Fission Products Development Laboratory	58	0.06	4.6	0.16	2.8
7. Waste Evaporator, Building 2531	3.6	0.02	1.5	0.74	13.0
8. Buildings 3525 and 3550	<1	<0.01	--	0.47	8.3
9. Building 2026	<1	<0.01	--	0.25	4.4

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

[b]The bulk of this activity is from contaminated ground water which is seeping into the pipe line in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.10
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.10

[a]Activity primarily ^{131}I as noted in text.

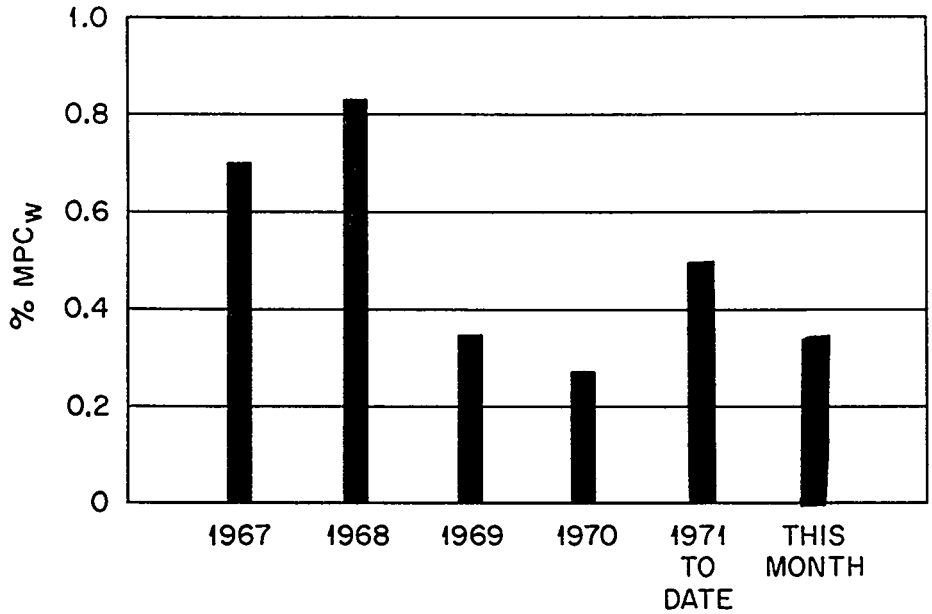

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

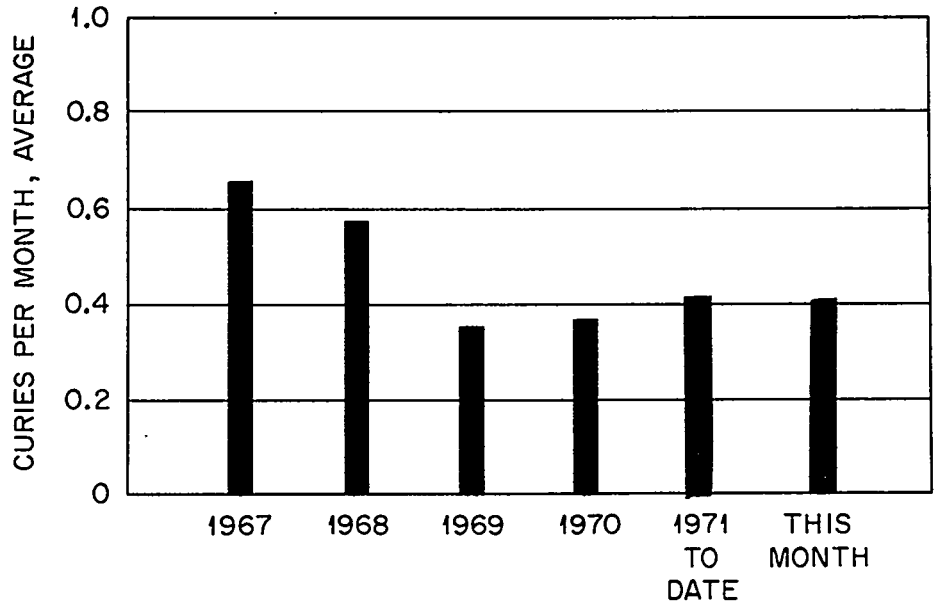

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

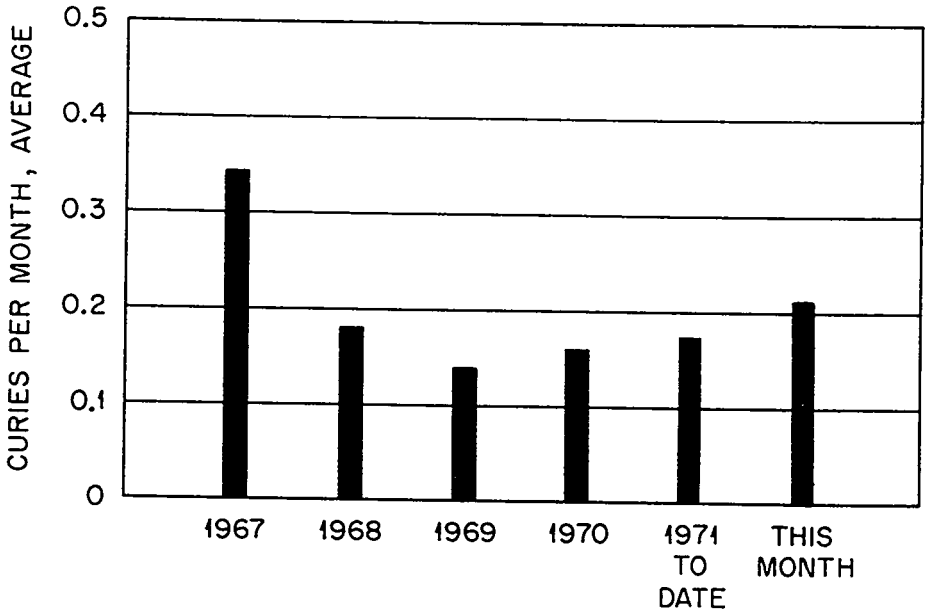

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

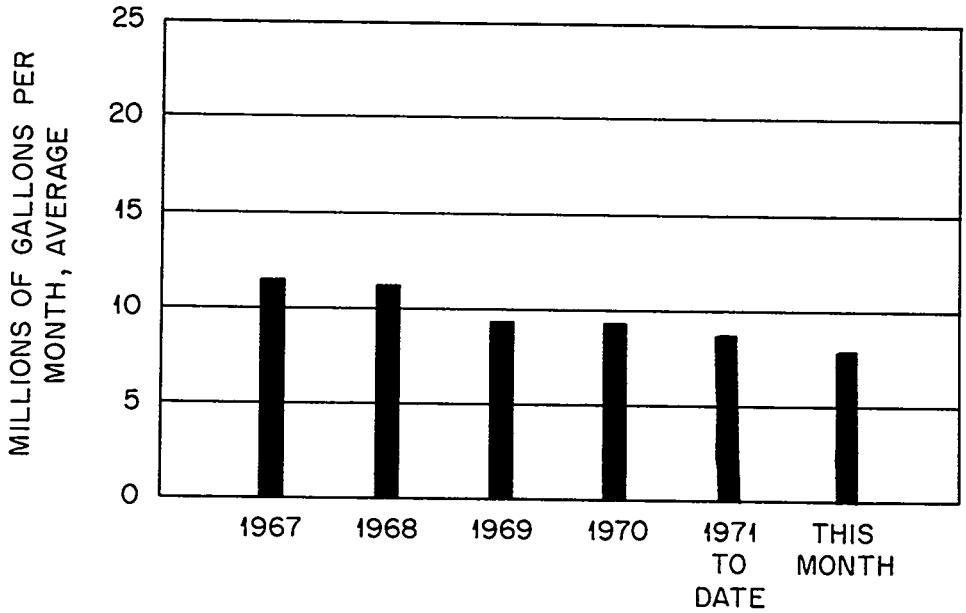

Fig. 4. Process Waste Volumes.

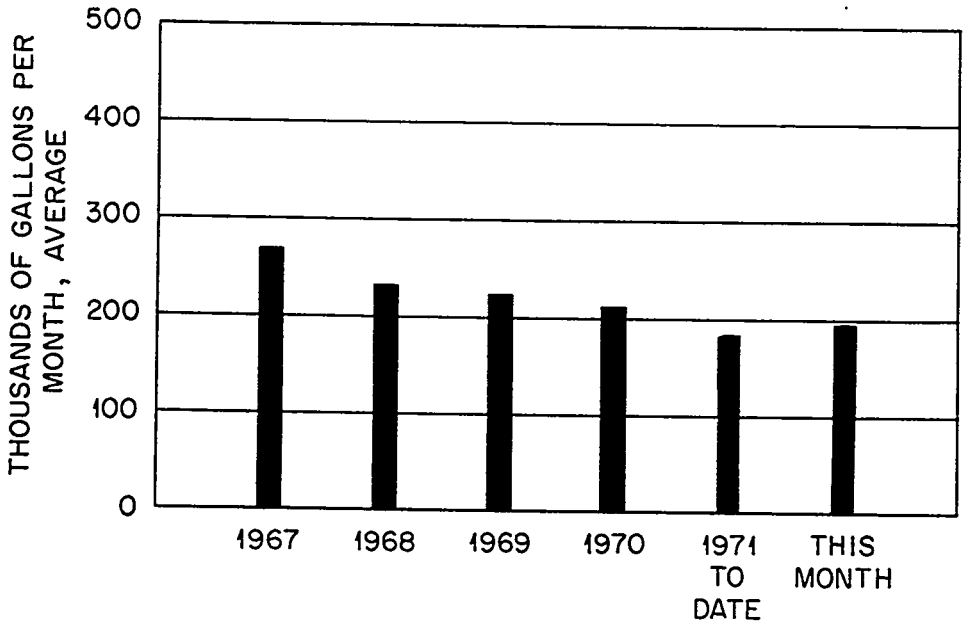

Fig. 5. Intermediate-Level Waste Volumes.

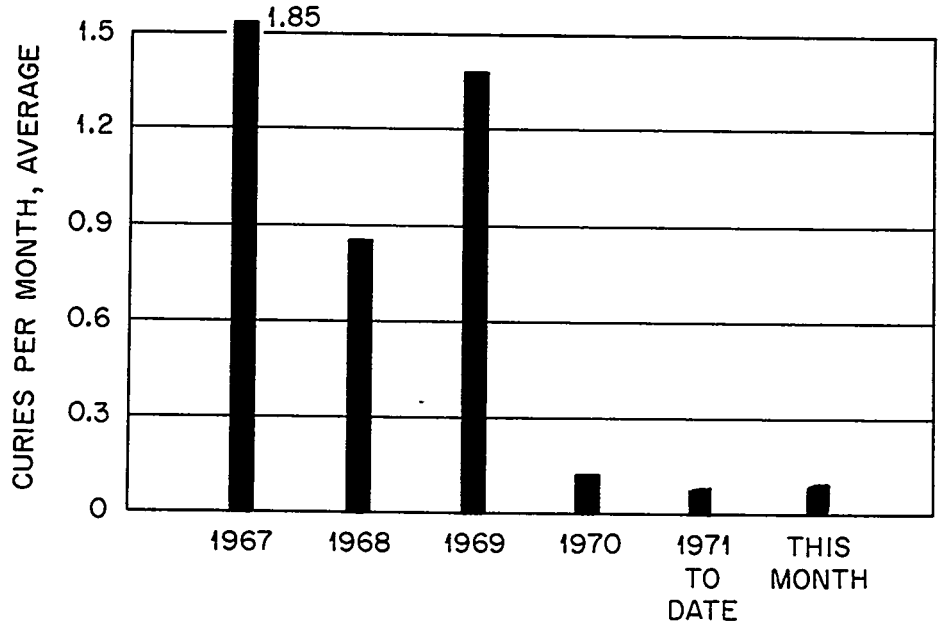

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

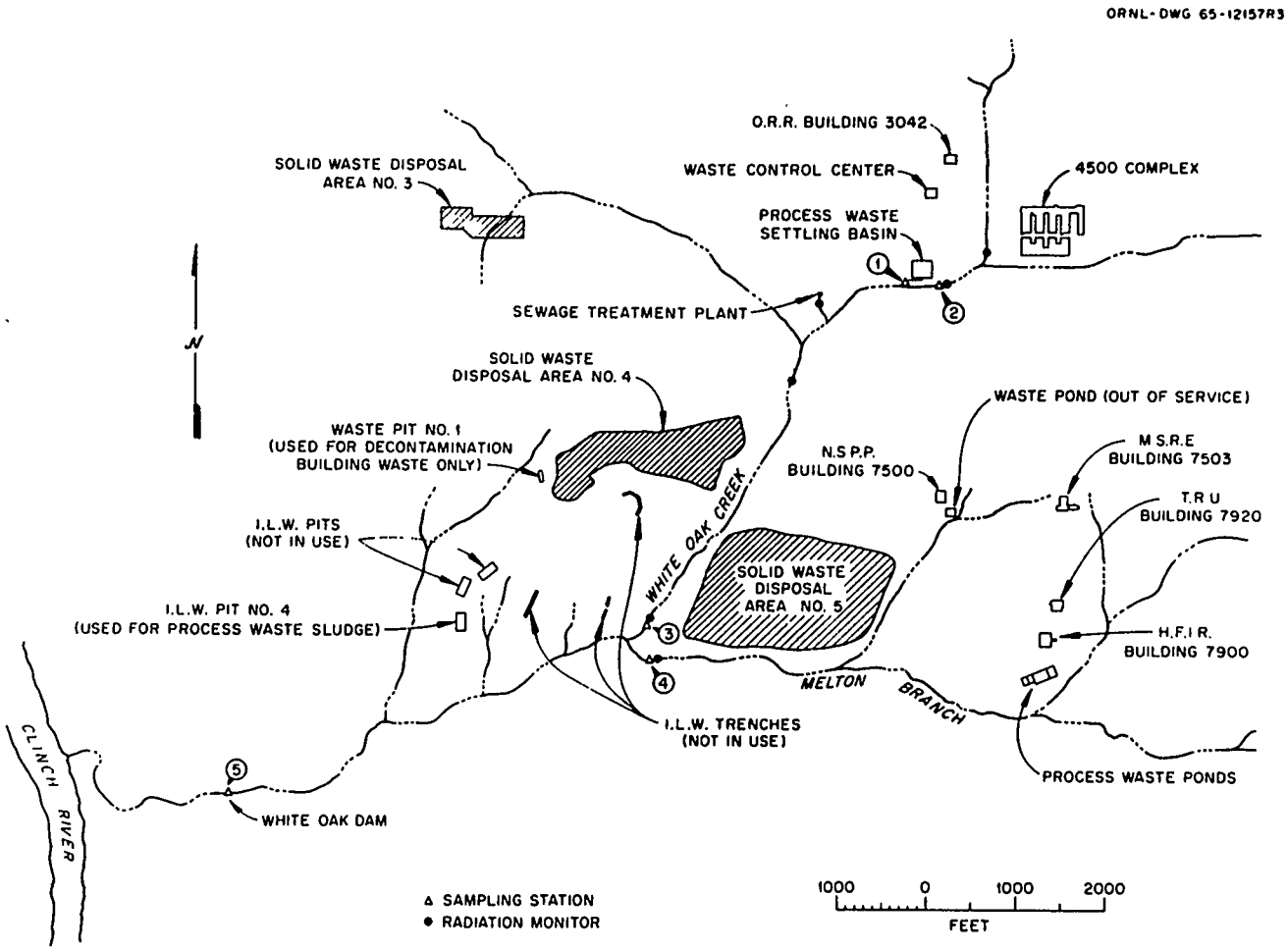

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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71-5-28

MAY 19 1971

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DATE: May 12, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of March, 1971

TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

This document has been approved for release to the public by:

David R. Hamrin 3/13/96
Technical Information Officer Date
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LIQUID WASTE

Release to Clinch River

The concentration of radionuclides in the river resulting from ORNL waste discharges was 0.80% of the MPC_W for a release to an uncontrolled area (see Figure 1). The increase in the concentration is the result of a low river flow and does not represent an increase in the amount of radionuclides discharged. The main contaminants were strontium, tritium, and iodine, contributing 74.7%, 21.3%, and 2.1%, respectively, to the calculated percent of the MPC_W.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 5.7 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 73% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

In September, 1968, a program was initiated in Buildings 3042, 3025, and 3525 to divert noncontaminated water from the process waste system to the storm sewer. These changes should be completed next month and

the results of this effort to date are reflected in Figure 4 which compares the average volume of waste water handled each month.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 306 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	252,000
Volume transferred to Evaporator	228,000
Tank Farm free space at beginning of month	428,000
Tank Farm free space at end of month	387,000
Evaporator concentrate returned to Tank Farm	17,000
Total volume of concentrate in Tank Farm	125,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	31,000
4500 Complex	24,000
Fission Products Development Laboratory	10,000
ORR and BSR	35,000
High Flux Isotope Reactor	29,000
Radioisotopes Processing Area	22,000
Building 3026	22,000

Preparation of the request for directive to replace the radioactive liquid waste line from Melton Valley to Bethel Valley was completed. The request was submitted to the AEC during the latter part of March.

GASEOUS WASTE

The ORNL stacks discharged 860 millicuries of ^{131}I this month. The bulk of this activity was released during xenon processing in the Radioisotopes Area. The alpha and beta-gamma particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.3%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	120[b]	0.97[b]	1.71	87.3	2.09[b]	35.6
2. Radioisotopes Processing Area	93	0.11	0.15	7.7	0.23	3.9
3. Buildings 3503 and 3508	11	0.02	0.04	2.0	0.60	10.2
4. Buildings 3025 and 3026	1	<0.001	<0.01	--	1.31	22.3
5. Building 3019	13	<0.005	<0.01	--	0.10	1.7
6. Fission Products Development Laboratory	39	0.02	0.03	1.5	0.10	1.7
7. Waste Evaporator, Building 2531	5	0.01	0.03	1.5	0.81	13.6
8. Buildings 3525 and 3550	<0.1	0.01	<0.01	--	0.46	7.8
9. Building 2026	1	<0.0001	<0.01	--	0.19	3.2

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from drains in Building 3047 and from inleakage of ground water in the Radioisotopes Area.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Process waste	1	0.16	0.38
Miscellaneous discharges from east end of plant	2	0.02	0.13
Discharge from Bethel Valley Area	3	0.27	0.73
Discharge from Melton Valley Area	4	0.06	0.15
Total discharge from all sources	3,4	0.33	0.88
White Oak Dam to Clinch River (Health Physics measurement)	5	0.38	0.99

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.85[b]
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.86

[a]Activity primarily ^{131}I as noted in text.

[b]The bulk of this activity was released during xenon processing in the Isotopes Area.

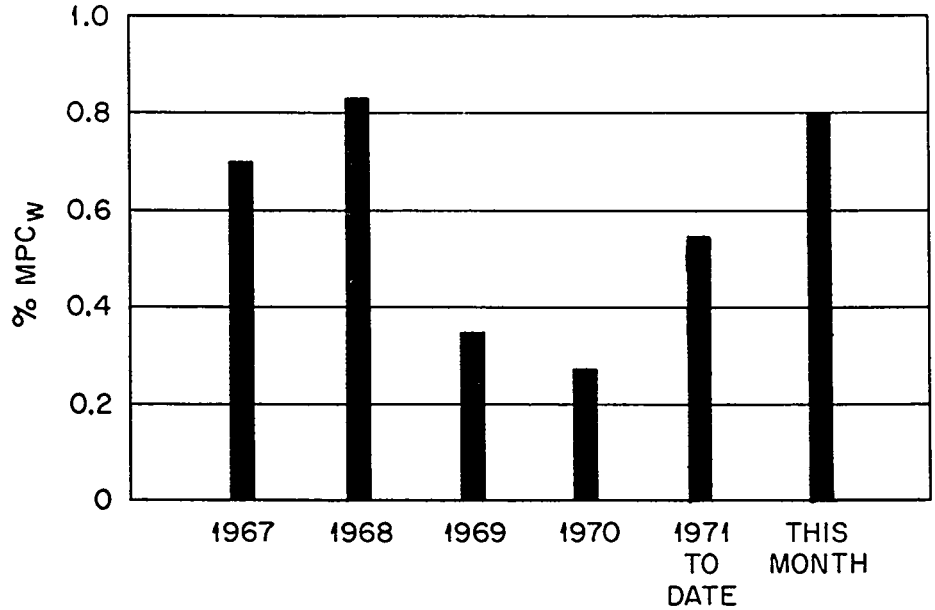

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

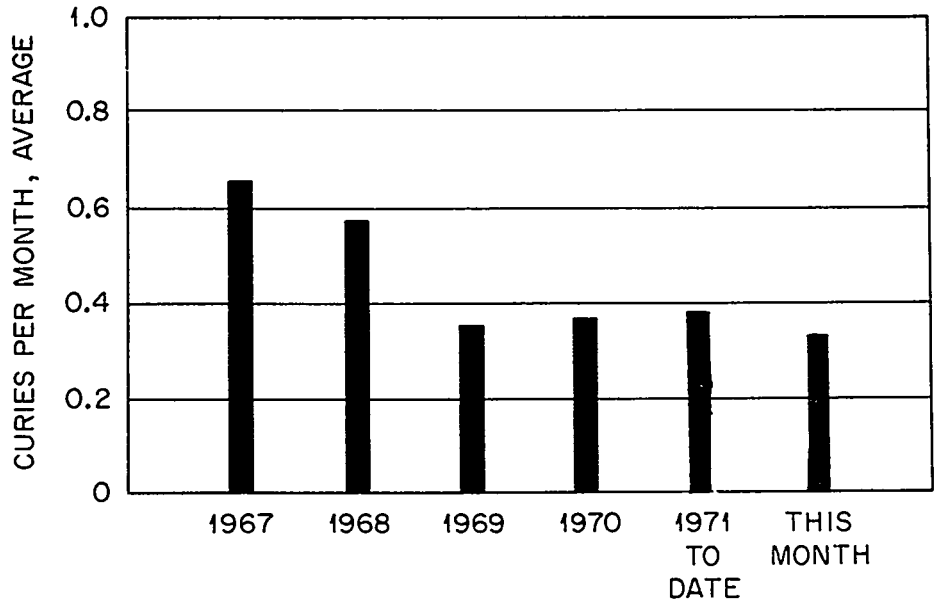

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

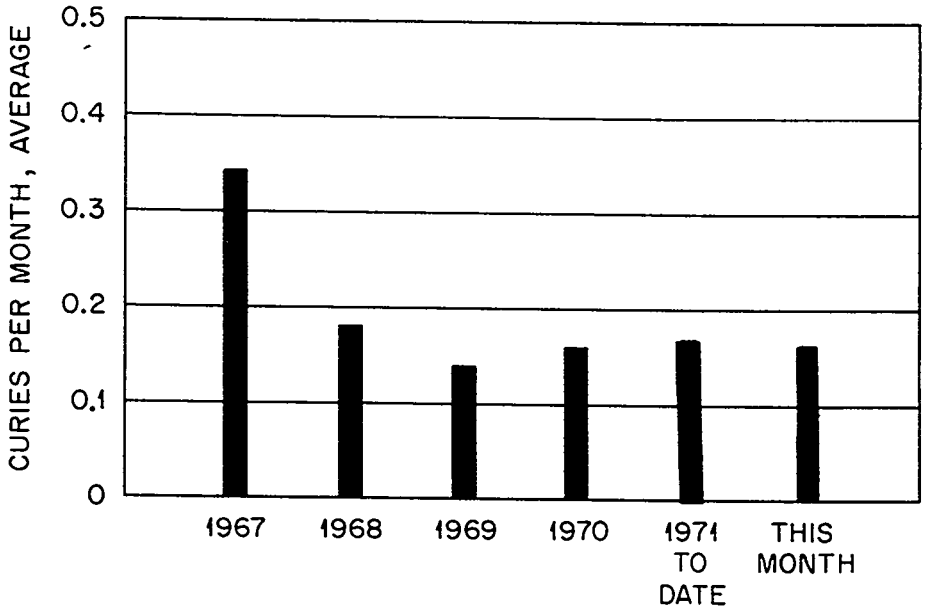

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

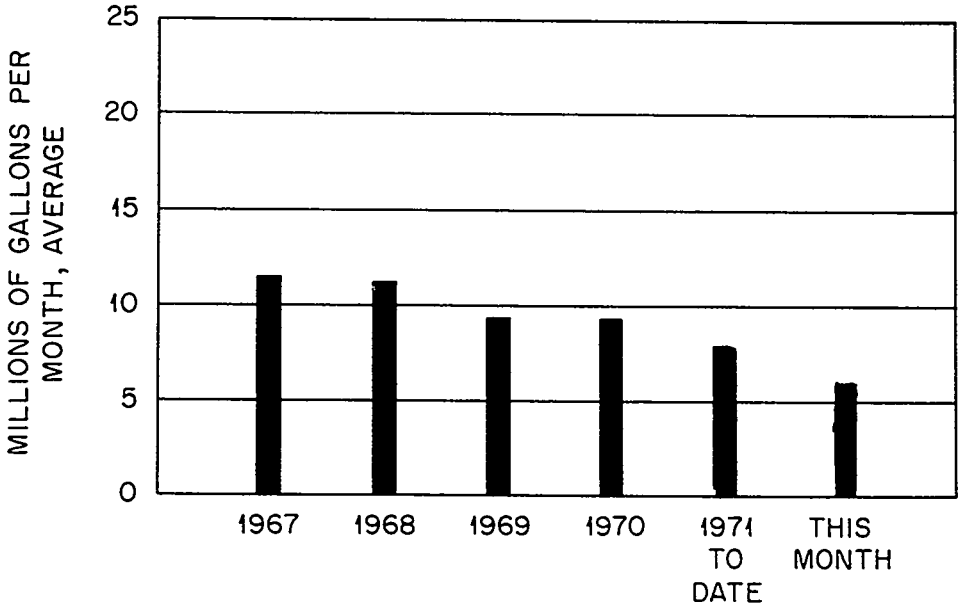

Fig. 4. Process Waste Volumes.

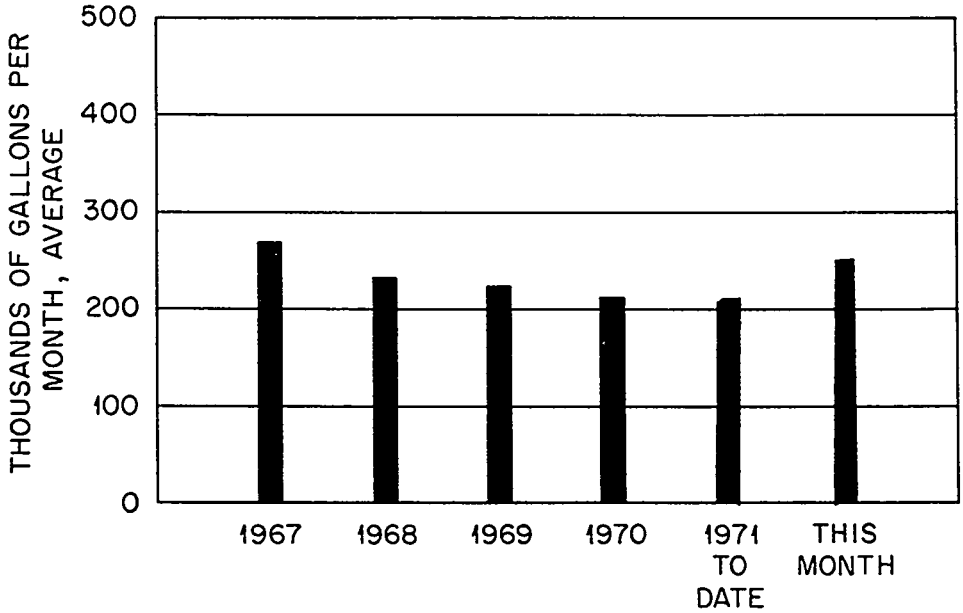

Fig. 5. Intermediate-Level Waste Volumes.

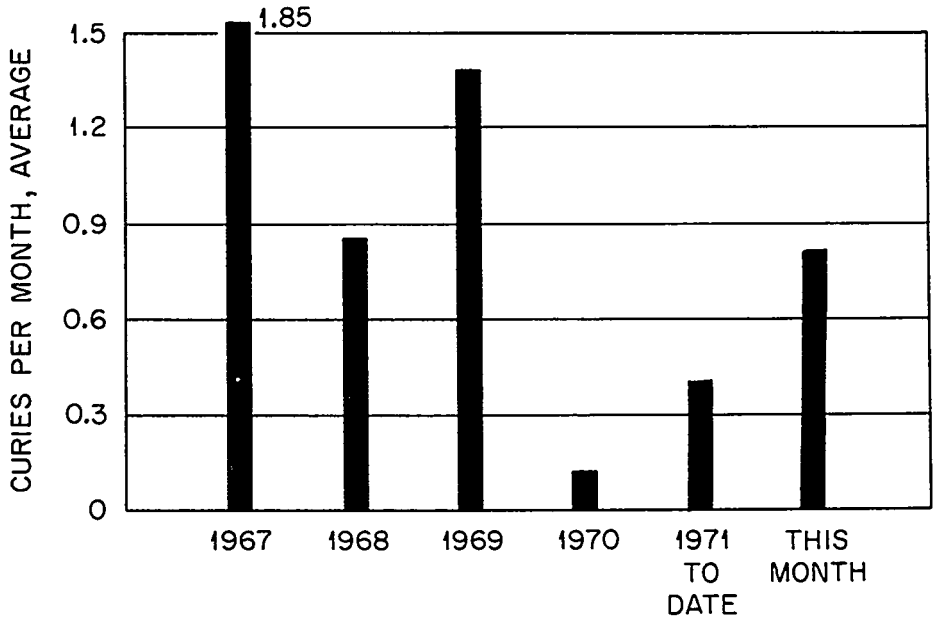

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

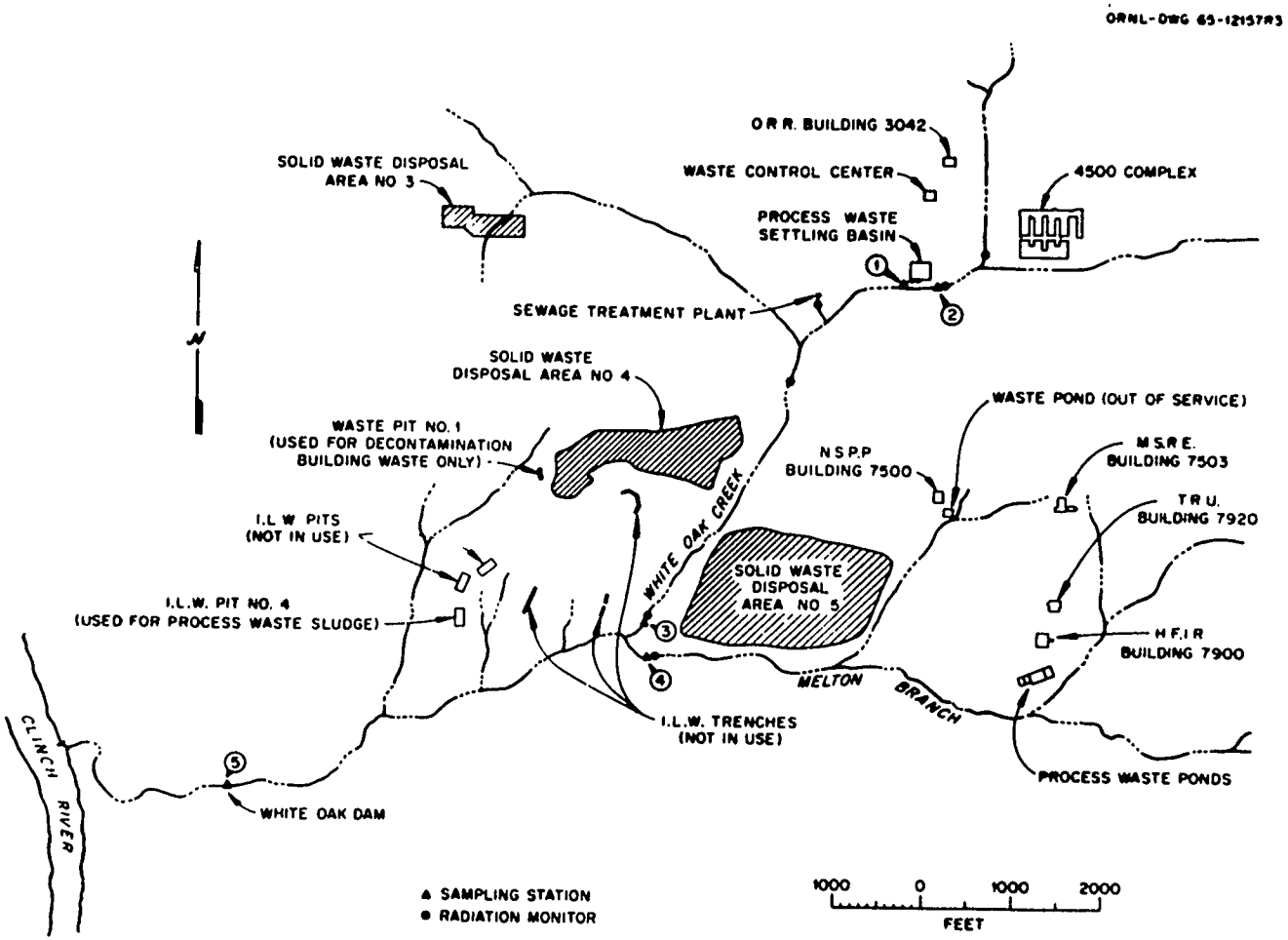

Fig 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

2056

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ORNL
CENTRAL FILES NUMBER
71-6-18

DATE: June 4, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of April, 1971

TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

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This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The Health Physics measurements of contaminants released to the Clinch River, which had been reported each month in the past, will be reported on a quarterly basis in the future. This change is reflected in Figure 1 and Table 1 and results from an effort to reduce analytical costs.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.7 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 82% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

The program for diverting noncontaminated water from the process waste system, mentioned in the March, 1971, report, has been completed. As a result, Figure 4 reflects a further decrease in the volume of water treated.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 279 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	172,000
Volume transferred to Evaporator	201,000
Tank Farm free space at beginning of month	387,000
Tank Farm free space at end of month	406,000
Evaporator concentrate returned to Tank Farm	10,000
Total volume of concentrate in Tank Farm	135,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	35,000
Fission Products Development Laboratory	12,000
ORR and BSR	18,000
High Flux Isotope Reactor	26,000
Radioisotopes Processing Area	25,000
Building 3026	17,000

A directive was received from the AEC to proceed with the new waste line from Melton Valley to Bethel Valley. Work has commenced on welding double lengths of pipe together and on excavation for the line.

GASEOUS WASTE

The ORNL stacks discharged 90 millicuries of ^{131}I this month. The alpha and beta-gamma particulate activities released during the period

were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.7% and 0.3%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Process waste	1	0.07	0.18
Miscellaneous discharges from east end of plant	2	<0.01	0.44
Discharge from Bethel Valley Area	3	0.19	0.49
Discharge from Melton Valley Area	4	0.04	0.12
Total discharge from all sources	3,4	0.23	0.61
White Oak Dam to Clinch River[c] (Health Physics measurement)	5		

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]Beginning April, 1971, this information is being provided on a quarterly basis.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average, c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	108[b]	0.46	0.85[b]	53.5	1.16	29.4
2. Radioisotopes Processing Area	111	0.07	0.17	10.7	0.22	5.6
3. Buildings 3503 and 3508	8.7	0.02	0.04	2.5	0.69	17.5
4. Buildings 3025 and 3026	2.1	<0.01	<0.01	--	0.44	11.1
5. Building 3019	16.0	<0.01	0.01	0.6	0.14	3.5
6. Fission Products Development Laboratory	28.6	<0.01	0.01	0.6	0.07	1.8
7. Waste Evaporator, Building 2531	102	0.01	0.51	32.1	0.73	18.5
8. Buildings 3525 and 3550	0.06	<0.01	<0.01	--	0.31	7.8
9. Building 2026	0.42	<0.01	<0.01	--	0.19	4.8

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from inleakage of ground water in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.08
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.01
Total activity in gases released		0.09

[a]Activity primarily ^{131}I as noted in text.

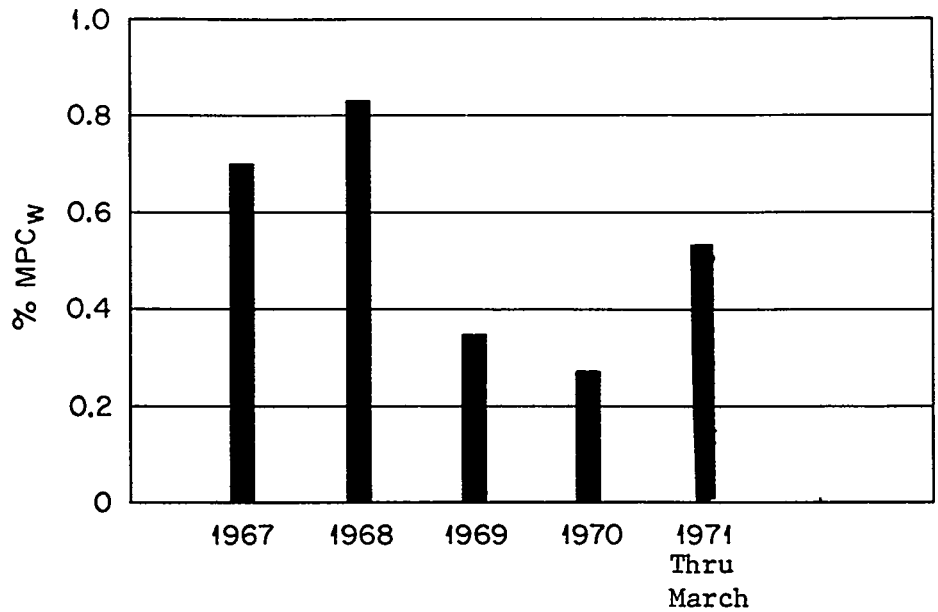

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

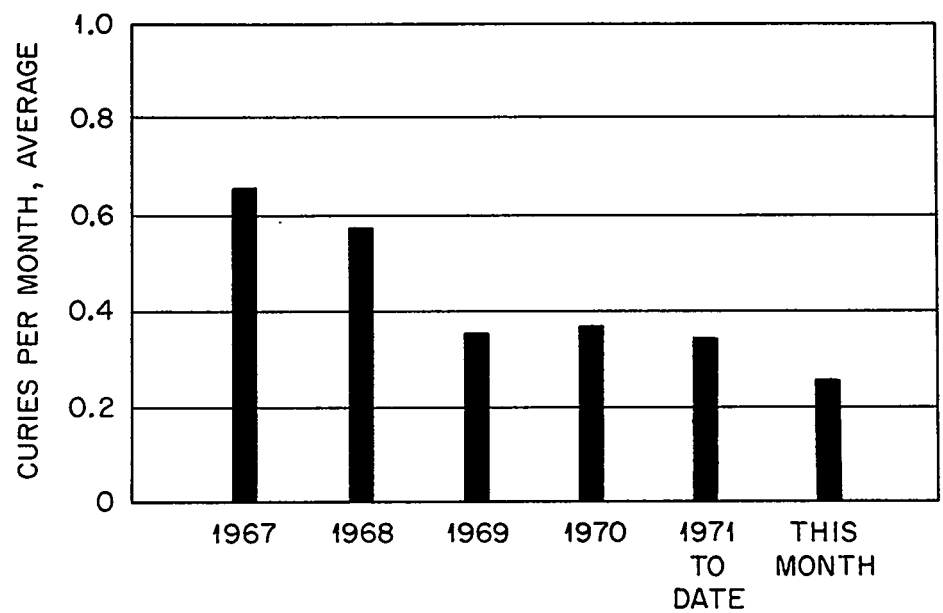

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

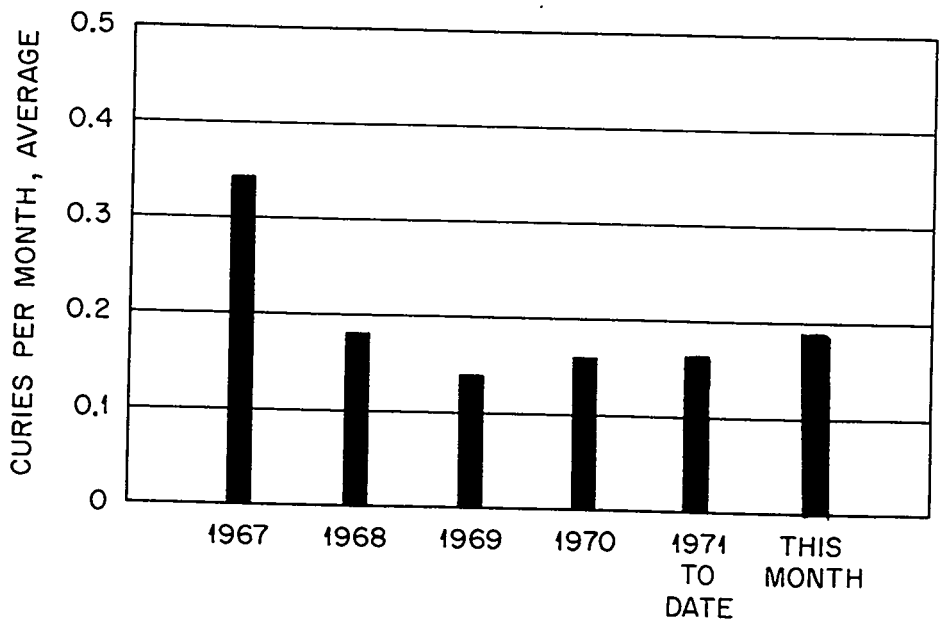

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

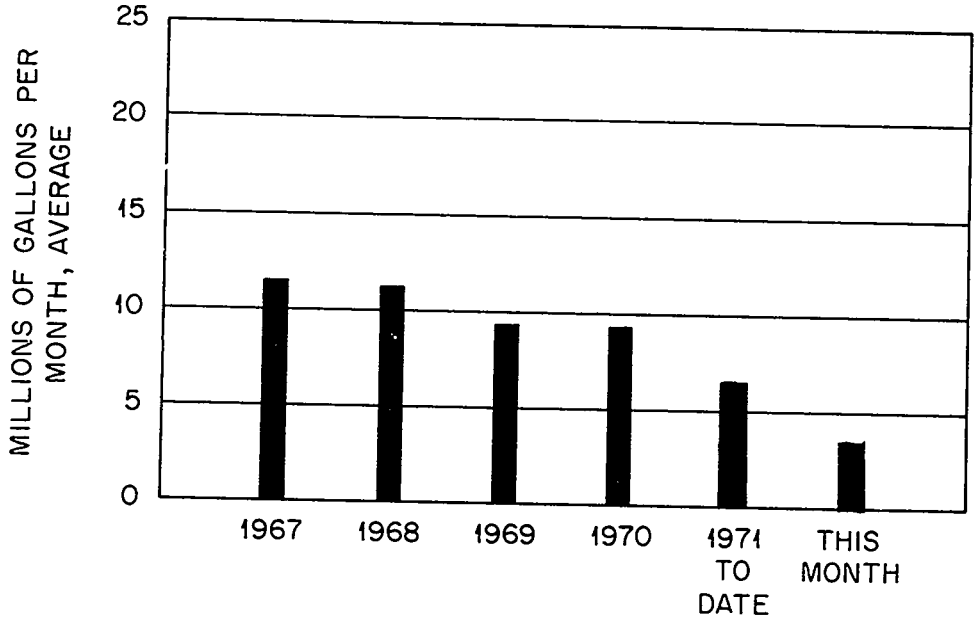

Fig. 4. Process Waste Volumes.

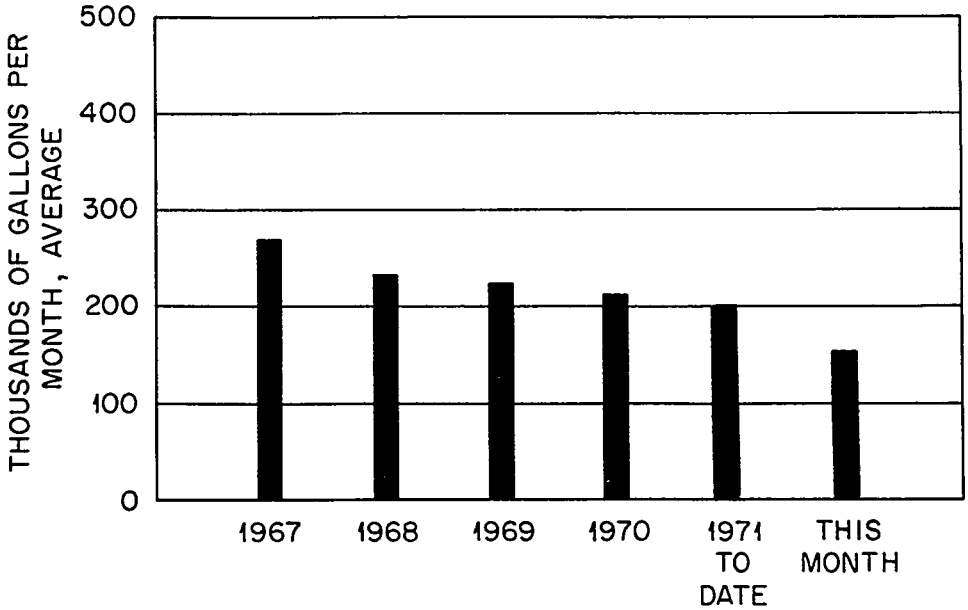

Fig. 5. Intermediate-Level Waste Volumes.

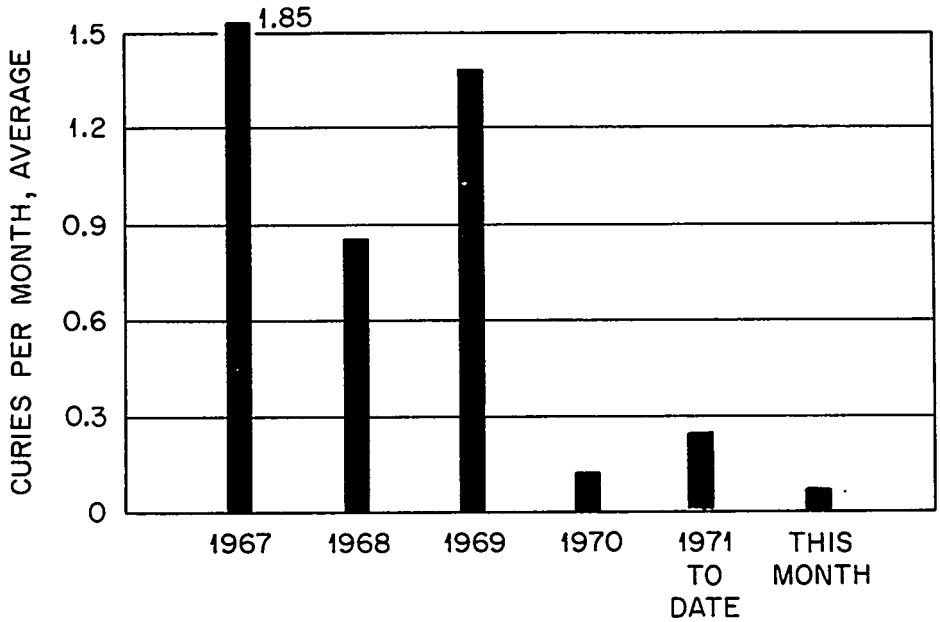

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

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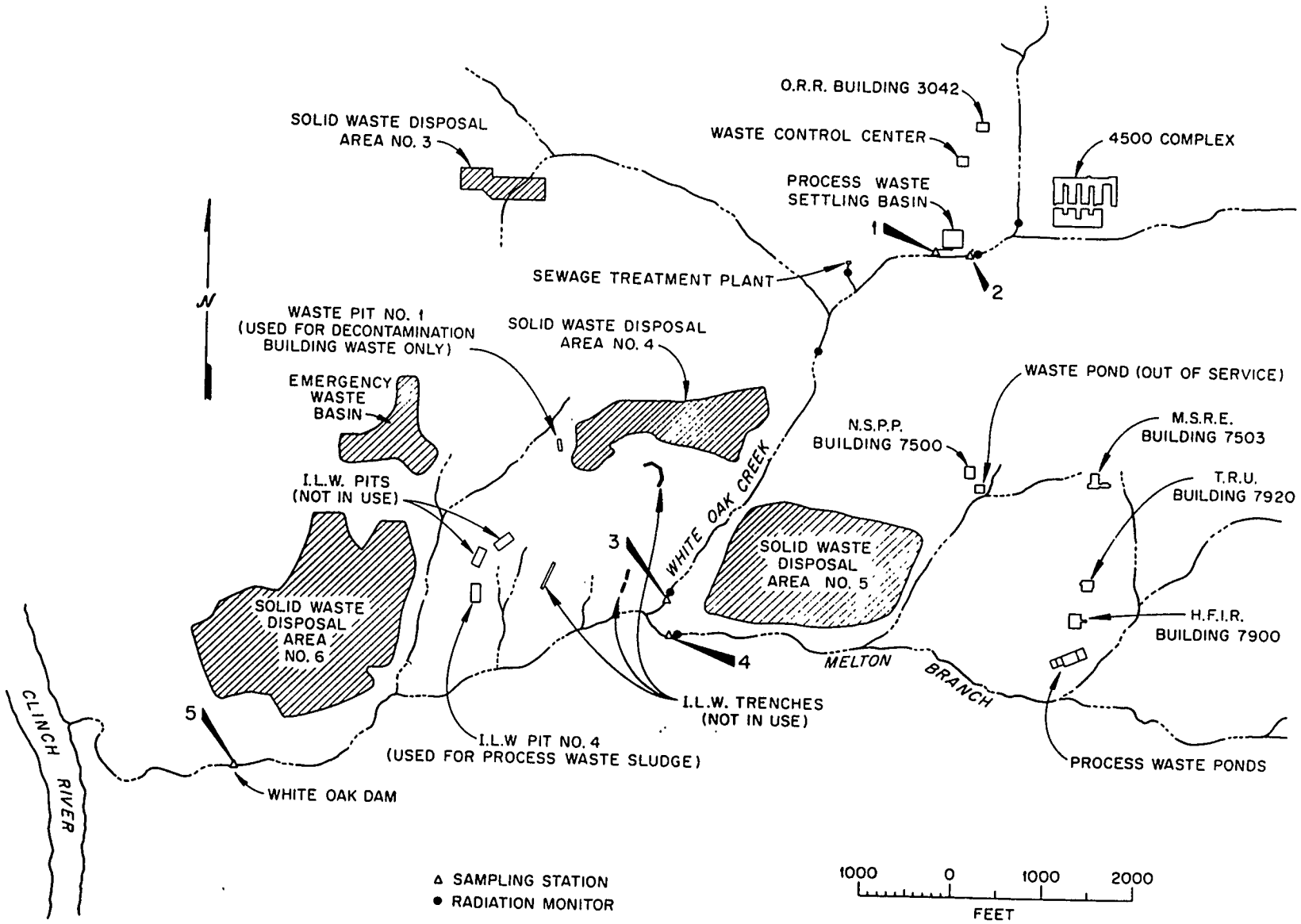

2056

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71-6-42

DATE: June 25, 1971

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TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

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David K Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The Health Physics measurements of contaminants released to the Clinch River, which had been reported each month in the past, are being reported on a quarterly basis. This change is reflected in Figure 1 and Table 1 and results from an effort to reduce analytical costs.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.5 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 78% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 281 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	216,000
Volume transferred to Evaporator	209,000
Tank Farm free space at beginning of month	406,000
Tank Farm free space at end of month	395,000
Evaporator concentrate returned to Tank Farm	4,000
Total volume of concentrate in Tank Farm	148,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	28,000
Fission Products Development Laboratory	26,000
ORR and BSR	24,000
High Flux Isotope Reactor	20,000
Radioisotopes Processing Area	22,000
Building 3026	14,000
4500 Complex	21,000

Work continued on the installation of the new waste transfer line from Melton Valley to Bethel Valley. Most of the single contained line across Haw Ridge has been installed and excavation for the double contained sections is underway. Final drawings for the pipeline are being prepared and should be completed soon.

GASEOUS WASTE

The ORNL stacks discharged 160 millicuries of ^{131}I this month. The alpha and particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged

less than 1.9% and 0.4%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Process waste	1	0.11	0.26
Miscellaneous discharges from east end of plant	2	0.02	0.19
Discharge from Bethel Valley Area	3	0.40	0.81
Discharge from Melton Valley Area	4	0.07	0.14
Total discharge from all sources	3,4	0.47	0.95
White Oak Dam to Clinch River (Health Physics measurement	5	---[c]	---[c]

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]Beginning April, 1971, this information is being provided on a quarterly basis.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	126[b]	0.36	0.83[b]	48.6	0.97	27.8
2. Radioisotopes Processing Area	384	0.19	0.71	41.6	0.27	7.8
3. Buildings 3503 and 3508	15	0.03	0.08	4.7	0.75	21.4
4. Buildings 3025 and 3026	8	<0.01	0.01	.5	0.20	5.7
5. Building 3019	19	<0.01	<0.01	--	0.07	2.0
6. Fission Products Development Laboratory	51	0.01	0.02	1.1	0.07	2.0
7. Waste Evaporator, Building 2531	11	0.01	0.06	3.5	0.75	21.4
8. Buildings 3525 and 3550	<0.01	<0.01	<0.01	--	0.17	4.8
9. Building 2026	0.20	<0.01	<0.01	--	0.25	7.1

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from inleakage of ground water in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.13
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.03[b]
Total activity in gases released		0.16

[a]Activity primarily ^{131}I as noted in text.

[b]This activity was released from the TRU processing area.

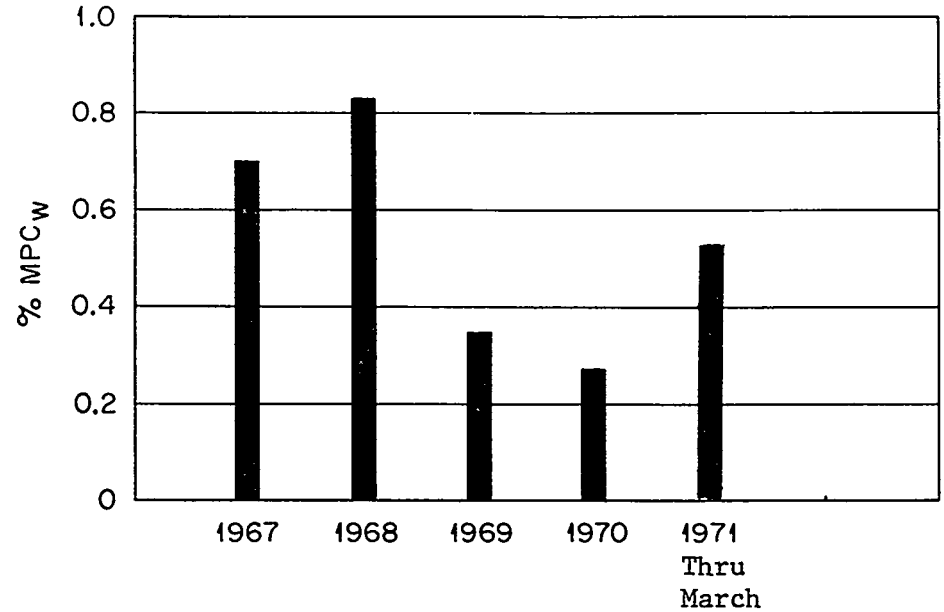

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

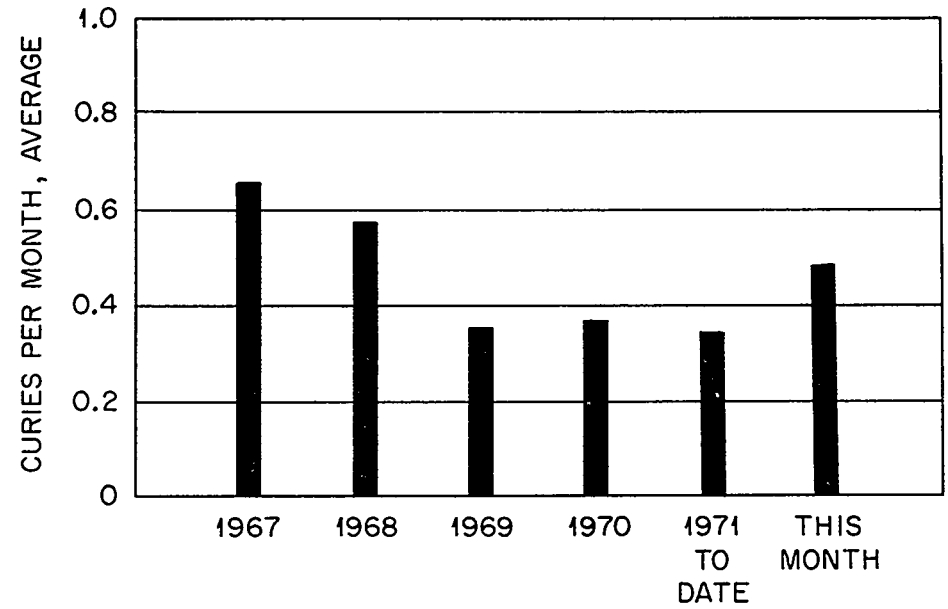

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

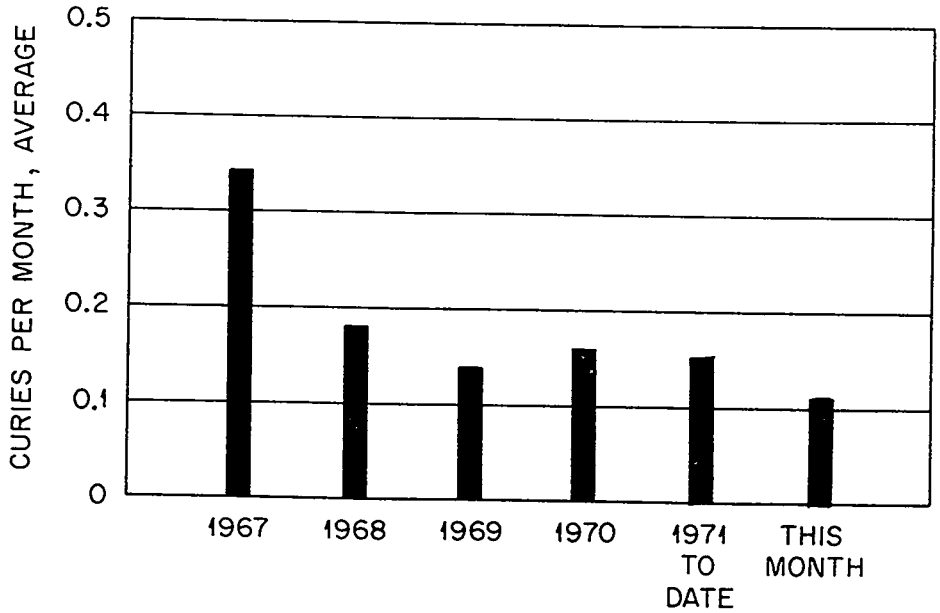

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

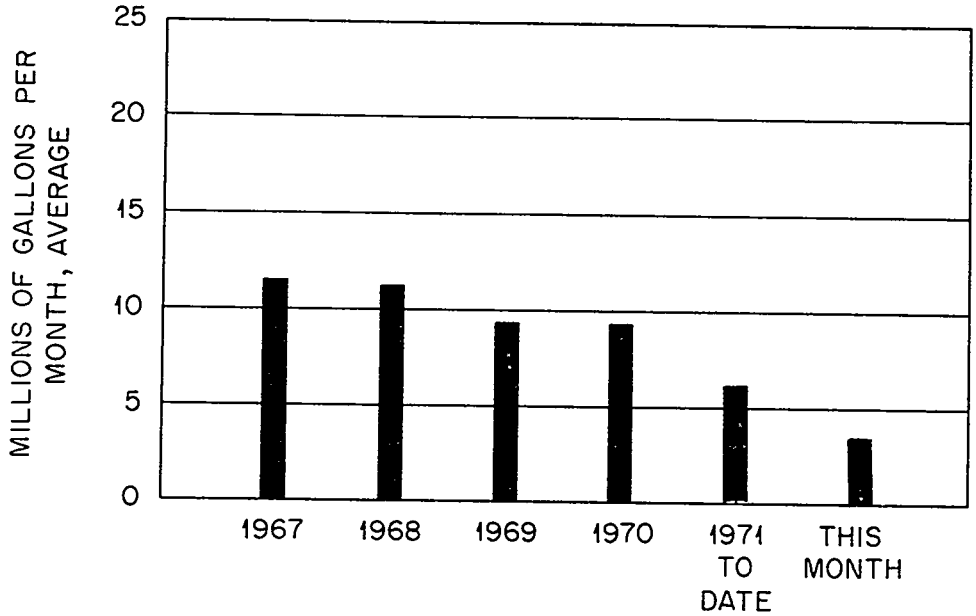

Fig. 4. Process Waste Volumes.

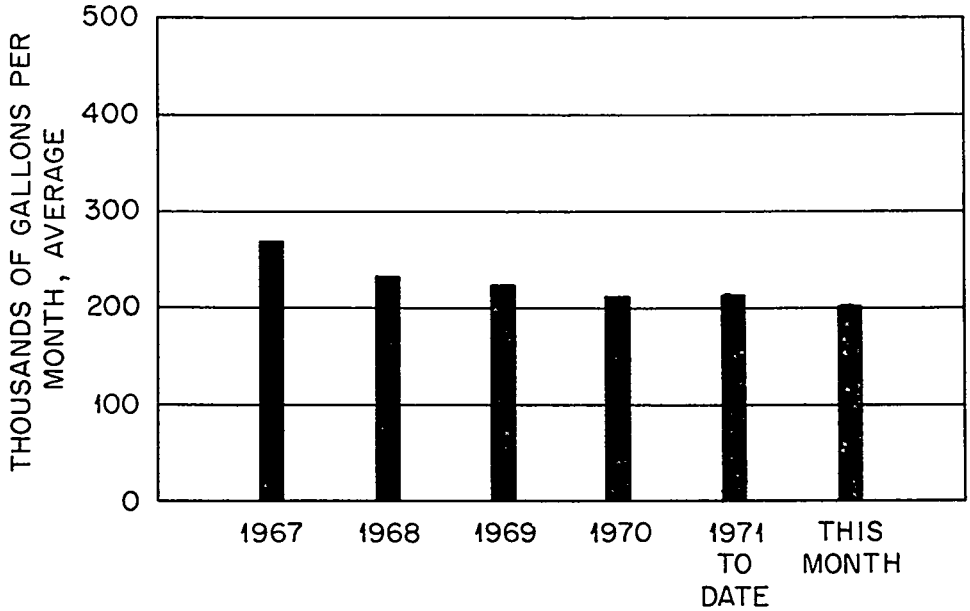

Fig. 5. Intermediate-Level Waste Volumes.

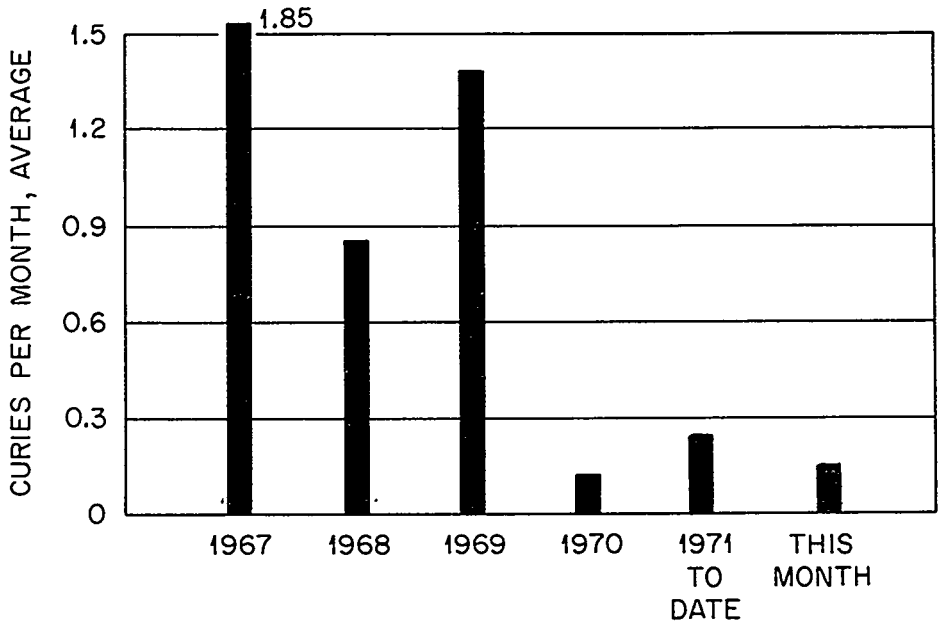

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

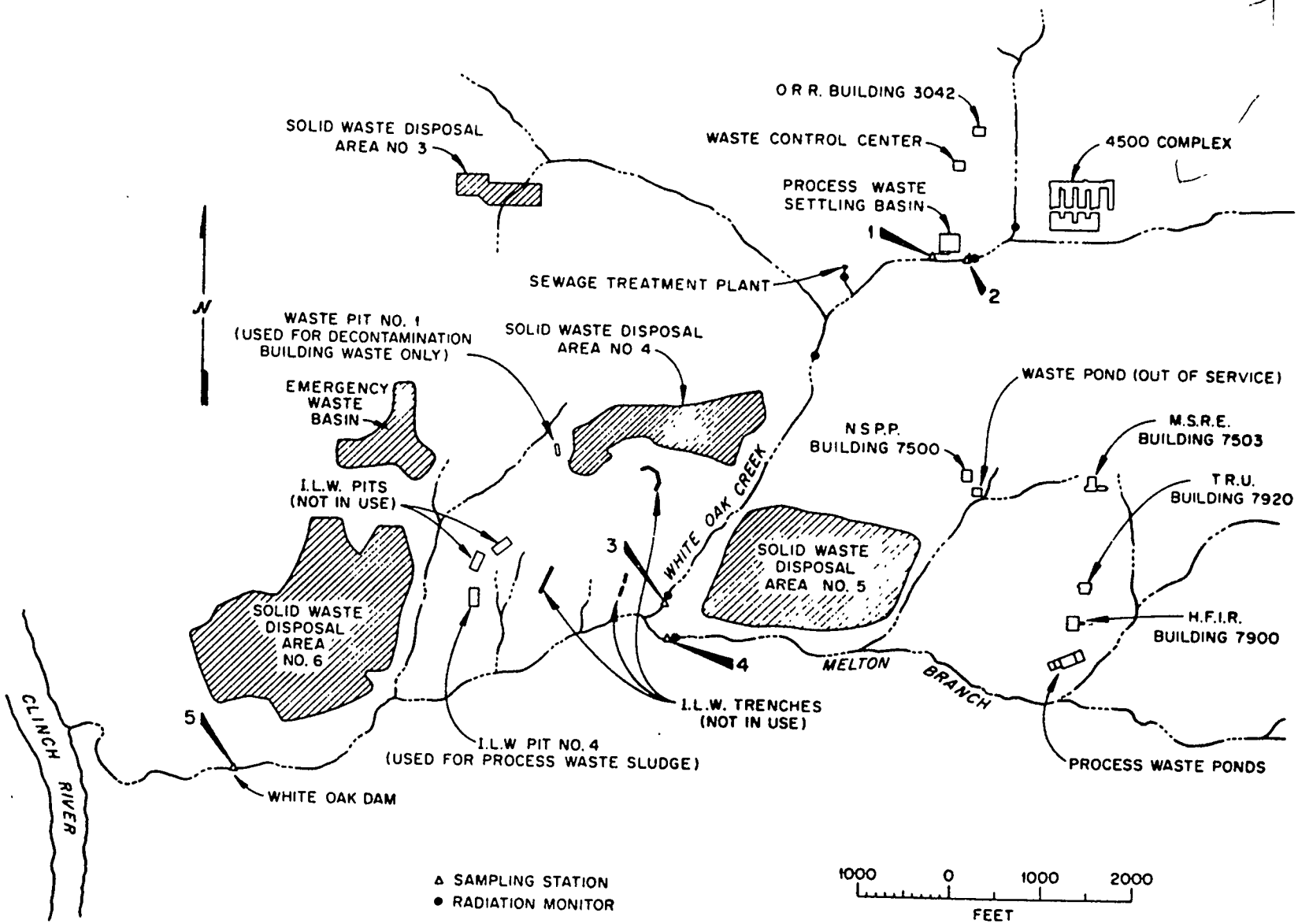

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

2056

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NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

AUG 24 1971

Special Distribution

ORNL
CENTRAL FILES NUMBER
71-8-29

DATE: August 17, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of June, 1971

TO: Distribution

FROM: G. J. Dixon, L. C. Lasher, and H. T. Russell

This document has been approved for release to the public by

David E. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The concentration of radionuclides in the river resulting from ORNL waste discharges during the quarter ending June, 1971, was 0.23% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine, contributing 72.6, 22.4, and 3.6%, respectively, to the calculated percent of the MPC_W.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.5 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 87% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 230 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	215,000
Volume transferred to Evaporator	166,000
Tank Farm free space at beginning of month	395,000
Tank Farm free space at end of month	342,000
Evaporator concentrate returned to Tank Farm	4,000
Total volume of concentrate in Tank Farm	157,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	20,000
Fission Products Development Laboratory	23,000
ORR and BSR	27,000
High Flux Isotope Reactor	26,000
Radioisotopes Processing Area	33,000
Building 3026	13,000
4500 Complex	15,000

Installation of the new waste transfer line from Melton Valley to Bethel Valley continued during the month. Ditching across the hill has been completed, and most of the single contained line has been installed.

GASEOUS WASTE

The ORNL stacks discharged 440 millicuries of ^{131}I this month. The alpha and particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.7% and 0.3%, respectively, of the calculated maximum permissible

operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6. As can be noted from Table 3, approximately 68% of the total release was from the TRU processing area.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.058	0.168
Miscellaneous discharges from east end of plant	2	0.007	0.043
Discharge from Bethel Valley Area	3	0.104	0.268
Discharge from Melton Valley Area	4	0.018	0.046
Total discharge from all sources	3,4	0.122	0.314
White Oak Dam to Clinch River (Health Physics measurement)	5	0.87[c]	2.0[c]

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]These figures represent the total for the quarterly period ending June, 1971.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	119[b]	0.38[b]	0.72	65.5	0.89	25.9
2. Radioisotopes Processing Area	318	0.14	0.35	31.8	0.16	4.7
3. Buildings 3503 and 3508	9.5	0.04	0.02	1.8	0.68	19.7
4. Buildings 3025 and 3026	5.4	<0.01	<0.01	-	0.20	5.8
5. Building 3019	5.9	<0.01	<0.01	-	0.18	5.2
6. Fission Products Development Laboratory	23.5	0.01	<0.01	-	0.09	2.6
7. Waste Evaporator, Building 2531	25.9	0.10	0.01	0.9	0.55	16.0
8. Buildings 3525 and 3550	0.03	<0.01	<0.01	-	0.37	10.8
9. Building 2026	0.90	<0.01	<0.01	-	0.32	9.3

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from inleakage of ground water in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.14
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.30[b]
Total activity in gases released		0.44

[a]Activity primarily ^{131}I as noted in text.

[b]This activity was released from the TRU processing area.

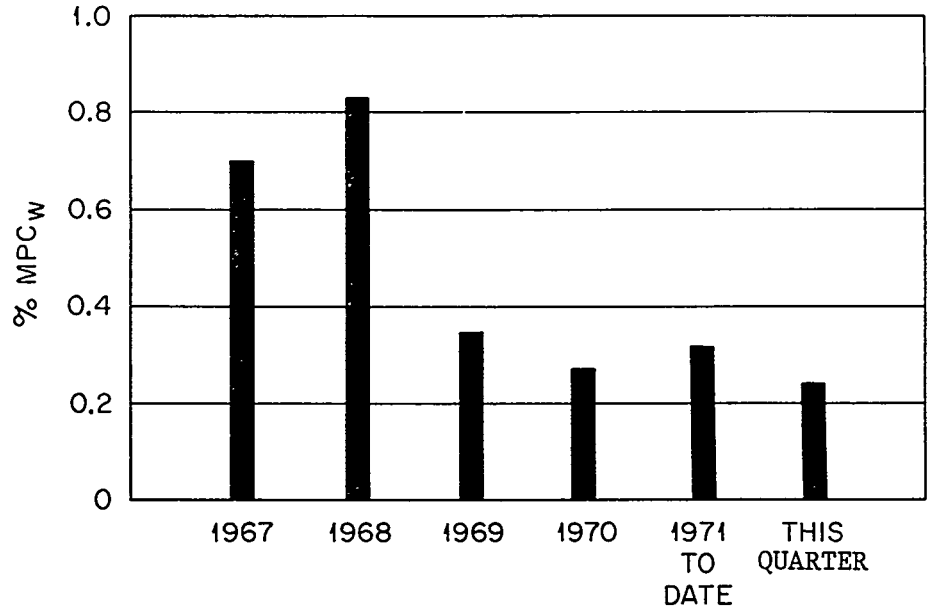

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

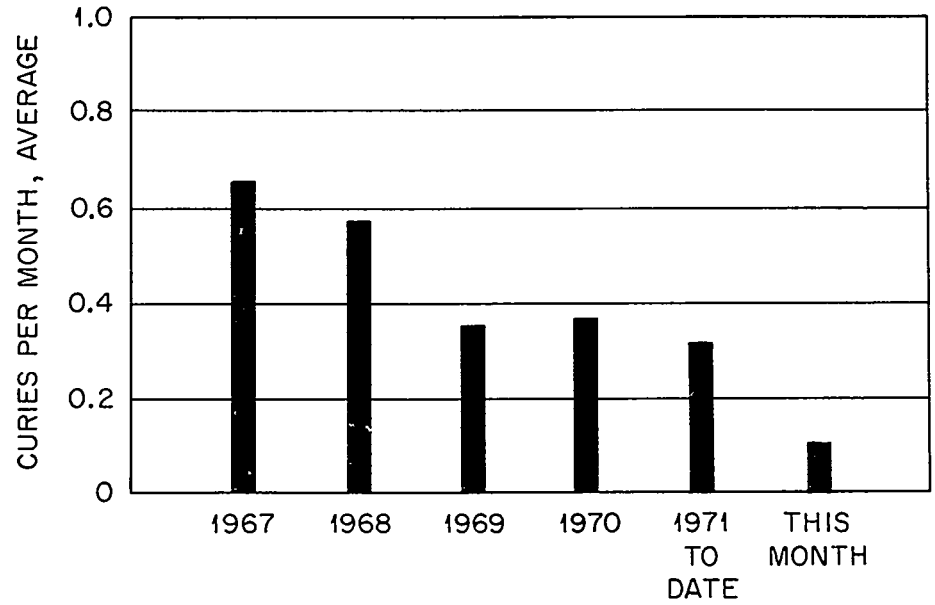

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

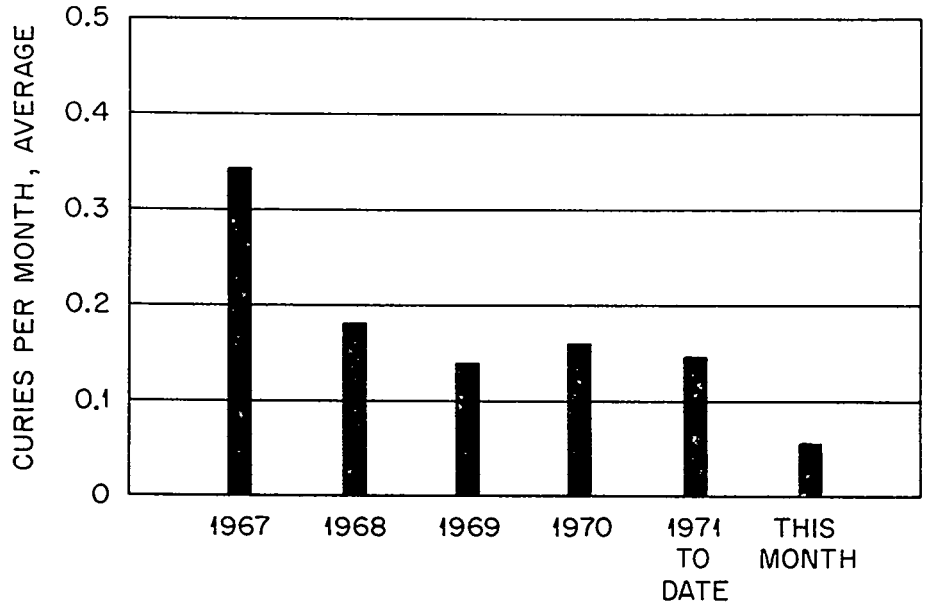

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

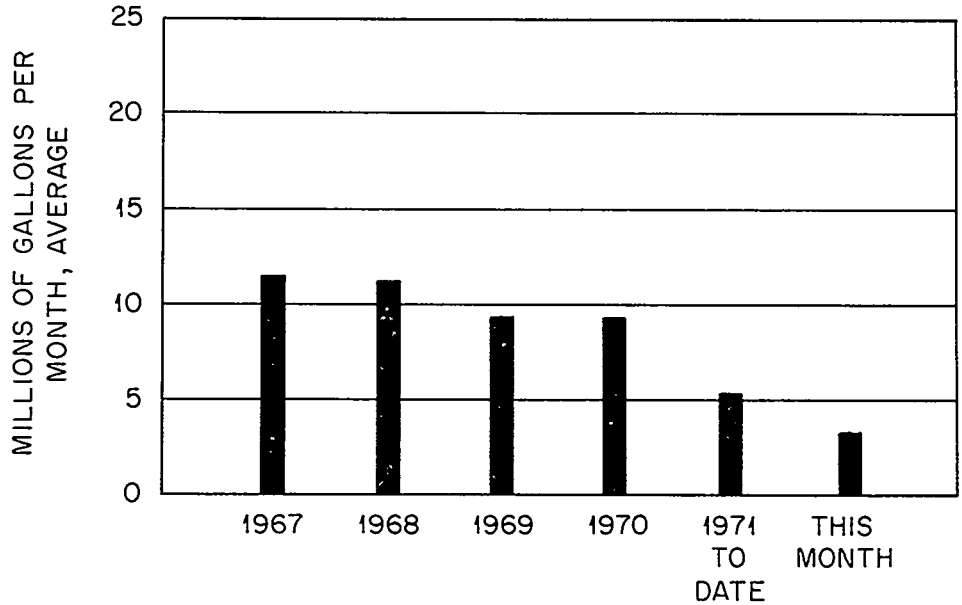

Fig. 4. Process Waste Volumes.

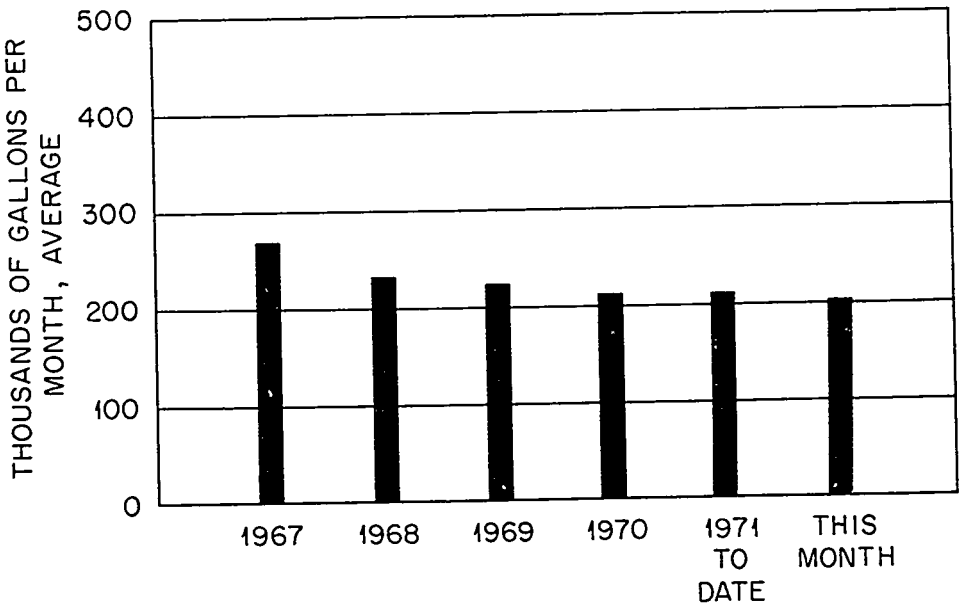

Fig. 5. Intermediate-Level Waste Volumes.

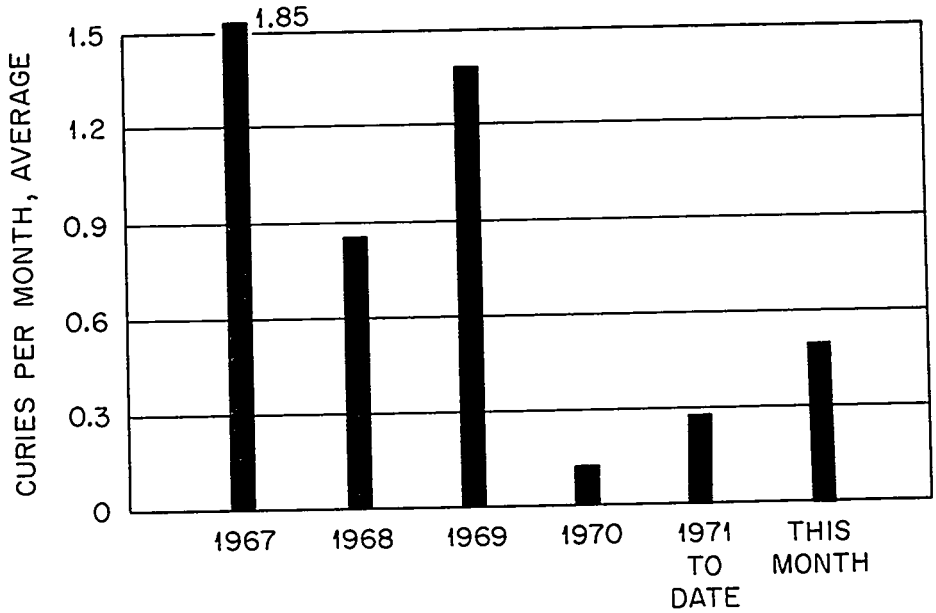

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

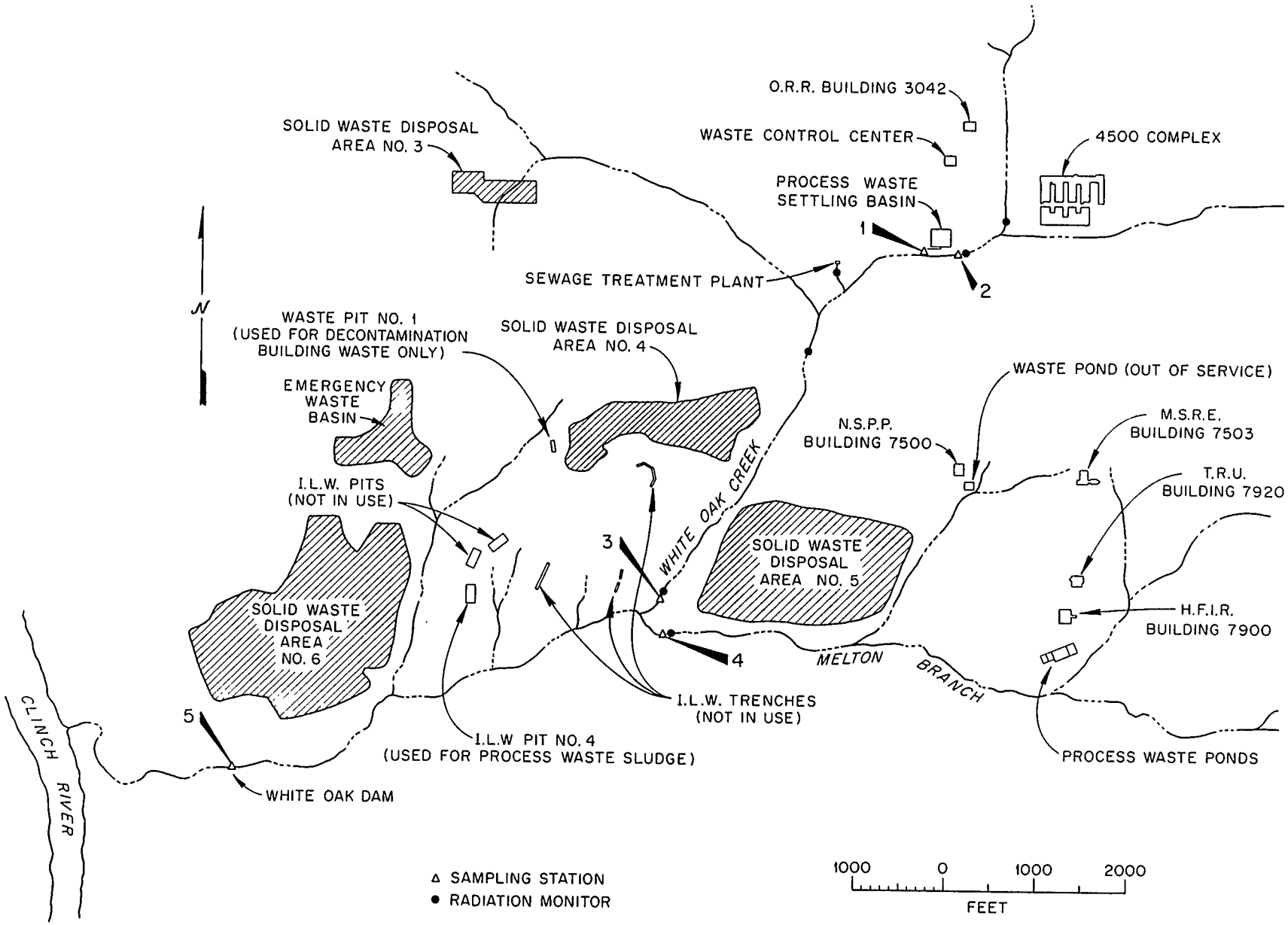

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

SEP 23 1971

2056

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OAK RIDGE, TENNESSEE 37830

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ORNL
CENTRAL FILES NUMBER
71-9-22

DATE: September 17, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of July, 1971

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release to the public by

David C Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of July, 1971, was 0.19% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.14% MPC_W, 0.04% MPC_W, and 0.005% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.8 million gallons of contaminated water was chemically treated this month. Gross-beta analyses of the influent and effluent streams indicate that 86% of the activity was removed. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

During the four-month period of April, 1971, through July, 1971, the volume of process waste generated has averaged 3.9 million gal/mo, less than one-half the rate experienced in recent years. Also during this period, the average monthly release of $^{89,90}Sr$ in process waste discharged to White Oak Creek was 87 mCi which is 55% lower than that experienced in the previous 12 months.

The reduction in volume resulted from an effort initiated in September, 1970, to divert unnecessary water from Buildings 3042, 3025, and 3525 to the storm sewer. The reduction was far greater than had been anticipated. The decrease in the strontium activity appears to be

a result of an improvement in the efficiency of the Process Waste Treatment Plant caused by the reduction in the rate of processing. The process waste discharge of strontium activity to the creek during the four months represents only 36% of the total strontium released to White Oak Lake as compared to 40%, and more, which had been reported in previous years.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 275 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	223,000
Volume transferred to Evaporator	205,000
Tank Farm free space at beginning of month	342,000
Tank Farm free space at end of month	318,000
Evaporator concentrate returned to Tank Farm	6,000
Total volume of concentrate in Tank Farm	171,000*

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,000
Fission Products Development Laboratory	22,000
ORR and BSR	25,000
High Flux Isotope Reactor	15,000
Radioisotopes Processing Area	41,000
Building 3026	22,000

Installation of the new waste transfer line from Melton Valley to Bethel Valley continued during the month. All of the two-inch pipe across Haw Ridge has been welded, examined, and tested. The design for all of the jacketed portions of the line has been completed.

*Inleakage into W-8 Tank amounted to 8,000 gallons.

GASEOUS WASTE

The ORNL stacks discharged 640 millicuries of ^{131}I this month. The alpha and particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.2%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

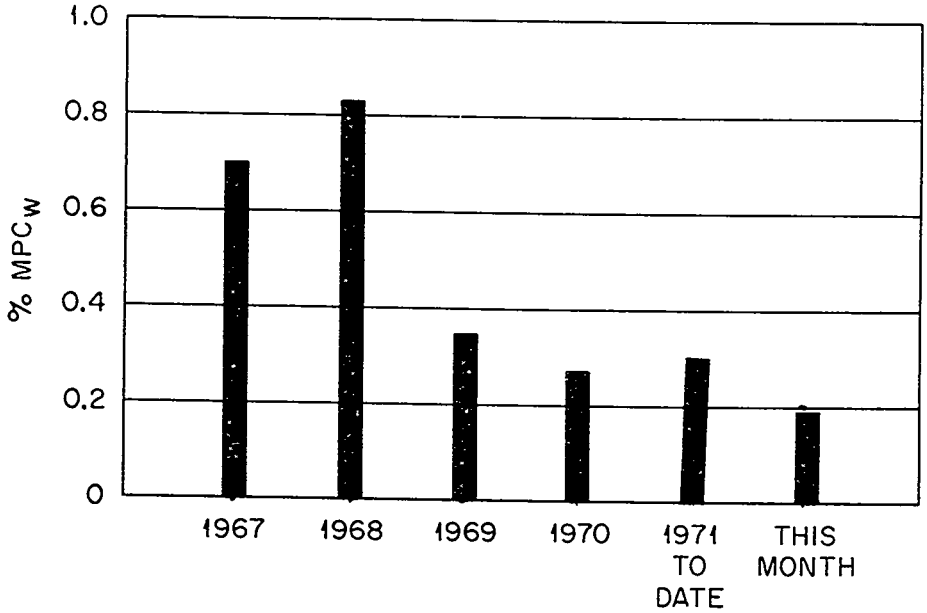

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

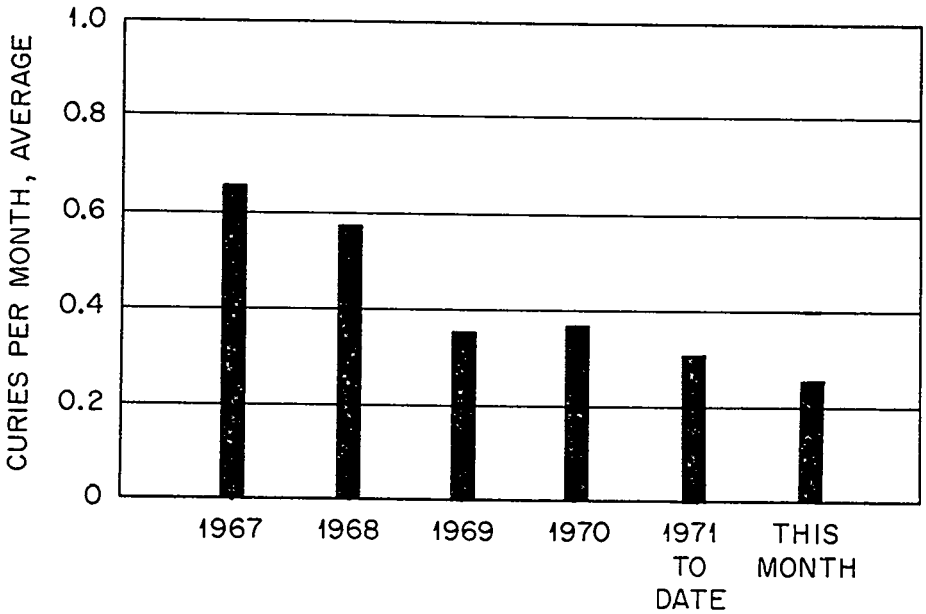

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

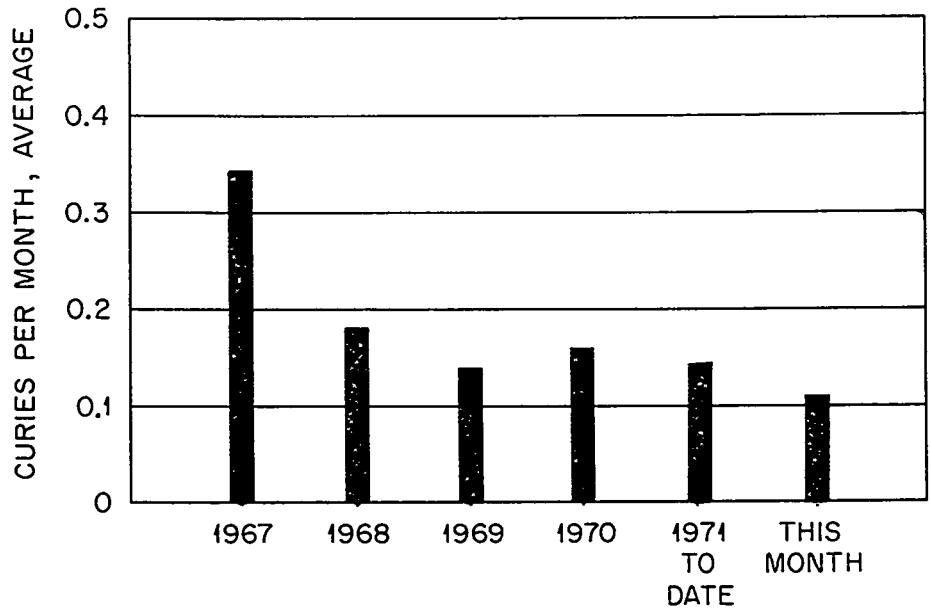

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

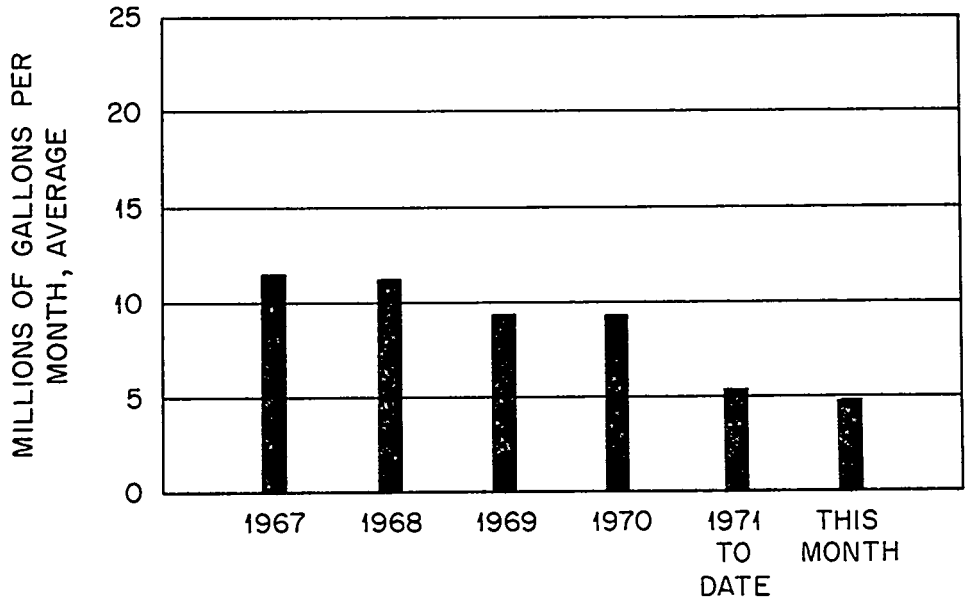

Fig. 4. Process Waste Volumes.

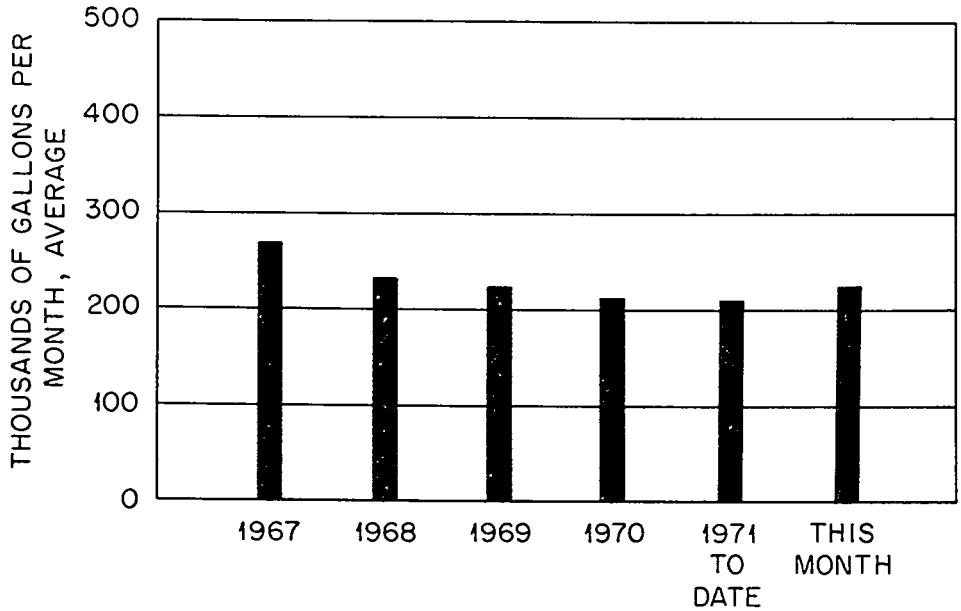

Fig. 5. Intermediate-Level Waste Volumes.

