2018

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CENTRAL FILES NUMBER
64-3-21

COPY NO. 40

DATE: March 10, 1964

SUBJECT: Radioactive Waste Disposal
Report for the month of January 1964

TO: Distribution

FROM: L. C. Lasher

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

David R Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 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 No. 1. Figures No. 2 and 3 compare the discharge of radioactive waste on a monthly basis.

A total of 40 curies of radioactivity was discharged into White Oak Creek this month. The ruthenium discharge (characteristically the largest single contaminant) amounted to 23 curies. Most of this activity came from the disposal pit area. The difference between the 23 curies released to the creek and the 51 curies measured at the dam (station 7) is probably due to the freezing and thawing of the soil in the former White Oak Lake bed; similar conditions had been noted during the winter months in previous years. This condition may also be responsible for the difference of 0.23 curie in the measurements of the strontium release.

The release of activity from Bethel Valley was considerably higher than normal because of two operating mishaps. A spill at the Fission Products Development Laboratory discharged 25 curies of promethium-147 into the process waste system. Following chemical treatment, 11 curies of this nuclide were discharged into the creek. The sanitary system and a storm drain became contaminated as a result of a break in the intermediate level waste transfer line from the Isotope Area to W-5; 4 curies of cesium-137 and 0.3 curie of strontium-90 were released into the creek through these systems.

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	0.6	Trace	0,8	13
Miscellaneous discharges from east end of plant	2	0.08	none detected	0.002	0.08
Total discharge from Bethel Valley area	3	0.9	$\angle$0.2	3.9	16
Total discharge from Melton Valley area	4	0.1	none detected	0.01	0.1
East waste pit seepage	5	0.0009	21	$\angle$0.005	22
West waste pit seepage	6	0.0019	2	$\angle$0.02	2
Total discharge from all sources	3,4,5,6	1.0	23	4	40
White Oak Dam to Clinch River (Health Physics measurement)	7	1.23	51.21	2.52	59.65
Gaseous Waste[3]					
3039 Stack	8				4.6
3020 Stack	9				0.004
3018 Stack	10				None
Total activity in gases released					4.6

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

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

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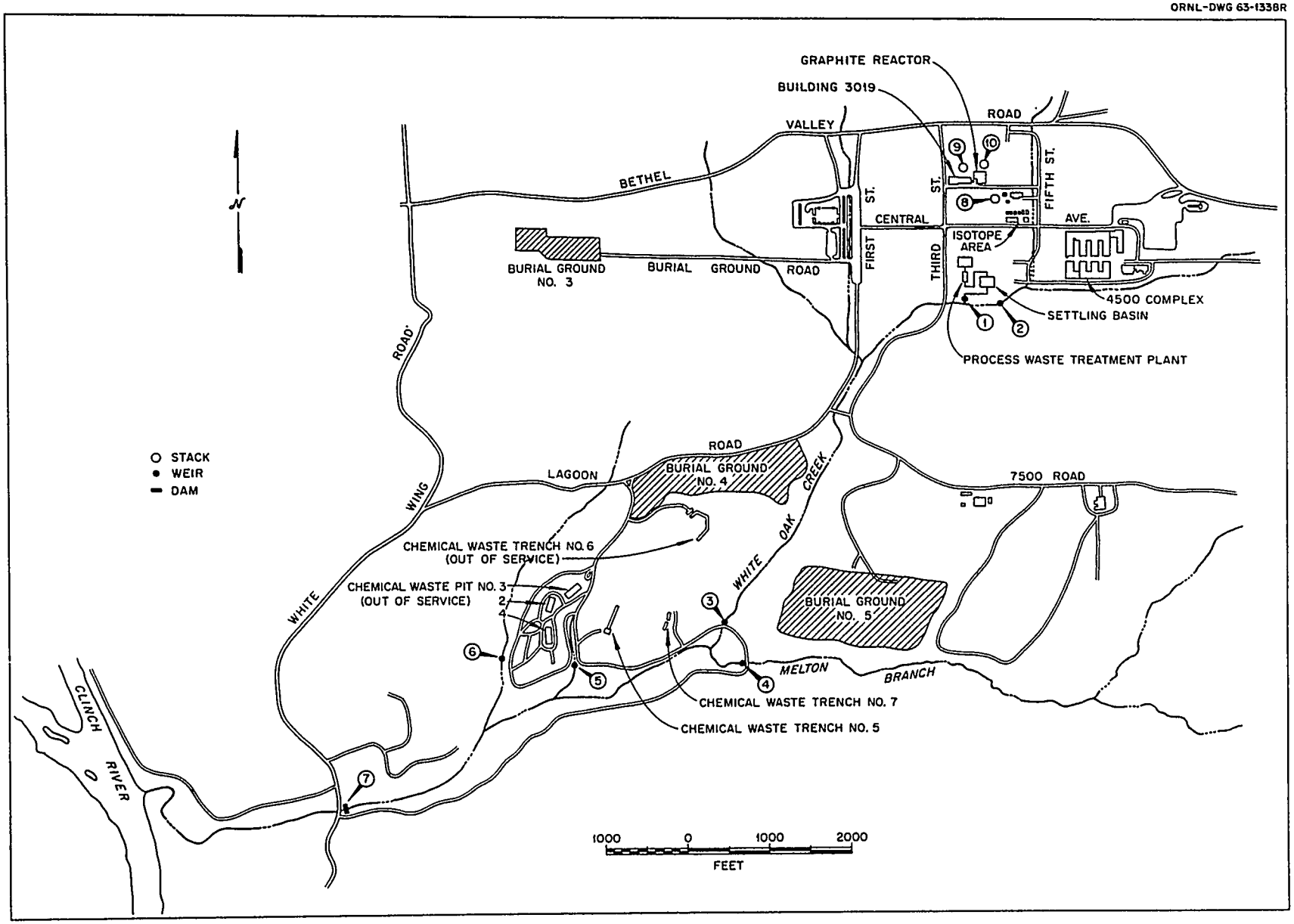

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

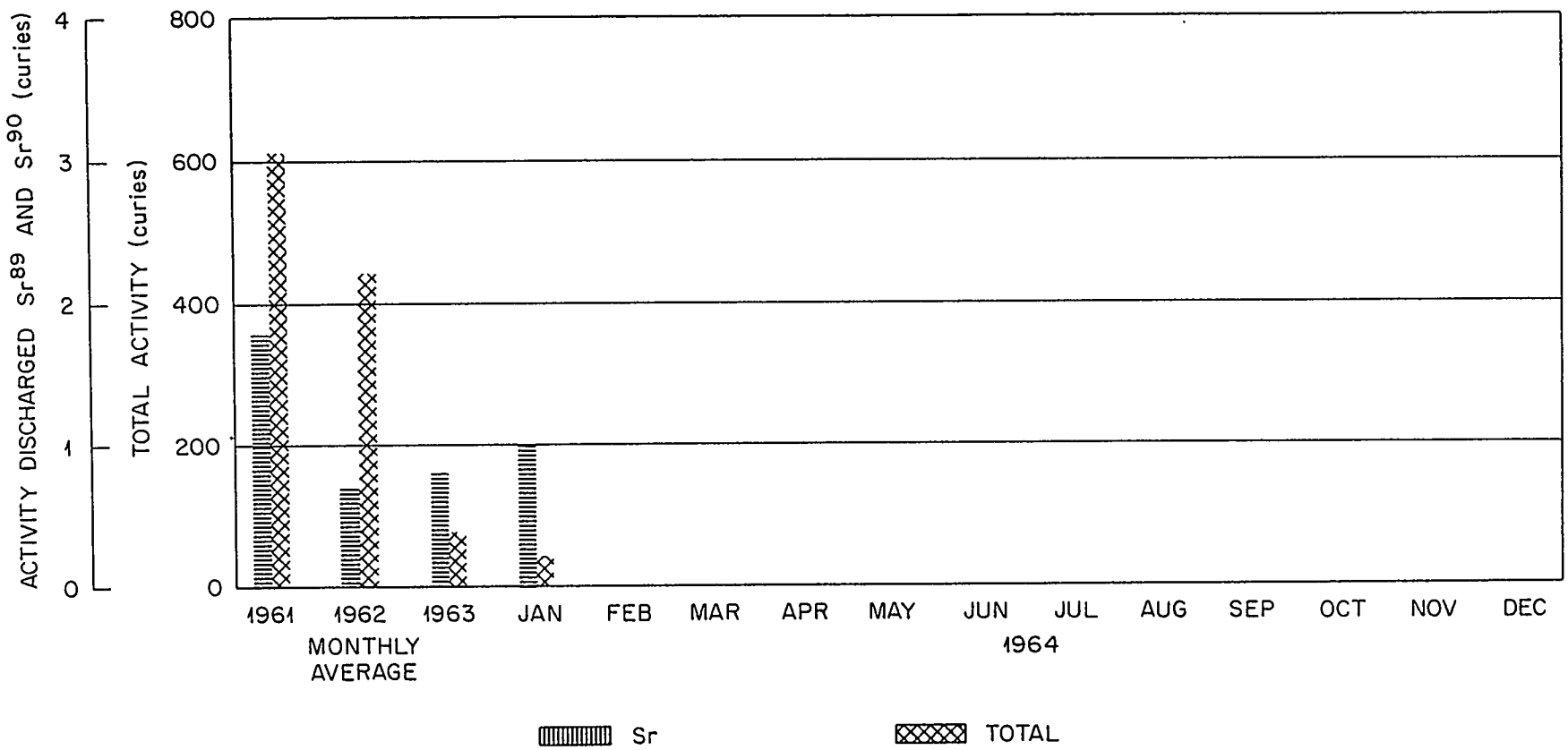

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

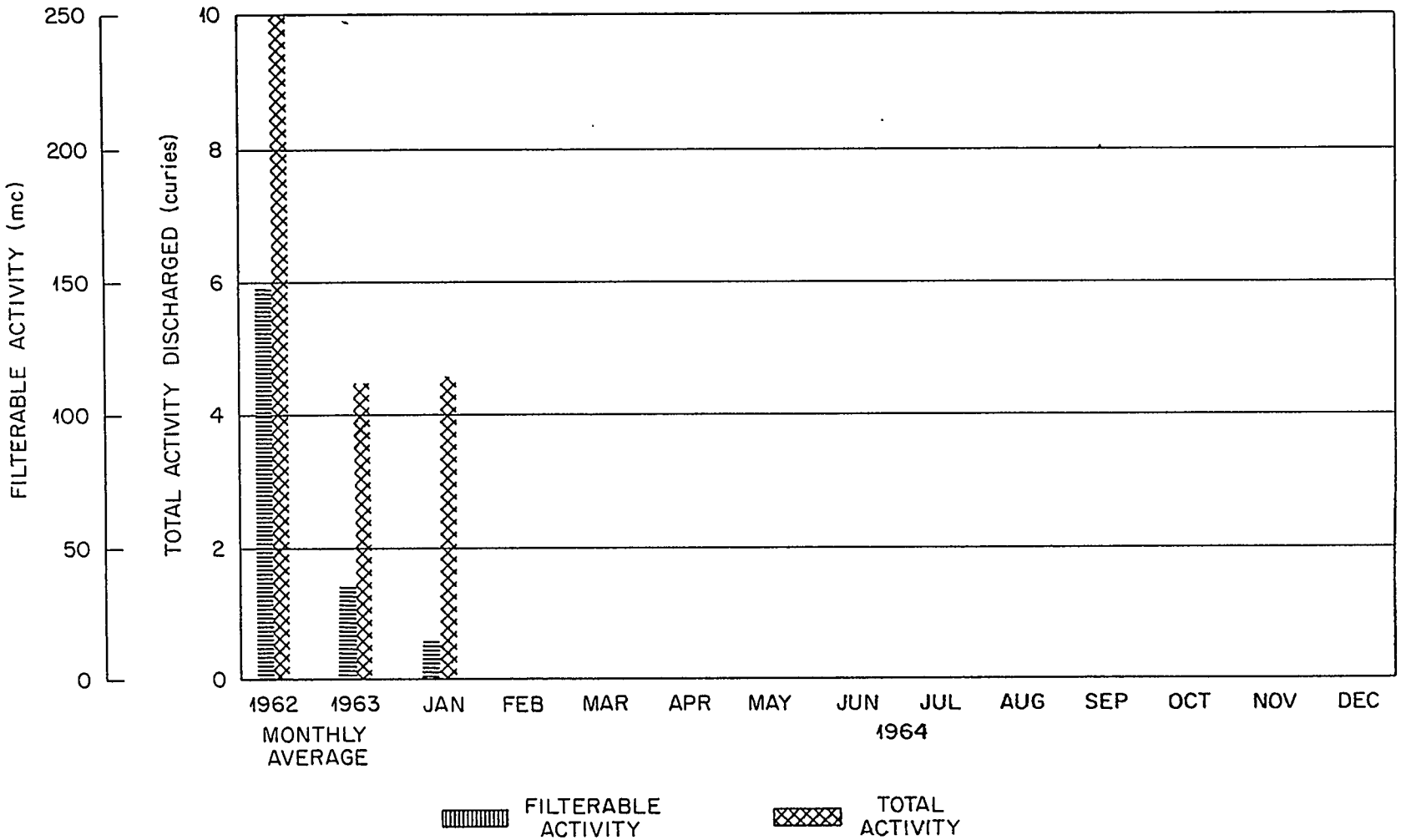

Fig. 3 Activity Release in Gaseous Waste

For the second consecutive month, approximately 0.1 curie of radioactive strontium was released into the Melton Valley stream from the 7500 Area pond. Removing the pond from service and filling it in is being held up by several piping changes in Building 7500.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The process waste treatment removed 14 curies of promethium-147 allowing only 11 curies of this nuclide to be discharged to the creek. Strontium decontamination, although still below normal, has improved this month. The capacity of the Waste Treatment Plant was again exceeded, and approximately 1.5 million gallons of waste was discharged into the creek without chemical treatment.

Table No. 2 presents data pertinent to the operation of the Waste Treatment Plant, and Table No. 3 is a tabulation of the waste discharged into the process system.

INTERMEDIATE-LEVEL WASTE

A total of 378,000 gallons of waste was pumped to the disposal trenches during the month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	122,400
2.	Trench 7A	147,600
3.	Trench 7B	108,000

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 16.6×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.2×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)[1]	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^2	1.7	0.6	65
$Ru^{103,106}$	<0.1	none detected	100
Co^{60}	<0.1	none detected	100
Cs^{137}	2.6	0.8	69
TRE	no determination	--	--
Pm^{147}	25	11	56
Gross Beta	189	80	58

[1]Includes activity contained in the untreated waste that bypassed the plant.

[2]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 and Decontamination Facility	31	1.71	5.7	3.9	25.7
2. Radioisotopes Processing Area	26	0.29	1.0	0.8	5.3
3. Buildings 3503 and 3508	6	0.02	0.1	0.2	1.3
4. Buildings 3025, 3026 and 3550	52[2]	0.73	2.5	1.0	6.6
5. Building 3019	0	--	--	1.8	11.8
6. Fission Products Development Laboratory	508[3]	27	90.8	0.3	2.0
7. 4500 Area	0	--	--	6.1	40.1
8. Building 3525	0	--	--	1.1	7.2

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

[2]Most of this activity was discharged from a leaking transfer line.

[3]Incomplete Sample - part of the composite sample was picked up after a promethium spill.

Major contributors to the system are listed below:

		Gallons
1.	4500 Complex	56,680
2.	Building 3019	55,221
3.	Reactor Complex	43,735
4.	Fission Products Development Laboratory	26,674
5.	Radioisotopes Processing Area	23,997

Table No. 4 is an inventory of the nuclides transferred to the disposal sites.

GASEOUS WASTE SYSTEM

The 3039 stack system discharged 4.6 curies of gaseous radioactivity which was identified as I^{131}. Virtually all of the activity was released from the Radioisotopes Processing Area through the off-gas system. Only 13 millicuries of particulate activity were released. The combined release from the 3020 and 3018 systems was insignificant. Comparative monthly releases from the stack systems are illustrated by Figure No. 4.

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	48	48	4,851	7,885	149	149	5,250	5,437	99	99	6,628	6,759
Ru^{106}	28	28	1,096	5,831	73	73	1,130	1,561	49	49	981	1,307
Cs^{137}	2,440	2,440	48,108	79,697	3,750	3,750	26,296	31,634	2,500	2,500	25,947	30,115
Co^{60}	4	4	837	994	7	7	365	383	4	4	385	398
TRE	--	--	--	2,242	--	--	--	6	--	--	--	5
TOTALS	2,520	2,520	54,892	96,649	3,979	3,979	33,041	39,021	2,652	2,652	33,941	38,584

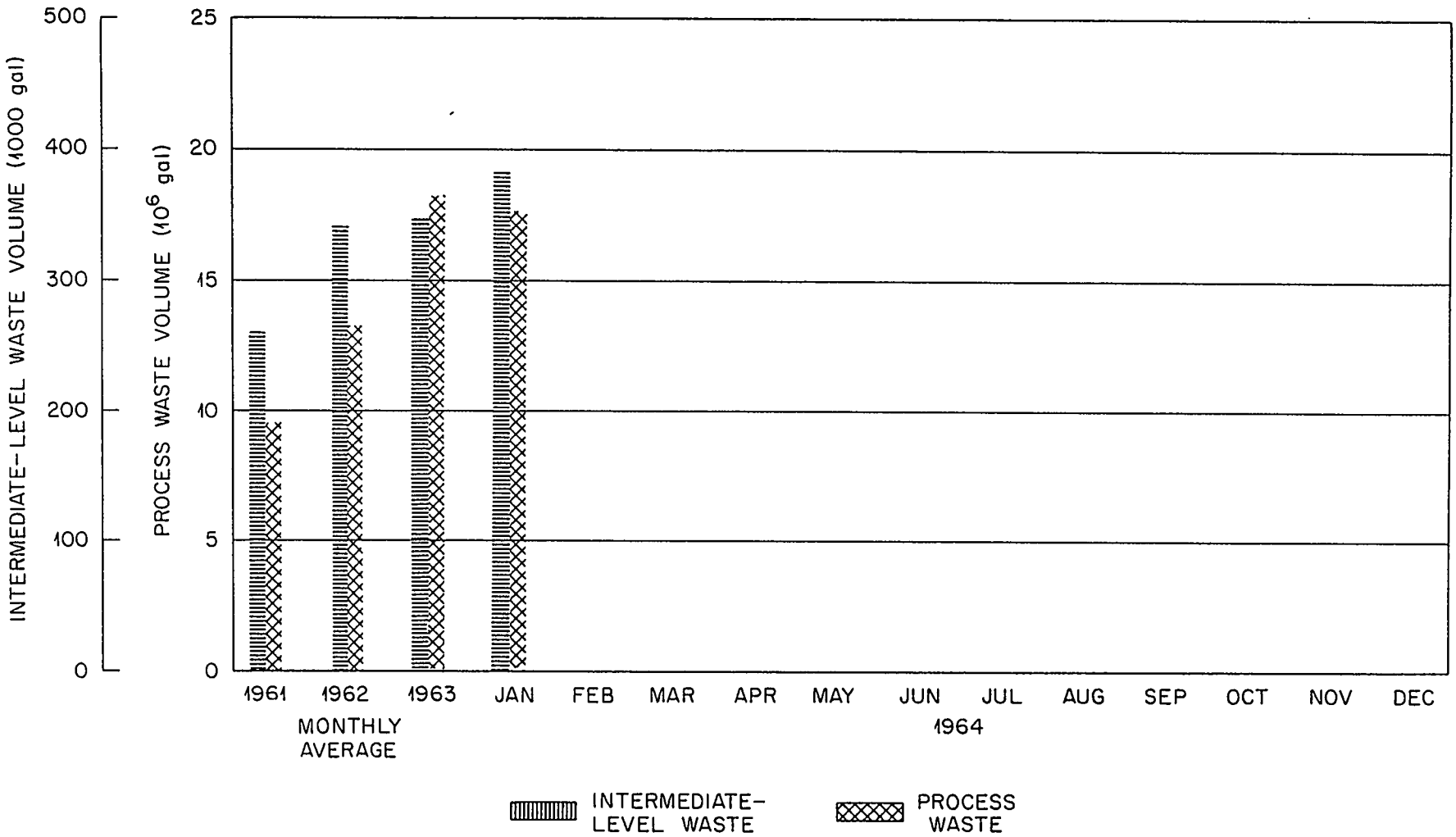

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER

64-3-57

COPY NO. 40

DATE: March 25, 1964

SUBJECT: Radioactive Waste Disposal
Report for the month of February 1964

TO: Distribution

FROM: L. C. Lasher

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

David R Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 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 discharge of radioactivity in the wastes on a monthly basis.

The total amount of radioactivity discharged to White Oak Creek was 31 curies; of the total, 28 curies was ruthenium released from the seepage pit area. The total strontium discharge was 0.9 curie, 0.1 curie less than the amount reported in January. The strontium discharge from the Bethel Valley area was high at 0.8 curie. Of this amount only 0.3 curie was released in the combined effluents from the Process Waste Treatment Plant, Sewage Disposal System and Storm Drains. The remaining 0.5 curie cannot be accounted for and apparently came from some area presently not monitored. The strontium discharge from the 7500 area pond into the Melton Valley branch of the creek was 0.1 curie for the third consecutive month.

In an effort to locate the source of 0.5 curie of strontium that could not be accounted for in the Bethel Valley discharges, special samples of the creek water were taken after the results of the monthly composite sample analyses were obtained. The analyses of the special samples failed to reveal any unusual discharges or the source of the unknown release during the month. To improve the chances of detecting any similar releases that may occur in the future, samples at station No. 3 will be analyzed on a weekly basis rather than monthly as has been the practice in the past.

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	0.1	$<$ 0.1	0.1	0.2
Miscellaneous discharges from east end of plant	2	0.004	None	$<$ 0.004	0.004
Total discharge from Bethel Valley area	3	0.8	$<$ 0.04	0.4	1.2
Total discharge from Melton Valley area	4	0.1	$<$ 0.012	$<$ 0.001	0.1
East waste pit seepage	5	$<$ 0.001	16	$<$ 0.003	17.4
West waste pit seepage	6	0.02	12	$<$ 0.02	12.4
Total discharge from all sources	3,4,5,6	0.9	28	0.4	31
White Oak Dam to Clinch River (Health Physics measurement)	7	0.94	25.99	0.51	31.65
Gaseous Waste[3]					
3039 Stack	8				9.2
3020 Stack	9				$<$ 0.004
3018 Stack	10				$<$ 0.001
Total activity in gases released					9.2

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

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

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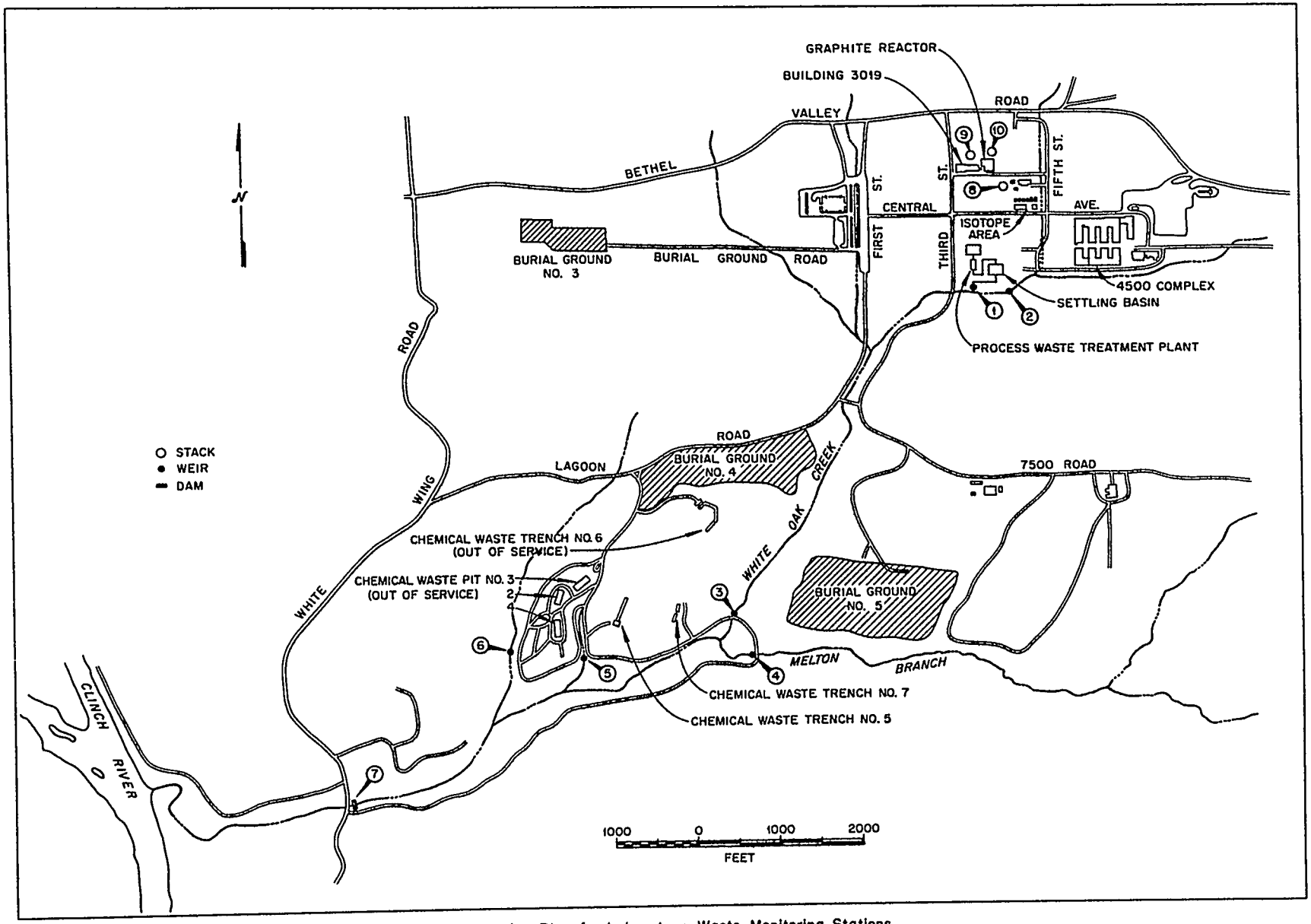

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

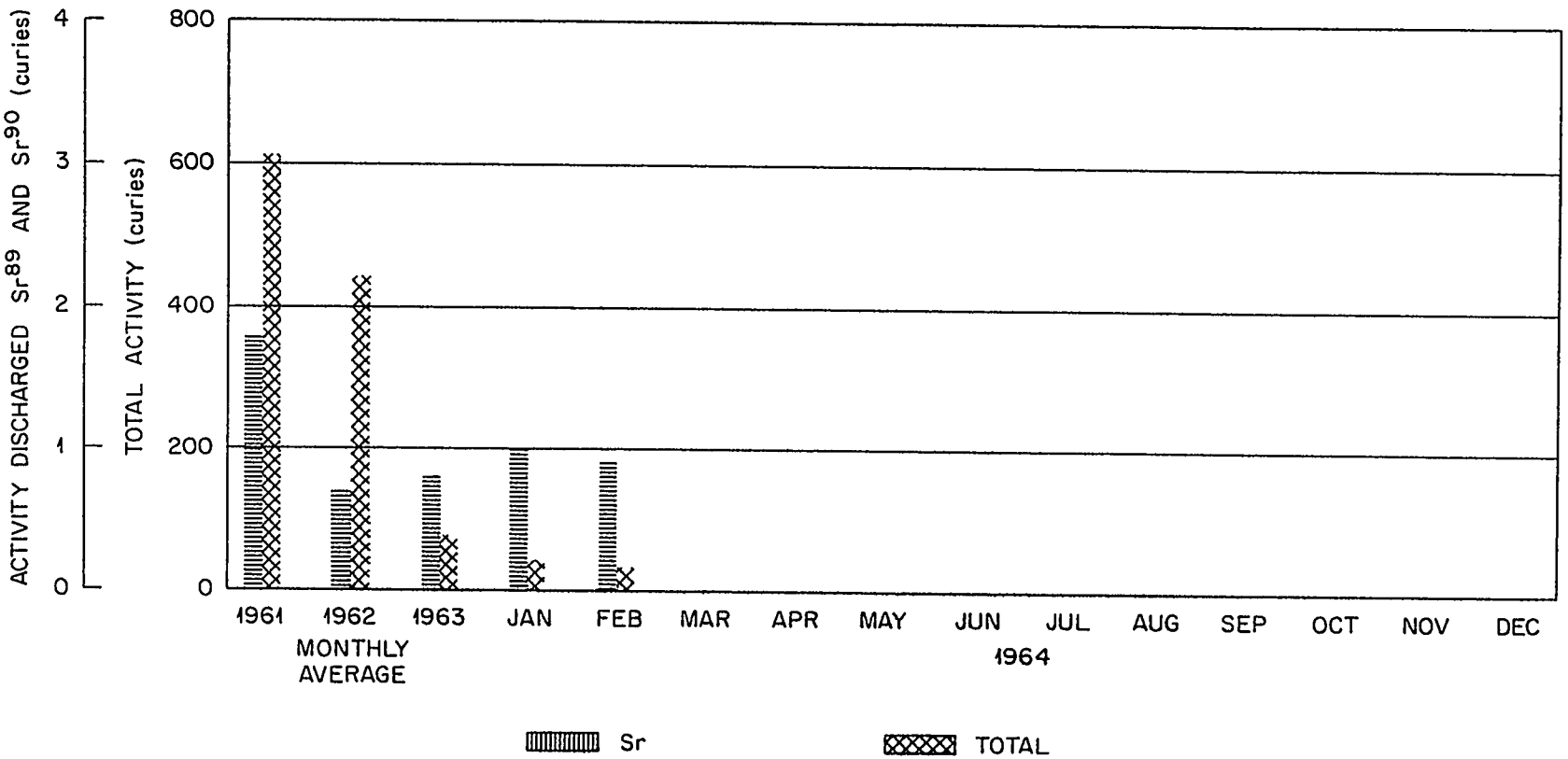

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

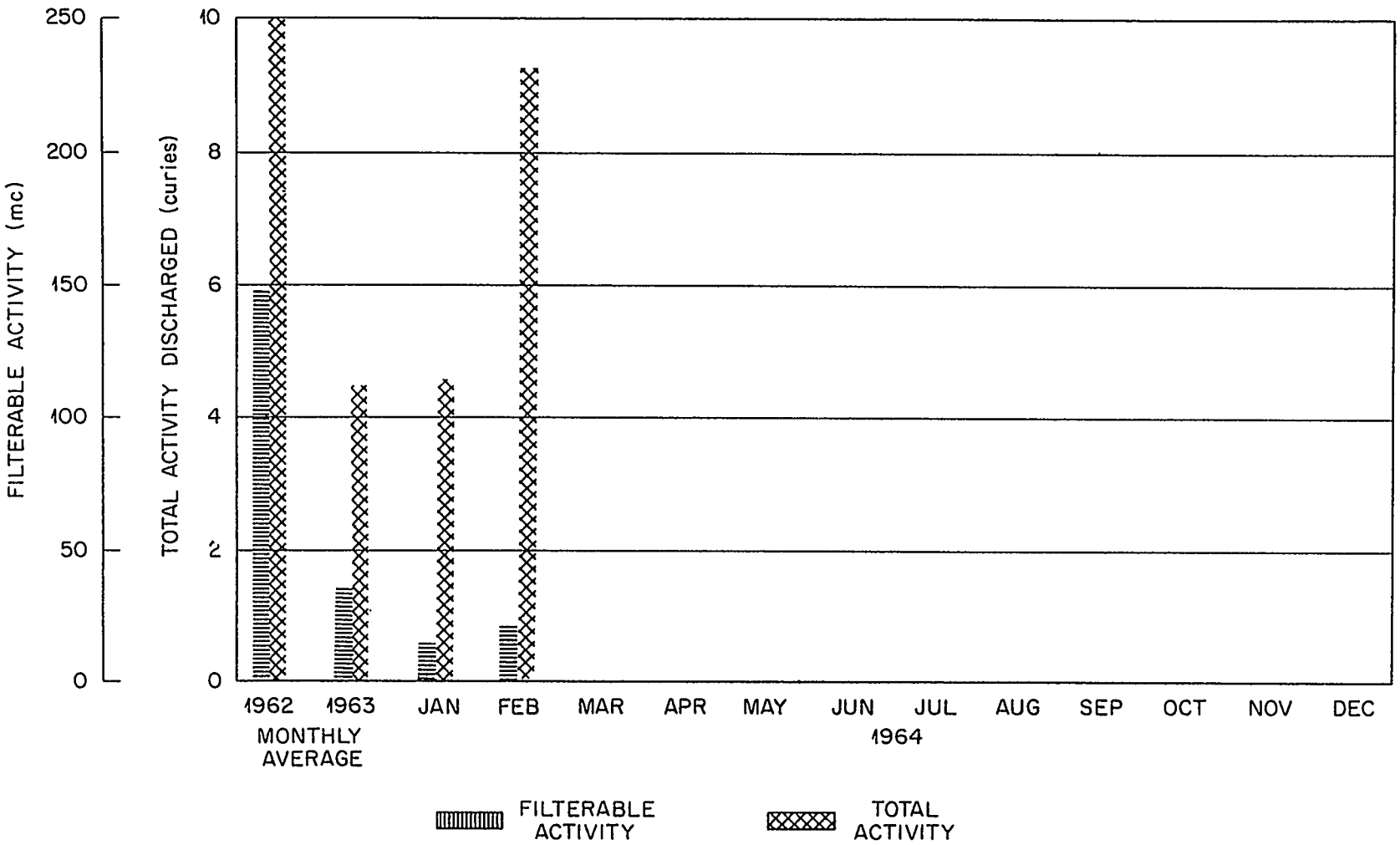

Fig. 3 Activity Release in Gaseous Waste

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The process waste system operated normally this month. The strontium decontamination has improved, and only 0.1 curie of this nuclide was discharged from the Waste Treatment Plant during the period. The total decontamination (indicated by gross beta analysis) was somewhat low; this figure undoubtedly reflects the poor removal of Pm^{147}.

Table No. 2 presents data pertaining to the operation of the Waste Treatment Plant and Table No. 3 is a tabulation of the waste discharged into the process waste system.

INTERMEDIATE-LEVEL WASTE

A total of 352,600 gallons of waste was pumped to the covered disposal trenches this month. It was distributed between the trenches as follows:

		Gallons
1.	Trench 5	80,400
2.	Trench 7A	184,000
3.	Trench 7B	88,200

Major contributors to the system are listed below:

1.	4500 Complex	70,395
2.	Building 3019	42,451
3.	Reactor Complex	35,047
4.	Radioisotopes Processing Area	15,711
5.	Fission Products Development Laboratory	8,095

Table No. 4 is an inventory of the nuclides transferred to the disposal sites.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 14.8×10^6 gallons

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

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)[1]	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^2	0.9	0.1	89
$Ru^{103,106}$	0.1	$<$ 0.01	$>$ 90
Co^{60}	$<$ 0.05	$<$ 0.02	$\sim$ 60
Cs^{137}	1.1	0.1	90
Gross Beta	56	20	65

[1]Includes activity contained in the untreated waste that bypassed the 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 and Decontamination Facility	18	0.25	39.1	4	25.5
2.	Radioisotopes Processing Area	6	0.05	7.8	0.6	3.8
3.	Buildings 3503 and 3508	4	0.01	1.6	0.2	1.3
4.	Buildings 3025, 3026 and 3550	2	0.03	4.7	1.0	6.4
5.	Building 3019	0	--	--	1.5	9.6
6.	Fission Products Development Laboratory	65	0.27	42.2	0.3	1.9
7.	4500 Area	0	--	--	7.1	45.2
8.	Building 3525	2	0.03	4.7	1.0	6.4

[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	44	92	4,851	7,929	24	173	5,250	5,461	16	115	6,628	6,775
Ru^{106}	7	35	1,096	5,838	26	99	1,130	1,587	18	67	981	1,325
Cs^{137}	750	3,190	48,108	80,447	4,200	7,950	26,296	35,834	2,800	5,300	25,947	32,915
Co^{60}	6	10	837	1,000	8	15	365	391	6	10	385	404
TRE	--	--	--	2,242	--	--	--	6	--	--	--	5
TOTALS	807	3,327	54,892	97,456	4,258	8,237	33,041	43,279	2,840	5,492	33,941	41,424

Analyses of grab samples, taken at intervals of approximately two months, indicate that there is no significant movement of radioactive strontium in the seep streams from the covered trenches to the creek and that the ruthenium being released from the same trenches is only a small fraction of the amount being released from the area of the waste pits that have been taken out of service. Two of the waste pits have been filled and will be covered with an asphalt pavement as soon as weather permits the asphalting operation. The third pit remains open and is being used for disposal of the Process Waste Treatment Plant Lime-soda ash-clay sludge.

GASEOUS WASTE SYSTEM

The 3039 stack system discharged a total of 9.2 curies of gaseous radioactivity this month. The activity was identified as I^{131}. The discharge of particulate activity amounted to 21 millicuries (also I^{131}). The total release from the 3018 and 3020 system continued to be insignificant (Table No. 1). Comparative monthly releases from the stack systems are illustrated in Figure No. 3.

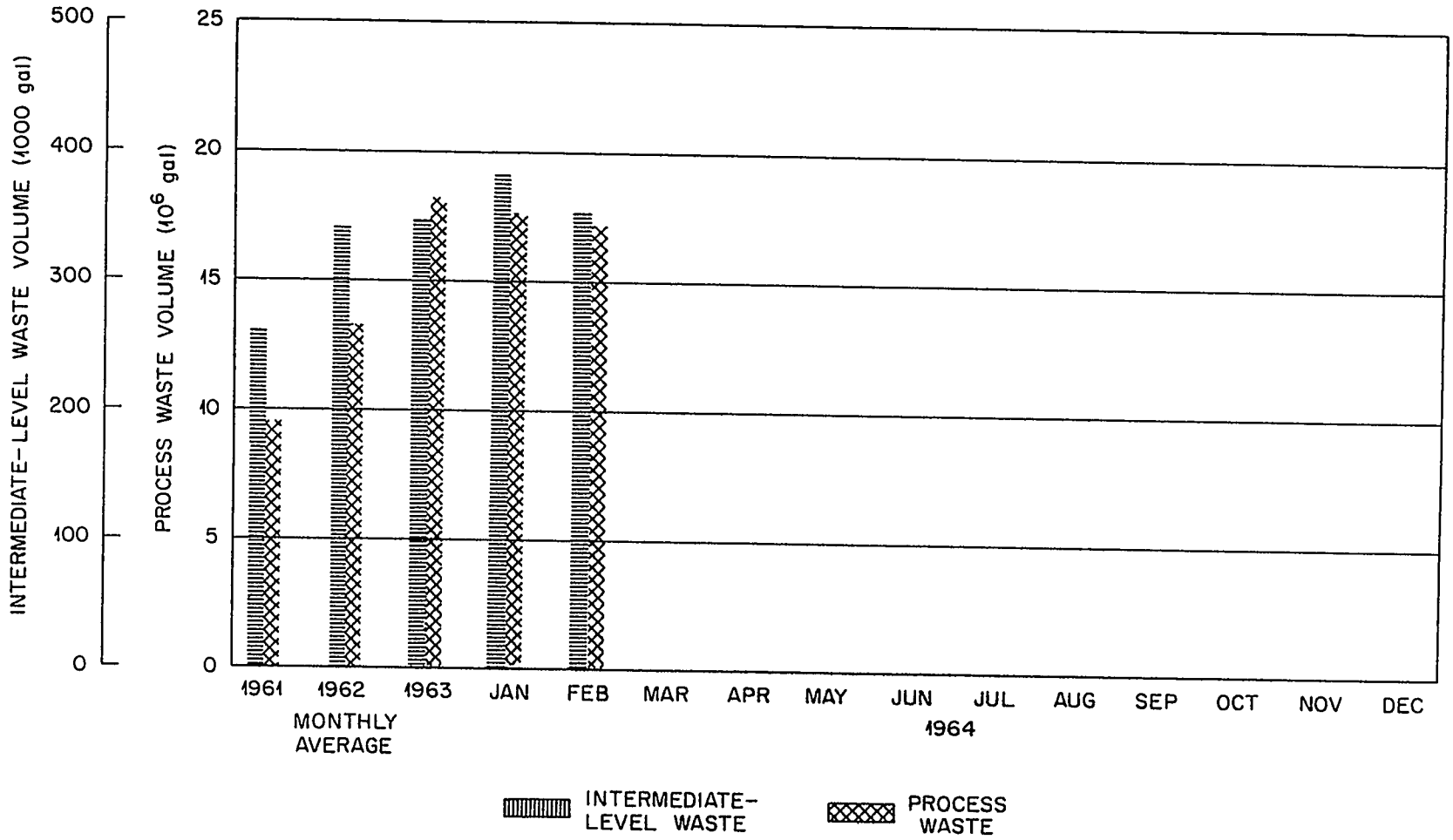

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER
64-4-87

COPY NO. 42

DATE: April 29, 1964

SUBJECT: Radioactive Waste Disposal
For the month of March 1964

TO: Distribution

FROM: L. C. Lasher

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

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 summarizes 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 discharge of radioactivity in the wastes on a monthly basis.

A total of 55 curies of radioactivity was discharged into White Oak Lake this month. Of this total, 32 curies were ruthenium released from the waste pit area. The strontium discharge amounted to 0.7 curie. Of this total, 0.4 curie was discharged by the process waste system, and an additional 0.02 curie was released from the east section of the Laboratory (measured at monitoring station No. 2). Results from "grab" samples indicate that the Sewage Treatment Plant discharged about 0.1 curie of strontium. The remaining 0.18 curie may have entered the creek through the storm drain systems, possibly from soil previously contaminated by underground waste-line leaks. The source of activity measured at station No. 2, mainly cesium-137, is not known.

SPECIAL SAMPLING OF WHITE OAK CREEK

For the past two years there has been a persistent discrepancy in the amounts of strontium detected in White Oak Creek. Routine samples taken at the point of discharge into White Oak Lake usually show a greater amount of strontium activity than samples taken at the Settling Basin discharge. This pickup in activity, as much as 0.5 curie/month, has been attributed to "miscellaneous drainage" from burial grounds which lie along the course of the stream; from contaminated storm

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	0.4	<0.2	0.1	0.5
Miscellaneous discharges from east end of plant	2	0.02	<0.01	1.0	1.0
Total discharge from Bethel Valley area	3	0.7	0.06	1.3	2.0
Total discharge from Melton Valley area	4	0.04	<0.01	<0.01	0.04
East waste pit seepage	5	<0.001	20.	<0.01	21.
West waste pit seepage	6	0.001	12.	<0.03	13.
Total discharge from all sources	3,4,5,6	0.7	32.	1.3	35.
White Oak Dam to Clinch River (Health Physics measurement)	7	1.04	29.48	0.88	35.21
Gaseous Waste[3]					
3039 Stack	8				42.
3020 Stack	9				--
3018 Stack	10				--
Total activity in gases released					42.

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

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

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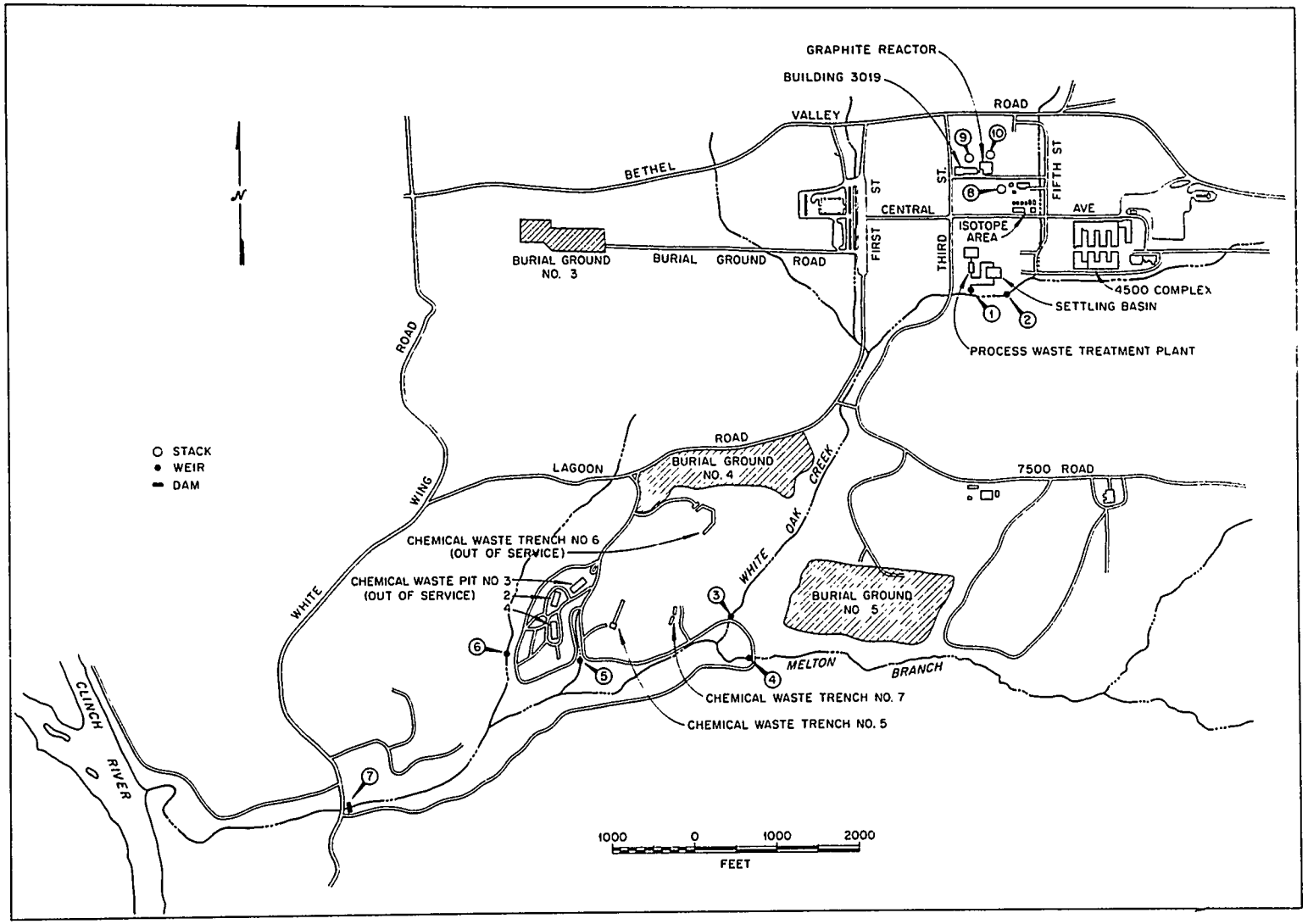

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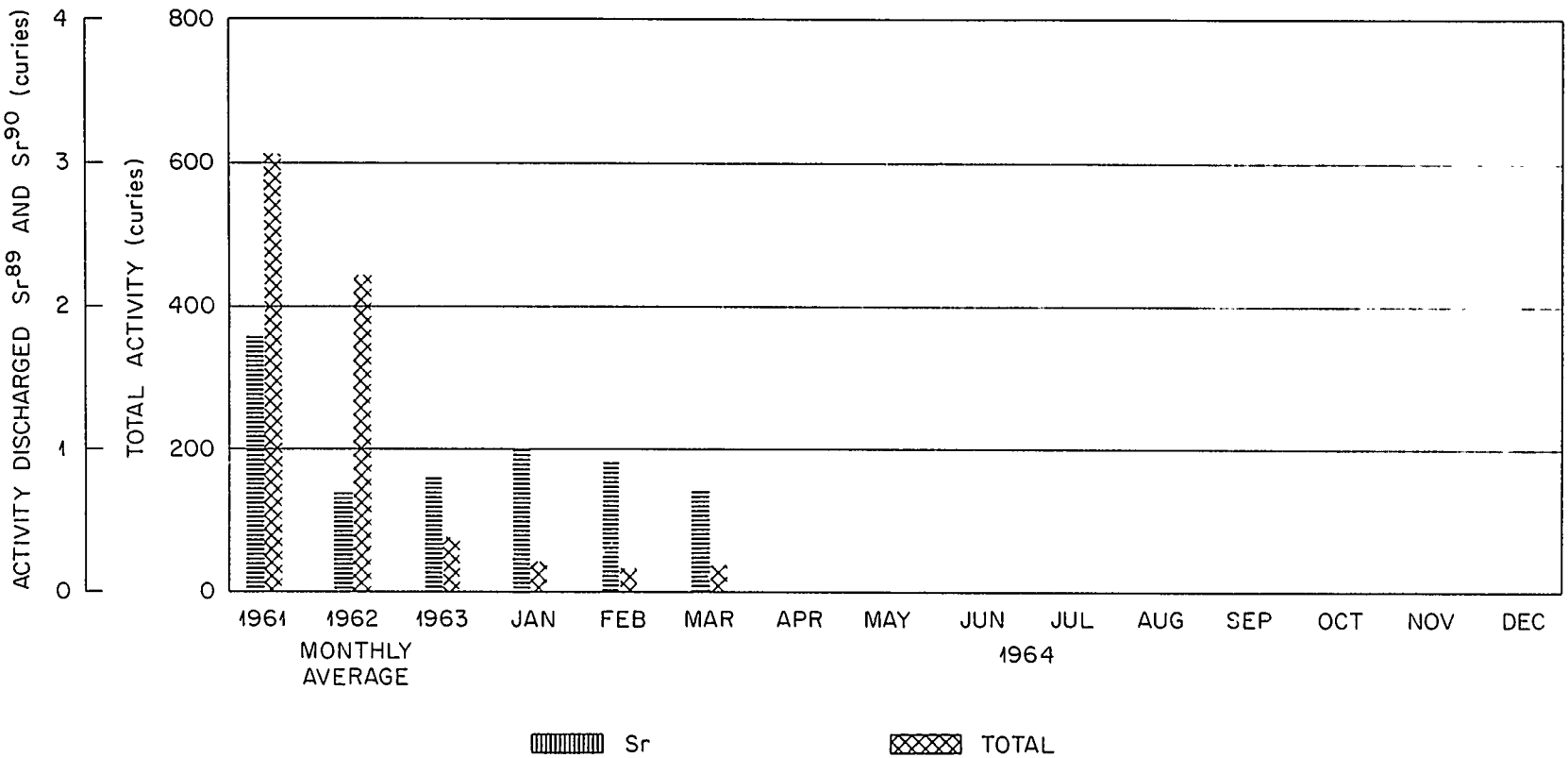

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

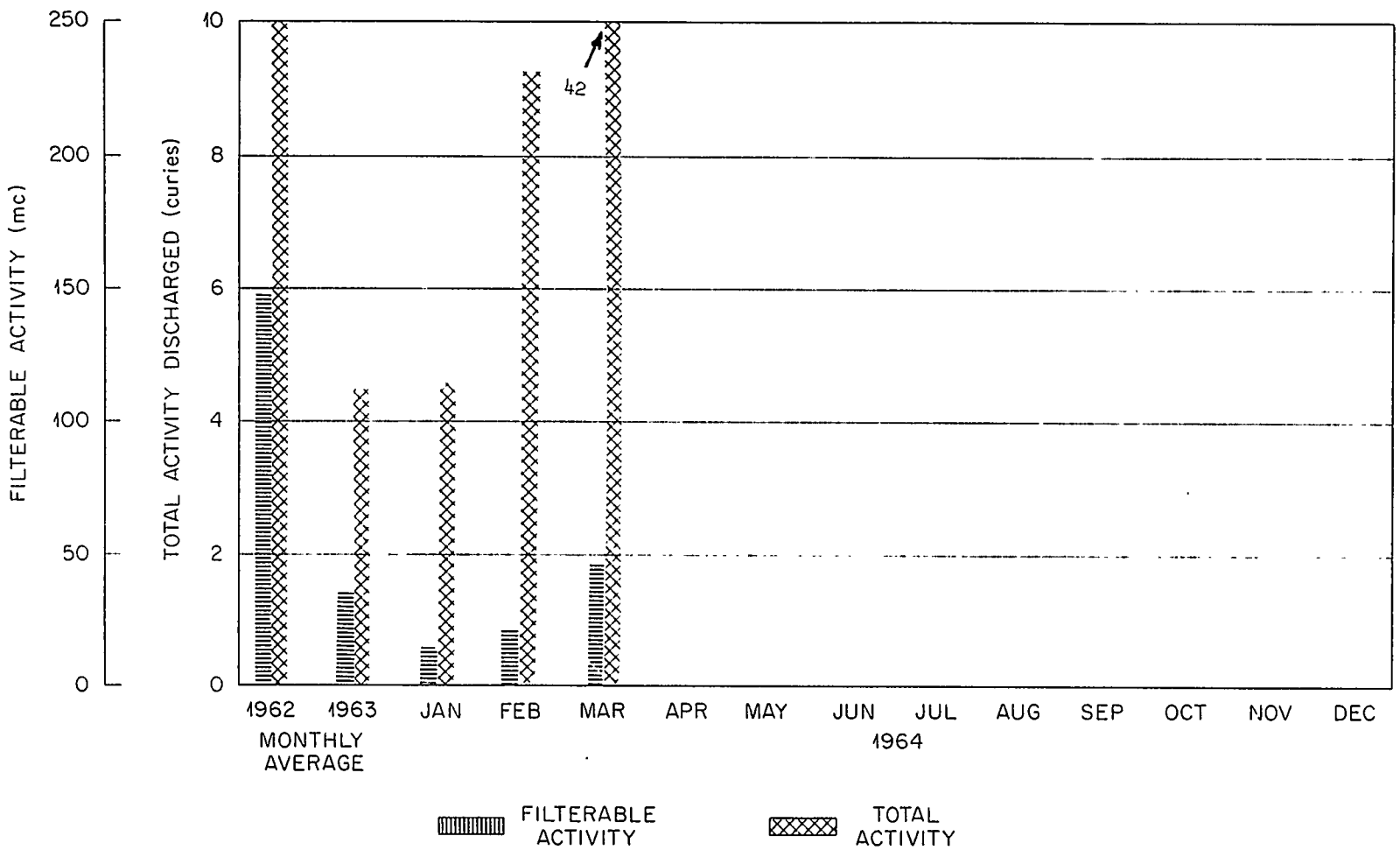

Fig. 3 Activity Release in Gaseous Waste

sewers discharging into the creek; and from various other sources such as the sewage treatment plant, laundry, and abandoned but contaminated and leaking process lines lying near the stream. Much "spot" sampling has been carried out in an effort to pinpoint the source of the activity but without success. A more intensive sampling program is now planned wherein the creek will be sampled on a daily basis at six points. The first of these locations will be immediately below the settling basin discharge. Five other locations will be chosen, more or less equally spaced, extending to the monitor located at the lake bed (station No. 3) and including one located in north fork, which joins White Oak Creek in the vicinity of the 1000 Area. A continuous leak sampler[1] will be used, similar to the device developed at Paducah. This sampler bleeds in a very slow stream of liquid at a rate controlled by the venting of air through a capillary. It is hoped that daily samples covering much of the stream will eventually lead to the area where the excessive activity is originating. More definite steps can then be taken to isolate the discharge.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

All of the waste was treated this month, although the plant operated at full capacity most of the time. The efficiency of the plant, summarized in Table No. 2, was fair. Table No. 3 lists the main sources of discharge into the process waste system.

---

[1]K. K. Mitchell and R. C. Baker, Continuous Leak Water Sampler, KY-423 (November 30, 1962)

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 18.3×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.9×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^1	1.5	0.4	73
$Ru^{103,106}$	<0.2	<0.2	--
Co^{60}	<0.1	<0.03	--
Cs^{137}	0.9	0.1	89
Gross Beta	48 c/m/ml	10 c/m/ml	79 c/m/ml

[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 and Decontamination Facility	81	4.	97.6	3.6	22.8
2.	Radioisotopes Processing Area	7	0.08	1.9	0.8	5.1
3.	Buildings 3503 and 3508	$\angle$ 1	--	--	0.4	2.5
4.	Buildings 3025, 3026 and 3550	$\angle$ 1	--	--	1.2	7.6
5.	Building 3019	$\angle$ 1	--	--	1.4	8.9
6.	Fission Products Development Laboratory	4	0.02	0.5	0.4	2.5
7.	4500 Area	$\angle$ 1	--	--	7.0	44.3
8.	Building 3525	$\angle$ 1	--	--	1.0	6.3

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

INTERMEDIATE-LEVEL WASTE

A total of 374,200 gallons of waste was pumped into the disposal trenches this month. Distribution between the trenches was as follows:

		Gallons
1.	Trench 5	98,200
2.	Trench 7A	163,800
3.	Trench 7B	112,200

An additional 7,500 gallons of waste was pumped to the Shale Fracturing Area for experimental disposal.

Major contributors to the system are listed below:

		Gallons
1.	Building 3019	67,320
2.	4500 Complex	55,185
3.	Reactor Complex	50,550
4.	Building 3026-C	27,680
5.	Radioisotopes Processing Area	21,484
6.	Fission Products Development Laboratory	15,745

Table No. 4 is an inventory of the nuclides transferred to the disposal 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 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	240	332	4,851	8,169	93	266	5,250	5,554	62	177	6,628	6,837
Ru^{106}	11	46	1,096	5,849	9	108	1,130	1,596	6	73	981	1,331
Cs^{137}	840	4,030	48,108	81,287	750	8,700	26,296	36,584	500	5,800	25,947	33,415
Co^{60}	14	24	837	1,014	5	20	365	396	4	14	385	408
TOTALS	1,105	4,432	54,892	96,319	857	9,094	33,041	44,130	572	6,064	33,941	41,991

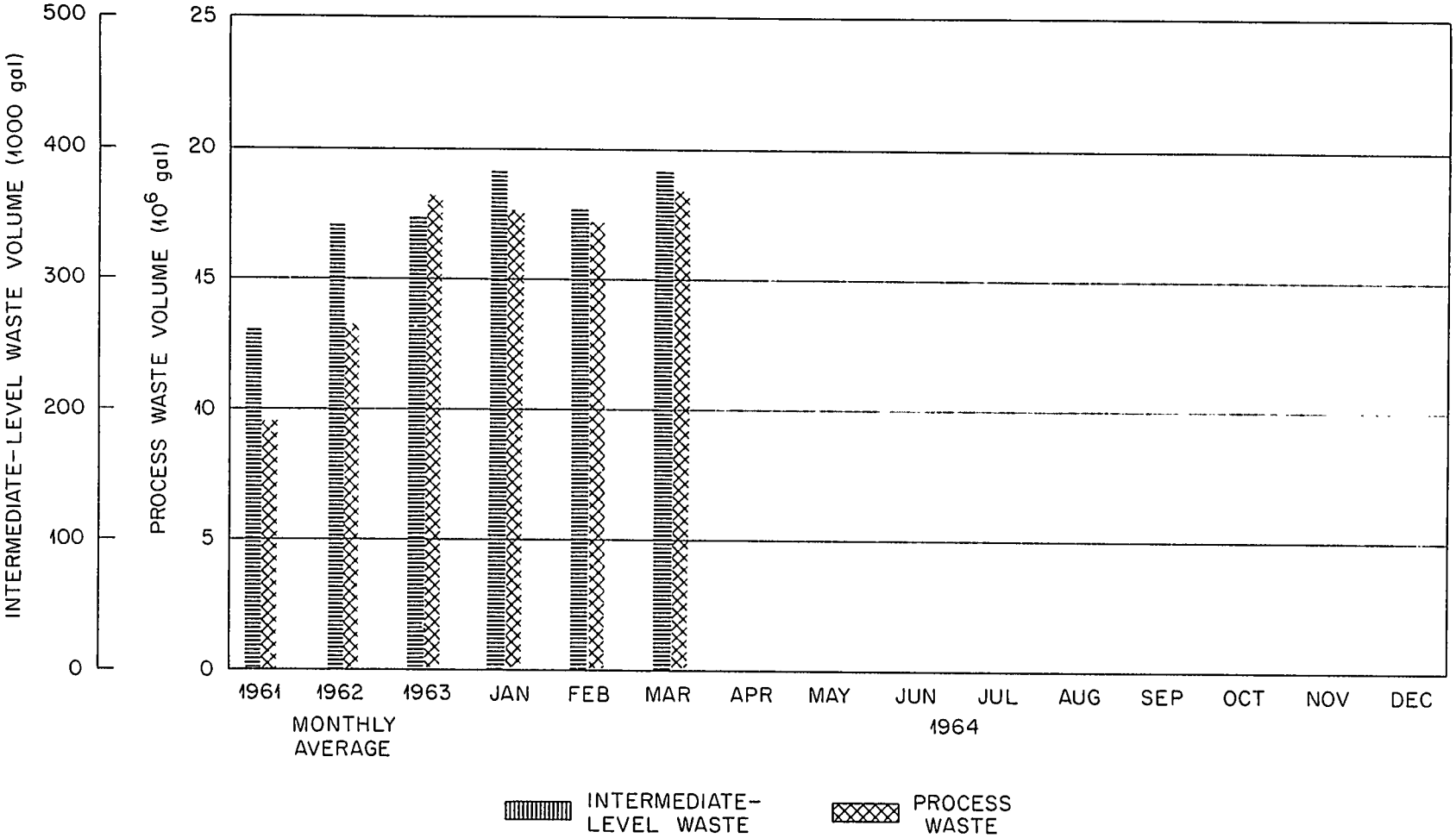

Fig. 4 Liquid Waste Volumes

GASEOUS WASTE SYSTEM

A total of 42 curies of I^{131} was released through the 3039 stack system from the Isotope Area. A summary of the weekly discharges is given below:

Week Ending Date	Discharge, Curies of I^{131}
March 8	1.5
March 15	8.4
March 22	28.3
March 29	3.4

The total activity released from the 3018 and 3020 stack systems was insignificant. A comparison of monthly releases from all stacks is shown in Figure No. 3.

2018

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ORNL
CENTRAL FILES NUMBER
64-5-68

DATE: May 21, 1964

COPY NO. 42

SUBJECT: Radioactive Waste Disposal
For the Month of April 1964

TO: Distribution

FROM: L. C. Lasher

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

Denny R Hamm 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 presents a summary of data obtained from a network of stations which monitor the Laboratory waste effluents. The physical locations of these stations are shown in Figure No. 1. Figure No. 2 and Figure No. 3 compare the release of radioactive wastes on a monthly basis.

The discharge of radioactivity into White Oak Creek was 30 curies; 28 curies of the total were Ru^{106} from the waste pit area. The strontium discharge was high at 1.2 curies. Of this total only 0.4 curie was discharged from the process waste system, and it is estimated that another 0.15 curie may have been discharged from the sewage treatment plant and the storm-drain system. The balance of approximately 0.65 curie cannot be identified with any known sources of discharge into the creek.

The intensive creek sampling program, described in last month's report, to locate unknown sources of strontium release to the creek, was begun this month. The analytical data gathered to date is not sufficient for logical interpretation. It is hoped that an adequate amount of information will be available for the next monthly report.

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	0.4	0.1	0.1	0.4
Miscellaneous discharges from east end of plant	2	0.01	none detected	< 0.01	0.01
Total discharge from Bethel Valley area	3	1.2	0.07	0.7	2.0
Total discharge from Melton Valley area	4	0.04	< 0.01	0.01	< 0.1
East waste pit seepage	5	0.001	20.	0.005	20.
West waste pit seepage	6	0.002	8.	0.02	8.
Total discharge from all sources	3,4,5,6	1.2	28.	0.7	30.
White Oak Dam to Clinch River (Health Physics measurement)	7	1.06	29.51	0.94	35.22
Gaseous Waste[3]					
3039 Stack	8				11.
3020 Stack	9				0.001
3018 Stack	10				< 0.001
Total activity in gases released					11.

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

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

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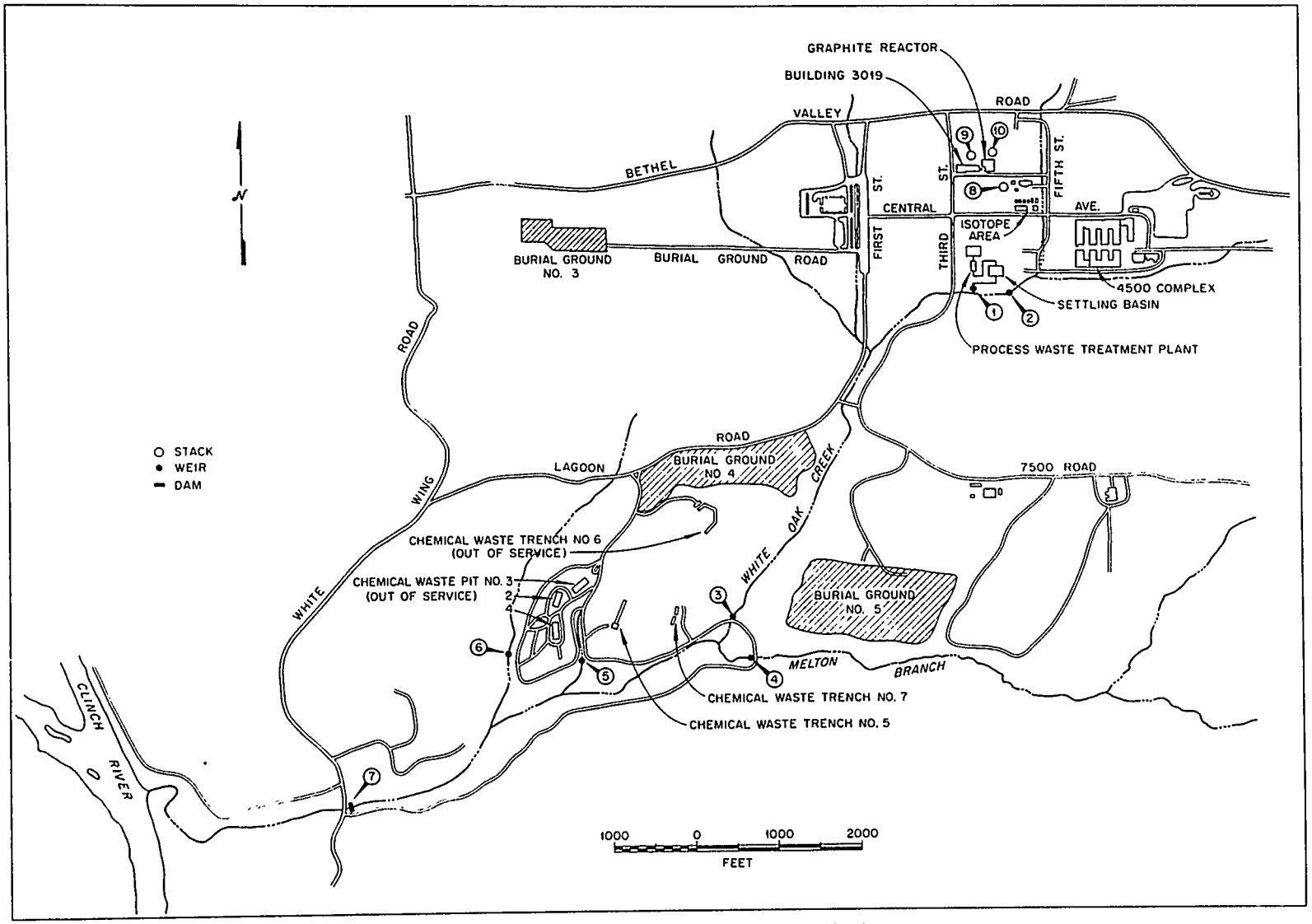

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

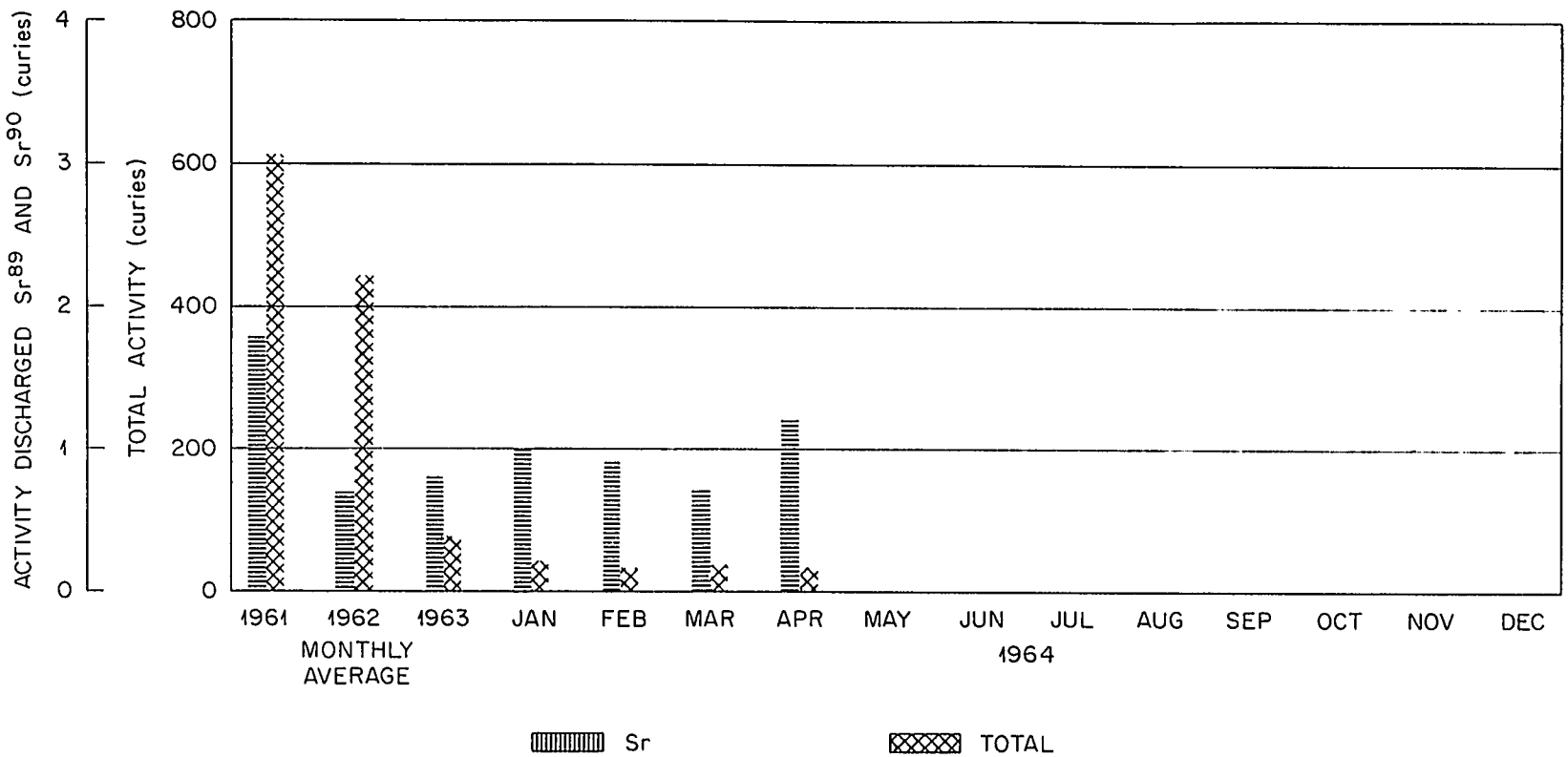

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

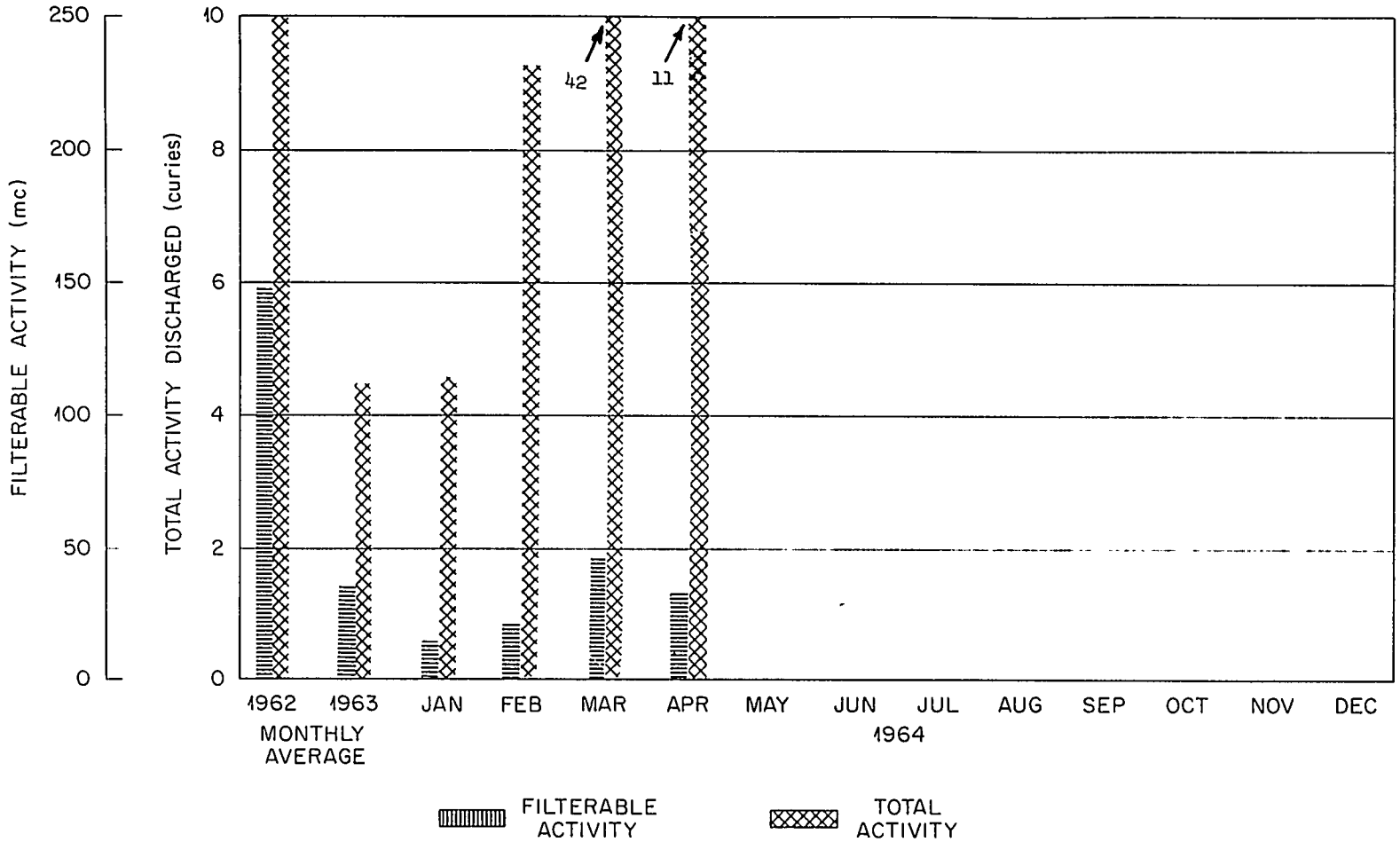

Fig. 3 Activity Release in Gaseous Waste

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Process Waste Treatment Plant was operated at full capacity all month and at peak flows it was necessary to by-pass the plant several times; a total of 1.5 million gallons of slightly contaminated waste was discharged into White Oak Creek without the benefit of chemical treatment. Decontamination factors achieved by the plant and the settling basin were normal (Table No. 2). Table No. 3 lists the main sources of waste discharged into the system.

INTERMEDIATE-LEVEL WASTE

A total of 344,100 gallons of waste was pumped into the disposal trenches this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	91,800
2.	Trench 7A	166,900
3.	Trench 7B	85,400

An additional 52,500 gallons of waste was pumped to the Shale Fracturing Area for experimental disposal.

Major contributors to the system are listed below:

		Gallons
1.	4500 Complex	64,683
2.	Building 3019	59,143
3.	Reactor Complex	55,580
4.	Building 3026-C	32,020
5.	Radioisotopes Processing Area	30,682

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 15.5×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.3×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^1	1.6	0.4	75
$Ru^{103,106}$	<0.1	<0.09	
Co^{60}	none detected	<0.03	
Cs^{137}	<0.1	<0.09	
Gross Beta	75 c/m/ml	20 c/m/ml	73

[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	64	3.01	74.7	3.5	22.0
2.	Radioisotopes Processing Area	40	0.74	18.4	1.2	7.5
3.	Buildings 3503 and 3508	2	0.03	0.7	1.2	7.5
4.	Buildings 3025, 3026 and 3550	3	0.04	1.0	1.0	6.3
5.	Building 3019	5	0.09	2.2	1.3	8.2
6.	Fission Products Development Laboratory	5	0.02	0.5	0.2	1.3
7.	4500 Area	1	0.09	2.2	6.6	41.5
8.	Building 3525	1	0.01	0.2	0.9	5.7

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

		Gallons
6.	Fission Products Development Laboratory	17,025

Table No. 4 is an inventory of the nuclides transferred to the disposal area.

GASEOUS WASTE SYSTEM

The 3039 stack system discharged 11 curies of radioactivity this month. Most of this activity was identified as I^{131}. The total discharge from the 3020 and 3018 stacks continued to be insignificant. A comparison of the total monthly releases from all stacks is shown in Figure No. 3.

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	640	972	4,851	9,141	3,900	4,166	5,250	9,720	2,600	2,777	6,628	9,614
Ru^{106}	3	49	1,096	5,898	2	110	1,130	1,706	1	74	981	1,405
Cs^{137}	240	4,270	48,108	85,557	390	9,090	26,296	45,674	260	6,060	25,947	39,475
Co^{60}	6	30	837	1,044	10	30	365	426	7	21	385	429
TOTALS	889	5,321	54,892	101,640	4,302	13,396	33,041	57,526	2,868	8,932	33,941	50,923

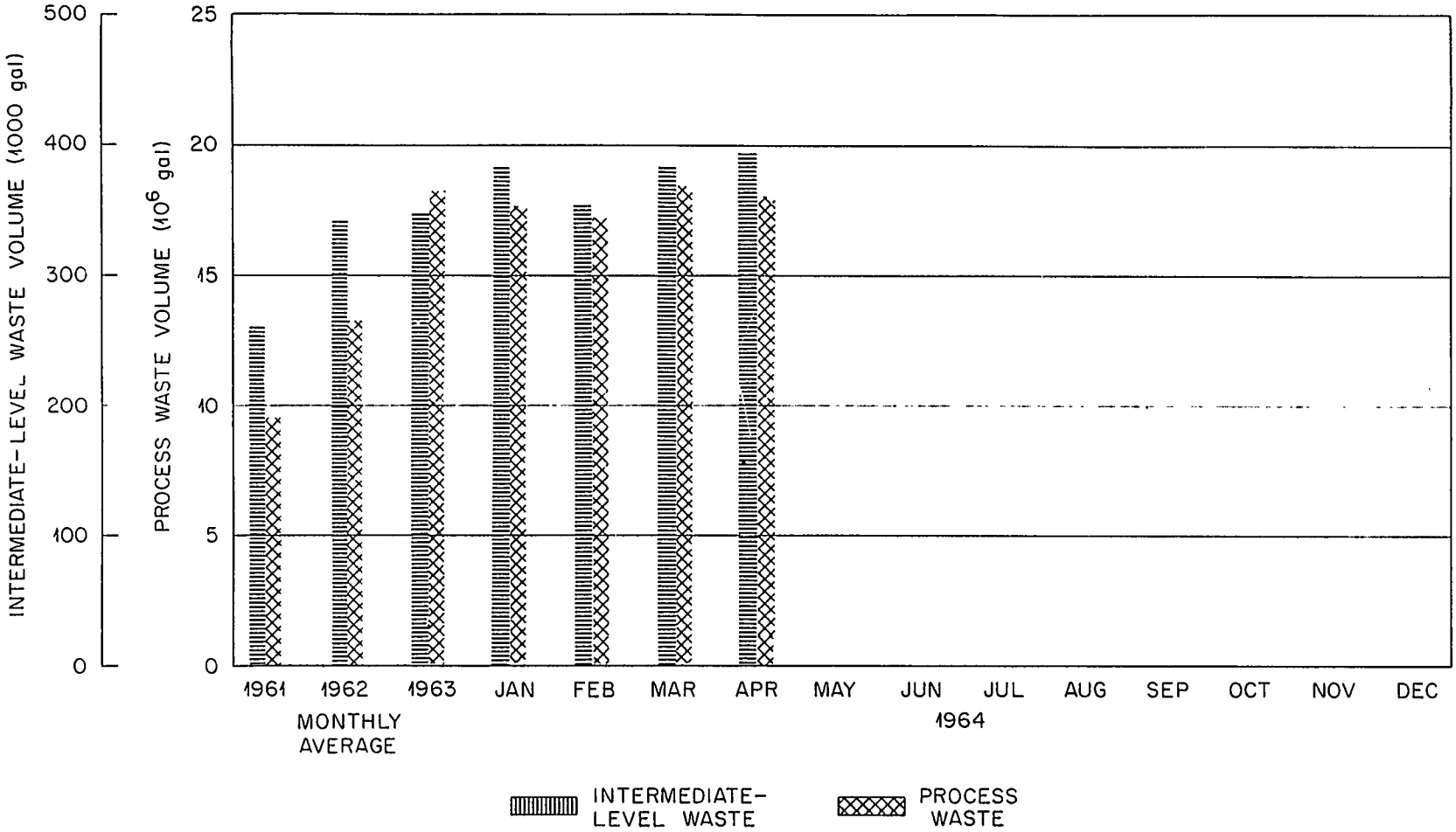

Fig. 4 Liquid Waste Volumes

2018
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CENTRAL FILES NUMBER
64-7-6

DATE: July 6, 1964

COPY NO. 42

SUBJECT: Radioactive Waste Disposal
For the Month of May 1964

TO: Distribution

FROM: L. C. Lasher

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

Daniel R Hamrin 8/9/95
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

A summary of the radioactivity released in Laboratory wastes is presented in Table 1. Figure 1 shows the physical location of a network of stations which monitor Laboratory waste effluents. Figures 2 and 3 compare the releases on a monthly basis.

Twenty-six curies of radioactivity was discharged into White Oak Lake. Of this amount, 24 curies were ruthenium from the waste pit area. The total activity released from the Melton Valley area was higher than normal this month. Essentially, all of this activity (0.2 curie) was strontium; it was discharged into the creek when the 7500 area retention pond was drained and removed from service. The waste release from the Bethel Valley area was normal.

The special creek sampling program started in March, was continued during this month. Daily samples were taken in White Oak Creek at six locations extending from the settling basin to the White Oak Lake bed. A plot of strontium transport past each sampling point, determined from the sample analyses and from approximate flow data, indicates that there is an appreciable influx of strontium to the creek between the settling basin and Burial Ground No. 4. From that point to the lake bed, the rate of pick-up is much less. North Fork, which flows into White Oak Creek north of the 7500 Road bridge, contributed negligible activity.

The samplers have now been relocated between the settling basin and Burial Ground No. 4 in hopes of isolating a particular discharge into the creek in that area, if one exists. Sampling at North Fork has been

discontinued and an additional sampler has been put into operation at the Sewage Treatment Plant. Further results of this study will be reported in June.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Process Waste Treatment Plant operated at full capacity most of the month. It was by-passed twice during the period, and 0.8 million gallons of slightly contaminated waste was discharged into White Oak Creek without chemical treatment. Decontamination achieved by the treatment system was normal (Table 2). Table 3 lists the main sources of waste discharged into the system.

The excavation of two 170,000 gallon ponds for handling 4500 Complex wastes was started this month. The ponds and associated piping will permit the diversion of the wastes either directly to the creek or to the Process Waste Treatment Plant depending on the amount of activity in the waste. Since the bulk of the waste discharged into the system from the 4500 Complex is normally free of contamination (Table 3), a reduction of 45%.in the total volume requiring treatment is anticipated next fall when the ponds are connected to the system.

INTERMEDIATE-LEVEL WASTE

A total of 424,400 gallons of waste was pumped into the disposal trenches this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	150,200
2.	Trench 7A	176,600
3.	Trench 7B	97,600

An additional 20,000 gallons of waste was pumped to the Shale Fracturing Area for experimental disposal.

Major contributors to the system are listed below:

		Gallons
1.	4500 Complex	108,933
2.	Building 3019	69,767
3.	Reactor Complex	53,420
4.	Radioisotope Processing Area	50,625
5.	Building 3026-C	21,290
6.	Fission Products Development Laboratory	17,326

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

GASEOUS WASTE SYSTEM

The 3039 stack system discharged 2.1 curies of I^{131} this month. Only 45 millicuries of filterable activity was detected; most of the filterable activity (39 millicuries) was identified as cerium-144. The total amount of activity discharged by the 3018 and 3020 stack systems was not significant. Figure 3 gives a comparison of 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	0.3	<0.09	<0.09	0.3
Miscellaneous discharges from east end of plant	2	No results. Sample accidentally discarded.			
Total discharge from Bethel Valley area	3	0.7	0.06	0.02	0.8
Total discharge from Melton Valley area	4	0.2	0.003	0.002	0.2
East waste pit seepage	5	0.0002	18	<0.002	19
West waste pit seepage	6	0.0003	6	0.005	6
Total discharge from all sources	3,4,5,6	0.9	24	0.027	26
White Oak Dam to Clinch River (Health Physics measurement)	7	0.55	10.49	0.24	12.79
Gaseous Waste[3]					
3039 Stack	8				2.1
3020 Stack	9				<0.01
3018 Stack	10				<0.01
Total activity in gases released					2.1

[1] Refers to Figure 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: 17.7×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.4×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.04	0.27	74
$Ru^{103,106}$	0.08	<0.08	
Co^{60}	None detected	None detected	
Cs^{137}	0.56	<0.09	>84
Gross Beta Analysis	43 c/m/ml	9 c/m/ml	79

[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	9	3.87	55	3.1	19
2. Radioisotopes Processing Area	21	2.73	39	0.9	6
3. Buildings 3503 and 3508	0	0	0	1.2	7
4. Buildings 3025, 3026, and 3550	1	0.15	2	1.1	7
5. Building 3019	1	0.22	3	1.6	10
6. Fission Products Development Laboratory	2	0.06	1	0.2	1
7. 4500 Area	0	0	0	7.4	45
8. Building 3525	0	0	0	0.8	5

[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	831	1803	4851	9972	2097	6263	5250	11817	1398	4175	6628	11012
Ru^{106}	19	68	1096	5917	32	142	1130	1738	21	95	981	1426
Cs^{137}	1716	5986	48108	87273	2823	11913	26296	48497	1882	7942	25947	41357
Co^{60}	14	44	837	1058	45	75	365	471	30	51	385	459
TOTALS	2580	7901	54892	104220	4997	18393	33041	62523	3331	12263	33941	54254

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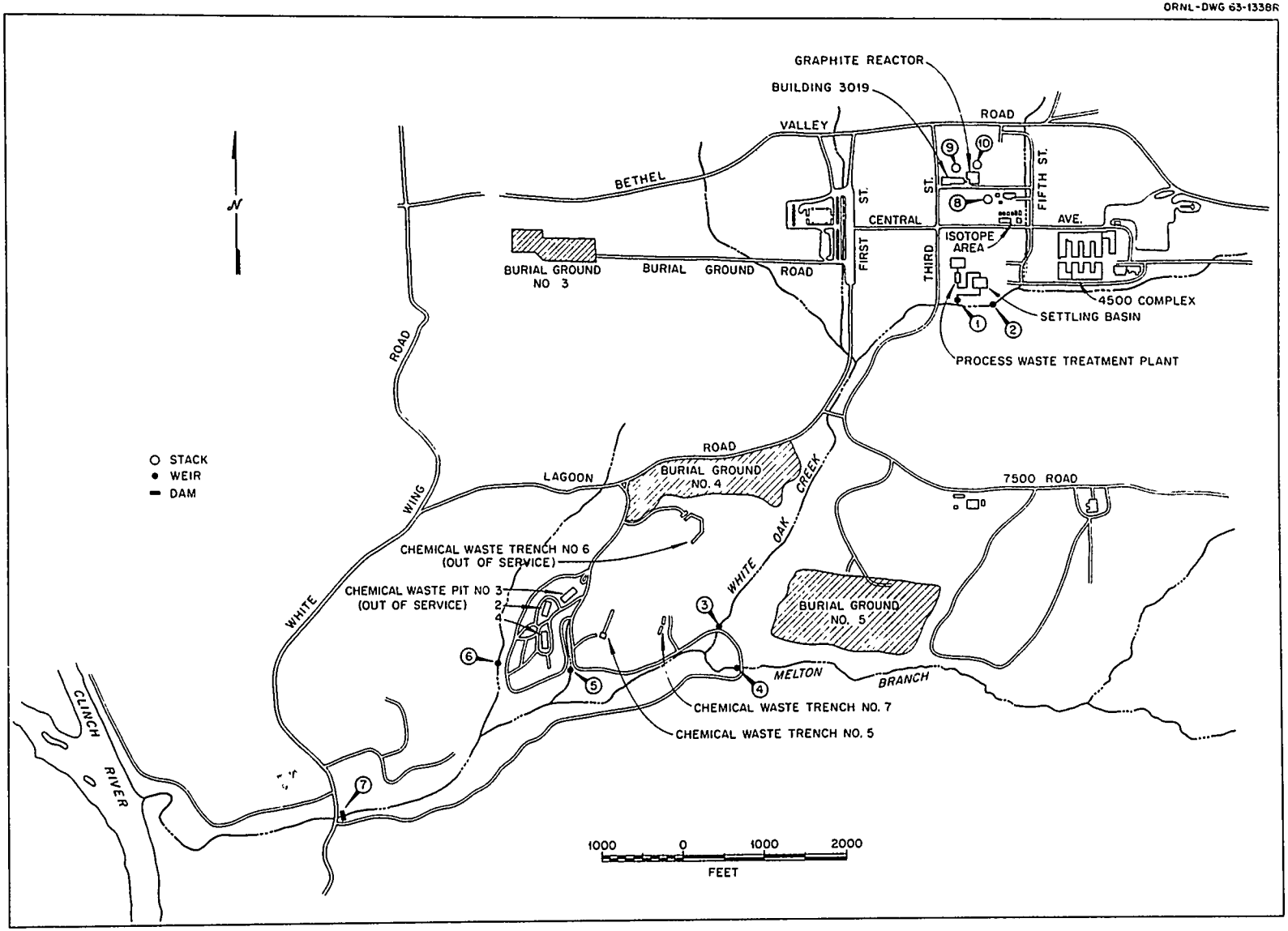

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

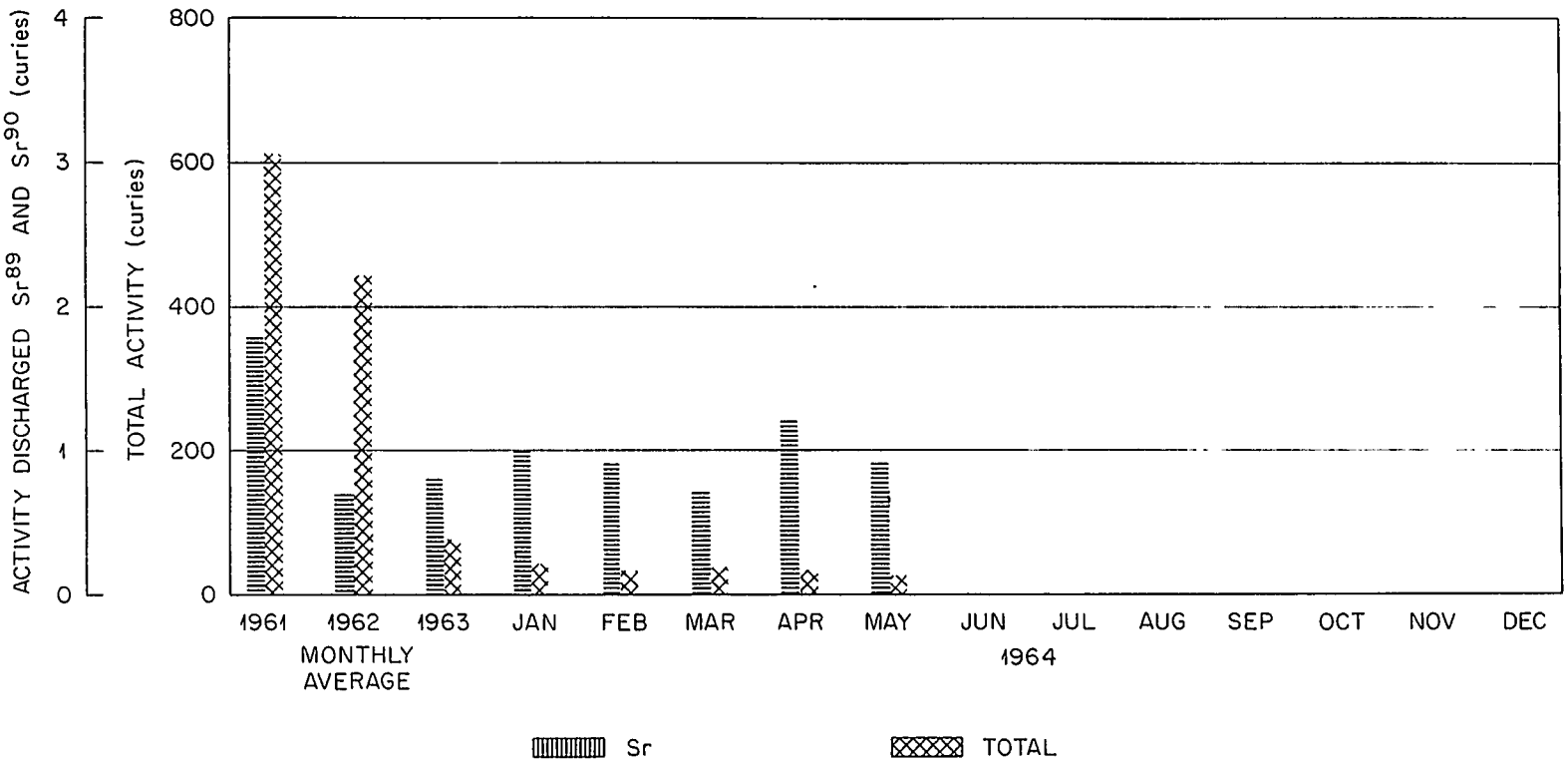

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

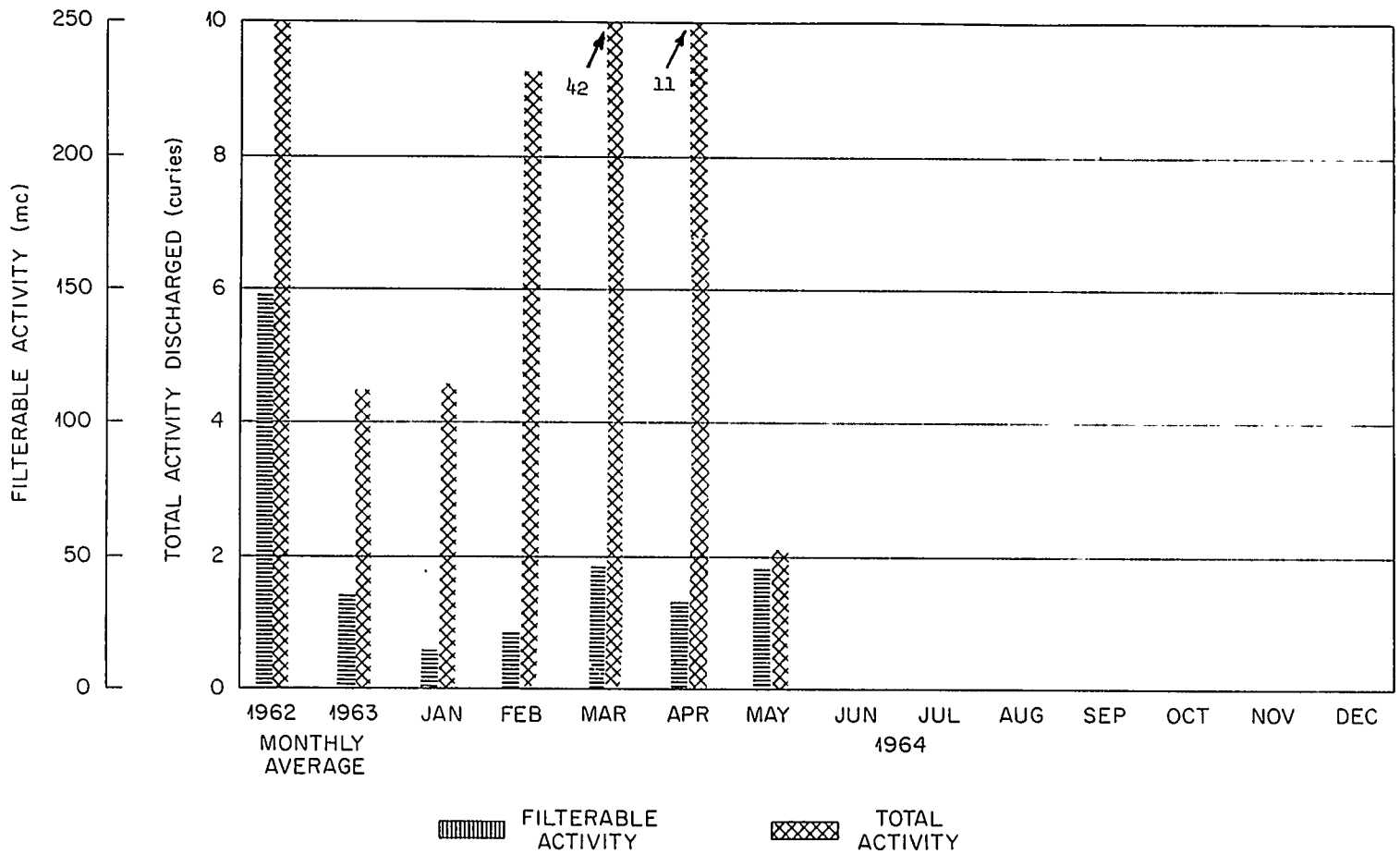

Fig. 3 Activity Release in Gaseous Waste

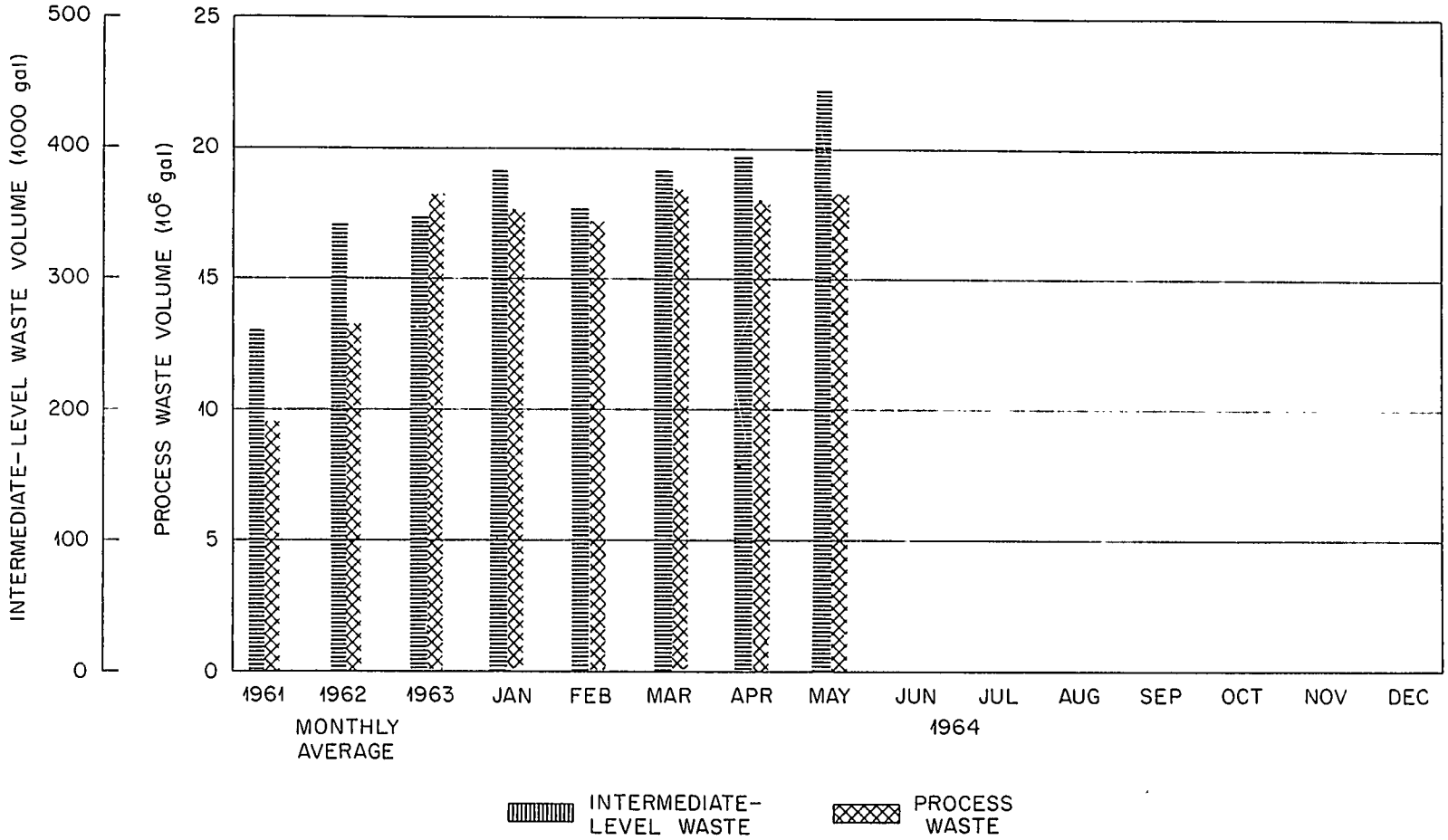

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER
64-7-63

COPY NO. 42

DATE: July 30, 1964

SUBJECT: Radioactive Waste Disposal
For the Month of June 1964

TO: Distribution

FROM: L. C. Lasher

ChemRisk Document No. 2018

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

David R Hamrin 8/9/95
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 summarizes data obtained from a network of stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figure 2 and Figure 3 compare the releases of radioactivity in wastes on a monthly basis.

A total of 21 curies was discharged into White Oak Lake this month. Most of this activity was ruthenium (19 curies) which was discharged from the waste pit area. The total discharge from the Bethel Valley area was low at 0.5 curie. Of this total, 0.4 curie was strontium. The 40 millicuries released from the Melton Valley area was normal.

Results of sampling carried out in White Oak Creek at points between the Settling Basin and Burial Ground No. 4 did not indicate any influx of strontium to the creek other than that contributed by the Waste Treatment Plant discharge. The scant rainfall during the month would make such a finding predictable; however, the routine samples taken at Monitoring Stations 1 and 3 (Figure 1) indicated that the usual discrepancy did exist. At this time no satisfactory explanation can be given for the contradiction.

It is becoming evident that if these spurious, sometimes weather-dependent releases into White Oak Creek are to be definitely pinpointed a very careful sampling program must be carried out for a number of months and it may be necessary to employ flow measuring and proportional sampling techniques. In view of the probable costs involved, such a program will not be undertaken at this time. A more detailed discussion

of the results of the work carried out during the past two months will be presented in a separate memorandum.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Process Waste Treatment Plant continued to operate at maximum capacity during the month. The plant was by-passed several times during the period and one million gallons of slightly contaminated waste was discharged into the creek without the benefit of chemical treatment. Decontamination achieved by the system was lower than normal (Table 2). The principal sources of waste discharged into the system are listed in Table 3.

INTERMEDIATE-LEVEL WASTE

A total of 349,200 gallons of waste was pumped into the disposal trenches this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	141,600
2.	Trench 7 A	137,200
3.	Trench 7 B	70,400

Major contributors to the system are listed below:

1.	4500 Complex	84,692
2.	Reactor Complex	59,782
3.	Building 3019	56,470
4.	Building 3026-C	22,520
5.	Fission Products Development Laboratory	20,798
6.	Radioisotopes Processing Area	19,283

Table No. 4 is an inventory of the nuclides transferred to the disposal area.

GASEOUS WASTE SYSTEM

A total of 1.8 curies of gaseous I^{131} was discharged from the 3039 stack this month; the particulate activity amounted to 5 millicuries. The amount of activity discharged by the 3018 and 3020 air handling systems was not significant. Figure 3 is a comparison of 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	<0.2	<0.3	0.2
Miscellaneous discharges from east end of plant	2	0.01	none detected	none detected	0.01
Total discharge from Bethel Valley area	3	0.4	0.03	0.07	0.5
Total discharge from Melton Valley area	4	0.04	<0.01	<0.01	0.04
East waste pit seepage	5	<0.0001	14.	<0.001	15.
West waste pit seepage	6	<0.0001	5	<0.001	5.
Total discharge from all sources	3,4,5,6	0.4	19.	0.07	21.
White Oak Dam to Clinch River (Health Physics measurement)	7	0.39	6.12	0.18	8.64
Gaseous Waste[3]					
3039 Stack	8				1.8
3020 Stack	9				<0.01
3018 Stack	10				<0.01
Total activity in gases released					

[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: 16.2×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.4×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[1]	0.6	0.2	67
$Ru^{103,106}$	<0.2	<0.2	
Co^{60}	None detected	None detected	
Cs^{137}	0.3	<0.3	
Gross Beta Analysis	43 c/m/ml	10 c/m/ml	77

[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	15	0.630	36.2	3.0	17.2
2.	Radioisotopes Processing Area	11	0.121	7.0	0.8	4.6
3.	Buildings 3503 and 3508	3	0.084	4.8	1.5	8.6
4.	Buildings 3025, 3026 and 3550	3	0.042	2.4	1.0	5.8
5.	Building 3019	15	0.525	30.2	2.5	14.4
6.	Fission Products Development Laboratory	1	0.004	0.2	0.3	1.7
7.	4500 Area	3	0.303	17.4	7.2	41.4
8.	Building 3525	2	0.030	1.7	1.1	6.3

[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	766	2569	4851	10738	504	6767	5250	12321	252	4427	6628	11264
Ru^{106}	9	77	1096	5926	8	150	1130	1746	4	99	981	1430
Cs^{137}	606	6592	48108	87879	1246	13159	26296	49743	623	8565	25947	41980
Co^{60}	6	50	837	1064	4	79	365	475	2	53	385	461
TOTALS	1387	9288	54892	105607	1762	20155	33041	64285	881	13144	33941	55135

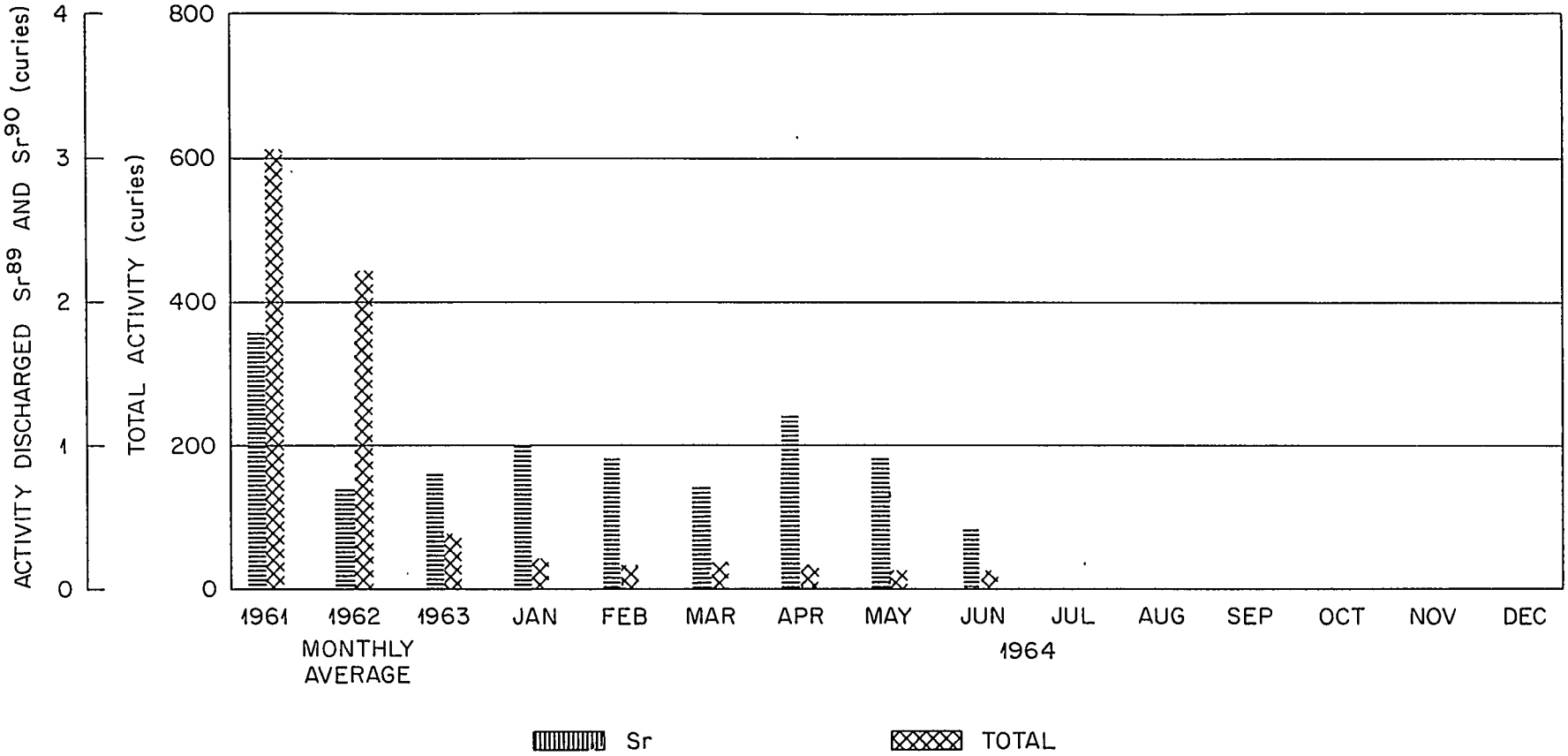

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

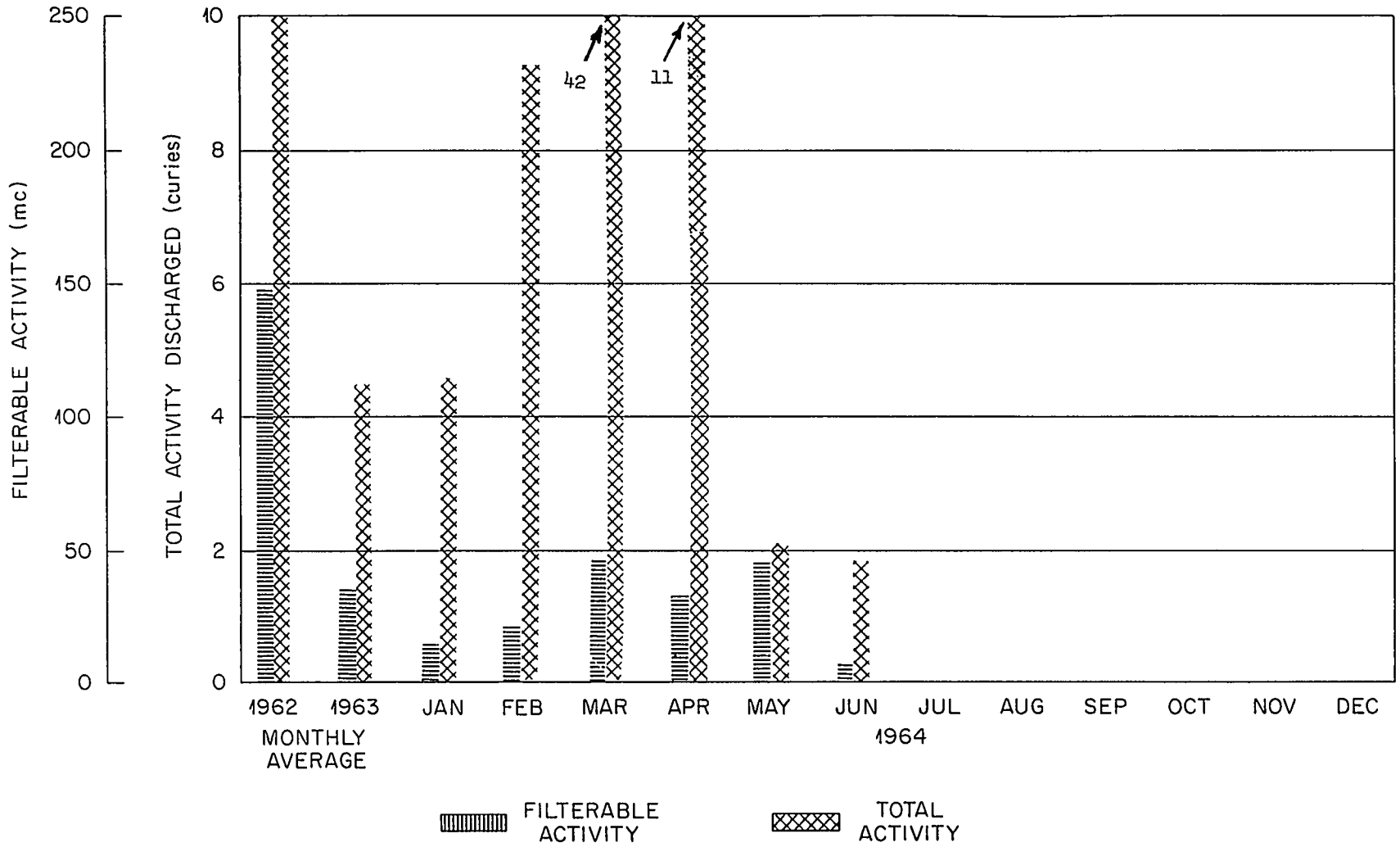

Fig. 3 Activity Release in Gaseous Waste

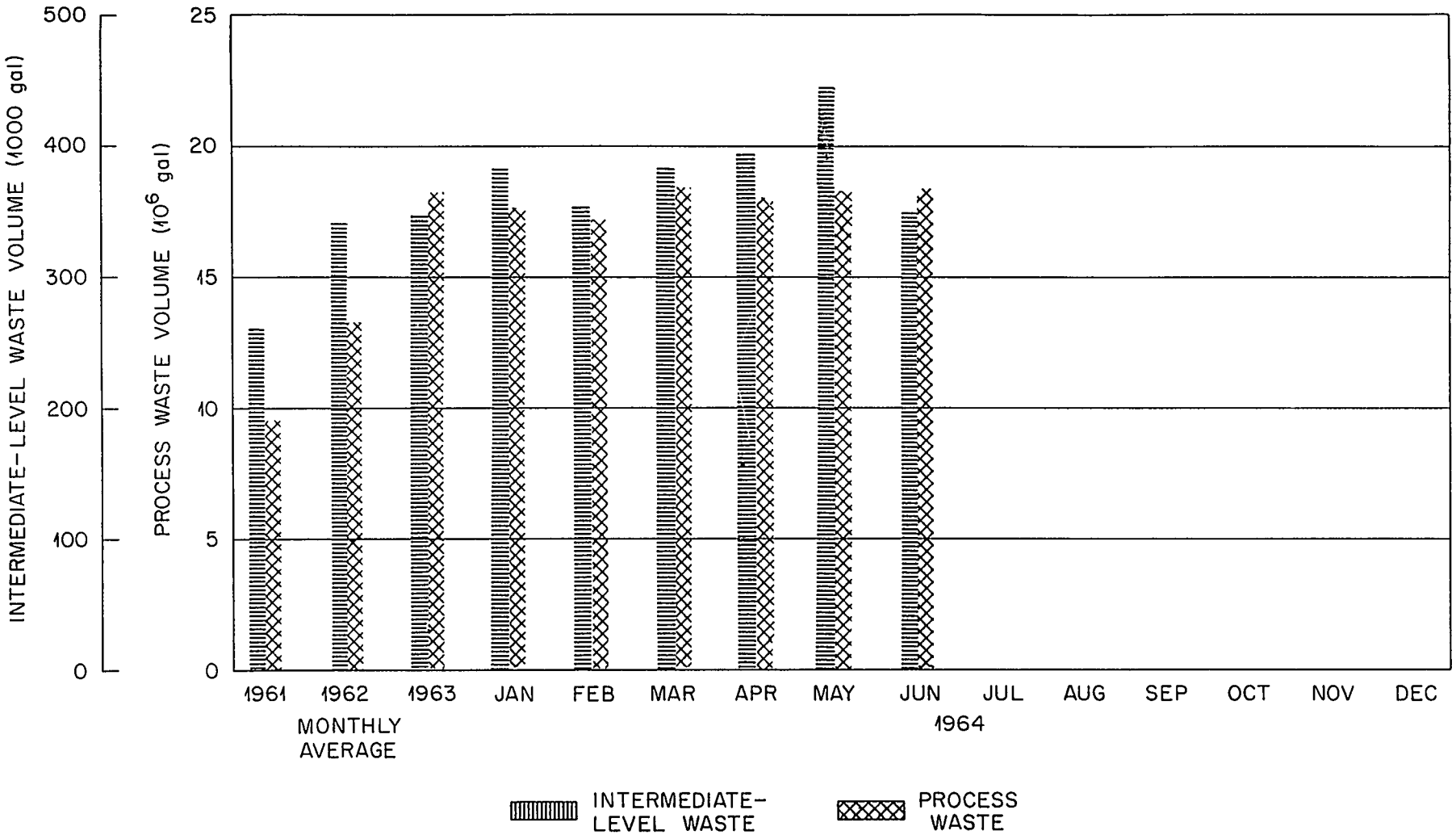

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER
64-8-77

COPY NO. 42

DATE: August 27, 1964

SUBJECT: Radioactive Waste Disposal
For the Month of July 1964

TO: Distribution

FROM: L. C. Lasher

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

David R Hamrin 8/9/95
Technical Information Officer Date
ORNL Site

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ChemRisk Document No. 2018

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 summarizes 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 radioactive waste on a monthly basis.

A total of 34 curies of radioactive waste was discharged into White Oak Lake this month. Most of this activity was ruthenium which was released from the waste pit area. The total amount of strontium activity discharged into White Oak Lake was low at 250 millicuries (Figure 2). However, the strontium discharge measured at White Oak Dam was 0.41 curie (Table 1). This amounts to a discrepency of approximately 150 millicuries which cannot be reconciled at the present time.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Process Waste Treatment Plant processed 17.9 million gallons of waste during the month. The capacity of the plant was exceeded several times and 1.7 million gallons of waste was discharged into White Oak Creek without chemical treatment. The by-passed waste and high flow volume through the plant probably account for the relatively poor decontamination achieved by the treatment system (Table 2). Principal sources of waste discharged into the system are listed in Table 3.