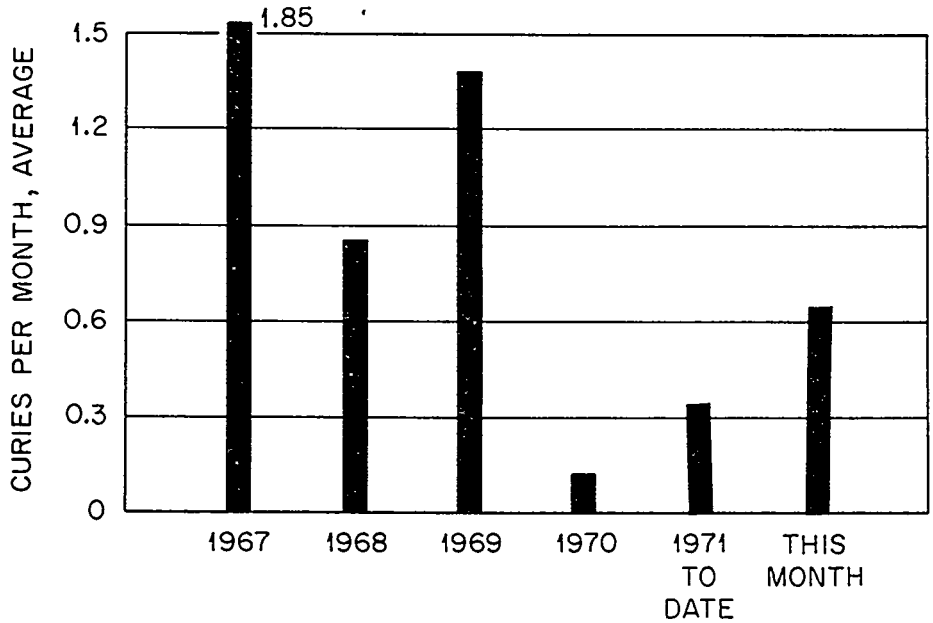

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.11	0.40
Miscellaneous discharges from east end of plant	2	0.01	0.06
Discharge from Bethel Valley Area	3	0.22	0.73
Discharge from Melton Valley Area	4	0.04	0.08
Total discharge from all sources	3,4	0.26	0.81
White Oak Dam to Clinch River (Health Physics measurement)	5	0.20	0.62

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

TABLE 2

PROCESS WASTE DISCHARGES

	Gross Beta Activity Average c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	% of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	129	0.50[b]	1.02	61.8	1.16	30.5
2. Radioisotopes Processing Area	350	0.13	0.31	18.9	0.13	3.4
3. Buildings 3503 and 3508	11.5	0.02	0.06	3.6	0.79	20.8
4. Buildings 3025 and 3026	10	<0.01	0.02	1.2	0.27	7.1
5. Building 3019	66	<0.01	0.02	1.2	0.05	1.3
6. Fission Products Development Laboratory	26	<0.01	0.02	1.2	0.10	2.6
7. Waste Evaporator, Building 2531	50	0.02	0.20	12.1	0.58	15.3
8. Buildings 3525 and 3550	<0.05	<0.01	<0.01	-	0.50	13.2
9. Building 2026	2.2	<0.01	<0.01	-	0.22	5.8

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from inleakage of ground water in the Radioisotopes Area.

TABLE 3

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.57[b]
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.07
Total activity in gases released		0.64

[a]Activity primarily ^{131}I as noted in text.

[b]This activity was released from the Radioisotopes Area.

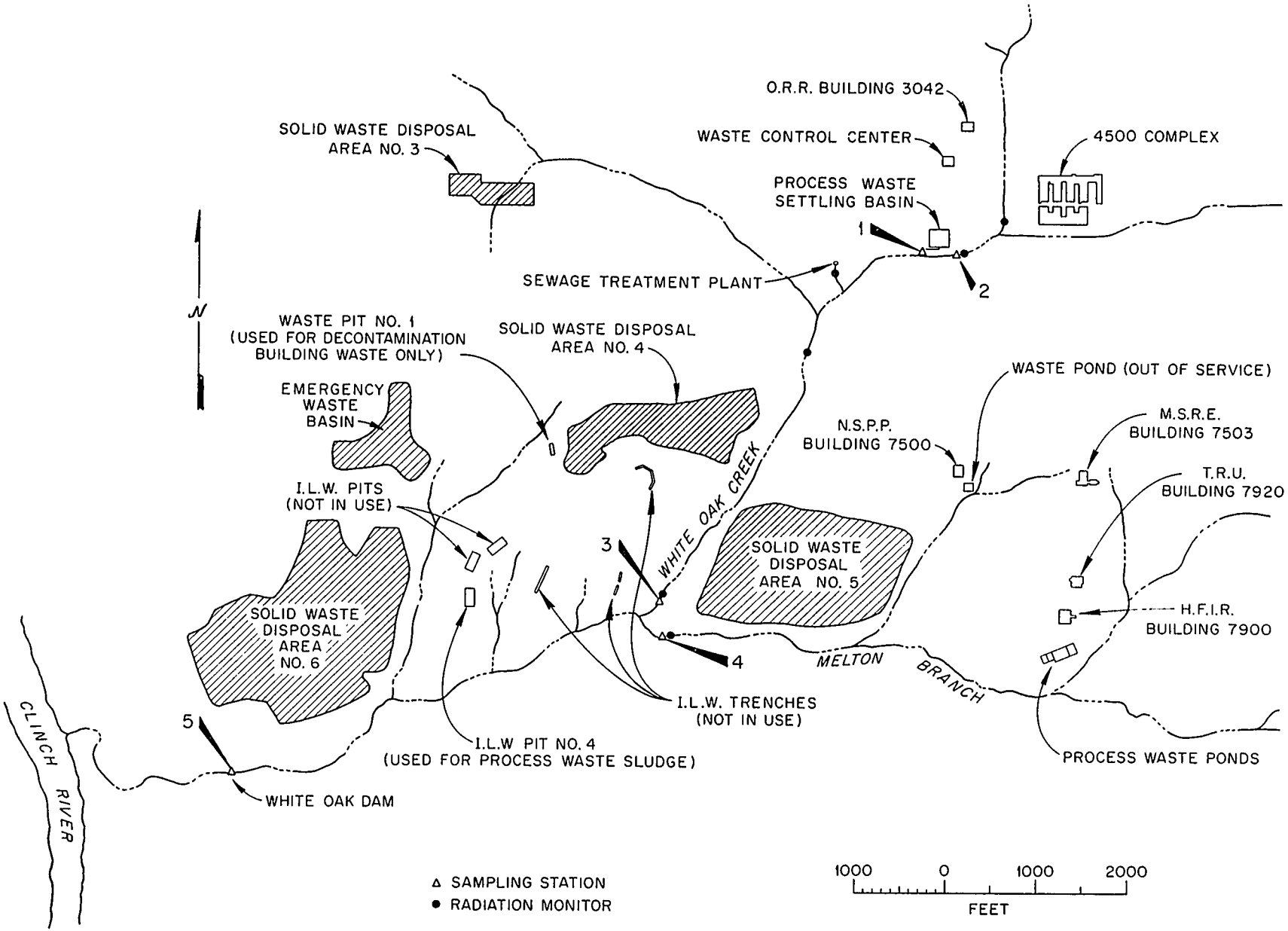

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

2056

DATE ISSUED: OCT 8 1971

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OAK RIDGE, TENNESSEE 37830

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ORNL-71-1
CENTRAL FILES NUMBER
71-9-32

DATE: September 30, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of August, 1971

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release to the public by

David F. Hamrin 7/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1971, was 0.185% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.147% MPC_W, 0.02% MPC_W, and 0.015% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.5 million gallons of contaminated water was chemically treated this month. Analyses of the Waste Treatment Plant influent and effluent streams indicate that the removal efficiency was 74% for both the ^{90}Sr and gross-beta activities. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 320 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	261,000
Volume transferred to Evaporator	238,000
Tank Farm free space at beginning of month	318,000
Tank Farm free space at end of month	291,000

	Gallons
Evaporator concentrate returned to Tank Farm	4,000
Volume of concentrate available for hydrofracture	184,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	25,000
Fission Products Development Laboratory	19,000
ORR and BSR	26,000
High Flux Isotope Reactor	50,000
Radioisotopes Processing Area	34,000
Building 3026	15,000
4500 Complex	14,000

Installation of the new waste transfer line from Melton Valley to Bethel Valley continued during the month. A procedure for field cleaning, fabrication, and examination of the jacketed portion of the line was issued to Rust Engineering Company for their use. All of the Title II design was completed.

GASEOUS WASTE

The ORNL stacks discharged 470 millicuries of ^{131}I this month. The alpha and particulate activities released during the period were not significant. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

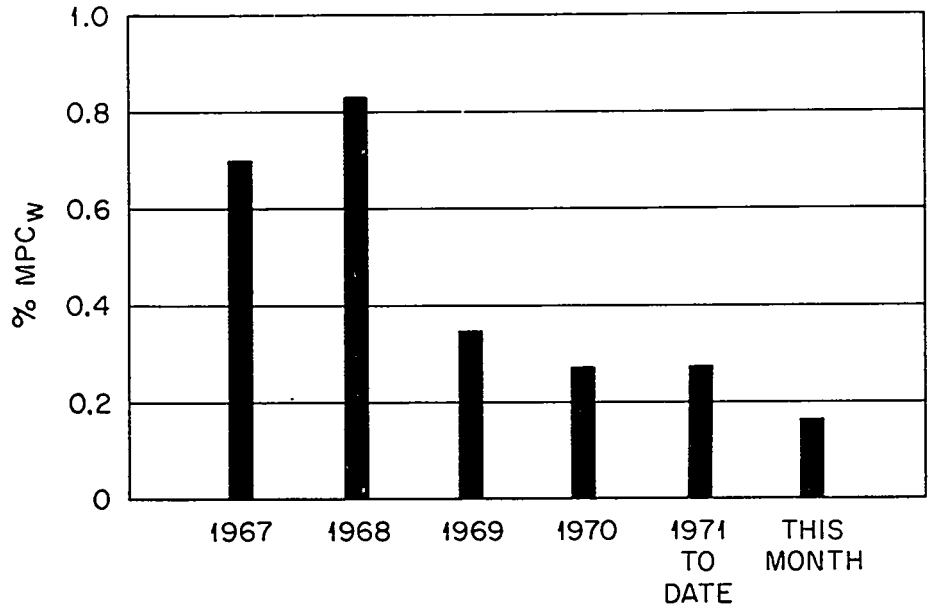
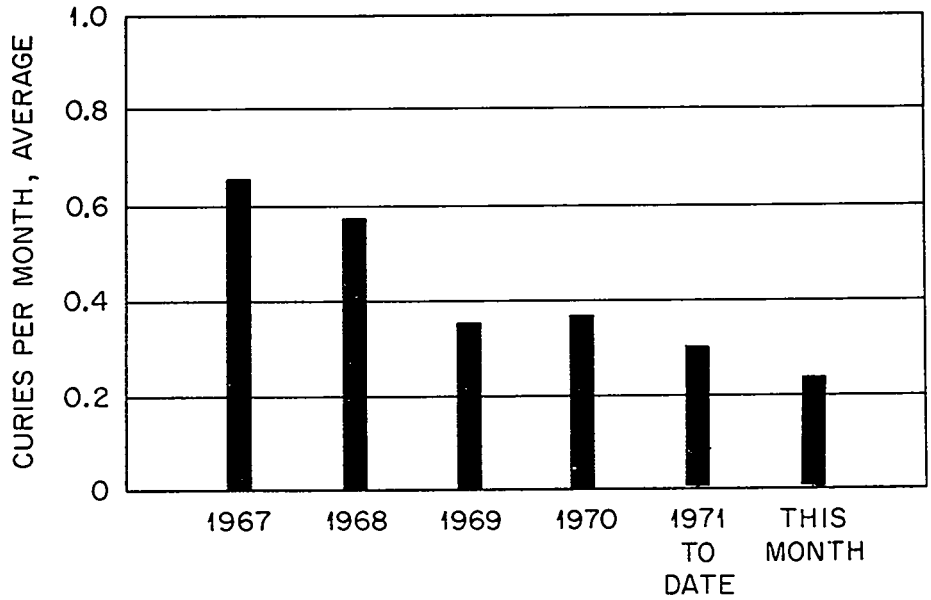


Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)



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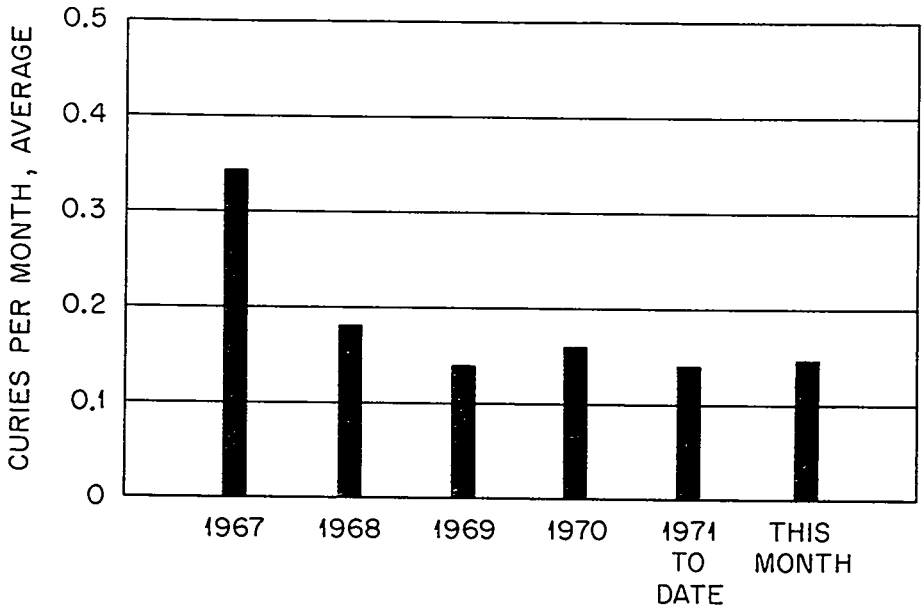

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

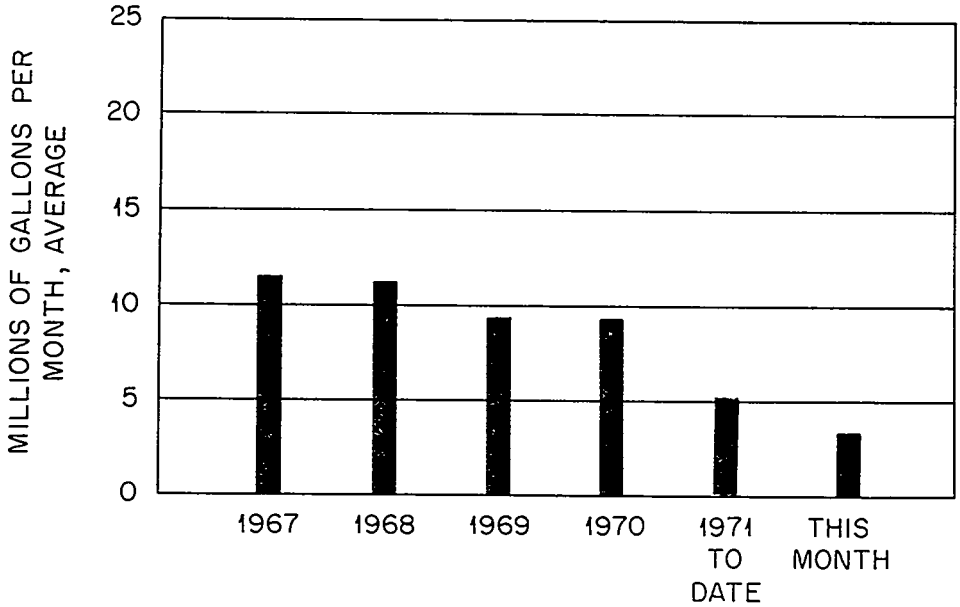

Fig. 4. Process Waste Volumes.

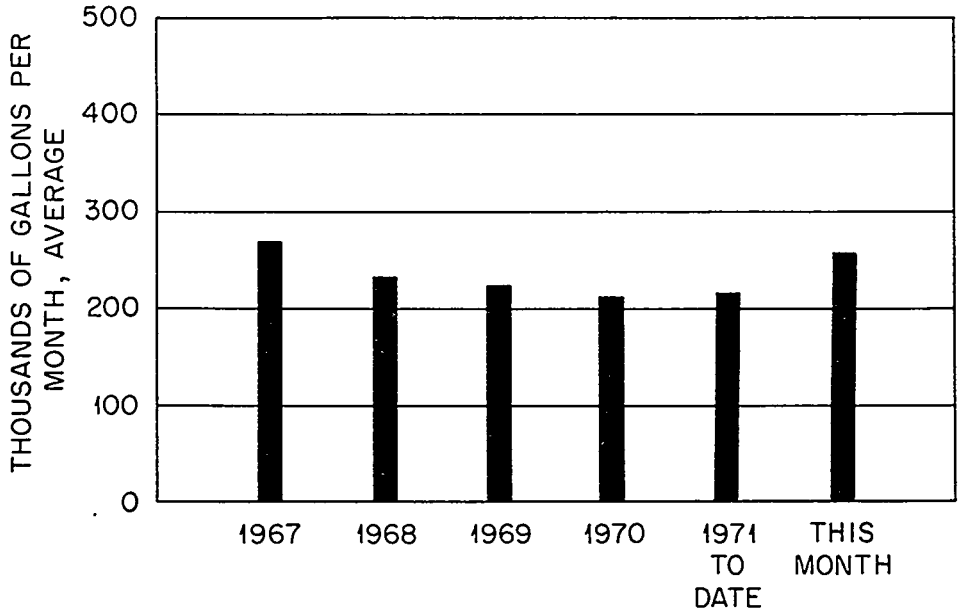

Fig. 5. Intermediate-Level Waste Volumes.

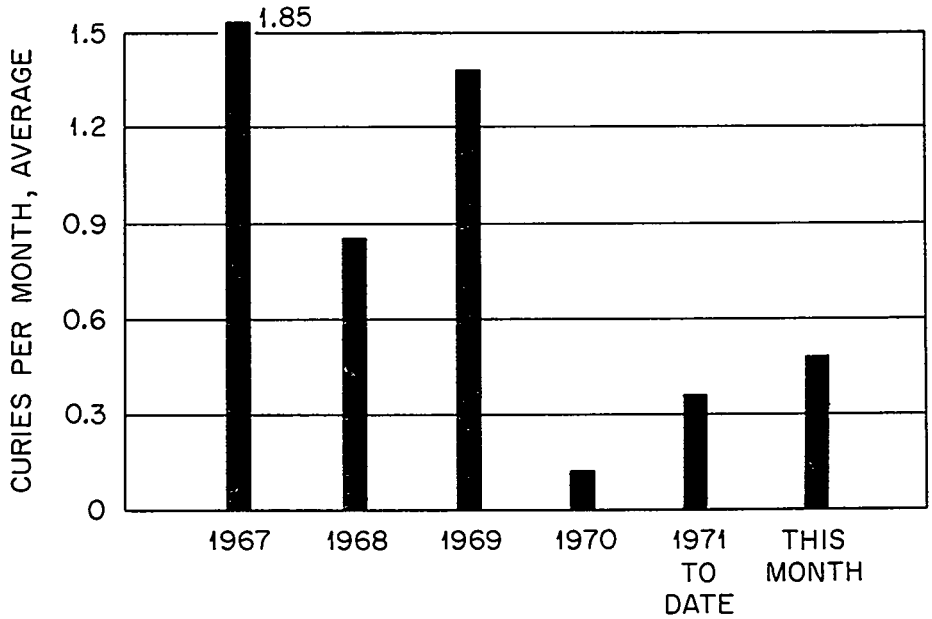

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.15	0.37
Miscellaneous discharges from east end of plant	2	0.03	0.10
Discharge from Bethel Valley area	3	0.22	0.48
Discharge from Melton Valley area	4	0.03	0.07
Total discharge from all sources	3,4	0.25	0.55
White Oak Dam to Clinch River (Health Physics measurement)	5	0.22	0.55

[a]Refers to Figure 7.

[b]Approximation based on an estimated average couting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process Waste Discharges

	Gross Beta Activity Average c/m/ml	^{90}Sr, Curies	Gross Beta Activity[a] Curies	Gross Beta Activity[a] % of Total	Million Gallons	% of Total
1. Reactor Operations and Radioisotopes Area	88	0.35[b]	0.65	56.0	1.08	30.2
2. Radioisotopes Processing Area	204	0.04	0.11	9.5	0.08	2.2
3. Buildings 3503 and 3508	12.8	0.02	0.05	4.3	0.54	15.1
4. Buildings 3025 and 3026	5.5	<0.01	0.01	0.9	0.38	10.6
5. Building 3019	4	<0.01	<0.01	-	0.05	1.4
6. Fission Products Development Laboratory	3	-	<0.01	-	0.07	2.0
7. Waste Evaporator, Building 2531	40.1	0.03	0.20	17.2	0.72	20.1
8. Buildings 3525 and 3550	1.2	<0.01	<0.01	-	0.44	12.3
9. Building 2026	90.6	0.02	0.14	12.1	0.22	6.1

[a]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[b]All of the strontium activity entered this system through inleakage of contaminated ground water in the Radioisotopes Area. More than two-thirds of the flow in this system originates from inleakage of ground water in the Radioisotopes Area.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.44[b]
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.03
Total activity in gases released		0.47

[a]Activity primarily ^{131}I as noted in text.

[b]This activity was released from the Radioisotopes Area.

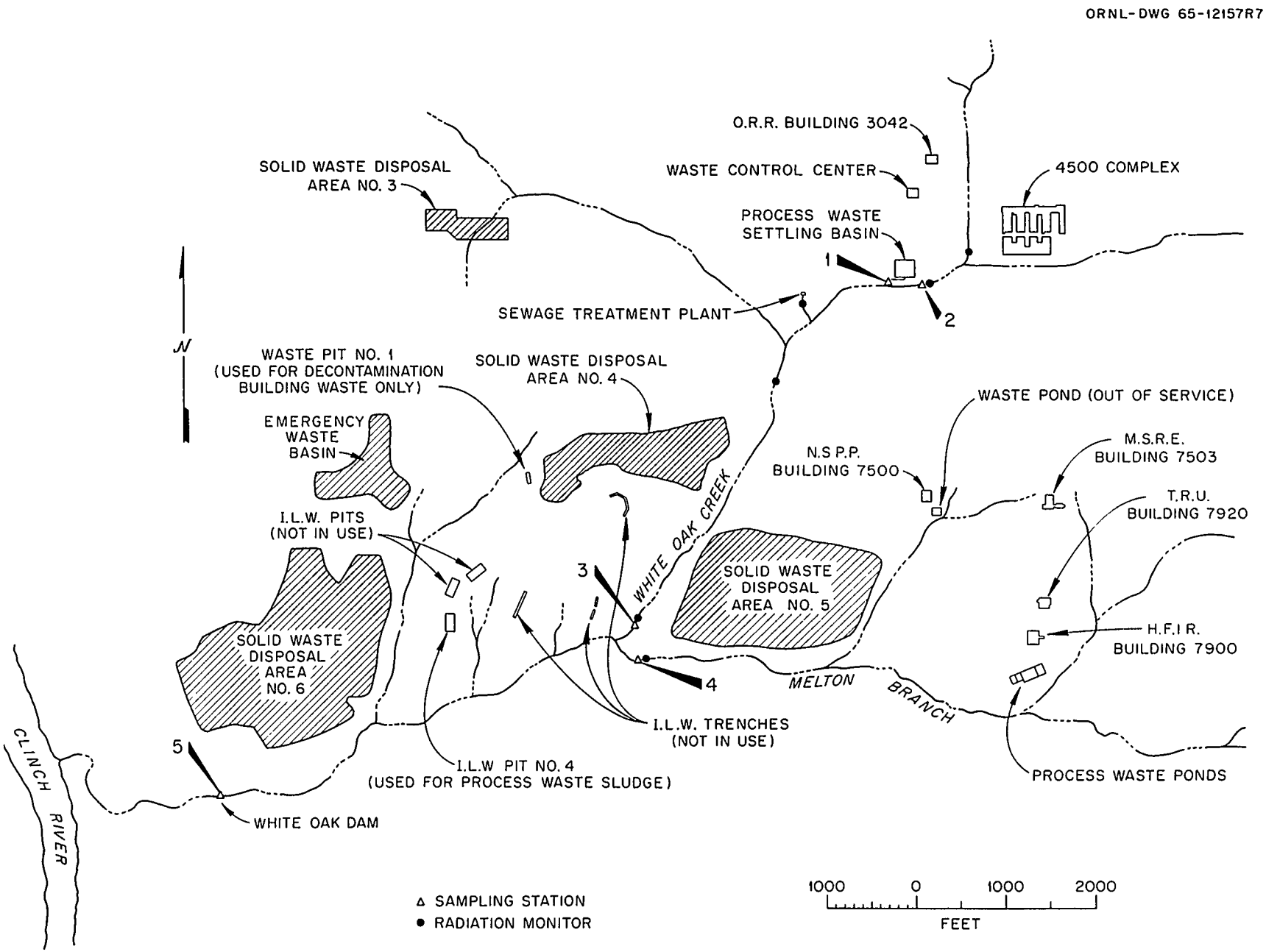

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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ORNL
CENTRAL FILES NUMBER
71-11-8

DATE: November 4, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of September, 1971

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1971, was 0.12% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.09% MPC_W, 0.02% MPC_W, and 0.008% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.6 million gallons of contaminated water was chemically treated this month. Analyses of the Waste Treatment Plant influent and effluent streams indicate that the removal efficiencies were 74% and 58% for the ^{90}Sr and gross-beta activities, respectively. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 349 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	261,000
Volume transferred to Evaporator	251,000
Tank Farm free space at beginning of month	291,000
Tank Farm free space at end of month	273,000
Evaporator concentrate returned to Tank Farm	8,000
Volume of concentrate available for hydrofracture	196,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,000
Fission Products Development Laboratory	16,000
ORR and BSR	33,000
High Flux Isotope Reactor	25,000
Radioisotopes Processing Area	32,000
4500 Complex	19,000

Installation of the new waste transfer line from Melton Valley to Bethel Valley continued during the month. A quality assurance audit of the project was conducted on September 27, 1971.

GASEOUS WASTE

The ORNL stacks discharged 90 millicuries of ^{131}I this month. The filterable particulate activities released during the period amounted to about 205 microcuries. Inert gases released from the 3039 and 7911 stacks averaged less than 2.1% and 0.2%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases of ^{131}I are compared on a monthly basis in Figure 6.

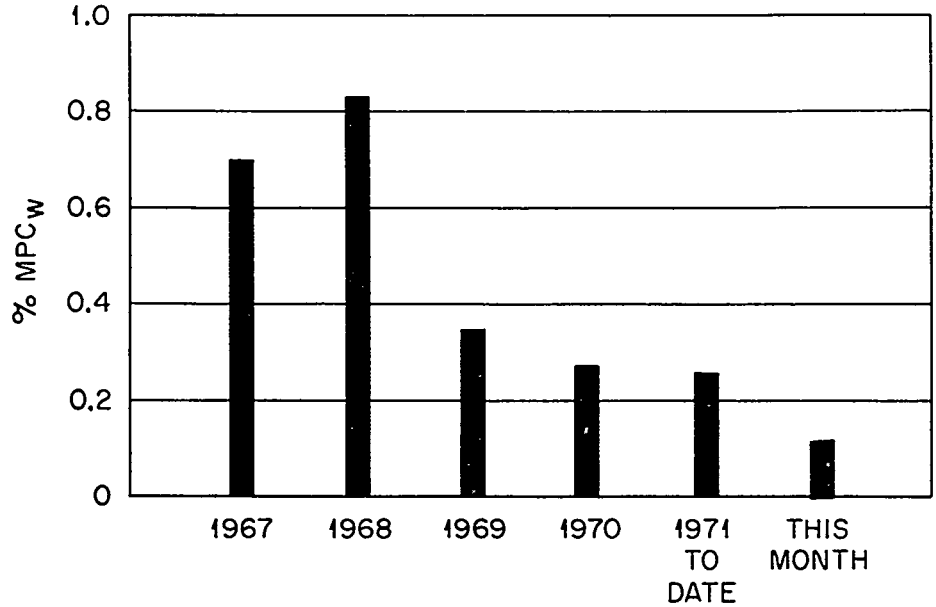

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

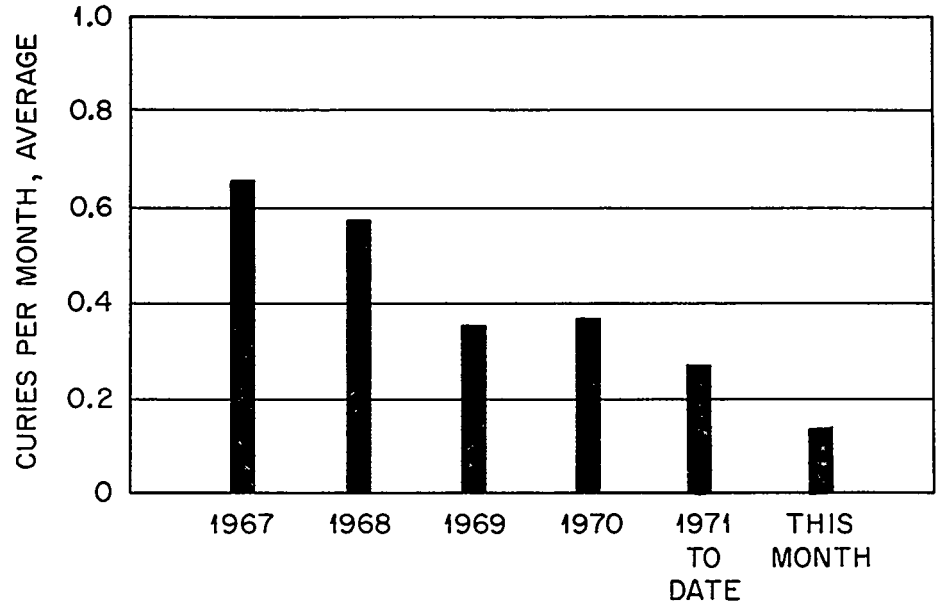

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

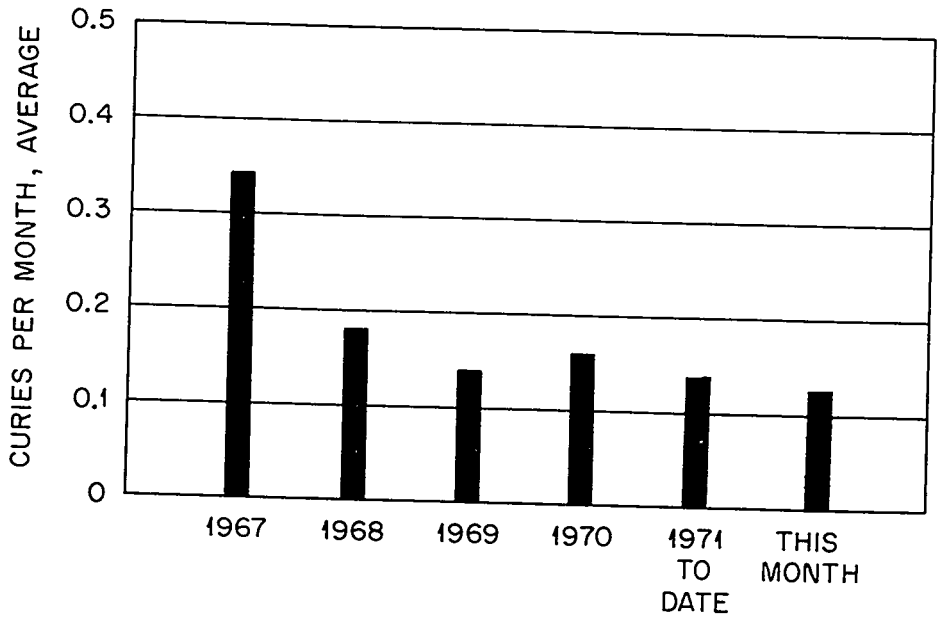

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

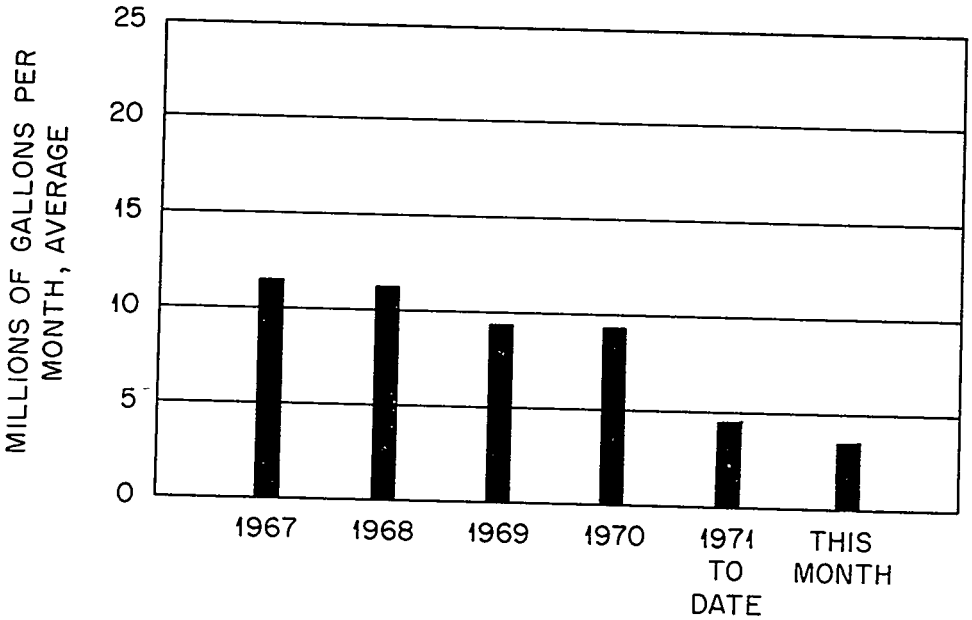

Fig. 4. Process Waste Volumes.

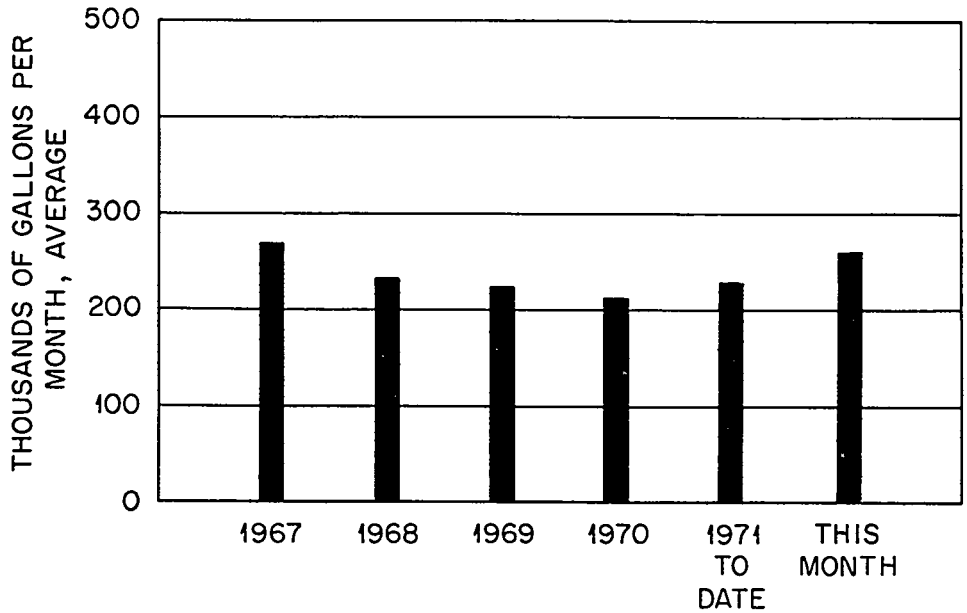

Fig. 5. Intermediate-Level Waste Volumes.

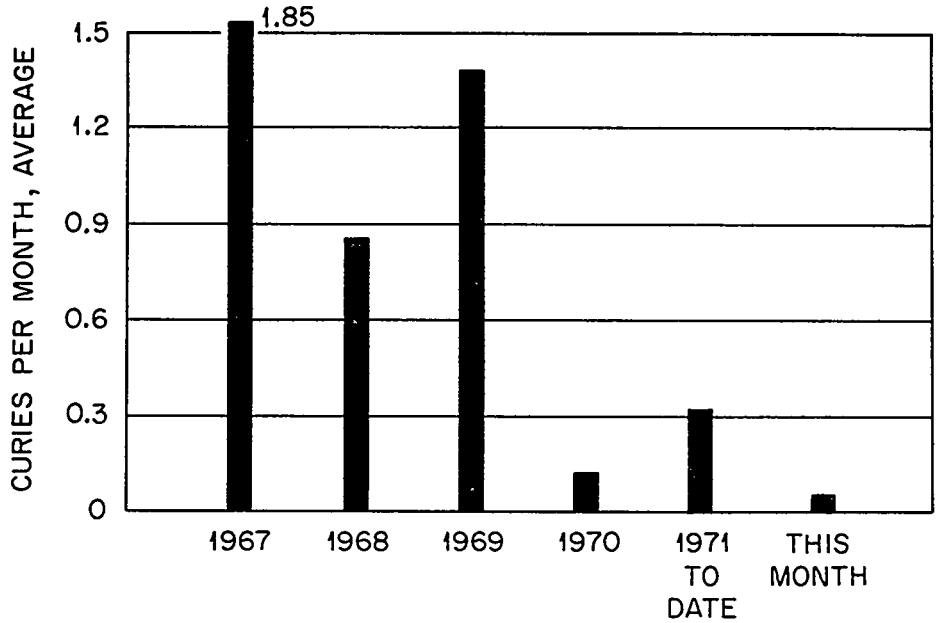

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

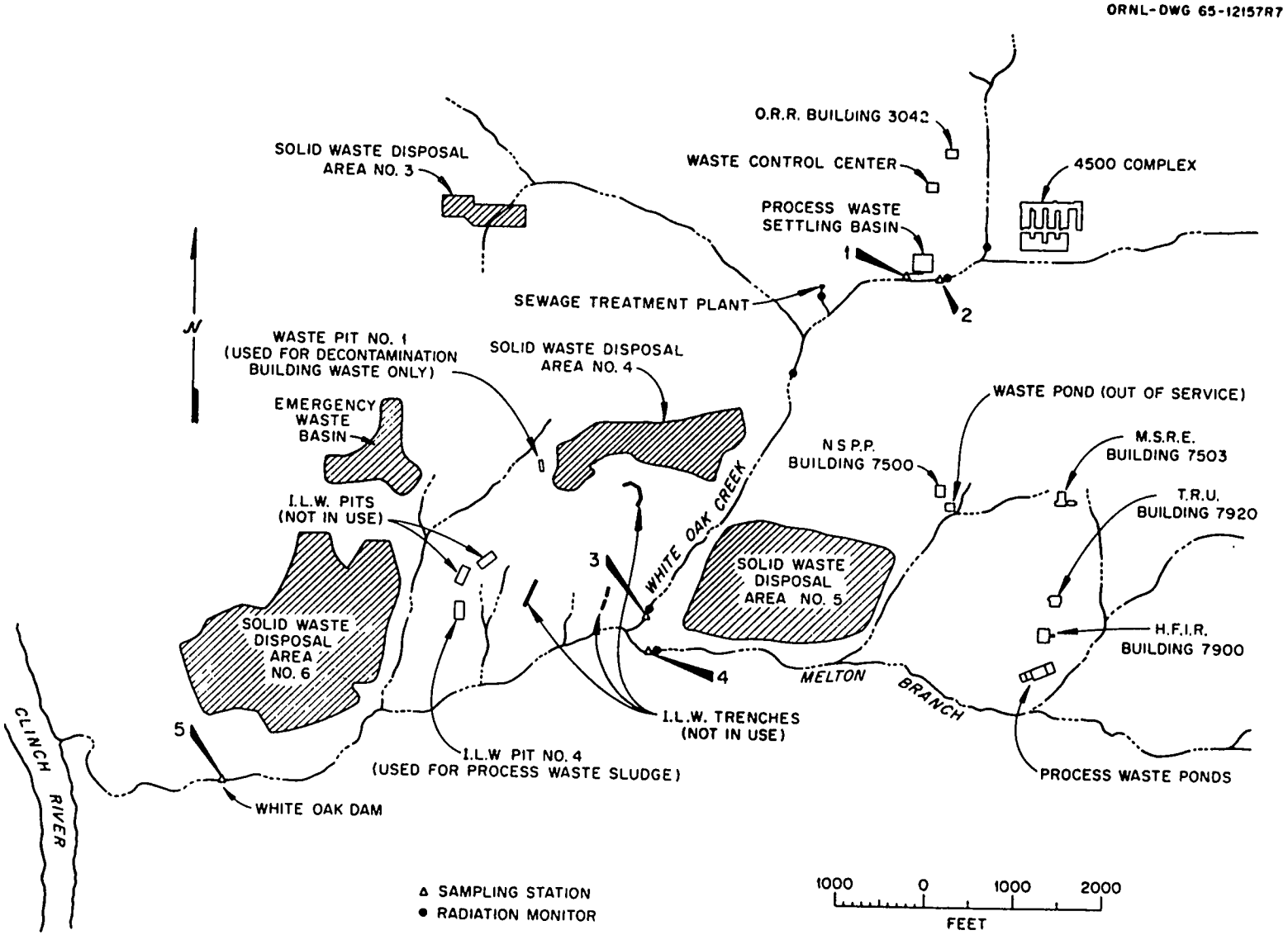

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.12	0.51
Miscellaneous discharges from east end of plant	2	0.01	0.05
Discharge from Bethel Valley area	3	0.13	0.38
Discharge from Melton Valley area	4	0.03	0.06
Total discharge from all sources	3, 4	0.16	0.44
White Oak Dam to Clinch River (Health Physics measurement)	5	0.10	0.24

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

Source	Gross-Beta Activity Average c/m/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	510	0.15	21.7	0.10	2.4
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.37[a]	53.7	0.81	19.4
3. Reactor Operations (MH112)	9.7	<0.01	-	0.38	9.1
4. Buildings 3503 and 3508	8.8	0.03	4.3	0.84	20.1
5. Buildings 3025 and 3026	14.8	<0.01	-	0.34	8.1
6. Building 3019	27.3	0.02	2.9	0.05	1.2
7. Fission Products Development Laboratory	4.8	<0.01	-	0.11	2.6
8. Waste Evaporator, Building 2531	50.6	0.12	17.4	0.98	23.5
9. Buildings 3525 and 3550	0.02	<0.01	-	0.36	8.6
10. Building 2026	1.1	<0.01	-	0.21	5.0

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b], Microcuries
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.08	195
Radiochemical Processing Pilot Plant	3020	<0.01	<1
MSRE	7512	<0.01	<1
HFIR	7911	0.01	10
Total activity in gases released		0.09	205

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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DATE DEC 20 1971

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ORNL
CENTRAL FILES NUMBER
71-12-23

DATE: December 7, 1971

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of October, 1971

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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This document has been approved for release to the public by:

Donald C Hamm 10/9/95
Technical Information Officer (Date)
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of October, 1971, was 0.10% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.08% MPC_W, 0.02% MPC_W, and 0.002% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.5 million gallons of contaminated water was chemically treated this month. Analyses of the Waste Treatment Plan influent and effluent streams indicate that the removal efficiencies were 73% and 63% for the ^{90}Sr and gross-beta activities, respectively. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 399 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	312,000
Volume transferred to Evaporator	297,000
Tank Farm free space at beginning of month	273,000
Tank Farm free space at end of month	250,000
Evaporator concentrate returned to Tank Farm	8,000
Volume of concentrate available for hydrofracture	199,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	18,900
Fission Products Development Laboratory	40,900
ORR and BSR	20,400
High-Flux Isotope Reactor	99,400
Radioisotopes Processing Area	24,400
4500 Complex	22,200

GASEOUS WASTE

The ORNL stacks discharged 300 millicuries of ^{131}I this month. The filterable particulate activities released during the period amounted to about 207 microcuries. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

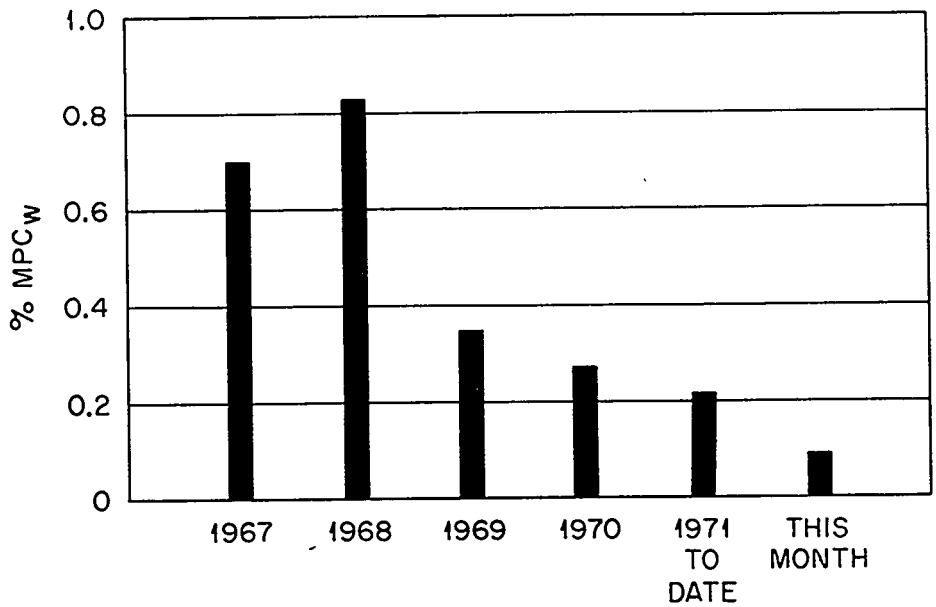

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

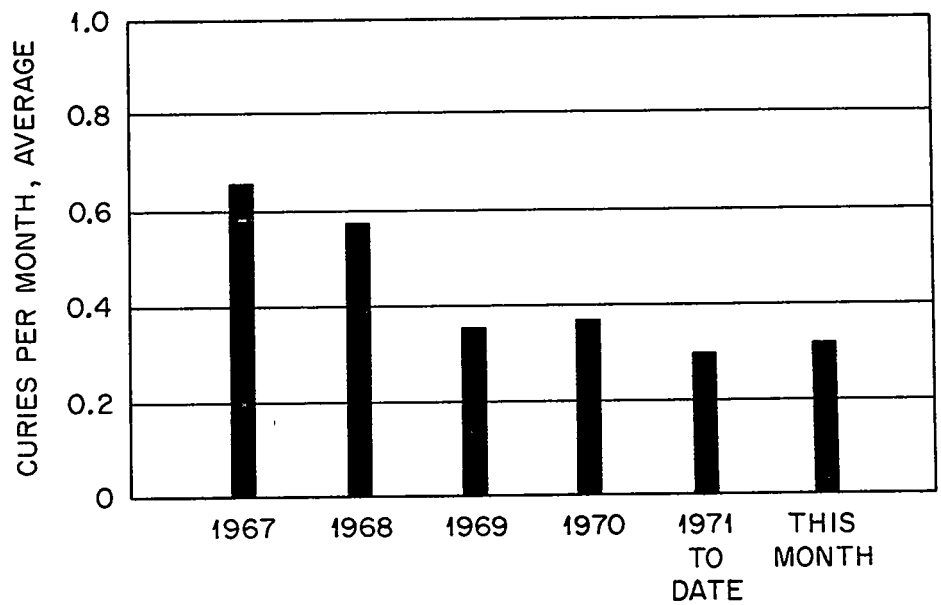

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

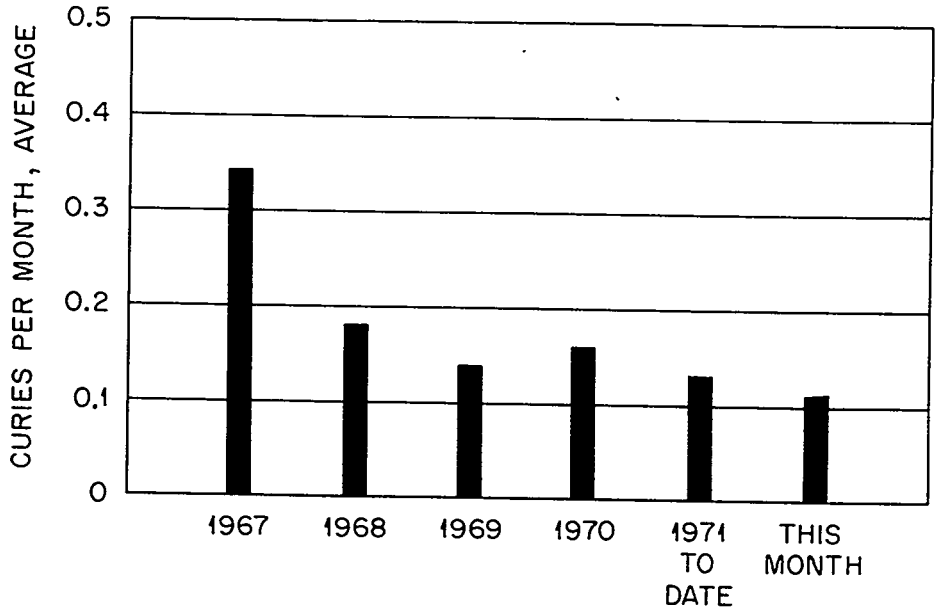

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

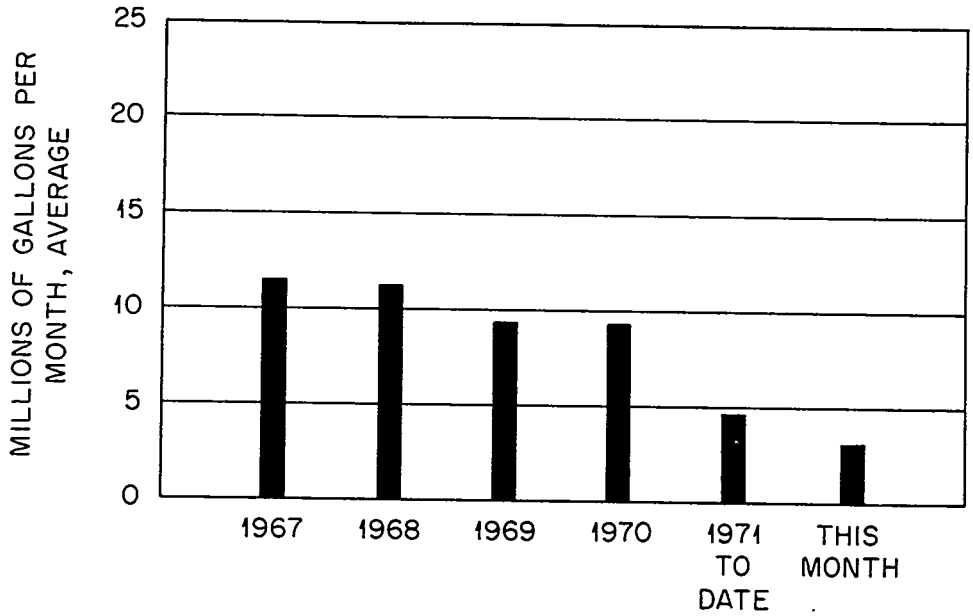

Fig. 4. Process Waste Volumes.

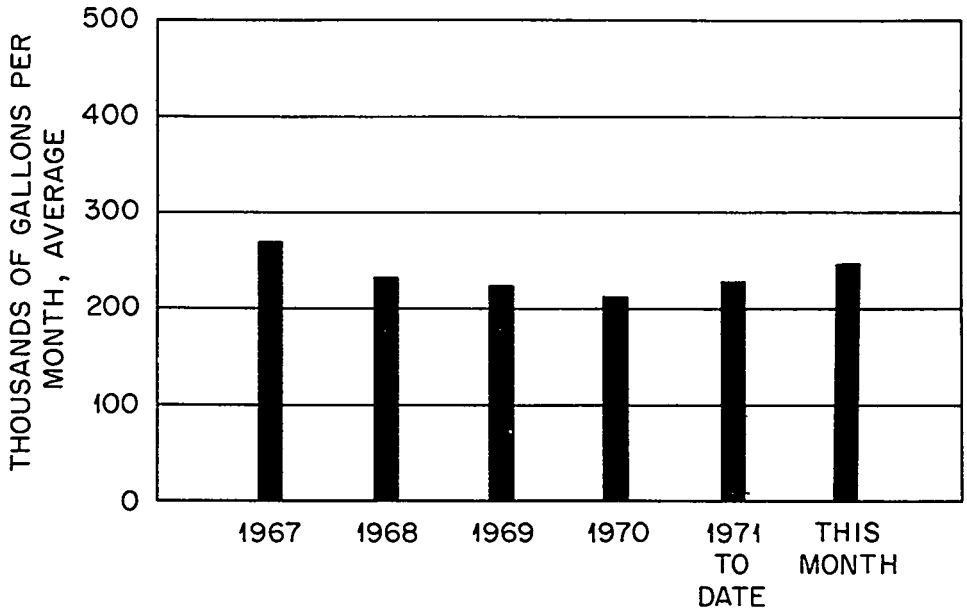

Fig. 5. Intermediate-Level Waste Volumes.

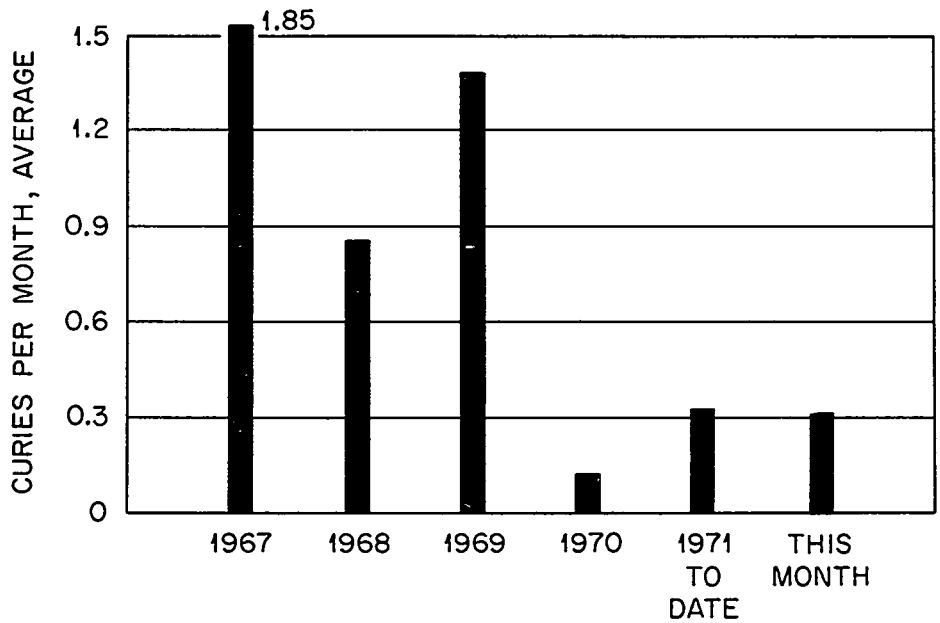

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

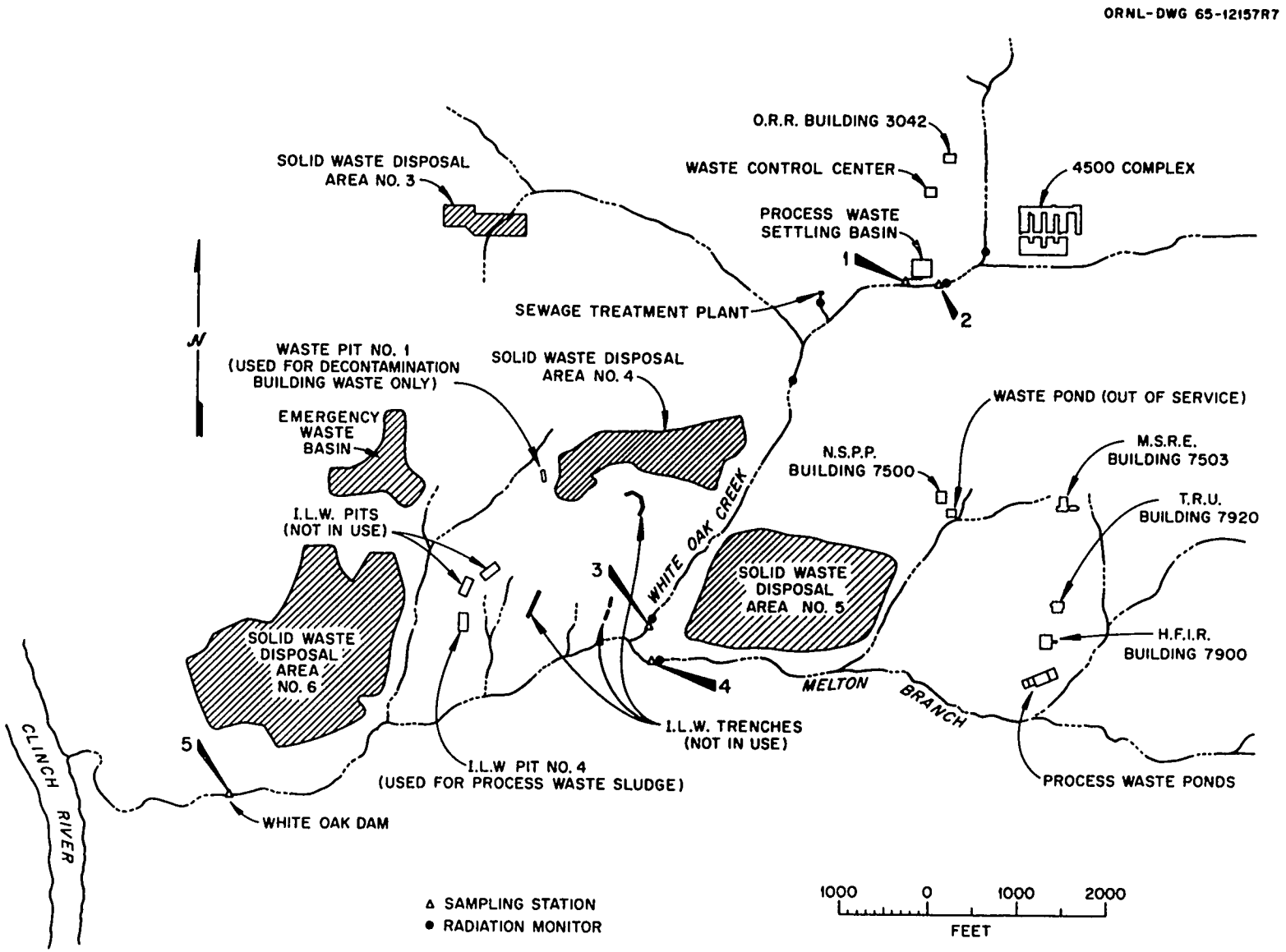

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.11	0.33
Miscellaneous discharges from east end of plant	2	0.02	0.02
Discharge from Bethel Valley area	3	0.27	0.66
Discharge from Melton Valley area	4	0.05	0.13
Total discharge from all sources	3, 4	0.32	0.79
White Oak Dam to Clinch River (Health Physics measurement)	5	0.13	0.31

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

Stack	Gross-Beta Activity Average c/m/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	330	0.05	6.4	0.06	1.4
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.55[a]	70.5	0.69	16.4
3. Reactor Operations (MH112)	7.2	<0.01	-	0.32	7.6
4. Buildings 3503 and 3508	9.3	0.03	3.9	0.90	21.5
5. Buildings 3025 and 3026	4.9	<0.01	-	0.21	5.0
6. Building 3019	39	<0.01	-	0.08	1.9
7. Fission Products Development Laboratory	-	<0.01	-	0.05	1.2
8. Waste Evaporator, Bldg. 2531	85	0.15	19.2	1.23	29.3
9. Buildings 3525 and 3550	0.06	<0.01	-	0.44	10.5
10. Building 2026	0.24	<0.01	-	0.22	5.2

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b], Microcuries
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.30	175
Radiochemical-Processing Pilot Plant	3020	<0.01	4
MSRE	7512	<0.01	<1
HFIR	7911	0.01	28
Total activity in gases released		0.31	207

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

DATE ISSUED: FEB 9 1972

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ORNL No. 1
CENTRAL FILES NUMBER
72-1-51

DATE: January 24, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of November, 1971

TO: Distribution

FROM: G. J. Dixon

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This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1971, was 0.09% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.07% MPC_W, 0.02% MPC_W, and 0.003% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.2 million gallons of contaminated water was chemically treated this month. Analyses of the Waste Treatment Plant influent and effluent streams indicate that the removal efficiencies were 67% and 68% for the ^{90}Sr and gross-beta activities, respectively. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 322 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	191,000
Volume transferred to Evaporator	232,000
Tank Farm free space at beginning of month	250,000
Tank Farm free space at end of month	284,000
Evaporator concentrate returned to Tank Farm	7,000
Volume of concentrate available for hydrofracture	217,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,100
Fission Products Development Laboratory	28,700
ORR and BSR	13,050
High-Flux Isotope Reactor	13,150
Radioisotopes Processing Area	21,300
4500 Complex	21,500

GASEOUS WASTE

The ORNL stacks discharged 110 millicuries of ^{131}I this month. The filterable particulate activities released during the period amounted to 194 microcuries. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.4%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

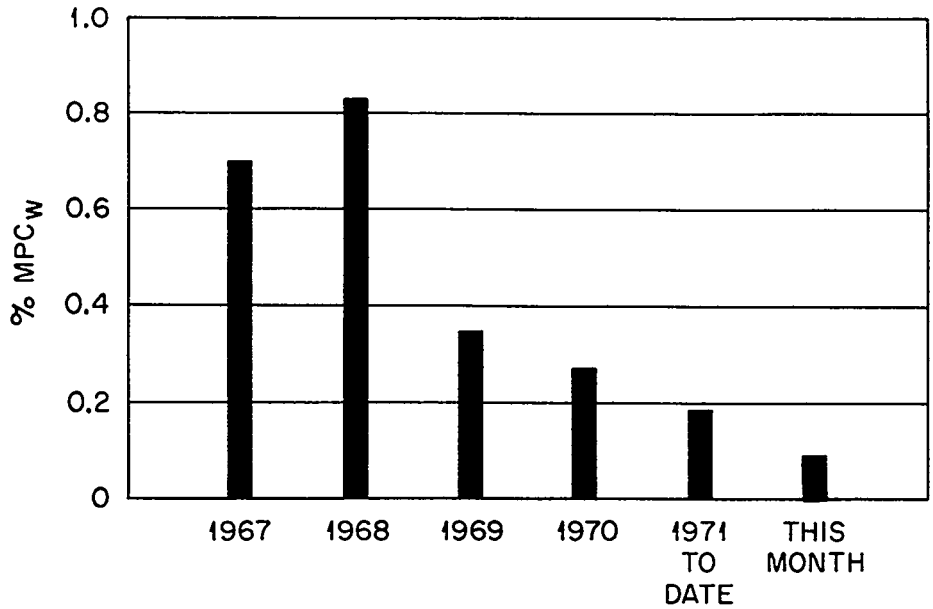

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

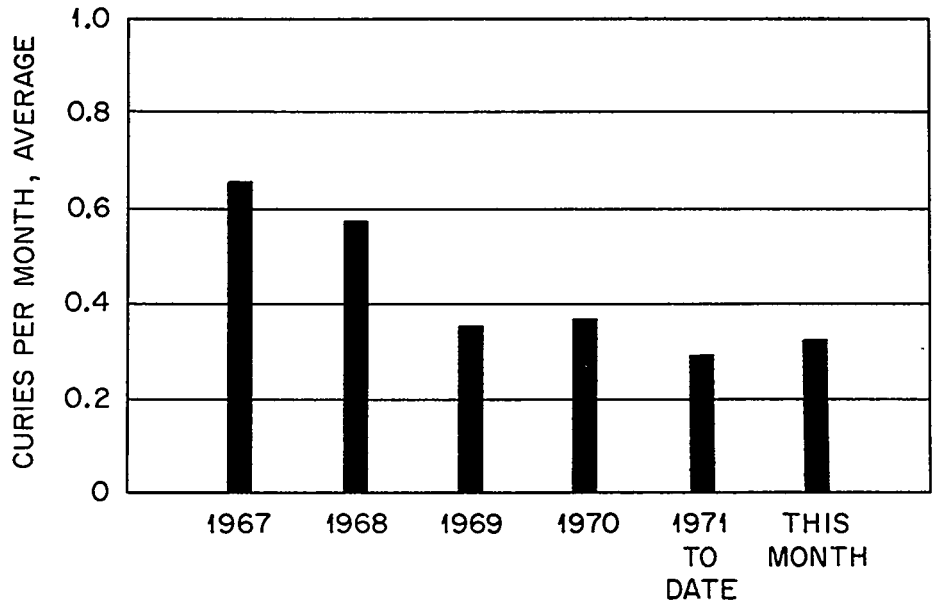

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

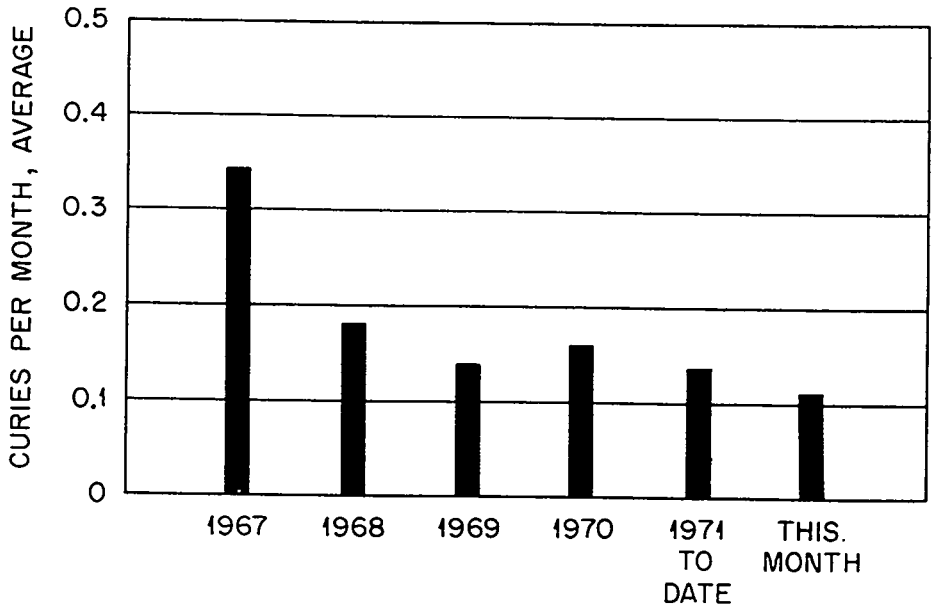

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

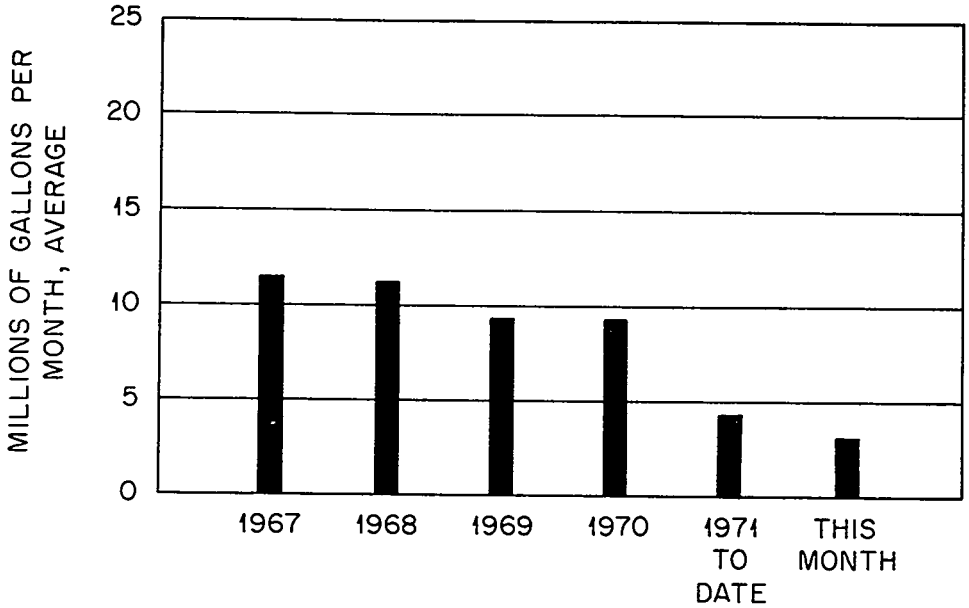

Fig. 4. Process Waste Volumes.

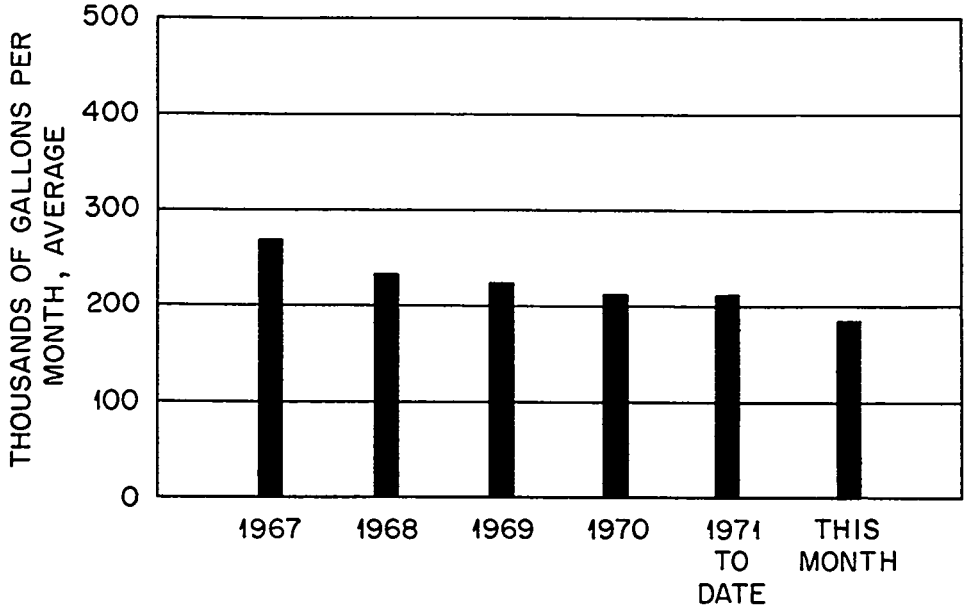

Fig. 5. Intermediate-Level Waste Volumes.

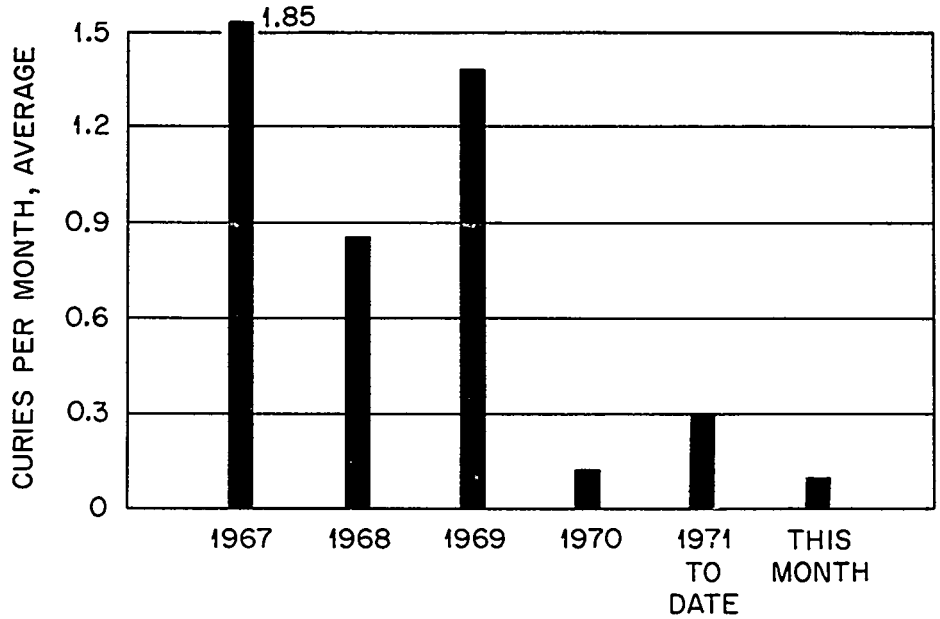

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

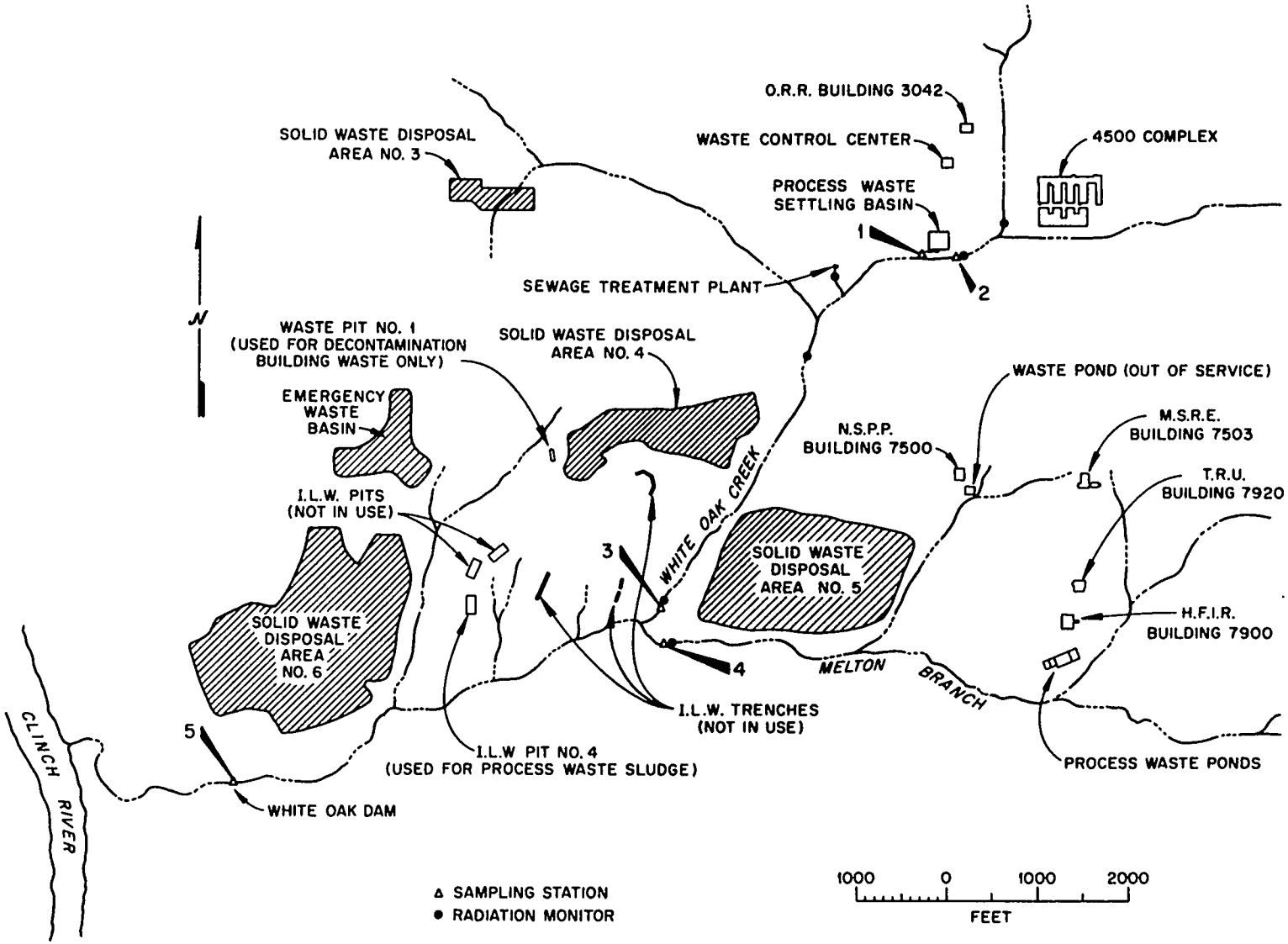

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.11	0.23
Miscellaneous discharges from east end of plant	2	0.01	0.10
Discharge from Bethel Valley area	3	0.28	0.59
Discharge from Melton Valley area	4	0.05	0.13
Total discharge from all sources	3, 4	0.33	0.72
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.28

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

Stack	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	264	0.08	18.2	0.14	2.9
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.25[b]	56.8	0.94	19.7
3. Reactor Operations (MH112)	6.6	<0.01	-	0.30	6.3
4. Buildings 3503 and 3508	6.9	0.02	4.5	1.13	23.7
5. Buildings 3025 and 3026	12.2	<0.01	-	0.18	3.8
6. Building 3019	38.8	<0.01	-	0.03	0.6
7. Fission Products Development Laboratory	-	<0.01	-	0.03	0.6
8. Waste Evaporator, Bldg. 2531	42	0.09	20.5	1.43	30.0
9. Buildings 3525 and 3550	<1	<0.01	-	0.38	8.0
10. Building 2026	<1	<0.01	-	0.21	4.4

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (curies)	Filterable Particulate Activity[b] (microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.11	129
Radiochemical-Processing Pilot Plant	3020	<0.01	4
MSRE	7512	<0.01	<1
HFIR	7911	<0.01	61
Total activity in gases released		0.11	194

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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ORNL-4-1
CENTRAL FILES NUMBER
72-1-51

DATE: January 24, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of November, 1971

TO: Distribution

FROM: G. J. Dixon

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1971, was 0.09% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.07% MPC_W, 0.02% MPC_W, and 0.003% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.2 million gallons of contaminated water was chemically treated this month. Analyses of the Waste Treatment Plant influent and effluent streams indicate that the removal efficiencies were 67% and 68% for the ^{90}Sr and gross-beta activities, respectively. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 322 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	191,000
Volume transferred to Evaporator	232,000
Tank Farm free space at beginning of month	250,000
Tank Farm free space at end of month	284,000
Evaporator concentrate returned to Tank Farm	7,000
Volume of concentrate available for hydrofracture	217,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,100
Fission Products Development Laboratory	28,700
ORR and BSR	13,050
High-Flux Isotope Reactor	13,150
Radioisotopes Processing Area	21,300
4500 Complex	21,500

GASEOUS WASTE

The ORNL stacks discharged 110 millicuries of ^{131}I this month. The filterable particulate activities released during the period amounted to 194 microcuries. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.4%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

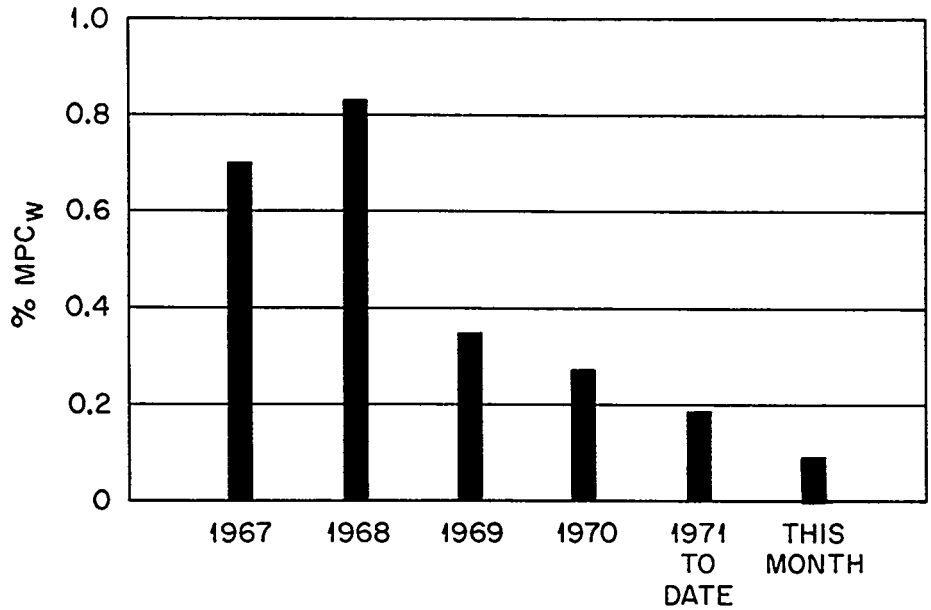

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

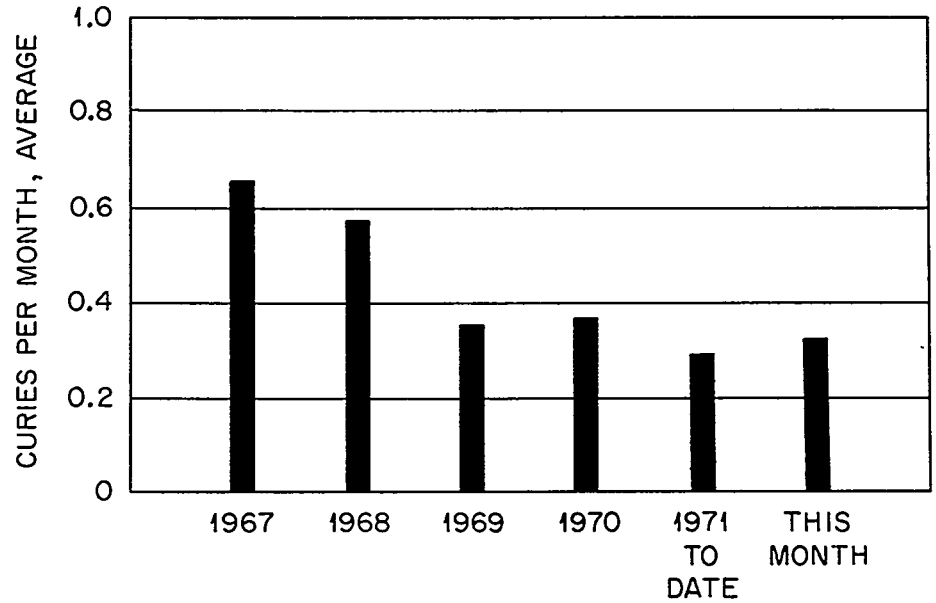

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

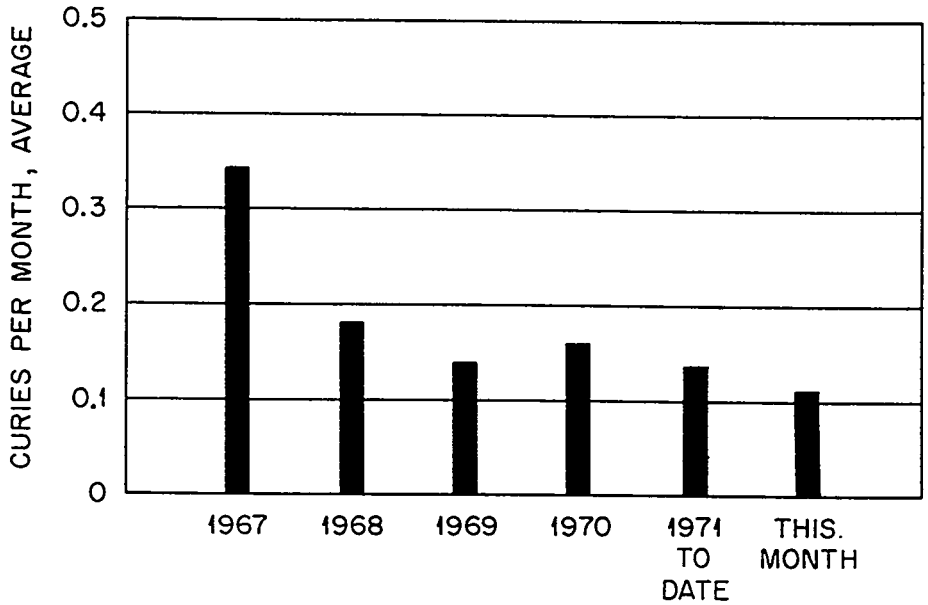

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

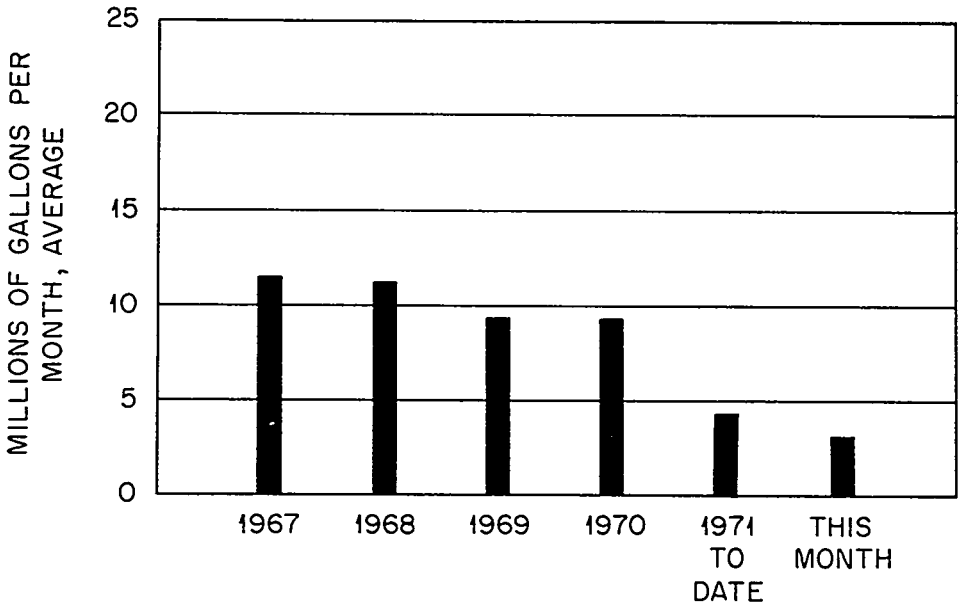

Fig. 4. Process Waste Volumes.

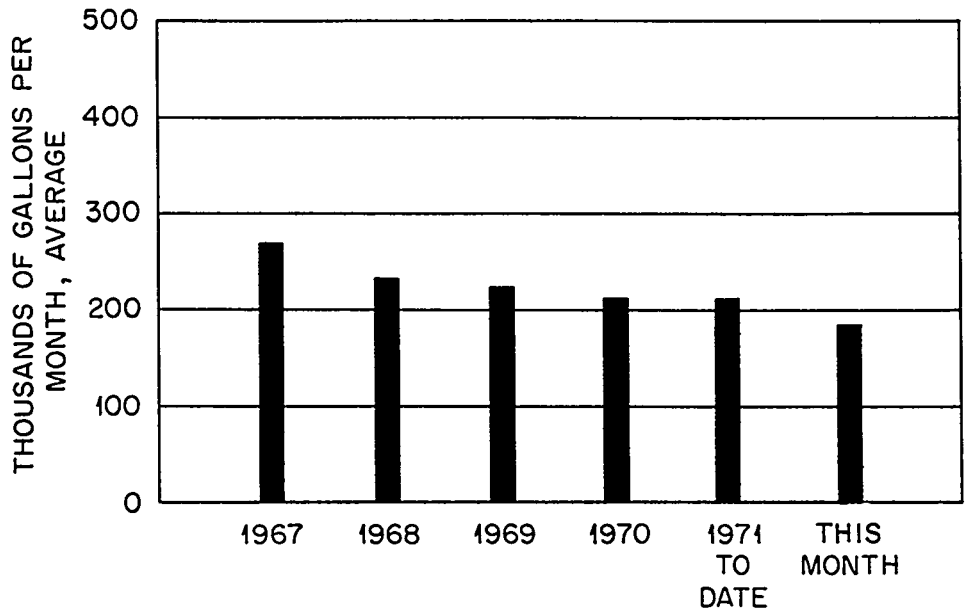

Fig. 5. Intermediate-Level Waste Volumes.

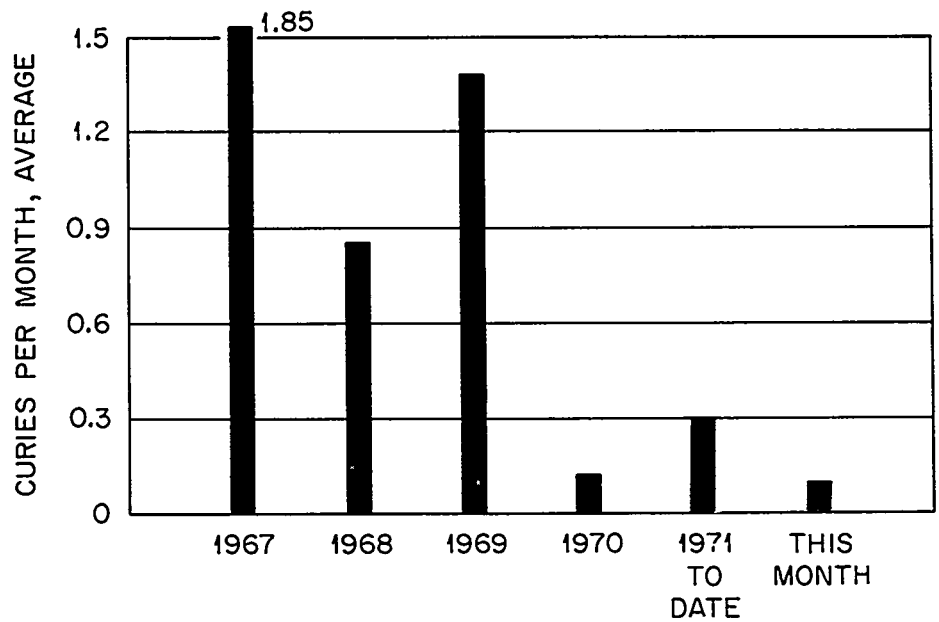

Fig. 6.. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

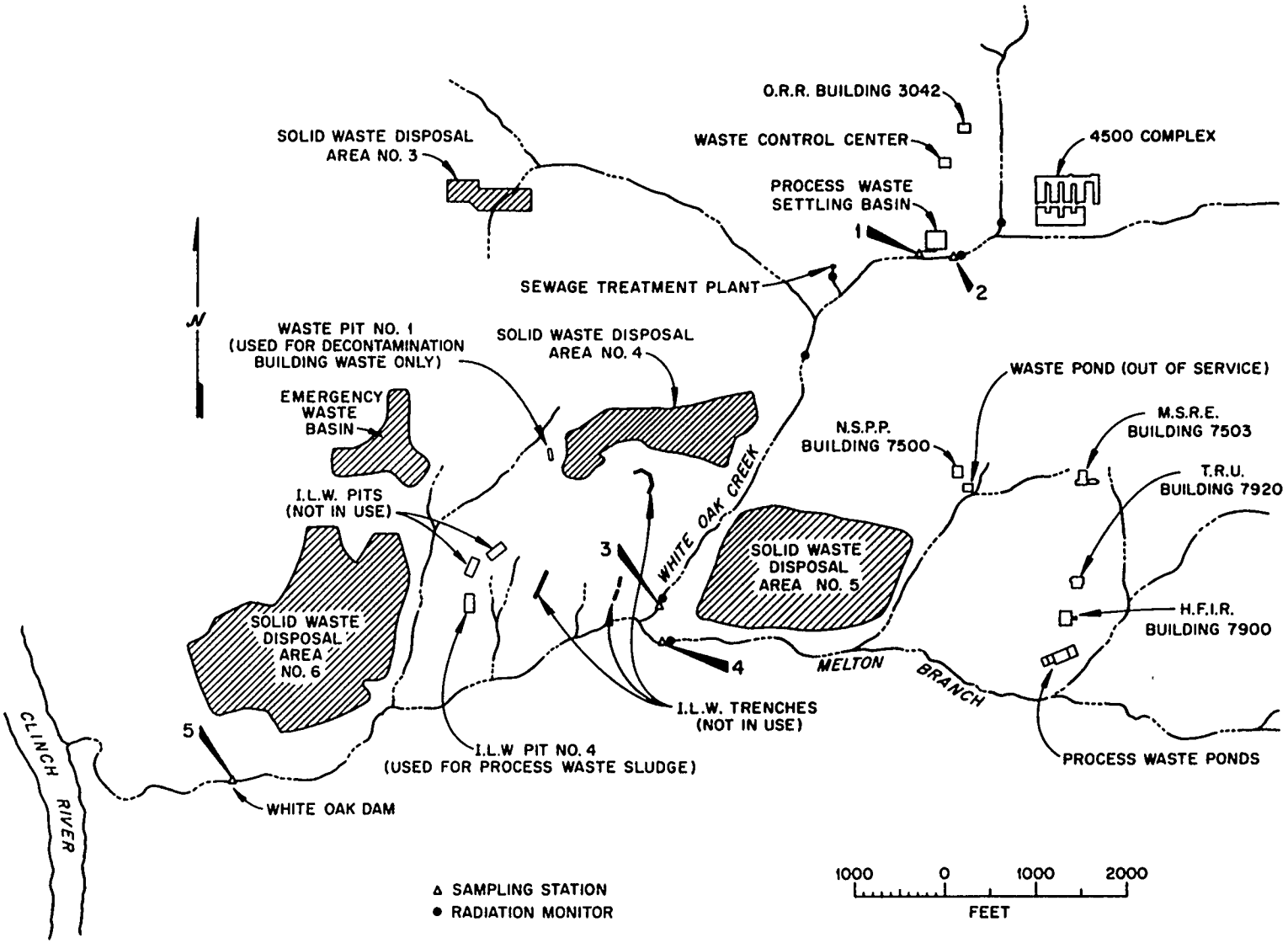

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.11	0.23
Miscellaneous discharges from east end of plant	2	0.01	0.10
Discharge from Bethel Valley area	3	0.28	0.59
Discharge from Melton Valley area	4	0.05	0.13
Total discharge from all sources	3, 4	0.33	0.72
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.28

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

Stack	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	264	0.08	18.2	0.14	2.9
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.25[b]	56.8	0.94	19.7
3. Reactor Operations (MH112)	6.6	<0.01	-	0.30	6.3
4. Buildings 3503 and 3508	6.9	0.02	4.5	1.13	23.7
5. Buildings 3025 and 3026	12.2	<0.01	-	0.18	3.8
6. Building 3019	38.8	<0.01	-	0.03	0.6
7. Fission Products Development Laboratory	-	<0.01	-	0.03	0.6
8. Waste Evaporator, Bldg. 2531	42	0.09	20.5	1.43	30.0
9. Buildings 3525 and 3550	<1	<0.01	-	0.38	8.0
10. Building 2026	<1	<0.01	-	0.21	4.4

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (curies)	Filterable Particulate Activity[b] (microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.11	129
Radiochemical-Processing Pilot Plant	3020	<0.01	4
MSRE	7512	<0.01	<1
HFIR	7911	<0.01	61
Total activity in gases released		0.11	194

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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72-3-15

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DATE: March 6, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of December, 1971

TO: Distribution

FROM: G. J. Dixon

This document has been approved for release to the public by:

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of December, 1971 was 0.37% of the MPC_W (see Fig 1.) The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.28% MPC_W, 0.07% MPC_W, and 0.008% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Fig 2. The high discharge shown in Table 1 and Fig 2 resulted from an underground crossover that developed between the process waste line from the intermediate-level waste evaporator building and a storm sewer. This leakage allowed some activity to bypass the Waste Treatment Plant. The flow from this particular storm sewer is currently being pumped to MH-243.

Process Waste

A total of 3.8 million gallons of contaminated water was chemically treated this month. Rather than shut down the Waste Treatment Plant when the equilization pond is low, as has been past practice, flow is being maintained through the plant and the effluent returned to the equilization pond. It is hoped that recycling in this manner will reduce the amount of activity released to White Oak Creek. Analyses of the Waste Treatment Plant influent and effluent streams indicate that removal efficiencies in the order of 90% for ^{90}Sr and gross-beta

activities may be possible. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 399 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	240,000
Volume transferred to Evaporator	181,000
Tank Farm free space at beginning of month	284,000
Tank Farm free space at end of month	220,000
Evaporator concentrate returned to Tank Farm	5,000
Volume of concentrate available for hydrofracture	232,000

A list of the major contributors of intermediate-level waste is given below. Fig 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	13,300
Fission Products Development Laboratory	19,500
ORR and BSR	29,800
High-Flux Isotope Reactor	17,200
Radioisotopes Processing Area	37,300
4500 Complex	29,400

GASEOUS WASTE

The ORNL stacks discharged 110 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 319 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.5%, respectively, of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig 6.

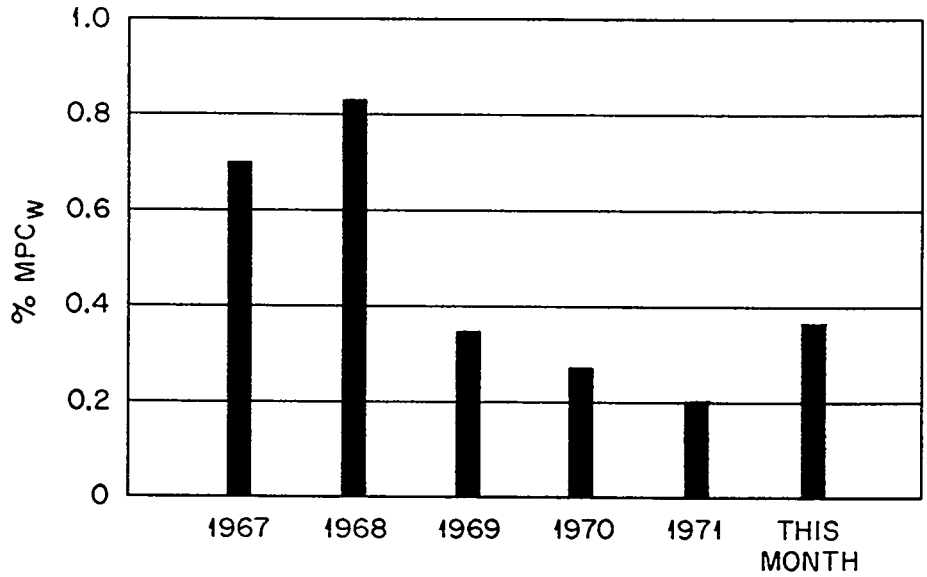

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

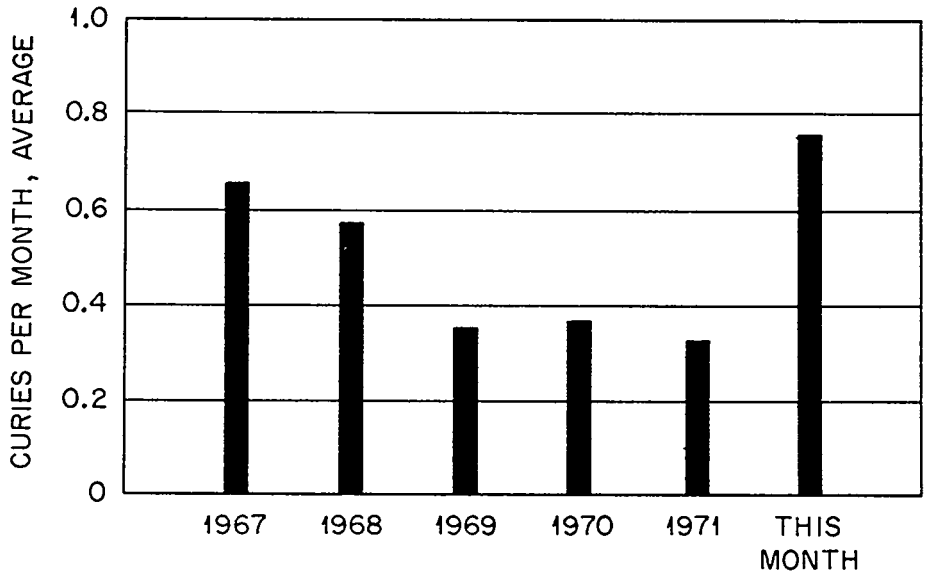

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

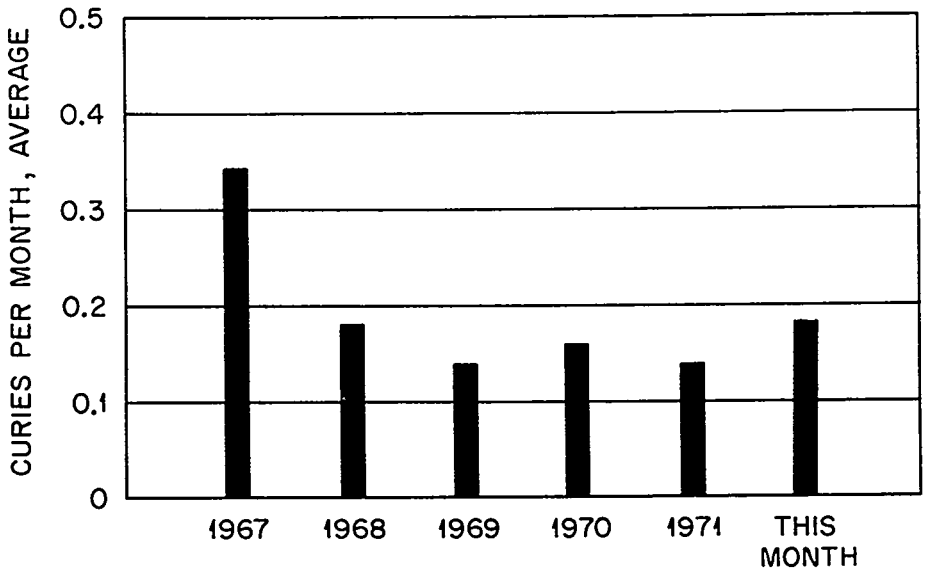

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

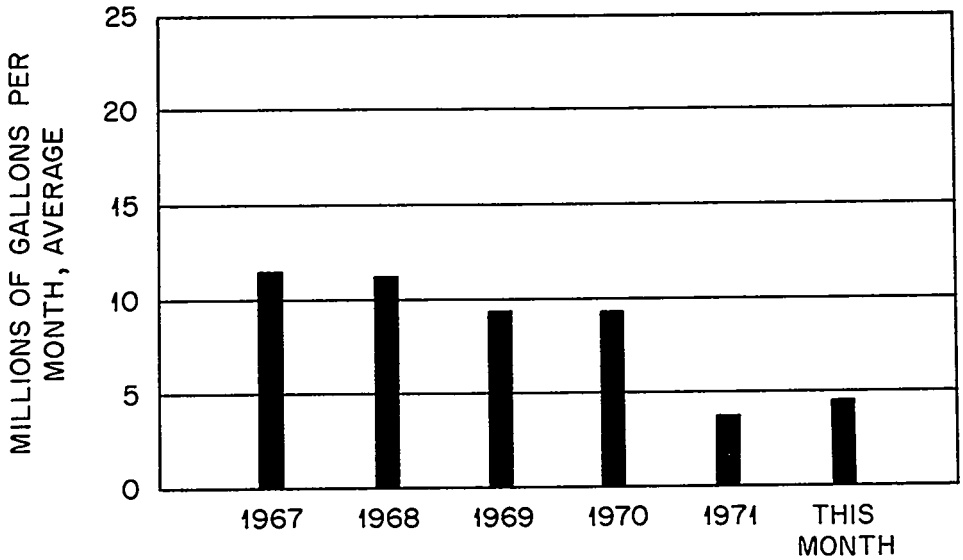

Fig. 4. Process Waste Volumes.