INTERMEDIATE-LEVEL WASTE

A total of 399,800 gallons of waste was pumped into the disposal trenches this month. The waste was distributed as follows:

		Gallons
1.	Trench 5	150,200
2.	Trench 7A	137,200
3.	Trench 7B	82,400

Major contributors to the system were as follows:

		Gallons
1.	4500 Complex	84,540
2.	Radioisotopes Processing Area	58,920
3.	Building 3019	46,140
4.	Reactor Complex	42,960
5.	Building 3026-C	20,950
6.	Fission Products Development Laboratory	19,700

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

GASEOUS WASTE SYSTEM

A total of 2.2 curies of gaseous I^{131} was discharged from the 3039 stack system. Only 8 millicuries of particulate activity were detected. The total release of activity from the 3020 and 3018 air handling systems was insignificant. 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	<0.17	<0.16	<0.16	<0.5
Miscellaneous discharges from east end of plant	2	0.008	None detected		0.008
Total discharge from Bethel Valley area	3	0.22	0.02	0.09	0.3
Total discharge from Melton Valley area	4	0.03	<0.01	<0.01	0.03
East waste pit seepage	5	<0.001	15.	<0.01	16.
West waste pit seepage	6	<0.001	17.	<0.01	18.
Total discharge from all sources	3,4,5,6	0.25	32.	0.09	34.
White Oak Dam to Clinch River (Health Physics measurement)	7	0.41	4.54	0.10	6.57
Gaseous Waste[3]					
3039 Stack	8				2.2
3020 Stack	9				<0.01
3018 Stack	10				<0.01
Total activity in gases released					2.2

[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: 17.9×10^6 Gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18.5×10^6 Gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^1	0.9	0.2	78
$Ru^{103, 106}$	<0.2	<0.2	
Co^{60}	None detected	None detected	
Cs^{137}	0.4	<0.2	
Gross Beta Analysis	30 c/m/ml	8 c/m/ml	73

[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	7	0.273	37.0	2.8	15.9
2. Radioisotope Processing Area	21	0.294	39.8	1.0	5.7
3. Buildings 3503 and 3508	7	0.154	20.9	1.6	9.1
4. Buildings 3025, 3026 and 3550	1	0.014	1.9	1.0	5.7
5. Building 3019	0	--	--	2.5	14.2
6. Fission Products Development Laboratory	2	0.003	0.4	0.1	0.6
7. 4500 Area	0	--	--	7.7	43.8
8. Building 3525	0	--	--	0.9	5.1

[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	90	2659	4851	7510	460	7227	5250	12477	230	4657	6628	11285
Ru^{106}	3	80	1096	1176	4	154	1130	1284	2	101	981	1082
Cs^{137}	5700	12292	48108	60400	4400	17559	26296	43855	2200	10765	25947	36712
Co^{60}	3	53	837	890	5	84	365	449	3	56	385	441
TOTALS	5796	15084	54892	69976	4869	25024	33041	58065	2435	15579	33941	49520

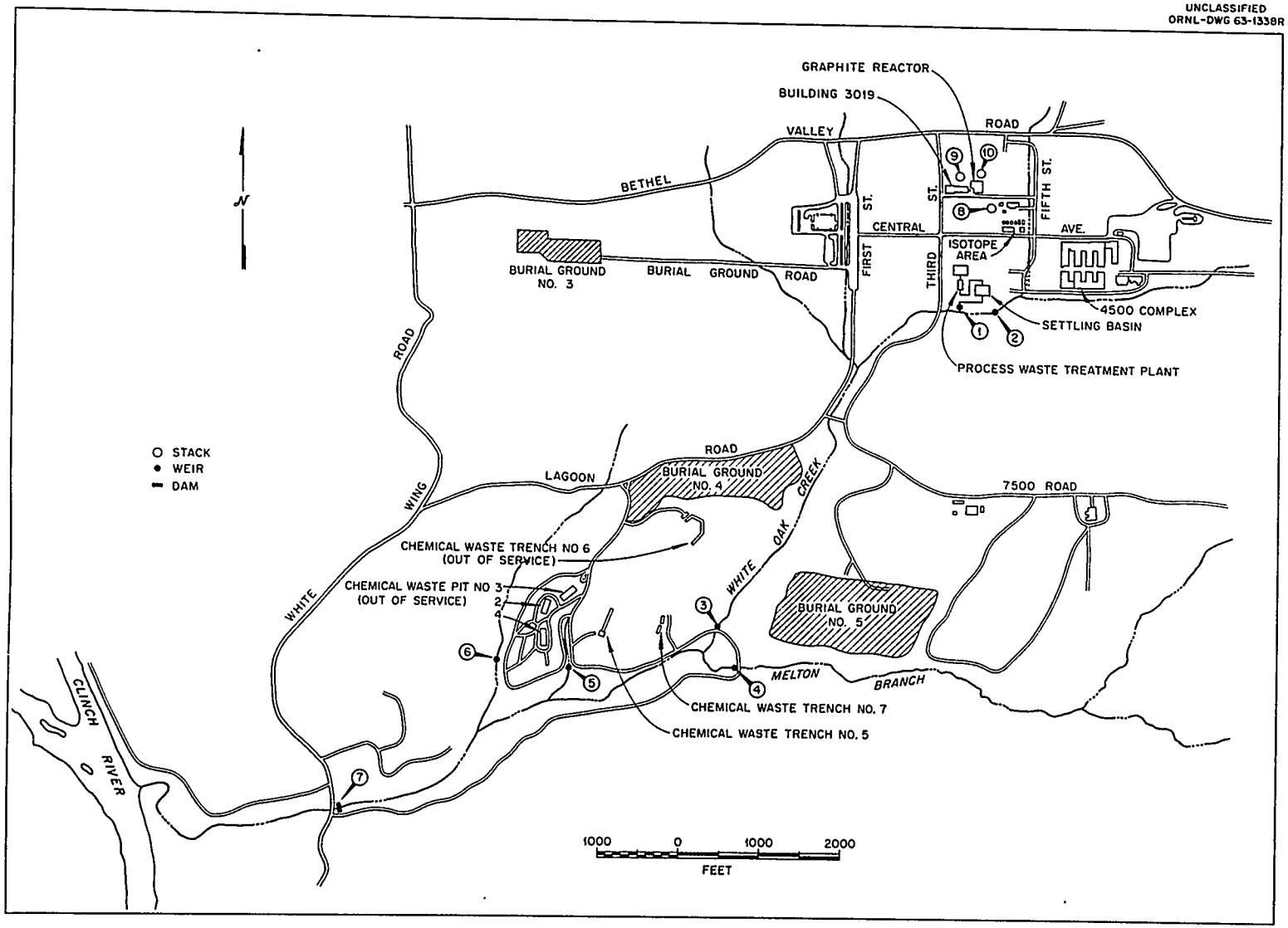

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

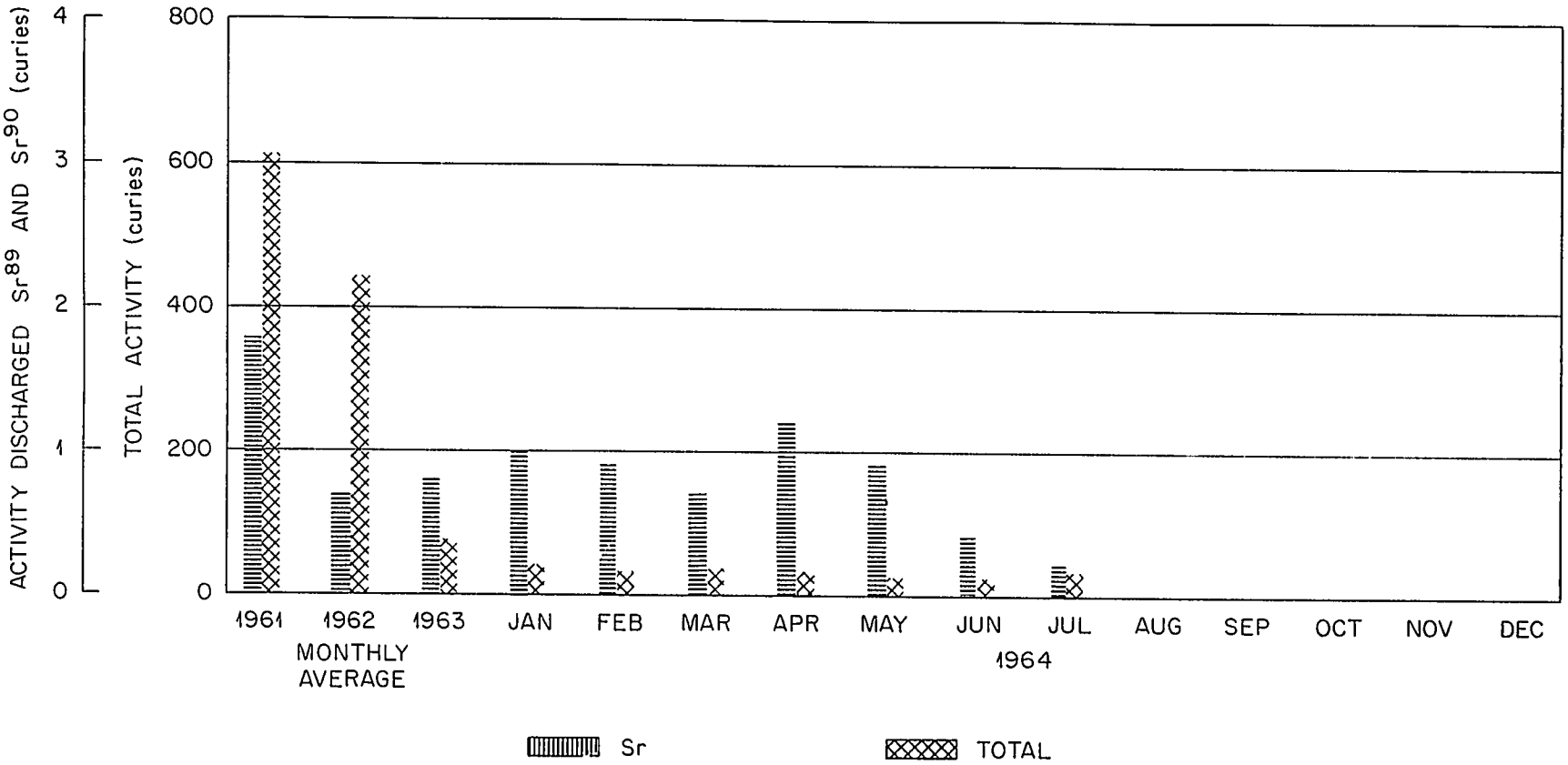

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

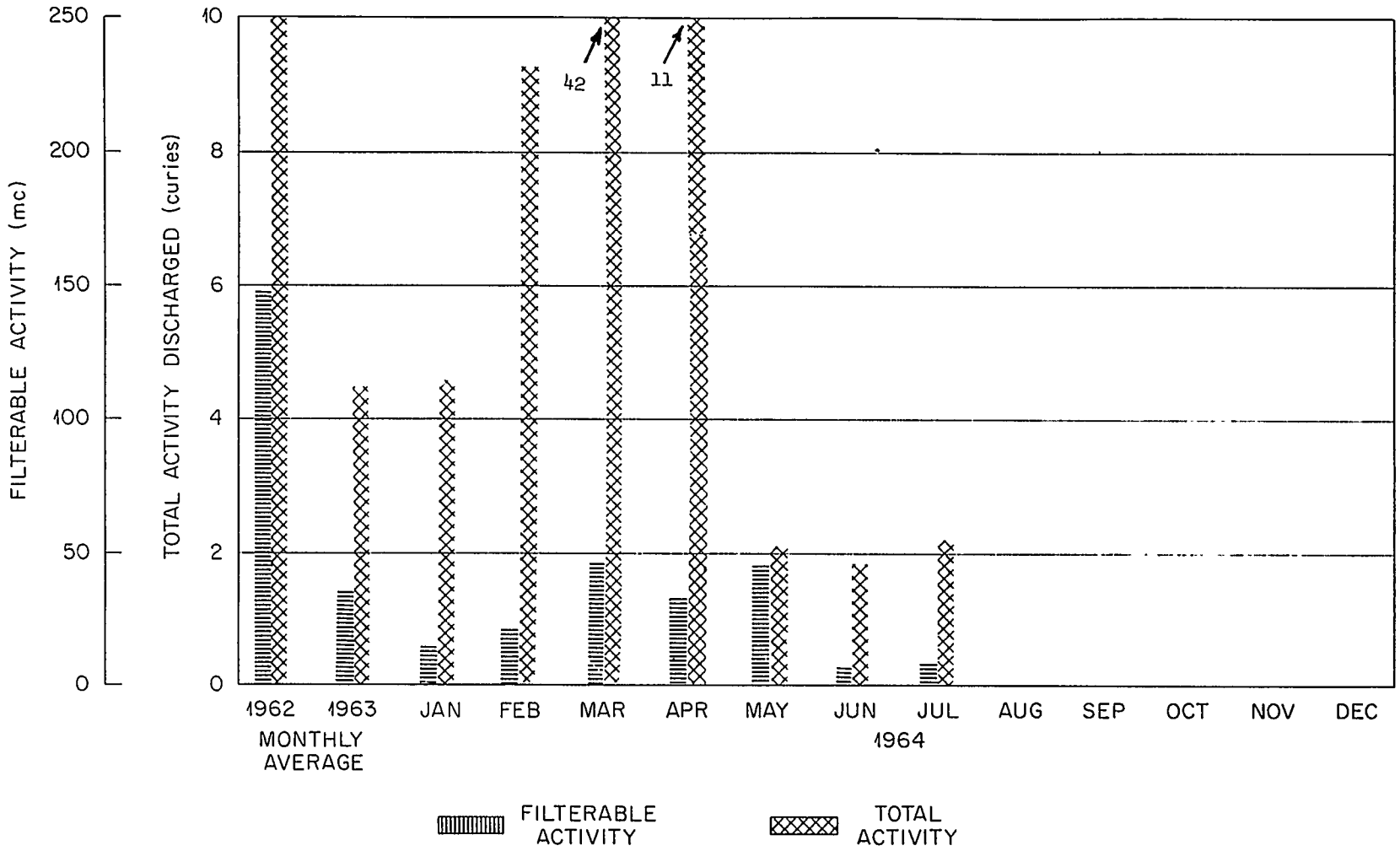

Fig. 3 Activity Release in Gaseous Waste

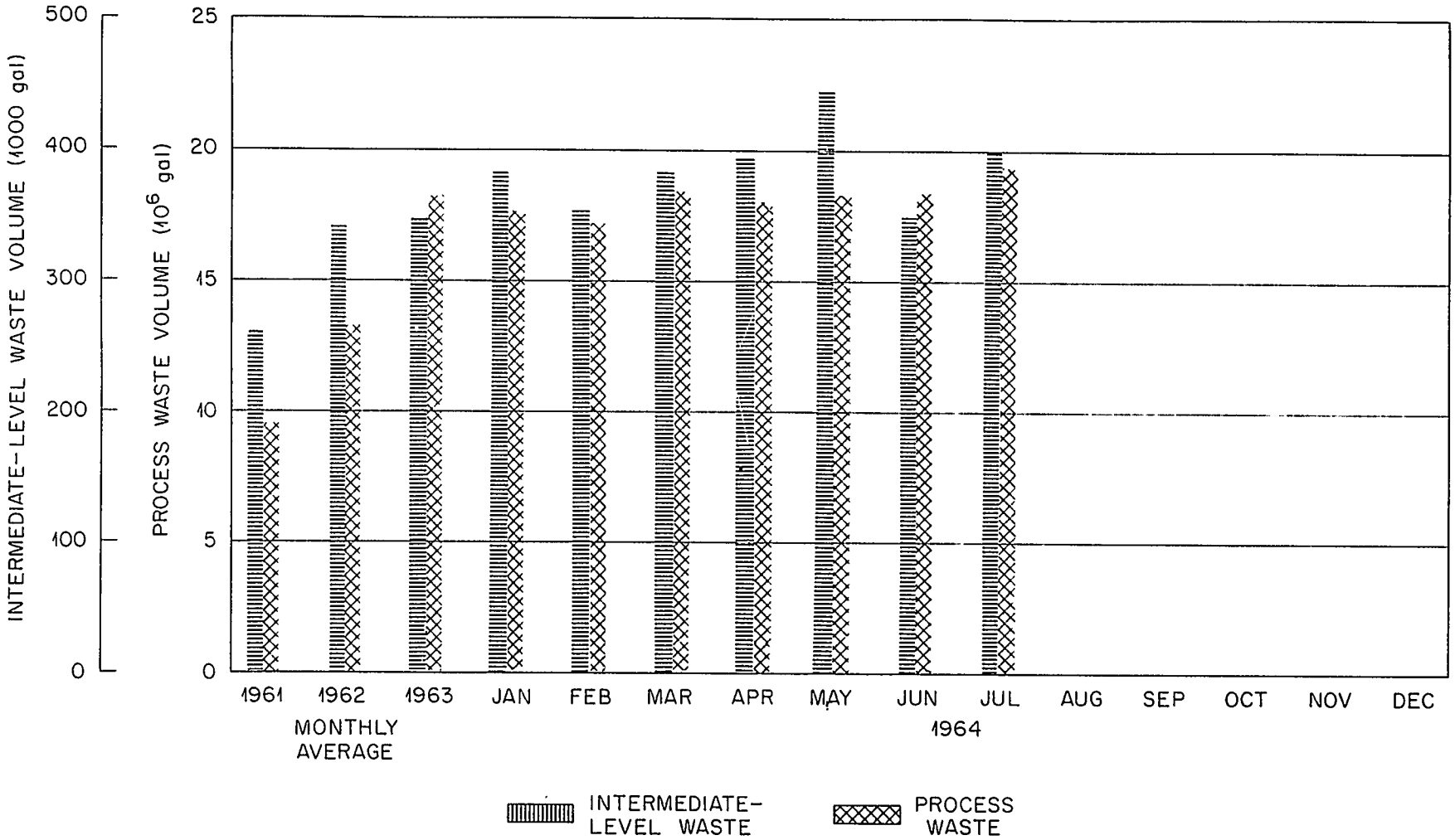

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER

64-9-63

DATE: September 24, 1964

COPY NO. 42

SUBJECT: Radioactive Waste Disposal for the month of August 1964

TO: Distribution

FROM: L. C. Lasher

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

David C Hamrin 8/9/95
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 radioactive waste on a monthly basis. Figure 4 shows a comparison of volumes of waste handled.

The total discharge of radioactive waste into White Oak Lake amounted to 30.5 curies this month. Essentially all of this activity was ruthenium which was released from the waste pit area. Only 330 millicuries of strontium were discharged into the lake. Of this total, 300 millicuries were discharged by the Bethel Valley drainage system, and the remaining 30 millicuries were released from the Melton Valley area. The cesium release amounted to 100 millicuries.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 17.9 million gallons of waste was processed by the Waste Treatment Plant this month. The plant capacity was exceeded several times during the month and 2.9 million gallons of slightly contaminated waste was discharged into White Oak Creek without chemical treatment. However, the overall decontamination achieved was satisfactory (Table 2).

There was only one significant accidental release of activity into the process waste system. The release was three curies of cesium-137 from the Fission Products Development Laboratory operations. The discharge to the creek as a result of the accident was only 250 millicuries.

Table 3 lists the principal sources of waste discharged into the system.

INTERMEDIATE-LEVEL WASTE

A total of 474,100 gallons of waste was pumped into the disposal trenches this month. The waste was distributed as follows:

		Gallons
1.	Trench 5	182,800
2.	Trench 7A	169,700
3.	Trench 7B	121,600

Major contributors to the system were as follows:

		Gallons
1.	4500 Complex	120,490
2.	Building 3019	52.200
3.	Radioisotopes Processing Area	47,900
4.	Reactor Complex	46,080
5.	Fission Products Development Laboratory	30,370
6.	Building 3026-C	20,460

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

GASEOUS WASTE SYSTEM

The gaseous waste discharge from the 3039 air handling system was 1.5 curies; all of the activity was identified as I^{131}. Only 4 millicuries of particulate activity were detected. The release of radioactivity from the 3020 and 3018 systems continued to be insignificant. 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	<0.2	0.4	0.6
Miscellaneous discharges from east end of plant	2	0.01	None detected		0.01
Total discharge from Bethel Valley area	3	0.3	0.1	0.1	0.5
Total discharge from Melton Valley area	4	0.03	<0.01	<0.01	0.03
East waste pit seepage	5	<0.001	12.	<0.01	12.
West waste pit seepage	6	<0.001	18.	<0.01	18.
Total discharge from all sources	3,4,5,6	0.33	30.1	0.1	30.5
White Oak Dam to Clinch River (Health Physics measurement)	7	0.38	7.71	0.19	9.32
Gaseous Waste[3]					
3039 Stack	8				1.5
3020 Stack	9				<0.01
3018 Stack	10				<0.01
Total activity in gases released					1.5

[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: 17.9×10^6 Gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 21.5×10^6 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
$Ru^{103, 106}$	<0.2	<0.02	--
Co^{60}	None detected	--	--
Cs^{137}	2.9	0.4	86
Gross Beta Analysis	75 c/m/ml	9 c/m/ml	88

[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	12	0.49	9.0	2.95	15.7
2.	Radioisotope Processing Area	28	0.39	7.2	1.01	5.4
3.	Buildings 3503 and 3508	3	0.06	1.1	1.44	7.7
4.	Buildings 3025, 3026 and 3550	4	0.07	1.3	1.16	6.2
5.	Building 3019	11	0.43	7.9	2.78	14.8
6.	Fission Products Development Laboratory	--	3.0[2]	55.4	0.03	0.2
7.	4500 Area	8	0.98	18.1	8.71	46.5
8.	Building 3525	0	--	--	0.66	3.5

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

[2]Approximation based on analysis of diversion box sample. The activity entered the process waste system downstream of the sampler in the FPDL tributary.

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	750	3409	4851	11578	832	8059	5250	13613	603	5260	6628	12097
Ru^{106}	12	92	1096	5941	13	167	1130	1763	10	111	981	1442
Cs^{137}	8308	20600	48108	101887	6061	23620	26296	60204	4389	15154	25947	48569
Co^{60}	19	72	837	1086	17	101	365	497	12	68	385	476
TOTALS	9089	24173	54892	120492	6923	31947	33041	76077	5014	20593	33941	62584

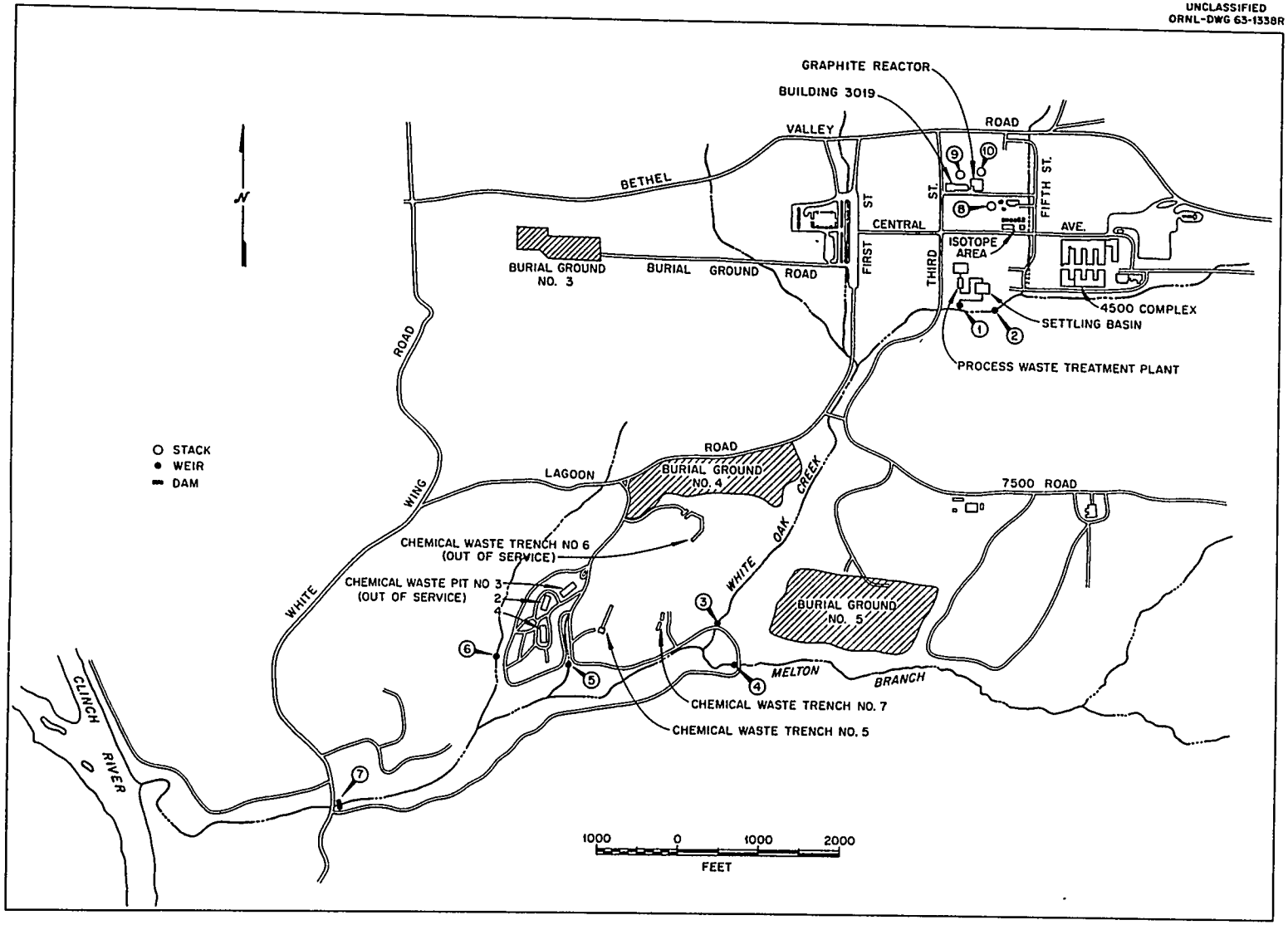

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

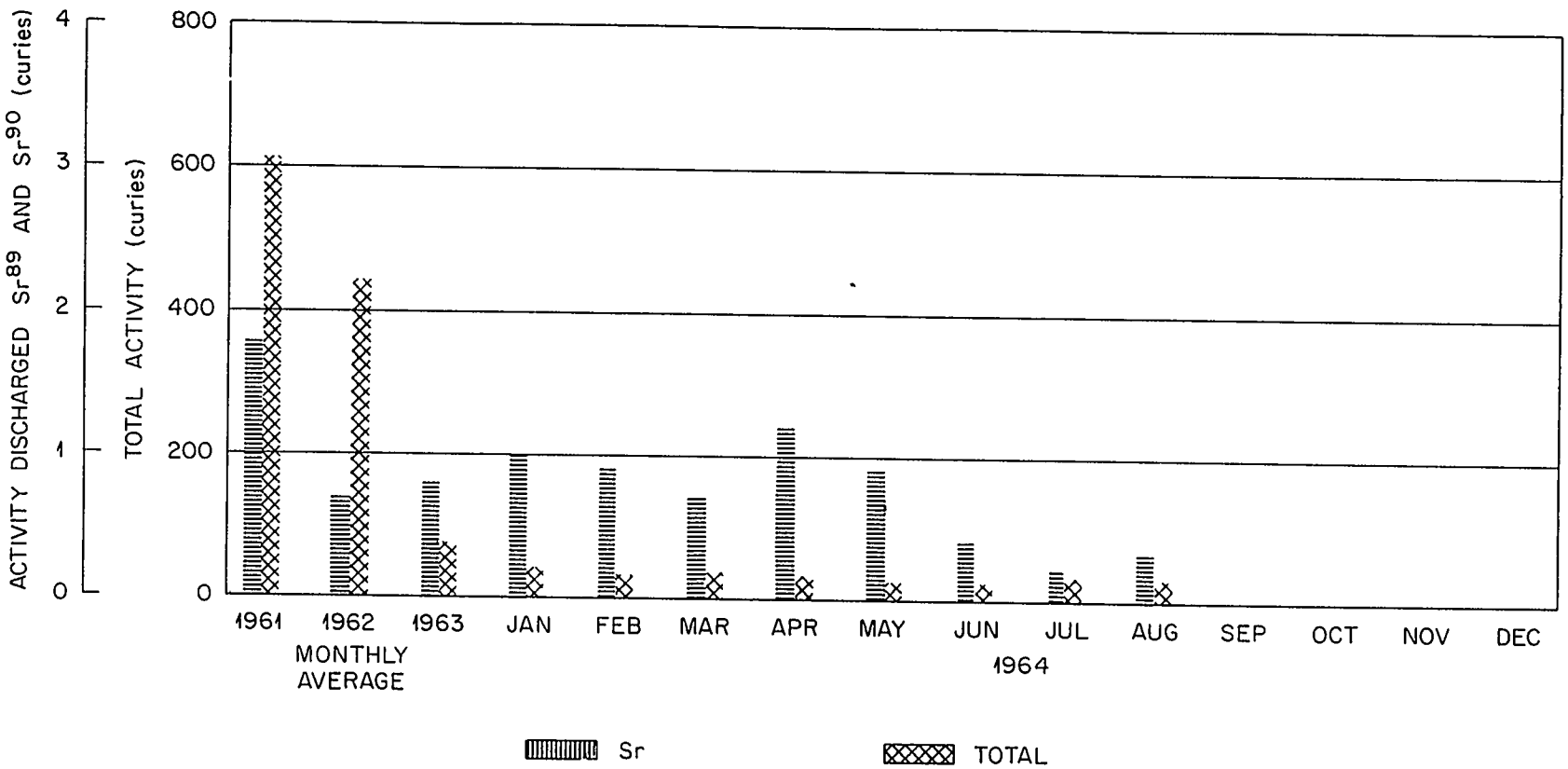

Fig. 2 Activity Discharged in Liquid Waste to White Oak Creek

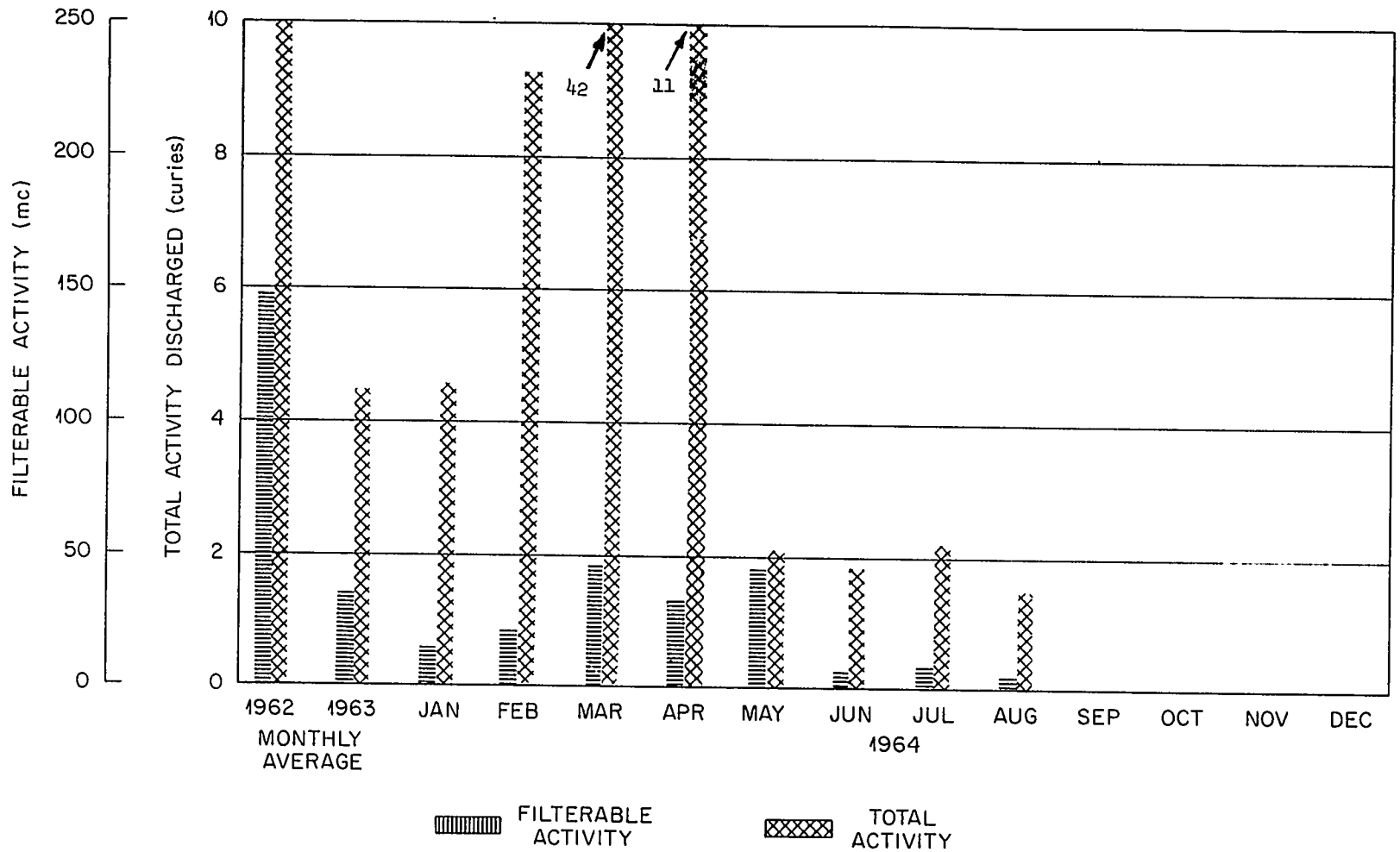

Fig. 3 Activity Release in Gaseous Waste

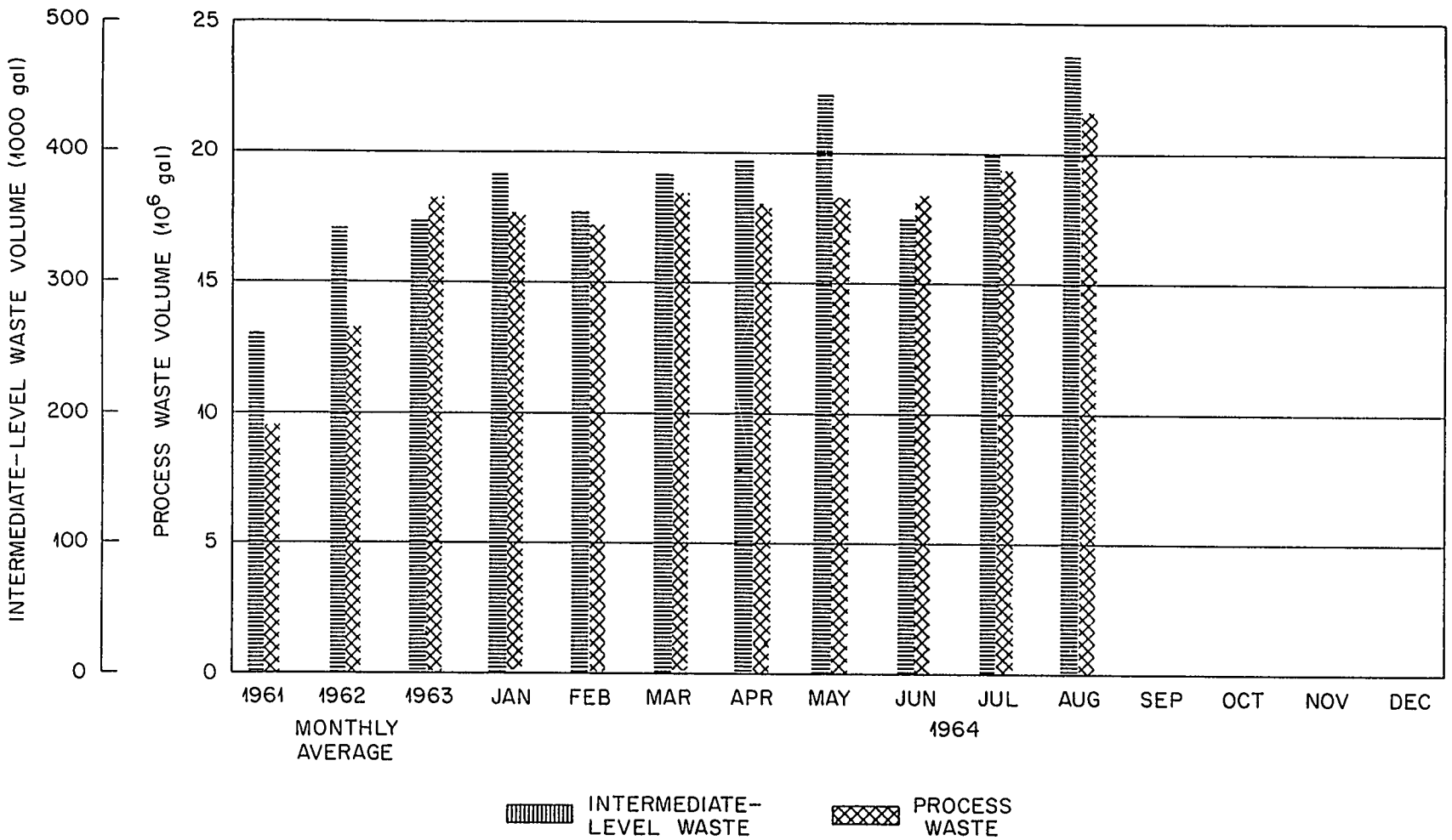

Fig. 4 Liquid Waste Volumes

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CENTRAL FILES NUMBER

65-3-11

DATE: March 5, 1965

COPY NO. 43

SUBJECT: Radioactive Waste Disposal Operations Report for January, 1965

TO: Distribution

FROM: L. C. Lasher

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

David C Hamrin 3/4/96
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 through 5 compare the releases of radioactive waste on a monthly basis.

The total discharge in liquid wastes this month was 22.75 curies. Ruthenium (19.26 curies) and cobalt (3.03 curies) seeping from the soil disposal area, accounted for most of the activity. The strontium discharge (0.46 curie) was about the same as the previous month. Only 0.08 curie came from the process waste system and the balance from miscellaneous unmonitored sources and the creek bed itself.

The total release of activity in gaseous waste was 4.33 curies. The 3039 stack system accounted for the bulk of it with a discharge of 3.89 curies of I^{131} and 0.39 curie of Hg^{203}. The particulate activity from the same system was above normal (see Figure 5) because of increased processing at the Isotope Area and the Fission Product Development Laboratory. The particulate activity was identified as follows:

Nuclide	Millicuries
1. I^{131}	13
2. Cs^{137}	9
3. Ce^{144}	1

The total discharge from the 3020 system was 20 millicuries of I^{131}.

INTERMEDIATE-LEVEL WASTE

A total of 388,600 gallons of waste was pumped to the disposal area this month. Distribution between the trenches is recorded below:

		Gallons
1.	Trench 5	133,120
2.	Trench 7A	149,570
3.	Trench 7B	105,370

Major contributors to the system were as follows:

		Gallons
1.	Building 3019	102,270
2.	4500 Complex	41,450
3.	Reactor Complex	40,340
4.	Fission Products Development Laboratory	38,348
5.	Isotope Processing Area	26,440

Table 4 is an inventory of the nuclides transferred to the soil disposal area. Figure 6 compares the January volumes of intermediate level waste with the monthly average of prior years.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The process waste volume continued to be well below the capacity of the Waste Treatment Plant because it was possible to divert 6.7 million gallons of uncontaminated water from the 4500 area to the creek through the new ponds. The efficiency of the Waste Treatment Plant, shown in Table 2, continued to be high. The main sources of activity handled by the process waste system are listed in Table 3. Figure 7

compares the volume of process waste handled with the monthly average of previous years.

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	0.03	none detected	0.14
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	0.02
Total discharge from Bethel Valley area	3	0.43	0.01	0.13	0.56
Total discharge from Melton Valley area	4	0.03	< 0.01	< 0.01	0.03
East waste pit seepage	5	< 0.01	11.31	none detected	13.22
West waste pit seepage	6	< 0.01	7.94	none detected	8.94
Total discharge from all sources	3,4,5,6	0.46	19.26	0.13	22.75
White Oak Dam to Clinch River (Health Physics measurement)	7	0.64	13.78	0.11	17.40
Gaseous Waste[3]					
3039 Stack	8				4.30
3020 Stack	9				0.02
3018 Stack	10				< 0.01
Total activity in gases released					4.33

[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: 10.8×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.5×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr^1	1.52	0.08	95
$Ru^{103,106}$	0.09	0.03	67
Co^{60}	0.09	0.04	56
Cs^{137}	0.37	none detected	100
Gross Beta Analysis	50 c/m/ml	3 c/m/ml	94

[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	% OF TOTAL
1.	Reactor Operations	6	0.25	61	3.07	39.6
2.	Radioisotope Processing Area	3	0.05	11	1.14	14.7
3.	Buildings 3503 and 3508	0	--	--	0.34	4.4
4.	Buildings 3025, 3026 and 3550	0	--	--	1.20	15.5
5.	Building 3019	0	--	--	0.22	2.8
6.	Fission Products Development Laboratory	--[2]	--	--	0.01	0.1
7.	4500 Area	13	0.12	28	0.65	8.4
8.	Building 3525	0	--	--	1.12	14.5

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

[2] Sampler not operable because of low volume. The amount of activity was estimated to be insignificant.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

	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	262	262	5303	13734	793	793	10583	16930	580	580	6867	14284
Ru^{106}	5	5	118	5972	3	3	189	1788	2	2	126	1459
Cs^{137}	680	680	58688	140655	998	998	53398	90980	730	730	35876	70021
Co^{69}	6	6	110	1130	13	13	131	540	9	9	88	505
TOTALS	953	953	64219	161491	1807	1807	64301	110238	1321	1321	42957	86269

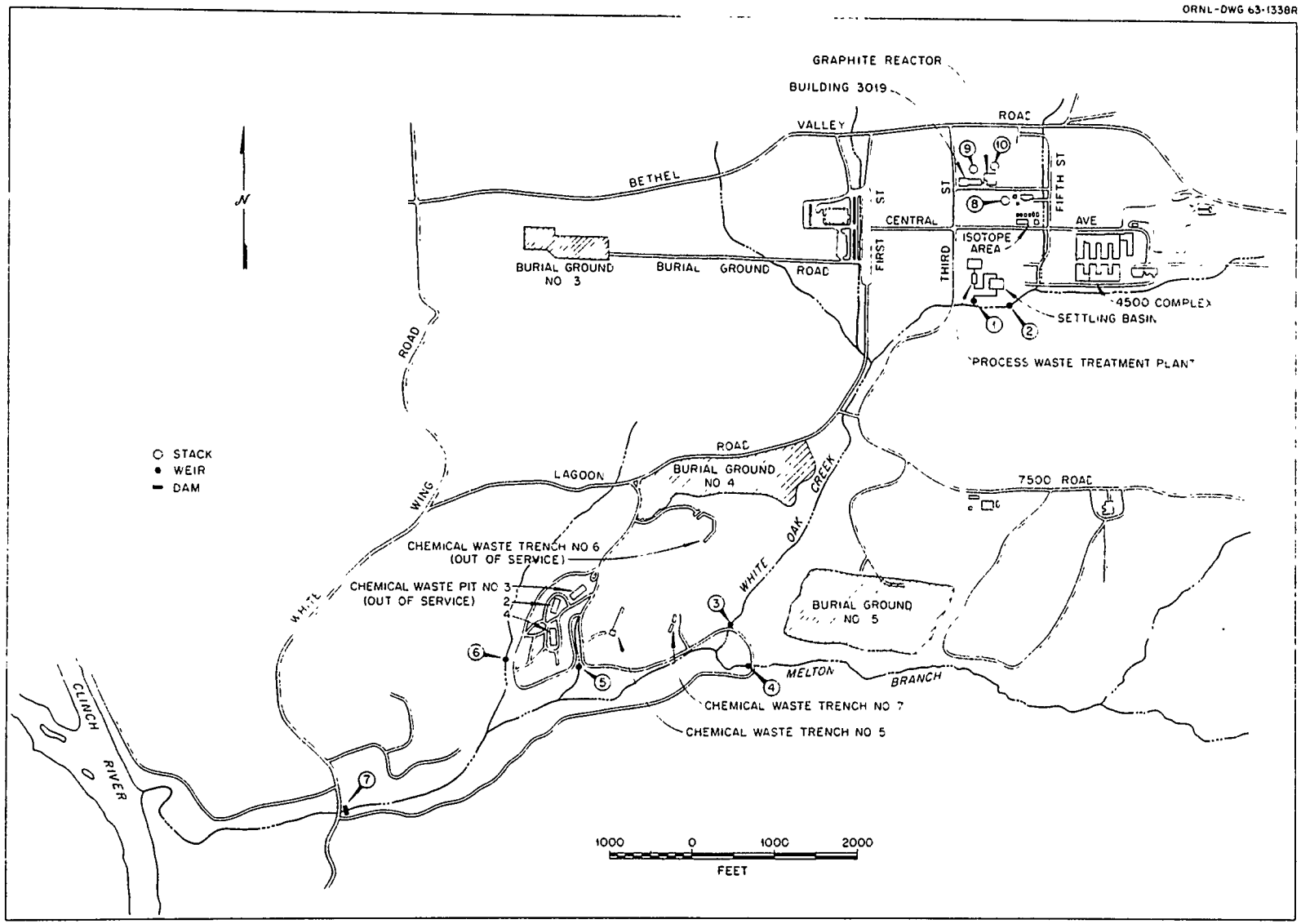

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

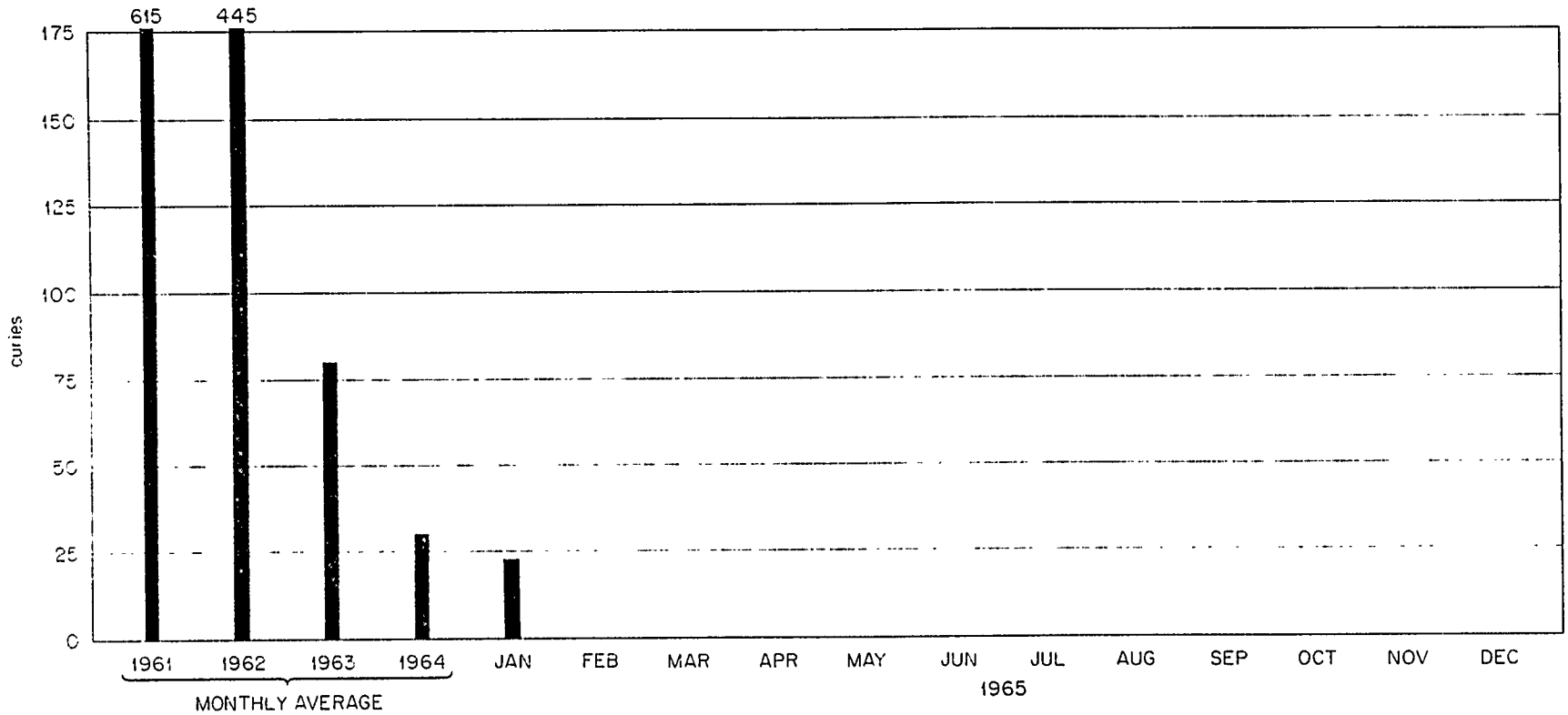

Fig. 2. Total Activity Discharged in Liquid Waste to White Oak Creek

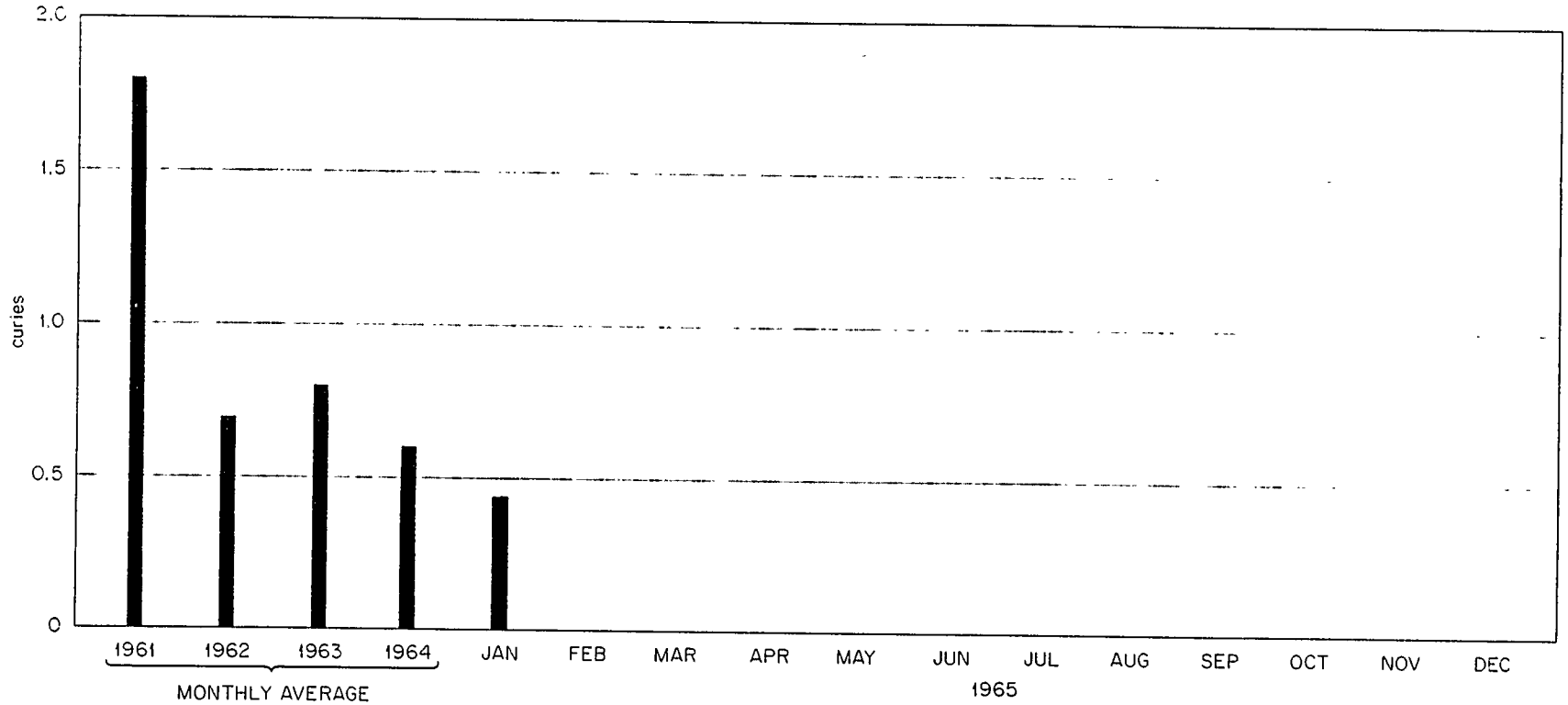

Fig. 3. Sr^{89} and Sr^{90} Discharged in Liquid Waste to White Oak Creek

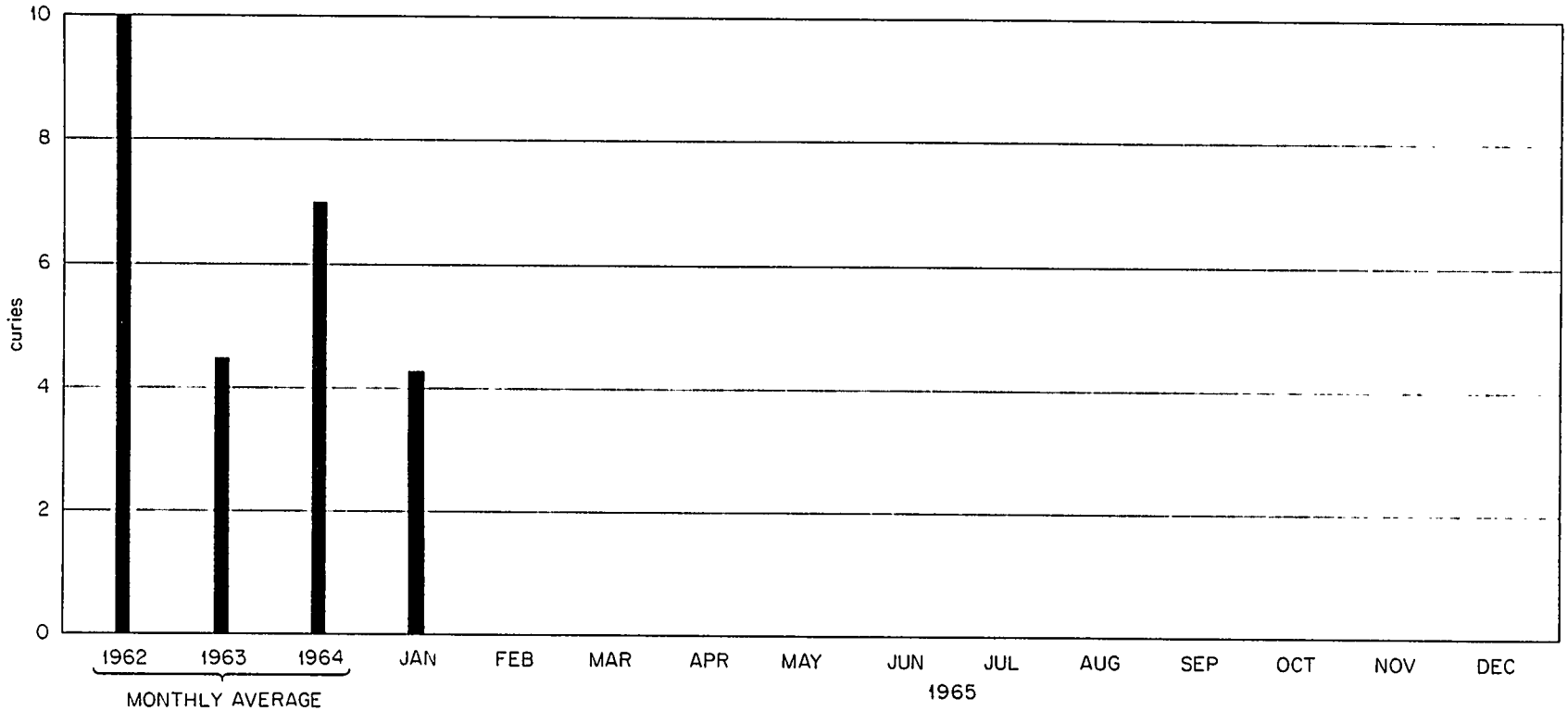

Fig. 4. Total[1] Activity Released in Gaseous Waste

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

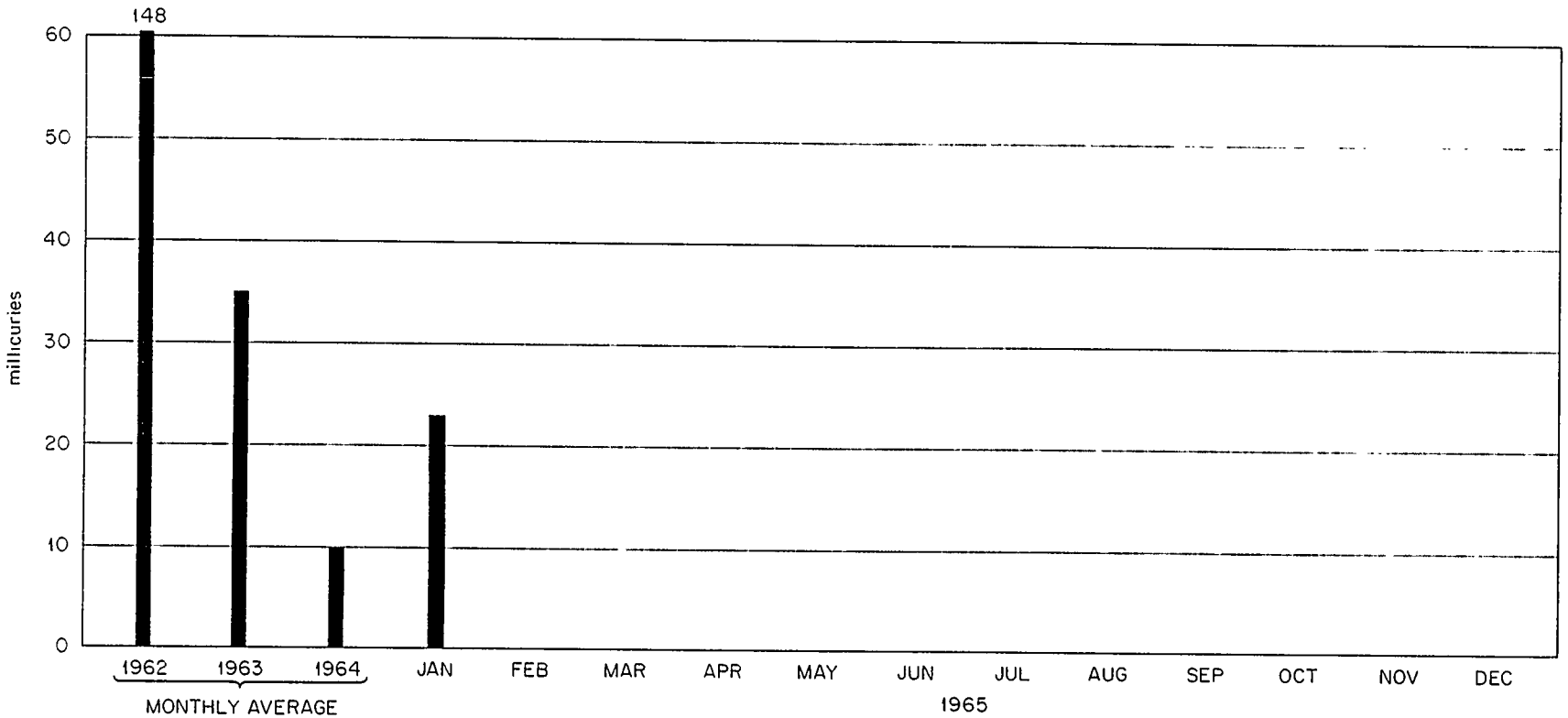

Fig. 5. Filterable Activity Released in Gaseous Waste

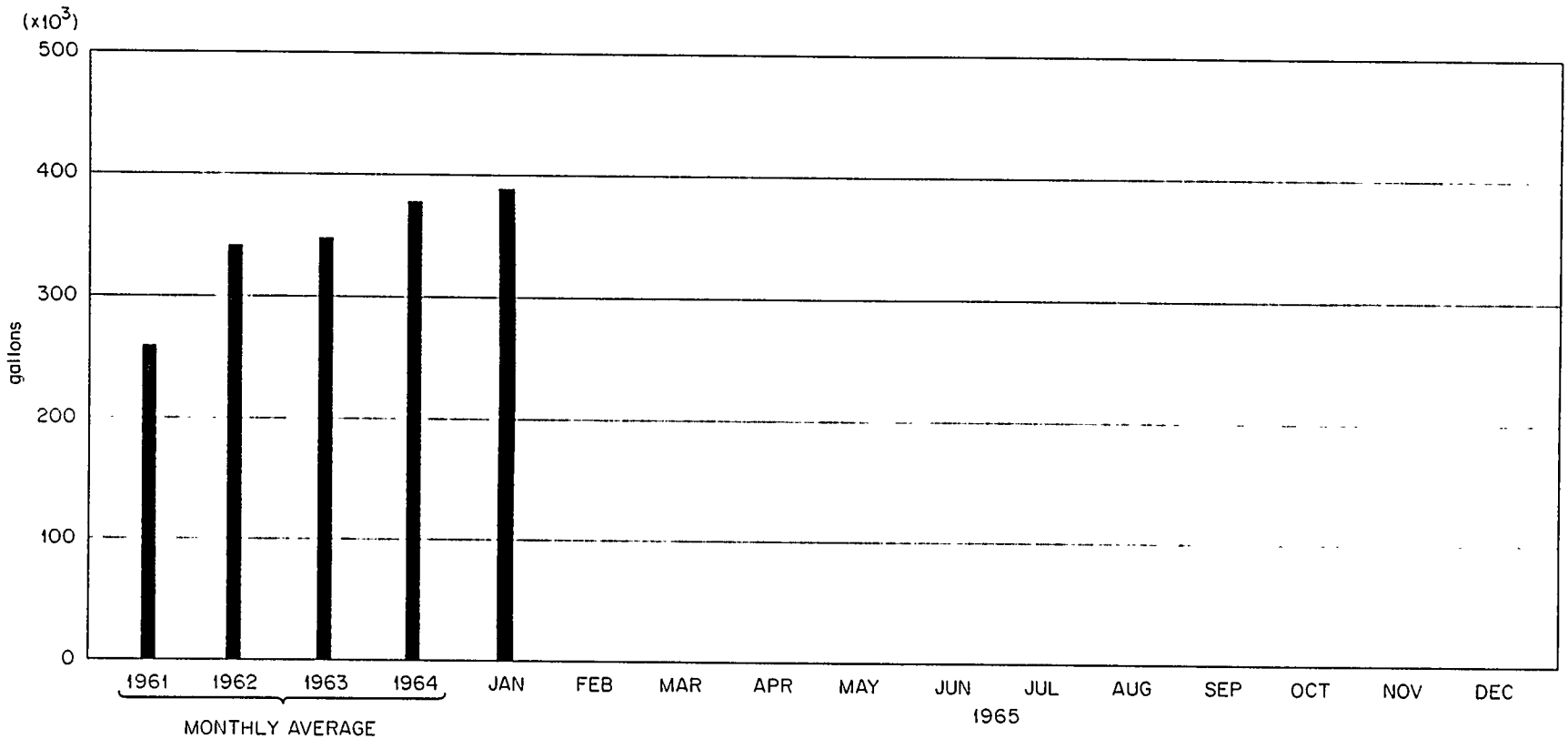

Fig. 6. Intermediate Level Waste Volumes

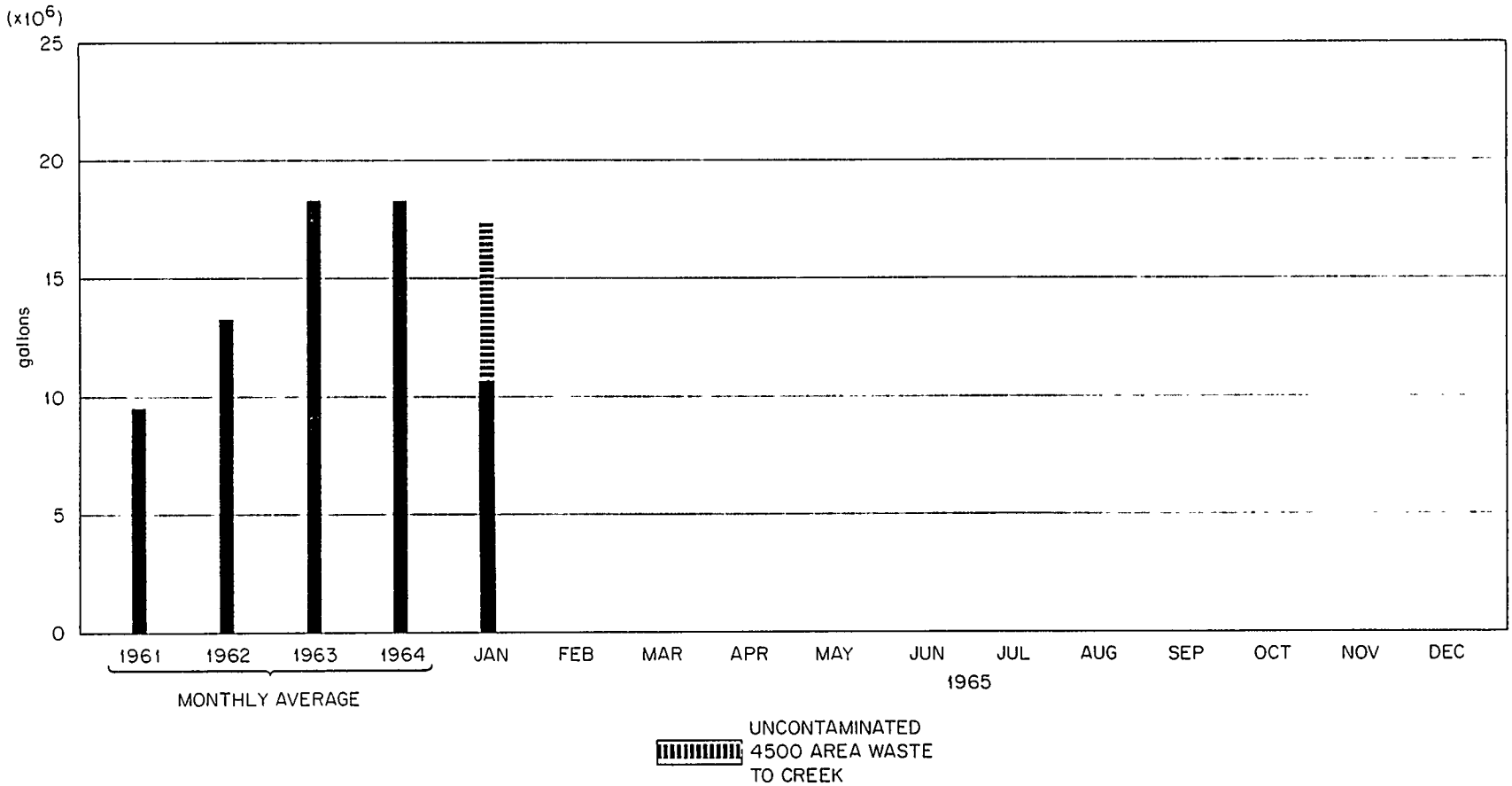

Fig. 7. Process Waste Volumes

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65-3-55

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DATE: March 30, 1965

SUBJECT: Radioactive Waste Disposal Operations Report for February, 1965

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David C Hamrin 3/4/96
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 sampling stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 through 8 compare the releases of waste on a monthly basis.

A total of 12.03 curies of radioactivity was discharged into White Oak Lake this month. Most of the activity was ruthenium (10.24 curies) and cobalt (0.95 curies) which came from the soil disposal area. The total strontium discharge into White Oak Lake was 660 millicuries. Of this amount, 620 millicuries were released from the Bethel Valley drainage area and the remainder from Melton Valley. The strontium discharged by the process waste system was only 110 millicuries, and the discharge from the east sector of the Laboratory was negligible. Most of the Bethel Valley discharge came from the creek bed itself and from a number of unmonitored tributaries which carry small amounts of radioactivity.

The gaseous waste system released 1.38 curies of activity this month. The major constituent was gaseous ^{131}I (1.31 curies) which was released from the 3039 stack. The 3039 stack system also released 57 millicuries of particulate activity which was identified as follows:

Nuclide	Millicuries
1. ^{137}Cs	54.6
2. ^{131}I	2.4
3. ^{144}Ce	0.2

The bulk of the ^{137}Cs came from the Fission Product Development

Laboratory through the cell ventilation system. The filters in that system have since been changed and a reduction in the discharge of particulate activity has been noted.

The total release from the 3020 stack was 15 millicuries.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

By using the 4500 area ponds, the volume of contaminated water handled by the Waste Treatment Plant was kept well below the plant capacity. Almost 5 million gallons of uncontaminated water was dumped directly to the creek. Strontium decontamination efficiency of 88% was achieved by the plant which was alightly lower than that of the previous four months probably because of a series of minor mechanical failures which affected the chemical feeders and the sludge-removal system. A summary of plant operations is given in Table 2.

Table 3 lists the sources of waste discharged to the system. There is now some doubt about the validity of the activity shown as emanating from the reactor operations. An investigation of the system has shown that the activity measured in the tributary from the reactor area may be seeping into the process waste line from the soil. Sampling and analyzing of tributary streams to identify the source definitely is being continued.

INTERMEDIATE-LEVEL WASTE

A total of 348,050 gallons of waste was pumped to the soil disposal area this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	,119,700
2.	Trench 7A	140,160
3.	Trench 7B	88,190

Major contributors to this system were as follows:

		Gallons
1.	Building 3019	85,150
2.	4500 Complex	62,540
3.	Reactor Complex	54,870
4.	Radioisotopes Processing Area	36,600
5.	Fission Products Development Laboratory	11,610

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

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	0.11	none detected	0.06	0.19
Miscellaneous discharges from east end of plant	2	0.01	none detected	none detected	0.01
Total discharge from Bethel Valley area	3	0.62	0.05	0.18	0.85
Total discharge from Melton Valley area	4	0.04	< 0.01	< 0.01	0.04
East waste pit seepage	5	< 0.01	7.55	none detected	8.29
West waste pit seepage	6	< 0.01	2.64	none detected	2.85
Total discharge from all sources	3,4,5,6	0.66	10.24	0.18	12.03
White Oak Dam to Clinch River (Health Physics measurement)	7	0.37	9.89	0.21	12.48
Gaseous Waste[3]					
3039 Stack	8				1.36
3020 Stack	9				0.02
3018 Stack	10				< 0.01
Total activity in gases released					1.38

[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: 10.6×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.5×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[1]	0.94	0.11	88
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.03	0.02	33
^{137}Cs	0.29	0.06	79
Gross Beta Analysis	31 c/m/ml	4 c/m/ml	87

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1]		VOLUME	
		CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations[2]	10	0.350	41.3	2.59	29.8
2. Radioisotope Processing Area	6	0.104	12.3	1.29	14.8
3. Buildings 3503 and 3508	2	0.011	1.3	0.42	4.8
4. Buildings 3025, 3026 and 3550	1	0.014	1.6	1.06	12.2
5. Building 3019	2	0.004	0.5	0.13	1.5
6. Fission Products Development Laboratory	1	0.001	0.1	0.06	0.7
7. 4500 Area	12	0.351	41.4	2.17	24.9
8. Building 3525	1	0.013	1.5	0.98	11.3

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

[2]See text

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	59	321	5303	13793	230	1023	10583	17160	144	724	6867	14428
^{106}Ru	1	6	118	5973	3	6	189	1791	2	4	126	1461
^{137}Cs	78	758	58688	140733	79	1077	53398	91059	49	779	35876	70070
^{60}Co	7	13	110	1137	9	22	131	549	6	15	88	511
TOTALS	145	1098	64219	161636	321	2128	64301	110559	201	1522	42957	86470

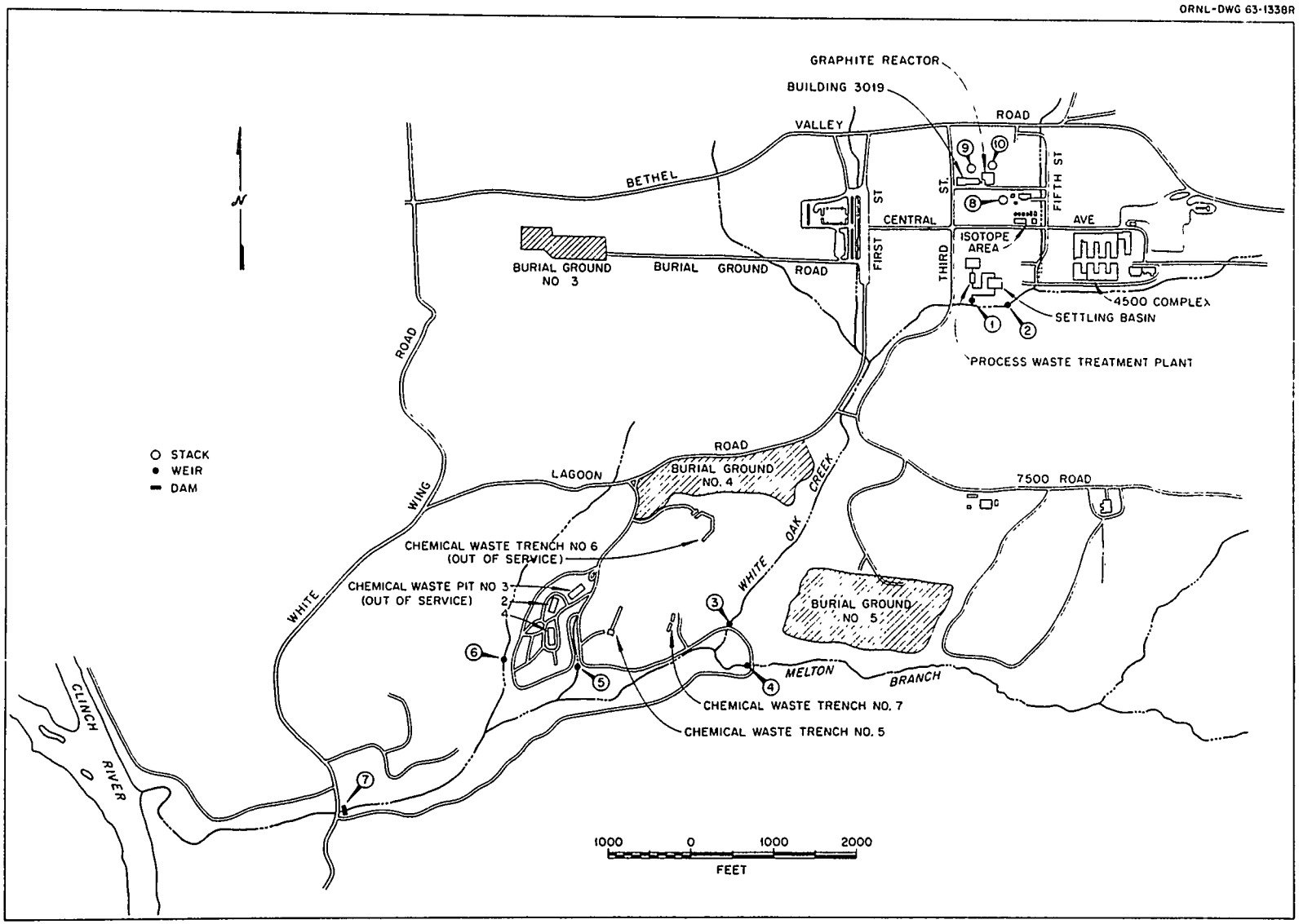

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

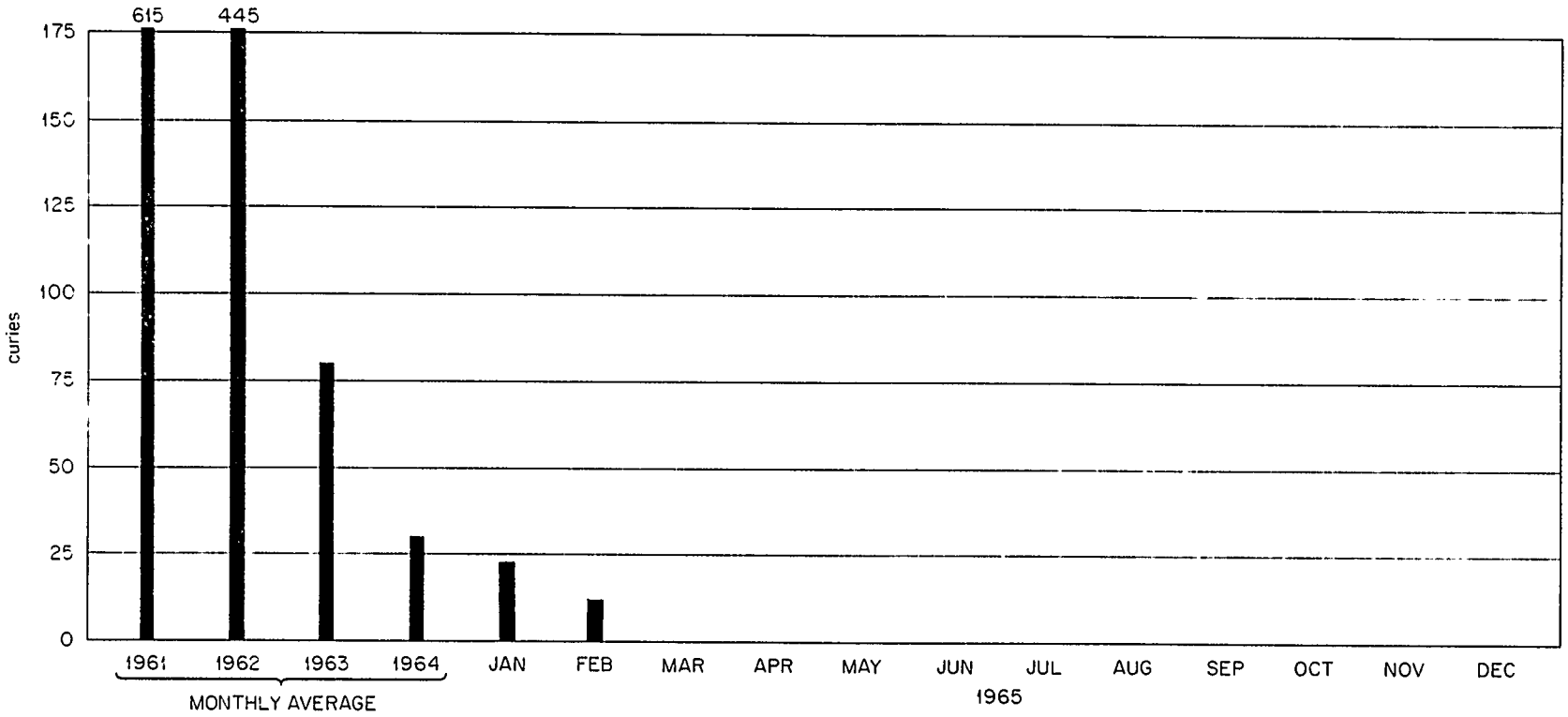

Fig. 2. Total Activity Discharged in Liquid Waste to White Oak Creek

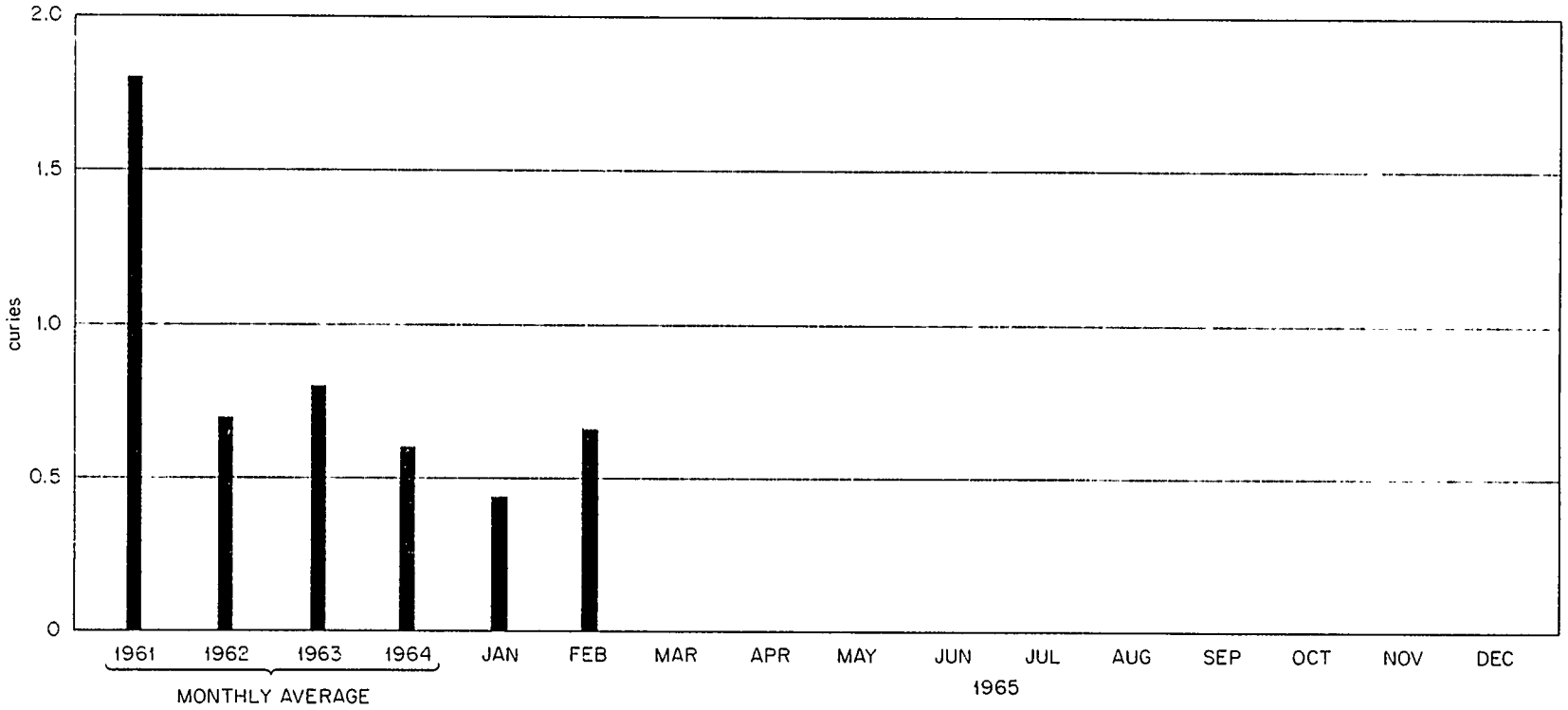

Fig. 3. ^{89}Sr and ^{90}Sr Discharged in Liquid Waste to White Oak Creek

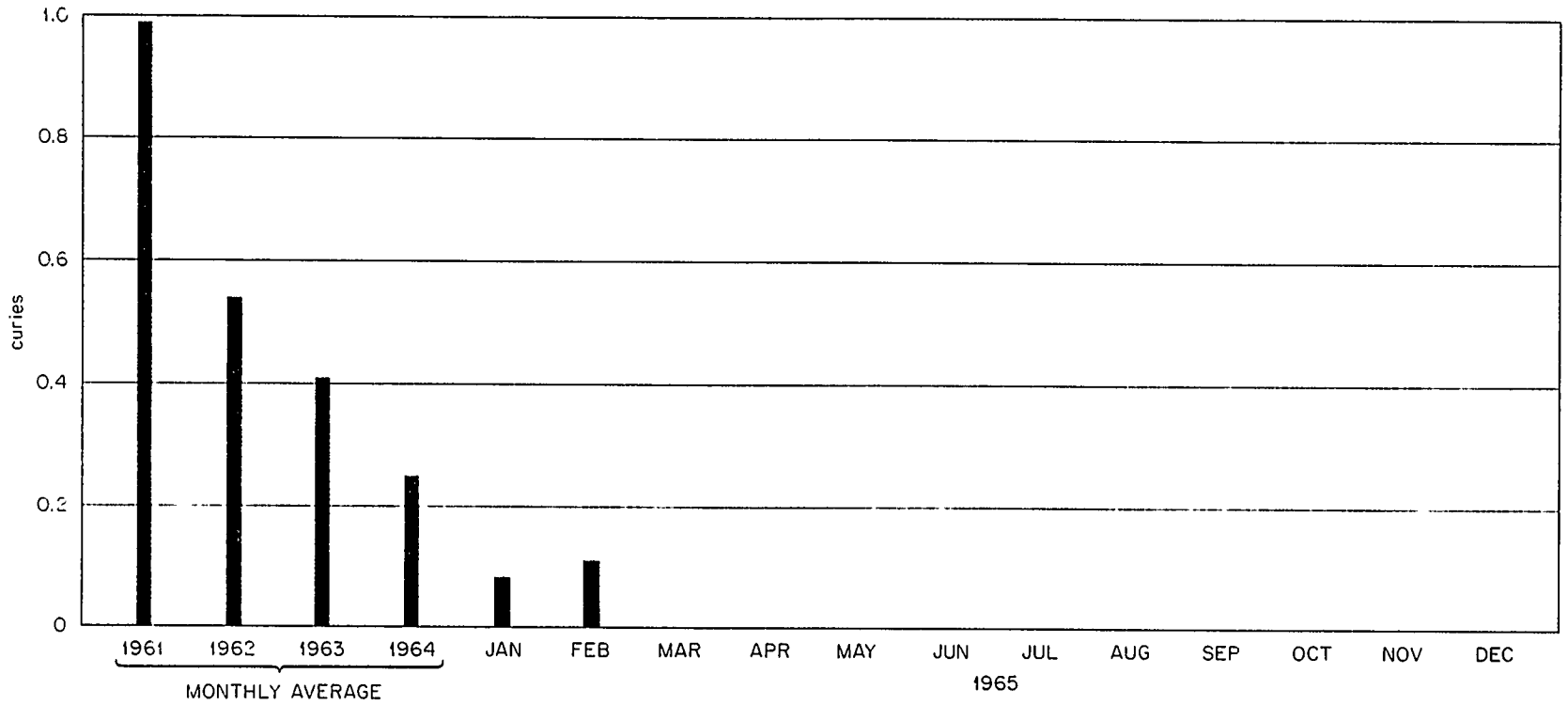

Fig. 4. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

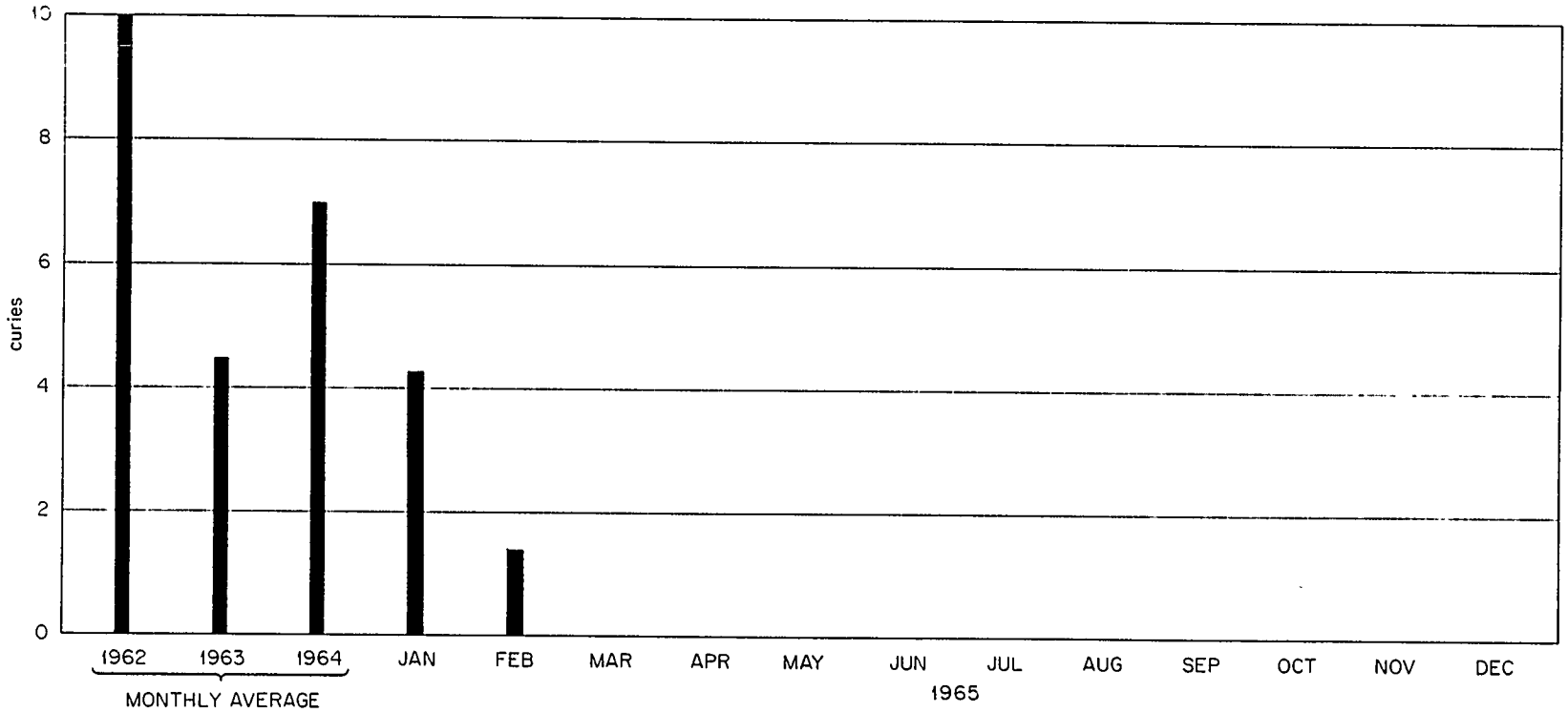

Fig. 5. Total[1] Activity Released in Gaseous Waste

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

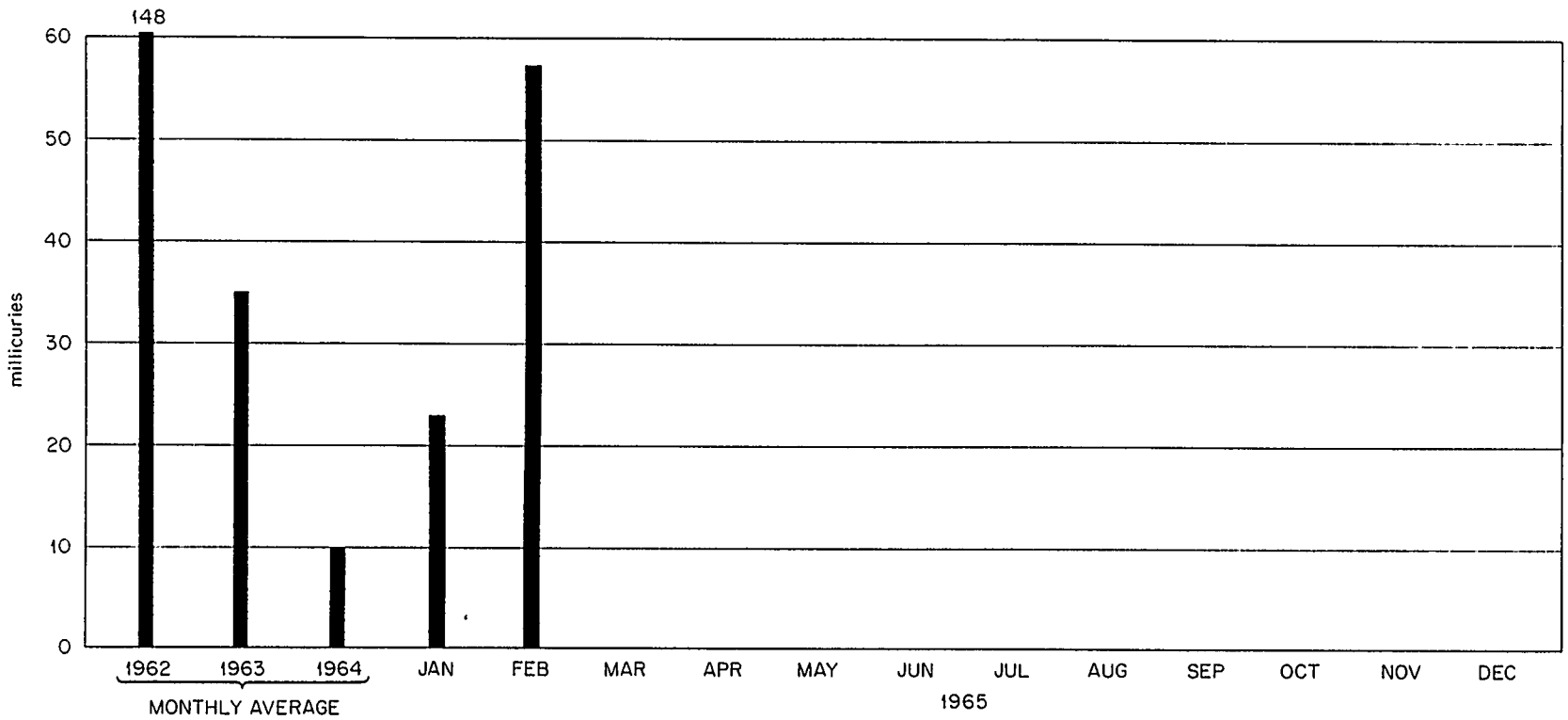

Fig. 6. Filterable Activity Released in Gaseous Waste

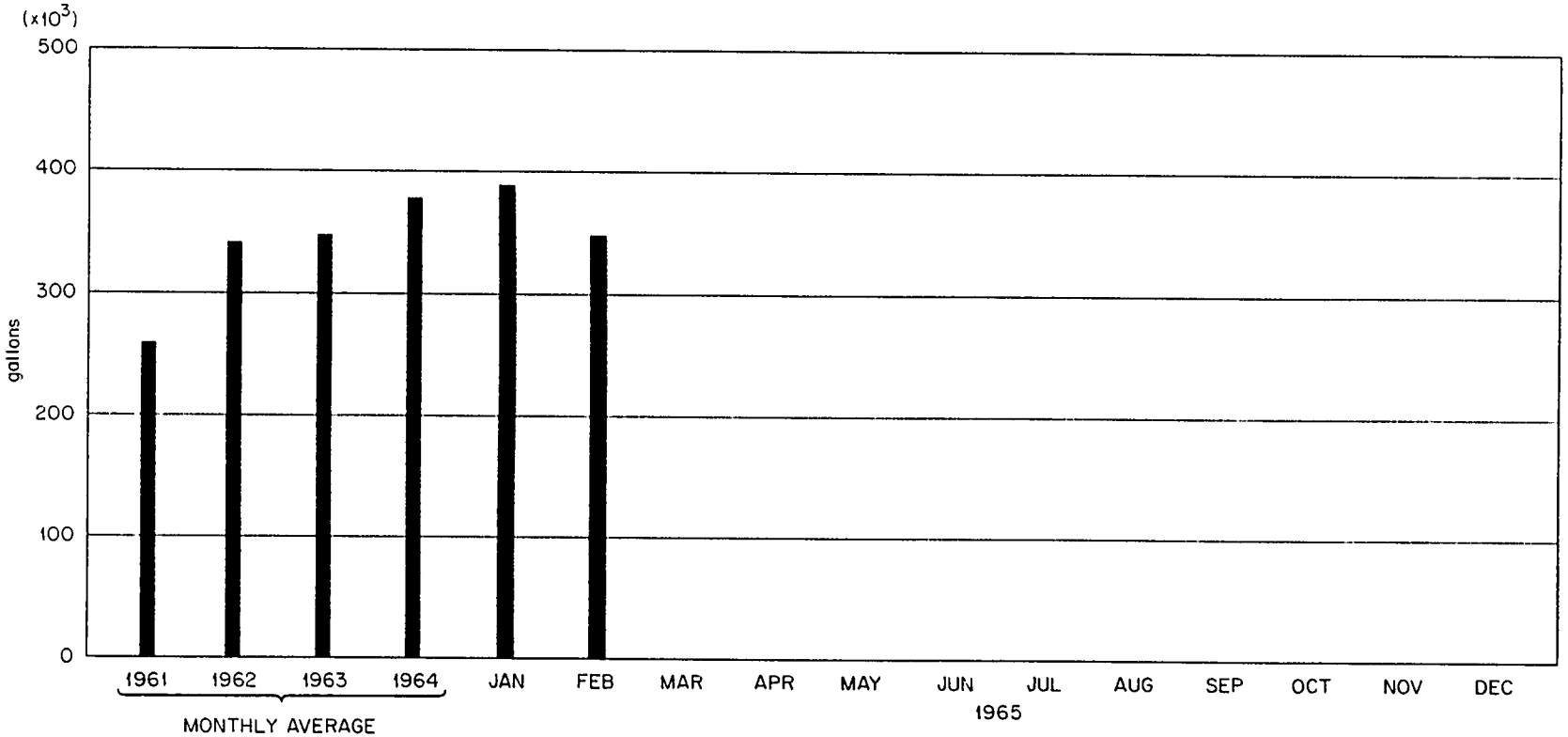

Fig. 7. Intermediate Level Waste Volumes

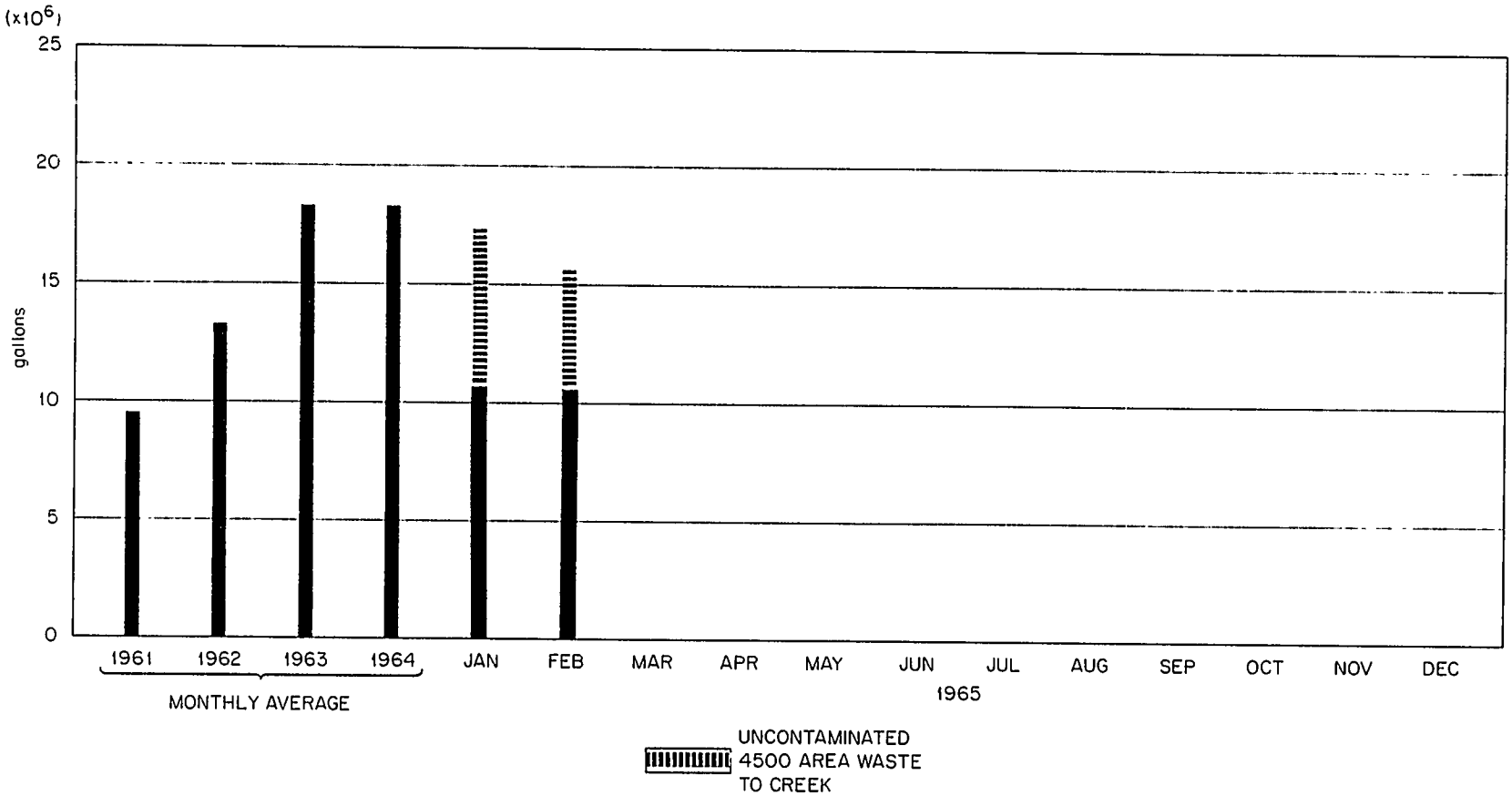

Fig.8. Process Waste Volumes

Distribution:

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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 these stations are shown in Figure 1. Figures 2 through 8 compare the releases of waste on a monthly basis.

The total discharge of radioactivity into White Oak Lake was 18.10 curies. The bulk of this discharge was ruthenium (15.72 curies) which came from the soil disposal area. Cobalt (0.94 curie), cesium (0.57 curie) and strontium (0.95 curie) account for the remainder of the total discharge. Most of the strontium (0.91 curie) was released by the Bethel Valley drainage system, primarily from the creek bed and other sources, not routinely sampled, during periods of heavy rainfall. Only 0.26 curie of strontium was released from the process waste system.

The total release of gaseous radioactivity increased significantly (Figure 5). Virtually all of this radioactivity was iodine which was released from the 3039 stack system. The 3039 system also released 54 millicuries of particulate activity which was identified as follows:

	Nuclide	Millicuries
1.	^{131}I	6
2.	^{137}Co	48

All of the cesium was released from the Fission Products Development Laboratory. The total release from the 3018, 3020 and 2026 stacks was 16 millicuries.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The capacity of the Waste Treatment Plant was exceeded several times this month because of extended periods of heavy rainfall. It was necessary to divert about one million gallons of slightly contaminated water at the diversion box and discharge it directly into the creek without chemical treatment. As a result of the bypassing operation and the increased flow rates through the plant, the efficiency of the plant was low (74% for Sr).

A summary of plant operations is given in Table 2. Table 3 lists the main sources of waste discharged into the system. Figure 4 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 373,016 gallons of waste was pumped to the ground disposal area this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	103,619
2.	Trench 7A	184,484
3.	Trench 7B	84,913

Major contributors to this system were as follows:

		Gallons
1.	Building 3019	116,770
2.	4500 Complex	90,820
3.	Reactor Complex	38,160
4.	Fission Products Development Laboratory	26,890

	Gallons
5. Radioisotopes Processing Area	26,800

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

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	0.26	0.14	0.18	0.61
Miscellaneous discharges from east end of plant	2	0.07	0.01	0.01	0.15
Total discharge from Bethel Valley area	3	0.91	0.05	0.56	1.64
Total discharge from Melton Valley area	4	0.04	0.01	0.01	0.26
East waste pit seepage	5	< 0.01	9.06	none detected	9.07
West waste pit seepage	6	< 0.01	6.60	none detected	7.13
Total discharge from all sources	3,4,5,6	0.95	15.72	0.57	18.10
White Oak Dam to Clinch River (Health Physics measurement)	7	1.30	16.50	1.09	24.56
Gaseous Waste[3]					
3039 Stack	8				4.75
3020 Stack	9				0.01
3018 Stack	10				0.03
2026 Stack	11				< 0.01
Total activity in gases released					4.80

[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: 12.3×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 17.7×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[1]	1.01	0.26	74
$^{103,106}Ru$	0.17	0.14	--
^{60}Co	0.06	0.04	--
^{137}Cs	0.62	0.18	71
Gross Beta Analysis	39 c/m/ml	8 c/m/ml	80

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1]		VOLUME	
		CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations	9[2]	0.396[2]	46.0[2]	3.28	38.5
2. Radioisotope Processing Area	21	0.294	34.2	1.06	12.4
3. Buildings 3503 and 3508	6	0.004	0.5	0.50	5.8
4. Buildings 3025, 3026 and 3550	3	0.005	0.6	1.33	15.6
5. Building 3019	9	0.090	10.5	0.73	8.5
6. Fission Products Development Laboratory	7	0.001	0.1	0.005	0.1
7. 4500 Area	7	0.056	6.5	0.60	7.1
8. Building 3525	1	0.014	1.6	1.02	12.0

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

[2]There is evidence that the activity measured at the Reactor Area sampling station may be seeping into the Reactor Area line from the soil in the Radioisotope Processing Area. An investigation to determine the actual source is being continued.

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	95	416	5303	14209	651	1674	10583	17811	294	1018	6867	14722
^{106}Ru	3	9	118	5982	2	8	189	1793	1	5	126	1462
^{137}Cs	687	1445	58688	142178	3937	5014	53398	94996	1778	2557	35876	71848
^{60}Co	6	19	110	1156	30	52	131	579	14	29	88	525
TOTALS	791	1889	64219	163525	4620	6748	64301	115179	2087	3609	42957	88557

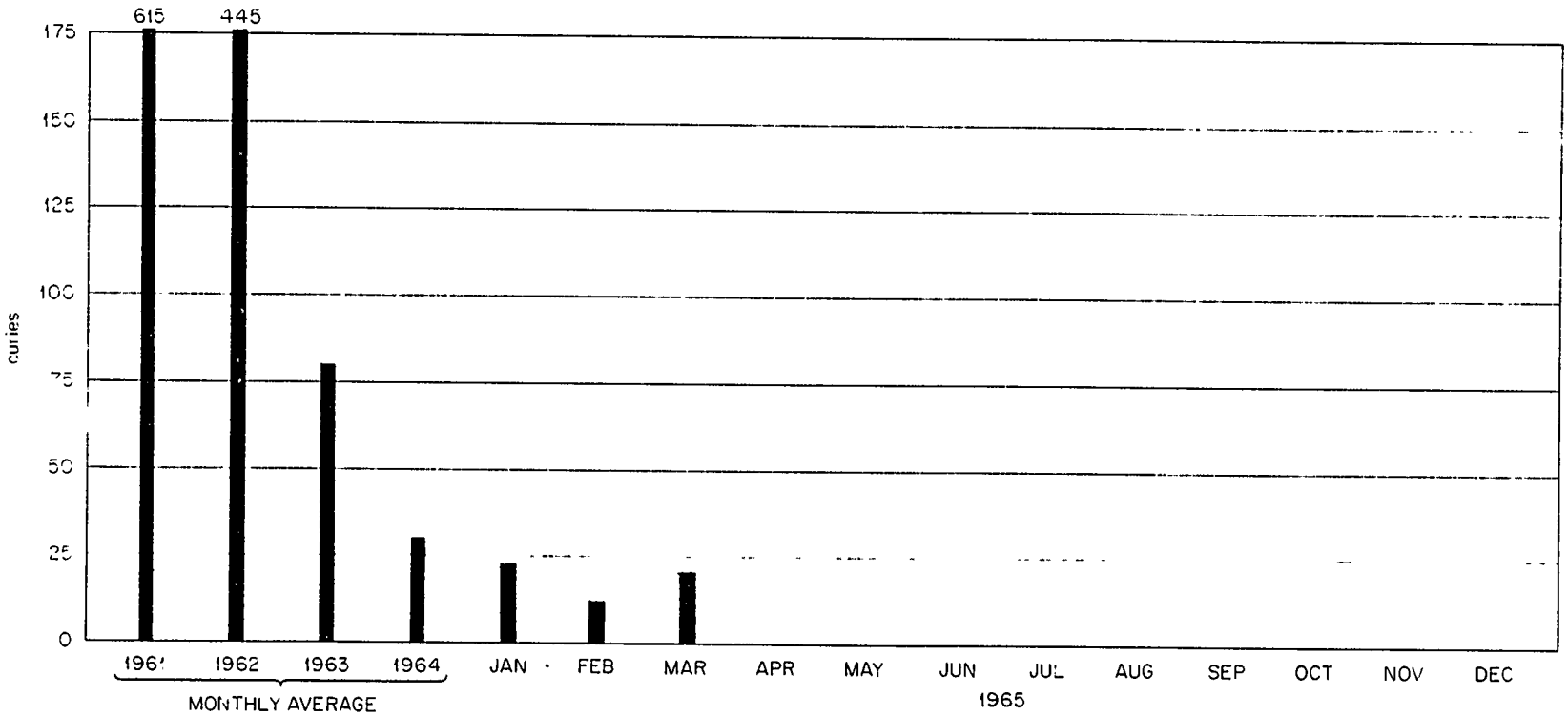

Fig. 2. Total Activity Discharged in Liquid Waste to White Oak Creek

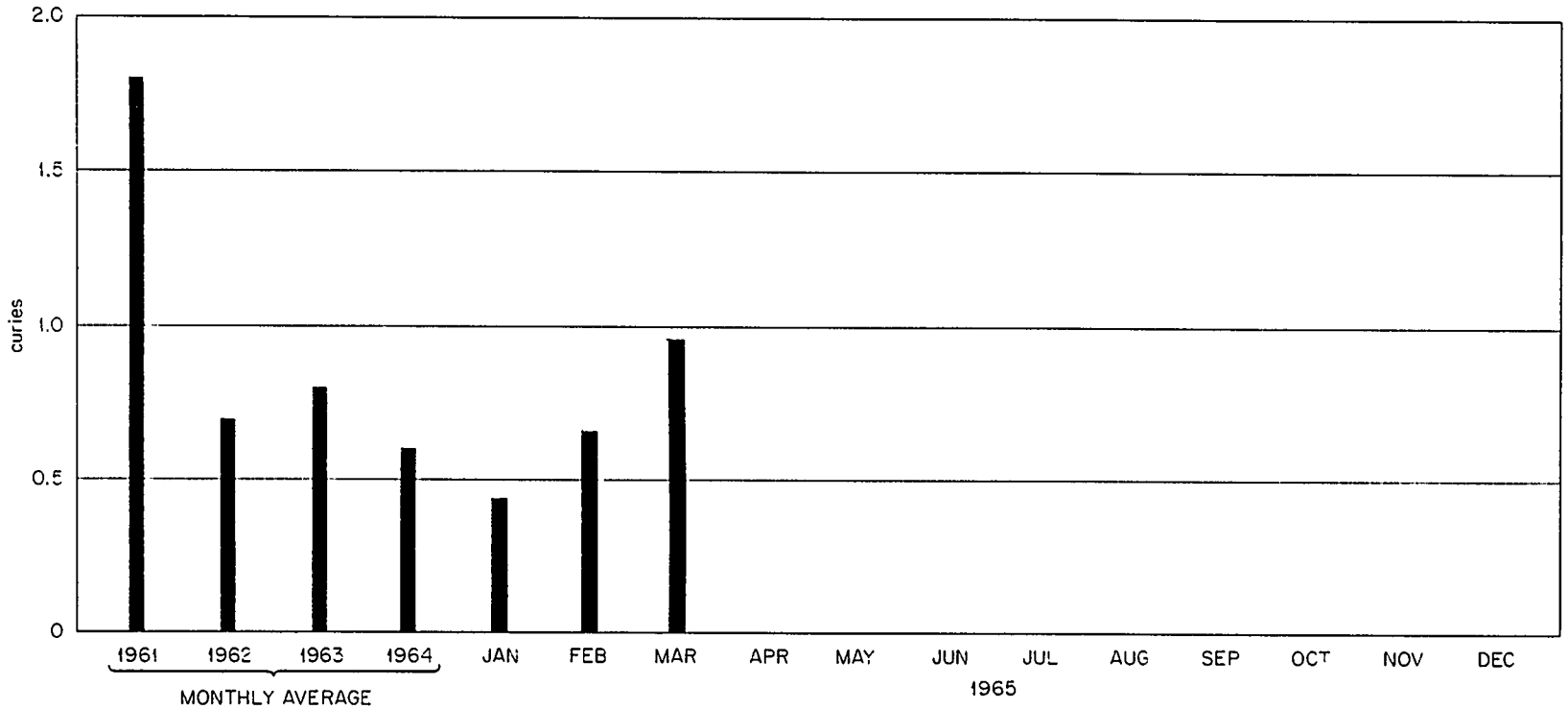

Fig. 3. ^{89}Sr and ^{90}Sr Discharged in Liquid Waste to White Oak Creek

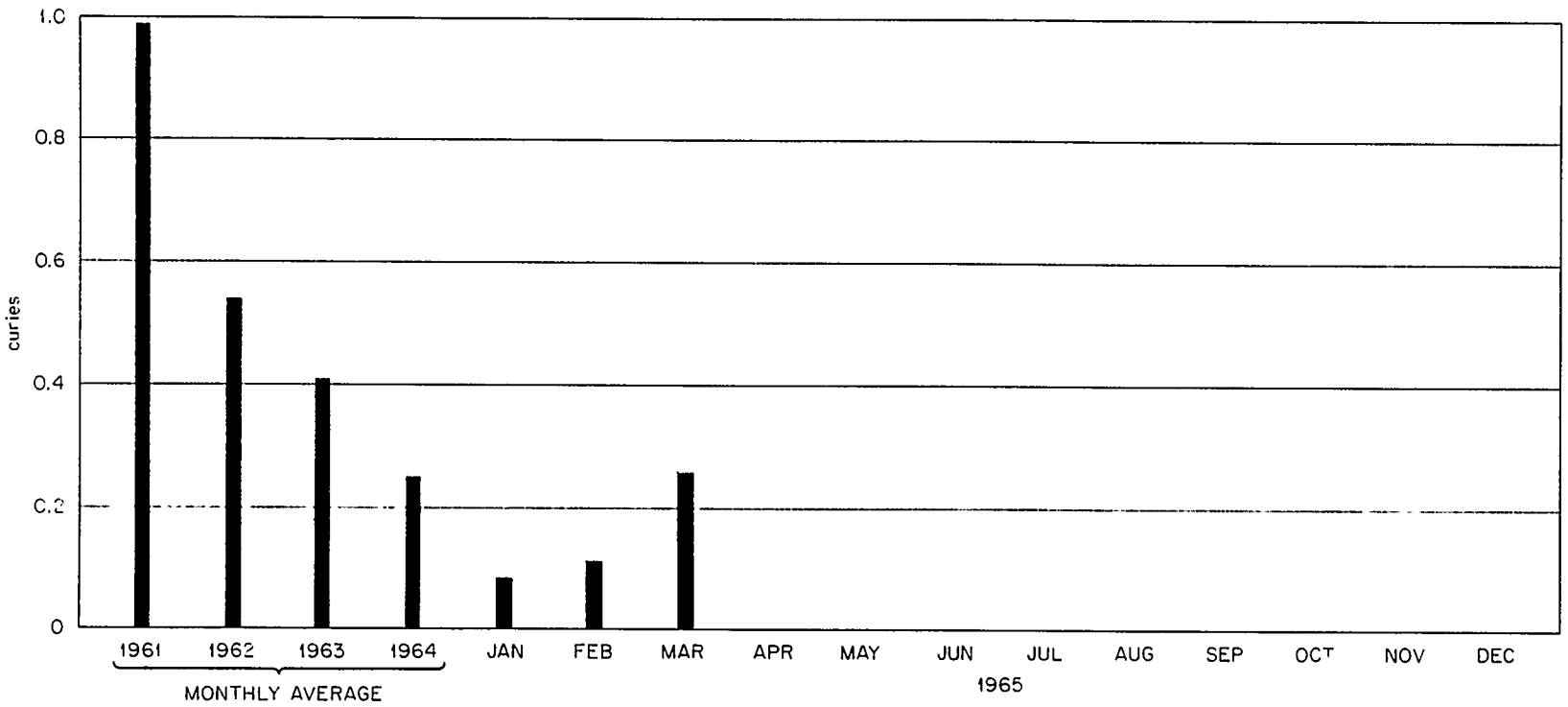

Fig.4. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

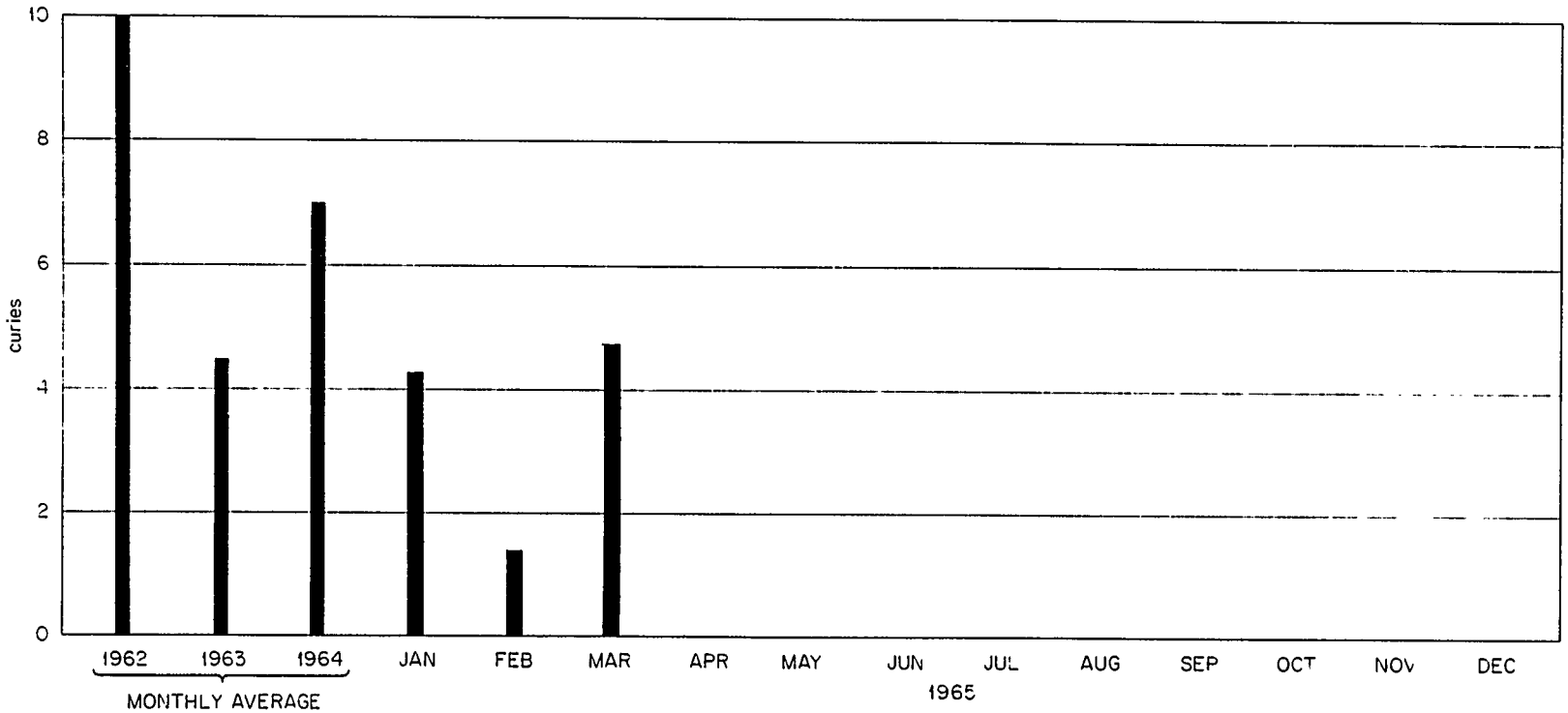

Fig. 5. Total[1] Activity Released in Gaseous Waste

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

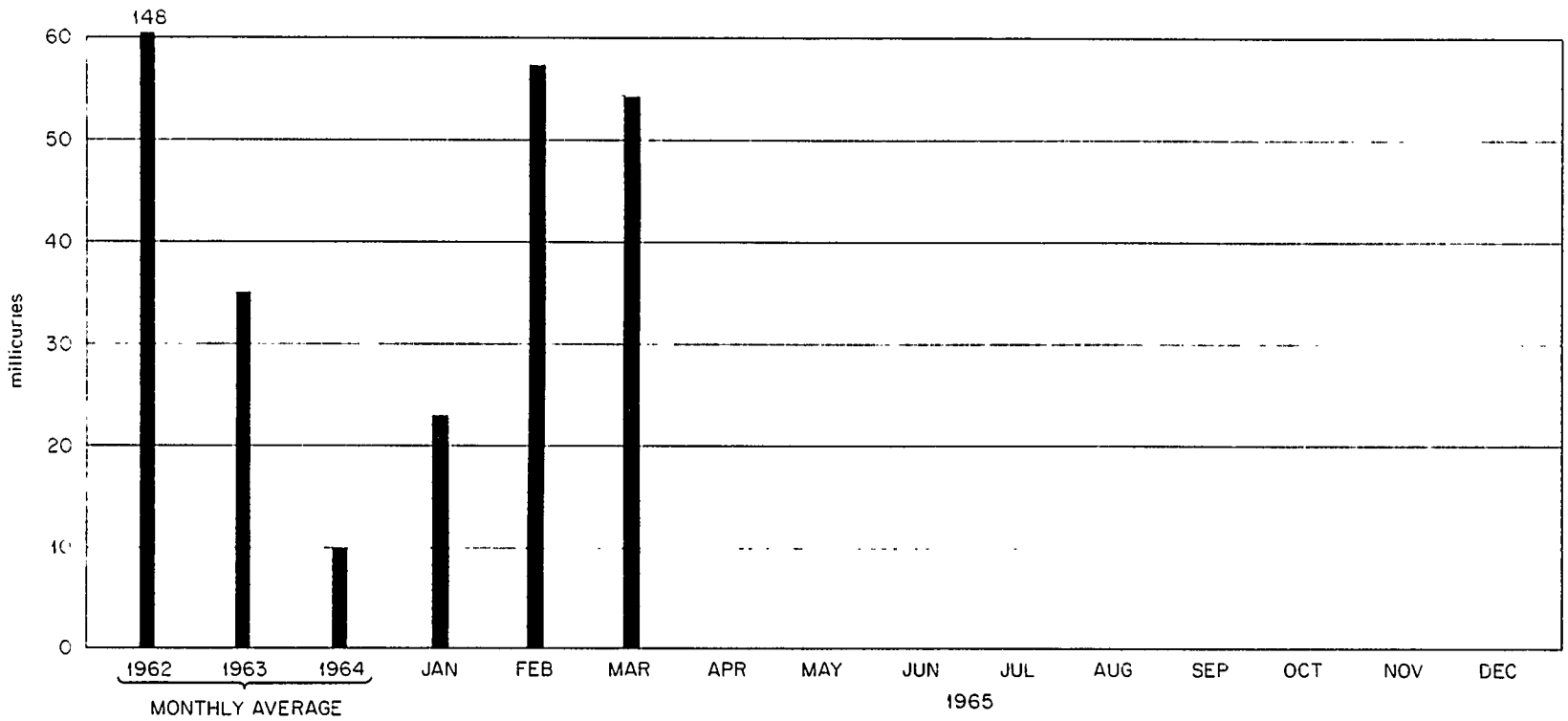

Fig. 6. Filterable Activity Released in Gaseous Waste

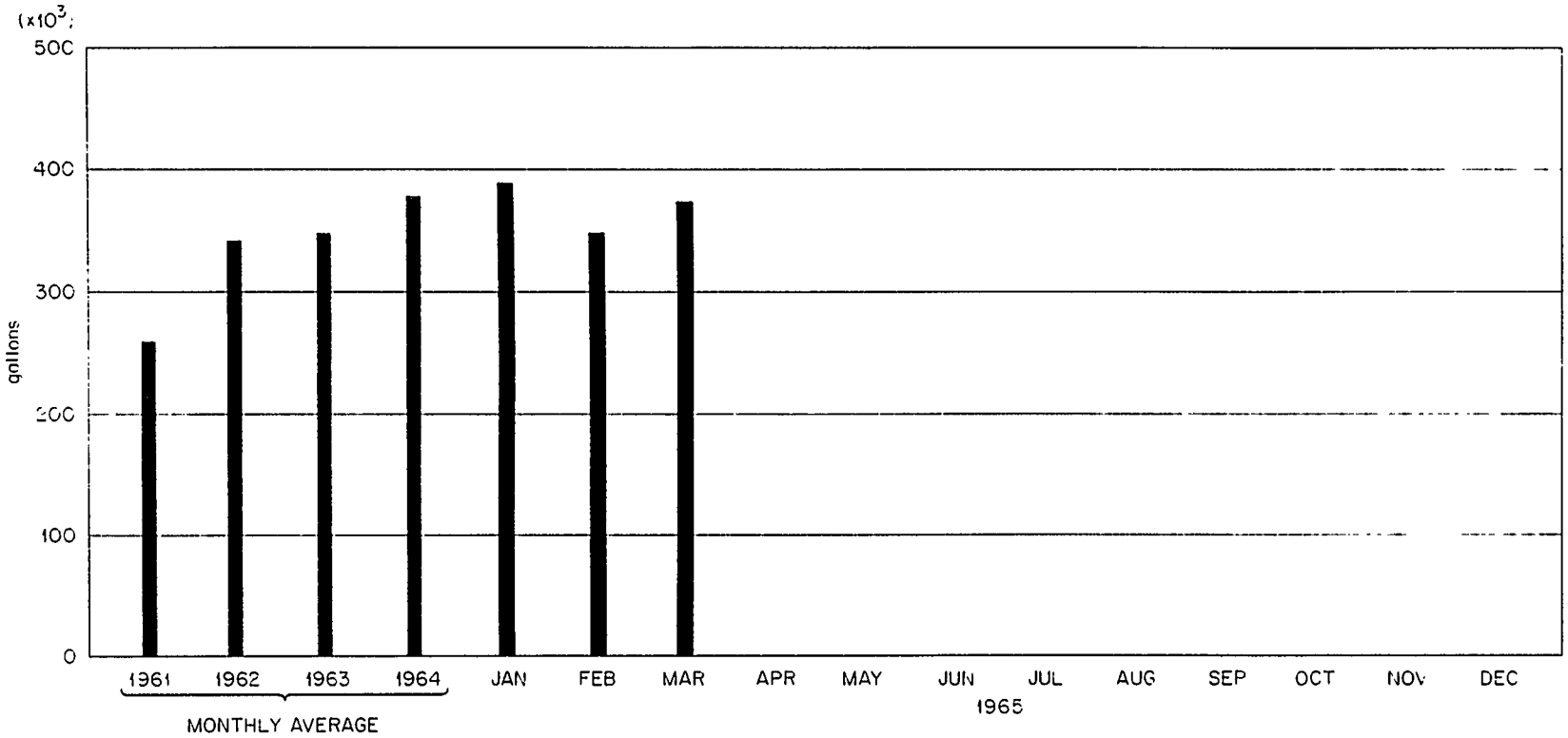

Fig. 7. Intermediate Level Waste Volumes

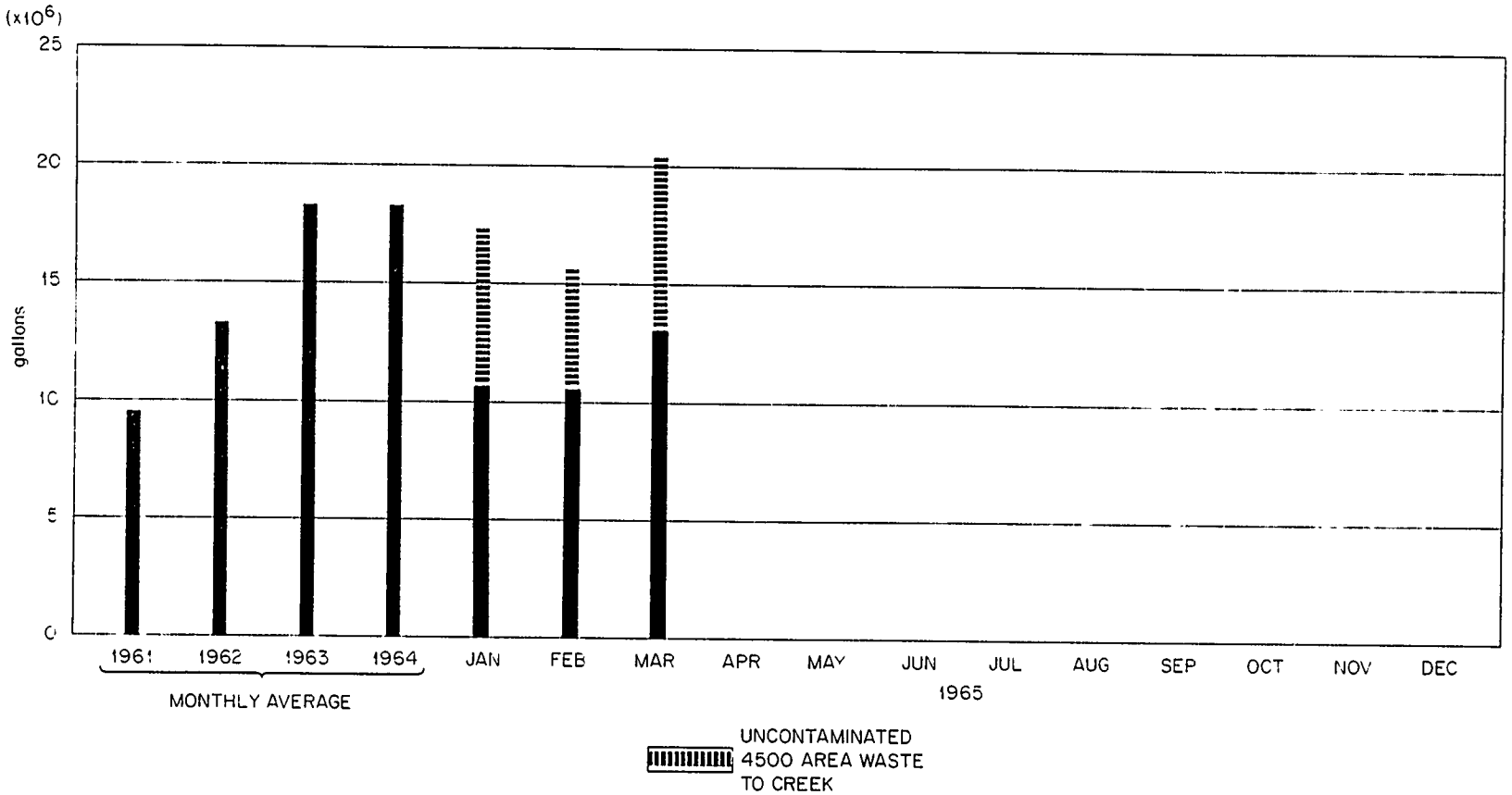

Fig.8. Process Waste Volumes

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65-5-52

DATE: May 25, 1965

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SUBJECT: Radioactive Waste Disposal Operations Report for April 1965

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 7/4/96
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 sampling stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Figures 2 through 8 compare the releases of waste on a monthly basis.