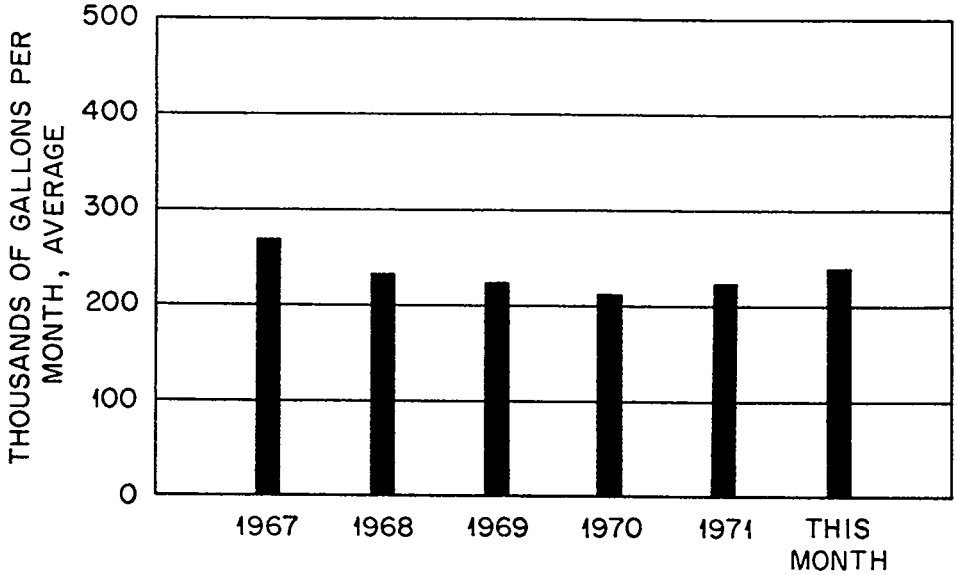

Fig. 5. Intermediate-Level Waste Volumes.

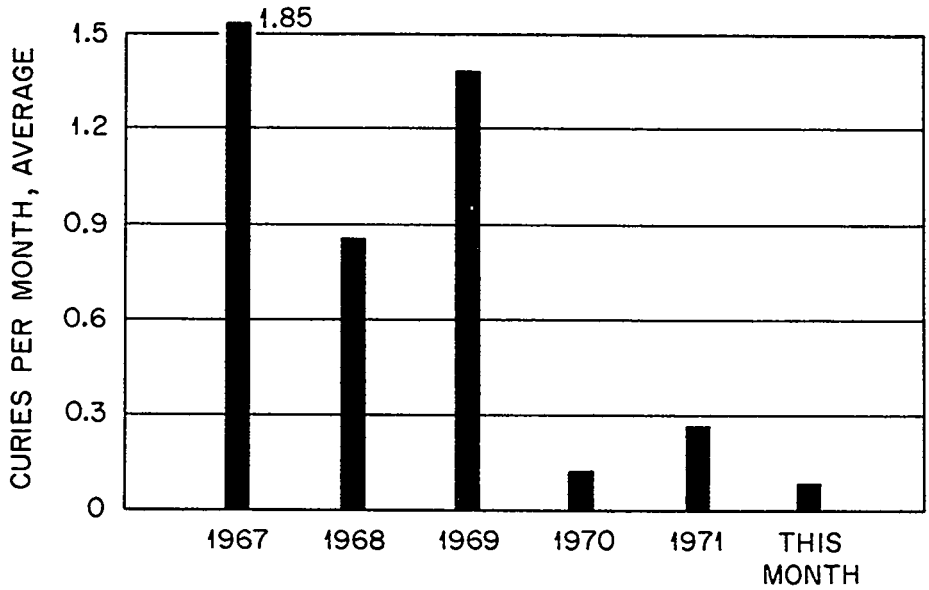

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

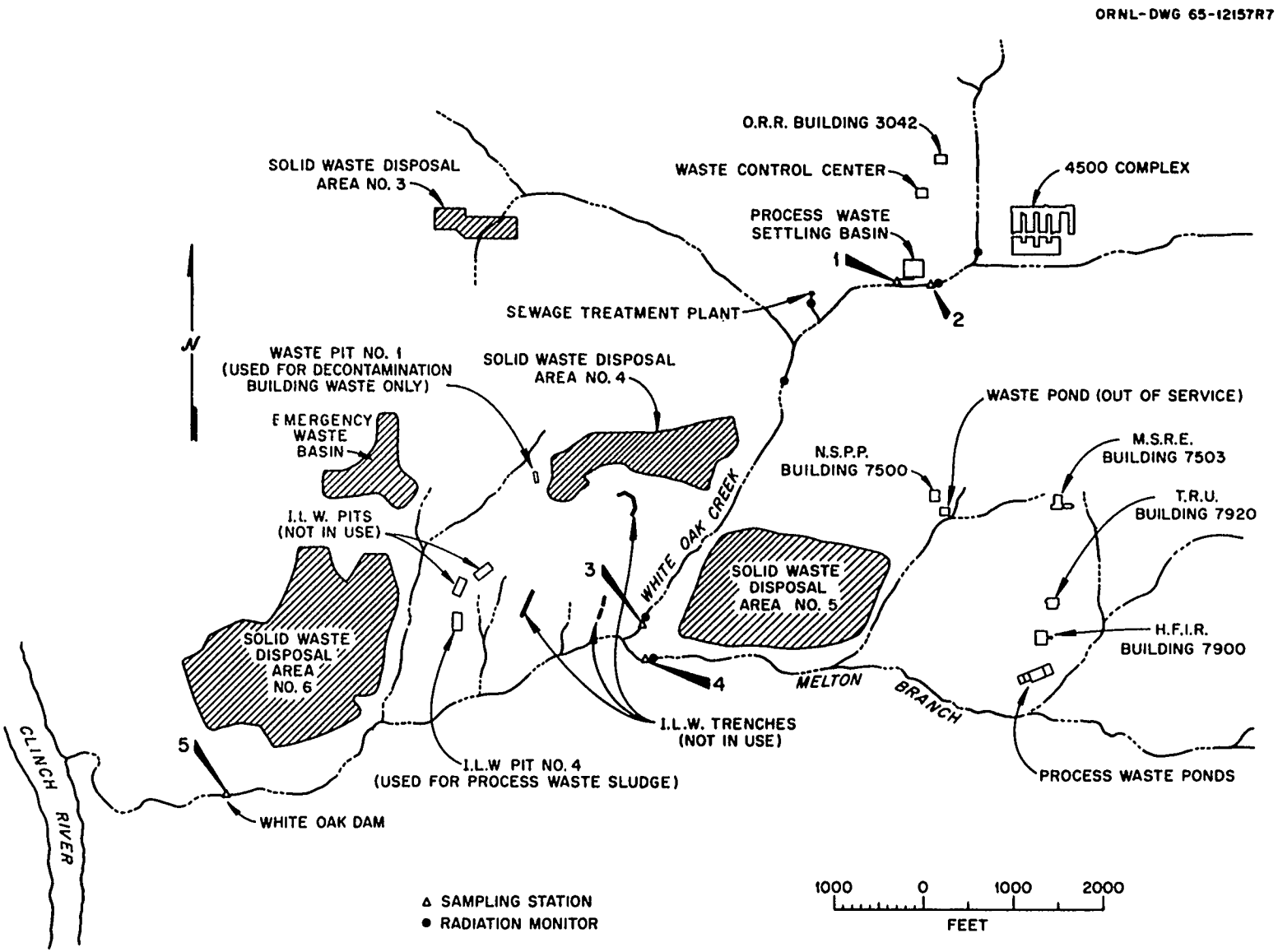

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.18	0.43
Miscellaneous discharges from east end of plant	2	0.01	0.15
Discharge from Bethel Valley area	3	0.68	1.38
Discharge from Melton Valley area	4	0.09	0.17
Total discharge from all sources	3, 4	0.77	1.55
White Oak Dam to Clinch River (Health Physics measurement)	5	0.51	1.20

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	272	0.09	2.2	0.16	3.5
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.26[b]	6.5	1.00	21.6
3. Reactor Operations (MH112)	12	<0.01	-	0.38	8.2
4. Buildings 3503 and 3508	11	0.03	0.8	1.04	22.6
5. Buildings 3025 and 3026	3	<0.01	-	0.27	5.8
6. Building 3019	35	<0.01	-	0.01	0.2
7. Fission Products Development Laboratory	-	<0.01	-	0.04	0.8
8. Waste Evaporator, Bldg. 2531	2,680	3.60	90.5	0.95	20.5
9. Buildings 3525 and 3550	<1	<0.01	-	0.59	12.7
10. Building 2026	<1	<0.01	-	0.19	4.1

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.08	208
Radiochemical-Processing Pilot Plant	3020	<0.01	16
MSRE	7512	<0.01	<1
HFIR	7911	0.03	95
Total activity in gases released		0.11	319

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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FROM: G. J. Dixon

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Donald R. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of January, 1972, was 0.27% of the MPC_W (see Figure 1.) The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.21% MPC_W, 0.05% MPC_W, and 0.008% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The high discharge shown in Table 1 for Stations 3, 4, and 5 and in Figure 2 for Stations 3 and 4 is still a result of the underground crossover, mentioned in the December, 1971 report, that developed between the process waste line from the intermediate-level waste evaporator building and a storm sewer. The high discharge for this month is not unexpected since there is a delay of several days from the time material enters the process waste system until it passes over White Oak Dam. The heavy rainfall during the month also resulted in an increase in ^{90}Sr activity being leached from the burial grounds as evidenced by the increase in ^{90}Sr activity at Stations 3 and 4.

Process Waste

A total of 5.1 million gallons of contaminated water was chemically treated this month. The recycling of flow through the equilization pond initiated last month was continued this month. A monthly comparison of

the strontium activity released from the process-waste systems to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross beta discharges from these sources. The high ^{90}Sr discharge from the Waste Evaporator is a carryover from the leak that occurred in December.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 350 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	281,100
Volume transferred to Evaporator	260,600
Tank Farm free space at beginning of month	220,000
Tank Farm free space at end of month	194,300
Evaporator concentrate returned to Tank Farm	5,100
Volume of concentrate available for hydrofracture	242,800

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	15,300
Fission Products Development Laboratory	33,300
ORR and BSR	37,100
High-Flux Isotope Reactor	19,600
Radioisotopes Processing Area	38,700
4500 Complex	18,500

GASEOUS WASTE

The ORNL stacks discharged 120 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 223 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.0% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

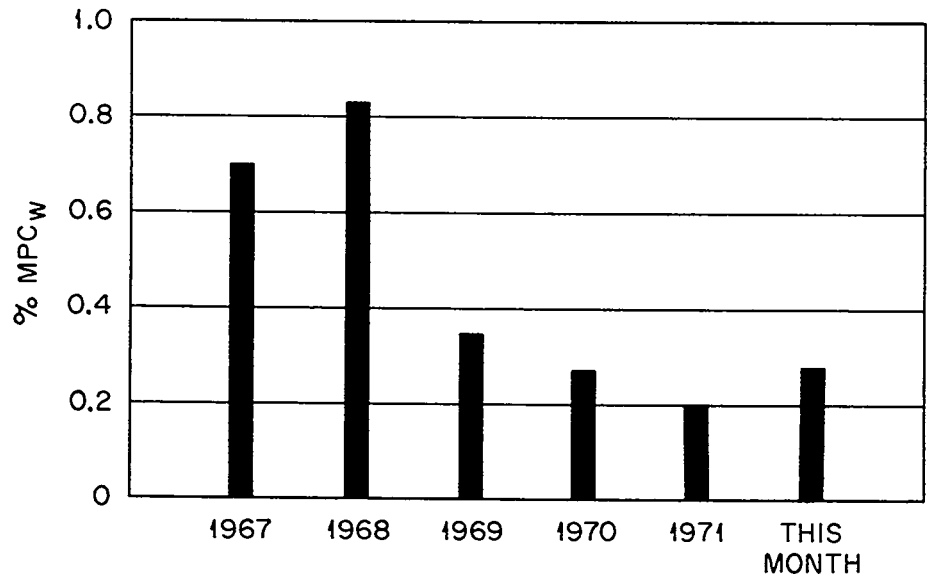

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

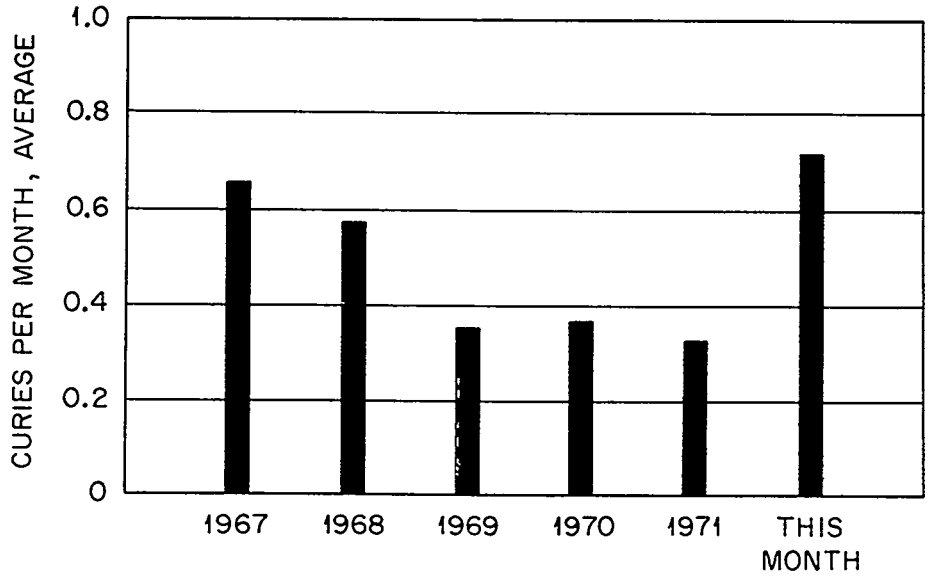

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

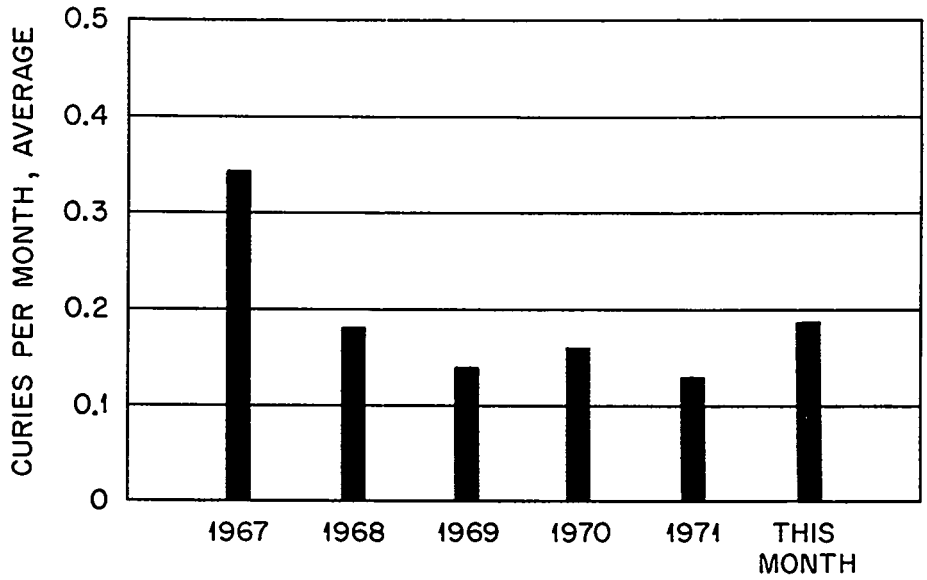

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

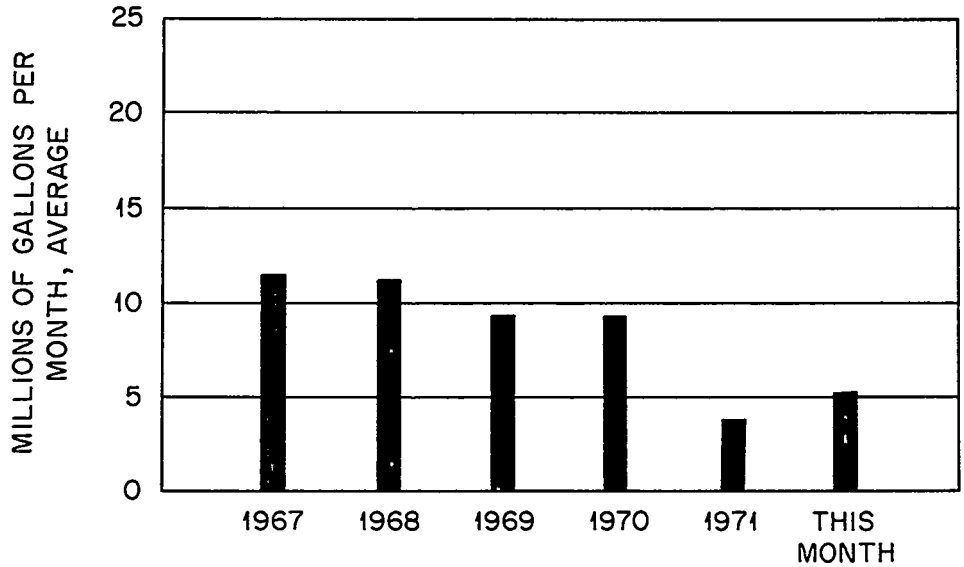

Fig. 4. Process Waste Volumes.

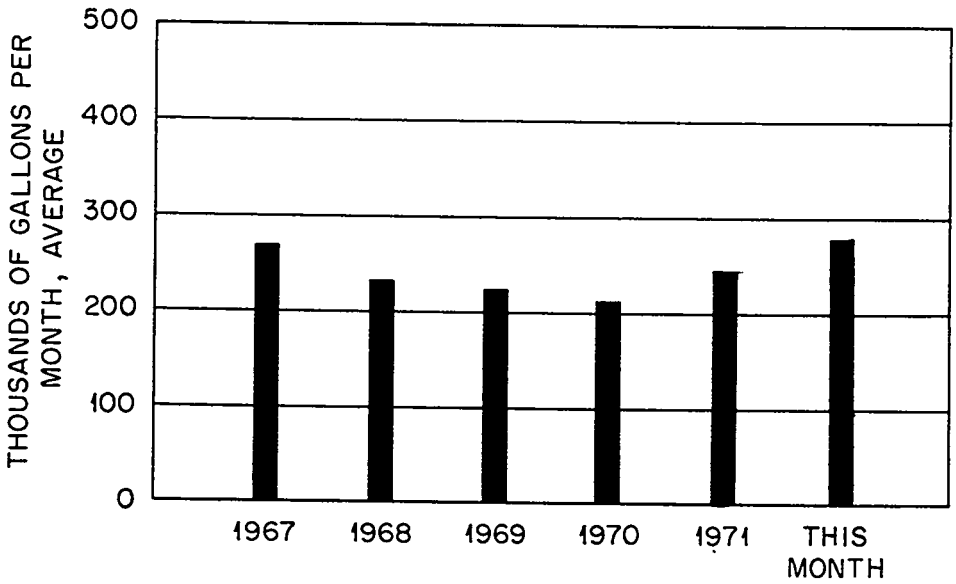

Fig. 5. Intermediate-Level Waste Volumes.

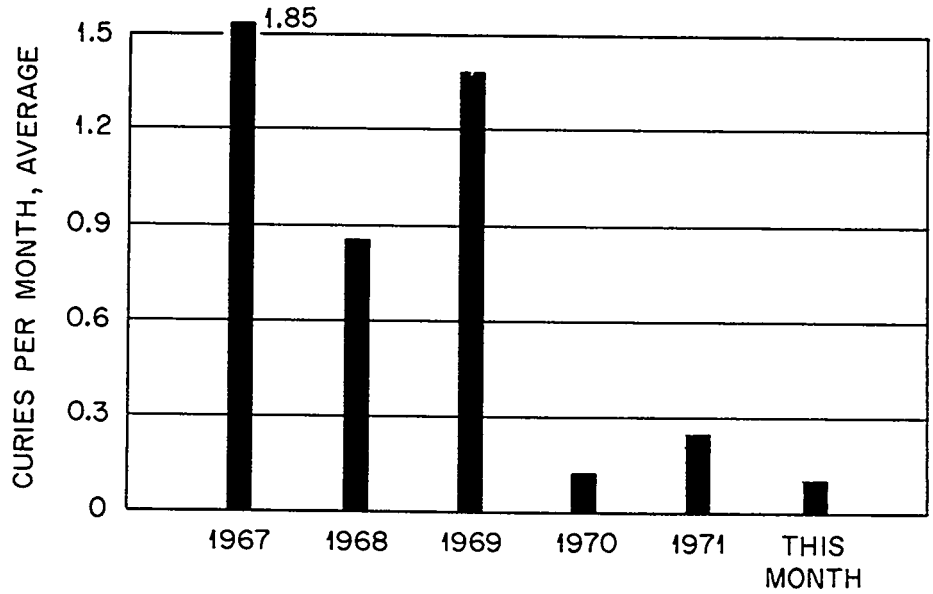

Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

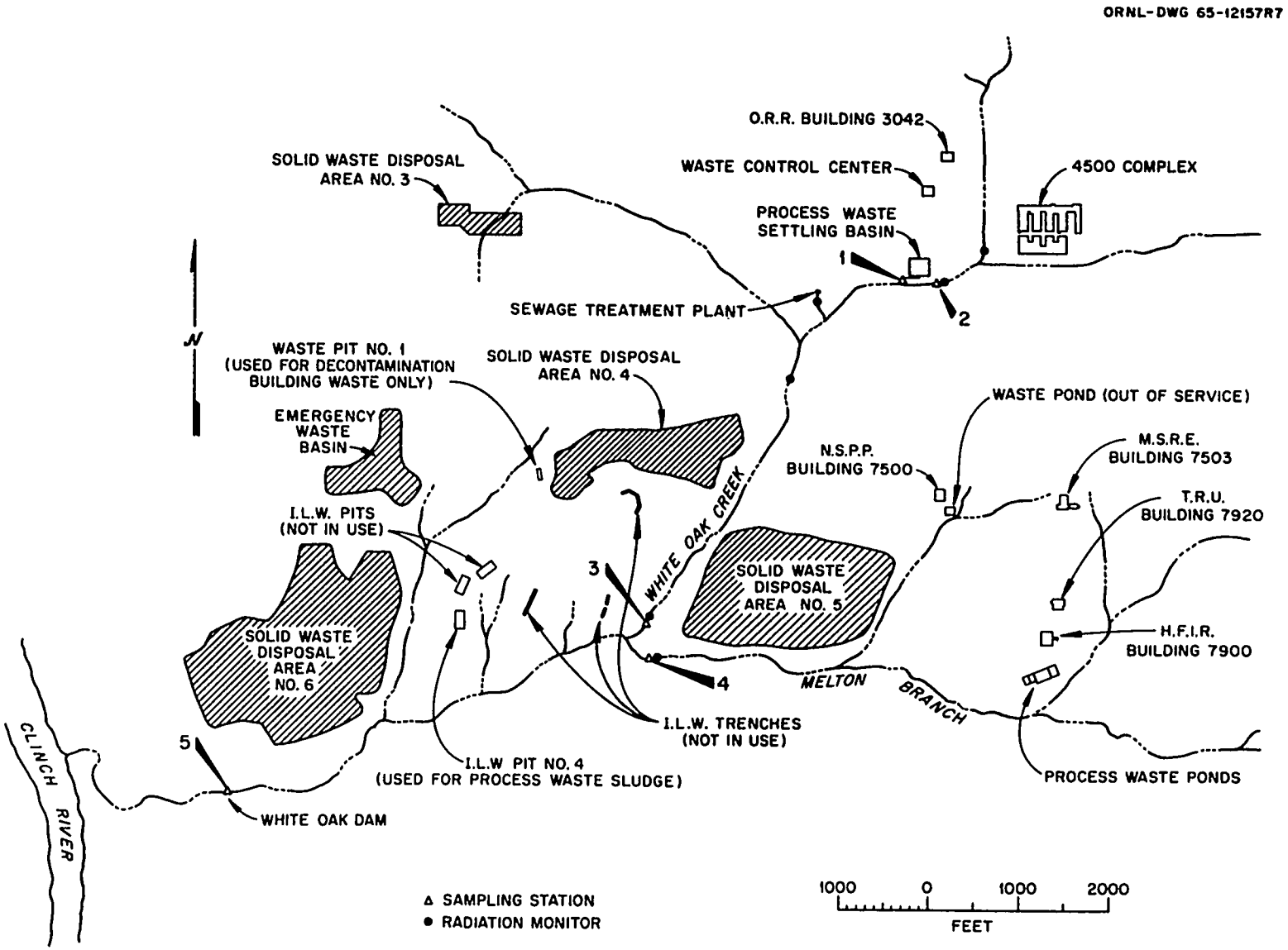

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.19	0.42
Miscellaneous discharges from east end of plant	2	0.03	0.15
Discharge from Bethel Valley area	3	0.58	1.42
Discharge from Melton Valley area	4	0.14	0.26
Total discharge from all sources	3, 4	0.72	1.68
White Oak Dam to Clinch River (Health Physics measurement)	5	0.78	2.09

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing[c] Area (MH234)	264	0.19	14.4	0.36	7.5
2. Radioisotopes Processing Area (MH114 minus MH112)	108[b]	0.16[b]	12.1	0.67	14.1
3. Reactor Operations (MH112)[c]					
4. Buildings 3503 and 3508	12.2	0.03	2.3	0.98	20.6
5. Buildings 3025 and 3026	20	<0.01	--	0.53	11.1
6. Building 3019	30.2	<0.01	--	0.03	0.6
7. Fission Products Development Laboratory	--	<0.01	--	0.03	0.6
8. Waste Evaporator, Bldg. 2531	294	0.94	71.2	1.24	26.0
9. Buildings 3525 and 3550	< 0.1	<0.01		0.73	15.3
10. Building 2026	0.2	<0.01		0.20	4.2

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[c]The Reactor Operations flow was diverted from MH112 to MH234 for test purposes.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	< 1
Central Radioactive Gas Disposal Facilities	3039	0.12	182
Radiochemical-Processing Pilot Plant	3020	< 0.01	7
MSRE	7512	< 0.01	< 1
HFIR	7911	< 0.01	34
Total activity in gases released		0.12	223

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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NUCLEAR DIVISION

POST OFFICE BOX X
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Special Distribution

ORNL
CENTRAL FILES NUMBER
72-4-36

DATE: April 24, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of February, 1972

TO: Distribution

FROM: G. J. Dixon

FILE COPY

This document has been approved for release to the public by:

David R. Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of February, 1972, was 0.31% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.21% MPC_W, 0.06% MPC_W, and 0.031% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.3 million gallons of contaminated water was chemically treated this month. The recycling of flow through the equilization pond was continued this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Sources

The waste evaporator operated at an average boildown rate of 365 gph. A summary of operating data is listed on the following page.

	Gallons
Total volume generated	241,700
Volume transferred to Evaporator	253,900
Tank Farm free space at beginning of month	194,300
Tank Farm free space at end of month	201,200
Evaporator concentrate returned to Tank Farm	5,300
Volume of concentrate available for hydrofracture	259,300

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	19,850
Fission Products Development Laboratory	13,400
ORR and BSR	17,400
High-Flux Isotope Reactor	27,750
Radioisotopes Processing Area	27,050
4500 Complex	25,700

GASEOUS WASTE

The ORNL stacks discharged 70 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 2.8 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

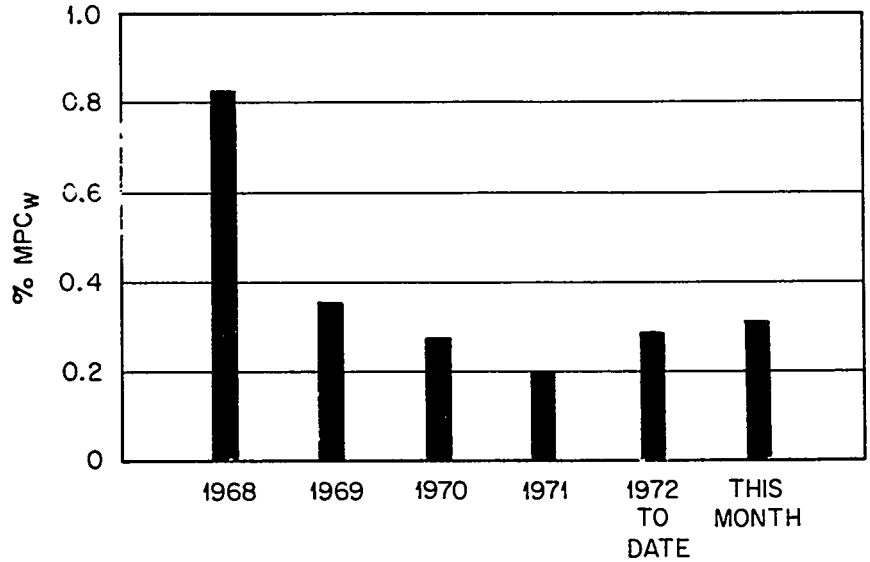

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

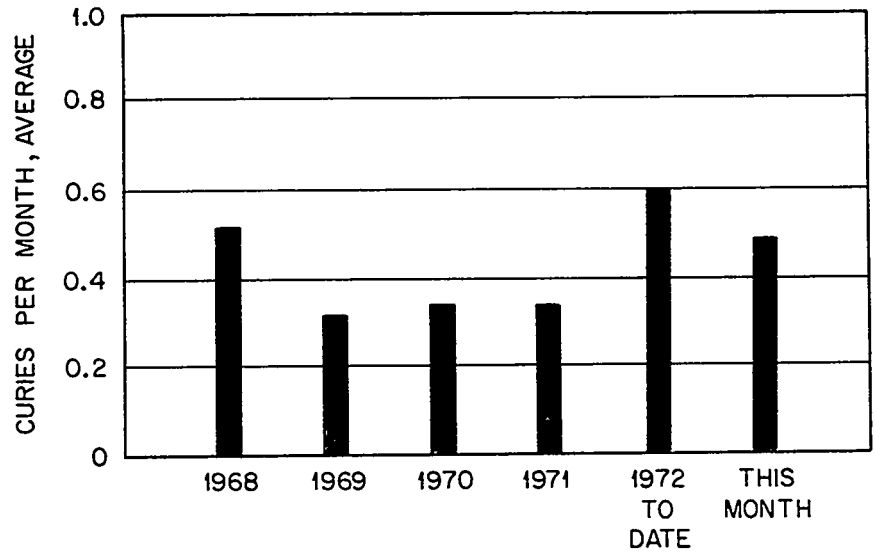

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

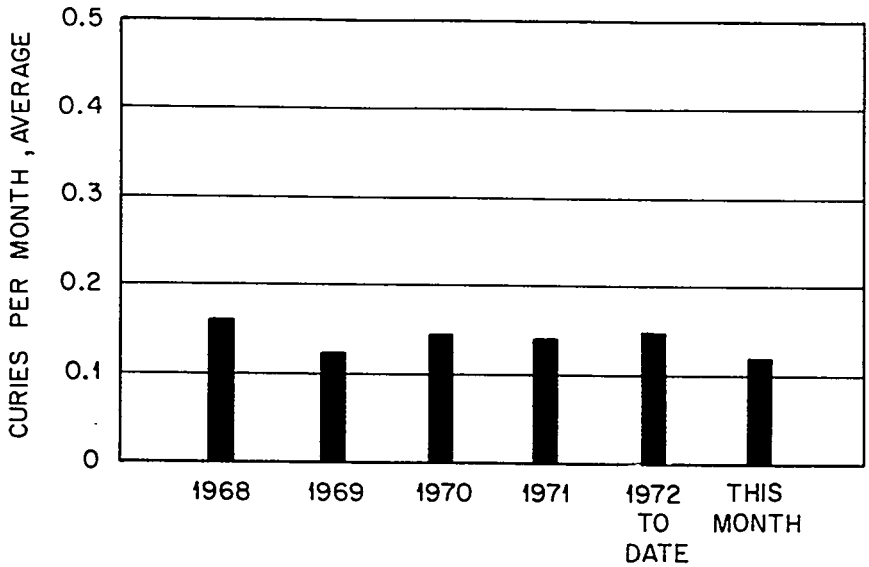

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

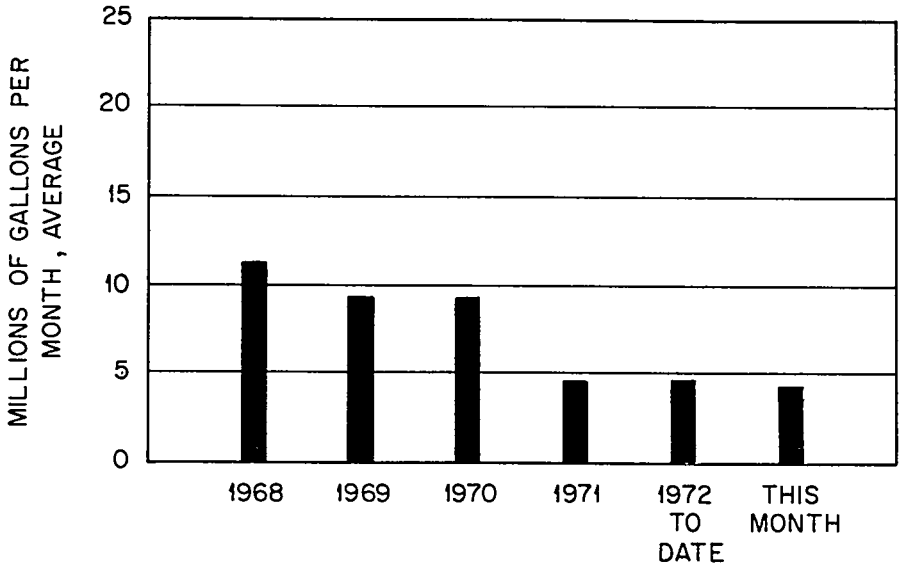

Fig 4. Process Waste Volumes.

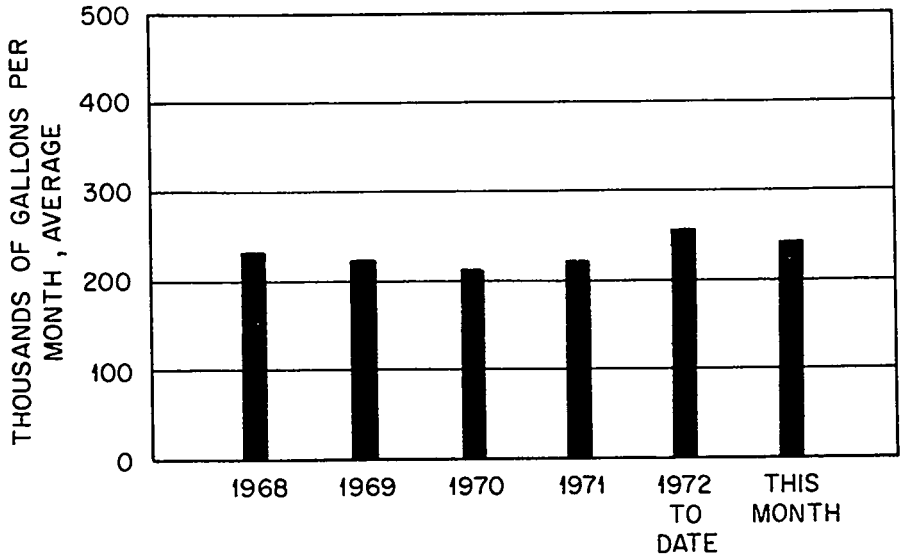

Fig 5. Intermediate – Level Waste Volumes.

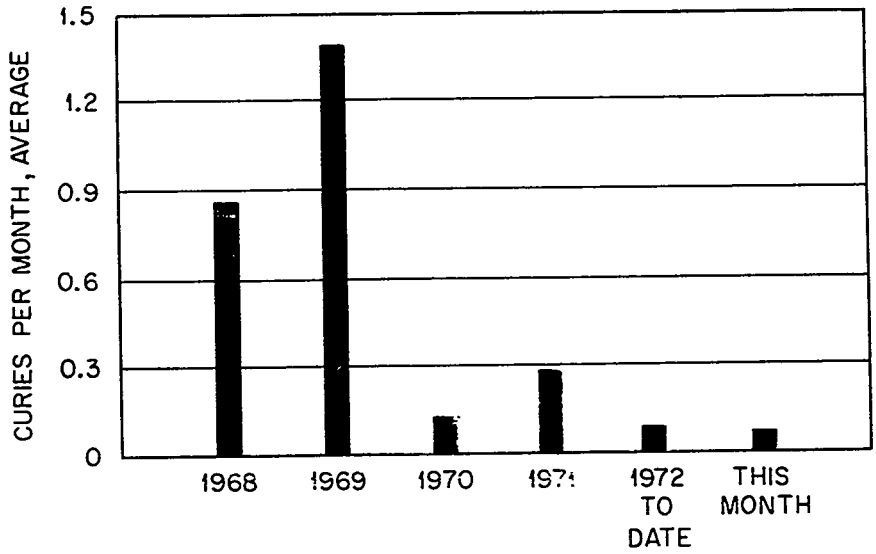

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

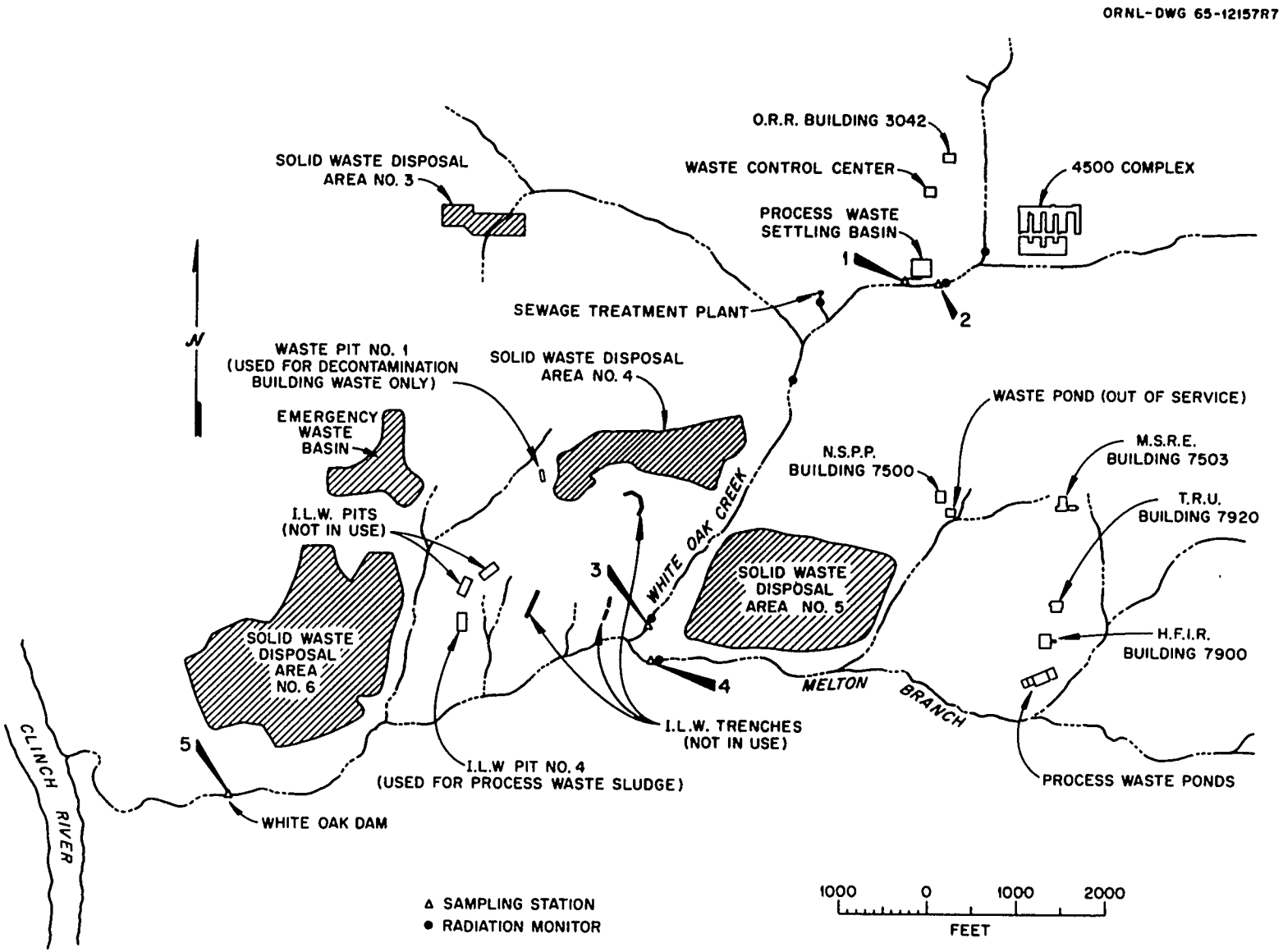

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.12	0.22
Miscellaneous discharges from east end of plant	2	0.01	0.05
Discharge from Bethel Valley area	3	0.40	0.73
Discharge from Melton Valley area	4	0.08	0.18
Total discharge from all sources	3, 4	0.48	0.91
White Oak Dam to Clinch River (Health Physics measurement)	5	0.42	1.05

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

Stack	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	90	0.12	14.3	0.52	11.9
2. Radioisotopes Processing Area (MH114)	203	0.31	36.9	0.57	13.1
3. Reactor Operations (MH112)	-	-	-	-	-
4. Buildings 3503 and 3508	10.1	0.03	3.6	1.06	24.3
5. Buildings 3025 and 3026	16	<0.01	-	0.28	6.4
6. Building 3019	11.9	<0.01	-	0.12	2.7
7. Fission Products Development Laboratory	-	<0.01	-	0.03	0.7
8. Waste Evaporator, Bldg. 2531	152	0.38	45.2	1.01	23.2
9. Buildings 3525 and 3550	0.07	<0.01	-	0.58	13.3
10. Building 2026	0.13	<0.01	-	0.19	4.4

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Millicuries)
HRLAL	2026	<0.01	< 1
Central Radioactive Gas Disposal Facilities	3039	0.06	2.8
Radiochemical-Processing Pilot Plant	3020	<0.01	< 1
MSRE	7512	<0.01	< 1
HFIR	7911	0.01	< .1
Total activity in gases released		0.07	2.8

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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ORNL
CENTRAL FILES NUMBER
72-5-39

DATE: May 24, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of March, 1972

TO: Distribution

FROM: G. J. Dixon

This document has been approved for release to the public by:

Daniel R. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of March, 1972, was 0.38% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.27% MPC_W, 0.09% MPC_W, and 0.12% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. As can be noted, the Sr discharge to White Oak Lake is still above average. The high discharge reported for January (and possibly part of that for February) was caused by the underground crossover between a process waste line and a storm sewer described in the December, 1971, report. The above-average discharge for March appears to be due to heavy rainfall which may have leached out more activity from the burial grounds. Samples from the storm sewer mentioned above indicate that the March discharge is not related to the previously described release. However, a recheck of all sewer discharges to the creek is now in progress to be sure that no new leakages have developed in recent months.

Process Waste

A total of 5.0 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in

Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Sources

The waste evaporator operated at an average boildown rate of 324 gph. A summary of operating data follows:

	Gallons
Total volume generated	205,900
Volume transferred to Evaporator	241,400
Tank Farm free space at beginning of month	201,200
Tank Farm free space at end of month	232,000
Evaporator concentrate returned to Tank Farm	4,665
Volume of concentrate available for hydrofracture	268,700

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	25,000
Fission Products Development Laboratory	16,500
ORR and BSR	23,300
High Flux Isotope Reactor	24,150
Radioisotopes Processing Area	30,700
4500 Complex	11,650

GASEOUS WASTE

The ORNL stacks discharged 50 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 2 mCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.8% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

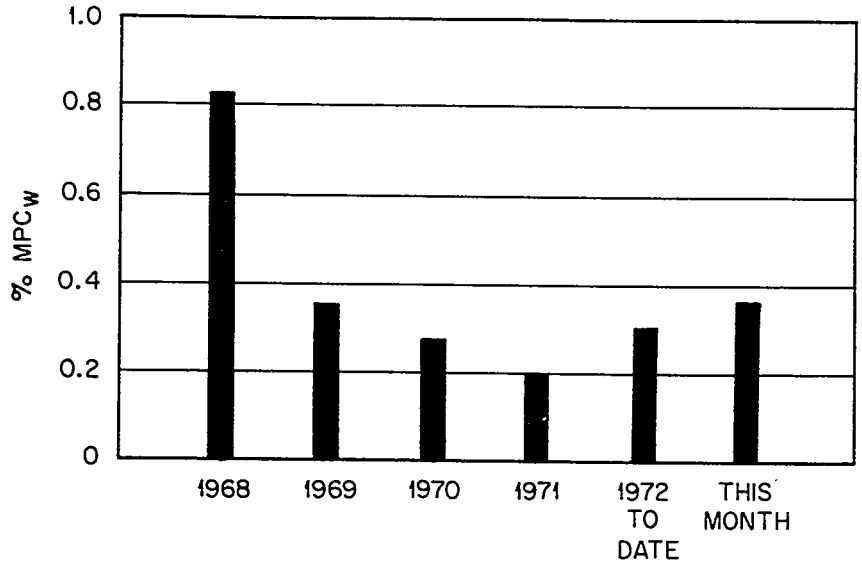
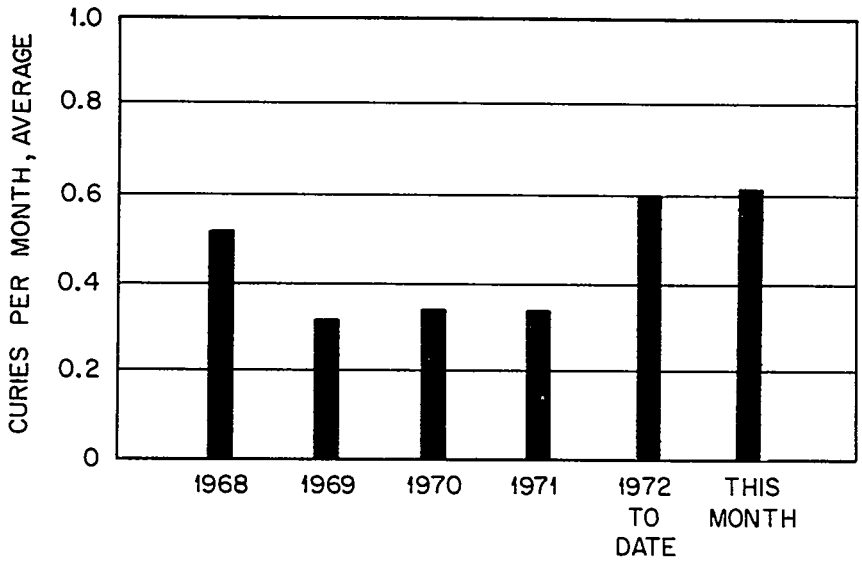


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)



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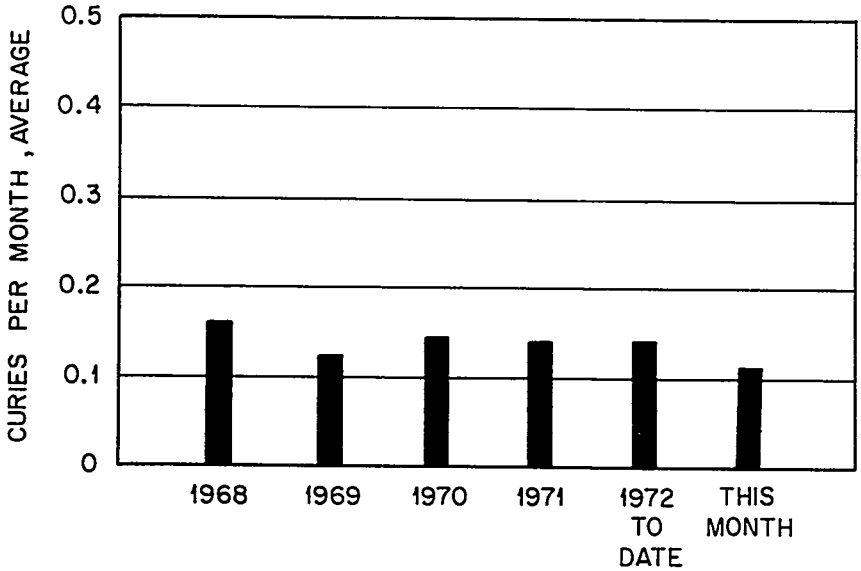

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

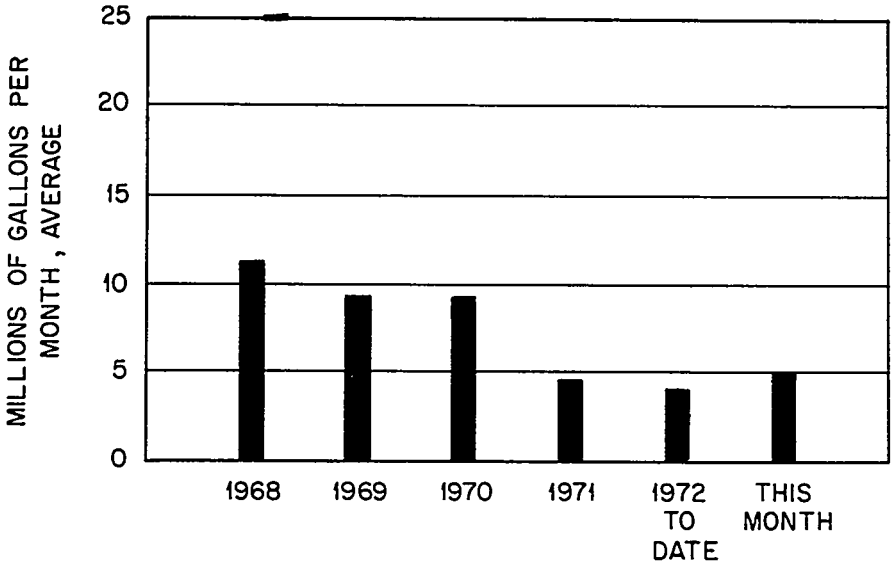

Fig 4. Process Waste Volumes.

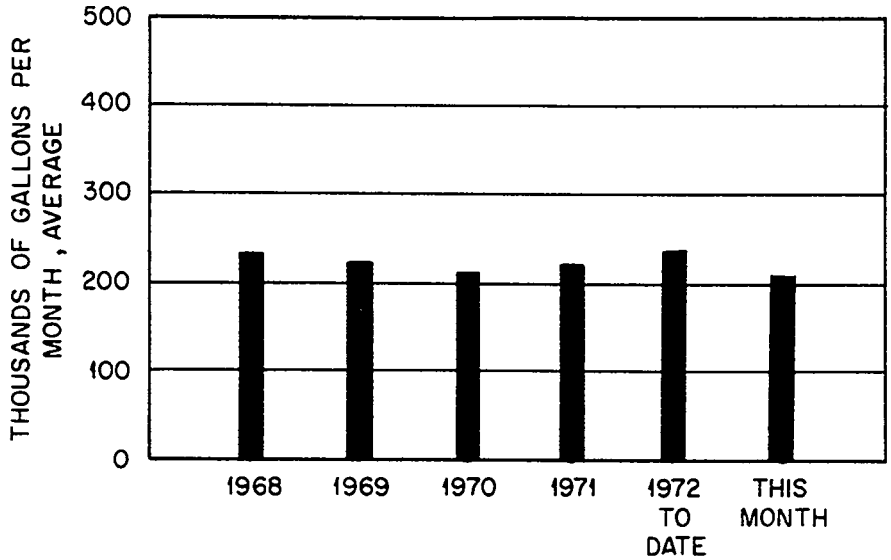

Fig 5. Intermediate – Level Waste Volumes.

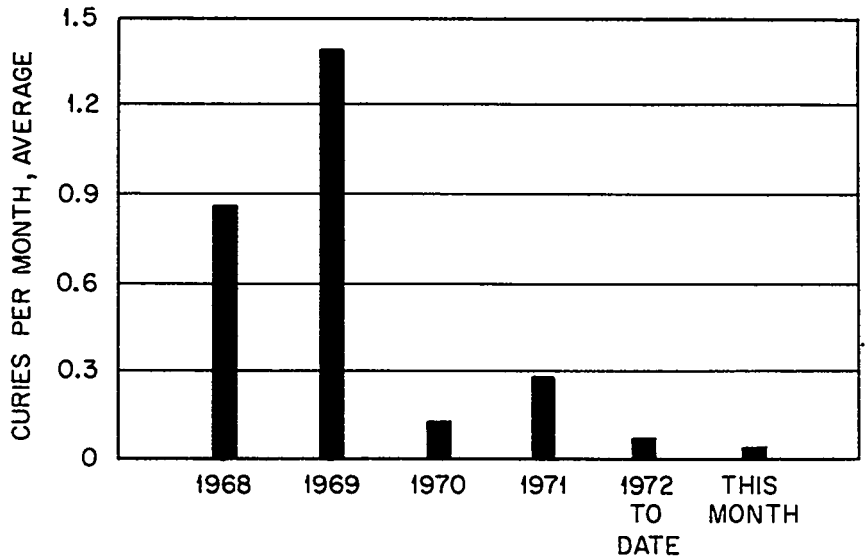

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

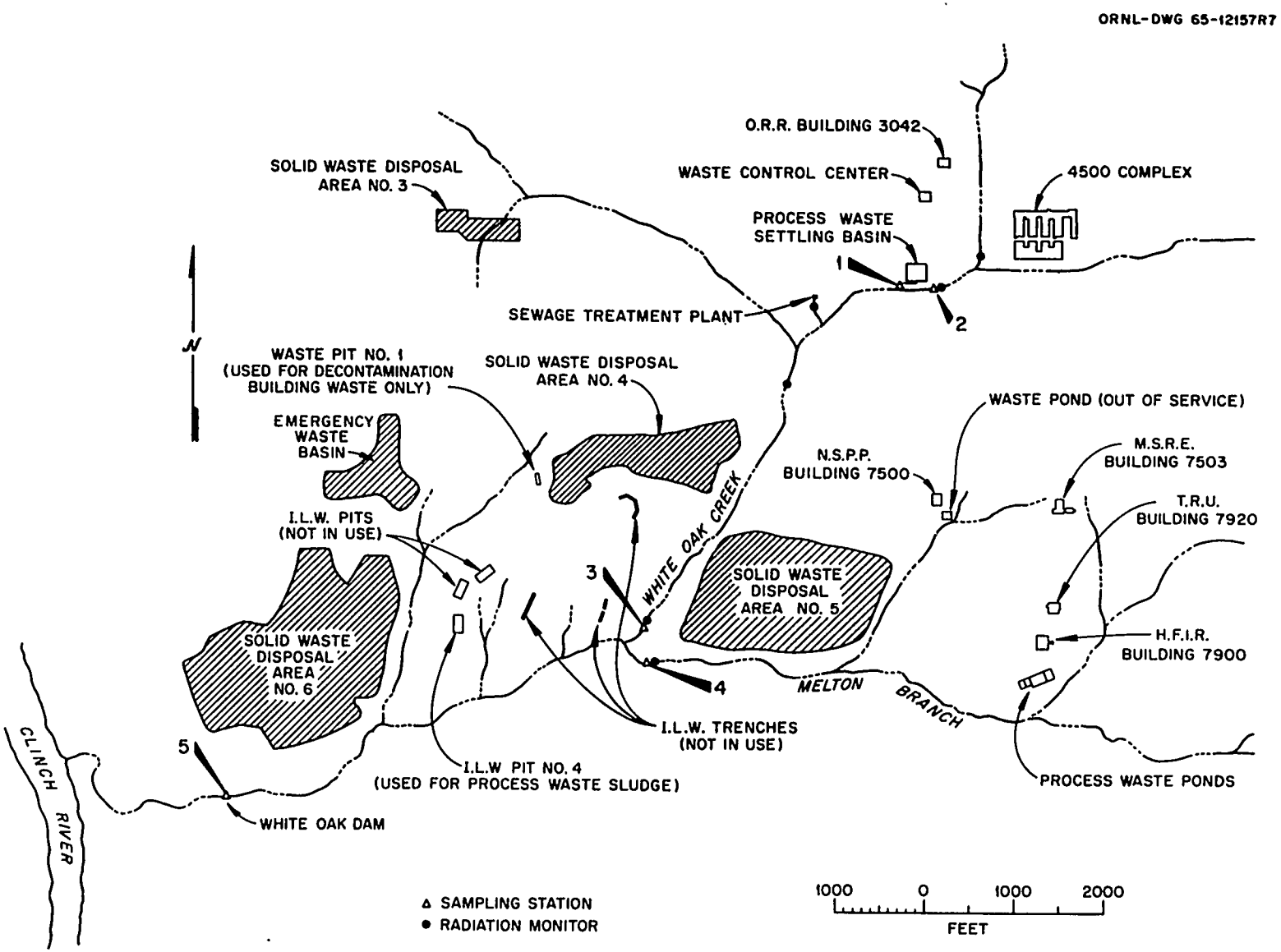

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process waste	1	0.12	0.26
Miscellaneous discharges from east end of plant	2	0.02	0.06
Discharge from Bethel Valley Area	3	0.48	1.07
Discharge from Melton Valley Area	4	0.13	0.27
Total discharge from all sources	3, 4	0.61	1.34
White Oak Dam to Clinch River (Health Physics measurement)	5	0.47	1.24

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	162.0	0.02	2.8	0.06	1.2
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.31[b]	43.0	0.48	9.3
3. Reactor Operations (MH112)	6.0	<0.01	-	0.33	6.4
4. Buildings 3503 and 3508	10.0	0.03	4.2	1.07	20.8
5. Buildings 3025 and 3026	25.0	<0.01	-	0.26	5.1
6. Building 3019	10.8	<0.01	-	0.11	2.1
7. Fission Products Development	-	<0.01	-	0.03	0.6
8. Waste Evaporator, Bldg. 2531	114.0	0.22	30.6	1.03	20.0
9. Buildings 3525 and 3550	0.03	<0.01	-	0.78	15.2
10. Building 2026	0.20	<0.01	-	0.19	3.7
11. Tank Farm Drainage	47.5	0.14	19.4	0.80	15.6

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Millicuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	0.04	2
Radiochemical-Processing Pilot Plant	3020	<0.01	<1
MSRE	7512	<0.01	<1
HFIR	7911	0.01	<1
Total activity in gases released		0.05	2

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

DATE ISSUED: JUN 23 1972

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NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

ORNL
CENTRAL FILES NUMBER
72-6-23

DATE: June 12, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of April, 1972

TO: Distribution

FROM: G. J. Dixon

This document has been approved for release to the public by:

David C. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1972, was 0.37% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.29% MPC_W, 0.07% MPC_W, and 0.014% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. As can be noted, the Sr discharge to White Oak Lake is still higher than the average monthly discharge in 1971 but is less than the average for the year to date. The recheck of the sewer discharges mentioned in the last report indicated that no leak has developed.

Process Waste

A total of 4.8 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boildown rate of 307 gph. A summary of operating data follows:

	Gallons
Total volume generated	174,500
Volume transferred to Evaporator	221,000
Tank Farm free space at beginning of month	232,000
Tank Farm free space at end of month	272,100
Evaporator concentrate returned to Tank Farm	6,490
Volume of concentrate available for hydrofracture	280,100

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	18,350
Fission Products Development Laboratory	14,550
ORR and BSR	12,550
High Flux Isotope Reactor	19,750
Radioisotopes Processing Area	24,750
4500 Complex	8,800

GASEOUS WASTE

The ORNL stacks discharged 100 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 374 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

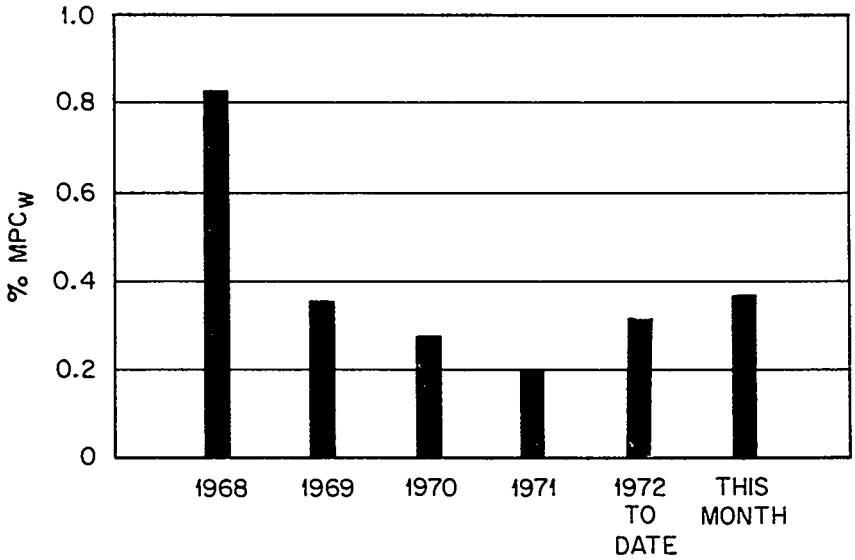

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

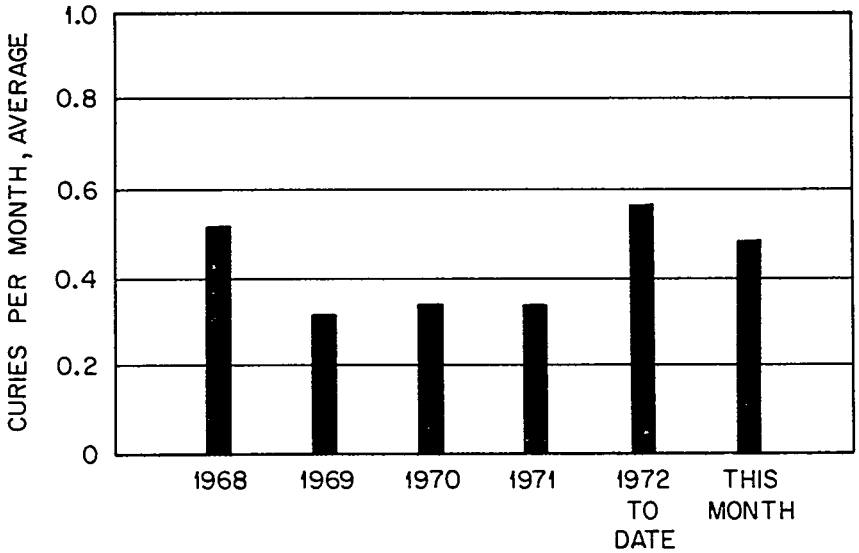

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

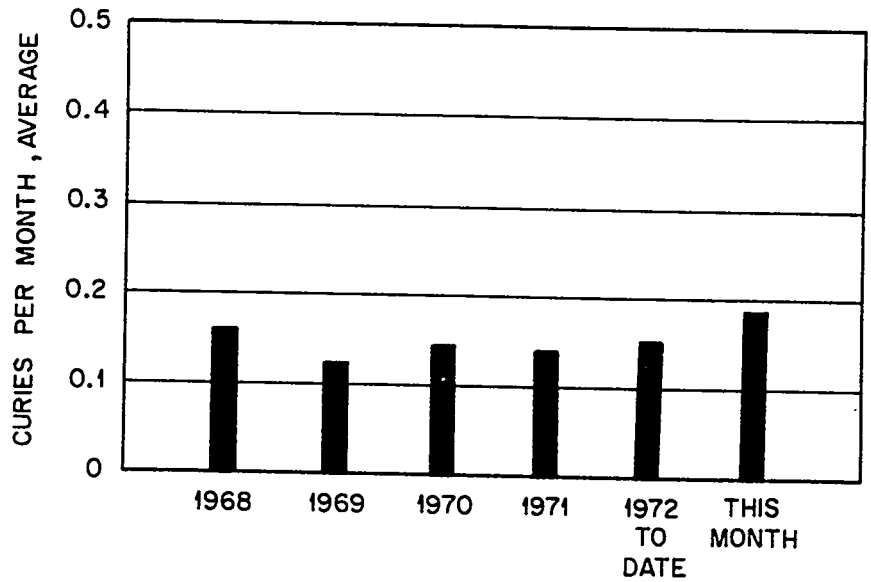

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

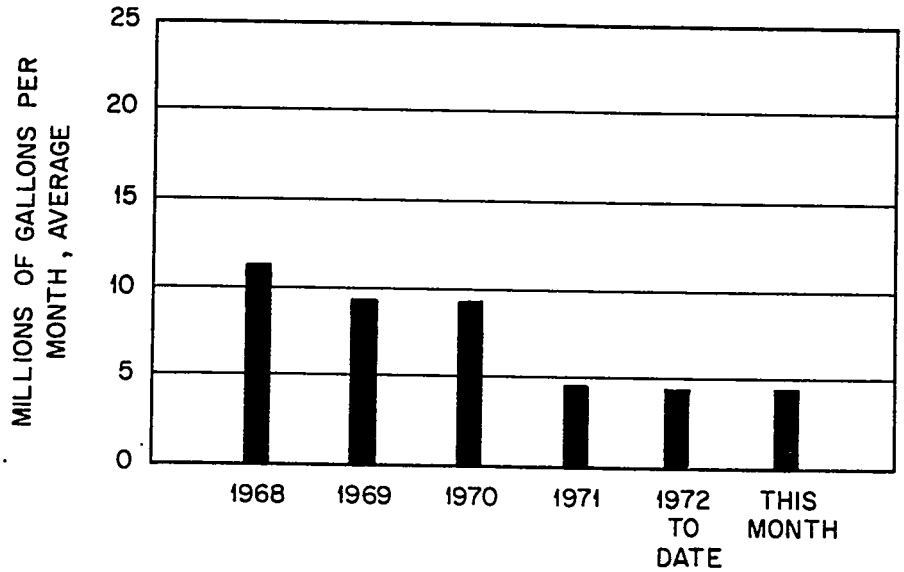

Fig 4. Process Waste Volumes.

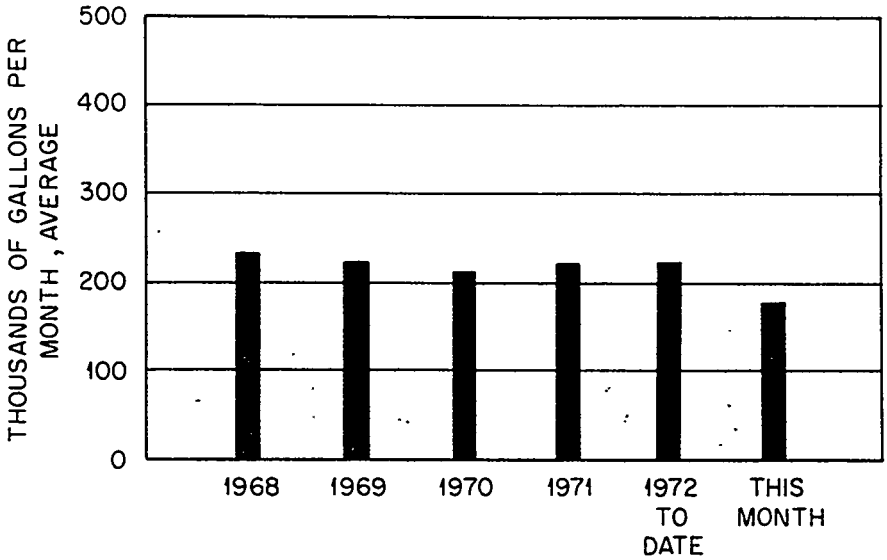

Fig 5. Intermediate – Level Waste Volumes.

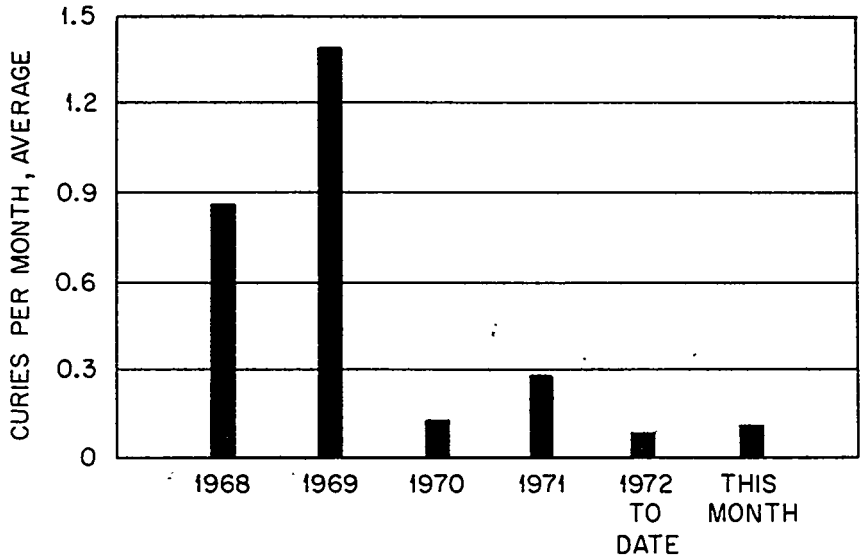

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

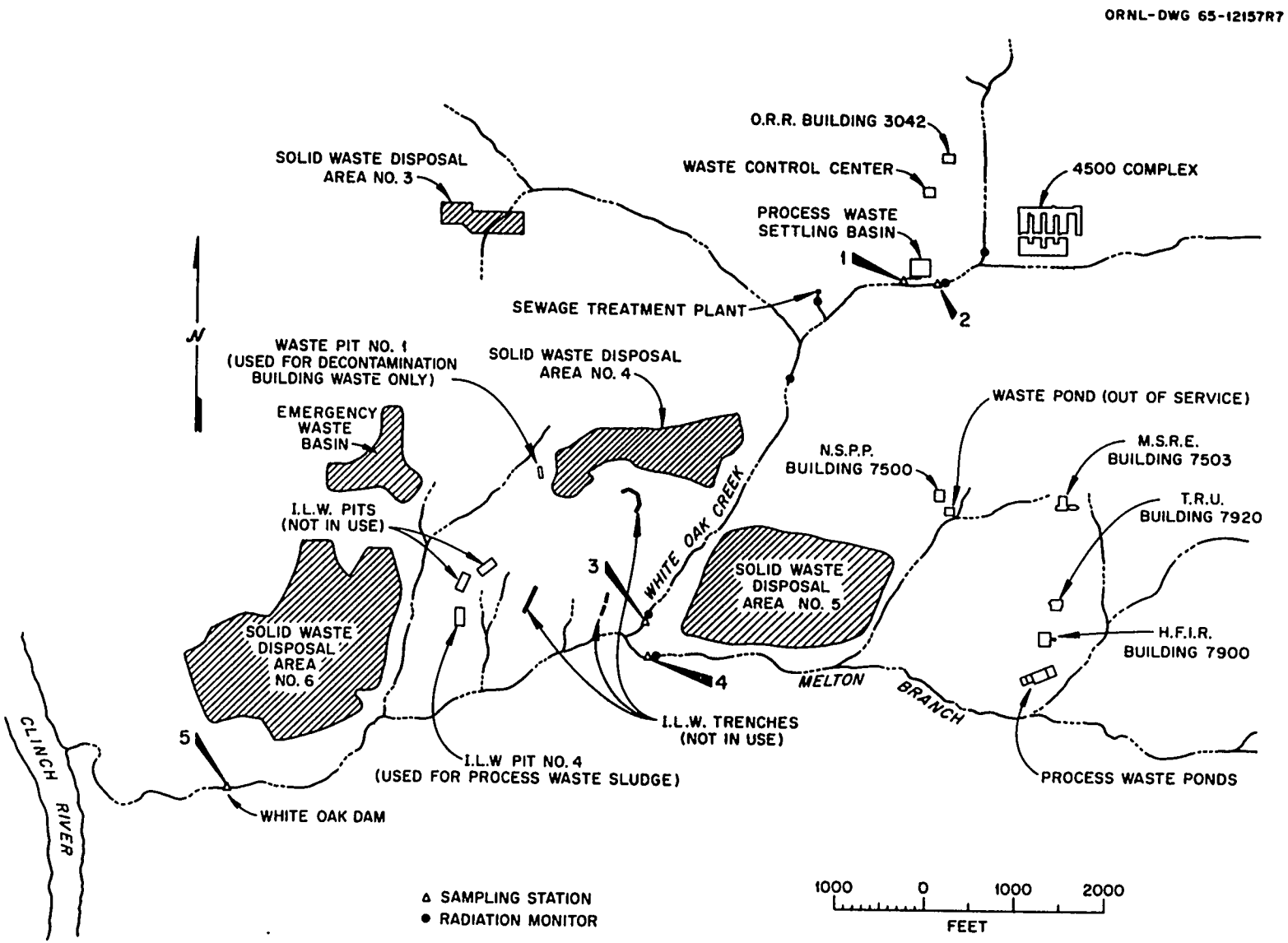

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.19	0.42
Miscellaneous discharges from east end of plant	2	0.02	0.06
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.41	0.90
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.07	0.16
Total discharge from all sources	3, 4	0.48	1.06
White Oak Dam to Clinch River (Health Physics measurement)	5	0.30	0.72

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	138	0.01	1.2	0.04	0.8
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.37[b]	43.0	0.62	12.7
3. Reactor Operations (MH112)	12.9	<0.01	-	0.27	5.5
4. Buildings 3503 and 3508	10.1	0.02	2.3	0.78	16.1
5. Buildings 3025 and 3026	23.9	<0.01	-	0.23	4.7
6. Building 3019	11.5	<0.01	-	0.11	2.2
7. Fission Products Development Laboratory	-	<0.01	-	0.03	0.6
8. Waste Evaporator, Bldg. 2531	165	0.34	39.5	0.99	20.3
9. Buildings 3525 and 3550	0.03	<0.01	-	0.82	16.8
10. Building 2026	0.06	<0.01	-	0.19	3.9
11. Tank Farm Drainage	45.6	0.12	14.0	0.80	16.4

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	< 1
Central Radioactive Gas Disposal Facilities	3039	0.08	353
Radiochemical-Processing Pilot Plant	3020	0	< 1
MSRE	7512	0	< 1
HFIR	7911	0.02	21
Total activity in gases released		0.10	374

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

AUG 10 1972

2056

DATE ISSUED: [redacted]

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OAK RIDGE, TENNESSEE 37830

Special Distribution

ORNL
CENTRAL FILES NUMBER
72-8-7

DATE: August 2, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of May, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release to the public by:

David R. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of May, 1972, was 0.21% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.14% MPC_W, 0.04% MPC_W, and 0.026% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. As can be noted, the Sr discharge to White Oak Lake has dropped below the average monthly discharge in 1971.

Process Waste

A total of 5.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate-Level Waste

The waste evaporator operated at an average boildown rate of 297 gph. A summary of operating data follows:

	Gallons
Total volume generated	212,800
Volume transferred to Evaporator	221,200
Tank Farm free space at beginning of month	272,100
Tank Farm free space at end of month	277,500
Evaporator concentrate returned to Tank Farm	2,880
Volume of concentrate available for hydrofracture	288,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	15,250
Fission Products Development Laboratory	21,550
ORR and BSR	30,450
High Flux Isotope Reactor	19,050
Radioisotopes Processing Area	19,950
4500 Complex	7,950

GASEOUS WASTE

The ORNL stacks discharged 420 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 249 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.8% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

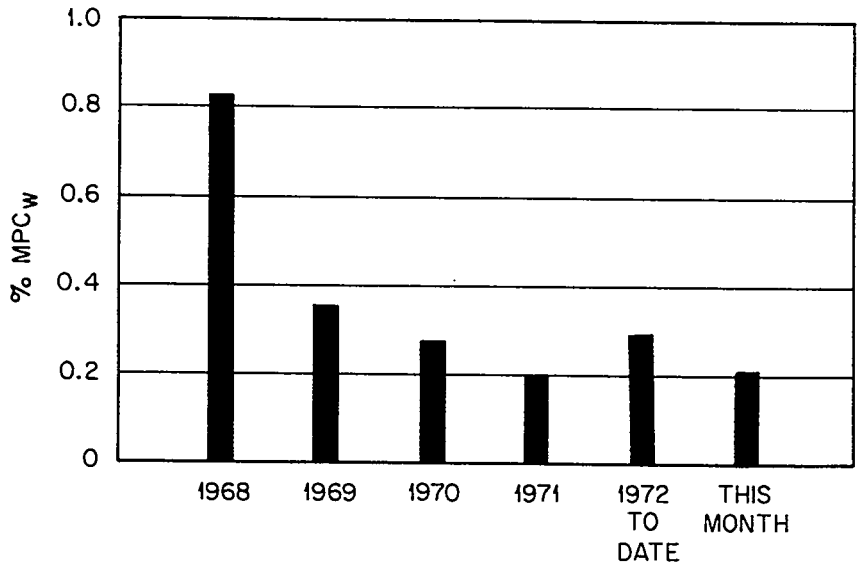

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

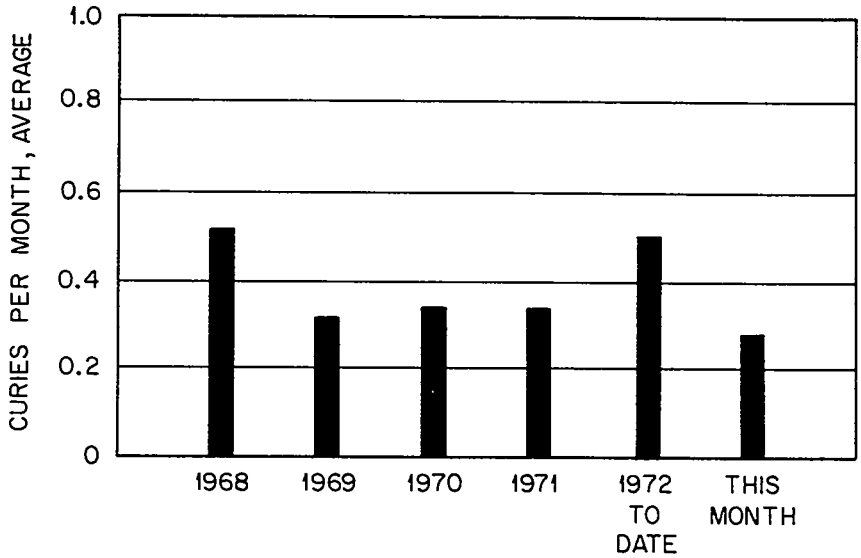

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

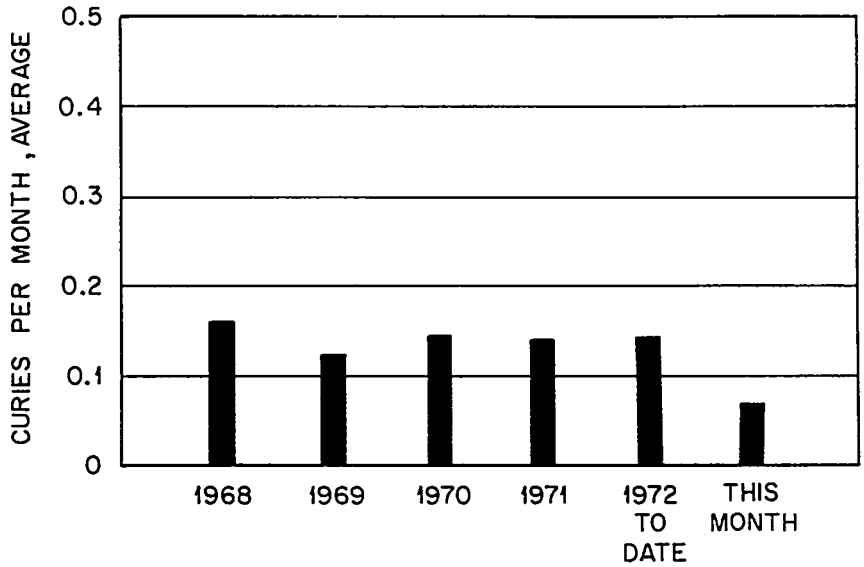

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

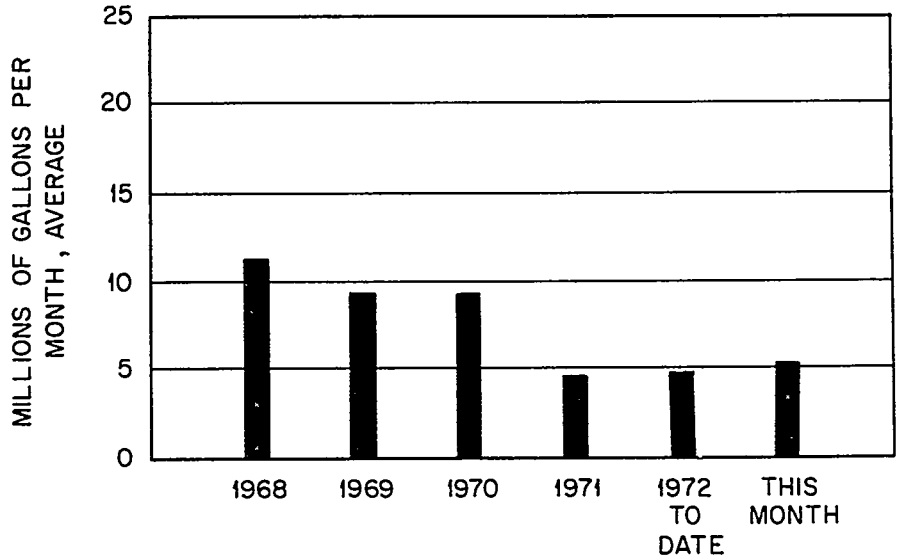

Fig 4. Process Waste Volumes.

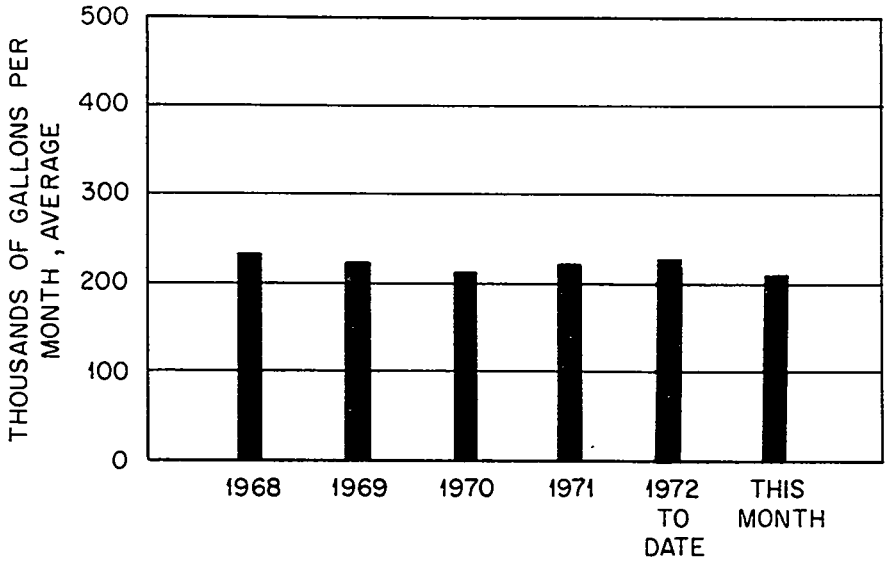

Fig 5. Intermediate – Level Waste Volumes.

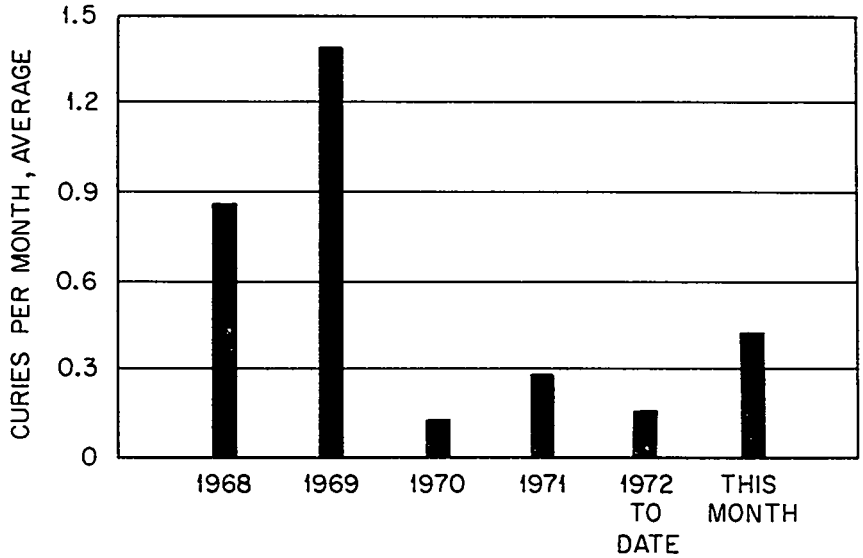

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

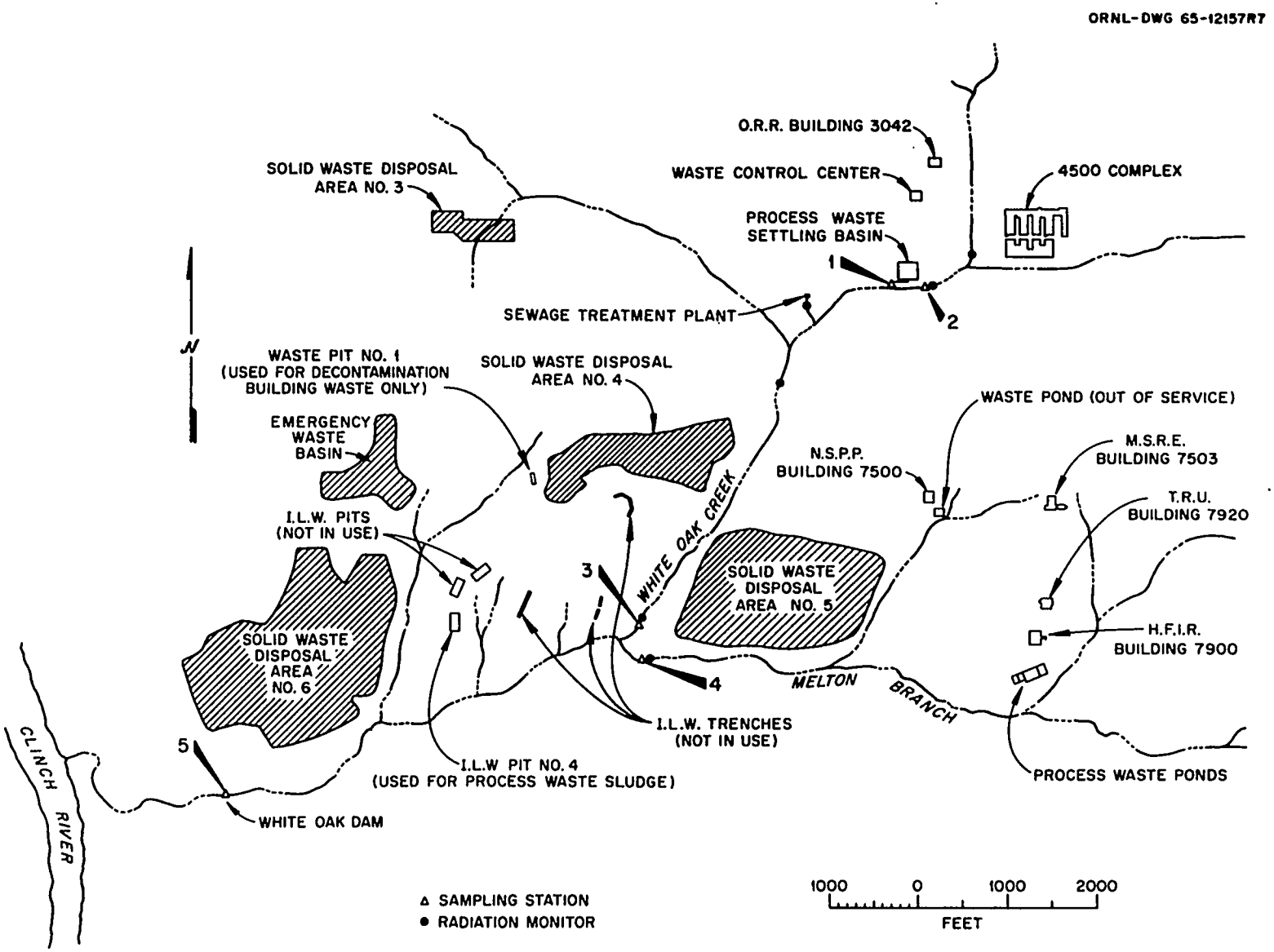

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.07	0.24
Miscellaneous discharges from east end of plant	2	0.03	0.16
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.25	0.59
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.03	0.02[c]
Total discharge from all sources	3,4	0.28	0.61
White Oak Dam to Clinch River (Health Physics measurements)	5	0.21	0.65

[a]Refers to Figure 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]This value appears low. The sample has been destroyed and therefore a recheck cannot be made.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	156	0.01	1.8	0.05	1.0
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.36[b]	63.2	0.78	14.9
3. Reactor Operations (MH112)	41	< 0.01	-	0.34	6.5
4. Buildings 3503 and 3508	12	0.03	5.2	1.01	19.3
5. Buildings 3025 and 3026	17	< 0.01	-	0.20	3.8
6. Building 3019	23	< 0.01	-	0.03	0.6
7. Fission Products Development Laboratory	-	< 0.01	-	0.03	0.6
8. Waste Evaporator, Bldg. 2531	33	0.03	5.2	0.88	16.9
9. Buildings 3525 and 3550	0.04	< 0.01	-	0.84	16.1
10. Building 2026	0.40	< 0.01	-	0.21	4.0
11. Tank Farm Drainage	55	0.14	24.6	0.85	16.3

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	< 1
Central Radioactive Gas Disposal Facilities	3039	0.15	192
Radiochemical-Processing Pilot Plant	3020	0	4
MSRE	7512	0	< 1
HFIR	7911	0.27[c]	53
Total activity in gases released		0.42	249

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This activity was released from the Transuranium Processing Plant.

DATE ISSUED: AUG 10 1972

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OAK RIDGE, TENNESSEE 37830

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ORNL
CENTRAL FILES NUMBER
72-8-8

DATE: August 3, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of June, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release to the public by:

David R. Hamrin 3/12/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1972, was 0.156% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.107% MPC_W, 0.03% MPC_W, and 0.017% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 232 gph. The lower than average boildown rate and the decreased tank farm free space at the end of the month result from the evaporator being shut down for a period of 160 hours for scheduled maintenance.

	Gallons
Total volume generated	215,100
Volume transferred to evaporator	167,400
Tank Farm free space at beginning of month	277,500
Tank Farm free space at end of month	223,400
Evaporator concentrate returned to tank farm	6,470
Volume of concentrate available for hydrofracture	295,300

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	20,000
Fission Products Development Laboratory	19,200
ORR and BSR	32,800
High Flux Isotope Reactor	26,200
Radioisotopes Processing Area	22,900
4500 Complex	6,300
Buildings 3508 and 3503	9,900
Transuranium Processing Area	7,400

GASEOUS WASTE

The ORNL stacks discharged 220 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 197 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.0% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

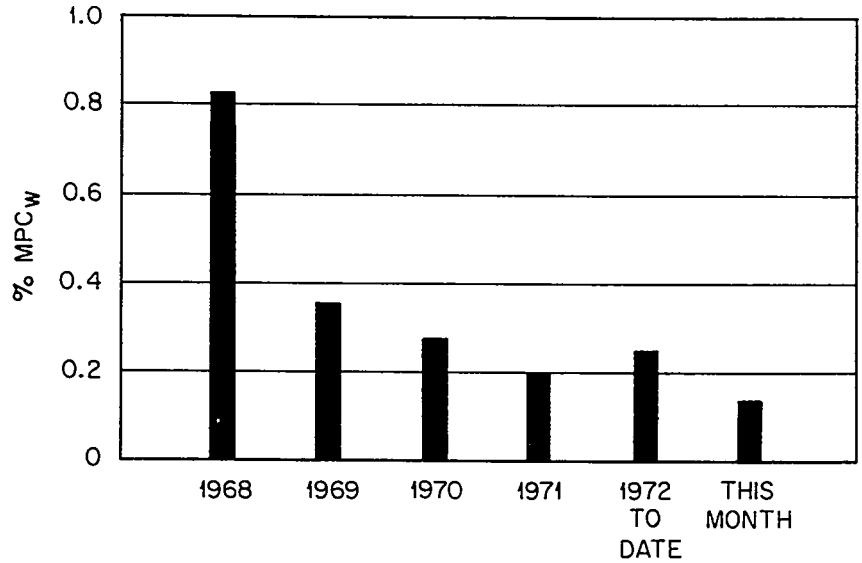

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

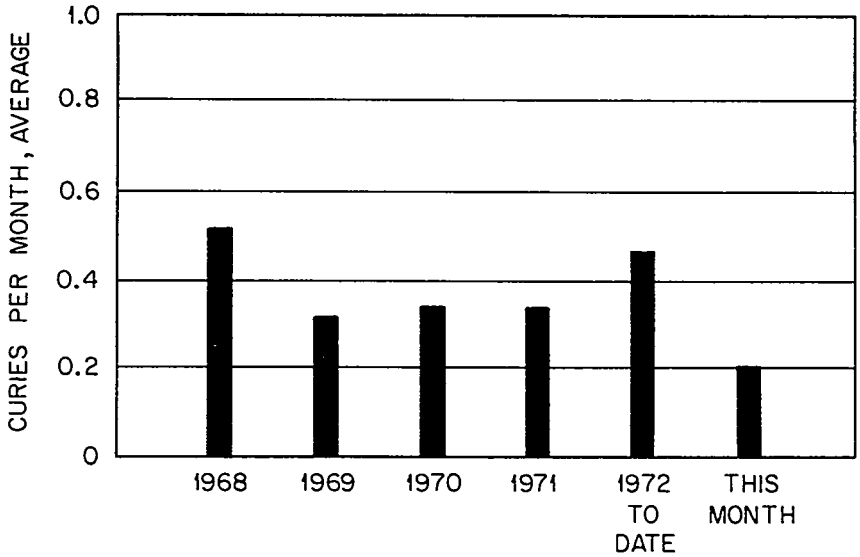

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

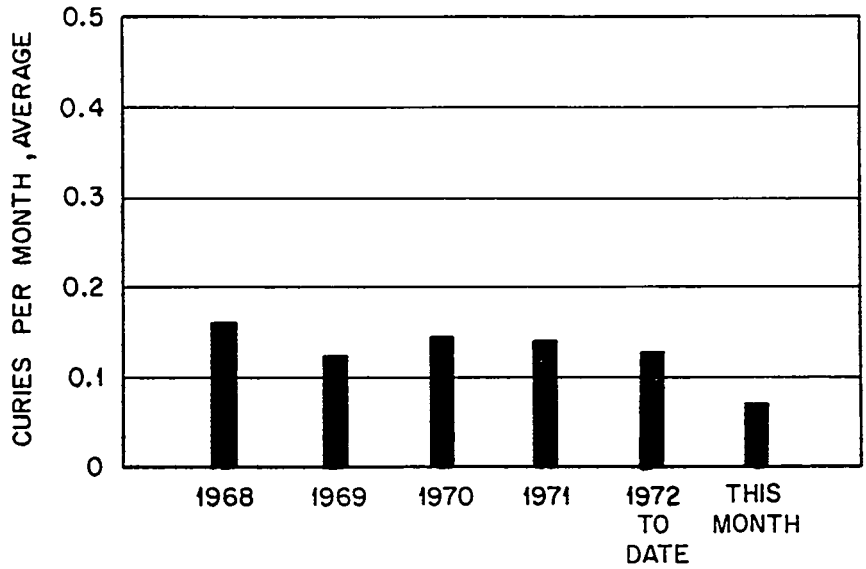

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

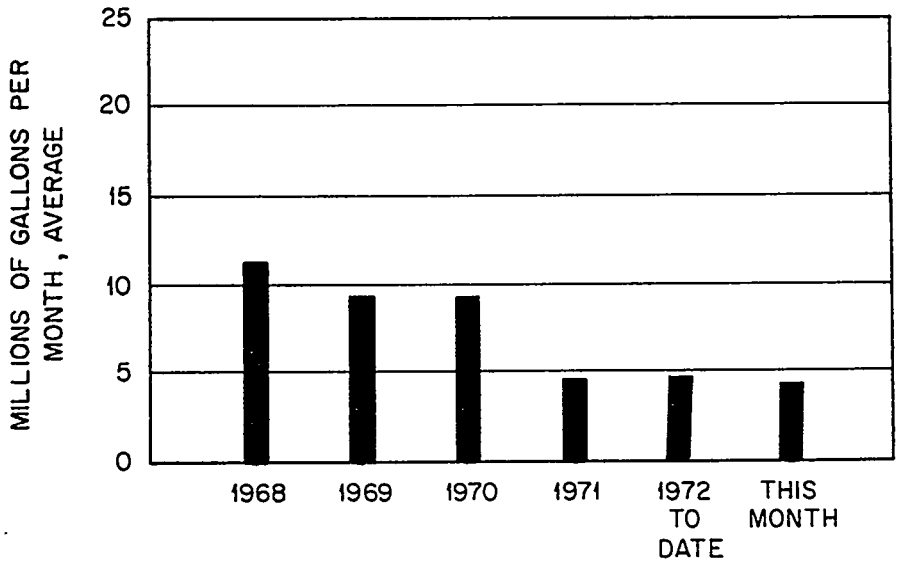

Fig 4. Process Waste Volumes.