The total discharge of radioactivity into White Oak Lake was 11.25 curies. Ruthenium (9.94 curies) seeping from the soil disposal area accounted for most of this discharge. The remainder included cobalt (1.37 curies) and lesser amounts of strontium (0.60 curie) and cesium (0.33 curie). Most of the strontium was released by the Bethel Valley drainage system (0.55 curie). Of this amount, 0.14 curie was discharged by the process waste system. The remainder is attributed to the creek bed and several tributary streams which are not sampled routinely. The total amount of activity contributed by the Melton Valley System was negligible.

The total activity released to the Clinch River, as measured by the Health Physics Division at station 7, continued to be low. The calculated average concentration, resulting from ORNL discharges, was 0.9% of the maximum permissible for populations in the neighborhood of Atomic Energy Installations.

A creditable decrease in the total discharge of gaseous radioactivity was noted this month (Figure 5). Essentially all of this activity (610 millicuries) continued to be ^{131}I which was released by the 3039 stack system. This low release of gaseous activity was the result of improved containment achieved during ^{131}I processing at the

Radioisotopes Processing Area. The 3039 system also discharged 13 millicuries of particulate activity. Of this amount, 11 millicuries was ^{137}Cs; the remainder was ^{131}I.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Operation of the process waste system was normal this month. Total decontamination achieved by the Waste Treatment Plant was good (95 percent removed by gross beta analysis), and the total discharge of radioactivity into the creek was only 240 millicuries.

A summary of plant operations is given in Table 2. Table 3 lists the main sources of waste discharged into the system. Figure 4 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 416,864 gallons of waste was pumped to the ground disposal area this month. Included in this amount was part of the backlog of contaminated water accumulated during heavy rainfall and 10,000 gallons from the Melton Valley area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	123,853
2.	Trench 7A	211,464
3.	Trench 7B	81,547
	Total -	416,864

Major contributors to the system were as follows:

		Gallons
1.	Building 3019	86,360
2.	4500 Complex	76,680
3.	Reactor Complex	52,960
4.	Radioisotopes Processing Area	21,150
5.	Fission Products Development Laboratory	17,080

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

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	0.14	0.05	0.05	0.24
Miscellaneous discharges from east end of plant	2	0.03	< 0.01	< 0.01	0.04
Total discharge from Bethel Valley area	3	0.55	0.06	0.33	1.13
Total discharge from Melton Valley area	4	0.05	< 0.01	< 0.01	0.06
East waste pit seepage	5	< 0.01	7.84	< 0.01	7.82
West waste pit seepage	6	< 0.01	2.04	< 0.01	2.24
Total discharge from all sources	3,4,5,6	0.60	9.94	0.33	11.25
White Oak Dam to Clinch River (Health Physics measurement)	7	0.47	9.28	0.06	12.20
Gaseous Waste[3]					
3039 Stack	8				0.61
3020 Stack	9				< 0.01
3018 Stack	10				< 0.01
2026 Stack	11				< 0.01
Total activity in gases released					0.61

[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: 11.2×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.9×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[1]	0.97	0.14	86
$^{103,106}Ru$	none detected	0.05	--
^{60}Co	0.08	none detected	--
^{137}Cs	0.59	0.05	92
Gross Beta Analysis	35 c/m/ml	3 c/m/ml	95

1 Past analyses indicated that "Total Sr" is greater than 90% ^{90}Sr

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1]		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	13[2]	0.507[2]	65.2[2]	2.92	36.1
2.	Radioisotope Processing Area	16	0.192	24.6	0.87	10.8
3.	Buildings 3503 and 3508	2	0.012	1.5	0.43	5.3
4.	Buildings 3025, 3026 and 3550	2	0.034	4.2	1.26	15.6
5.	Building 3019	1	0.011	1.4	0.85	10.5
6.	Fission Products Development Laboratory	1	< 0.001	- -	0.01	0.1
7.	4500 Area	2	0.020	2.5	0.75	9.3
8.	Building 3525	0	< 0.001	- -	0.92	11.4
9.	Building 2026	5	0.005	0.6	0.07	0.9

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

[2]There is evidence that the activity measured at the Reactor Area Sampling Station may be seeping from the soil at the Rasioisotope Processing Area. An investigation to determine the actual source is being continued.

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	389	805	5303	14598	900	2574	10583	18711	350	1368	6867	15072
^{106}Ru	6	15	118	5988	9	17	189	1802	4	9	126	1466
^{137}Cs	3549	4994	58688	145727	6804	11818	53398	101800	2646	5203	35876	74494
^{60}Co	< 1	19	110	1156	< 1	52	131	579	< 1	29	88	525
TOTALS	3944	5833	64219	167469	7713	14461	64301	122892	3000	6609	42957	91557

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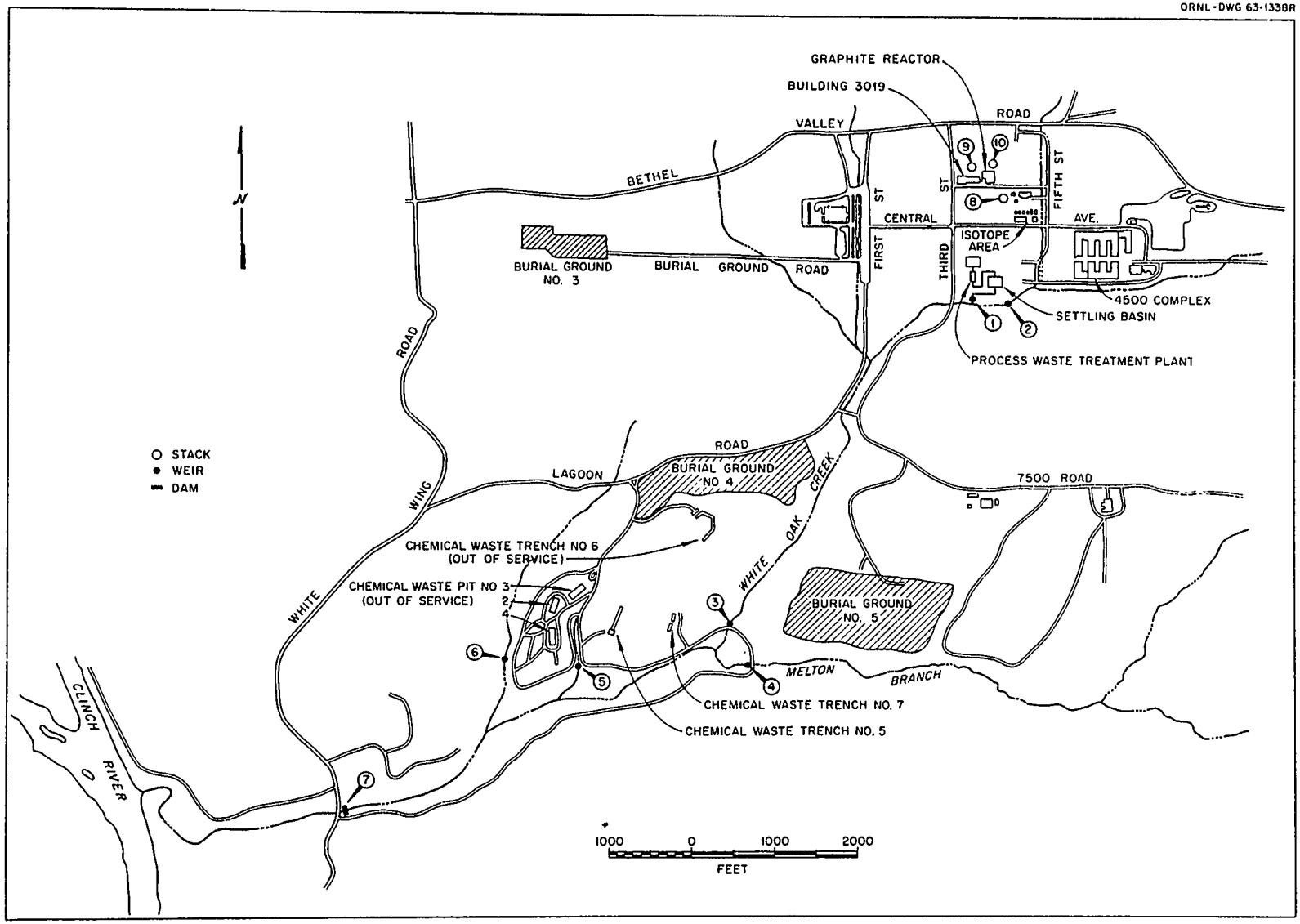

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

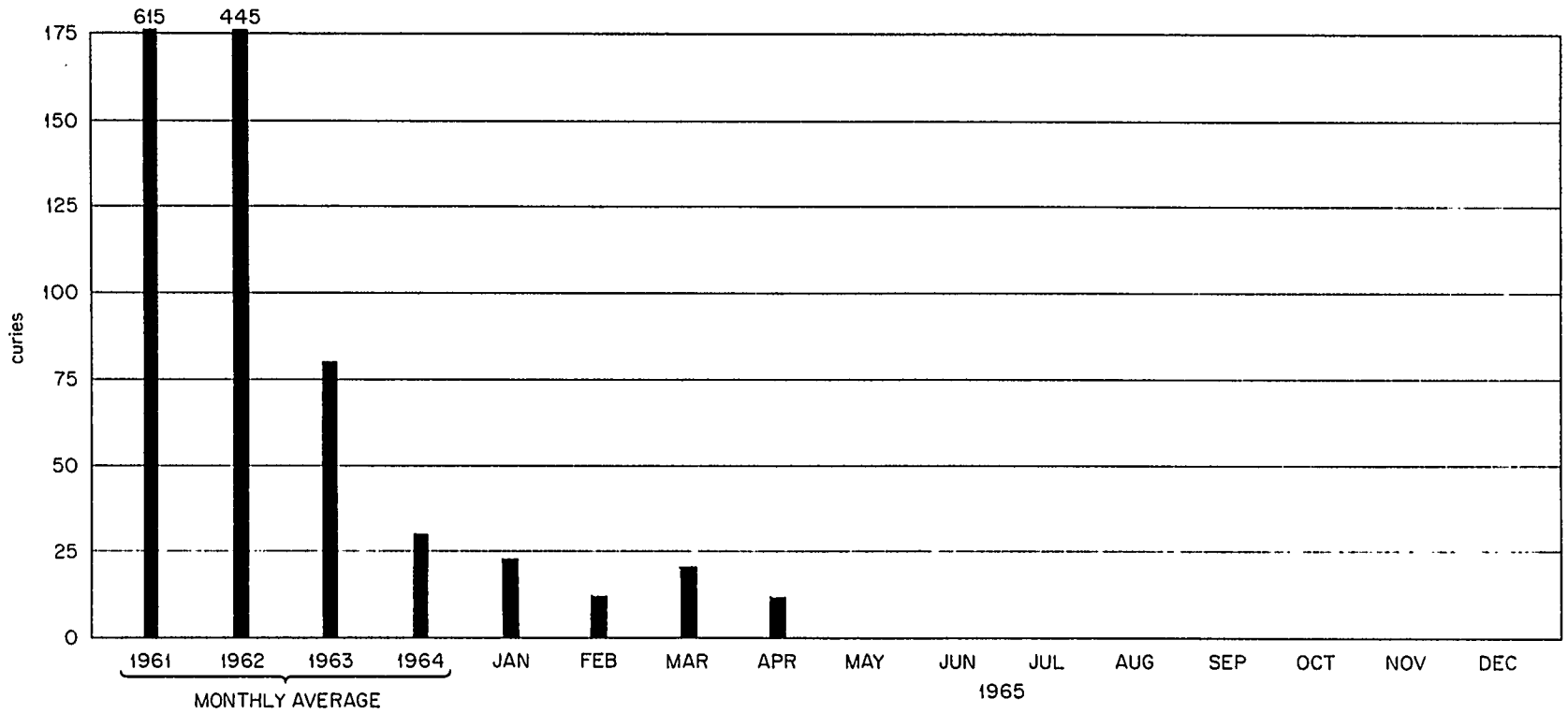

Fig. 2. Total Activity Discharged in Liquid Waste to White Oak Creek

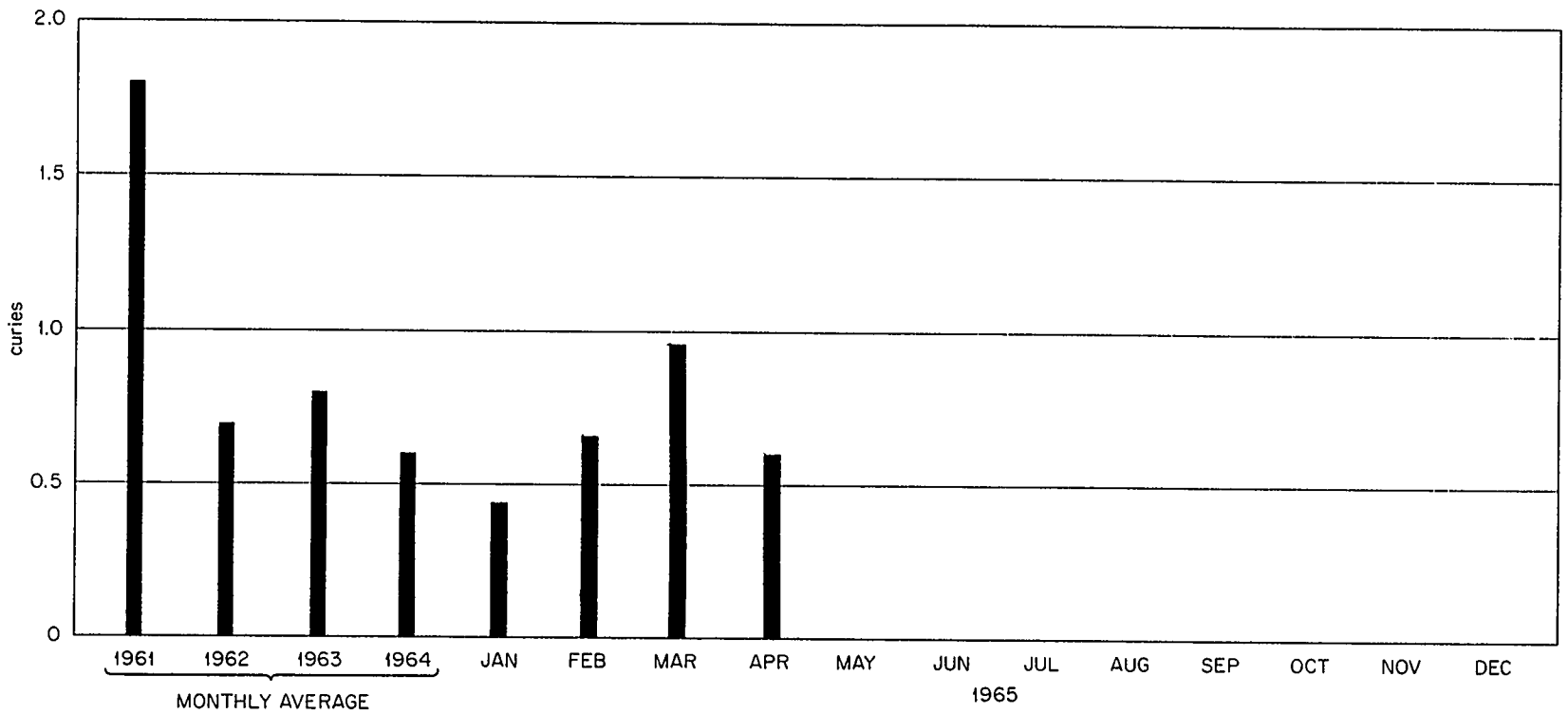

Fig. 3. ^{89}Sr and ^{90}Sr Discharged in Liquid Waste to White Oak Creek

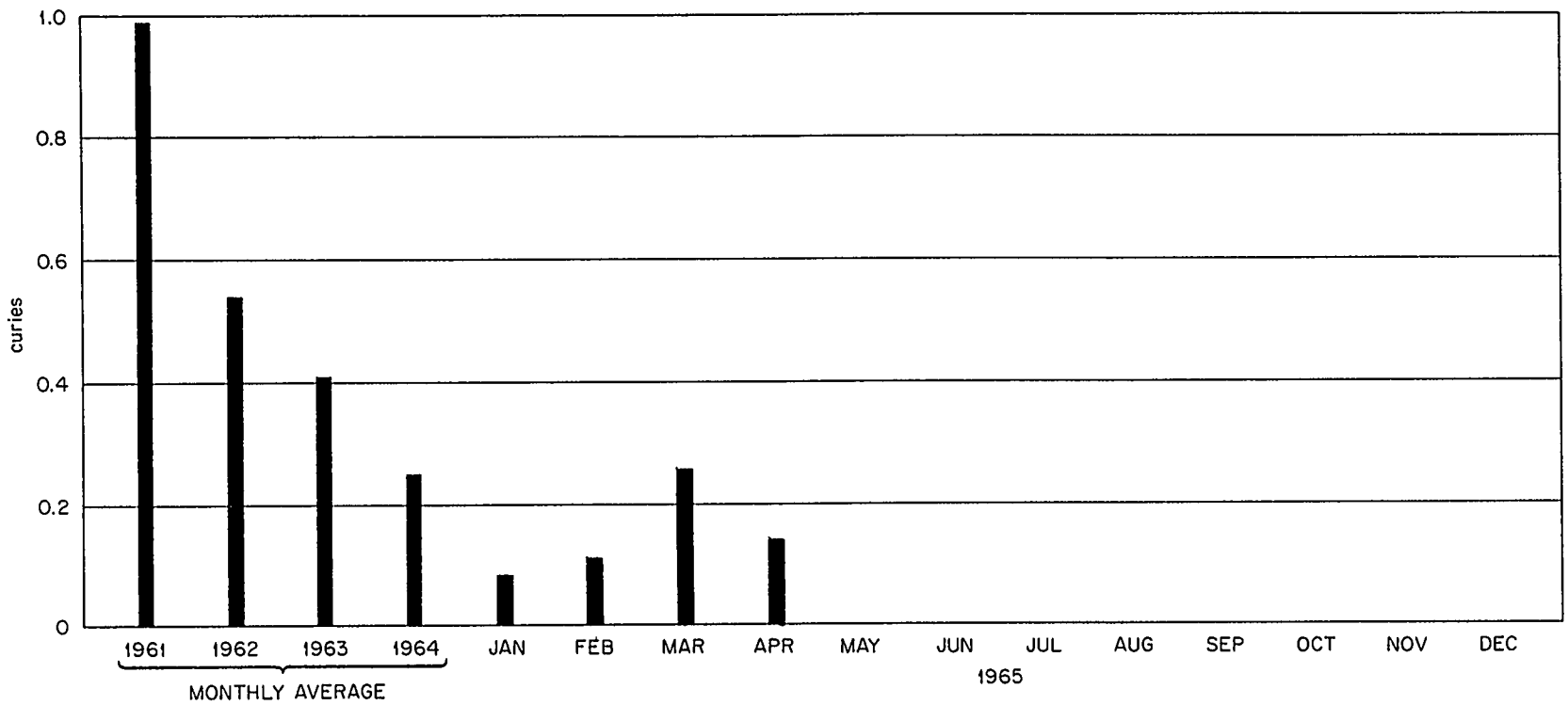

Fig. 4. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

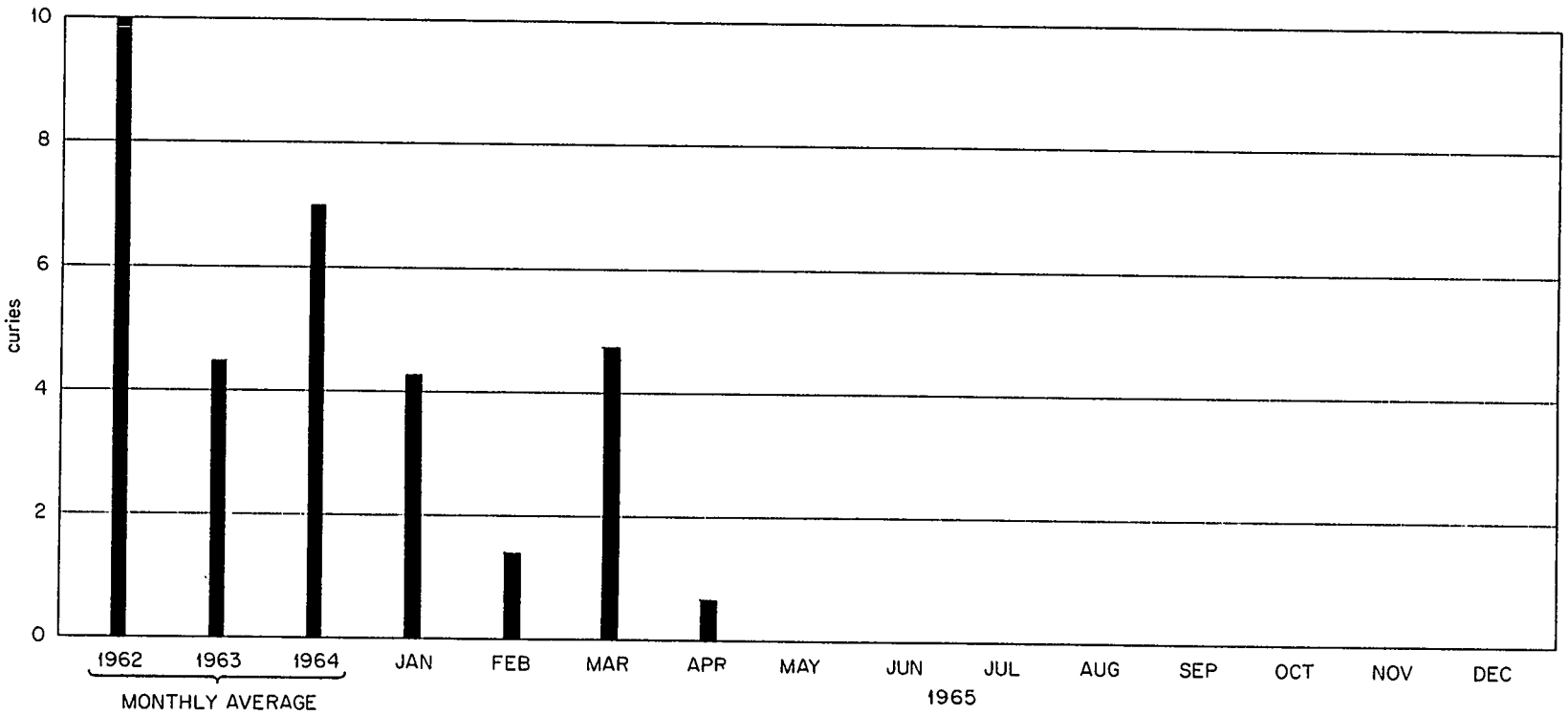

Fig. 5. Total[1] Activity Released in Gaseous Waste

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

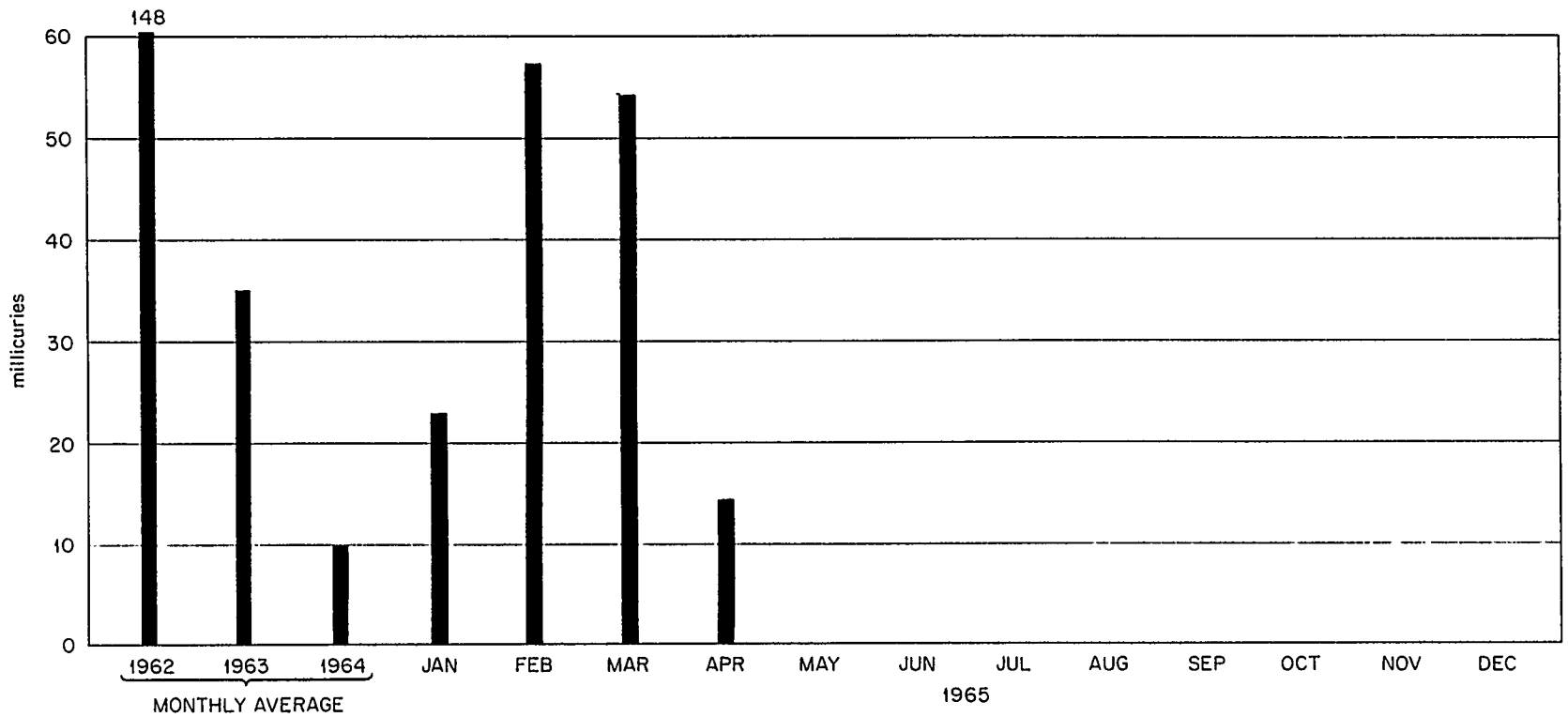

Fig. 6. Filterable Activity Released in Gaseous Waste

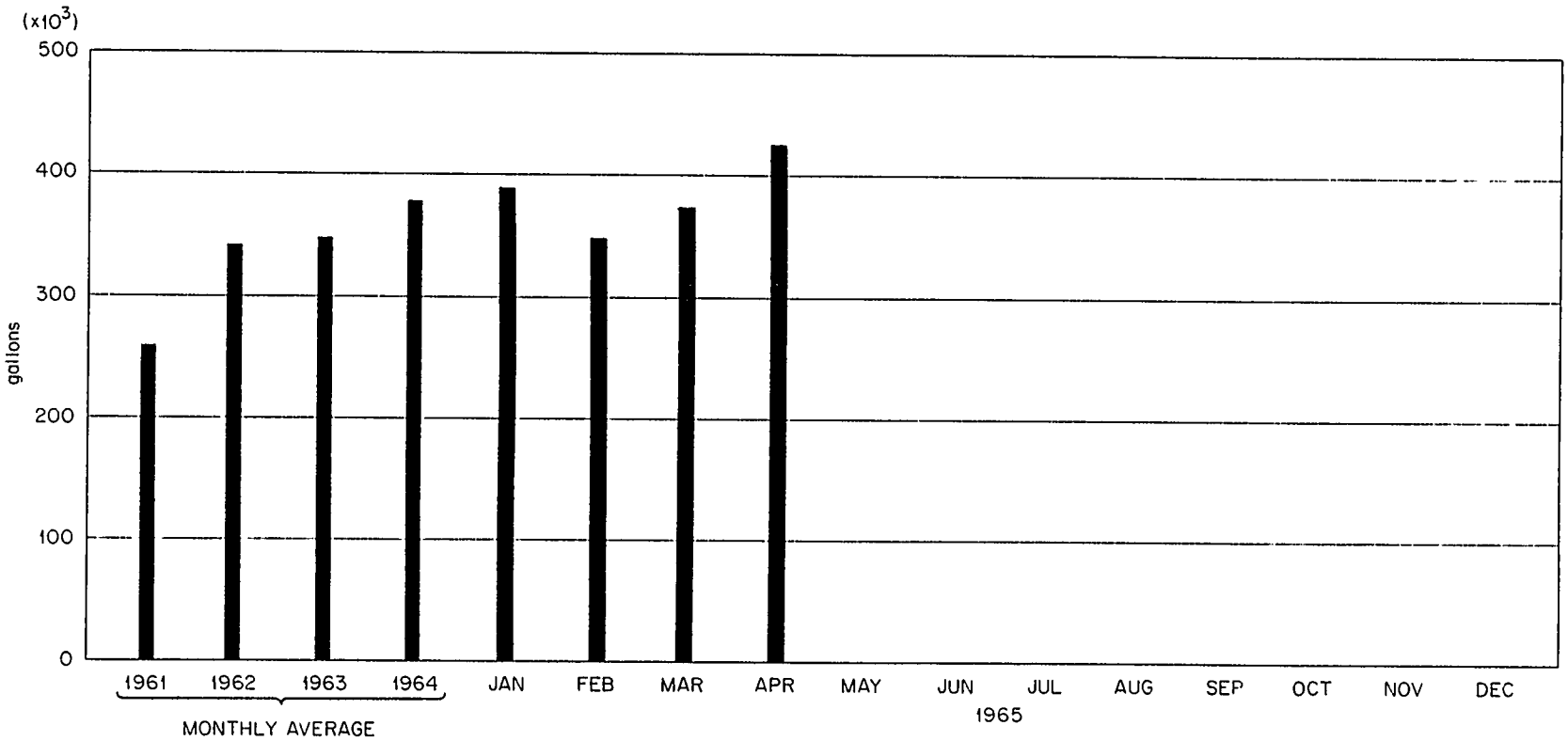

Fig. 7. Intermediate Level Waste Volumes

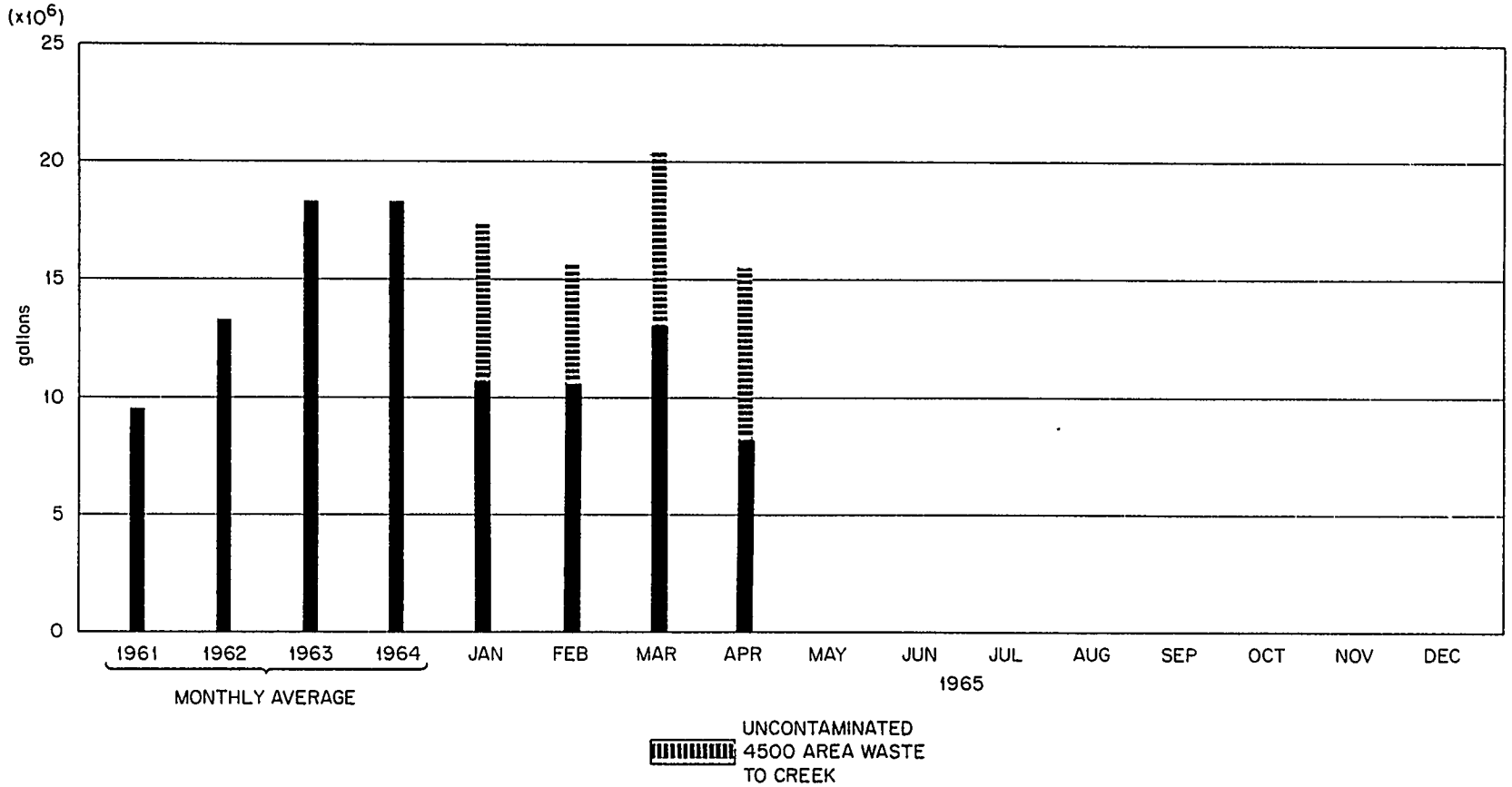

Fig.8. Process Waste Volumes

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FROM: L. C. Lasher

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 summerizes the amounts of radioactive nuclides released in liquid wastes this month; the data were obtained by a number of sampling stations whose locations are shown in Figure 1. Figure 2 shows the calculated percent of MPC in the Clinch River which resulted from the Laboratory releases; this information was provided by the Health Physics Division. Figures 3 through 9 compare the releases of waste on a monthly basis.

The total discharge of radioactivity into White Oak Creek was 11.51 curies. Most of this activity was ^{106}Ru and ^{60}Co. The $^{89-90}Sr$ release amounted to 330 millicuries. Only 90 millicuries of this nuclide was discharged from the process waste system, and the remainder is attributed to the creek bed and unmonitored drainage systems.

The gaseous waste systems released 790 millicuries of radioactivity. Of this amount, 218 millicuries was filterable activity, primarily ^{137}Cs. A summary of the releases is given in Table 2 and comparison to those of previous months and years is shown in Figures 6 and 7.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The process waste system operated normally this month. Decontamination by the treatment plant was good: the efficiency (determined by gross beta analysis) was 90%. Approximately 10 million gallons of water was processed. An additional 9 million gallons of uncontaminated water was diverted by the 4500 ponds and discharged, untreated, into the creek.

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

INTERMEDIATE-LEVEL WASTE SYSTEM

A total of 318,834 gallons of waste was pumped to the soil disposal area this month. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	137,674
2.	Trench 7A	89,374
3.	Trench 7B	91,813

An additional 40,000 gallons was pumped to the Shale Fracturing Area for experimental disposal.

Major contributors to the ILW system are listed below:

		Gallons
1.	Building 3019	105,190
2.	Reactor Complex	55,360
3.	Fission Products Development Laboratory	35,400
4.	4500 Complex	35,000
5.	Radioisotopes Processing Area	25,730

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Monitoring Station Number[1]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	Total[2]
Process waste	1	0.09	none detected	0.08	0.17
Miscellaneous discharges from east end of plant	2	0.01	0.01	< 0.01	0.02
Total discharge from Bethel Valley Area	3	0.29	0.01	0.12	0.42
Total discharge from Melton Valley Area	4	0.03	< 0.01	< 0.01	0.03
East waste pit seepage	5	< 0.01	7.13	0.33	8.36
West waste pit seepage	6	< 0.01	2.48	< 0.01	2.70
Total discharge from all sources	3,4,5,6	0.33	9.62	0.45	11.51
White Oak Dam to Clinch River (Health Physics measurement)	7	0.24	4.27	0.12	5.97

[1]Refers to Fig. 1

[2]Includes other nuclides not listed here

TABLE 2

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[1] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.77
Radiochemical Processing Pilot Plant	3020	0.02
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
Total activity in gases released		0.79

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

TABLE 3

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.5×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.2×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[1]	0.73	0.09	88
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.05	none detected	100
^{137}Cs	0.28	0.08	71
Gross Beta Analysis	30 c/m/ml	3 c/m/ml	90

[1]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[1]		VOLUME	
		CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations & Radioisotope area	14[2]	0.546[2]	76.1	2.82	37.2
2. Radioisotope Processing Area	5	0.075	10.5	1.09	14.4
3. Buildings 3503 and 3508	3	0.033	4.6	0.77	10.1
4. Buildings 3025, 3026 and 3550	1	0.021	2.9	1.48	19.5
5. Building 3019	2	0.012	1.7	0.38	5.0
6. Fission Products Development Laboratory	5	0.002	0.3	0.02	0.3
7. 4500 Area	-	--	--	--	--
8. Building 3525	2	0.020	2.8	0.72	9.5
9. Building 2026	2	0.008	1.1	0.30	4.0

[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 in the Radioisotope Area.

TABLE 5

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	2057	4155	5303	17948	546	3323	10583	19460	546	2131	6867	15835
^{106}Ru	19	51	118	6024	6	41	189	1826	6	31	126	1488
^{137}Cs	2856	12605	58688	153338	1137	15911	53398	105893	1137	9007	35876	78298
^{60}Co	32	87	110	1224	12	72	131	599	12	50	88	546
TOTALS	4964	16898	64219	178534	1701	19347	64301	127778	1701	11219	42957	96167

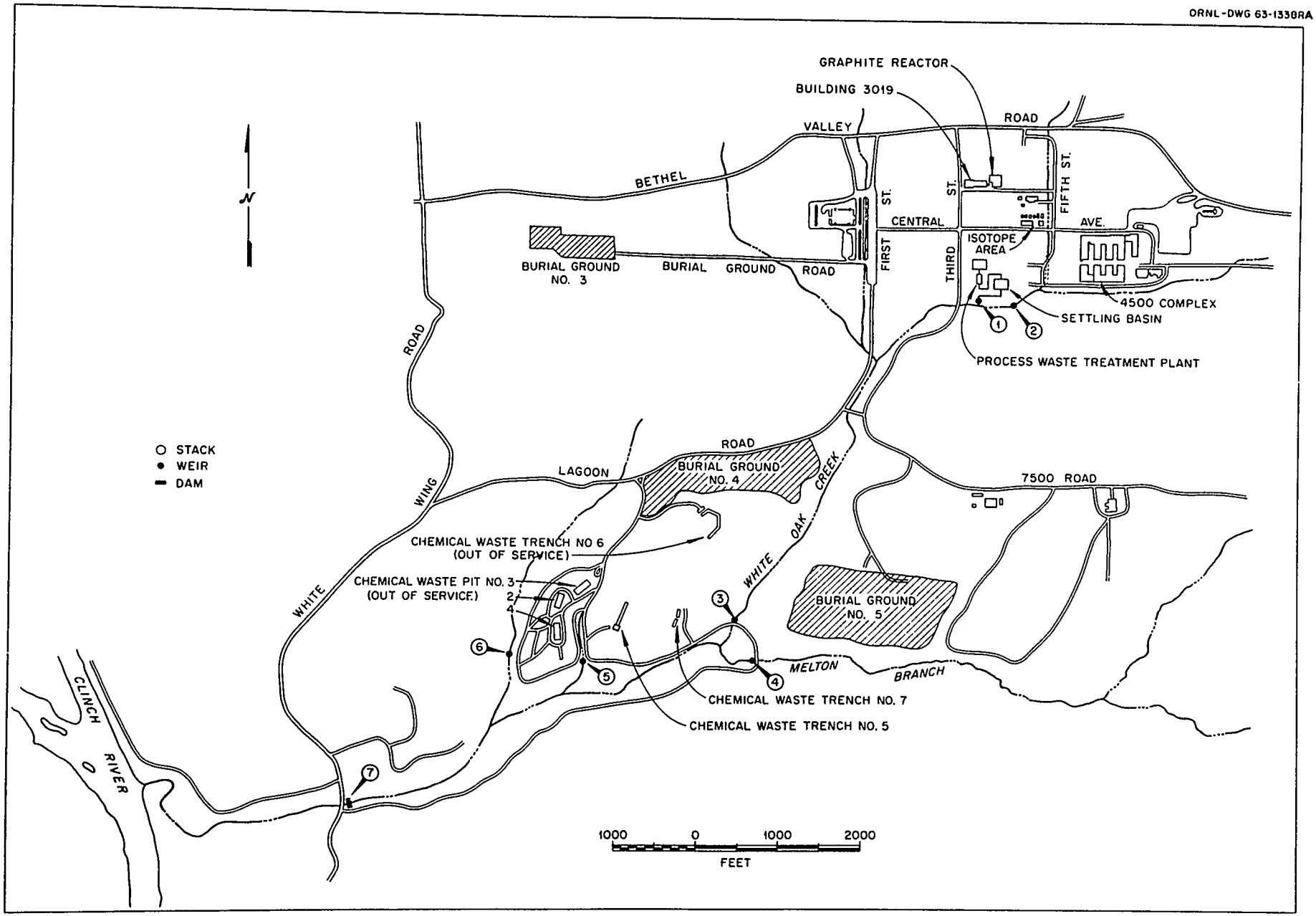

Fig. 1. Location Plan for White Oak Creek Sampling Stations.

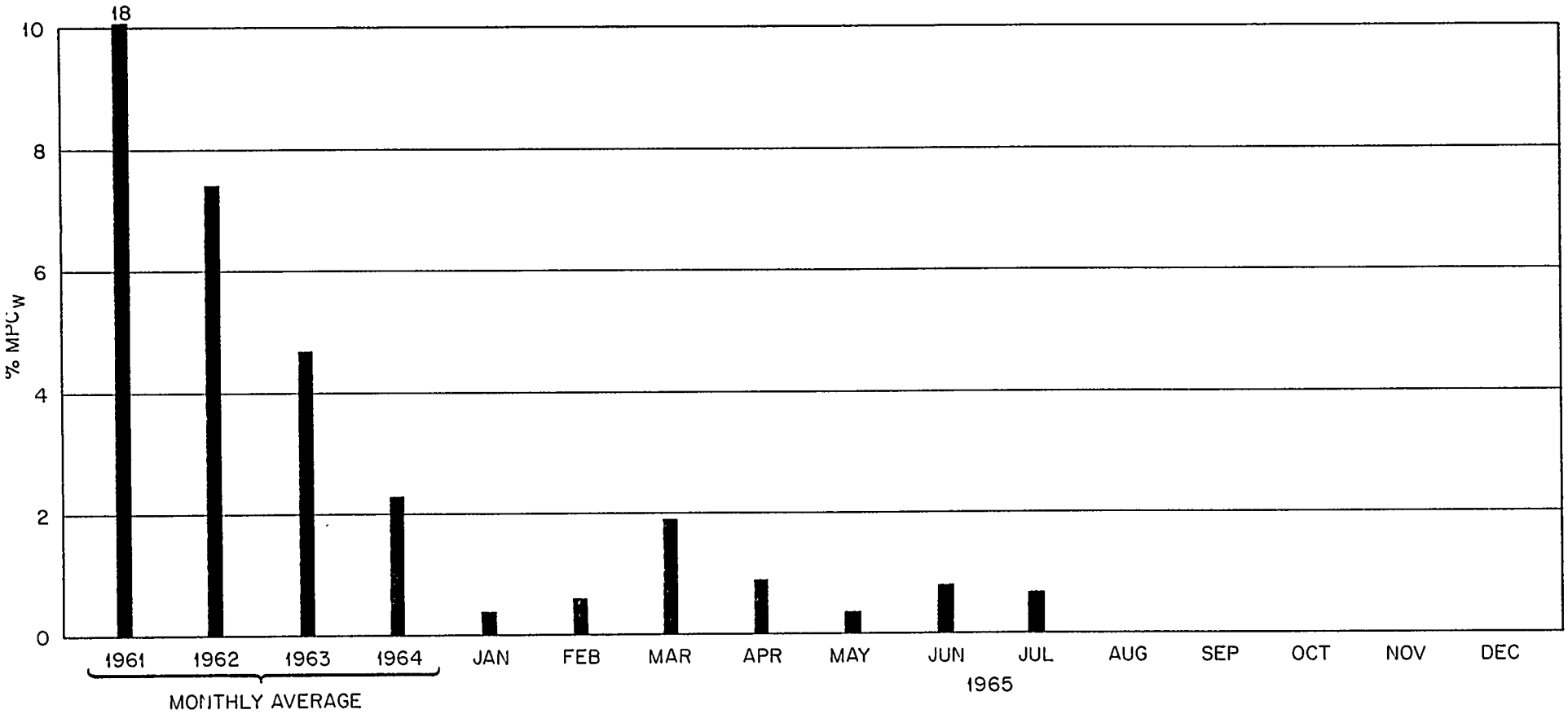

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

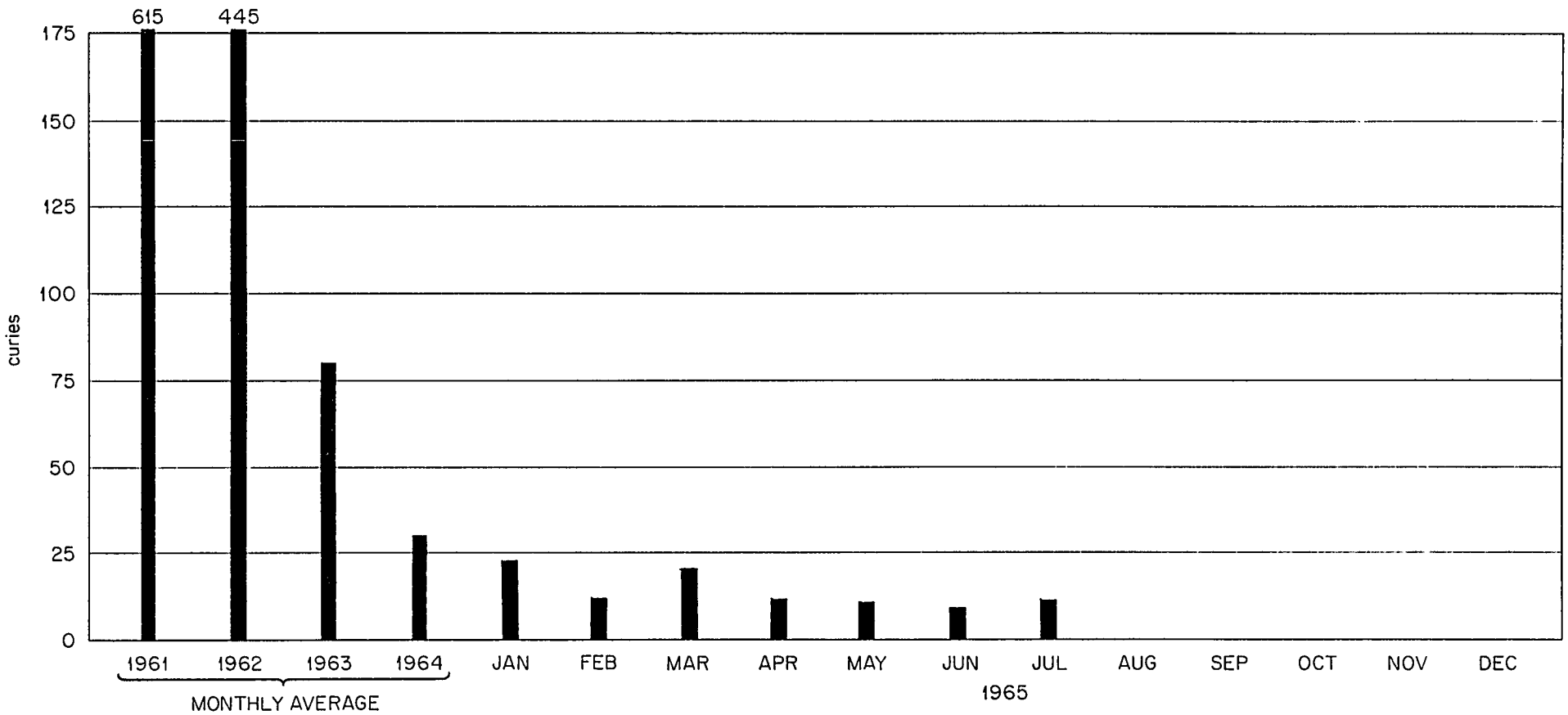

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

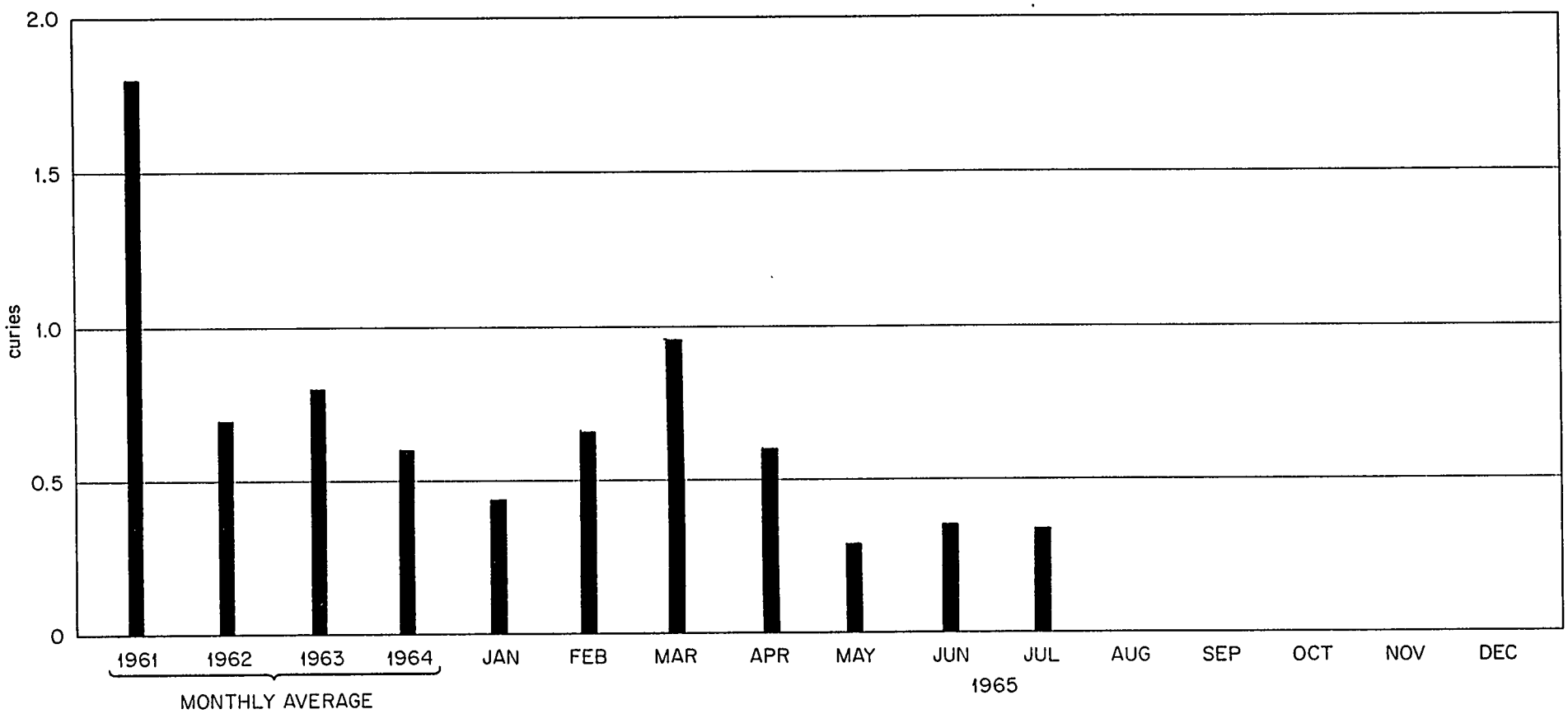

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

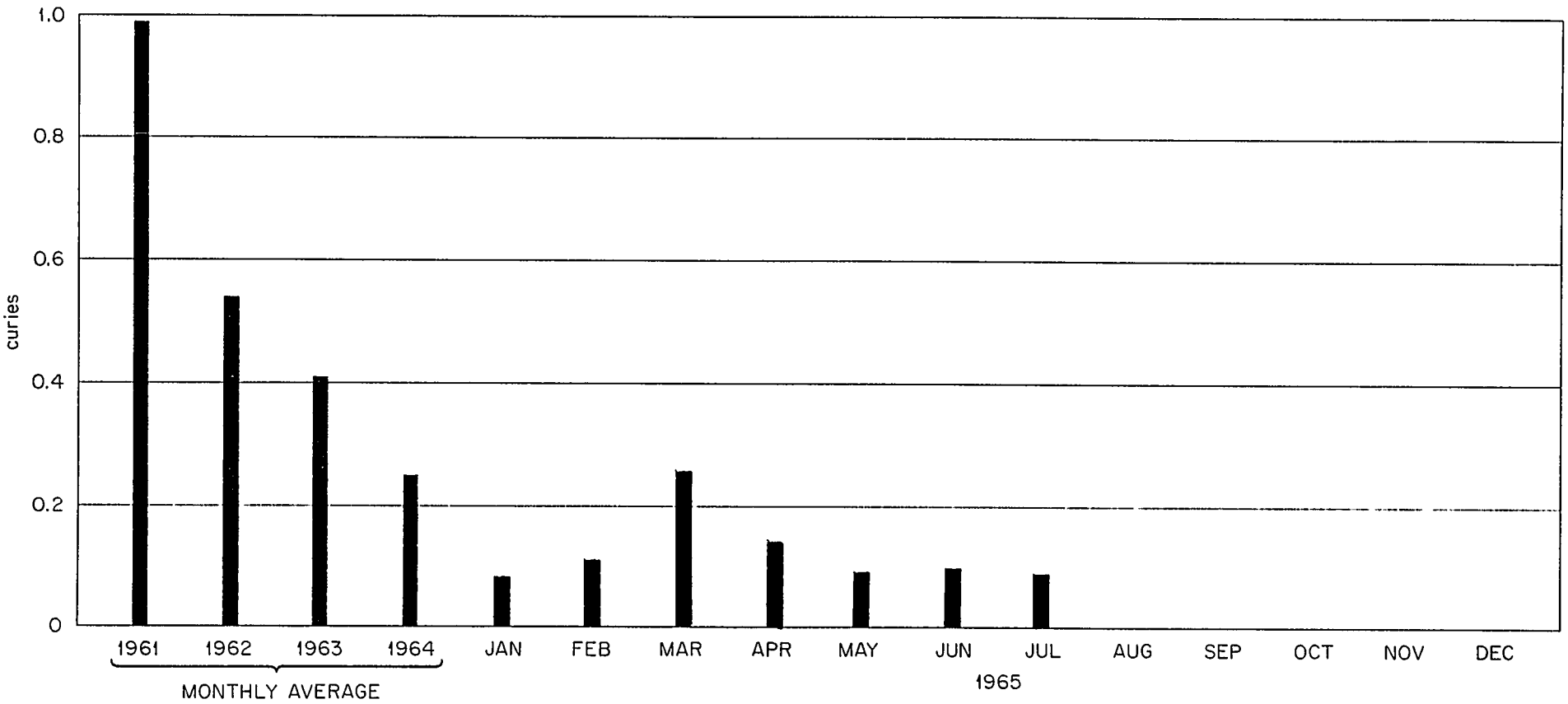

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

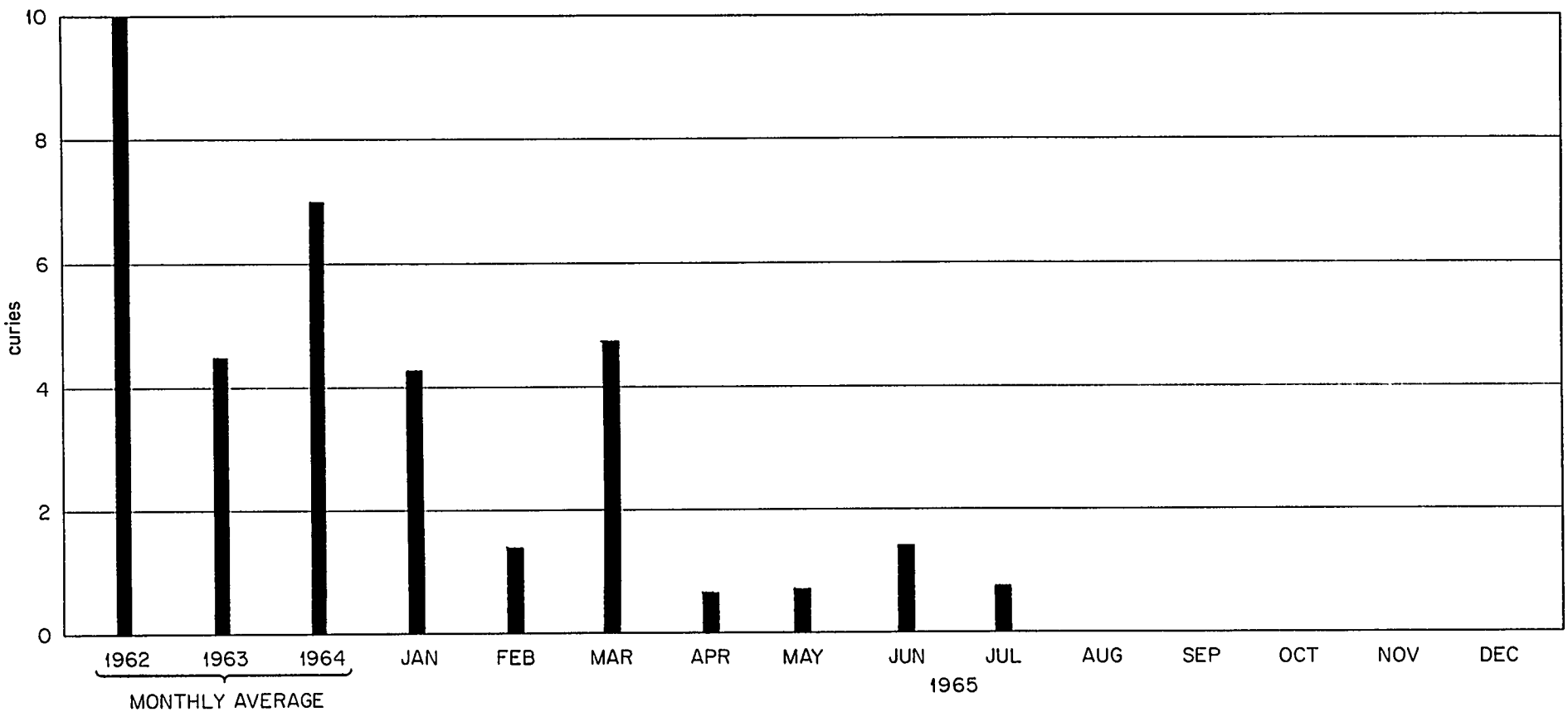

Fig. 6. Total[1] Activity Released in Gaseous Waste

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

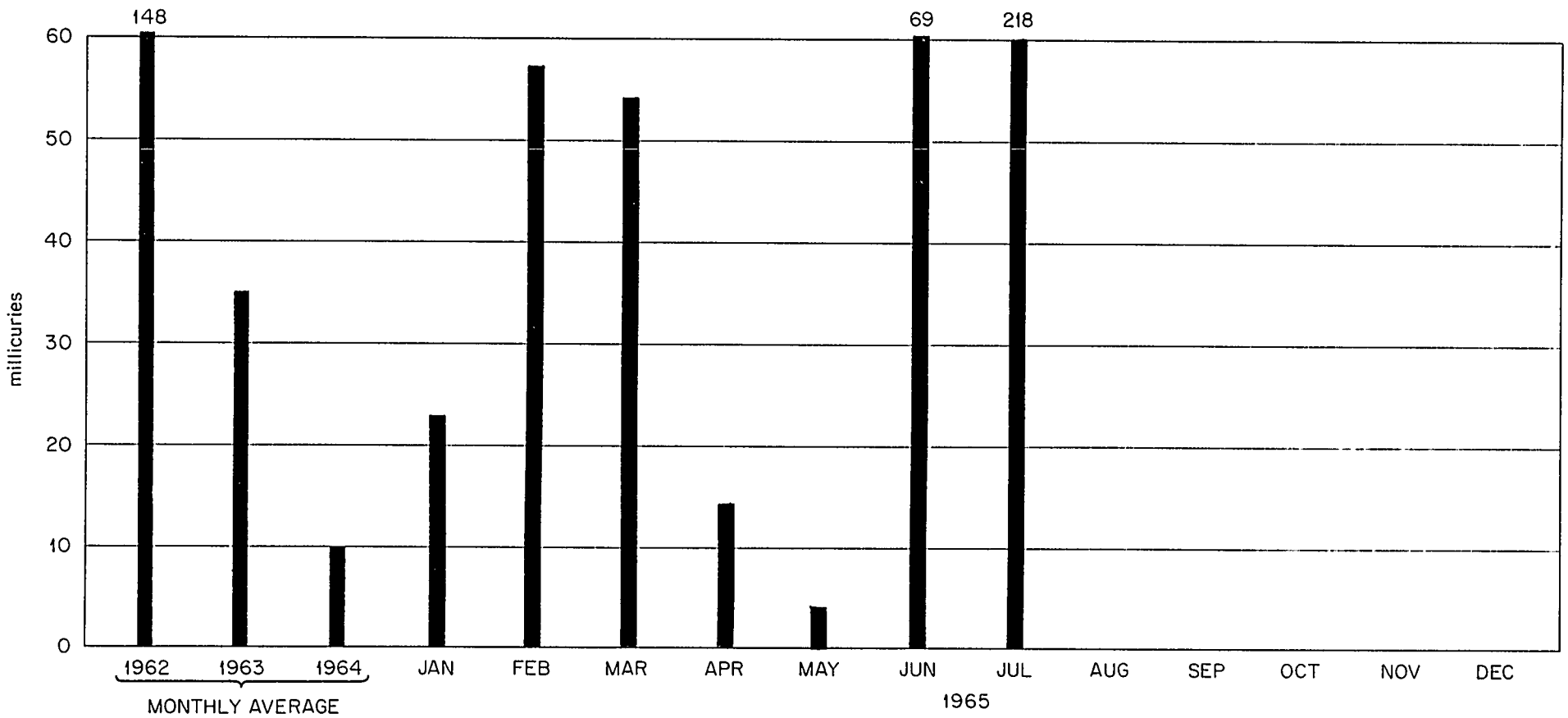

Fig. 7. Filterable Activity Released in Gaseous Waste

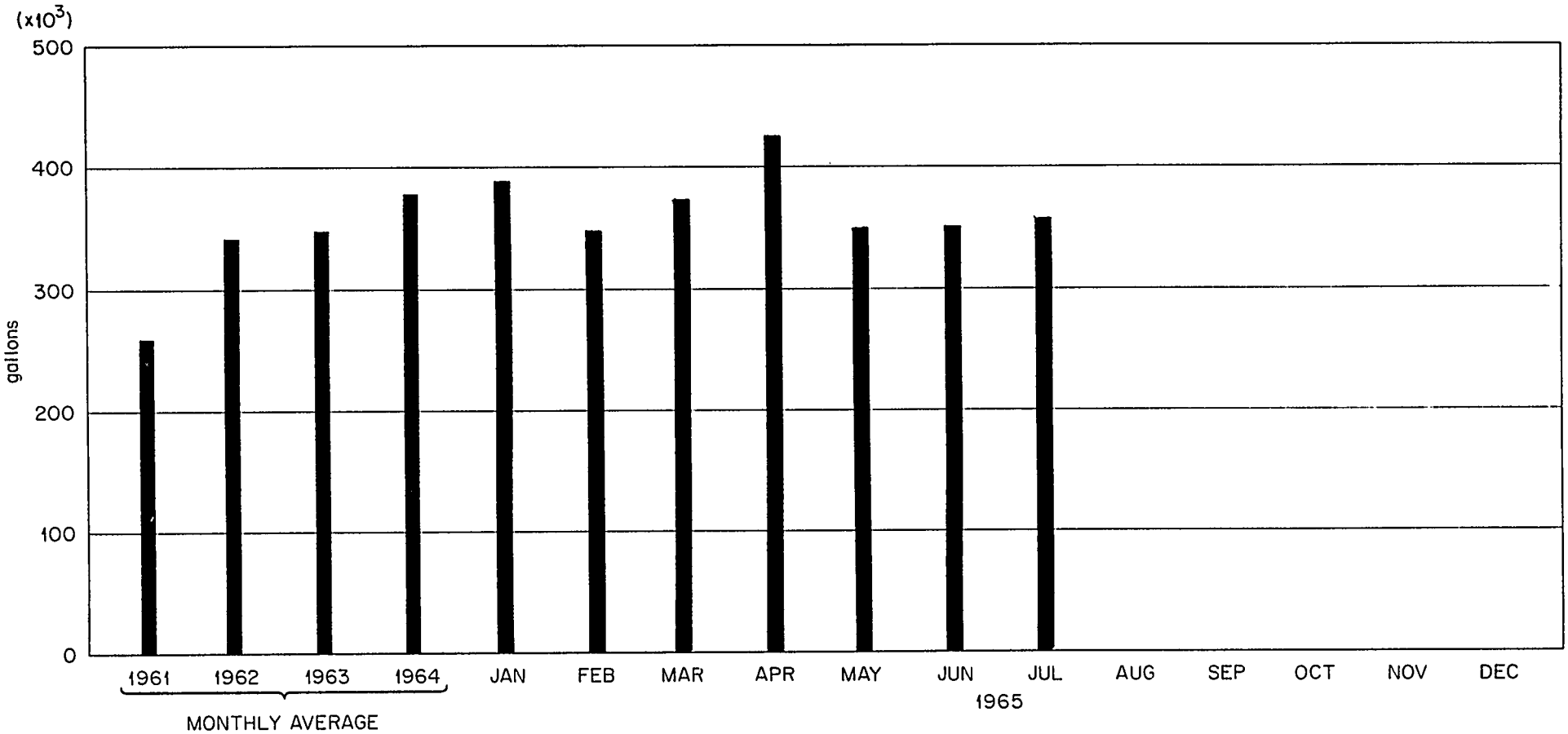

Fig. 8. Intermediate Level Waste Volumes

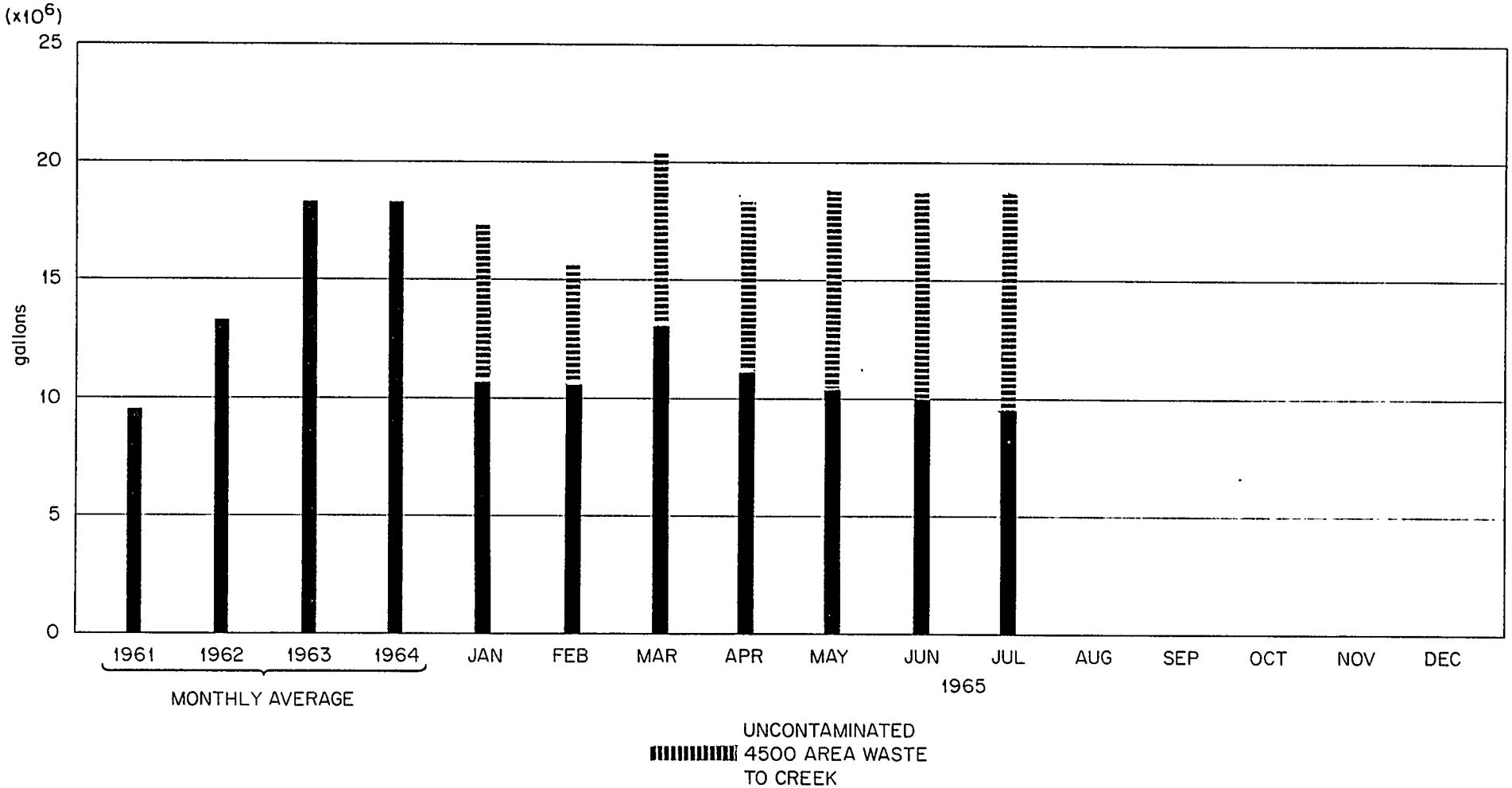

Fig.9. Process Waste Volumes

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 gives a summary of activity measurements made at the White Oak Creek sampling stations. The locations of these stations are shown in Figure 1. Figures 2 through 5 compare the significant data obtained from the stations on a monthly and yearly basis. Figures 6 and 7 compare the volumes of liquid wastes handled.

The total release of radioactivity to White Oak Lake was 10.20 curies. Most of it was ruthenium (8.97 curies) and cobalt (0.93 curie). The strontium release was 0.25 curie. Practically all of it came from the Bethel Valley drainage system; the process waste system discharged 0.10 curie and 0.13 curie came from the creek bed and other minor sources not routinely sampled.

A total of 1.66 curies of activity was released from the Laboratory's main gas handling systems (see Table 2). The bulk of the release was ^{131}I with 48 millicuries of ^{197}Hg and 40 millicuries of ^{191}Os. Comparisons of gaseous releases on a monthly and yearly basis are shown in Figures 8 and 9.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The process waste system operated normally this month. Plant efficiency (determined by gross beta analysis) was 84 percent. A total of 8.9 million gallons of contaminated water was processed by the plant; 10.4 million gallons of uncontaminated water was diverted to the creek through the 4500 area ponds.

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

INTERMEDIATE-LEVEL WASTE SYSTEM

A total of 345,973 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	164,869
2.	Trench 7A	53,213
3.	Trench 7B	125,891

Major contributors to the ILW system are listed below:

		Gallons
1.	Building 3019	73,910
2.	Reactor Complex	37,100
3.	Fission Products Development Laboratory	35,260
4.	4500 Complex	29,190
5.	Radioisotopes Processing Area	21,010

An inventory of all activity put into the trenches to date is given in Table 5.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Montoring Station Number[a]	Total Sr	^{106}Ru	^{137}Cs	Total[b]
Process waste	1	0.10	none detected	0.08	0.18
Miscellaneous discharges from east end of plant	2	< 0.01	none detected	none detected	< 0.01
Total discharge from Bethel Valley Area	3	0.23	0.01	0.05	0.29
Total discharge from Melton Valley Area	4	0.02	< 0.01	< 0.01	0.02
East waste pit seepage	5	< 0.01	3.92	none detected	4.42
West waste pit seepage	6	< 0.01	5.04	none detected	5.47
Total discharge from all sources	3,4,5,6	0.25	8.97	0.05	10.20
White Oak Dam to Clinch River (Health Physics measurement)	7	0.17	1.56	0.08	2.35

[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	1.65
Radiochemical Processing Pilot Plant	3020	0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
Total activity in gases released		1.66

[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: 8.9×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.6×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.44	0.10	77
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.04	none detected	100
^{137}Cs	0.27	0.08	71
Gross Beta Analysis	23 c/m/ml	4 c/m/ml	84

[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 & Radioisotope area	9[b]	0.351[b]	69.6	2.89	38.2
2. Radioisotope Processing Area	1	0.012	2.4	0.87	11.5
3. Buildings 3503 and 3508	10	0.140	27.8	1.03	13.6
4. Buildings 3025, 3026 and 3550	0	--	--	1.60	21.2
5. Building 3019	0	--	--	0.22	2.9
6. Fission Products Development Laboratory	4	0.001	0.2	0.02	0.3
7. 4500 Area	0	--	--	--	--
8. Building 3525	0	--	--	0.78	10.3
9. Building 2026	0	--	--	0.15	2.0

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

[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 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	17,172	21,327	5,303	35,120	1,341	4,664	10,583	20,801	3,278	5,409	6,867	19,113
^{106}Ru	29	80	118	6,053	3	44	189	1,829	6	37	126	1,494
^{137}Cs	9,234	21,839	58,688	162,572	2,871	18,782	53,398	108,764	7,018	11,878	35,876	85,316
^{60}Co	108	195	110	1,332	19	91	131	618	47	97	88	593
TOTALS	26,543	43,441	64,219	205,077	4,234	23,581	64,301	132,012	10,349	17,421	42,957	106,516

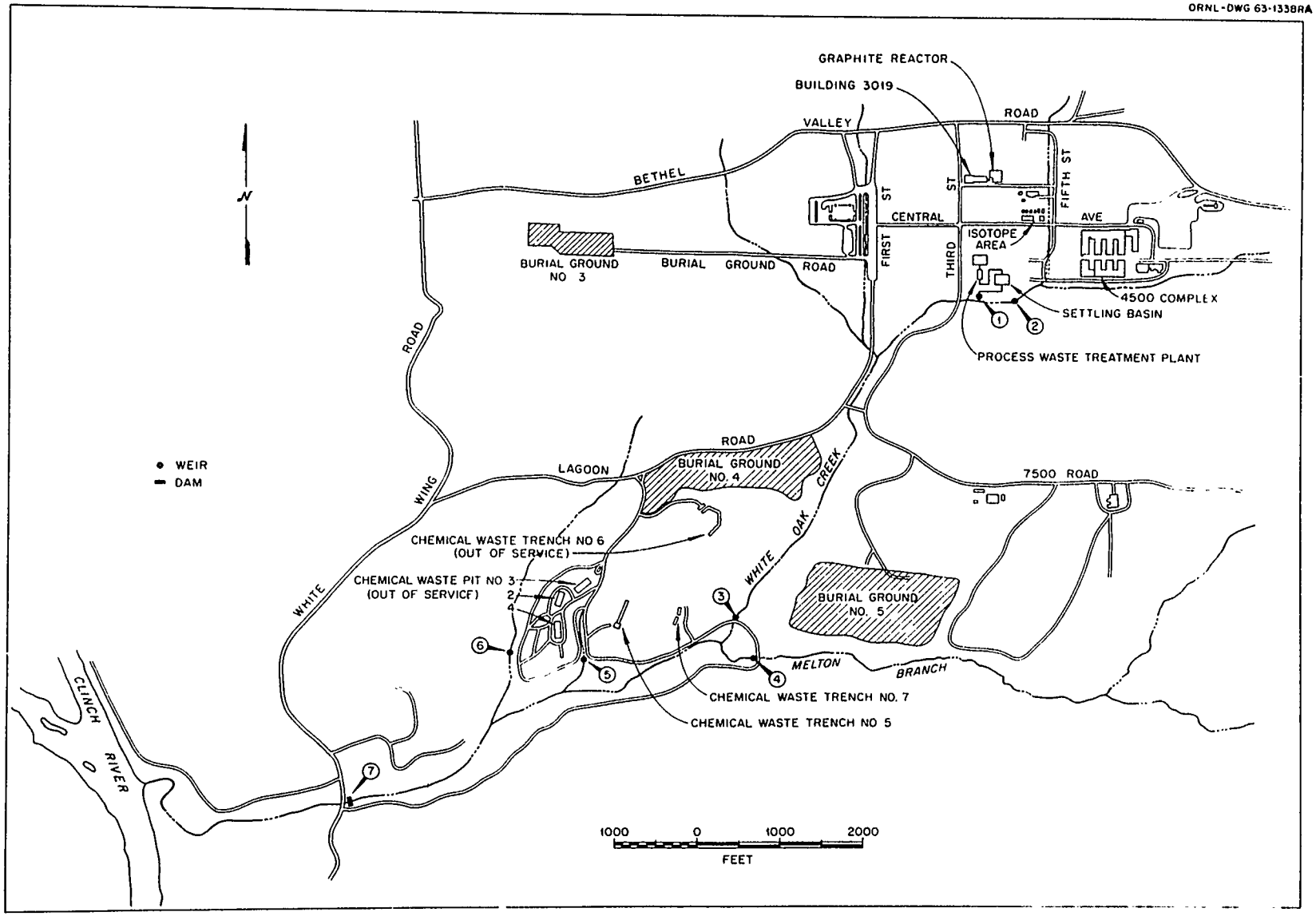

Fig. 1. Location Plan for White Oak Creek Sampling Stations.

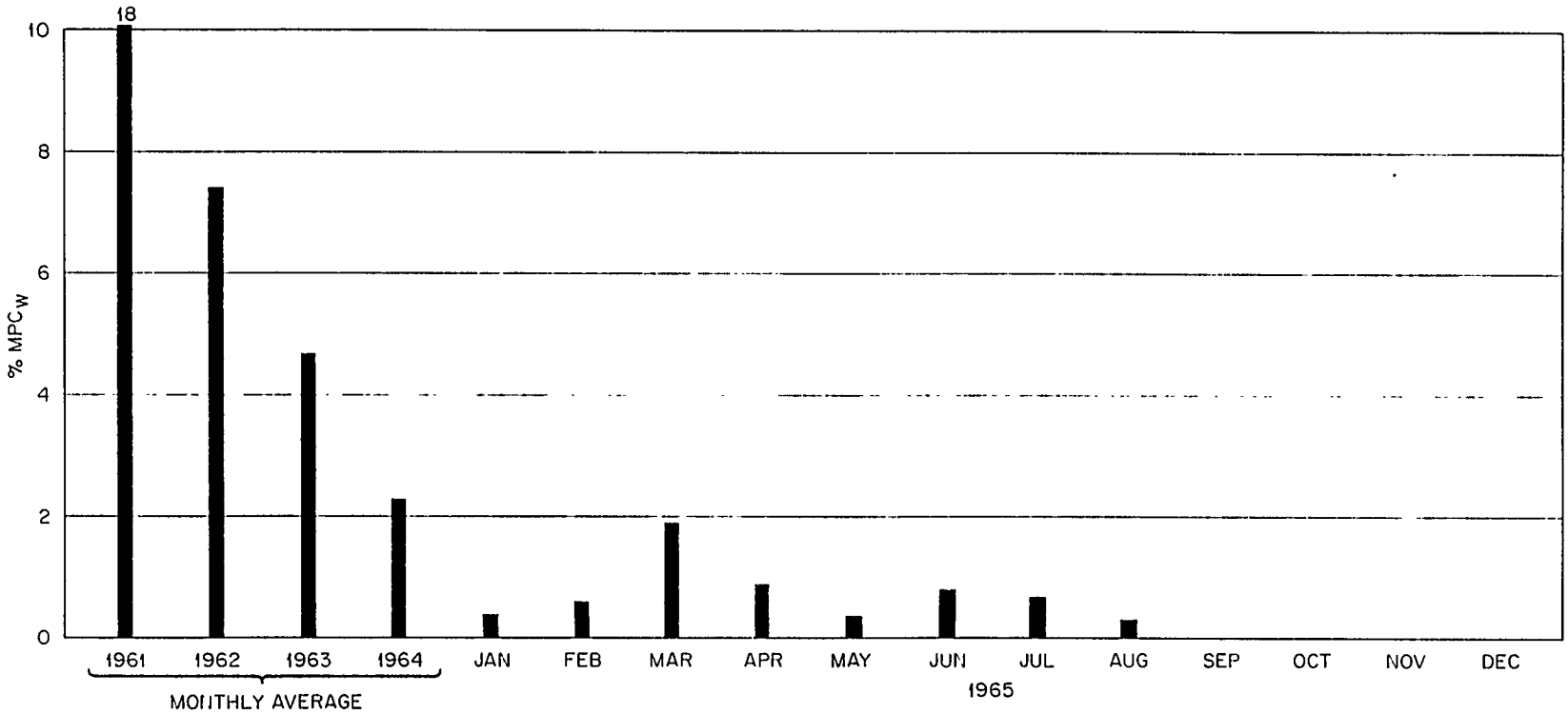

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

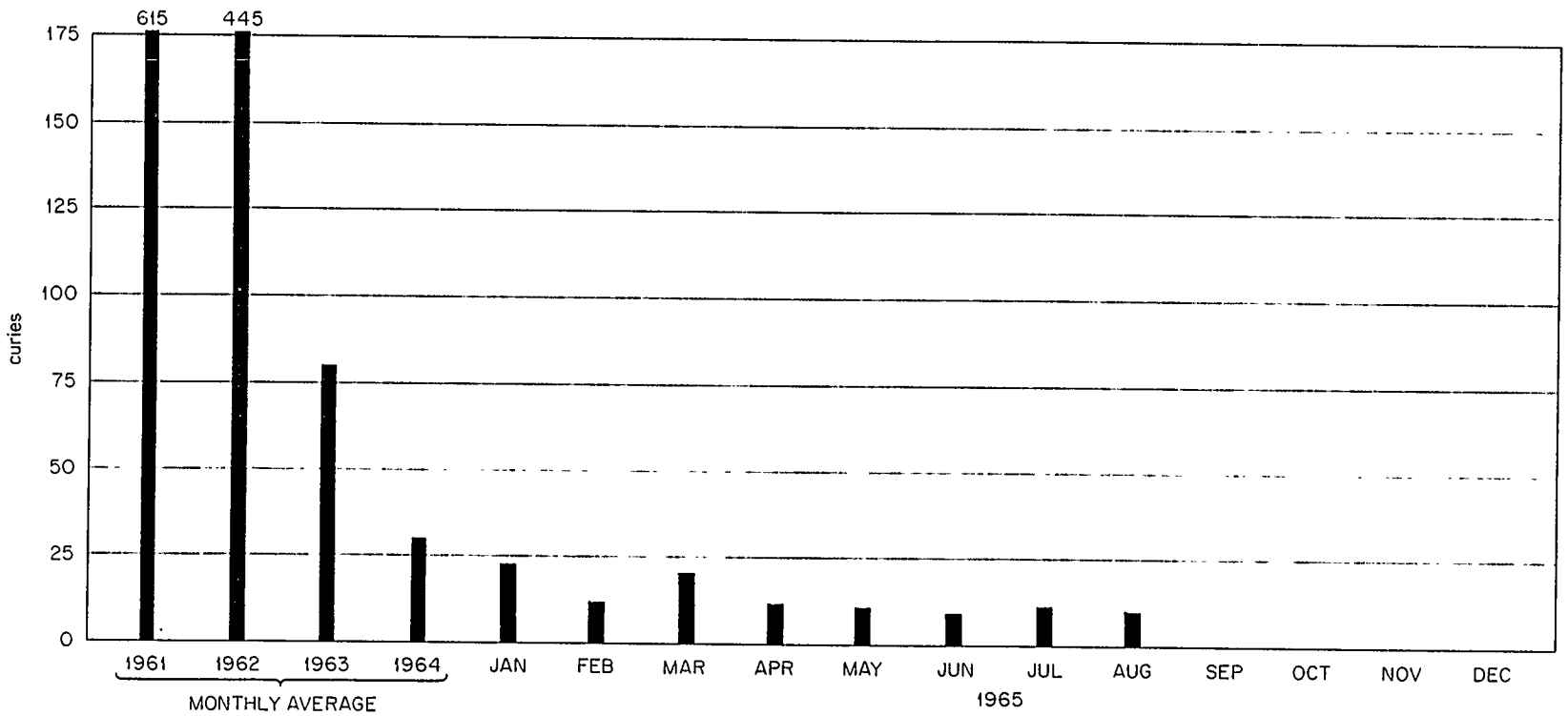

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

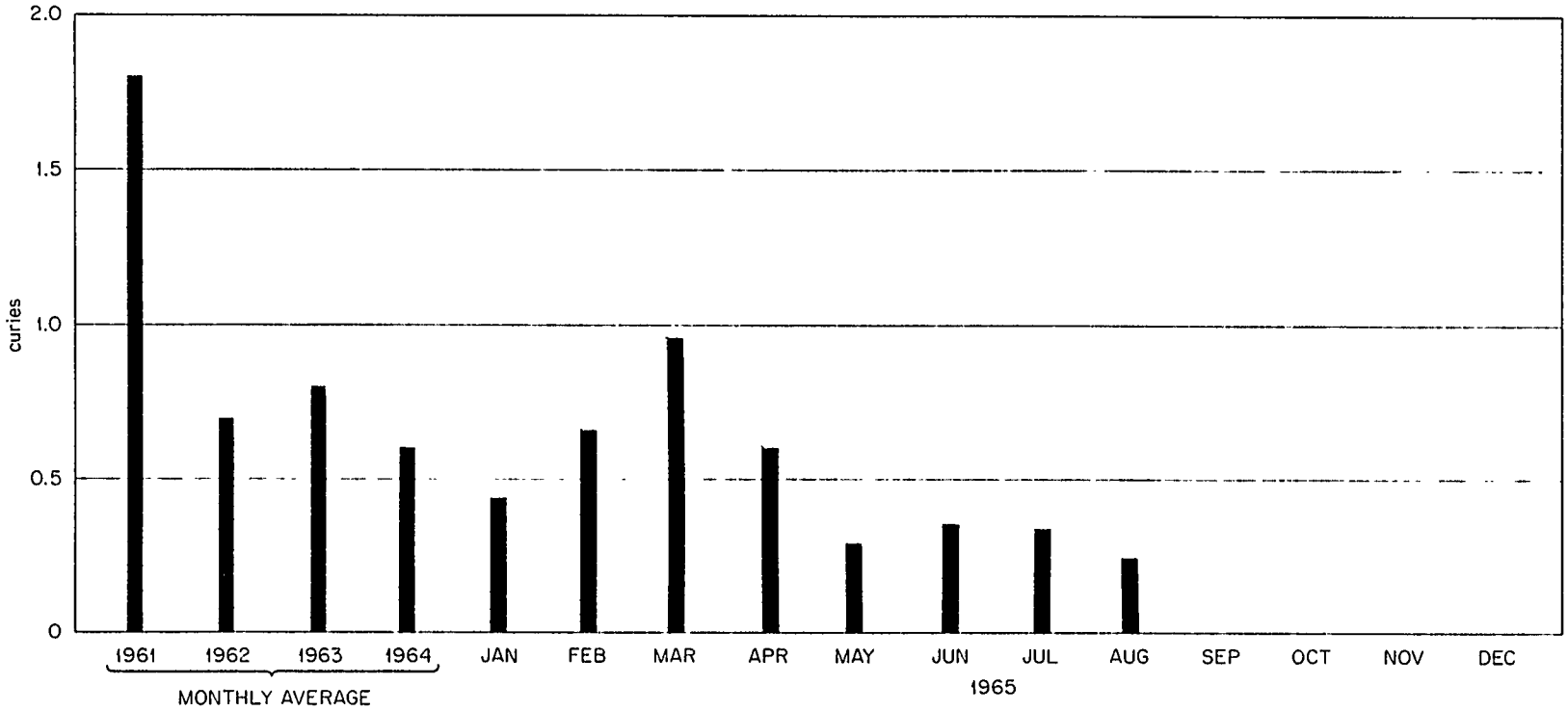

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

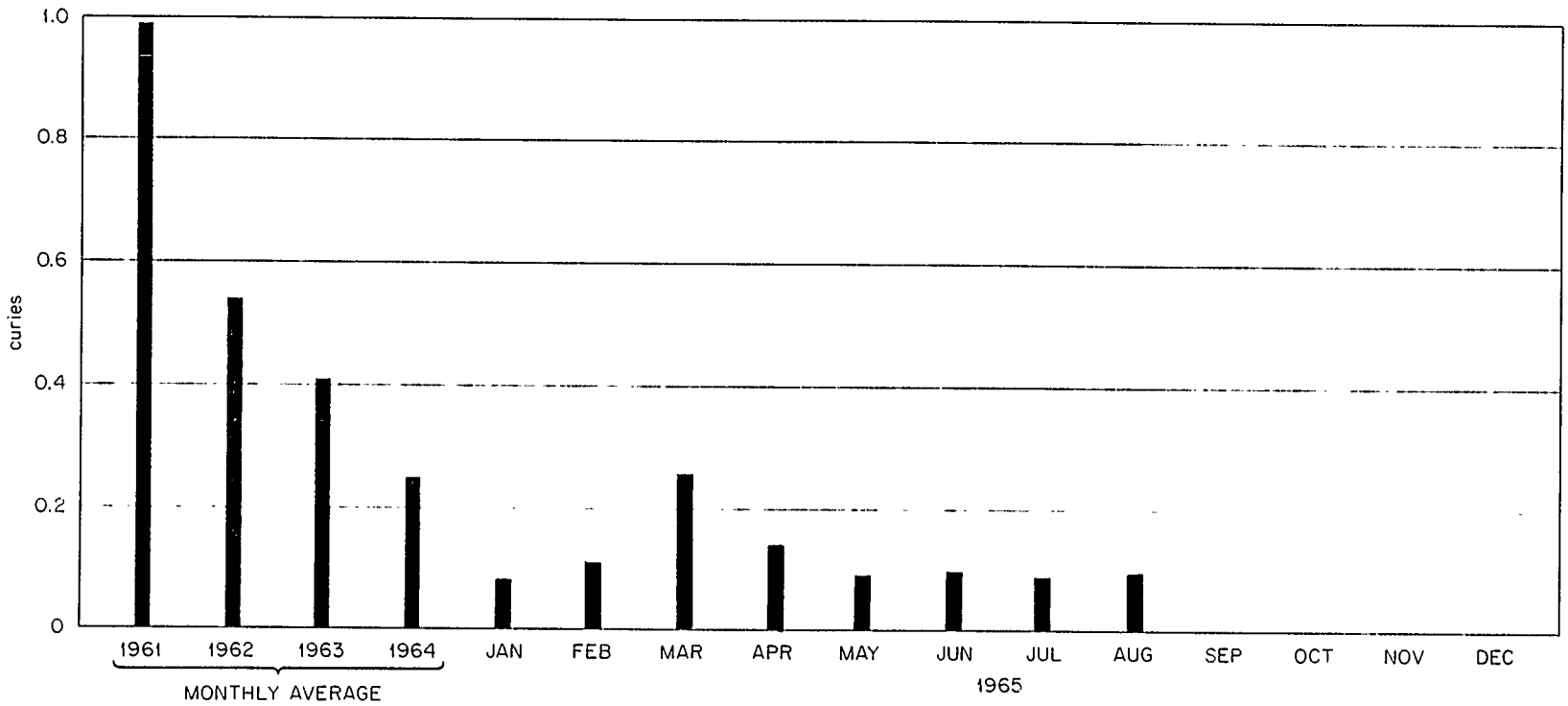

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

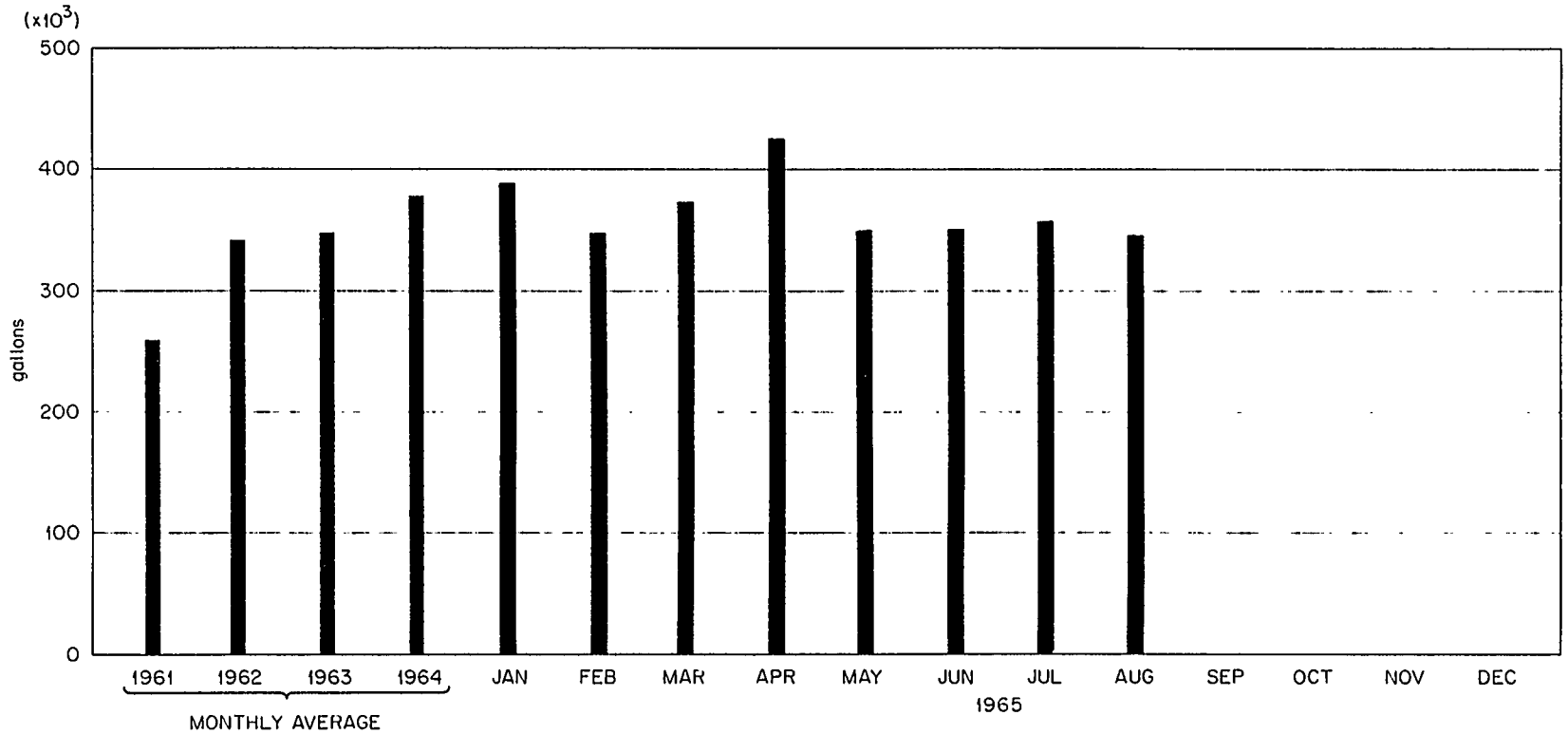

Fig. 6. Intermediate Level Waste Volumes

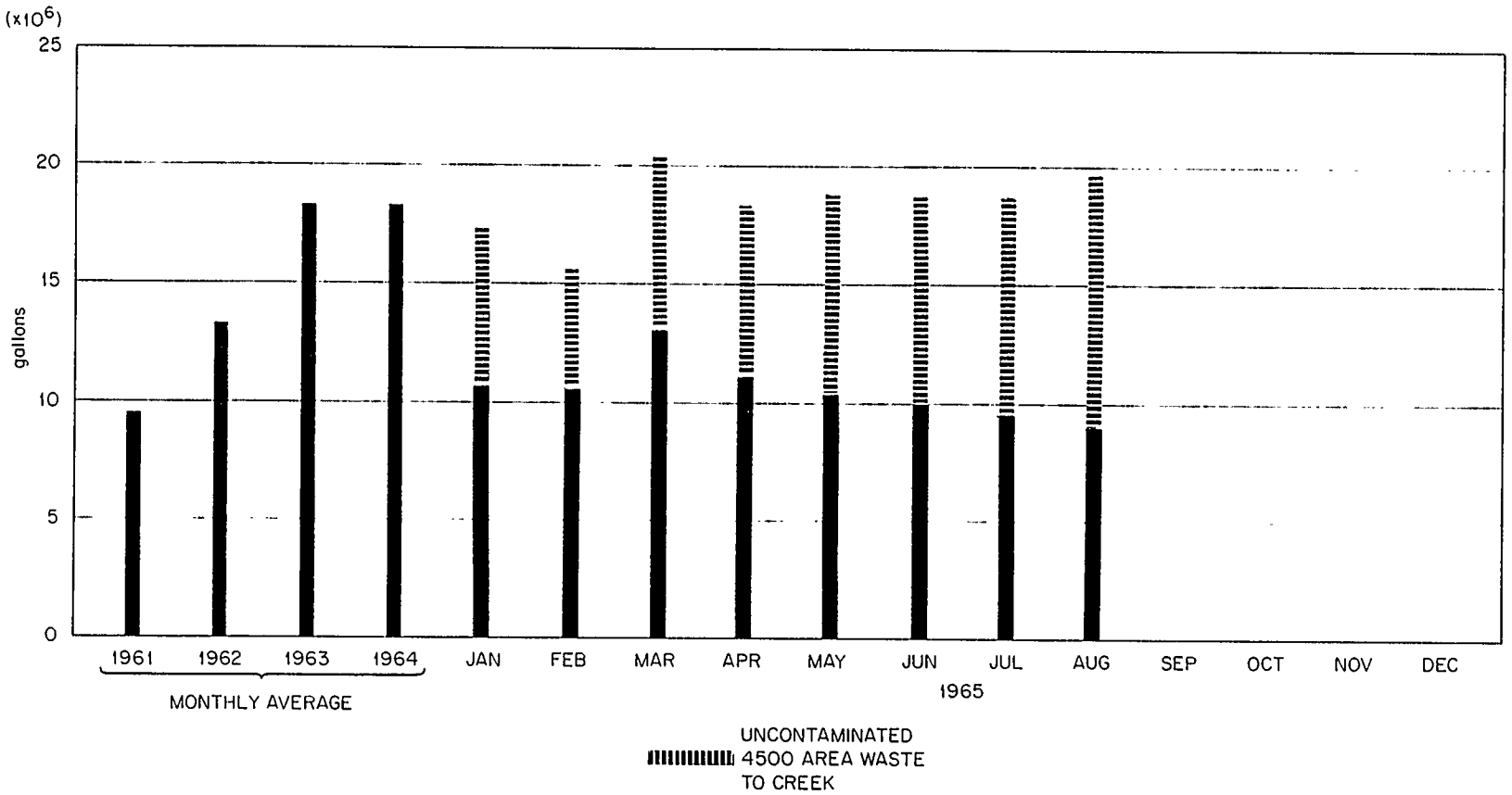

Fig. 7. Process Waste Volumes

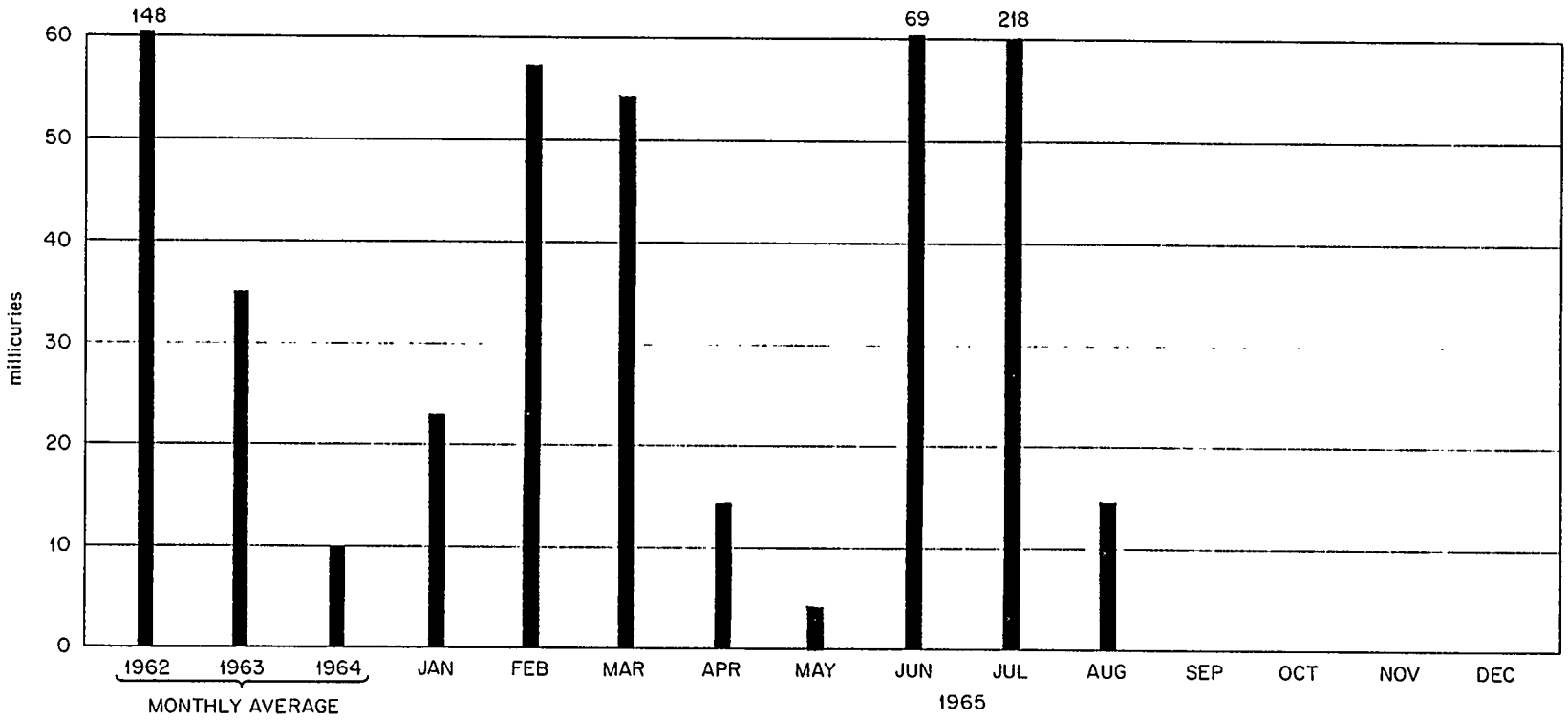

Fig. 8. Filterable Activity Released in Gaseous Waste

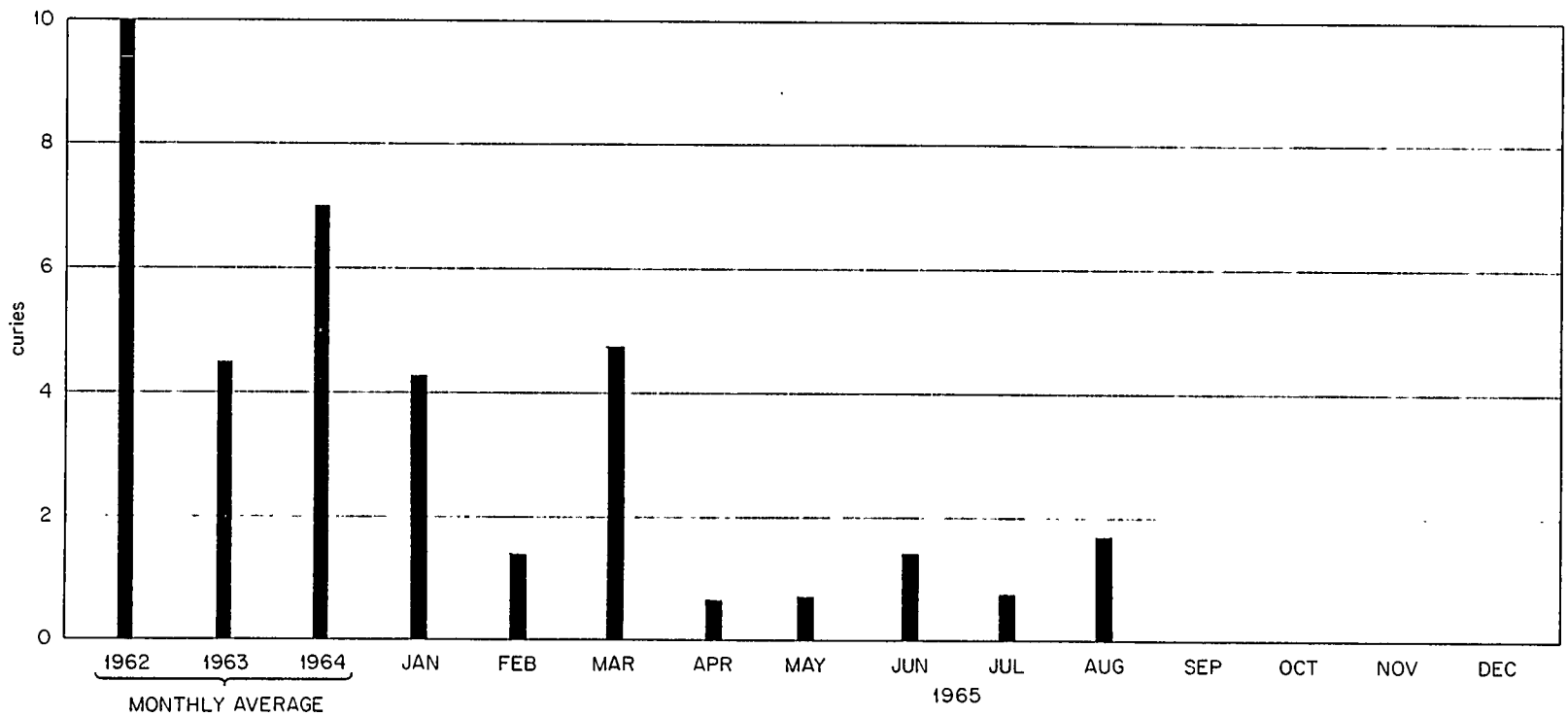

Fig. 9. Total[1] Activity Released in Gaseous Waste

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

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CENTRAL FILES NUMBER
65-11-7

COPY NO. 43

DATE: November 2, 1965

SUBJECT: Radioactive Waste Disposal Operations Report for the month of September 1965

TO: Distribution

FROM: L. C. Lasher

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

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

A summary of the amounts of radioactivity measured by sampling stations along White Oak Creek is shown in Table 1. The physical locations of the sample stations are shown in Figure 1. Figure 2 through 5 compare data obtained from these stations on a monthly and yearly basis. Figures 6 and 7 compare the volumes of liquid wastes handled.

The amount of radioactive waste discharged into White Oak Lake was 10.98 curies. Most of this waste was ruthenium (8.66 curies). Lesser amounts of cobalt (1.11 curies) and cesium (0.91 curie) were also detected. The strontium discharge was 0.3 curie. The bulk of the strontium (0.21 curie) came from unmonitored sources along the creek; only 0.07 curie was discharged from the process waste system. The discharge from the Melton Valley area was 0.02 curie.

The gaseous waste discharge amounted to 0.20 curie this month. Practically all of this activity was released from the 3039 stack; the waste was primarily iodine (0.14 curie) and mercury (0.03 curie). The stack releases are tabulated in Table 2. Figures 8 and 9 compare gaseous releases or a monthly and yearly basis.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Approximately 10 million gallons of contaminated water was processed this month. Plant operations were normal; the over-all efficiency was 86%. A total of 11 million gallons of uncontaminated water was diverted by the 4500 pond system and discharged to the creek without treatment.

A summary of plant operations is shown in Table 3; the major

contributors to this system are listed in Table 4.

INTERMEDIATE-LEVEL WASTE

A total of 318,500 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	168,640
2.	Trench 7A	49,310
3.	Trench 7B	100,600

Major contributors to the ILW system are listed below:

		Gallons
1.	Reactor Complex	65,730
2.	Building 3019	43,800
3.	4500 Complex	35,710
4.	Fission Products Development Laboratory	22,810
5.	Radioisotopes Processing Area	18,040

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	0.07	0.08	0.16	0.31
Miscellaneous discharges from east end of plant	2	< 0.01	0.01	< 0.01	0.01
Total discharge from Bethel Valley Area	3	0.28	0.03	0.41	0.77
Total discharge from Melton Valley Area	4	0.02	< 0.01	< 0.01	0.02
East waste pit seepage	5	< 0.01	5.40	0.32	6.48
West waste pit seepage	6	< 0.01	3.23	0.18	3.71
Total discharge from all sources	3,4,5,6	0.30	8.66	0.91	10.98
White Oak Dam to Clinch River (Health Physics measurement)	7	0.13	1.67	0.10	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	0.20
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
Total activity in gases released		0.20

[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 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.7×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.67	0.07	90
$^{103,106}Ru$	none detected	0.08	--
^{60}Co	0.08	none detected	100
^{137}Cs	0.19	0.16	16
Gross Beta Analysis	29 c/m/ml	4 c/m/ml	86

[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	9	0.315[b]	55.6	2.56	28.9
2.	Radioisotope Processing Area	1	0.010	1.8	0.80	9.0
3.	Buildings 3503 and 3508	10	0.240[c]	42.4	1.75	19.8
4.	Buildings 3025 and 3550	0	--	--	1.72	19.4
5.	Building 3019	0	--	--	1.02	11.5
6.	Fission Products Development Laboratory	4	0.001	0.2	0.02	0.2
7.	4500 Area	0	--	--	--	--
8.	Building 3525	0	--	--	0.92	10.4
9.	Building 2026	0	--	--	0.07	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.

[c]A storage canal outside of Building 3503 appears to be the source of this activity.