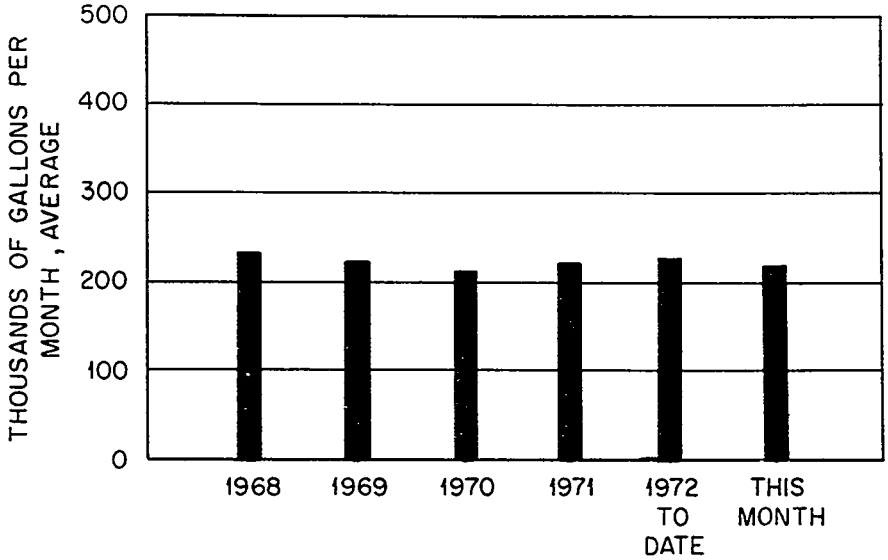

Fig 5. Intermediate – Level Waste Volumes.

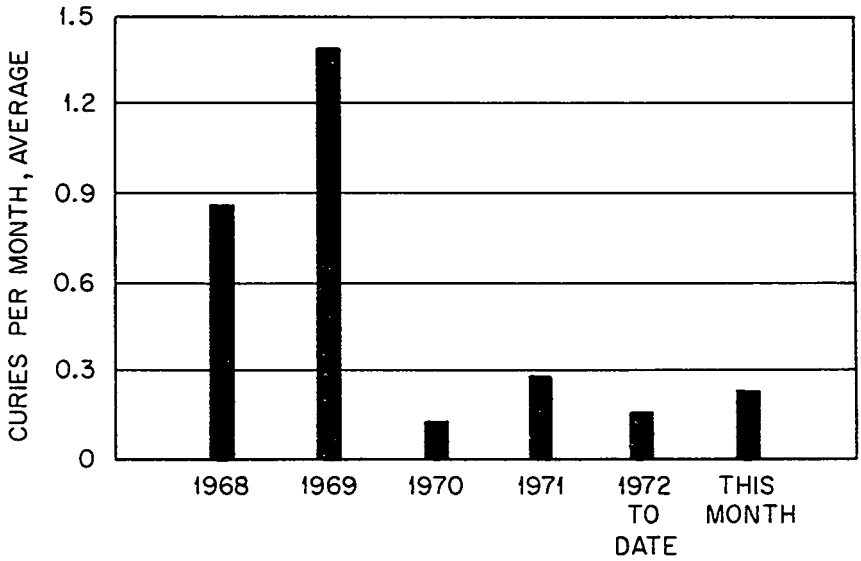

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

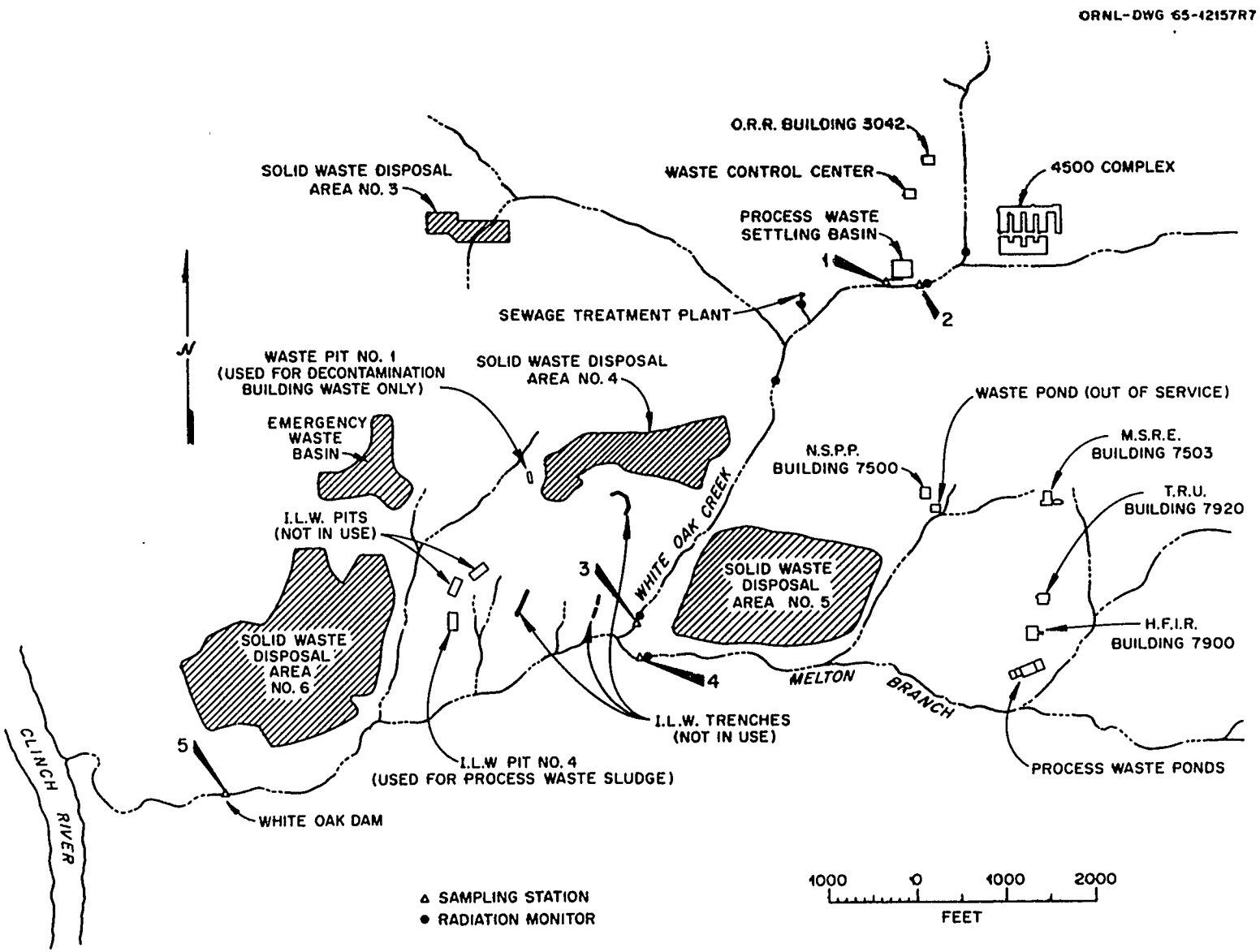

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.07	0.16
Miscellaneous discharges from east end of plant	2	0.03	0.12
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.17	0.40
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.03	0.05
Total discharge from all sources	3,4	0.20	0.45
White Oak Dam to Clinch River (Health Physics measurement)	5	0.16	0.375

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	132	0.03	4.8	0.07	1.6
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.41[b]	65.1	0.86	19.9
3. Reactor Operations (MH112)	21	0.01	1.6	0.33	7.6
4. Buildings 3503 and 3508	10	0.04	6.3	1.00	23.1
5. Buildings 3025 and 3026	11	< 0.01	-	0.20	4.6
6. Building 3019	19	< 0.01	-	0.03	0.7
7. Fission Products Development Laboratory	-	< 0.01	-	0.03	0.7
8. Waste Evaporator, Bldg. 2531	162	0.06	9.5	0.20	4.6
9. Buildings 3525 and 3550	< 0.1	< 0.01	-	0.72	16.8
10. Building 2026	0.15	< 0.01	-	0.20	4.6
11. Tank Farm Drainage	45	0.08	12.7	0.68	15.8

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	< 1
Central Radioactive Gas Disposal Facilities	3039	0.01	174
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	< 1
HFIR	7911	0.21[c]	22
Total activity in gases released		0.22	197

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This activity was released from the Transuranium Processing Plant.

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NUCLEAR DIVISION

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OAK RIDGE, TENNESSEE 37830

ORNL
CENTRAL FILES NUMBER
72-10-28

DATE: October 20, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of August, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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This document has been approved for release to the public by:

David R Hamrin 10/9/85
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1972, was 0.15% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.12% MPC_W, 0.02% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 333 gph. A summary of operating data follows:

	Gallons
Total volume generated	221,000
Volume transferred to evaporator	248,000
Tank Farm free space at beginning of month	245,000
Tank Farm free space at end of month	262,000
Evaporator concentrate returned to tank farm	10,000
Volume of concentrate available for hydrofracture	313,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	22,800
Fission Products Development Laboratory	34,800
ORR and BSR	22,600
High Flux Isotope Reactor	45,700
Radioisotopes Processing Area	21,700
4500 Complex	7,900
Transuranium Processing Area	4,600

GASEOUS WASTE

The ORNL stacks discharged 40 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 204 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.4% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

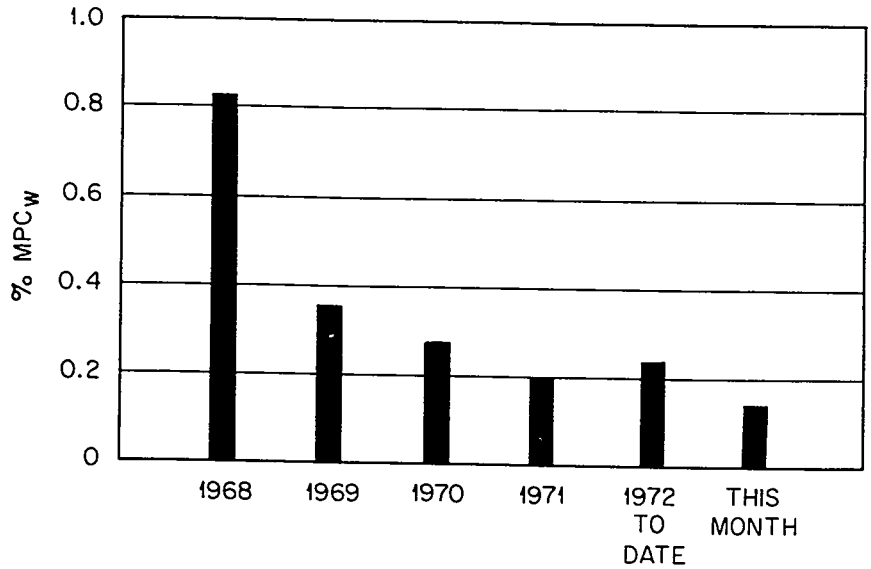

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

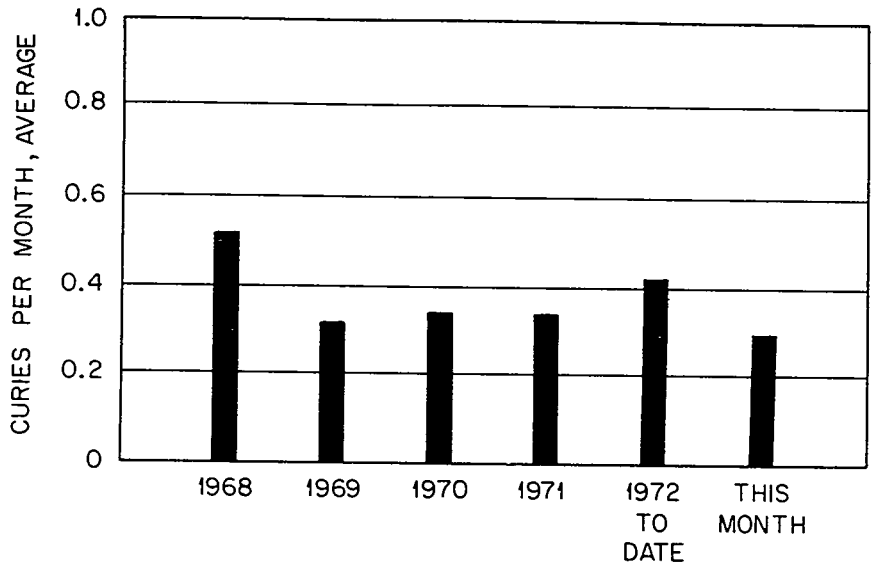

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

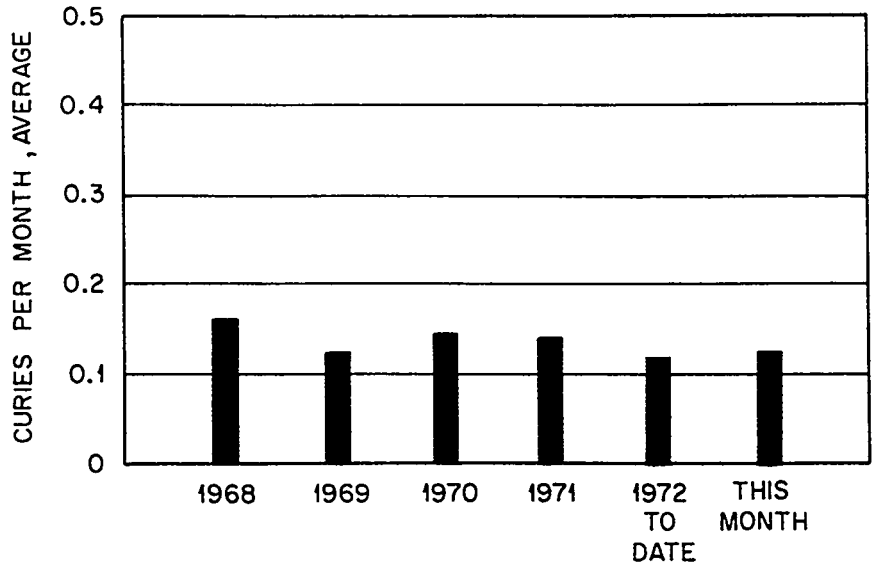

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

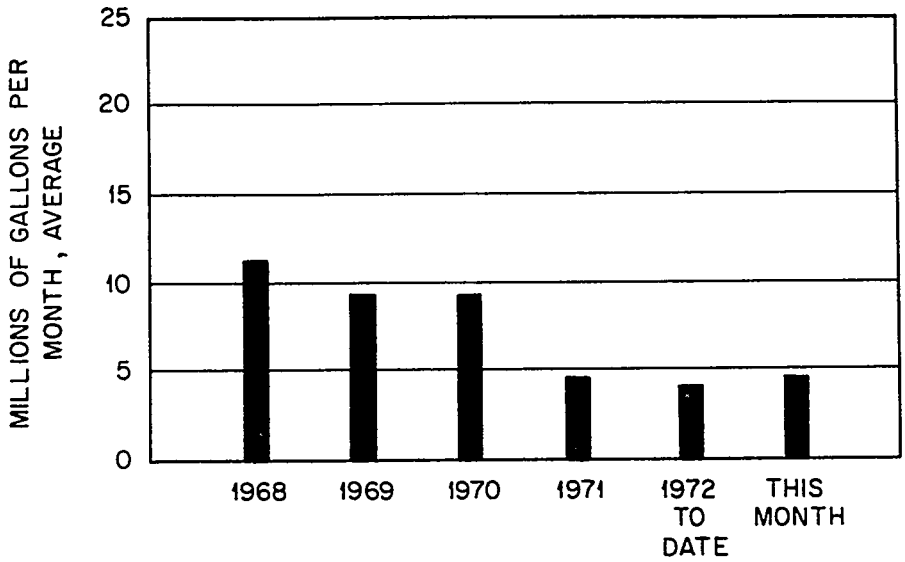

Fig 4. Process Waste Volumes.

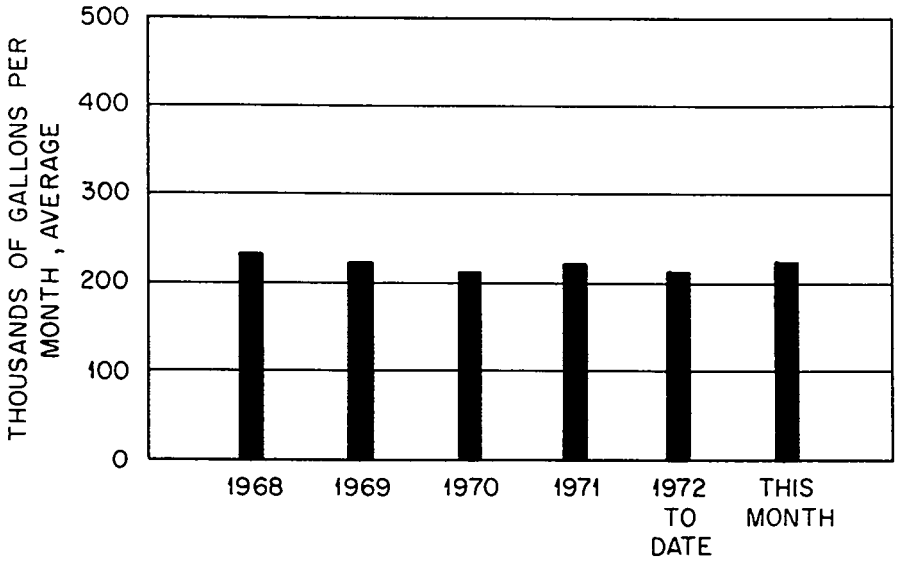

Fig 5. Intermediate – Level Waste Volumes.

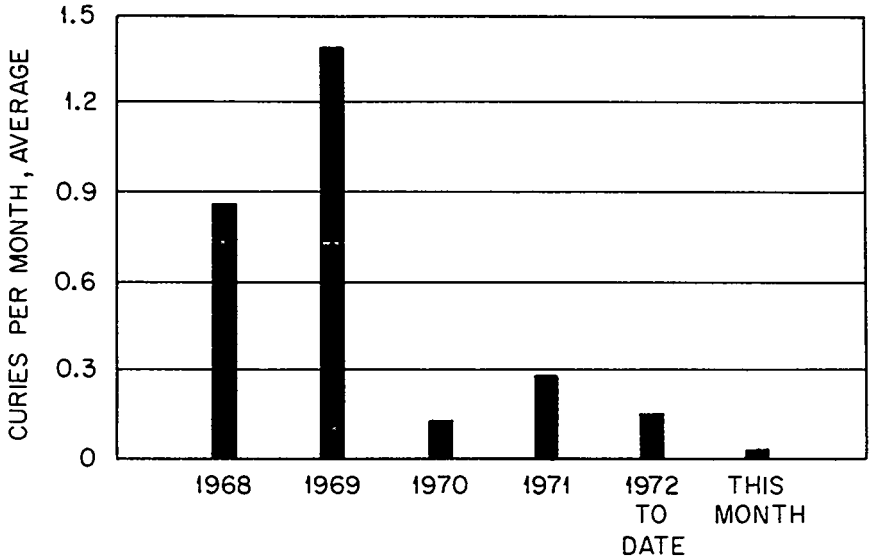

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

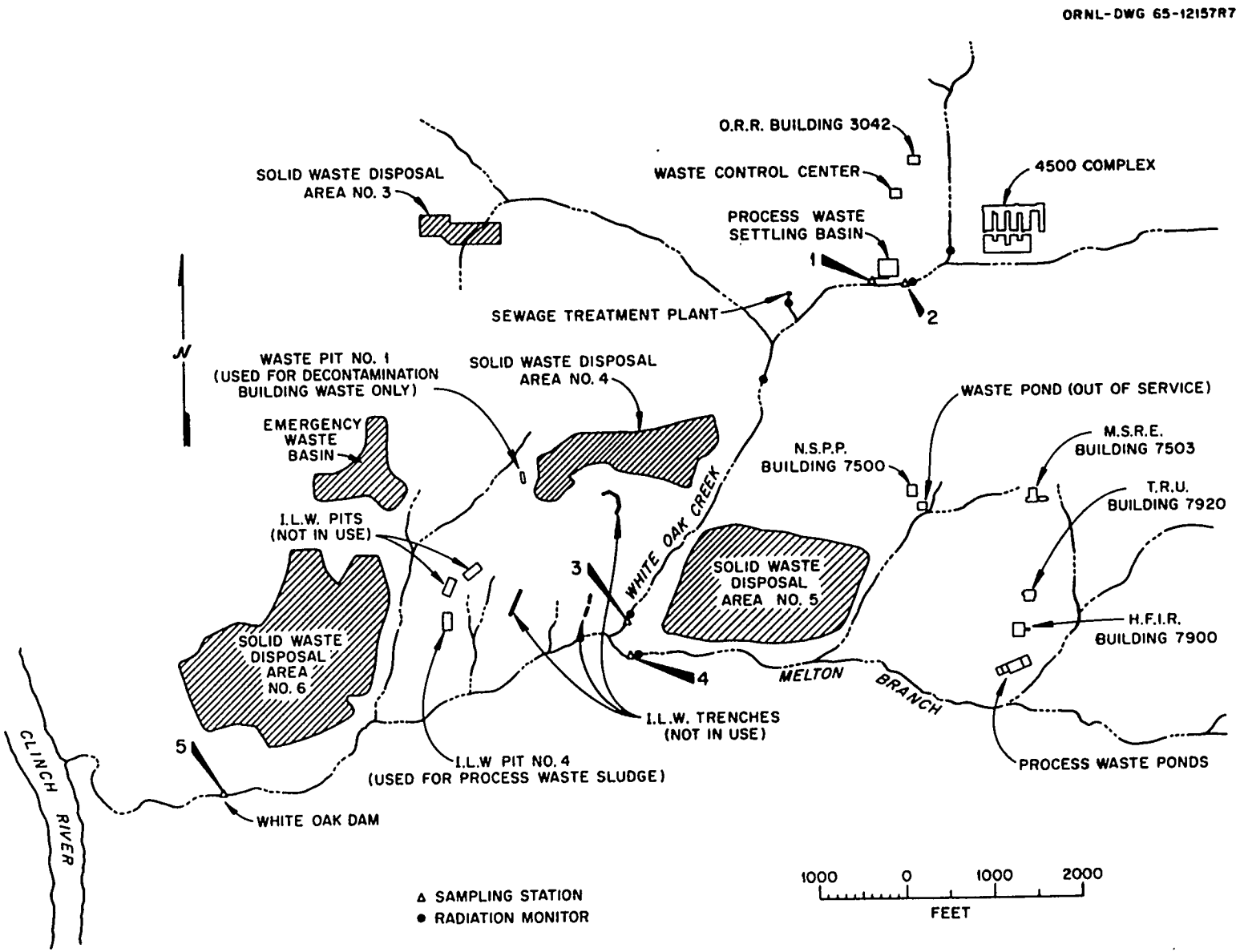

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.13	0.30
Miscellaneous discharges from east end of plant	2	0.03	0.02
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.23	0.44
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.15
Total discharge from all sources	3,4	0.31	0.59
White Oak Dam to Clinch River (Health Physics measurement)	5	0.17	0.40

[a]Refers to Fig 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	84.0	0.04	5.9	0.16	3.1
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.41[b]	60.3	0.76	14.9
3. Reactor Operations (MH112)	10.4	0.01	1.5	0.45	8.8
4. Buildings 3503 and 3508	17.2	0.04	5.9	0.93	18.3
5. Buildings 3025 and 3026	7.8	<0.01	-	0.32	6.3
6. Building 3019	13.2	<0.01	-	0.04	0.8
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4
8. Waste Evaporator, Bldg. 2531	48.0	0.06	8.8	0.71	14.0
9. Buildings 3525 and 3550	< 0.01	<0.01	-	0.84	16.5
10. Building 2026	0.23	<0.01	-	0.15	2.9
11. Tank Farm Drainage	57.0	0.12	17.6	0.71	14.0

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.03	90
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	113
Total activity in gases released		0.04	204

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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ORNL
CENTRAL FILES NUMBER
72-10-42

DATE: October 30, 1972

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of September, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Harris 10/9/95
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1972, was 0.17 of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.14 MPC_W, 0.01 MPC_W, and 0.01 MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 2.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 228 gph. A summary of operating data follows:

	Gallons
Total volume generated	166,000
Volume transferred to evaporator	164,000
Tank Farm free space at beginning of month	262,000
Tank Farm free space at end of month	333,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture	241,000
Volume of concentrate transferred to Shale Fracture	80,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	21,700
Fission Products Development Laboratory	22,800
ORR and BSR	12,000
High Flux Isotope Reactor	16,500
Radioisotopes Processing Area	24,400
4500 Complex	7,900
Transuranium Processing Area	3,300

SHALE FRACTURING DISPOSAL OF ILW, INJECTION 8

The slot used for Injections 5, 6 and 7 (1968-1970) was plugged with cement and a new slot was cut at a depth of 832 feet. On September 29, a total of 72,700 gallons of concentrated ILW (0.42ci/gal) was injected into the new slot. This waste contained 27,800 curies of ^{137}Cs, 400 curies of ^{90}Sr, 2500 curies of ^{106}Ru, 50 curies of ^{60}Co, 6 grams of ^{239}Pu, and 0.07 grams of ^{244}Cm. Materials used for the injection are listed below. The slurries are in the order of their injection.

Solids	Weight, lb	lb/gal
Portland cement, Type 1	233,000	2.8
Kingston fly ash	233,000	2.8
Attapulgite	90,000	1.1
Grundite	45,000	0.6
Total weight of Solids	601,000	7.3

Liquids for Slurry	Gallons
Waste pit water	5,100
ILW	72,700
Fresh water	3,600
Water (displacement of well)	840
Total volume	82,240

Additional information concerning the injection is given in a memo from H. O. Weeren to Distribution "Preliminary Results at Hydrofracture Injection ILW-8", October 23, 1972.

GASEOUS WASTE

The ORNL stacks discharged 100 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 165 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

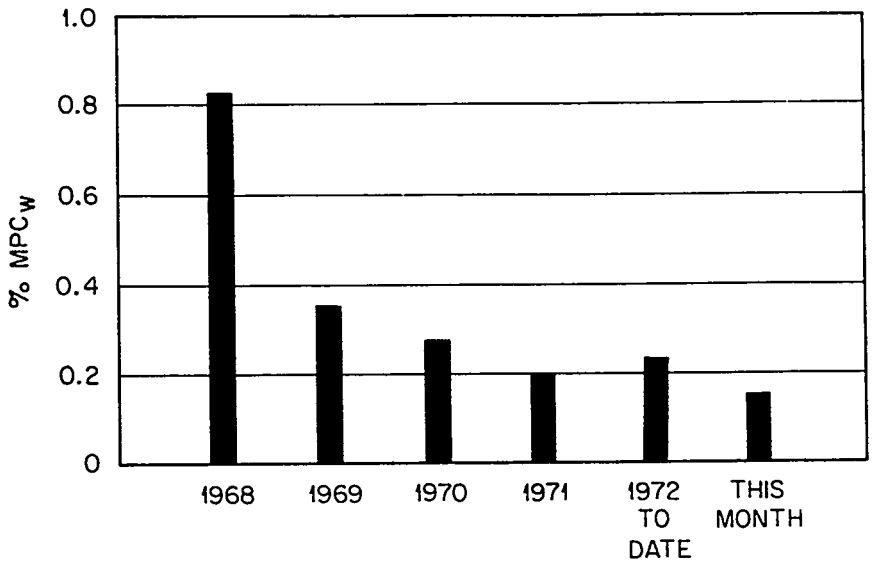

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

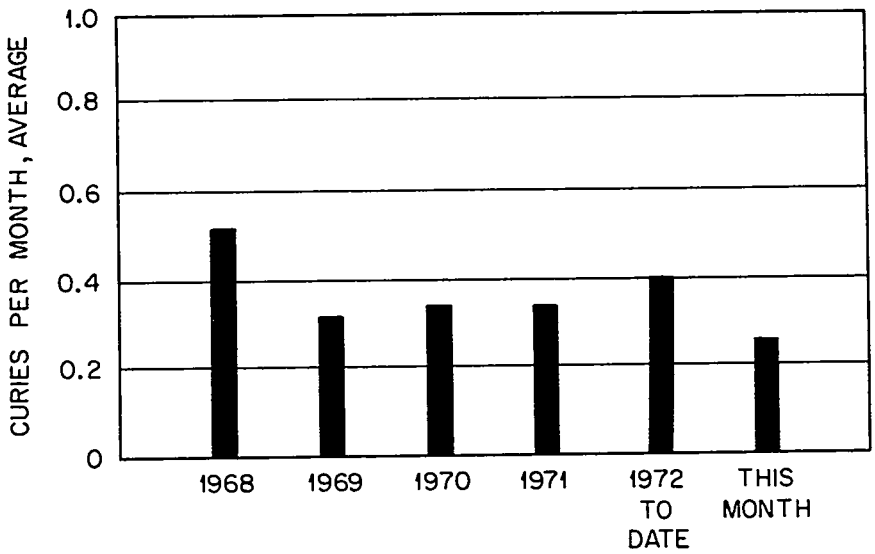

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

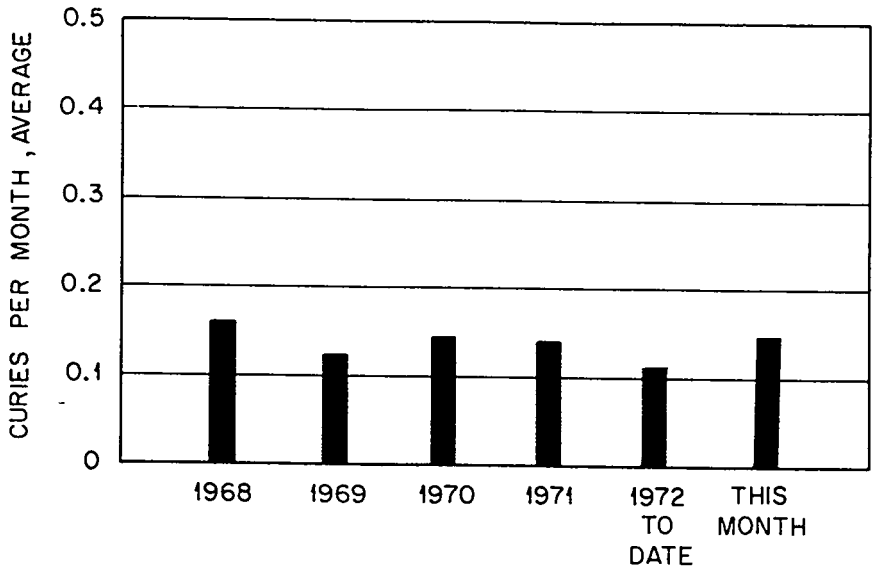

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

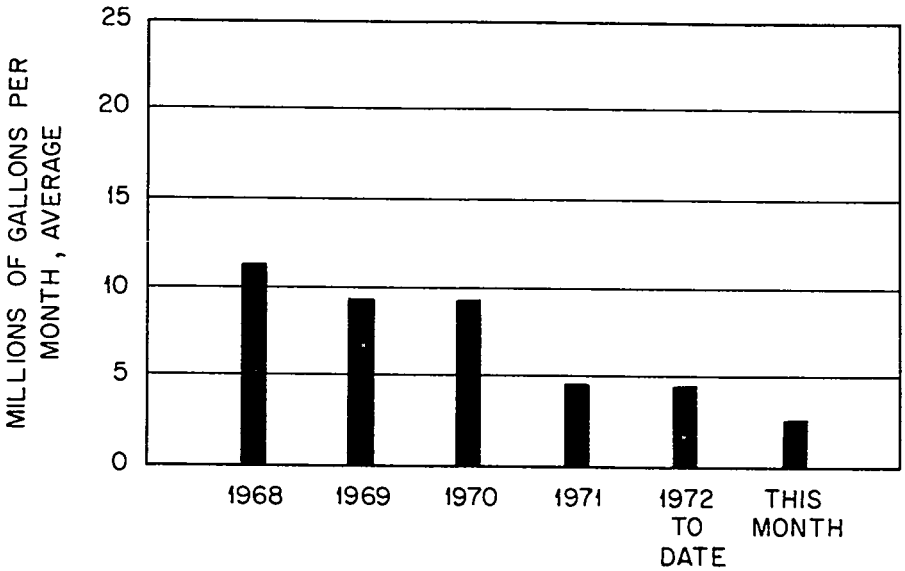

Fig 4. Process Waste Volumes.

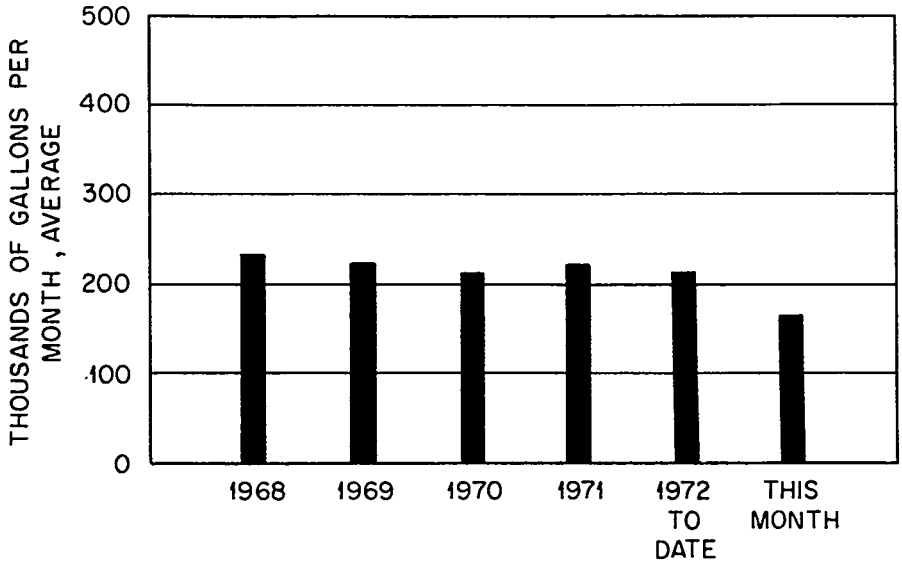

Fig 5. Intermediate – Level Waste Volumes.

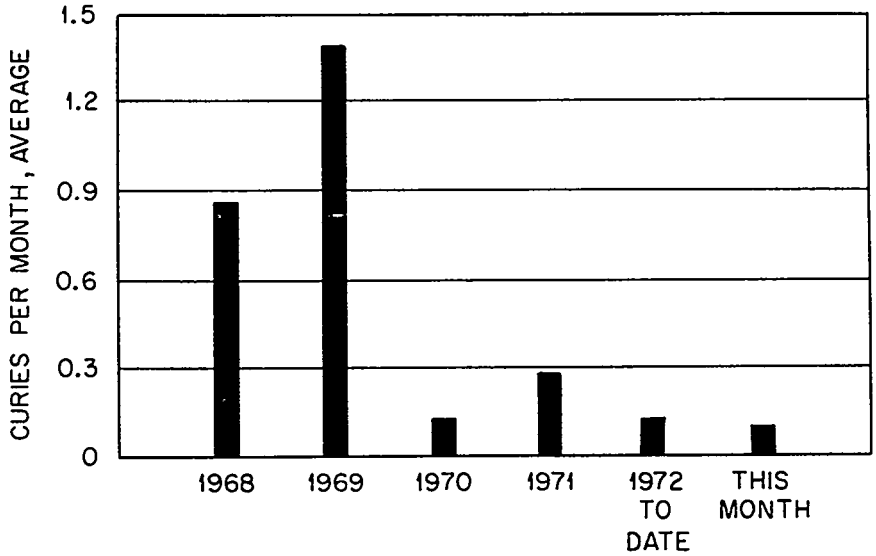

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

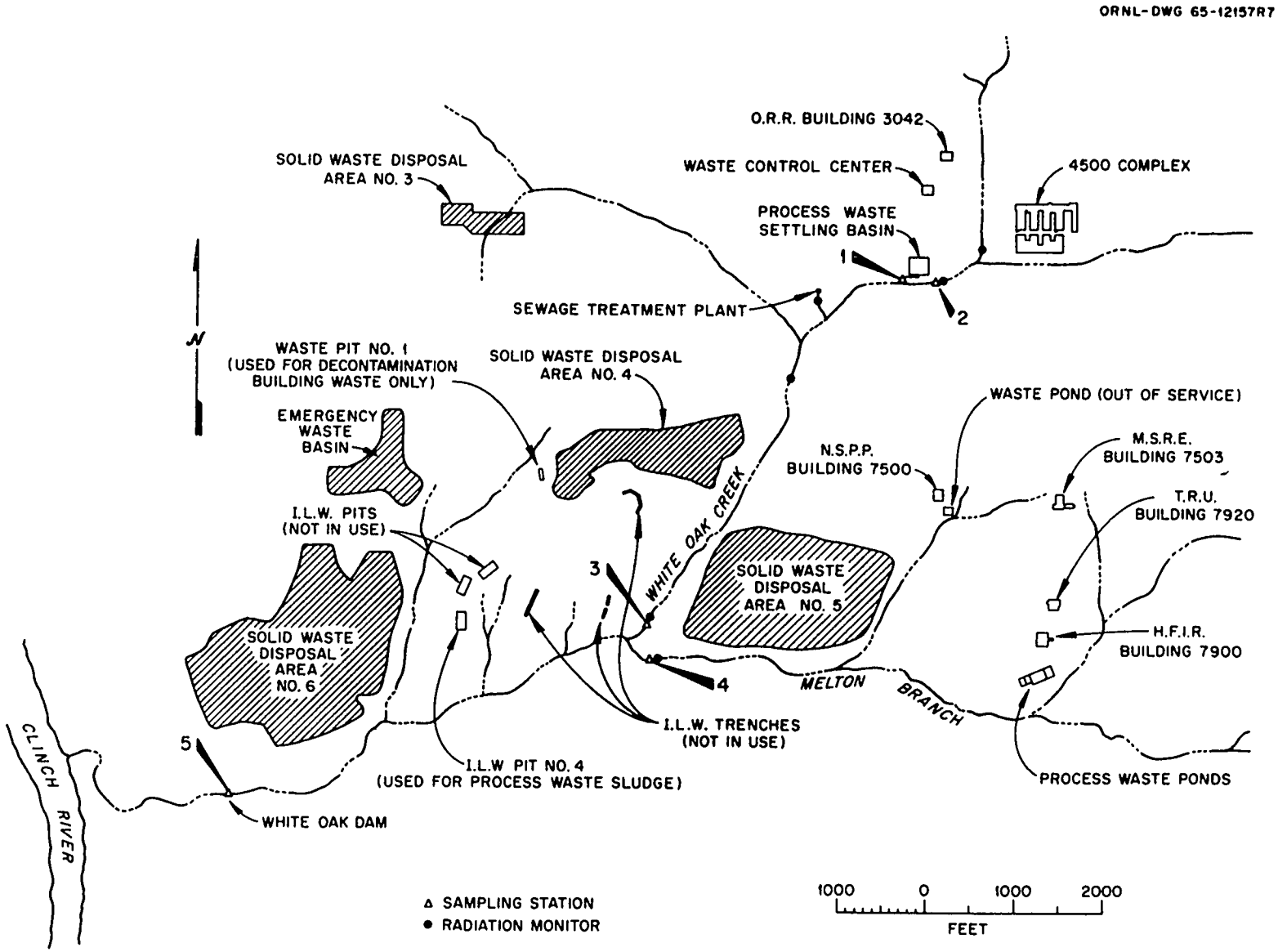

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.15	0.28
Miscellaneous discharges from east end of plant	2	0.02	0.04
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.24	0.40
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.03
Total discharge from all sources	3,4	0.26	0.43
White Oak Dam to Clinch River (Health Physics measurement)	5	0.19	0.40

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	42	0.03	6.4	0.26	5.9
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.20[b]	42.6	0.45	10.2
3. Reactor Operations (MH112)	7.5	<0.01	-	0.27	6.1
4. Buildings 3503 and 3508	14.7	0.04	8.5	0.85	19.3
5. Buildings 3025 and 3026	7.1	<0.01	-	0.37	8.4
6. Building 3019	5.0	<0.01	-	0.05	1.1
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4
8. Waste Evaporator, Bldg. 2531	147	0.08	17.0	0.56	12.7
9. Buildings 3525 and 3550	< 0.1	<0.01	-	0.83	18.8
10. Building 2026	< 0.1	0.02	4.2	0.16	3.6
11. Tank Farm Drainage	108	0.10	21.3	0.59	13.5

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.09	120
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.01	43
Total activity in gases released		0.10	165

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

JAN 24 1973

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ORNL
CENTRAL FILES NUMBER
73-1-25

DATE: January 19, 1973

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of November, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1972, was 0.26% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.19% MPC_W, 0.05% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.7 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. There is no obvious reason for the higher-than-normal discharge shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 274 gph. A summary of operating data follows:

	Gallons
Total volume generated	162,000
Volume transferred to evaporator	197,000
Tank Farm free space at beginning of month	440,000
Tank Farm free space at end of month	540,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	36,000
Volume of concentrate transferred to Shale Fracture	71,000
Total volume of concentrate in storage	82,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	28,200
Fission Products Development Laboratory	15,400
ORR and BSR	14,500
High Flux Isotope Reactor	13,900
Radioisotopes Processing Area	30,900
4500 Complex	8,300
Transuranium Processing Area	4,900

SHALE FRACTURING DISPOSAL OF ILW, INJECTION 10

ILW injection No. 10 was made on November 8, 1972, through the existing slot at a depth of 832 feet. A total of 82,400 gallons of concentrated ILW was injected into the fractured shale formation. This waste contained 18,213 curies of ^{137}Cs, 1,290 curies of ^{90}Sr, 579 curies of ^{106}Ru, 47 curies of ^{60}Co, 5.9 grams of ^{239}Pu, and 0.3 grams of ^{244}Cm. Materials used for the injection are listed below. The slurries are in the order of their injection.

Solids	Weight, lb	lb/gal
Portland cement, Type 1	279,300	3.1
Kingston fly ash	236,100	2.6
Attapulgite	108,000	1.2
Grundite	54,000	0.6
Total weight of Solids	677,400	7.5

Liquids for Slurry	Gallons
Waste pit water	7,000
ILW	82,400
Fresh water	1,000
Total volume	90,400

Additional information concerning the injection is given in a memo from H. O. Weeren to Distribution, "Preliminary Results of Hydrofracture Injection ILW-10, December 22, 1972.

GASEOUS WASTE

The ORNL stacks discharged 160 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 354 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.8% and 0.9% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

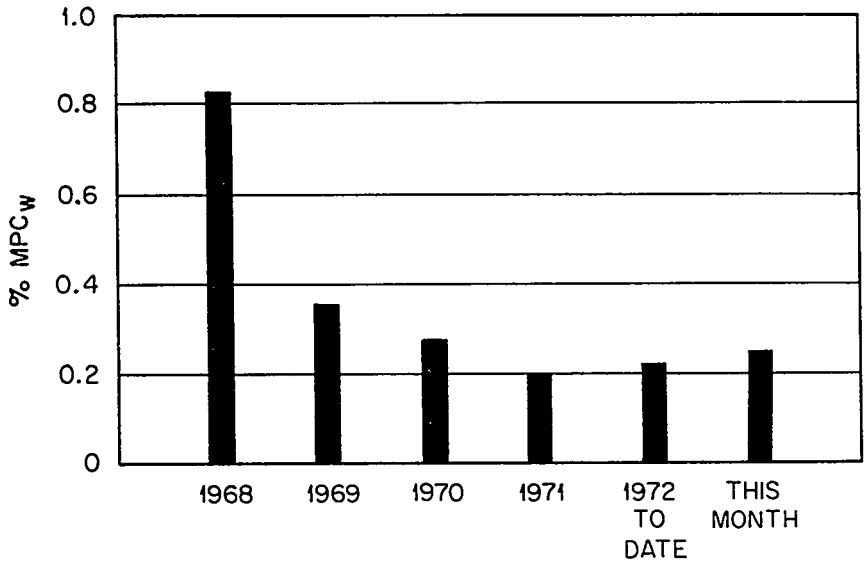

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

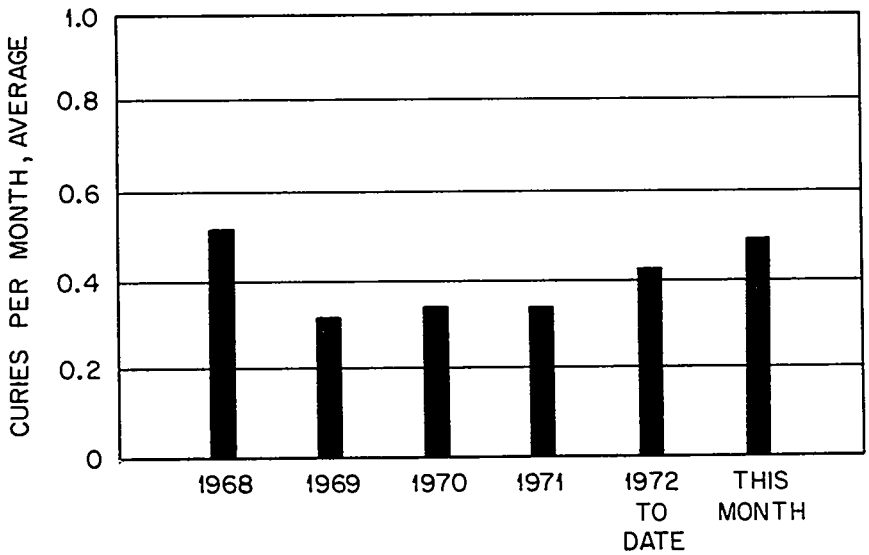

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

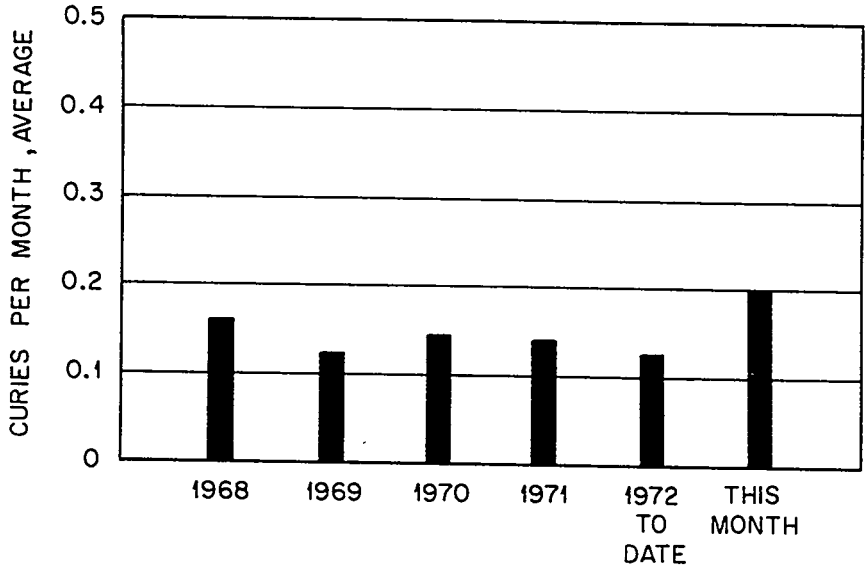

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

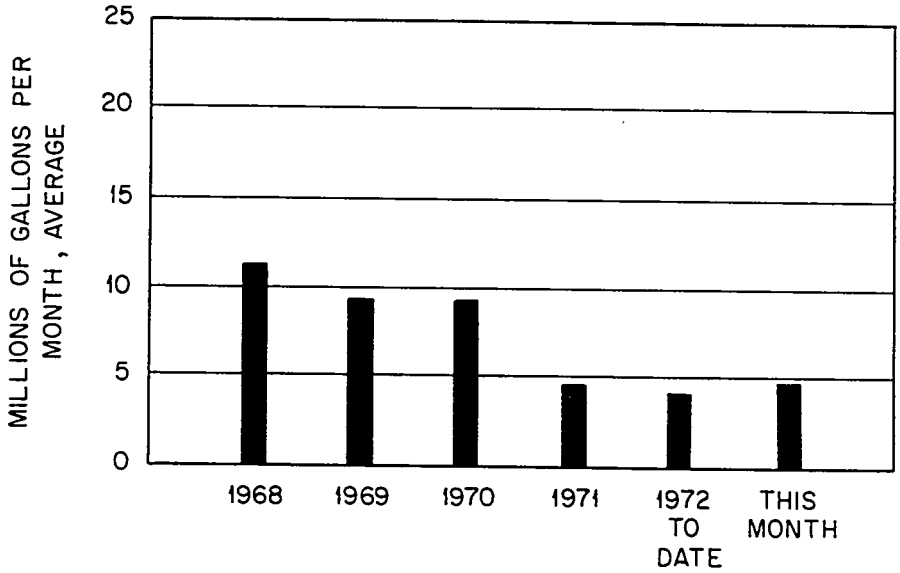

Fig 4. Process Waste Volumes.

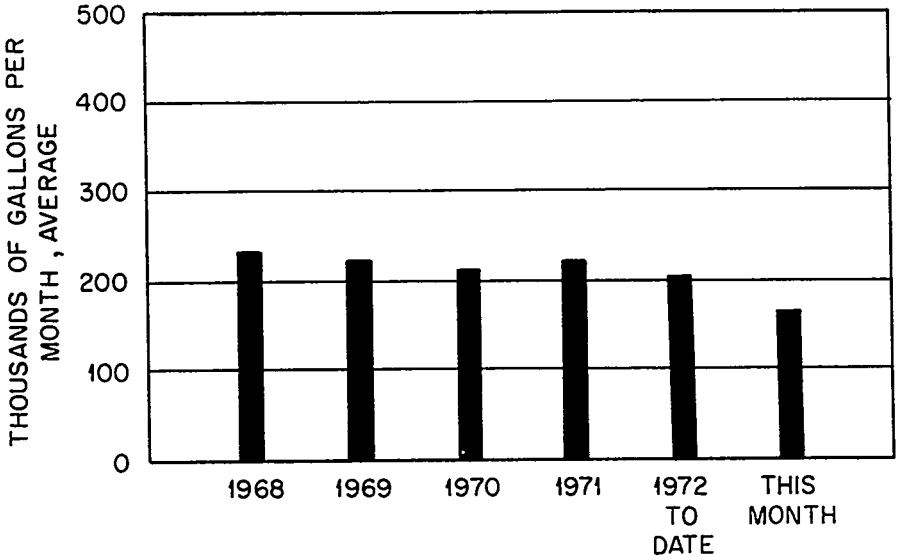

Fig 5. Intermediate – Level Waste Volumes.

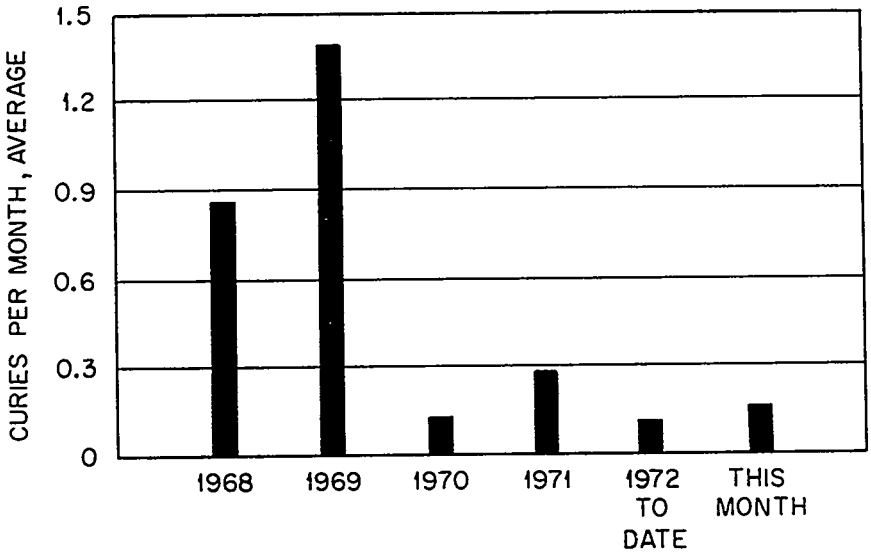

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

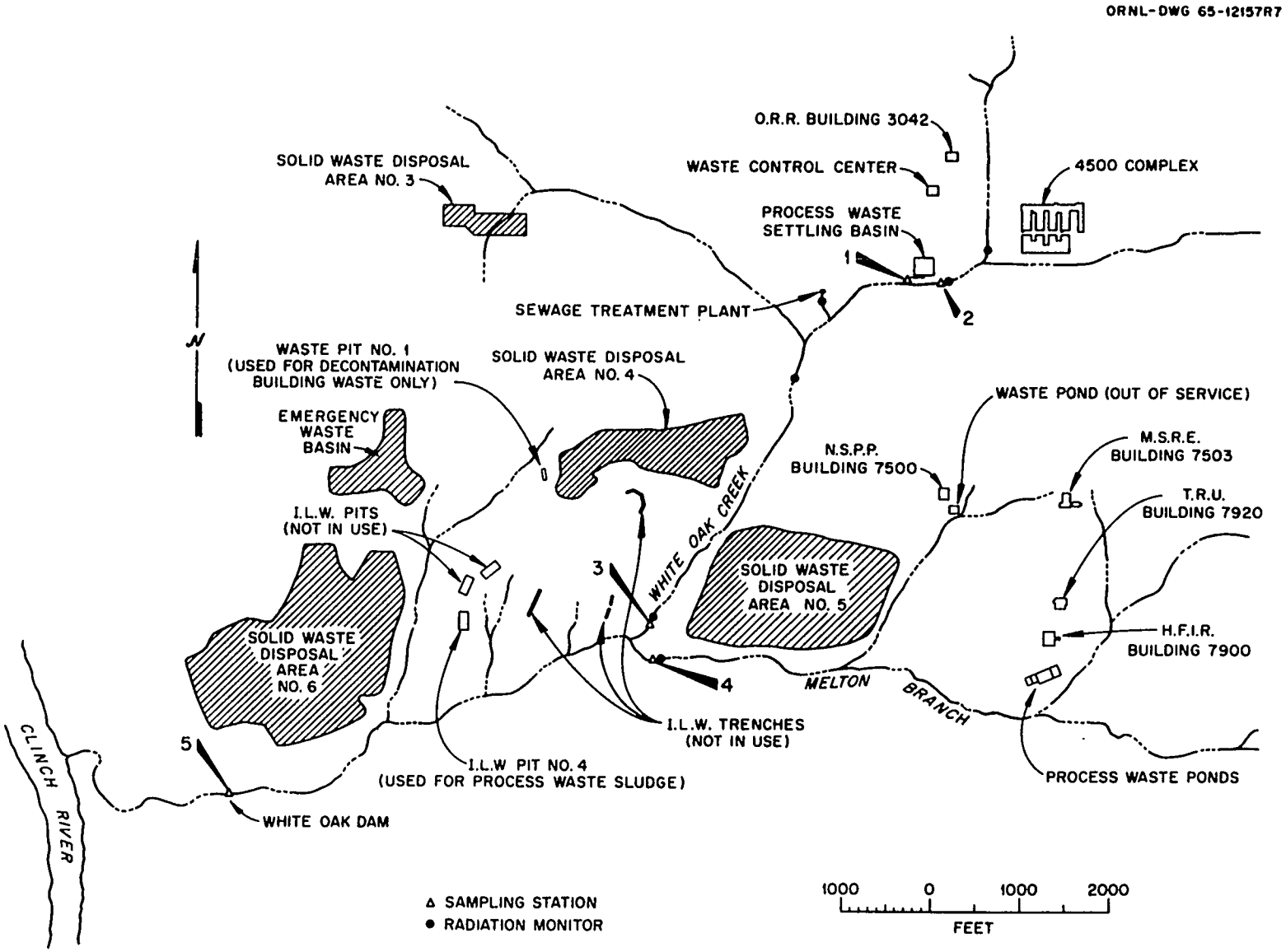

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.20	0.37
Miscellaneous discharges from east end of plant	2	0.02	0.07
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.42	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.08
Total discharge from all sources	3,4	0.50	0.88
White Oak Dam to Clinch River (Health Physics measurement)	5	0.29	0.67

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	108	0.02	3.6	0.14	2.6
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.27[b]	49.1	0.33	6.0
3. Reactor Operations (MH112)	4.4	<0.01	-	0.59	10.8
4. Buildings 3503 and 3508	11.2	0.03	5.5	1.05	19.2
5. Buildings 3025 and 3026	4.5	<0.01	-	0.66	12.1
6. Building 3019	5.2	<0.01	-	0.11	2.0
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.4
8. Waste Evaporator, Bldg. 2531	348	0.17	30.9	0.70	12.8
9. Buildings 3525 and 3550	<0.05	<0.01	-	0.82	15.0
10. Building 2026	0.08	<0.01	-	0.15	2.7
11. Tank Farm Drainage	102	0.06	10.9	0.90	16.4

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.14	170
Radiochemical-Processing Pilot Plant	3020	0	17
MSRE	7512	0	0
HFIR	7911	0.02	167
Total activity in gases released		0.16	354

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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ORNL 2

CENTRAL FILES NUMBER

73-2-3

DATE: February 1, 1973

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of December, 1972

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 3/13/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of December, 1972, was 0.89% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.83% MPC_W, 0.04% MPC_W, and 0.02% MPC_W, respectively. The higher-than-normal discharge is explained below in the discussion under "Process Waste".

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling station are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The high ^{90}Sr discharge noted in Table 1 and Figure 2 is discussed in the next topic.

Process Waste

A total of 5.0 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Table 2 lists the sources of waste discharged into the system and compares the ^{90}Sr and gross-beta discharges from these sources.

The comparatively high discharge of activity into the creek resulted from an accidental release into the process waste system from the cell ventilation system that serves the Fission Products Development Laboratory. Normally, the water that accumulates in the underground cell ventilation

duct is disposed of in the ILW system. A plugged drain in the filter pit allowed water to accumulate in the cell ventilation duct and to seep into a nearby clay process waste pipe. More detailed information regarding this incident can be found in "Unusual Occurrence Report ORNL-1" dated December 28, 1972.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 313 gph. A summary of operating data follows:

	Gallons
Total volume generated	262,000
Volume transferred to evaporator	233,000
Tank Farm free space at beginning of month	540,000
Tank Farm free space at end of month	505,000
Evaporator concentrate returned to tank farm	10,000
Volume of concentrate available for hydrofracture (South Tank Farm)	44,000
Volume of concentrate transferred to Shale Fracture	4,000
Total volume of concentrate in storage	90,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	49,000
Fission Products Development Laboratory	41,200
ORR and BSR	32,200
High Flux Isotope Reactor	12,900
Radioisotopes Processing Area	36,000
4500 Complex	9,200
Transuranium Processing Area	5,000

SHALE FRACTURING DISPOSAL OF ILW, INJECTION 11

ILW injection No. 11 was made on December 5, 1972, through the existing slot at a depth of 832 feet. A total of 76,400 gallons of concentrated ILW was injected into the fractured shale formation. This waste contained 23,382 curies of ^{137}Cs, 360 curies of ^{134}CS, 1099 curies of ^{90}Sr, 396 curies of ^{106}Ru, 60 curies of ^{60}Co, and 1.84 grams of ^{244}Cm. Materials used for the injection are listed below. The slurries are in the order of their injection.

Solids	Weight, lb	lb/gal
Portland cement, Type 1	264,300	3.2
Kingston fly ash	233,900	2.8
Attapulgite	101,750	1.2
Grundite	50,900	0.6
Total weight of Solids	650,800	7.8

Liquids for Slurry	Gallons
Waste pit water	6,500
ILW	76,400
Fresh water	800
Total volume	83,700

Additional information concerning the injection is given in a memo from H. O. Weeren to Distribution, "Preliminary Results of Hydrofracture Injection ILW-11, January 22, 1973.

GASEOUS WASTE

The ORNL stacks discharged 150 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 361 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.0% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

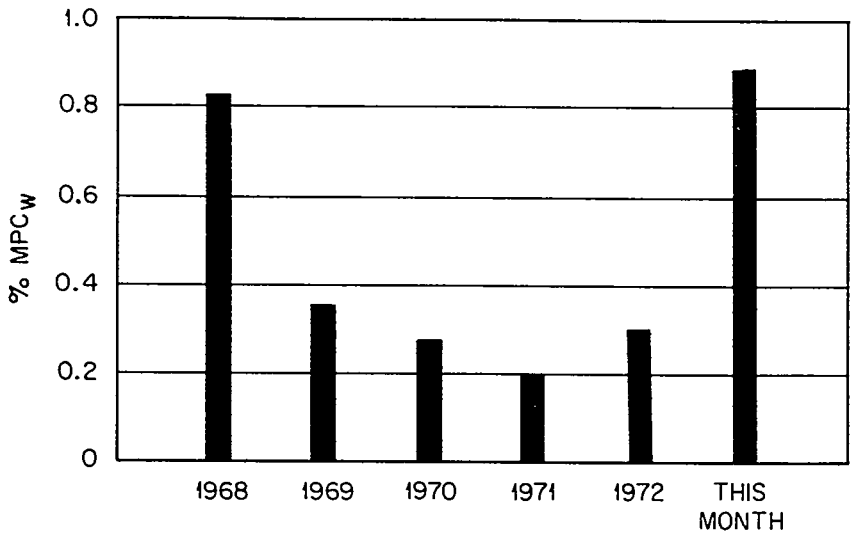

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

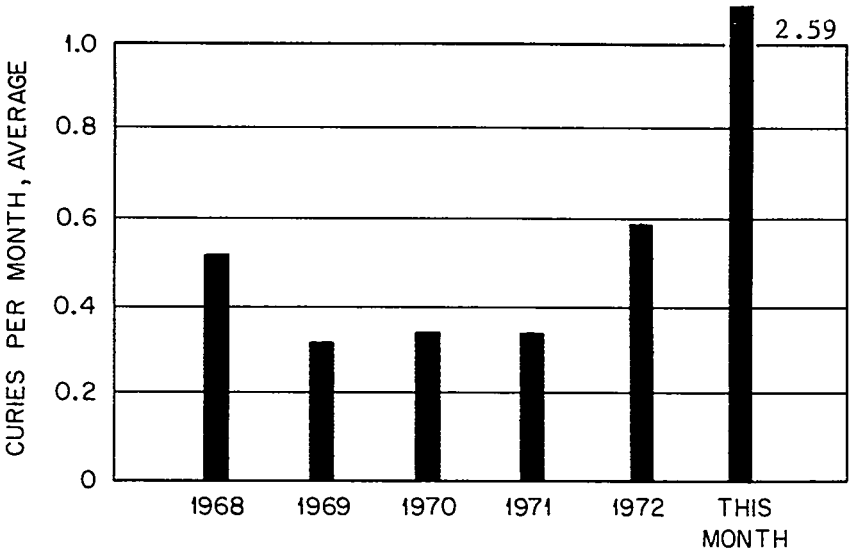

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

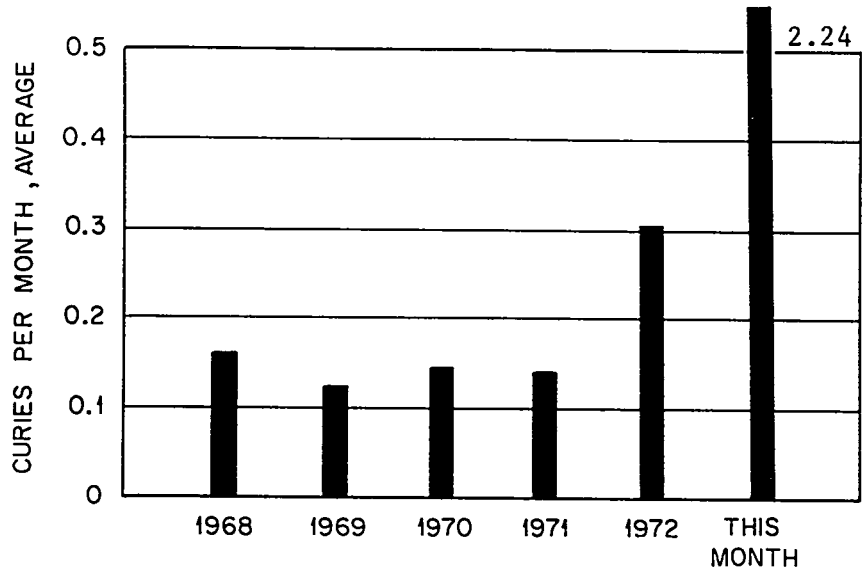

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

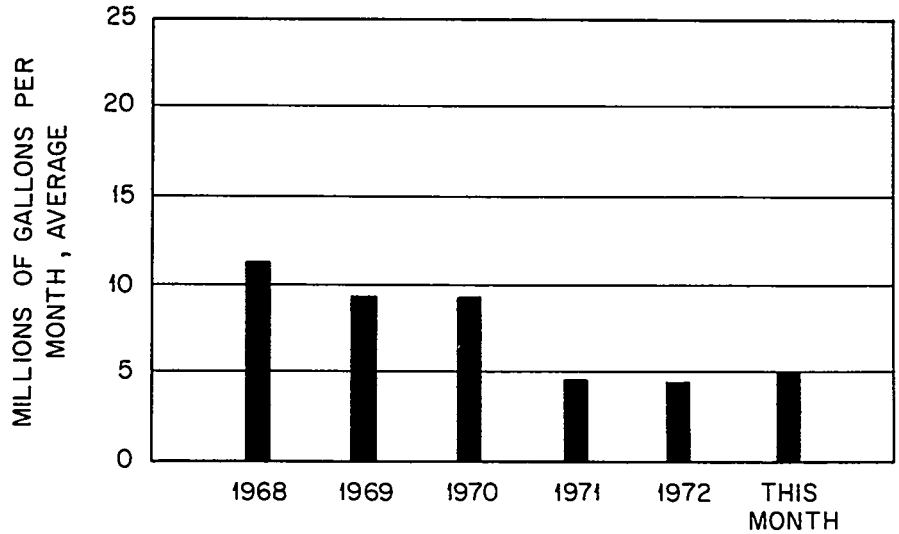

Fig 4. Process Waste Volumes.

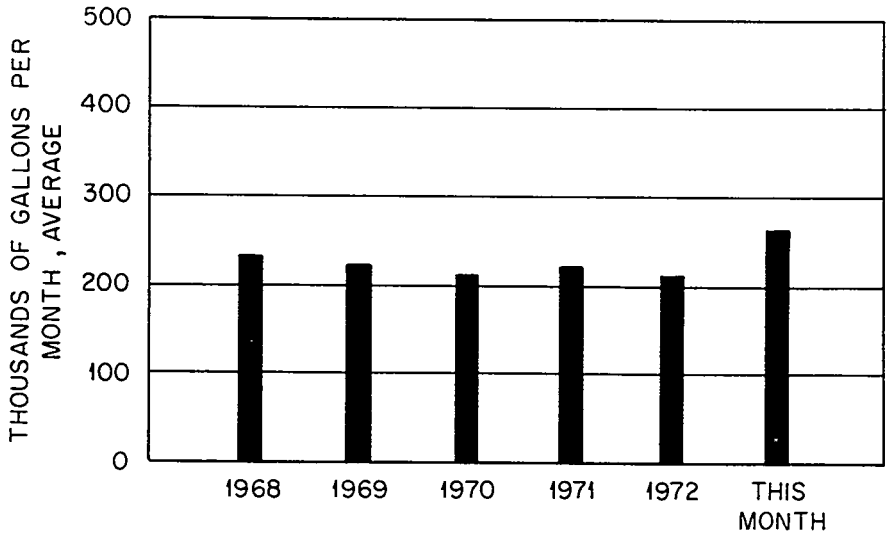

Fig 5. Intermediate – Level Waste Volumes.

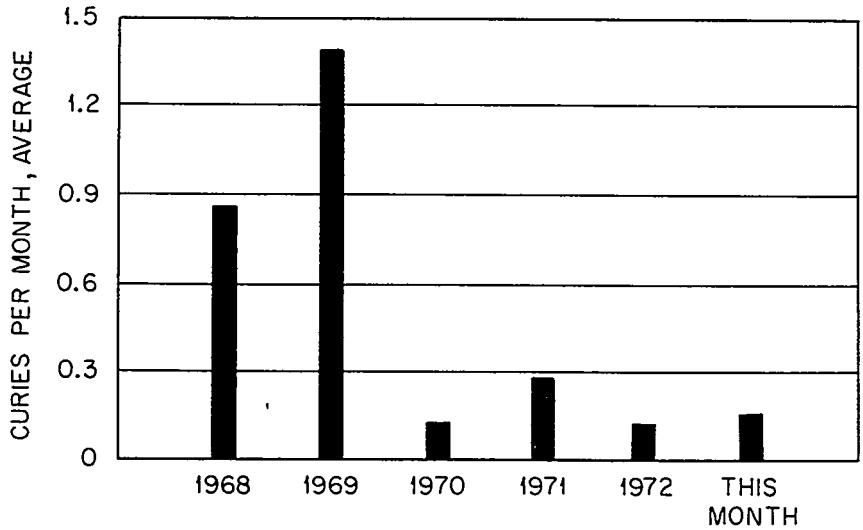

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

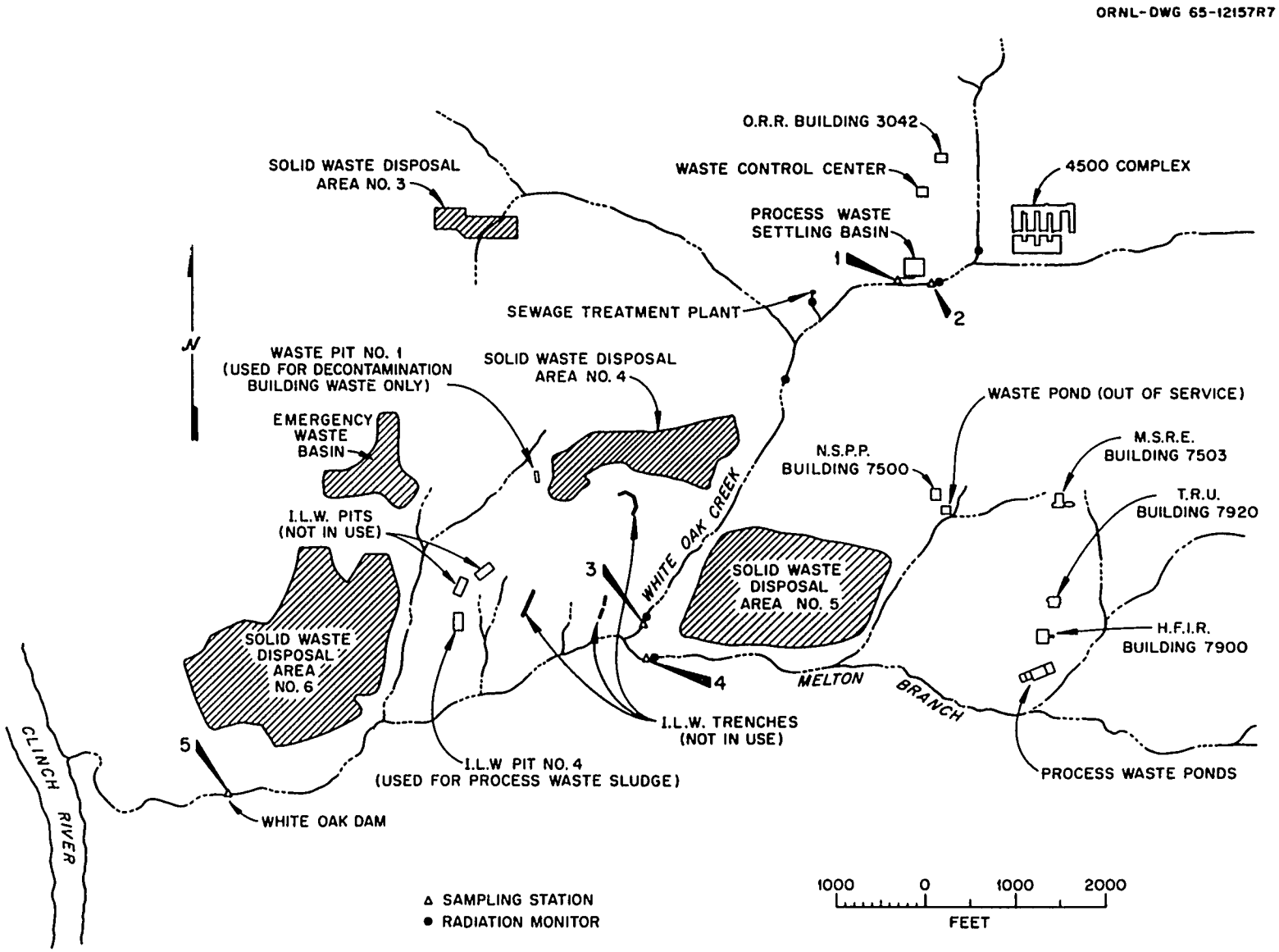

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	2.24	4.24
Miscellaneous discharges from east end of plant	2	<0.02	<0.18
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	2.39	5.65
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.20	0.36
Total discharge from all sources	3,4	2.59	6.01
White Oak Dam to Clinch River (Health Physics measurement)	5	2.53	5.18

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	276	0.04	0.4	0.16	2.4
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.46[b]	4.1	0.36	5.3
3. Reactor Operations (MH112)	6.05	<0.01	-	0.81	12.0
4. Buildings 3503 and 3508	23	0.10	0.9	1.29	19.1
5. Buildings 3025 and 3026	17	<0.01	-	0.61	9.1
6. Building 3019	12	<0.01	-	0.22	3.3
7. Fission Products Development Laboratory (MH209)	-	<0.01	-	0.01	0.1
7a. Fission Products Development Laboratory (Ventilation Duct)	-	10[c]	89.4	-	-
8. Waste Evaporator, Bldg. 2531	220	0.21	1.9	1.07	15.9
9. Buildings 3525 and 3550	0.08	<0.01	-	0.76	11.3
10. Building 2026	0.27	<0.01	-	0.19	2.8
11. Tank Farm Drainage	129	0.37	3.3	1.26	18.7

[a]Counted at 30% geometry.

[b]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[c]This is an estimated value based on a ^{90}Sr removal efficiency of 75-80%.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.14	262
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.01	97
Total activity in gases released		0.15	361

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

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DATE: May 16, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of March, 1973, was 0.63% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.50% MPC_W, 0.08% MPC_W, and 0.04% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The high ^{90}Sr discharge, noted in Table 1 and Figures 2 and 3, is apparently the result of the unusually heavy rainfall experienced during the month. The discharge reported for Station 2 appears to be in error. It is higher than normal by a factor of ten and is not reflected in measurements made downstream at Station 3.

Process Waste

A total of 3.4 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The discharge from the settling basin is high because some of the flow had to bypass the waste treatment plant during the heavy rains. This was necessary to keep the equilization pond from overflowing. Table 2 lists the sources of waste discharged into the system and compares the gross-beta discharges from these sources.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 228 gph.

	Gallons
Total volume generated	229,000
Volume transferred to evaporator	228,000
Tank Farm free space at beginning of month	511,000
Tank Farm free space at end of month	501,000
Evaporator concentrate returned to tank farm	9,000
Volume of concentrate available for hydrofracture (South Tank Farm)	41,000*

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	43,200
Fission Products Development Laboratory	27,300
ORR and BSR	32,600
High Flux Isotope Reactor	25,000
Radioisotopes Processing Area	25,900
4500 Complex	23,500
Transuranium Processing Area	5,500

*This figure does not include the 18,000 gals of waste that is stored in W-9 and is scheduled for reprocessing.

GASEOUS WASTE

The ORNL stacks discharged 460 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 1331 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.4% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards forty-four times while the pH of Melton Branch was out of compliance three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river. The frequency of analysis has been reduced from once a week to once a month. The samples are composited for the entire month. The investigation to determine the source of the mercury contamination in White Oak Creek is continuing. Recent samples indicate that the mercury is entering the creek through manhole 190 which receives the effluent from the 4500 complex.

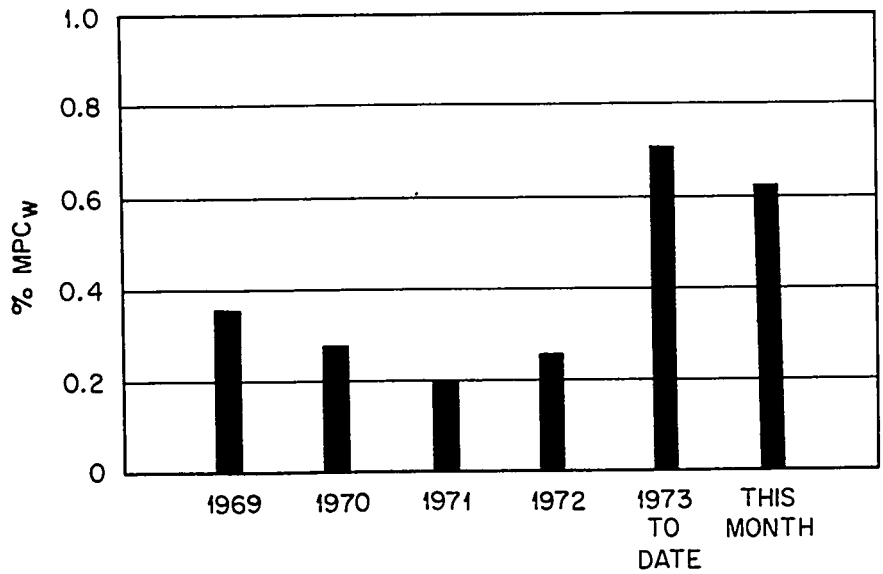

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

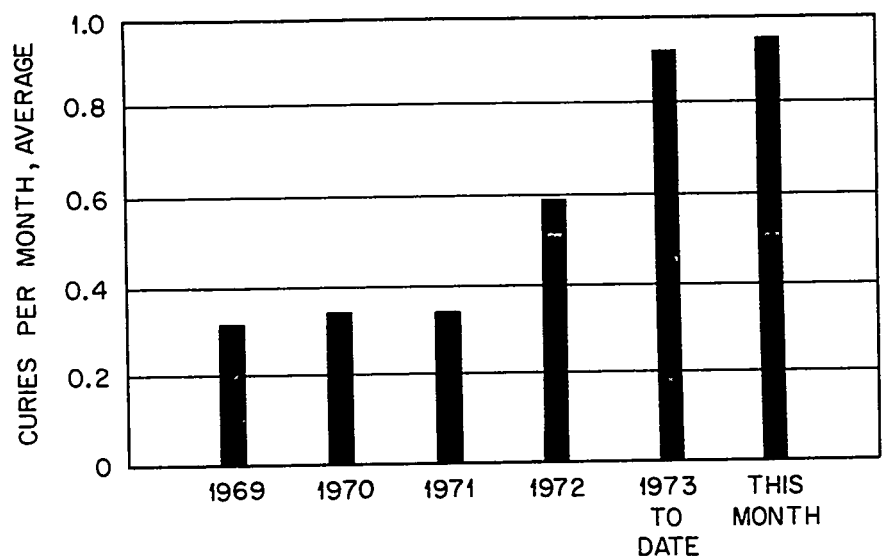

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

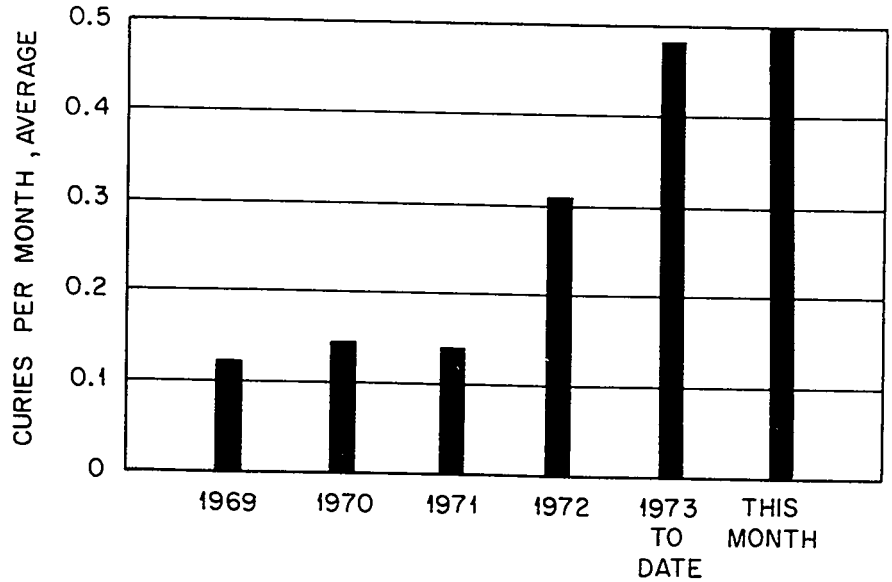

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

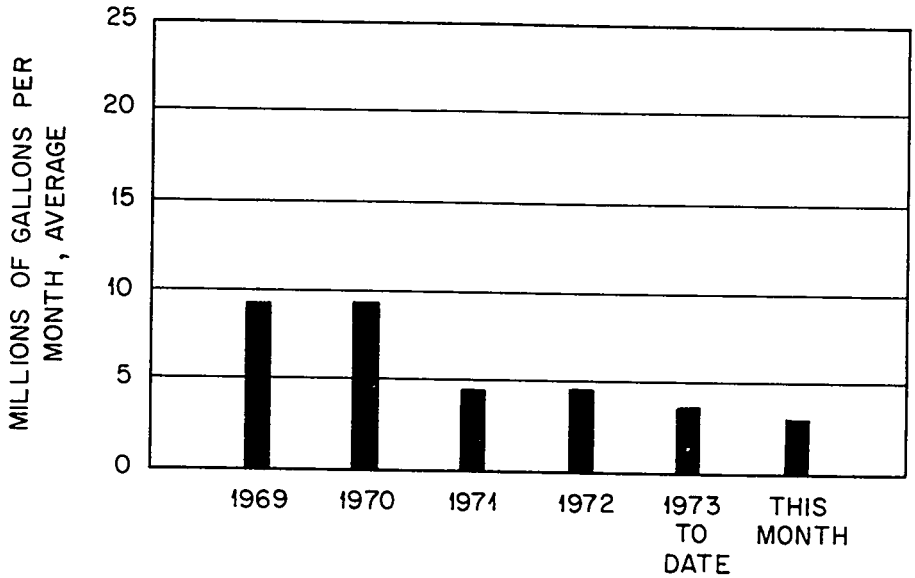

Fig 4. Process Waste Volumes.

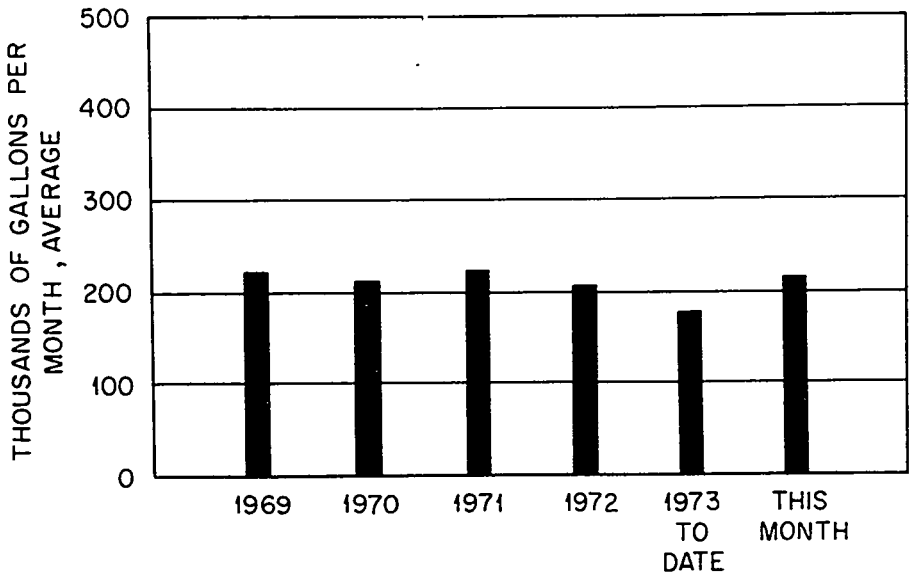

Fig 5. Intermediate – Level Waste Volumes.

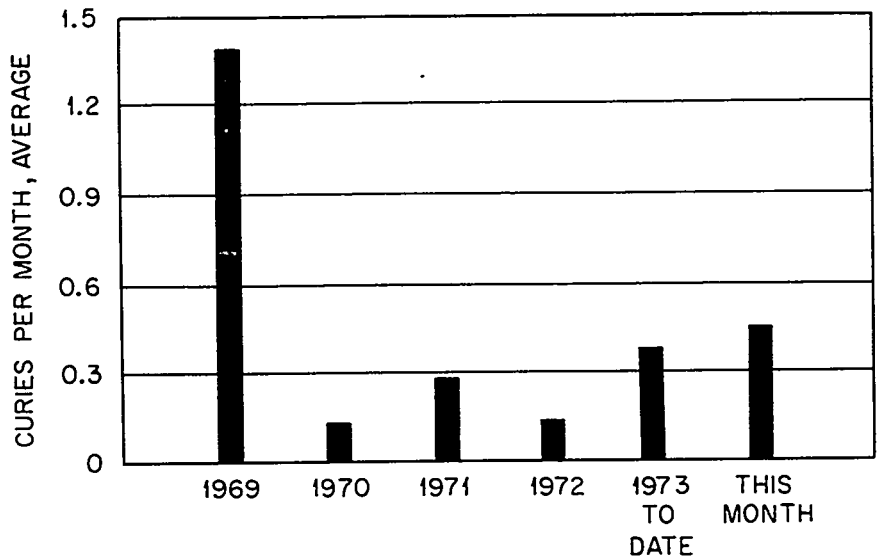

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

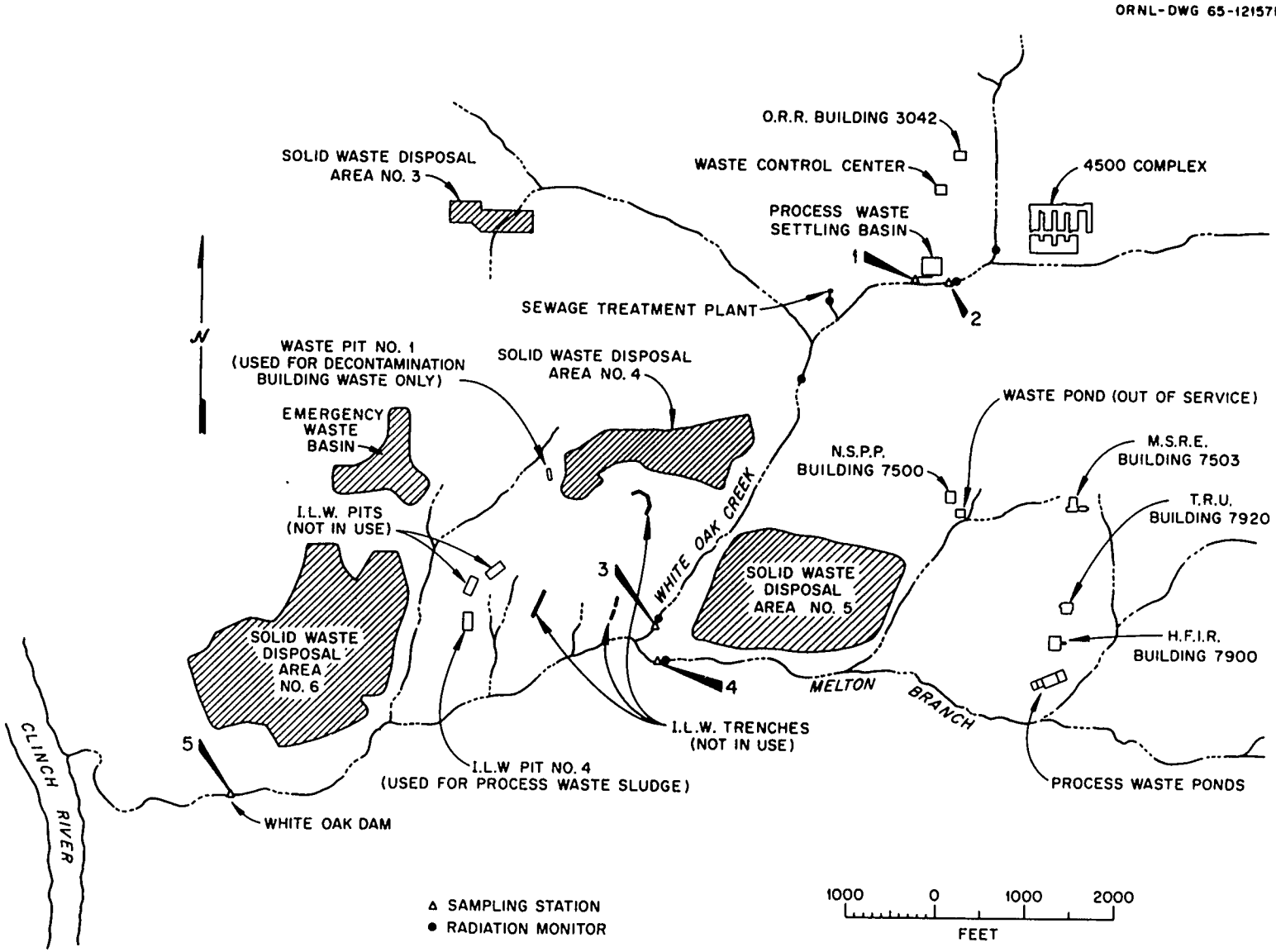

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.50	1.06
Miscellaneous discharges from east end of plant	2	0.41	0.82
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.79	1.49
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.17	0.31
Total discharge from all sources	3,4	0.96	1.80
White Oak Dam to Clinch River (Health Physics measurement)	5	1.2	2.4

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	60.3	<0.01	-	0.18	3.0
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.13[c]	19.1	0.68	11.5
3. Reactor Operations (MH112)	5.8	0.01	1.5	0.39	6.6
4. Buildings 3503 and 3508	21.0	0.13	19.1	1.12	18.9
5. Buildings 3025 and 3026	4.6	0.01	1.5	0.48	8.1
6. Building 3019	10.6	<0.01	-	0.07	1.2
7. Fission Products Development Laboratory	-	-	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	43.4	0.20	29.4	0.80	13.5
9. Buildings 3525 and 3550	$\leq$ 0.03	<0.01	-	0.73	12.3
10. Building 2026	$\leq$ 0.024	<0.01	-	0.19	3.2
11. Tank Farm Drainage	27.6	0.20	29.4	1.28	21.5

[a]Counted at 30% geometry.

[b]These are approximations based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.33	1283
Radiochemical-Processing Pilot Plant	3020	0	3
MSRE	7512	0	0
HFIR	7911	0.13	45
Total activity in gases released		0.46	1331

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam March, 1973

Measurement (a)	Standard (b)	Sample Point (c)	Reading Maximum	Reading Minimum	Times Out of Compliance	Total Time Out of Compliance, Hrs
pH	6.5-8.5 <1 pH unit/day change	3	9.3	5.5	44[d]	25.3
		4	9.0	6.8	3[e]	1.75
		5	7.7	6.6	None	-
Dissolved Oxygen	5 ppm Min.	3	>15.0	6.5	None	-
		4	>15.0	6.6	None	-
		5	13.4	7.2	None	-
Temp.	<30°C < 2°C/hr change	3	20.0	8.3	None	-
		4	20.0	8.3	None	-
		5	20.3	9.0	None	-

a. These measurements are continuous and are recorded.

b. These are Tennessee Water Quality Criteria standards.

c. Refer to Figure 7.

d. Forty-four excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for thirty-four excursions, the ORR was responsible for nine excursions, and one was from an unknown source.

e. Three excursions outside the 6.5-8.5 standard. The TRU retention pond was responsible for two and one was from an unknown source.

Table 5. Concentration of Nonradioactive Effluents
March, 1973

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.052	0.39	0.084	<0.005
Zn	0.5	0.023	<0.005	<0.005	<0.005
Pb	0.05	<0.02	<0.02	<0.02	<0.02
P as PO_4	1	0.12	0.008	0.079	0.055
NO_3	45	6.57	6.18	2.60	1.23
Hg	0.002	0.0079	0.00005	0.0047	<0.00005
Phenols	0.2	0.004	0.005	0.003	0.002

a. These are the standards currently being considered by the EPA.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

JUL 23 1973

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ORNL
CENTRAL FILES NUMBER

73-7-3

DATE: July 8, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

COPY

This document has been approved for release to the public by:

David R. Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of April, 1973, was 0.72% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.54% MPC_W, 0.14% MPC_W, and 0.03% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.1 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 232 gph.

	Gallons
Total volume generated	153,000
Volume transferred to evaporator	167,000
Tank Farm free space at beginning of month	501,000
Tank Farm free space at end of month	503,000
Evaporator concentrate returned to tank farm	12,000
Volume of concentrate available for hydrofracture (South Tank Farm)	65,000*

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	23,200
Fission Products Development Laboratory	34,500
ORR and BSR	21,700
High Flux Isotope Reactor	21,700
Radioisotopes Processing Area	13,000
4500 Complex	3,400
Transuranium Processing Area	5,500

*This includes 12,000 gallons of ^{137}Cs waste from FPDL. This waste was treated as concentrate and was pumped directly to W-10.

GASEOUS WASTE

The ORNL stacks discharged 100 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 246 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.4% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards forty-two times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river. The search for the source of the mercury contamination in White Oak Creek is continuing.

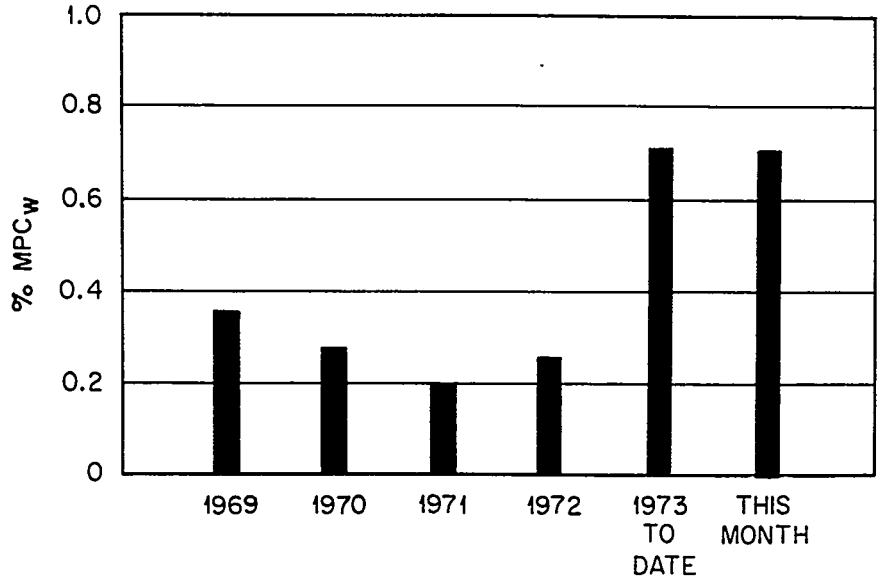

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

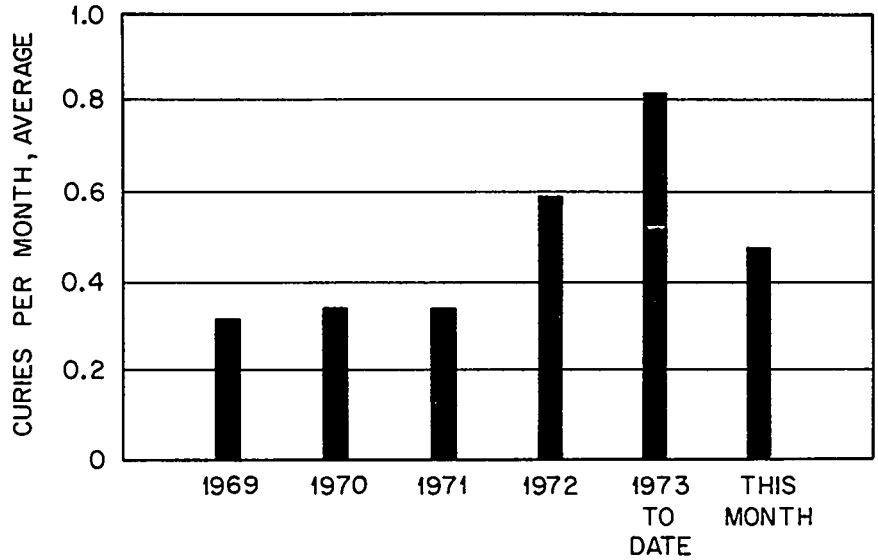

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

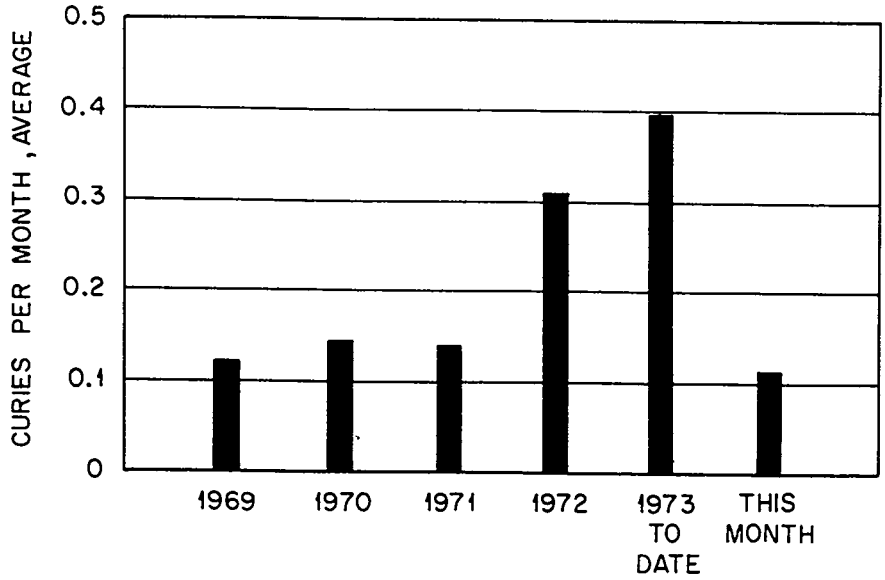

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

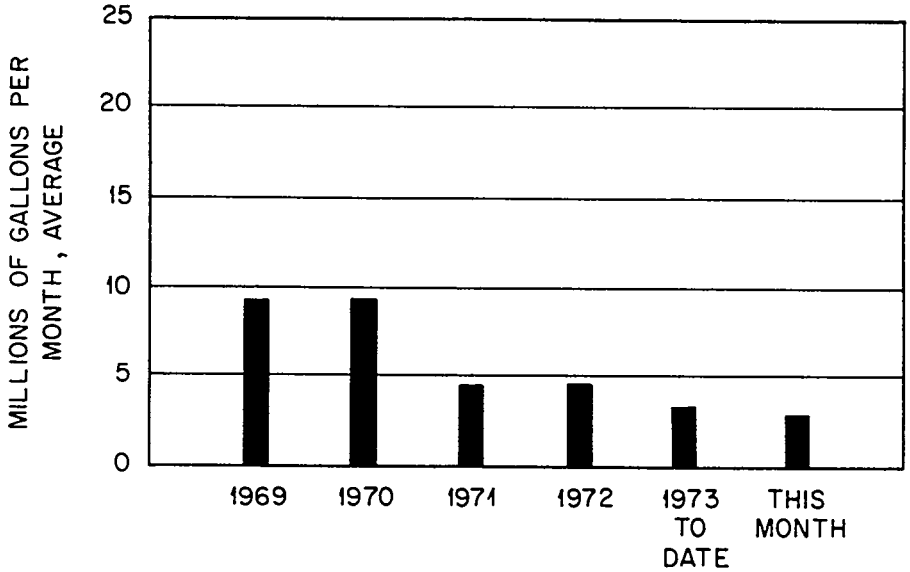

Fig 4. Process Waste Volumes.