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	357	21,684	5,303	35,477	104	4,768	10,583	20,905	197	5,606	6,867	19,310
^{106}Ru	6	86	118	6,059	2	46	189	1,831	3	40	126	1,497
^{137}Cs	15,138	21,876	58,688	177,710	3,825	22,607	53,398	112,589	7,225	19,103	35,876	92,541
^{60}Co	37	232	110	1,369	13	104	131	631	24	121	88	617
TOTALS	15,538	43,878	64,219	220,615	3,944	27,525	64,301	135,956	7,449	24,870	42,957	113,965

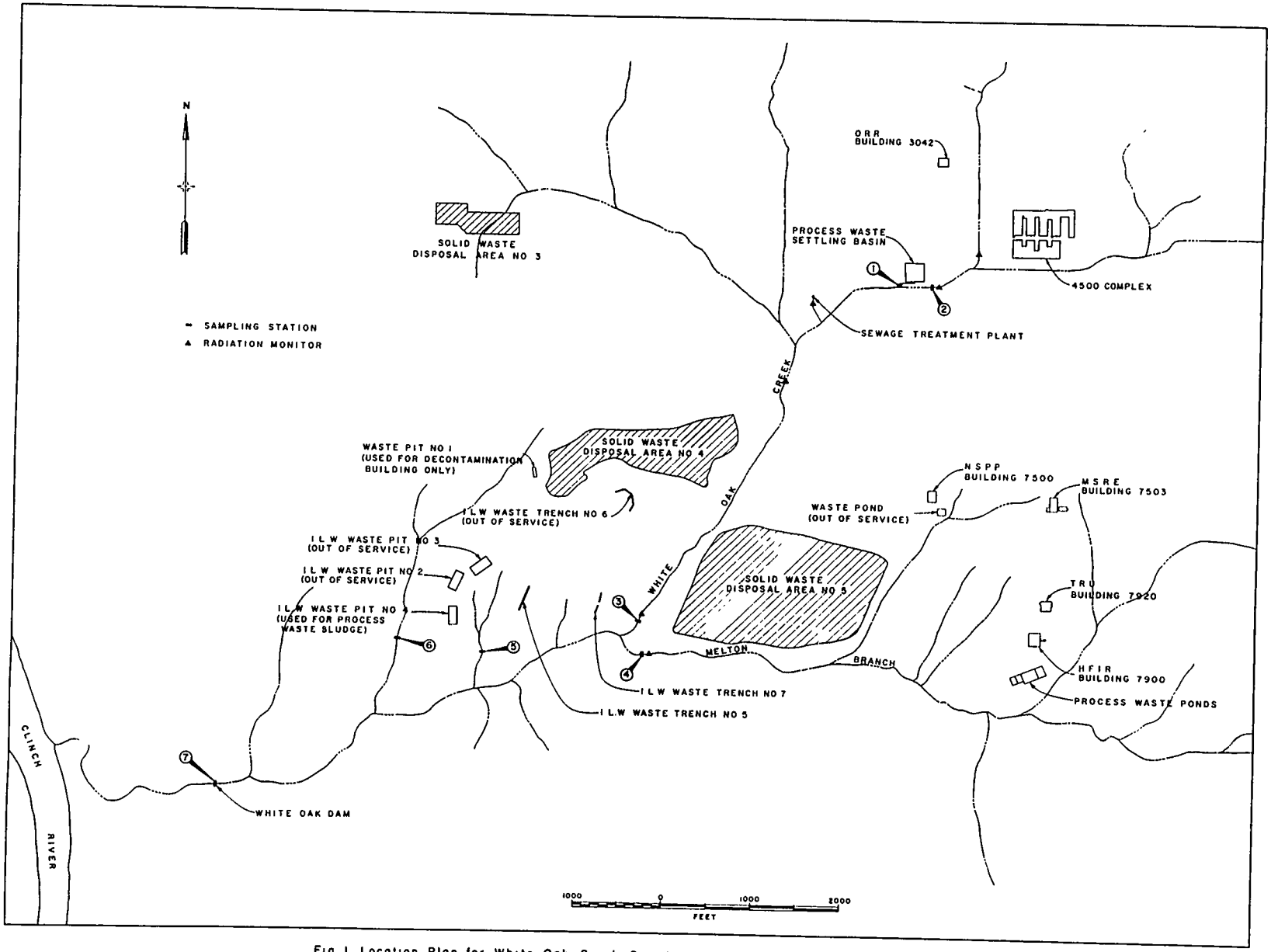

Fig 1 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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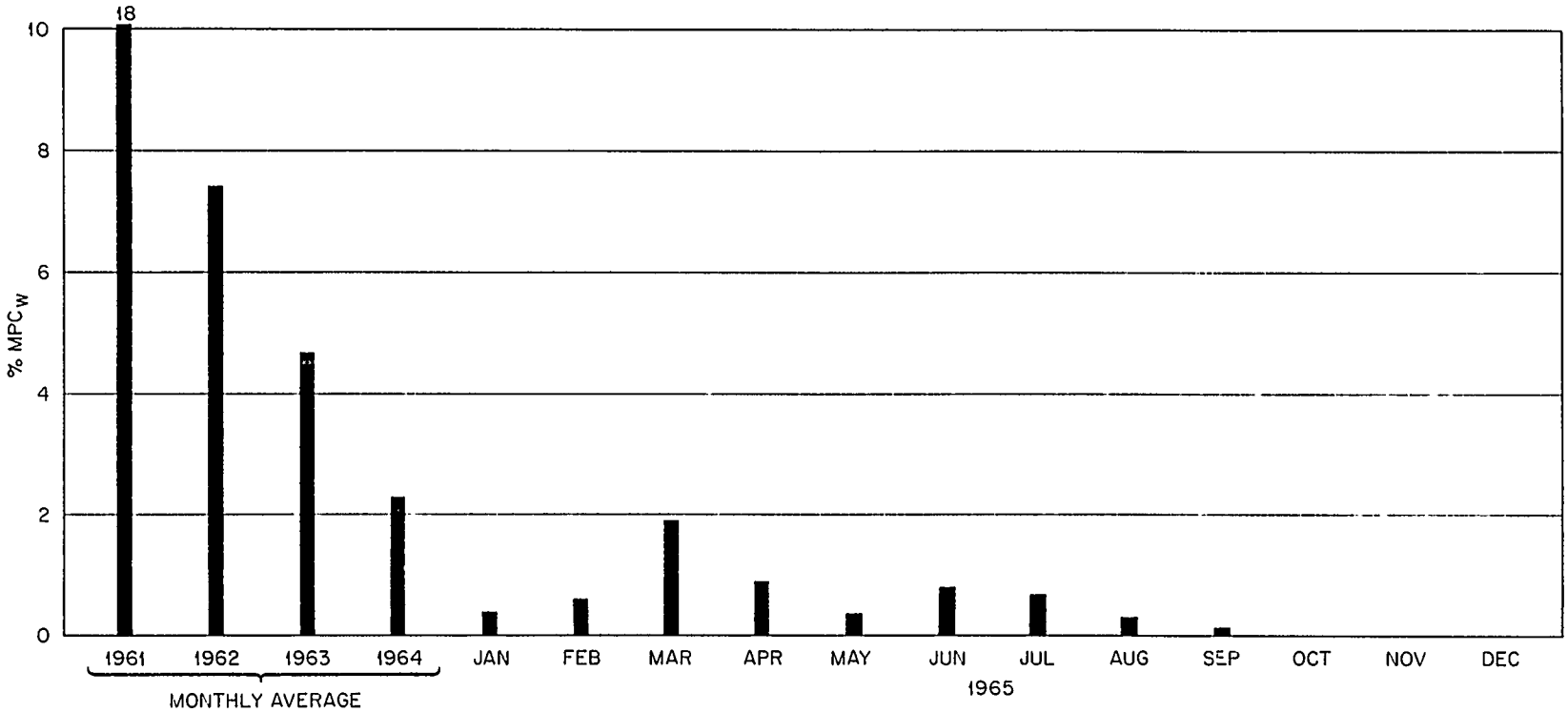

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

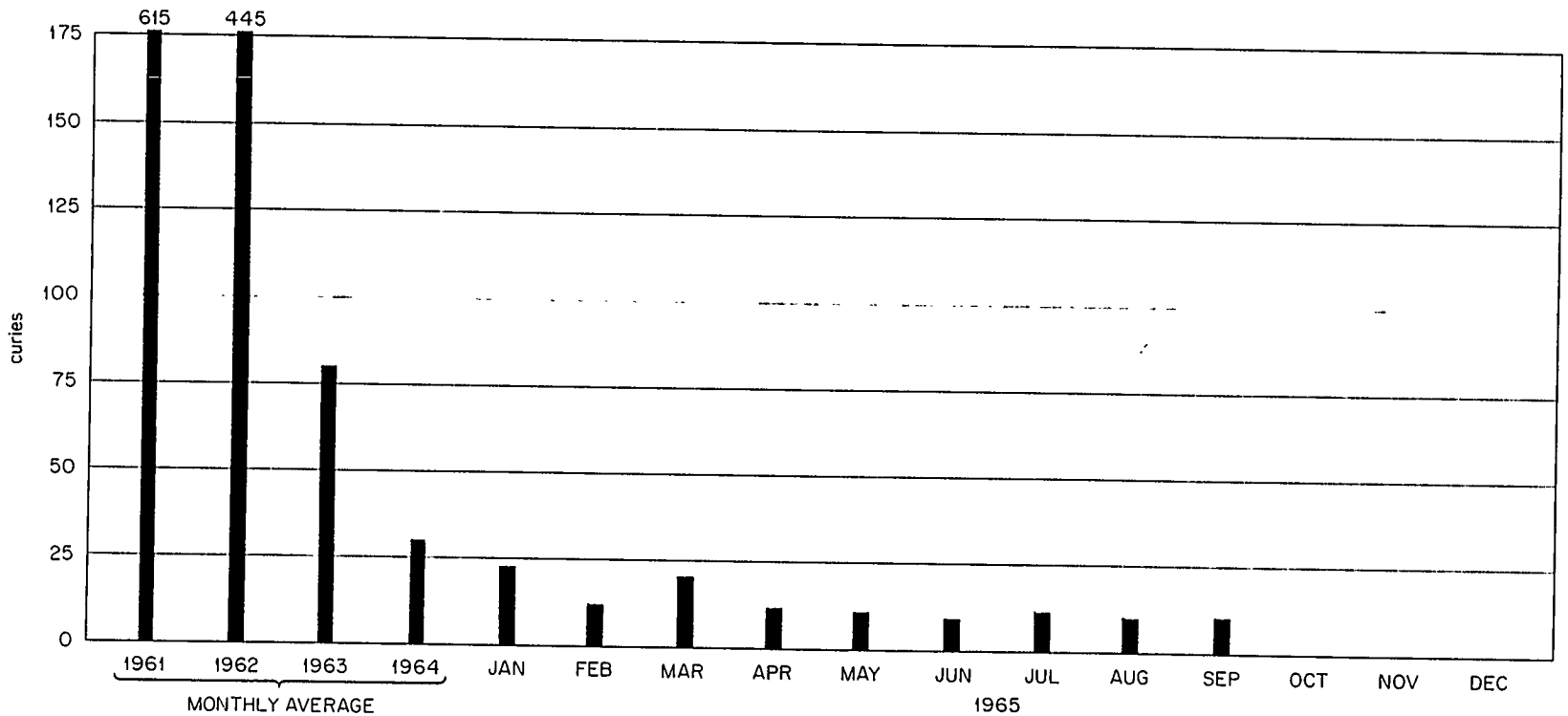

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

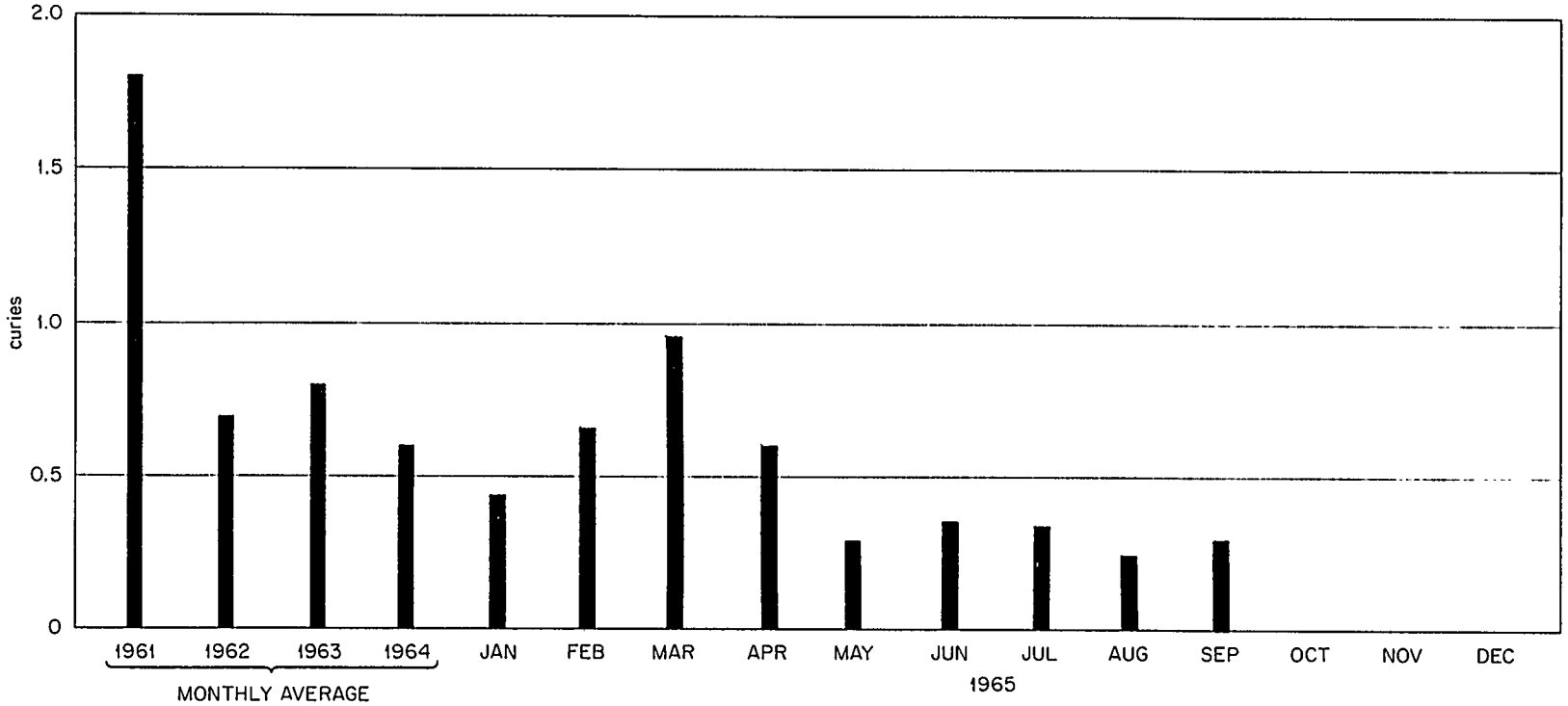

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

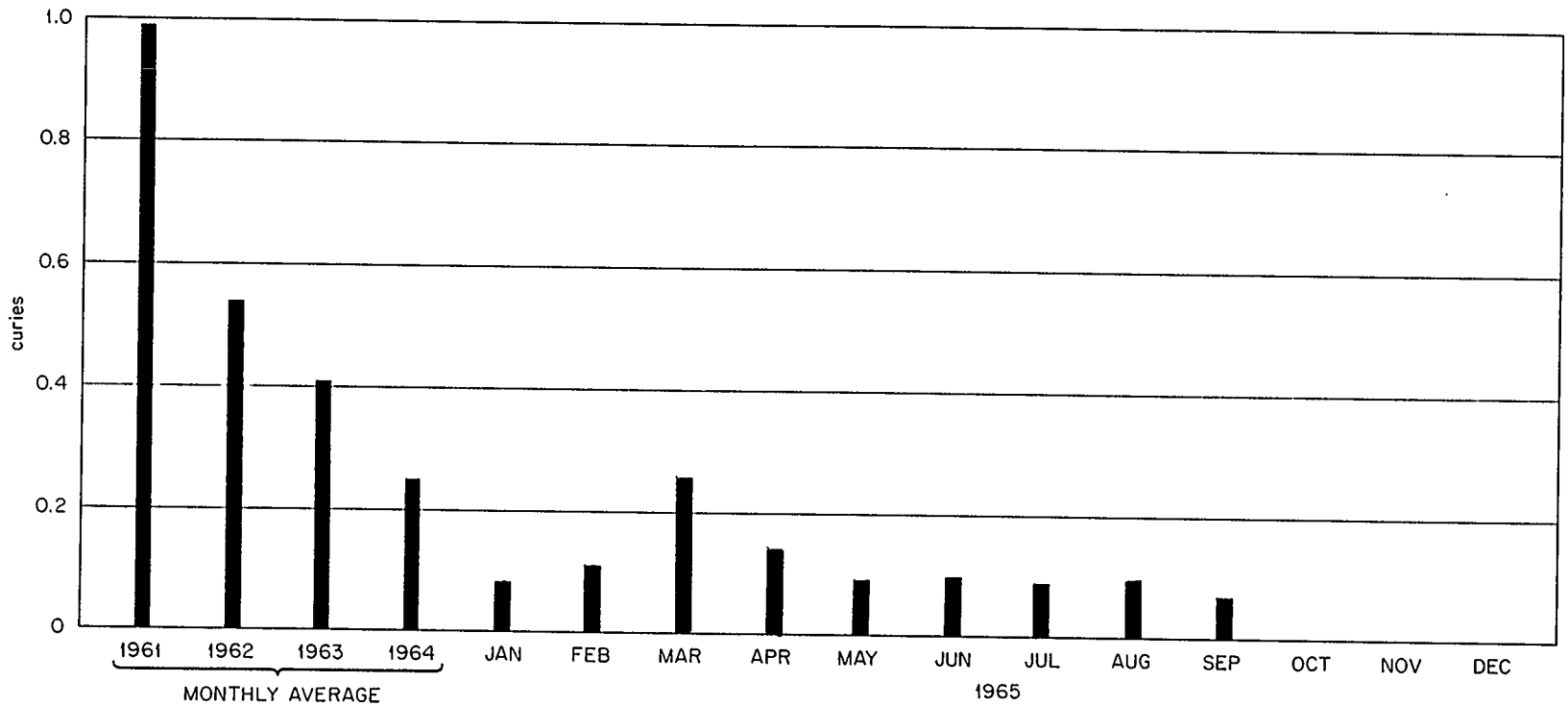

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

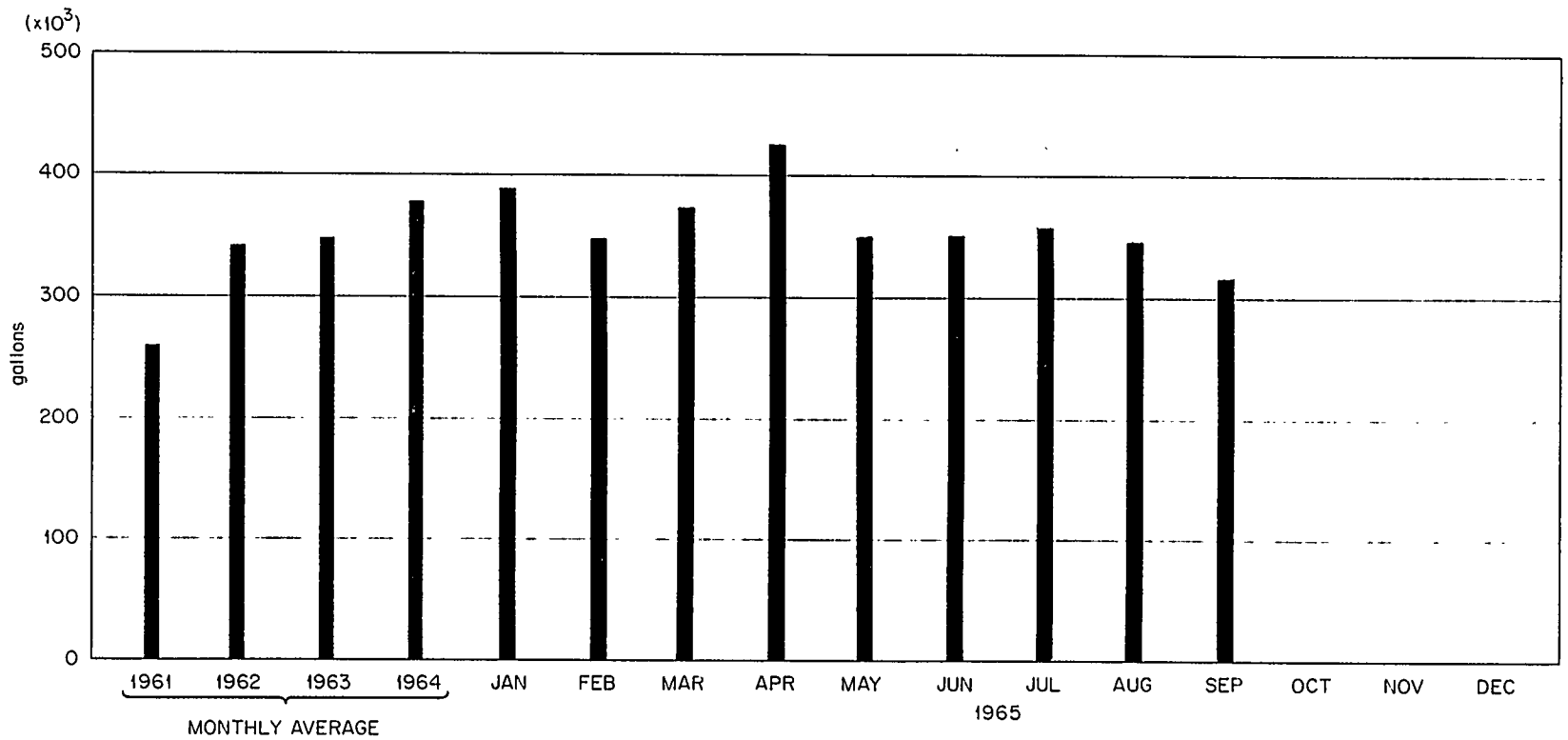

Fig. 6. Intermediate Level Waste Volumes

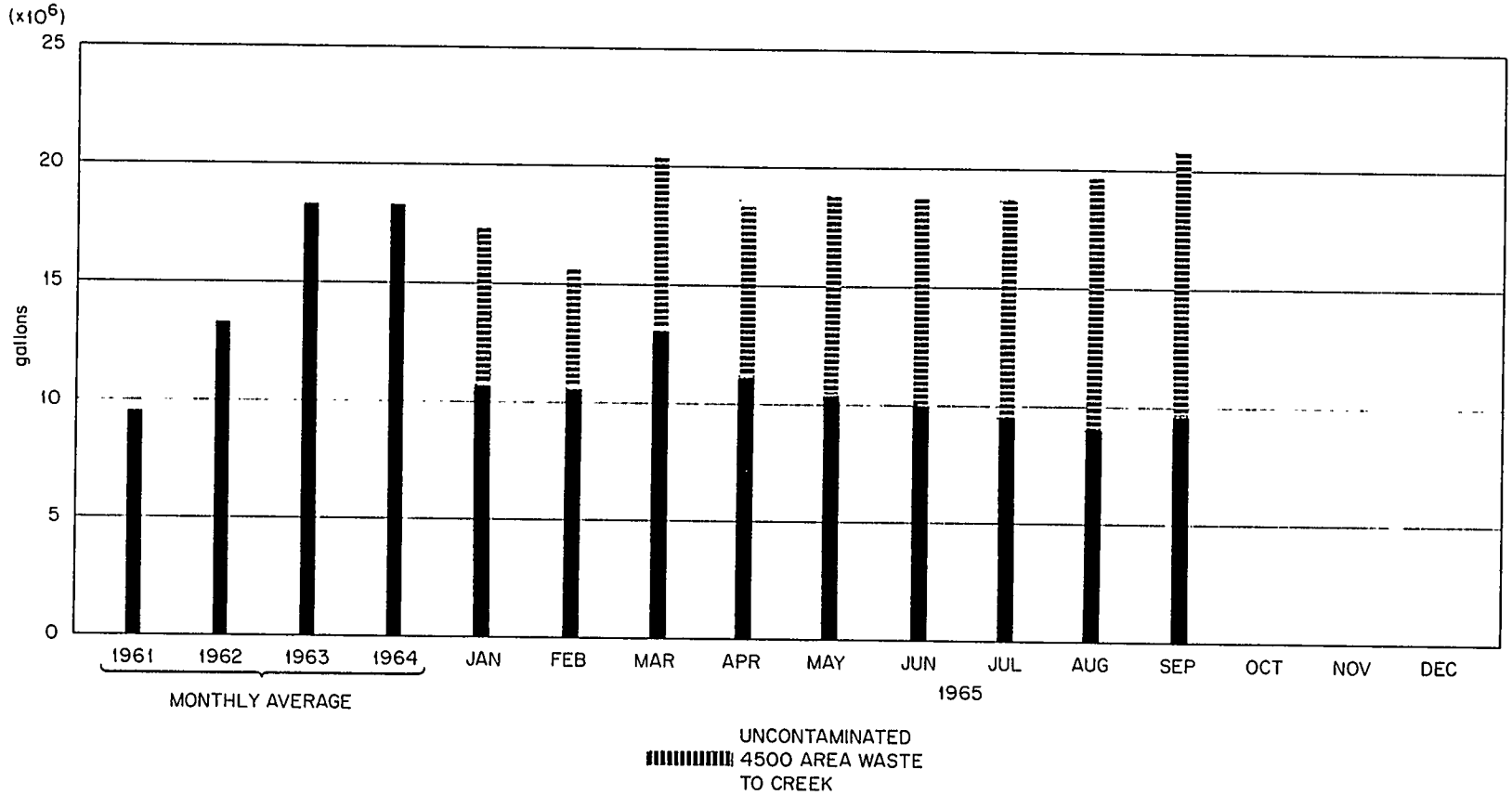

Fig. 7. Process Waste Volumes

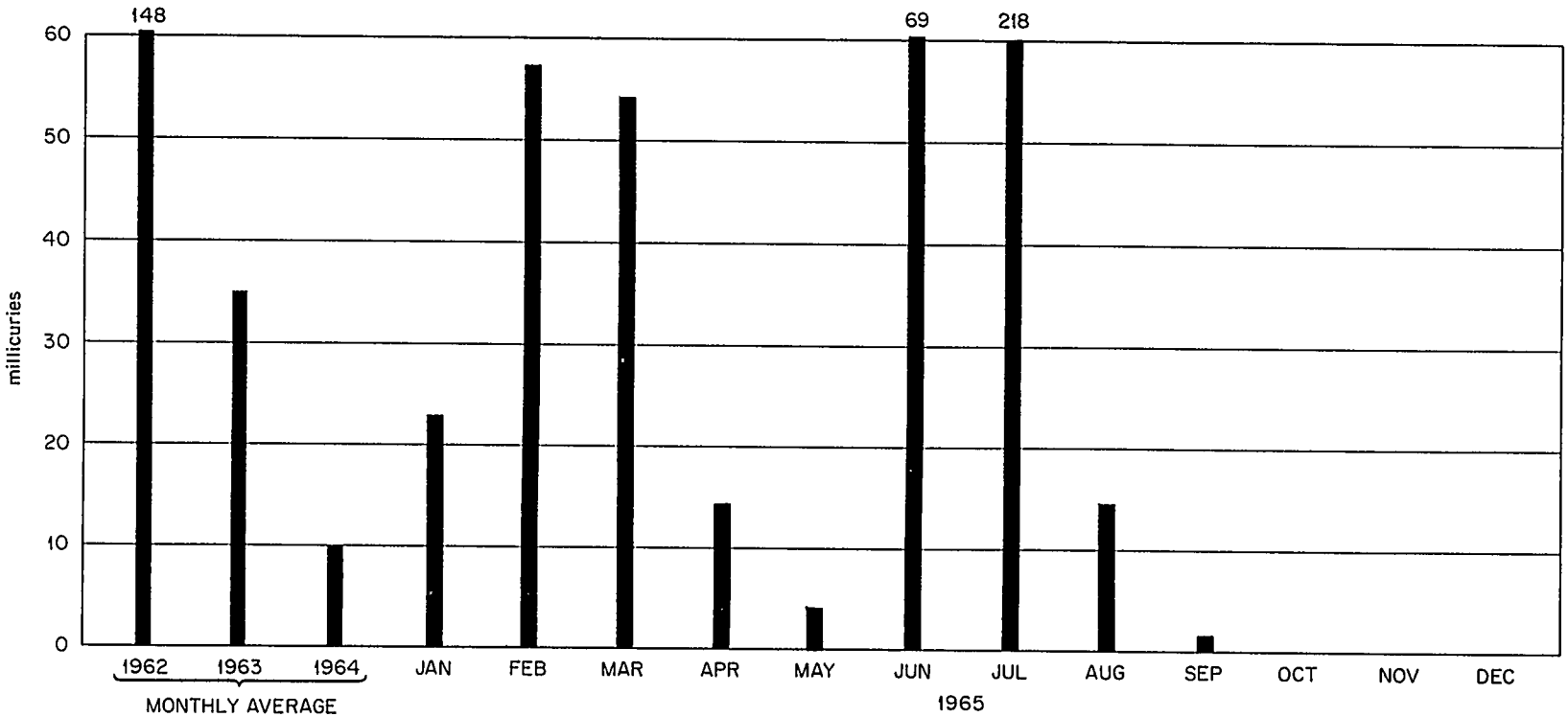

Fig. 8. Filterable Activity Released in Gaseous Waste

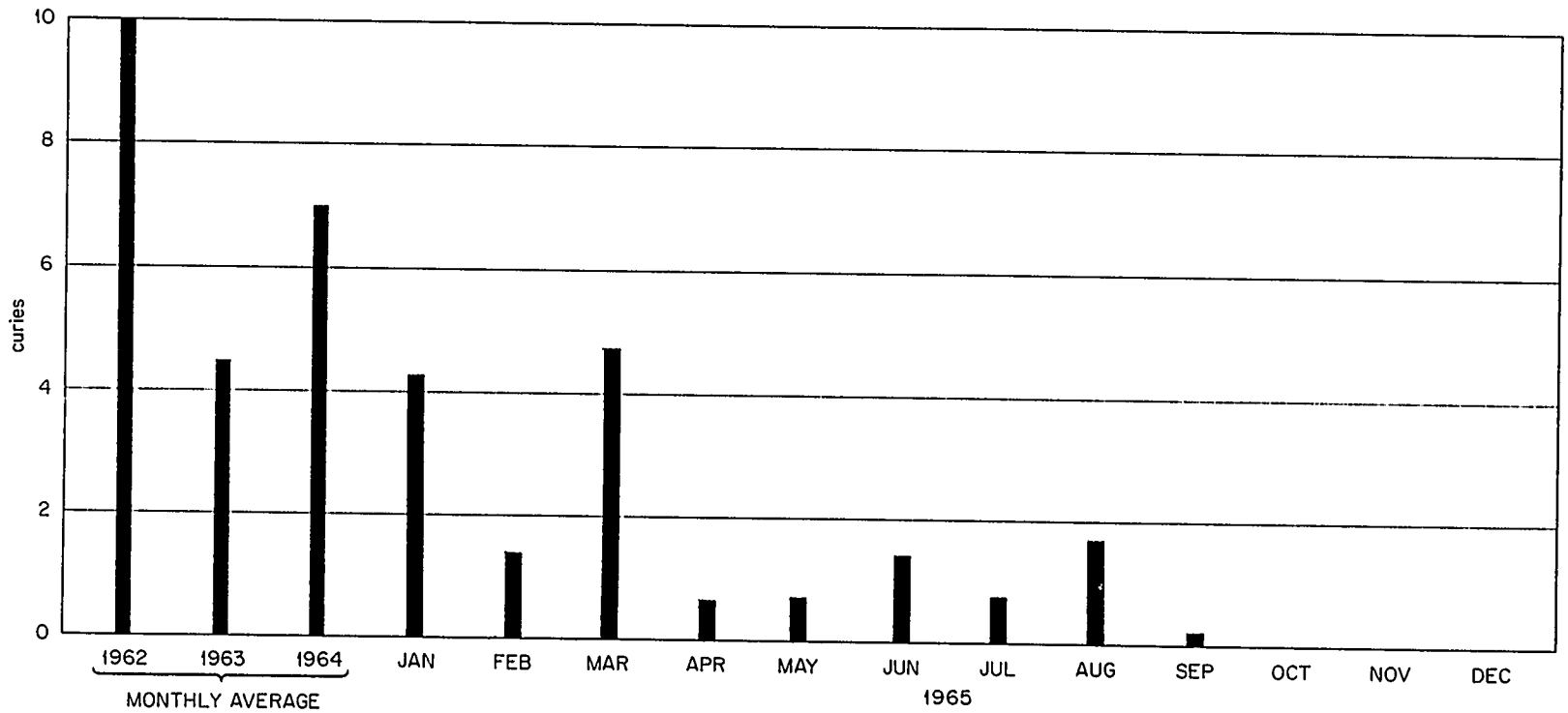

Fig. 9. Total[1] Activity Released in Gaseous Waste

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

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DATE: January 11, 1966

COPY NO. 43

SUBJECT: Radioactive Waste Disposal Operations Report for the month of November 1965

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table 1 is a summary of the 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 7.96 curies of radioactivity was discharged into White Oak Lake this month. Ruthenium (6.05 curies), cobalt (1.05 curies) and cesium (0.52 curie) comprised the bulk of this release. The total strontium discharge amounted to 0.34 curie. More than one-half of the strontium (0.19 curie) originated from sources not routinely monitored. The strontium release from the process waste system was 0.13 curie; an additional 0.02 curie was discharged by the Melton Valley drainage system.

The stack systems discharged a total of 1.15 curies of radioactivity during the month. The bulk of this discharge was ^{131}I (0.97 curie); 0.12 curie of ^{203}Hg and 0.02 curie of ^{197}Hg were also detected. The total amount of filterable activity detected was less than 0.01 curie. Table 2 lists the releases from all of the operating stacks. Figures 8 and 9 compare this month's release to those of previous months.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The Waste Treatment Plant processed 10 million gallons of contaminated waste water this month; 9.5 million gallons of uncontaminated water was diverted by the 4500 pond system and dumped into White Oak Creek without chemical treatment.

The treatment plant operated normally during the period; however, decontamination achieved by this system was below normal.

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 287,490 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	164,780
2.	Trench 7A	44,900
3.	Trench 7B	77,800

Major contributors to the ILW system are listed below:

		Gallons
1.	Reactor Complex	71,910
2.	4500 Complex	47,850
3.	Building 3019	36,470
4.	Radioisotopes Processing Area	29,920
5.	Fission Products Development Laboratory	19,910

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	0.13	none detected	0.48	0.04
Miscellaneous discharges from east end of plant	2	0.05	0.01	0.01	0.06
Total discharge from Bethel Valley Area	3	0.32	0.01	0.23	0.62
Total discharge from Melton Valley Area	4	0.02	< 0.01	< 0.01	0.02
East waste pit seepage	5	< 0.01	4.36	0.24	5.40
West waste pit seepage	6	< 0.01	1.68	0.05	1.92
Total discharge from all sources	3,4,5,6	0.34	6.05	0.52	7.96
White Oak Dam to Clinch River (Health Physics measurement)	7	0.16	1.73	0.09	2.63

[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	0.04
Central Radioactive Gas Disposal Facilities	3039	1.11
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
Total activity in gases released		1.15

[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: 10 x 10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.3 x 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]	0.73	0.13	82
$^{103,106}Ru$	none detected	none detected	--
^{60}Co	0.03	0.03	none
^{137}Cs	1.01	0.48	52
Gross Beta Analysis	41 c/m/ml	8 c/m/ml	80

[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	24[b]	0.79[b]	64.2	2.42	22.0
2.	Radioisotope Processing Area	15[c]	0.27[c]	22.1	1.34	12.2
3.	Buildings 3503 and 3508	5	0.14	11.3	2.02	18.4
4.	Buildings 3025, 3026 and 3550	< 1	--	--	1.91	17.4
5.	Building 3019	0	--	--	2.02	18.4
6.	Fission Products Development Laboratory	0	--	--	0.03	0.3
7.	4500 Area	6	0.01	0.8	0.15	1.4
8.	Building 3525	< 1	--	--	0.82	7.5
9.	Building 2026	5	0.02	1.6	0.26	2.4

[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	219	78,743	5,303	92,536	91	5,044	10,583	21,181	182	6,103	6,867	19,807
^{106}Ru	4	383	118	6,356	1	52	189	1,857	3	51	126	1,508
^{137}Cs	5,265	40,684	58,688	196,518	1,526	27,893	53,398	117,875	3,052	28,547	35,876	101,985
^{60}Co	8	1,823	110	2,960	3	724	131	651	6	155	88	651
Totals	5,496	121,633	64,219	298,370	1,621	33,113	64,301	141,544	3,243	34,856	42,957	123,951

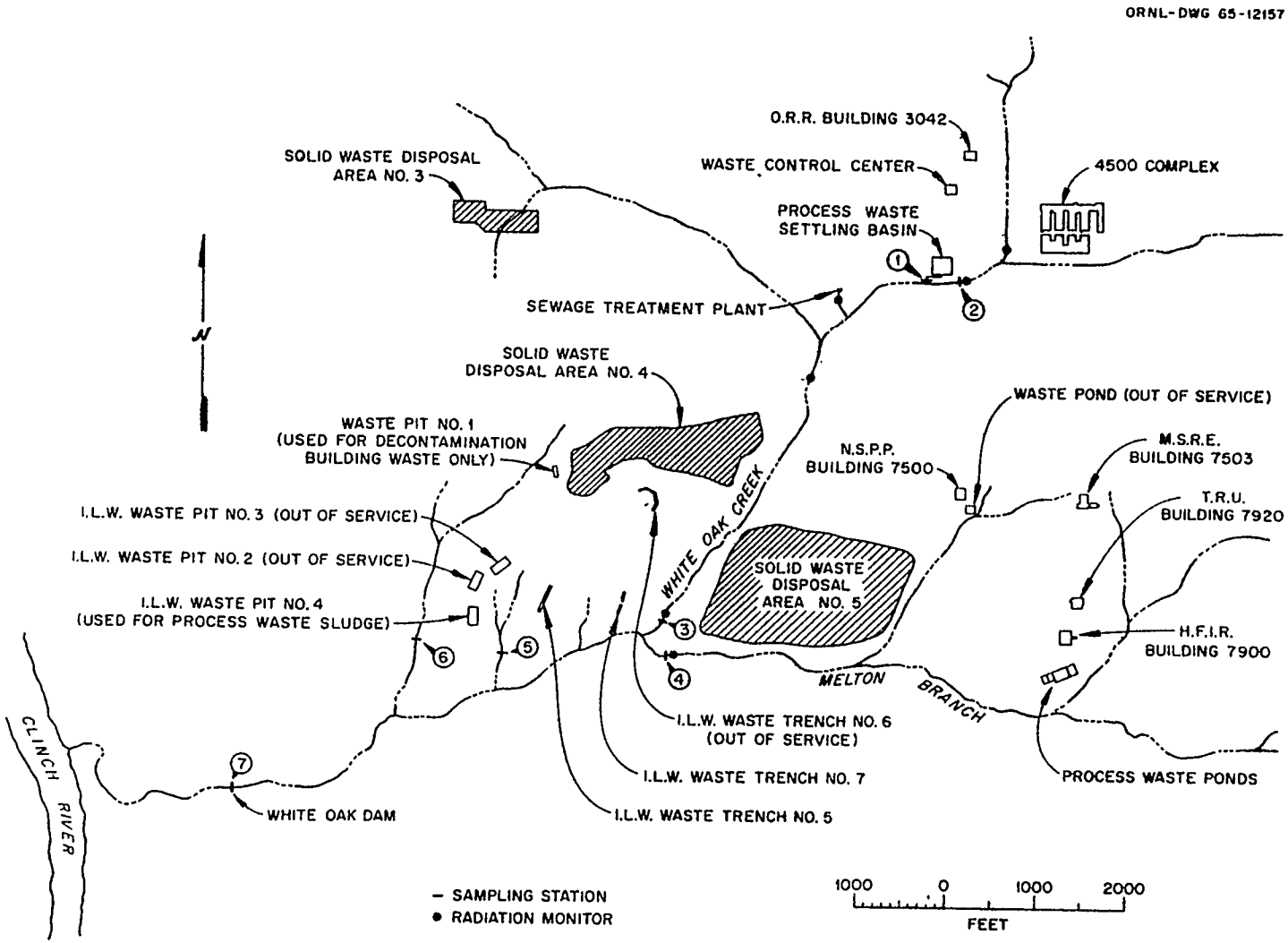

Fig. 1. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

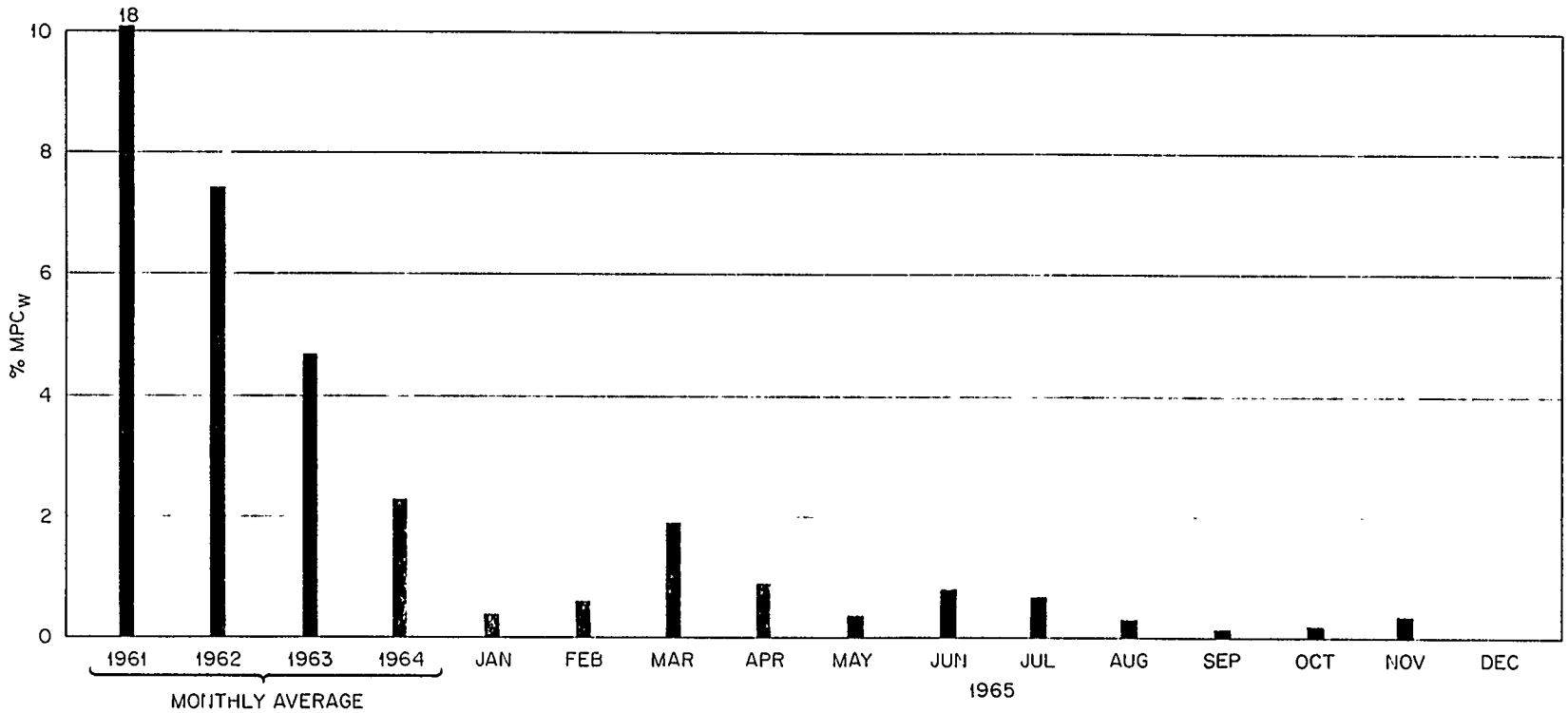

Fig. 2. Calculated Percent of MPC in Clinch River Due to Laboratory Discharges.

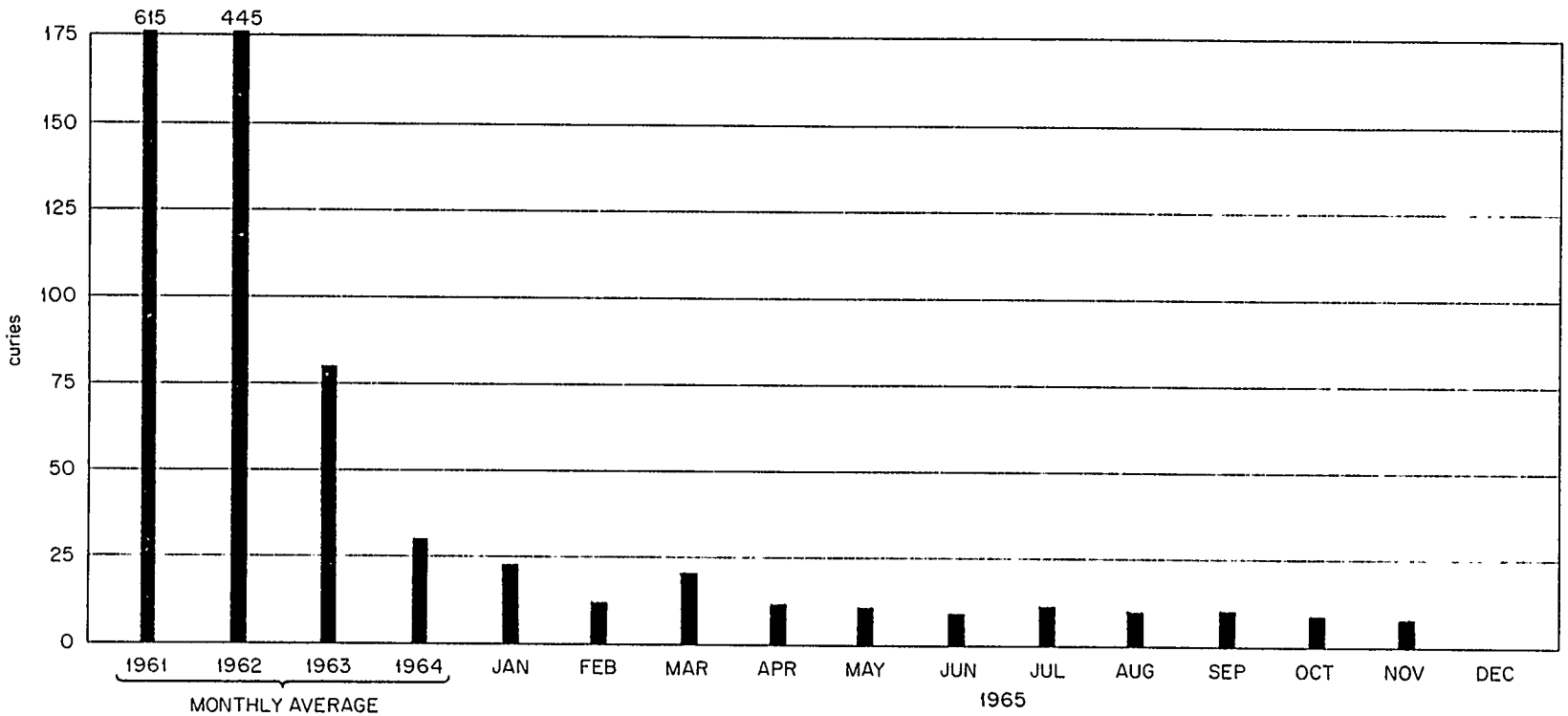

Fig. 3. Total Activity Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

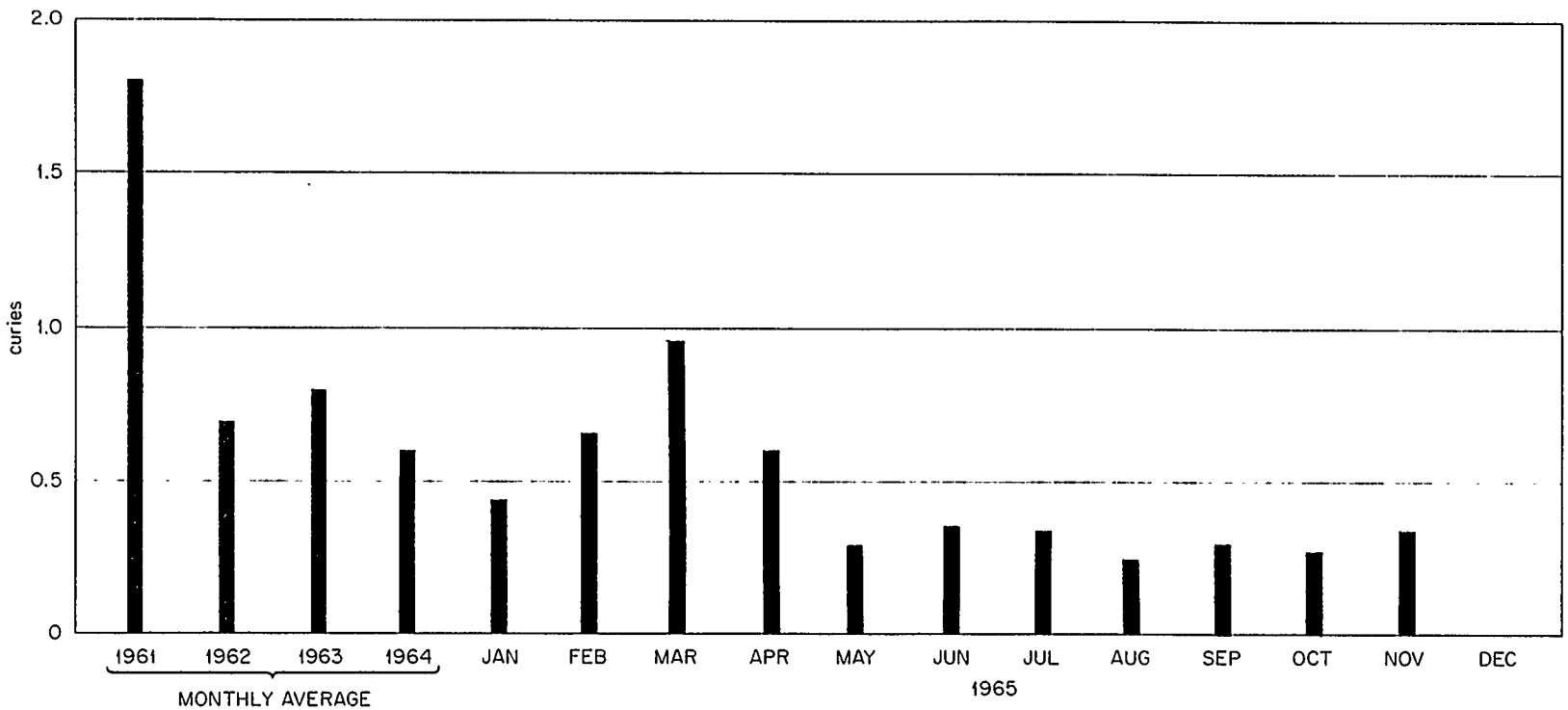

Fig. 4. ^{89}Sr and ^{90}Sr Measured in White Oak Creek at Sampling Stations 3,4,5, and 6 (See Fig. 1).

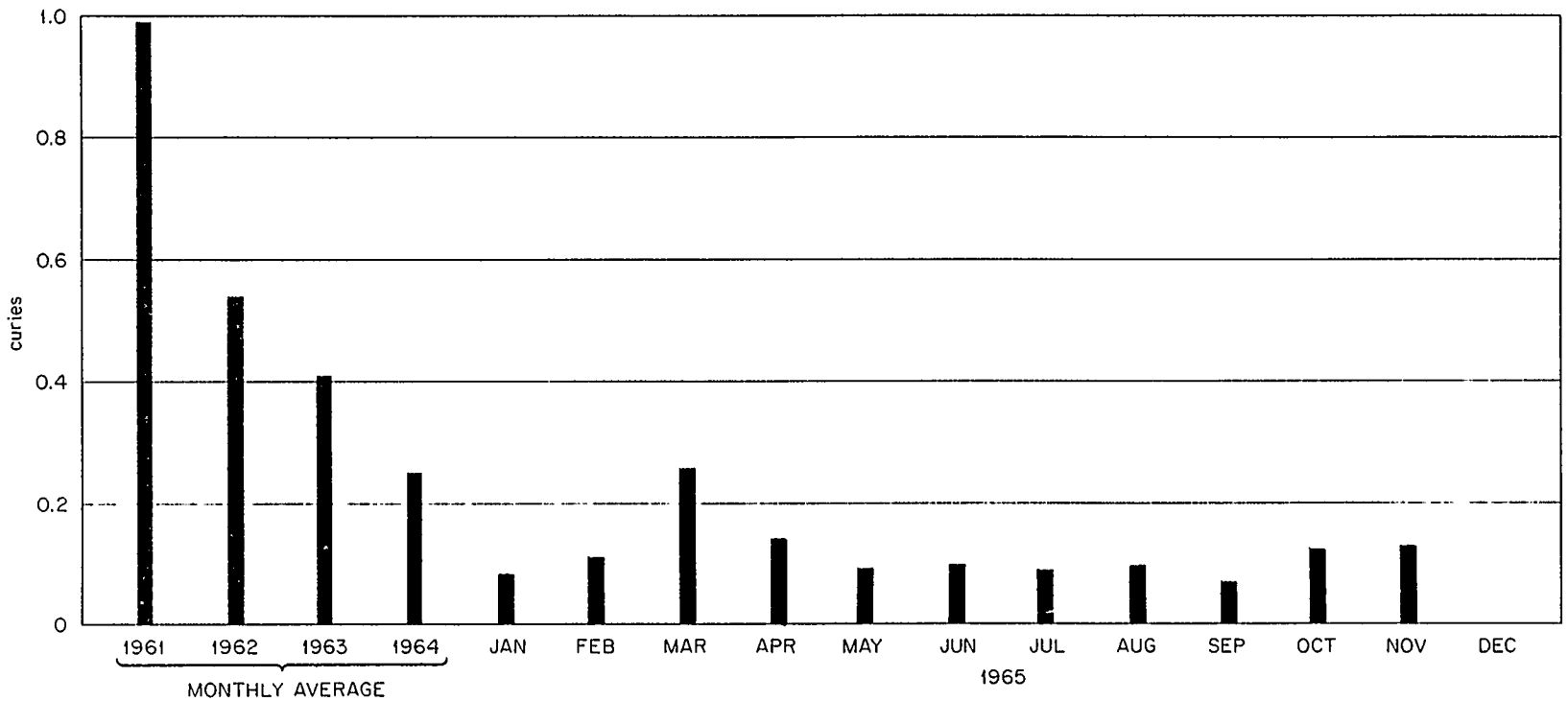

Fig. 5. ^{89}Sr and ^{90}Sr Discharged in Process Waste to White Oak Creek

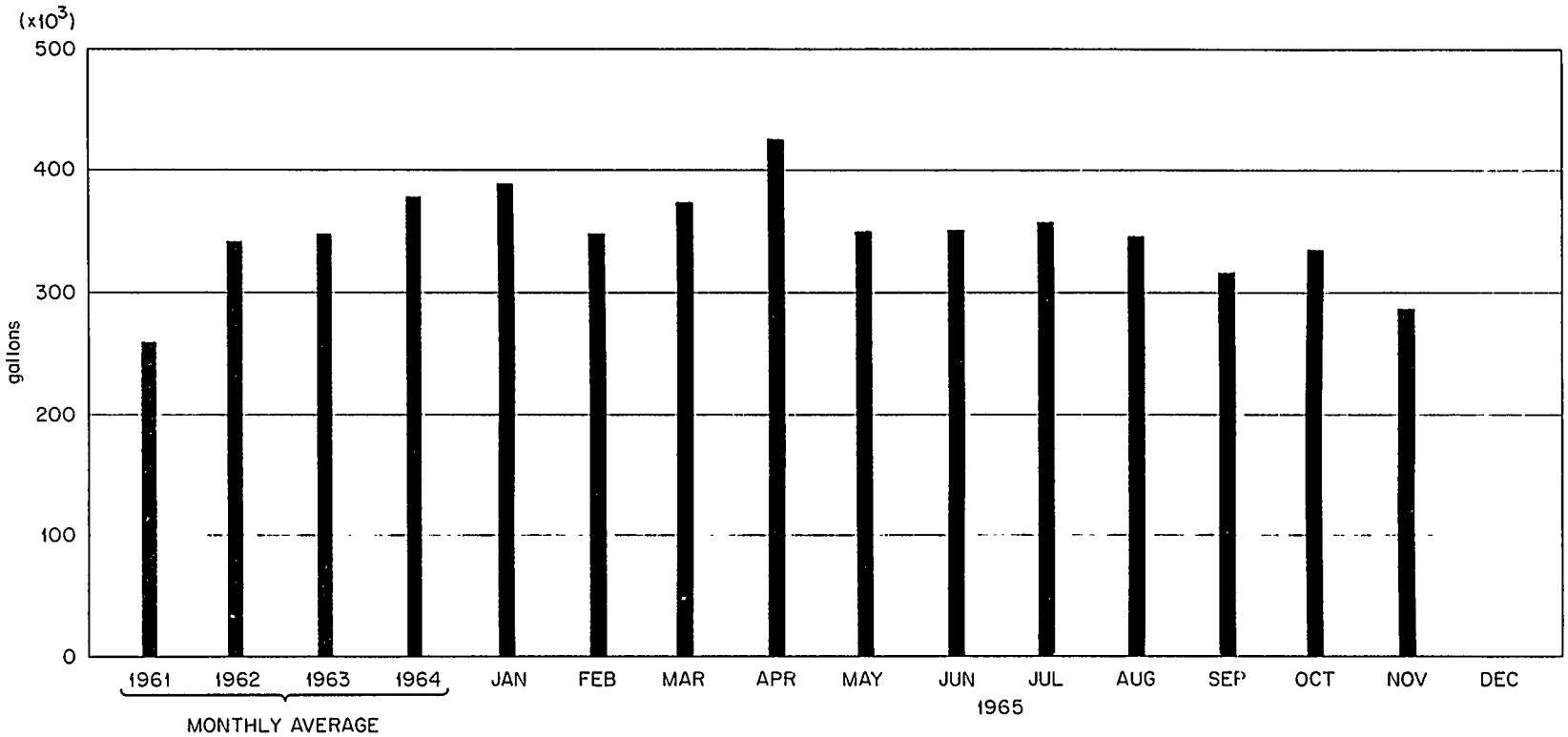

Fig. 6. Intermediate Level Waste Volumes

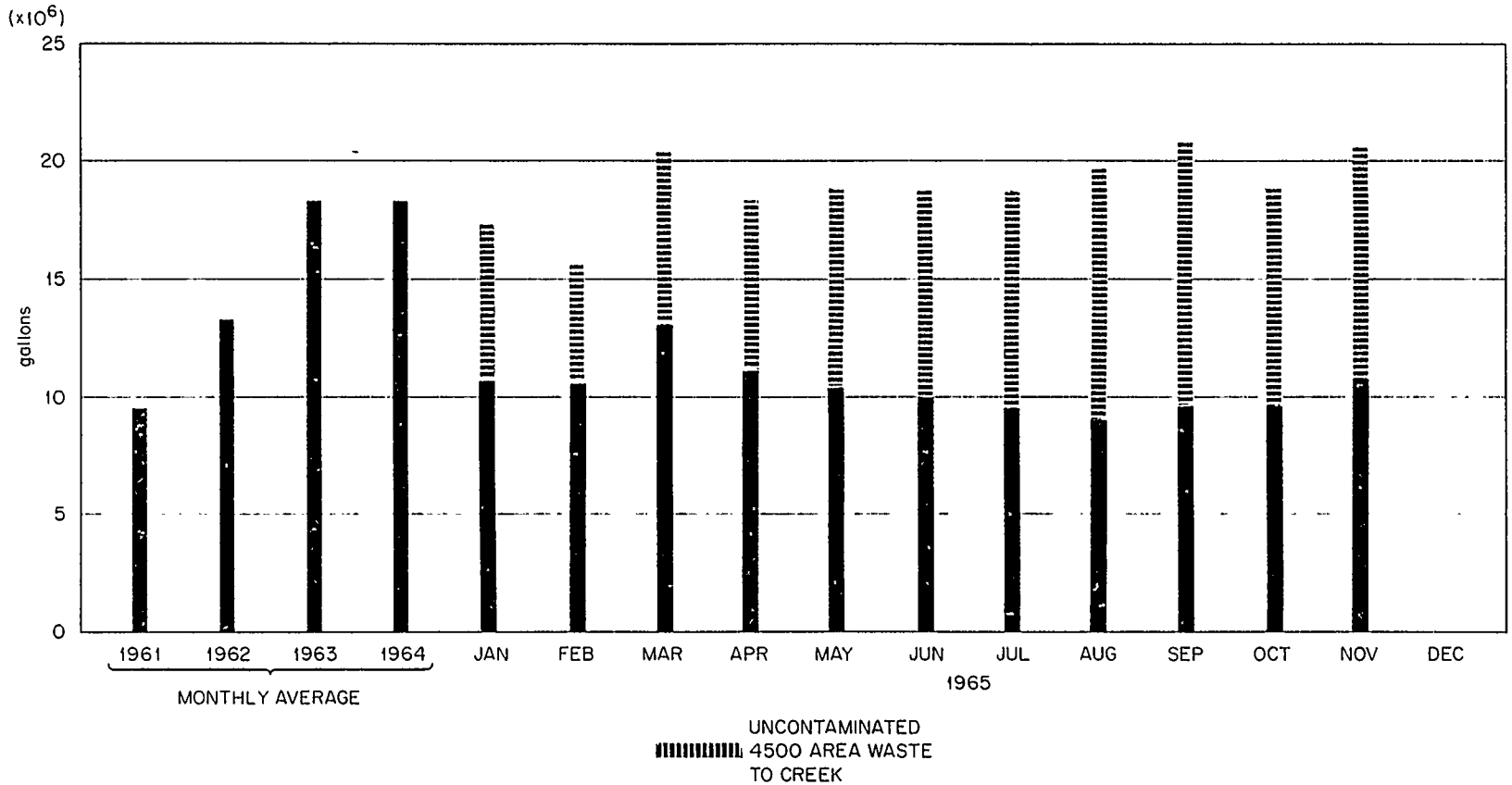

Fig. 7. Process Waste Volumes

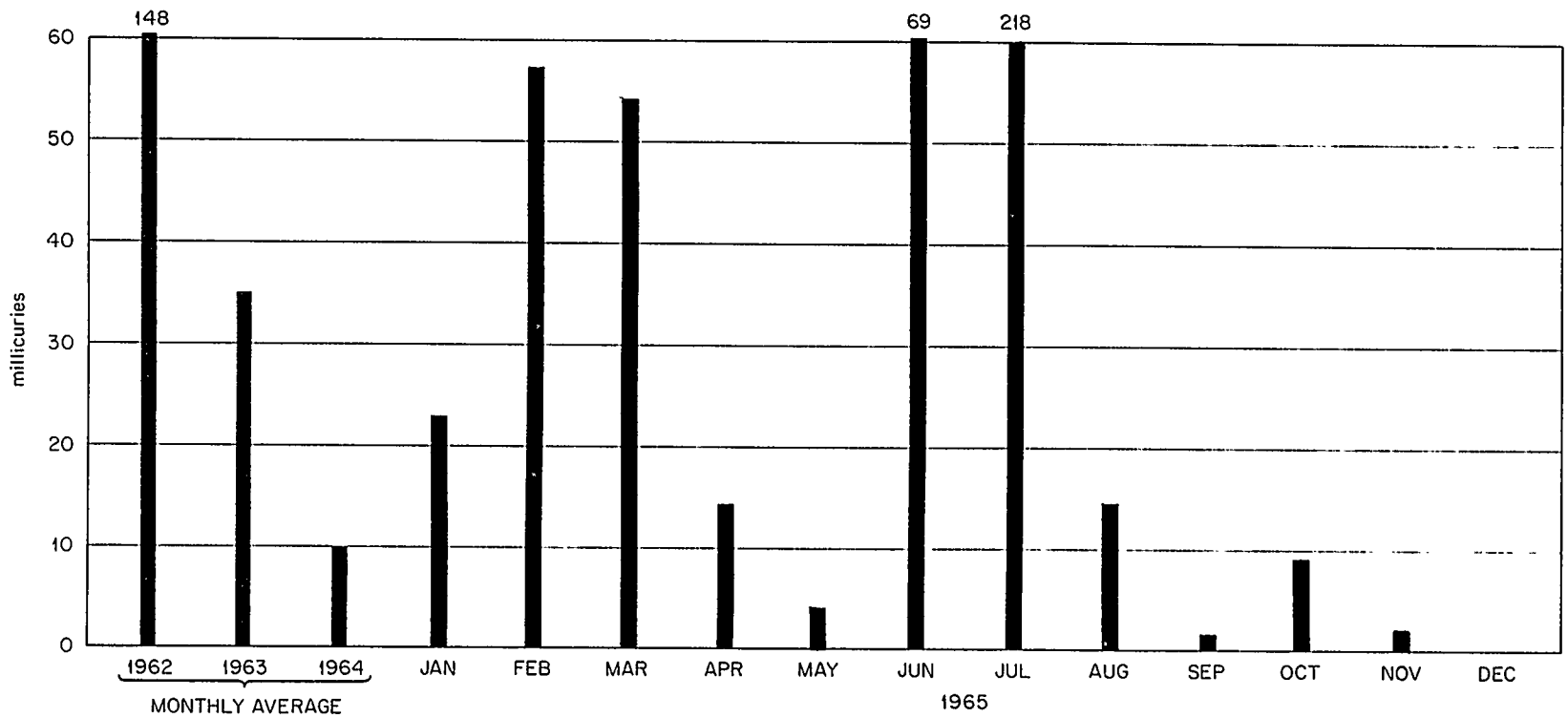

Fig. 8. Filterable Activity Released in Gaseous Waste

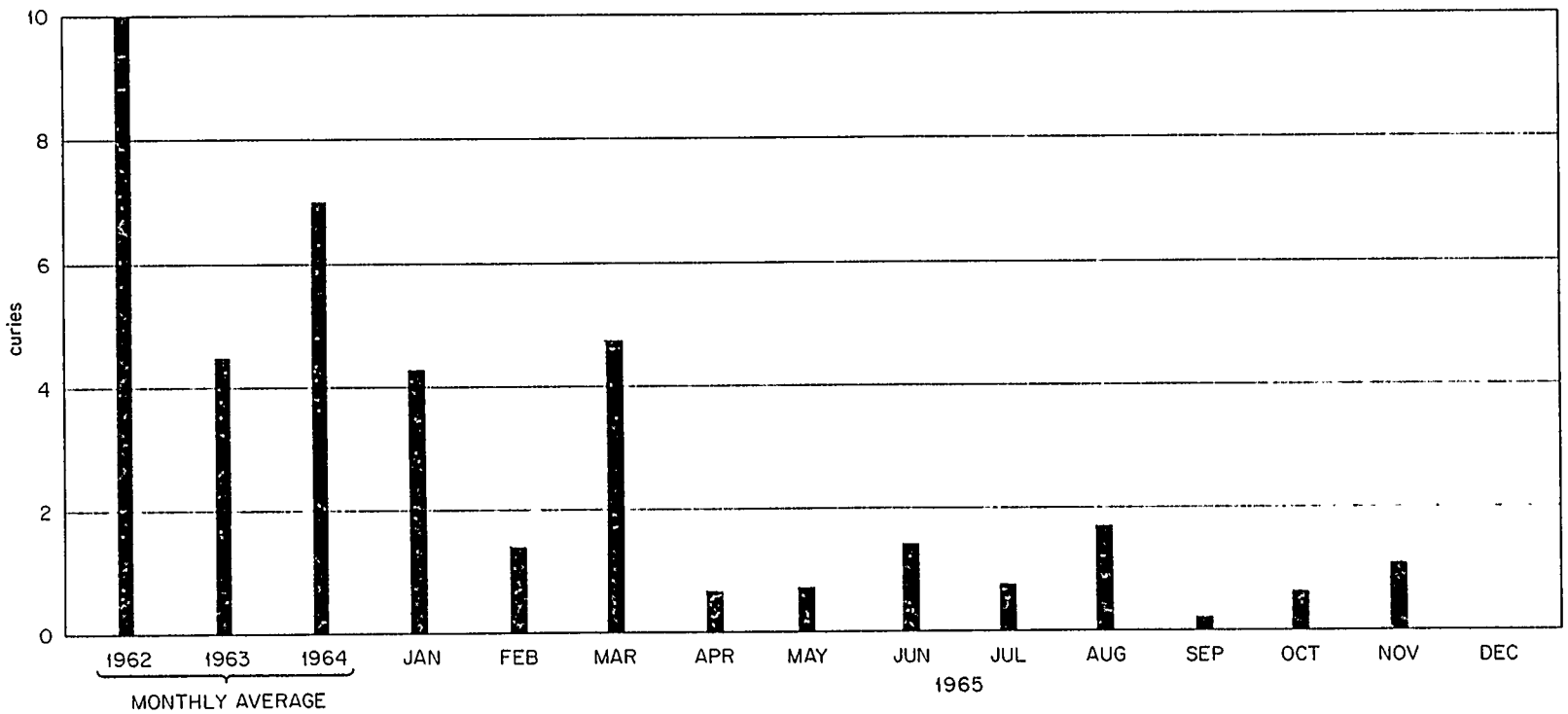

Fig. 9. Total[1] Activity Released in Gaseous Waste

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

2018

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CENTRAL FILES NUMBER
66-3-14

DATE: March 8, 1966

COPY NO. 46

SUBJECT: Radioactive Waste Disposal Operations Report for the month of January 1966

TO: Distribution

FROM: L. C. Lasher

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

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The average level of contamination of the Clinch River due to ORNL releases, as measured by the Health Physics Division at White Oak Dam, was 0.58% of the maximum permissible concentration. The main contaminants were strontium and ruthenium, contributing 79% and 18% respectively, to the percent of MPC_w. A comparison of this month's MPC_w value to those of previous months is shown in Figure 1.

White Oak Creek Monitoring

The total activity released to White Oak Lake was 25.1 curies with ruthenium (18.4 curies), cobalt (3.8 curies) and cesium (2.4 curies) accounting for practically all of it. The strontium discharge to the lake was 0.58 curie with only 0.12 curie coming from the process waste system. It is estimated that another 0.12 curie was discharged from the laundry, sewage plant, storm sewers and other minor sources not routinely monitored and that 0.34 curie was contamination washed out of the creek bed itself. Comparison of this month's releases to White Oak Lake to those of previous months are shown in Figures 2 and 3. Detailed information obtained from all seven of the creek sampling stations is given in Table 1.

Process Waste

Only minor difficulties were experienced in the operation of the process waste system. The volume of waste received was normal (9.8 million gallons). The efficiency of the Process Waste Treatment Plant was satisfactory, with an 86% removal of strontium, the main containmant. The strontium discharge and the volume of waste processed this month are compared to those of previous months in Figures 4 and 5. The Process Waste

Treatment Plant analytical data is given in Table 2. The main sources of activity and volume of process waste are listed in Table 3.

Intermediate Level Waste

A total of 321,000 gallons of waste was pumped to the trenches this month. This volume is compared to that of previous months in Figure 6. The amount of activity transferred and an inventory of main nuclides in the trenches is given in Table 4. The major contributors to the system this month are listed below.

	Gallons
Reactor Complex	57,000
4500 Complex	87,000
Building 3019	31,000
Radioisotope Processing Area	16,000
Fission Products Development Laboratory	20,000

GASEOUS WASTE

A total of 1.1 curies was released from the five main stacks. The bulk of the activity was ^{131}I with a small amount of ^{197}Hg (0.05 curie) and a trace of ^{137}Cs. Only 4 millicuries of particulate activity, mainly ^{137}Cs, was released this month. Gaseous release comparisons are shown in Figures 7 and 8. Individual stack releases for this month are given in Table 5.

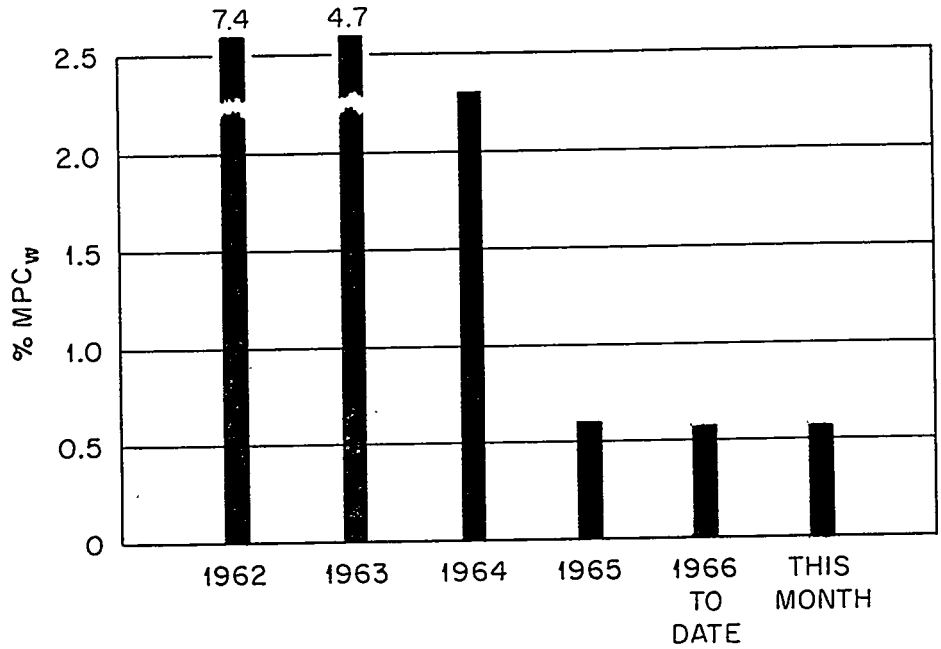

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

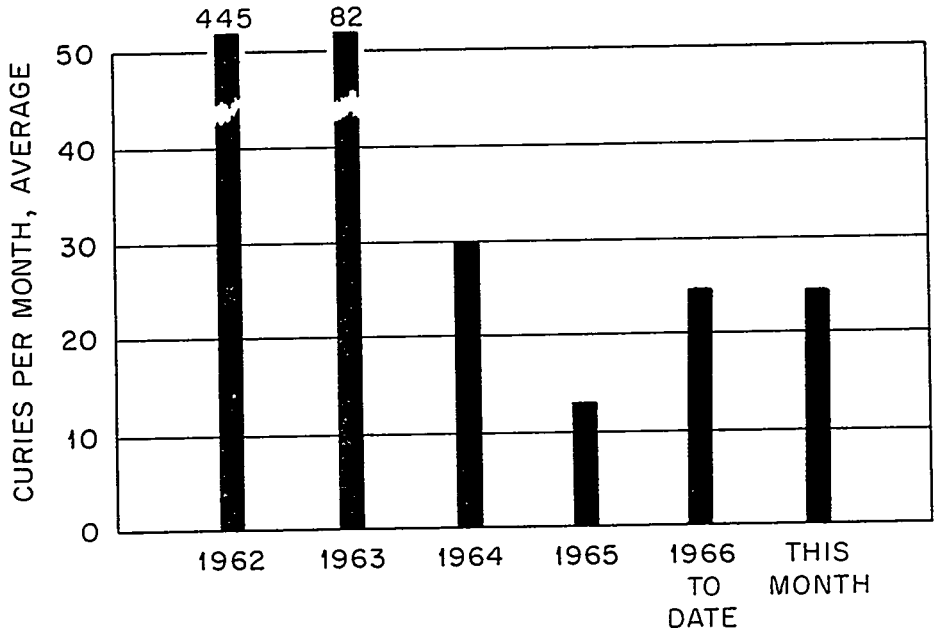

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

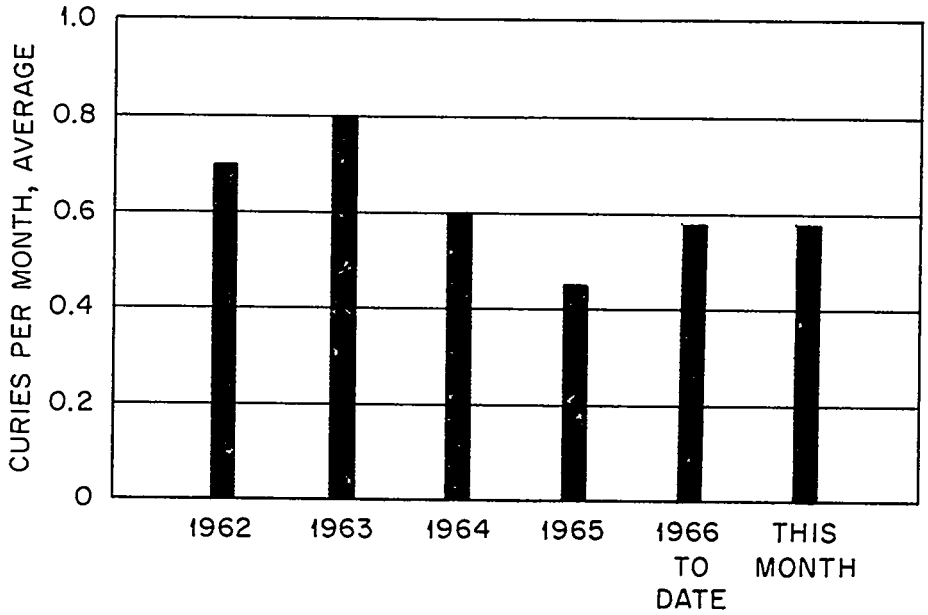

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

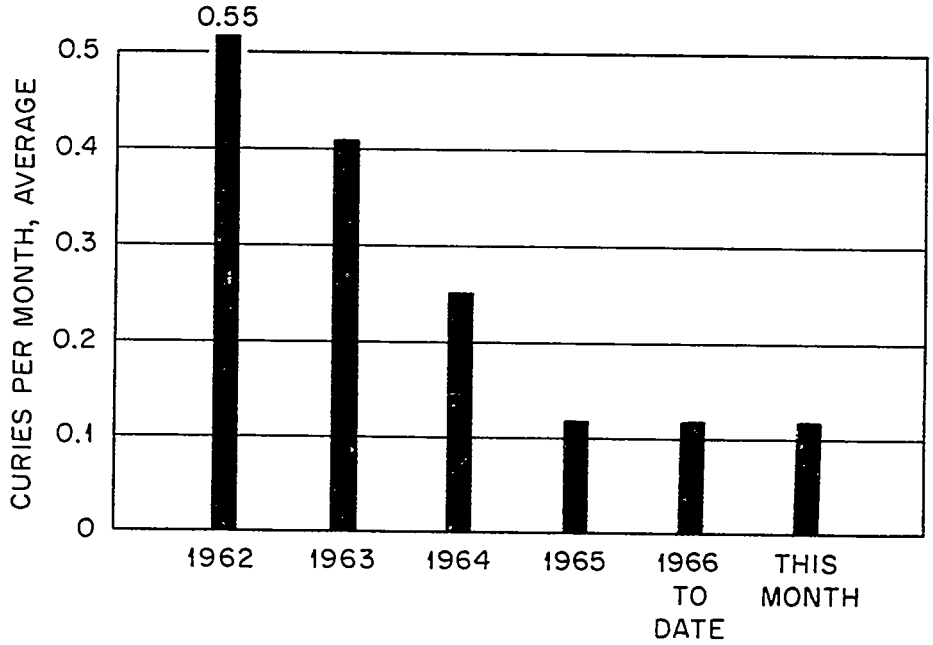

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

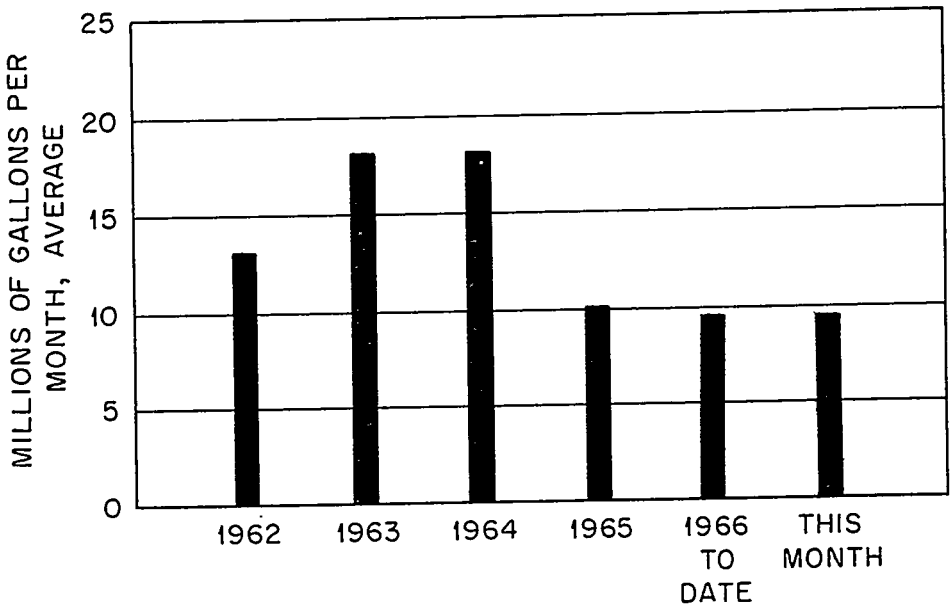

Fig. 5. Process Waste Volumes

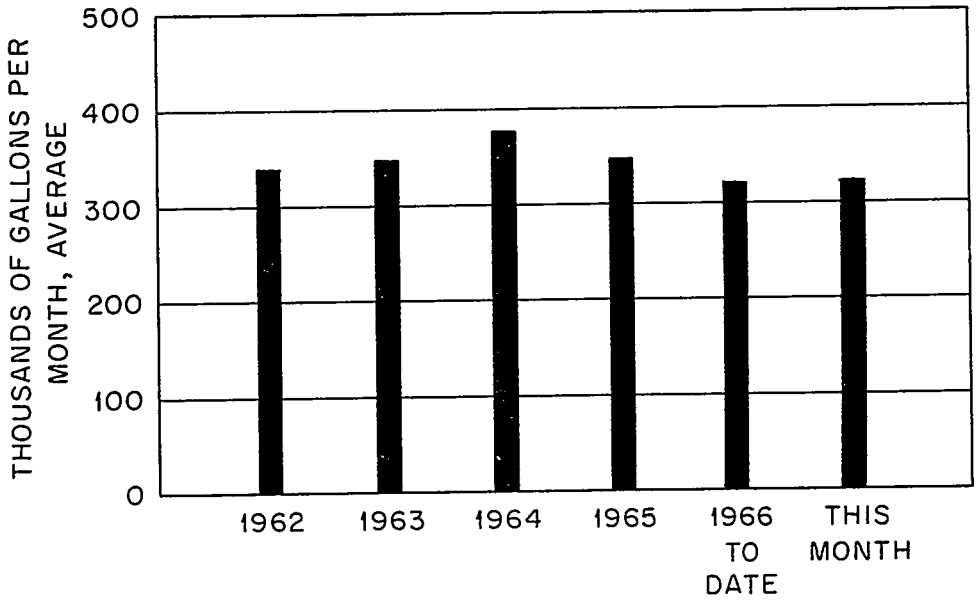

Fig. 6. Intermediate Level Waste Volumes

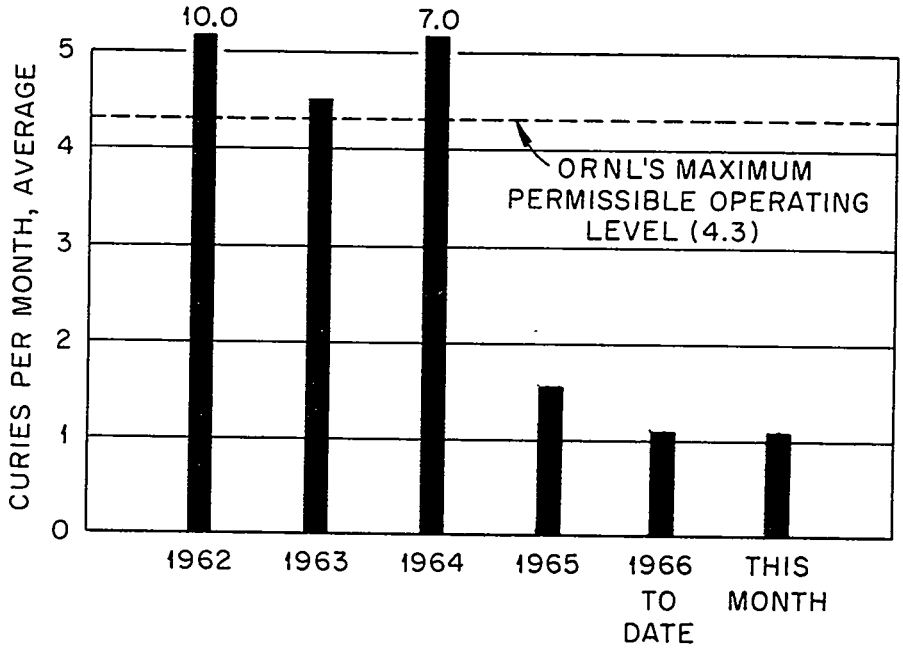

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species)

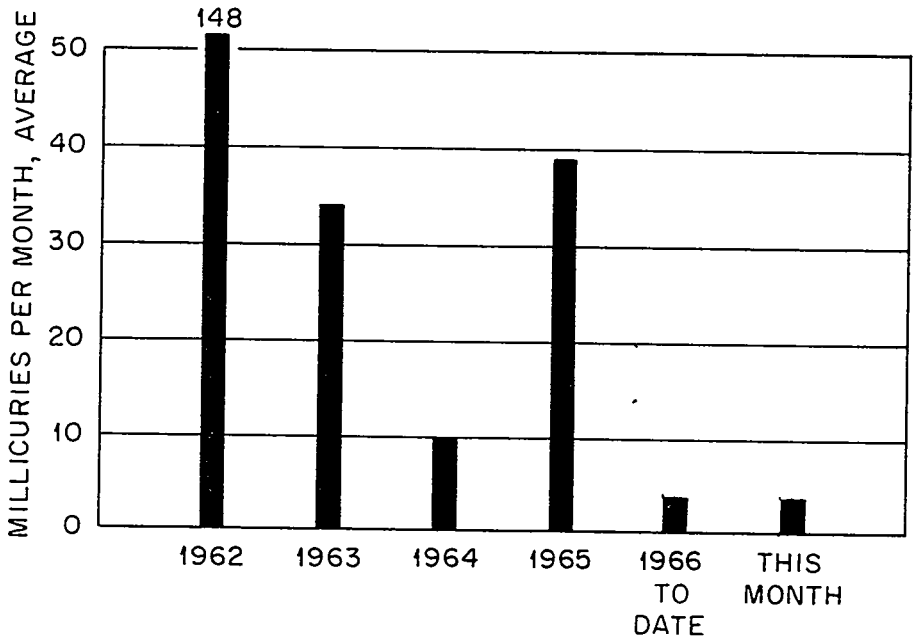

Fig. 8. Filterable Activity Released in Gaseous Waste

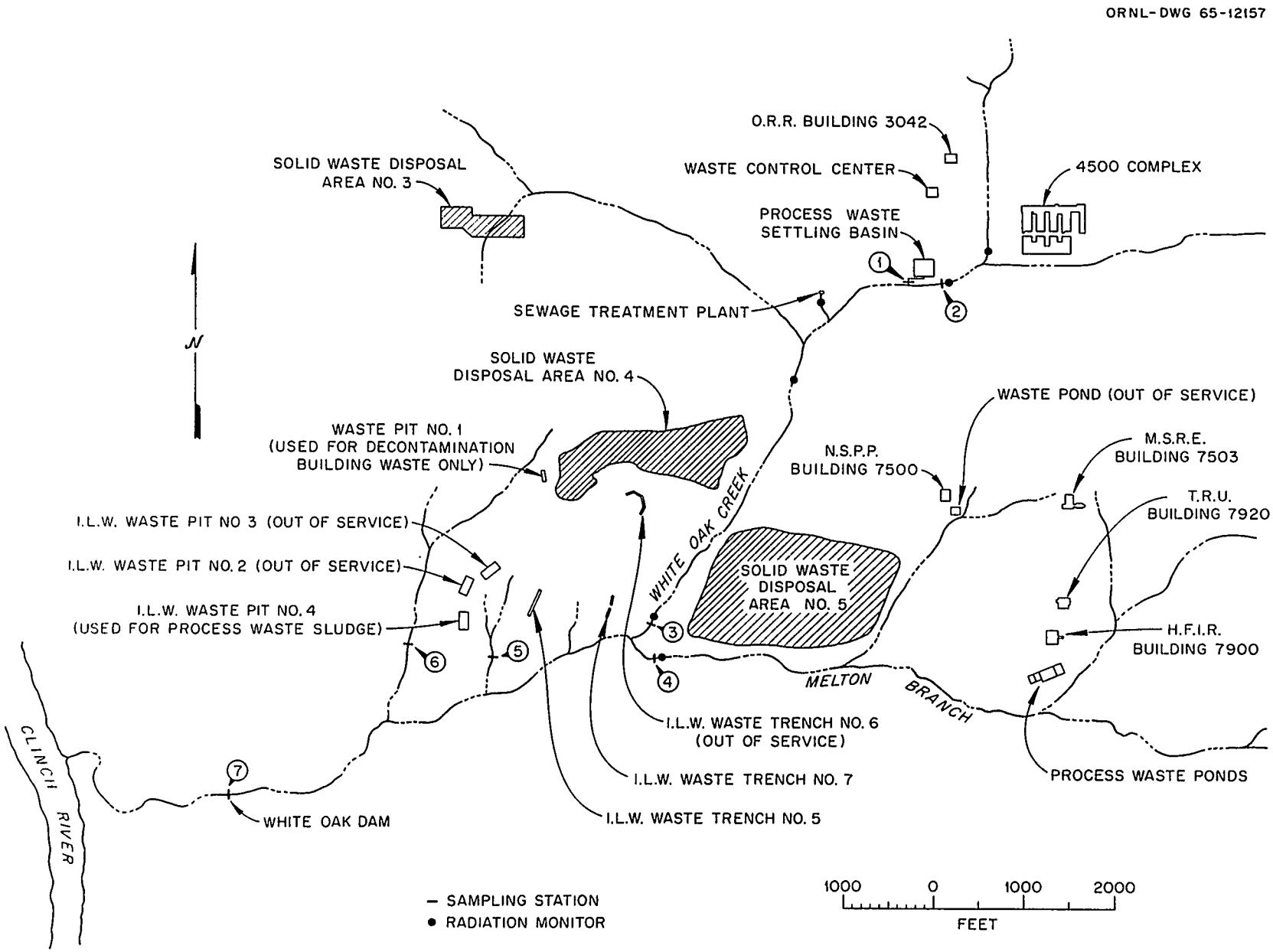

Fig. 9 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.12	none detected	0.15	none	0.27
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	none	0.01
Total discharge from Bethel Valley Area	3	0.58	0.07	0.53	none	1.18
Total discharge from Melton Valley Area	4		Not Sampled			
East waste pit seepage	5	< 0.01	17.43	1.84	3.68	22.95
West waste pit seepage	6	< 0.01	0.86	0.02	0.10	0.98
Total discharge from all sources	3,4,5,6	0.58	18.36	2.39	3.78	25.11
White Oak Dam to Clinch River (Health Physics measurement)	7	0.26	3.17	0.09	0.70	4.65

[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: 9.8×10^6 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]	0.87	0.12	86
$^{103,106}Ru$	none detected	--	--
^{60}Co	0.03	none detected	100
^{137}Cs	1.53	0.15	90
Gross Beta Analysis	46 c/m/ml	5 c/m/ml	89

[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	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	18[b]	0.540[b]	62.5	2.19	28.0
2.	Radioisotope Processing Area	21	0.244	28.2	0.86	11.0
3.	Buildings 3503 and 3508	2	0.042	4.9	1.57	20.0
4.	Buildings 3025, 3026 and 3550	1	0.016	1.9	1.16	14.8
5.	Building 3019	1	0.019	2.2	1.39	17.7
6.	Fission Products Development Laboratory	2	0.002	0.2	0.06	0.8
7.	4500 Area	--	--	--	none[c]	--
8.	Building 3525	0	--	--	0.58	7.4
9.	Building 2026	2	0.001	0.1	0.02	0.3

[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 pipeline in the vicinity of Building 3047 in the Radioisotopes Area.

[c]The waste from this area was found free of contamination and was released to the creek without treatment.

TABLE 4

ACTIVITY TRANSFERRED TO 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	551	551	80,243	94,587	260	260	5,534	21,931	260	260	7,327	21,291
^{106}Ru	5	5	388	6,366	1	1	53	1,859	1	1	54	1,512
^{137}Cs	1,269	1,269	57,435	199,437	487	487	28,451	118,920	487	487	34,088	103,866
^{60}Co	20	20	1,827	2,984	10	10	125	662	10	10	158	664
Totals	1,845	1,845	139,893	303,374	758	758	34,163	143,372	758	758	41,627	127,333

TABLE 5

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facility	3039	0.72
Radiochemical Processing Pilot Plant	3020	0.37
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		1.09

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

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DATE: April 12, 1966

SUBJECT: Radioactive Waste Disposal Operations Report for the month of February 1966

TO: Distribution

FROM: L. C Lasher

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

David C Hamm 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The average level of radioactive contamination in the river resulting from ORNL's discharges, as measured by the Health Physics Division at White Oak Dam, was 2.9% of the MPC_w. The main contaminants continued to be strontium and ruthenium, contributing 72% and 22% respectively to the percent of MPC_w.

A comparison of this month's MPC_w values to those of previous months is shown in Figure 1. The increase in the concentration shown for this month was due to a low river flow (approximately one-third of the January flow) and an increase in the amount of total activity released through the White Oak Dam.

White Oak Creek Monitoring

The total release to White Oak Lake was 5.33 curies. The activity consisted of ruthenium (3.33 curies), strontium (0.74 curie), cesium (0.72 curie), and cobalt (0.54 curie).

The strontium release was approximately 50% higher than the average monthly release for the preceding year. About two-thirds of the total could not be attributed to any routinely monitored source; it appears as a difference between the total strontium measured at sampling stations 1 and 2 and that measured at station 3 (see Table 1 and Figure 9).

The activity measurements at station 3 have been consistently higher than the total measured at stations 1 and 2 since the sampling stations were installed several years ago. Past investigations to determine the source of the releases gave some evidence that a large portion of the strontium may be scoured from the soil in the creek itself. A comparison

of the current measurements to those of previous years lends support to that conclusion since it appears that more activity is released during the winter months when the soil freezes and thaws and the water table is at a higher level.

Comparisons of this month's releases to those of previous months are shown in Figures 2 and 3.

Process Waste

A total of 8.8 million gallons of contaminated water was processed this month. The treatment plant efficiency, based on gross beta analysis, was 90%. A summary of plant operations is shown in Table 2. Table 3 lists the main sources of activity released into the system. Strontium releases from the process waste system into White Oak Creek are compared in Figure 4; Figure 5 shows a comparison of the volumes treated.

Intermediate Level Waste

A total of 373,000 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	118,000
2.	Trench 7A	144,000
3.	Trench 7B	111,000

Major contributors to the system are listed below:

		Gallons
1.	4500 Complex	90,210
2.	Reactor Complex	81,850
3.	Building 3019	38,920
4.	Fission Products Development Laboratory	29,670
5.	Radioisotopes Processing Area	27,390

Figure 6 compares the volumes pumped to the trenches; an inventory of the nuclides deposited in the disposal area is shown in Table 4.

GASEOUS WASTE

A total of 1.23 curies was discharged from the stack systems. Virtually all of the activity was gaseous ^{131}I; nine millicuries of ^{197}Hg were also identified. The particulate activity (mostly strontium) amounted to 20 millicuries. Figures 7 and 8 compare monthly releases. Table 5 lists individual stack releases.

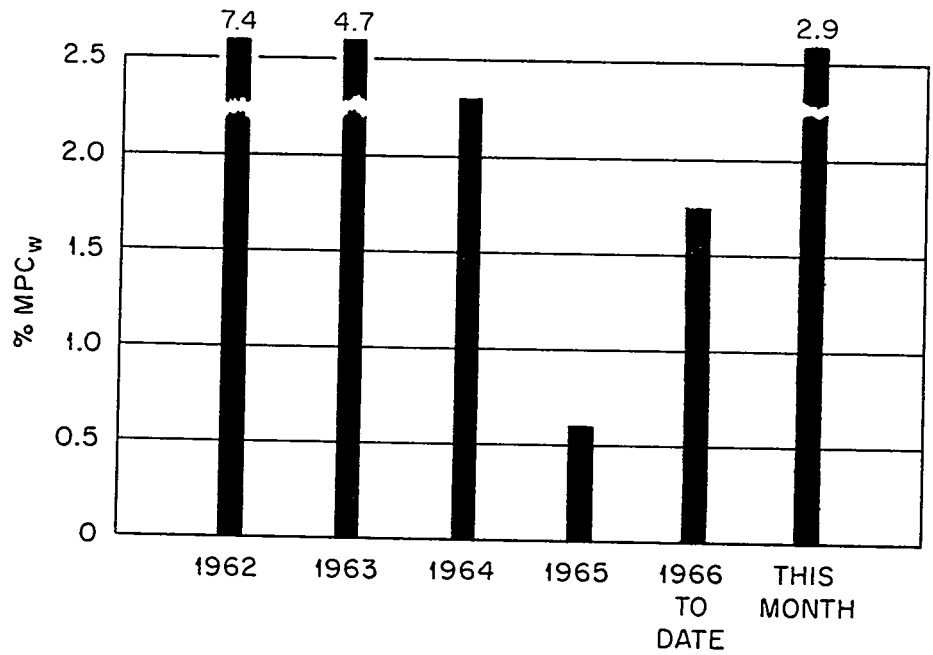

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Health Physics Measurements at White Oak Dam)

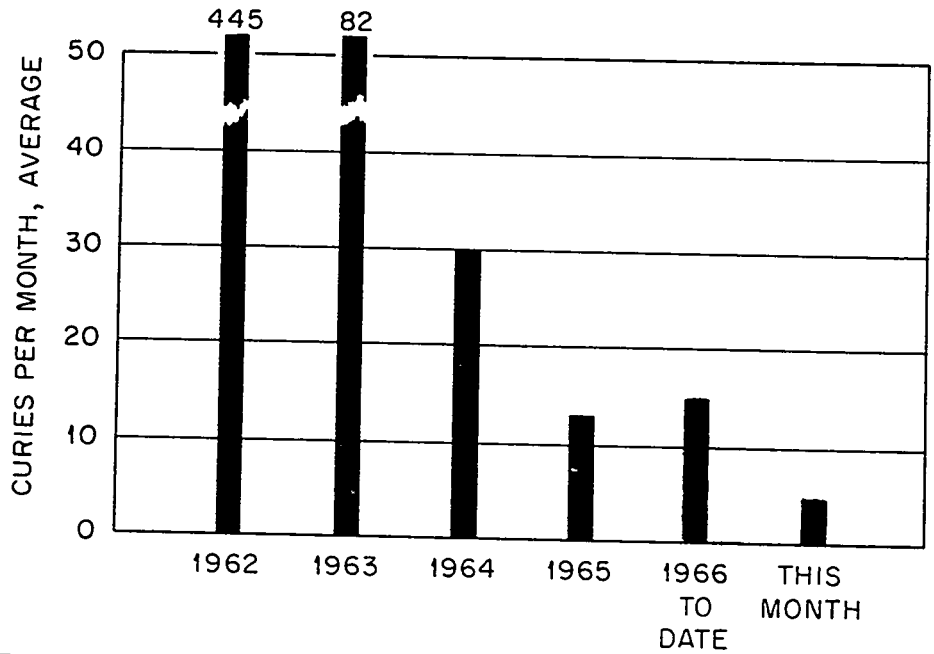

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

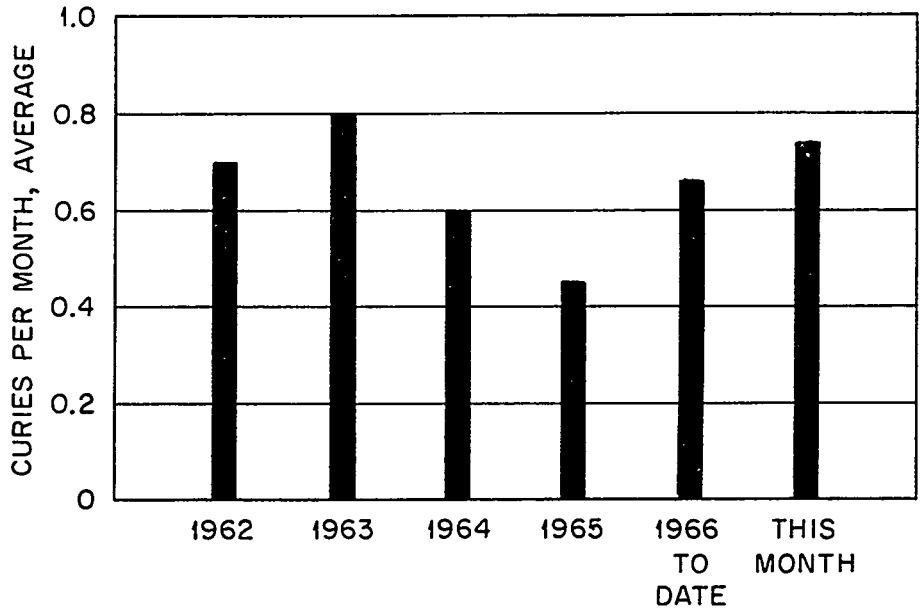

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

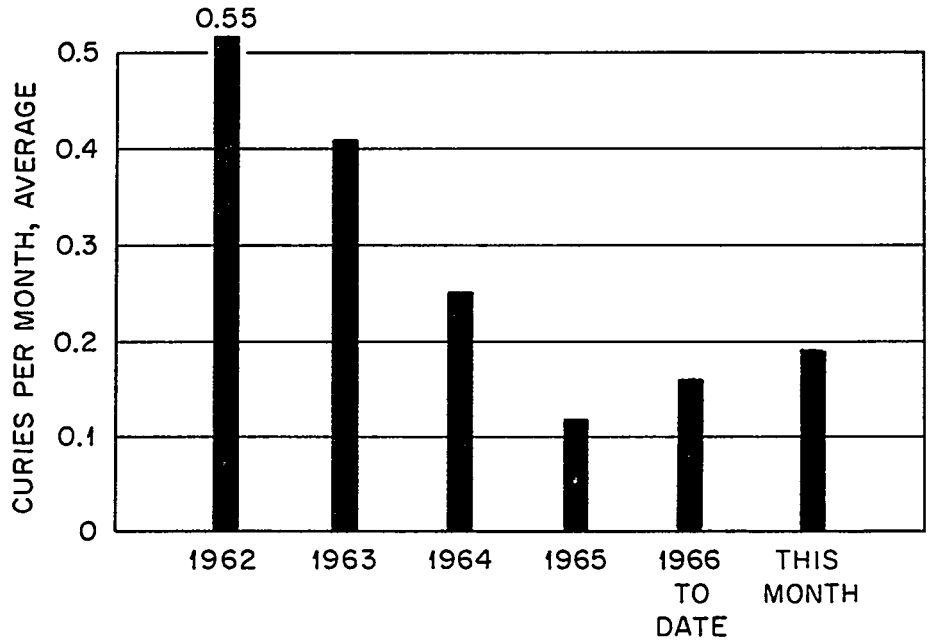

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

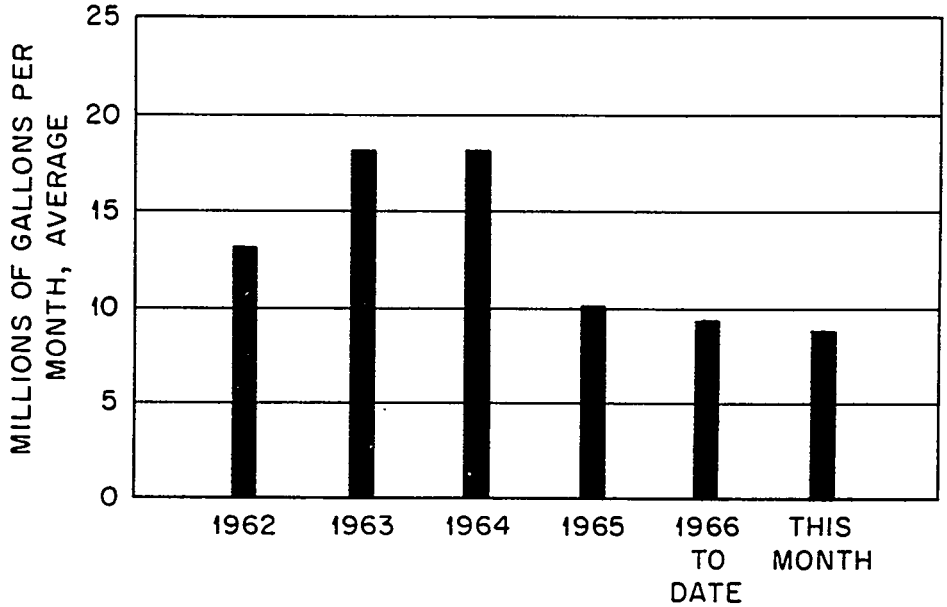

Fig. 5. Process Waste Volumes

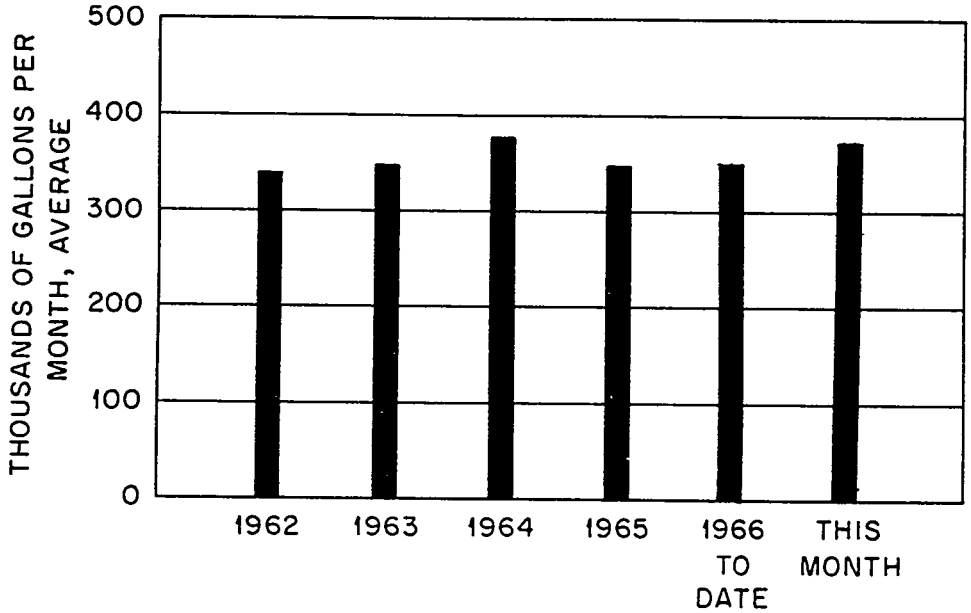

Fig. 6. Intermediate Level Waste Volumes

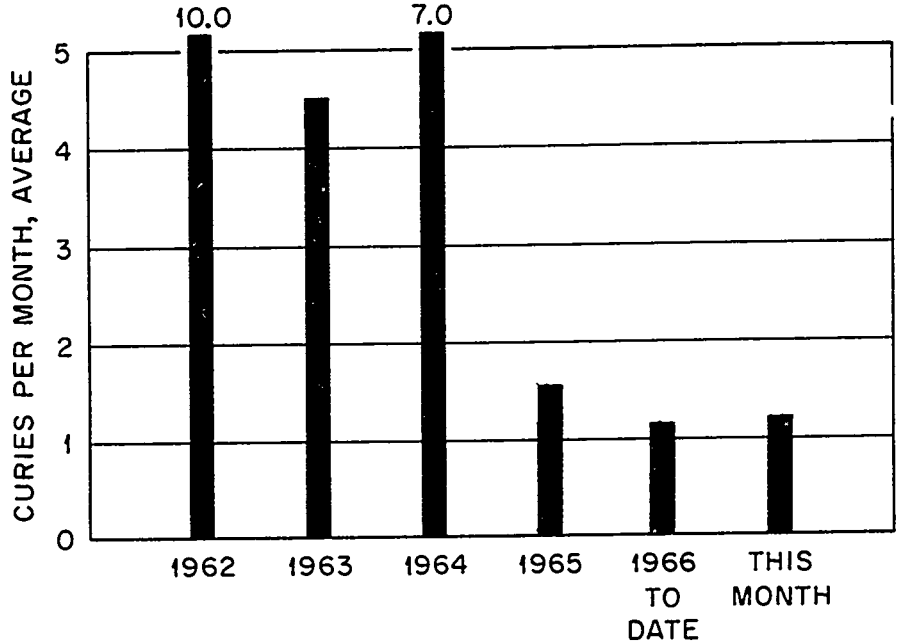

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

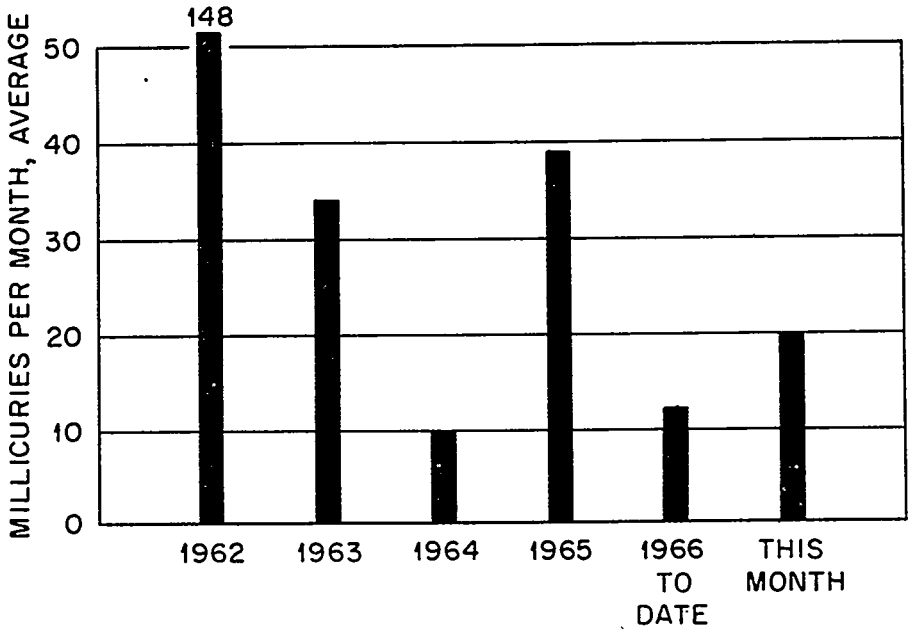

Fig. 8. Filterable Activity Released in Gaseous Waste

ORNL-DWG 65-12157

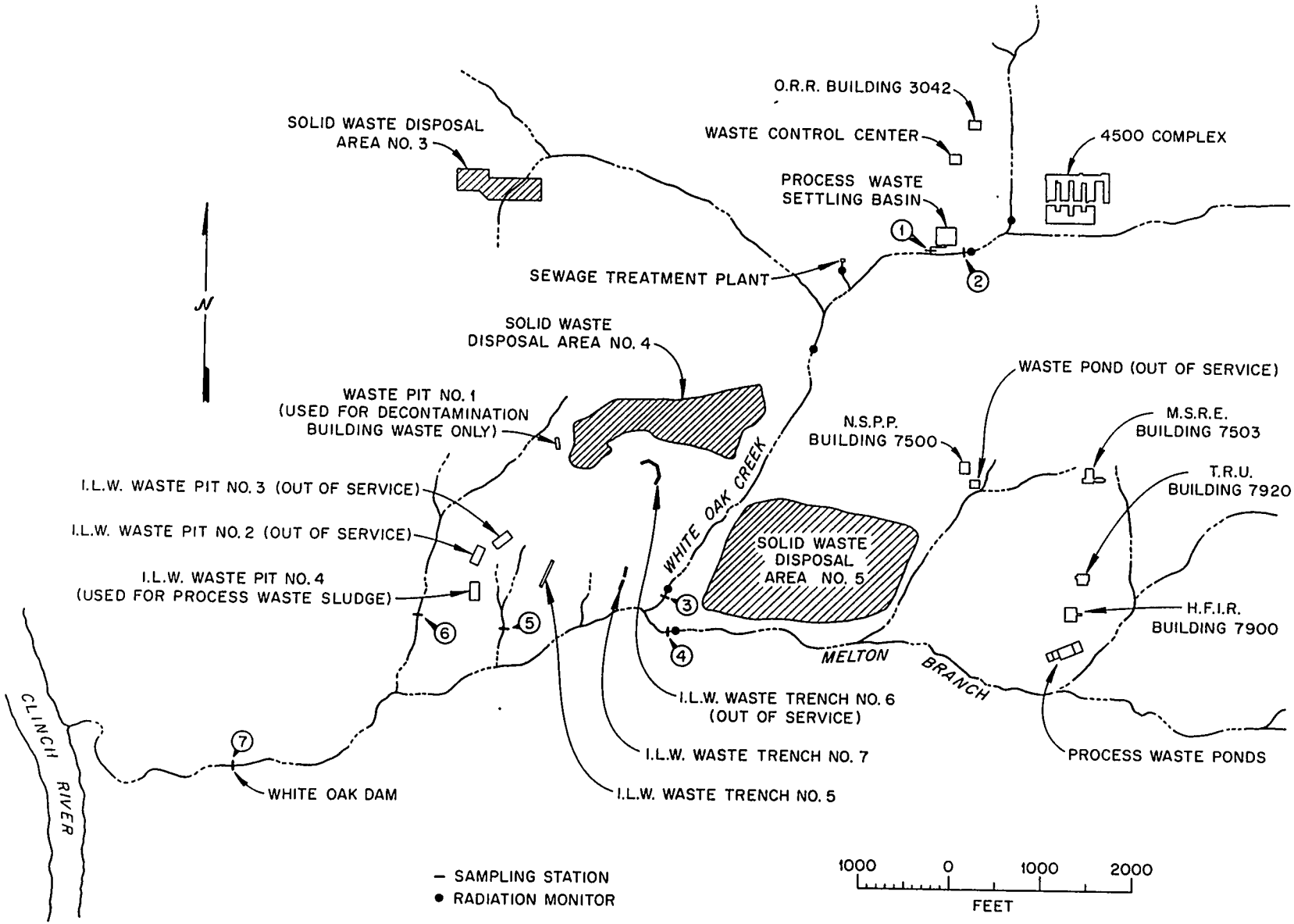

Fig. 1. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

Source	Montoring Station Number[a]	Activity (Curies) Total Sr	^{106}Ru	^{137}Cs	^{60}Co	Total[b]
Process waste	1	0.19	none	0.49	0.04	0.72
Miscellaneous discharges from east end of plant	2	0.01	0.02	< 0.01	none	0.04
Total discharge from Bethel Valley Area	3	0.69	0.03	0.72	none	1.44
Total discharge from Melton Valley Area	4	0.05	< 0.01	< 0.01	none	0.05
East waste pit seepage	5	< 0.01	2.76	none	0.46	3.22
West waste pit seepage	6	< 0.01	0.54	< 0.01	0.08	0.62
Total discharge from all sources	3,4, 5,6	0.74	3.33	0.72	0.54	5.33
White Oak Dam to Clinch River (Health Physics measurement)	7	0.52	4.54	0.44	1.80	8.95

[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: 8.8×10^6 gal

TOTAL WASTE VOLUME DISCHARGED
TO WHITE OAK CREEK THIS MONTH: 13.1×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.02	0.19	81
$^{103,106}Ru$	None	--	--
^{60}Co	0.09	0.04	56
^{137}Cs	3.80	0.49	87
Gross Beta Analysis	88 c/m/ml	9 c/m/ml	90

[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	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	10	0.39[b]	19.5	2.83	28.5
2.	Radioisotope Processing Area	90	1.53	76.5	1.22	12.3
3.	Buildings 3503 and 3508	1	0.03	1.5	1.86	18.7
4.	Buildings 3025, 3026 and 3550	2	0.05	2.5	1.87	18.8
5.	Building 3019	0	--	--	1.49	15.0
6.	Fission Products Development Laboratory	0	--	--	0.04	0.4
7.	4500 Area	0	--	--	none[c]	
8.	Building 3525	0	--	--	0.61	6.2
9.	Building 2026	3	< 0.001	--	0.01	0.1

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

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

[c]All waste from this area was found free of contamination and was released to the creek without treatment.

TABLE 4

ACTIVITY TRANSFERRED TO 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	722	1,273	80,243	95,309	2,081	2,341	5,534	24,012	1,647	1,907	7,327	22,938
^{106}Ru	6	11	388	6,372	8	9	53	1,867	6	7	54	1,518
^{137}Cs	1,623	2,892	57,435	201,060	1,716	2,203	28,451	120,636	1,359	1,846	34,088	105,225
^{60}Co	30	50	1,827	3,014	117	127	125	779	93	103	158	757
TOTALS	2,381	4,226	139,893	305,755	3,922	4,680	34,163	147,294	3,105	3,863	41,627	130,438

TABLE 5

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.01
Central Radioactive Gas Disposal Facility	3039	1.16
Radiochemical Processing Pilot Plant	3020	0.06
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		1.23

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

2018

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CENTRAL FILES NUMBER
66-5-29

DATE: May 5, 1966

COPY NO. 46

SUBJECT: Radioactive Waste Disposal Operations Report for the month of March 1966

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The contamination of the Clinch River caused by ORNL discharges was 6.7% of the MPC_w. The comparatively high concentration (see Figure 1) was due to a very low river flow which was less than one percent of the average flow. The main contaminants were strontium and ruthenium, contributing 67% and 24% respectively, to the percent of the MPC_w. The information pertaining to the White Oak Dam and Clinch River was provided by the Health Physics Division.

White Oak Creek Monitoring

The total amount of radioactivity released into White Oak Lake was 6.29 curies. Most of this contamination was ruthenium (4.32 curies), which seeped from the disposal trenches. Cobalt (1.09 curies), cesium (0.45 curie) and strontium (0.40 curie) were also present. The scouring of the creek bed itself and minor sources not routinely monitored accounted for more than one-half (0.23 curie) of the total activity. Complete creek monitoring data is given in Table 1. Figures 2 and 3 compare releases into the creek on a monthly basis.

Process Waste

The process waste system operated without incident this month. A total of 10.2 million gallons of contaminated water was processed by the Waste Treatment Plant. Plant efficiency, based upon gross beta analysis, was 82%.

A summary of plant operations is shown in Table 2; Table 3 lists the main sources of activity discharged into the system. The strontium release from the process waste system is compared to those of previous

periods in Figure 4. Figure 5 shows a comparison of the volumes treated.

Intermediate Level Waste

A total of 366,000 gallons of waste was pumped to the soil disposal area. The waste was distributed between the trenches as follows:

		Gallons
1.	Trench 5	133,000
2.	Trench 7A	122,000
3.	Trench 7B	111,000

Major contributors to the system are listed below:

		Gallons
1.	Reactor Complex	111,000
2.	4500 Complex	71,000
3.	Building 3019	55,000
4.	Fission Products Development Laboratory	18,000
5.	Radioisotopes Processing Area	17,000

Figure 6 compares the volumes of waste pumped to the trenches; Table 4 is an inventory of the activity deposited in the trenches.

The construction of the 600 gph evaporator was completed this month and test runs, using actual waste, were begun on March 29. The limited operations experienced thus far have been satisfactory.

GASEOUS WASTE

The total release from all of the operating stacks was 3.95 curies. Virtually all of this activity (3.92 curies) was identified as ^{131}I. Most of it was released from the 4500 Complex via the cell ventilation system. Small amounts (0.02 curie) of ^{197}Hg were also detected. The filterable activity was less than 10 millicuries.

Figures 7 and 8 compare monthly releases. Table 5 lists the individual stack discharges.

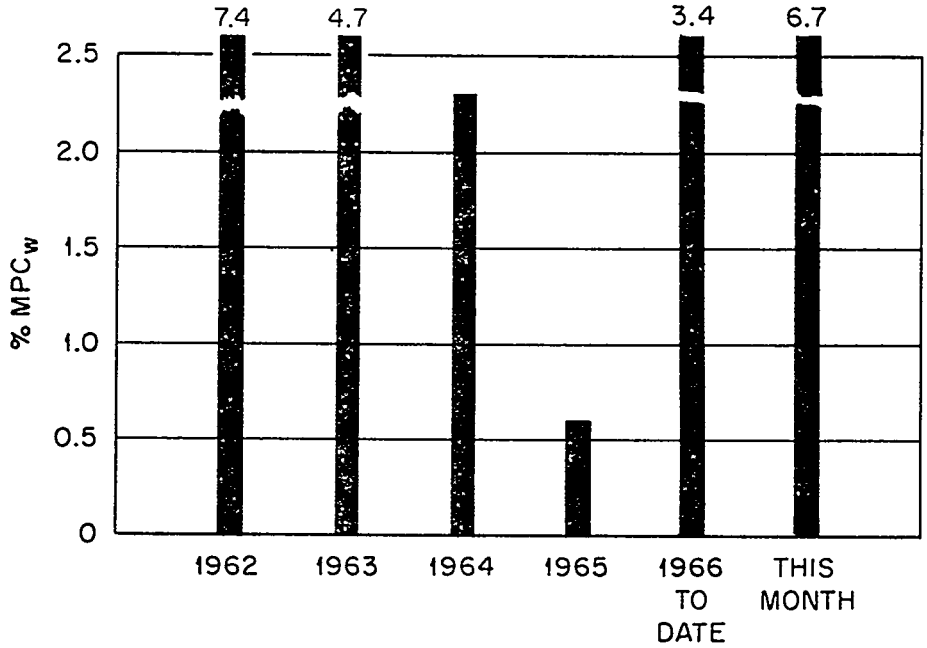

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Health Physics Measurements at White Oak Dam)

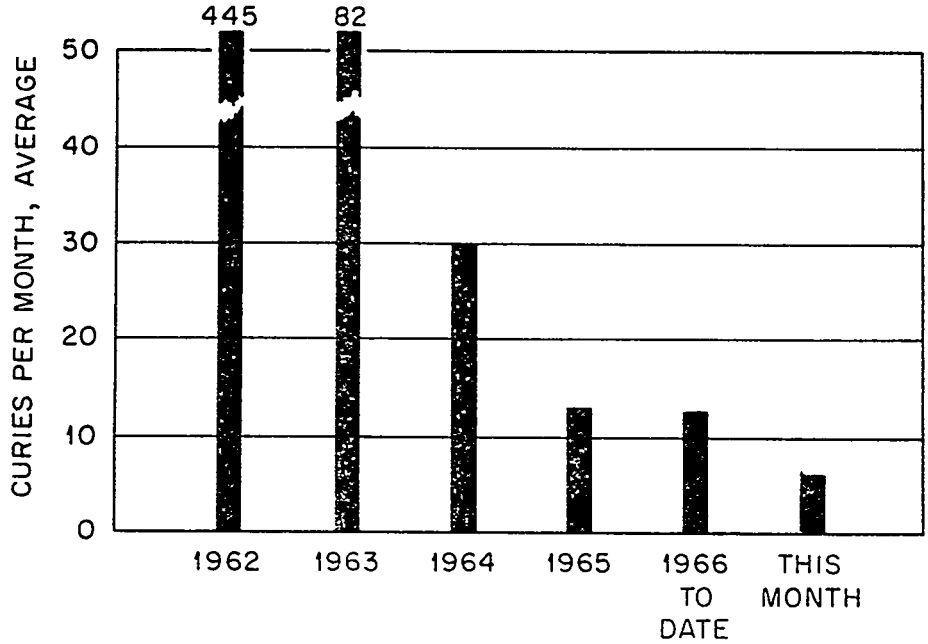

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

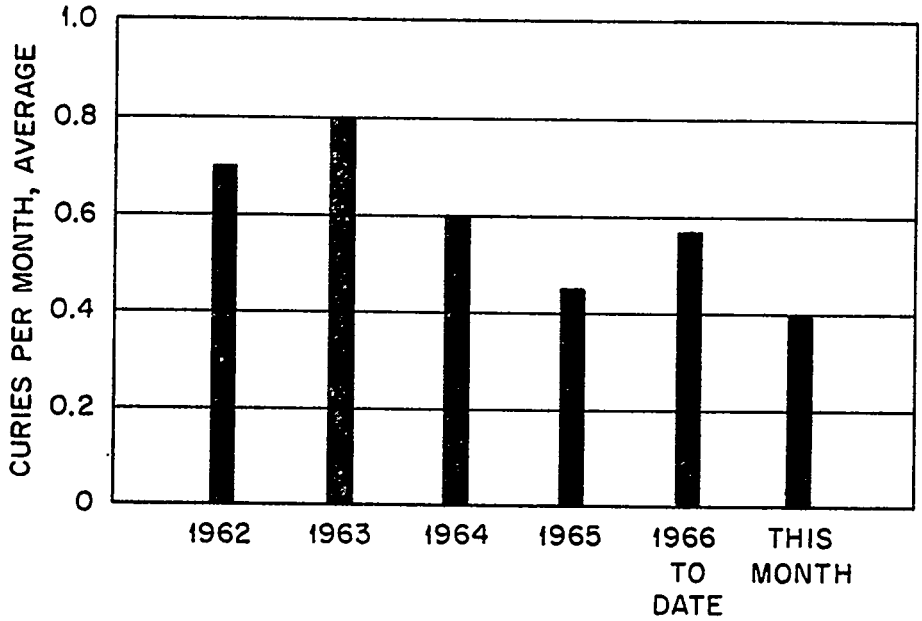

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

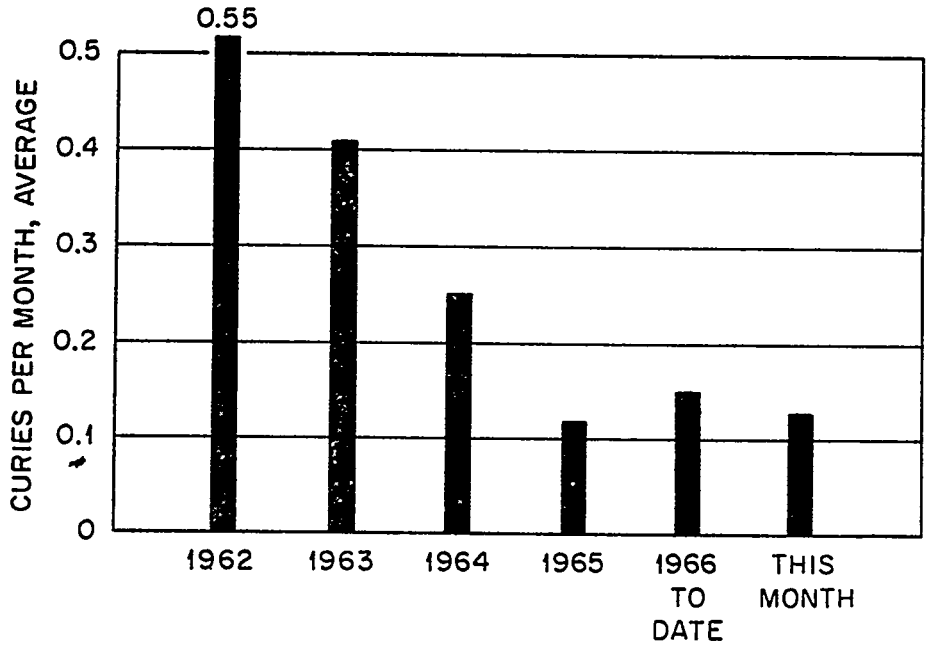

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

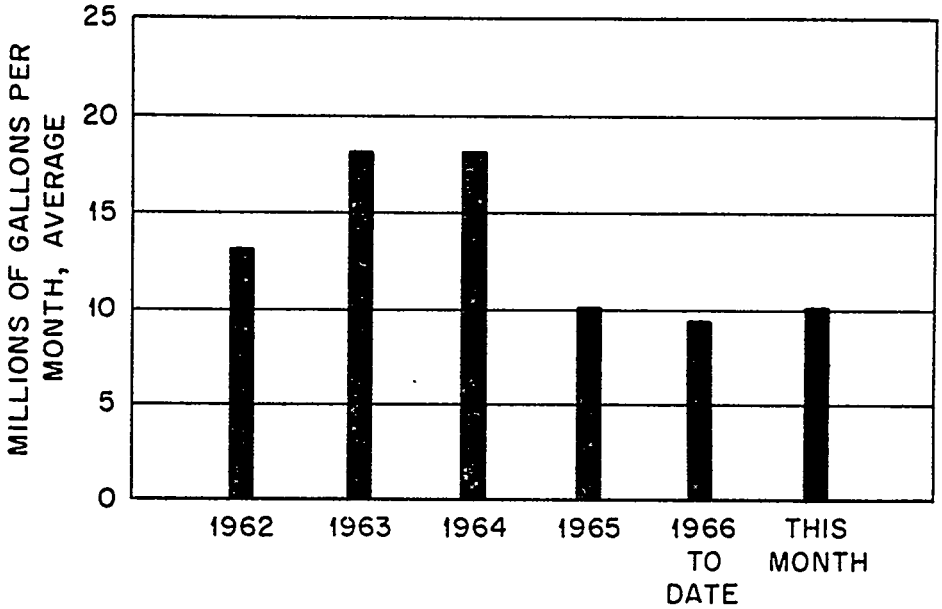

Fig. 5. Process Waste Volumes

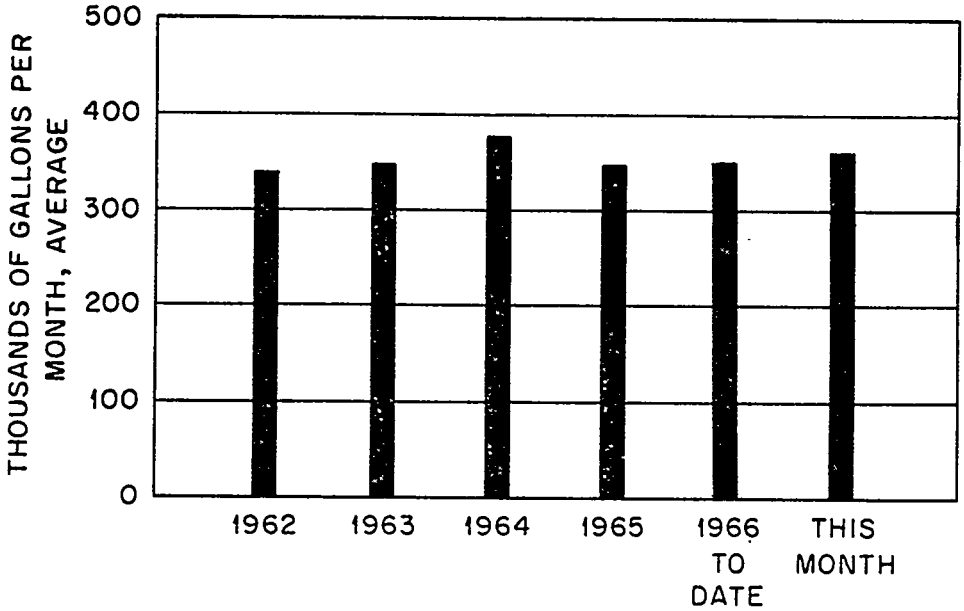

Fig. 6. Intermediate Level Waste Volumes

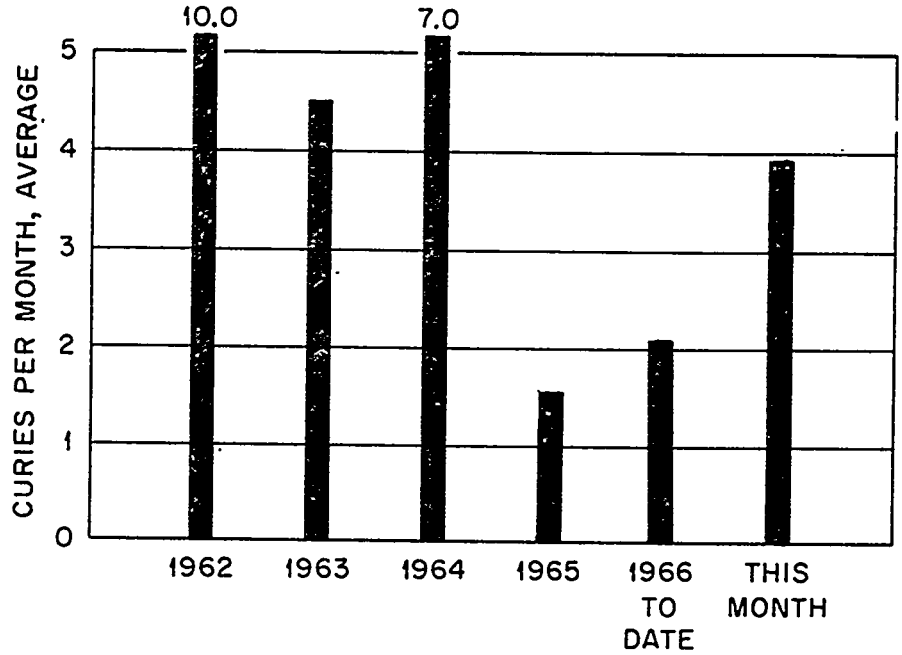

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

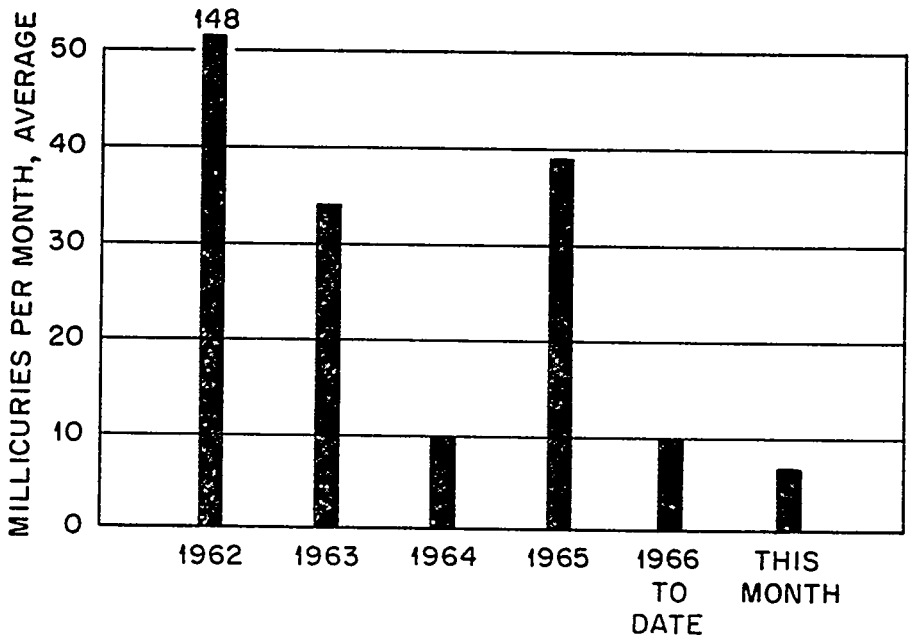

Fig. 8. Filterable Activity Released in Gaseous Waste

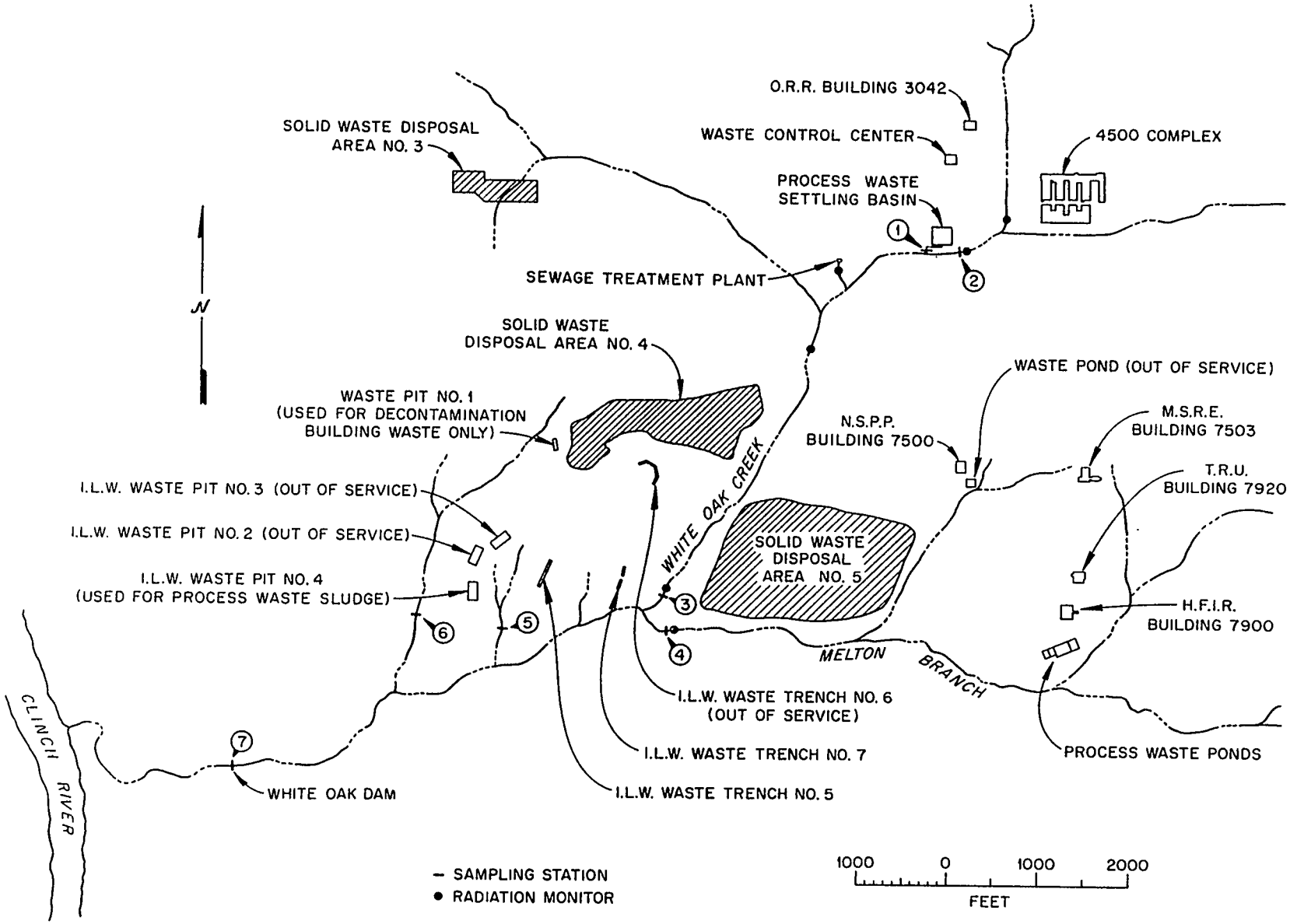

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.13	none	0.44	none	0.57
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none	0.01
Total discharge from Bethel Valley area	3	0.36	0.01	0.30	0.06	0.73
Total discharge from Melton Valley Area	4	0.04	< 0.01	< 0.01	none	0.04
East waste pit seepage	5	< 0.01	3.70	0.15	0.96	4.81
West waste pit seepage	6	< 0.01	0.62	0.02	0.07	0.71
Total discharge from all sources	3,4,5,6	0.40	4.32	0.45	1.09	6.29
White Oak Dam to Clinch River (Health Physics measurement)	7	0.21	2.80	0.23	1.75	5.53

[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: 14.4×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.77	0.13	83
$^{103,106}Ru$	none	--	--
^{60}Co	0.05	none	100
^{137}Cs	1.78	0.44	75
Gross Beta Analysis	50 c/m/ml	9 c/m/ml	82

[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	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	6	0.22[b]	34.4	2.74	25.2
2.	Radioisotope Processing Area	20	0.42	65.6	1.56	14.3
3.	Buildings 3503 and 3508	< 1	--	--	1.87	17.2
4.	Buildings 3025, 3026 and 3550	< 1	--	--	2.25	20.6
5.	Building 3019	< 1	--	--	1.67	15.3
6.	Fission Products Development Laboratory	3	< 0.01	--	0.02	0.2
7.	Building 3525	< 1	--	--	0.63	5.8
8.	Building 2026	2	< 0.01	--	0.15	1.4

[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 lines in the vicinity of Building 3047 in the Radioisotopes Area.

TABLE 4

ACTIVITY TRANSFERRED TO TRENCHES

	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B Curies			
Nuclides	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	796	2,069	80,243	96,105	517	2,858	5,534	24,529	467	2,374	7,327	23,405
^{106}Ru	9	20	388	6,381	5	14	53	1,872	4	11	54	1,522
^{137}Cs	1,659	4,551	57,435	202,719	1,793	3,996	28,451	122,429	1,623	3,469	34,088	106,848
^{60}Co	17	67	1,827	3,031	6	133	125	785	5	108	158	762
TOTALS	2,481	6,707	139,893	308,236	2,321	7,001	34,163	149,615	2,099	5,962	41,627	132,537

TABLE 5

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	< 0.01
Central Radioactive Gas Disposal Facilities	3039	3.86
Radiochemical Processing Pilot Plant	3020	0.09
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		3.95

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

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CENTRAL FILES NUMBER
66-7-9

DATE: July 6, 1966

COPY NO. 46

SUBJECT: Radioactive Waste Disposal Operations Report for the month of May 1966

TO: Distribution

FROM: L. C Lasher

This document has been approved for release to the public by

David R Hamrin 7/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River caused by ORNL waste discharges was 4.4% of the MPC_w (see Figure 1). The comparatively high concentration experienced this year to date and this month was the result of low river flows. The flow this month was less than 25% of normal. The main contaminants this month were strontium and ruthenium, contributing 83% and 13%, respectively, to the percent of the MPC_w. Information pertaining to the contamination of the Clinch River was provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 6.10 curies of radioactive waste was discharged into White Oak Lake. The bulk of the activity was ruthenium (3.58 curies) and cobalt (1.08 curies) which came from the soil disposal areas. The cesium discharge was 0.91 curie and the strontium, 0.54 curie. Most of the strontium and cesium came from the process waste system. Complete creek monitoring data is shown in Table 1. Figures 2 and 3 compare releases into the creek on a monthly basis.

Process Waste

The activity discharged to the creek through the process waste system was higher than usual mainly because of operating difficulties experienced with the intermediate-level waste evaporator (see section on intermediate-level waste) Based on gross beta analyses, approximately two-thirds of the total activity measured in the process waste system came from the evaporator building. Breakdowns of the clay and lime feeders at the Process Waste Treatment Plant also contributed to the higher discharge by reducing the

plant decontamination efficiency. The strontium removal was only 73%.

The strontium released in process waste to the creek this month is compared to that of previous months in Figure 4; Figure 5 compares the volumes of process wastes handled. Table 2 summarizes the significant operating data for the Process Waste Treatment Plant and Table 3 lists the main sources of activity into the system.

Intermediate-Level Waste

The evaporator was operated at the maximum possible rate to reduce the large backlog of waste stored in the tank farm. The average rate was 490 gal/hr and the maximum was 750 gal/hr, depending on the nature of the waste and the amount of foam it produced when boiled.

Driving the equipment above its nominal capacity together with periodic excessive foaming resulted in a higher than normal discharge of activity in the condensate to the process waste system. Approximately two curies of strontium and seven curies of cesium were discharged during the month. To reduce future activity discharges, the possibility of decontaminating the condensate by ion-exchange is being investigated.

The significant data for the intermediate-level waste operations is given below. No waste was pumped to the trenches.

	Gallons
Total volume generated	314,000
Volume transferred to evaporator	365,000
Volume of evaporator concentrate returned to tank farm	15,000
Tank farm free space at beginning of month	134,000
Tank farm free space at end of month	170,000

Main contributors to the ILW system were as follows:

	Gallons
Building 3019	32,000
4500 Complex	49,000
Reactor Complex	23,000
Fission Products Development Laboratory	21,000
Radioisotopes Processing Area	13,000

Figure 6 comparies the volume of waste handled this month to that of previous months.

GASEOUS WASTE

The total release from all of the operating stacks was 1.44 curies. Virtually all of the activity (1.39 curies) was identified as ^{131}I Most of it was released from the 4500 complex through the cell ventilation system. Small amounts of ^{197}Hg (0.05 curie) were detected. The filterable activity was less than one millicurie.

Comparisons of this month's releases to those of previous months are shown in Figures 7 and 8.

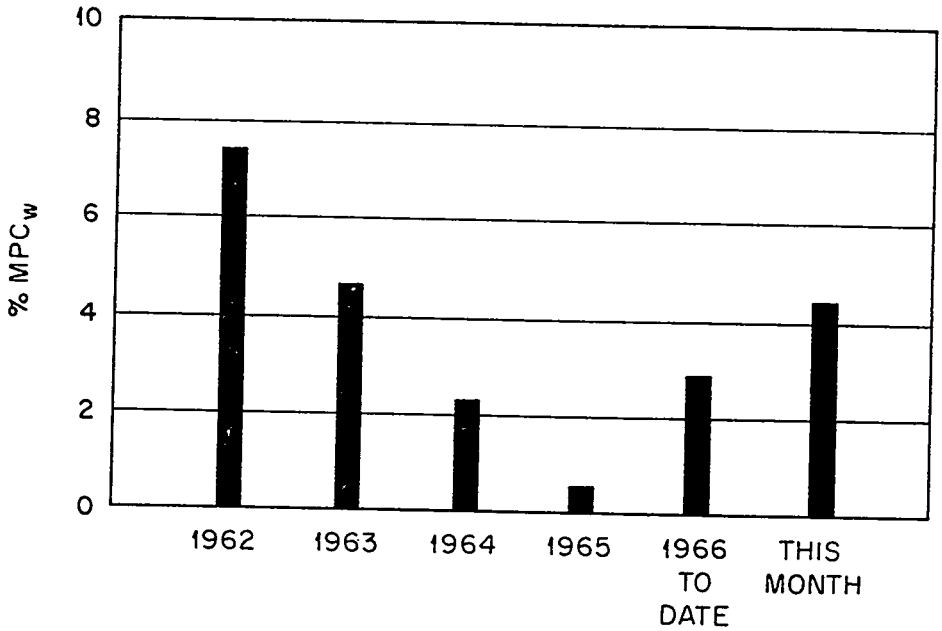

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Health Physics Measurements at White Oak Dam)

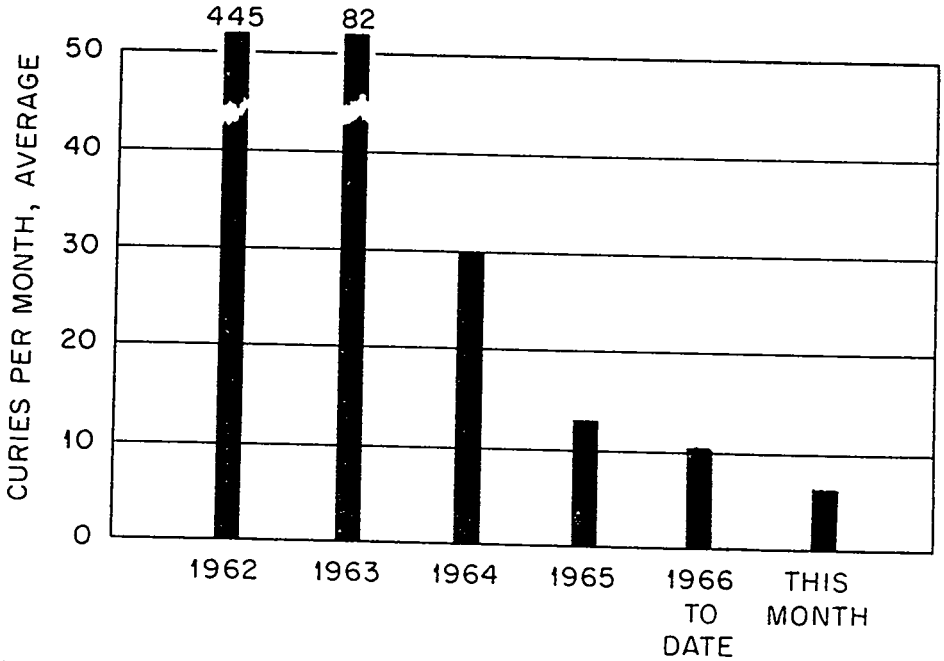

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

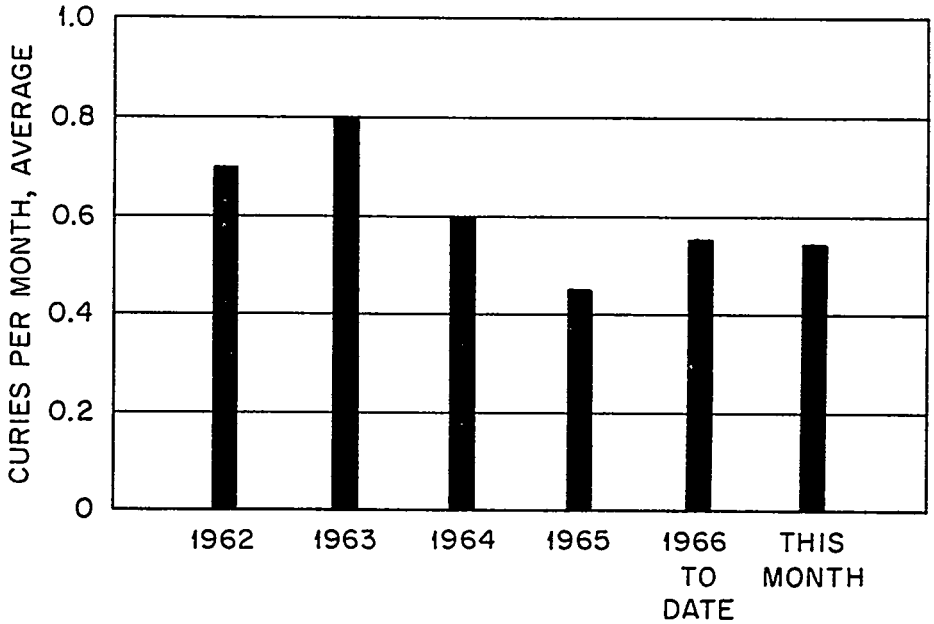

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

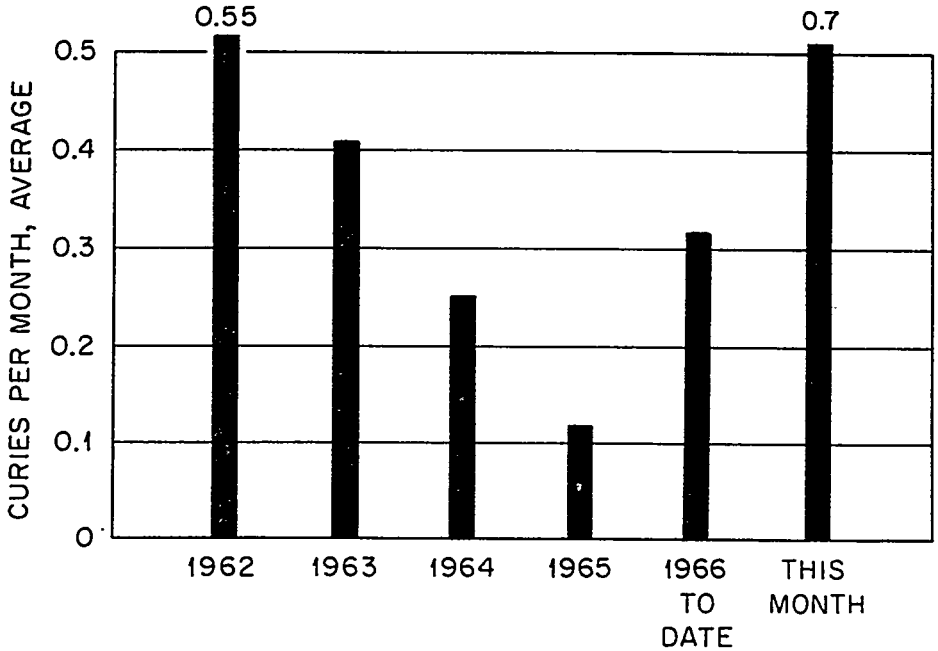

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

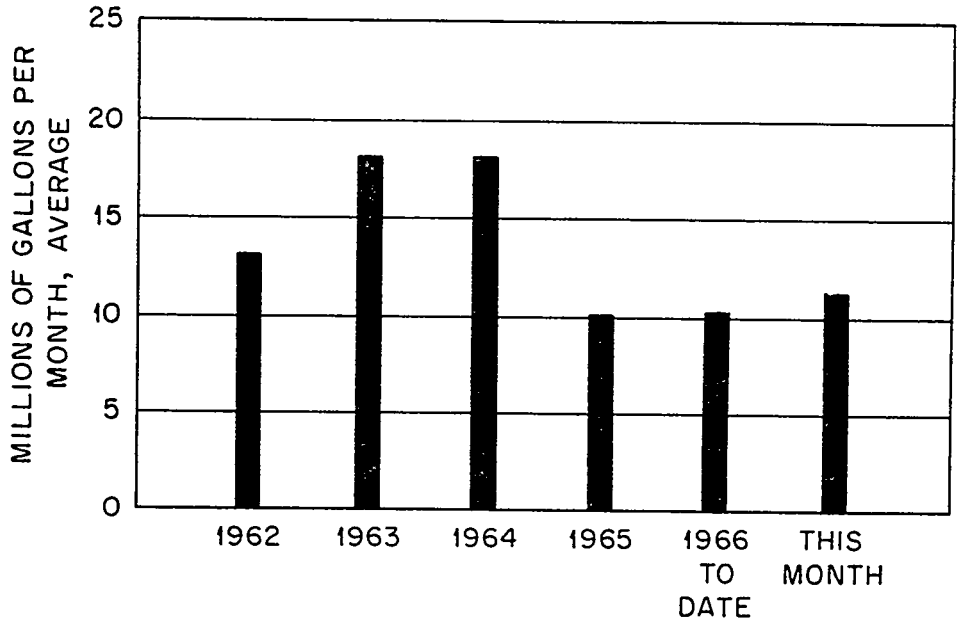

Fig. 5. Process Waste Volumes

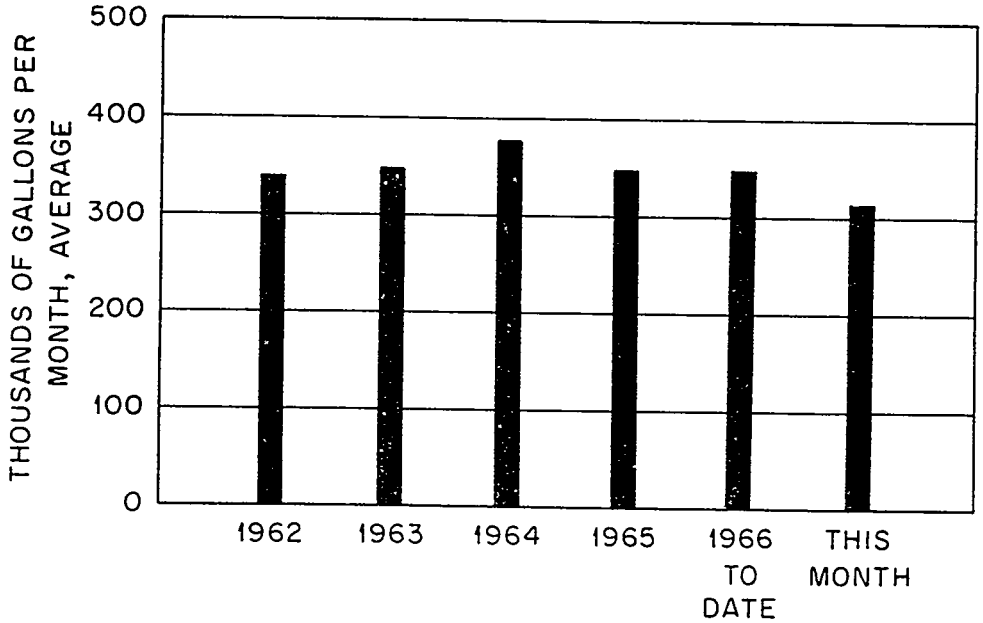

Fig. 6. Intermediate Level Waste Volumes

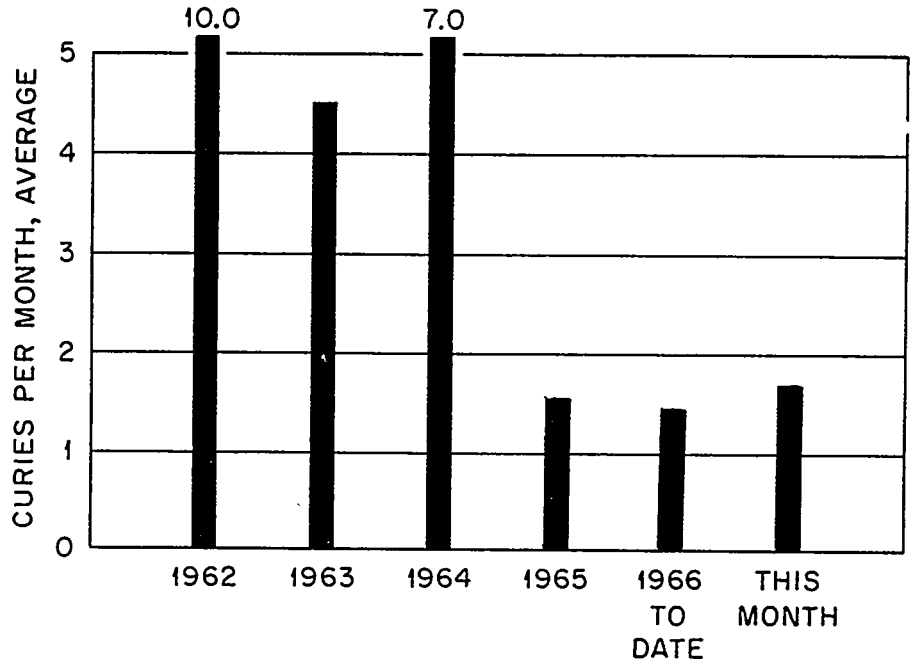

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

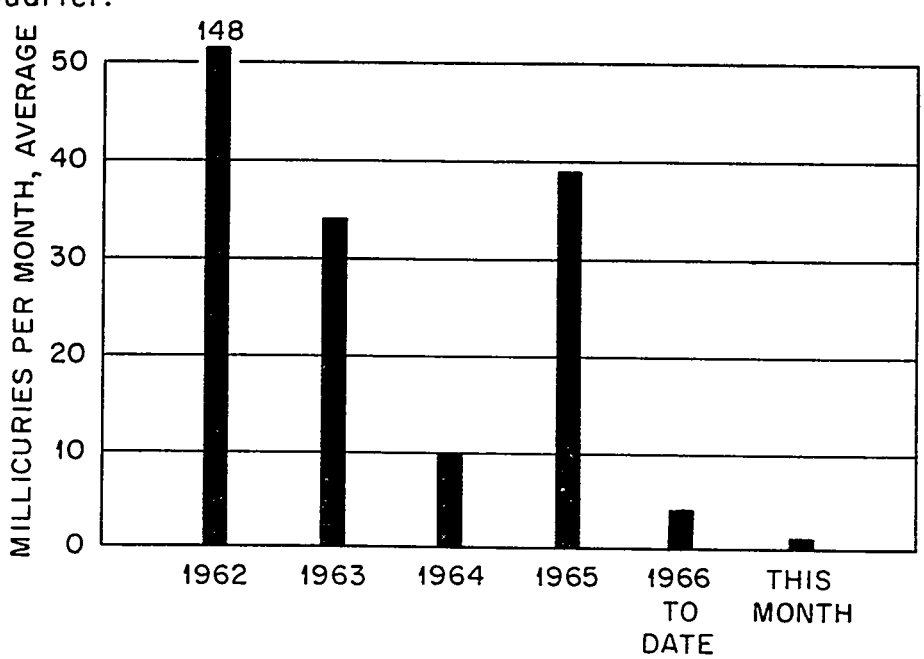

Fig. 8. Filterable Activity Released in Gaseous Waste

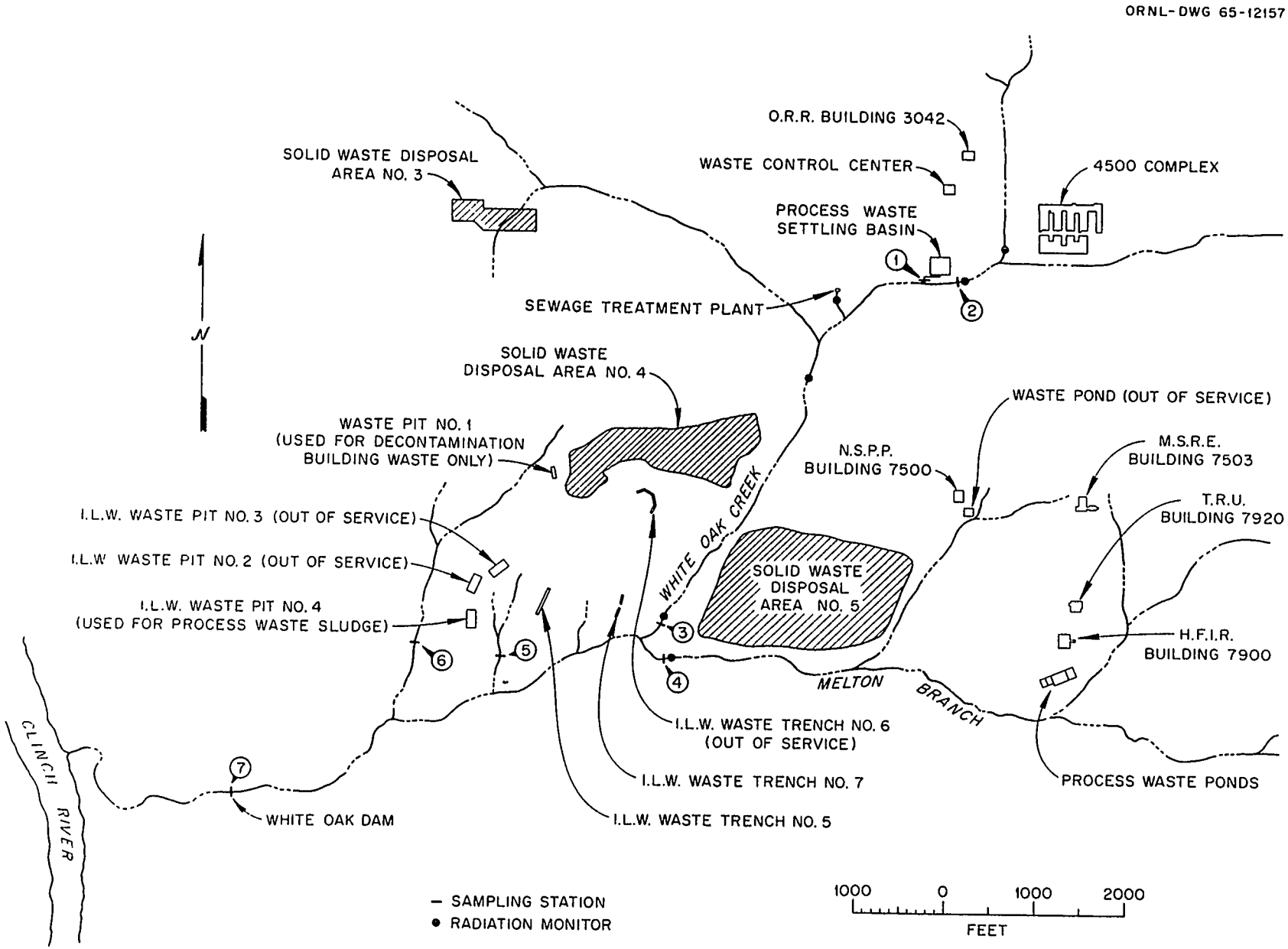

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.70	0.72	2.80	0.03	4.25
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	0.02	none	0.03
Total discharge from Bethel Valley Area	3	0.49	0.03	0.88	0.09	1.48
Total discharge from Melton Valley Area	4	0.05	< 0.01	< 0.01	none	0.05
East waste pit seepage	5	< 0.01	2.29	none	0.83	3.12
West waste pit seepage	6	< 0.01	1.26	0.03	0.16	1.45
Total discharge from all sources	3,4,5,6	0.54	3.58	0.91	1.08	6.10
White Oak Dam to Clinch River (Health Physics measurement)	7	0.41	4.23	0.17	0.67	6.17

[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: 11.3×10^6 Gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.2×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	2.57	0.70	73
$^{103,106}Ru$	1.01	0.72	29
^{60}Co	0.14	0.03	79
^{137}Cs	6.74	2.80	58
Gross Beta Analysis	246 c/m/ml	46 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	GAL x 10^6	% OF TOTAL
1.	Reactor Operations	15	0.49[b]	16.8	2.41	21.4
2.	Radioisotope Processing Area	15	0.32	11.0	1.59	14.1
3.	Buildings 3503 and 3508	2	0.08	2.8	2.76	24.5
4.	Buildings 3025 and 3026	2	0.06	2.1	2.20	19.5
5.	Building 3019	2	0.01	0.3	0.39	3.4
6.	Fission Products Development Laboratory	none	none	--	0.11	1.0
7.	Waste Evaporator, Building 2531	120	1.94	66.7	1.20	10.6
8.	Buildings 3525 and 3550	1	0.01	0.3	0.61	5.4
9.	Building 2026	< 1	none	--	0.01	0.1
10.	Melton Valley Area	none	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 lines 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	0.05
Central Radioactive Gas Disposal Facilities	3039	1.36
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		1.44

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

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CENTRAL FILES NUMBER
66-8-26

DATE: August 11, 1966

COPY NO. 4 6

SUBJECT: Radioactive Waste Disposal Operations Report for the month of June 1966

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

Technical Information Officer 3/4/96
ORNL Site Date

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River caused by ORNL waste discharges was 0.5% of MPC_w. The main contaminants were strontium and ruthenium contributing 94% and 5%, respectively, to the MPC_w. A comparison of river contamination on a monthly basis is shown in Figure 1. The relatively high concentration experienced this year to date (2.7% of MPC_w) was due primarily to low river flows which averaged approximately one-third of normal. Information pertaining to the Clinch River was provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 4.56 curies of radioactive waste was discharged into White Oak Lake. The activity was primarily ruthenium (3.15 curies) and cobalt (0.59 curie) which seeped from the soil disposal areas. The strontium release was 0.41 curie, with the process waste system contributing only 0.14 curie to the total. The remaining activity was discharged from sources not routinely monitored and from the creek bed itself. The cesium discharge, mainly from the process waste system, was 0.41 curie. A summary of creek monitoring data is given in Table 1. Figures 2 and 3 compare the waste releases on a monthly basis.

Process Waste

Approximately 9 million gallons of contaminated water was chemically treated at the Waste Treatment Plant. Although the plant functioned normally, the decontamination was poor. The gross beta analysis indicates an overall removal of 74%. The precipitation process may

have been inhibited by phosphates in the water which resulted from clean up activities at the process and research areas.

Table 2 is a summary of plant operations. The main sources of activity are listed in Table 3, and Figures 4 and 5 compare the waste releases on a monthly basis.

Intermediate Level Waste

The evaporator was operated at an average evaporation rate of 450 gal/hr. Foam, produced while evaporating solutions of high caustic content, continued to be an operating problem. The maximum evaporation rate was 600 gph. Significant ILW operating data is given below.

	Gallons
Total volume generated	229,000
Volume transferred to evaporator	327,000
Volume of evaporator concentrate returned to tank farm	8,000
Tank farm free space at beginning of month	170,000
Tank farm free space at end of month	260,000

Main contributors to the ILW system were as follows.

	Gallons
Building 3019	45,000
4500 Complex	34,000
Fission Products Development Laboratory	25,000
Reactor Complex	20,000
Radioisotope Processing Area	8,000

Figure 6 compares the current volumes of waste handled with those of previous months.

GASEOUS WASTE

The operating stack systems released 440 millicuries of radioactive gaseous waste (Table 4). The activity was primarily gaseous ^{131}I; most of it was released from the 3039 stack. The particulate activity discharge was 68 millicuries of ^{137}Cs.

Figures 7 and 8 show a comparison of the stack releases on a monthly basis.

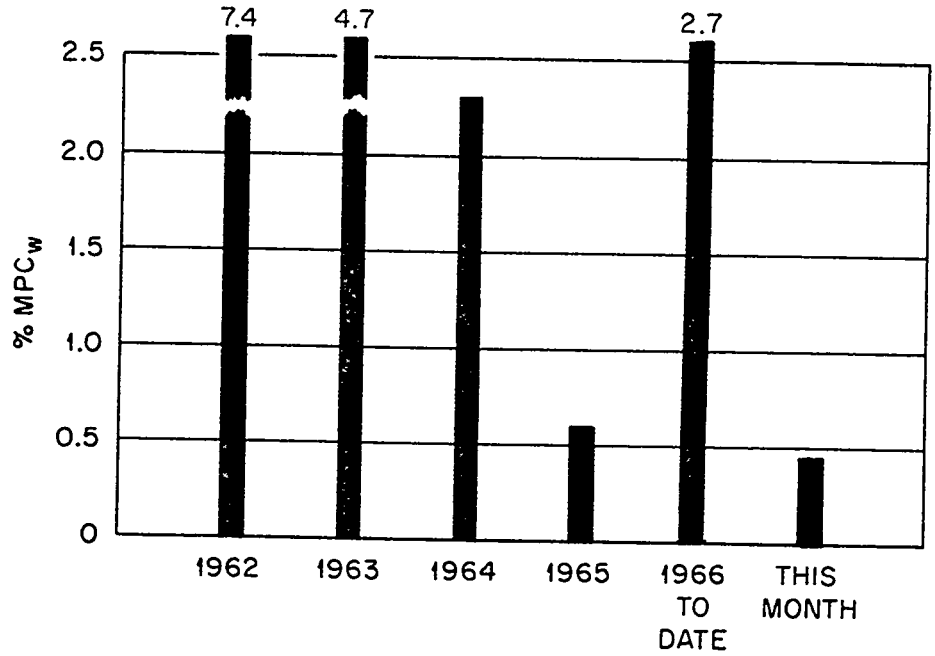

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Health Physics Measurements at White Oak Dam)

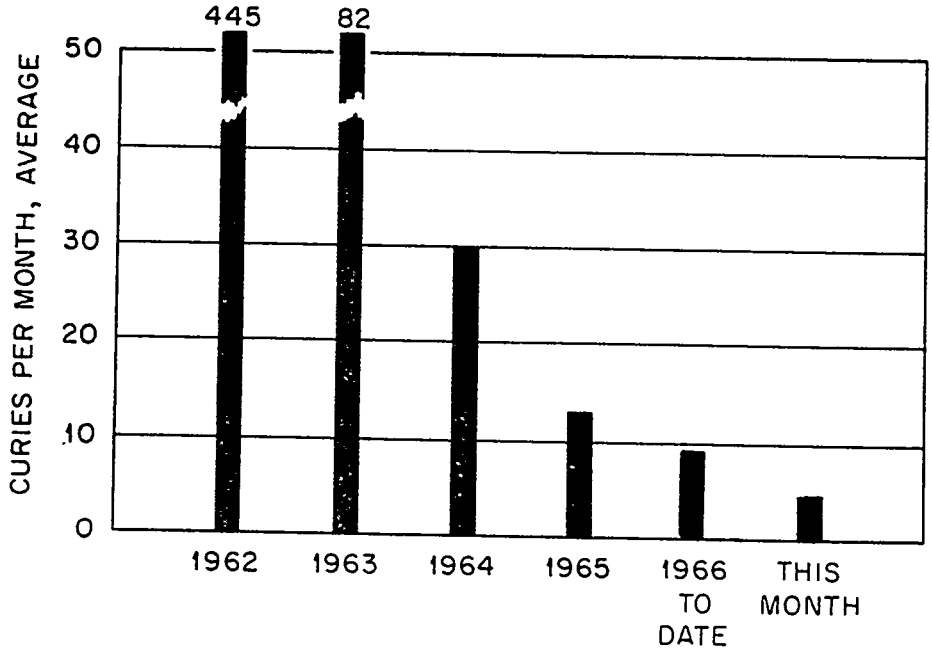

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

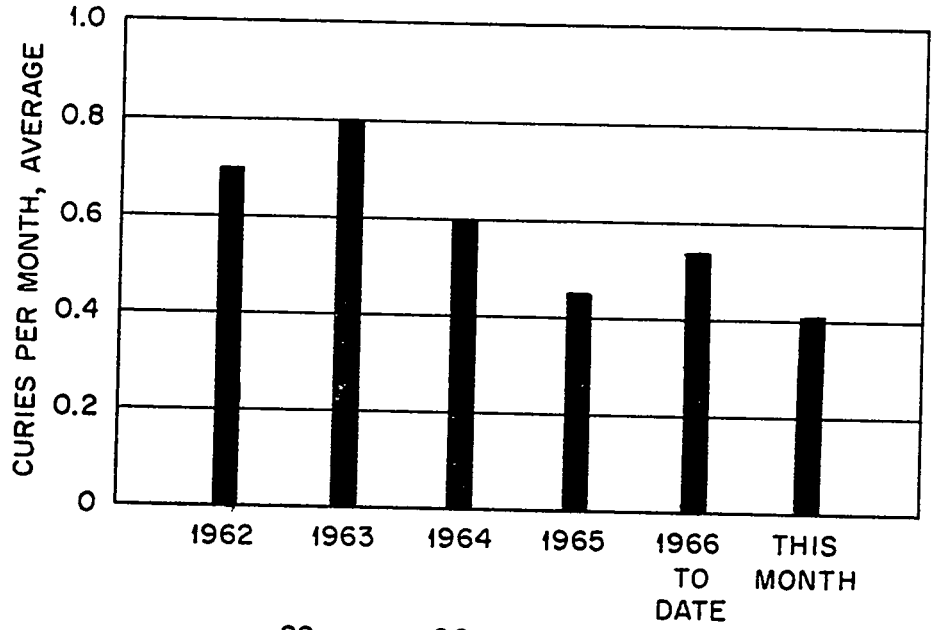

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

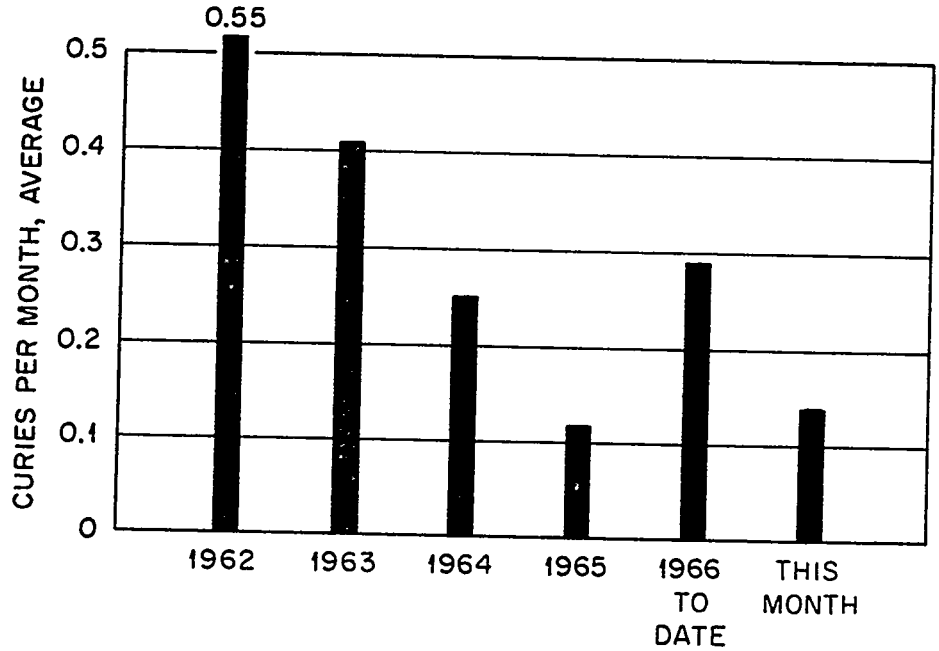

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

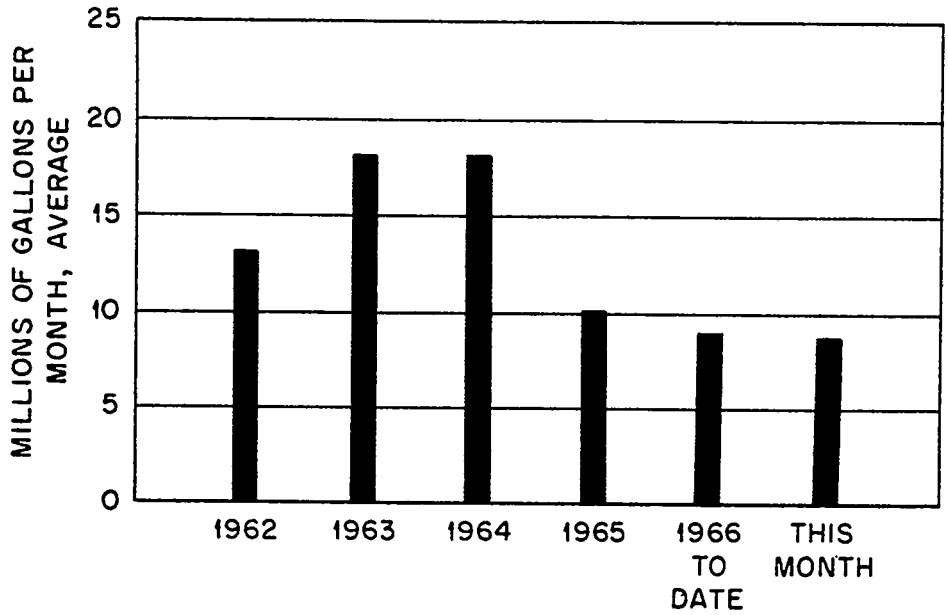

Fig. 5. Process Waste Volumes

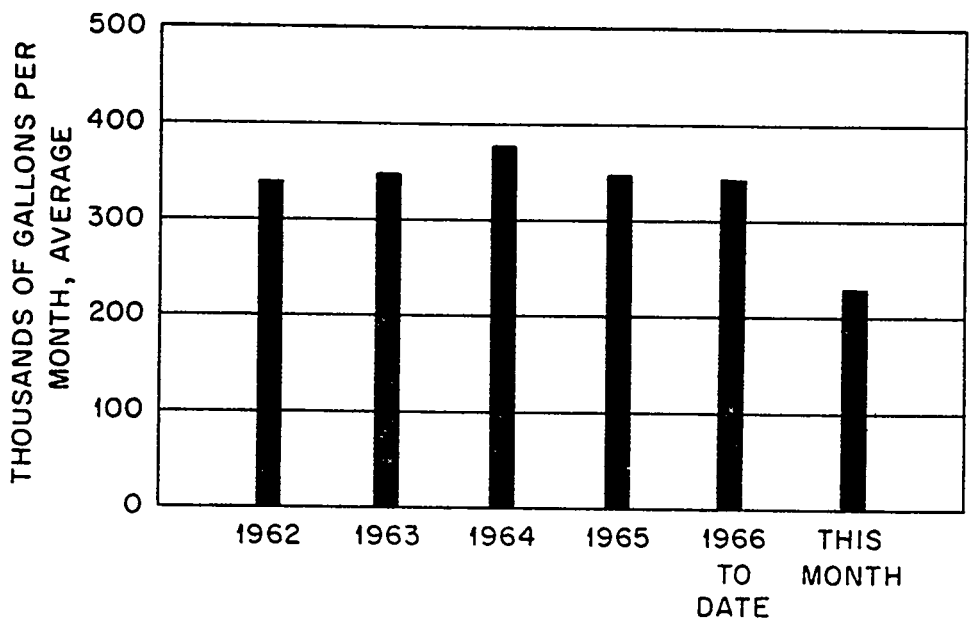

Fig. 6. Intermediate Level Waste Volumes

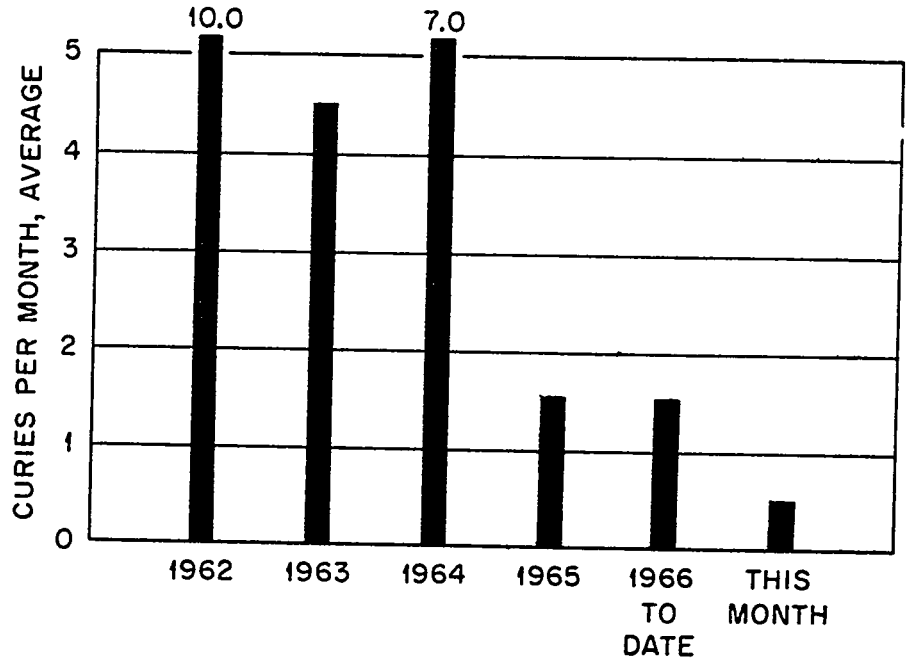

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

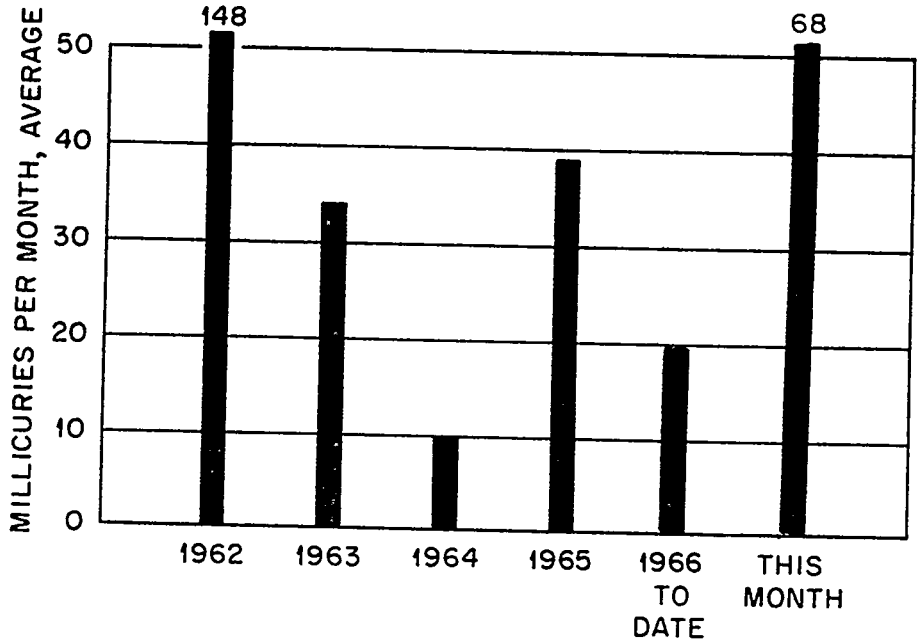

Fig. 8. Filterable Activity Released in Gaseous Waste

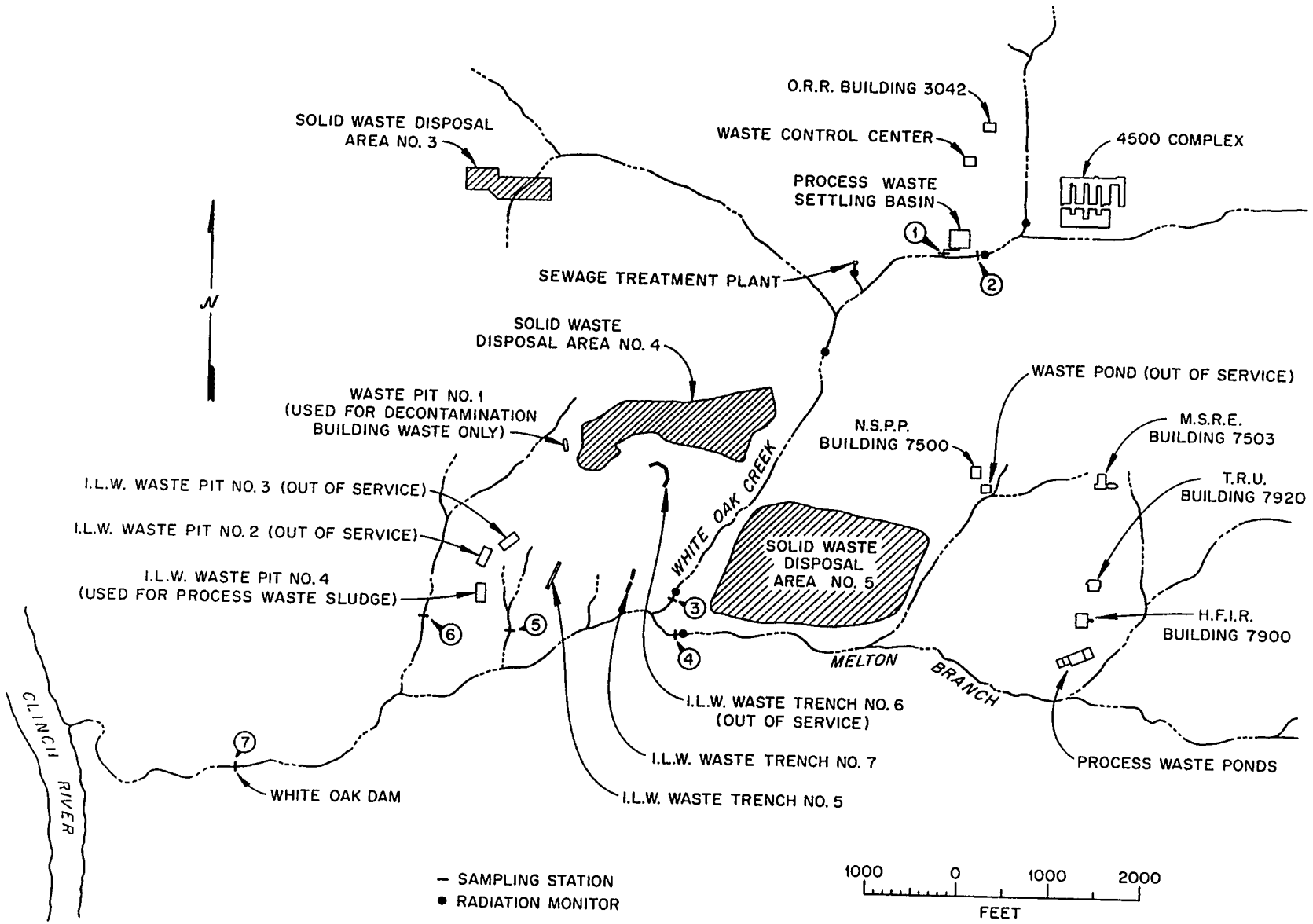

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.14	none	0.50	0.04	0.68
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	0.01	none	0.02
Total discharge from Bethel Valley Area	3	0.38	0.01	0.30	0.01	0.70
Total discharge from Melton Valley Area	4	0.03	< 0.01	< 0.01	none	0.03
East waste pit seepage	5	< 0.01	1.32	0.05	0.30	1.67
West waste pit seepage	6	< 0.01	1.82	0.06	0.28	2.16
Total discharge from all sources	3,4,5,6	0.41	3.15	0.41	0.59	4.56
White Oak Dam to Clinch River (Health Physics measurement)	7	0.15	0.43	0.03	0.07	0.99

[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: 8.9×10^6 Gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 10.8×10^6 Gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.66	0.14	79
$^{103,106}Ru$	none	--	--
^{60}Co	0.10	0.04	60
^{137}Cs	1.26	0.50	60
Gross Beta Analysis	50 c/m/ml	13 c/m/ml	74

[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	13	0.49[b]	22	2.74	23.1
2.	Radioisotope Processing Area	8	0.18	8	1.69	14.2
3.	Buildings 3503 and 3508	2	0.07	3	2.47	20.8
4.	Buildings 3025 and 3026	2	0.07	3	2.49	21.0
5.	Building 3019	0	--	--	0.62	5.2
6.	Fission Products Development Laboratory	0	--	--	0.16	1.3
7.	Waste Evaporator, Building 2531	94	1.41	64	1.10	9.3
8.	Buildings 3525 and 3550	0	--	--	0.53	4.4
9.	Building 2026	0	--	--	0.08	0.7
10.	Melton Valley Area	0	--	--	0	--

[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	0.05
Central Radioactive Gas Disposal Facilities	3039	0.34
Radiochemical Processing Pilot Plant	3020	0.05
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.44

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

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DATE: September 8, 1966

SUBJECT: Radioactive Waste Disposal Operations Report for the month of July 1966

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River caused by ORNL waste discharges was 0.32% of MPC_w. The main contaminants were strontium and ruthenium, contributing 93.82% and 4.05%, respectively, to the total concentration. Figure 1 compares the river contamination on a monthly basis. The year-to-date concentration (2.5%) is comparatively high mainly because of a low river flow which was approximately one-third that considered to be normal 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 radioactive waste discharged into White Oak Lake was 11.28 curies. Ruthenium (8.67 curies) and Cobalt (1.67 curies), seeping from the soil disposal area, comprised the bulk of the activity. Radioactive strontium (0.38 curie) and cesium (0.56 curie) were also released. Most of this contamination was released 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 11.4 million gallons of low-level waste was chemically treated at the Waste Treatment Plant. Several failures of the clay feeder and the sludge scraper hindered the decontamination process. Only 62% of the cesium activity was removed; decontamination of the beta emitters amounted to 82%. Plant operations are summarized in Table 2.

Table 3 lists the principal sources of activity discharged into the process waste system. The largest single source was the intermediate-level waste evaporator, contributing 42% of the total activity in its condensate. A project is now under way to install an ion-exchange resin column to remove the activity from the condensate.

Figures 4 and 5 compare the releases to the creek from the process waste system on a monthly basis.

Intermediate-Level Waste

The evaporator operated continuously and an average rate of 450 gph was attained. Foaming, during boil-down, was the only operating problem encountered. Significant data pertaining to that operation is tabulated below:

	Gallons
Total volume generated	284,000
Volume transferred to evaporator	338,000
Volume of evaporator concentrate returned to tank farm	11,000
Tank farm free space at beginning of month	272,000
Tank farm free space at end of month	315,000

Main contributors to the ILW system were as follows:

	Gallons
Building 3019	84,000
4500 Complex	32,000
Fission Products Development Laboratory	29,000
Reactor Complex	26,000
Radioisotopes Processing Area	12,000

Figure 6 is a monthly comparison of the volumes of waste handled.

GASEOUS WASTE

A total of 0.73 curie of radioactive gaseous waste was discharged from the ORNL stacks. Most of this activity (0.56 curie) was released from the 3039 system. Virtually all of this activity was gaseous ^{131}I. The discharge of filterable activity amounted to 5 millicuries of ^{137}Cs. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

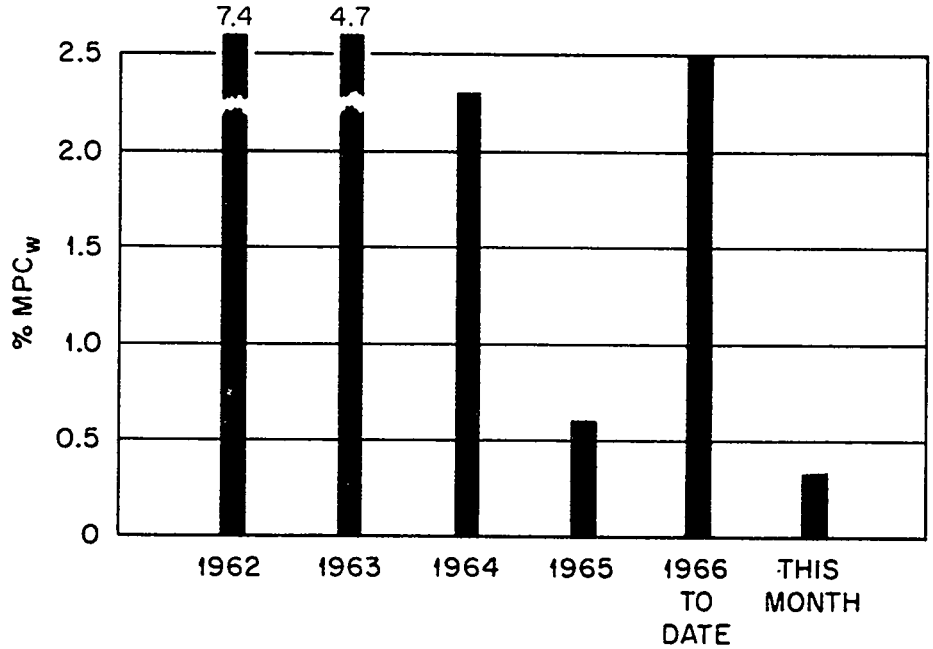

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

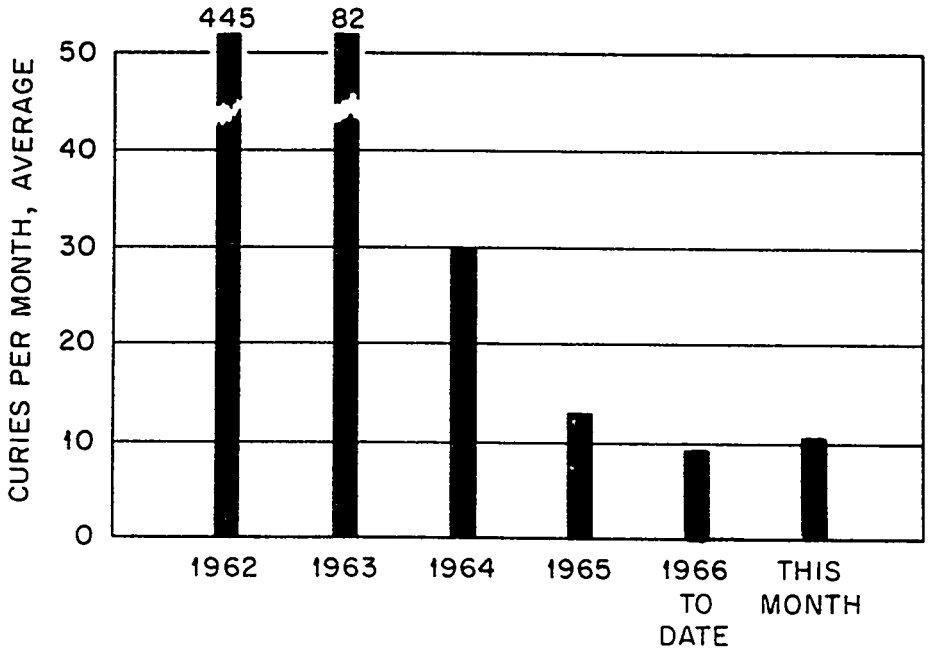

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

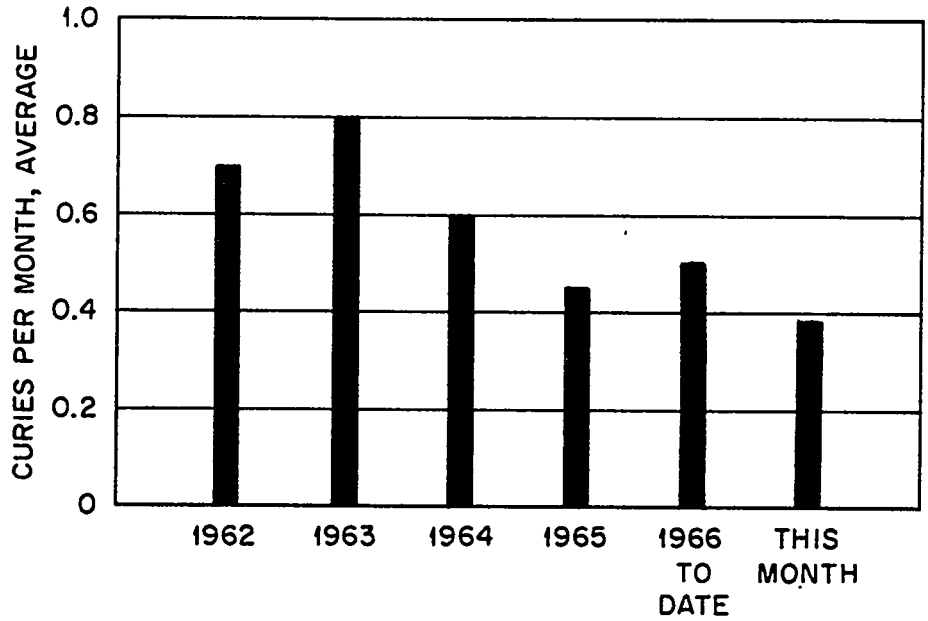

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

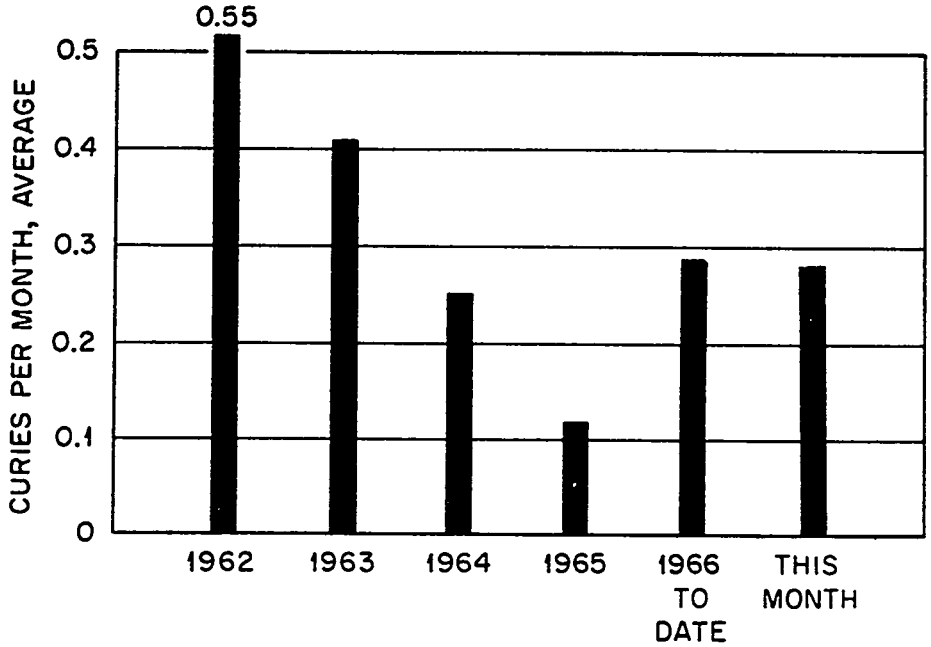

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

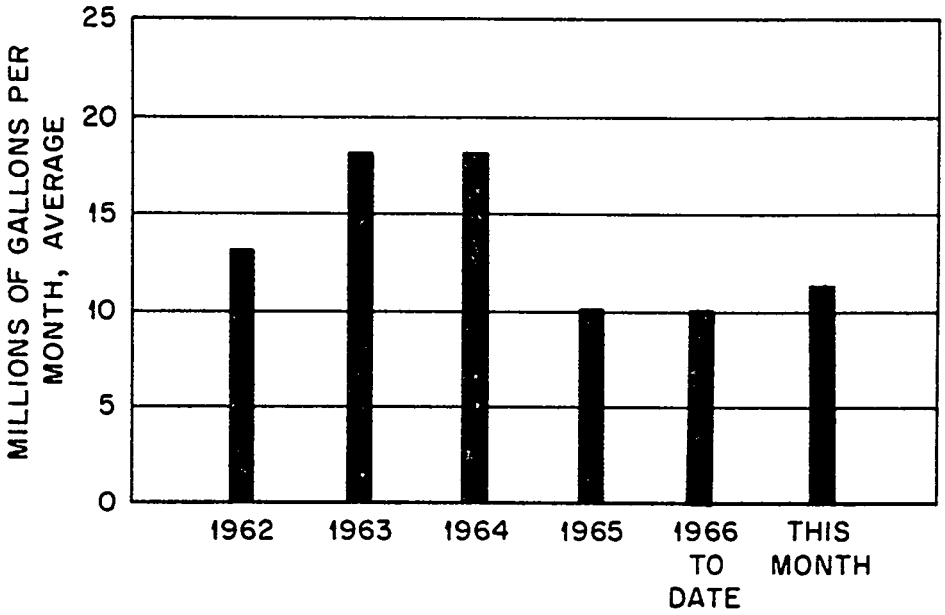

Fig. 5. Process Waste Volumes

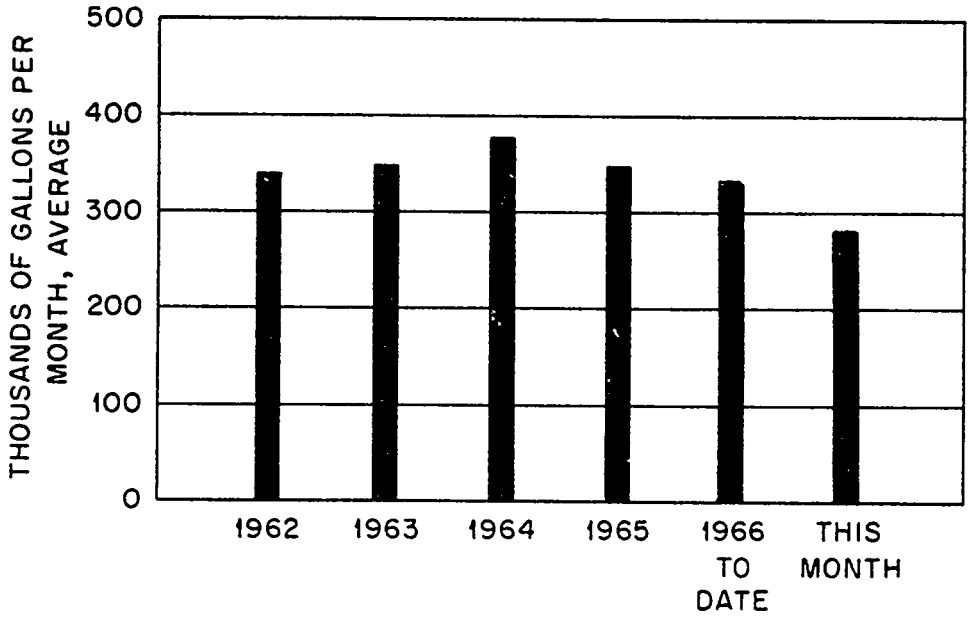

Fig. 6. Intermediate Level Waste Volumes

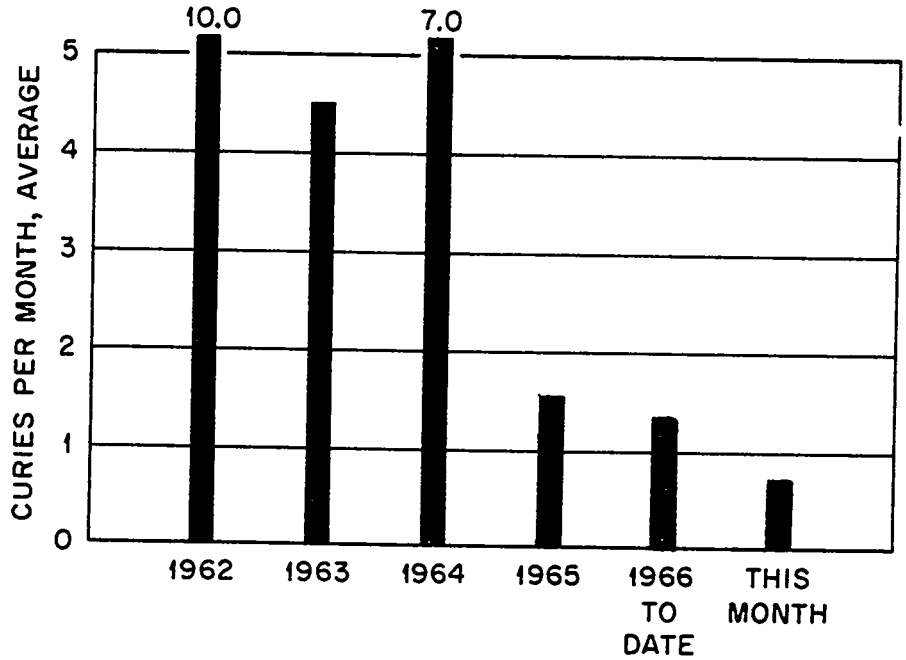

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species) ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

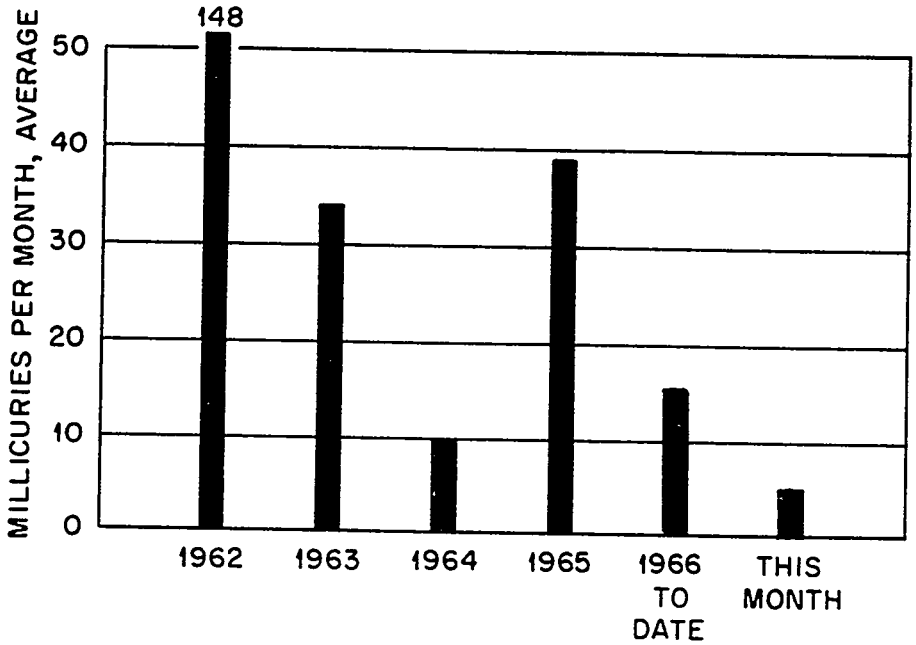

Fig. 8. Filterable Activity Released in Gaseous Waste

ORNL-DWG 65-12157

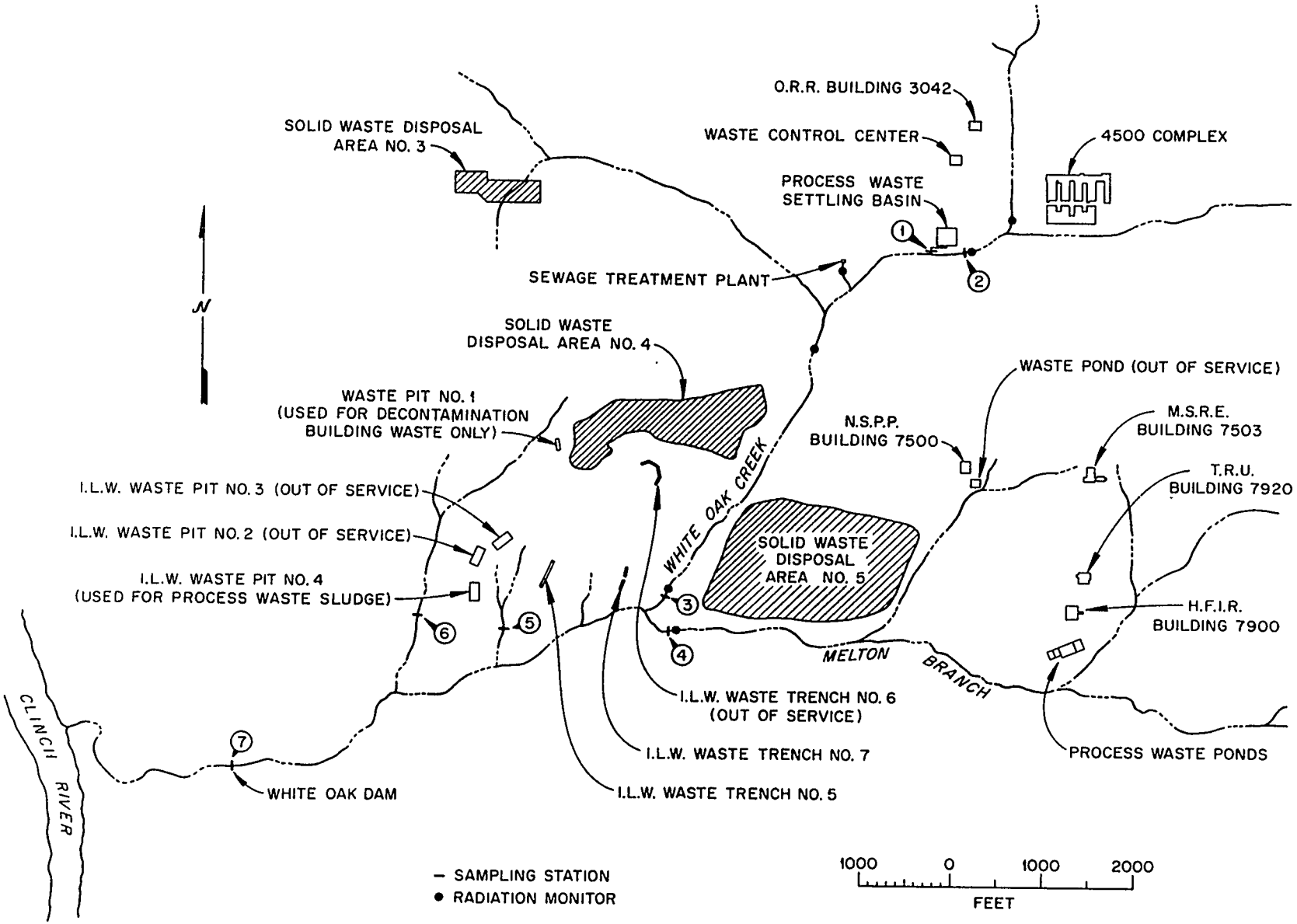

Fig. 9 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.28	none	0.60	0.02	0.90
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none	< 0.01
Total discharge from Bethel Valley Area	3	0.36	0.01	0.22	none	0.59
Total discharge from Melton Valley Area	4	0.02	< 0.01	none	none	0.02
East waste pit seepage	5	< 0.01	1.40	0.07	0.42	1.89
West waste pit seepage	6	< 0.01	7.26	0.27	1.25	8.78
Total discharge from all sources	3,4,5,6	0.38	8.67	0.56	1.67	11.28
White Oak Dam to Clinch River (Health Physics measurement)	7	0.24	0.59	0.09	0.07	1.34

[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: 11.4×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.37	0.28	80
$^{103,106}Ru$	none	none	--
^{60}Co	0.07	0.02	71
^{137}Cs	1.58	0.60	62
Gross Beta Analysis	60 c/m/ml	11 c/m/ml	82

[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	0	--	--	3.3	29.0
2.	Radioisotope Processing Area	13	0.29	18.3	1.6	14.0
3.	Buildings 3503 and 3508	1	0.03	1.9	2.0	17.5
4.	Buildings 3025 and 3026	22	0.59	37.1	2.0	17.5
5.	Building 3019	0	--	--	0.6	5.3
6.	Fission Products Development Laboratory	0	--	--	0.1	0.9
7.	Waste Evaporator, Building 2531	37	0.67	42.1	1.3	11.4
8.	Buildings 3525 and 3550	2	0.01	0.6	0.4	3.5
9.	Building 2026	0	--	--	0.1	0.9
10.	Melton Valley Area	0	--	--	0	--

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

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.10
Central Radioactive Gas Disposal Facilities	3039	0.56
Radiochemical Processing Pilot Plant	3020	0.07
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.73

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

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CENTRAL FILES NUMBER
66-10-31

COPY NO. 16

DATE: October 13, 1966

SUBJECT: Radioactive Waste Disposal Operations Report for the month of August 1966

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River caused by ORNL waste discharges was 0.36% of the MPC_w. The main contaminants were strontium and ruthenium, contributing 87% and 7% respectively, to the total concentration. Figure 1 compares the river contamination on a monthly basis. The year-to-date concentration (2.1%) 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 radioactive waste discharge into White Oak Lake amounted to 9.70 curies. This activity was primarily ruthenium (7.08 curies) and cobalt (1.45 curies) which seeped from the soil disposal area. Lesser amounts of strontium (0.63 curie) and cesium (0.54 curie) were also released. 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 the monthly waste releases into the creek.

Process Waste

The Waste Treatment Plant processed 11.2 million gallons of low-level waste this month. Decontamination achieved by the plant was somewhat low; gross analysis indicate that 74% of the beta activity was removed by the process. Erratic addition of the chemical feeds, resulting from equipment malfunctions, hindered the decontamination process. A summary of plant operations is shown in Table 2.

The increase in the strontium released to White Oak Creek in the process waste this month and the year 1966 to date, shown in Figure 4, and the corresponding increase in the total strontium released to the creek, shown in Figure 3, was due mainly to the activity carried in the condensate from the intermediate-level waste evaporator. A project is now under way to install an ion-exchange resin column to remove the activity from the condensate. A detailed review of discharges from the main contributors during 1965 and 1966 has shown that the Radioisotope Area was the only other source that increased its discharge and was responsible for a small portion of the total increase.

Figure 5 compares the volumes of process waste on a monthly and yearly basis.

Intermediate-Level Waste

The evaporator operated continuously at an average rate of 425 gph. Significant data pertaining to the operation are tabulated below:

	Gallons
Total volume generated	287,000
Volume transferred to evaporator	316,000
Volume of concentrate returned to tank farm	8,000
Tank farm free space at the beginning of month	313,000
Tank farm free space at end of month	334,000

Main contributors to the ILW system were as follows:

	Gallons
Building 3019	71,000
Fission Products Development Laboratory	32,000

	Gallons
Reactor Complex	19,000
4500 Complex	18,000
Radioisotopes Processing Area	15,000

Figure 6 is a monthly comparison of the volumes of waste handled.

GASEOUS WASTE

The radioactivity released from the ORNL stacks amounted to 1.37 curies. Virtually all of this activity was ^{131}I. A total of 22 millicuries of filterable activity (20 mc of ^{137}Cs and 2 mc of ^{131}I) was also released. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

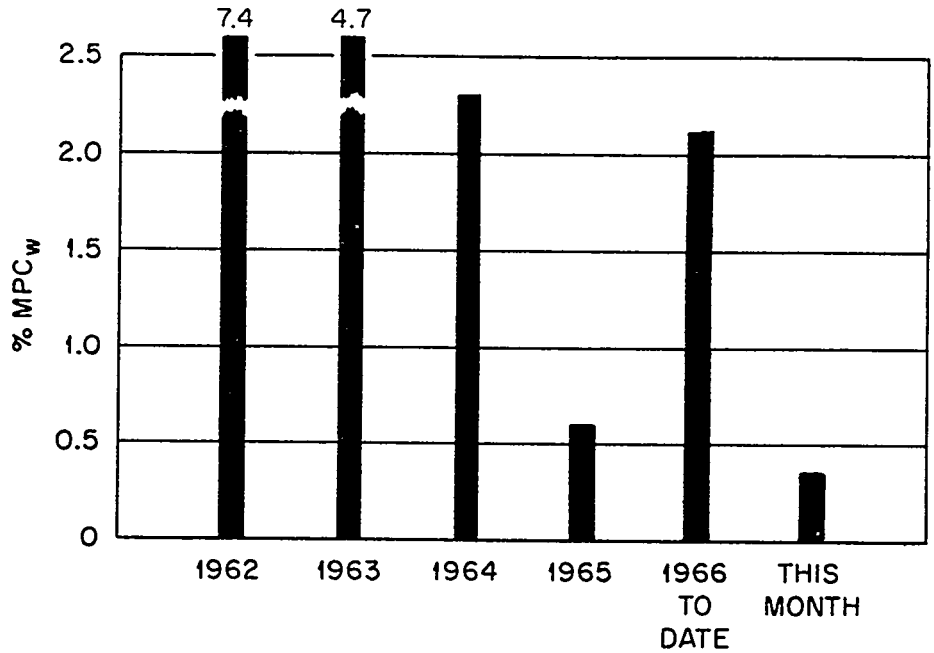

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

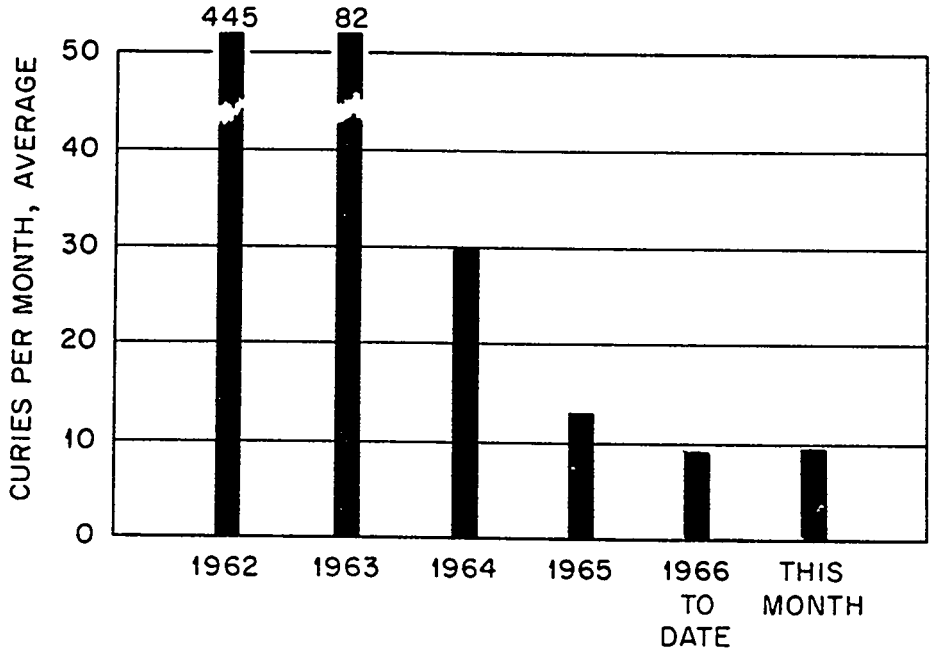

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

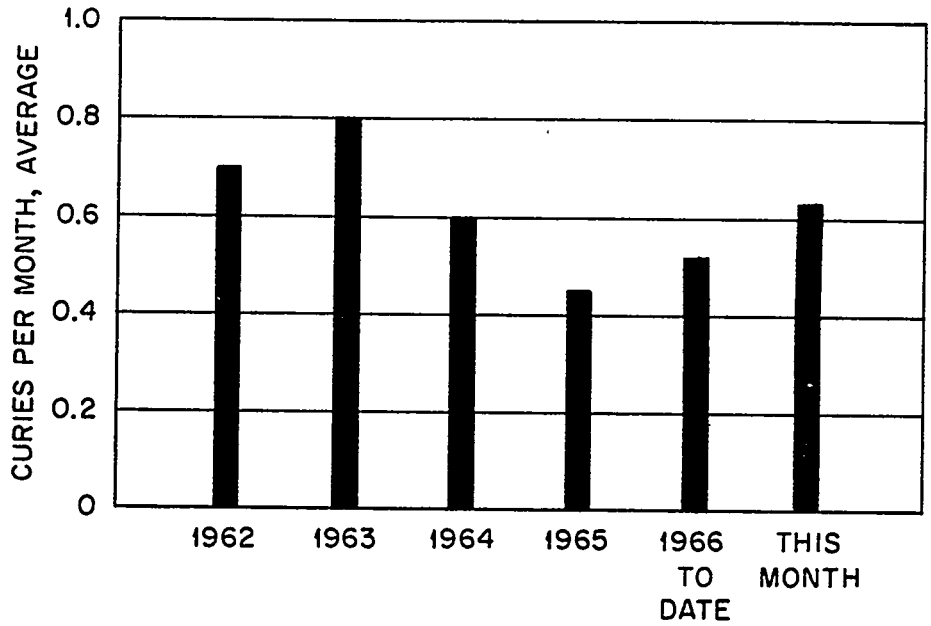

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

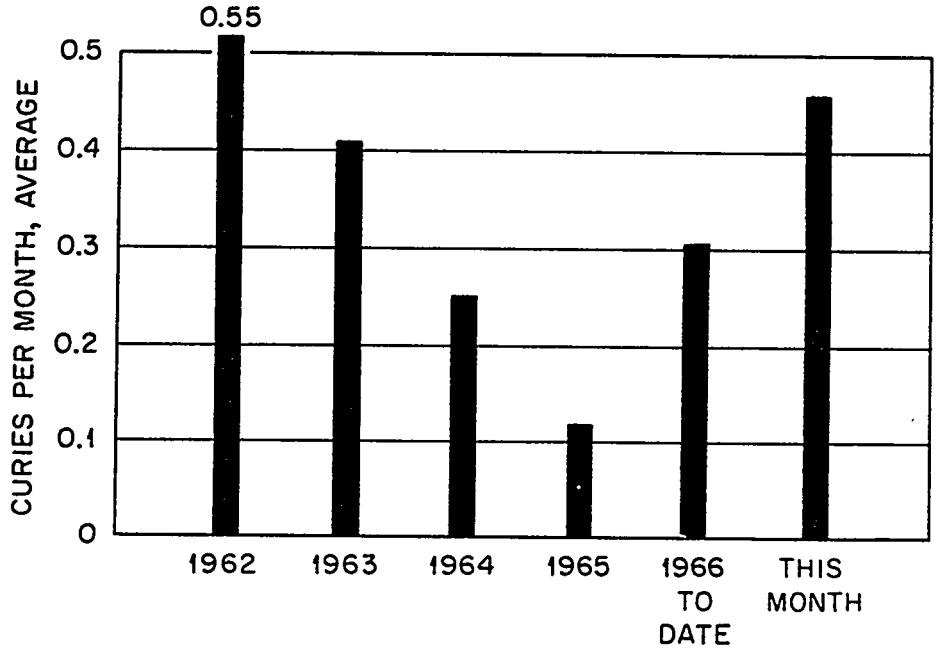

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

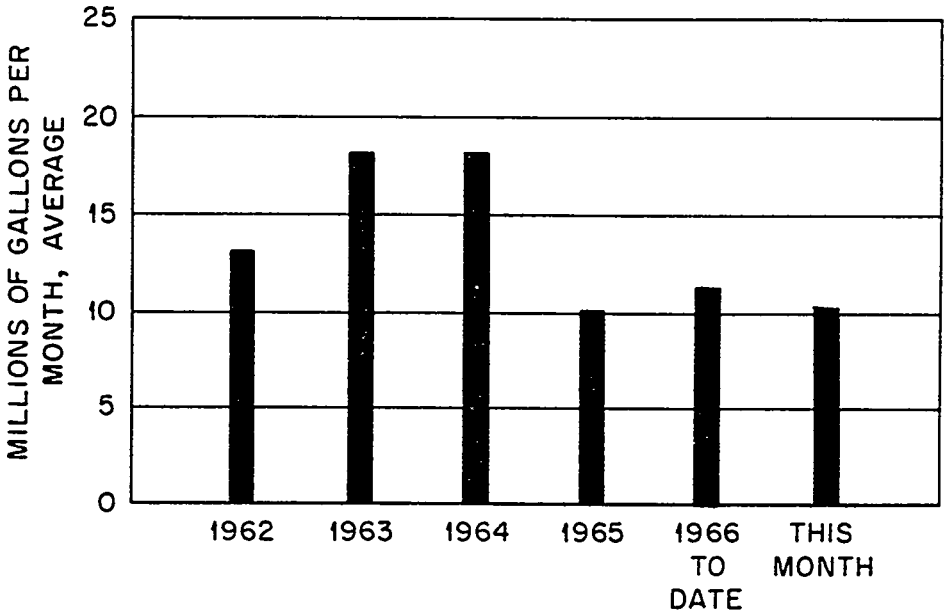

Fig. 5. Process Waste Volumes

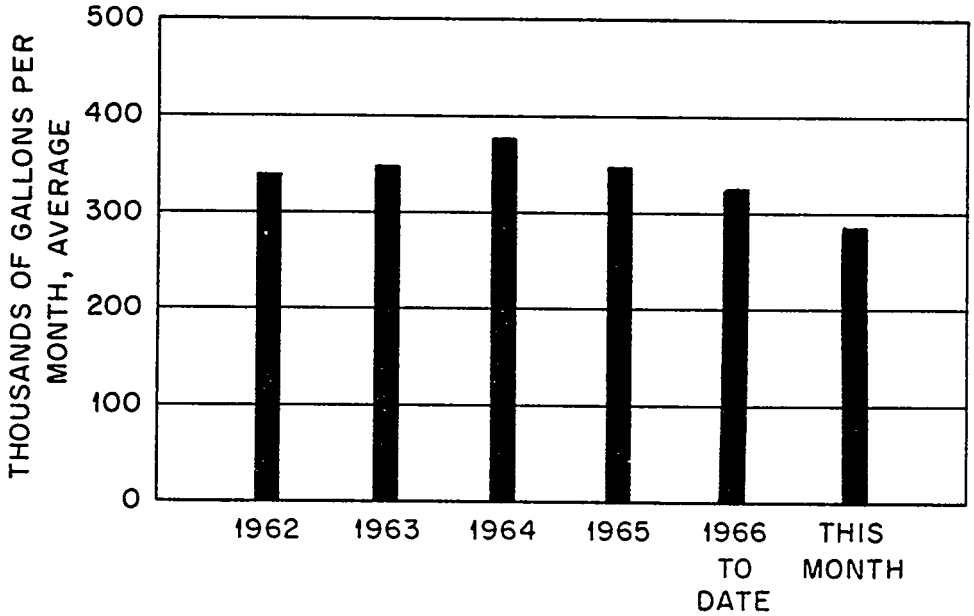

Fig. 6. Intermediate Level Waste Volumes

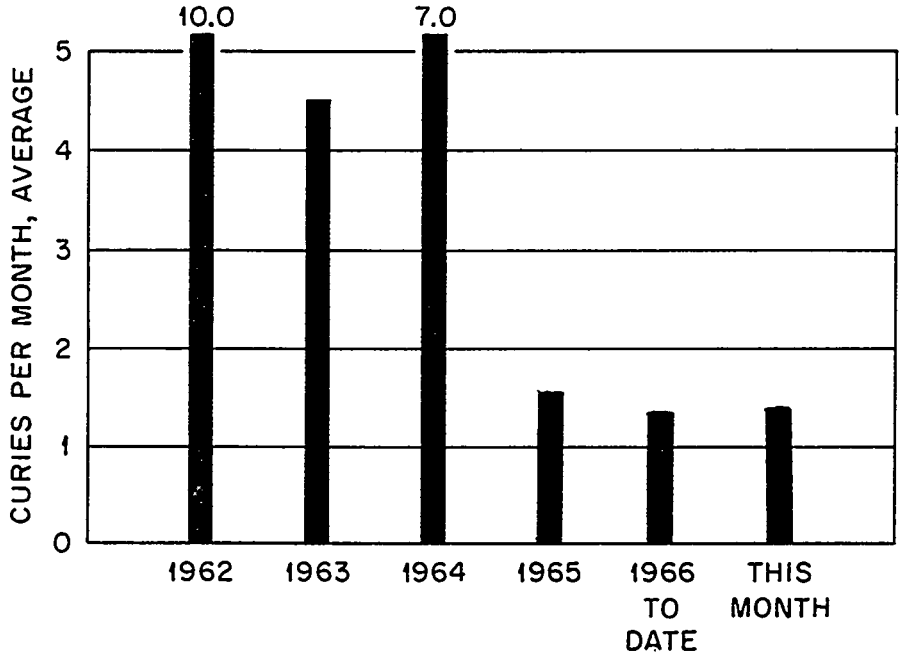

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

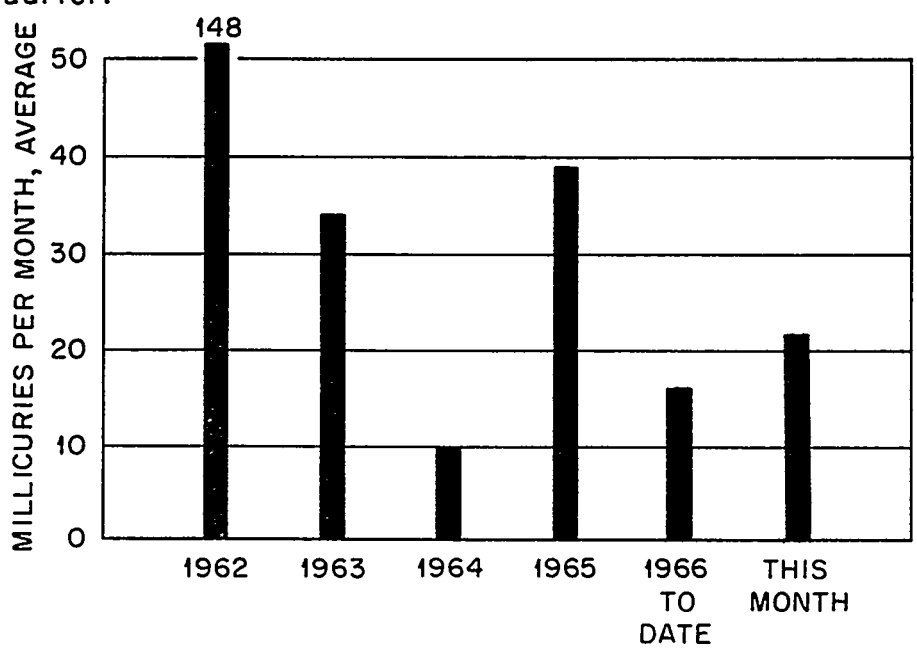

Fig. 8. Filterable Activity Released in Gaseous Waste

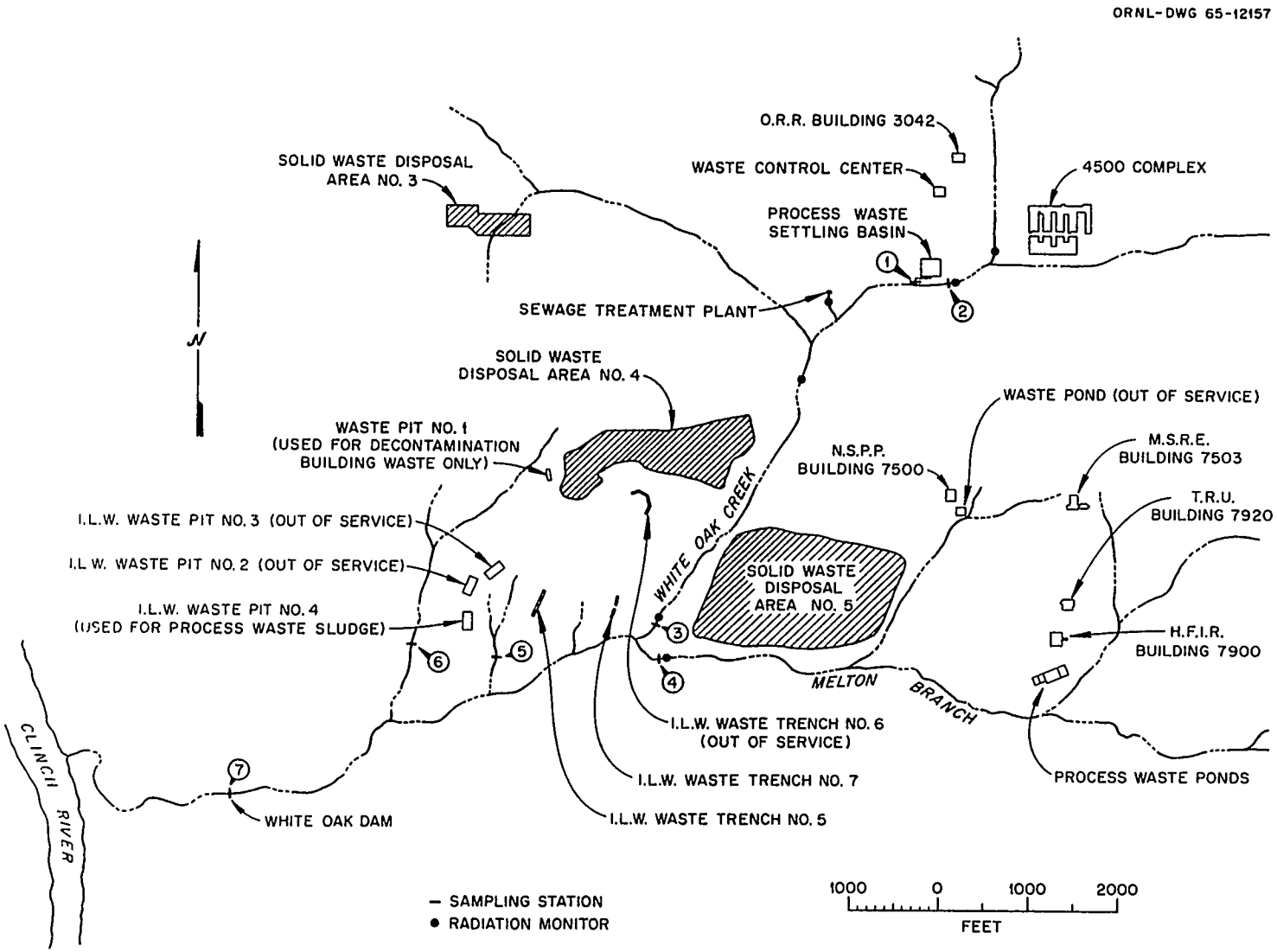

Fig. 9 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.46	None	0.53	None	0.99
Miscellaneous discharges from east end of plant	2	0.03	< 0.01	0.02	None	0.05
Total discharge from Bethel Valley Area	3	0.60	< 0.01	0.26	None	0.86
Total discharge from Melton Valley Area	4	0.03	< 0.01	0.01	None	0.04
East waste pit seepage	5	< 0.01	2.99	0.14	0.77	3.90
West waste pit seepage	6	< 0.01	4.09	0.13	0.68	4.90
Total discharge from all sources	3,4,5,6	0.63	7.08	0.54	1.45	9.70
White Oak Dam to Clinch River (Health Physics measurement)	7	0.44	1.86	0.15	0.19	3.23

[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: 11.2×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.6×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.14	0.46	60
$^{103,106}Ru$	None	None	--
^{60}Co	0.06	None	100
^{137}Cs	0.93	0.53	43
Gross Beta Analysis	42 c/m/ml	11 c/m/ml	74

[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	0.68[b]	45.9	3.2	28.3
2.	Radioisotope Processing Area	6	0.17	11.5	2.1	18.6
3.	Buildings 3503 and 3508	9	0.25	16.9	2.0	17.7
4.	Buildings 3025 and 3026	5	0.14	9.5	1.9	16.8
5.	Building 3019	1	< 0.01	--	0.3	2.7
6.	Fission Products Development Laboratory	41	0.04	2.7	0.1	0.9
7.	Waste Evaporator, Building 2531	9	0.15	10.1	1.2	10.6
8.	Buildings 3525 and 3550	1	0.05	3.4	0.4	3.5
9.	Building 2026	0	--	--	0.1	0.9
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	0.02
Central Radioactive Gas Disposal Facilities	3039	1.26
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	0.09
HFIR	7911	< 0.01
Total activity in gases released		1.37

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

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FROM: L. C. Lasher

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David R. Hamrin 3/4/96
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 waste discharges was 0.60% of the maximum permissible concentration. The main contaminants were strontium and ruthenium, contributing 84.1% and 9.5%, respectively, to the percent of MPC_w. Figure 1 compares the river contamination on a monthly basis. The year-to-date concentration (2.1%) 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 radioactive discharge into White Oak Lake was 2.77 curies. The bulk of the activity was ruthenium (1.72 curies) and cobalt (0.52 curie) which seeped from the soil disposal areas. The strontium discharge was 0.37 curie. Approximately 40% (0.15 curie) of the strontium release was apparently leached from the White Oak Creek bed. The release from the process waste system amounted to 0.16 curie; an additional 0.05 curie was released by the Melton Valley drainage system. The cesium discharge was 0.16 curie; virtually all of this activity was released from the process waste system. A summary of creek monitoring data is shown in Table 1. Figures 2 and 3 compare waste releases on a monthly basis.

Process Waste

A total of 8.9 million gallons of low-level waste was chemically treated at the Waste Treatment Plant. Although an improvement was noted, decontamination achieved by the plant was below normal - 74%

of the gross activity was removed. A summary of plant operations 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 Creek is shown in Figure 3. Figure 4 compares the strontium releases from the process waste system, and the volumes of waste handled by the system are shown in Figure 5.

Intermediate Level Waste

The evaporator operated at an average rate of 319 gph. The operation was slowed down by scale build-up in the evaporator vessel, which required extensive acid rinsing. In addition, four air-operated steam control valves failed during the month. A table of significant operating data is given below:

	Gallons
Total volume generated	240,000
Volume transferred to evaporator	237,000
Volume of concentrate returned to tank farm	17,000
Tank farm free space at the beginning of month	343,000
Tank farm free space at end of month	323,000

Main contributors to the system were as follows:

	Gallons
Building 3019	70,000
Fission Products Development Laboratory	45,000
Reactor Complex	25,000
4500 Complex	22,000
Radioisotopes Processing Area	17,000

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

GASEOUS WASTE

The radioactive waste discharge from the ORNL stacks amounted to 1.11 curies. Virtually all of this activity was gaseous ^{131}I. A total of 9 millicuries of filterable activity (^{137}Cs) was released. Figure 7 and 8 compare the gaseous waste releases on a monthly basis.