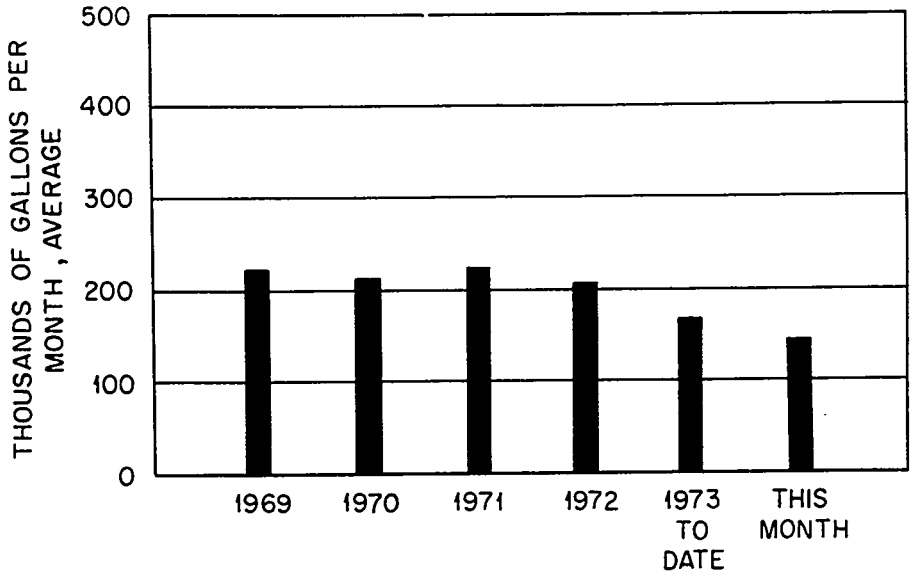

Fig 5. Intermediate – Level Waste Volumes.

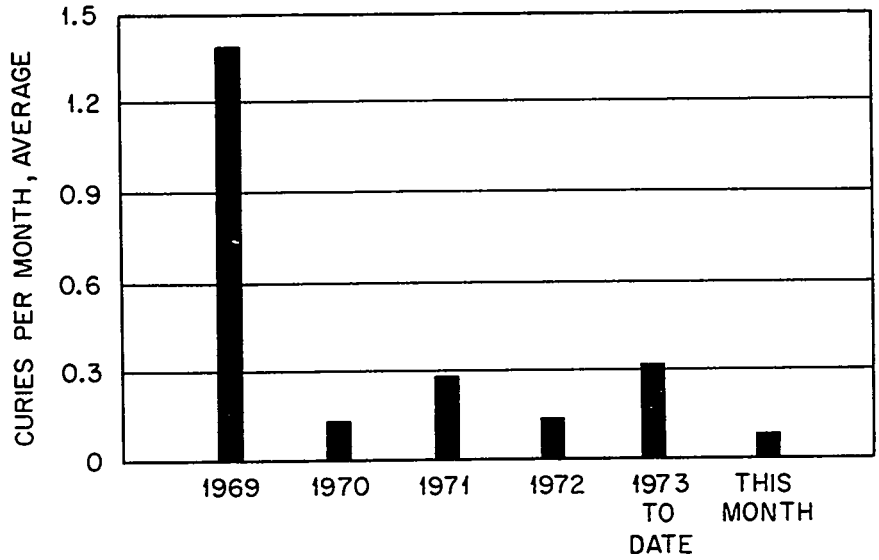

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

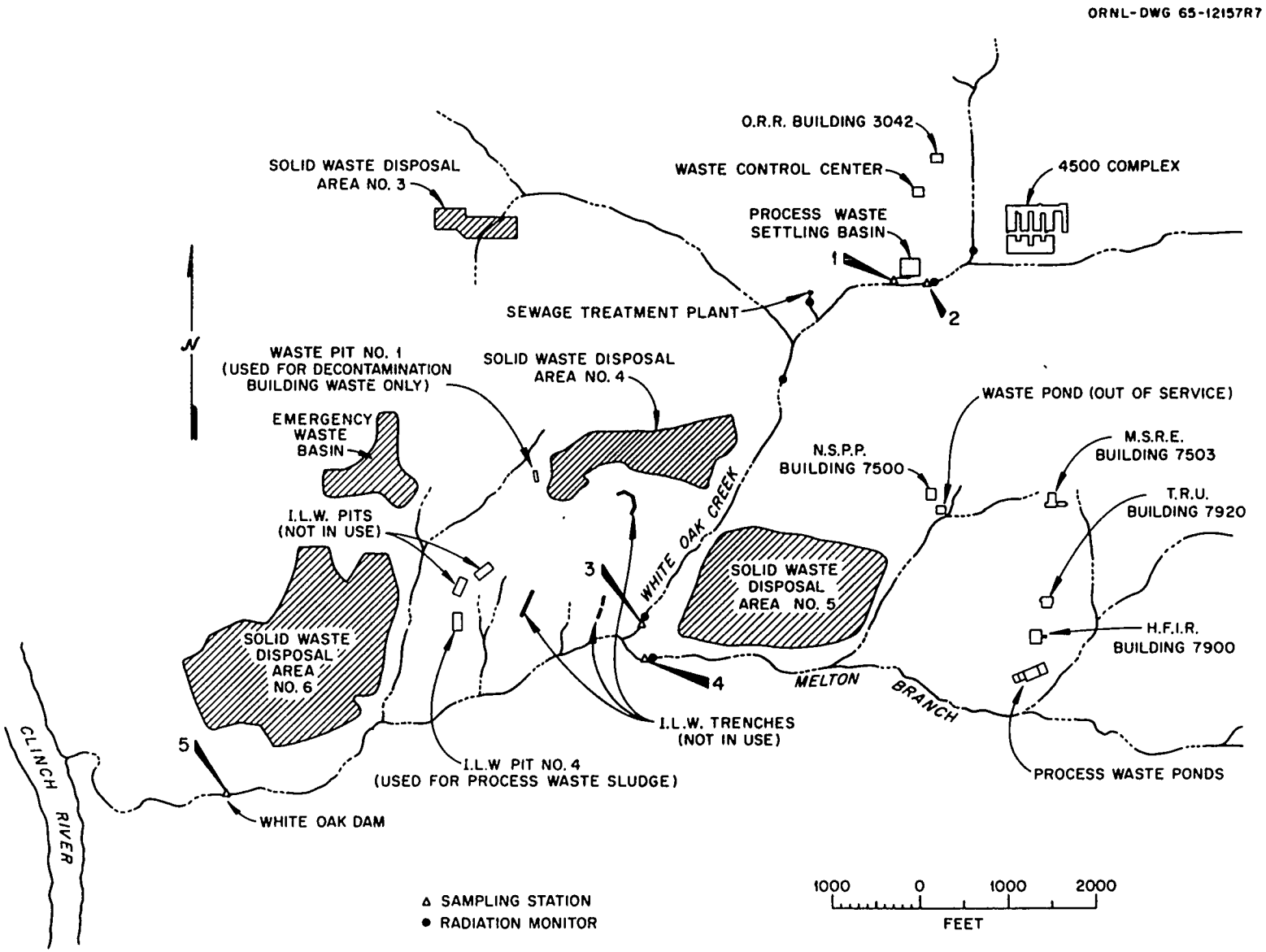

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.12	0.24
Miscellaneous discharges from east end of plant	2	0.01	0.04
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.39	0.71
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.08	0.17
Total discharge from all sources	3,4	0.47	0.88
White Oak Dam to Clinch River (Health Physics measurement)	5	0.43	0.76

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	40.5	0.10	4.5	0.12	2.5
2. Radioisotopes Processing Area (MH114 minus MH112)	24.9	0.42[c]	18.8	0.46	9.7
3. Reactor Operations (MH112)	< 0.04	<0.01	-	0.33	7.0
4. Buildings 3503 and 3508	0.24	<0.01	-	0.93	19.7
5. Buildings 3025 and 3026	22.1	0.06	2.7	0.49	10.4
6. Building 3019	6.1	<0.01	-	0.05	1.1
7. Fission Products Development Laboratory	-	-	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	114	1.36	60.7	0.56	11.9
9. Buildings 3525 and 3550	3.2	0.01	0.4	0.63	13.3
10. Building 2026	4.2	<0.01	-	0.11	2.3
11. Tank Farm Drainage	13.4	0.29	12.9	1.03	21.9

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.07	208
Radiochemical-Processing Pilot Plant	3020	0	5
MSRE	7512	0	0
HFIR	7911	0.03	33
Total activity in gases released		0.10	246

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam April, 1973

Measurement (a)	Standard (b)	Sample Point (c)	Reading Maximum	Reading Minimum	Times Out of Compliance	Total Time Out of Compliance, Hrs
pH	6.5-8.5 <1 pH unit/day change	3	9.1	5.2	42[d]	28.1
		4	8.4	6.6	None	-
		5	8.3	6.6	None	-
Dissolved Oxygen	5 ppm Min.	3	8.8	5.3	None	-
		4	11.6	5.8	None	-
		5	>15.0	8.0	None	-
Temp.	<30°C < 2°C/hr change	3	23.7	10.0	None	-
		4	26.2	10.0	None	-
		5	22.5	8.2	None	-

a. These measurements are continuous and are recorded.

b. These are Tennessee Water Quality Criteria standards.

c. Refer to Figure 7.

d. Forty-two excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for thirty-one excursions, the ORR was responsible for eleven excursions.

Table 5. Concentration of Nonradioactive Effluents
April, 1973

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.080	0.715	0.135	<0.005
Zn	0.5	0.020	0.038	<0.005	<0.005
Pb	0.05	<0.02	<0.02	<0.02	<0.02
P	1	0.08	0.03	0.12	0.10
NO_3	45	1.50	0.80	1.40	1.50
Hg	0.002	0.0041	0.0011	0.0006	0.0000
Phenols	0.2	0.001	0.001	0.002	0.001

a. These are the standards currently being considered by the EPA.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DATE ISSUED OCT 16 1973

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ORNL
CENTRAL FILES NUMBER
73-10-12

DATE: October 9, 1973

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1973, was 0.12% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.090% MPC_W, 0.021% MPC_W, and 0.005% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.4 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. Additional drains from Building 3550 were routed to the storm sewer, resulting in a flow reduction to the process waste system of about 200,000 gallons per month.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 233 gph.

	Gallons
Total volume generated	193,000
Volume transferred to evaporator	173,000
Tank Farm free space at beginning of month	478,000
Tank Farm free space at end of month	451,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture (South Tank Farm)	86,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	18,800
Fission Products Development Laboratory	25,500
ORR and BSR	19,500
High Flux Isotope Reactor	17,600
Radioisotopes Processing Area	16,000
4500 Complex	34,600
Transuranium Processing Area	3,300

GASEOUS WASTE

The ORNL stacks discharged 120 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 342 μCi. The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.0% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards 26 times. The dissolved oxygen was below the minimum standard in White Oak Creek and Melton Branch 22 and 8 times, respectively.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

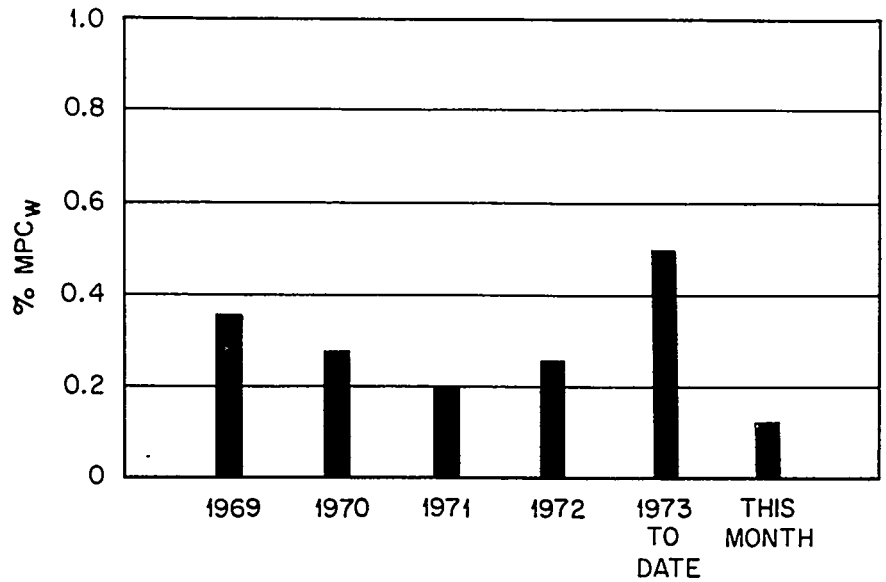

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

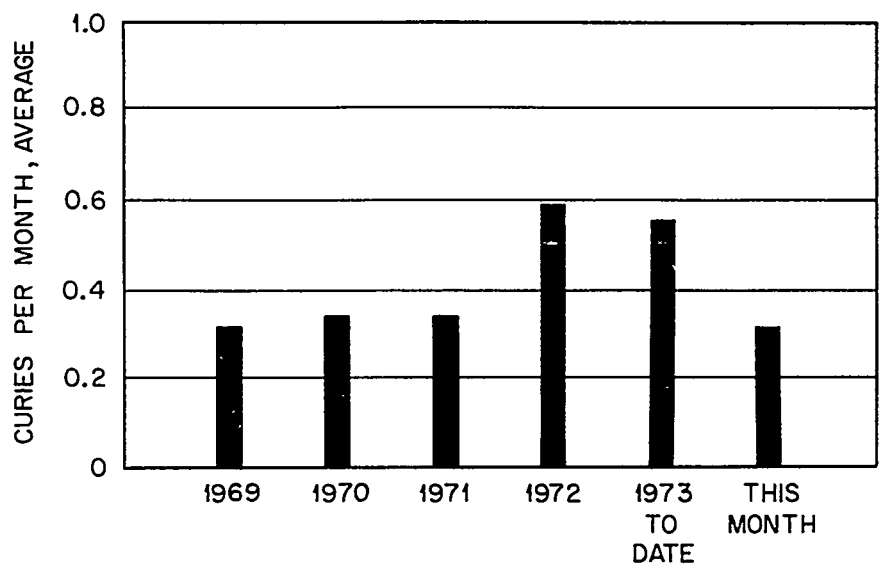

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

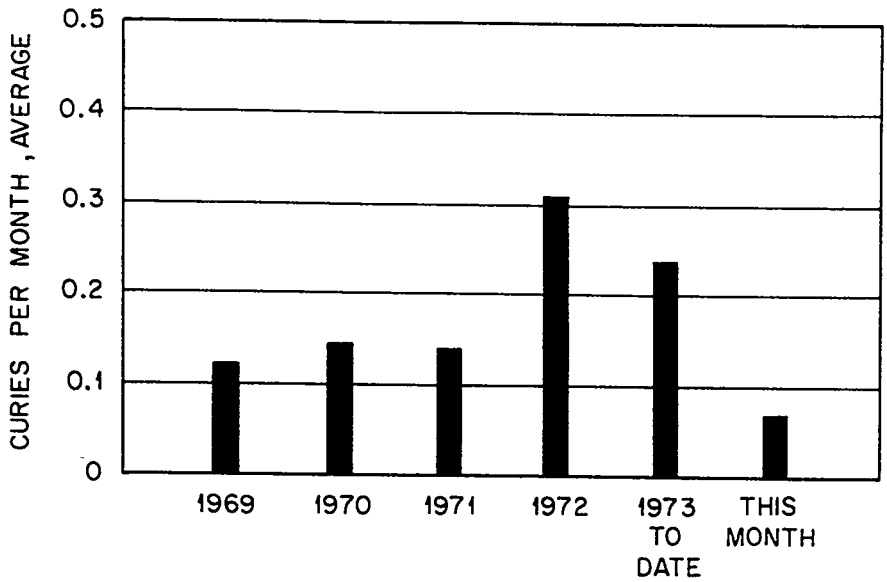

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

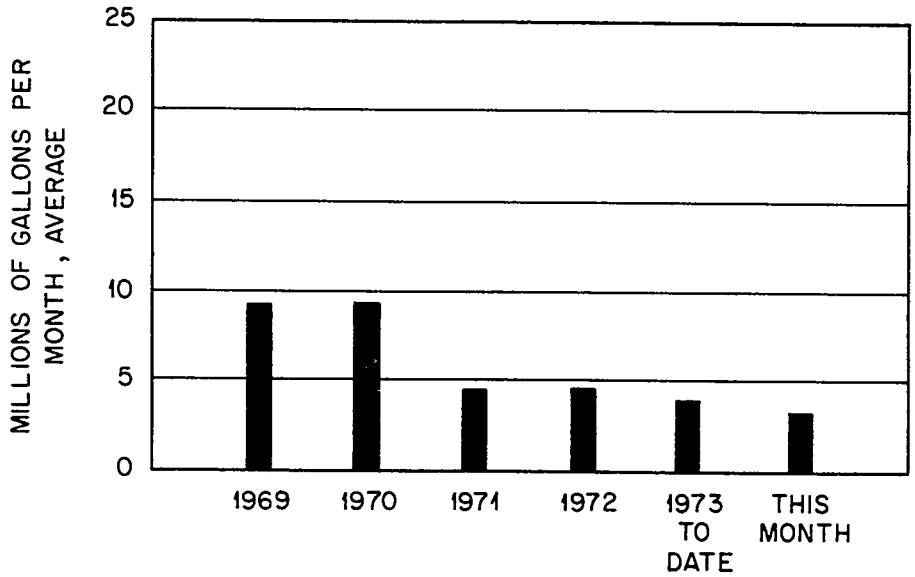

Fig 4. Process Waste Volumes.

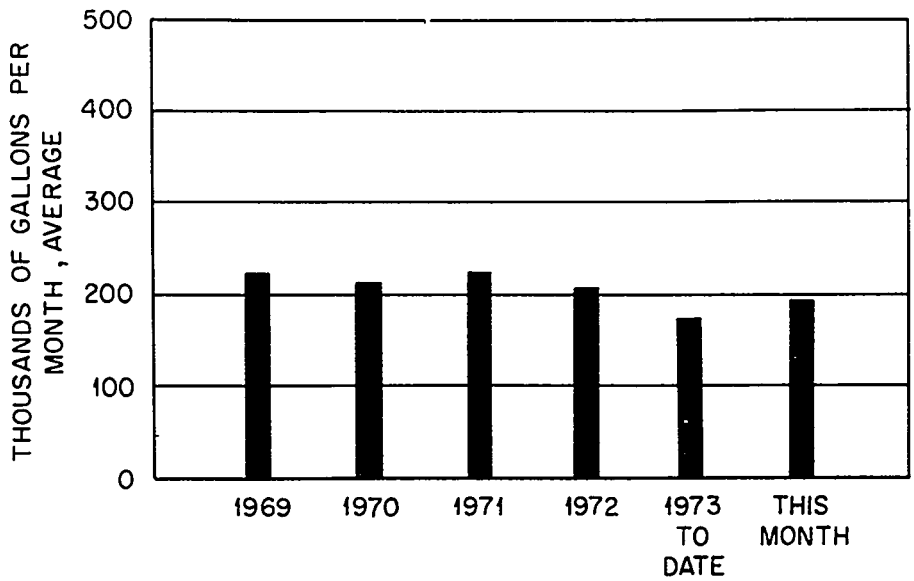

Fig 5. Intermediate – Level Waste Volumes.

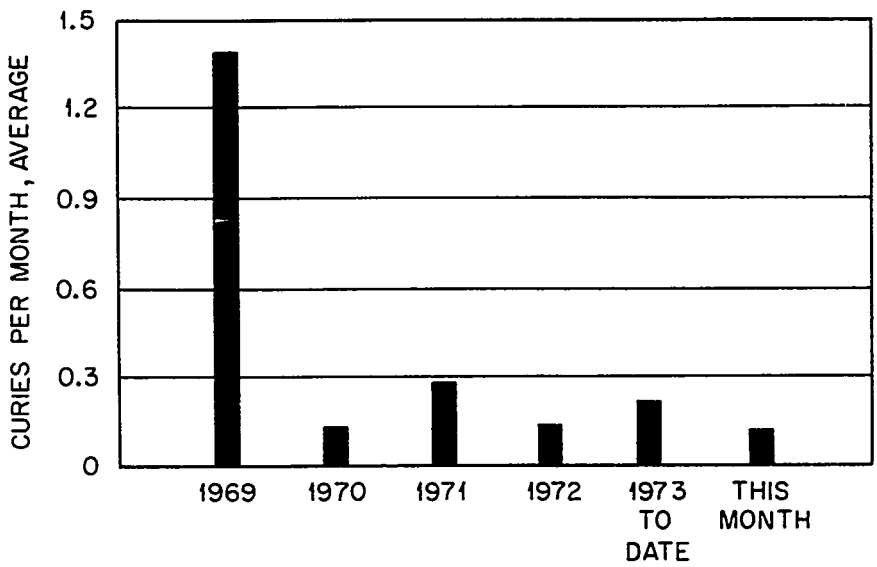

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

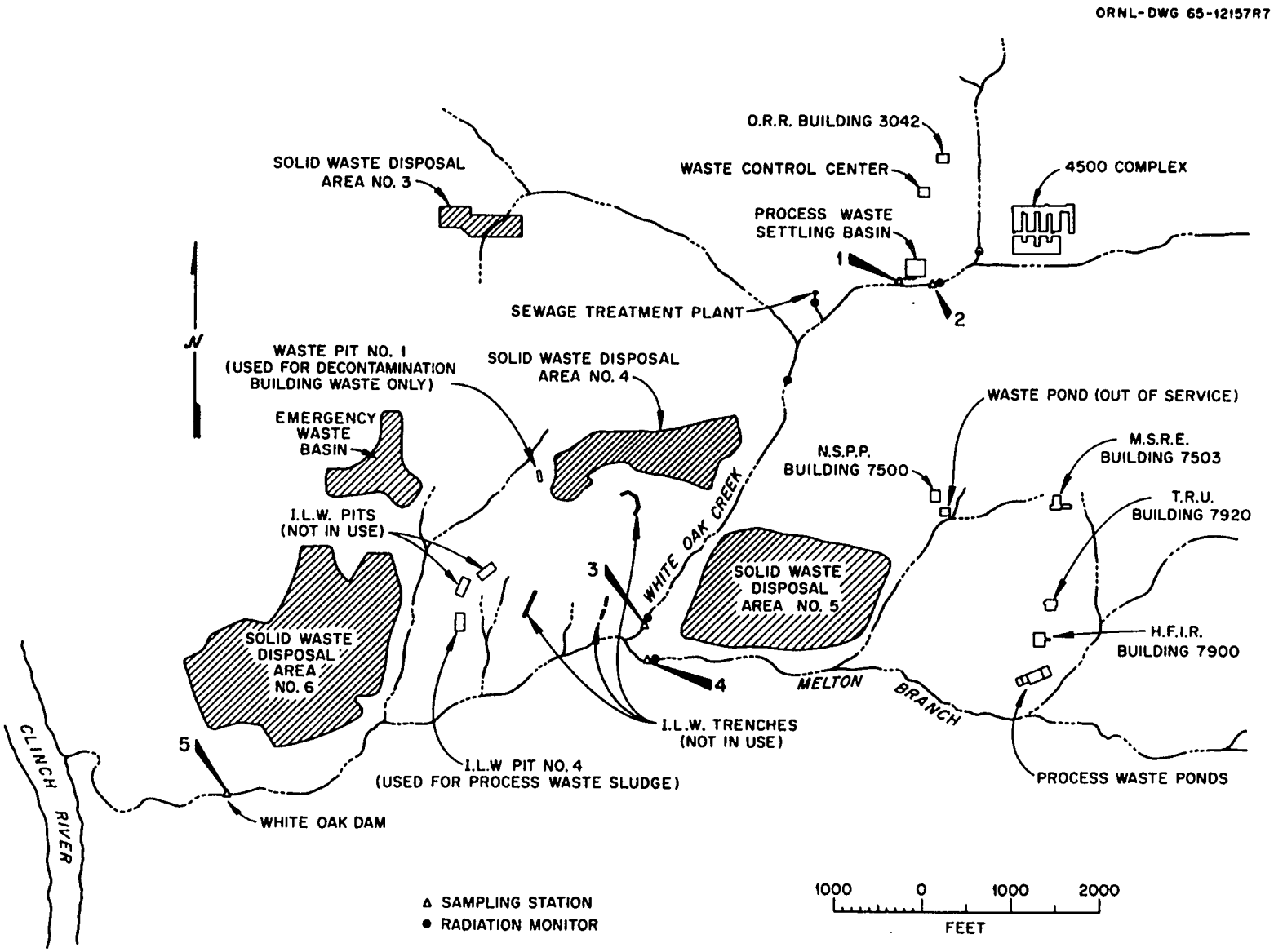

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.07	0.14
Miscellaneous discharges from east end of plant	2	0.01	$\leq$0.10
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.18	0.55
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.14	0.38
Total discharge from all sources	3,4	0.32	0.93
White Oak Dam to Clinch River (Health Physics measurement)	5	0.22	0.42

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	116	0.05	8.2	0.08	1.7
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.23[c]	37.7	0.37	7.7
3. Reactor Operations (MH112)	15.1	0.04	6.6	0.51	10.6
4. Buildings 3503 and 3508	17	0.09	14.8	0.96	20.0
5. Buildings 3025 and 3026	3.4	<0.01	-	0.31	6.4
6. Building 3019	10.7	<0.01	-	0.09	1.9
7. Fission Products Development Laboratory	-	-	-	0.56	11.7
8. Waste Evaporator, Bldg. 2531	4.0	0.01	1.6	0.56	11.7
9. Building 3525	1.7	<0.01	-	0.31	6.4
10. Building 2026	0.2	<0.01	-	0.16	3.3
11. Tank Farm Drainage	38.8	0.19	31.1	0.89	18.6

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.11	267
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.01	73
Total Activity in Gases Released at X-10 Site		0.12	342
Isotopes Division - Y-12 Area		-	0.4

[a]Activity primarily ^{131}I as noted in text.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam August, 1973

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5 <1 pH unit/day change	3	9.1	<4.5	26[d]	36.6
		4	7.9	6.9	None	-
		5	8.5	7.0	None	-
Dissolved Oxygen	5 ppm min.	3	11.1	0.2	22	-
		4	8.7	4.0	8	-
		5	>15.0	5.3	None	-
Temp.	<30°C < 2°C/hr change	3	28.0	17.5	None	-
		4	28.9	22.5	None	-
		5	>30.0	23.2	9e	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Twenty-six excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for twenty-four excursions, and the ORR was responsible for two excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]Weather conditions caused the temperature excursions.

Table 5. Concentration of Nonradioactive Effluents
August, 1973

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.050	2.790	0.120	<0.005
Zn	0.1	0.010	0.095	0.007	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	≤0.101	≤0.083	≤0.074	0.005
NO_3 (as N)	10	5.65	1.38	0.47	0.29
Hg	0.005	0.0002	0.0001	0.0002	<0.0001
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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CENTRAL FILES NUMBER

74-1-9

DATE: January 7, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

ChemRisk Document No. 2056

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of October, 1973, was 0.18% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.14% MPC_W, 0.028% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.2 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 219 gph.

	Gallons
Total volume generated	138,000
Volume transferred to evaporator	163,000
Tank Farm free space at beginning of month	453,000
Tank Farm free space at end of month	475,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture (South Tank Farm)	97,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	16,900
Fission Products Development Laboratory	30,800
ORR and BSR	14,400
High Flux Isotope Reactor	16,100
Radioisotopes Processing Area	25,200
4500 Complex	12,100
Transuranium Processing Area	1,100

GASEOUS WASTE

The ORNL stacks discharged 70 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 279 μCi. The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

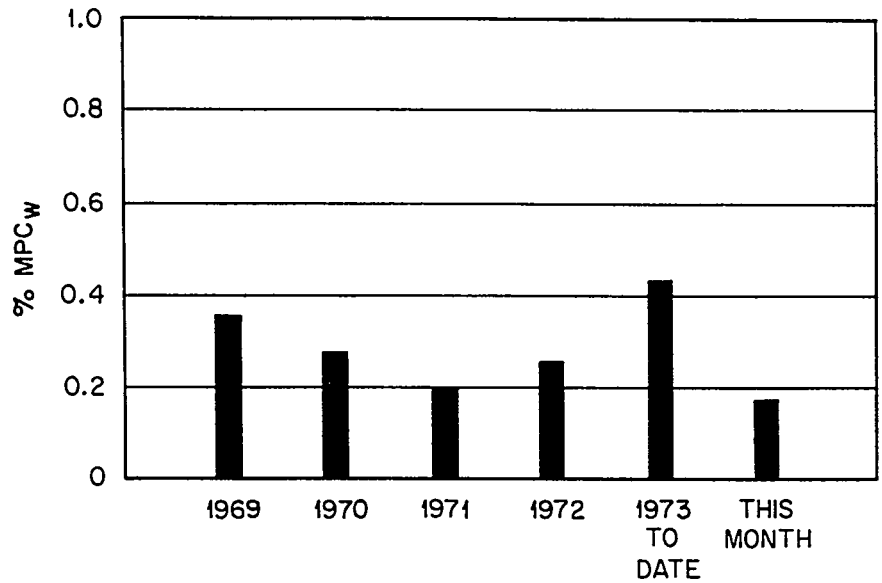

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

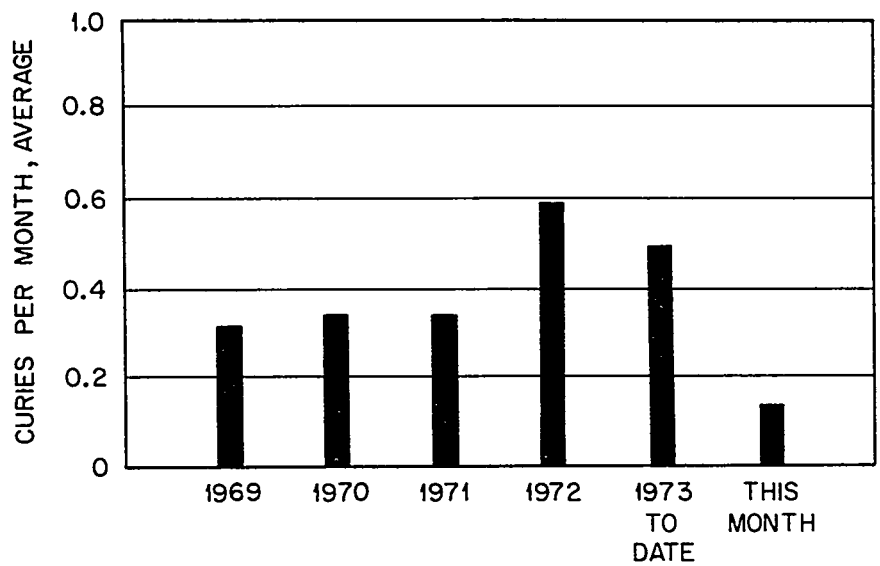

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

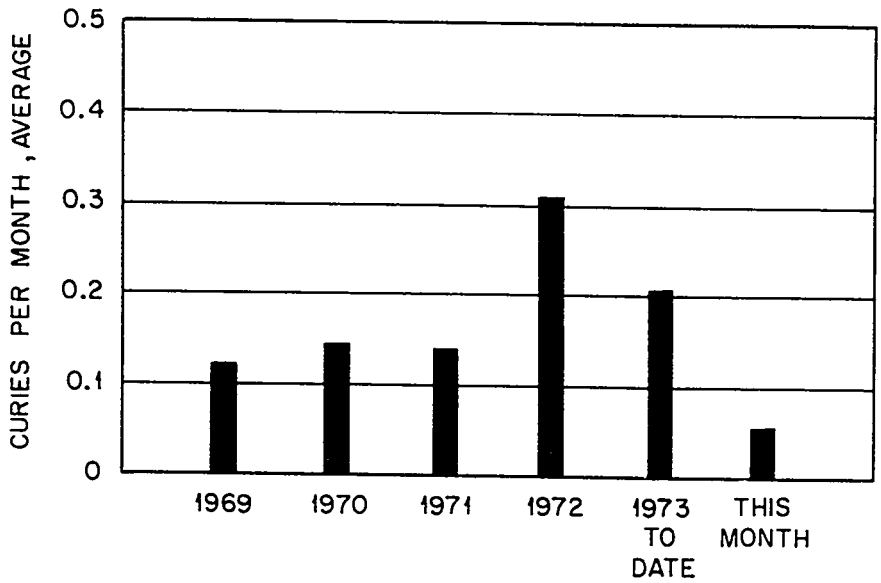

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

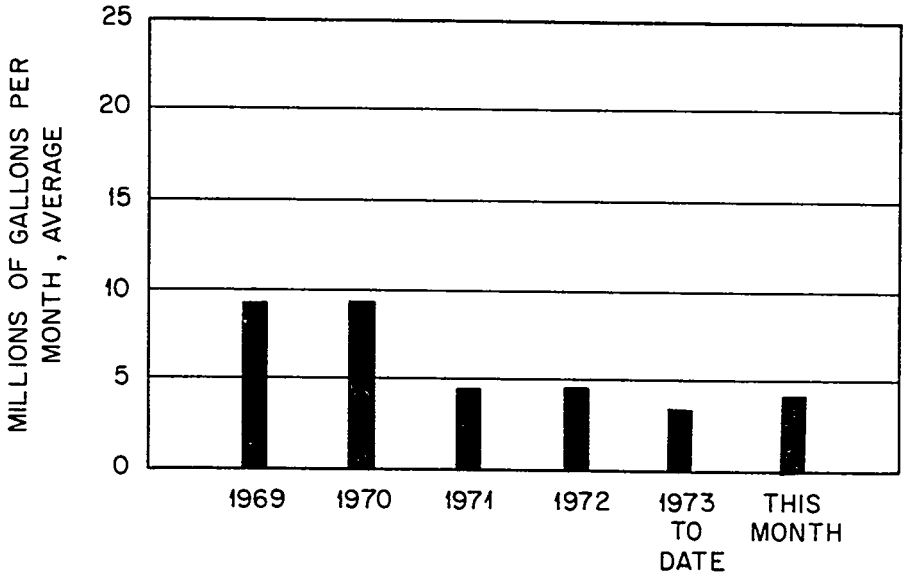

Fig 4. Process Waste Volumes.

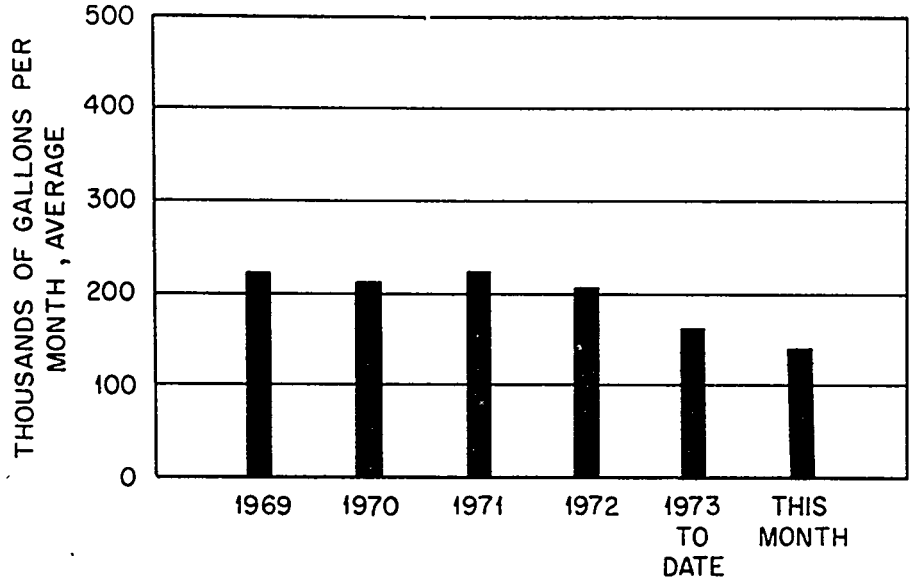

Fig 5. Intermediate – Level Waste Volumes.

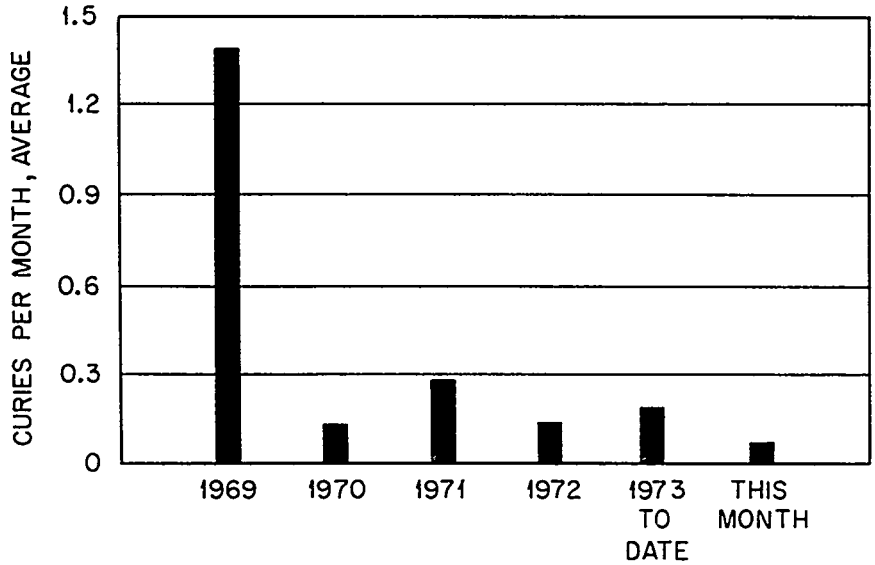

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

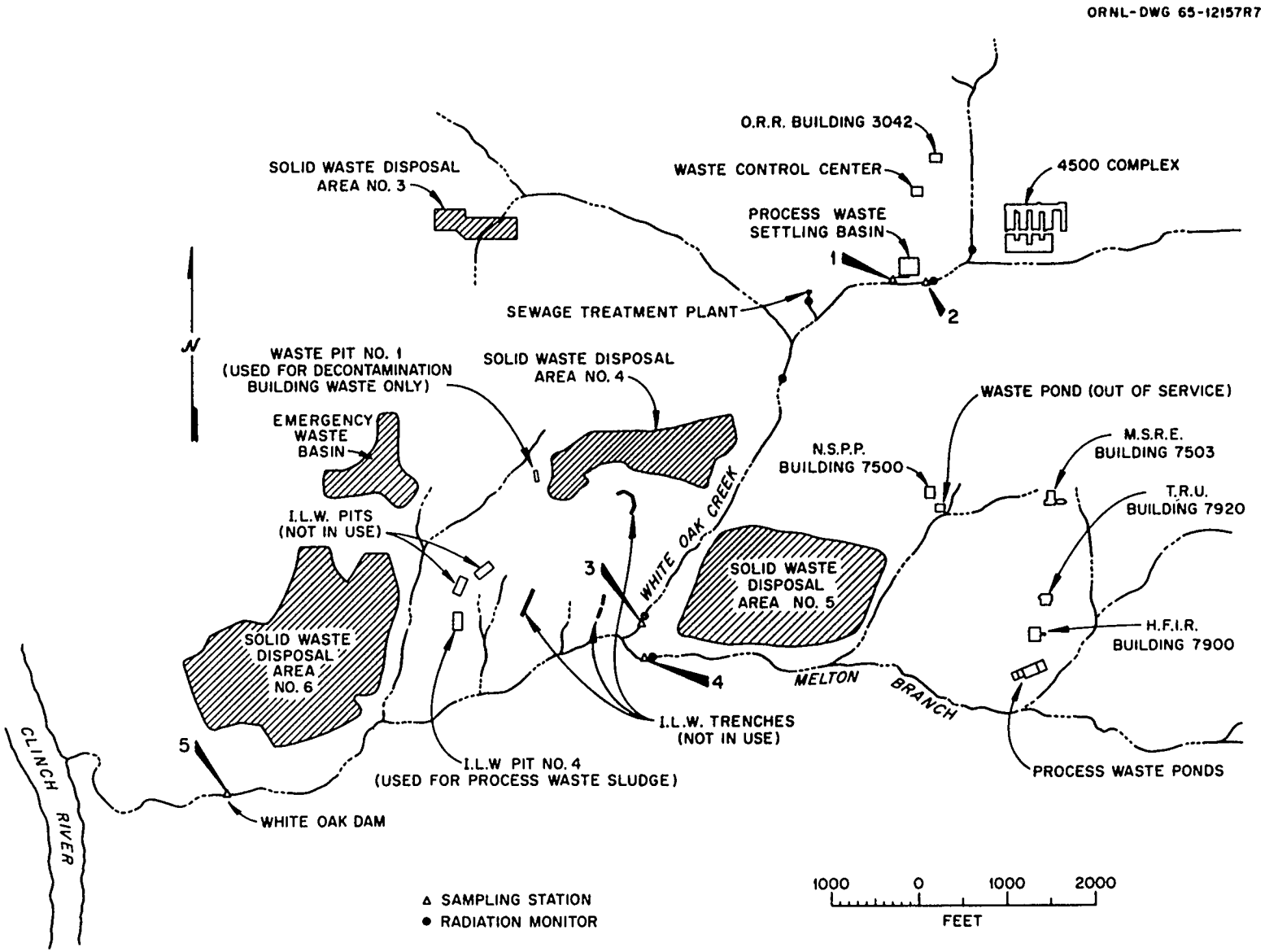

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.06	0.19
Miscellaneous discharges from east end of plant	2	0.01	$\leq$0.09
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.31
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.19
Total discharge from all sources	3,4	0.14	0.50
White Oak Dam to Clinch River (Health Physics measurement)	5	0.10	0.17

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	119.2	0.07	10.9	0.11	2.6
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.25[c]	39.1	0.25	5.9
3. Reactor Operations (MH112)	5.8	0.01	1.5	0.36	8.4
4. Buildings 3503 and 3508	16.9	0.09	14.1	1.00	23.5
5. Buildings 3025 and 3026	2.0	<0.01	-	0.36	8.4
6. Building 3019	4.2	<0.01	-	0.09	2.1
7. Fission Products Development Laboratory	-	<0.01	-	0.02	0.5
8. Waste Evaporator, Bldg. 2531	-	-	-	0.59	13.8
9. Buildings 3525	≤ 0.01	<0.01	-	0.56	13.2
10. Building 2026	1.0	<0.01	-	0.12	2.8
11. Tank Farm Drainage	49.2	0.22	34.4	0.80	18.8

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.04	224
Radiochemical-Processing Pilot Plant	3020	0	2
MSRE	7512	0	0
HFIR	7911	0.03	53
Total Activity in Gases Released at X-10 Site		0.07	279
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		0.2 (^{3}H)	

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam October, 1973

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Maximum	Minimum		
pH	6.5-8.5 <1 pH unit/day change	3	> 9.5	5.9	21	30
		4	7.6	6.9	None	-
		5	8.9	7.2	6	9.7
Dissolved Oxygen	5 ppm Min.	3	11.2	2.1	21	-
		4	11.6	4.3	2	-
		5	>15.0	5.3	None	-
Temp.	<30°C < 2°C/hr change	3	25.5	12.5	None	-
		4	27.4	13.0	None	-
		5	26.5	13.8	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Twenty-one excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for fourteen excursions, the Building 3004 demineralizer was responsible for seven excursions, and two were from an unknown source. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
October, 1973

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.150	2.710	0.230	0.015
Zn	0.1	0.025	0.212	0.008	<0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.14	0.09	0.05	<0.01
NO_3 (as N)	10	1.13	1.01	0.75	0.09
Hg	0.005	0.0004	<0.0001	0.0004	0.0001
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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CENTRAL FILES NUMBER

74-2-9

DATE: February 8, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1973

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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David R. Hamrin 6/9/95
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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of December, 1973, was 0.57% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.38% MPC_W, 0.096% MPC_W, and 0.08% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The heavy rainfall during November and December has resulted in high discharges of ^{90}Sr from the burial grounds. An examination of data indicates that the ^{90}Sr discharged from the burial grounds is proportional to the flow in White Oak Creek. The creek flow for December was considerably higher than normal.

Process Waste

A total of 4.9 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The above-normal ^{90}Sr discharge from the PWTP is again the result of the heavy rains. The ^{90}Sr input to the PWTP was higher than usual but not because of any particular source.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 267 gph.

	Gallons
Total volume generated	147,000
Volume transferred to evaporator	199,000
Tank Farm free space at beginning of month	408,000
Tank Farm free space at end of month	454,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	112,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	23,600
Fission Products Development Laboratory	22,400
ORR and BSR	16,900
High Flux Isotope Reactor	12,500
Radioisotopes Processing Area	8,400
4500 Complex	14,000
Transuranium Processing Area	4,800

GASEOUS WASTE

The ORNL stacks discharged 70 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 202 μCi. The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.2% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards forty-three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

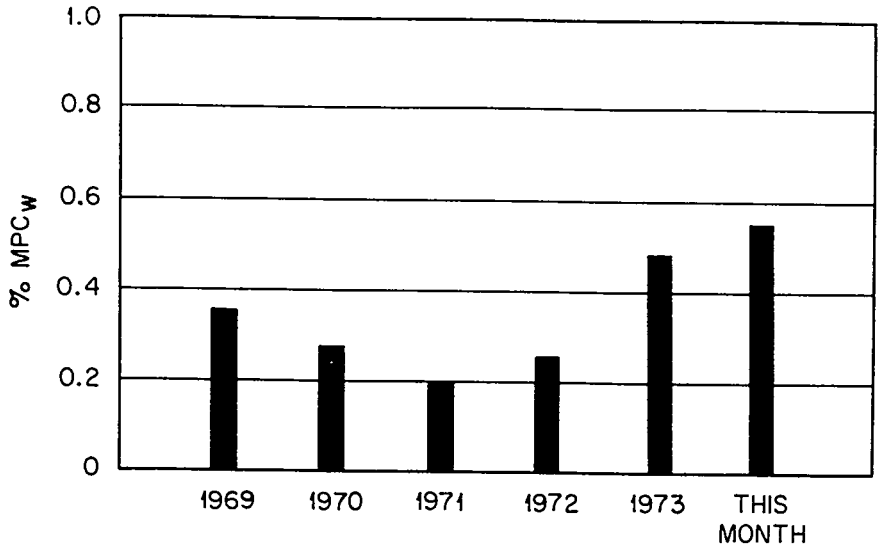

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

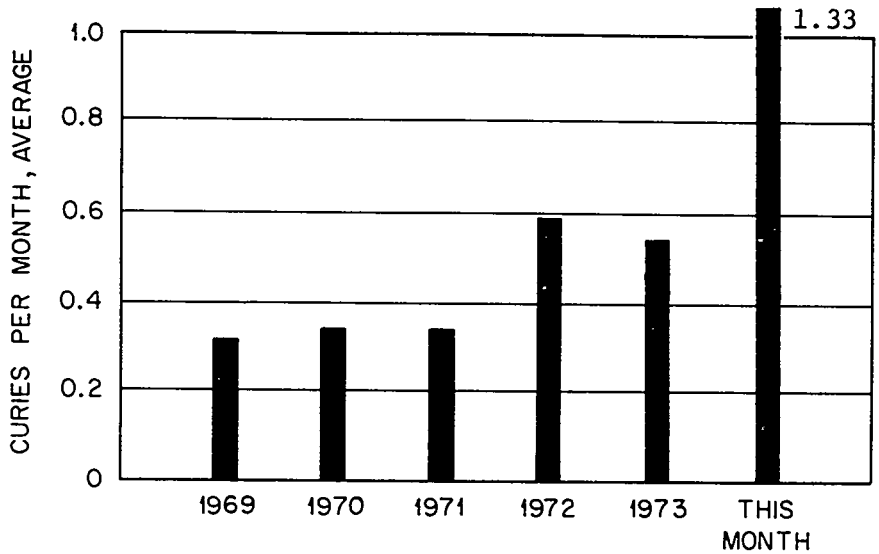

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

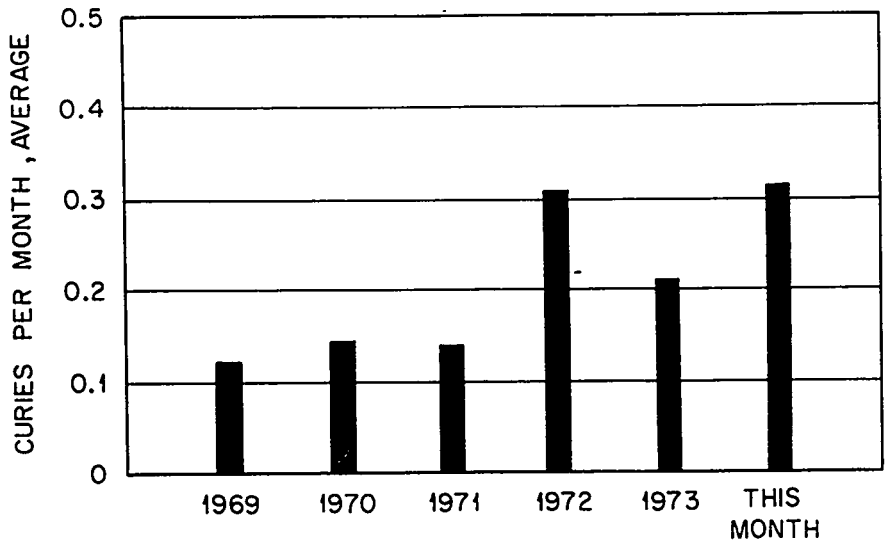

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

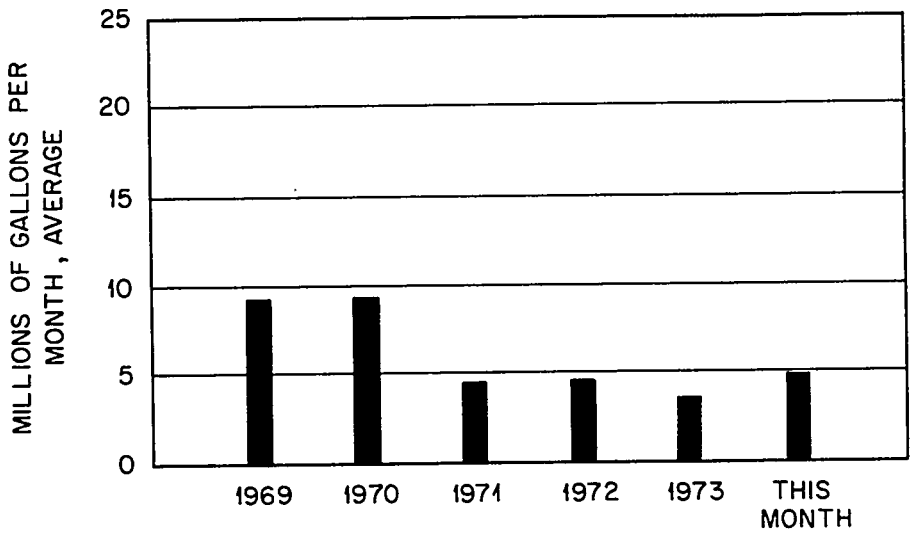

Fig 4. Process Waste Volumes.

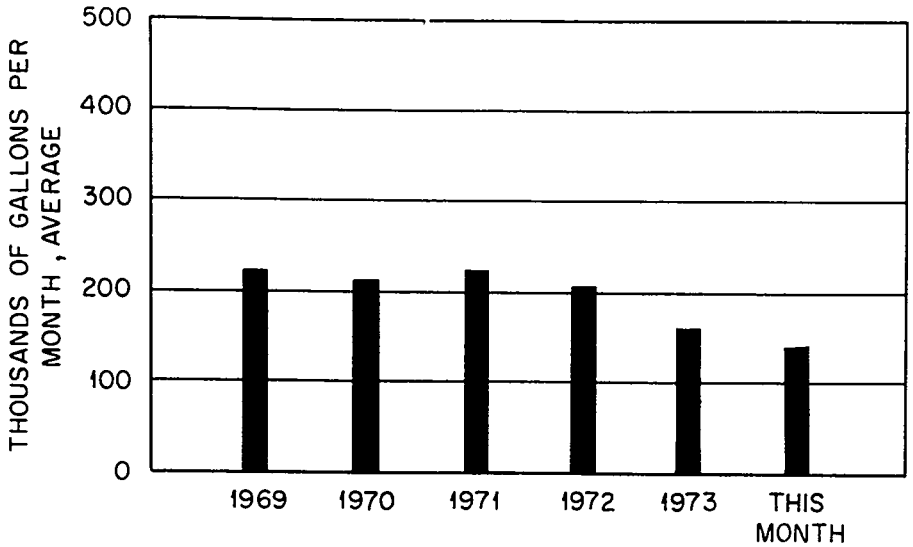

Fig 5. Intermediate – Level Waste Volumes.

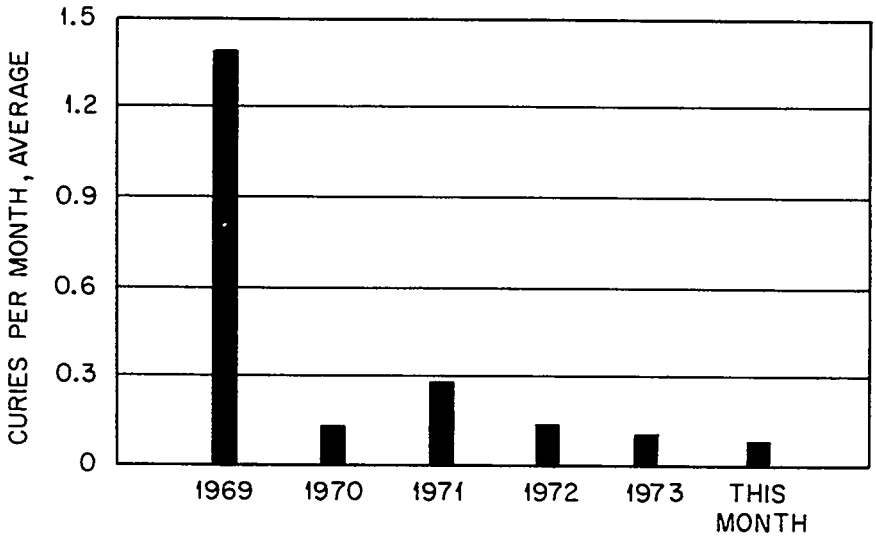

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

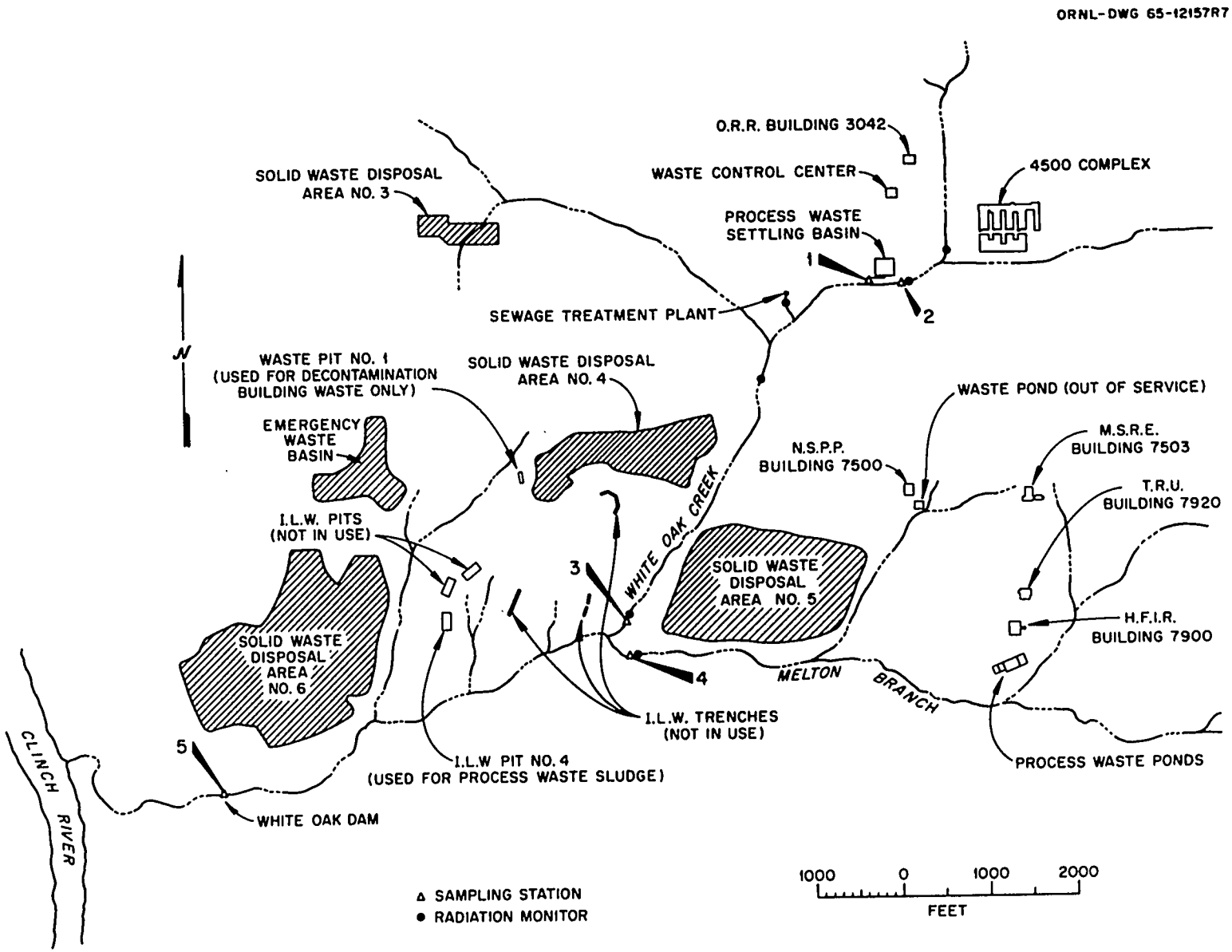

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.32	0.92
Miscellaneous discharges from east end of plant	2	$\leq$0.06	$\leq$0.33
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.21	2.71
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.12	$\leq$0.32
Total discharge from all sources	3,4	1.33	$\leq$3.03
White Oak Dam to Clinch River (Health Physics measurement)	5	0.83	1.47

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	148	0.05	5.0	0.06	1.2
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.37[c]	37.4	0.48	9.3
3. Reactor Operations (MH112)	2.6	0.01	1.0	0.83	16.1
4. Buildings 3503 and 3508	34.2	0.22	22.3	1.14	22.1
5. Buildings 3025 and 3026	6.4	<0.01	-	0.25	4.8
6. Building 3019	9.2	<0.01	-	0.19	3.7
7. Fission Products Development Laboratory	-	<0.01	-	<0.01	-
8. Waste Evaporator, Bldg. 2531	51.5	0.13	13.1	0.44	8.5
9. Building 3525	$\leq$ 0.2	<0.01	-	0.07	1.4
10. Building 2026	$\leq$ 0.5	<0.01	-	0.14	2.7
11. Tank Farm Drainage	23.4	0.21	21.2	1.56	30.2

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in mahholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.07	183
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	<0.01	18
Total Activity in Gases Released at X-10 Site		0.07	202
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		c	

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value will not be available until the end of January, 1974.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam December, 1973

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3	5.6	> 9.5	43	37
		4	6.6	7.6	None	-
		5	6.8	7.5	None	-
Dissolved Oxygen	5 ppm Min.	3	6.7	12.9	None	-
		4	9.6	13.1	None	-
		5	10.1	13.8	None	-
Temp.	<30°C < 2°C/hr change	3	< 5.0	12.5	None	-
		4	< 5.0	15.5	None	-
		5	6.0	14.5	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Forty-three excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for thirty-eight excursions, the Building 3004 demineralizer was responsible for four excursions, and one was from the BSR demineralizer. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
December, 1973

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.050	0.765	0.115	<0.005
Zn	0.1	0.014	0.047	0.005	0.005
Pb	0.05	<0.020	<0.020	<0.020	<0.020
P	1	0.06	0.02	0.03	<0.01
NO_3 (as N)	10	0.37	0.19	0.36	0.31
Hg	0.005	0.0001	<0.0001	<0.0001	<0.0001
Phenols	0.1	<0.001	<0.001	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

APR 17 1974

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ORNL
CENTRAL FILES NUMBER

74-4-26

DATE: April 10, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of February, 1974, was 0.22% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.18% MPC_W, 0.03% MPC_W, and 0.008% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. Rainfall has continued to be above normal and consequently, the ^{90}Sr discharge from the burial grounds is still high.

Process Waste

A total of 4.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 217 gph.

	Gallons
Total volume generated	138,000
Volume transferred to evaporator	146,000
Tank Farm free space at beginning of month	435,000
Tank Farm free space at end of month	433,000
Evaporator concentrate returned to tank farm	10,000
Volume of concentrate available for hydrofracture (South Tank Farm)	129,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	24,900
Fission Products Development Laboratory	11,900
ORR and BSR	39,600
High Flux Isotope Reactor	24,400
Radioisotopes Processing Area	8,100
4500 Complex	6,900
Transuranium Processing Area	1,300

GASEOUS WASTE

The ORNL stacks discharged 190 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 433 μCi. The particulate activity released by the Isotopes Division at Y-12 amounted to 0.4 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.3% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The ^{3}H discharge from the Tritium Target Fabrication Building (Building 7025) was 7.2 Ci.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards 40 times, and the pH of Melton Branch was out of compliance only once.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

Lead analyses previously reported have been discontinued with this report because the past analyses have given no indication of lead in ORNL discharges, and none of the present work at ORNL is such that a significant amount of lead may be released. Mercury analyses in Melton Branch have also been discontinued for similar reasons.

A semiannual spectrographic analysis was run on the effluent from White Oak Dam. There was nothing in the results of this analysis to indicate the need for analyses in addition to those being made on a routine basis.

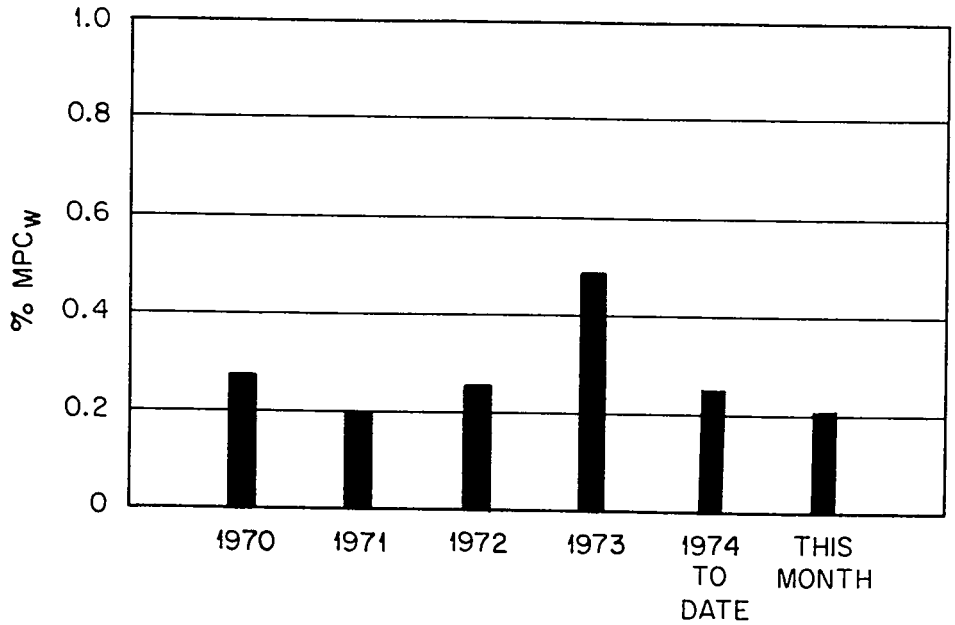

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

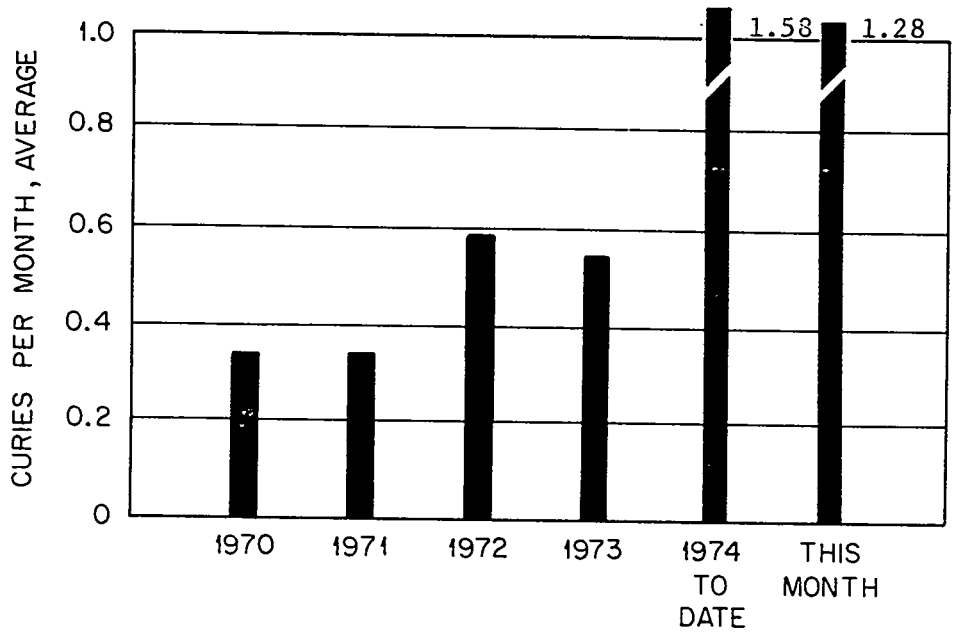

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

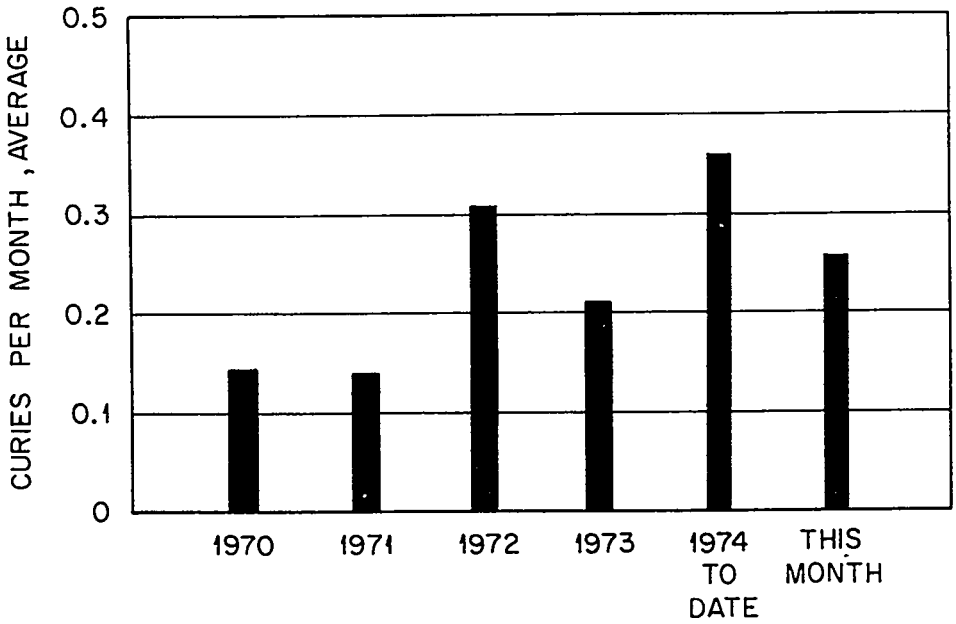

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

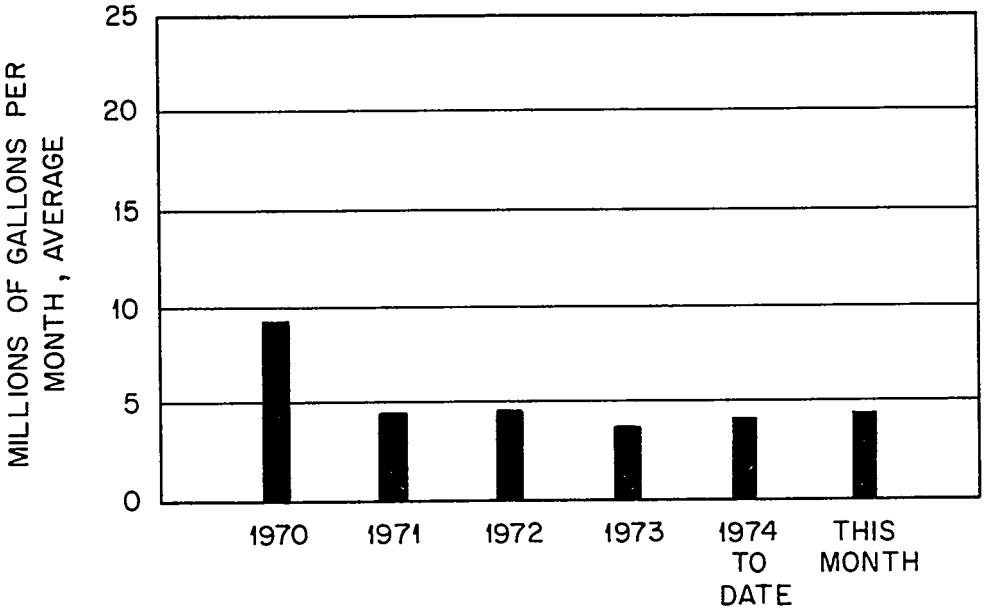

Fig 4. Process Waste Volumes.

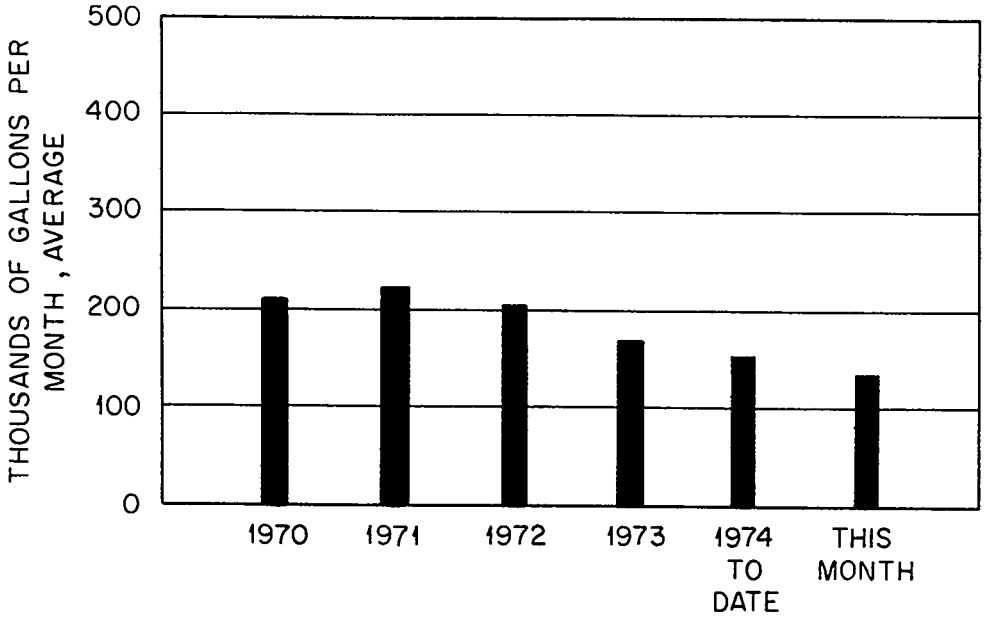

Fig 5. Intermediate – Level Waste Volumes.

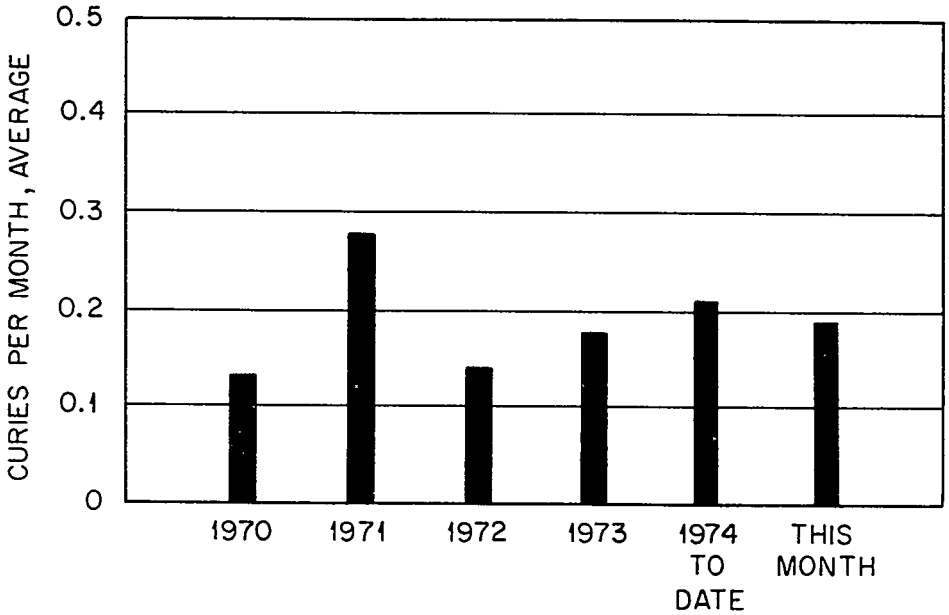

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

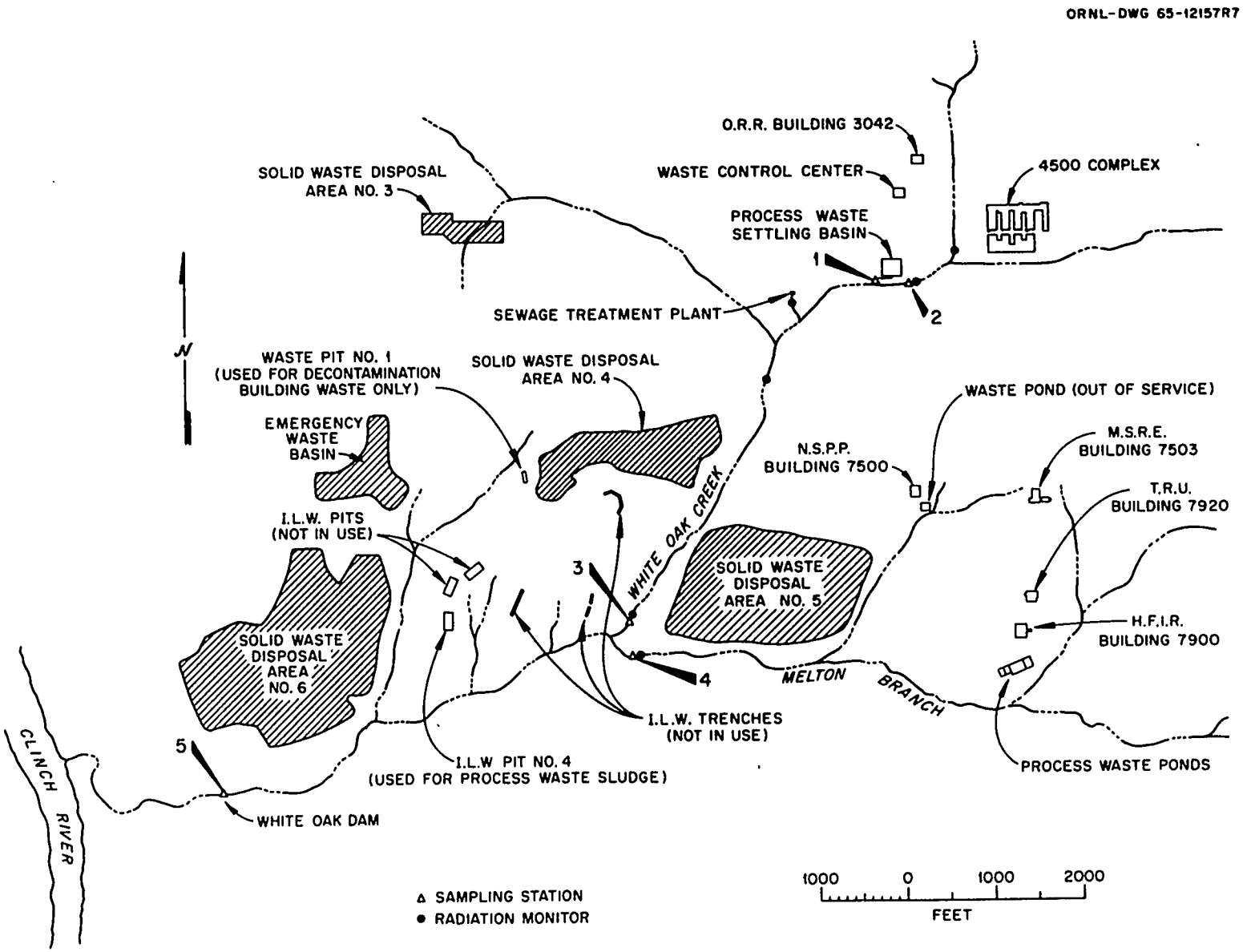

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.26	0.39
Miscellaneous discharges from east end of plant	2	0.02	$\leq$0.21
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.02	1.85
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.26	0.39
Total discharge from all sources	3,4	1.28	2.24
White Oak Dam to Clinch River (Health Physics measurement)	5	0.66	0.84

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	132	0.04	4.4	0.06	1.4
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.19[c]	21.4	0.29	6.6
3. Reactor Operations (MH112)	8.8	0.02	2.2	0.51	11.7
4. Buildings 3503 and 3508	28.9	0.20	22.5	1.22	27.9
5. Buildings 3025 and 3026	3.6	<0.01	-	0.01	0.2
6. Building 3019	4.5	<0.01	-	0.15	3.4
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	35.6	0.07	7.9	0.34	7.8
9. Building 3525	≤ 0.3	<0.01	-	0.07	1.6
10. Building 2026	≤ 0.2	<0.01	-	0.15	3.4
11. Tank Farm Drainage	41.7	0.37	41.6	1.57	35.8

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Mircocuries)
HRLAL	2026	0	-
Central Radioactive Gas Disposal Facilities	3039	0.13	330
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.06	102
Total Activity in Gases Released at X-10 Site		0.19	433
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		7.2 (^{3}H)	

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam February, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5	3	5.7	9.2	40[d]	26.2
	<1 pH unit/day change	4	6.7	8.7	1[e]	0.7
		5	7.0	7.7	None	-
Dissolved Oxygen	5 ppm Min.	3	10.5	13.7	None	-
		4	8.4	14.1	None	-
		5	7.3	11.4	None	-
Temp.	<30°C	3	7.6	14.5	None	-
	< 2°C/hr change	4	<5.0	12.4	None	-
		5	6.7	17.2	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Forty excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 33 excursions, and the Building 3004 demineralizer was responsible for seven excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]The source of the high pH excursion is unknown.

Table 5. Concentration of Nonradioactive Effluents
February, 1974

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.008	0.095	0.035	<0.005
Zn	0.1	0.240	0.007	<0.005	<0.005
P	1	0.03	0.01	0.03	0.01
NO_3 (as N)	10	1.98	0.07	0.49	0.48
Hg	0.005	0.0083	c	0.0003	<0.0001
Phenols	0.1	0.005	<0.001	<0.001	0.002

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL
CENTRAL FILES NUMBER
74-5-17

DATE: May 17, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 6/9/95
Technical Information Officer Date
ORNL RIS

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of March, 1974, was 0.65% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.49% MPC_W, 0.09% MPC_W, and 0.03% MPC_W, respectively. The higher than normal concentrations are the result of a lower flow in the Clinch River.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The wet conditions that have prevailed the past several months continue to influence the amount of activity that is leached from the burial grounds. The ^{90}Sr discharge attributed to Burial Ground No. 4 for the month of March is 0.60 Ci, whereas the average monthly discharge for the past three years is estimated to be 0.14 Ci.

Process Waste

A total of 4.6 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. An investigation is underway to determine the reason for the above-normal discharges experienced from the process-waste system the past few months.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 204 gph.

	Gallons
Total volume generated	148,000
Volume transferred to evaporator	152,000

	Gallons
Tank Farm free space at beginning of month	433,000
Tank Farm free space at end of month	431,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	134,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	21,500
Fission Products Development Laboratory	14,000
ORR and BSR	48,400
High Flux Isotope Reactor	14,200
Radioisotopes Processing Area	9,400
4500 Complex	6,600
Transuranium Processing Area	1,800

GASEOUS WASTE

The ORNL stacks discharged 390 mCi of ^{131}I this month. The higher than normal ^{131}I discharge is the result of leakage that developed between the filters and the framing in a filter pit belonging to the Isotopes Division. This fault has been corrected and the filter pit again meets specifications. The filterable particulate activities released by the Isotopes Division at Y-12 amounted to 0.4 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.1% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6. The ^{3}H discharge from the Tritium Target Fabrication Building (Building 7025) is also shown in Table 3.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

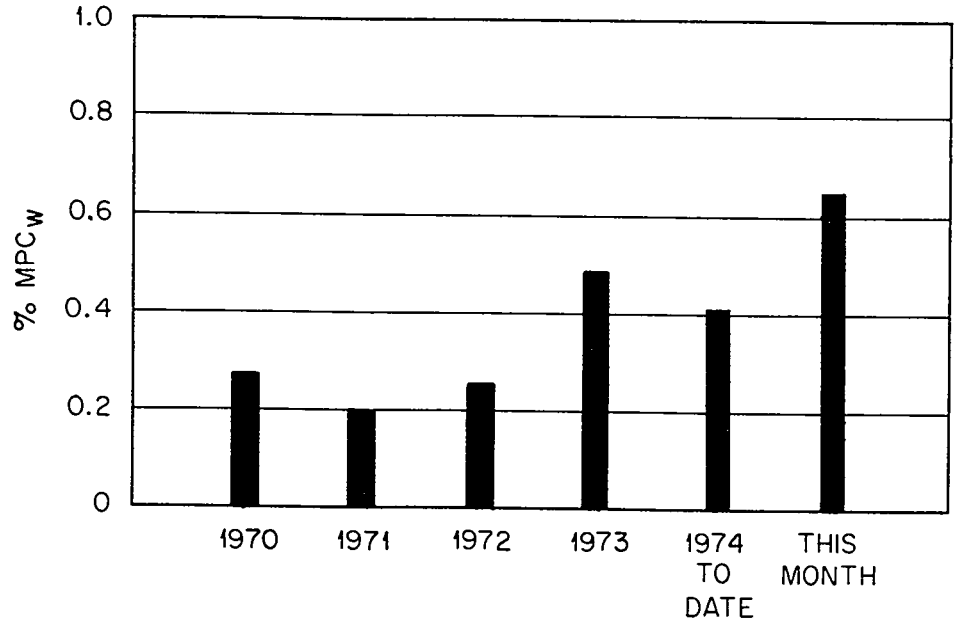

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

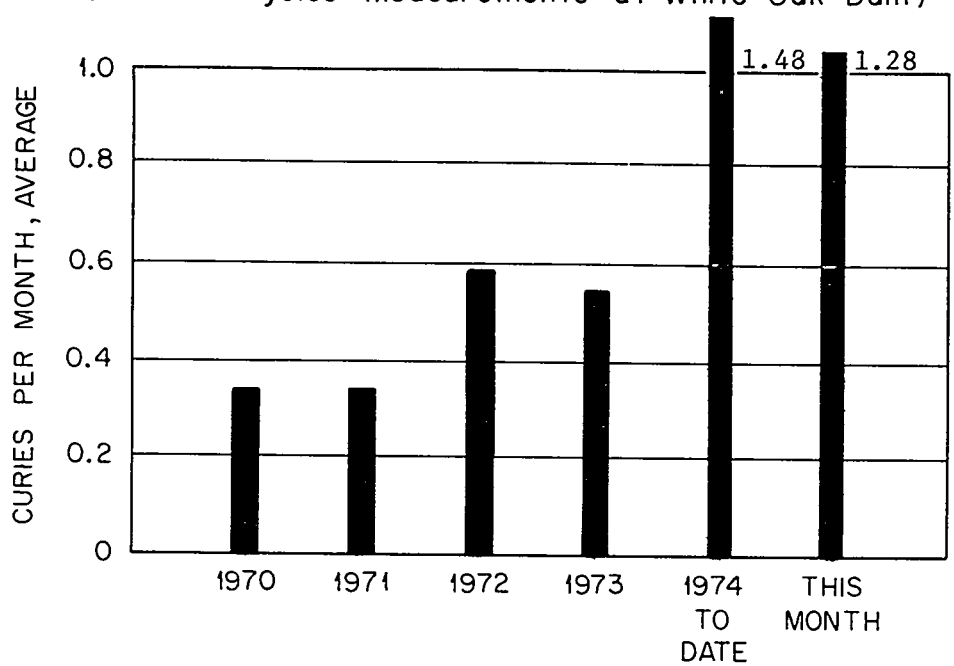

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

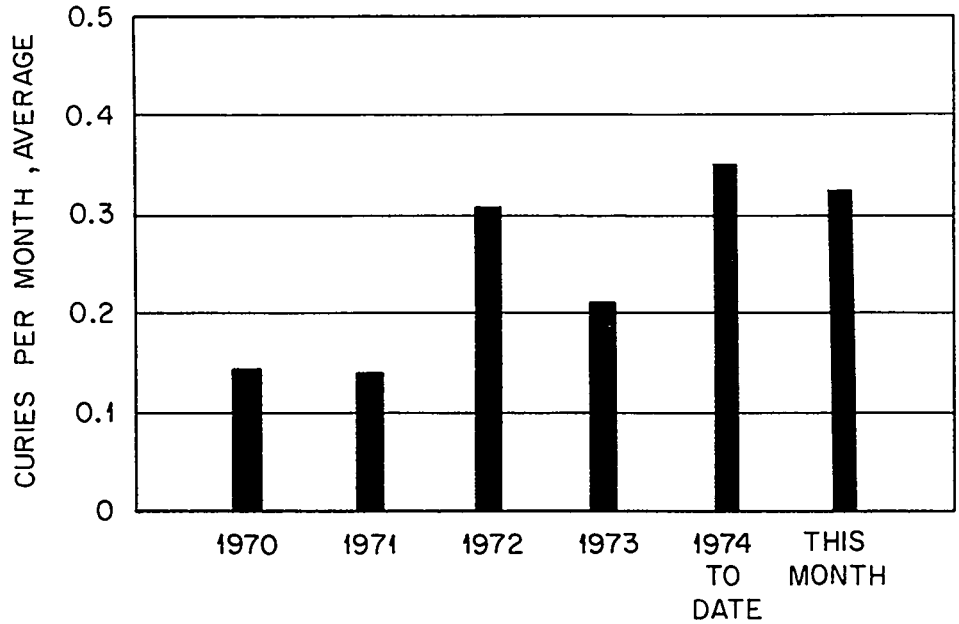

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

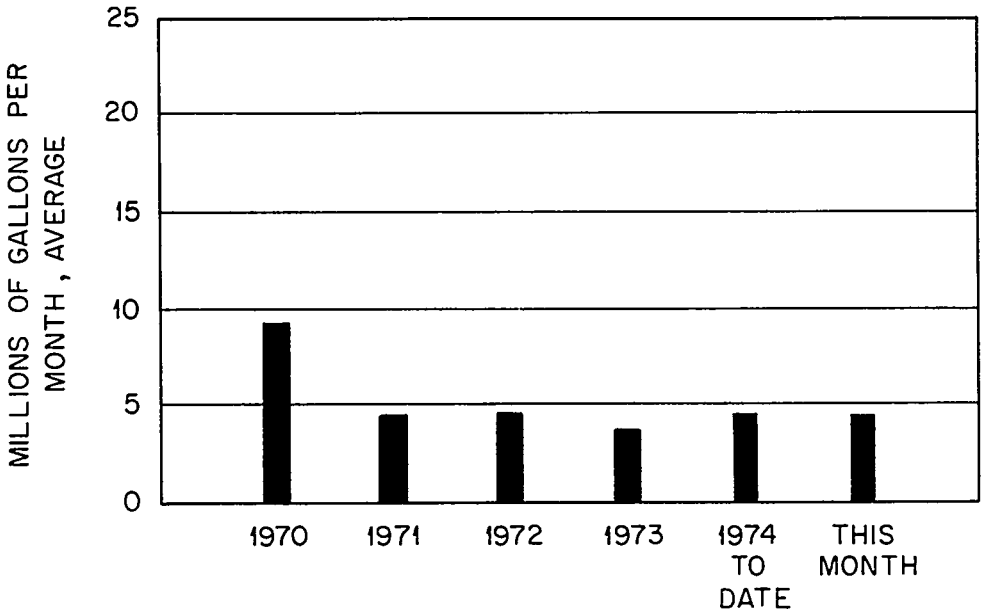

Fig 4. Process Waste Volumes.

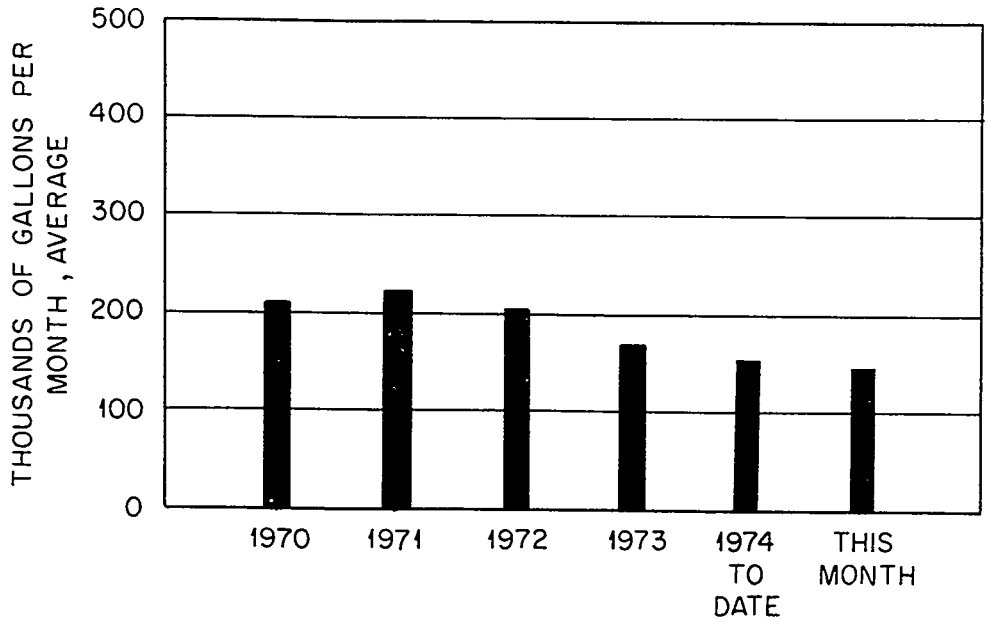

Fig 5. Intermediate – Level Waste Volumes.

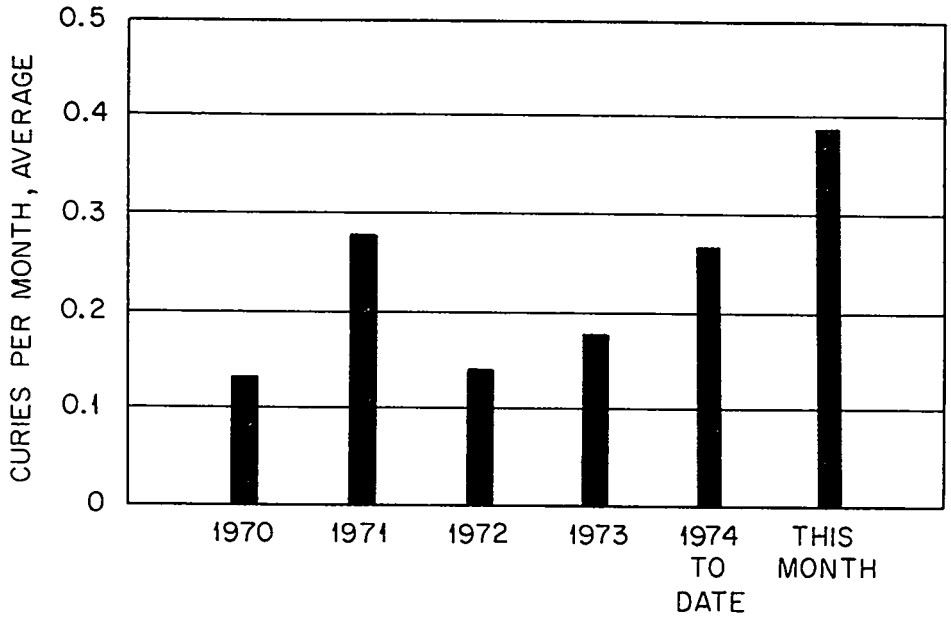

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

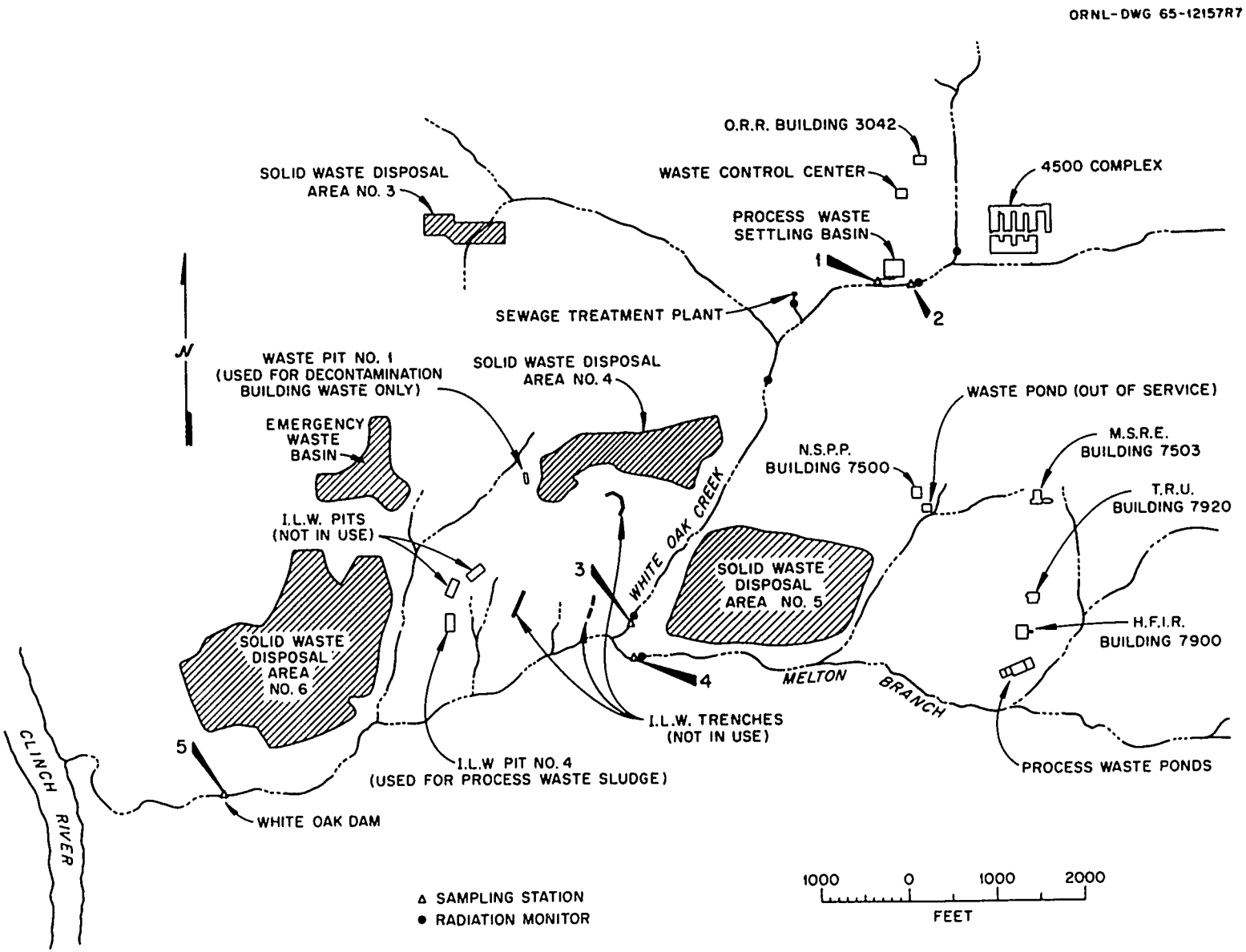

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.32	0.59
Miscellaneous discharges from east end of plant	2	0.18	0.82
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	1.12	2.15
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.16	0.24
Total discharge from all sources	3,4	1.28	2.39
White Oak Dam to Clinch River (Health Physics measurement)	5	0.75	1.15

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	82.7	0.04	6.2	0.09	2.0
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.18[c]	28.2	0.37	8.0
3. Reactor Operations (MH112)	12.0	0.04	6.2	0.55	12.0
4. Buildings 3503 and 3508	44.7	0.27	42.2	1.06	23.0
5. Buildings 3025 and 3026	3.9	<0.01	-	0.21	4.6
6. Building 3019	5.4	<0.01	-	0.19	4.1
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.2
8. Waste Evaporator, Bldg. 2531	9.5	0.03	4.7	0.49	10.7
9. Building 3525	0.2	<0.01	-	0.04	0.8
10. Building 2026	0.5	<0.01	-	0.17	3.7
11. Tank Farm Drainage	9.4	0.08	12.5	1.42	30.9

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.39	699
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0	27
Total Activity in Gases Released at X-10 Site		0.39	727
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		13.7 (^{3}H)	

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam March, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3	5.9	9.2	33	23.2
		4	6.6	8.4	None	-
		5	6.7	8.0	None	-
Dissolved Oxygen	5 ppm Min.	3	5.1	12.7	None	-
		4	5.0	13.6	None	-
		5	5.5	12.1	None	-
Temp.	<30°C < 2°C/hr change	3	9.0	18.4	None	-
		4	8.0	18.7	None	-
		5	9.0	20.4	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Thirty-three excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 25 excursions, and the Building 3004 demineralizer was responsible for 8 excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

Table 5. Concentration of Nonradioactive Effluents
March, 1974

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.045	0.570	0.090	<0.005
Zn	0.1	0.036	0.038	0.010	<0.005
P	1	0.04	<0.01	0.05	<0.01
NO_3 (as N)	10	0.43	0.35	2.46	0.34
Hg	0.005	0.0014	c	0.0002	0.0000
Phenols	0.1	<0.001	0.007	<0.001	<0.001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL
CENTRAL FILES NUMBER
74-10-60

DATE: October 29, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 10/9/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1974, was 0.22% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.20% MPC_W, 0.01% MPC_W, and <0.01 MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 2.9 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 184 gph.

	Gallons
Total volume generated	115,000
Volume transferred to evaporator	137,000
Tank Farm free space at beginning of month	383,000
Tank Farm free space at end of month	446,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture (South Tank Farm)	116,000

Transfer of ILW to the Shale Fracture storage tanks was commenced this month in preparation for an October injection. A total of 47,000 gallons of ILW concentrate was transferred to these tanks during the month.

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	18,100
Fission Products Development Laboratory	28,700
ORR and BSR	19,200
High Flux Isotope Reactor	29,300
Radioisotopes Processing Area	7,500
4500 Complex	2,900
Transuranium Processing Area	2,800

GASEOUS WASTE

The ORNL stacks discharged 300 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 173 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.3% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards nineteen times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

NONROUTINE MAINTENANCE

A bottom panel of the cell ventilation duct located on the north side of the 3039 area failed as a result of excessive corrosion. The Isotopes Area was shut down for approximately two hours while temporary repairs were made.

The shaft coupling grid spring on the W-8 transfer pump broke during a transfer to the Shale Fracture storage tanks. One operating day was lost while repairs were made to the pump.

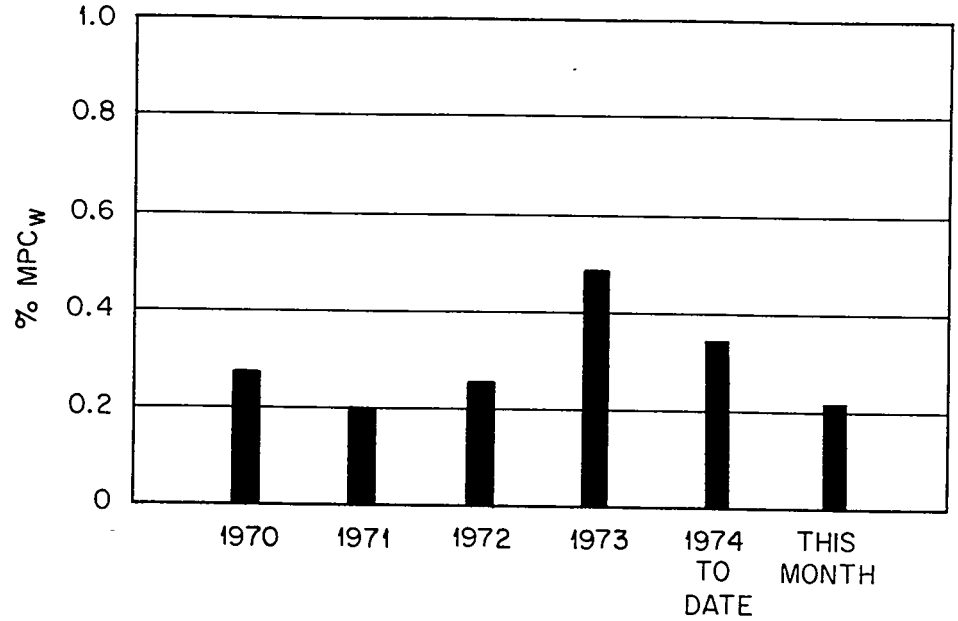

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

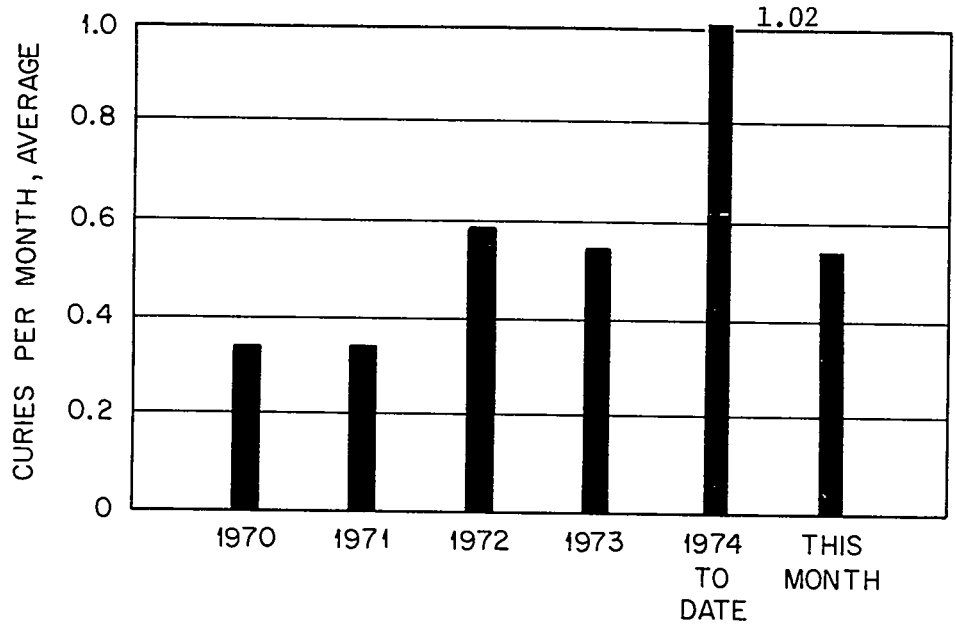

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

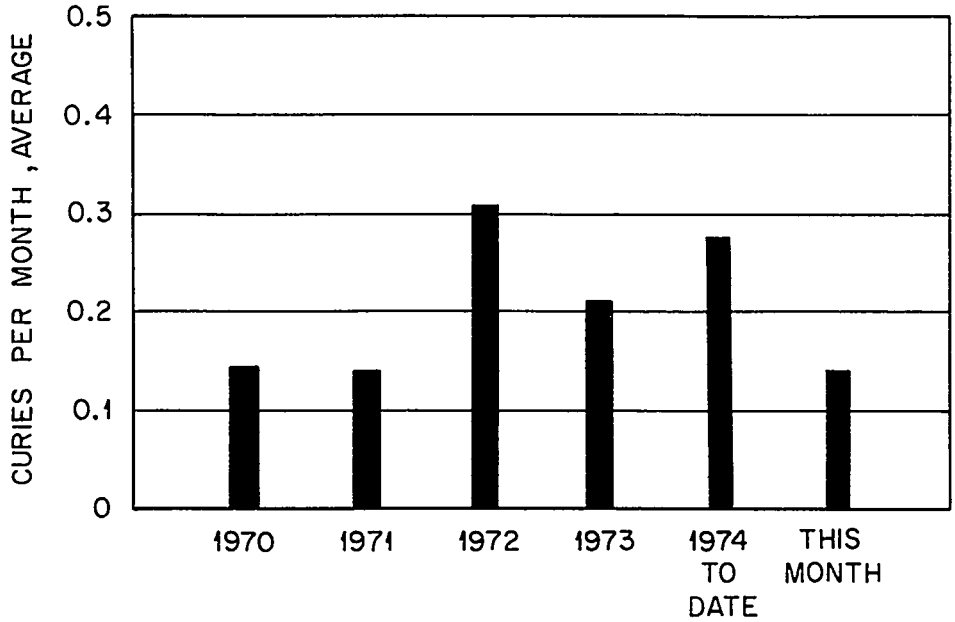

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

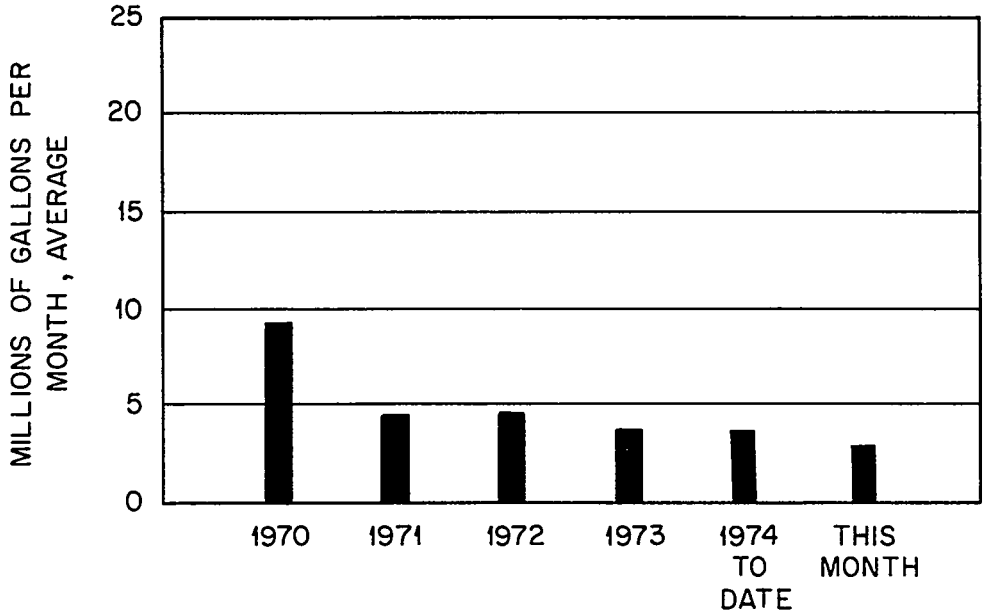

Fig 4. Process Waste Volumes.

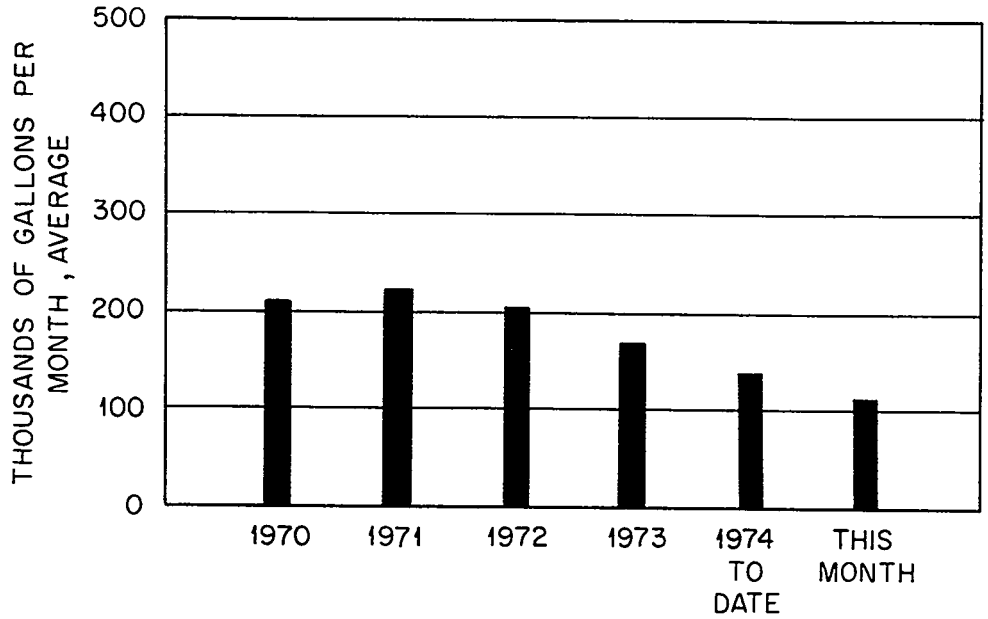

Fig 5. Intermediate – Level Waste Volumes.

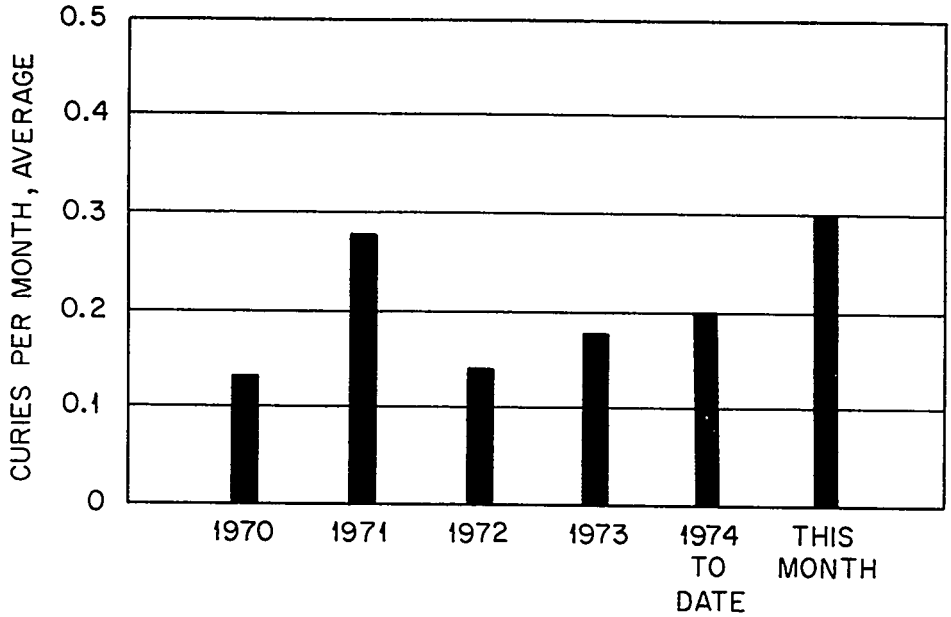

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

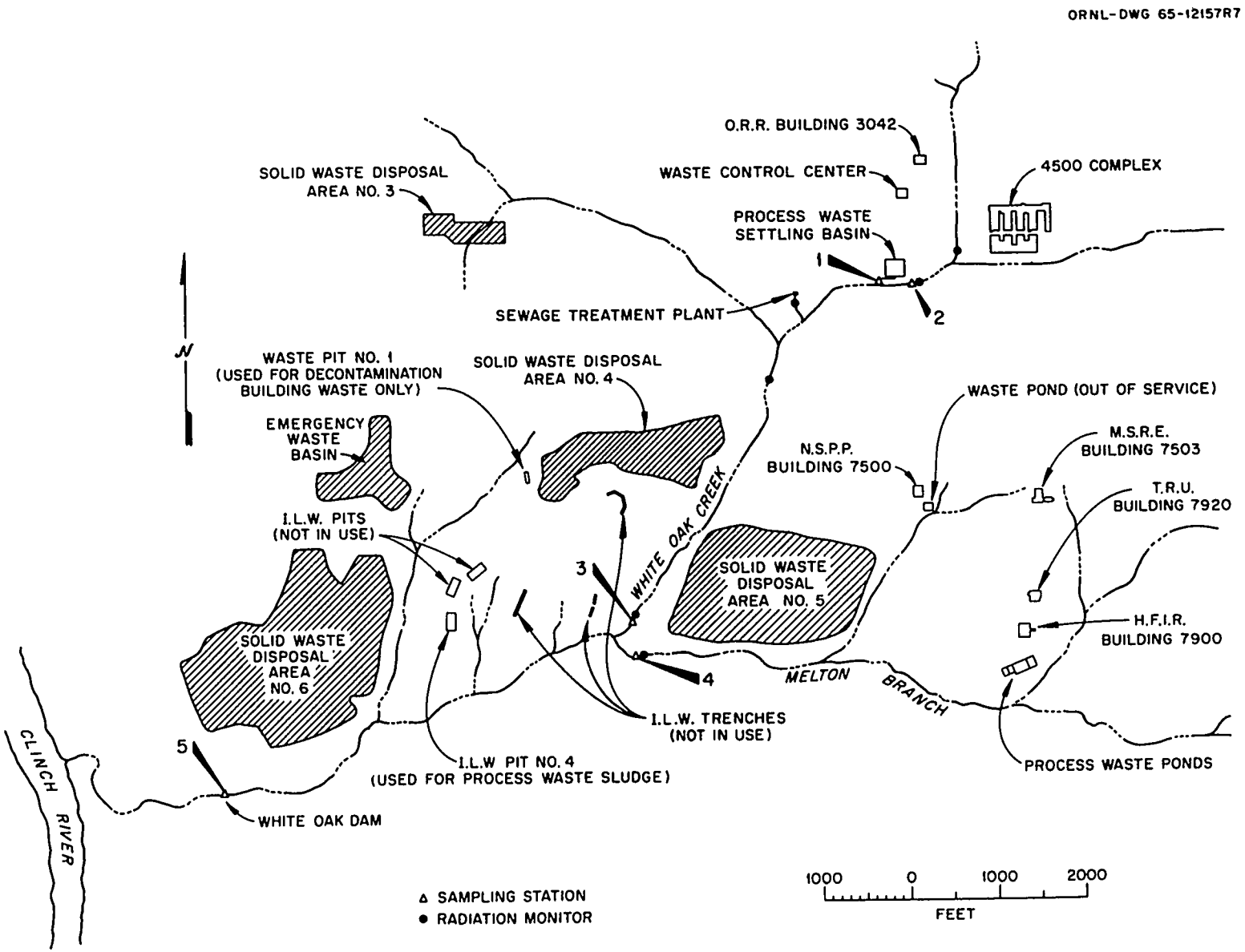

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.14	0.36
Miscellaneous discharges from east end of plant	2	0.04	0.30
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.50	1.01
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.04	0.08
Total discharge from all sources	3,4	0.54	1.09
White Oak Dam to Clinch River (Health Physics measurement)	5	0.32	0.39

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	148.0	0.06	10.7	0.07	2.1
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.26[c]	46.4	0.43	12.9
3. Reactor Operations (MH112)	1.8	<0.01	-	0.45	13.5
4. Buildings 3503 and 3508	11.3	0.01	1.8	0.22	6.6
5. Buildings 3025 and 3026	2.7	<0.01	-	0.28	8.4
6. Building 3019	4.1	<0.01	-	0.27	8.1
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3
8. Waste Evaporator, Bldg. 2531	9.4	0.03	5.4	0.65	19.5
9. Building 3525	0.1	<0.01	-	0.06	1.8
10. Building 2026	≤0.3	<0.01	-	0.17	5.0
11. Tank Farm Drainage	47.9	0.20	35.7	0.73	21.8

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.29	158
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	14
Total Activity in Gases Released at X-10 Site		0.30	173
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		0.87 (^{3}H)	

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam August, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5 <1 pH unit/day change	3	5.4	9.0	19[d]	62.1
		4	6.9	8.0	None	-
		5	6.7	8.5	None	-
Dissolved Oxygen	5 ppm Min.	3	<1.0	9.8	21	324
		4	5.0	7.6	None	-
		5	5.0	>15.0	None	-
Temp.	<30°C < 2°C/hr change	3	17.0	26.5	None	-
		4	18.5	24.0	None	-
		5	20.0	>30.0	11	e

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Nineteen excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 13 excursions, and the Building 3004 demineralizer was responsible for 6 excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]The temperature excursions were due to weather conditions.

Table 5. Concentration of Nonradioactive Effluents
August, 1974

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.010	0.575	<0.005	<0.005
Zn	0.1	0.010	0.015	<0.005	<0.005
P	1	0.23	0.09	0.13	<0.01
NO_3 (as N)	10	0.27	0.35	0.21	0.01
Hg	0.005	0.0001	c	0.0002	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL
CENTRAL FILES NUMBER
74-11-13

DATE: November 15, 1974

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

FILE COPY

This document has been approved for release to the public by:

David R Hamrin 10/8/95
Technical Information Officer Date
ORNL Site

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1974, was 0.23% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr, ^{3}H, and ^{131}I, were 0.20% MPC_W, 0.01% MPC_W, and 0.01% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 4.2 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 194 gph.

	Gallons
Total volume generated	146,000
Volume transferred to evaporator	140,000
Tank Farm free space at beginning of month	446,000
Tank Farm free space at end of month	473,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture (South Tank Farm)	125,000
Volume of concentrate at hydrofracture site	82,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,400
Fission Products Development Laboratory	22,300
ORR and BSR	17,400
High Flux Isotope Reactor	9,000
Radioisotopes Processing Area	6,500
4500 Complex	5,100
Transuranium Processing Area	2,200

GASEOUS WASTE

The ORNL stacks discharged 150 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 495 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 3.2% and 0.8% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards twenty-three times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

Nonroutine Maintenance

A defective coil in a control circuit caused the shutdown of the normal off-gas blower. The unit was out of service approximately forty-eight hours for procurement and installation of a new coil.

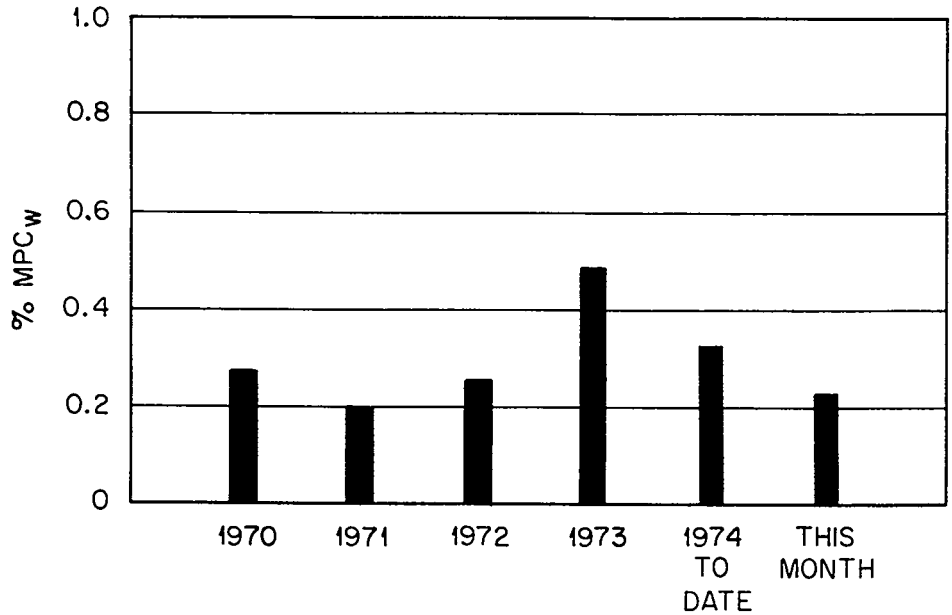

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

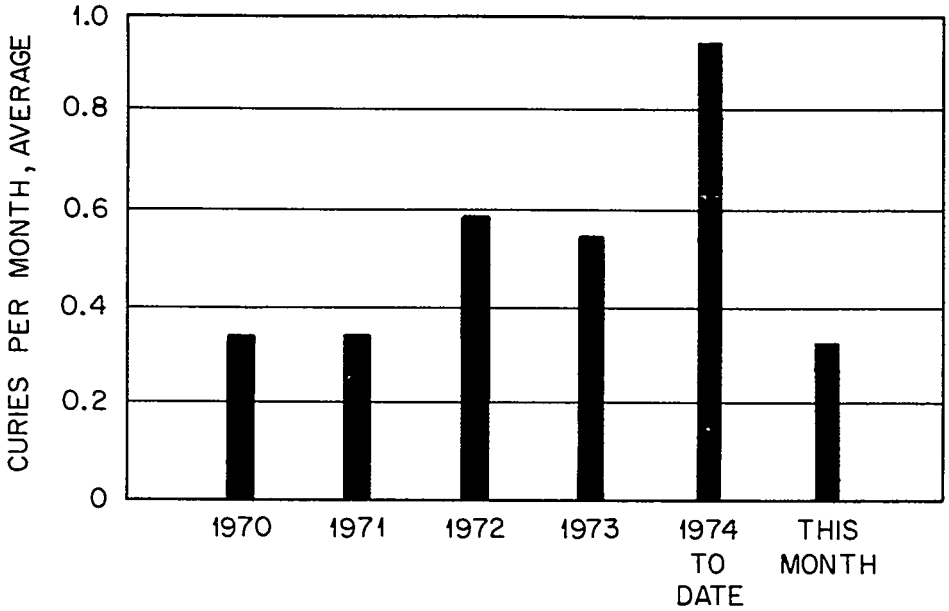

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

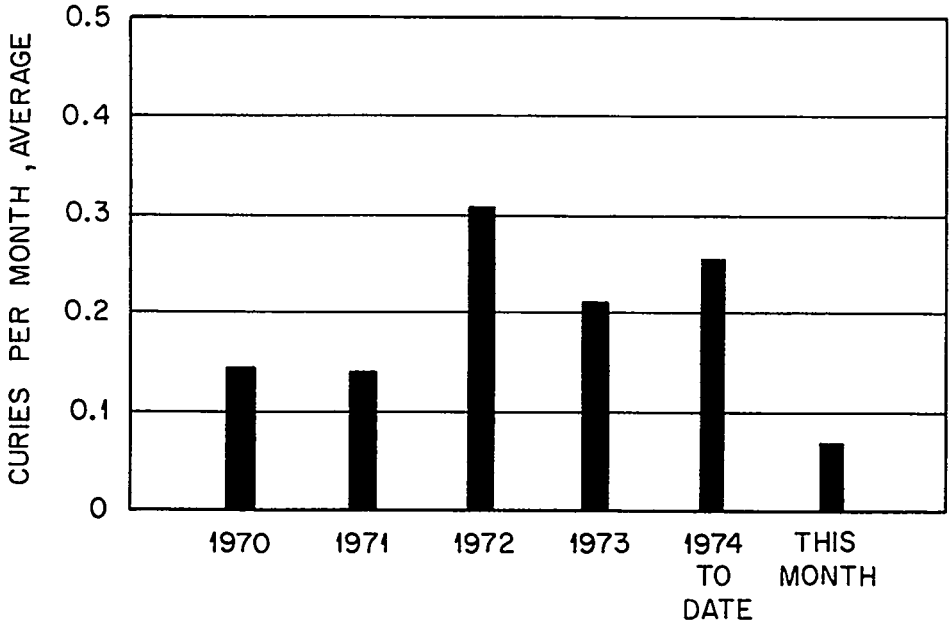

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

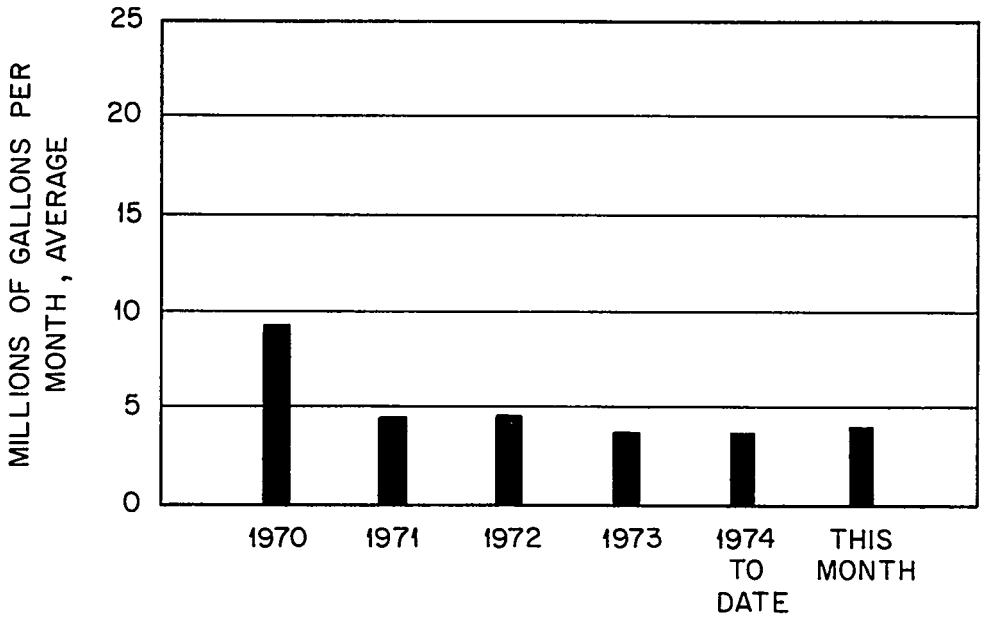

Fig 4. Process Waste Volumes.

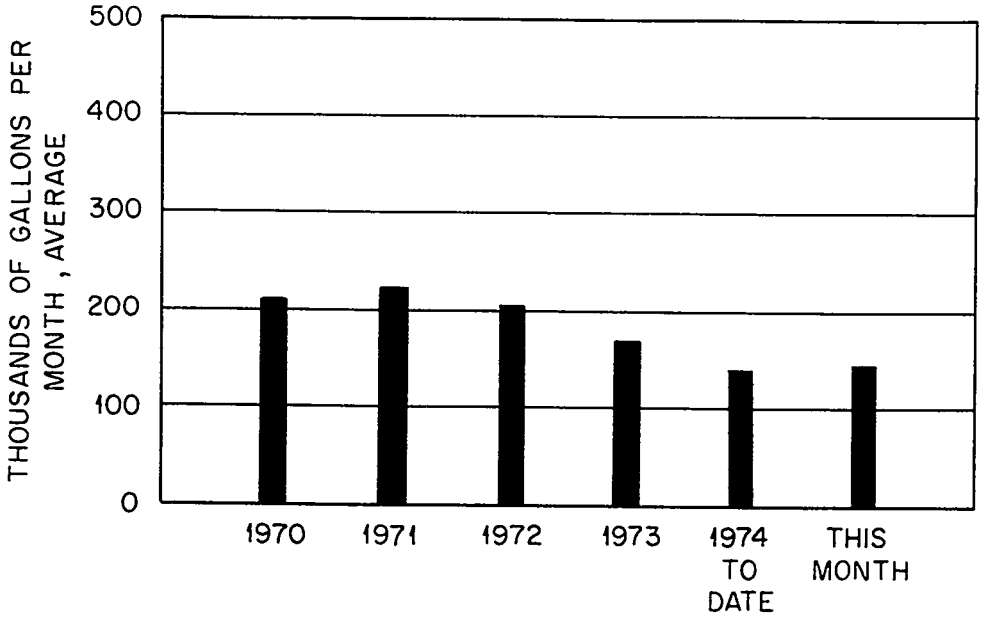

Fig 5. Intermediate – Level Waste Volumes.

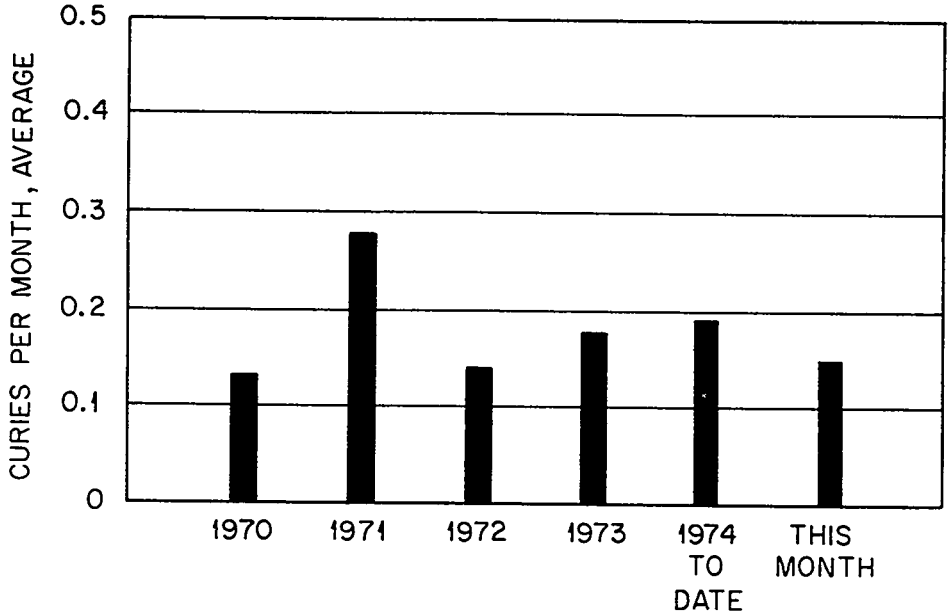

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

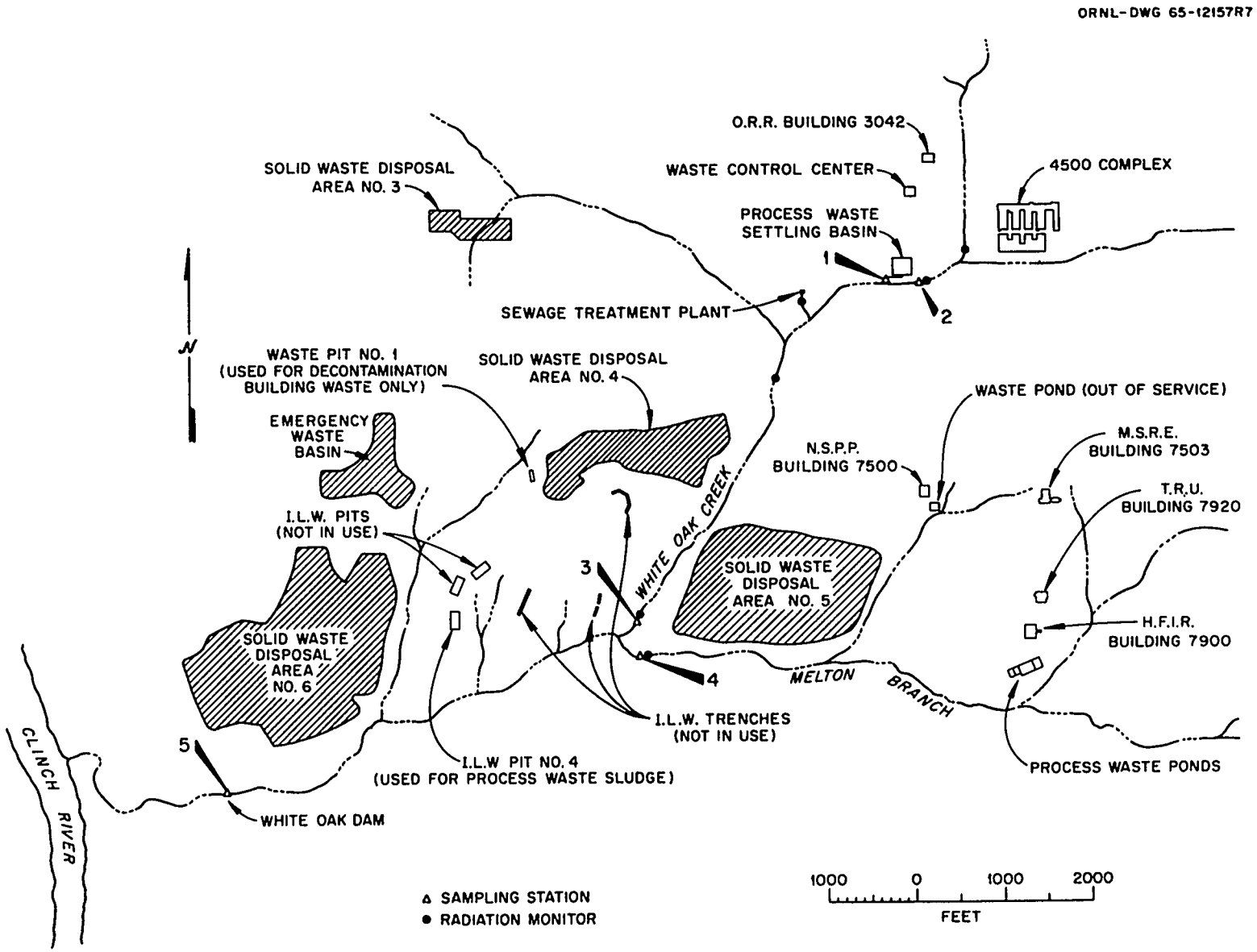

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.07	0.17
Miscellaneous discharges from east end of plant	2	0.02	0.12
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.31	0.51
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.02	0.05
Total discharge from all sources	3,4	0.33	0.56
White Oak Dam to Clinch River (Health Physics measurement)	5	0.16	0.22

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	128.0	0.03	6.6	0.04	1.1
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.19[c]	41.3	0.33	9.5
3. Reactor Operations (MH112)	1.0	<0.01	-	0.54	15.5
4. Buildings 3503 and 3508	≤ 2.1	<0.01	-	0.27	7.7
5. Buildings 3025 and 3026	2.4	<0.01	-	0.37	10.6
6. Building 3019	3.6	<0.01	-	0.39	11.2
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3
8. Waste Evaporator, Bldg. 2531	17.5	0.06	13.0	0.58	16.6
9. Building 3525	≤ 0.2	<0.01	-	0.04	1.1
10. Building 2026	0.7	<0.01	-	0.14	4.0
11. Tank Farm Drainage	41.4	0.18	39.1	0.78	22.4

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	-
Central Radioactive Gas Disposal Facilities	3039	0.14	374
Radiochemical-Processing Pilot Plant	3020	0	4
MSRE	7512	0	-
HFIR	7911	0.01	117
Total Activity in Gases Released at X-10 Site		0.15	495
Isotopes Division - Y-12 Area			0.4
Tritium Target Fabrication Building		c	
Building 4508 Ventilation Discharges[d]			
Room 136			1.4×10^{-2}
Room 265			3.2×10^{-3}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This discharge will be reported with the October data.

[d]These ventilation ducts have been equipped with filter paper samplers and the gross alpha particulate discharges will be reported each month.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam September, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading Minimum	Reading Maximum	Times Out of Compliance	Total Time Out of Compliance, Hrs
pH	6.5-8.5 <1 pH unit/day change	3	5.4	8.9	23[d]	32.5
		4	6.9	8.5	None	-
		5	7.0	9.1	20[e]	-
Dissolved Oxygen	5 ppm Min.	3	<1.0	11.4	20	316
		4	5.0	8.1	None	-
		5	5.5	>15.0	None	-
Temp.	<30°C < 2°C/hr change	3	15.8	26.7	None	-
		4	15.0	25.0	None	-
		5	18.7	28.2	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Twenty-three excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 20 excursions, and the Building 3004 demineralizer was responsible for 3 excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]The pH excursions in White Oak Lake were apparently the result of a gradual increase in the pH of the lake due to natural causes and not to Laboratory operations.

Table 5. Concentration of Nonradioactive Effluents
September, 1974

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.070	3.250	0.115	0.010
Zn	0.1	0.008	0.062	<0.005	<0.005
P	1	0.24	0.32	0.09	<0.01
NO_3 (as N)	10	0.64	1.77	0.72	<0.01
Hg	0.005	0.0005	c	0.0004	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DATE JAN 30 1975

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NUCLEAR DIVISION

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OAK RIDGE, TENNESSEE 37830

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ORNL
CENTRAL FILES NUMBER
75-1-28

DATE: January 16, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1974, was 0.44% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.37% MPC_W and 0.05% MPC_W, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 2.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 146 gph.

	Gallons
Total volume generated	107,000
Volume transferred to evaporator	105,000
Tank Farm free space at beginning of month	470,000
Tank Farm free space at end of month	433,000
Evaporator concentrate returned to tank farm	35,000*
Volume of concentrate available for hydrofracture (South Tank Farm)	123,000
Volume of concentrate at hydrofracture site	57,000

*25,000 gallons were pumped back from the hydrofracture site so that an empty tank would be available in case of leaking tank at that location.

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	17,000
Fission Products Development Laboratory	14,200
ORR and BSR	13,000
High Flux Isotope Reactor	18,600
Radioisotopes Processing Area	8,300
4500 Complex	5,400
Transuranium Processing Area	1,400

GASEOUS WASTE

The ORNL stacks discharged 60 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 809 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-one times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

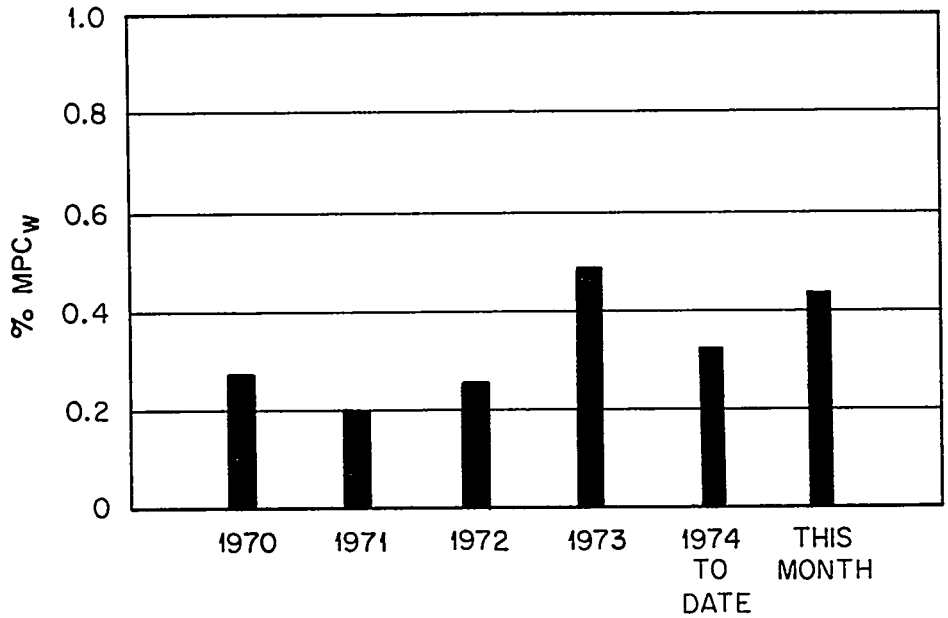

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

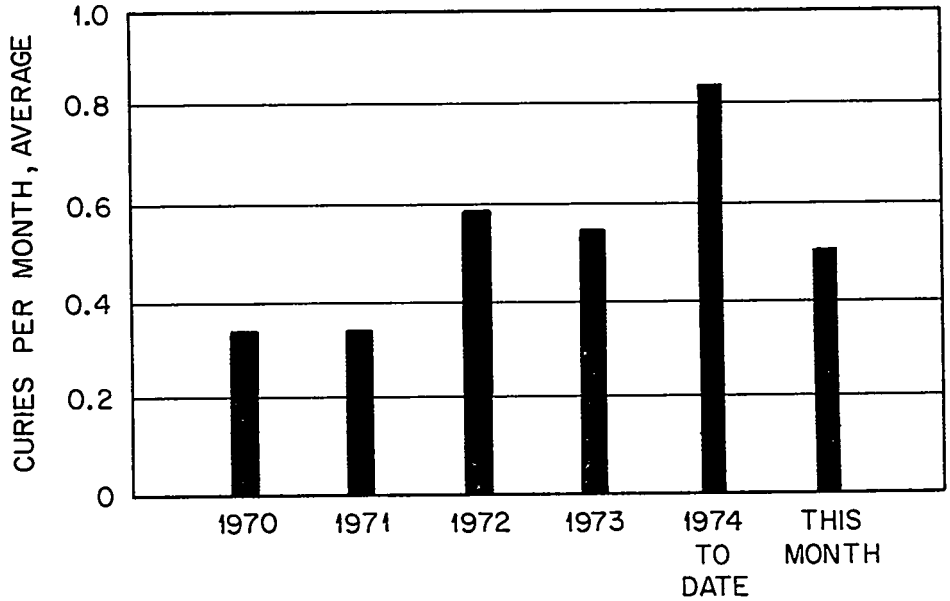

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

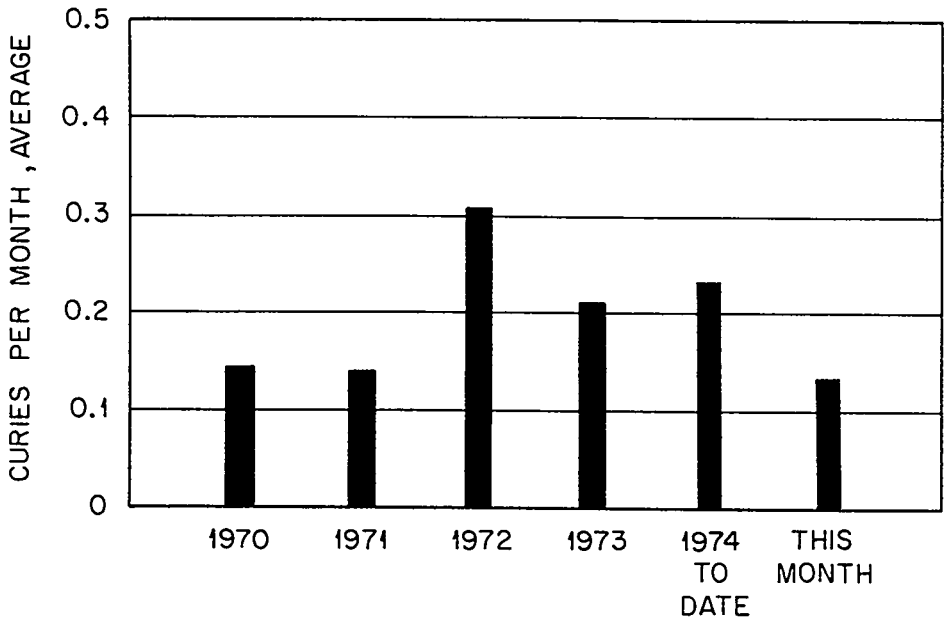

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

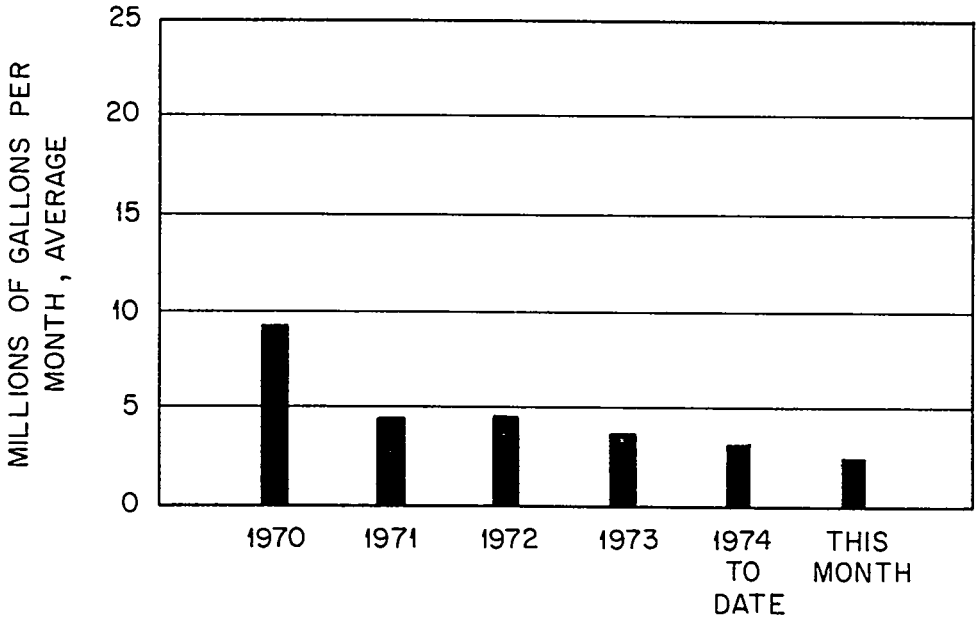

Fig 4. Process Waste Volumes.

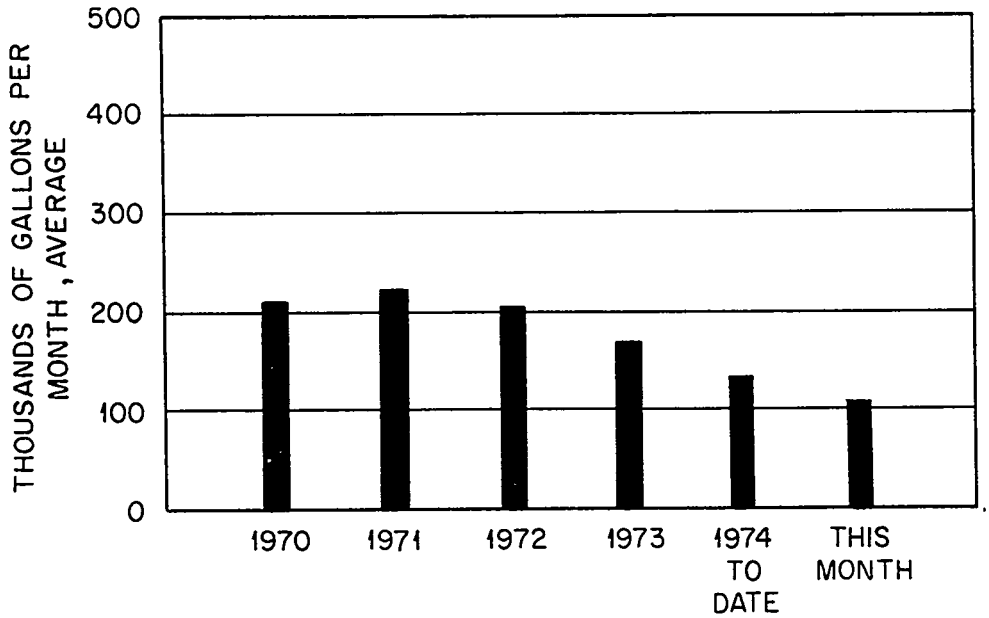

Fig 5. Intermediate – Level Waste Volumes.

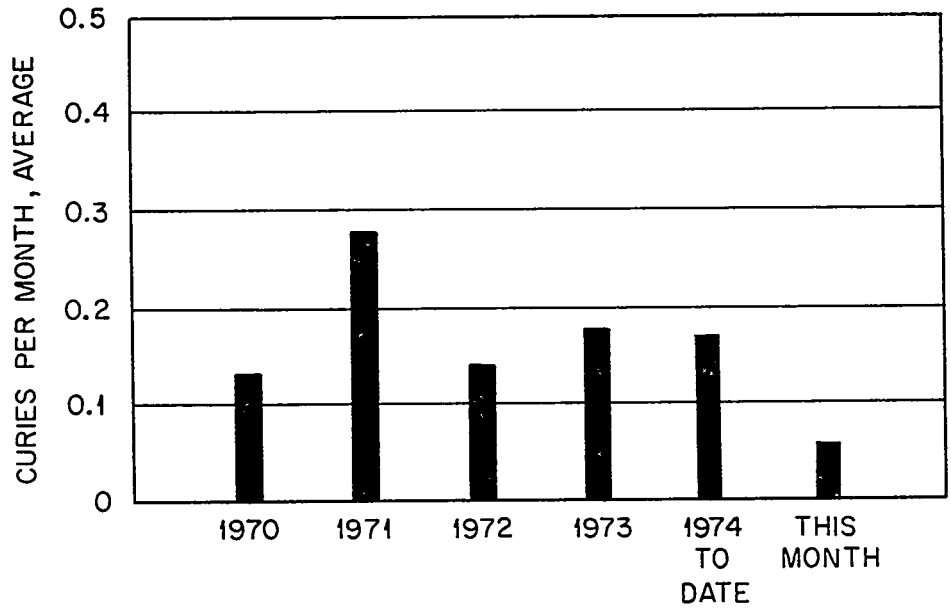

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

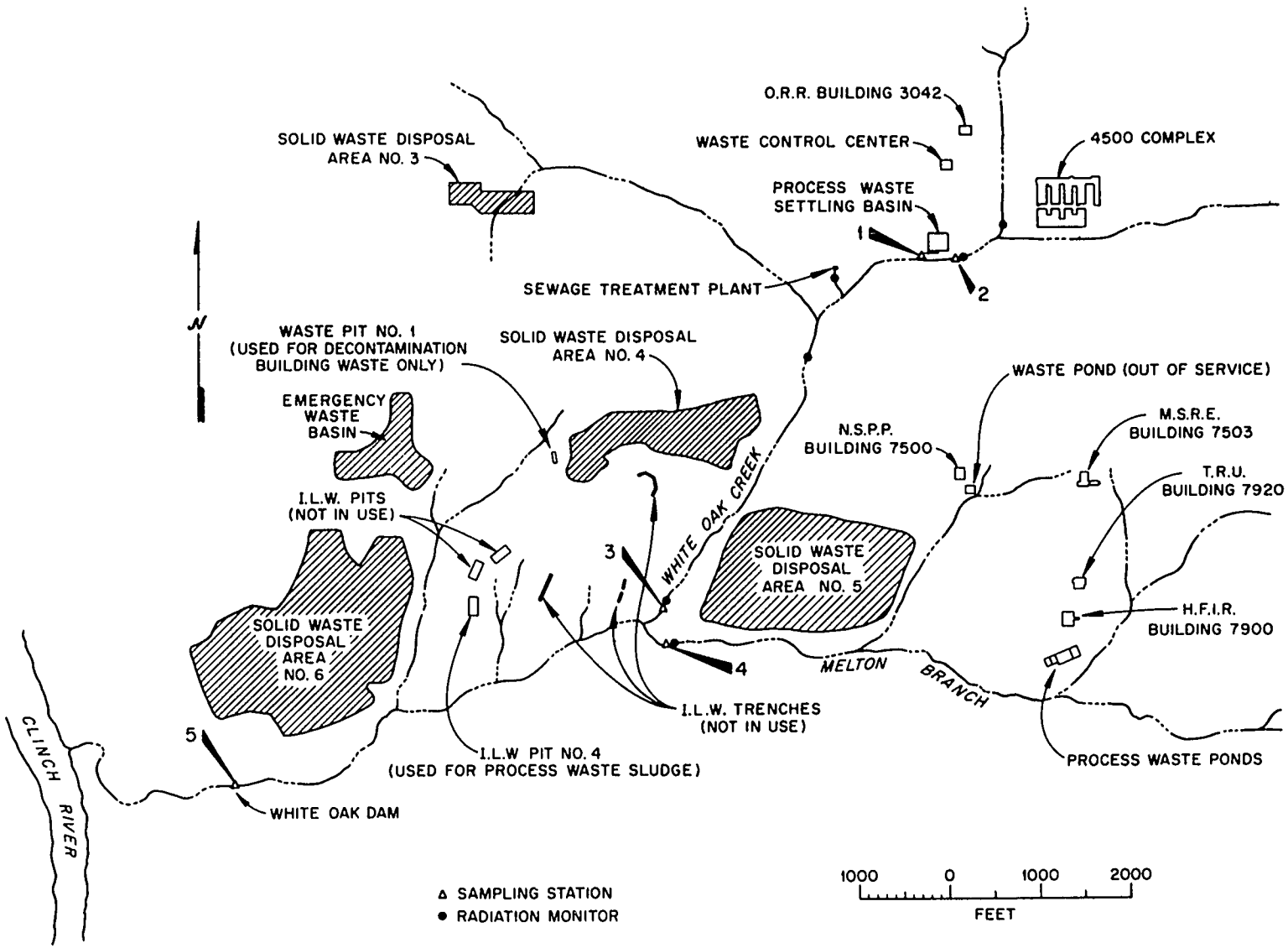

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.13	0.25
Miscellaneous discharges from east end of plant	2	0.07	0.36
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.46	1.05
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.04	0.16
Total discharge from all sources	3,4	0.50	1.21
White Oak Dam to Clinch River (Health Physics measurement)	5	0.32	0.45

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	150	0.06	13.0	0.07	2.0
2. Radioisitopes Processing Area (MH114 minus MH112)	-	0.17[c]	37.0	0.30	8.8
3. Reactor Operations (MH112)	4.8	<0.01	-	0.56	16.4
4. Buildings 3503 and 3508	≤ 0.7	<0.01	-	0.24	7.0
5. Buildings 3025 and 3026	3.5	<0.01	-	0.22	6.5
6. Building 3019	5.4	0.02	4.3	0.48	14.1
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3
8. Waste Evaporator, Bldg. 2531	15.7	0.05	10.9	0.61	17.9
9. Building 3525	0.08	<0.01	-	0.07	2.0
10. Building 2026	0.3	<0.01	-	0.20	5.9
11. Tank Farm Drainage	42.2	0.16	34.8	0.65	19.1

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.05	790
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	18
Total Activity in Gases Released at X-10 Site		0.06	809
Isotopes Division - Y-12 Area			4×10^{-1}
Tritium Target Fabrication Building		c (^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			1×10^{-4}
Room 265			5×10^{-4}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This discharge will be reported with the December, 1974, data.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch, and at White Oak Dam November, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading Minimum	Reading Maximum	Times Out of Compliance	Total Time Out of Compliance, Hrs
pH	6.5-8.5 <1 pH unit/day change	3	5.5	> 9.5	31[d]	45.8
		4	6.9	8.1	None	-
		5	7.3	9.4	e	-
Dissolved Oxygen	5 ppm Min.	3	2.8	14.7	6	70
		4	5.8	>15.0	None	-
		5	5.1	>15.0	None	-
Temp.	<30°C < 2°C/hr change	3	8.0	22.5	None	-
		4	7.0	20.0	None	-
		5	8.3	20.2	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Thirty-one excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 26 excursions, and the Building 3004 demineralizer was responsible for five excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]The high pH in White Oak Lake was apparently the result of a gradual increase in the pH due to natural causes and not to Laboratory operations. The pH remained above the 8.5 limit for approximately fourteen days.

Table 5. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.050	2.10	0.16	0.02
Zn	0.1	0.009	0.144	<0.005	<0.005
P	1	0.51	0.69	0.36	0.12
NO_3 (as N)	10	1.2	1.8	1.0	0.2
Hg	0.005	0.0019	c	0.0004	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1976, was 0.63% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.54% MPC_W and 0.07% MPC_W, respectively. These values represent 0.27 Ci of ^{90}Sr and 354 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

The solid waste burial grounds contributed ∿85% of the total strontium discharged to White Oak Lake. The overflow from the settling basin was a minor contributor (<1%) this month. The project to eliminate the settling basin discharge by piping it to the new Process Waste Treatment Plant is under way with a scheduled completion date for the middle of July.

Process Waste

A total of 3.11 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The new Process Waste Treatment Plant in its third month of operation continued to operate effectively with a >99.9% efficiency for strontium removal and ∿98% efficiency for gross beta removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 126 gph.

	Gallons
Total volume generated	100,000
Volume transferred to evaporator	91,000
Tank Farm free space at beginning of month	372,000
Tank Farm free space at end of month	358,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	140,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	20,000
Fission Products Development Laboratory	None
ORR and BSR	17,000
High Flux Isotope Reactor	14,000
Radioisotopes Processing Area	20,000
4500 Complex	5,900
Transuranium Processing Area	1,800

GASEOUS WASTE

The ORNL stacks discharged 90 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 136 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are comapred on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen limit was exceeded in four of four samples at the main sewage plant.
2. The BOD limit was exceeded in four of four samples at the main sewage plant.
3. The settleable solids limit was exceeded in one of four samples at the main sewage plant.
4. The chlorine residual limit was exceeded in one of ninety samples at the main sewage plant.
5. The BOD limit was exceeded in two of four samples at the 7900 area plant.
6. The suspended solids limit was exceeded in three of four samples at the 7900 area plant.
7. The chlorine residual limit was exceeded in twelve of fifty samples at the 7900 area plant.

Plans are under way for the installation of two 10 hp aerators in the ponds of the Main Sewage Treatment Plant. The installation of the aerators is expected to eliminate the main difficulties in satisfying the NPDES requirements.

Operational adjustments and the addition of timing devices are in progress in attempting to bring the 7900 area sewage plant into compliance.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, White Oak Dam, and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

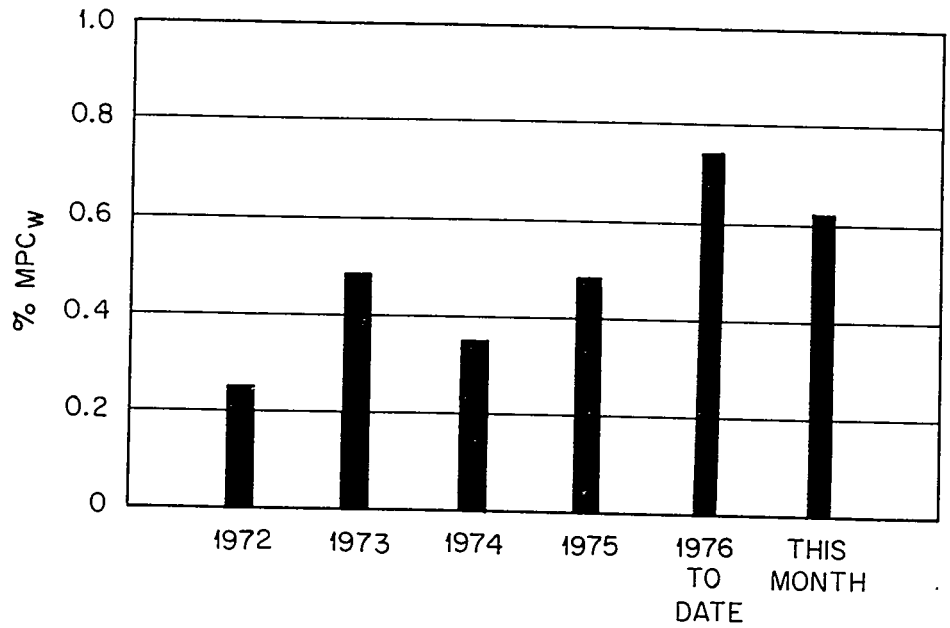

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

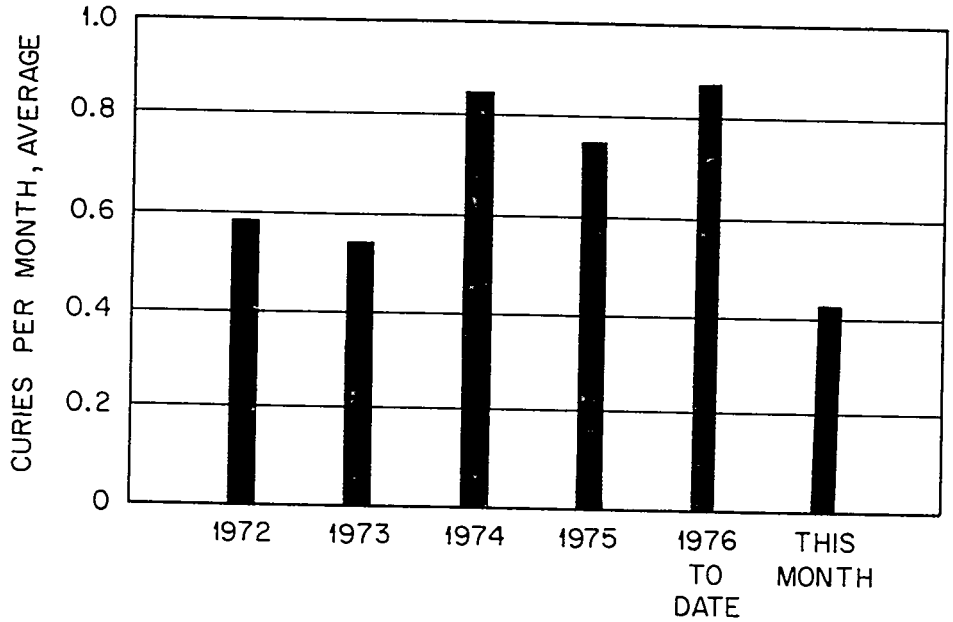

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

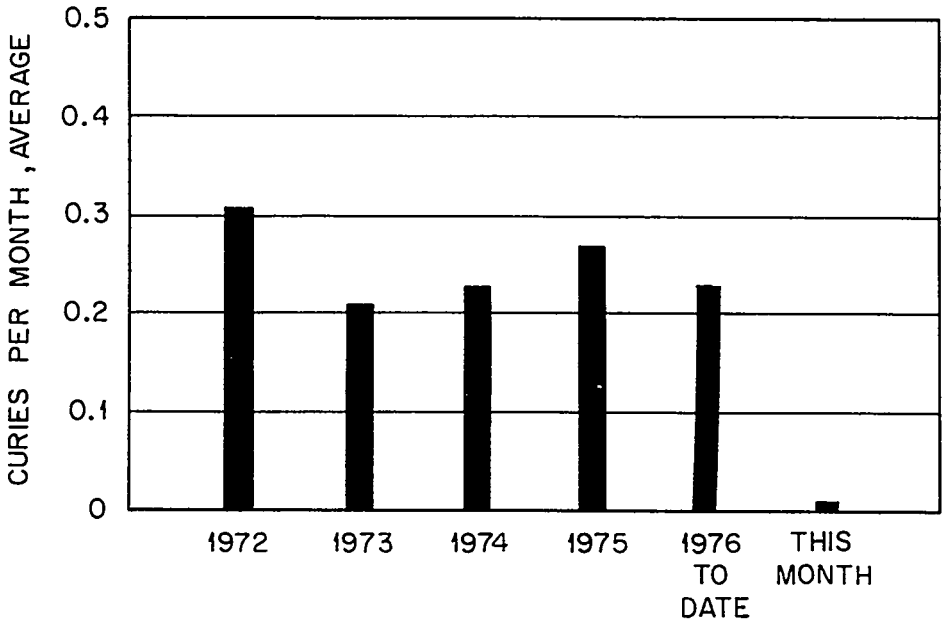

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

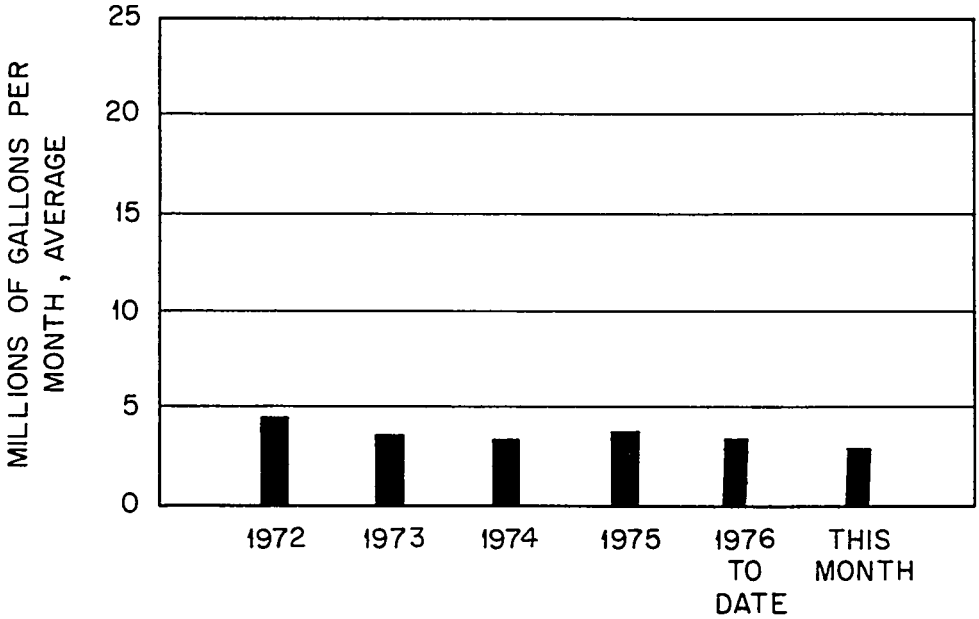

Fig 4. Process Waste Volumes.

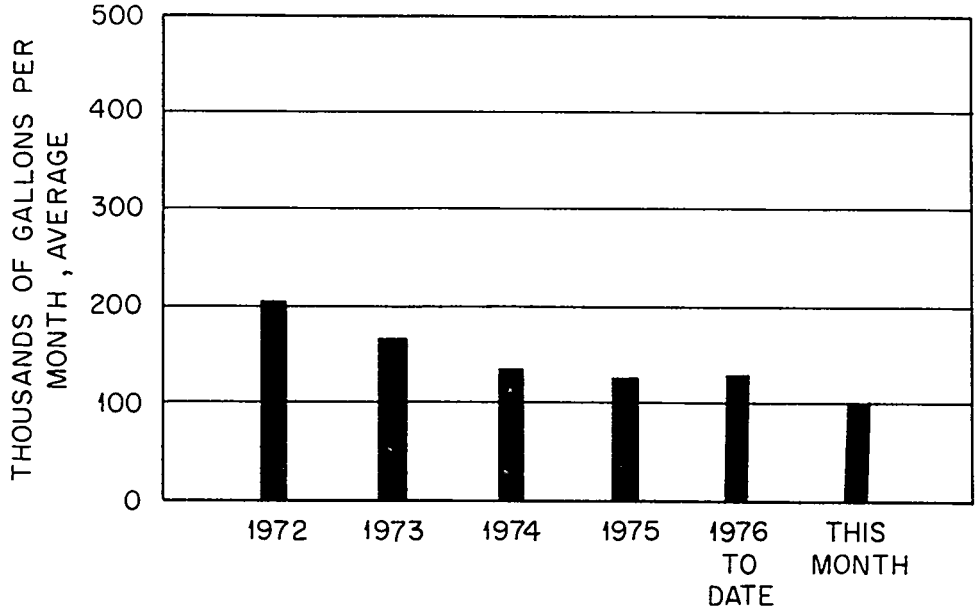

Fig 5. Intermediate – Level Waste Volumes.

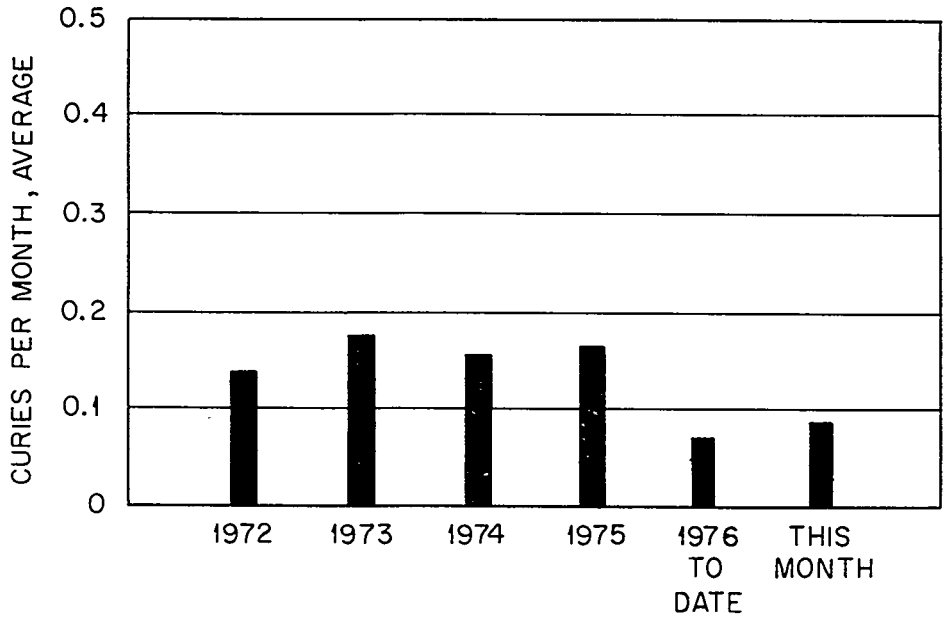

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

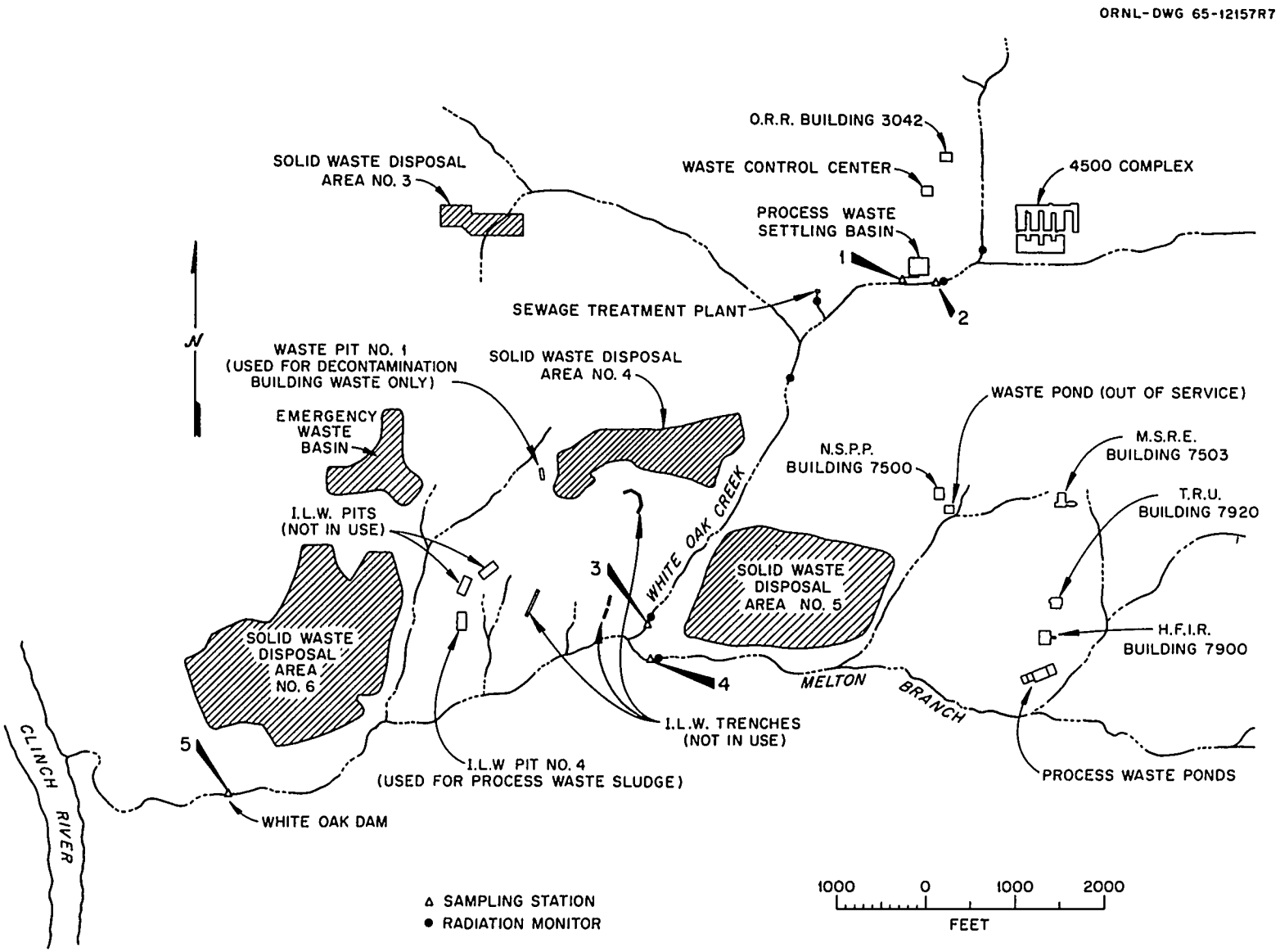

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.004[c]	0.0078
Miscellaneous discharges from east end of plant	2	0.006	0.073
Discharge from Bethel Vallye Operations and Burial Ground No. 4	3	0.388	0.519
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.047	0.081
Total discharge from all sources	3,4	0.435	0.600
White Oak Dam to Clinch River (Health Physics measurement)	5	0.27	0.340

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]This represents the release from the settling basin with the new Process Waste Treatment contributing only 0.0002 curies of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	89.7	0.036	4.07	0.07	1.76
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.260[c]	29.4	0.42	10.55
3. Reactor Operations (MH112)	2.67	0.014	1.58	0.90	22.61
4. Buildings 3503 and 3508	4.07	0.002	0.23	0.09	2.26
5. Buildings 3025 and 3026	1.53	0.002	0.23	0.26	6.53
6. Building 3019	$\leq$ 0.15	$\leq$ 0.0006	0.07	0.68	17.09
7. Fission Products Development Laboratory	-	0	0	None	0
8. Waste Evaporator, Bldg. 2531	57.7	0.170	19.23	0.52	13.07
9. Building 3525	0.93	0.0002	0.02	0.04	1.01
10. Building 2026	0.23	0.0002	0.02	0.15	3.77
11. Tank Farm Drainage	82.6	0.399	45.14	0.85	21.36

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	
Central Radioactive Gas Disposal Facilities	3039	0.08	131.0
Radiochemical-Processing Pilot Plant	3020	0	1.0
MSRE	7912	0	
HFIR	7911	0.01	4.0
Total Activity in Gases Released at X-10 Site		0.09	136
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges			
Room 136			$\leq 2.1 \times 10^{-4}$
Room 265			$\leq 4.6 \times 10^{-5}$
Building 5505 Discharges			
Glove Box			$\leq 3.0 \times 10^{-4}$
Hood			$\leq 5.2 \times 10^{-3}$

[a] Activity primarily ^{131}I except as noted.

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] Month of June will be included in the July, 1976 report.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.04	< 0.01	0.03	< 0.005
Zn	0.1	0.02	0.08	0.04	0.1
P	1	0.34	0.48	0.27	0.004
NO_3 (as N)	10	1.18	0.53	0.40	0.01
Hg	0.005	0.0007	c	0.0001	< 0.0001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL/CF-76/338

27

DATE: August 30, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

ChemRisk Document No. 2056

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of July, 1976, was 0.33% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.26% MPC_W and 0.05% MPC_W, respectively. These values represent 0.24 Ci of ^{90}Sr and 435 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

The solid waste burial grounds contributed 90% or more of the total strontium discharged to White Oak Lake. The project to eliminate the settling basin discharge by piping it to the equalization basin was completed during this month.

Process Waste

A total of 3.19 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The new Process Waste Treatment Plant continued to operate effectively with >99% efficiency for strontium removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 122 gph.

	Gallons
Total volume generated	91,000
Volume transferred to evaporator	91,000
Tank Farm free space at beginning of month	358,000
Tank Farm free space at end of month	353,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	148,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	23,700
ORR and BSR	16,700
High Flux Isotope Reactor	6,700
Radioisotopes Processing Area	9,700
4500 Complex	10,700
Transuranium Processing Area	5,300

GASEOUS WASTE

The ORNL stacks discharged 150 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 165 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.6% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen limit was exceeded in three of five samples at the main sewage plant.
2. The BOD limit was exceeded in five of five samples at the main sewage plant.
3. The settleable solids limit was exceeded in one of five samples at the main sewage plant.
4. The BOD limit was exceeded in two of five samples at the 7900 area plant.
5. The chlorine residual limit was exceeded in nine of fifty-three samples at the 7900 area plant.

The two 10 hp aerators to be installed in the ponds of the Main Sewage Treatment Plant are on order. The anticipated completion date for the installation of the equipment is for the end of November.

Operational adjustments continue to be made in attempting to bring the 7900 area sewage plant into compliance.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, White Oak Dam, and at a point in the Clinch River upstream from where White Oak Creek empties into the river.

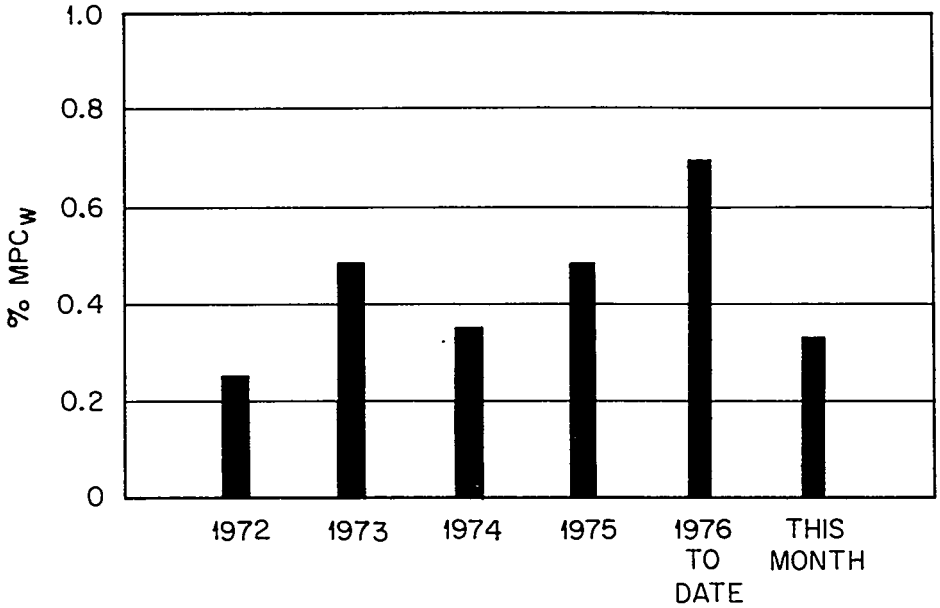

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

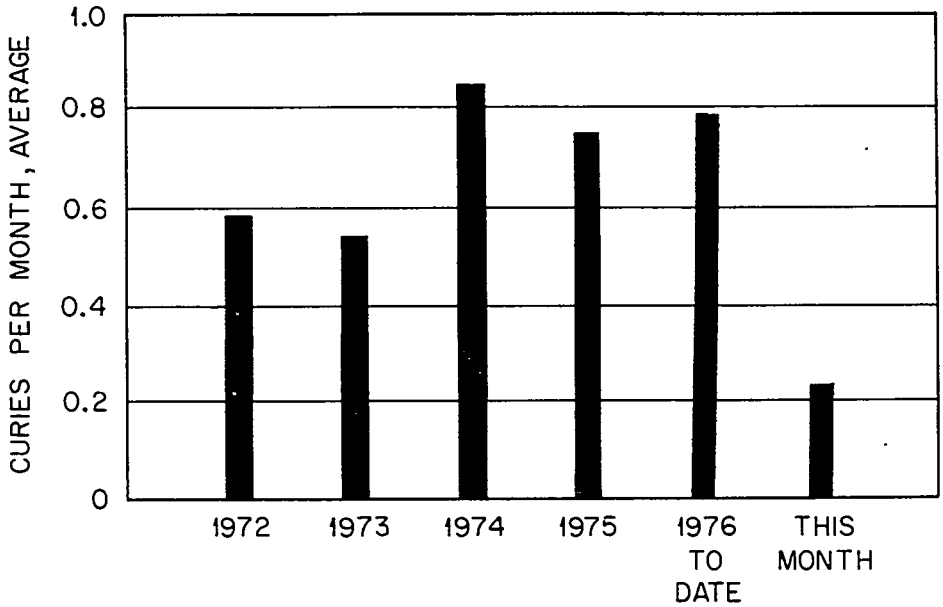

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

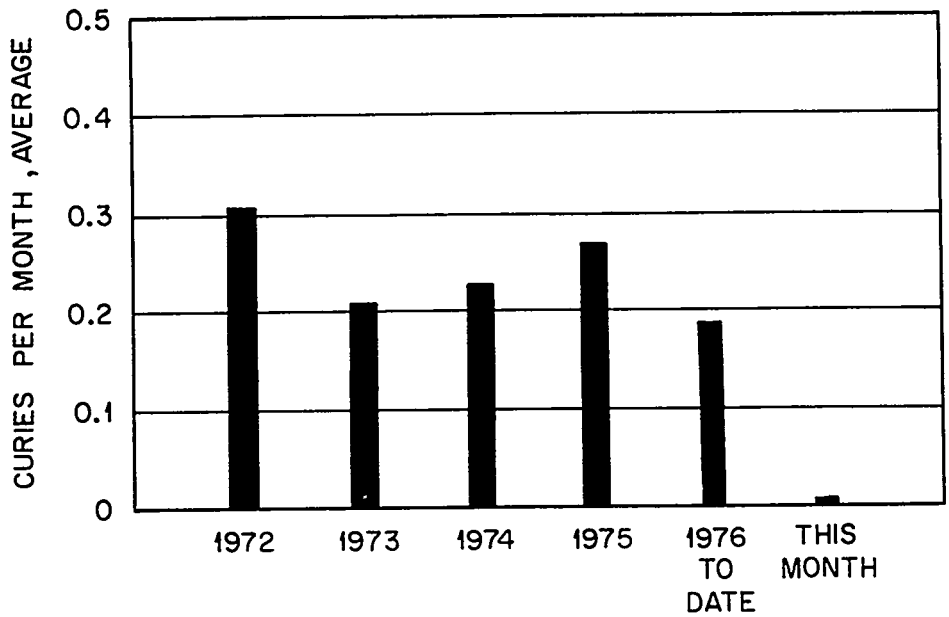

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

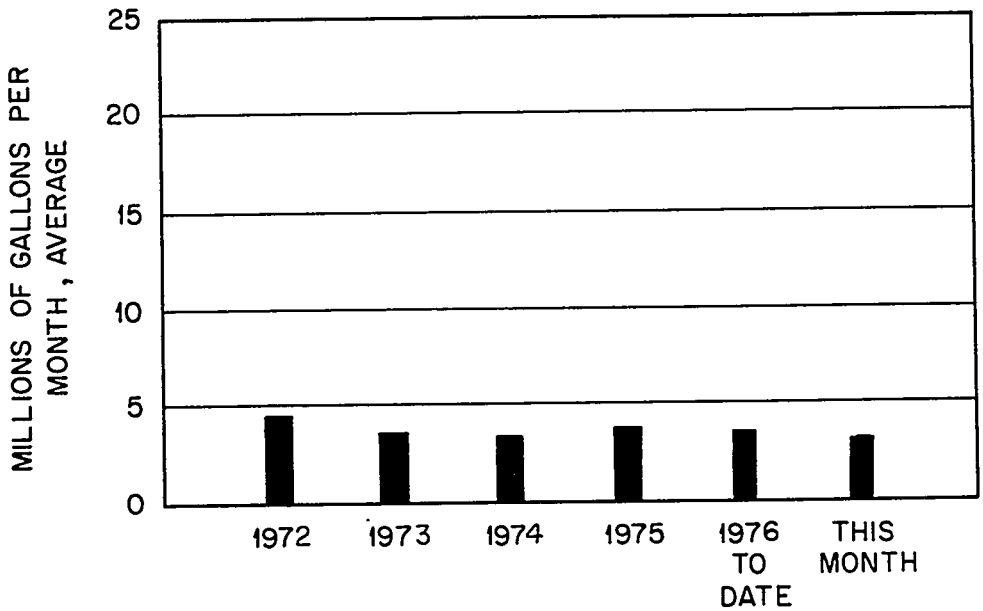

Fig 4. Process Waste Volumes.

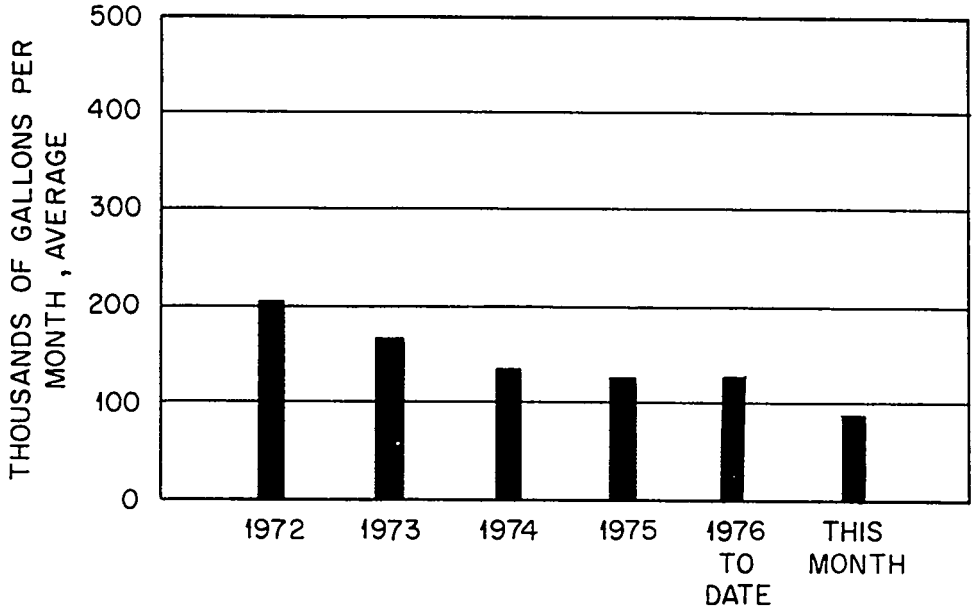

Fig 5. Intermediate – Level Waste Volumes.

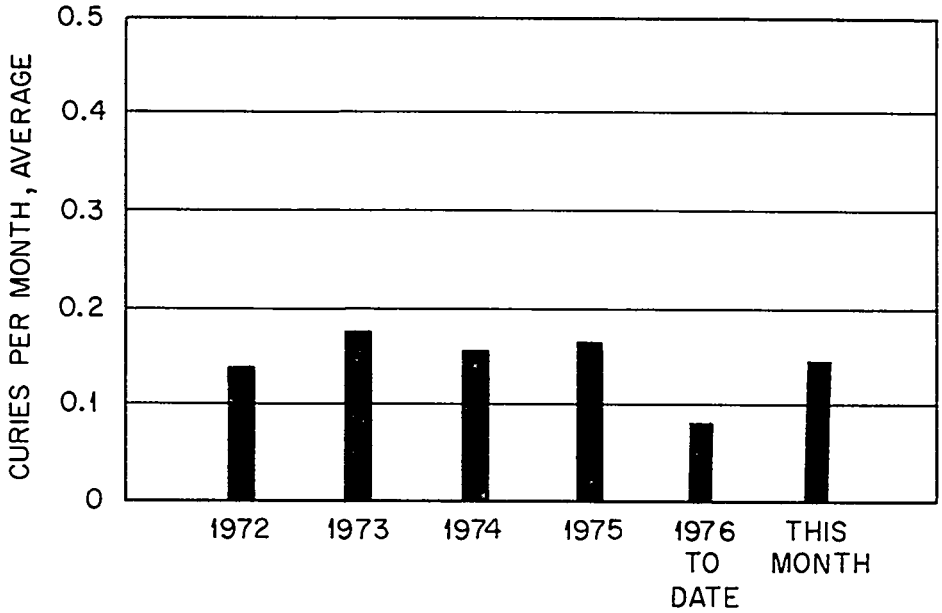

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

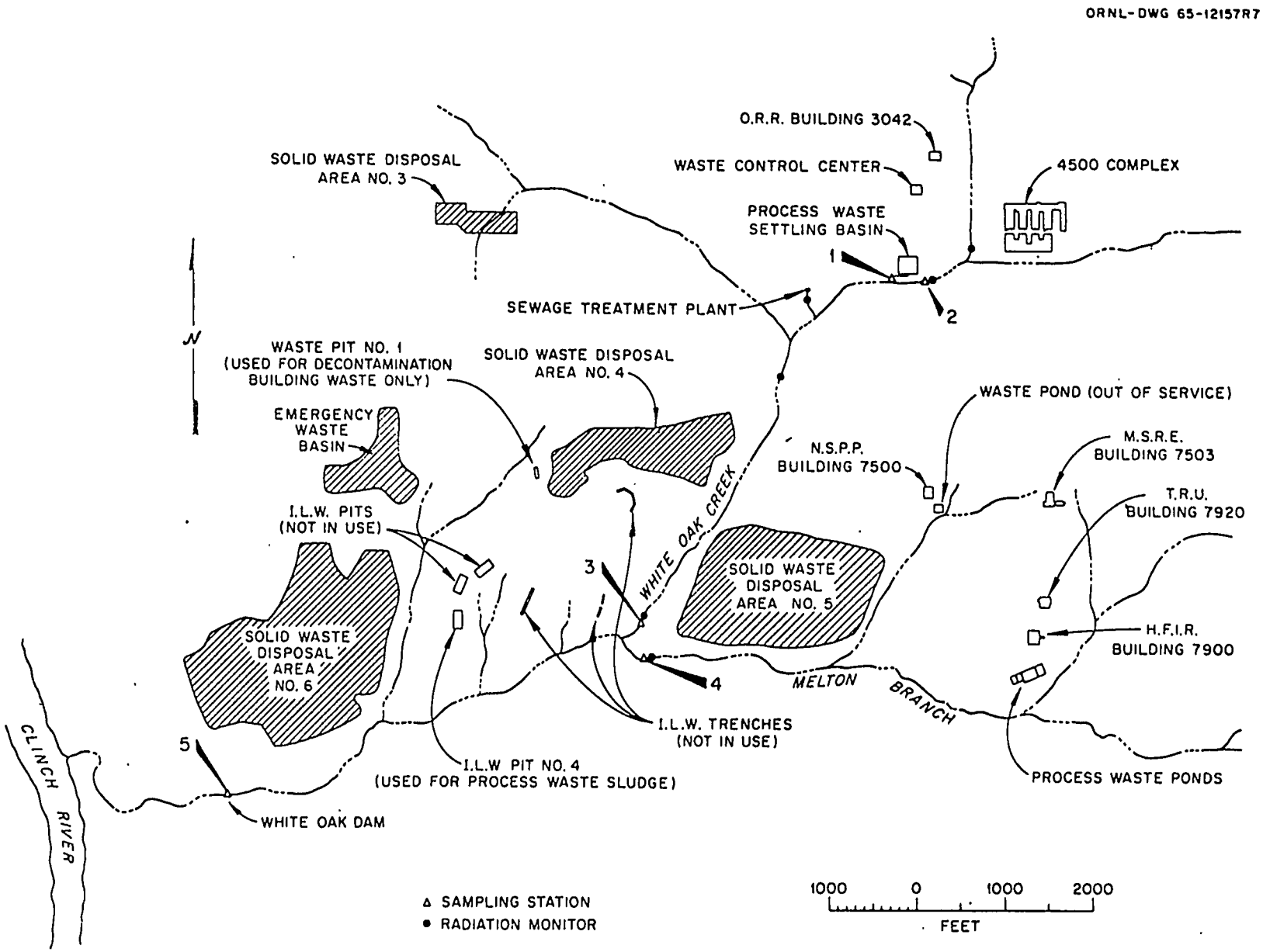

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0024	0.006
Miscellaneous discharges from east end of plant	2	0.006	0.21
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.21	0.96
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.025	0.11
Total discharge from all sources	3,4	0.24	1.07
White Oak Dam to Clinch River (Health Physics measurement)	5	0.24	0.44

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	91.4	0.036	2.45	0.07	1.53
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.735[c]	50.04	1.17	25.55
3. Reactor Operations (MH112)	1.06	0.004	0.27	0.7	15.28
4. Buildings 3503 and 3508	3.63	0.0025	0.17	0.12	2.62
5. Buildings 3025 and 3026	1.78	0.002	0.14	0.21	4.59
6. Building 3019	7.28	0.032	2.18	0.77	16.81
7. Waste Evaporator, Bldg. 2531	29.0	0.076	5.17	0.46	10.04
8. Building 3525	1.34	0.0005	0.03	0.06	1.31
9. Building 2026	1.82	0.0017	0.12	0.17	3.71
10. Tank Farm Drainage	120	0.579	39.42	0.85	18.56

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	$\leq$ 0.15	150
Radiochemical-Processing Pilot Plant	3020	0	1.4
MSRE	7512	0	0
HFIR	7911	< 0.01	15
Total Activity in Gases Released at X-10 Site		$\leq$ 0.15	165
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		2 (^{3}H)[c]	
Building 4508 Ventilation Discharges			
Room 136			2.1×10^{-4}
Room 265			4.6×10^{-5}
Building 5505 Discharges			
Glove Box			3.0×10^{-4}
Hood			5.2×10^{-3}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This includes the discharge for June.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.011	< 0.02	0.017	< 0.0001
Zn	0.1	0.026	0.12	0.022	0.008
P	1	0.30	0.74	0.29	0.008
NO_3 (as N)	10	1.07	0.20	0.09	0.06
Hg	0.005	0.002	c	0.0001	< 0.0001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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DATE: October 13, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1976

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FROM: E. E. Beauchamp and L. C. Lasher

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1976, was 0.07% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.06% MPC_W and 0.01% MPC_W, respectively. These values represent 0.07 Ci of ^{90}Sr and 131 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The solid waste burial grounds contributed 90% or more of total strontium discharged to White Oak Lake.

Process Waste

A total of 3.05 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with >99% efficiency for strontium removal and ∿98% for gross beta removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 146.5 gph.

	Gallons
Total volume generated	128,000
Volume transferred to evaporator	109,000
Tank Farm free space at beginning of month	353,000
Tank Farm free space at end of month	330,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydraulic disposal	153,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	15,400
Fission Products Development Laboratory	6,400
ORR and BSR	45,900
High Flux Isotope Reactor	12,900
Radioisotopes Processing Area	8,900
4500 Complex	14,500
Transuranium Processing Area	3,000

GASEOUS WASTE

The ORNL stacks discharged 110 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 183 μCi. Inert gases released from the 3039 and 7911 stacks averaged less that 0.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATION POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The BOD limit was exceeded in four of four samples at the main sewage plant.
2. The chlorine residual limit was exceeded in 17 of 93 samples at the main sewage plant.
3. The fecal coliform limit was exceeded in one sample from the main sewage plant.
4. The suspended solids limit was exceeded in 2 of 4 samples at the main plant.
5. The BOD limit was exceeded in 3 of 4 samples from the 7900 area plant.

6. The chlorine residual limit was exceeded in 5 of 31 samples at the 7900 area plant.

The anticipated completion date for the installation of the two 10 hp aerators at the main sewage plant is by the end of November.