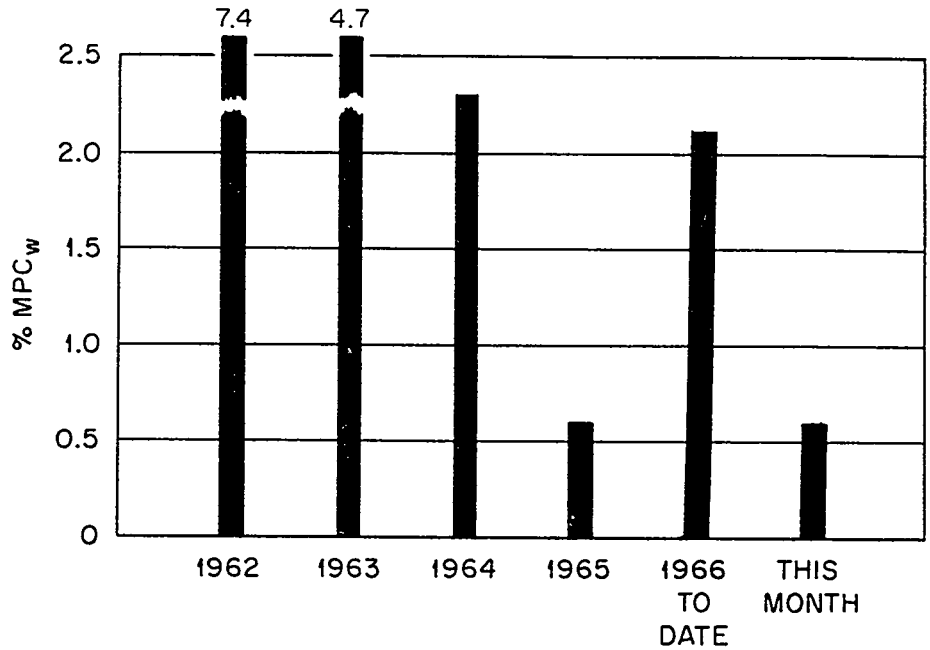

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

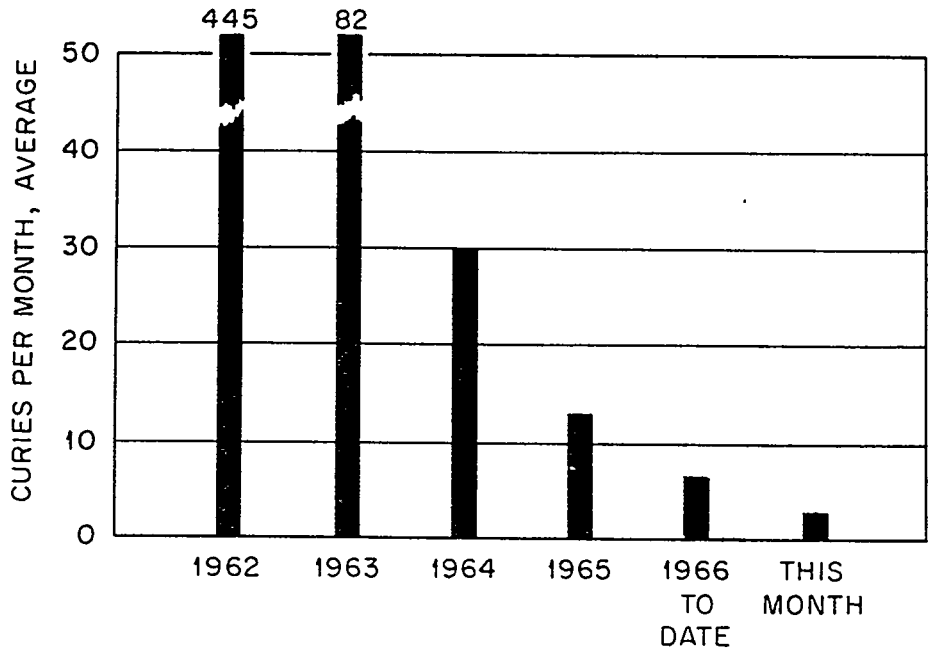

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

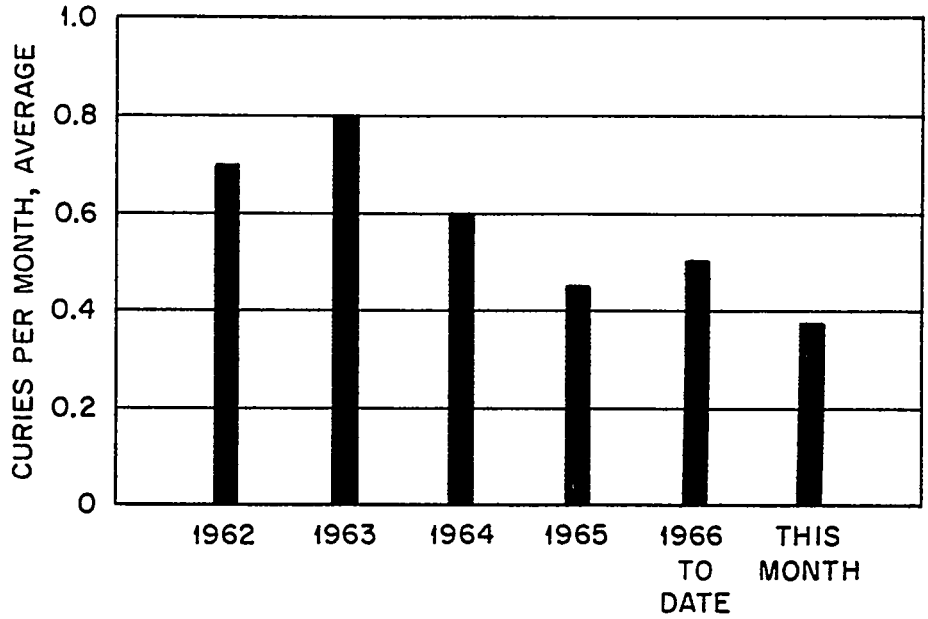

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

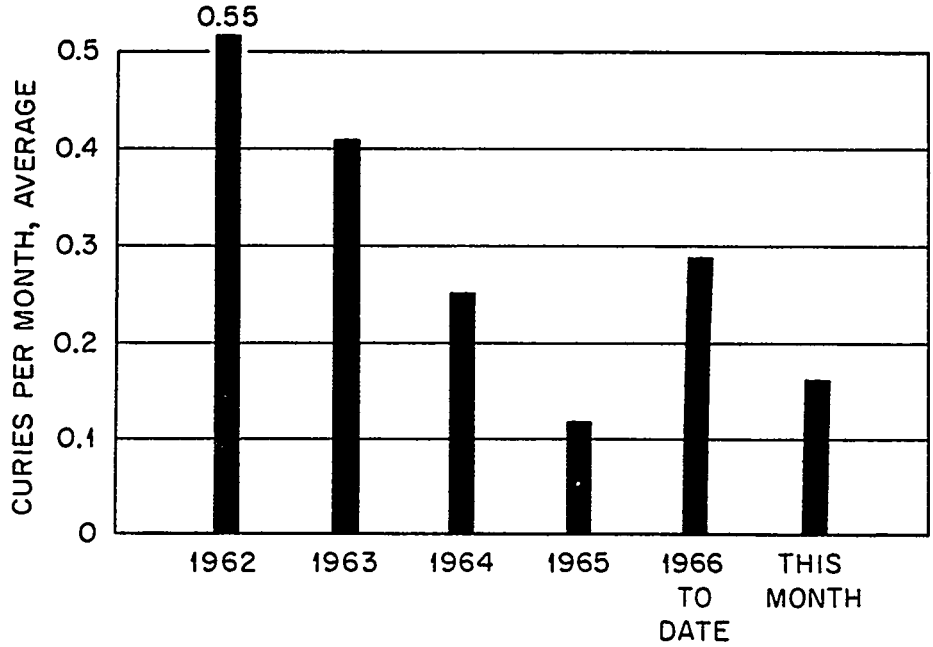

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

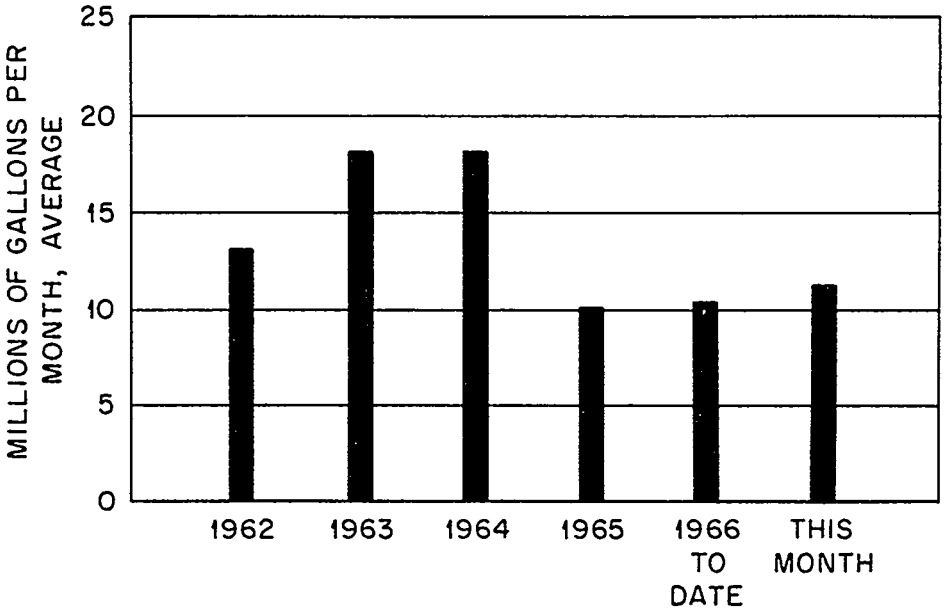

Fig. 5. Process Waste Volumes

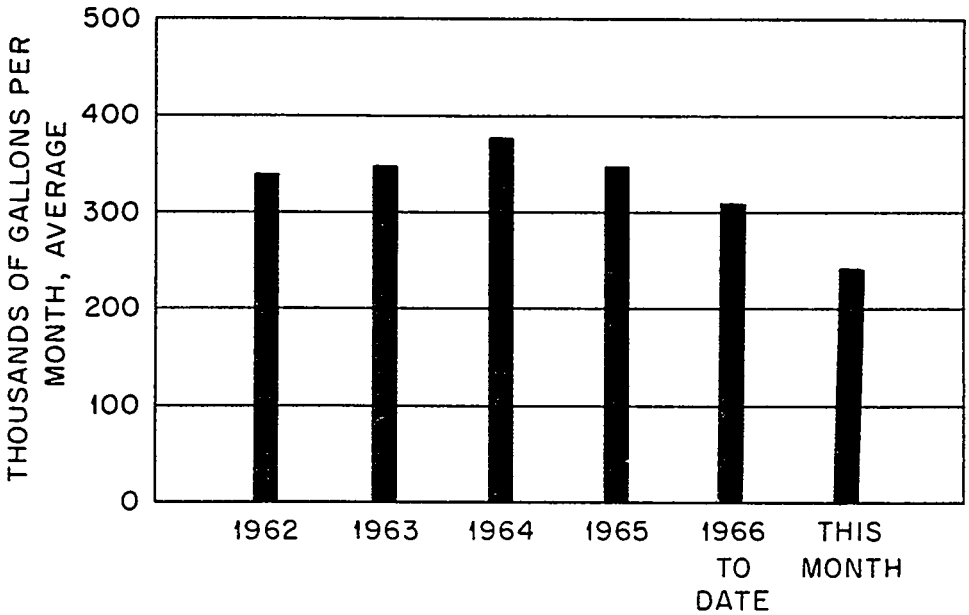

Fig. 6. Intermediate Level Waste Volumes

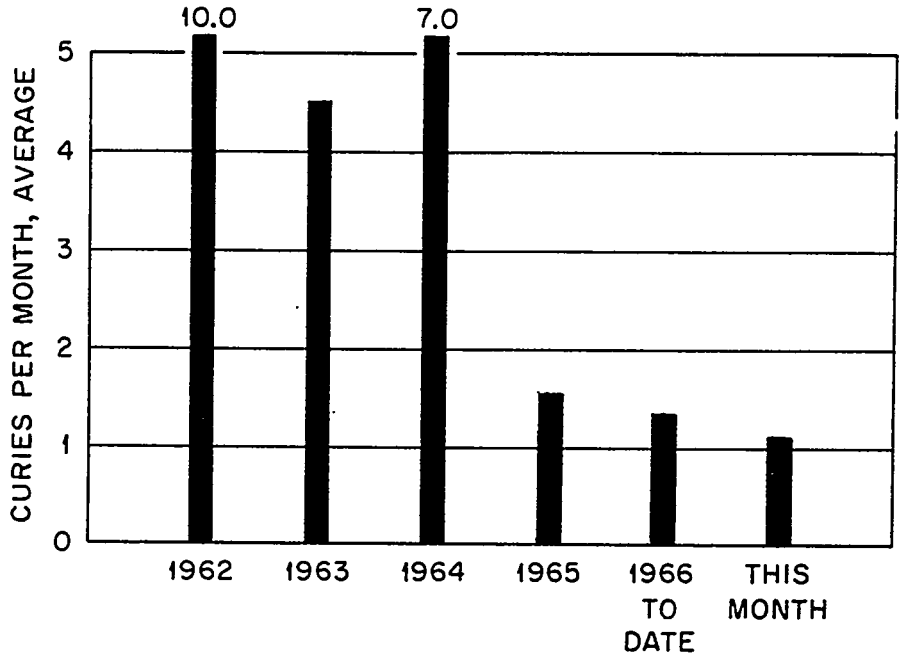

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

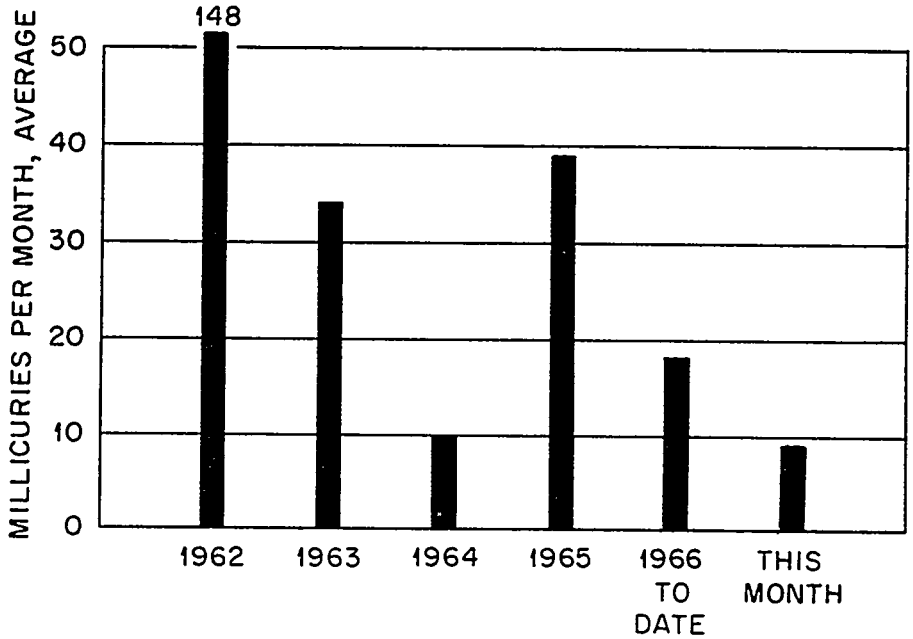

Fig. 8. Filterable Activity Released in Gaseous Waste

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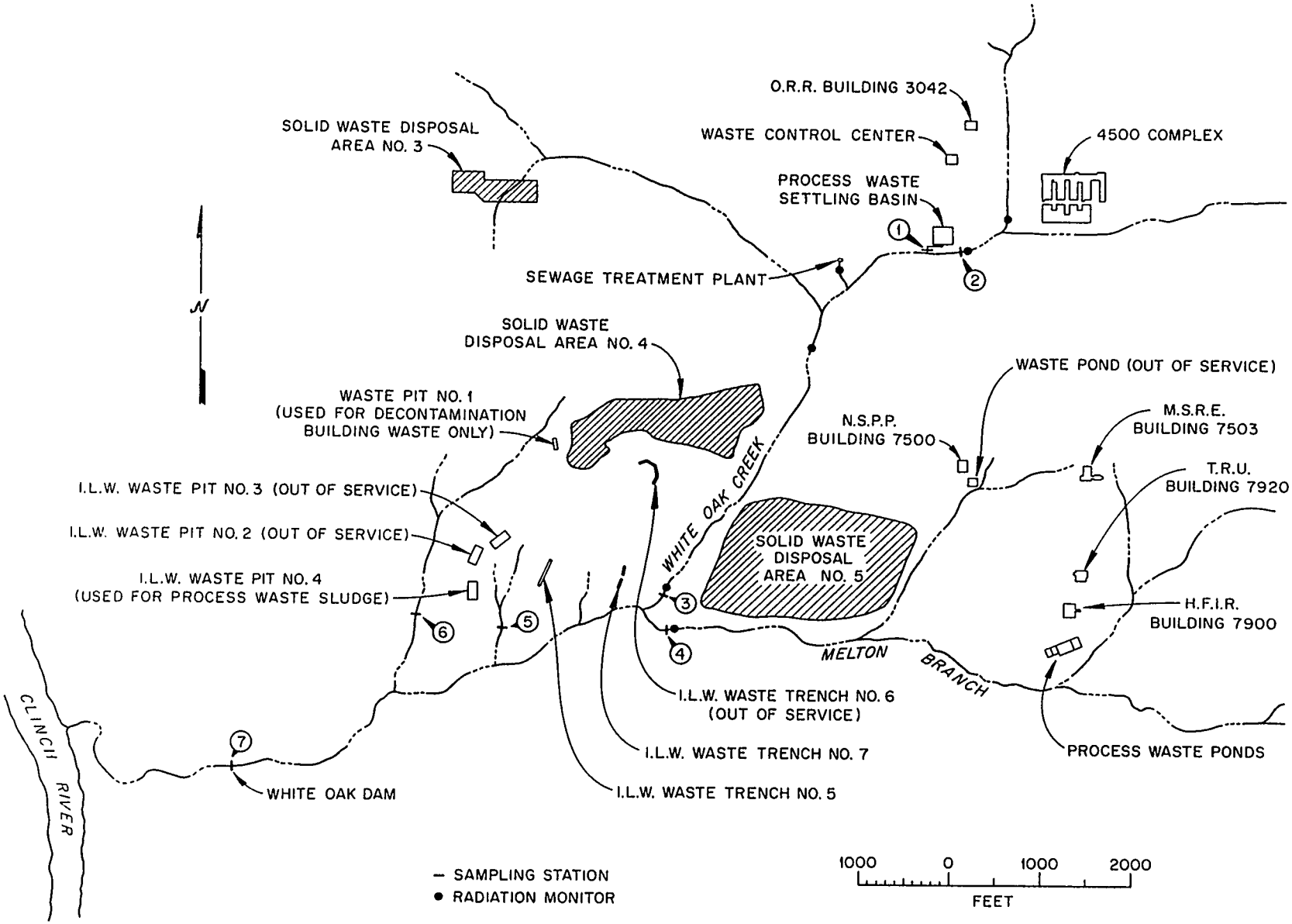

TABLE 1

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	0.16	None	0.39	None	0.55
Miscellaneous discharges from east end of plant	2	0.01	0.01	0.02	None	0.04
Total discharge from Bethel Valley Area	3	0.32	0.02	0.09	None	0.43
Total discharge from Melton Valley Area	4	0.05	0.01	< 0.01	None	0.06
East waste pit seepage	5	< 0.01	1.26	0.06	0.42	1.74
West waste pit seepage	6	< 0.01	0.43	0.01	0.10	0.54
Total discharge from all sources	3,4,5,6	0.37	1.72	0.16	0.52	2.77
White Oak Dam to Clinch River (Health Physics measurement)	7	0.37	2.16	0.05	0.28	3.50

[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: 8.9×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 13.5×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.55	0.16	71
$^{103,106}Ru$	None	--	--
^{60}Co	0.03	None	100
^{137}Cs	0.89	0.39	56
Gross Beta Analysis	42 c/m/ml	11 c/m/ml	74

[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	0.60[b]	35.3	2.62	23.4
2.	Radioisotope Processing Area	10	0.23	13.5	1.69	15.1
3.	Buildings 3503 and 3508	5	0.15	8.8	2.24	20.0
4.	Buildings 3025 and 3026	2	0.07	4.1	2.44	21.8
5.	Building 3019	0	--	--	0.16	1.4
6.	Fission Products Development Laboratory	39	0.13	7.7	0.25	2.3
7.	Waste Evaporator, Building 2531	34	0.52	30.6	1.14	10.2
8.	Buildings 3525 and 3550	0	--	--	0.49	4.4
9.	Building 2026	0	--	--	0.15	1.4
10.	Melton Valley Area	0	--	--	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	0.02
Central Radioactive Gas Disposal Facilities	3039	1.09
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		1.11

[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 0.28% of the MPC_w. The main contaminants were strontium and ruthenium, contributing 86.2% and 7.9%, respectively, to the percent of MPC_w. Figure 1 compares the river contamination on a monthly basis. The comparatively high year-to-date concentration resulted from abnormally low river flows early in the year. Data pertaining to White Oak Dam and the Clinch River were provided by the Health Physics Division.

White Oak Creek Monitoring

A total of 3.03 curies of radioactive waste was discharged into White Oak Lake. More than one-half of the activity was ruthenium (1.75 curie) which seeped from the soil disposal areas. Smaller amounts of cesium (0.12 curie) and cobalt (0.49 curie) were also released from this area. The total strontium release was 0.54 curie. Of this amount, 0.25 curie came from the process waste system and 0.21 curie from scouring of old contamination in the creek bed itself. The Melton Valley system contributed 0.08 curie. The origin of the Melton Valley release is being investigated.

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 basis.

Process Waste

A total of 7.9 million gallons of waste was chemically treated at the Waste Treatment Plant. The plant was by-passed for a period of 3 days for the purpose of cleaning sludge from the plant mixing and settling basins. Mechanical failures of a mixer and the sludge removal equipment reduced the efficiency of the operation; 76% 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. Figure 5 compares the volumes of waste handled.

Intermediate Level Waste

The evaporator operated at an average rate of 350 gph. A table of significant operating data is given below:

	Gallons
Total volume generated	191,000
Volume transferred to evaporator	260,000
Volume of concentrate returned to tank farm	17,000
Volume of concentrate transferred to shale fracturing	21,000
Tank Farm free space at beginning of month	361,000
Tank Farm free space at end of month	434,000

The main contributors of waste to the ILW system were as follows:

	Gallons
Building 3019	49,000
4500 Complex	40,000
Reactor Complex	29,000
Fission Products Development Laboratory	25,000
Radioisotopes Processing Area	13,000

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

Shale Fracturing Disposal of Intermediate-Level Waste, Injections 1A and 1B

The first deep-well disposal of intermediate-level waste, using the shale-fracturing method developed by the Health Physics Division, was made on December 12. Thirty-six-thousand gallons of evaporator-concentrated waste were injected into an 872-ft-deep fracture that had been previously used for the seventh experimental injection. It was followed on December 13 by a second injection of 26,000 gal, also into the same fracture.

The injections were made in a routine manner with no difficulty. The exposure of operators to radiation was kept well below the weekly tolerance levels. Personnel from the Halliburton Company assisted.

Two injections, rather than one large one, were made because of the limited capacity of the waste storage tanks at the well site. Storage tanks that are now being installed will accomodate single injections of 80,000 gal. It is estimated that no more than two 80,000-gal injections will be required each year to dispose of all of ORNL's intermediate-level waste after the present backlog of waste is

eliminated.

The radioisotopes contained in the waste in significant amounts in both injections were 19,950 curies of cesium, 21 curies of ruthenium, 8 curies of cobalt, and 3 curies of strontium. The materials used in the injected grout mixture and other significant data are given below.

Liquids		Gallons
Volume of waste		62,000
Total volume of water used for start-up and clean-up		3,800
Tri-butyl phosphate (antifoam agent)		100
Total volume of liquid injected		65,900
Solids	**Weight, lb.**	**lb/gal**
Portland cement, Type 2	160,530	2.44
Fly ash	160,530	2.44
Attapulgite	73,730	1.12
Grundite	39,060	0.59
D-glucone lactone	150	0.002
Total	434,000	6.592

The average waste pumping rate during both injections was 200 gpm. The well pressure during the injections varied between 1,600 psi and 1,900 psi.

The next injection of waste will be made in the spring of 1967 after the installation of the waste tanks and other improvements to the plant are completed.

Gaseous Waste

The ORNL stacks discharged a total of 2.04 curies of radioactivity. The activity was primarily ^{131}I. The particulate activity (primarily ^{137}Cs) amounted to 2 millicuries. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

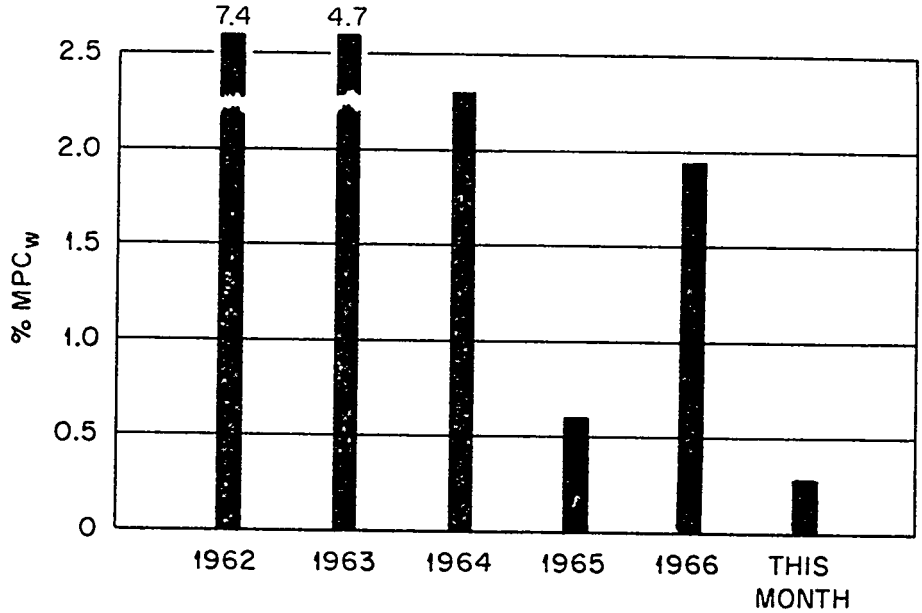

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

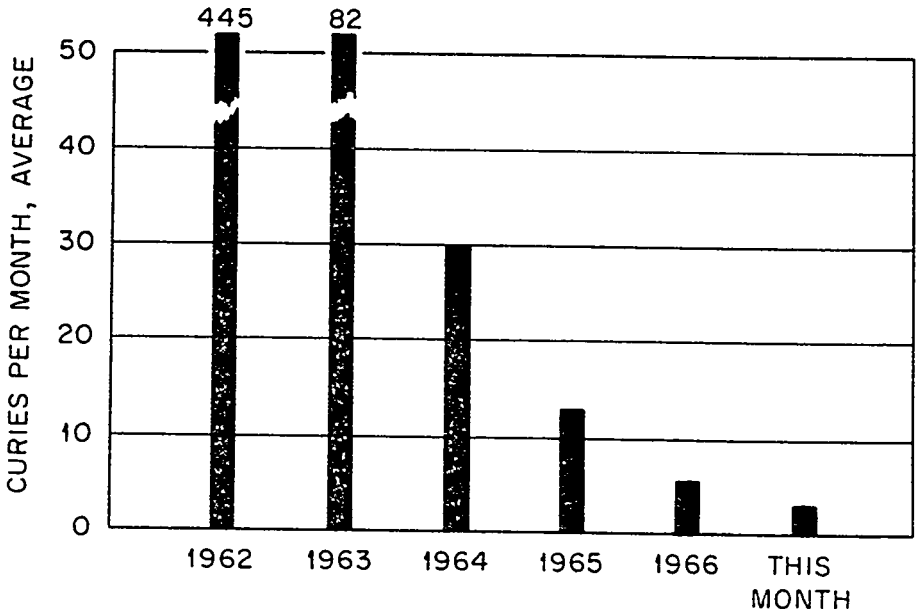

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

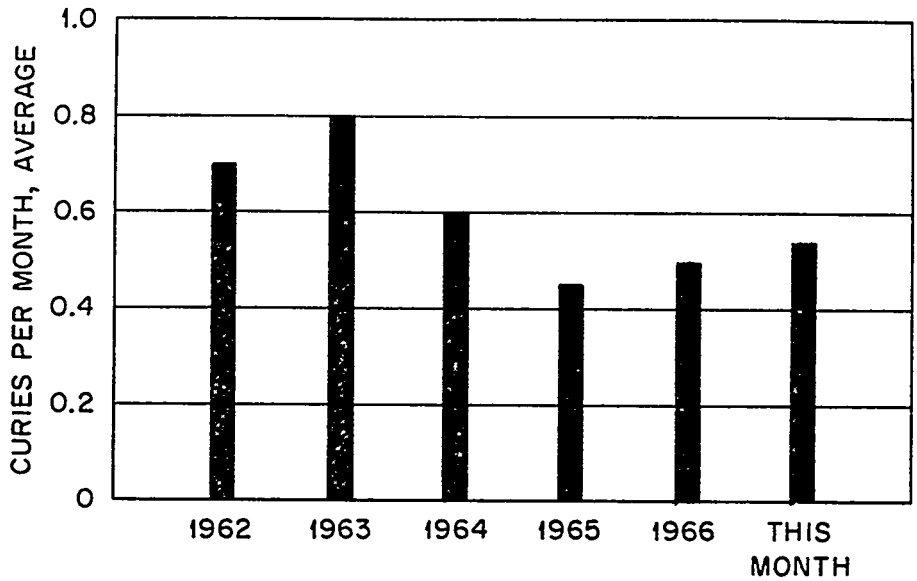

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

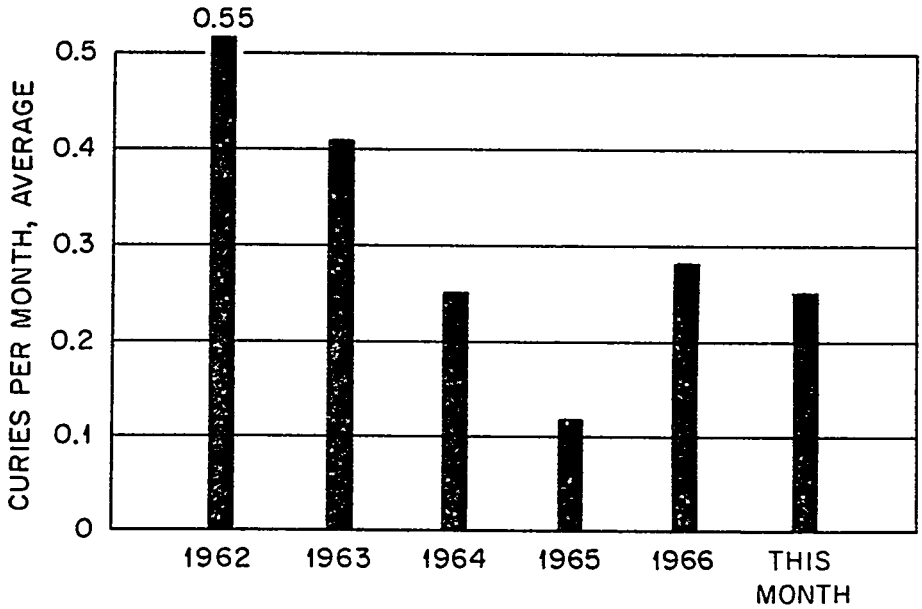

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

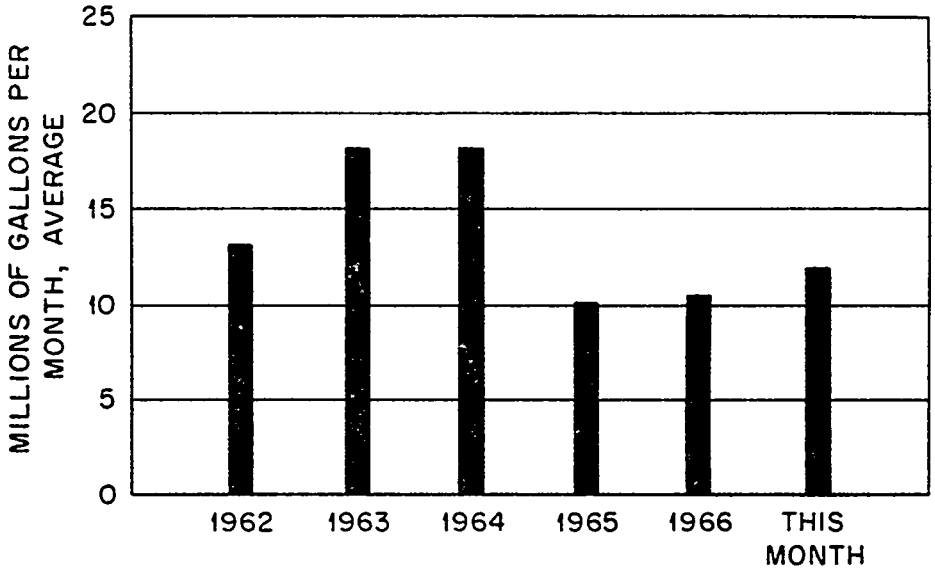

Fig. 5. Process Waste Volumes

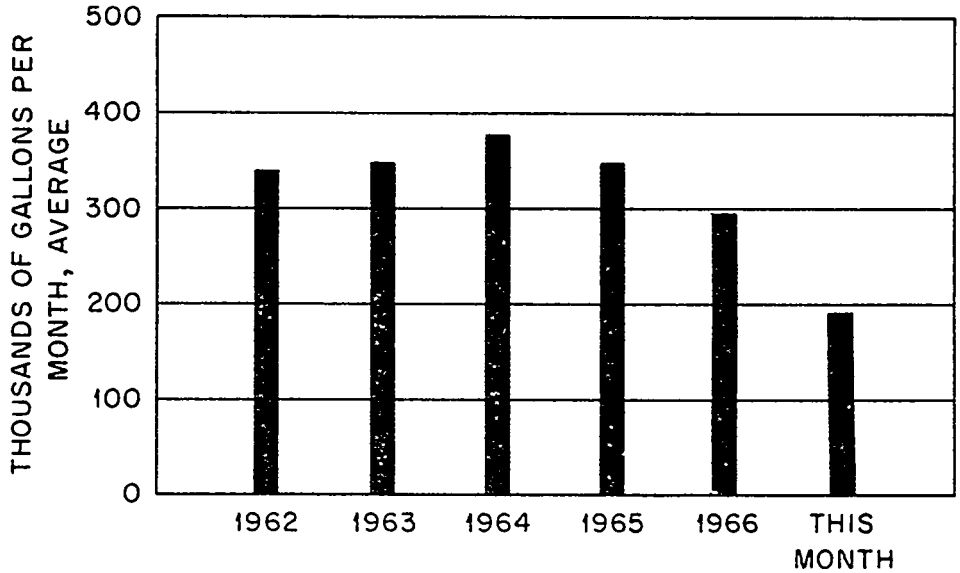

Fig. 6. Intermediate Level Waste Volumes

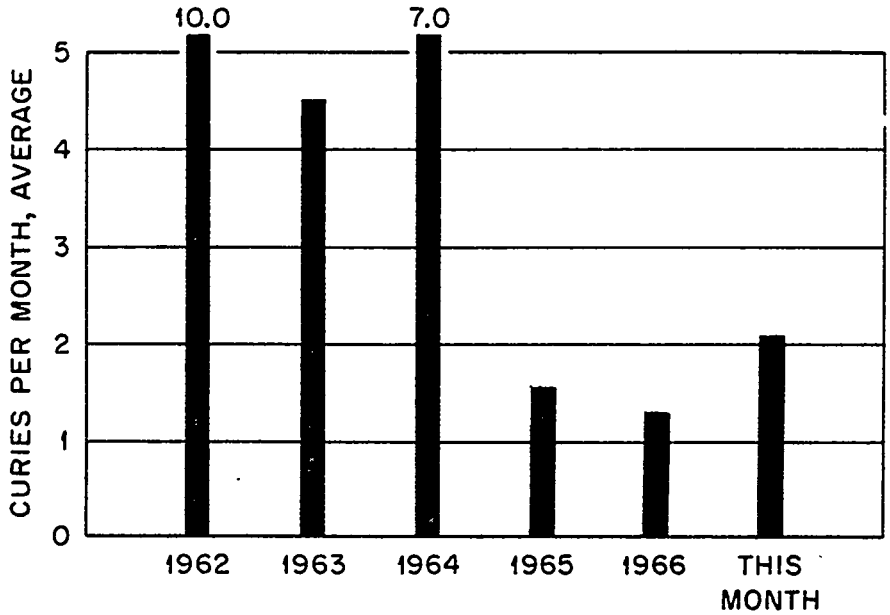

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species) ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

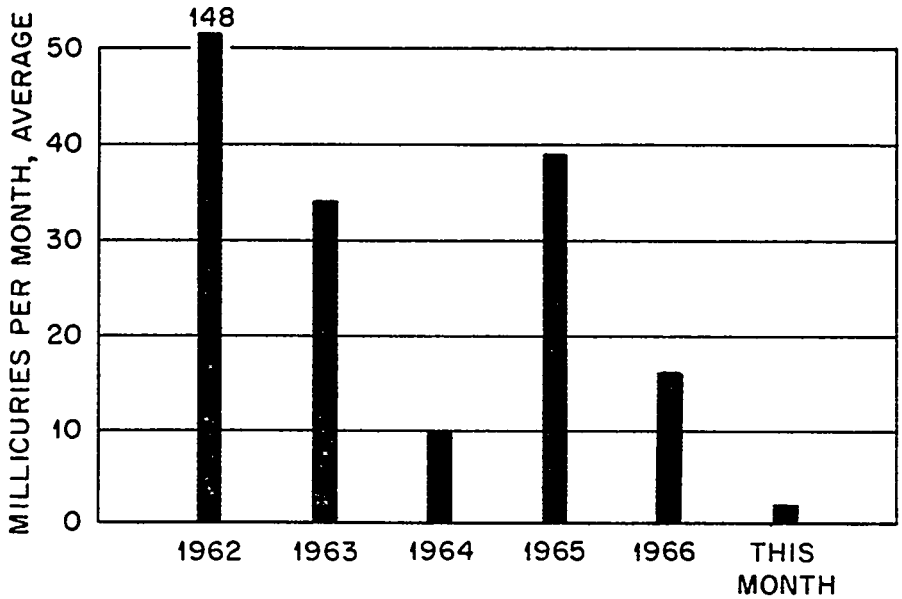

Fig. 8. Filterable Activity Released in Gaseous Waste

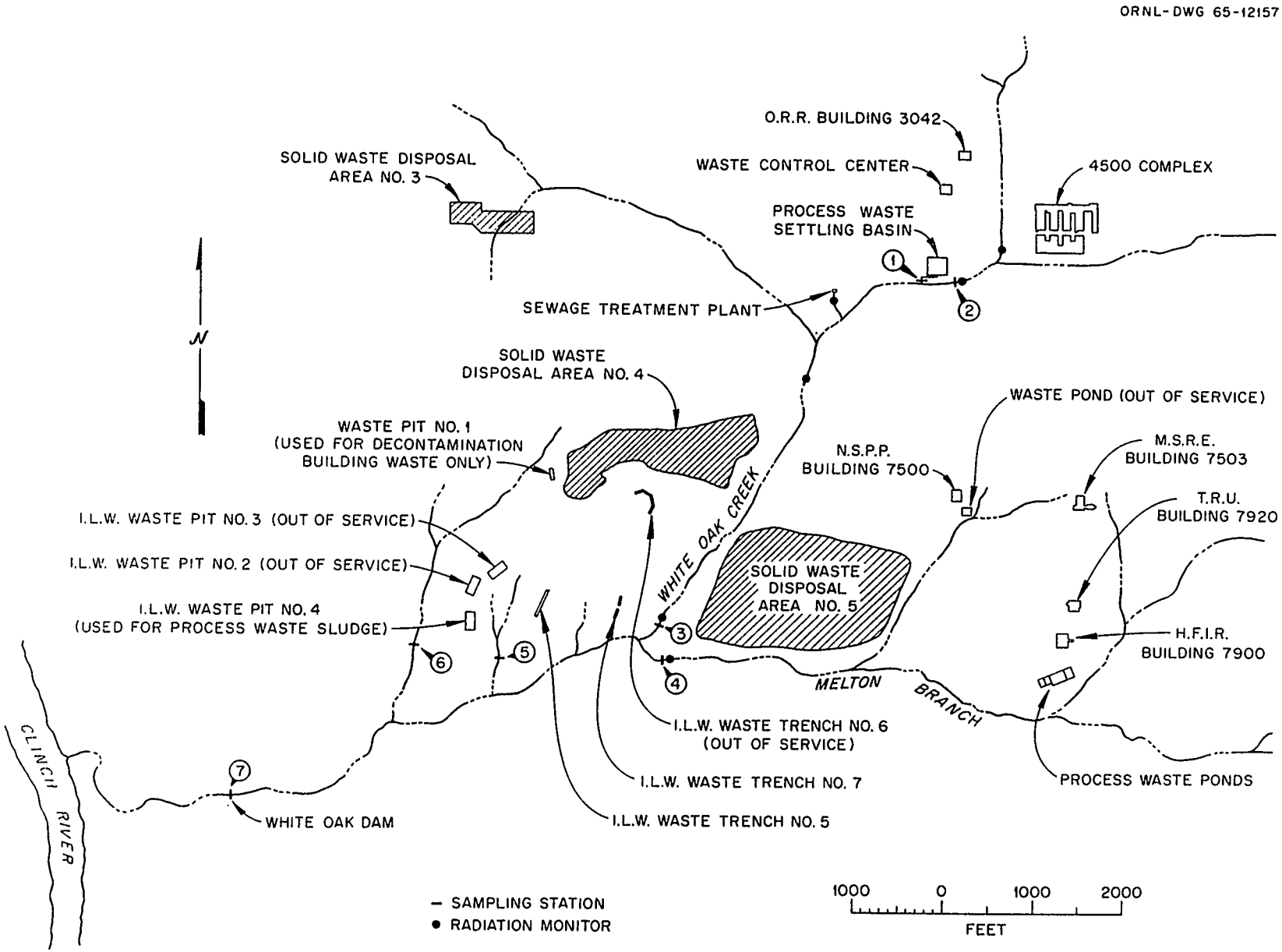

Fig. 9 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.25	None	0.19	0.02	0.46
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	None	< 0.01
Total discharge from Bethel Valley Area	3	0.46	< 0.01	0.12	None	0.58
Total discharge from Melton Valley Area	4	0.08	< 0.01	< 0.01	None	0.09
East waste pit seepage	5	< 0.01	1.31	0.11	0.42	1.84
West waste pit seepage	6	< 0.01	0.44	0.01	0.07	0.52
Total discharge from all sources	3,4,5,6	0.54	1.75	0.24	0.49	3.03
White Oak Dam to Clinch River (Health Physics measurement)	7	0.27	2.19	0.05	0.10	2.90

[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: 7.9×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.4×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	0.68	0.25	63
$^{103,106}Ru$	None	None	--
^{60}Co	0.03	0.02	33
^{137}Cs	0.21	0.19	10
Gross Beta Analysis	29 c/m/ml	7 c/m/ml	76

[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]	0.42[b]	47.2	2.84	24.2
2.	Radioisotope Processing Area	2	0.04	4.5	1.45	12.3
3.	Buildings 3503 and 3508	4	0.13	14.6	2.33	19.8
4.	Buildings 3025 and 3026	1	0.03	3.4	2.36	20.1
5.	Building 3019	0	--	--	0.21	1.8
6.	Fission Products Development Laboratory	33	0.14	15.7	0.31	2.6
7.	Waste Evaporator, Building 2531	7	0.12	13.5	1.31	11.1
8.	Buildings 3525 and 3550	1	0.01	1.1	0.92	7.8
9.	Building 2026	9	< 0.01	--	0.03	0.3
10.	Melton Valley Area	0	--	--	None treated	

[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	0.06
Central Radioactive Gas Disposal Facilities	3039	1.62
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	0.18
HFIR	7911	0.18
Total activity in gases released		2.04

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

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ORNL
CENTRAL FILES NUMBER
67-3-39

DATE: March 20, 1967

COPY NO. 18

SUBJECT: Radioactive Waste Disposal Operations Report for the month of January 1967

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R. Hamrin 3/4/96
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 waste discharges was 0.16% of MPC_w. The very low concentration of activity was due mainly to a high river flow. The main contaminants were strontium and ruthenium, contributing 77% and 14% respectively, 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 2.63 curies of beta-gamma activity was released into White Oak Lake. About one-half of this activity was ruthenium which came from the soil disposal areas. The cobalt and cesium releases were 0.59 curie and 0.44 curie, respectively. Most of the cobalt seeped from the soil disposal areas. The bulk of the cesium was released from the process waste system. The strontium release was 0.51 curie; practically all of it came from the Bethel Valley area.

Approximately 5 curies of alpha activity (^{242}Cm and ^{244}Cm) were also released into White Oak Lake this month when a leak in the ILW waste line from Building 3508 seeped into a process waste line. The alpha activity did not significantly affect the percent of the MPC_w in the Clinch River.

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

Process Waste

A total of 12.5 million gallons of waste was chemically treated this month. Decontamination (beta activity) achieved by the plant was 79%. 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 on a monthly basis. Figure 5 compares the volumes of waste handled.

Intermediate Level Waste

The evaporator operated at an average rate of 327 gph. It was frequently shut down, with a resulting loss in tank farm free space, to permit replacement and modification of the leaking, underground waste-condensate drain line. A summary of operating data is given below.

	Gallons
Total volume generated	296,000
Volume transferred to evaporator	243,000
Volume of concentrate returned to tank farm	13,000
Tank Farm free space at beginning of month	434,000
Tank Farm free space at end of month	368,000

The main contributors to the ILW system were as follows:

	Gallons
Building 3019	50,000
4500 Complex	39,000
Fission Products Development Laboratory	27,000
Reactor Complex	22,000
Radioisotopes Processing Area	10,000

About 50,000 gallons of alpha contaminated process waste (average alpha activity, 400 counts min^{-1} ml^{-1} was pumped into the ILW system for concentration and storage. This activity came from a leaking ILW transfer line.

Gaseous Waste

A total of 0.63 curie of gaseous radioactivity, identified as ^{131}I, was discharged from the ORNL stacks. The particulate discharge was less than one millicurie. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

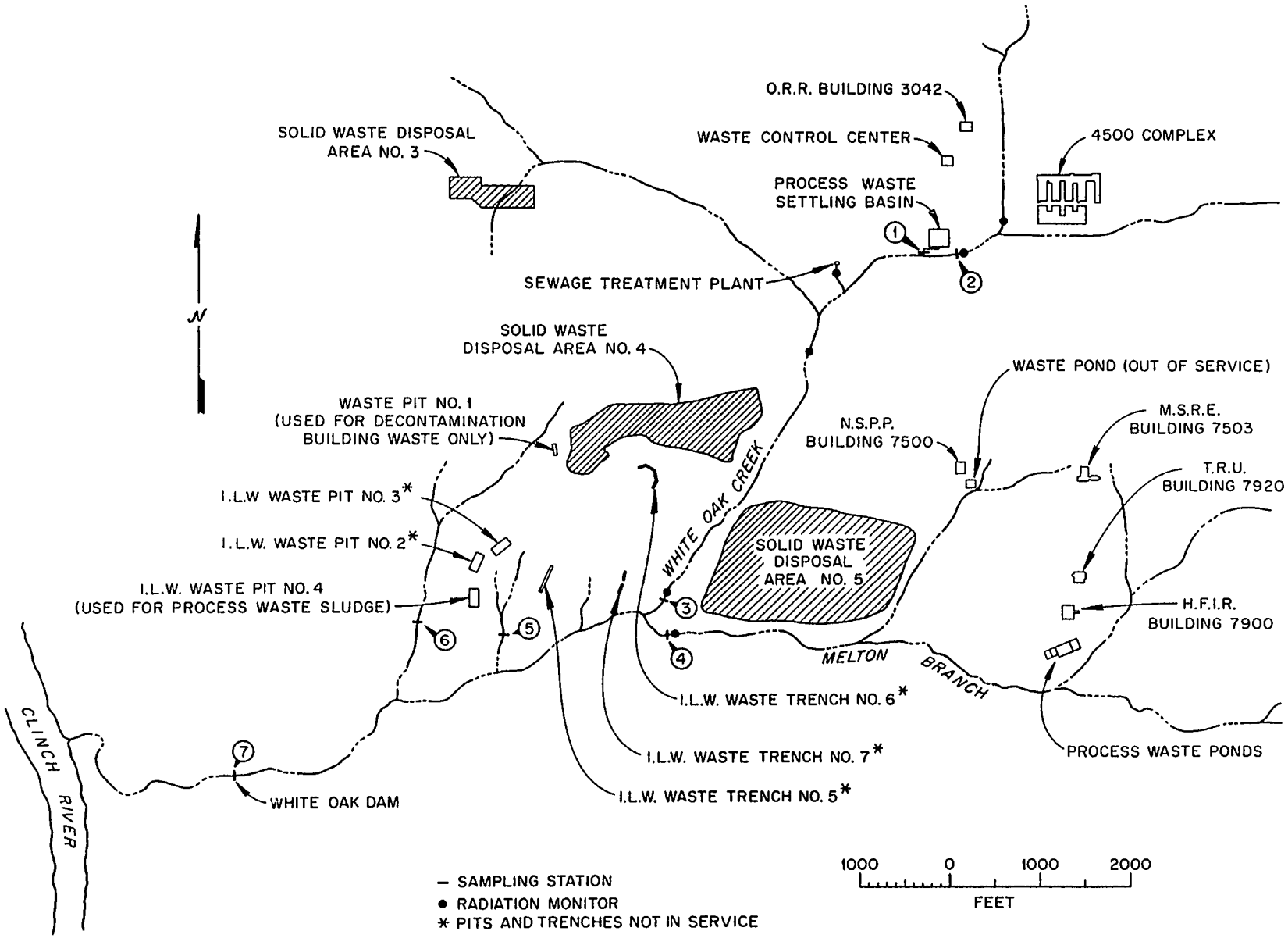

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

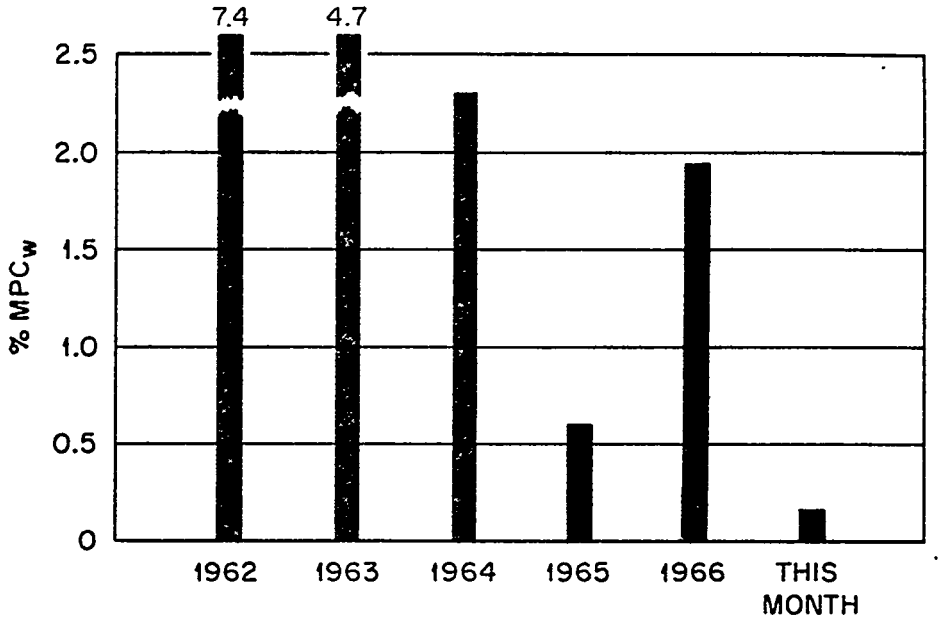

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges (Based on Health Physics Measurements at White Oak Dam)

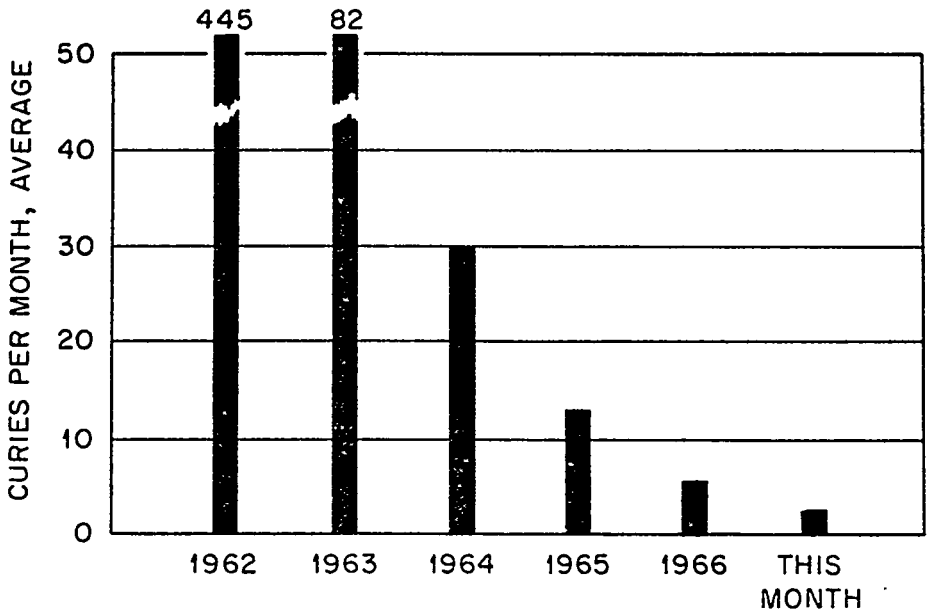

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

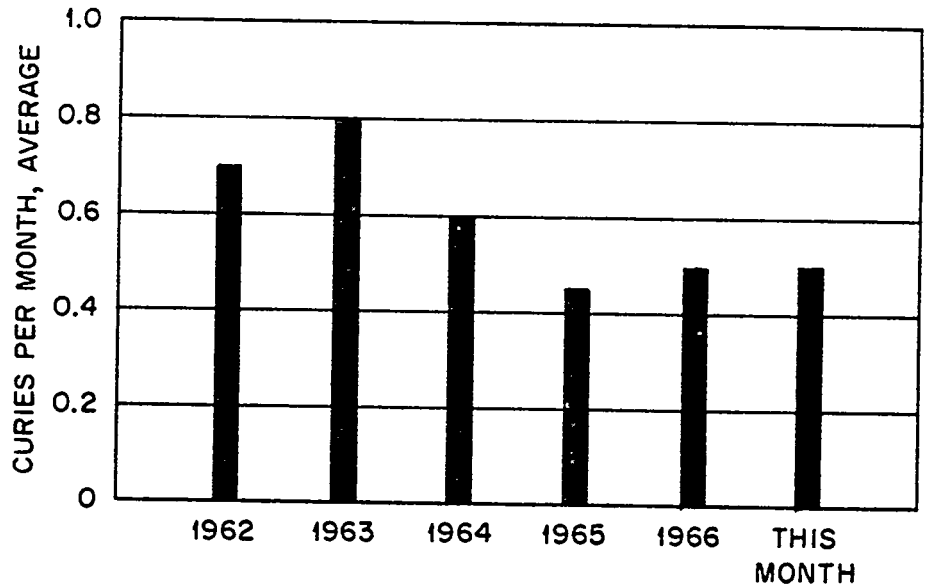

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9)

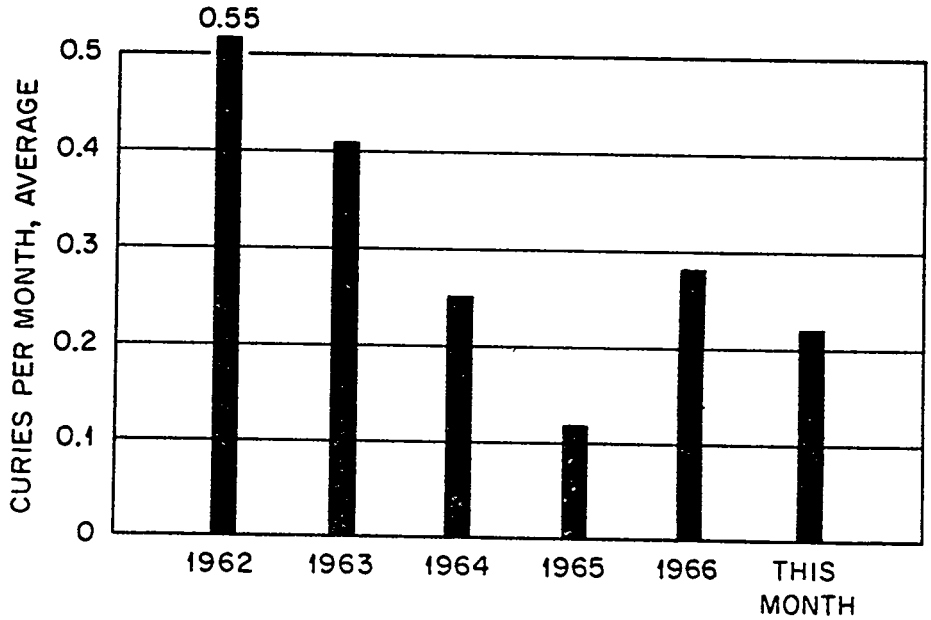

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek

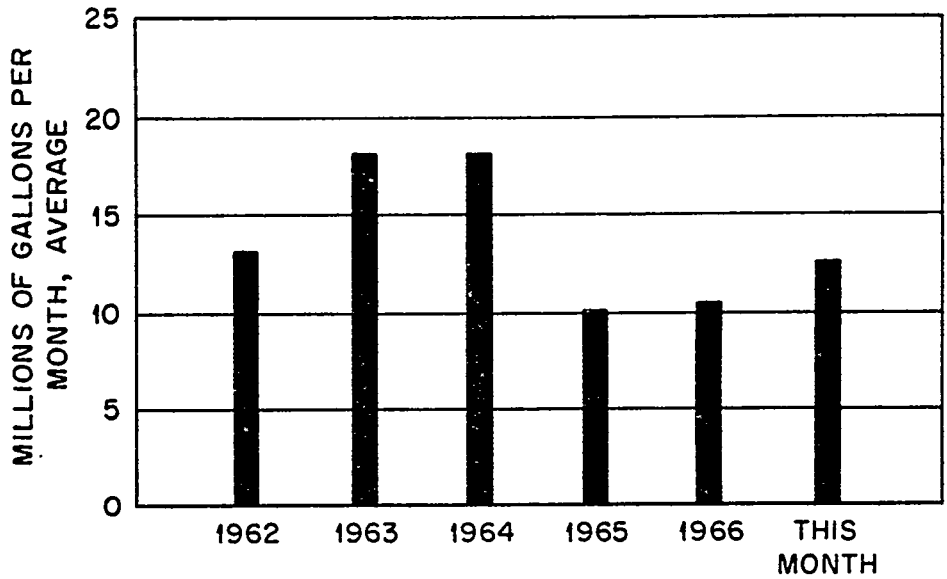

Fig. 5. Process Waste Volumes

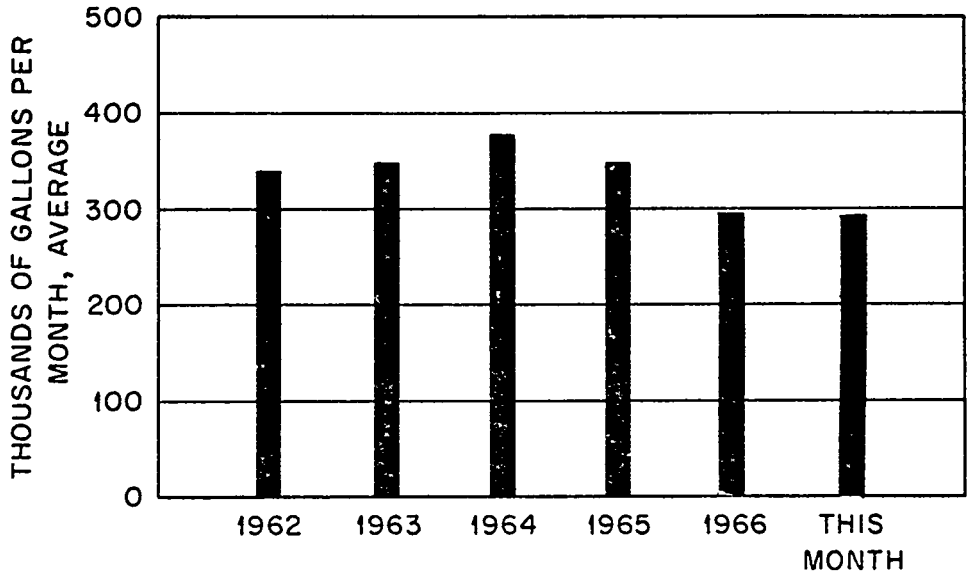

Fig. 6. Intermediate Level Waste Volumes

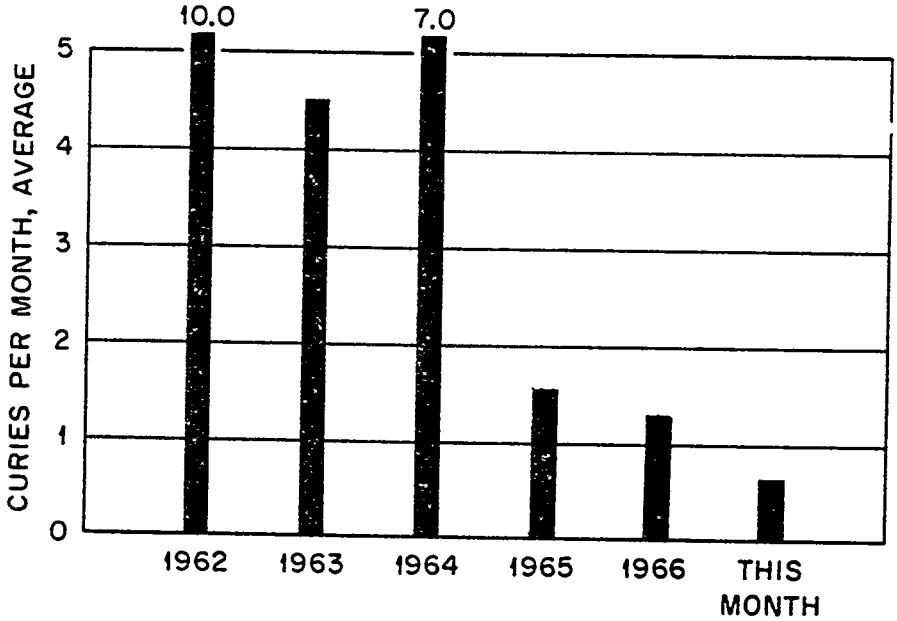

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species) ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

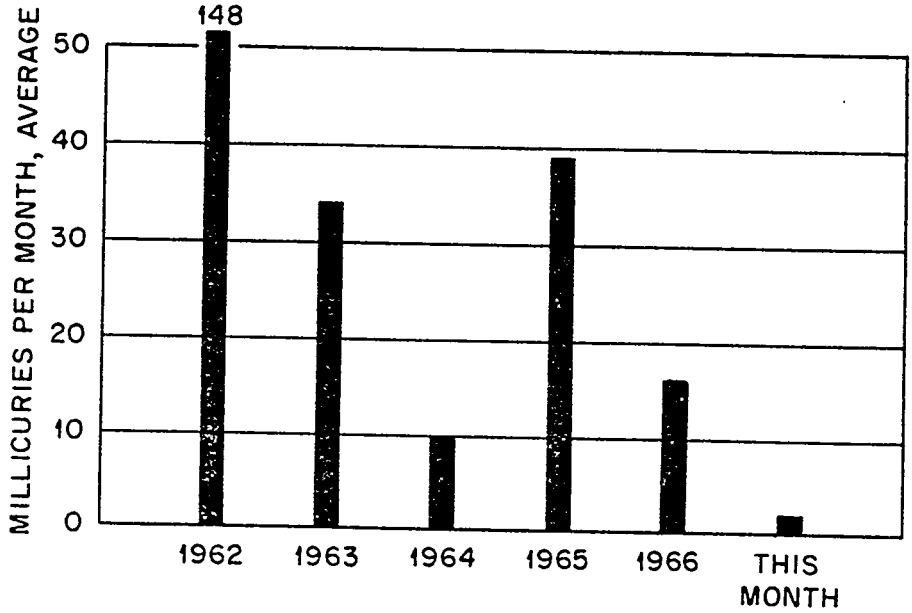

Fig. 8. Filterable Activity Released in Gaseous Waste

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	0.22	0.04	0.21	None	0.47
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	None	< 0.01
Total discharge from Bethel Valley Area	3	0.44	< 0.01	0.39	0.08	0.91
Total discharge from Melton Valley Area	4	0.07	< 0.01	< 0.01	0.11	0.18
East waste pit seepage	5	< 0.01	0.88	0.04	0.36	1.28
West waste pit seepage	6	< 0.01	0.21	0.01	0.04	0.26
Total discharge from all sources	3,4,5,6	0.51	1.09	0.44	0.59	2.63
White Oak Dam to Clinch River (Health Physics measurement)	7	0.23	3.53	0.10	0.40	5.12

[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: 12.5×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.09	0.22	80
$^{103,106}Ru$	None	0.04	--
^{60}Co	None	None	--
^{137}Cs	0.63	0.21	67
Gross Beta Analysis	34 c/m/ml	7 c/m/ml	79

[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	15[b]	0.56[b]	61.5	2.76	22.1
2.	Radioisotope Processing Area	3	0.07	7.7	1.68	13.5
3.	Buildings 3503 and 3508	2	0.06	6.6	2.07	16.6
4.	Buildings 3025 and 3026	2	0.06	6.6	2.24	18.0
5.	Building 3019	2	0.03	3.3	1.22	9.8
6.	Fission Products Development Laboratory	23	0.01	1.1	0.04	0.3
7.	Waste Evaporator, Building 2531	5	0.11	12.1	1.55	12.4
8.	Buildings 3525 and 3550	1	0.01	1.1	0.88	7.1
9.	Building 2026	1	< 0.01	--	0.03	0.2
10.	Melton Valley Area	0	--	--	0	--

[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	0.48
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		0.63

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

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FROM: L. C. Lasher

This document has been approved for release to the public by

Technical Information Officer
ORNL Site

3/4/96
Date

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.22% of MPC_W. The main contaminants were strontium and ruthenium, contributing 93.85% and 3.08%, respectively, 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

The ORNL radioactive waste discharge into White Oak Lake amounted to 3.01 curies. Over one-half of this discharge was ruthenium (1.13 curies) and cobalt (0.52 curie) which seeped from the soil disposal areas. Cesium activity, released primarily from the process waste system, amounted to 0.61 curie. The strontium discharge was 0.75 curie; 0.27 curie of this amount was released from the process waste system. The remaining 0.48 curie is attributed to the creek bed and a number of minor sources along the drainage 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

Approximately 12 million gallons of waste were chemically treated during the period. 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 system on a monthly basis. Figure 5 compares the volumes of

waste handled.

Intermediate Level Waste

The evaporator operated at an average rate of 382 gph. A summary of operating data is given below:

	Gallons
Total volume generated	261,000
Volume transferred to evaporator	284,000
Volume of concentrate returned to tank farm	16,000
Volume of concentrate transferred to hydrofracturing site	77,000
Tank farm free space at the beginning of month	450,000
Tank farm free space at the end of month	534,000

The main contributors to the ILW system were as follows:

	Gallons
Building 3019	64,000
4500 Complex	34,000
High Flux Isotope Reactor	28,000
Fission Products Development Laboratory	21,000
Reactor Complex	16,000
Radioisotopes Processing Area	15,000
Transuranium Processing Plant	11,000

Gaseous Waste

The ORNL stacks discharged a total of 1.37 curies of radioactivity this month. Virtually all of this activity was gaseous ^{131}I. The particulate activity amounted to 1 millicurie. Figures 7 and 8 compare the gaseous waste releases on a monthly basis. Individual stack releases are summarized in Table 4.

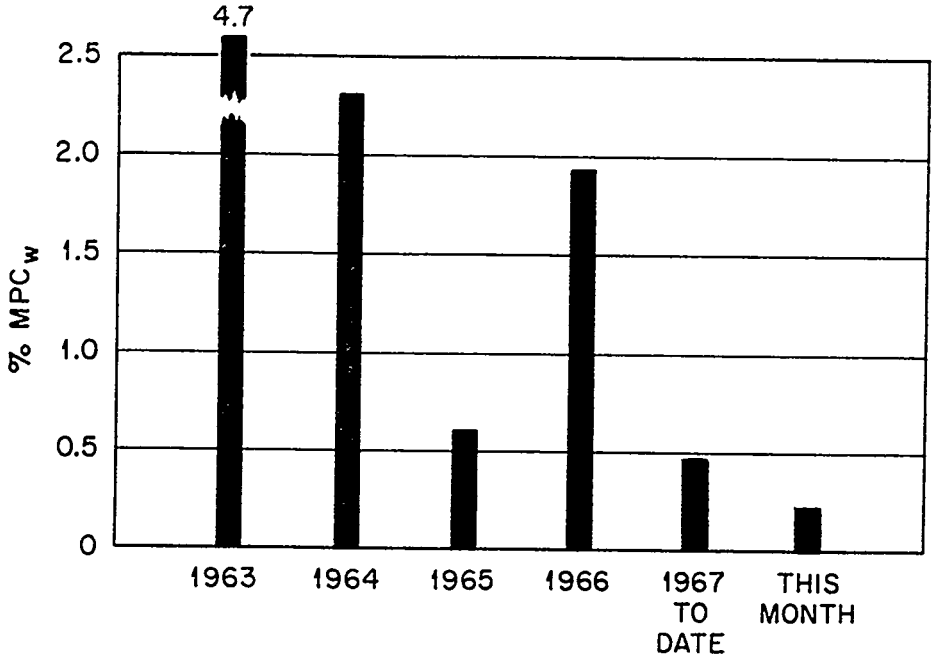

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

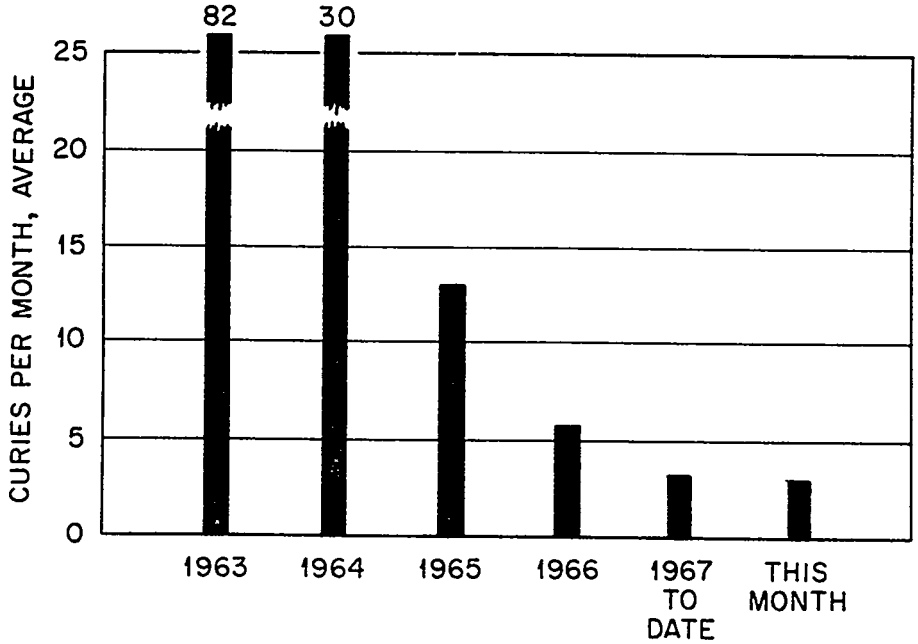

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

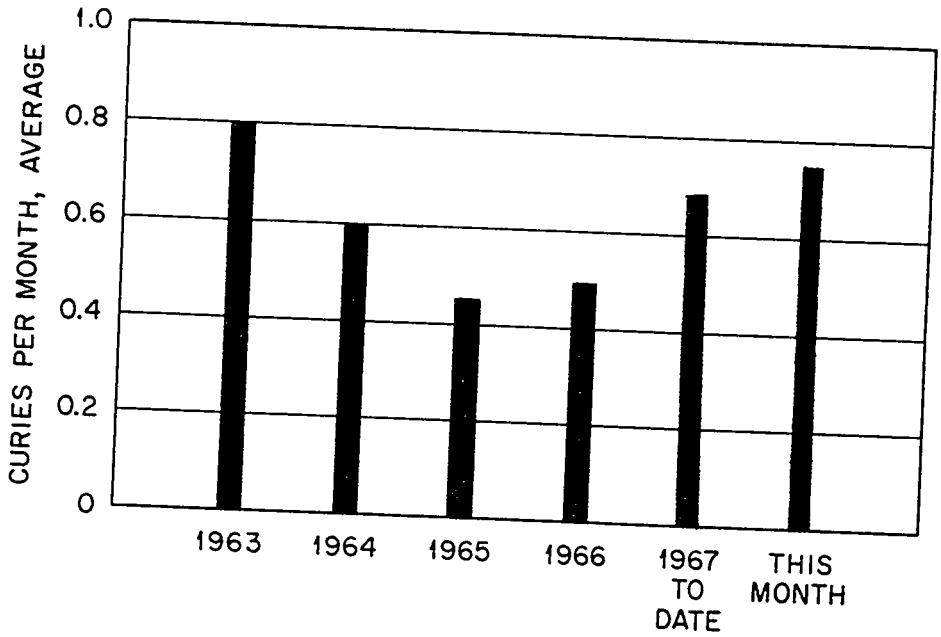

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

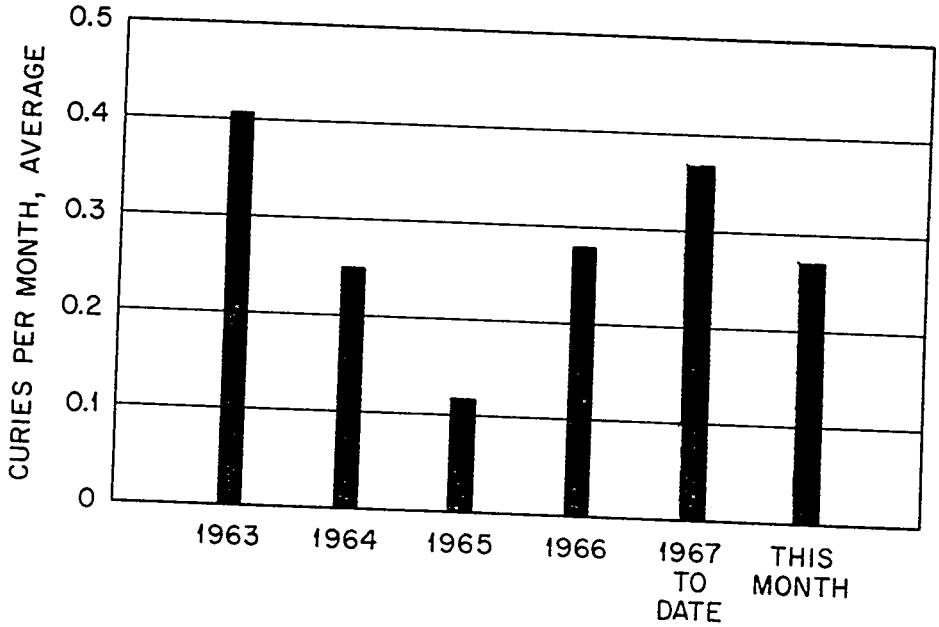

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

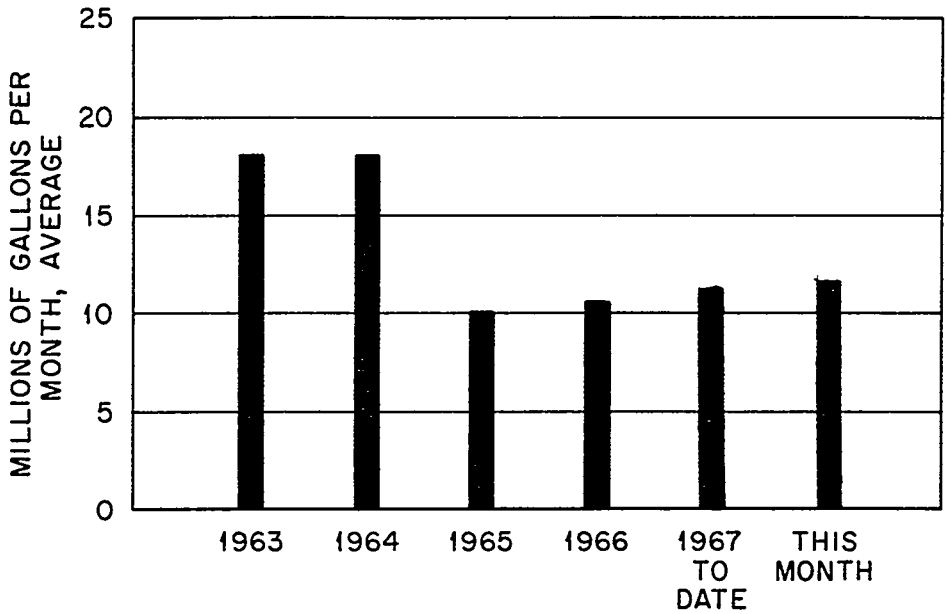

Fig. 5. Process Waste Volumes.

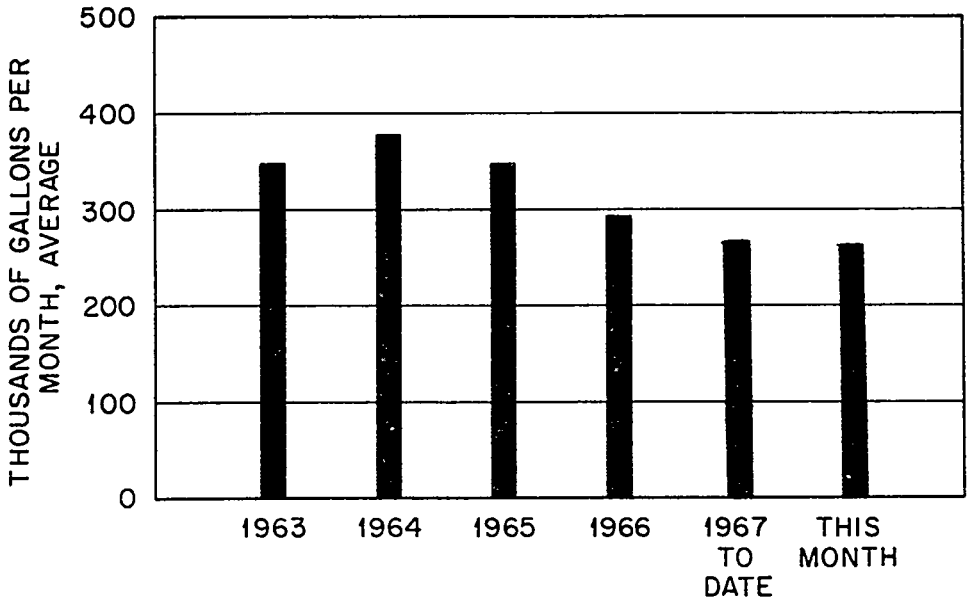

Fig. 6. Intermediate-Level Waste Volumes.

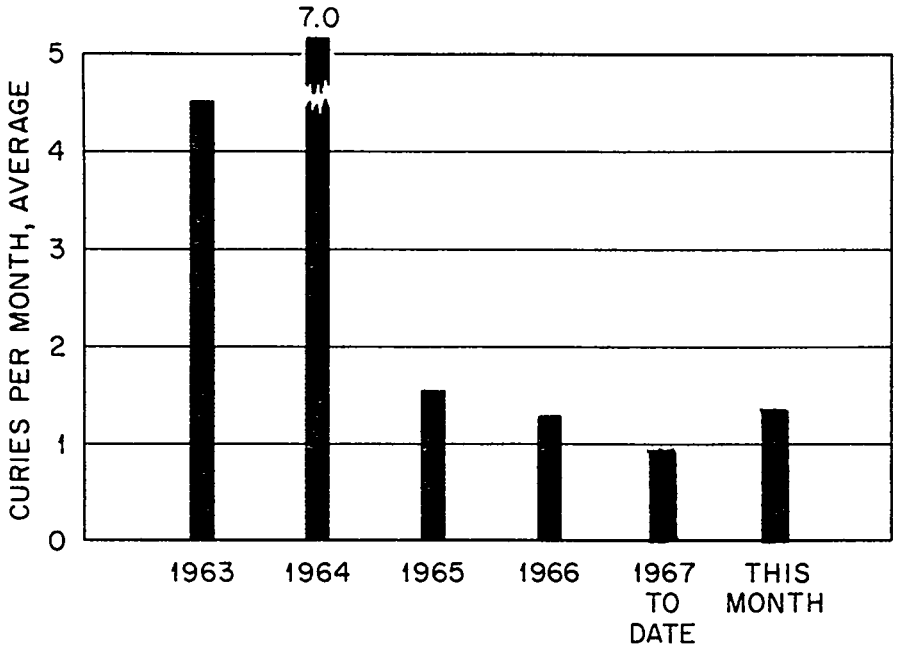

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

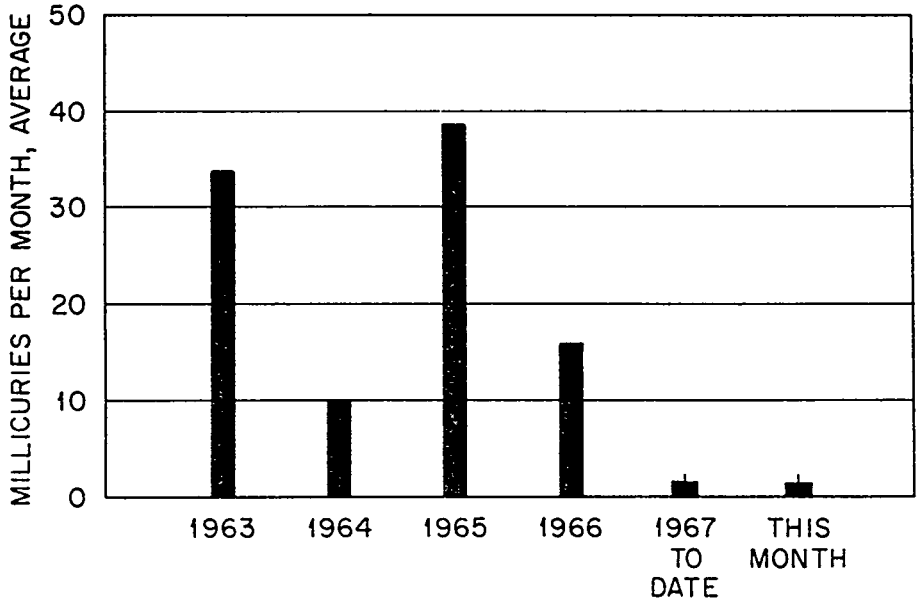

Fig. 8. Filterable Activity Released in Gaseous Waste.

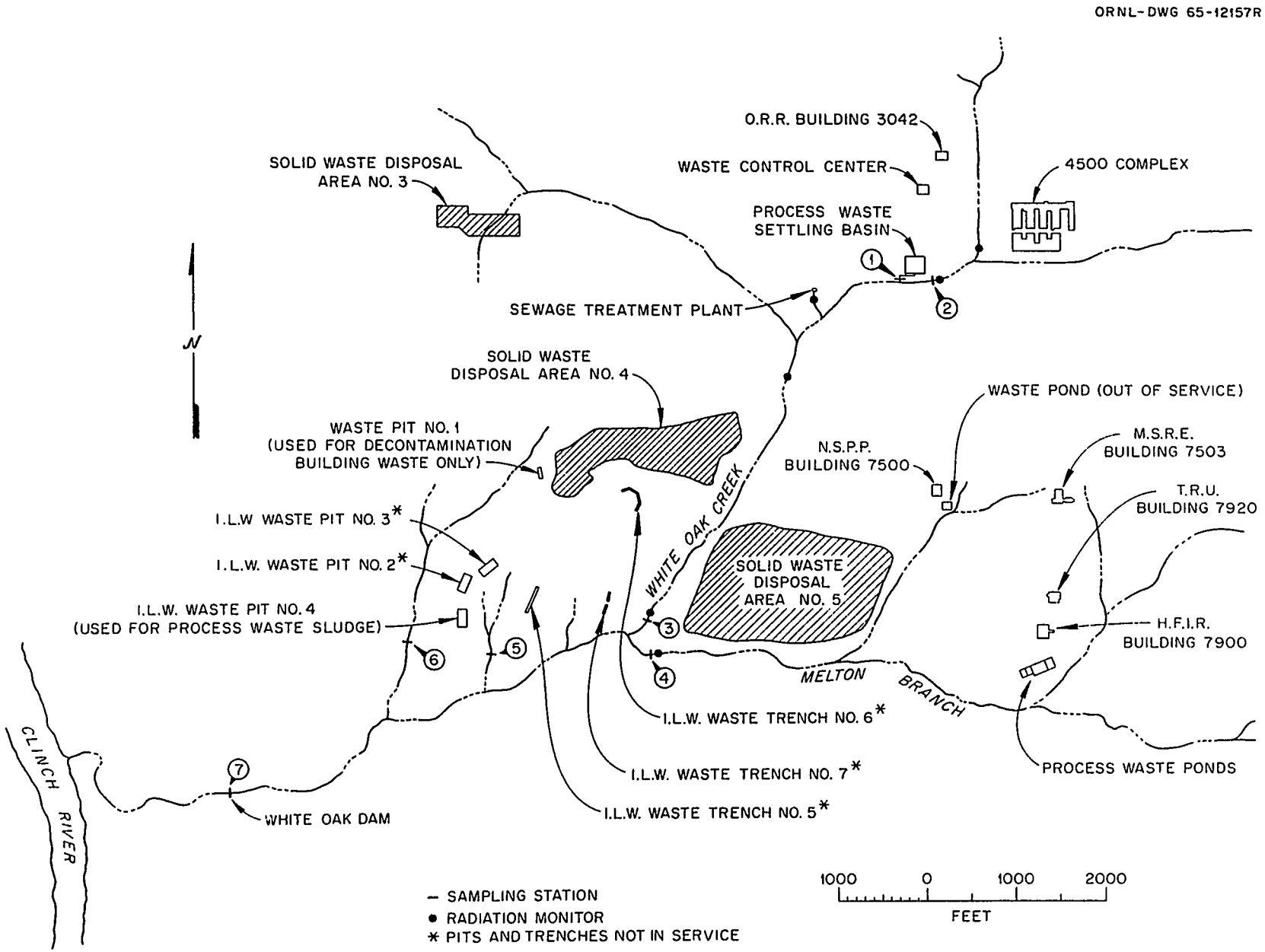

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.27	None	1.04	0.04	1.35
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	0.02	None	0.02
Total discharge from Bethel Valley Area	3	0.71	< 0.01	0.56	None	1.27
Total discharge from Melton Valley Area	4	0.04	< 0.01	< 0.01	None	0.04
East waste pit seepage	5	< 0.01	0.94	0.05	0.46	1.45
West waste pit seepage	6	< 0.01	0.19	< 0.01	0.06	0.25
Total discharge from all sources	3,4,5,6	0.75	1.13	0.61	0.52	3.01
White Oak Dam to Clinch River (Health Physics measurement)	7	0.56	0.74	0.46	0.32	3.09

[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: 11.7×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.6×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.70	0.27	84
$^{103,106}Ru$	None	None	--
^{60}Co	0.06	0.04	33
^{137}Cs	2.05	1.04	49
Gross Beta Analaysis	71 c/m/ml	19 c/m/ml	74

[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	18[b]	0.78	41.5	3.23	27.5
2.	Radioisotope Processing Area	37	0.70	37.2	1.41	12.0
3.	Buildings 3503 and 3508	0	--	--	2.11	18.0
4.	Buildings 3025 and 3026	0	--	--	2.62	22.3
5.	Building 3019	< 1	--	--	0.12	1.0
6.	Fission Products Development Laboratory	23	0.10	5.3	0.33	2.8
7.	Waste Evaporator, Building 2531	18	0.30	16.0	1.23	10.5
8.	Buildings 3525 and 3550	0	--	--	0.65	5.5
9.	Building 2026	0	--	--	0.04	0.4
10.	Melton Valley Area	--	--	--	--	--

[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	0.87
Central Radioactive Gas Disposal Facilities	3039	0.47
Radiochemical Processing Pilot Plant	3020	0.02
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	0.01
Total activity in gases released		1.37

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

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ORNL
CENTRAL FILES NUMBER
67-6-11

DATE: June 8, 1967

COPY NO. 48

SUBJECT: Radioactive Waste Disposal Operations Report for the month of April 1967

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

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 waste discharges was 0.68 percent of the MPC_w. The main contaminants were strontium and ruthenium, contributing 88.5 and 3.9% respectively, 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

The total amount of radioactive waste discharged into White Oak Lake was 2.65 curies. Contaminated seepage from the soil disposal areas accounted for 1.69 curies (primarily ruthenium and cobalt) of this total. The cesium discharge was 0.32 curie; 0.15 curie of this amount came from the process waste system. The strontium release was 0.4 curie; of this amount, 0.2 curie came from the process waste system. The remainder of the strontium came from the Melton Valley (0.04 curie) and White Oak Creek drainage systems.

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 11.7 million gallons of waste was chemically treated this month. Gross analysis of composite samples indicates that 76% of the beta gamma activity and 86% of the strontium were removed by the process. 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 on a monthly basis. Figure 5 compares the volumes of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 332 gph. A summary of operating data is given below:

	Gallons
Total volume generated	255,000
Volume transferred to evaporator	239,000
Volume transferred to shale fracturing	60,000
Volume of concentrate returned to tank farm	11,000
Tank Farm free space at beginning of month	534,000
Tank Farm free space at end of month	567,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Fission Products Development Laboratory	39,000
2.	Reactor Complex	38,000
3.	Building 3019	37,000
4.	High Flux Isotope Reactor	28,000
5.	4500 Complex	24,000
6.	Radioisotopes Processing Area	20,000
7.	Transuranium Processing Plant	11,000

Shale Fracturing Disposal of Intermediate-Level Waste, Injections 2A and 2B

The tank farm was emptied of all evaporator-concentrated waste when a total of 148,000 gal of waste was injected in two batches. The

first injection of 86,000 gal was made on April 20 and the second injection of 62,000 gal was made on April 24. Both injections were made into a new slot at the 862 ft depth. The increase in the batch size, which was previously limited to 40,000 gal by the capacity of the storage tanks at the Hydrofracturing Plant site, was made possible by the installation of two 23,000 gal surplus tanks obtained from the Y-12 Plant.

The radioisotopes contained in the waste in significant amounts, in both injections, were 58,500 curies of cesium, 1,050 curies of strontium, 442 curies of cobalt and 194 curies of ruthenium. The materials used in the grout mixture and other significant data are given below:

Liquids		Gallons
Concentrated waste		148,000
Water for start-up and clean-up		2,700
Water used to dispose of excess solids		14,000
Tributyl phosphate		100
Total volume of liquid injected		164,800
Solids	**Weight, lb.**	**lb/gal**
Portland cement, type 2	379,000	2.30
Fly ash	377,000	2.29
Attapulgite	175,000	1.06
Grundite	93,000	0.56
	1,024,000	6.21

Gaseous Waste

The radioactive gaseous waste release from the ORNL stacks was 3.47 curies (see Table 4). This activity was primarily ^{131}I. Only 3

millicuries of particulate activity were discharged during the period. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

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	0.20	None	0.15	None	0.35
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	None	< 0.01
Total discharge from Bethel Valley Area	3	0.36	0.04	0.26	None	0.66
Total discharge from Melton Valley Area	4	0.04	< 0.01	< 0.01	None	0.04
East waste pit seepage	5	< 0.01	1.13	0.06	0.50	1.69
West waste pit seepage	6	< 0.01	0.20	< 0.01	0.06	0.26
Total discharge from all sources	3,4,5,6	0.40	1.37	0.32	0.56	2.65
White Oak Dam to Clinch River (Health Physics measurement)	7	0.39	2.01	0.11	0.23	3.62

[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: 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]	1.40	0.20	86
$^{103,106}Ru$	0.12	None	100
^{60}Co	None	--	--
^{137}Cs	0.60	0.15	75
Gross Beta Analysis	51 c/m/ml	12 c/m/ml	76

[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	21	0.90[b]	31.8	3.17	27.2
2.	Radioisotope Processing Area	28	0.57	20.1	1.51	12.9
3.	Buildings 3503 and 3508	2	0.06	2.1	2.21	18.9
4.	Buildings 3025 and 3026	0	--	--	2.07	17.7
5.	Building 3019	2	0.01	0.4	0.35	3.0
6.	Fission Products Development Laboratory	19	0.18	6.4	0.72	6.2
7.	Waste Evaporator, Building 2531	78	1.11	39.2	1.05	9.0
8.	Buildings 3525 and 3550	0	--	--	0.58	5.0
9.	Building 2026	0	--	--	0.01	0.1
10.	Melton Valley Area	0	--	--	--	--

[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	0.77
Central Radioactive Gas Disposal Facilities	3039	2.27
Radiochemical Processing Pilot Plant	3020	0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR and TRU	7911	0.42[b]
Total activity in gases released		3.47

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

[b]The bulk of the activity was discharged from TRU

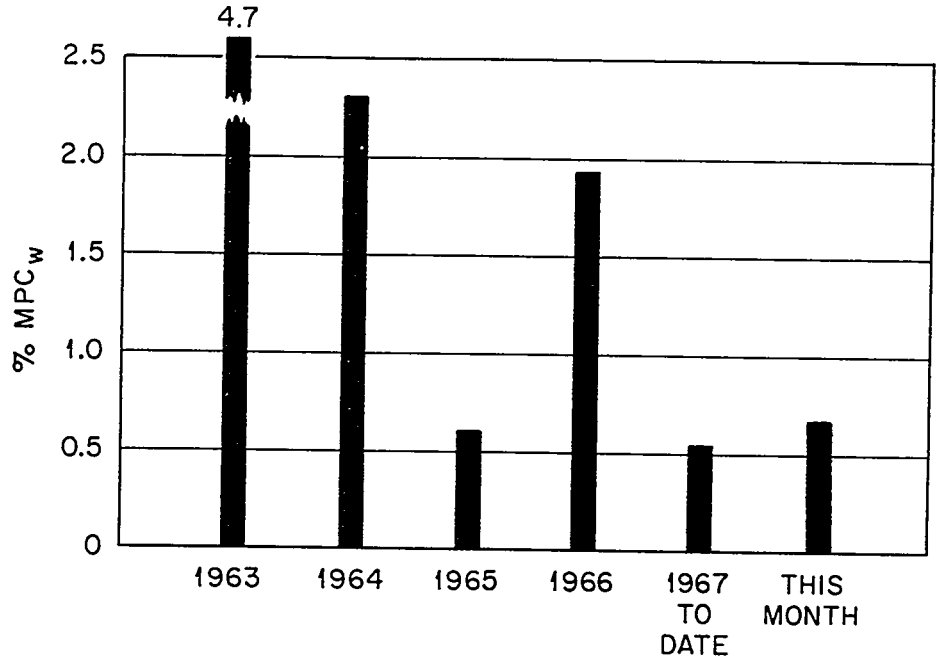

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

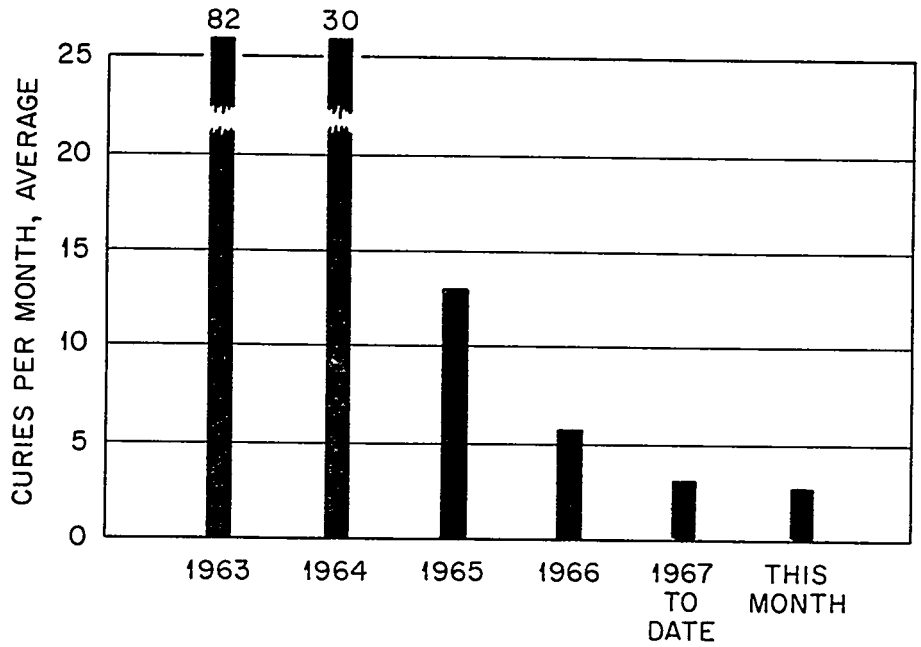

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9). The Activity is Mainly ^{106}Ru from the Soil Disposal Area.

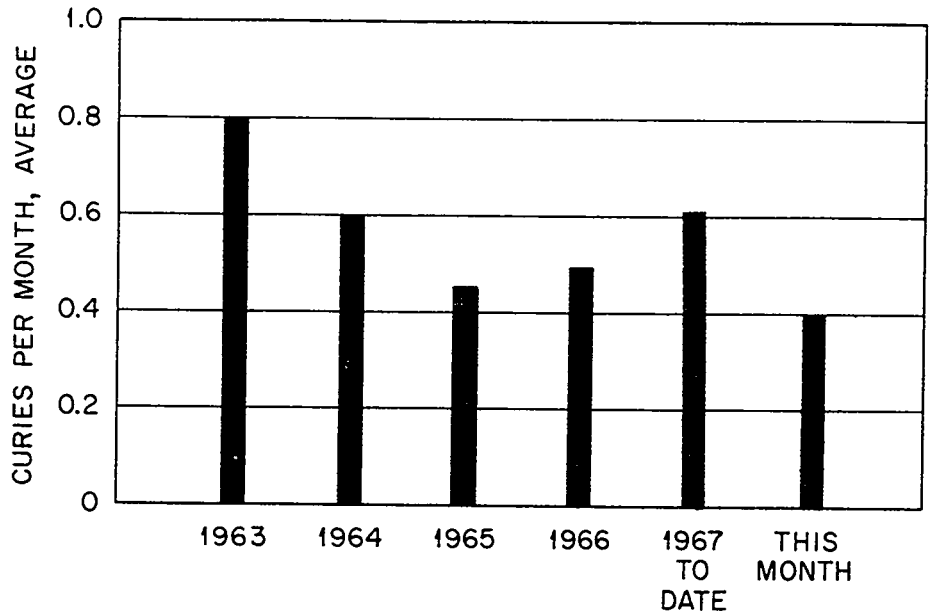

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

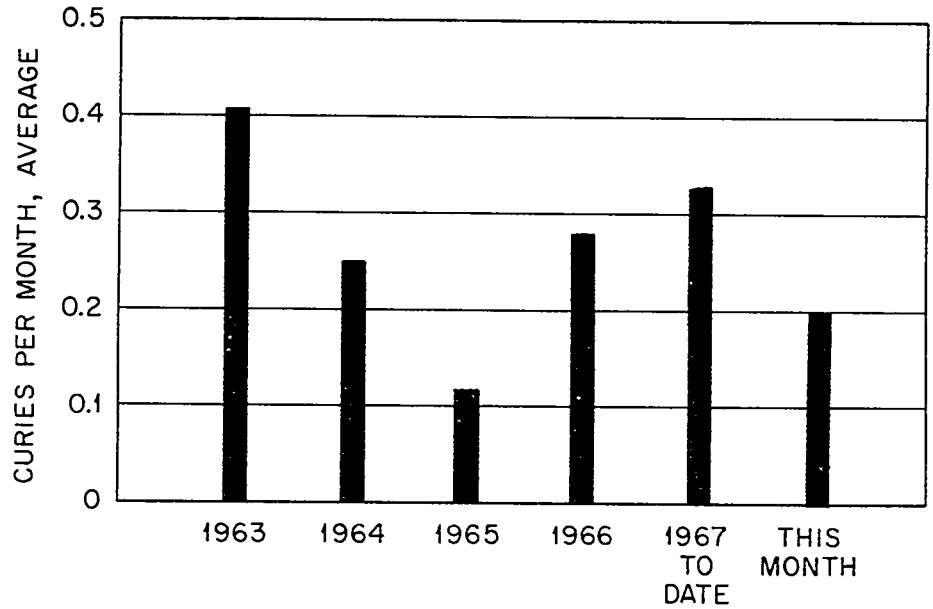

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

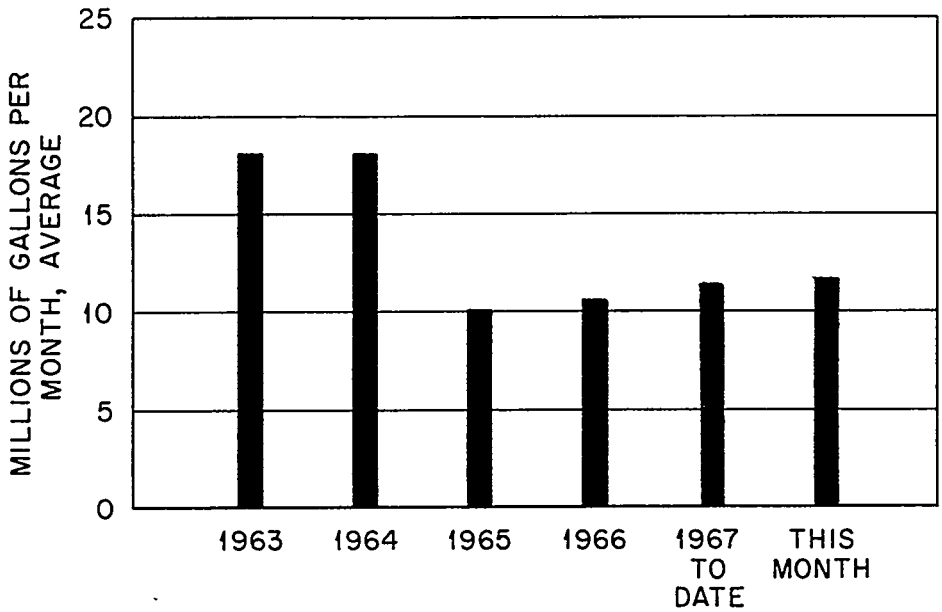

Fig. 5. Process Waste Volumes.

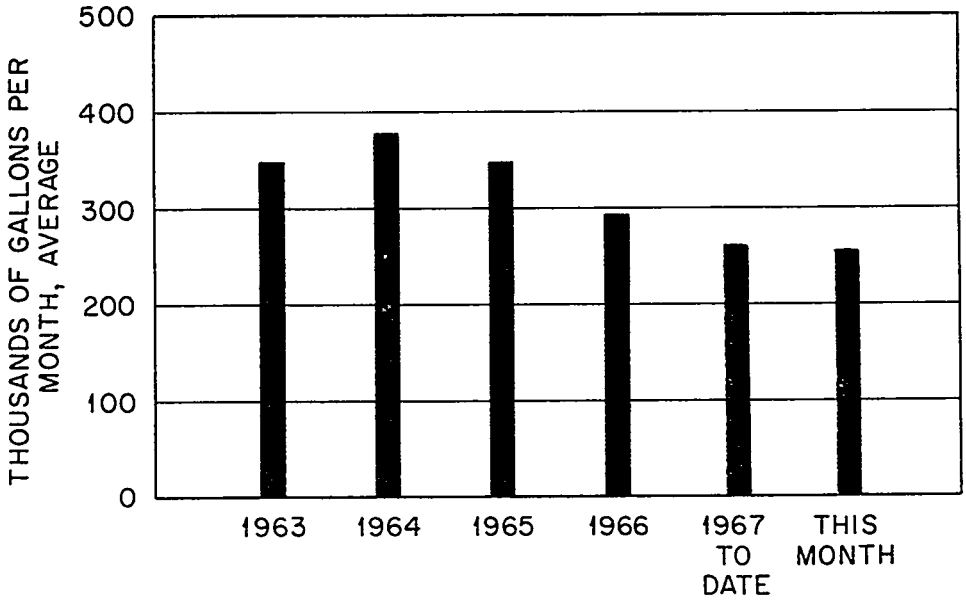

Fig. 6. Intermediate-Level Waste Volumes.

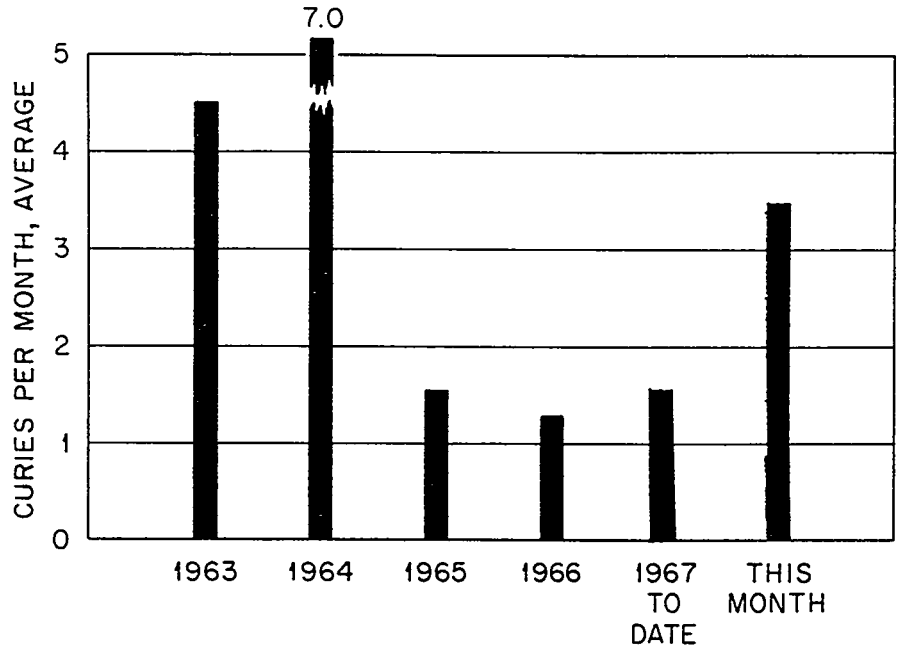

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

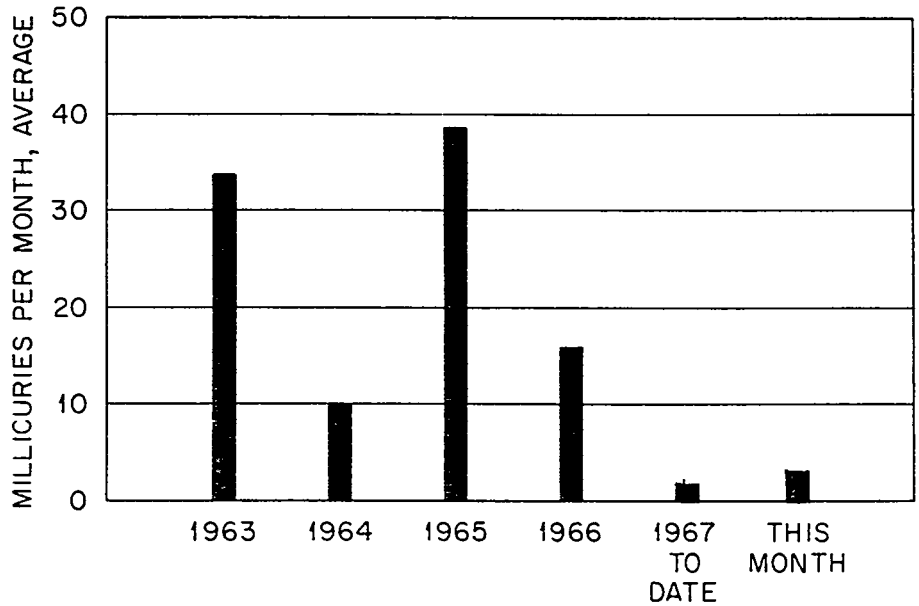

Fig. 8. Filterable Activity Released in Gaseous Waste.

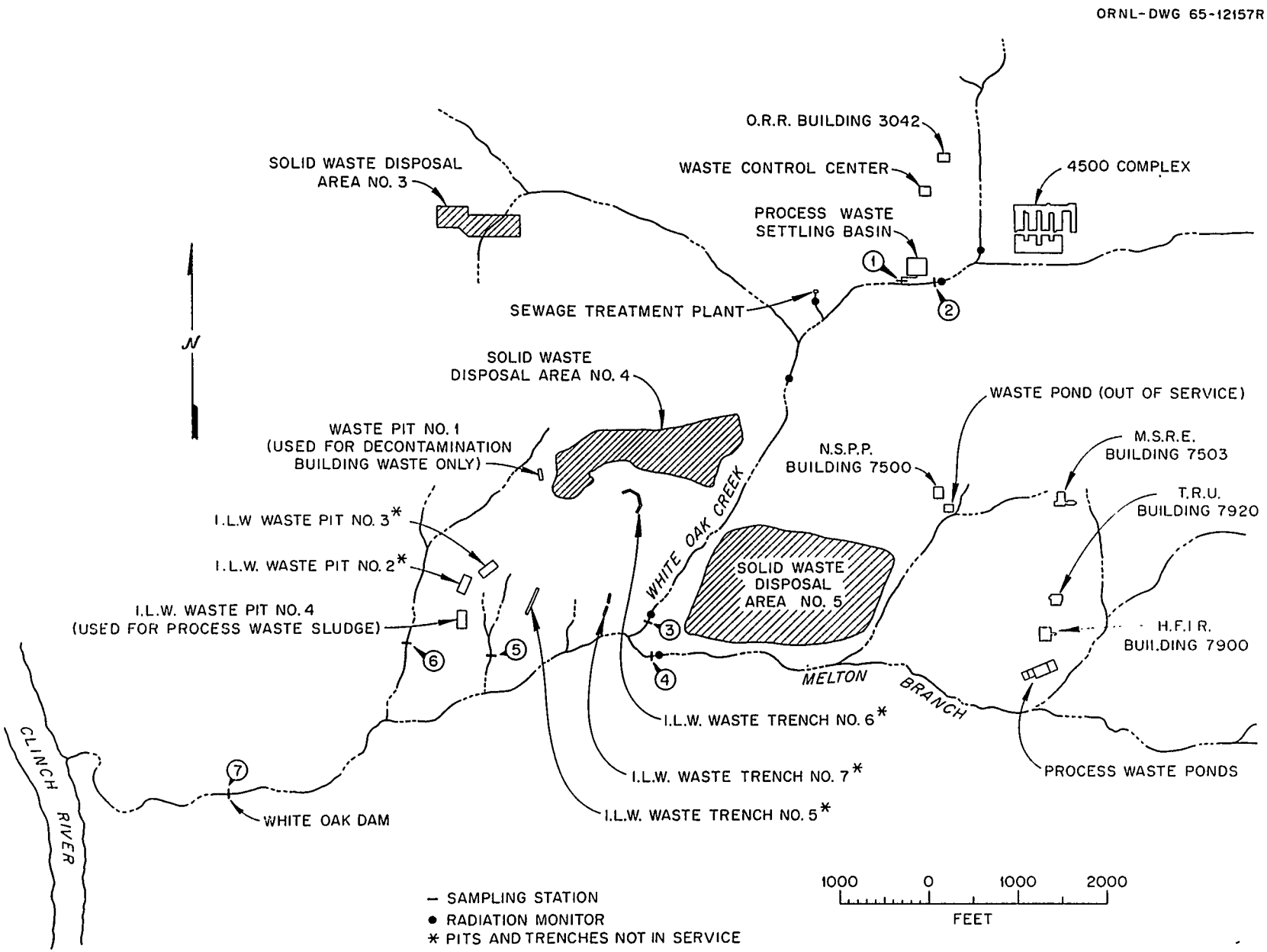

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Distribution:

1. H. H. Abee
2. T. A. Arehart
3. S. E. Auerbach
4. R. E. Brooksbank
5. C. L. Fox
6. Walter Belter, AEC-DRD, Washington, D. C.
7. F. R. Bruce
8. T. J. Burnett
9. G. C. Cain
10. K. E. Cowser
11. J. A. Cox
12. F. L. Culler
13. D. M. Davis
14. Wallace de Laguna
15. J. H. Gillette
16. P. N. Haubenreich
17. Howard V. Heacker, AEC-RDD-ORO
18. D. G. Jacobs
19. C. V. Ketron
20. D. J. Knowles
21. L. C. Lasher
22. T. F. Lomenick
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DATE: September 7, 1967

SUBJECT: Radioactive Waste Disposal Operations Report for the month of July 1967

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David C Hamm 3/4/96
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 waste discharges was 1.28% of the MPC_w for releases to uncontrolled areas. The strontium contamination in the waste was responsible for 92% of the percent of MPC_w. The increase in the river contamination over that in previous months of this year, was due mainly to higher releases of strontium from both the Melton Branch and the Bethel Valley drainage systems (See section "White Oak Creek Monitoring" below).

White Oak Creek Monitoring

A total of 3.35 curies was released to White Oak Lake, with strontium accounting for 1.00 curie of the total (see Figures 2 and 3). Only 0.36 curie of strontium was discharged from sources routinely monitored (see Table 1). The balance, 0.49 curie measured in the Bethel Valley branch and 0.15 curie measured in the Melton branch, cannot be accounted for. It had been previously theorized that most of the unaccounted for activity in the Bethel Valley branch was being scoured from the creek bed itself which had become highly contaminated many years ago. The fact that the activity in the Bethel Valley branch has not decreased over the last several years plus the fact that the unaccounted for activity in the Melton branch has increased from an insignificant amount to 0.15 curie this month, gives evidence that some of the activity may be coming from the solid waste burial grounds. The drainage from burial ground No. 4 is to the Bethel Valley branch and the drainage from burial ground No. 5 is to the Melton branch of White Oak Creek (see Figure 9).

The possibility of installing additional proportional sampling stations in the creek, in an attempt to account for all of the activity discharged to White Oak Lake, is again being investigated. Previous attempts to do so by taking grab samples gave erratic analytical data which could not resolve the problem.

Process Waste

A total of 11.6 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 volumes of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 449 gph. A summary of operating data is given below:

	Gallons
Total volume generated	334,000
Volume transferred to evaporator	334,000
Volume of concentrate returned to tank farm	28,000
Tank farm free space at the beginning of month	537,000
Tank farm free space at end of month	509,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Building 3019	62,000
2.	High Flux Isotope Reactor	56,000
3.	4500 Complex	55,000

		Gallons
4.	Reactor Complex	39,000
5.	Radioisotope Processing Area	27,000
6.	Fission Products Development Laboratory	23,000

Gaseous Waste

A total of 1.63 curies of radioactivity was discharged from ORNL stacks. The activity was primarily ^{131}I. The particulate discharge, ^{137}Cs, was 16 millicuries. Figures 7 and 8 compare the gaseous waste releases on a monthly basis.

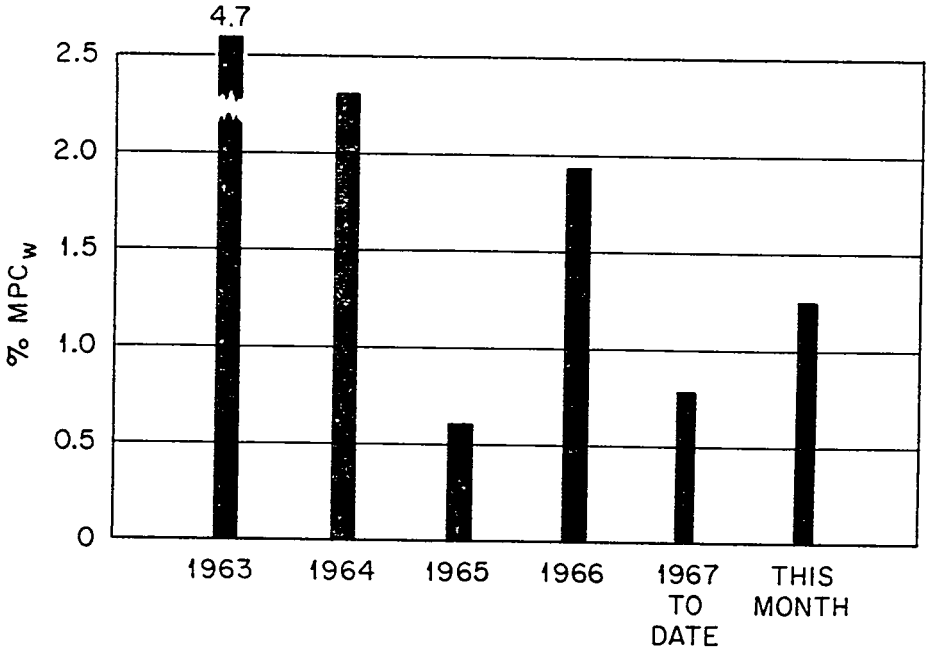

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

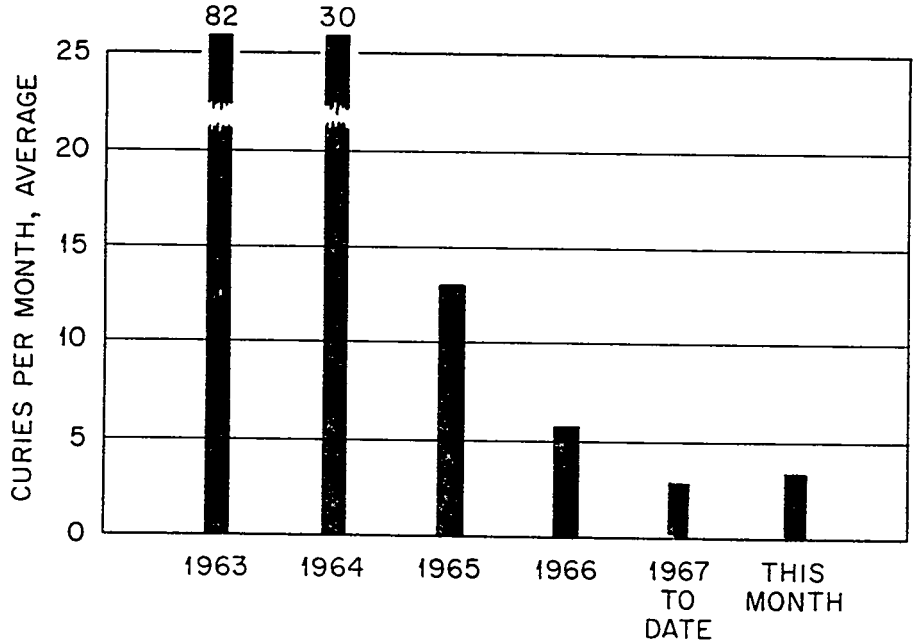

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

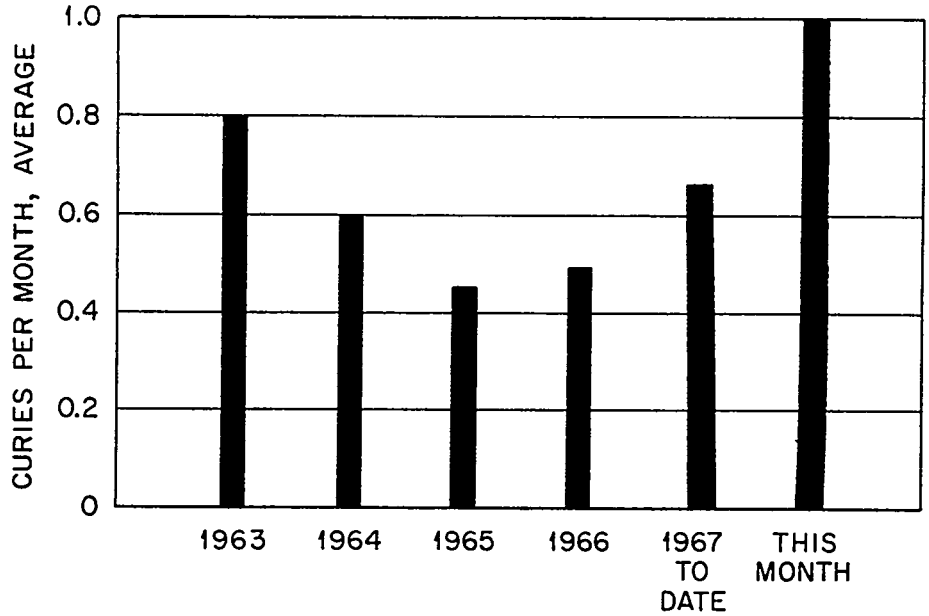

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

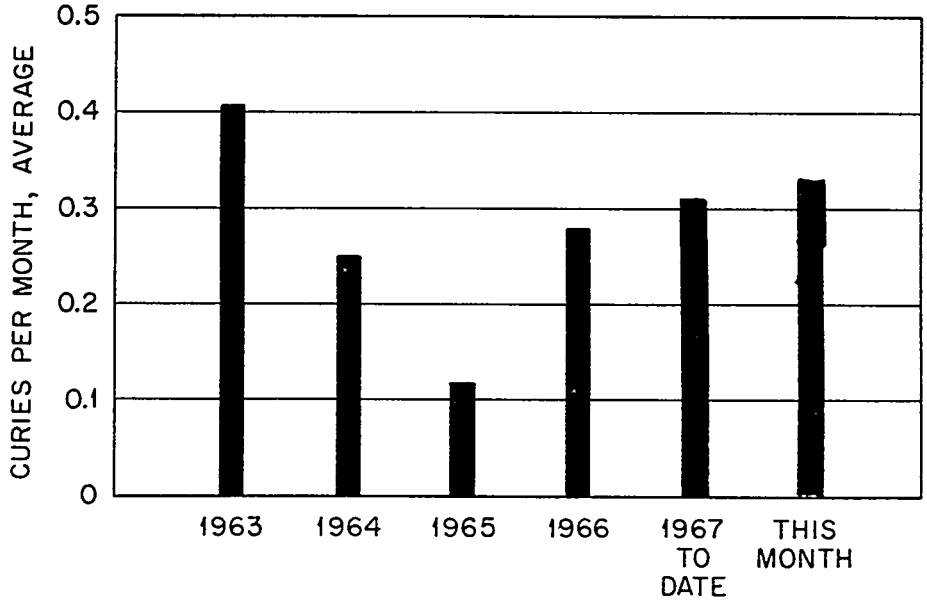

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

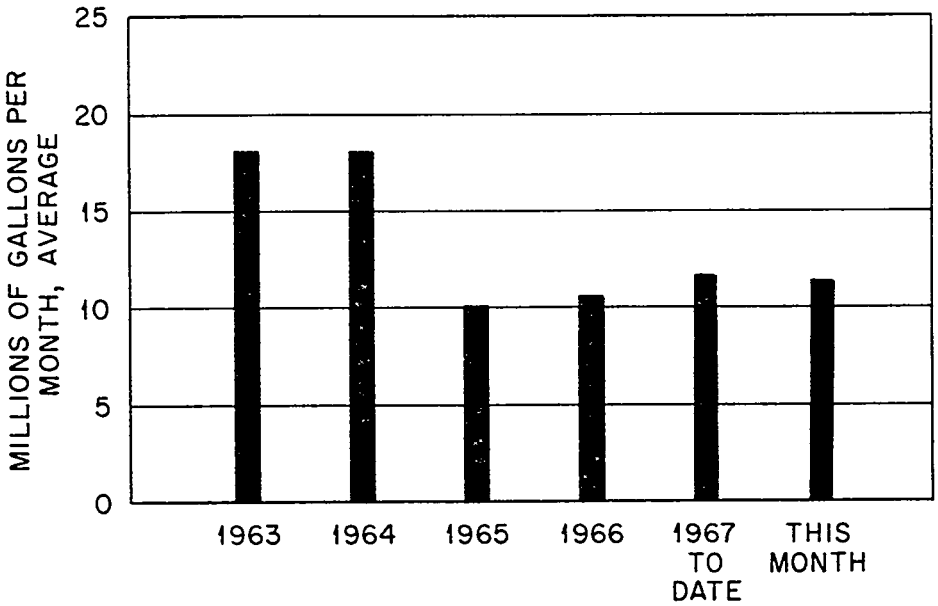

Fig. 5. Process Waste Volumes.

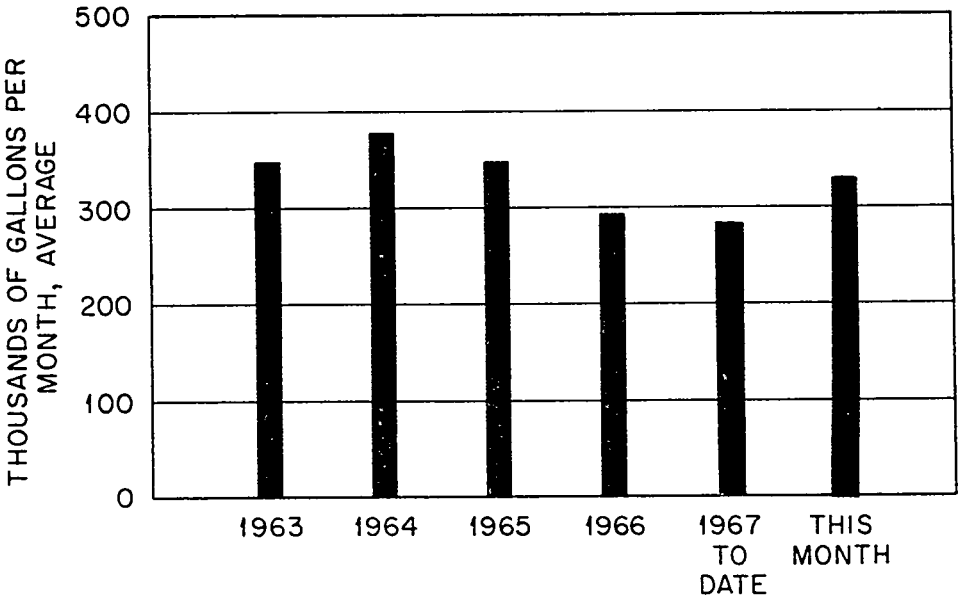

Fig. 6. Intermediate-Level Waste Volumes.

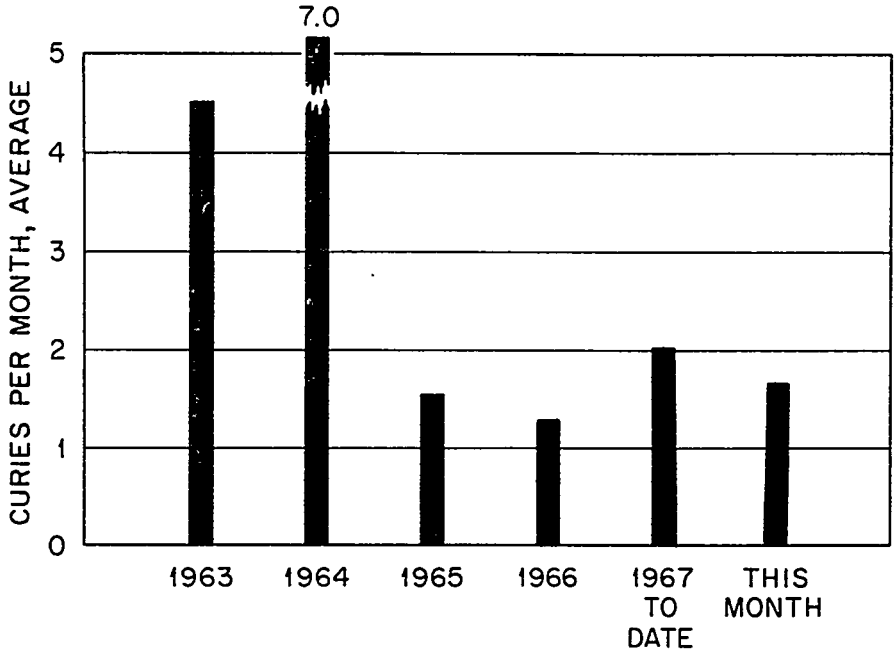

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

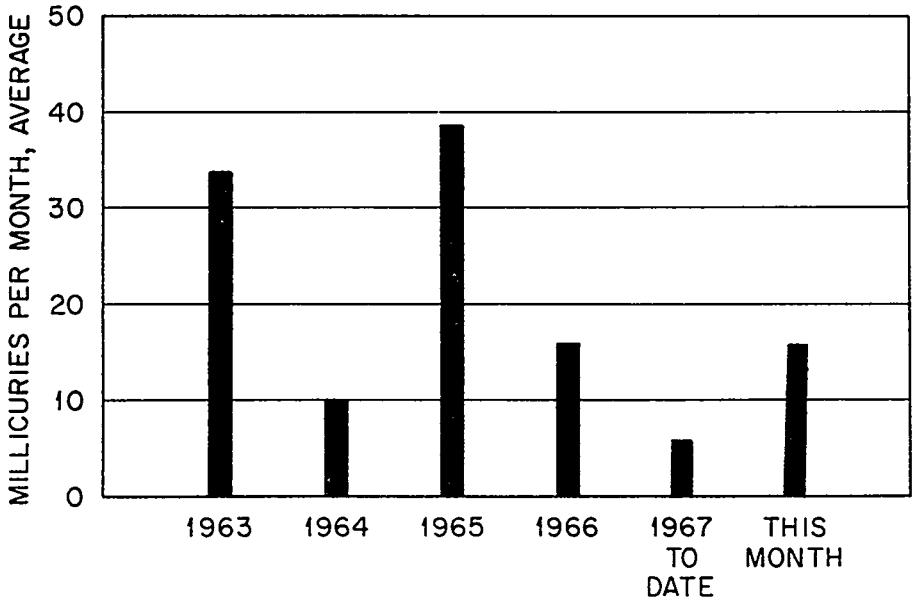

Fig. 8. Filterable Activity Released in Gaseous Waste.

ORNL-DWG 65-12157R

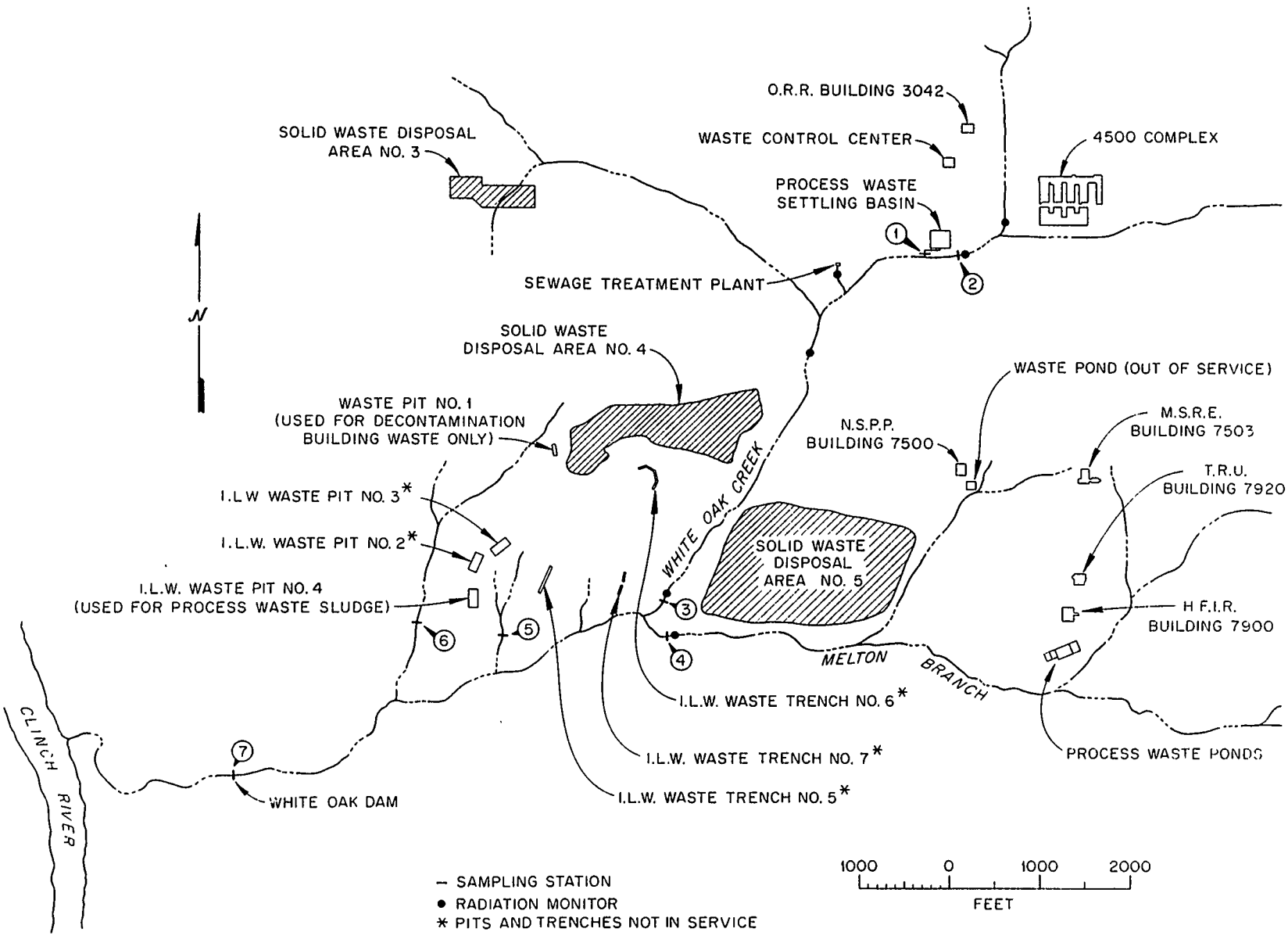

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.33	None	1.02	0.03	1.38
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	0.04	None	0.05
Total discharge from Bethel Valley Area	3	0.83	0.05	1.19	None	2.07
Total discharge from Melton Valley Area	4	0.17	< 0.01	< 0.01	None	0.17
East waste pit seepage	5	< 0.01	0.46	0.03	0.19	0.68
West waste pit seepage	6	< 0.01	0.32	0.02	0.09	0.43
Total discharge from all sources	3,4,5,6	1.00	0.83	1.24	0.28	3.35
White Oak Dam to Clinch River (Health Physics measurement)	7	1.06	2.95	0.70	0.45	7.40

[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: 11.6×10^6 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]	2.90	0.33	89
$^{103,106}Ru$	0.15	None	100
^{60}Co	0.10	0.03	70
^{137}Cs	6.52	1.02	84
Gross Beta Analysis	165 c/m/ml	20 c/m/ml	88

[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 MILLION GALLONS	VOLUME % OF TOTAL
1.	Reactor Operations	19[a]	0.91[a]	34.6	3.36	28.9
2.	Radioisotope Processing Area	35	0.60	22.8	1.18	10.2
3.	Buildings 3503 and 3508	6	0.17	6.5	1.96	16.9
4.	Buildings 3025 and 3026	< 1	--	--	1.04	8.9
5.	Building 3019	< 1	--	--	0.27	2.3
6.	Fission Products Development Laboratory	35	0.14	5.3	0.32	2.7
7.	Waste Evaporator, Building 2531	45	0.81	30.8	1.26	10.8
8.	Buildings 3525 and 3550	< 1	--	--	2.24	19.3
9.	Building 2026	< 1	--	--	< 0.01	--
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	0.34
Central Radioactive Gas Disposal Facilities	3039	1.21
Radiochemical Processing Pilot Plant	3020	0.08
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		1.63

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

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DATE: October 16, 1967

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SUBJECT: Radioactive Waste Disposal Operations Report for the month of August 1967

TO: Distribution

FROM: L. C. Lasher

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

David R. Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

The radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.22% of the MPC_w for a release to uncontrolled areas. Strontium, contributing 95% to the percent of MPC_w, was the primary contaminant. 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

A total of 1.69 curies of radioactive waste was discharged into White Oak Lake this month. Most of the activity was ruthenium (0.78 curie) and cobalt (0.25 curie) which came from the soil disposal areas. Cesium activity, released primarily from the process waste system, amounted to 0.22 curie. The strontium discharge was 0.44 curie; 0.35 of this amount came from the Bethel Valley area and 0.09 from Melton Valley.

The creek monitoring data 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 10.6 million gallons of slightly contaminated 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 to that of previous months.

Intermediate-Level Waste

The evaporator operated at an average rate of 320 gph. A summary of operating data is given below:

	Gallons
Total volume generated	244,000
Volume transferred to the evaporator	238,000
Volume of concentrate returned to tank farm	11,000
Tank Farm free space at beginning of month	509,000
Tank Farm free space at end of month	492,000

The main contributors to the ILW system are listed below. A monthly comparison of the total volumes of waste generated is given in Figure 6.

		Gallons
1.	4500 Complex	43,000
2.	High Flux Isotope Reactor	38,000
3.	Building 3019	36,000
4.	Reactor Complex	36,000
5.	Radioisotopes Processing Area	22,000
6.	Fission Products Development Laboratory	20,000
7.	Building 3525	13,000

Gaseous Waste

The combined discharge from the stacks contained 2.22 curies of ^{131}I and 1.38 curies of ^{137}Cs. All of the cesium was released through

the 3039 Stack. Four hundred millicuries of the total cesium was not filterable; it went through the filter portion of the sample cartridge and was deposited on the activated charcoal.

The individual stack discharges are given in Table 4. Monthly comparisons of all discharges are shown in Figures 7 and 8.

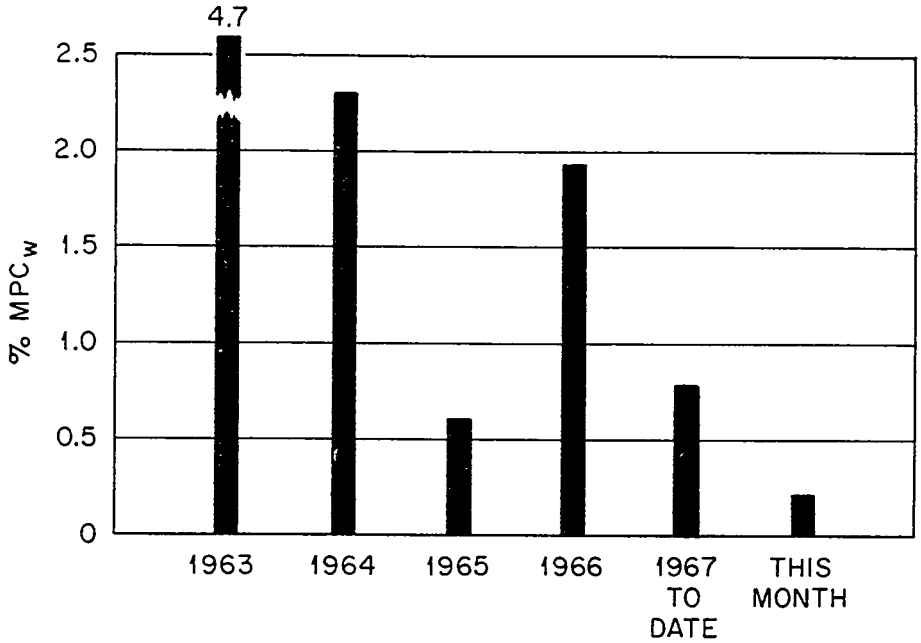

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

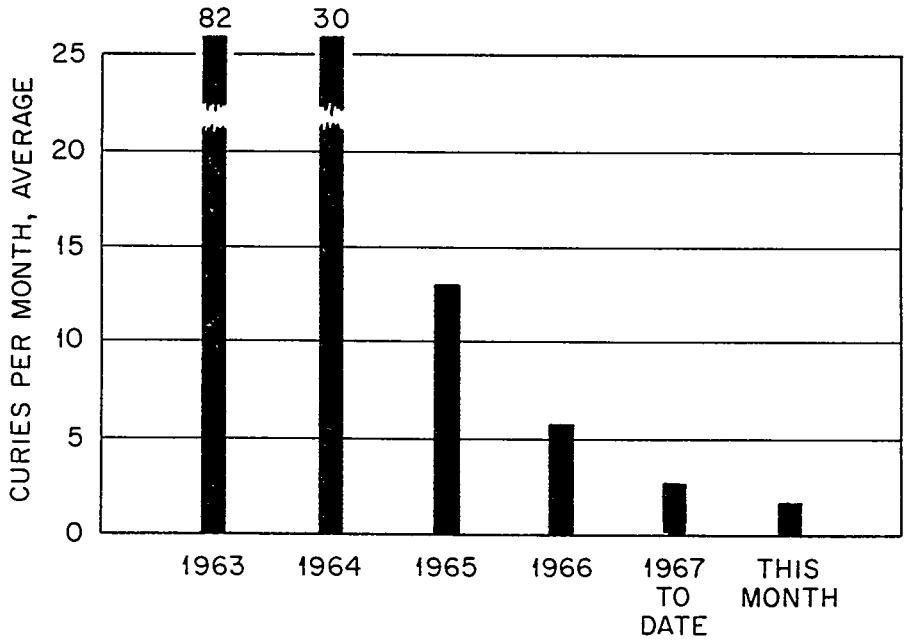

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

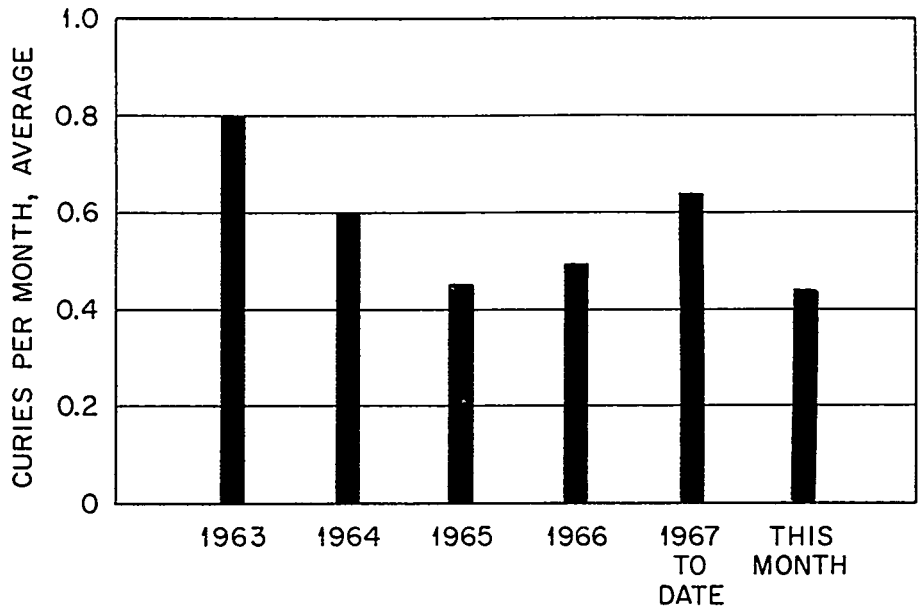

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

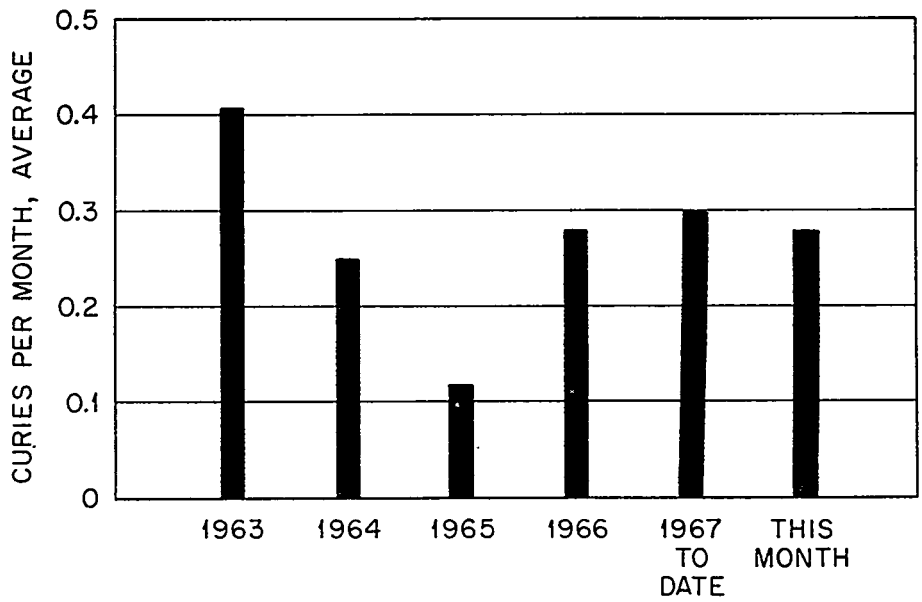

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

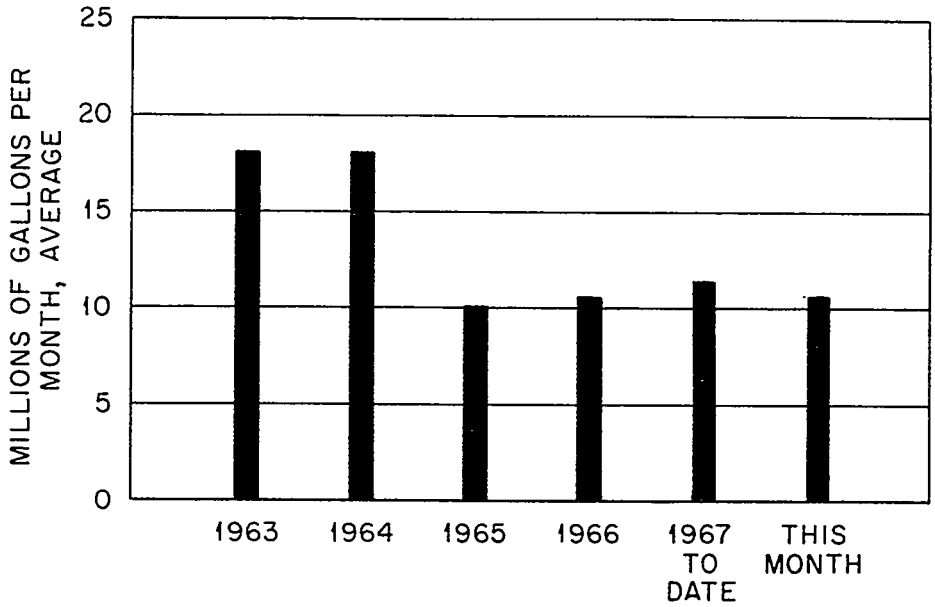

Fig. 5. Process Waste Volumes.

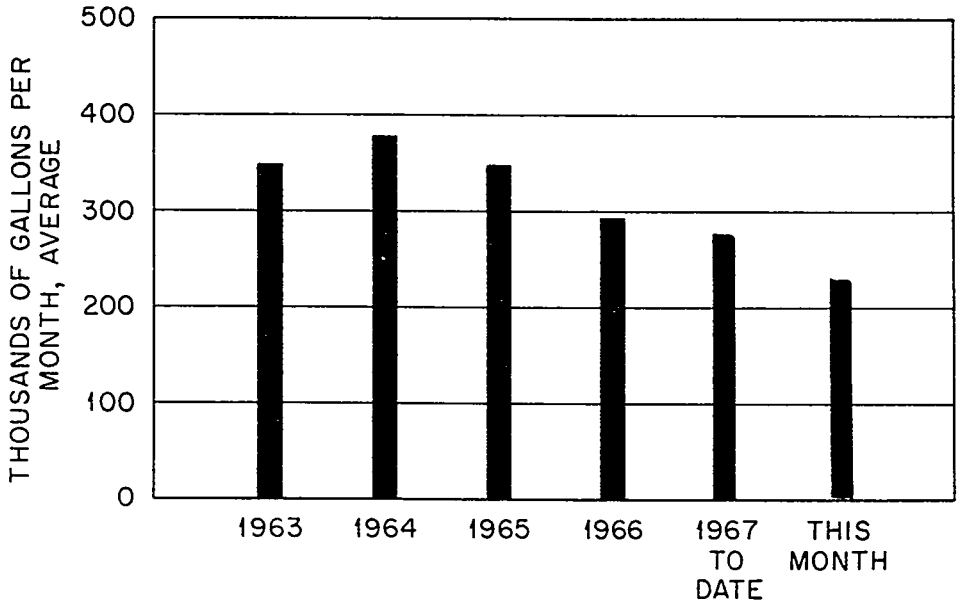

Fig. 6. Intermediate-Level Waste Volumes.

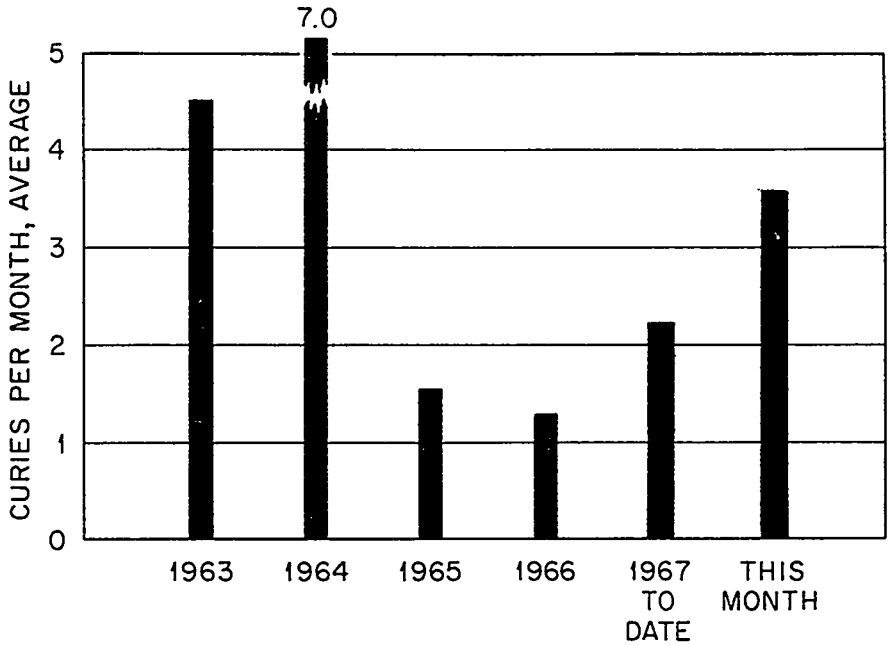

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

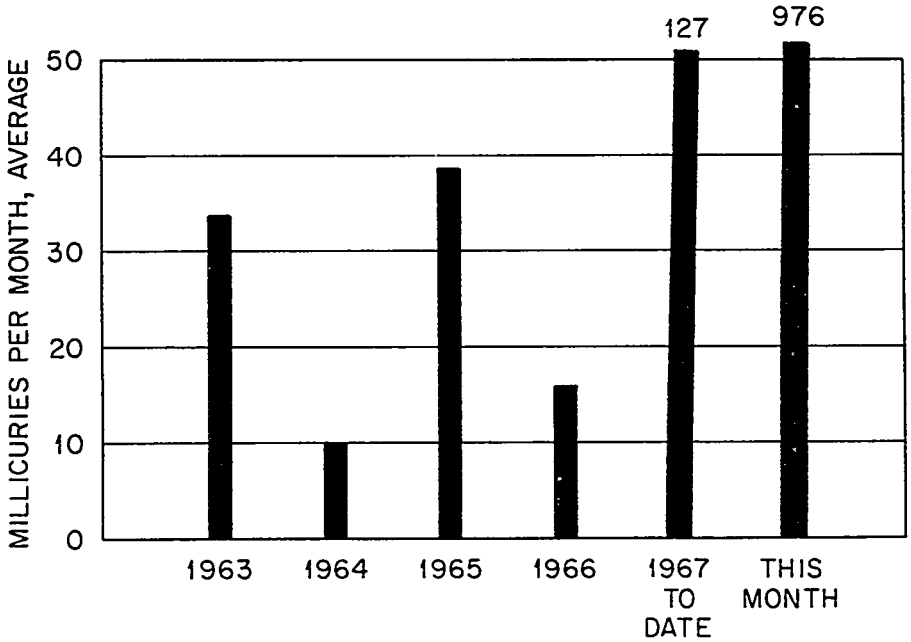

Fig. 8. Filterable Activity Released in Gaseous Waste.

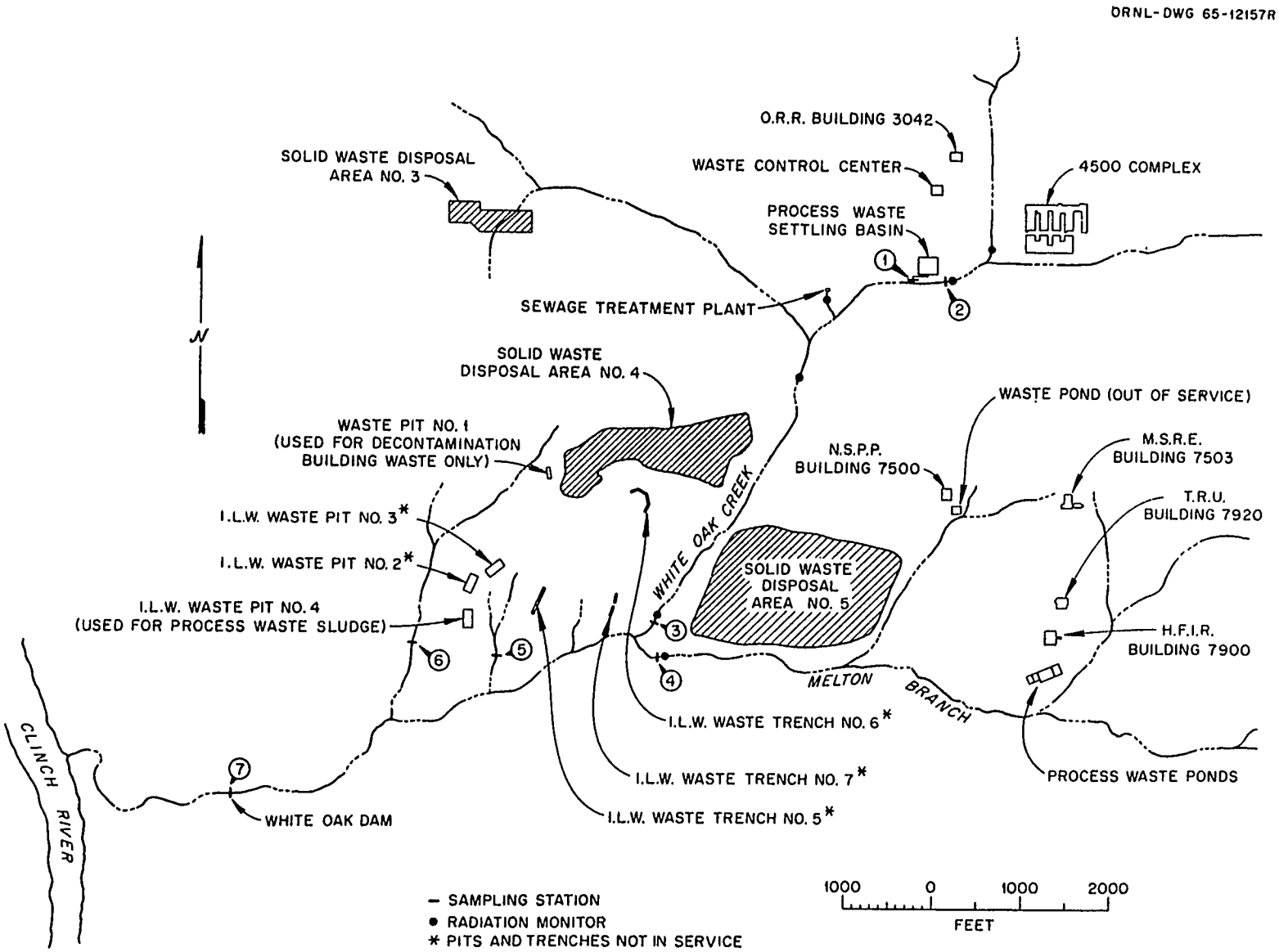

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.28	0.08	0.49	none detected	0.85
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	--
Total discharge from Bethel Valley Area	3	0.35	0.02	0.18	none detected	0.55
Total discharge from Melton Valley Area	4	0.09	< 0.01	< 0.01	none detected	0.09
East waste pit seepage	5	< 0.01	0.49	0.04	0.18	0.71
West waste pit seepage	6	< 0.01	0.27	< 0.01	0.07	0.34
Total discharge from all sources	3,4,5,6	0.44	0.78	0.22	0.25	1.69
White Oak Dam to Clinch River (Health Physics measurement)	7	0.25	0.60	0.05	0.04	1.26[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: 10.6×10^6 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]	1.32	0.28	79
$^{103,106}Ru$	None detected	0.08	--
^{60}Co	0.05	None detected	100
^{137}Cs	1.37	0.49	64
Gross Beta Analysis	57 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	16[b]	0.62[b]	35.6	2.76	26.0
2.	Radioisotope Processing Area	16	0.21	12.1	0.92	8.7
3.	Buildings 3503 and 3508	0	--	--	2.36	22.2
4.	Buildings 3025 and 3026	< 1	--	--	2.12	19.9
5.	Building 3019	1	0.03	1.7	0.17	1.6
6.	Fission Products Development Laboratory	8	0.28	16.1	0.27	2.5
7.	Waste Evaporator, Building 2531	43	0.60	34.5	1.00	9.4
8.	Buildings 3525 and 3550	0	--	--	1.01	9.5
9.	Building 2026	5	< 0.01	--	0.02	0.2
10.	Melton Valley Area	< 1	All waste discharged directly to creek			

[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	2.35
Radiochemical Processing Pilot Plant	3020	0.03
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	1.10
Total activity in gases released		3.60

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

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LIQUID WASTE

Release to Clinch River

The radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.31% of the MPC_W for a release to uncontrolled areas. Strontium, contributing 96% to the percentage or fraction of MPC_W observed, was the primary contaminant. 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 total discharge into White Oak Lake was 2.02 curies. Ruthenium (0.96 curie) and cobalt (0.44 curie), mainly from the pits and trenches that are no longer in service, accounted for the major portion of the total activity. The cesium discharge to the lake was 0.17 curie. The strontium discharge was 0.45 curie; 0.19 curie of this amount came from the process waste system and 0.09 curie from the Melton Valley area. There was no significant release of alpha activity.

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

A total of 10 million gallons of slightly radioactive waste was chemically treated this month. A summary of plant operations is shown in Table 2.

Table 3 lists the principal sources of radioactivity 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 320 gph. A summary of operating data is given below:

	Gallons
Total volume generated	236,000
Volume transferred to the evaporator	230,000
Volume of concentrate returned to tank farm	14,000
Tank Farm free space at beginning of month	492,000
Tank Farm free space at end of month	472,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Reactor Complex	41,000
2.	Building 3019	38,000
3.	High Flux Isotope Reactor	29,000
4.	4500 Complex	29,000
5.	Fission Products Development Laboratory	22,000
6.	Radioisotopes Processing Area	16,000
7.	Building 3525	12,000
8.	Building 3026-D	11,000

A monthly comparison of the volumes of waste handled is given in Figure 6.

Gaseous Waste

The ORNL stacks discharged 0.71 curie of radioactivity this month. Most of this activity was ^{131}I, and virtually all of it came from the 3039 system. The 3039 system also released 9 millicuries of

particulate ^{137}Cs. There was no significant release of alpha activity.

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

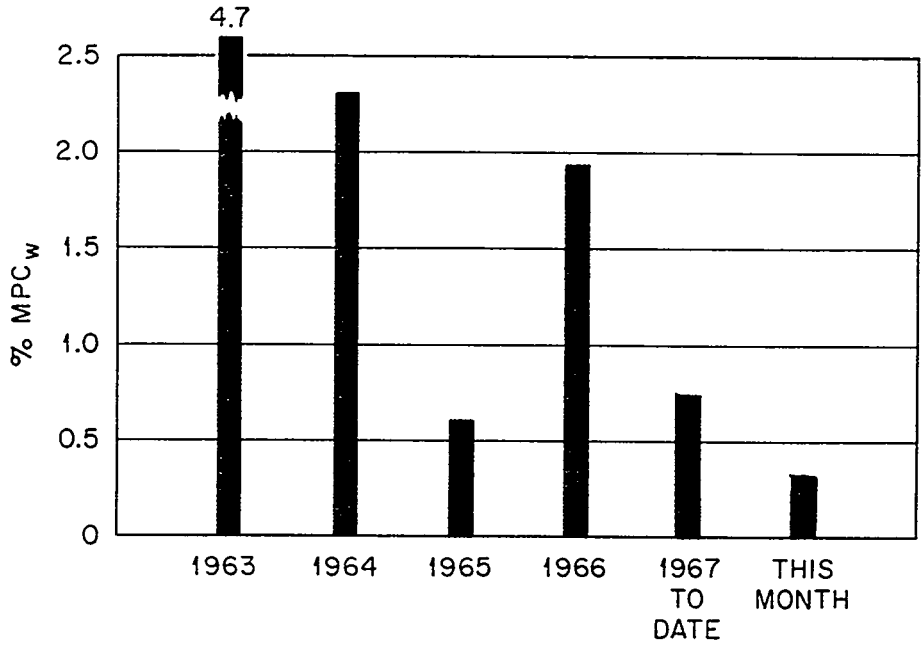

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

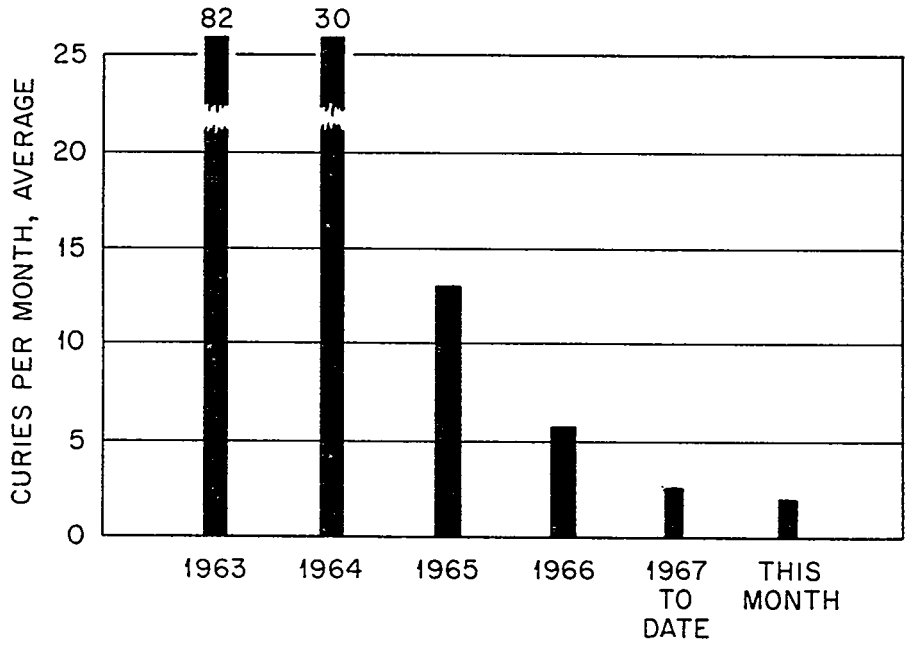

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

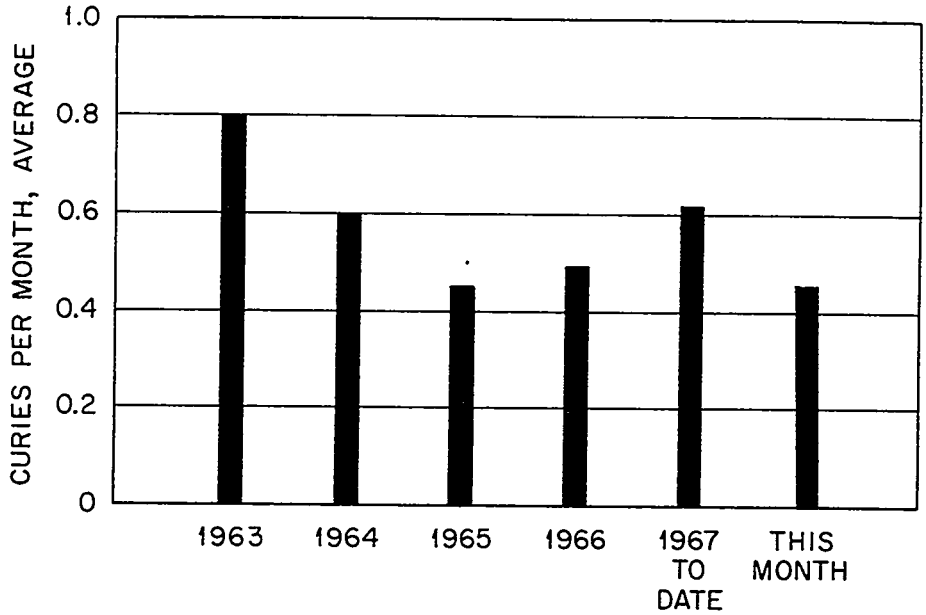

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

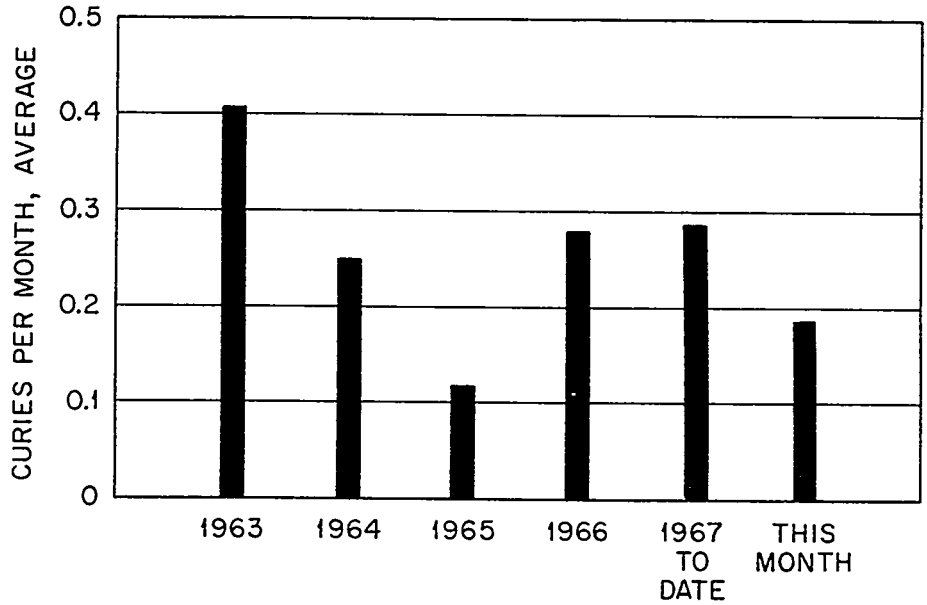

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

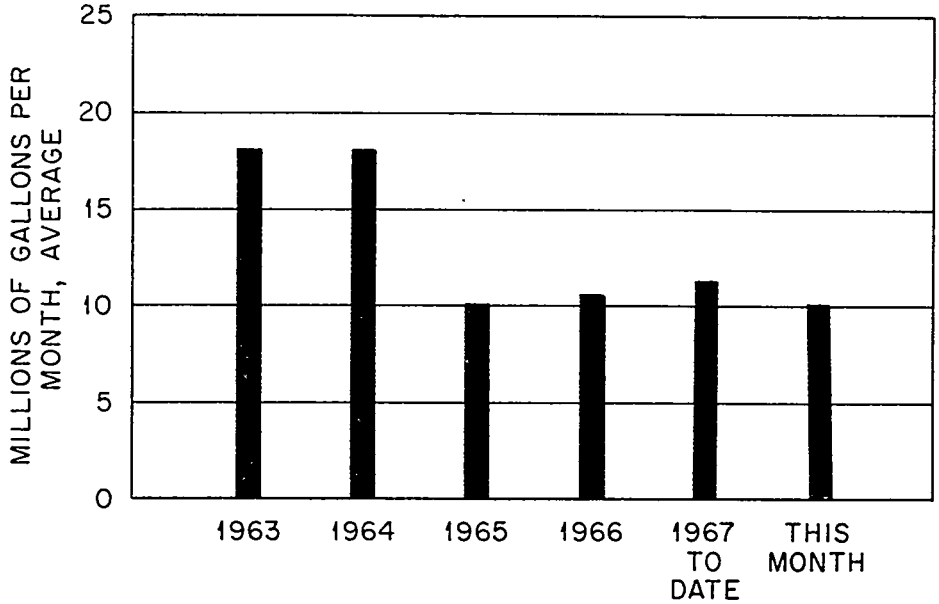

Fig. 5. Process Waste Volumes.

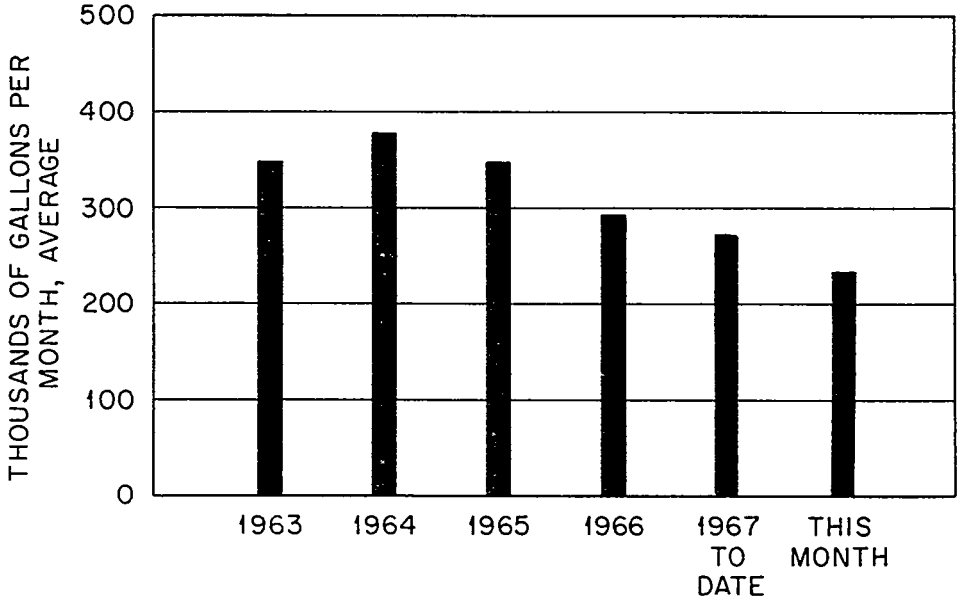

Fig. 6. Intermediate-Level Waste Volumes.

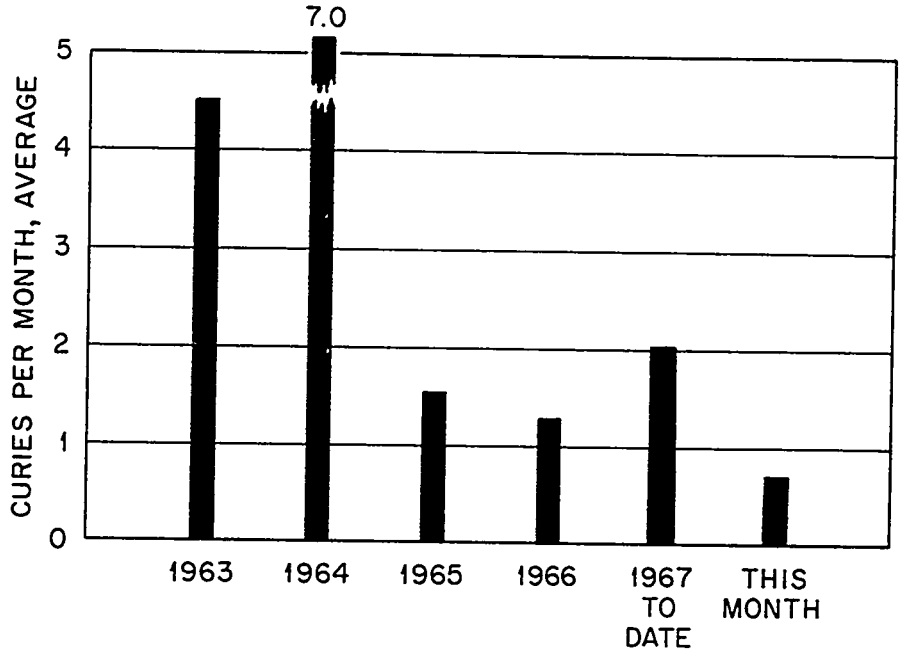

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

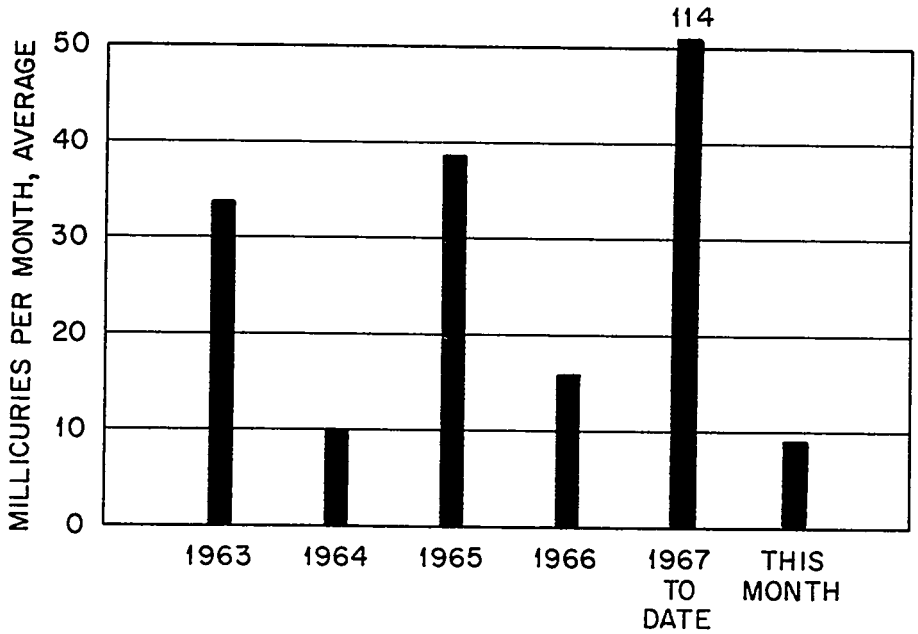

Fig. 8. Filterable Activity Released in Gaseous Waste.

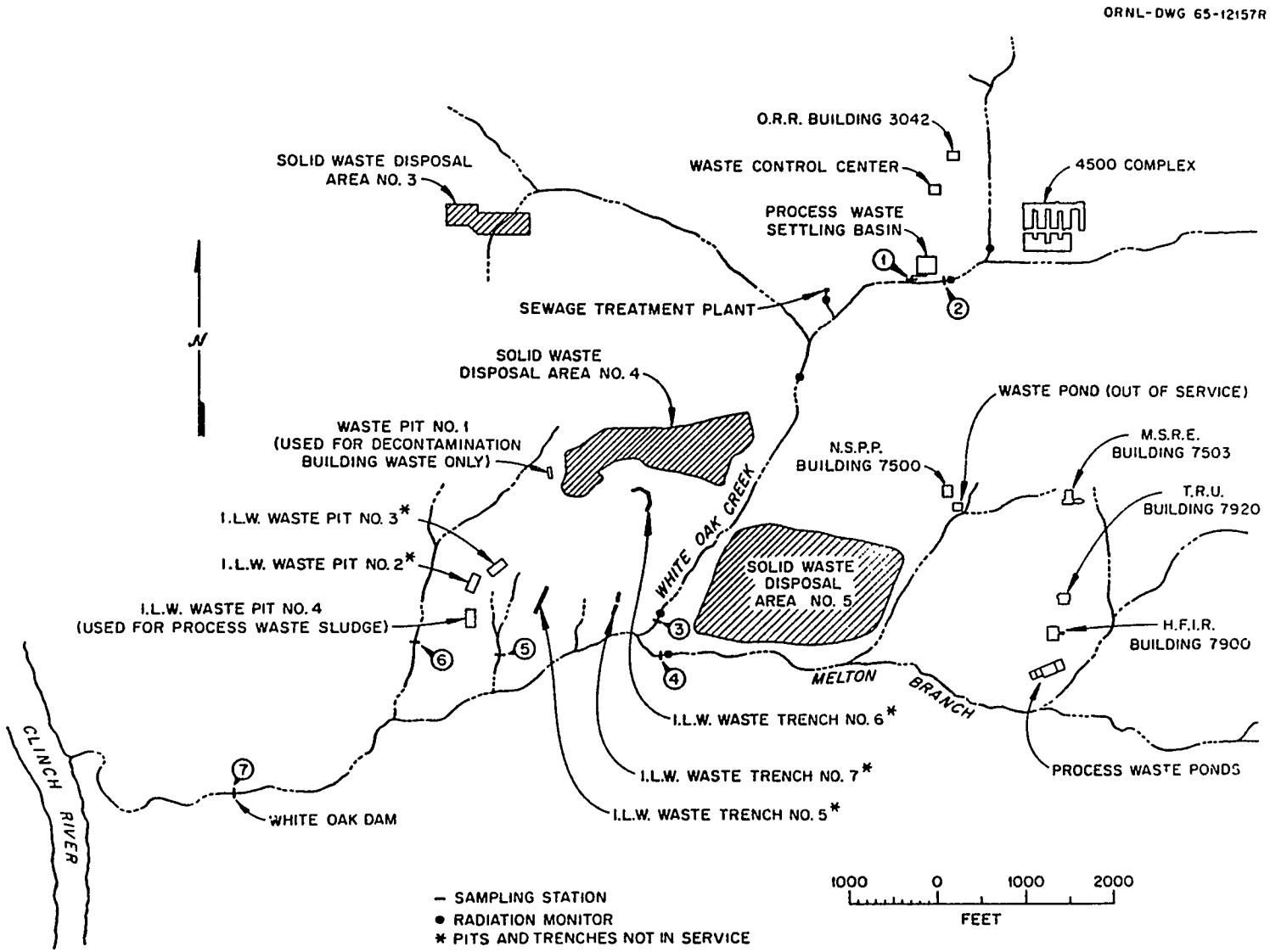

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.19	0.02	0.35	none detected	0.56
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	< 0.01
Total discharge from Bethel Valley Area	3	0.36	< 0.01	0.13	0.09	0.58
Total Discharge from Melton Valley Area	4	0.09	< 0.01	< 0.01	< 0.01	0.09
East waste pit seepage	5	< 0.01	0.76	0.04	0.30	1.10
West waste pit seepage	6	< 0.01	0.20	< 0.01	0.05	0.25
Total discharge from all sources	3,4,5,6	0.45	0.96	0.17	0.44	2.02
White Oak Dam to Clinch River (Health Physics measurement)	7	0.22	0.24	0.02	0.03	0.73[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: 10.1×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.5×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.17	0.19	84
$^{103,106}Ru$	None detected	0.02	--
^{60}Co	0.03	None detected	100
^{137}Cs	1.02	0.35	65
Gross Beta Analysis	47 c/m/ml	10 c/m/ml	79

[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]	0.53[b]	37.6	2.52	24.9
2.	Radioisotope Processing Area	20	0.20	14.2	0.69	6.8
3.	Buildings 3503 and 3508	1	0.03	2.1	2.15	21.3
4.	Buildings 3025 and 3026	< 1	--	--	2.02	20.0
5.	Building 3019	2	< 0.01	--	0.09	0.9
6.	Fission Products Development Laboratory	14	0.06	4.2	0.26	2.6
7.	Waste Evaporator, Building 2531	22	0.29	20.6	0.90	8.9
8.	Buildings 3525 and 3550	15	0.30	21.3	1.36	13.5
9.	Building 2026	0	--	--	0.11	1.1
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 seepign 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	0.02
Central Radioactive Gas Disposal Facilities	3039	0.67
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	< 0.01
MSRE	7512	< 0.01
HFIR	7911	0.02
Total activity in gases released		0.71

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

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67-12-26

DATE: December 15, 1967

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SUBJECT: Radioactive Waste Disposal Operations Report for the month of October 1967

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David R Hamrin 3/4/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Contamination of the Clinch River caused by ORNL radioactive waste discharges was 0.32% of the MPC_w for a release to uncontrolled areas. Strontium, contributing 95.72% to the MPC_w, was the primary contaminant, Figure 1 compares the river contamination on a monthly basis. Data pertaining to the White Oak Dam discharges were provided by the Health Physics Division.

White Oak Creek Monitoring

The total discharge to White Oak Lake was 2.13 curies. Of this total, about one-half (0.81 curie of ruthenium and 0.30 curie of cobalt) came from the soil disposal areas. The cesium release was 0.41 curie. Most of this activity is attributed to the process waste system. Strontium, released primarily from the Bethel Valley area, was 0.61 curie. The amount of alpha radioactivity released into White Oak Lake was not significant.

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

Process Waste

Approximately 12 million gallons of low level waste was chemically treated this month. A summary of plant operations is given in Table 2. Table 3 lists the principal sources of radioactivity discharged into the process waste system. Figure 4 compares the strontium releases from the process waste system into the creek. Figure 5 shows the

volumes of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 370 gph. A summary of operating data is given in the following table.

	Gallons
Total volume generated	264,000
Volume transferred to the evaporator	275,000
Volume of concentrate returned to tank farm	21,000
Volume of concentrate transferred to hydrofracturing site	89,000
Tank Farm free space at beginning of month	472,000
Tank Farm free space at end of month	551,000

Main contributors to the ILW system are listed below. A monthly comparison of the total volumes of waste generated is given in Figure 6.

		Gallons
1.	Reactor Complex	55,000
2.	Building 3019	40,000
3.	Fission Products Development Laboratory	30,000
4.	4500 Complex	30,000
5.	Radioisotopes Processing Area	28,000
6.	Building 3525	10,000

Gaseous Waste

The total discharge from the ORNL stacks was 0.92 curie. Virtually all of this activity was gaseous ^{131}I, discharged from the 3039 stack. The filterable activity (mainly ^{137}Cs) amounted to 10 millicuries. There was no significant amount of alpha activity detected.

Individual stack releases are listed in Table 4. Figures 7 and 8 compare stack releases on a monthly basis.

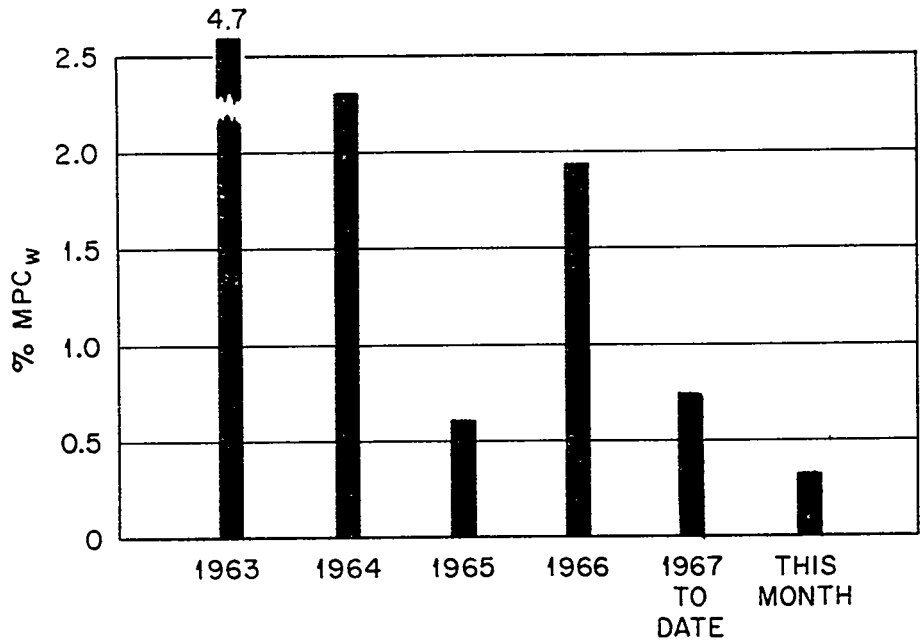

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

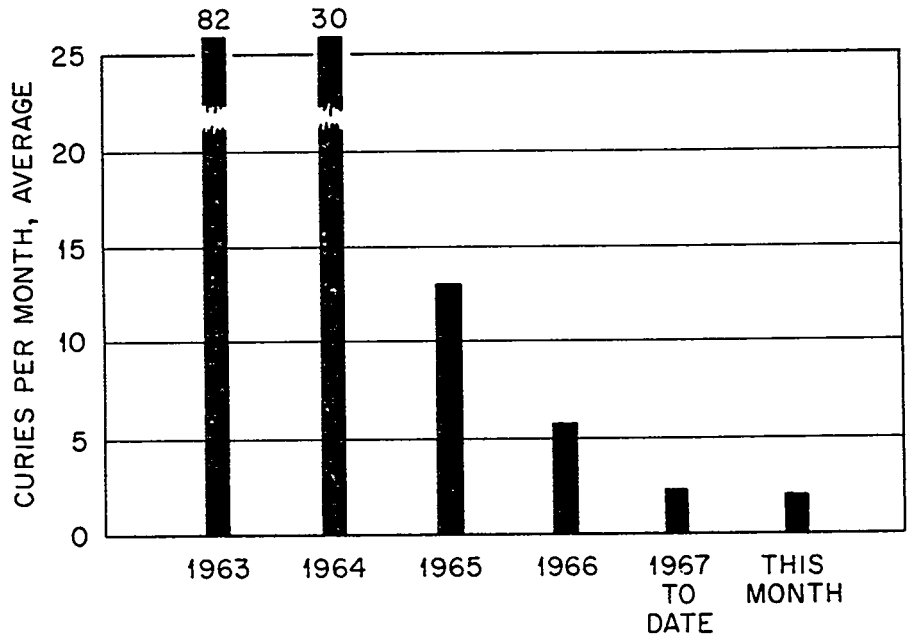

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

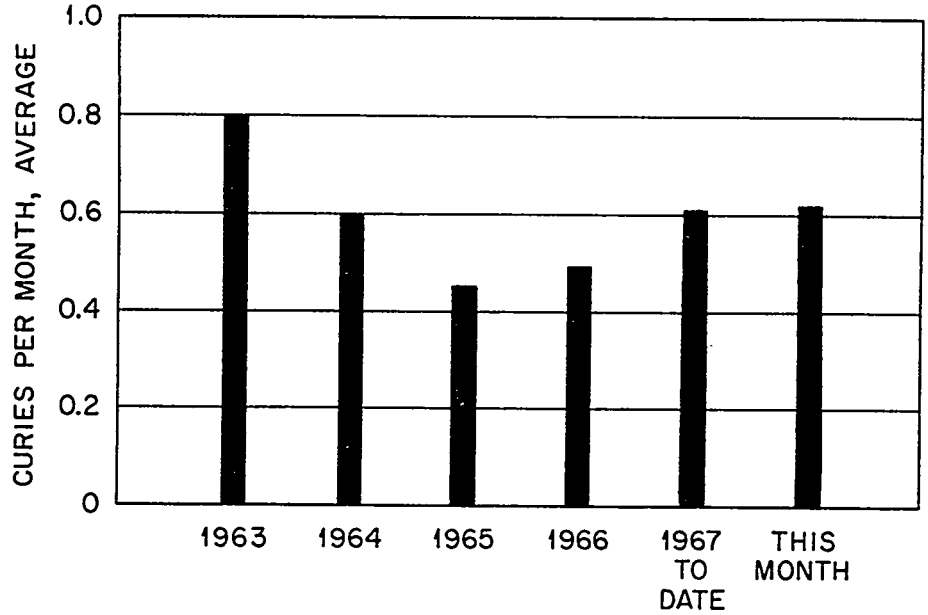

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

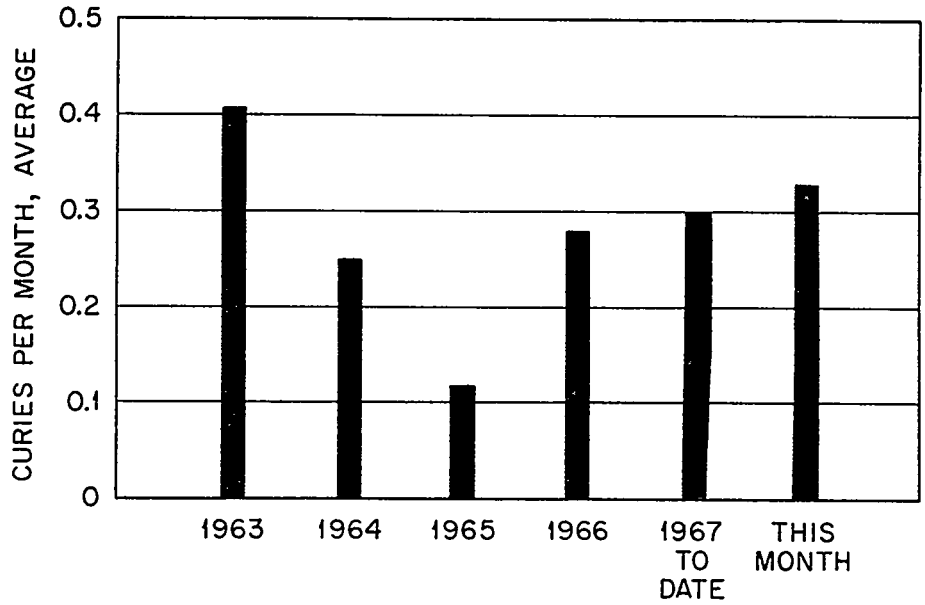

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

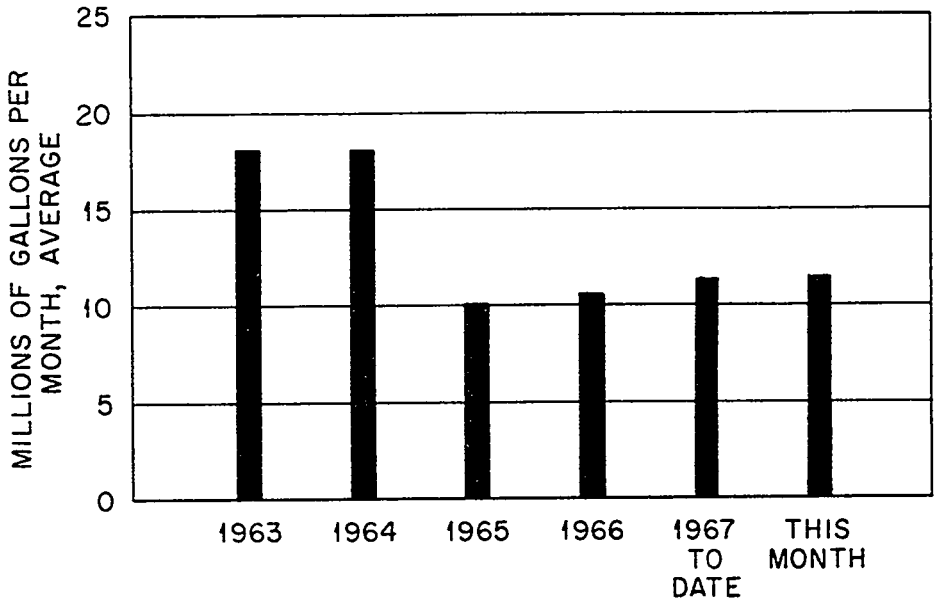

Fig. 5. Process Waste Volumes.

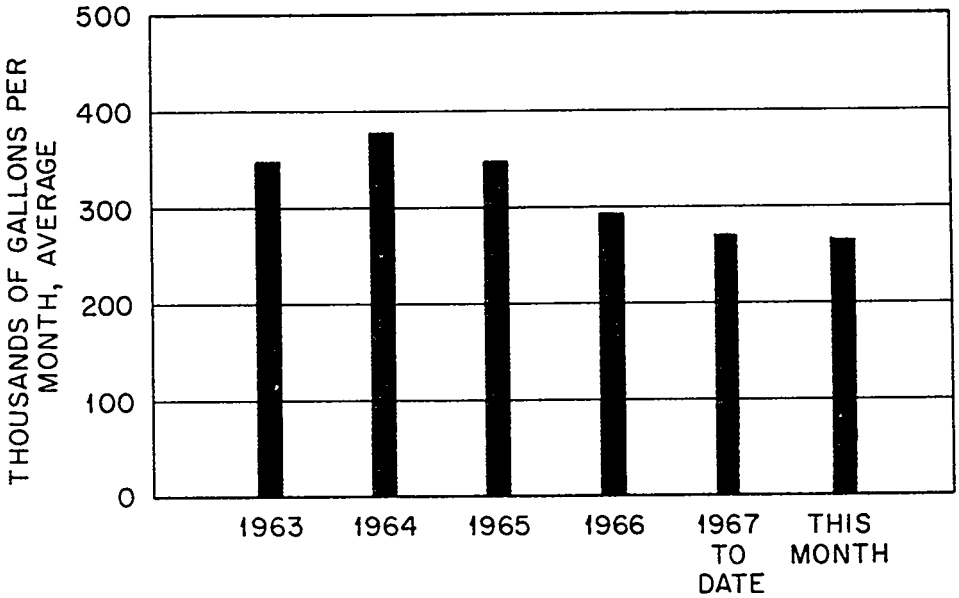

Fig. 6. Intermediate-Level Waste Volumes.

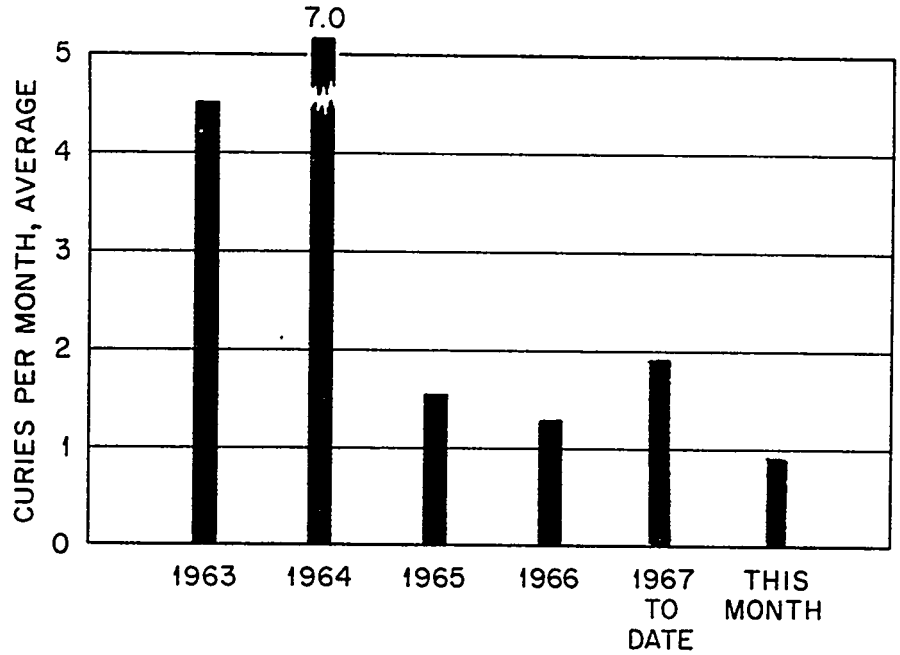

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

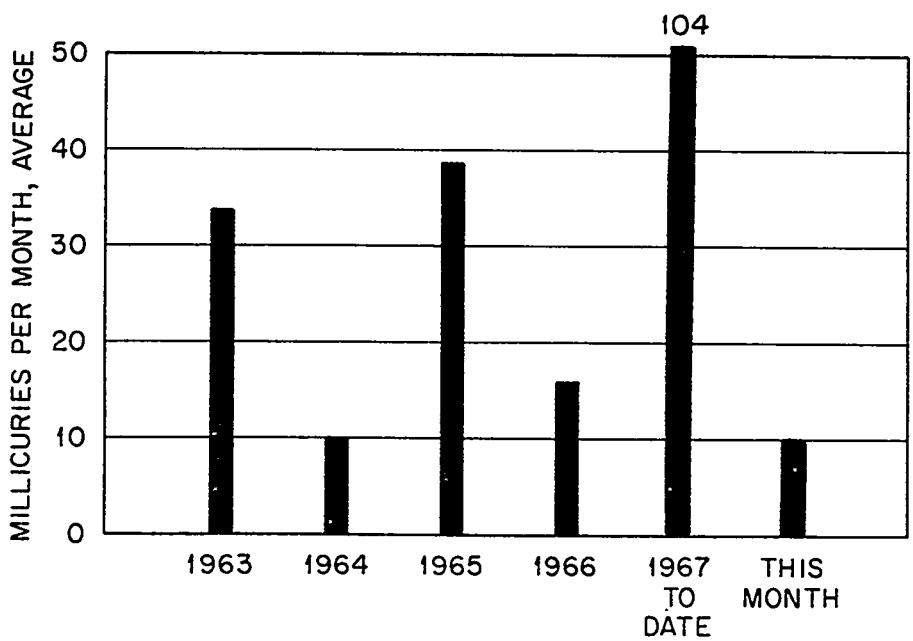

Fig. 8. Filterable Activity Released in Gaseous Waste.

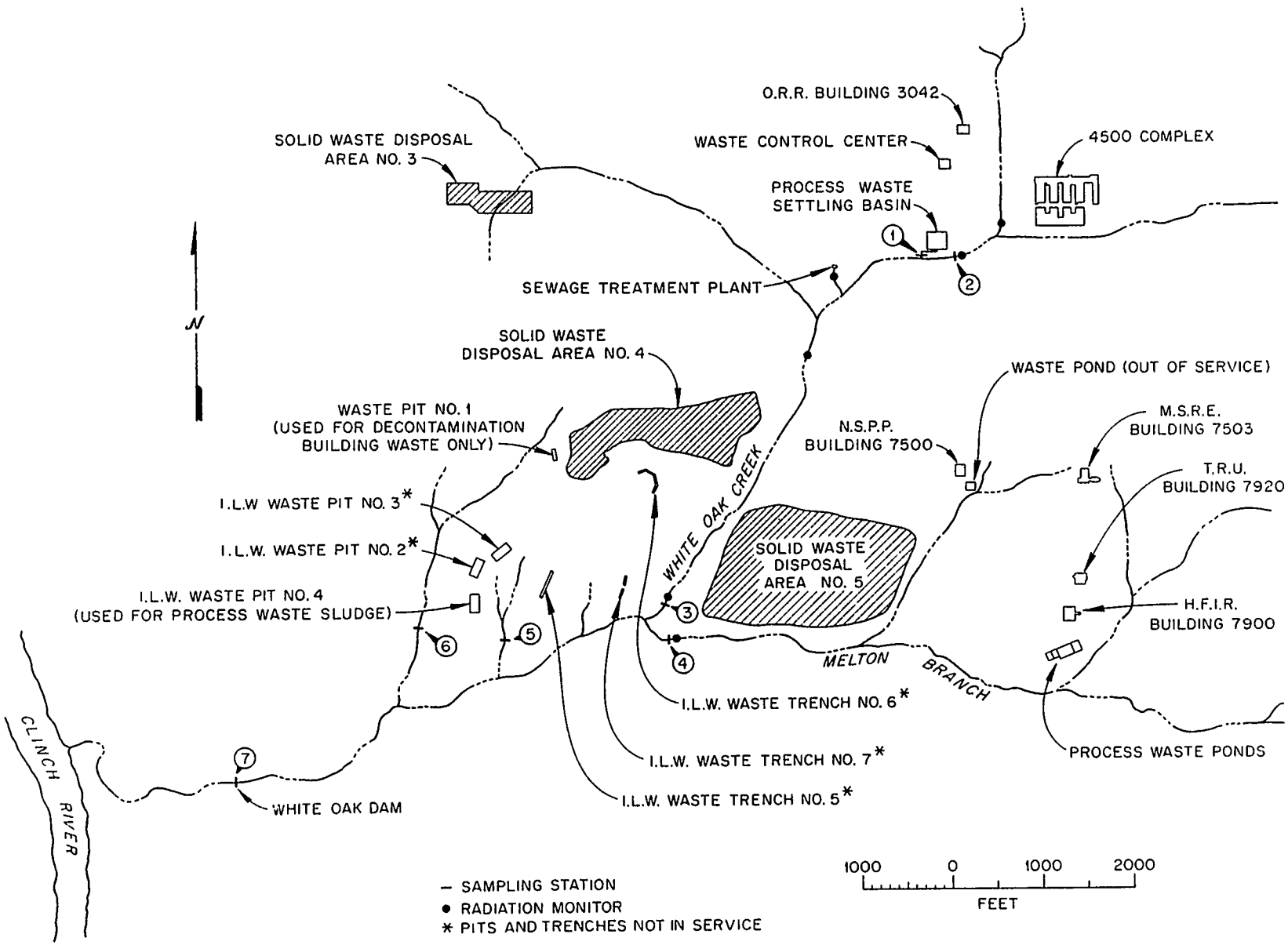

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.33	none detected	1.27	none detected	1.60
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	< 0.01
Total discharge from Bethel Valley Area	3	0.54	< 0.01	0.38	none detected	0.92
Total discharge from Melton Valley Area	4	0.07	< 0.01	< 0.01	none detected	0.07
East waste pit seepage	5	< 0.01	0.67	0.03	0.27	0.97
West waste pit seepage	6	< 0.01	0.14	< 0.01	0.03	0.17
Total discharge from all sources	3,4,5,6	0.61	0.81	0.41	0.30	2.13
White Oak Dam to Clinch River (Health Physics measurement)	7	0.45	0.96	0.14	0.10	2.22[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: 11.5×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.9×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	2.41	0.33	86
$^{103,106}Ru$	None detected	None detected	--
^{60}Co	0.04	None detected	100
^{137}Cs	7.86	1.27	84
Gross Beta Analysis	144 c/m/ml	22 c/m/ml	85

[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	13[b]	0.60	56.1	3.27	28.5
2.	Radioisotope Processing Area	5	0.08	7.5	1.08	9.4
3.	Buildings 3503 and 3508	0	--	--	2.14	18.6
4.	Buildings 3025 and 3026	4	0.11	10.3	2.01	17.5
5.	Building 3019	5	0.03	2.8	0.36	3.1
6.	Fission Products Development Laboratory	29	0.02	1.8	0.04	0.4
7.	Waste Evaporator, Building 2531	15	0.23	21.5	1.15	10.0
8.	Buildings 3525 and 3550	0	--	--	1.40	12.2
9.	Building 2026	0	--	--	0.03	0.3
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	0.06
Central Radioactive Gas Disposal Facilities	3039	0.86
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		0.92

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

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FROM: L. C. Lasher

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

David R. Hamrin 3/7/46
Technical Information Officer Date
ORNL Site

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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.

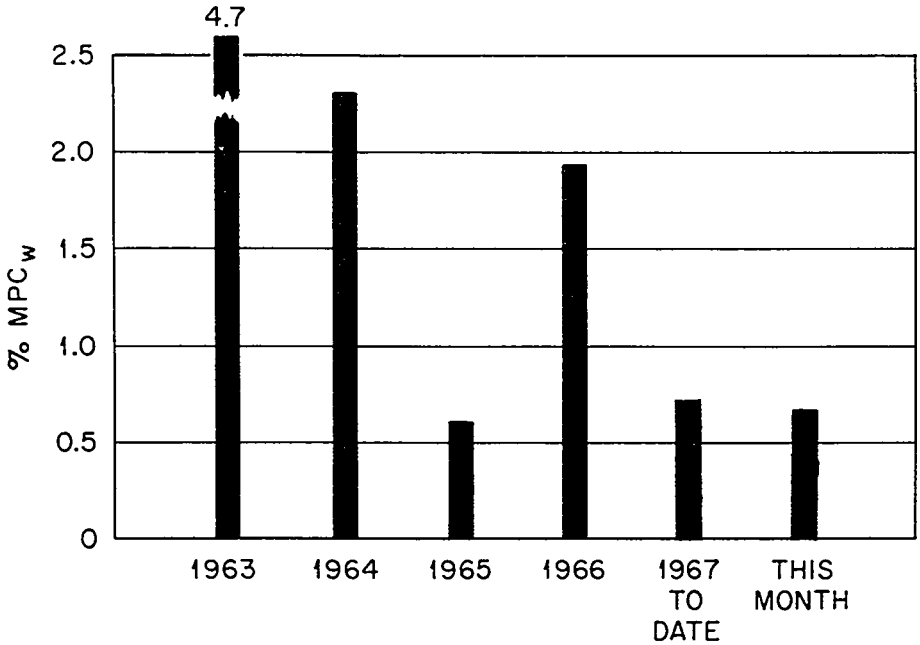

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

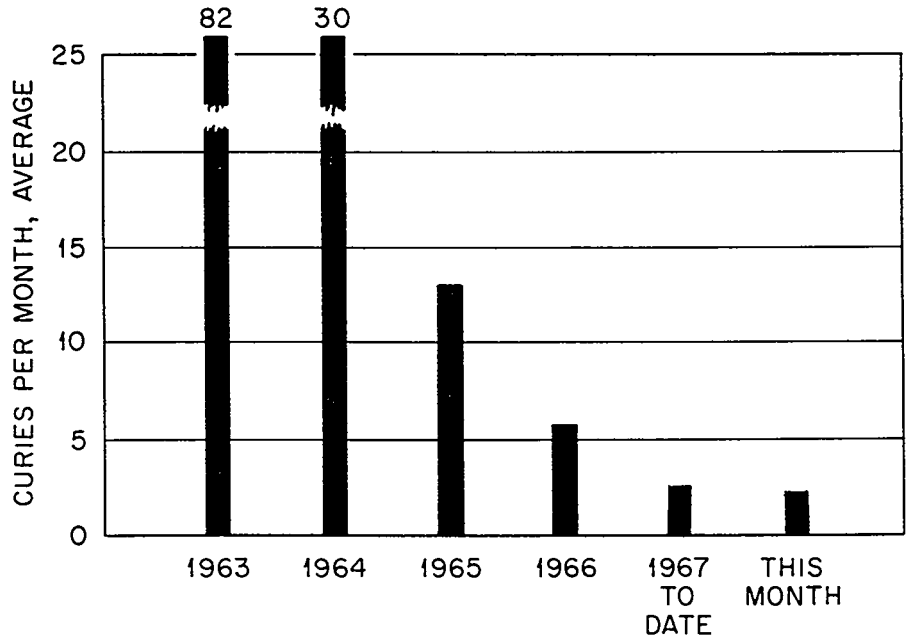

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

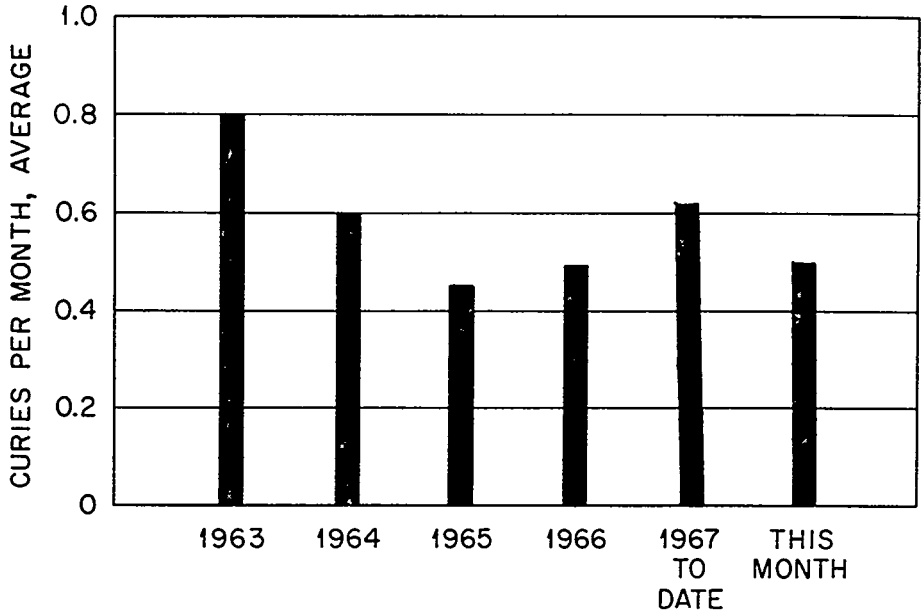

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

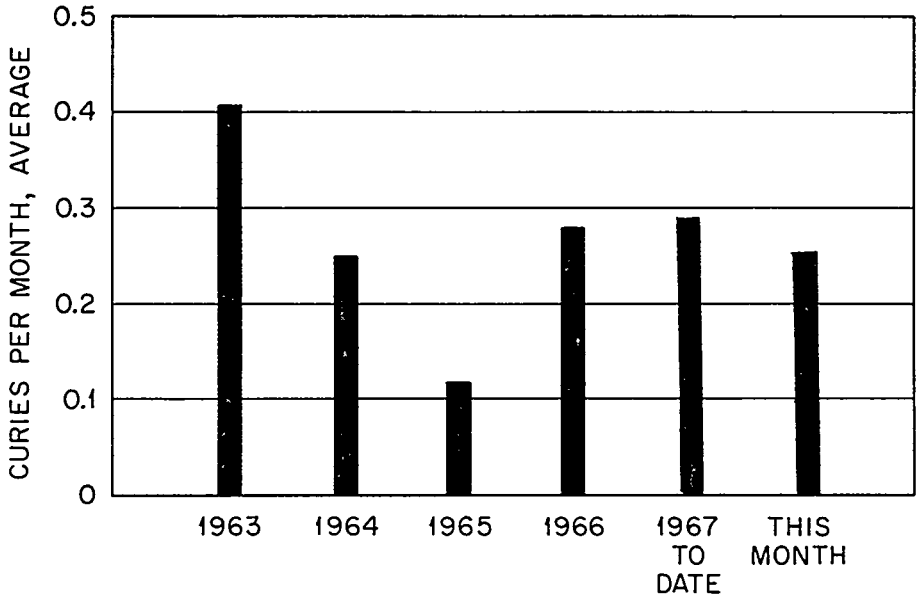

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

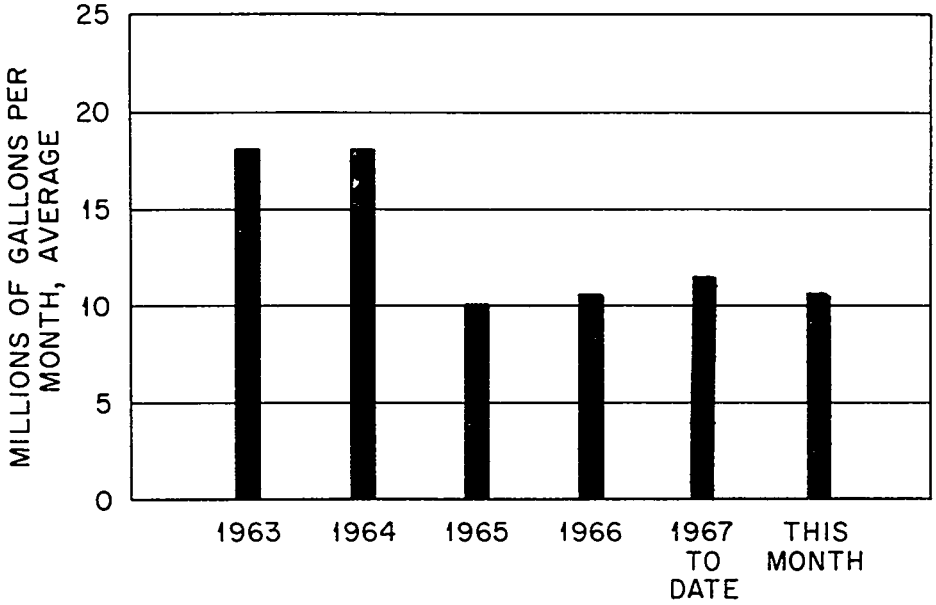

Fig. 5. Process Waste Volumes.

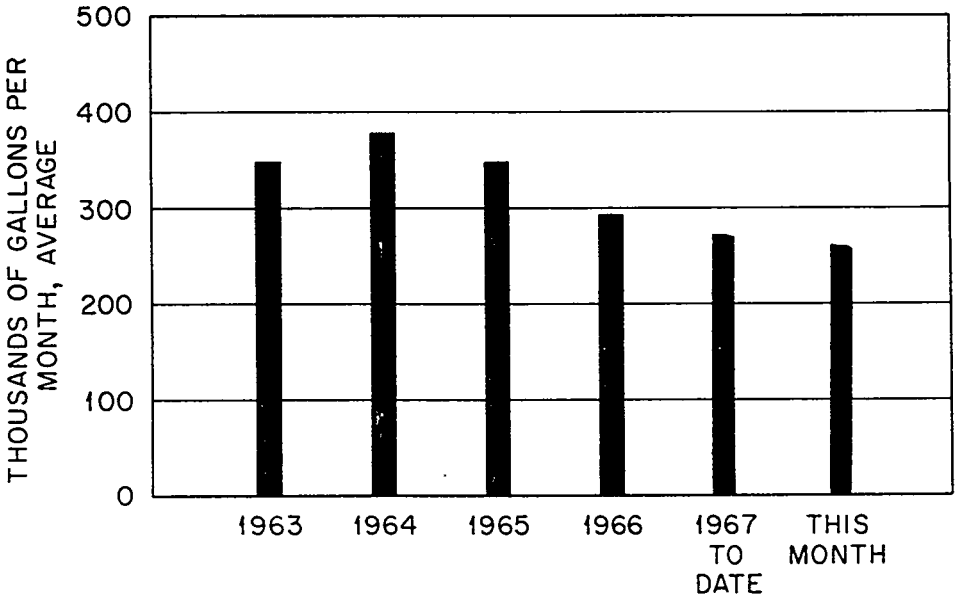

Fig. 6. Intermediate-Level Waste Volumes.

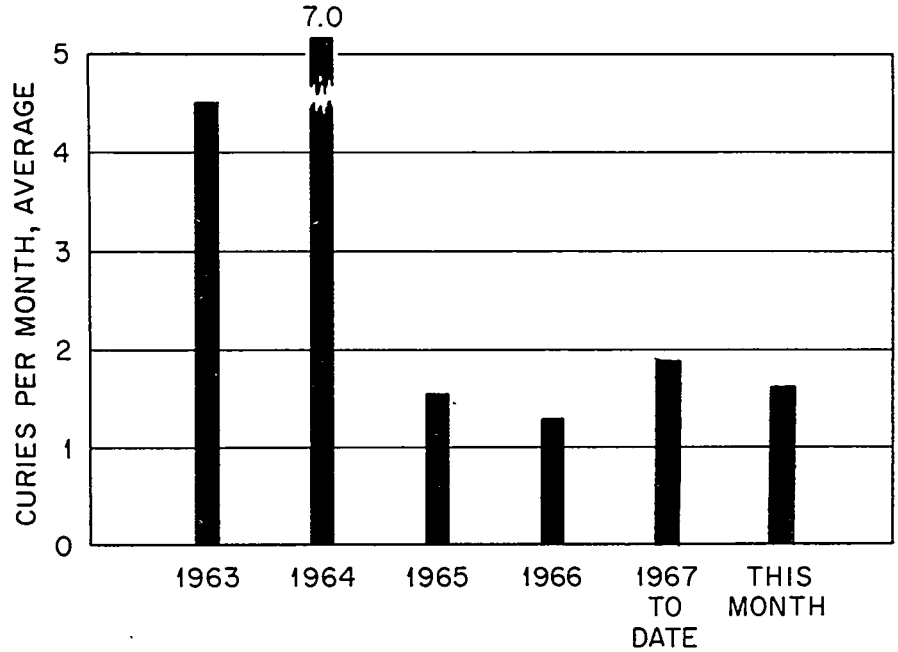

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

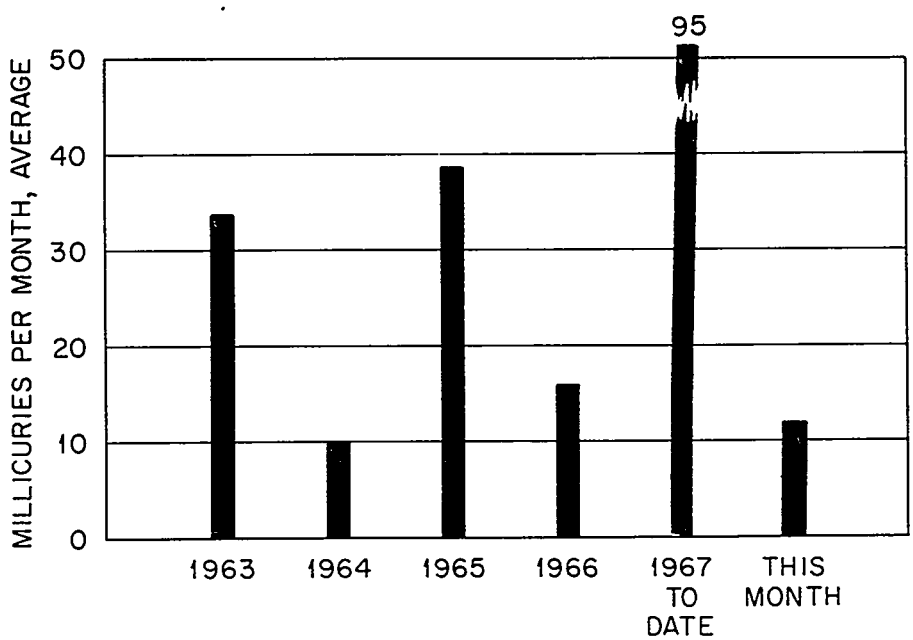

Fig. 8. Filterable Activity Released in Gaseous Waste.

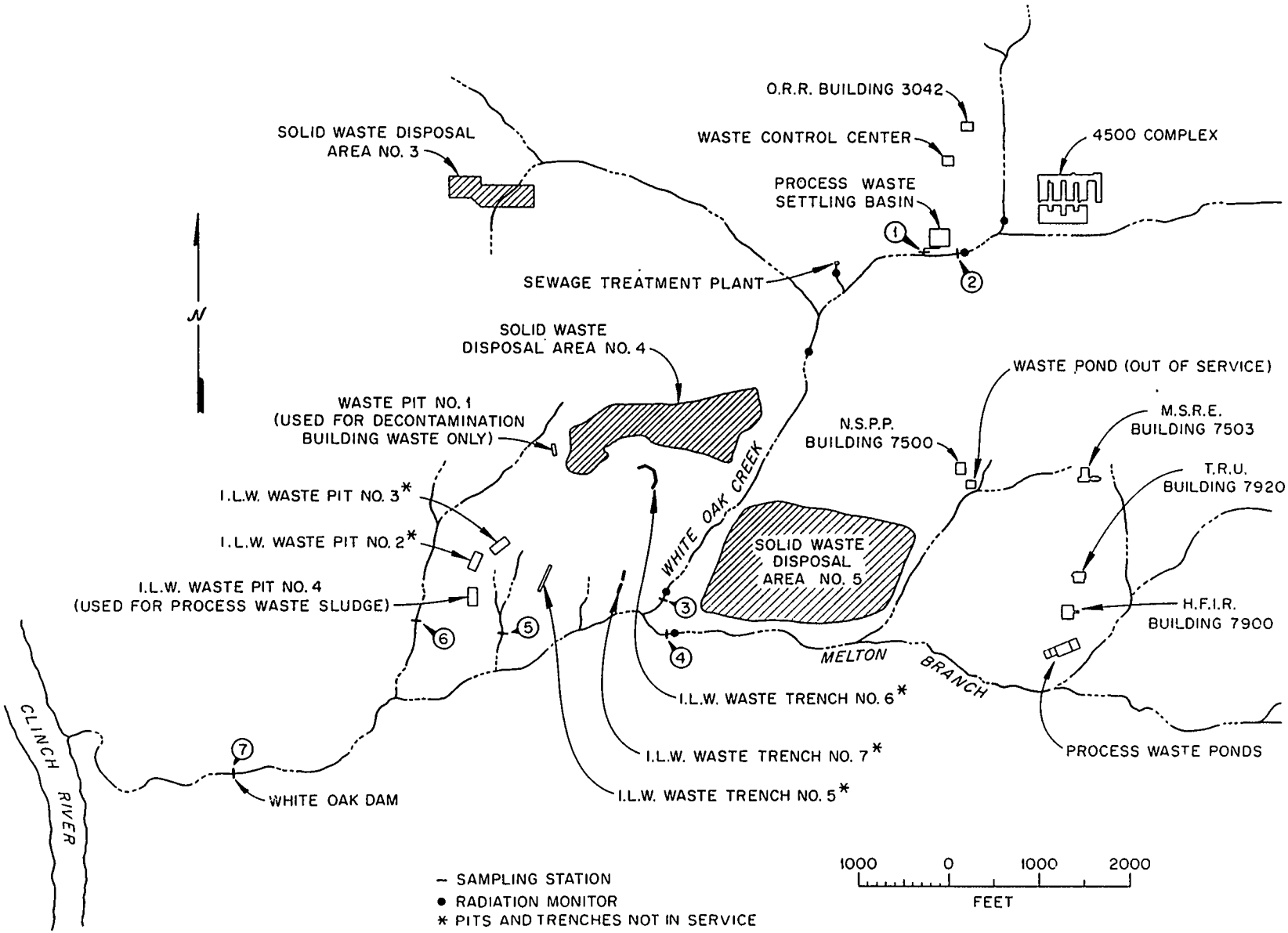

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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

DATE ISSUED: FEB 27 1969

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ORNL-4-7
CENTRAL FILES NUMBER
68-2-8

DATE: February 8, 1968

COPY NO.

SUBJECT: Radioactive Waste Disposal Operations Report for the month of December 1967

TO: Distribution

FROM: L. C. Lasher

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

David R. Hamrin 3/7/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river resulting from ORNL waste discharges was 0.71% of the MPC_w for a release to an uncontrolled area. Strontium, contributing 94.59% to the MPC_w, was the prime contaminant. 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 main contaminants released to White Oak Lake were 1.12 curies of strontium, 1.30 curies of cesium, 0.42 curie of ruthenium and 0.20 curie of cobalt (see Table 1, Figure 2, and Figure 3). A large portion of the strontium and cesium, possibly more than one-half of the total, came from the intermediate-level waste evaporator through the process waste system (see section "Intermediate-Level Waste"). The bulk of the ruthenium and cobalt came from the intermediate-level waste pits and trenches that are no longer in use.

Process Waste

A total of 13.2 million gallons of process waste was treated this month. A summary of plant operation is shown in Table 2.

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

Intermediate-Level Waste

Approximately seven curies of activity were released to the process waste system by the waste evaporator. This relatively high discharge

was caused by several foam-overs. Although the evaporator automatically shuts down when foaming occurs, some foam invariably go over to process waste with the condensate before the reaction subsides. In an effort to eliminate this problem in the future, a recycle line was installed in the condensate system which will permit the return of the contaminated condensate to the evaporator. The condensate dump valve, which was previously actuated only by high activity in the condensate, has been altered so that it will also respond to the foam-level indicator in the evaporator. This will close the condensate dump valve before any activity reaches the condensate tank.

A summary of operating data is listed below:

	Gallons
Total volume generated	292,000
Volume transferred to the evaporator	263,000
Volume of concentrate returned to tank farm	20,000
Tank Farm free space at beginning of month	550,000
Tank Farm free space at end of month	501,000

The main contributors to the ILW system were as follows:

		Gallons
1.	4500 Complex	46,000
2.	Building 3019	45,000
3.	Reactor Complex	28,000
4.	Radioisotopes Processing Area	20,000
5.	Fission Products Development Laboratory	17,000

Gaseous Waste

A total of 1.31 curies of activity, identified as ^{131}I, was discharged from the ORNL stacks. The amount of filterable activity and alpha material released were insignificant.

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

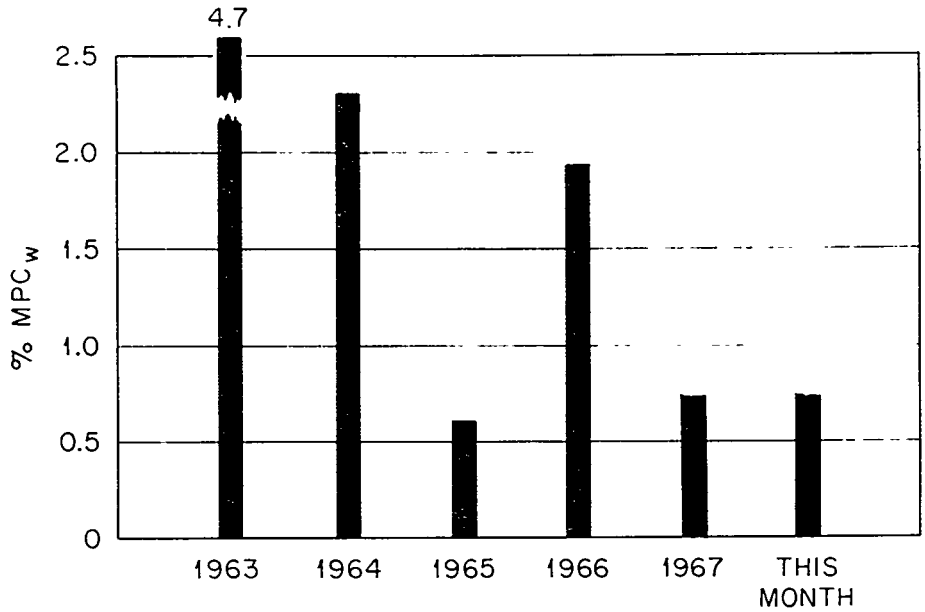

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

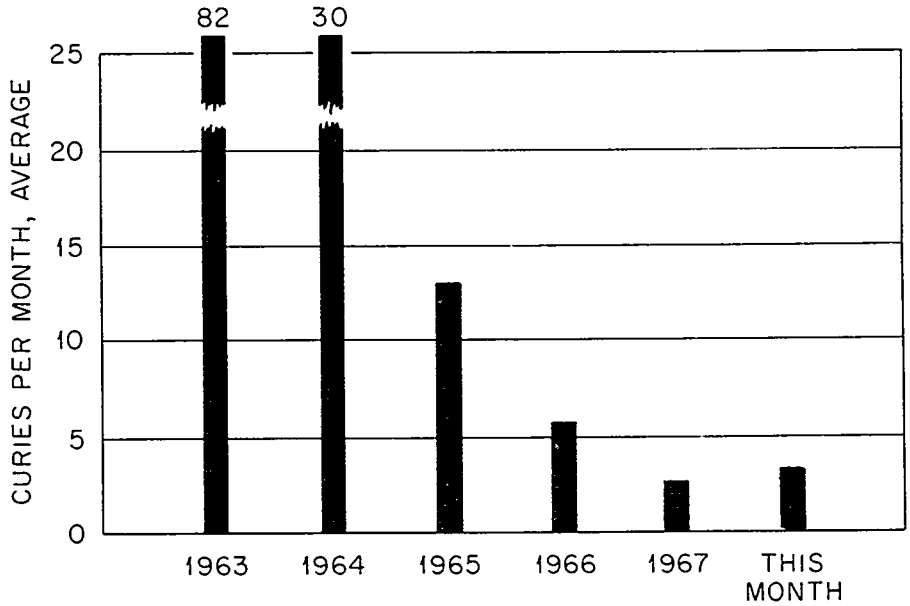

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

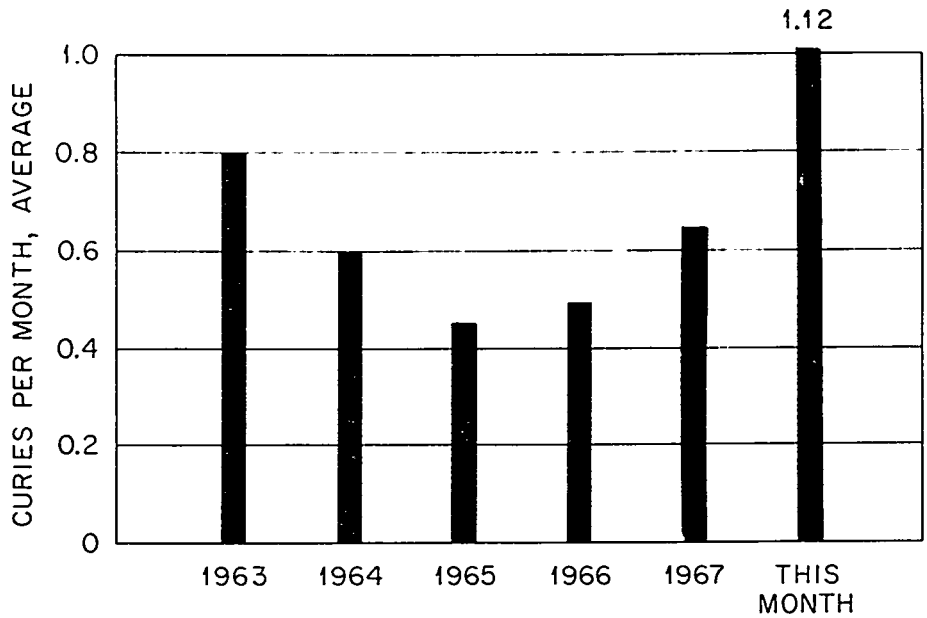

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

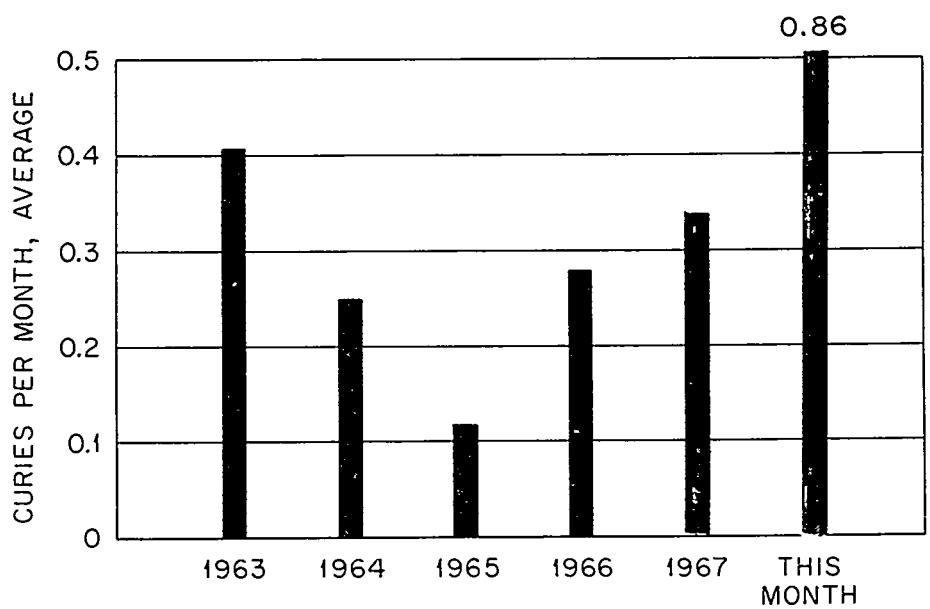

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

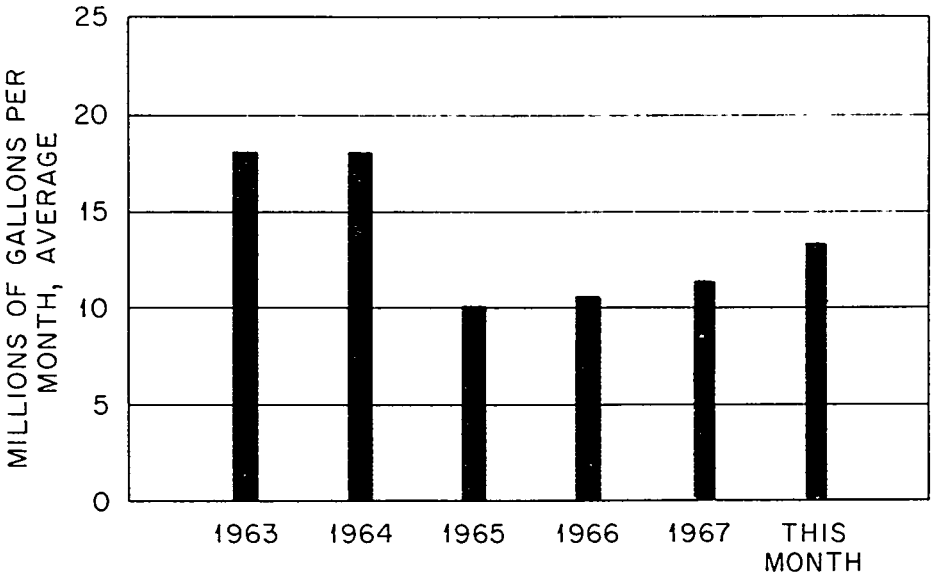

Fig. 5. Process Waste Volumes.

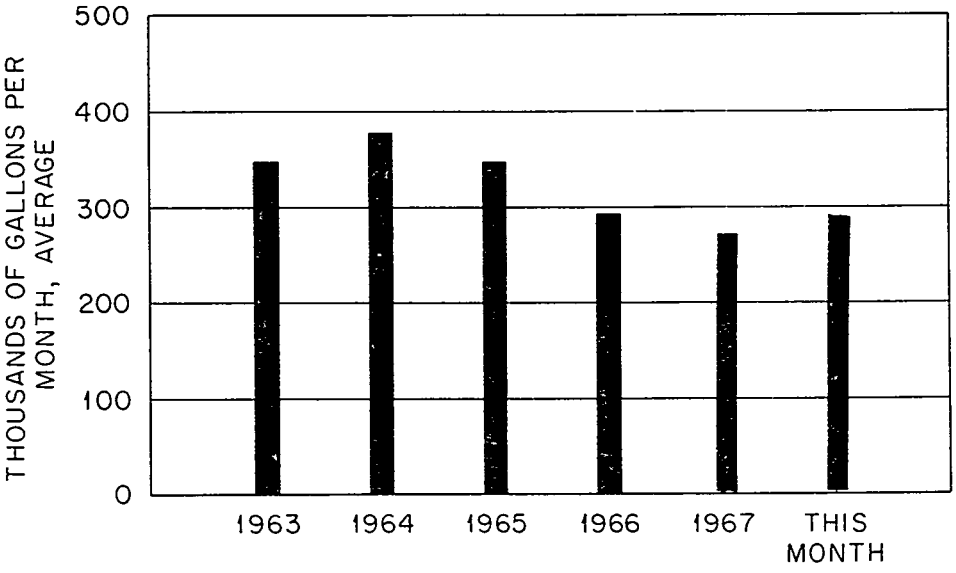

Fig. 6. Intermediate-Level Waste Volumes.

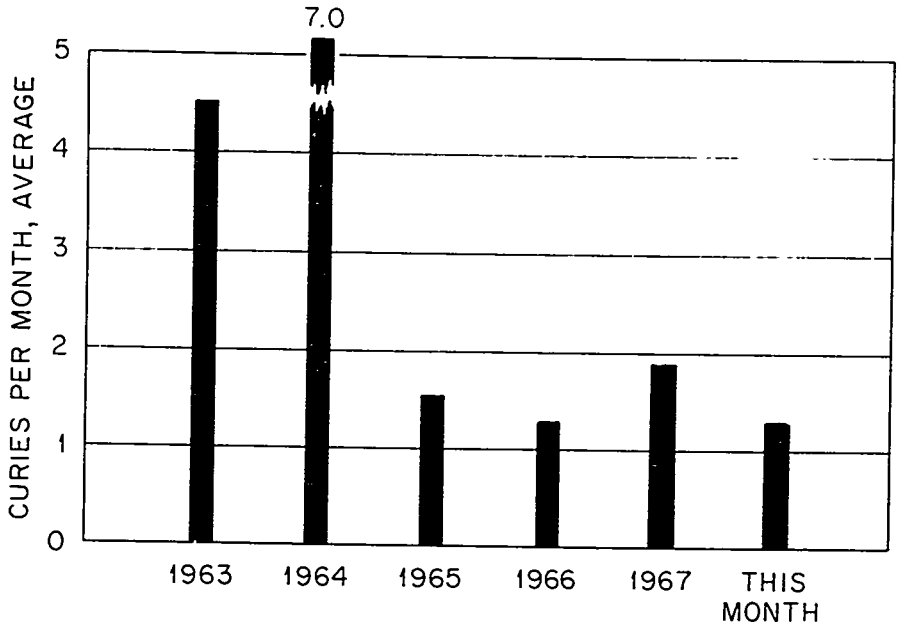

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

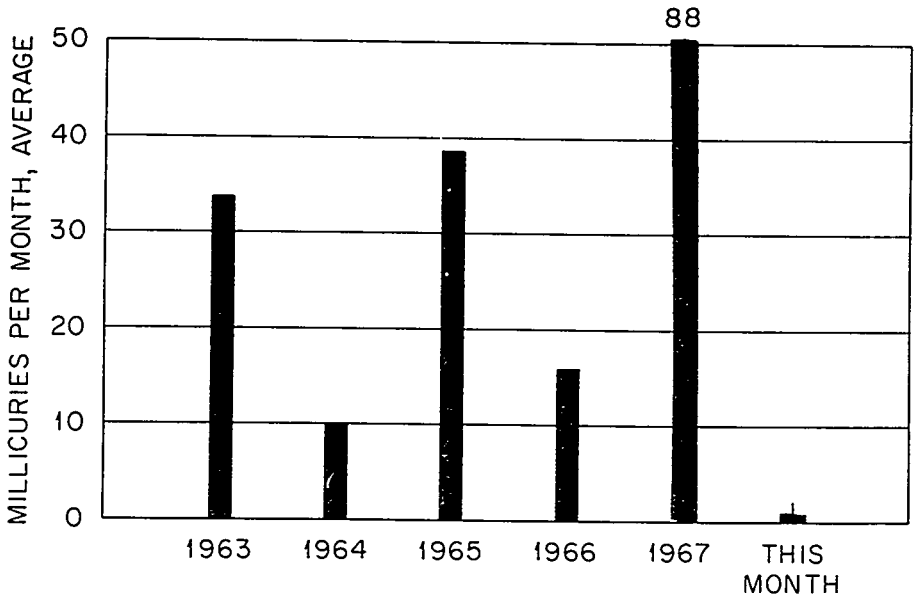

Fig. 8. Filterable Activity Released in Gaseous Waste.

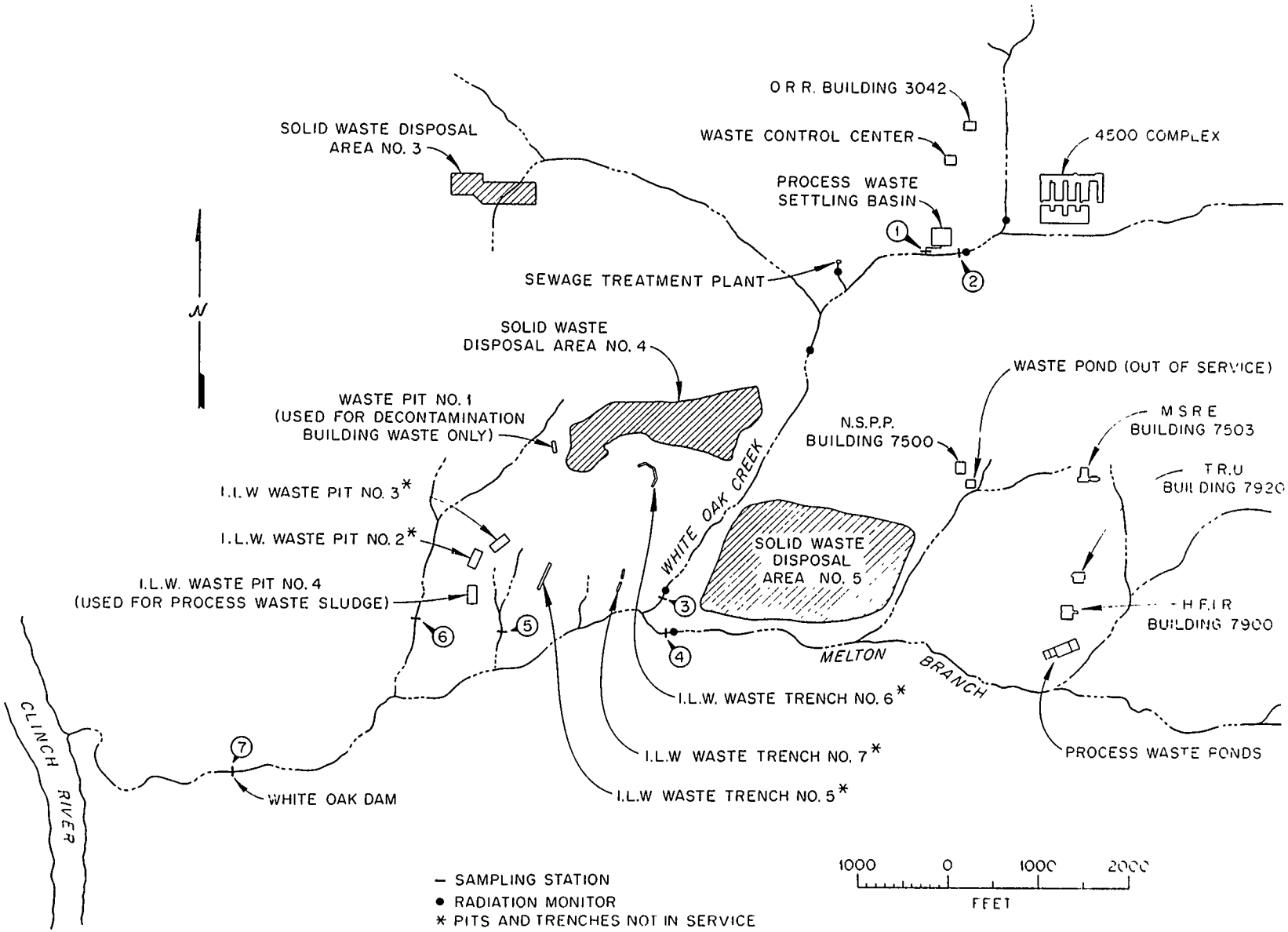

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.86	0.08	1.87	none detected	2.81
Miscellaneous discharges from east end of plant	2	0.02	< 0.01	0.02	none detected	0.04
Total discharge from Bethel Valley Area	3	1.04	0.02	1.27	none detected	2.33
Total discharge from Melton Valley Area	4	0.08	< 0.01	0.01	none detected	0.09
East waste pit seepage	5	< 0.01	0.20	0.02	0.13	0.35
West waste pit seepage	6	< 0.01	0.20	< 0.01	0.07	0.27
Total discharge from all sources	3,4,5,6	1.12	0.42	1.30	0.20	3.04
White Oak Dam to Clinch River (Health Physics measurement)	7	0.87	1.38	0.34	0.48	4.48[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: 13.2×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.1×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT & SETTLING BASIN
Total Sr[a]	3.72	0.86	77
$^{103,106}Ru$	0.25	0.08	68
^{60}Co	None	--	--
^{137}Cs	7.11	1.87	74
Gross Beta Analysis	165 c/m/ml	39 c/m/ml	76

[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	20[b]	0.86[b]	20.6	3.10	28.1
2.	Radioisotope Processing Area	12	0.24	5.8	1.37	12.4
3.	Buildings 3503 and 3508	3	0.06	1.4	1.43	13.0
4.	Buildings 3025 and 3026	2	0.06	1.4	2.16	19.6
5.	Building 3019	1	< 0.01	--	0.36	3.3
6.	Fission Products Development Laboratory	13	< 0.01	--	0.03	0.3
7.	Waste Evaporator, Building 2531	173	2.94	70.3	1.20	11.0
8.	Buildings 3525 and 3550	1	0.02	0.5	1.36	12.3
9.	Building 2026	1	< 0.01	--	< 0.01	--
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	0.08
Central Radioactive Gas Disposal Facilities	3039	1.23
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		1.31

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

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CENTRAL FILES NUMBER
68-3-6

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TO: Distribution

FROM: L. C. Lasher

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

David R Hamrin 3/7/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river which resulted from ORNL waste discharges was 0.22% of the MPC_w for a release to an uncontrolled area. Strontium, contributing 94.4% of the measured percent of MPC_w, was the prime contaminant. Figure 1 compares the river contamination on a monthly basis. Data pertaining to the White Oak Dam discharge were provided by the Health Physics Division.

White Oak Creek Monitoring

The main contaminants released to White Oak Lake were 0.64 curie of strontium, 0.48 curie of cesium, 0.41 curie of ruthenium, and 0.23 curie of cobalt (see Table 1, Figure 2, and Figure 3). Forty-four percent of the strontium was discharged through the process waste system; the remainder came from contamination in the creek bed or from seeps from the solid waste burial grounds. There was no significant discharge of alpha activity.

Process Waste

A total of 11 million gallons of waste was 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 to White Oak Creek on a monthly basis and Figure 5 compares the volume of waste handled.

Intermediate-Level Waste

The evaporator operated at an average rate of 368 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	243,000
Volume transferred to evaporator	274,000
Volume of concentrate returned to tank farm	22,000
Tank Farm free space at beginning of month	501,000
Tank Farm free space at end of month	510,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Building 3019	67,000
2.	Reactor Complex	45,000
3.	4500 Complex	39,000
4.	Building 3026	25,000
5.	High Flux Isotope Reactor	24,000
6.	Fission Products Development Laboratory	22,000
7.	Radioisotope Processing Area	17,000
8.	Transuranium Processing Plant	10,000

A monthly comparison of the total volumes of waste generated is given in Figure 6.

Gaseous Waste

The total discharge from the ORNL stacks was 0.81 curie of ^{131}I. The releases of alpha and particulate activities were not significant.