The problems encountered at the 7900 area sewage plant appear to be caused by over-aeration during periods of light load on off-shifts and weekends. Automatic timers have been installed to vary the degree of aeration with the plant load.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

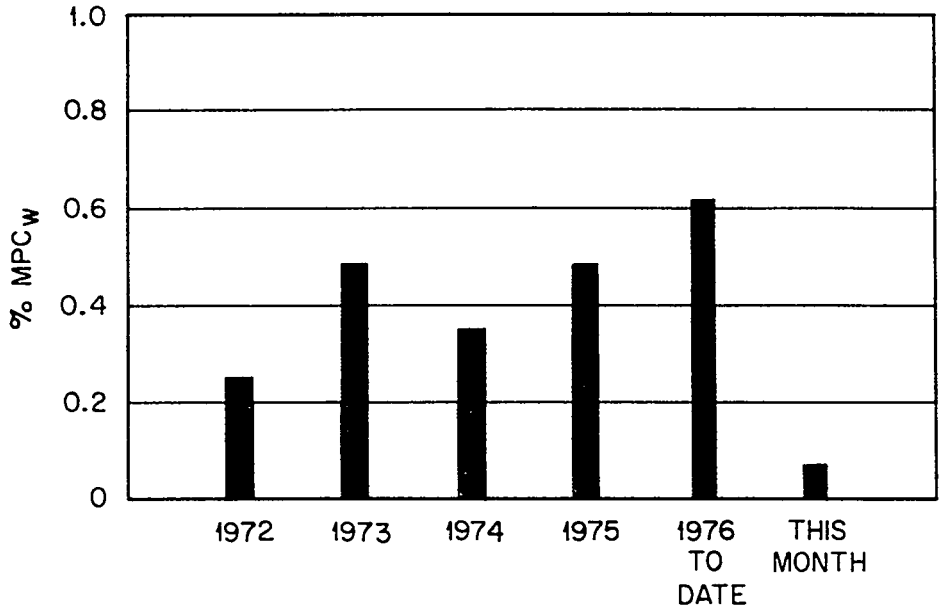

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

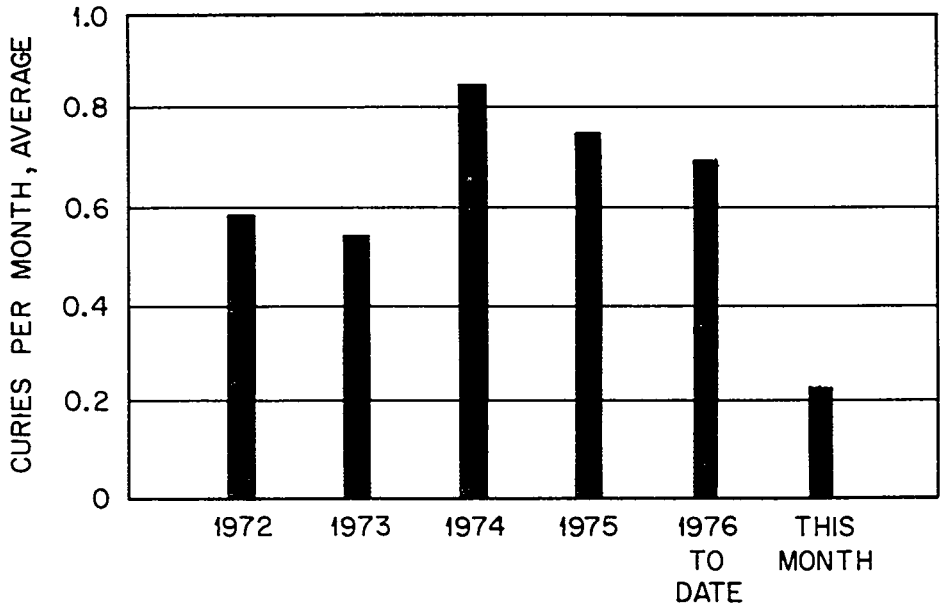

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

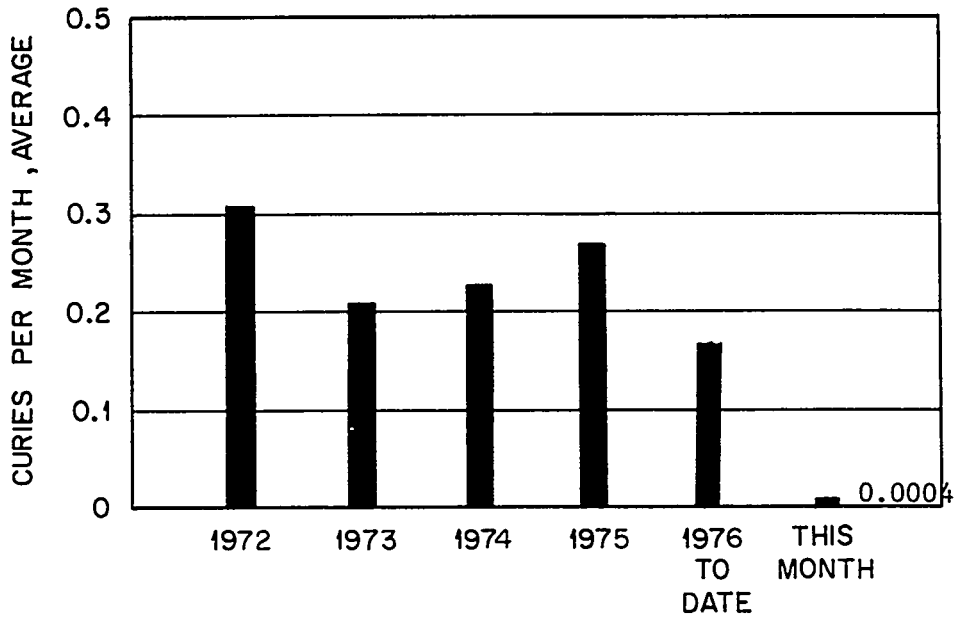

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

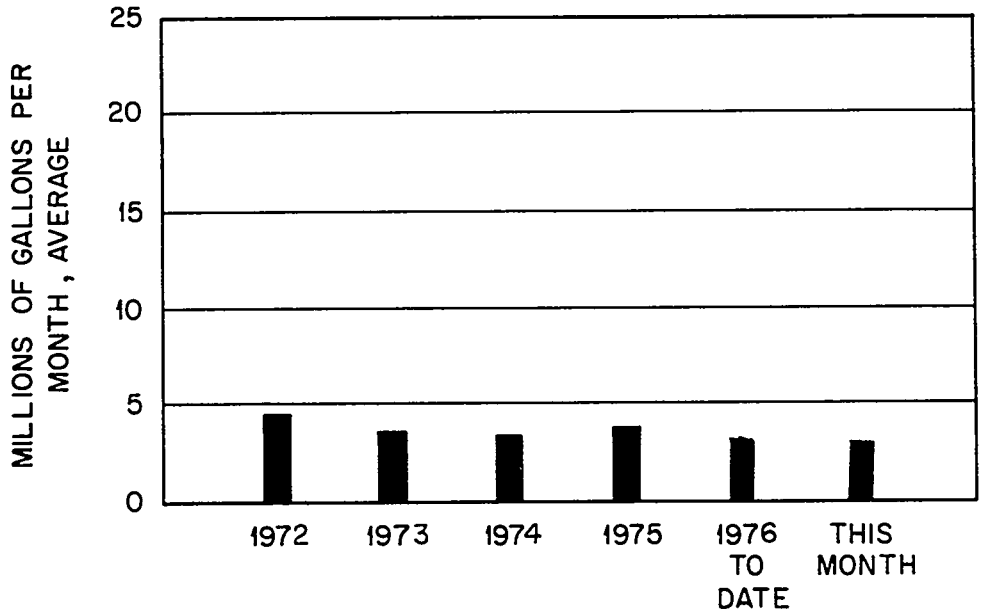

Fig 4. Process Waste Volumes.

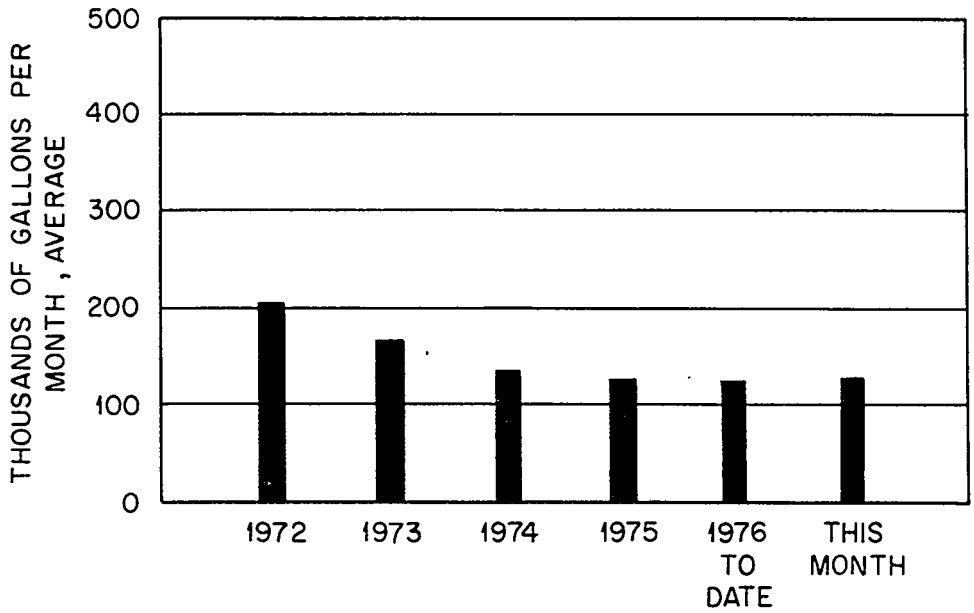

Fig 5. Intermediate – Level Waste Volumes.

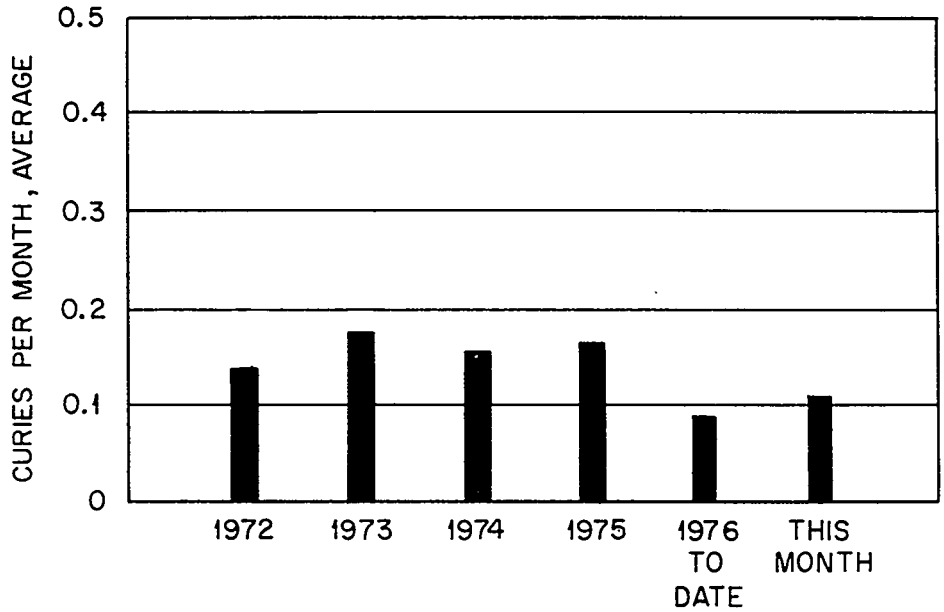

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

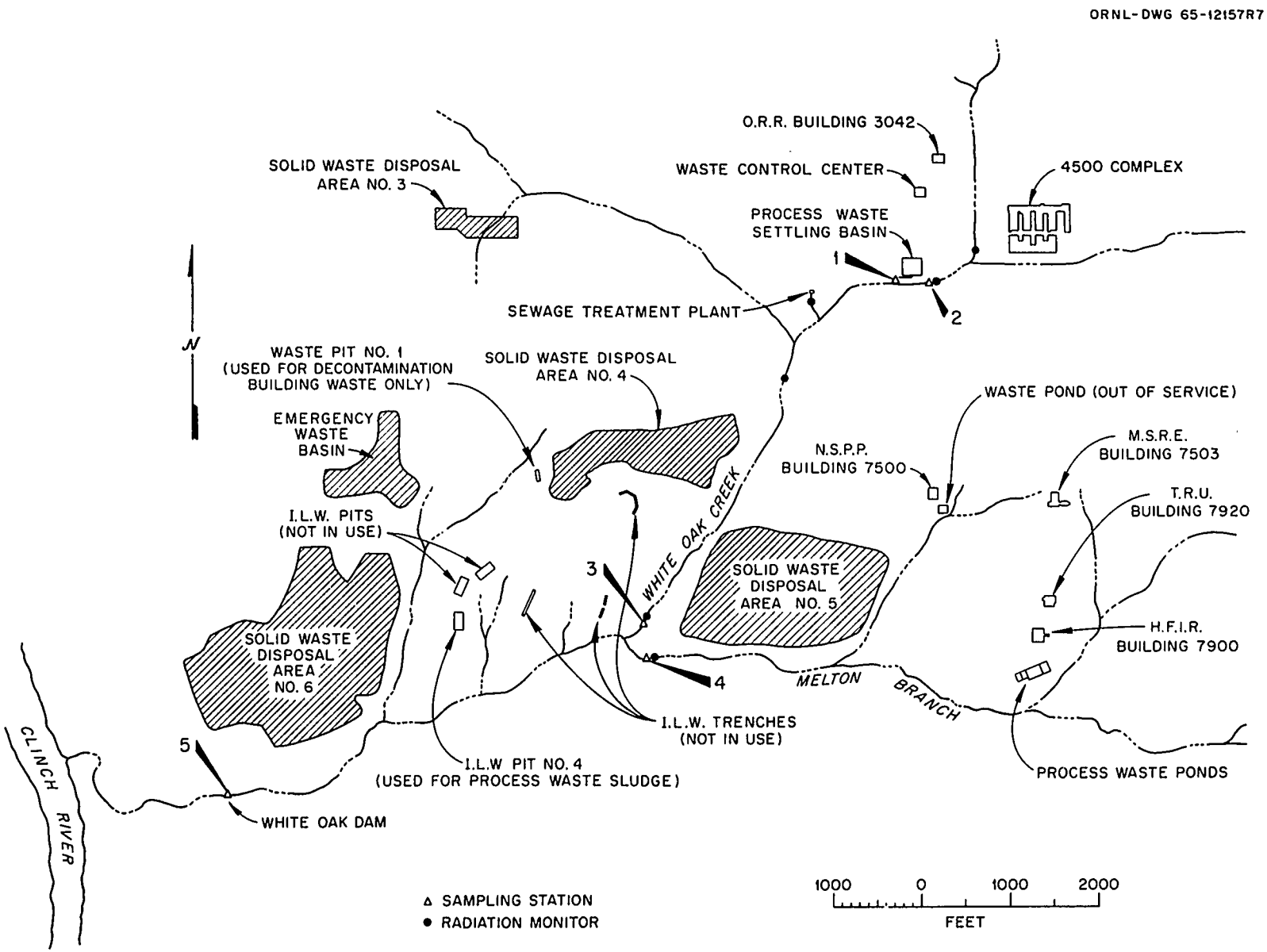

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0004	0.025
Miscellaneous discharges from east end of plant	2	0.0066	0.060
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.20	0.42
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.021	0.042
Total discharge from all sources	3,4	0.22	0.46
White Oak Dam to Clinch River (Health Physics measurement)	5	0.07	0.11

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	98.6	0.022	2.41	0.04	1.15
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.465[c]	50.9	0.31	8.93
3. Reactor Operations (MH112)	2.83	0.0095	1.04	0.59	17.00
4. Buildings 3503 and 3508	2.0	0.0017	0.19	0.15	4.32
5. Building 3025 and 3026	1.30	0.0017	0.19	0.23	6.63
6. Building 3019	1.8	0.0077	0.84	0.75	21.61
7. Waste Evaporator, Bldg. 2531	19.8	0.060	6.57	0.53	15.27
8. Building 3525	0.20	0.00005	0.01	0.04	1.15
9. Building 2026	0.96	0.0008	0.08	0.14	4.03
10. Tank Farm Drainage	88.0	0.345	37.77	0.69	19.83

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	$\leq$ 0.10	179
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	3
Total Activity in Gases Released at X-10 Site		$\leq$ 0.11	183
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		2.6(^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			3.6×10^{-4}
Room 265			8.2×10^{-5}
Building 5505 Discharges			
Glove Box			5.3×10^{-4}
Hood			9.0×10^{-3}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.02	< 0.01	0.015	< 0.0005
Zn	0.1	0.032	0.15	0.032	0.024
P	1	0.37	1.10	0.57	0.005
NO_3(as N)	10	1.26	0.83	1.17	0.018
Hg	0.005	0.0009	c	0.0002	< 0.00001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been dicontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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DATE: November 16, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1976

TO: Distribution

36 28

FROM: E. E. Beauchamp and L. C. Lasher

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1976, was 0.14% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.12% MPC_W and 0.01% MPC_W, respectively. These values represent 0.11 Ci of ^{90}Sr and 113 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 2.93 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with >99% efficiency for strontium removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 136 gph.

	Gallons
Total volume generated	95,000
Volume transferred to evaporator	98,000
Tank Farm free space at beginning of month	330,000
Tank Farm free space at end of month	330,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	198,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	15,500
Fission Products Development Laboratory	17,600*
ORR and BSR	12,500
High Flux Isotope Reactor	15,800
Radioisotopes Processing Area	8,900
4500 Complex	9,400
Transuranium Processing Area	2,500

*Storage tank pit has a water in-leakage problem from groundwater. This represents the volume jetted from the the storage tank pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL stacks discharged 260 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 202 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.0% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The BOD limit was exceeded in three of five samples at the main sewage plant.
2. The ammonia nitrogen was exceeded in three of five samples at the main plant.
3. The chlorine residual limit was exceeded in five of ninety samples at the main plant and for seven of thirty samples at the 7900 area plant.

4. The suspended solids limit was exceeded in one of five samples at the main sewage plant.

The installation of the two 10 hp aerators in the ponds at the Main Sewage Treatment Plant are expected to be completed by the end of November.

The 7900 area plant operated more effectively during this month. For example, the BOD limit was not exceeded during this month whereas this parameter was exceeded in 3 of 4 samples the previous month.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, and at a point in the Clinch River upstream from where White Oak Creek empties into the river.

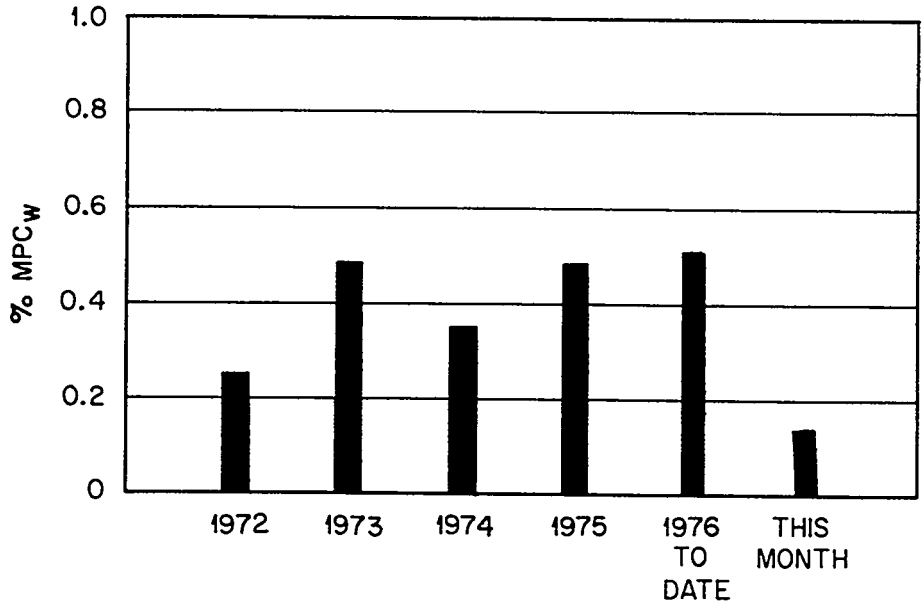

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

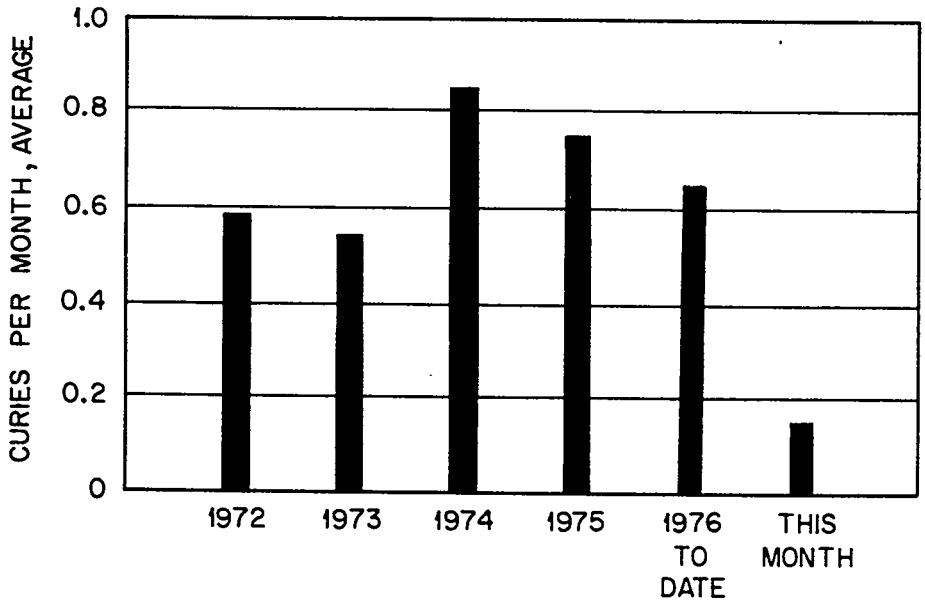

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

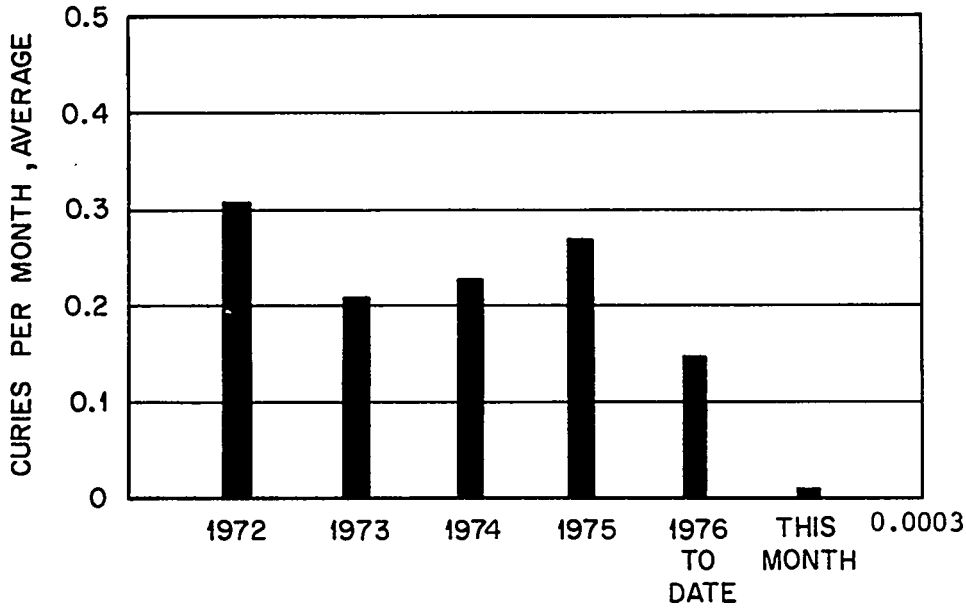

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

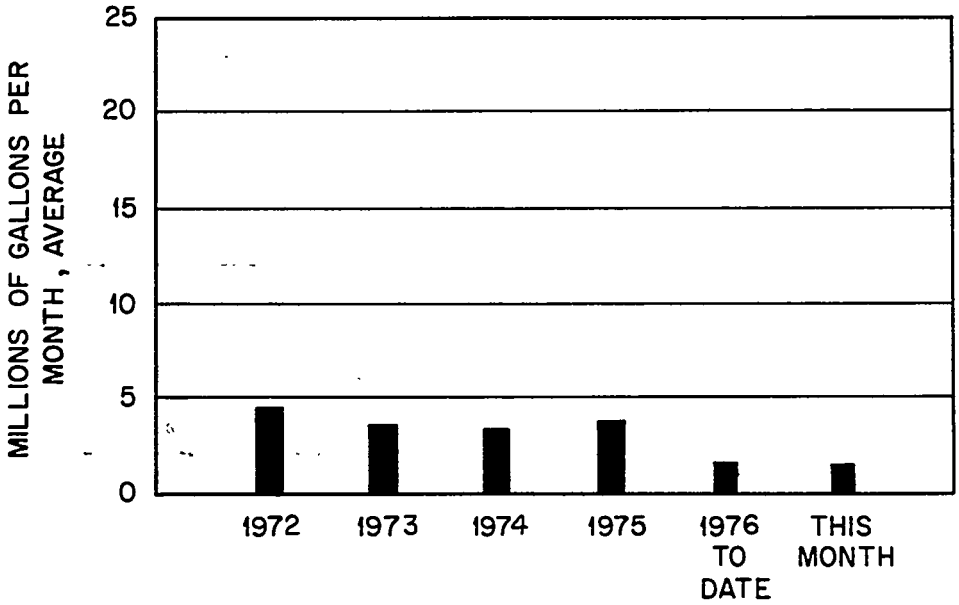

Fig 4. Process Waste Volumes.

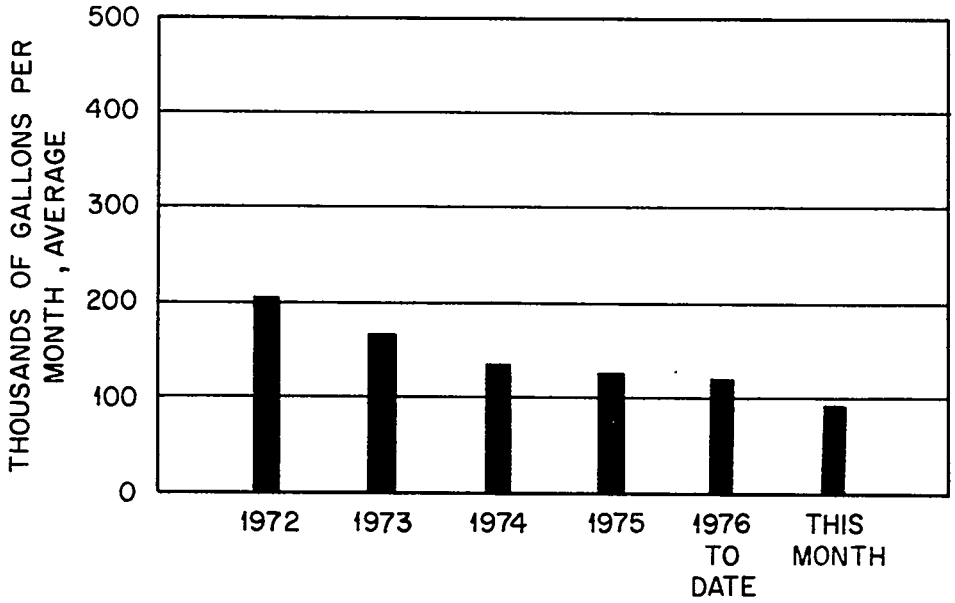

Fig 5. Intermediate – Level Waste Volumes.

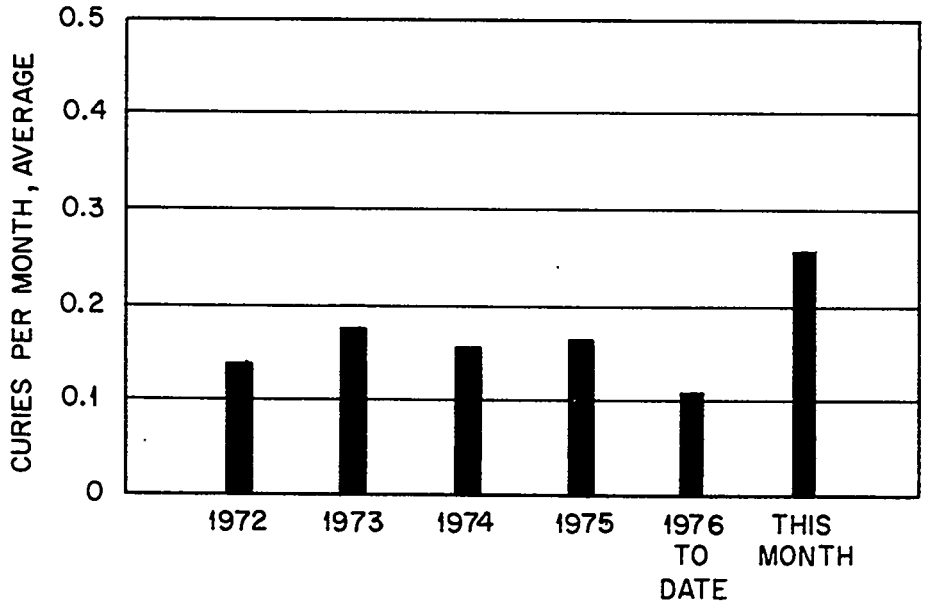

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

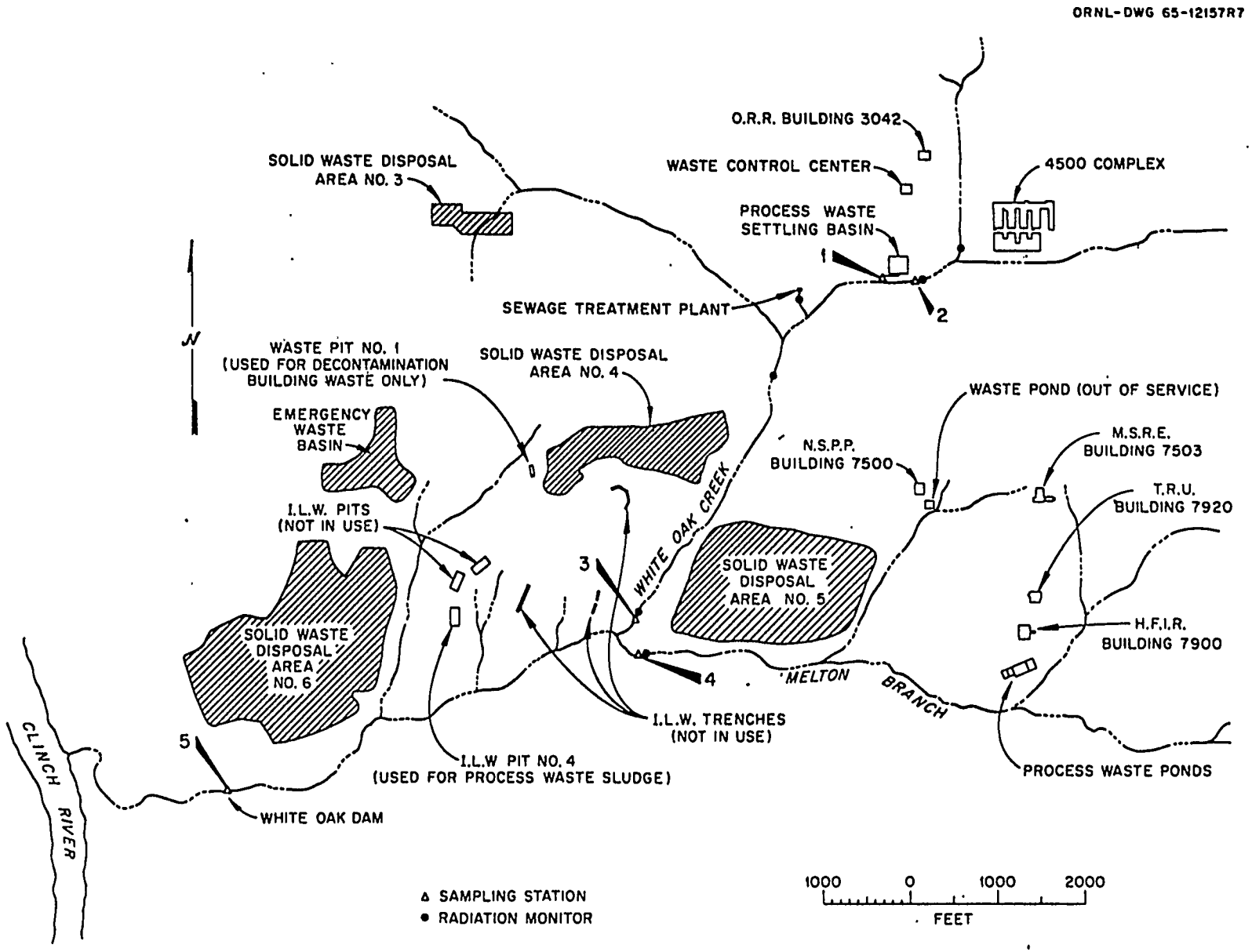

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0003	0.021
Miscellaneous discharges from east end of plant	2	0.019	$\leq$ 0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.29
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.008	0.06
Total discharge from all sources	3,4	0.13	0.35
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.16

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	93.6	0.021	2.81	0.04	1.32
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.430[c]	57.44	0.44	14.52
3. Reactor Operations (MH112)	6.65	0.015	2.00	0.39	12.87
4. Buildings 3503 and 3508	3.67	0.003	0.40	0.14	4.62
5. Buildings 3025 and 3026	1.07	0.002	0.27	0.30	9.90
6. Building 3019	4.23	0.011	1.47	0.44	14.52
7. Waste Evaporator, Bldg. 2531	8.56	0.026	3.47	0.54	17.82
8. Building 3525	0.50	0.0003	0.04	0.01	0.33
9. Building 2026	0.56	0.0003	0.04	0.10	3.30
10. Tank Farm Drainage	67.1	0.240	32.06	0.63	20.79

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurments in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.24	75.0
Radiochemical-Processing Pilot Plant	3020	0	0.2
MSRE	7512	0	0
HFIR	7911	$\leq$ 0.02	126.8
Total Activity in Gases Released at X-10 Site		$\leq$ 0.26	202
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		1(^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			2.1×10^{-4}
Room 265			4.7×10^{-5}
Building 5505 Discharges			
Glove Box			3.0×10^{-4}
Hood			5.2×10^{-3}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	< 0.01	< 0.01	0.0097	0.00002
Zn	0.1	0.048	0.13	0.03	0.012
P	1	0.38	0.60	0.40	0.007
NO_3 (as N)	10	2.63	6.86	0.69	0.37
Hg	0.005	0.0007	c	0.00016	0.00001

[a]Tennessee water quality criteria for fish and aquatic life.

[b]Refer to Figure 7. The Clinch River samples was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1976, was 0.4% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.26% MPC_W and 0.08% MPC_W, respectively. These values represent 0.3 Ci of ^{90}Sr and 923 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2.

Process Waste

A total of 3.94 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with 99.89% efficiency for strontium removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 164 gph.

	Gallons
Total volume generated	91,000
Volume transferred to evaporator	122,000
Tank Farm free space at beginning of month	328,000
Tank Farm free space at end of month	355,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	166,000

A list of the major contributors of intermediate-level waste is given below. Figure 5 compares the volumes of ILW generated each month.

	Gallons
Building 3019	18,600
Fission Products Development Laboratory (inleakage of groundwater to tank pit)	10,500
ORR and BSR	8,700
High Flux Isotope Reactor	8,800
Radioisotopes Processing Area	6,600
4500 Complex	8,900
Transuranium Processing Area	4,800

GASEOUS WASTE

The ORNL stacks discharged 40 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 85 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 0.6% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen limit was exceeded in five of five samples at the main sewage plant.
2. The chlorine residual limit was exceeded in five of five samples at the 7900 area plant.
3. The suspended solids limit was exceeded in four of five samples at the 7900 area plant.

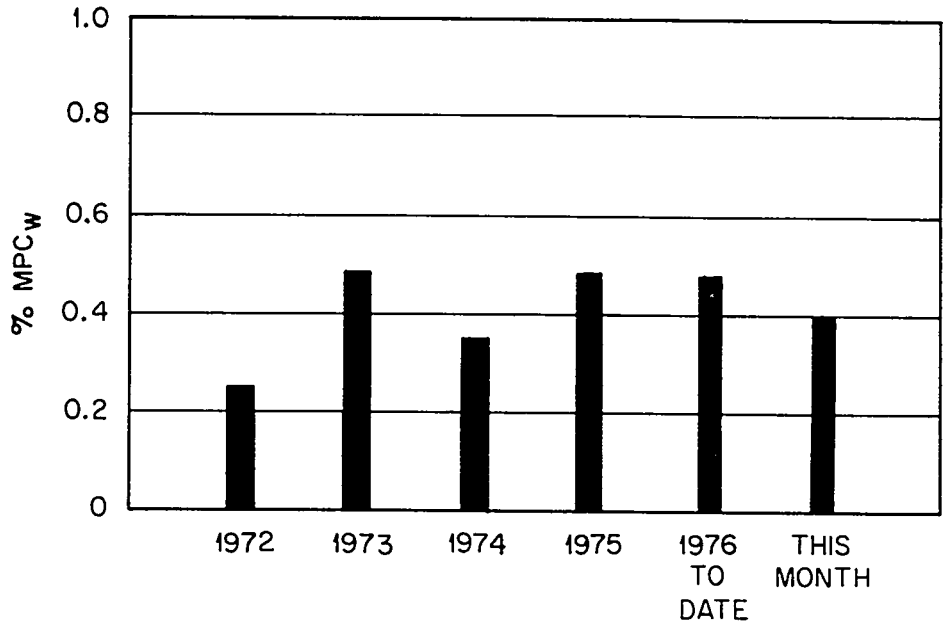

Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

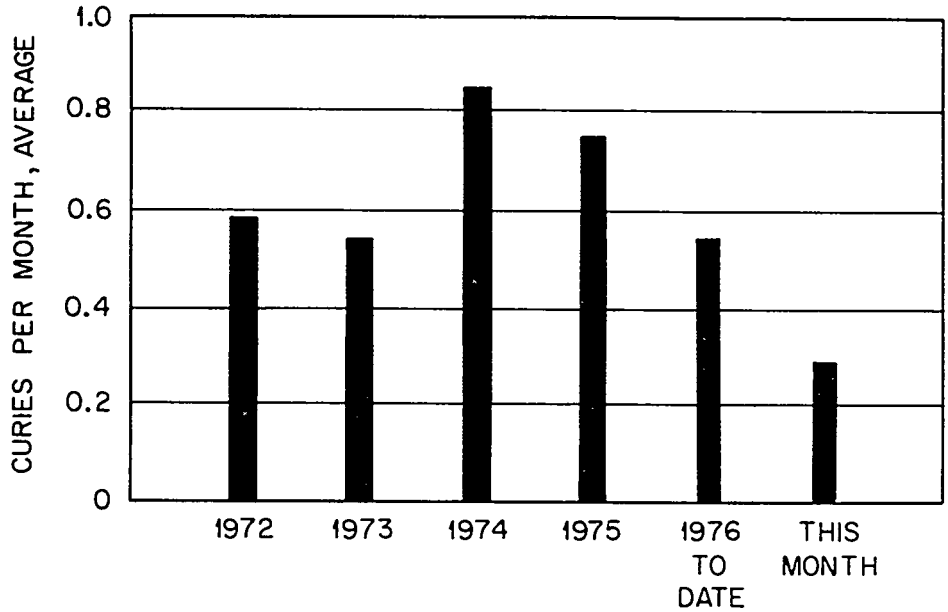

Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

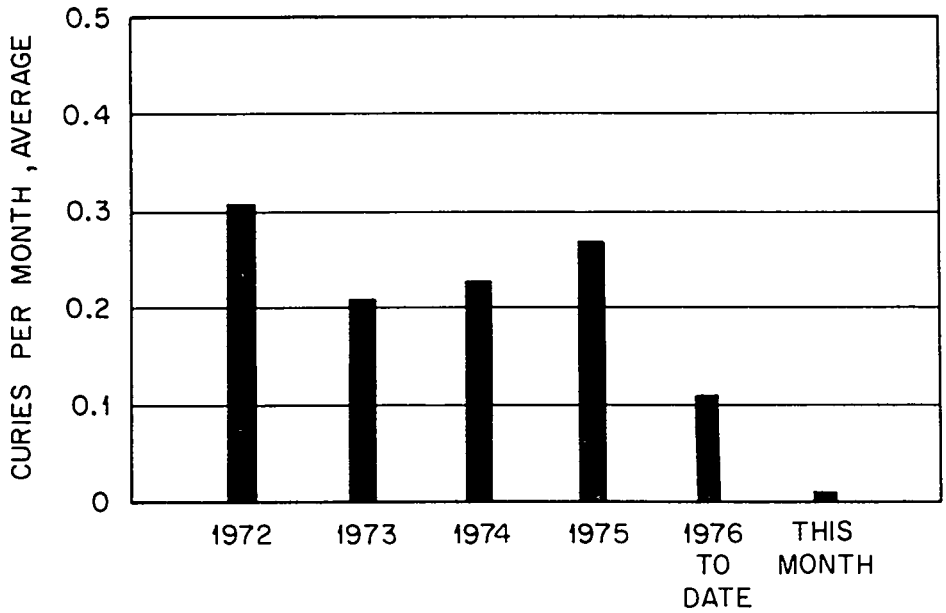

Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

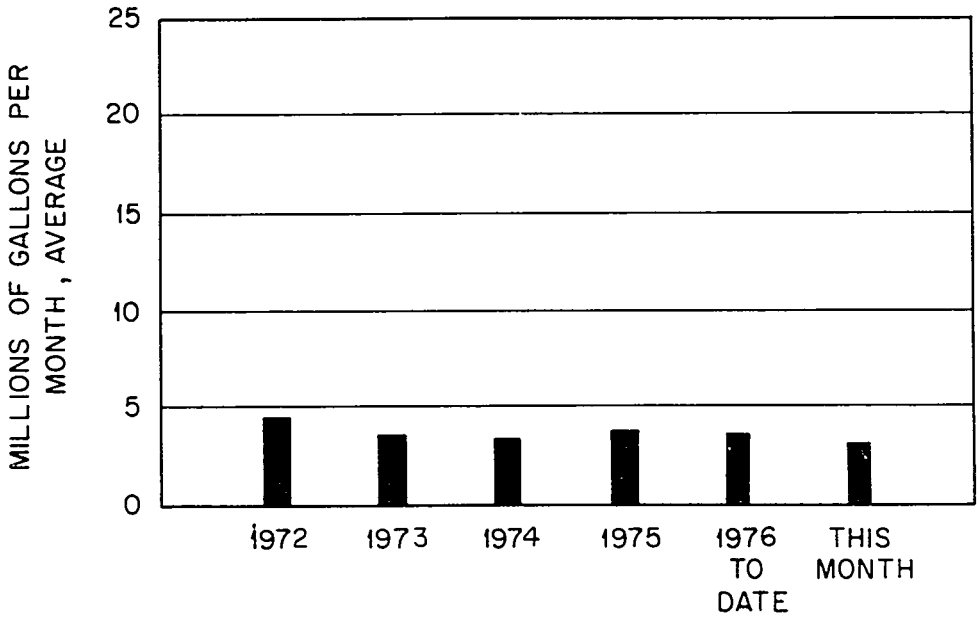

Fig 4. Process Waste Volumes.

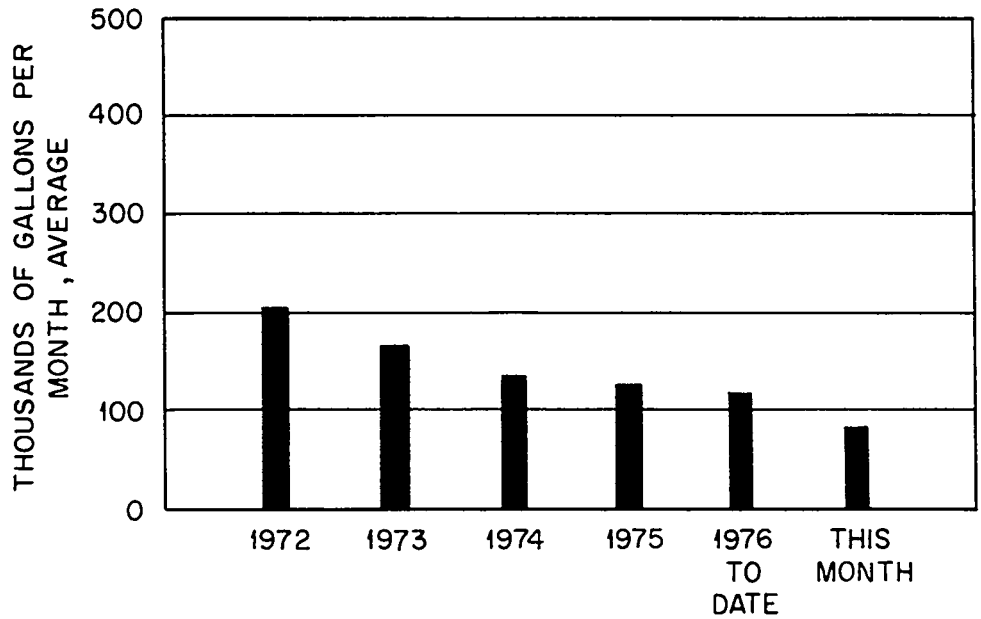

Fig 5. Intermediate – Level Waste Volumes.

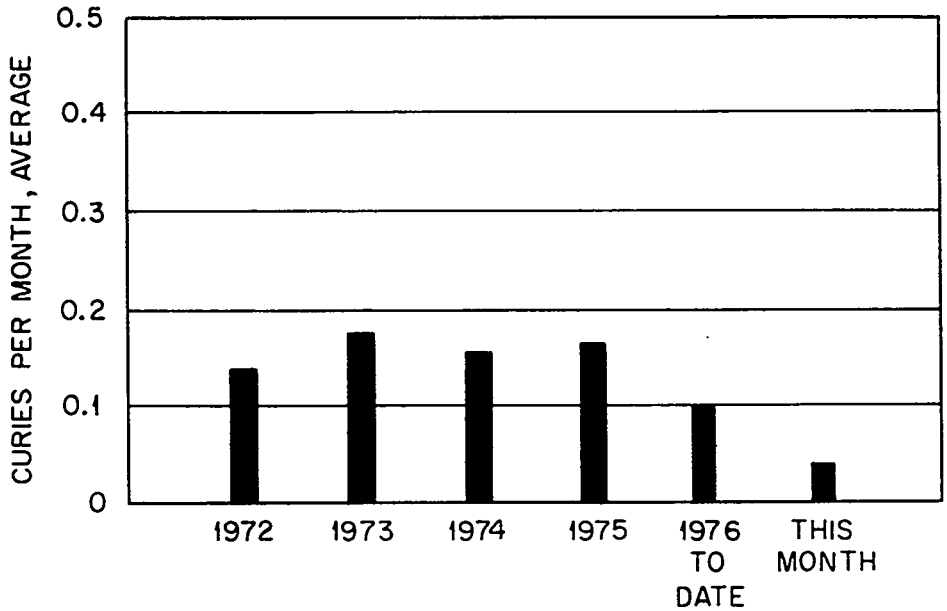

Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

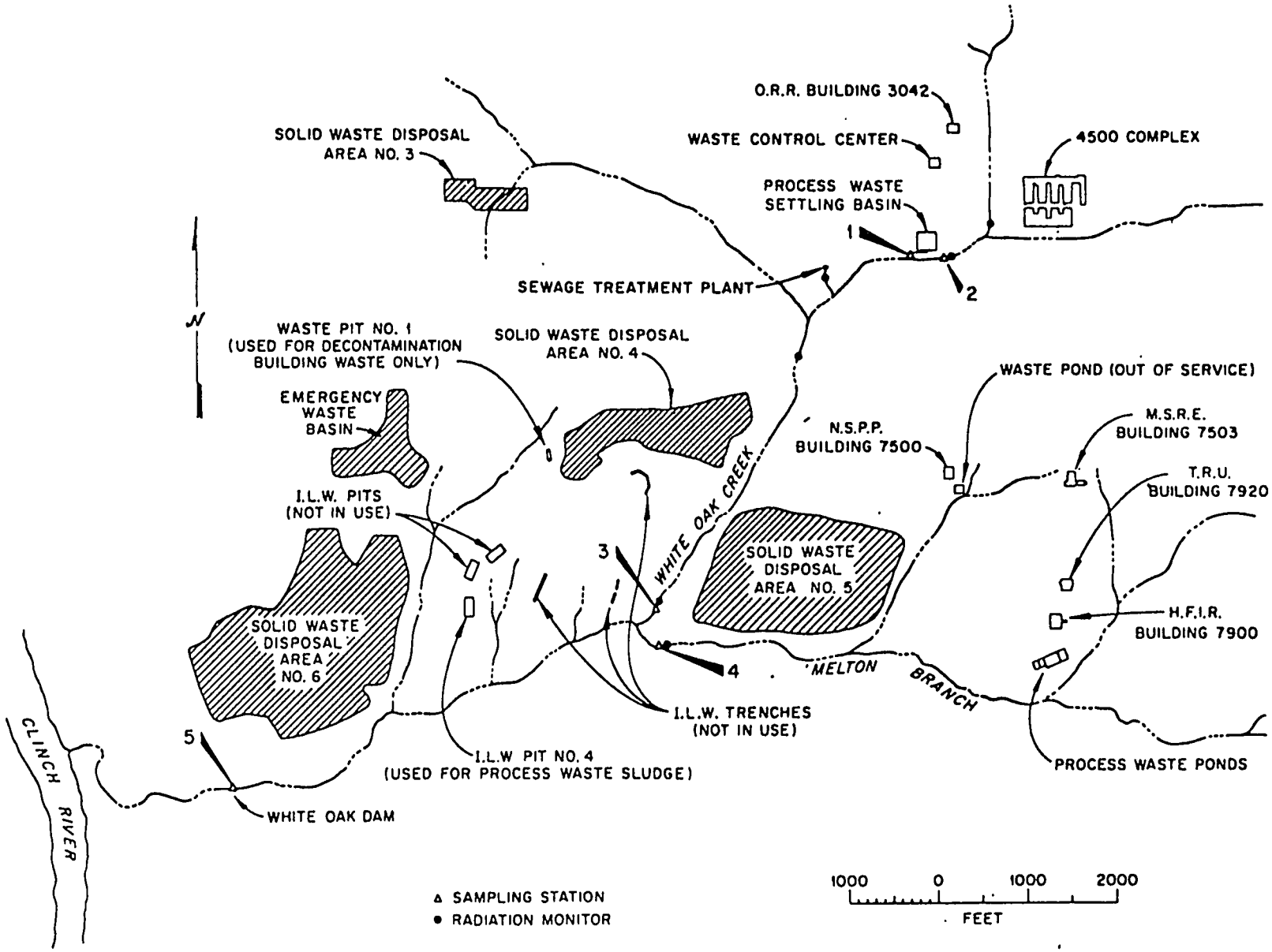

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross-Beta, Curies[b]
Process Waste	1	0.0012	0.053
Miscellaneous discharges from east end of plant	2	0.024	0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.26	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5.	4	0.033	0.092
Total discharge from all sources	3,4	0.29	0.89
White Oak Dam to Clinch River (Health Physics measurement)	5	0.30	0.41

[a]Refers to Fig. 7.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	101	0.023	1.5	0.04	1.1
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.27[c]	18.1	0.24	6.9
3. Reactor Operations (MH112)	2.12	0.006	0.4	0.49	14.0
4. Buildings 3503 and 3508	2.50	0.0024	0.2	0.17	4.9
5. Buildings 3025 and 3026	0.99	0.0028	0.2	0.50	14.3
6. Building 3019	9.48	0.0086	0.6	0.16	4.6
7. Waste Evaporator, Bldg. 2531	6.32	0.025	1.7	0.71	20.2
8. Building 3525	0.3	Trace	-	0.03	0.9
9. Building 2026	0.36	0.0002	0.01	0.08	2.3
10. Tank Farm Drainage	188	1.15	77.3	1.08	30.8

[a]Counted at 30% geometry.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross-beta activity is not sensitive to energies below that of ^{90}Sr.

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	0
Central Radioactive Gas Disposal Facilities	3039	≤ 0.03	71
Radiochemical-Processing Pilot Plant	3020	< 0.01	1
MSRE	7512	< 0.01	0
HFIR	7911	≤ 0.01	13
Total Activity in Gases Released at X-10 Site		≤ 0.04	85
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		< 0.5(H^3)	
Building 4508 Ventilation Discharges			
Room 136			3.2×10^{-4}
Room 265			7.0×10^{-5}
Building 5505 Discharges			
Glove Box			4.5×10^{-4}
Hood			7.8×10^{-3}

[a]Activity primarily ^{131}I except as noted.

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.02	< 0.01	0.009	< 0.0001
Zn	0.1	0.044	0.052	0.030	0.028
P	1	0.19	0.24	0.22	0.002
NO_3 (as N)	10	0.73	0.13	0.69	0.039
Hg	0.005	0.0009	c	0.0002	0.00001

[a]Tennessee water quality criteria for fish and aquatic life.

[b]Refer to Figure 7. The Clinch River samples were taken upstream from the point where White Oak Creek enters the river.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

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ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/85

DATE: March 8, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF NOVEMBER 1984

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

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SUMMARY

A total of 176-mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for 88% of this total. The Environmental and Occupational Safety Division measured a 200-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; approximately 1878 microcuries of ^{131}I were discharged during the reporting period.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November was 0.5% of the MPC_W (Fig. 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 10% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.2 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 2. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 53.0×10^4 m^3 and 16.7×10^4 m^3, respectively. Figure 2A shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 169 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were as follows: a total of 0.2 mCi of ^{90}Sr was released by the Process Waste Treatment Plant, 0.4 mCi of ^{90}Sr was released from the 190 pond system, and a total of 8.6 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the liquid LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 3).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	8.1	
190 Ponds	0.4	
Process Waste Treatment Plant	0.2	
Sewage Treatment Plant	8.6	
	17.3	
7500 Sampling Station	53.0	
Burial Grounds 1 and 3 and Floodplains		35.7
Station 3	120.0	
Burial Ground 4		67
Melton Branch		
7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	3.6	
	3.8	
Station 4	49	
Burial Ground 5		45.2
Liquid LLW Pit Disposal Area		
East Weir	0.2	
West Weir	6.9	
	7.1	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 Plus Ground Disposal Area)	176.1	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		155
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		88.0

Process Waste

A total of 2.08×10^4 m^3 of process waste was treated by ion exchange and released to White Oak Creek.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 4; the waste volume processed, compared to previous months, is shown in Fig. 5. The main contributors to the system are listed in Table 2. A total of 37 ion-exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	34.5	16	24
Bed Volume treated (1 BV = 1.3 m^3)	479	306	392

Liquid Low-Level Waste

Both of the evaporator systems were operated during the reporting period. The average boil-down rate was 0.56 m^3/hr.

A summary of storage operations is given below:

	m^3
Total Volume Generated	443.6
Volume Transferred to Evaporators	402.9
South Tank Farm Inventory:	
Beginning of Month	226.0
End of Month	226.0
Service Tank Inventory:	
W-21, Beginning of Month	25.6
W-21, End of Month	71.0
W-22, Beginning of Month	69.0
W-22, End of Month	34.5
W-23, Beginning of Month	135.9
W-23, End of Month	65.6
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	716.4
Total Volume at End of Month	787.2

A list of major contributors of liquid low-level waste is given below. Figure 6 compares the volumes of liquid LLW generated each month.

	m^3
Building 3019	16.0
Building 3525	10.6
Radioisotopes Processing Area	13.4
ORR and BSR	45.1
High Flux Isotope Reactor	27.1
Fission Products Development Laboratory	26.2[a]
4500 Complex	37.2
Building 3544	184.6

[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetted from the pit during the month. The pit can only be jetted to the liquid LLW line, since it was designed in this fashion.

Gaseous Waste

Approximately 1,878 microcuries of gaseous ^{131}I were released from the ORNL stacks during the period. The total amount of active particulates released during the period was 79 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 5.6% and 0.8%, respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 7.

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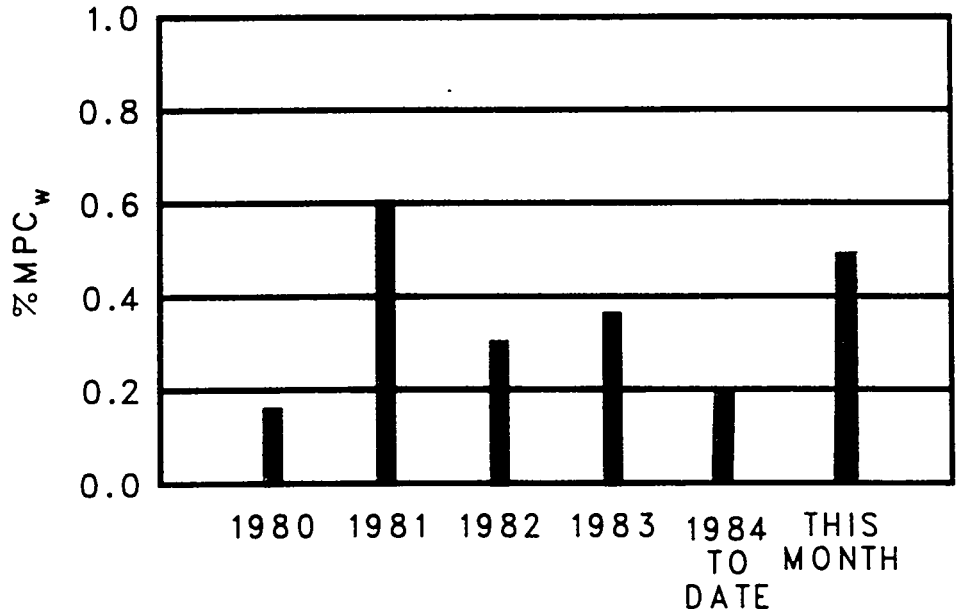

Fig. 1A. Calculated Radioactive Contamination (Percent of MPC_w) in Clinch River due to ORNL Discharges* (EOS Measurements at White Oak Dam).

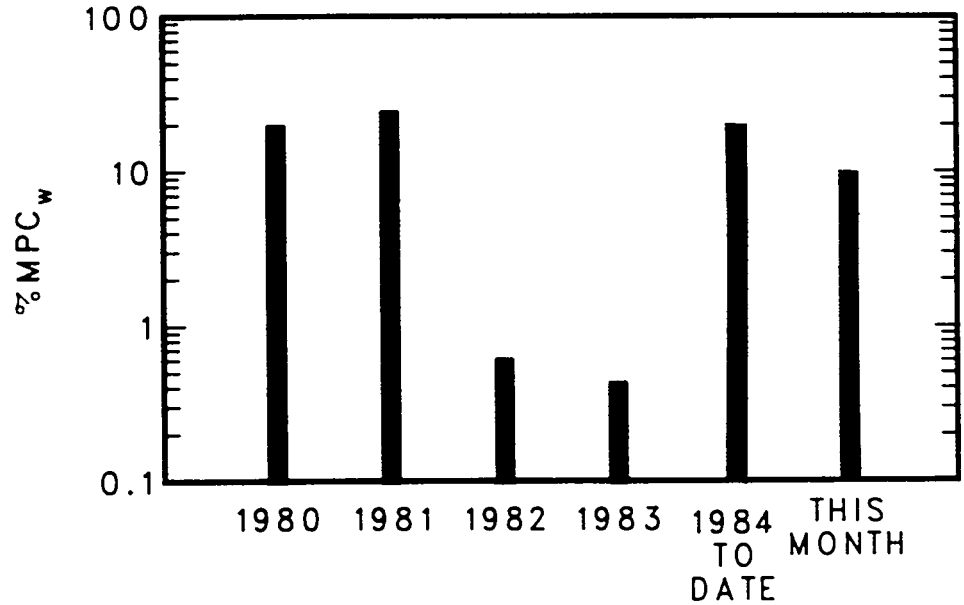

Fig. 1B. Measured Percent of MPC_w in Clinch River due to ORNL Discharges (EOS Samples at Confluence of White Oak Creek and the Clinch River).

*Assumes complete mixing of White Oak Creek with the Clinch River.

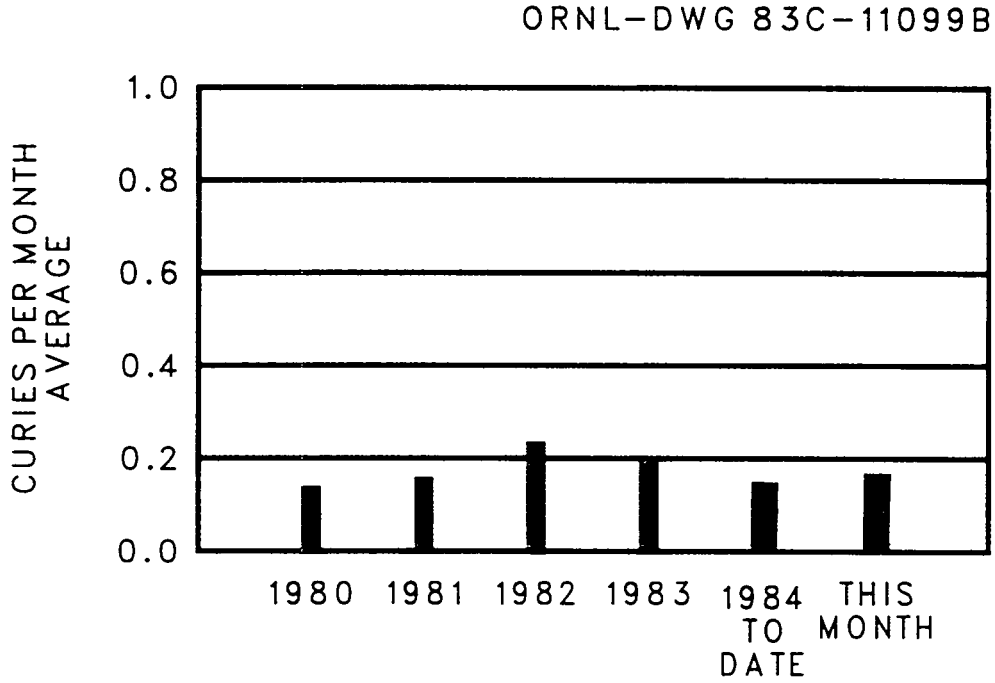

Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.3)

ORNL-DWG 85C-9237

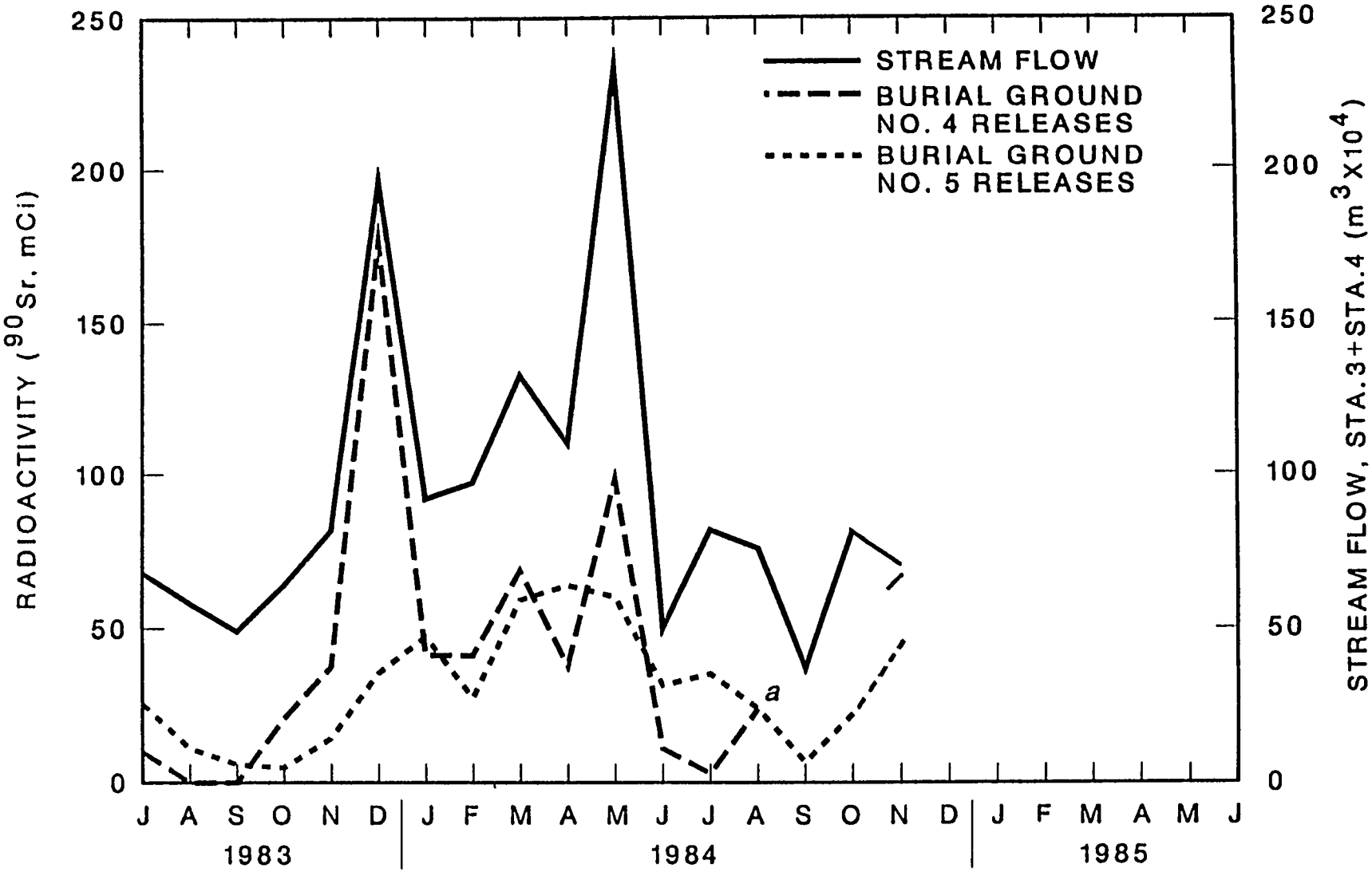

Fig. 2A. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a]Not reported because of uncertainties with flow data & possible cross-contamination of sample

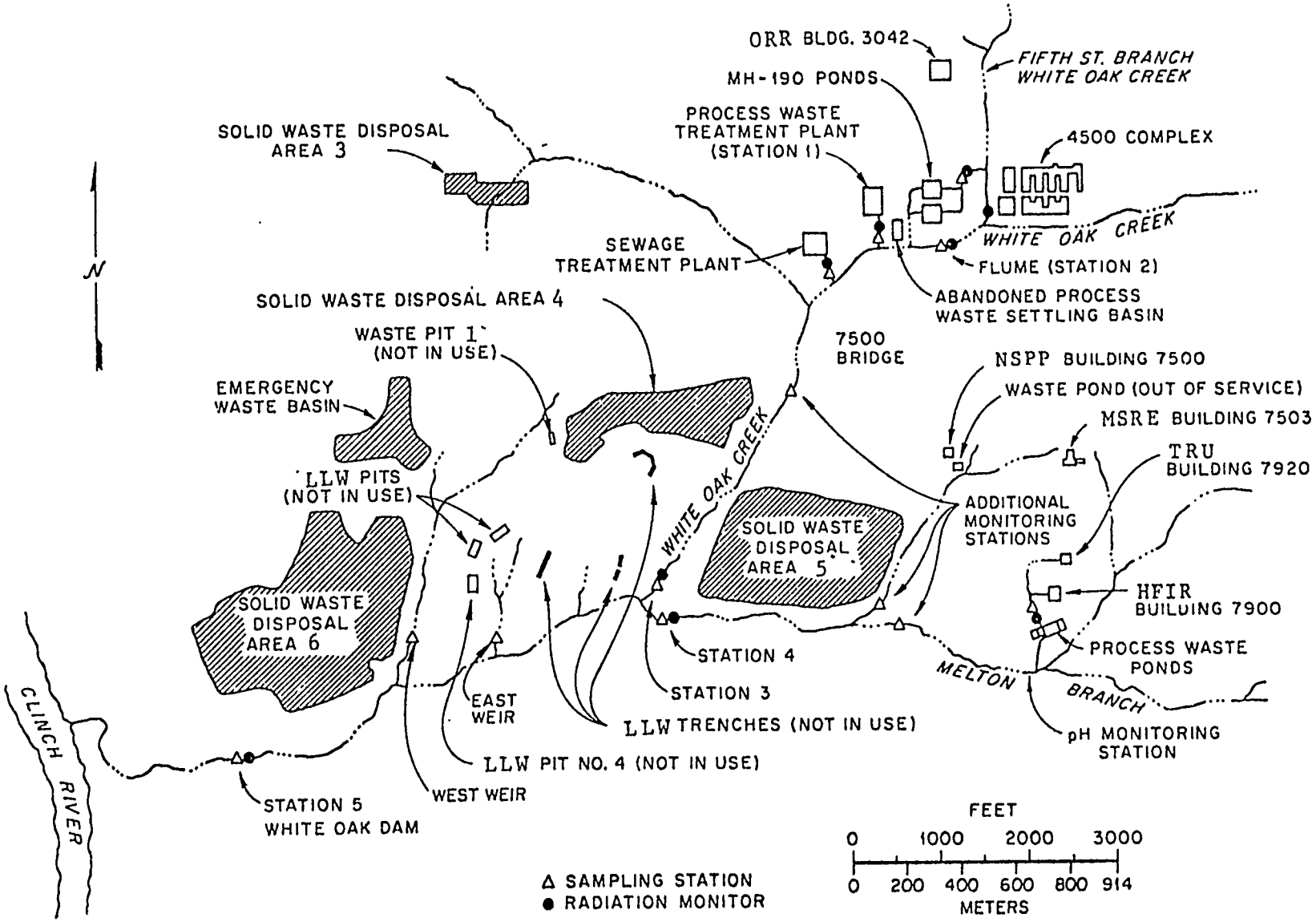

Fig. 3 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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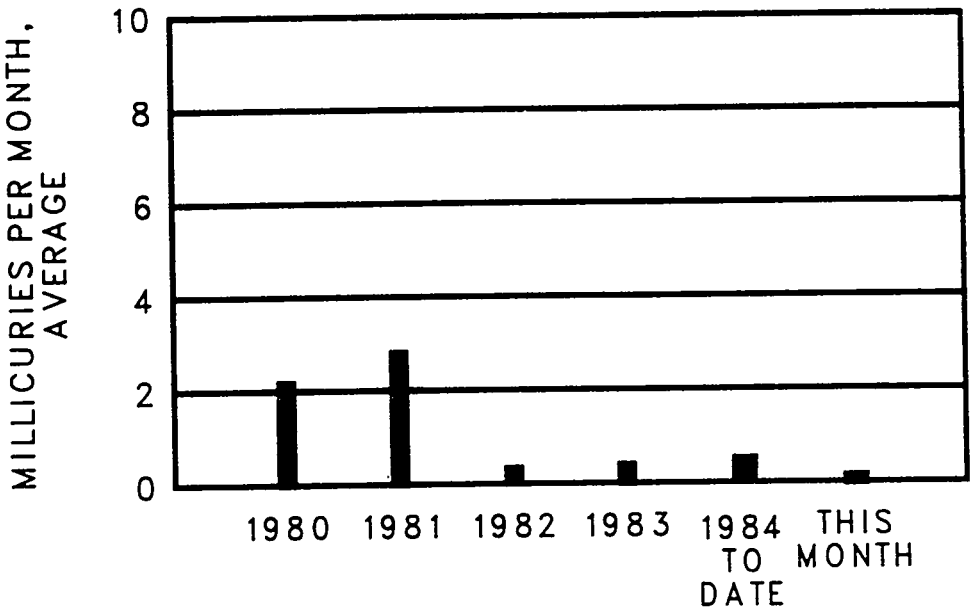

Fig. 4. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

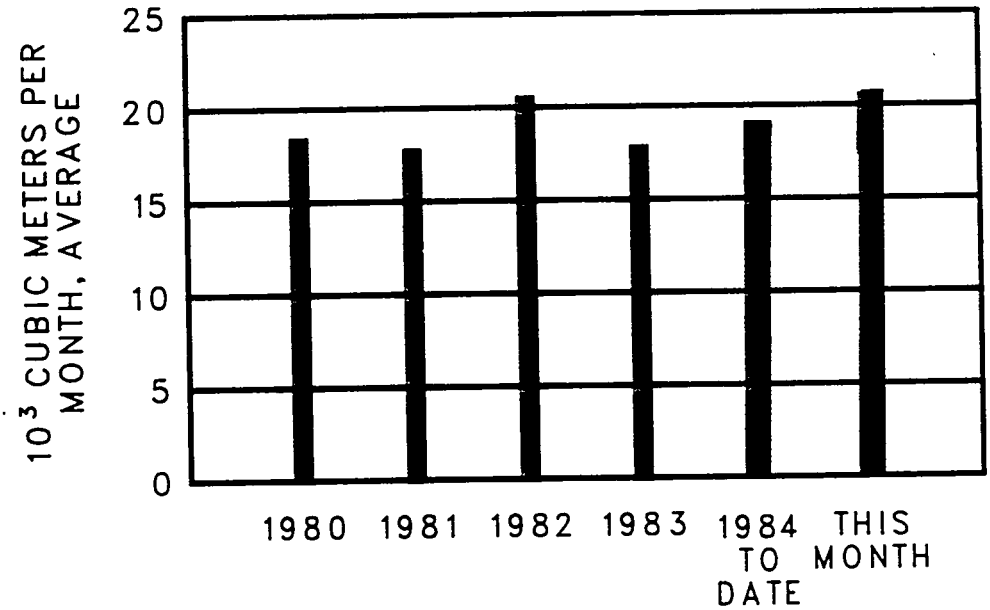

Fig. 5. Process Waste Volumes Treated in the PWTP.

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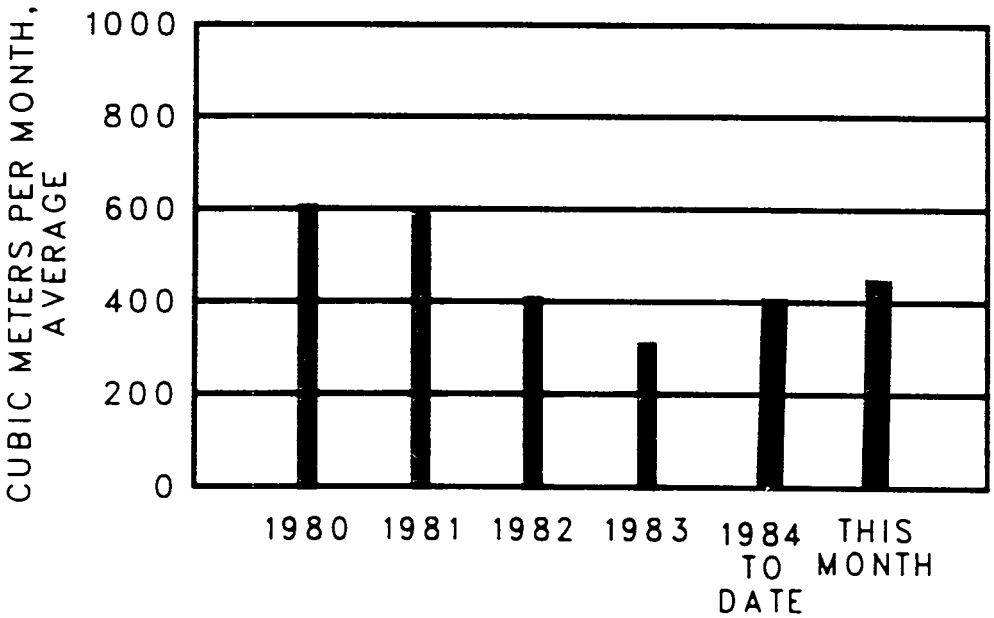

Fig. 6. Low-Level Waste Volume Generated this Month.

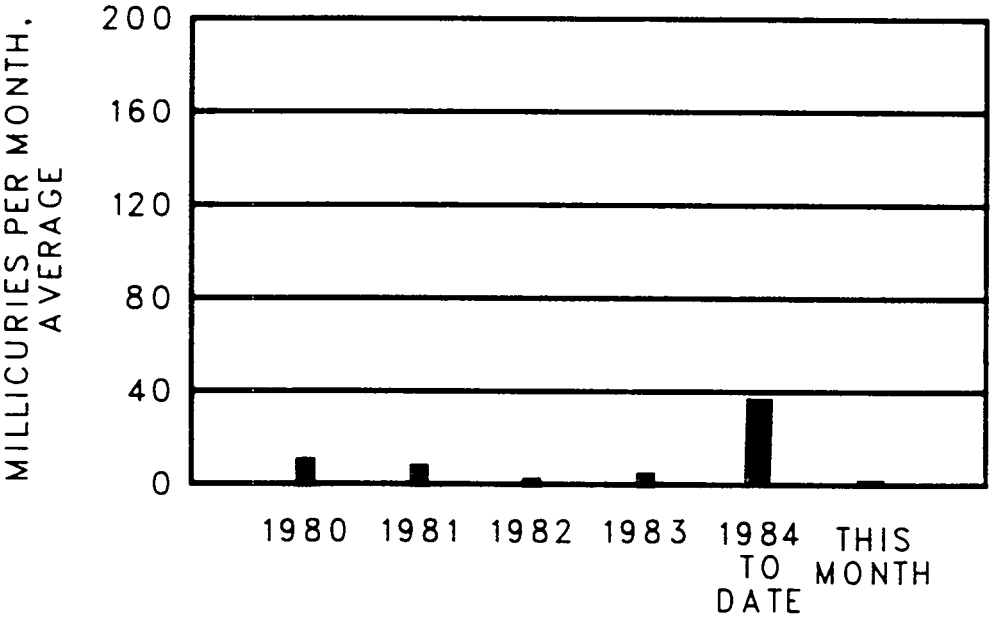

Fig. 7. Total Activity Released in Gaseous Waste (mainly ^{131}I, not including rare gases or other non-filterable species). Maximum Permissible Operating Level Is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.120	0.264
Discharge from Melton Valley Operations and Burial Ground 5	4	0.049	0.103
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits Burial Ground 6	West Weir	0.007	-----
Total Discharge from All Sources		0.176	0.367
White Oak Dam to Clinch River (EOS Measurements)		0.200	0.390

[a]Refers to Figure 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	4500	0.366	34.3	3.0	11.1
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.317[a]	29.7	5.8	21.5
Reactor Operations (MH 112)	7.2	0.001	0.1	4.9	18.1
Buildings 3503 and 3508 (MH 229)	0.4	<0.001	---	2.2	8.1
Buildings 3025 and 3026 (MH 149)	2.5	<0.001	---	1.9	7.0
Building 3019 (MH 25)	1100	<0.004	0.4	0.1	0.4
Waste Evaporator, Bldg. 2531 (MH 243)	270	0.011	1.0	1.5	5.6
Building 3525 (MH 235)	120	<0.006	0.6	1.7	6.3
Building 2026 (MH 240)	0.6	<0.001	---	0.8	3.0
Tank Farm Drainage	2600	0.361	33.9	5.1	18.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (μCi)	Filterable Particulate Activity[b] (μCi)
HRLAL	2026	<1	<1
Central Radioactive Gas Disposal Facilities	3039	$\leq$198	48
Radiochemical-Processing Pilot Plant	3020	<1	1
MSRE	7512	<0.1	<0.1
HFIR and TRU	7911	$\leq$1680	30
Activity in Gases Released at X-10 Site		$\leq$1878	79
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		(c)	---
Building 4508 Ventilation Discharges Room 265			1.8×10^{-4}
Building 5505 Discharges Glove Box			9.0×10^{-4}

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.
[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c]No data available at this time.

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ORNL/CF -85/86

DATE: March 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF DECEMBER 1984

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

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SUMMARY

Operation of the Waste Monitoring and Collection Systems for the month of December was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 135 mCi; drainage from the burial grounds, contaminated floodplains, and the dormant pit disposal area accounted for 74% of this total. The Environmental and Occupational Safety Division measured a 160 mCi release of ^{90}Sr at the White Oak Dam sample station (0.2% MPC_W in the Clinch River for recorded flows).

The radioactivity in the gaseous wastes released by the stack systems was primarily short-lived mixed fission products; approximately 2 mCi of ^{131} were detected during the period.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December was 0.2% of the MPC_W (Fig. 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 12% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.160 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 2. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 71.9×10^4 and 12.1×10^4 m^3, respectively. Figure 2A shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 124 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: a total of 0.3 mCi of ^{90}Sr was released by the Process Waste Treatment Plant, 0.2 mCi of ^{90}Sr was released from the 190 pond system, and a total of 16.0 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 3).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	5.5	
190 Ponds	0.2	
Process Waste Treatment Plant	0.3	
Sewage Treatment Plant	16.0	
	22.0	
7500 Sampling Station	67.0	
Burial Grounds 1 and 3 and Floodplains		45.0
Station 3	91.0	
Burial Ground 4		24.0
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	13.0	
	13.1	
Station 4	33.0	
Burial Ground 5		19.9
Liquid LLW Pit Disposal Area		
East Weir	0.4	
West Weir	11.0	
	11.4	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	135.4	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		100.3
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		74.1%

Process Waste

A total of 2.04×10^4 m^3 of process waste was treated by ion exchange and released to White Oak Creek.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 4; the waste volume processed, compared to previous months, is shown in Fig. 5. The main contributors to the system are listed in Table 2. A total of 41 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	40.5	20.5	26.5
Bed Volume (1 BV = $1.3m^3$)	604	313	387

Liquid Low-Level Waste

Both of the evaporator systems were operated in parallel during the month. The average boil-down rate was 0.54 m^3/h.

A summary of storage operations is given below:

	m^3
Total Volume Generated	452.1
Volume Transferred to Evaporators	403.7
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Service Tank Inventory:	
W-21, Beginning of Month	71.0
W-21, End of Month	103.6
W-22, Beginning of Month	34.5
W-22, End of Month	29.3
W-23, Beginning of Month	65.6
W-23, End of Month	121.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	787.2
Total Volume at End of Month	795.8

A list of major contributors of low-level waste is given below. Figure 6 compares the volumes of LLW generated each month.

	m^3
Transuranium Processing Area	10.9
Building 3019	7.6
Building 3525	14.3
Radioisotopes Processing Area	33.8
ORR and BSR	51.9
High Flux Isotope Reactor	74.6
Fission Products Development Laboratory	27.9[a]
4500 Complex	17.3
Building 3544	174.6

[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetted from the pit during the month. The pit can only be jetted to LLW, since it was designed in this fashion.

Gaseous Waste

The ORNL stacks discharged 1,752 μCi of caseous ^{131}I this month. The total amount of active particulates released during the period was 95 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 3.1% and 0.7%, respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 7.

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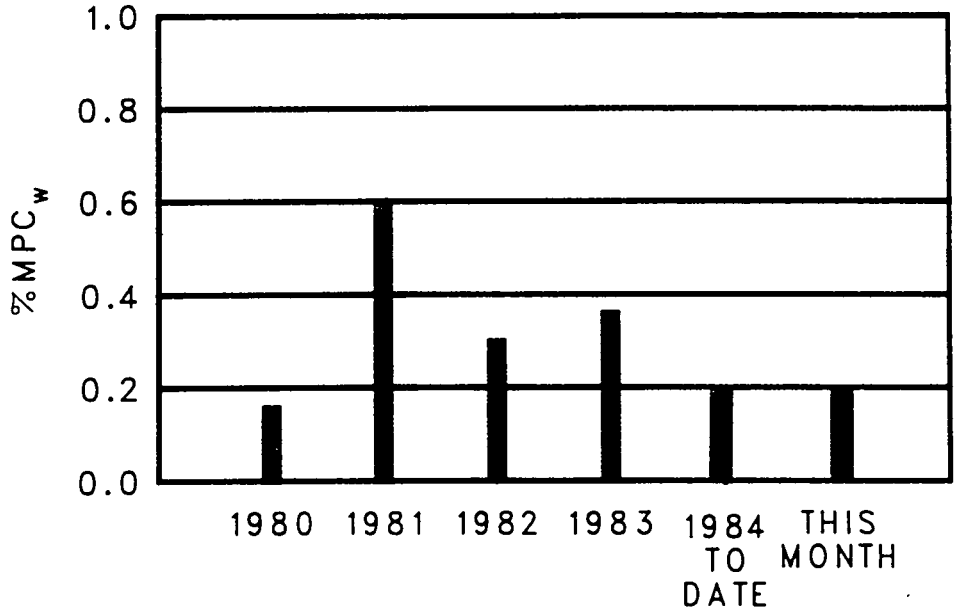

Fig. 1A. Calculated Radioactive Contamination (Percent of MPC_w) in Clinch River due to ORNL Discharges* (EOS) Measurements at White Oak Dam).

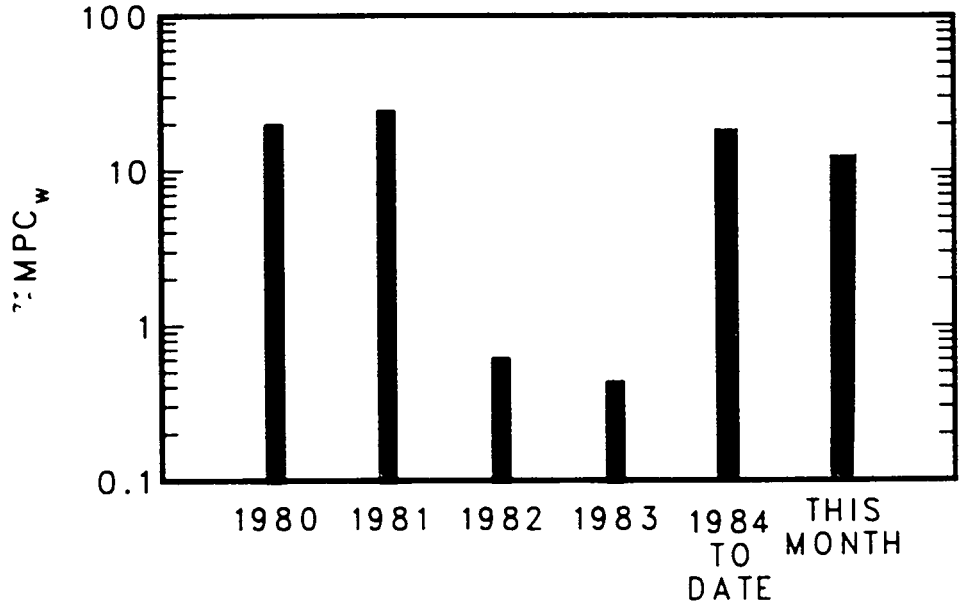

Fig. 1B. Measured Percent of MPC_w in Clinch River due to ORNL Discharges (EOS Samples at Confluence of White Oak Creek and the Clinch River).

*Assumes complete mixing of White Oak Creek with the Clinch River.

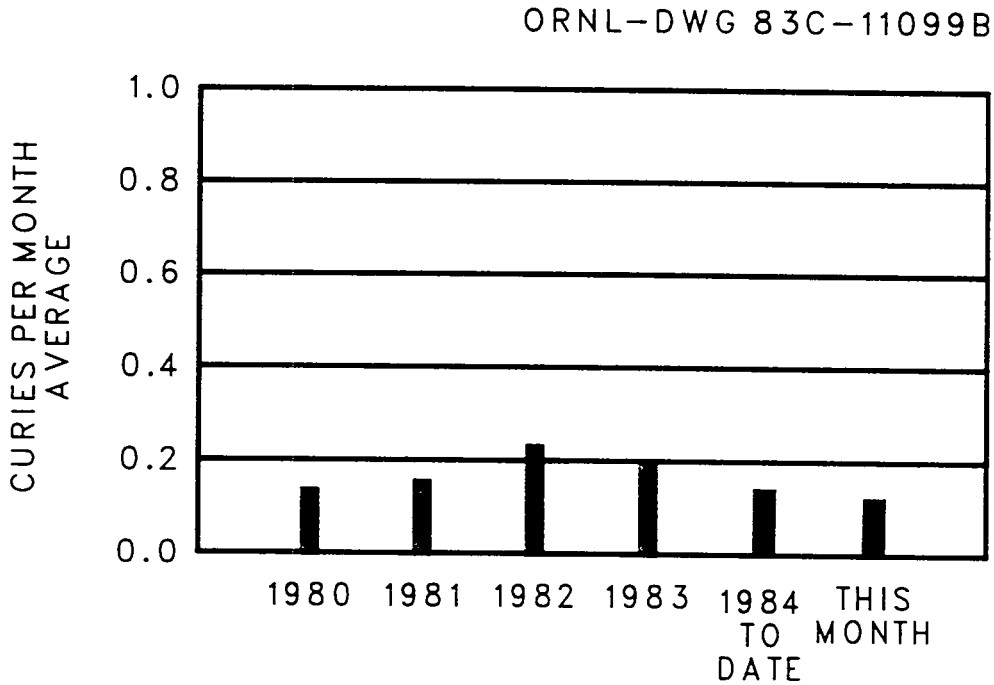

Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.3)

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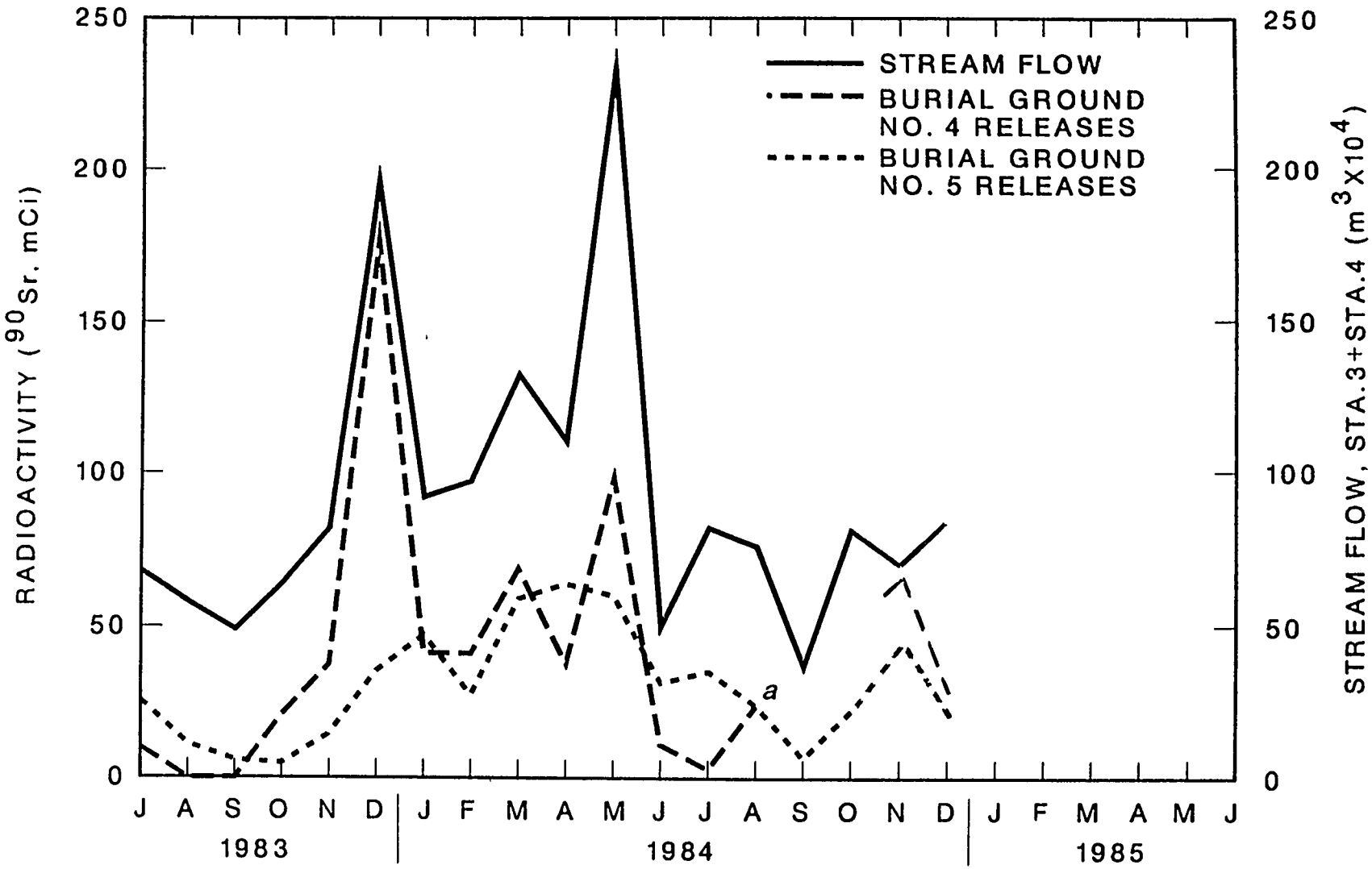

Fig. 2A. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a]Not reported because of uncertainties with flow data & possible cross-contamination of sample

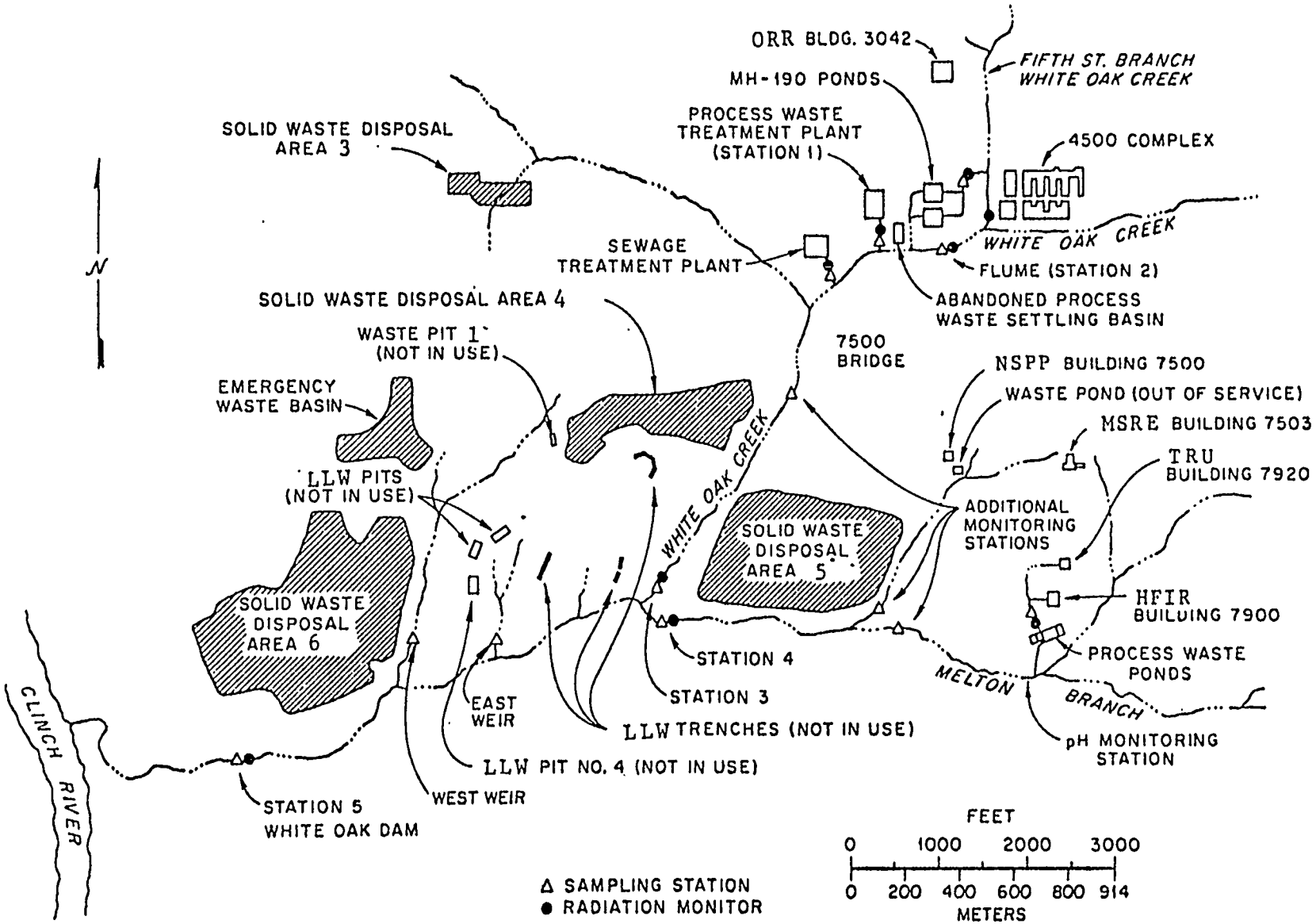

Fig. 3 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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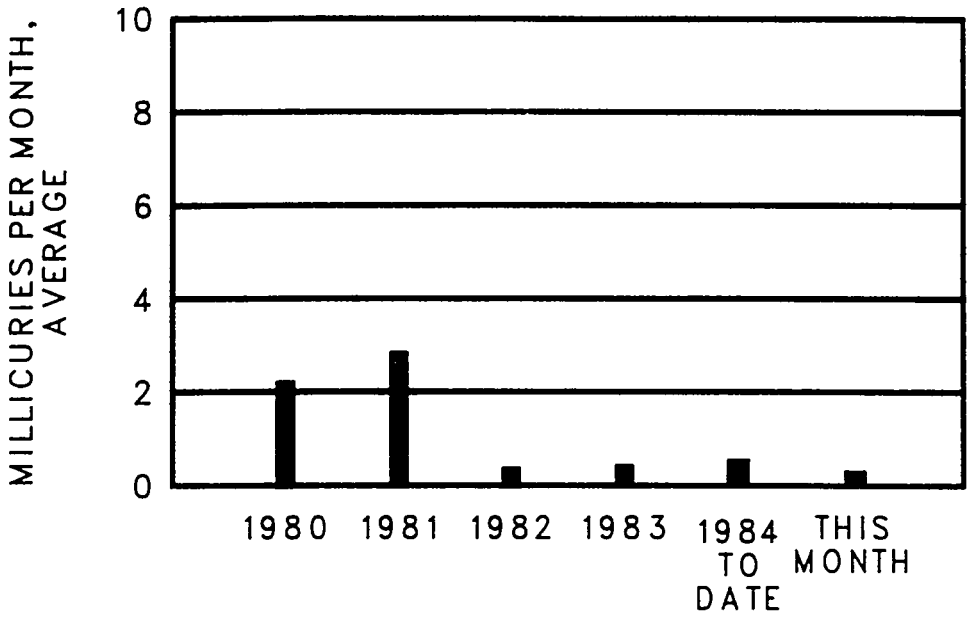

Fig. 4. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

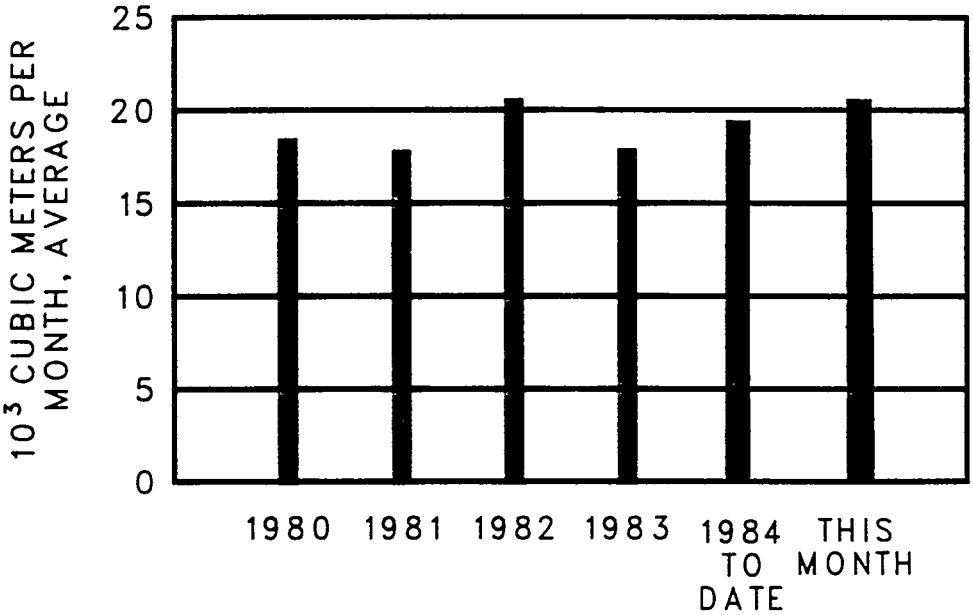

Fig. 5. Process Waste Volumes Treated in the PWTP.

ORNL-DWG 83C-11101B

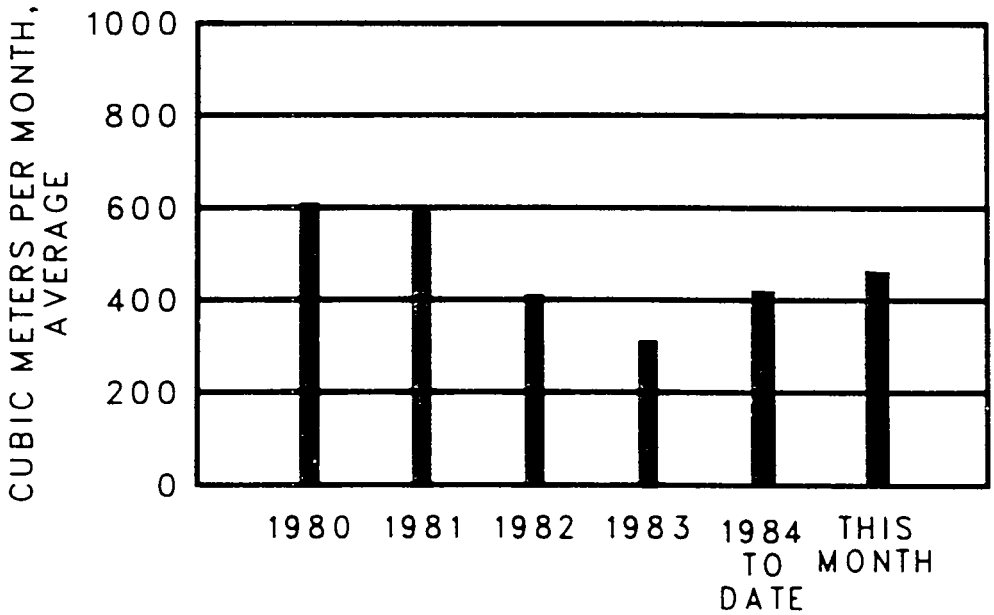

Fig. 6. Liquid Low-Level Waste Volume Generated This Month.

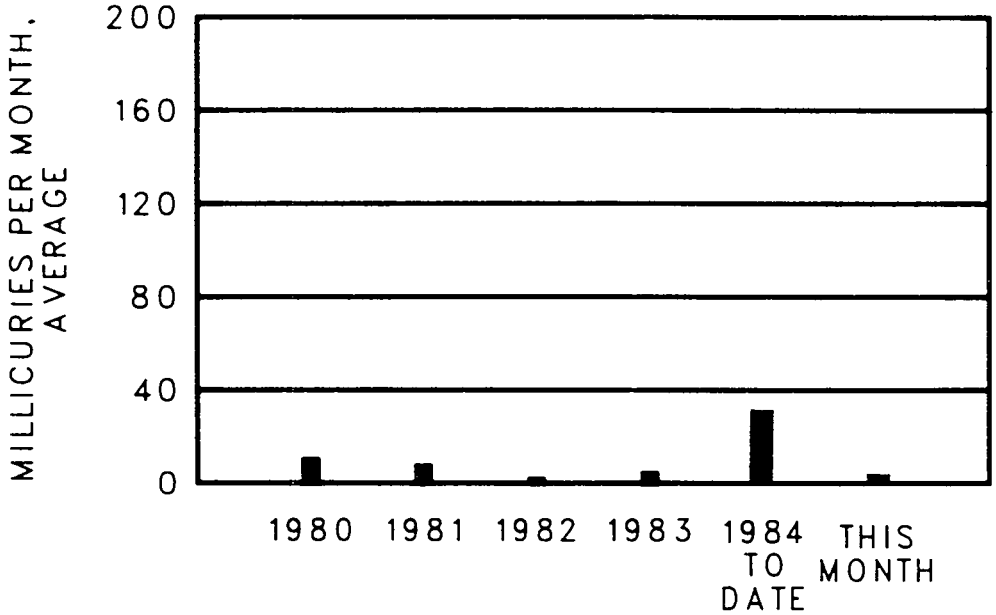

Fig. 7. Total Activity Released in Gaseous Waste (mainly ^{131}I, not including rare gases or other filterable species). Maximum Permissible Operating Level Is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.091	0.144
Discharge from Melton Valley Operations and Burial Ground 5	4	0.033	0.069
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.011	-----
Total Discharge from All Sources		0.135	0.213
White Oak Dam to Clinch River (EOS Measurements)		0.160	0.350

[a]Refers to Fig. 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	4500	0.004	1.5	0.12	0.5
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.052[a]	19.0	5.0	18.8
Reactor Operations (MH 112)	14	0.001	0.3	2.94	11.0
Buildings 3503 and 3508 (MH 229)	0.53	<0.001	---	2.12	8.0
Buildings 3025 and 3026 (MH 149)	2.6	<0.001	---	1.87	7.0
Building 3019 (MH 25)	1200	<0.004	1.5	0.13	0.5
Waste Evaporator, Bldg. 2531 (MH 243)	600	0.025	9.1	1.57	5.9
Building 3525 (MH 235)	4.1	0.001	----	1.38	5.2
Building 2026 (MH 240)	0.39	<0.001	---	0.95	3.6
Tank Farm Drainage	2500	0.188	68.6	10.5	39.5

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity (mCi)	Filterable Particulate Activity[a] (μCi)
HRLAL	2026	2	<1
Central Radioactive Gas Disposal Facilities	3039	$\leq$389	87
Radiochemical-Processing Pilot Plant	3020	1	1
MSRE	7512	<1.0	<1
HFIR and TRU	7911	$\leq$1360	7
Activity in Gases Released at X-10 Site		$\leq$1752	95
Chem. Tech. Division - Y-12 Area			(b)
Tritium Target Fabrication Building		(b)	---
Building 4508 Ventilation Discharges Room 265			1.8×10^{-4}
Building 5505 Discharges Glove Box			8.8×10^{-4}

[a]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[b]No data available at this time.

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CENTRAL FILES NUMBER

ORNL/CF-85/328

DATE: June 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF JANUARY 1985

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

ChemRisk Document No. 2056

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SUMMARY

A total of 185.3 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from burial grounds, contaminated floodplains, and the dormant pit disposal area accounted for 46.8% of this total. Of this total, 90 mCi of ^{90}Sr were released from the Sanitary System into White Oak Creek. The bulk of this release resulted from an infiltration of contaminated ground water into the sanitary drain pipe located at the northwest corner of Bldg. 3019. The activity emitted with the gaseous waste from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total release of ^{131}I was less than 1 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 410 mCi of ^{90}Sr were released from White Oak Lake during the period. This amount is significantly greater than the 185.3 mCi output from monitoring Stations 3 and 4. The ongoing surveillance activities at the inactive ground disposal areas and SWSA 6 do not account for this discrepancy, and it is attributed to seasonal flood water fluctuations. On January 26, the ^{90}Sr Department of Energy concentration guide for water (CG_w) was exceeded at White Oak Dam. Most of this contamination was

released into White Oak Creek from the sanitary sewer system which became contaminated by a groundwater source near Bldg. 3019. The mean weekly discharges of ^{90}Sr, ^{3}H, TRU and gross beta activities are shown in Figures 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 83.3×10^4 and 25.4×10^4 m^3, respectively. Figure 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 181 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek from the Process Waste Treatment Plant and the 190 Pond System were normal at 0.14 and 0.5 mCi, respectively. However, the infiltration of contaminated ground water in the vicintity of Bldg. 3019 elevated the ^{90}Sr release from the sanitary system to 90 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	8.0	
190 Ponds	0.5	
Process Waste Treatment Plant	0.14	
Sewage Treatment Plant	90.0	
	98.6	
7500 Sampling Station	a	
Burial Grounds 1 and 3 and Floodplains		b
Station 3	140.0	
Burial Ground 4		b
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	6.6	
Station 4	41.0	
Burial Ground 5		34.3
Liquid LLW Pit Disposal Area		
East Weir	<0.1	
West Weir	4.3	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	185.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		86.7
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		46.8

[a]Analysis of the composite sample at this station indicates a throughput of 650 mCi which by comparison with the other watershed monitors is in error. The error is attributed to sample cross-contamination.
[b]Unknown because of inconsistent data.

Process Waste

A total of 2.08×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 2.0×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 40 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	81	19	28
Bed Volume Treated (1 BV = 1.3 m^3)	1002	327	510

Liquid Low-Level Waste

Both of the evaporator systems were operated in parallel during the month. The average boil-down rate was 0.55 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 and W-22	441.3
Volume of LLW Feed to Evaporators	412.2
Volume of Evaporator Concentrate Transferred to W-23	34.3
Service Tank Inventory:	
W-21, Beginning of Month	103.6
W-21, End of Month	44.8
W-22, Beginning of Month	29.3
W-22, End of Month	110.5
W-23, Beginning of Month	121.0
W-23, End of Month	155.3
South Tank Farm Inventory:	
Beginning of Month	266.0
End of Month	266.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	795.8
Total Volume at End of Month	795.8

Note: Liquid Low-Level Waste is pumped from the area collection tanks into W-21 and W-22 which serve as feed tanks for the evaporators. Evaporator concentrate is stored in tank W-23 prior to transfer to the Melton Valley Storage Tanks.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of liquid LLW generated each month.

	m^3
Transuranium Processing Area	2.6
Building 3019	20.0
Building 3525	24.8
Radioisotopes Processing Area	24.6
ORR and BSR	102.2
High Flux Isotope Reactor	89.7
Fission Products Development Laboratory	29.0[a]
4500 Complex	19.0
Building 3544	112.6

[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetted from the pit during the month. The pit can only be jetted to LLW, since it was designed in this fashion.

Gaseous Waste

The ORNL stacks discharged approximately 809 μCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was 190 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.67% and 0.14%, respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

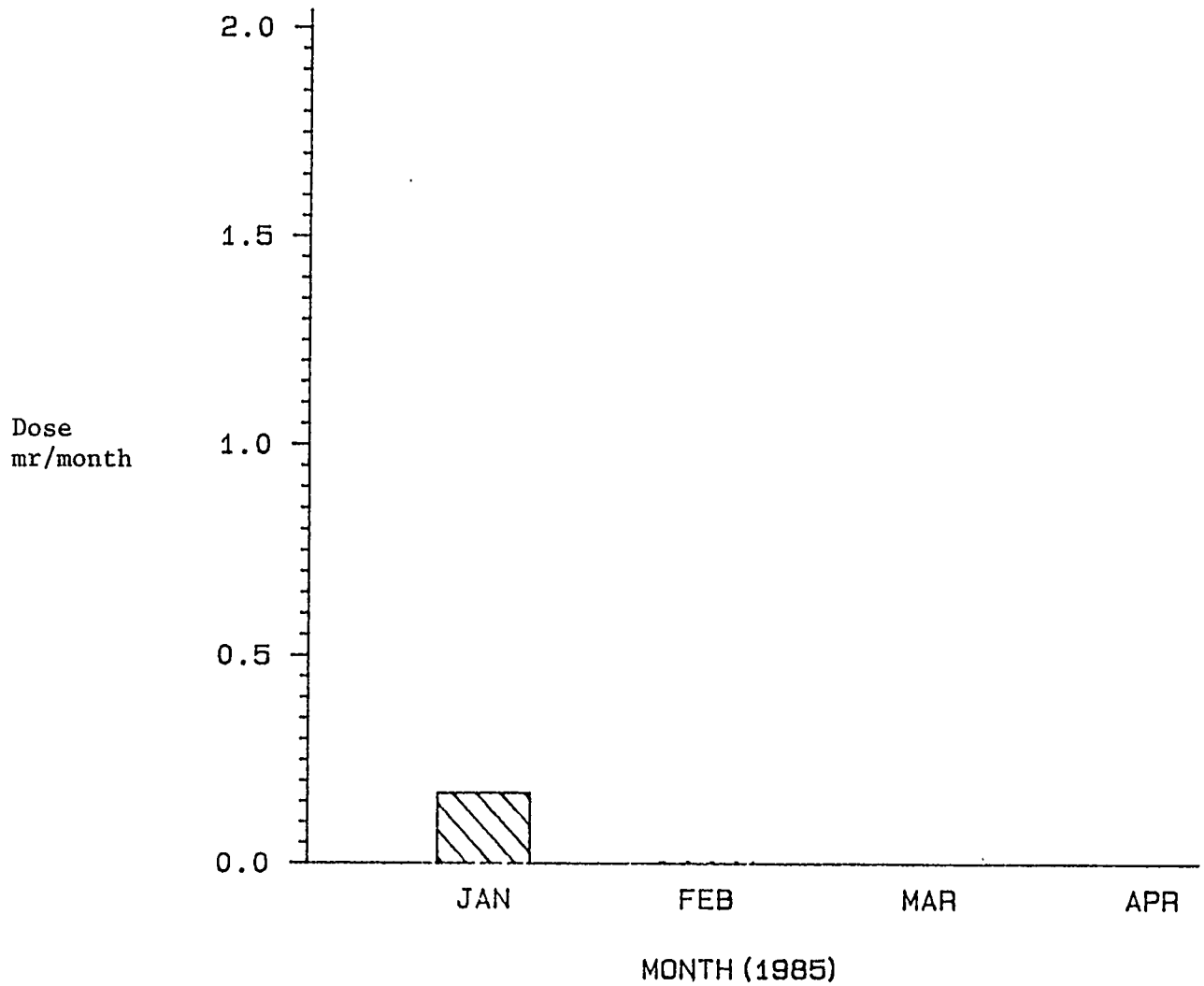

Fig. 1. Body Dose (mREM) Resulting from the Ingestion of Water at the Confluence of White Oak Creek and Clinch River.

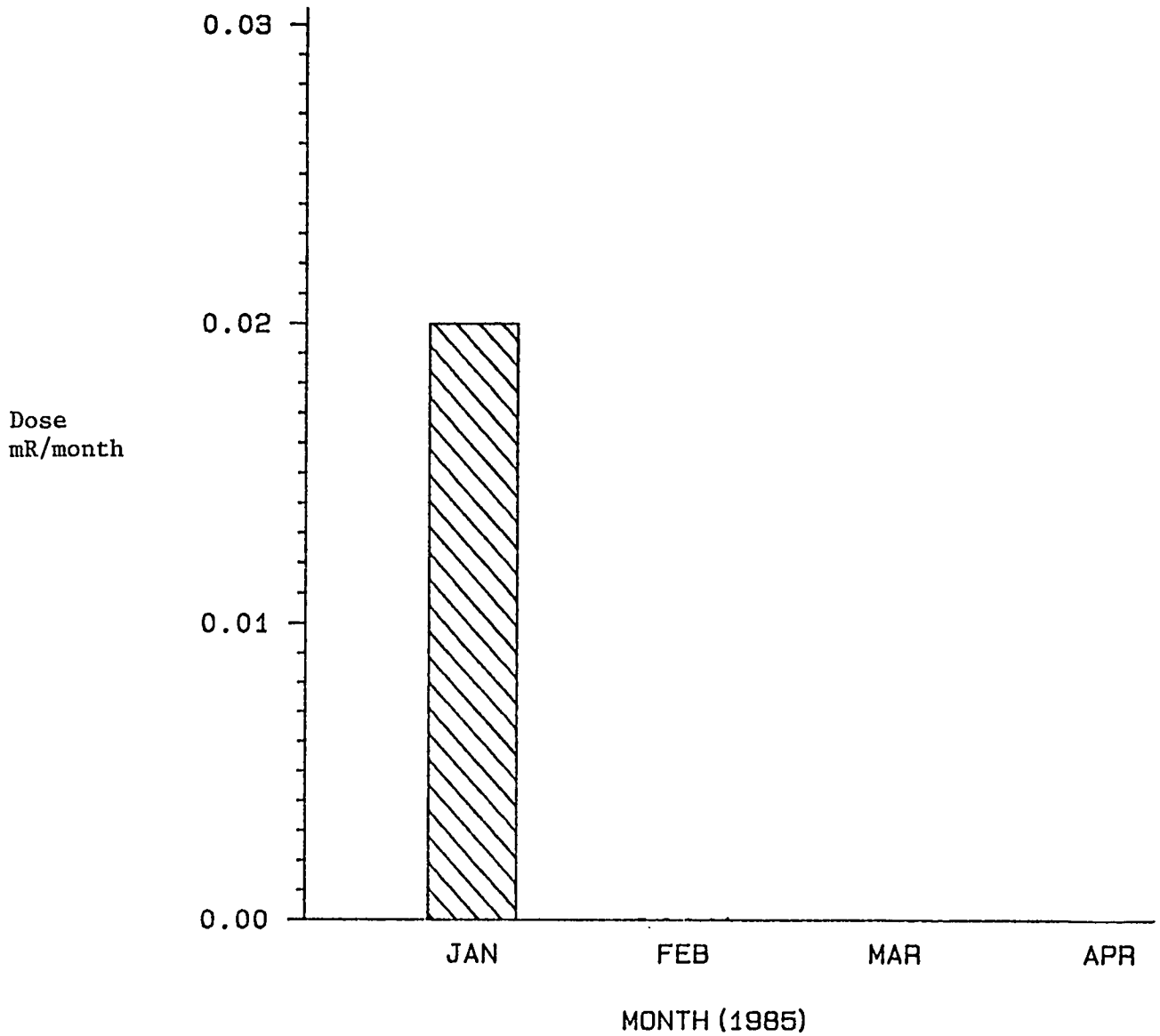

Fig. 2. Calculated Body Dose (mREM) Resulting from the Ingestion of Clinch River Water Below the Discharge of White Oak Dam.

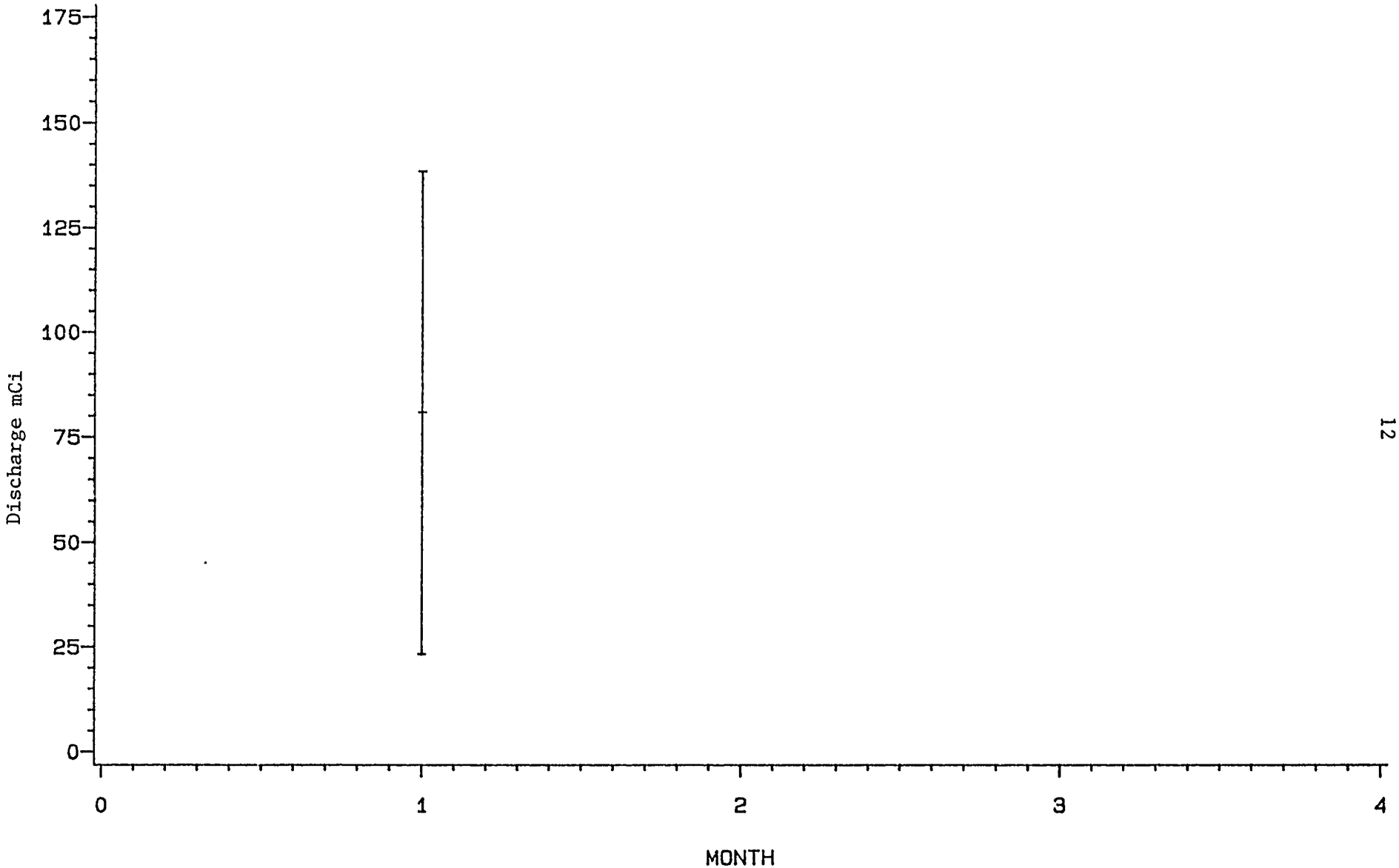

Fig. 3. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 — Analysis of ^{90}Sr.

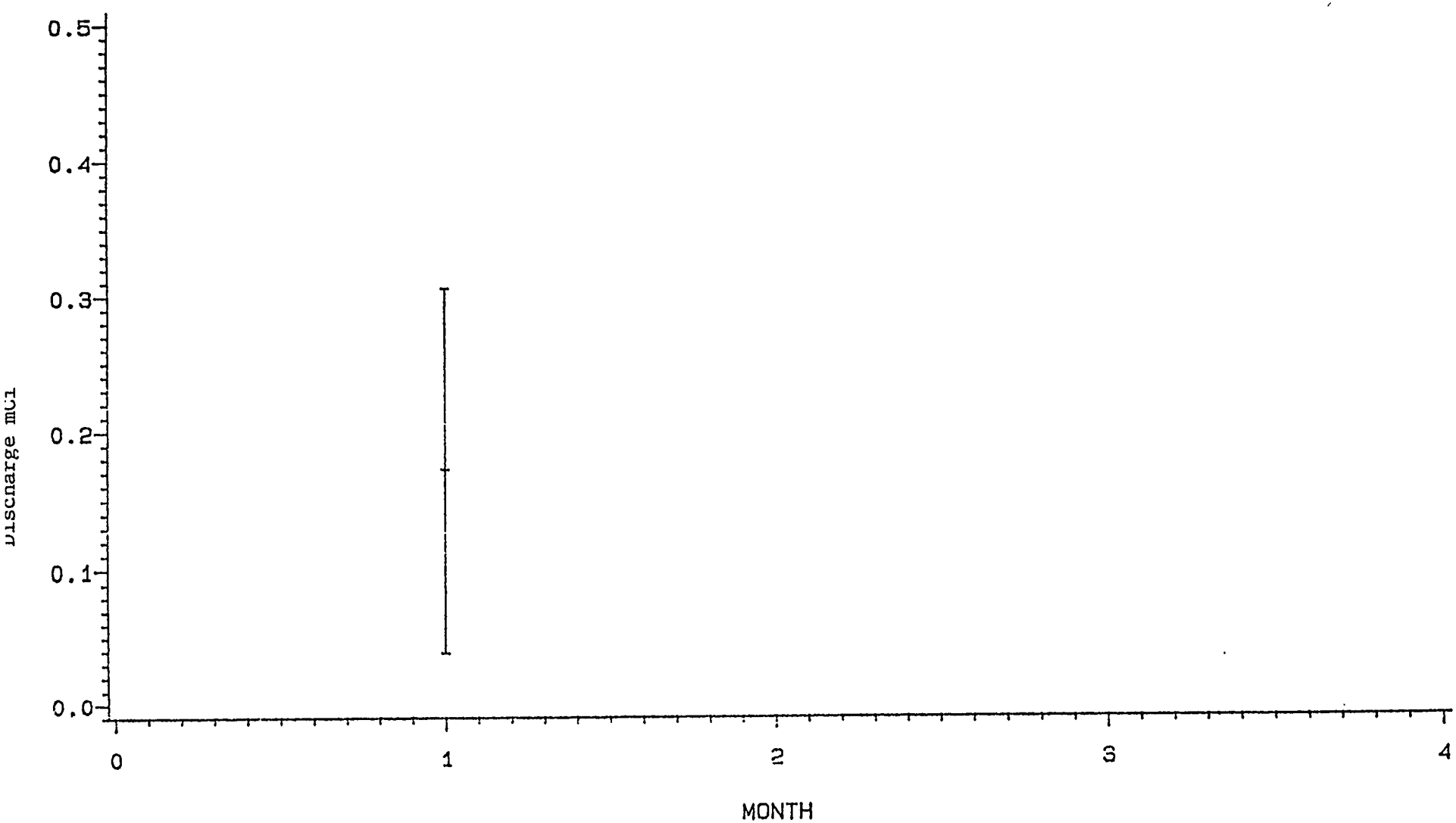

Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 -- Analysis of TRU.

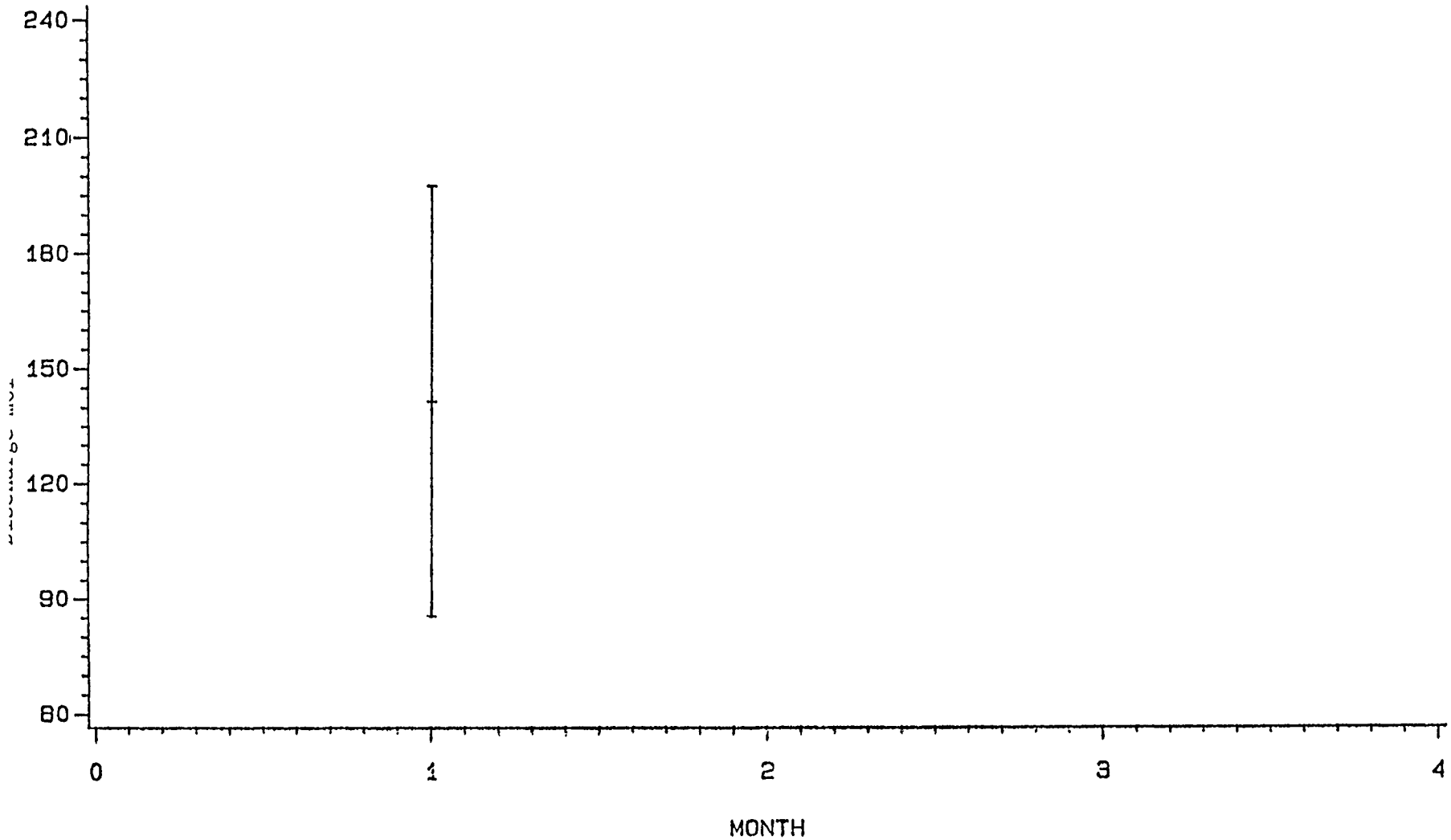

Fig. 5. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 — Analysis of ^{3}H.

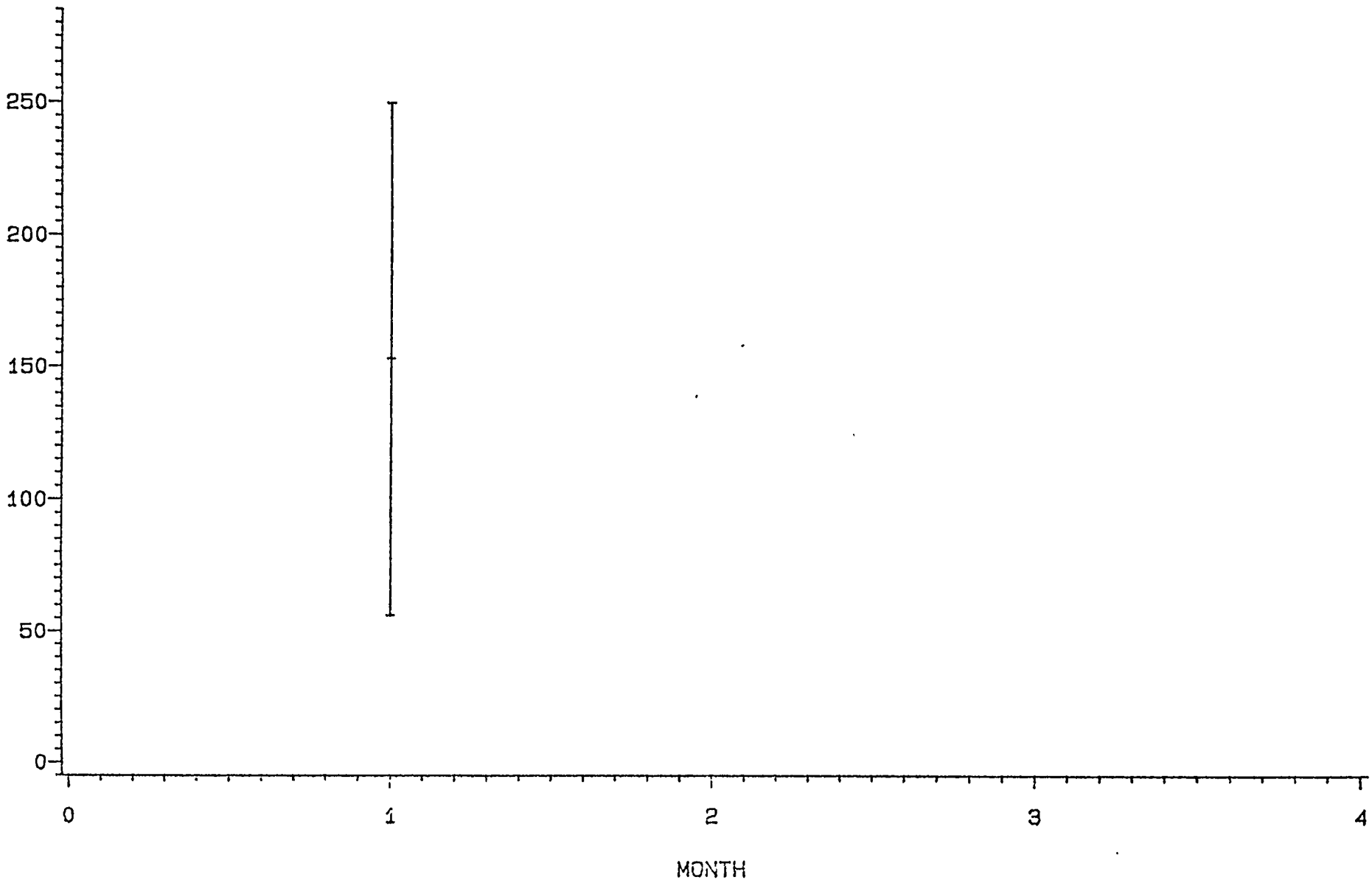

Fig. 6. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 -- Analysis of Gross Beta.

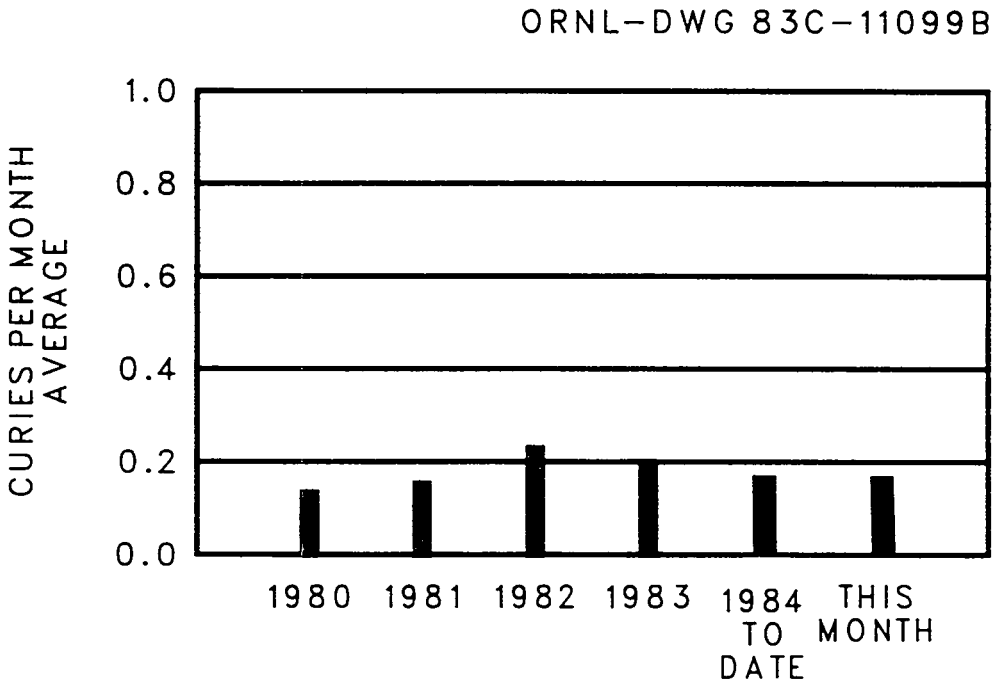

Fig. 7. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.3)

ORNL-DWG 85C-9237A

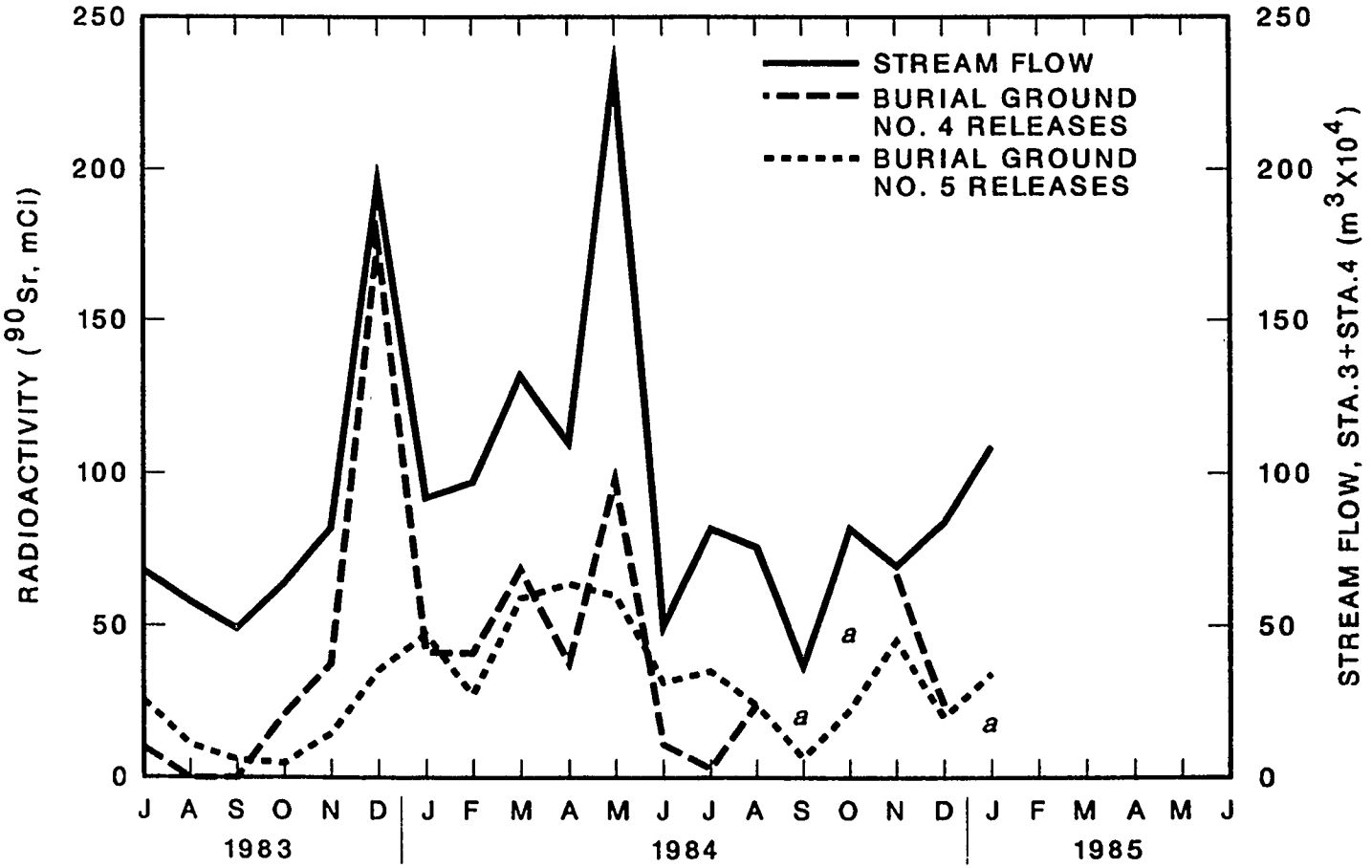

Fig. 8. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a]Not reported because of uncertainties with flow data & possible cross-contamination of sample

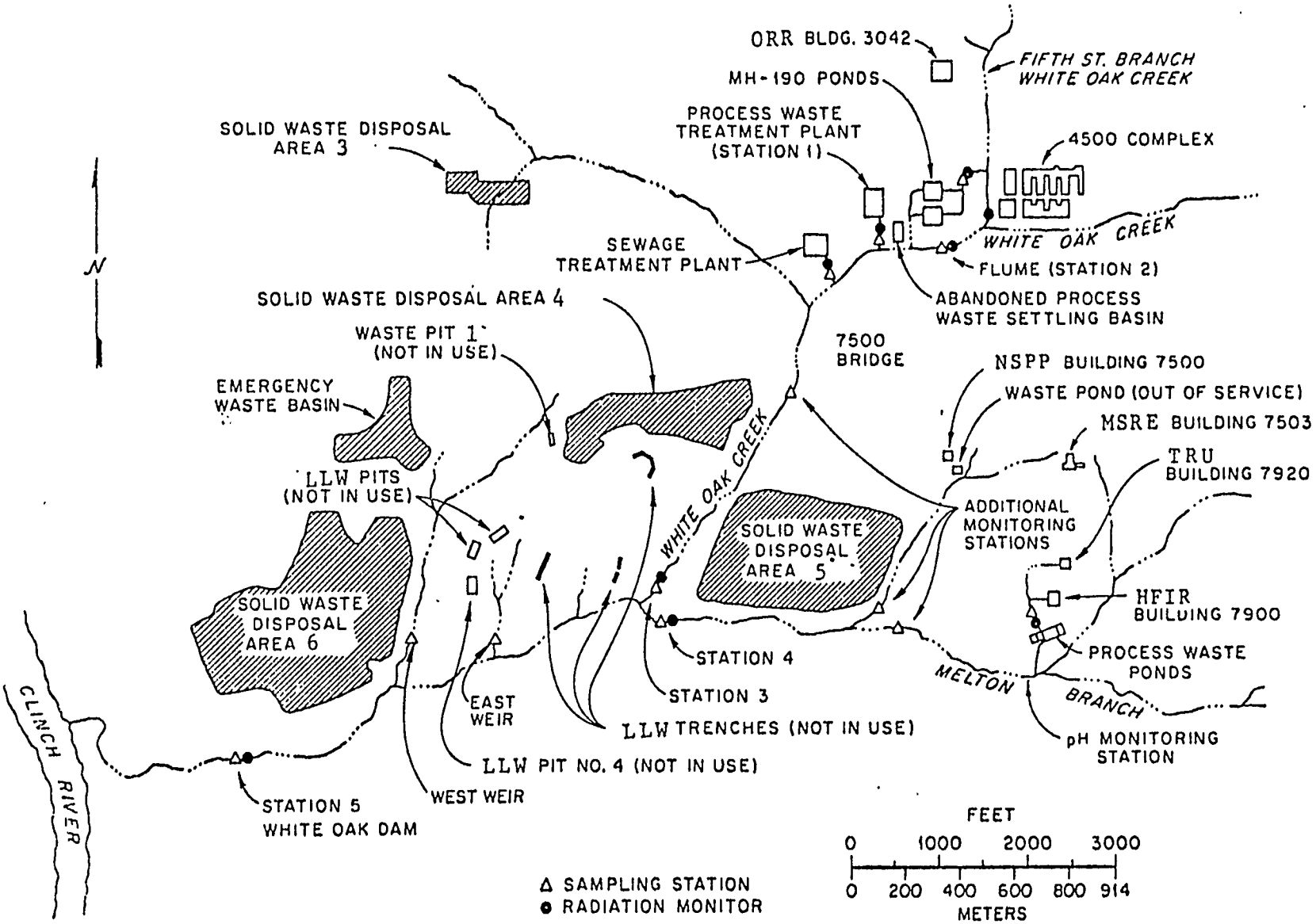

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

ORNL-DWG 83C-11100C

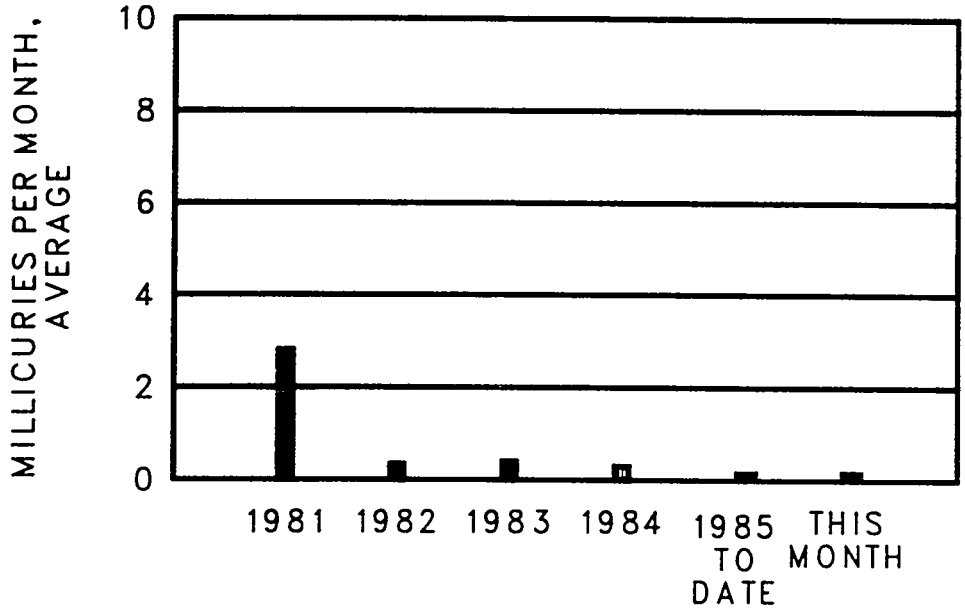

Fig. 10. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

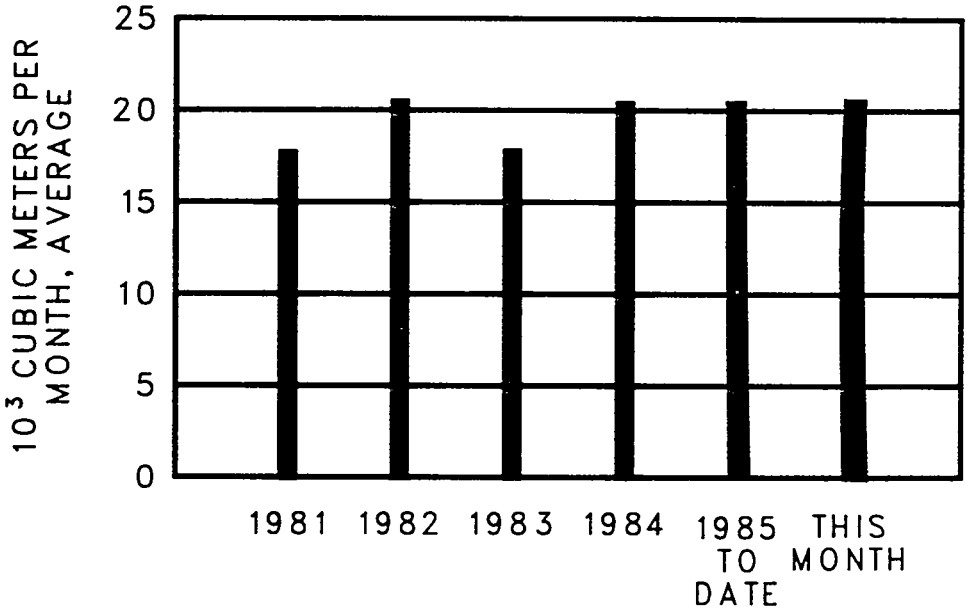

Fig. 11. Process Waste Volumes Treated in the PWTP.

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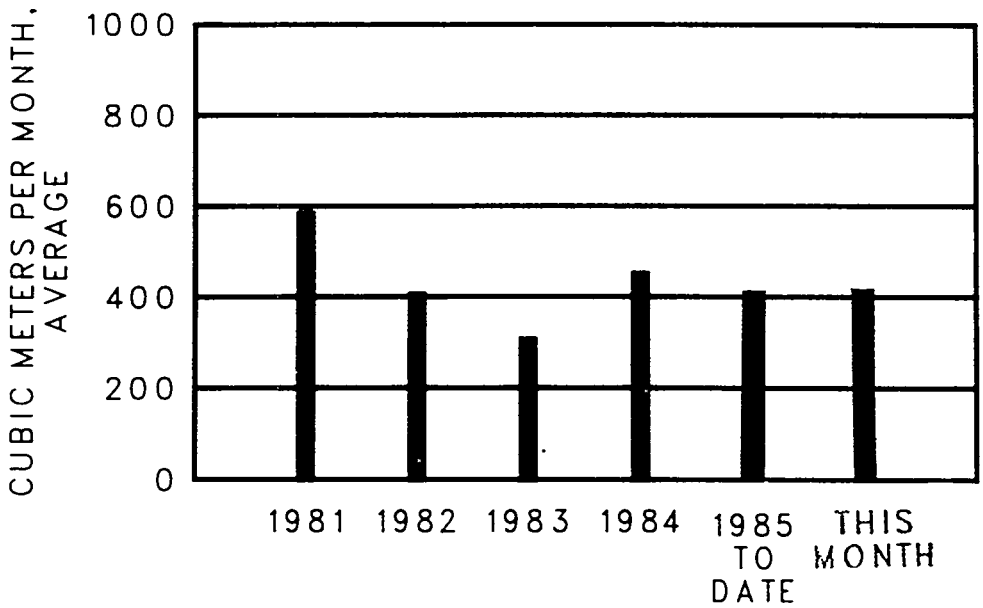

Fig. 12. Low-Level Waste Volume Generated this Month.

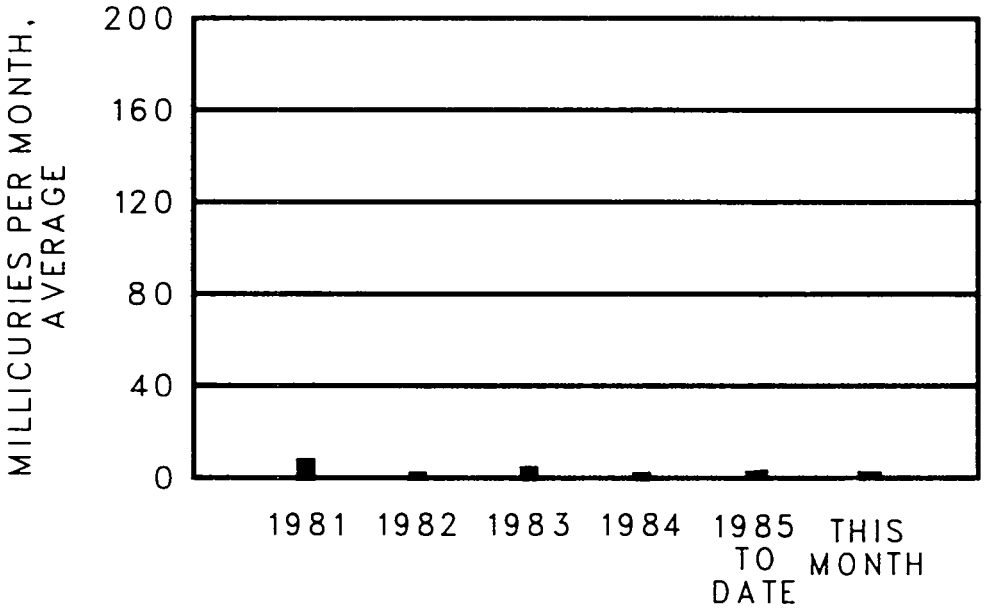

Fig. 13. Total Activity Released in Gaseous Waste (Mainly ^{131}I; not Including rare gases or other nonfilterable species). Maximum Permissible Operating Level is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.140	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.041	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.0001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.004	-----
Total Discharge from All Sources		0.185	
White Oak Dam to Clinch River (EOS Measurements)		0.410	0.76

[a]Refers to Fig. 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	5700	0.726	55.6	4.71	18.1
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.180[a]	13.8	3.2	12.3
Reactor Operations (MH 112)	13	0.001	0.1	3.49	13.4
Buildings 3503 and 3508 (MH 229)	0.49	<0.001	---	2.53	9.4
Buildings 3025 and 3026 (MH 149)	2.2	<0.001	---	1.74	6.7
Building 3019 (MH 25)	450	0.001	0.1	0.11	0.4
Waste Evaporator, Bldg. 2531 (MH 243)	470	0.019	1.4	1.53	5.9
Building 3525 (MH 235)	2.2	<0.001	---	1.85	7.0
Building 2026 (MH 240)	2.2	<0.001	---	0.80	3.1
Tank Farm Drainage	2300	0.379	29.0	6.09	23.4

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Activity (mCi)	Filterable Particulate Activity[a] (Ci)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.0001	1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤0.3	15	580
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<1	
MSRE - Stack No. 7512	<0.001	<0.001	
HFIR and TRU - Stack No. 7911	≤0.5	74	97
Activity in Gases Released at X-10 Site	≤0.8	190	
Tritium Target Fabrication Building		14 (^{3}H)	
Building 4508 Ventilation Discharges Room 265		No sample 1.1×10^{-4}	
Building 5505 Discharges Glove Box		1.3×10^{-3} 1.8×10^{-2}	

aThese values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

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DATE: September 7, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF JUNE 1985

TO: Distribution

FROM: C. B. Scott

Sponsor: J. H. Swanks

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SUMMARY

A total of 104 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for 81% of this total. The Environmental and Occupational Safety Division measured a 100-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total ^{131}I release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 100 mCi of ^{90}Sr was released from White Oak Lake during the period. The H^3 released over the dam amounted to 130 Ci, and the TRU assay was 0.4 mCi at this station. The mean weekly discharges of ^{90}Sr, H^3, TRU, and gross beta activities are shown in Fig. 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 83.3×10^4 and 6.4×10^4 m^3, respectively. Fig. 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 103 mCi of ^{90}Sr into White Oak Lake.

The Process Waste Treatment Plant and the 190 pond system released 0.12 and 0.21 mCi of ^{90}Sr into White Oak Creek during the period. A total of 5.1 mCi of ^{90}Sr was released from the sanitary waste system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	10.0	
190 Ponds	0.21	
Process Waste Treatment Plant	0.12	
Sewage Treatment Plant	5.1	
	15.43	
7500 Sampling Station	86.1[a]	
Burial Grounds 1 and 3 and Floodplains		70.7
Station 3	93.5	
Burial Ground 4		7.4
Melton Branch		
7900 Area (HFIR and TRU)	0.29	
7500 Area (NSPP and MSRE)	3.70	
	3.99	
Station 4	9.6	
Burial Ground 5		5.6
Liquid LLW Pit Disposal Area		
East Weir	<0.01	
West Weir	0.73	
	0.73	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	103.8	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		84.4
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		81.3

[a]The flow at this station was adjusted on the basis of the other watershed measurements.

Process Waste

A total of 2.32×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 2.24×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 38 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	43.0	27.5	34.5
Bed Volume (1 BV = 1.3 m^3)	581	366	478

Liquid Low-Level Waste

Both evaporator systems operated normally during the month. The average boil-down rate was 0.24 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 or W-22	339.3
Volume of LLW Feed Transferred to Evaporators	347.0
Volume of Evaporator Concentrate Transferred to W-23	41.4
Service Tank Inventory:	
W-21, Beginning of Month	64.4
W-21, End of Month	82.9
W-22, Beginning of Month	107.5
W-22, End of Month	81.3
W-23, Beginning of Month	94.5
W-23, End of Month	135.9
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	1095.0
Total Volume at End of Month	1095.0

Note: Liquid low-level waste is pumped from the area collection tanks into W-21 and W-22, which act as feed tanks for the evaporators. Evaporator concentrate is stored in W-23 prior to transfer to Melton Valley Storage Tanks.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of LLW generated each month.

	m^3
Transuranium Processing Area	8.6
Building 3019	18.9
Building 3525	24.0
Radioisotopes Processing Area	54.3
ORR and BSR	16.6
High Flux Isotope Reactor	32.7
Fission Products Development Laboratory	28.9[a]
4500 Complex	1.7
Building 3544	100.9

Gaseous Waste

The ORNL stacks discharged approximately 9.9 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was 224 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 4.5% and 0.6% respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

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[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetter from the pit during the month. The pit can only be jetted to LLW, since it was designed in this fashion.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.094	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.010	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.0003	
Total Discharge from All Sources		0.104	
White Oak Dam to Clinch River (EOS Measurements)		0.074	0.160

[a]Refers to Fig. 9.

[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	2600	0.428	67.8	6.09	25.4
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.010[a]	1.6	0.50	2.1
Reactor Operations (MH 112)	6.5	0.001	0.2	6.42	26.8
Buildings 3503 and 3508 (MH 229)	8.1	<0.001	---	2.43	10.1
Buildings 3025 and 3026 (MH 149)	5.0	<0.001	---	1.01	4.2
Building 3019 (MH 25)	4500	0.009	1.4	0.07	0.3
Waste Evaporator, Bldg. 2531 (MH 243)	2000	0.053	8.4	0.98	4.1
Building 3525 (MH 235)	5.6	<0.001	---	0.84	3.5
Building 2026 (MH 240)	2.8	<0.001	---	3.26	13.6
Tank Farm Drainage	2000	0.130	20.6	2.40	9.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Activity[a] (mCi)	Filterable Particulate Activity[b] (μCi)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.001	<1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤1.3	2981	3431
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<2	
MSRE - Stack No. 7512	<0.001	<1	
HFIR and TRU - Stack No. 7911	≤7.9	17	
Activity in Gases Released at X-10 Site	≤9.2	3000	446

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.
[b]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

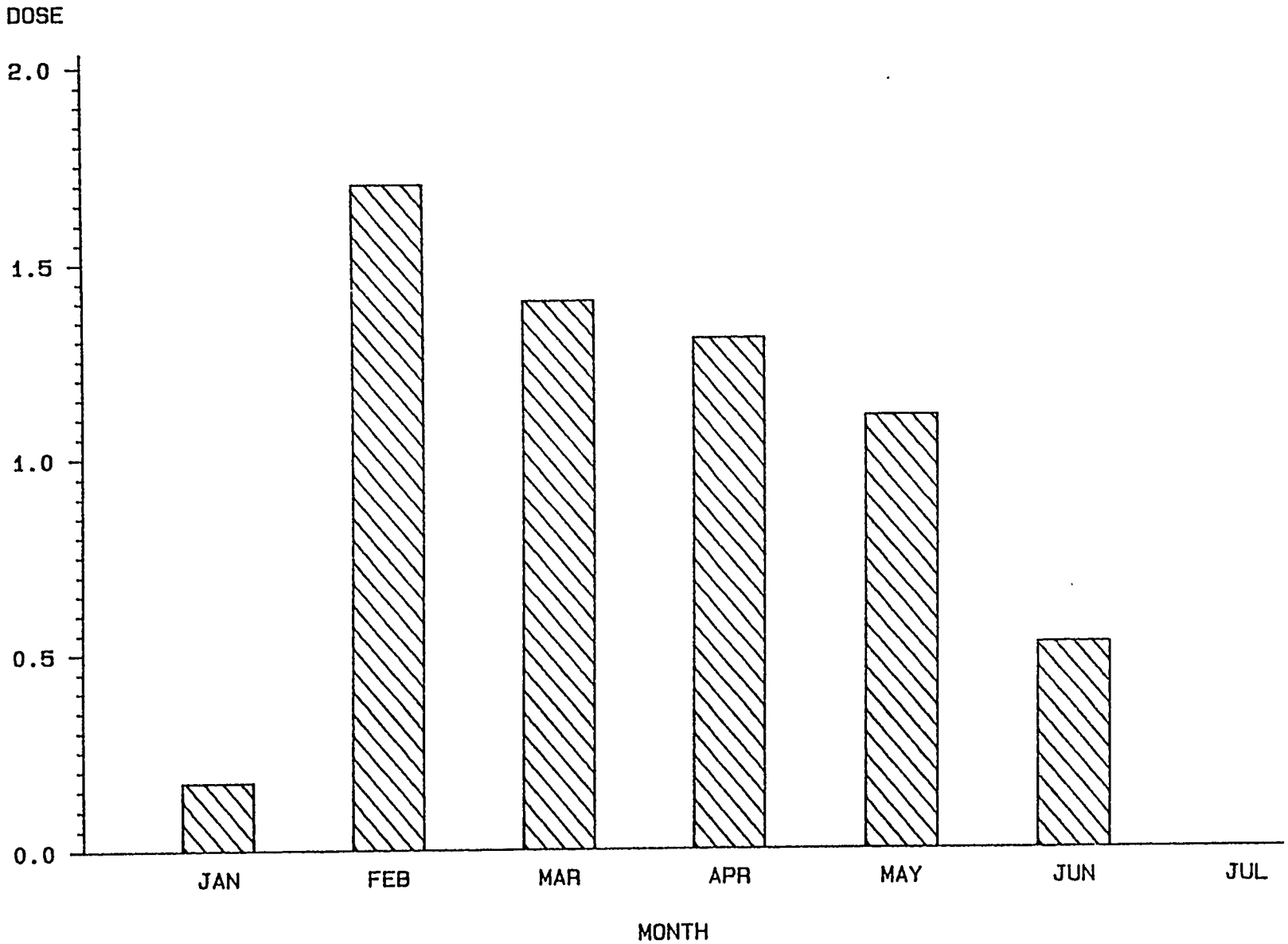

Fig. 1. Body Dose (mrem) Resulting From the Ingestion of Water at the Confluence of White Oak Creek and Clinch River.

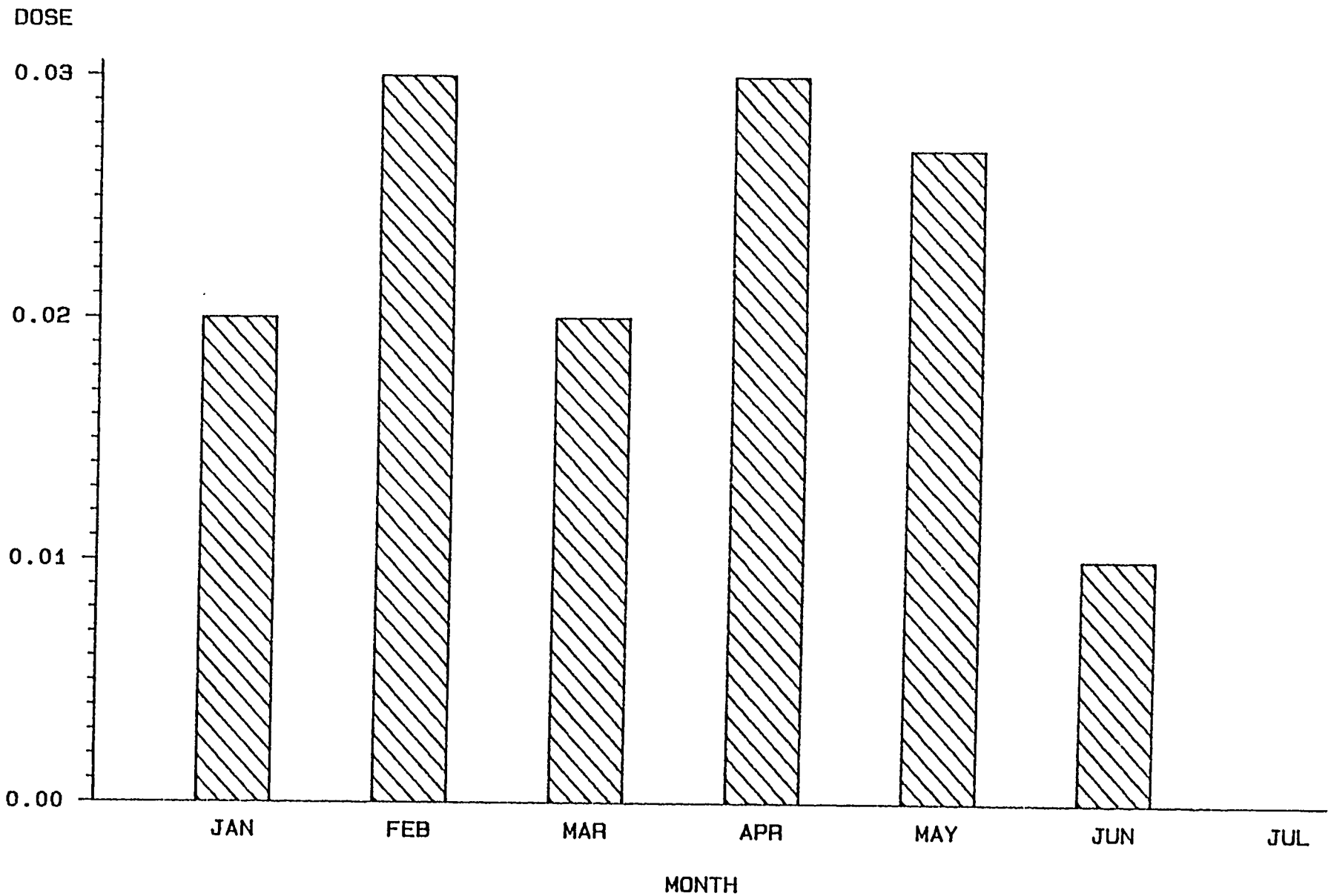

Fig. 2. Calculated Body Dose (mrem) Resulting From the Ingestion of Clinch River Water Below the Discharge of White Oak Dam.

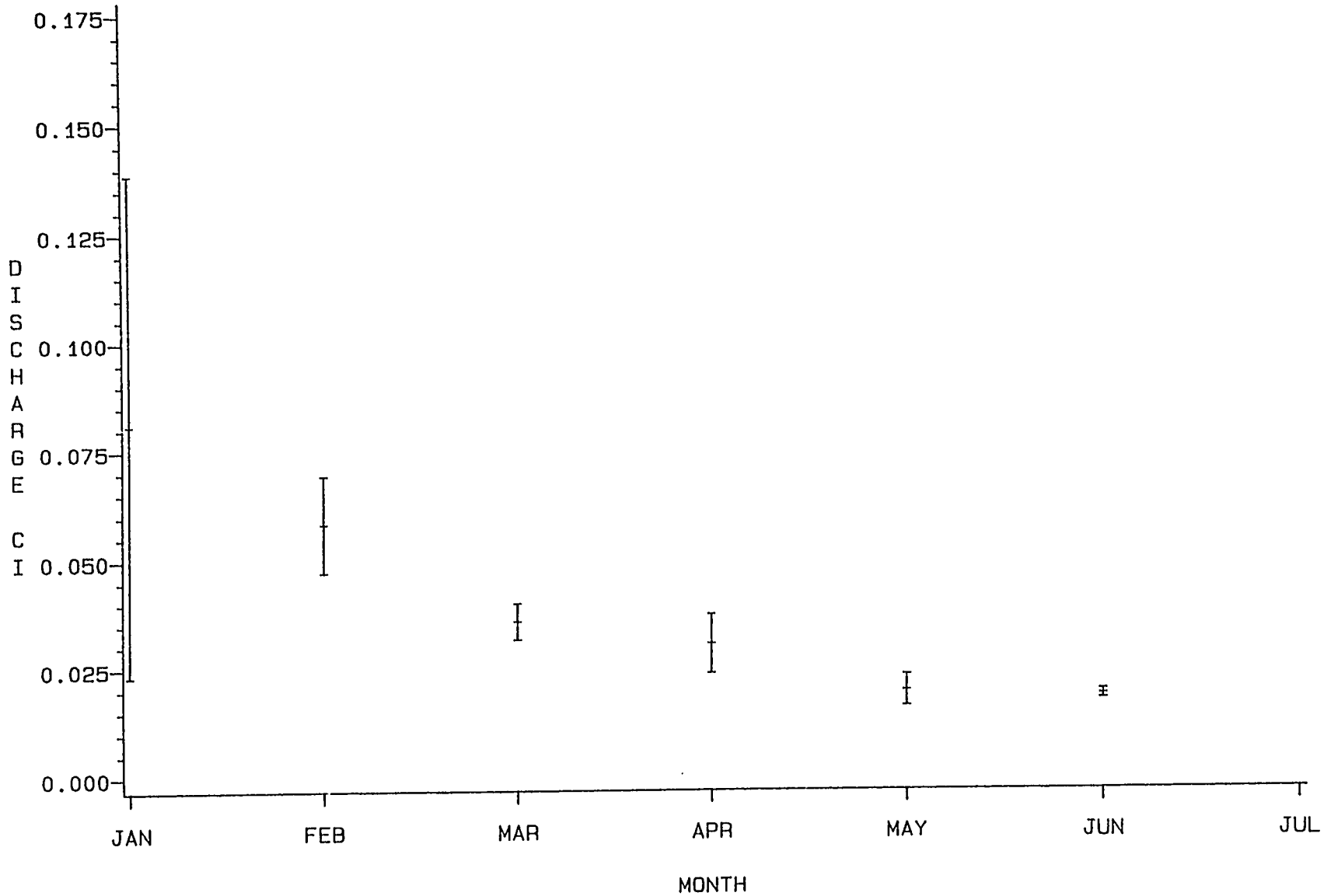

Fig. 3. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - SR-90.

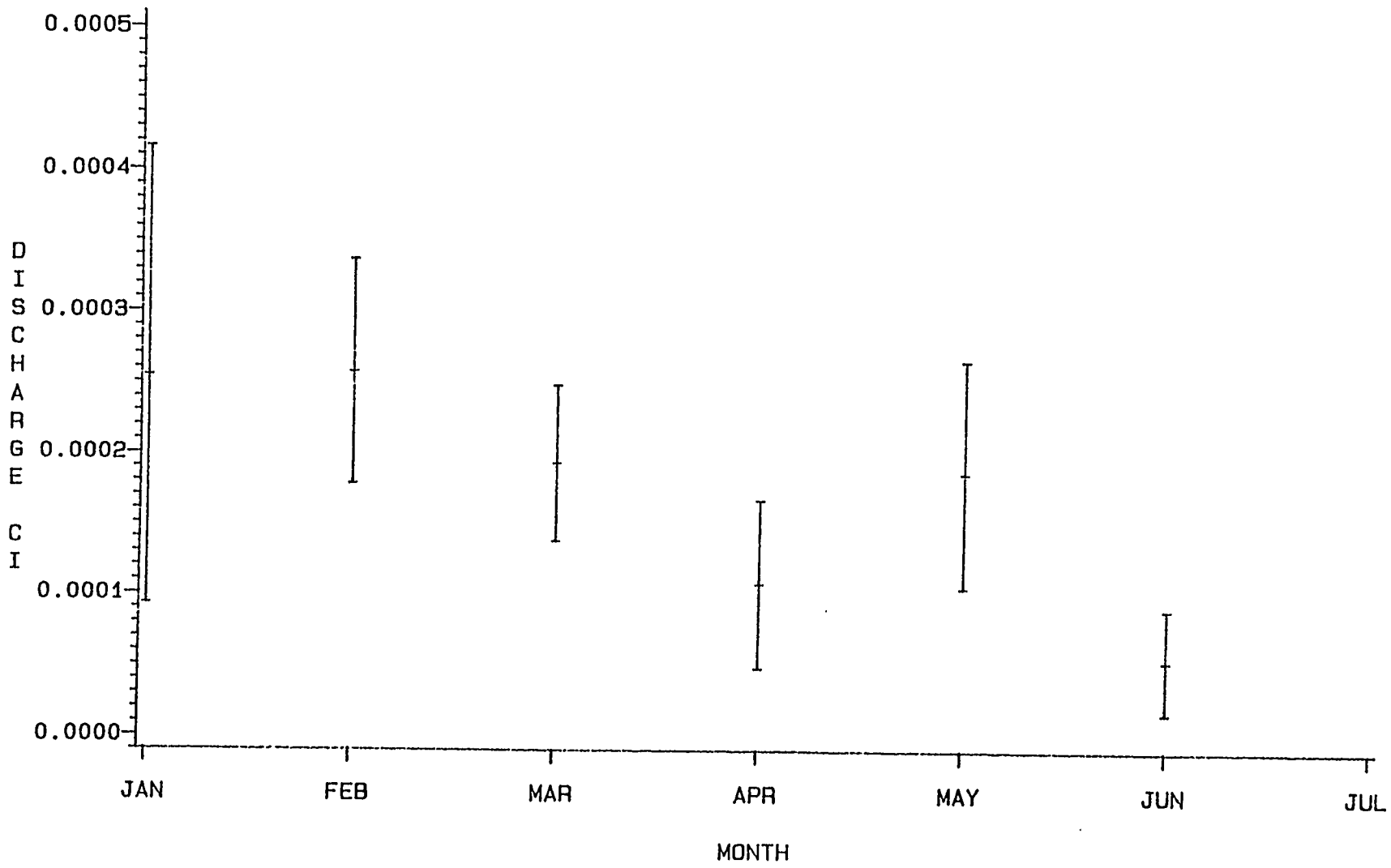

Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - TRU.

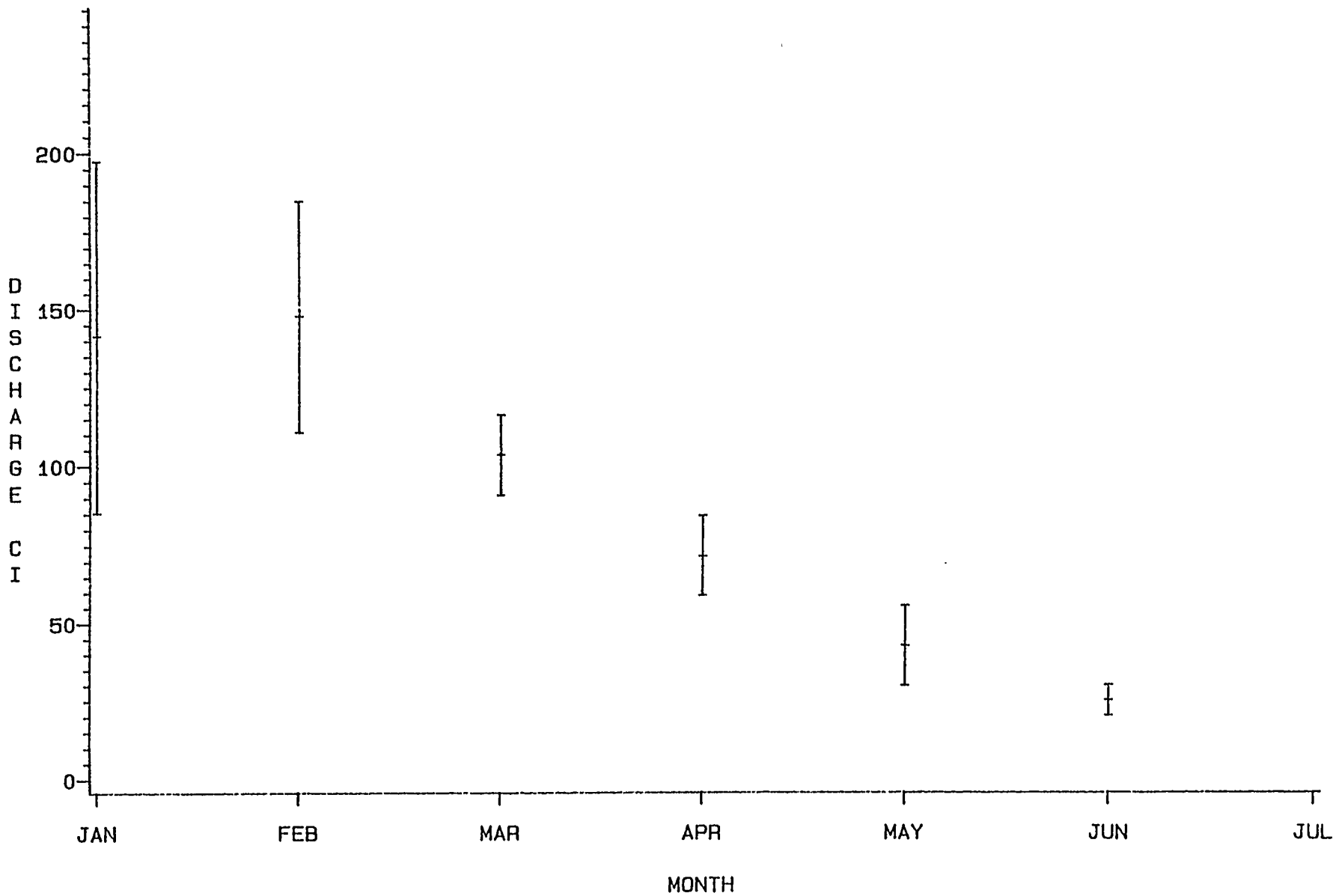

Fig. 5. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - H-3.

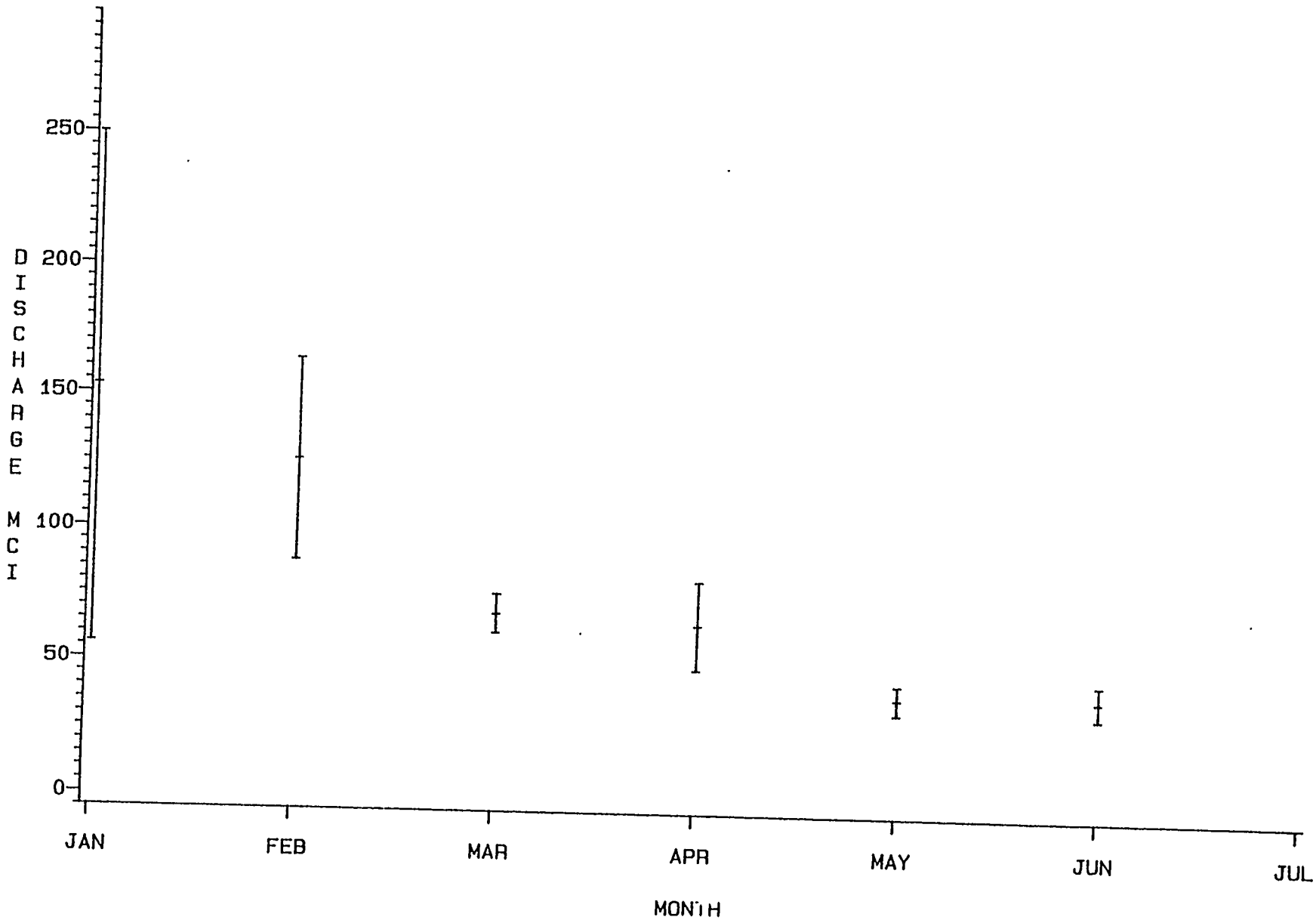

Fig. 6. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dame During 1985 - Gross Beta.

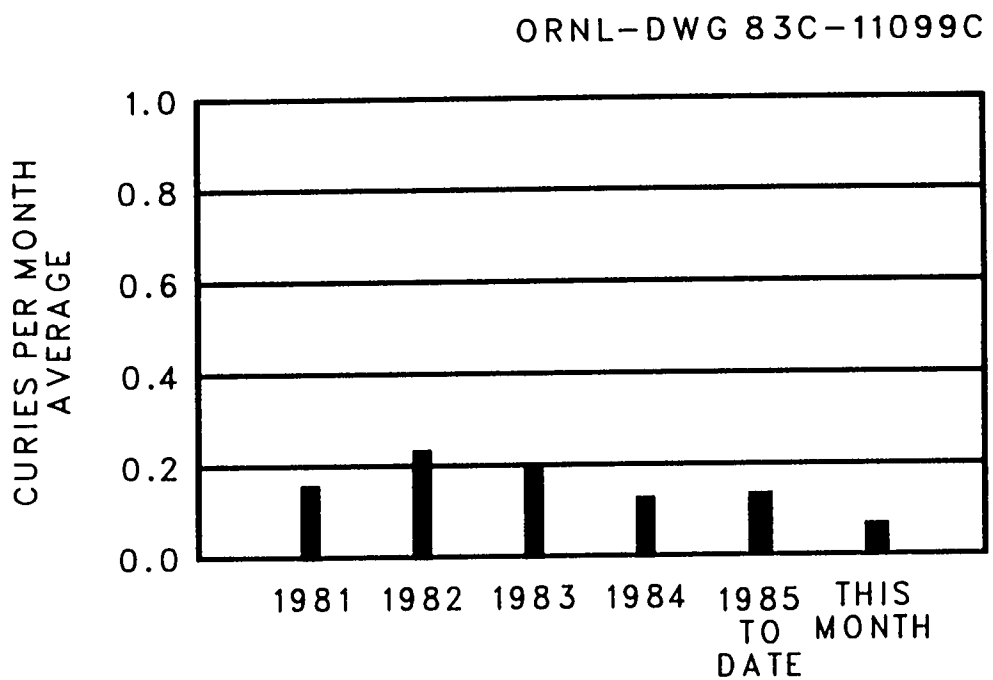

Fig. 7. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 9).

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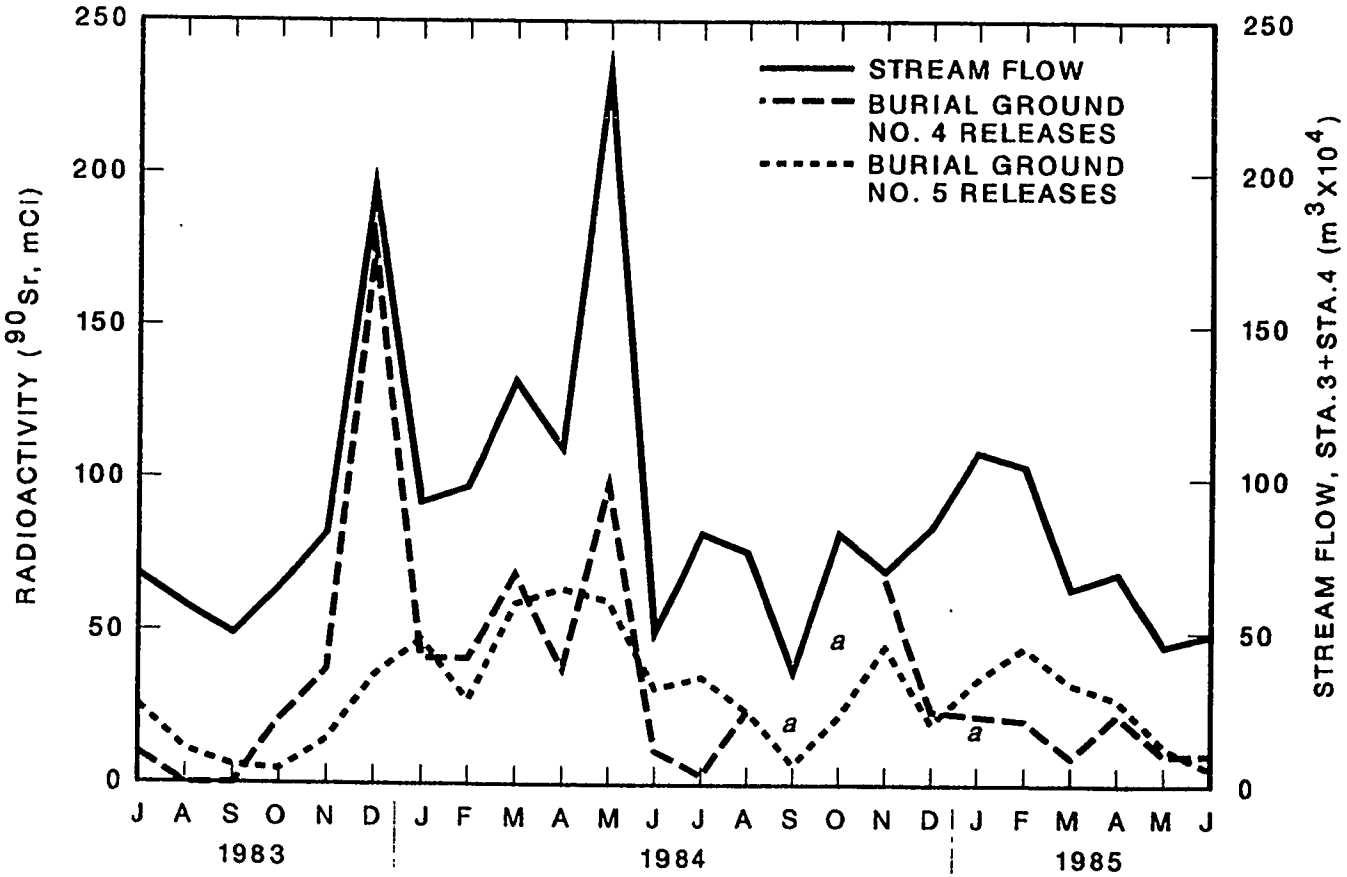

Fig. 8. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a] Not reported because of uncertainties with flow data & possible cross-contamination of sample

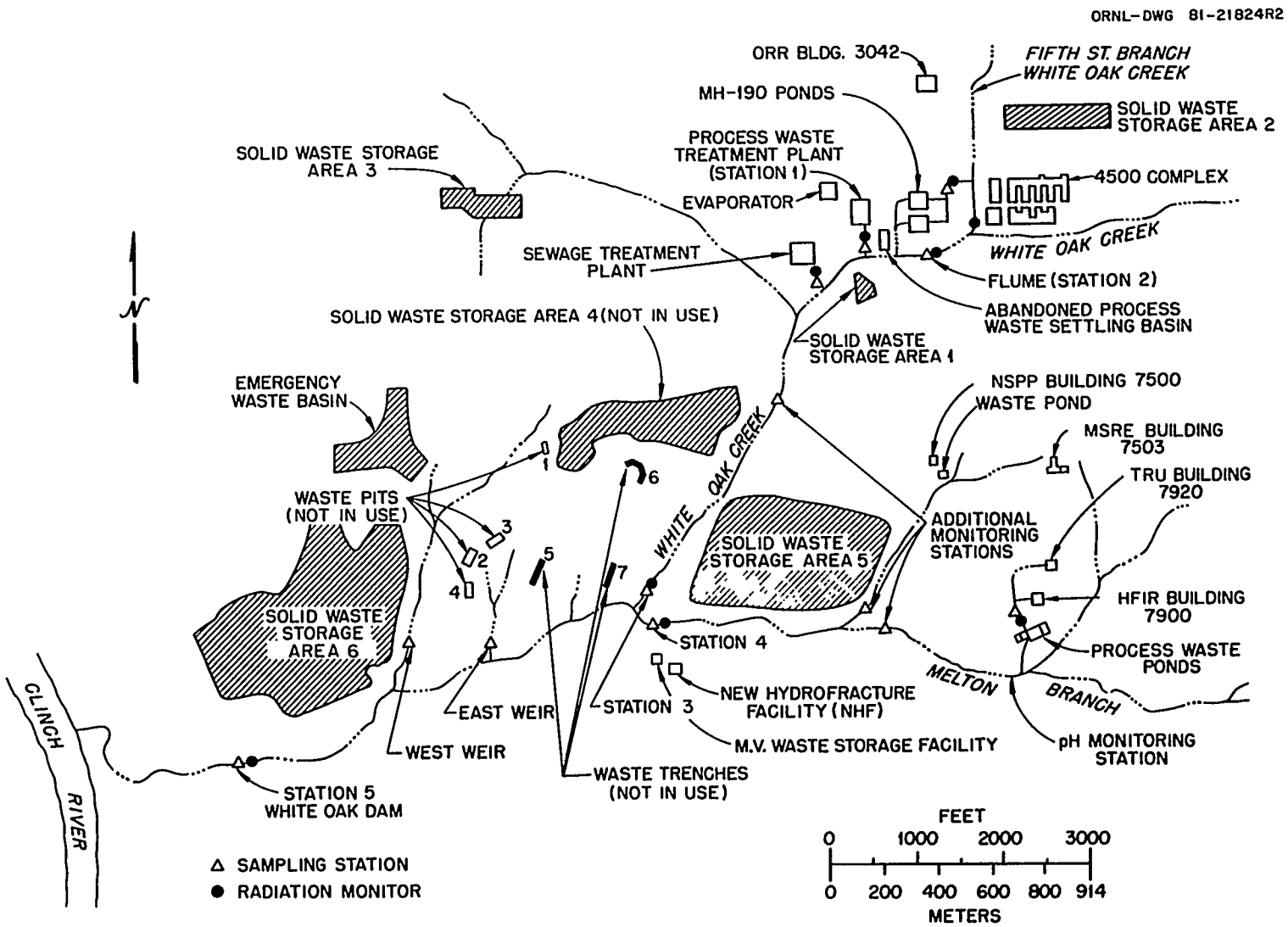

FIG. 9. LOCATION PLAN FOR WHITE OAK CREEK SAMPLING STATIONS AND RADIATION MONITORS.

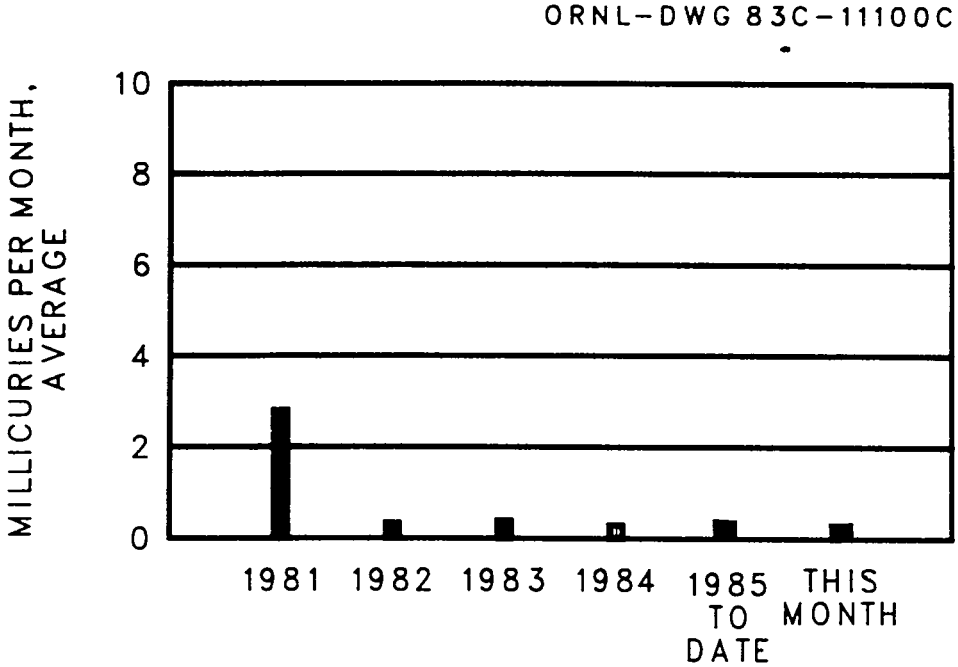

Fig. 10. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

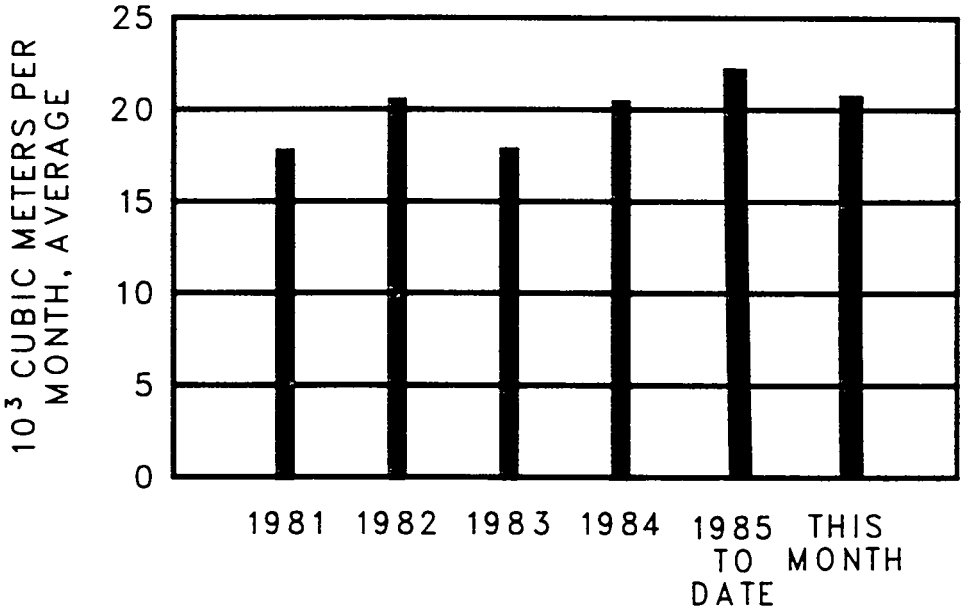

Fig. 11. Process Waste Volumes Treated in the PWTP.

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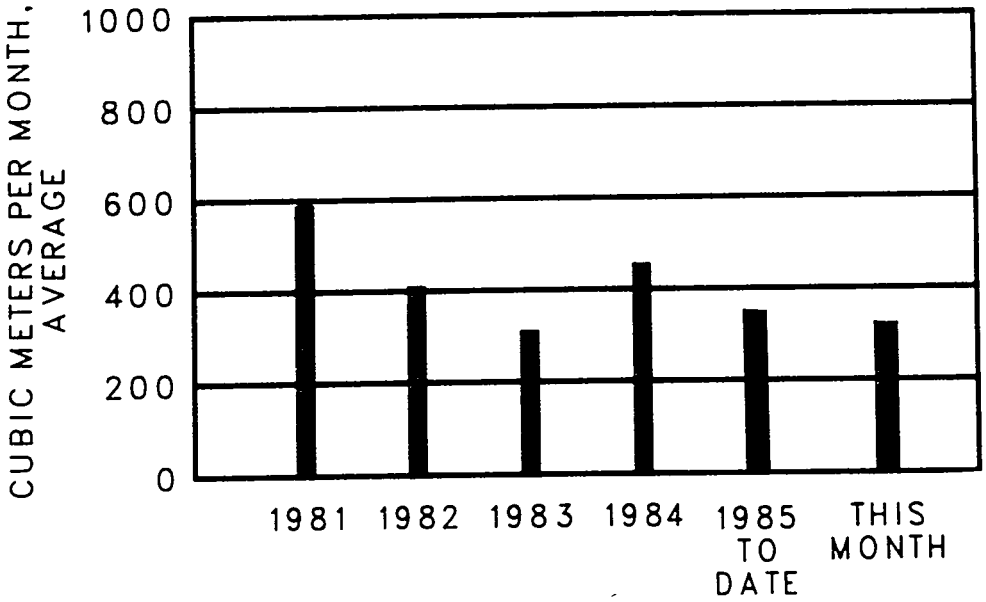

Fig. 12. Low-Level Waste Volume Generated This Month.

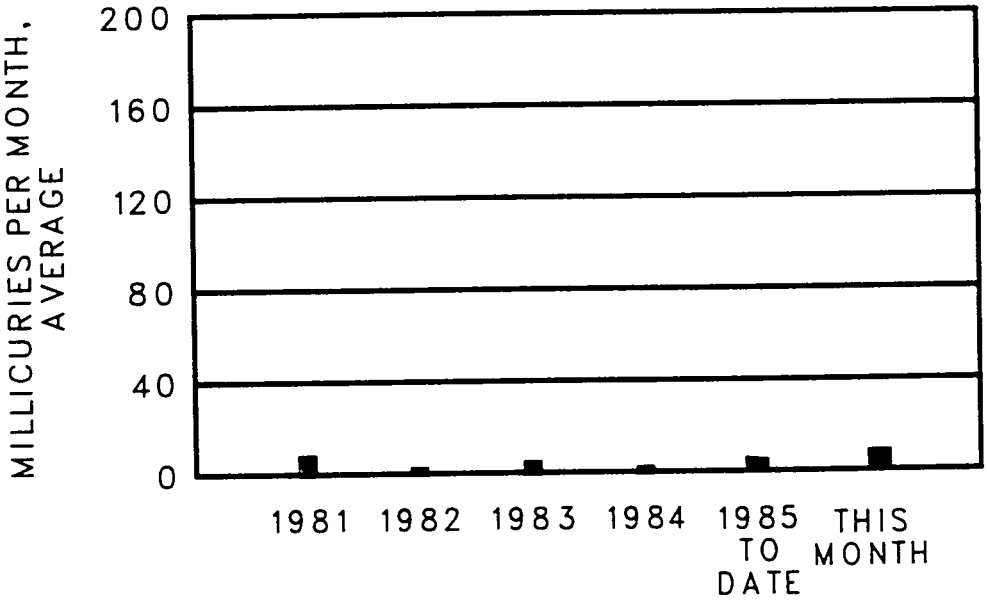

Fig. 13. Total Activity Released in Gaseous Waste (Mainly ^{131}I; not including rare gases or other nonfilterable species). Maximum Permissible Operating Level is 13 Ci per Quarter.

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