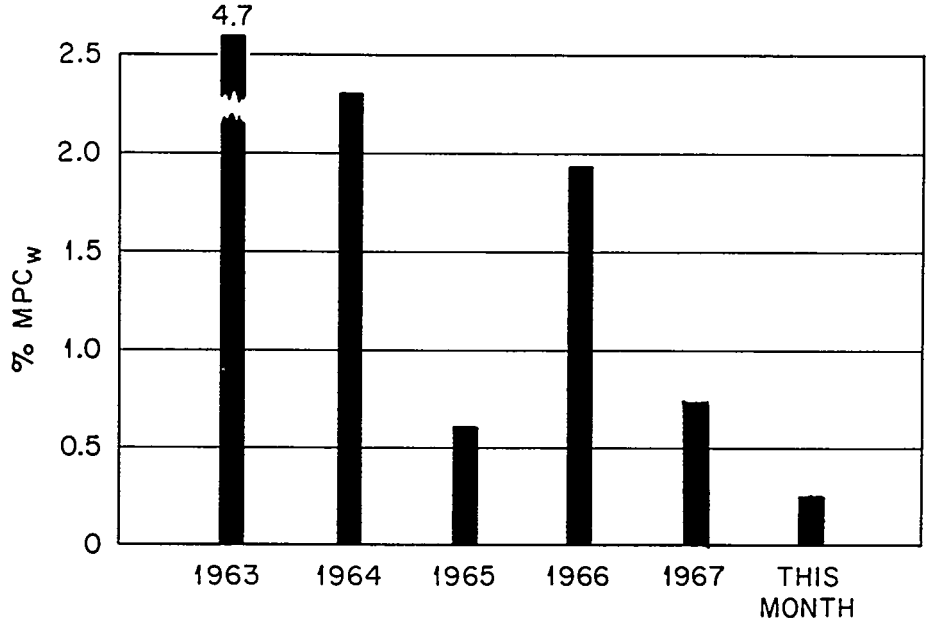

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

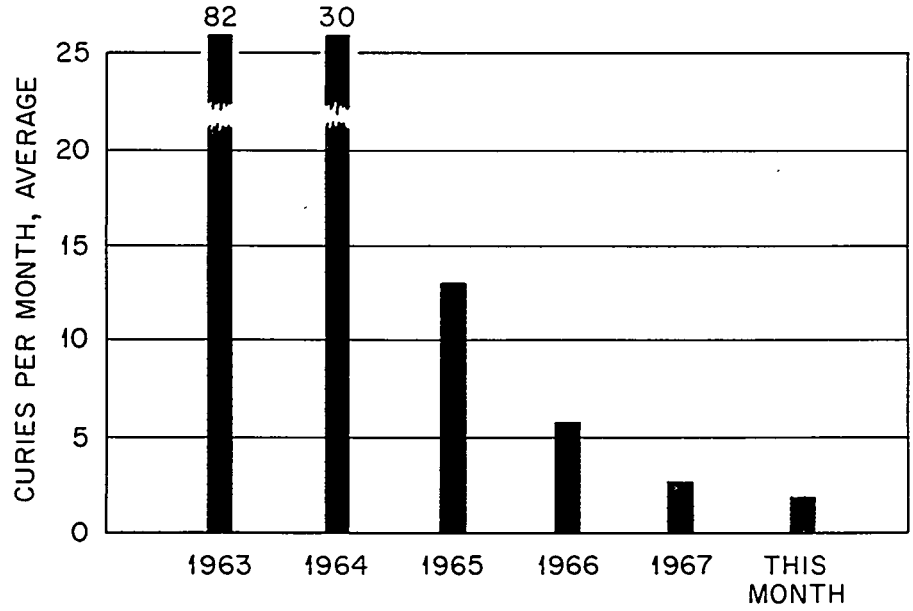

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

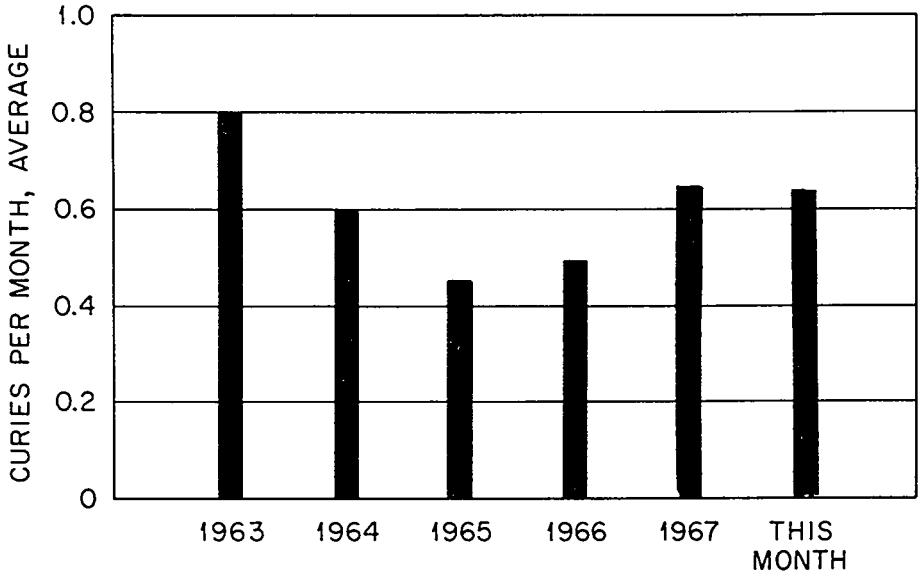

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5, and 6. (See Fig. 9)

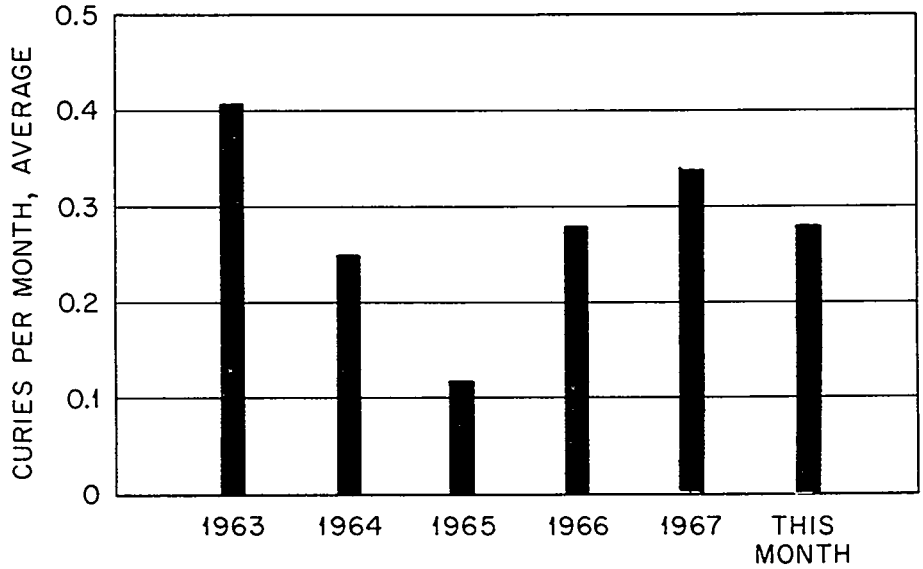

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

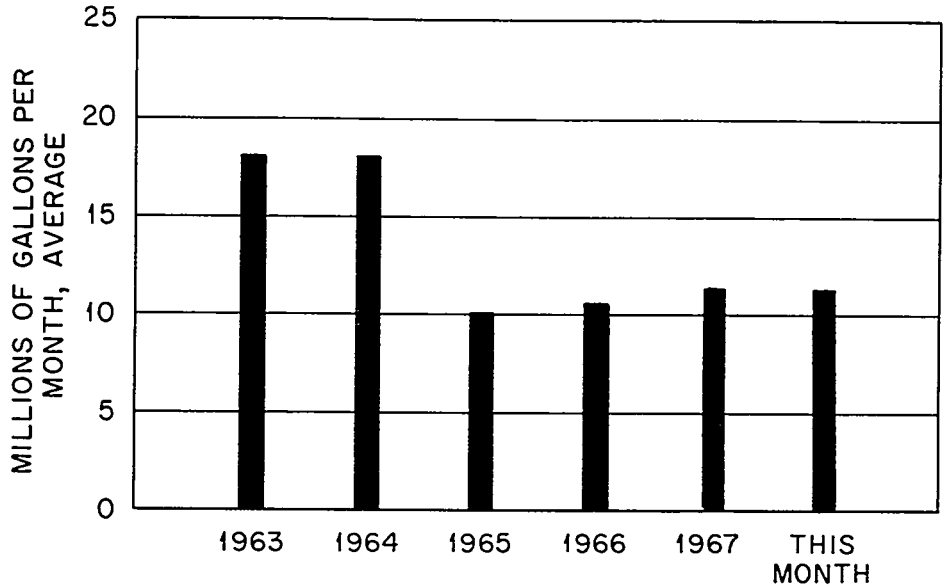

Fig. 5. Process Waste Volumes.

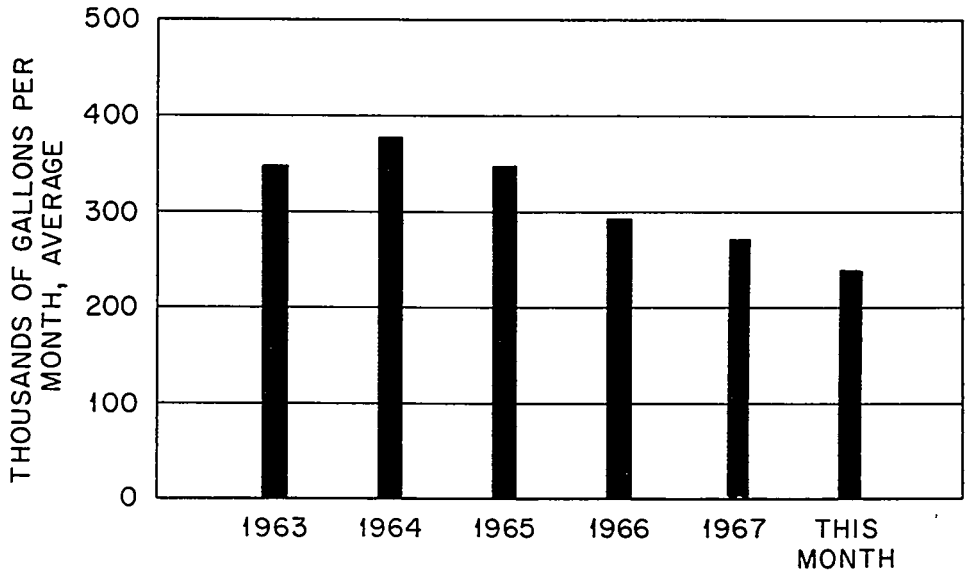

Fig. 6. Intermediate-Level Waste Volumes.

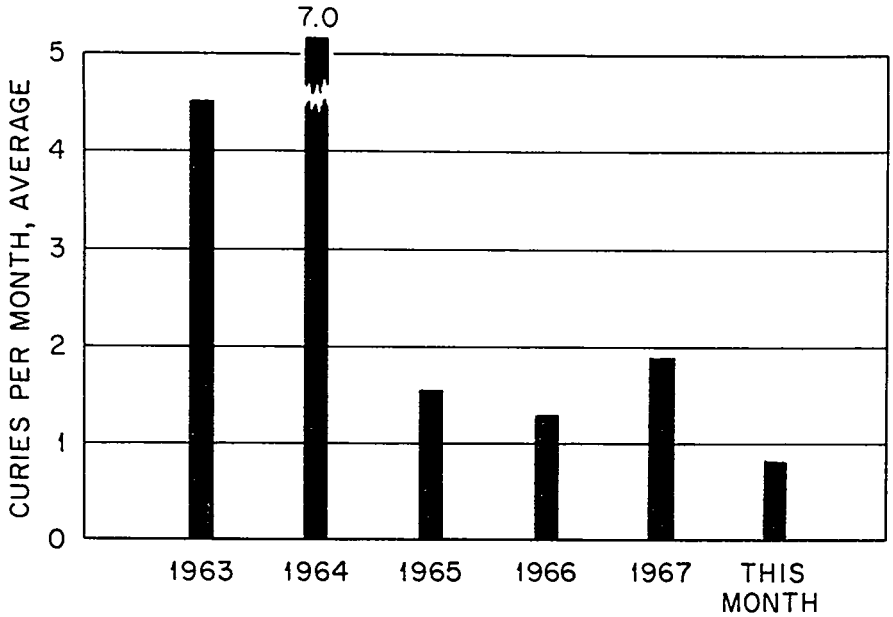

Fig. 7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

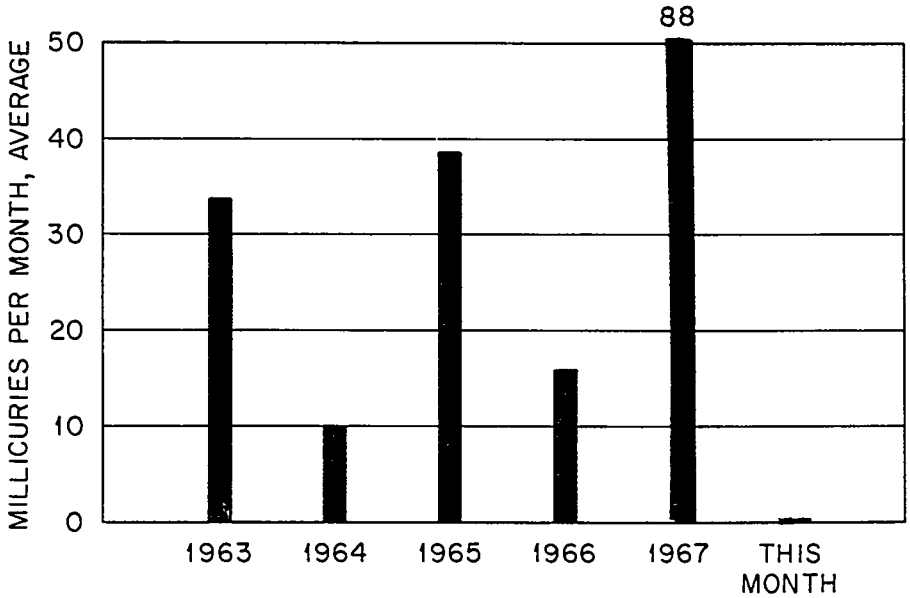

Fig. 8. Filterable Activity Released in Gaseous Waste.

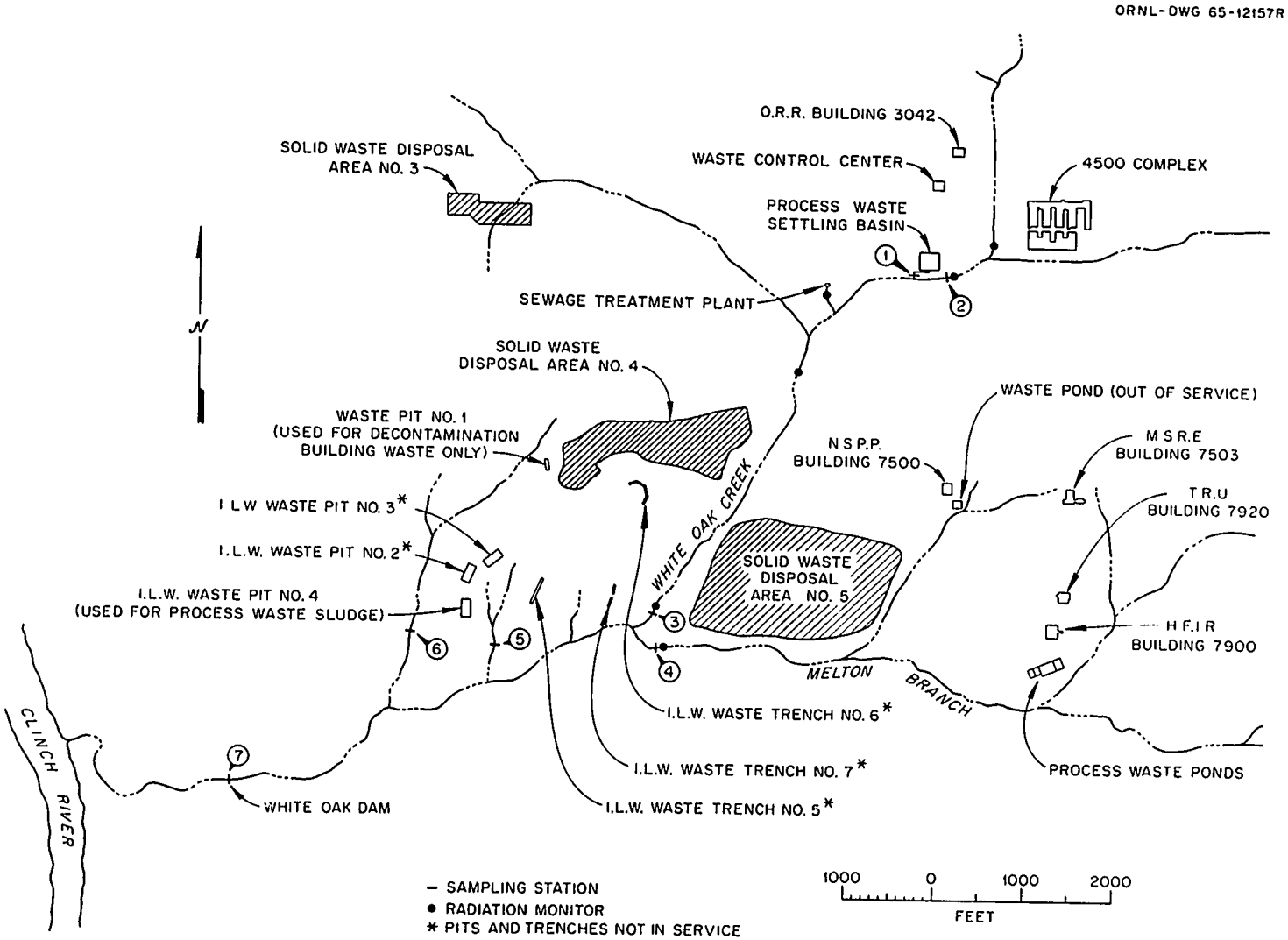

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.28	none detected	0.56	none detected	0.84
Miscellaneous discharges from east end of plant	2	< 0.01	0.02	< 0.01	none detected	0.02
Total discharge from Bethel Valley Area	3	0.56	0.02	0.48	none detected	1.06
Total discharge from Melton Valley Area	4	0.08	< 0.01	< 0.01	none detected	0.08
East waste pit seepage	5	< 0.01	0.23	none detected	0.15	0.38
West waste pit seepage	6	< 0.01	0.16	none detected	0.08	0.24
Total discharge from all sources	3,4,5,6	0.64	0.41	0.48	0.23	1.76
White Oak Dam to Clinch River (Health Physics measurement)	7	0.48	0.83	0.31	0.31	2.92[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: 11.2×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.2×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	2.32	0.28	88
$^{103,106}Ru$	0.27	none	100
^{60}Co	0.03	none	100
^{137}Cs	2.47	0.58	77
Gross Beta Analysis	123 c/m/ml	14 c/m/ml	89

[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 MILLION GALLONS	VOLUME % OF TOTAL
1.	Reactor Operations	17	0.71[b]	35.7	3.00	25.8
2.	Radioisotope Processing Area	11	0.23	11.6	1.47	12.7
3.	Buildings 3503 and 3508	1	0.02	1.0	1.64	14.1
4.	Buildings 3025 and 3026	0	--	--	2.11	18.2
5.	Building 3019	0	--	--	0.27	2.3
6.	Fission Products Development Laboratory	13	0.02	1.0	0.13	1.1
7.	Waste Evaporator, Building 2531	56	1.01	50.7	1.30	11.2
8.	Buildings 3525 and 3550	0	--	--	1.46	12.6
9.	Building 2026	0	--	--	< 0.01	--
10.	Building 2001	0	--	--	0.23	2.0
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	0.08
Central Radioactive Gas Disposal Facilities	3039	0.73
Radiochemical Processing Pilot Plant	3020	< 0.01
Graphite Reactor Building	3018	--
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.81

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

DATE ISSUED: APR 22 1968

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TO: Distribution

FROM: L. C. Lasher

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David R Hamrin 3/7/96
Technical Information Officer Date
ORNL Site

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste discharges was 0.26% of the MPC_W for a release to an uncontrolled area . The main contaminant was strontium which contributed 91.3% 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

A total of 1.28 curies of radioactivity was discharged into White Oak Lake. Strontium and cesium from the process waste system accounted for 0.30 curie and 0.51 curie, respectively, of the total. Ruthenium (0.27 curie) and cobalt (0.12 curie), from the waste pits and trenches no longer in use, accounted for most of the remainder. There was no significant discharge of alpha activity.

Table 1 lists the radioactive releases into White Oak Lake. Figures 2 and 3 compare these releases on a monthly basis.

Process Waste

A total of 9.6 million gallons of process waste was treated this month. A summary of plant operation is shown in Table 2.

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

Intermediate-Level Waste

The waste evaporator operated at an average rate of 272 gph. A summary of operating data is listed below:

		Gallons
1.	Total volume generated	177,000
2.	Volume transferred to evaporator	183,000
3.	Volume of concentrate returned to tank farm	9,000
4.	Tank farm free space at beginning of month	510,000
5.	Tank farm free space at end of month	507,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Building 3019	48,000
2.	4500 Complex	32,000
3.	Reactor Complex	21,000
4.	High Flux Isotope Reactor	16,000
5.	Transuranium Processing Plant	16,000
6.	Radioisotopes Processing Area	13,000
7.	Fission Products Development Laboratory	11,000

Gaseous Waste

A total of 850 millicuries of gaseous ^{131}I was discharged from the ORNL stack systems. The alpha activity detected during the period was insignificant.

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

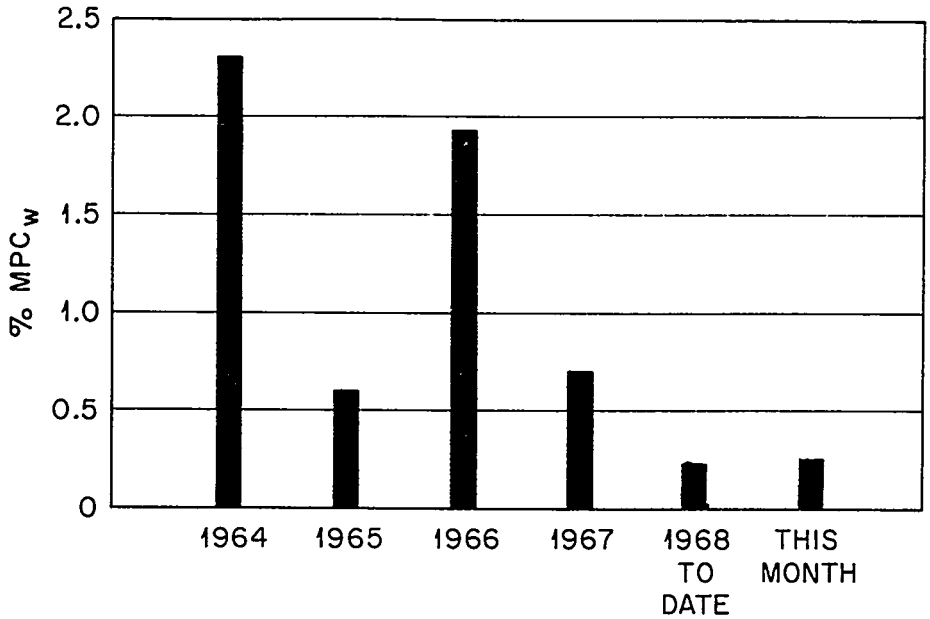

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

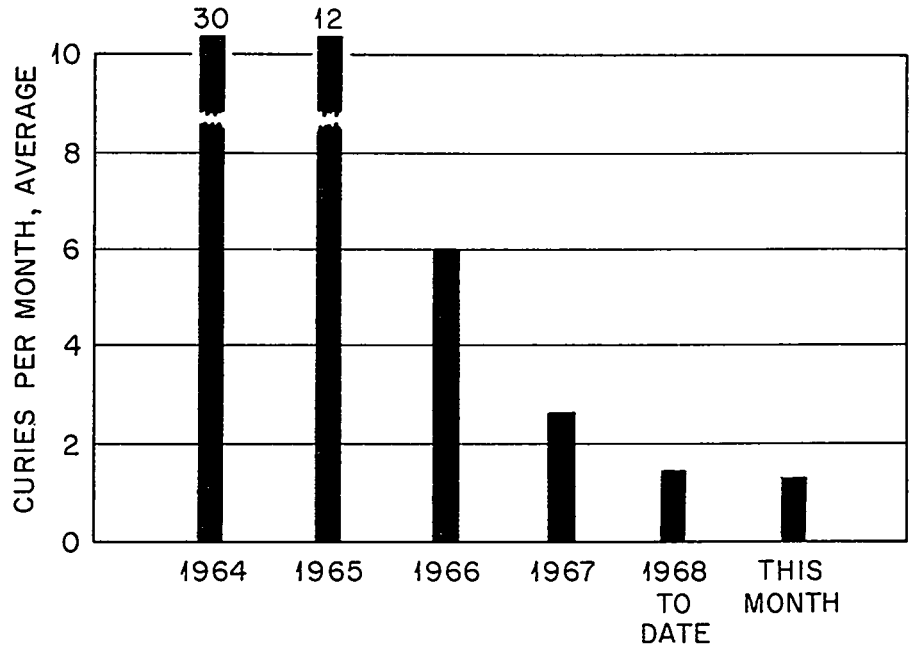

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

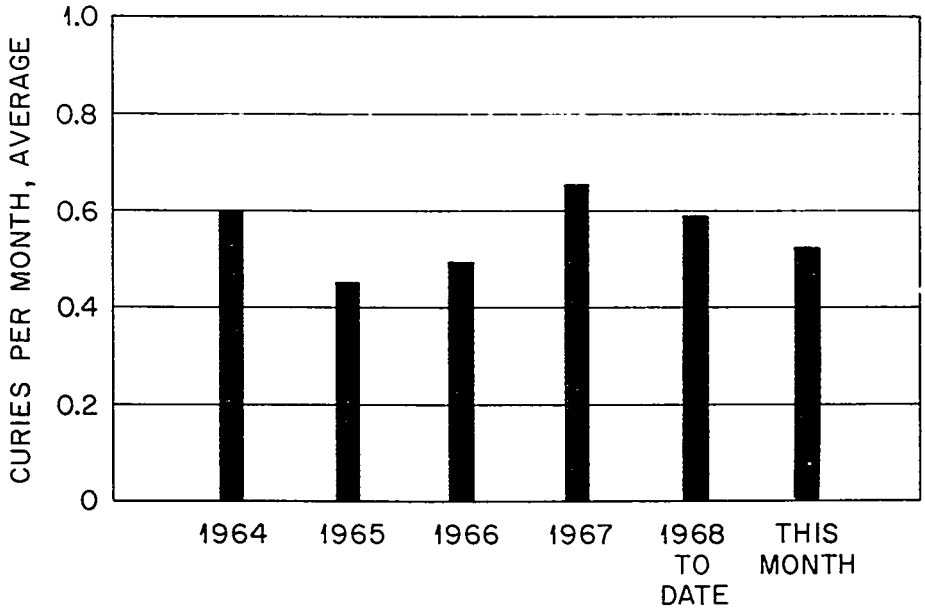

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

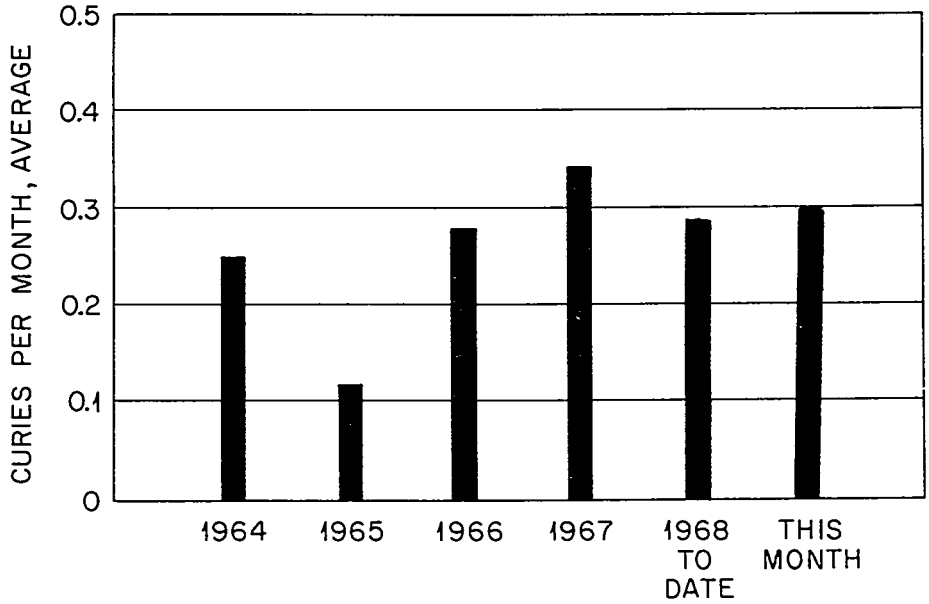

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

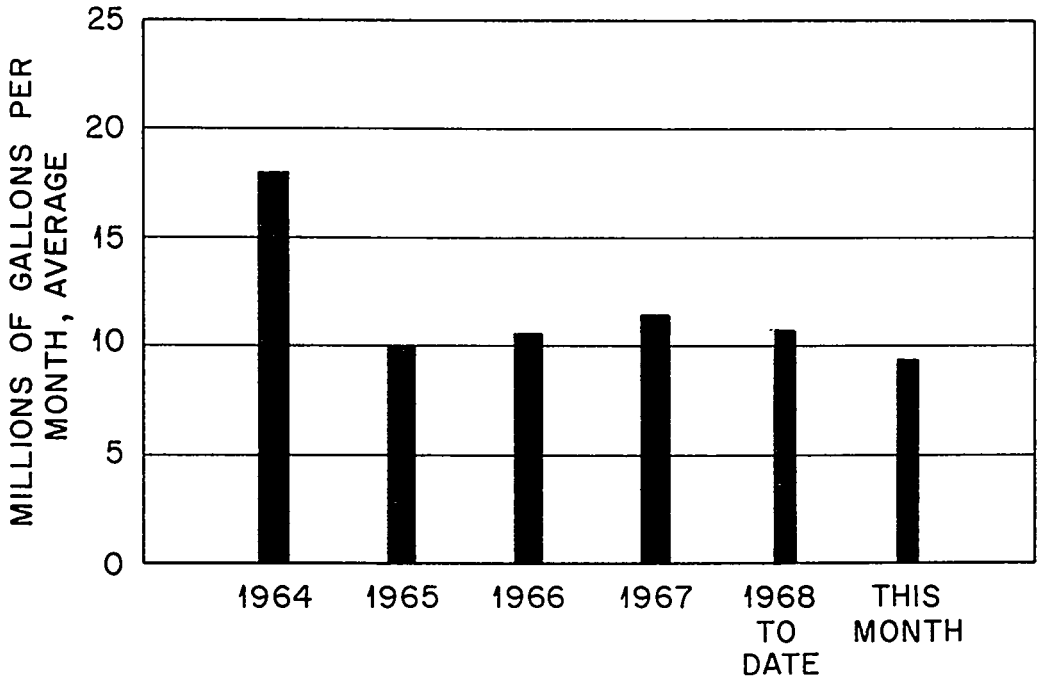

Fig. 5. Process Waste Volumes.

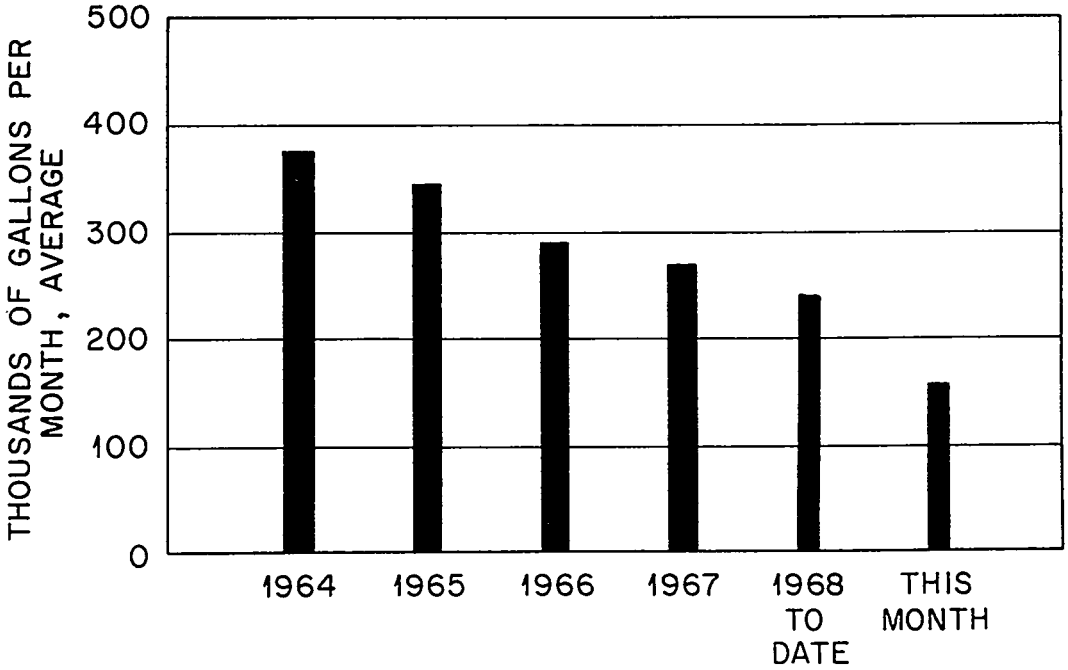

Fig. 6. Intermediate—Level Waste Volumes.

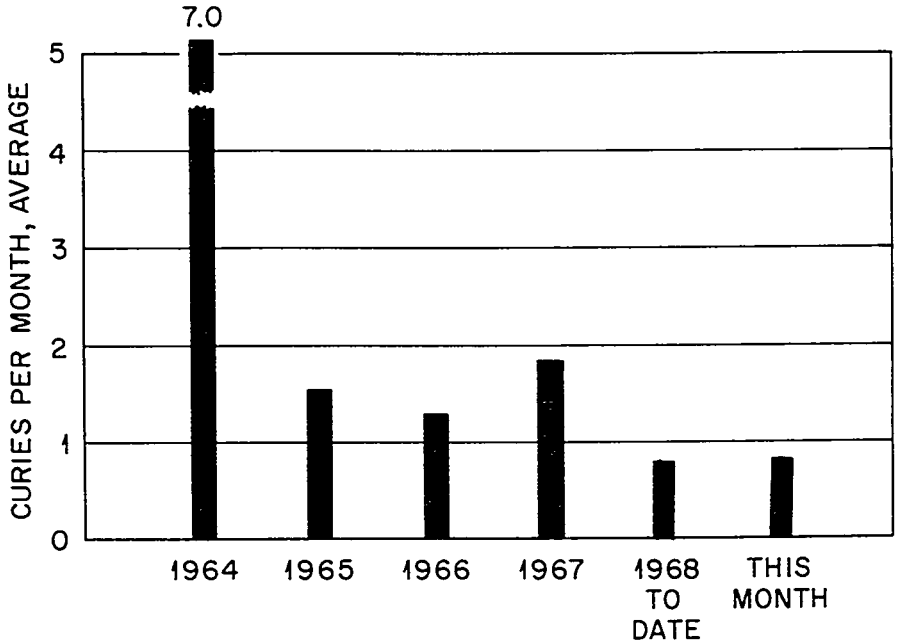

Fig.7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

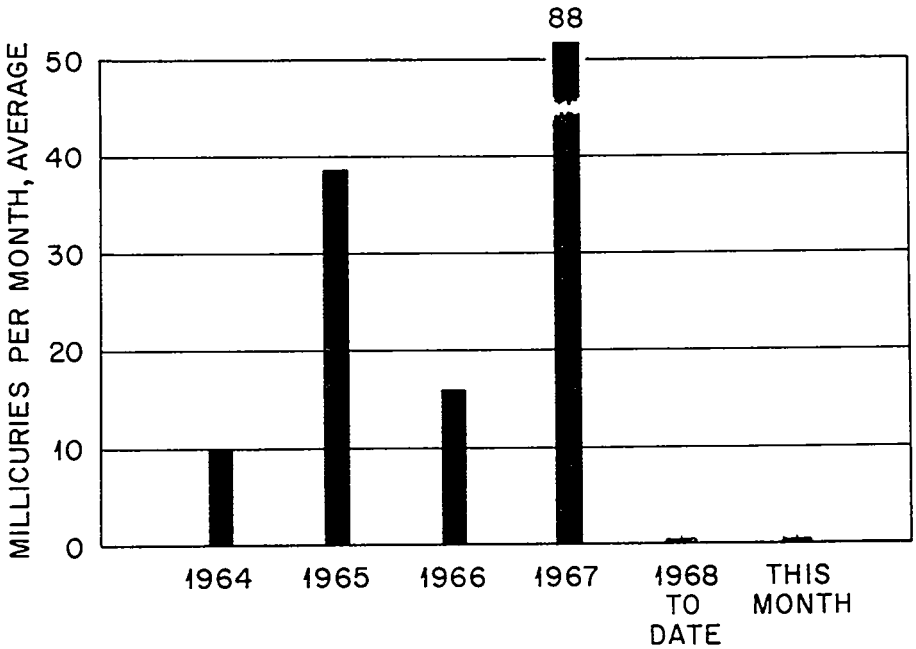

Fig. 8. Filterable Activity Released in Gaseous Waste.

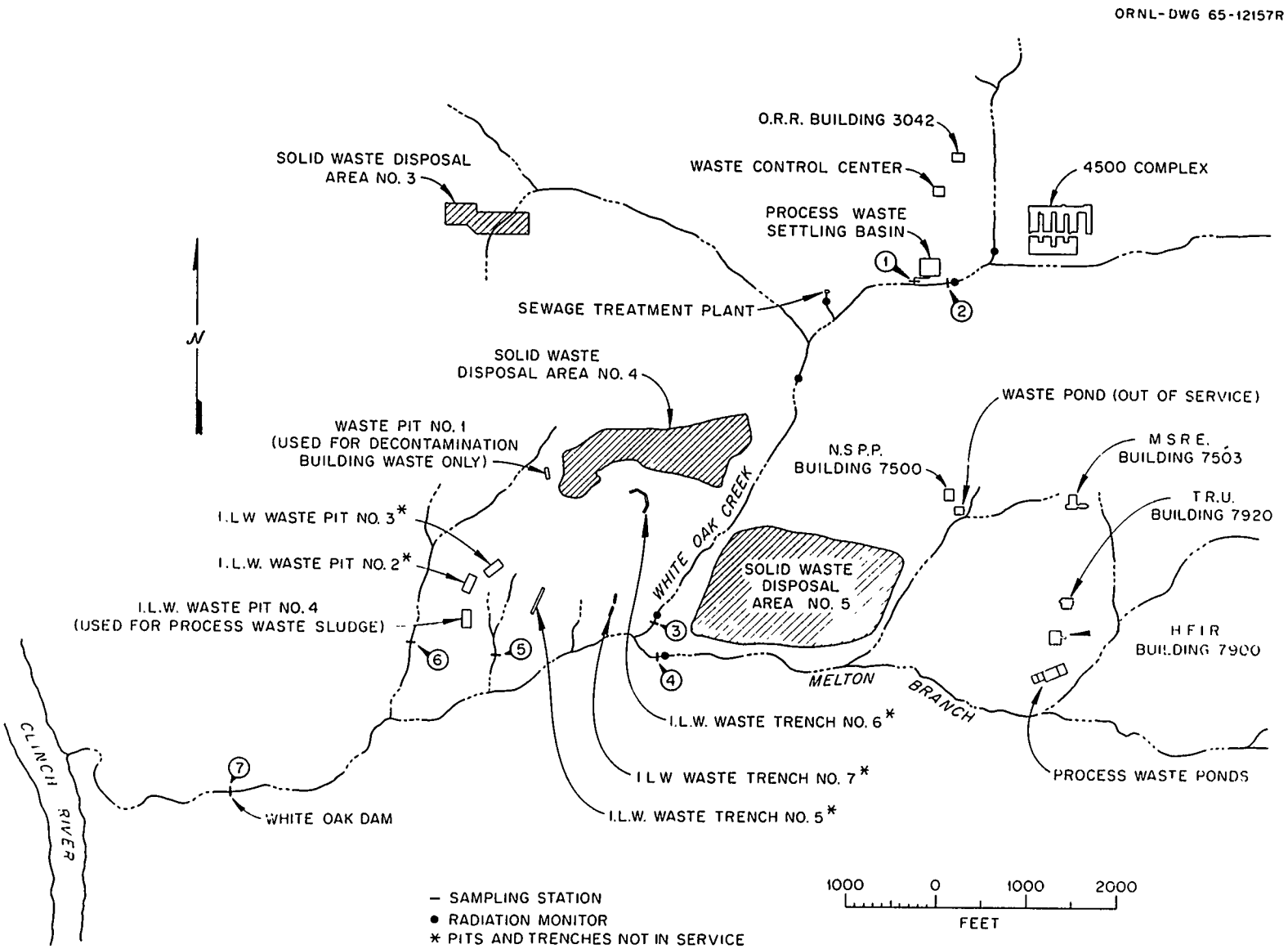

Fig 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.30	0.06	0.51	none detected	0.87
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	--
Total discharge from Bethel Valley Area	3	0.50	0.02	0.33	none detected	0.85
Total discharge from Melton Valley Area	4	0.03	< 0.01	< 0.01	none detected	0.03
East waste pit seepage	5	< 0.01	0.07	0.01	0.04	0.12
West waste pit seepage	6	< 0.01	0.20	< 0.01	0.08	0.28
Total discharge from all sources	3,4,5,6	0.53	0.29	0.34	0.12	1.28
White Oak Dam to Clinch River (Health Physics measurement)	7	0.23	0.94	0.07	0.10	1.77[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: 9.6×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.6×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.81	0.30	83
$^{103,106}Ru$	0.15	0.06	60
^{60}Co	none	none	--
^{137}Cs	1.22	0.51	58
Gross Beta Analysis	80 c/m/ml	17 c/m/ml	79

[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	58	1.74[b]	56.8	2.21	22.9
2.	Radioisotope Processing Area	7	0.14	4.6	1.47	15.3
3.	Buildings 3503 and 3508	2	0.04	1.3	1.21	12.6
4.	Buildings 3025 and 3026	2	0.06	2.0	2.10	21.8
5.	Building 3019	< 1	< 0.01	--	0.19	2.0
6.	Fission Products Development Laboratory	2	< 0.01	--	0.03	0.3
7.	Waste Evaporator, Building 2531	104	1.04	34.0	0.88	9.1
8.	Buildings 3525 and 3550	2	0.04	1.3	1.35	14.0
9.	Building 2026	0	--	--	< 0.01	--
10.	Building 2001	0	--	--	0.19	2.0
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	0.22
Central Radioactive Gas Disposal Facilities	3039	0.60
Radiochemical Processing Pilot Plant	3020	0.02
MSRE	7512	< 0.01
HFIR	7911	< 0.01
Total activity in gases released		0.84

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

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ORNL
CENTRAL FILES NUMBER
68-4-50

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SUBJECT: Radioactive Waste Disposal Operations Report for the month of March 1968

TO: Distribution

FROM: L. C. Lasher

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

Technical Information Officer
ORNL Site
Date 3/7/96

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river resulting from ORNL waste discharges was 1.25% of the MPC_W for a release to an uncontrolled area. Strontium accounted for 90% of the measured percent of MPC_W. A comparison of this month's river contamination to that of previous months is shown in Figure 1. The increase in the concentration for this month was caused by a low river flow which averaged approximately one-third normal.

White Oak Creek Monitoring

The main contaminants released to White Oak Lake were 0.55 curie of strontium, 0.91 curie of cesium, 0.34 curie of ruthenium and 0.21 curie of cobalt (see Table 1). The process waste system and other sources routinely monitored accounted for 24% of the strontium and 34% of the cesium released. The remainder came from contamination in the creek bed or from seeps from the solid waste burial grounds. The bulk of the cobalt and ruthenium came from the waste pits and trenches that are no longer used. Comparisons of this month's activity releases to White Oak Lake to those of previous months are shown in Figures 2 and 3. There was no significant release of alpha activity.

Process Waste

A total of 12.1 million gallons of process waste was treated this month. A summary of plant operations is given in Table 2.

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

Intermediate-Level Waste

The average boil-down rate for the evaporator was 368 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	282,000
Volume transferred to evaporator	274,000
Volume of concentrate returned to tank farm	11,000
Volume of concentrate transferred to hydraulic fracturing site	82,000
Tank farm free space at beginning of month	507,000
Tank farm free space at end of month	570,000

The major contributors to the ILW system were as follows:

		Gallons
1.	Building 3019	37,000
2.	4500 Complex	33,000
3.	Reactor Complex	28,000
4.	High Flux Isotope Reactor	26,000
5.	Building 3026	21,000
6.	Fission Products Development Laboratory	20,000
7.	Radioisotope Processing Area	18,000
8.	Transuranium Processing Area	13,000

Figure 6 shows a monthly comparison of the volumes of ILW generated.

Gaseous Waste

The ORNL stacks discharged 1.12 curies of ^{131}I. The release of alpha and particulate activities were not significant. Table 4 lists the release of activity from individual stack systems. Figures 7 and 8 compare the total releases on a monthly basis.

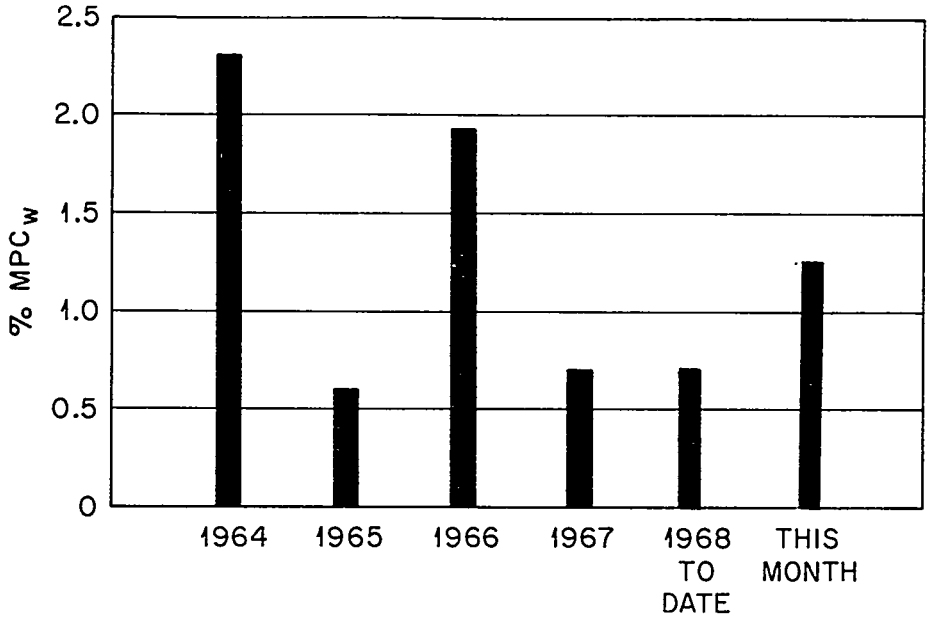

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

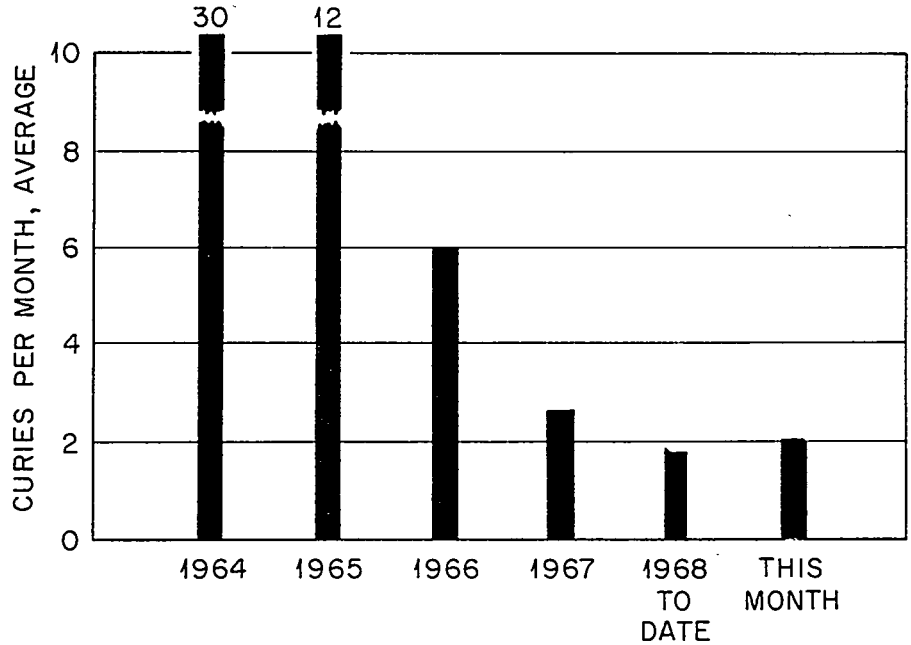

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

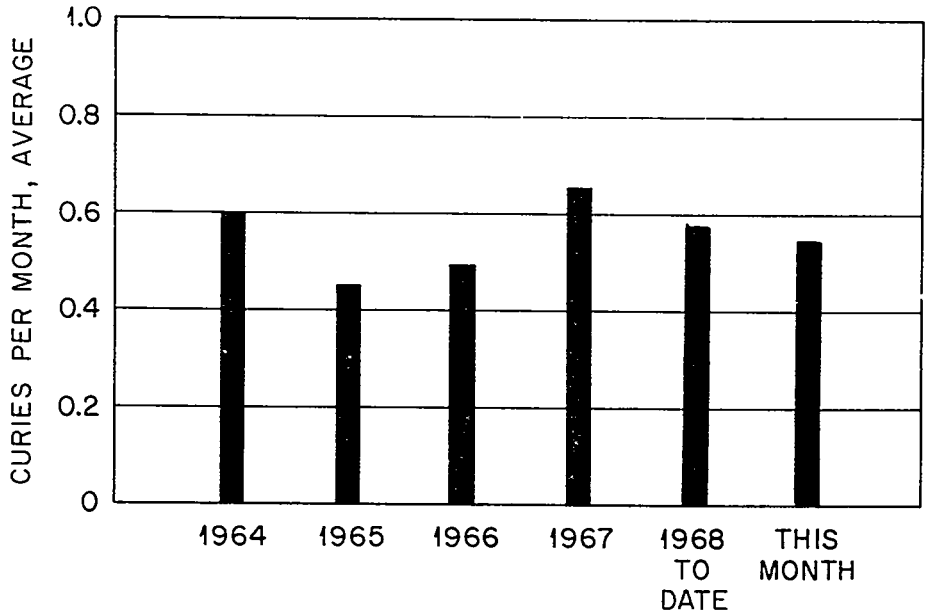

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

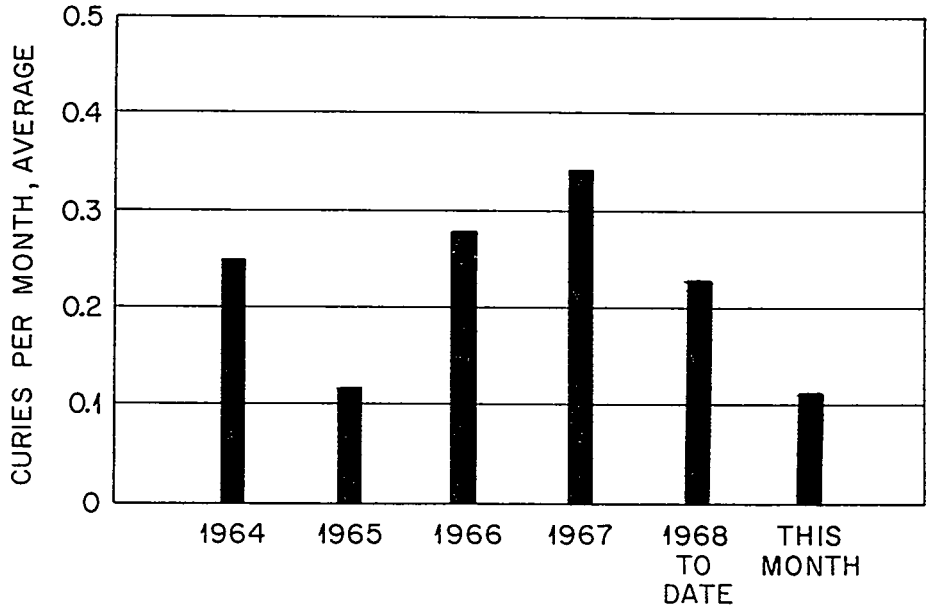

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

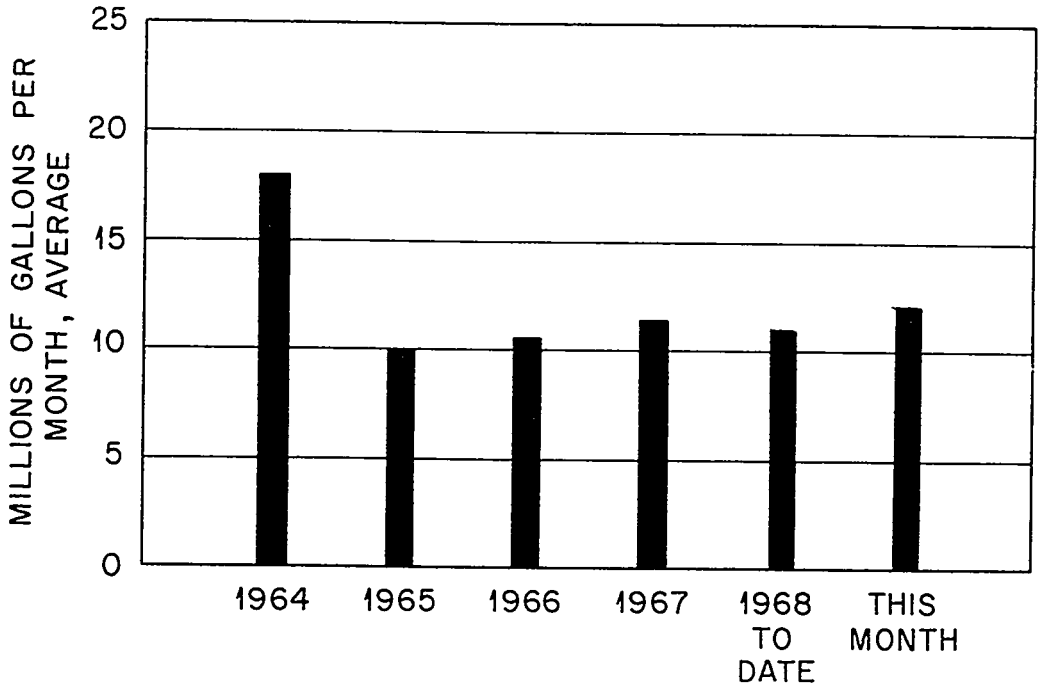

Fig. 5. Process Waste Volumes.

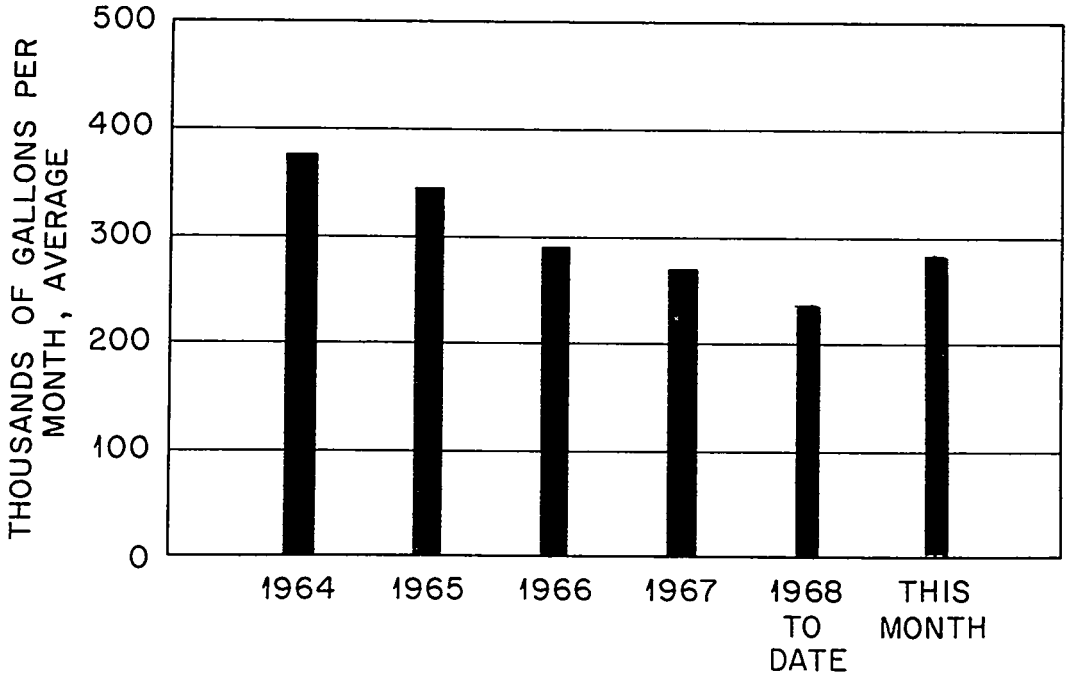

Fig. 6. Intermediate—Level Waste Volumes.

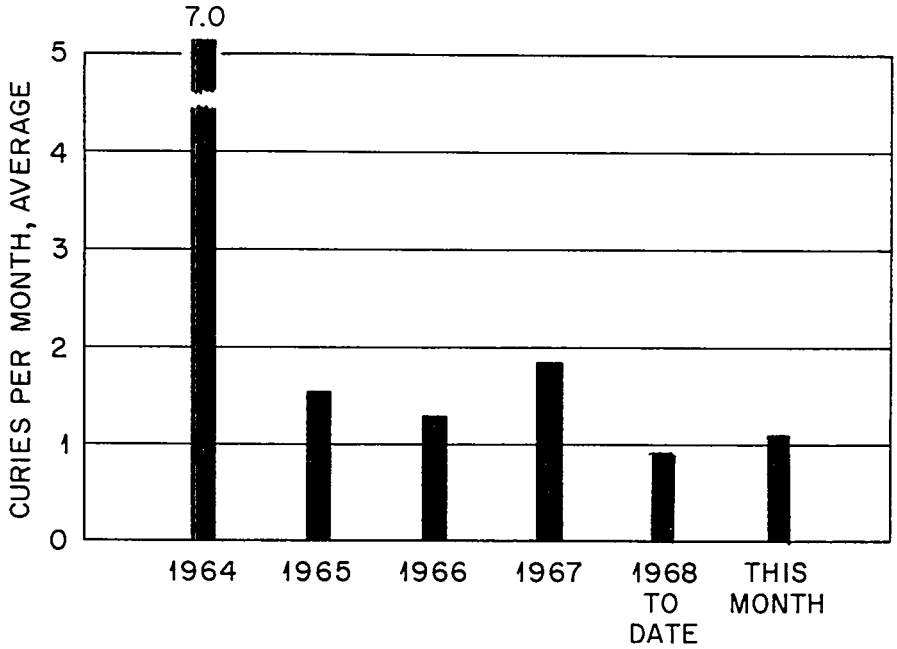

Fig.7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

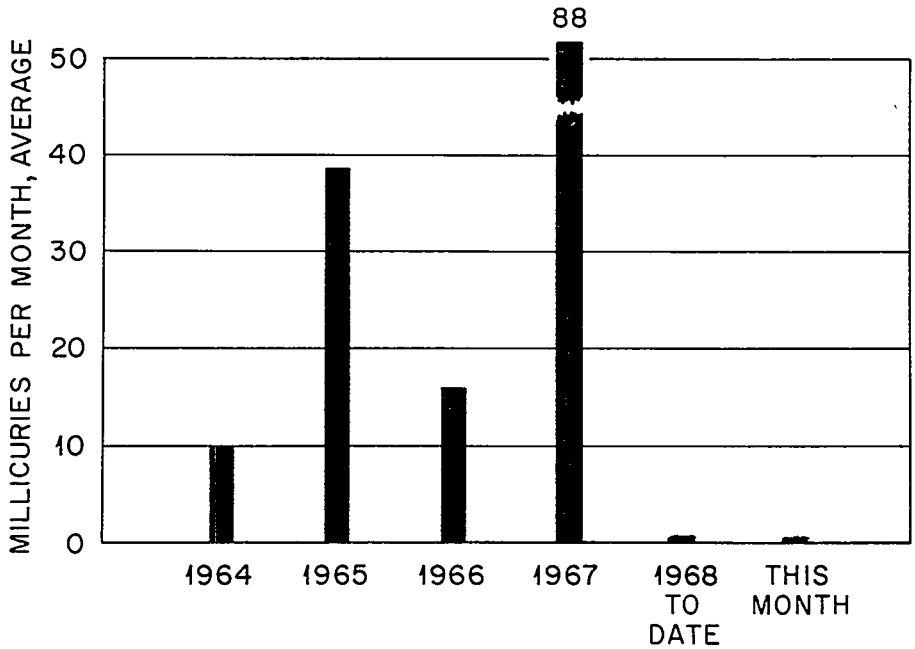

Fig. 8. Filterable Activity Released in Gaseous Waste.

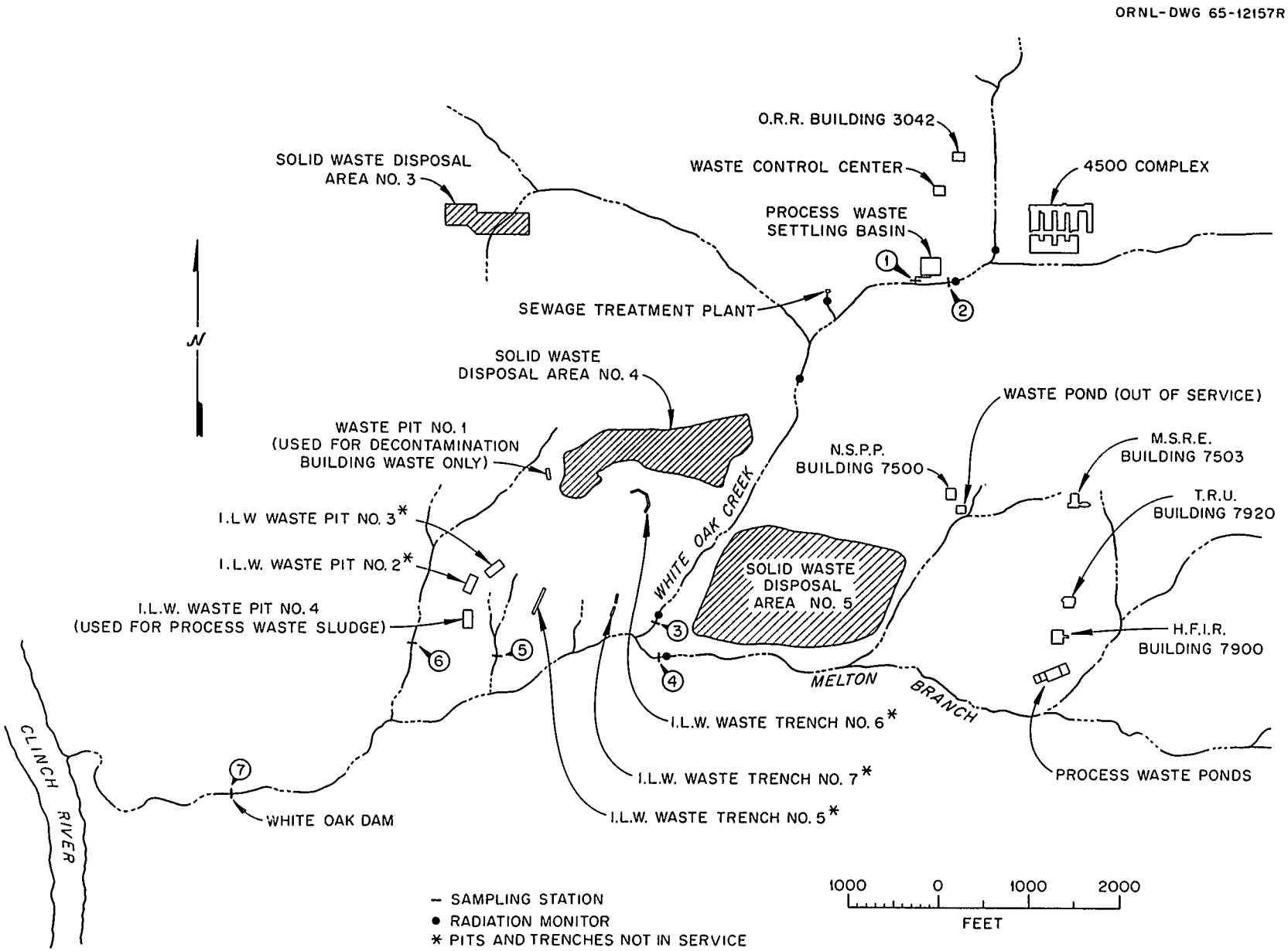

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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
Process waste	1	0.11	none detected	0.29	none detected	0.40
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	--
Total discharge from Bethel Valley Area	3	0.53	0.04	0.89	none detected	1.46
Total discharge from Melton Valley Area	4	0.02	< 0.01	< 0.01	none detected	0.02
East waste pit seepage	5	< 0.01	0.24	0.02	0.18	0.44
West waste pit seepage	6	< 0.01	0.06	< 0.01	0.03	0.09
Total discharge from all sources	3,4,5,6	0.55	0.34	0.91	0.21	2.01
White Oak Dam to Clinch River (Health Physics measurement)	7	0.41	1.51	0.17	0.26	3.07[b]

[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: 12.1×10^6 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]	1.25	0.11	91
$^{103,106}Ru$	0.08	none detected	100
^{60}Co	0.02	none detected	100
^{137}Cs	2.12	0.29	86
Gross Beta Analysis	56 c/m/ml	6 c/m/ml	89

[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 MILLION GALLONS	VOLUME % OF TOTAL
1. Reactor Operations	41	0.91[b]	40.6	1.59	16.1
2. Radioisotope Processing Area	5	0.10	4.5	1.48	15.0
3. Buildings 3503 and 3508	2	0.04	1.8	1.49	15.1
4. Buildings 3025 and 3026	1	0.03	1.3	2.27	22.9
5. Building 3019	4	0.01	0.5	0.23	2.3
6. Fission Products Development Laboratory	7	< 0.01	--	0.04	0.4
7. Waste Evaporator, Building 2531	67	1.15	51.3	1.23	12.4
8. Buildings 3525 and 3550	0	--	--	1.27	12.8
9. Building 2026	4	< 0.01	--	< 0.01	--
10. Melton Valley Area	No waste processed				
11. Building 2001	2	< 0.01	--	0.30	3.0

[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	0.13
Central Radioactive Gas Disposal Facilities	3039	0.90
Radiochemical Processing Pilot Plant	3020	0.02
MSRE	7512	< 0.01
HFIR	7911	0.07
Total activity in gases released		1.12

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

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LIQUID WASTE

Release to Clinch River

River contamination caused by ORNL discharges was 3.26% of the MPC_w for releases to an uncontrolled area. Poor dilution caused by a low river flow, which averaged 18% of normal, accounted for the comparatively high concentration of activity in the river (see Figure 1). The main contaminant was strontium, contributing 94% to the calculated percent of MPC_w.

White Oak Creek Monitoring

The main contaminants released to White Oak Lake were 0.52 curie of strontium, 0.55 curie of cesium, 0.36 curie of ruthenium and 0.20 curie of cobalt (see Table 1). The process waste system and other sources routinely monitored accounted for 31% of the strontium and 38% of the cesium. The remainder came from contamination in the creek bed or from seeps from the solid waste burial grounds. Practically all of the ruthenium and cobalt came from the waste pits and trenches that are no longer used. Comparisons of this month's activity releases to White Oak Lake to those of previous months are shown in Figures 2 and 3. There was no significant release of alpha activity.

Process Waste

Approximately 10 million gallons of waste water was chemically treated this month. A summary of operating data is given in Table 2.

Table 3 lists the waste discharges into the system. Figure 4 compares the strontium discharges into the creek and Figure 5 the volumes of waste handled.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 310 gph. A summary of operation data is given below:

	Gallons
Total volume generated	225,000
Volume transferred to evaporator	223,000
Volume of concentrate returned to tank farm	8,000
Volume of concentrate transferred to hydraulic fracturing site	16,000
Tank farm free space at beginning of month	570,000
Tank farm free space at end of month	576,000

The main contributors to the ILW system were as follows:

		Gallons
1.	Fission Products Development Laboratory	37,000
2.	Building 3019	33,000
3.	High Flux Isotope Reactor	32,000
4.	Reactor Complex	25,000
5.	Radioisotopes Processing Area	25,000
6.	4500 Complex	24,000
7.	Building 3026	3,000

A comparison of the total volume of ILW generated this month to that in previous months is shown in Figure 6.

Shale Fracturing Disposal of ILW, Injection 4

A total of 86,190 gallons of concentrated ILW containing 4,300 curies of strontium, 51,900 curies of cesium, and 200 curies of ruthenium was

injected into a new slot, 852 feet deep. The slot was over-displaced with water at the termination of the run. The "closed in" pressure of the well was 2,040 psi. Materials used in the injection are tabulated below. The liquids are listed in the order of their injections.

Solids	Weight, lb	lb/gal
Portland cement, type 2	184,950	1.90
Fly ash	185,930	1.92
Attapulgite	82,400	0.85
Grundite	45,400	0.47
Total weight of solids	498,680	5.14

Liquids injected, April 3		Gallons
1.	Water only	3,270
2.	Water with solids	600
3.	Waste with solids	24,010
4.	Water with solids	1,000
5.	Water only	1,330
	Total volume injected on April 3	30,210

Liquids injected, April 4		Gallons
1.	Water only	450
2.	Water with solids	700
3.	Waste with solids	62,180
4.	Water with solids	1,500
5.	Water only	2,050
	Total volume injected on April 4	66,880

Gaseous Waste

The ORNL stacks discharged a total of 1.22 curies of ^{131}I during the period. There was no significant amount of alpha activity detected. The individual stack releases are listed in Table 4.

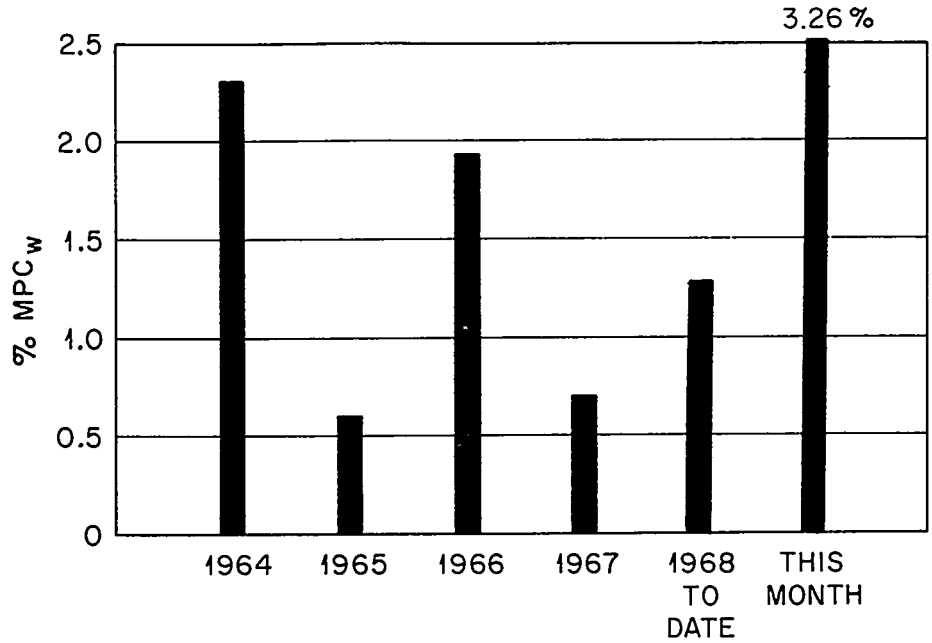

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

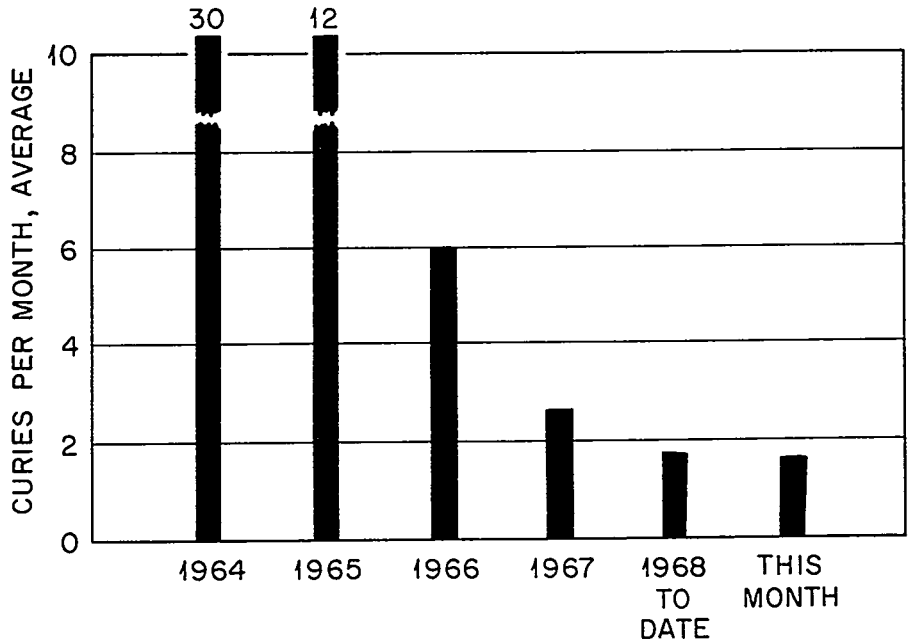

Fig. 2. Total Activity Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

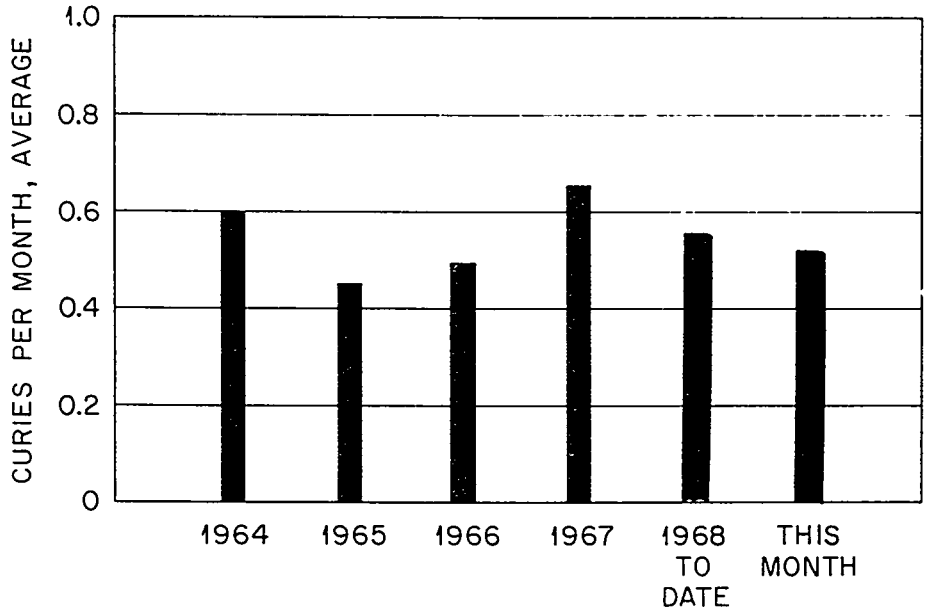

Fig. 3. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3, 4, 5 and 6 (See Fig. 9).

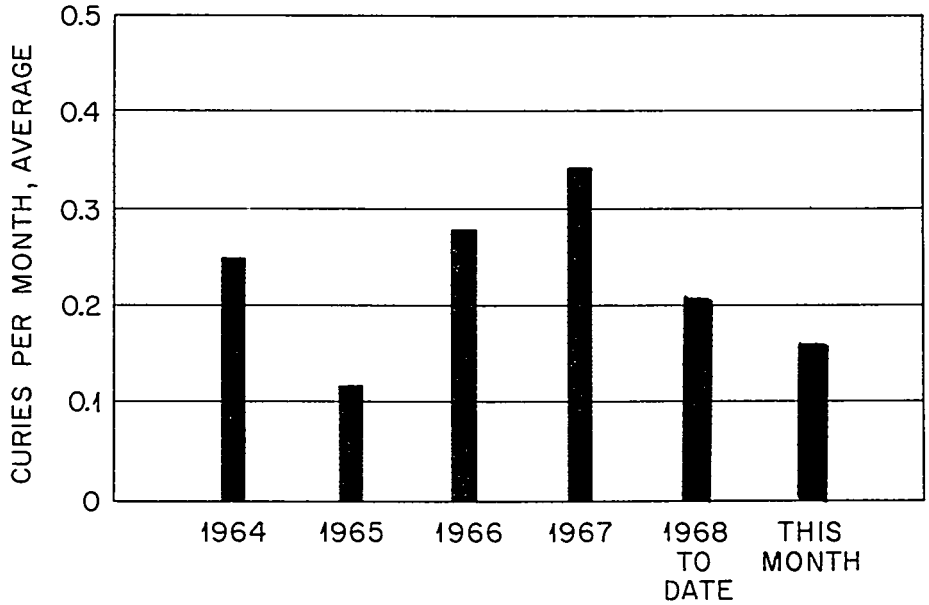

Fig. 4. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

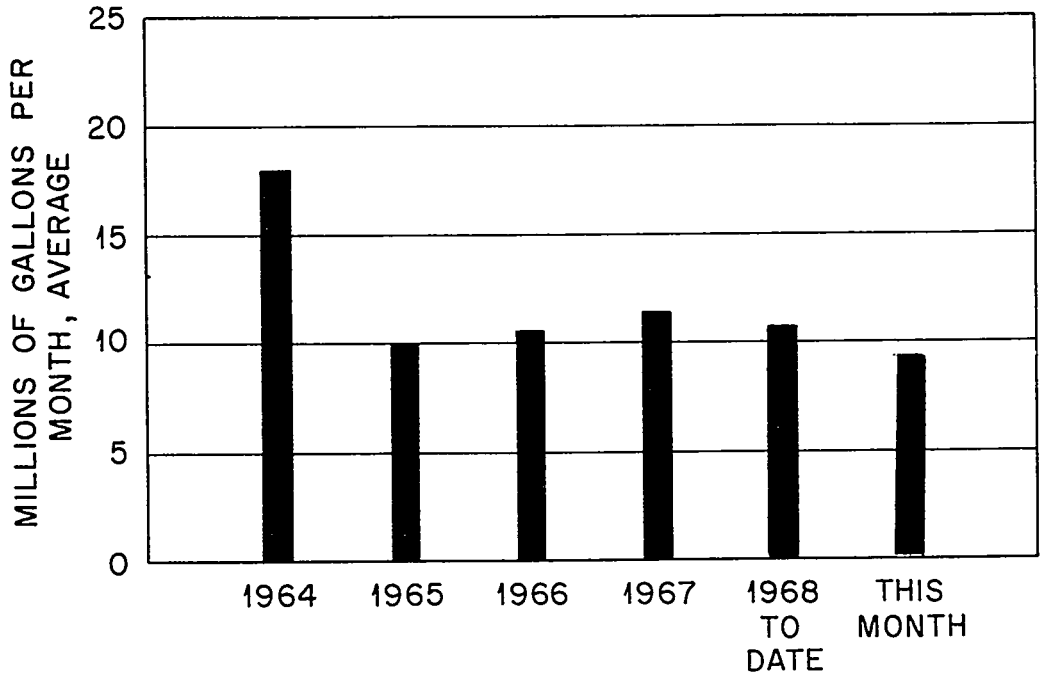

Fig. 5. Process Waste Volumes.

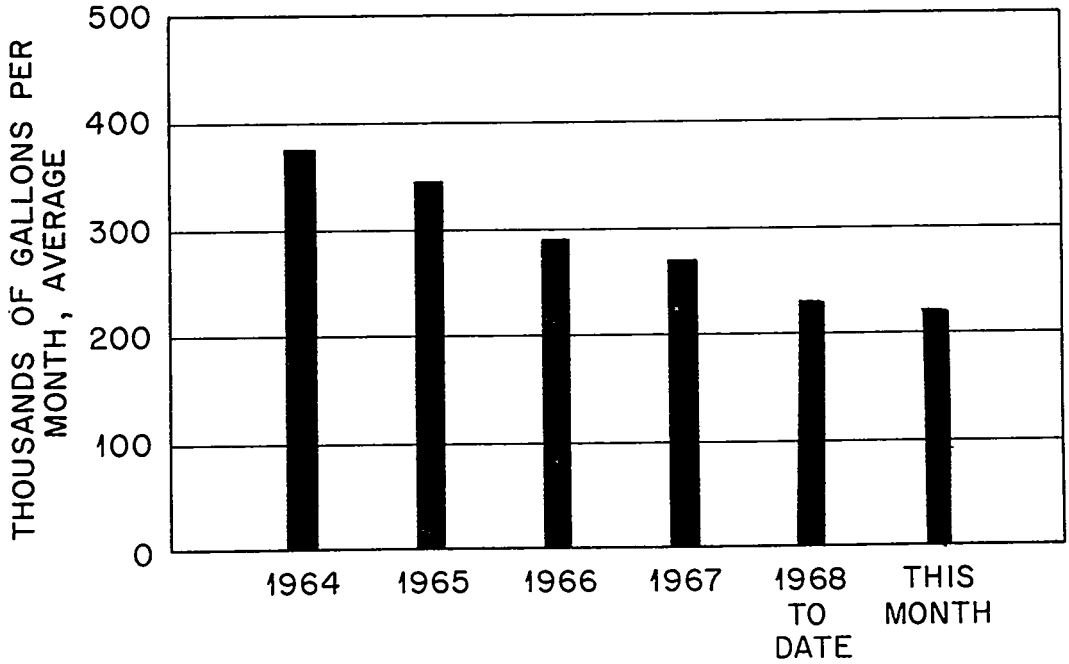

Fig. 6. Intermediate—Level Waste Volumes.

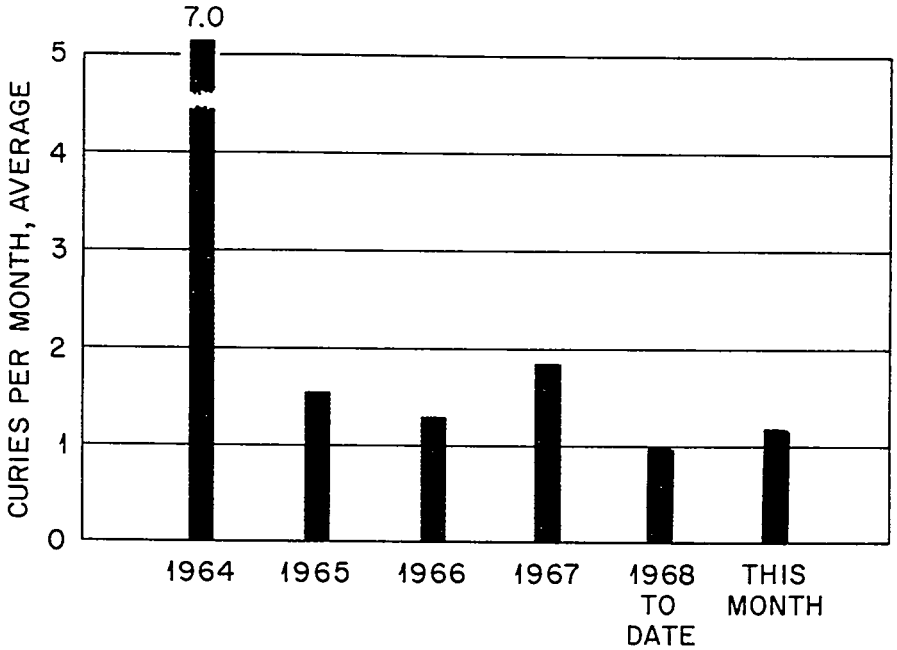

Fig.7. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

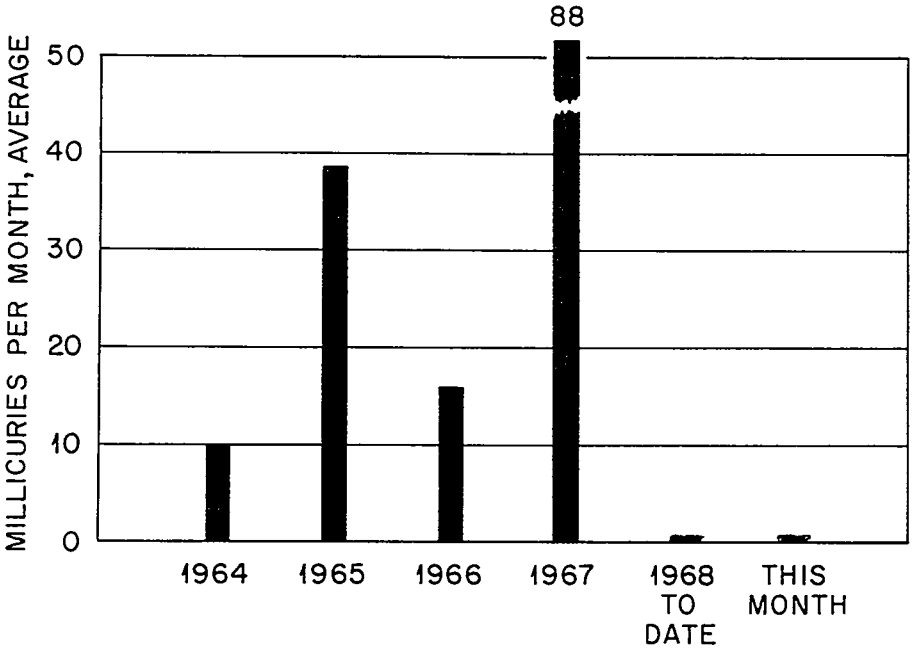

Fig. 8. Filterable Activity Released in Gaseous Waste.

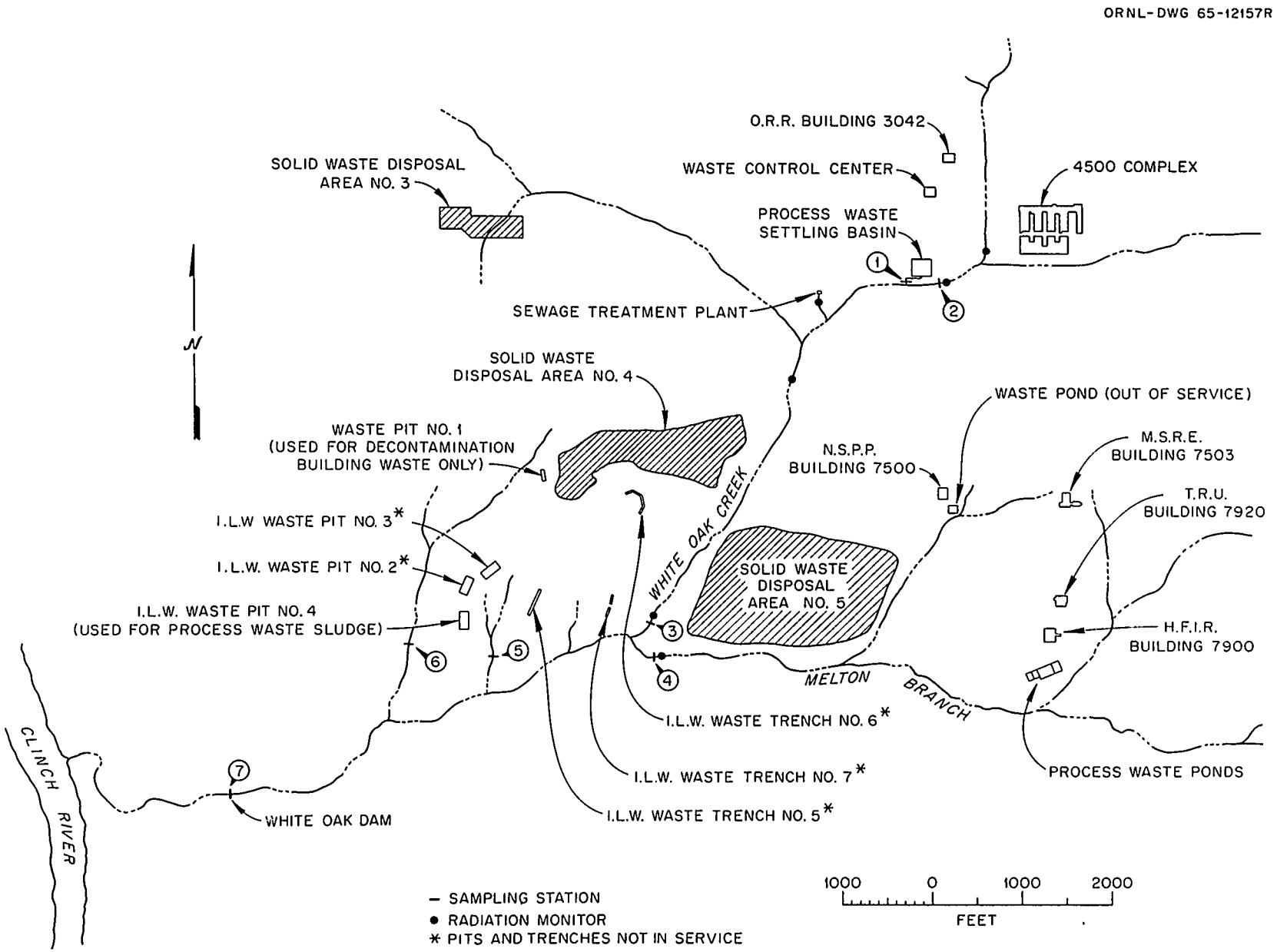

Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.16	none detected	0.21	none detected	0.37
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	none detected	--
Total discharge from Bethel Valley Area	3	0.49	0.02	0.55	none detected	1.06
Total discharge from Melton Valley Area	4	0.03	< 0.01	< 0.01	none detected	0.03
East waste pit seepage	5	< 0.01	0.19	< 0.01	0.16	0.35
West waste pit seepage	6	< 0.01	0.15	< 0.01	0.04	0.19
Total discharge from all sources	3,4,5,6	0.52	0.36	0.55	0.20	1.63
White Oak Dam to Clinch River (Health Physics measurement)	7	0.29	0.89	0.11	0.21	2.01[b]

[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: 9.6×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.26	0.16	87
$^{103,106}Ru$	none detected	none detected	--
^{60}Co	none detected	none detected	--
^{137}Cs	3.41	0.21	94
Gross Beta Analysis	87 c/m/ml	6 c/m/ml	93

[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 MILLION GALLONS	VOLUME % OF TOTAL
1.	Reactor Operations	10	0.17[b]	43.6	1.23	13.2
2.	Radioisotope Processing Area	6	0.11	28.2	1.28	13.7
3.	Buildings 3503 and 3508	1	0.02	5.1	1.62	17.3
4.	Buildings 3025 and 3026	1	0.03	7.7	2.16	23.1
5.	Building 3019	< 1	< 0.01	--	0.21	2.3
6.	Fission Products Development Laboratory	7	< 0.01	--	0.02	0.2
7.	Waste Evaporator, Building 2531	3	0.04	10.3	1.00	10.7
8.	Buildings 3525 and 3550	1	0.02	5.1	1.38	14.8
9.	Building 2026	3	< 0.01	--	< 0.01	--
10.	Building 2001	< 1	< 0.01	--	0.44	4.7

[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	0.13
Central Radioactive Gas Disposal Facilities	3039	0.74
Radiochemical Processing Pilot Plant	3020	0.02
MSRE	7512	0.33
HFIR	7911	< 0.01
Total activity in gases released		1.22

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

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68-9-42

COPY NO. 44

DATE: September 26, 1968

SUBJECT: Radioactive Waste Disposal Operations Report for the month of August 1968

TO: Distribution

FROM: 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 river caused by ORNL waste discharges was 0.12% of the MPC_w for a release to an uncontrolled area (see Figure 1). Strontium contributed 97.9% to the calculated percent of MPC_w.

White Oak Creek Monitoring

The main contaminants released to White Oak Lake are listed in Table 1. The total strontium release was 0.22 curie with 0.09 curie and 0.13 curie being released through the Bethel Valley branch and Melton branch of the creek, respectively. The strontium measured in the Melton branch was part of the release from the observation well drilling, in the Shale Fracturing area, mentioned in last month's report. Comparisons of this month's strontium measurements to those of previous months are given in Figures 2 and 3. There was no significant release of alpha activity.

Process Waste

A total of 12 million gallons of waste was chemically treated this month. Decontamination achieved by the waste treatment process was poor; there is no apparent explanation for this inefficiency. A summary of plant operations is given in Table 2.

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

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 411 gallons per hour. A summary of operations is listed below.

	Gallons
Total volume generated	261,000
Volume transferred to evaporator	306,000
Volume of concentrate returned to tank farm	10,000
Tank farm free space at beginning of month	468,000
Tank farm free space at end of month	503,000

The main contributors to the system are listed below:

		Gallons
1.	Fission Products Development Laboratory	53,000
2.	4500 Complex	43,000
3.	Building 3019	35,000
4.	ORR, LITR and BSR	32,000
5.	High Flux Isotope Reactor	27,000
6.	Radioisotopes Processing Area	13,000

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

Gaseous Waste

A total of 0.98 curie of gaseous ^{131}I was discharged from the ORNL stacks. Most of this activity (0.75 curie) came from the Transuranium Processing Plant. There was no significant release of alpha activity. Table 4 lists the individual stack releases; Figure 6 compares the stack releases on a monthly basis.

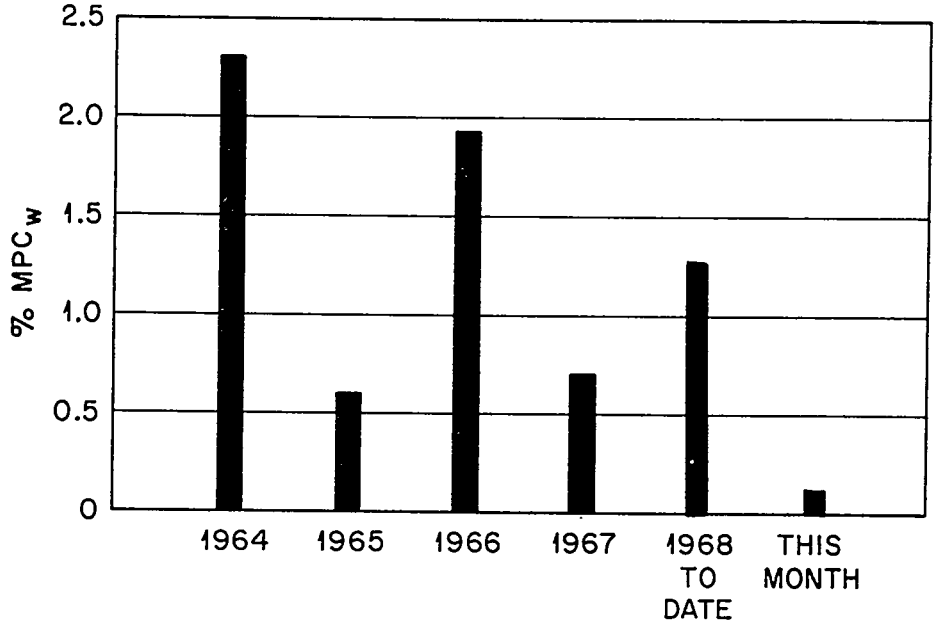

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharge (Health Physics Measurements at White Oak Dam)

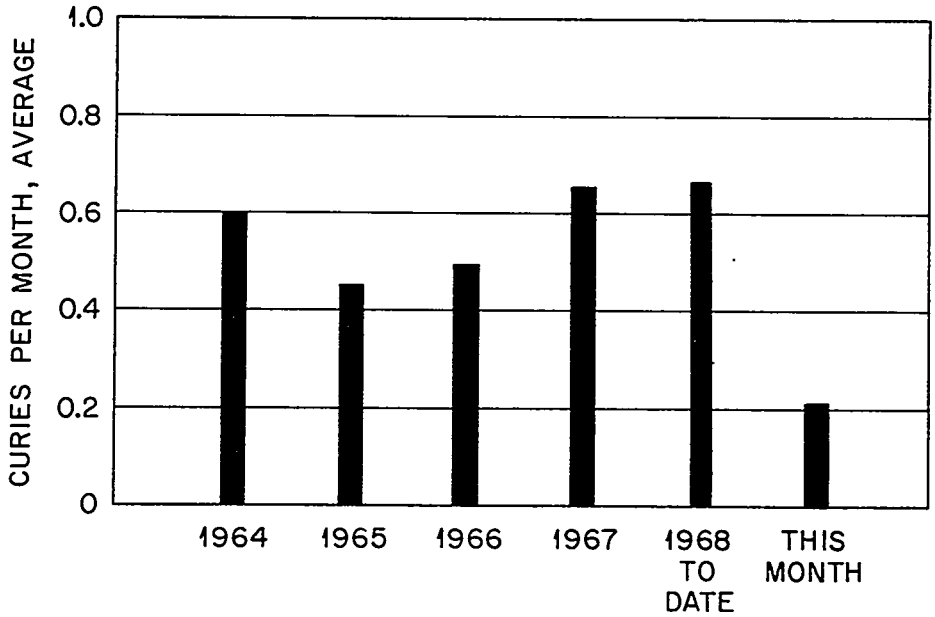

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

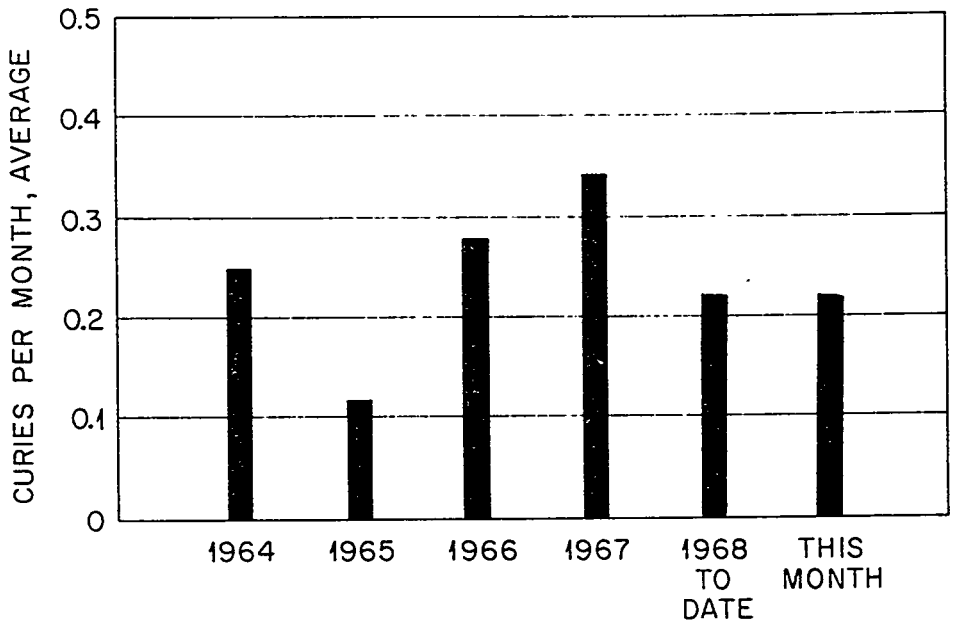

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

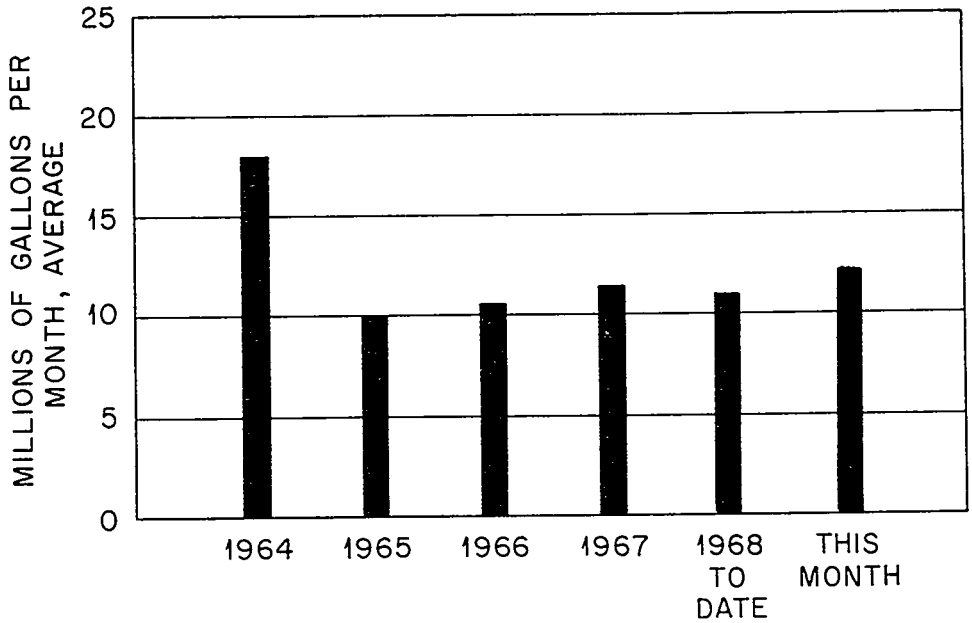

Fig. 4. Process Waste Volumes.

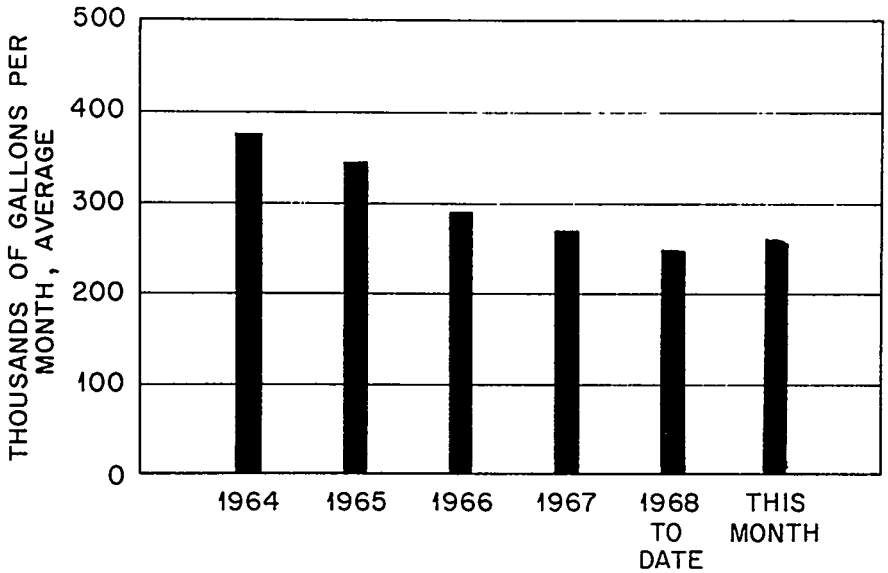

Fig. 5. Intermediate—Level Waste Volumes.

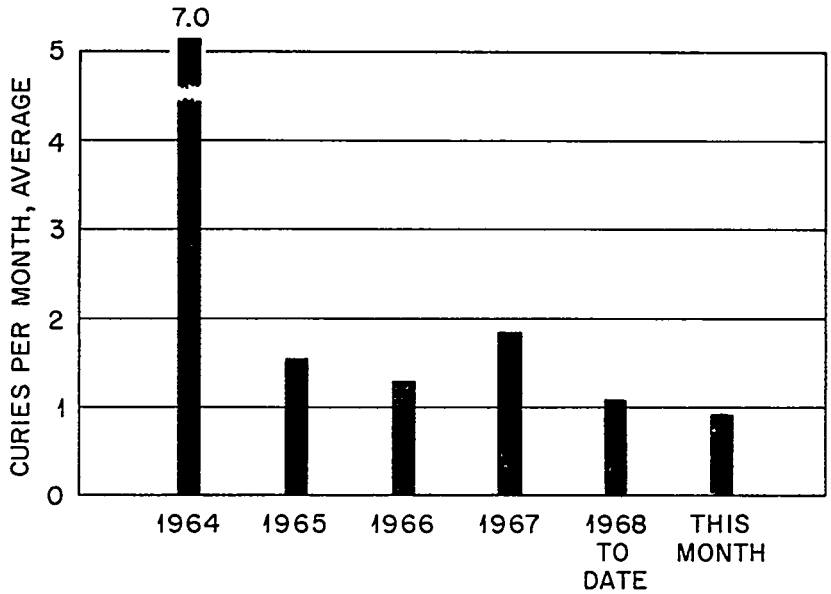

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

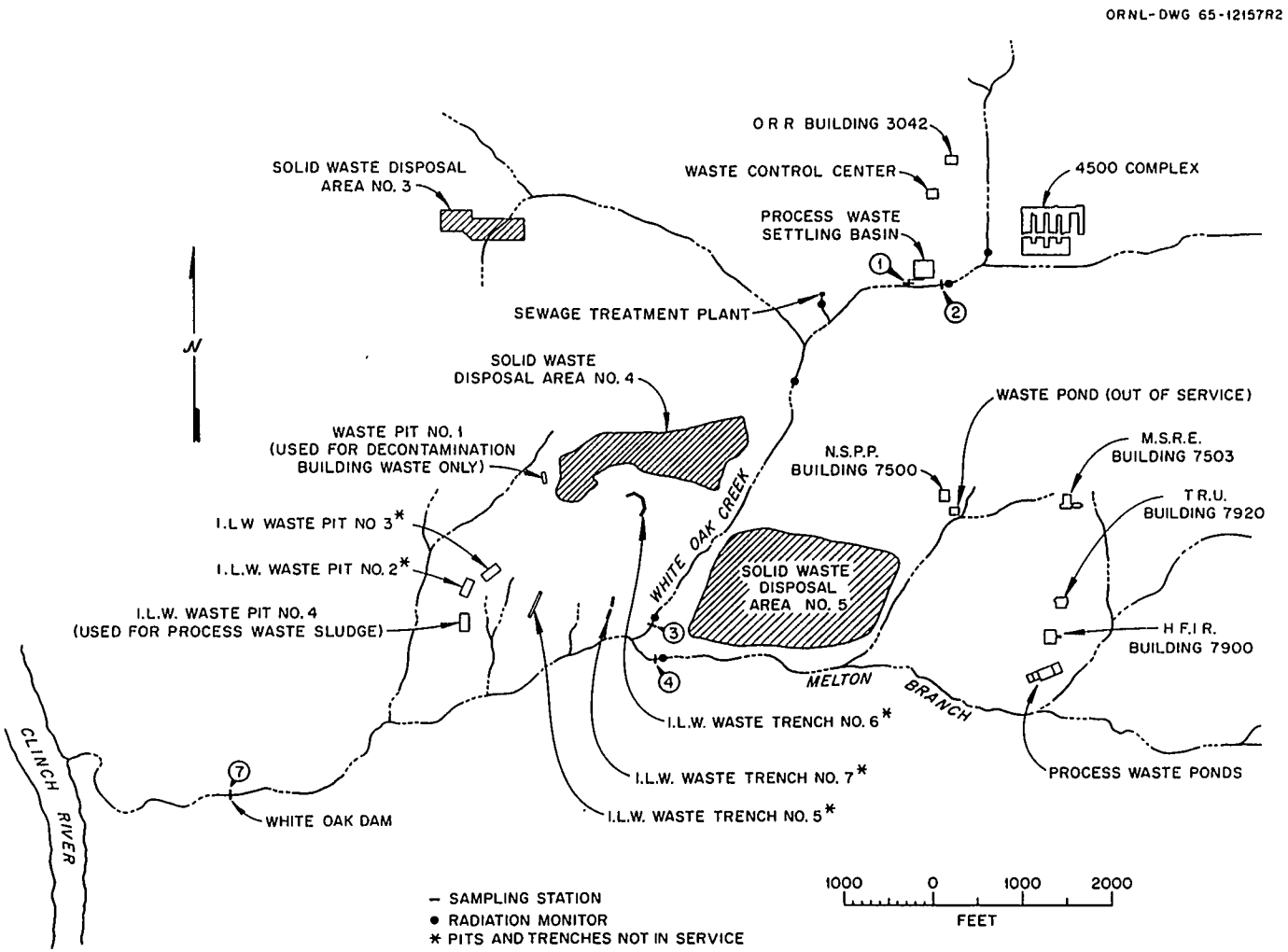

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.22	none detected	0.73	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	0.09	0.12	0.12	none detected
Total discharge from Melton Valley Area	4	0.13	0.01	< 0.01	none detected
Total discharge	3 & 4	0.22	0.13	0.12	none detected
White Oak Dam to Clinch River (Health Physics measurement)	7	0.18	0.04	0.03	< 0.01

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.9 x 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	0.22	72
$^{103,106}Ru$	0.15	none detected	100
^{60}Co	0.08	none detected	100
^{137}Cs	1.00	0.73	27
Gross Beta Analysis	40 c/m/ml	13 c/m/ml	69

[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	0.27[b]	26.2	3.21	30.9
2.	Radioisotope Processing Area	5	0.09	8.7	1.24	11.9
3.	Buildings 3503 and 3508	3	0.07	6.8	1.64	15.8
4.	Buildings 3025 and 3026	1	0.03	2.9	2.18	21.0
5.	Building 3019	< 1	< 0.01	--	0.45	4.3
6.	Fission Products Development Laboratory	7	0.01	1.0	0.14	1.3
7.	Waste Evaporator, Building 2531	35	0.56	54.4	1.15	11.1
8.	Buildings 3525 and 3550	0	< 0.01	--	0.39	3.7
9.	Building 2026	3	< 0.01	--	< 0.01	--
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	< 0.01
Central Radioactive Gas Disposal Facilities	3039	0.23
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR, TRU and TURF	7911	0.75
Total activity in gases released		0.98

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

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LIQUID WASTE

Release to Clinch River

The radioactive contamination of the river caused by ORNL waste releases was 0.65% of the MPC_w for a release to an uncontrolled area. The prime contaminant was strontium which contributed 97% to the calculated percent of MPC_w.

White Oak Creek Monitoring

The radionuclides released in significant amounts to White Oak Creek and the Clinch River are listed in Table 1. Monthly comparisons of the strontium discharged to the creek by the process waste system and the total strontium released to White Oak Lake are shown in Figures 2 and 3.

The strontium discharged by the process waste system, as measured at sampling station 1 (see Figure 7), was 0.06 curie while the measurement downstream at Station 3 was 0.47 curie. There is no apparent reason for the relatively large difference (0.41 curie) between the two measurements, although in the past the measurements at Station 3 have been consistently greater than those at Station 1. During the year 1968, the average difference between the measurements made at the two sampling stations was 0.16 curie per month.

The differences in the two measurements over the last seven years are shown in Table 2. Based on some spot sampling done by the Health Physics Division several years ago, it was estimated that approximately 0.12 curie per month of the total difference came from the laundry, sewage plant, and other minor sources not routinely monitored; but the

entire difference could not be explained. Extensive grab sampling of the creek by the waste disposal operating group gave inconsistent results and proved that the accounting for all of the activity in the creek could be accomplished only through long-term sampling with expensive, permanent-type, proportional sampling equipment. It was decided that the installation could not be justified in view of the relatively small discharges of activity into the river.

It is interesting to note that only 0.18 curie per month or 31% of the total strontium released to the lake in 1968 came from the process waste system, which at one time was the only significant source of activity discharged into the lake, also that a large portion of the total strontium comes from Melton Valley. Samples of discharges from the Melton Valley operations give no indication that they are discharging the activity and the only other possible source appears to be Burial Ground 5. Seepage of activity from Burial Ground 4 would also explain the difference in the strontium measurements made at Station 1 and 3 in the Bethel Valley branch of the creek.

Process Waste

A total of 12 million gallons of waste was chemically treated during the period. A summary of operations is given in Table 3. The volumes treated per month are compared in Figure 4. Table 4 lists the sources of waste and the amounts of radioactivity released into the system.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 259 gallons per hour. A summary of operations is given below:

	Gallons
Total volume generated	197,000
Volume transferred to evaporator	193,000
Volume of concentrate returned to Tank Farm	14,000
Tank Farm free space at beginning of month	558,000
Tank Farm free space at end of month	540,000

The major contributors to the ILW system are listed below:

		Gallons
1.	Fission Products Development Laboratory	49,000
2.	Building 3019	32,000
3.	ORR and BSR	29,000
4.	HFIR	22,000
5.	Radioisotopes Processing Area	19,000
6.	4500 Complex	18,000
7.	Transuranium Processing Plant	10,000

Figure 5 compares the volumes of waste handled this month to those of previous months.

Gaseous Waste

A total of 0.1 curie of ^{131}I was discharged from the ORNL stacks this month. There was no significant amount of alpha or particulate activity detected. Table 5 lists the amount of activity released from the individual stacks; Figure 6 compares the total amounts released each month.

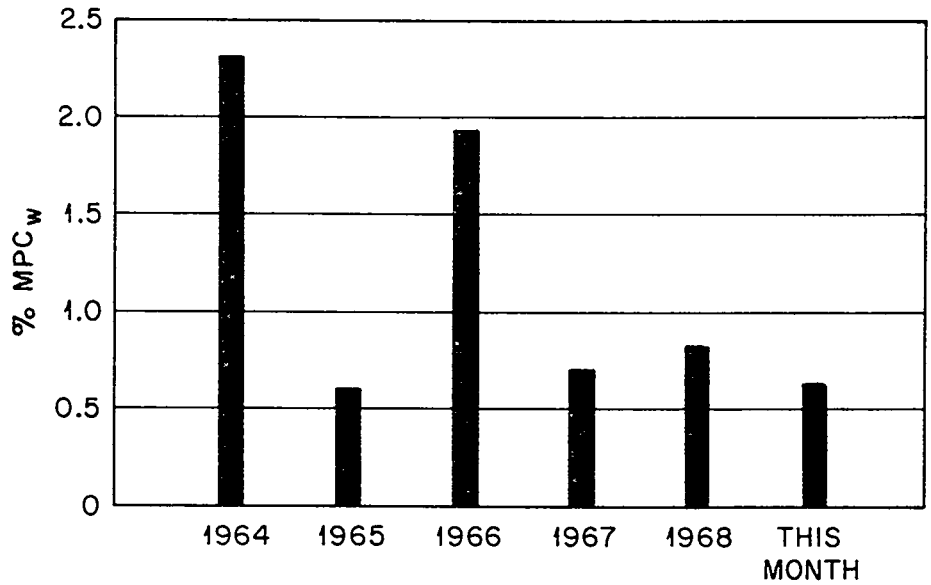

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharge (Health Physics Measurements at White Oak Dam)

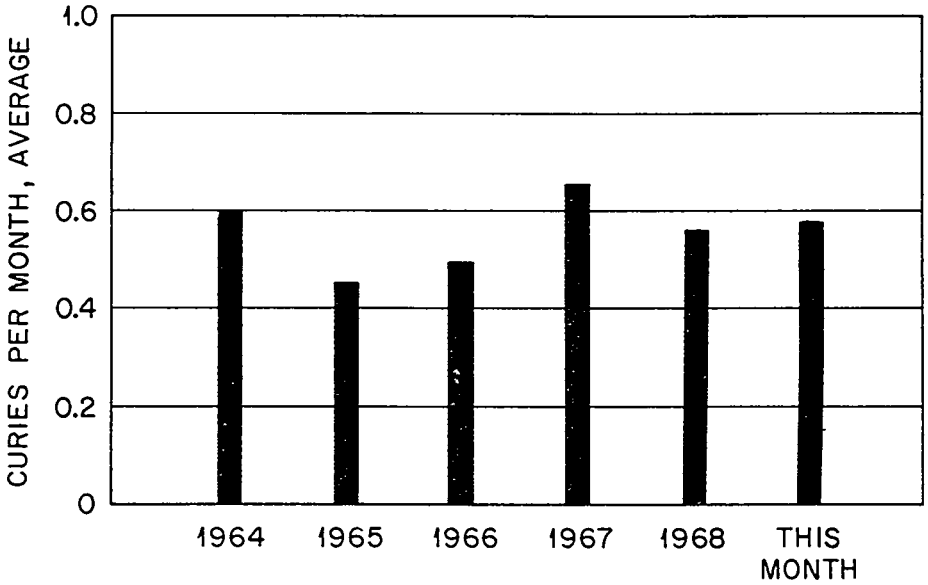

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

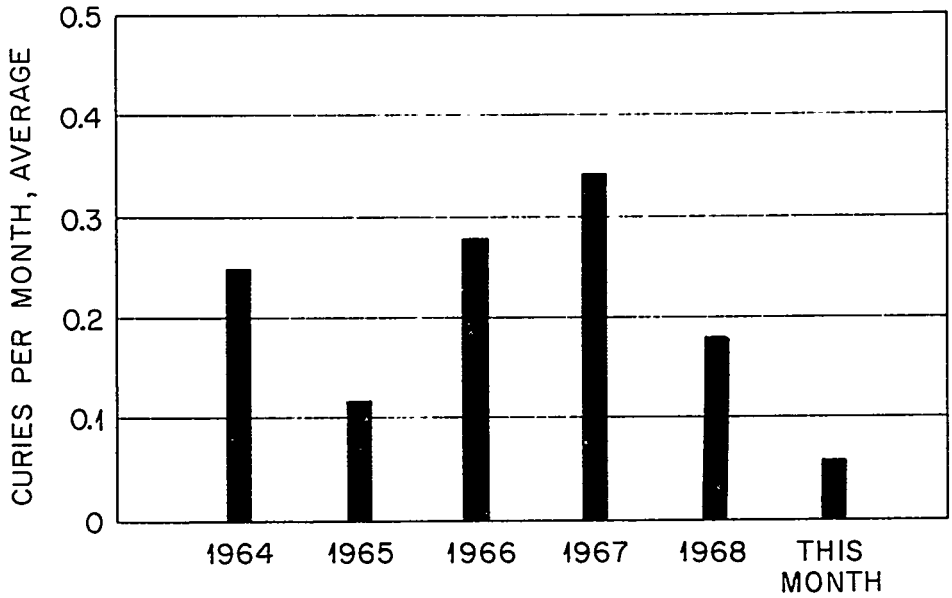

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

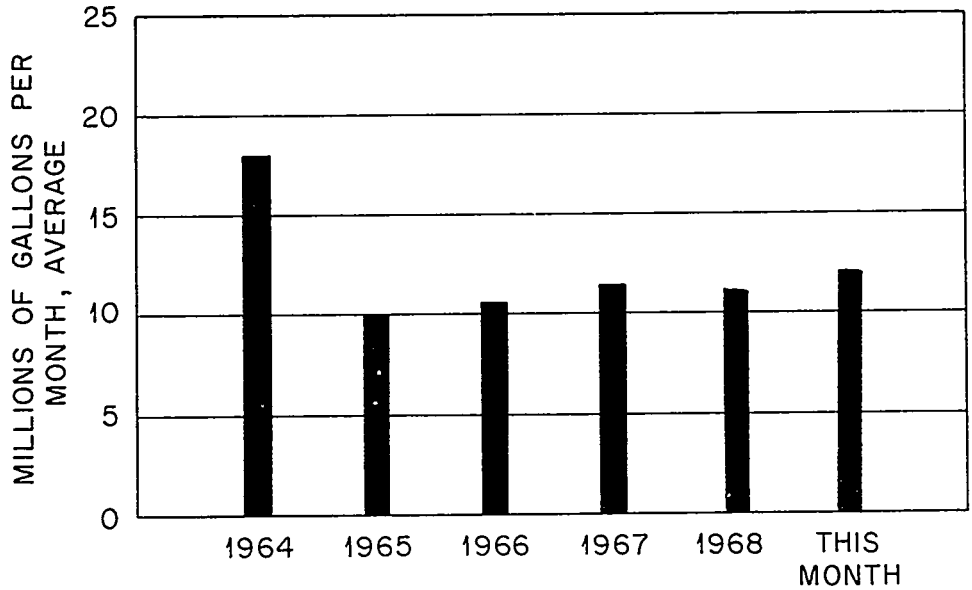

Fig. 4. Process Waste Volumes.

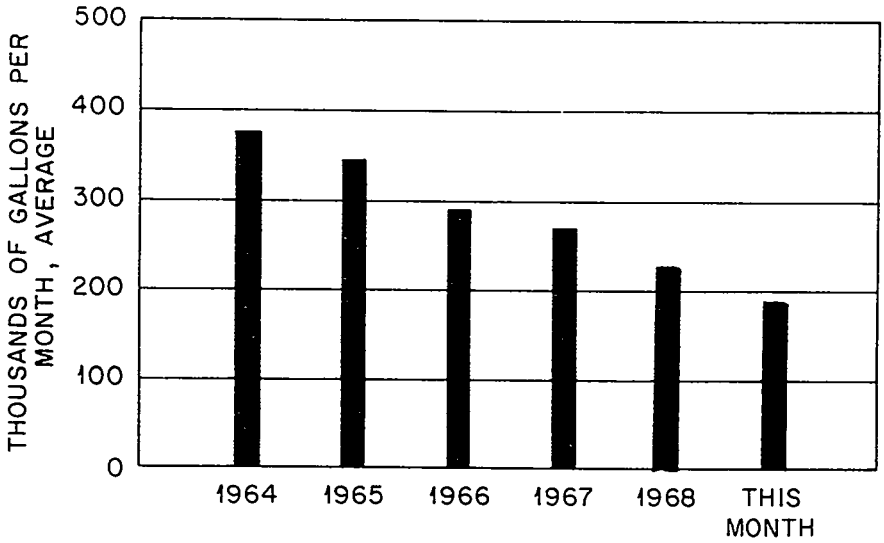

Fig. 5. Intermediate—Level Waste Volumes.

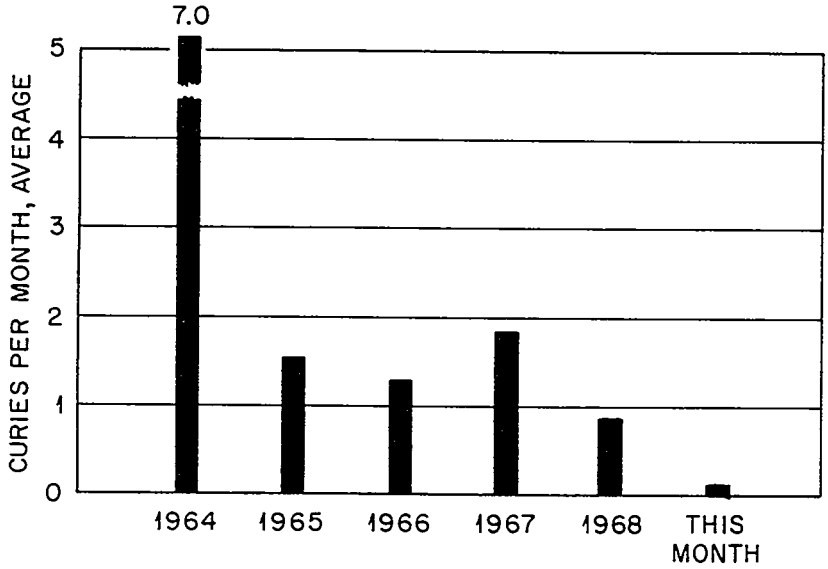

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

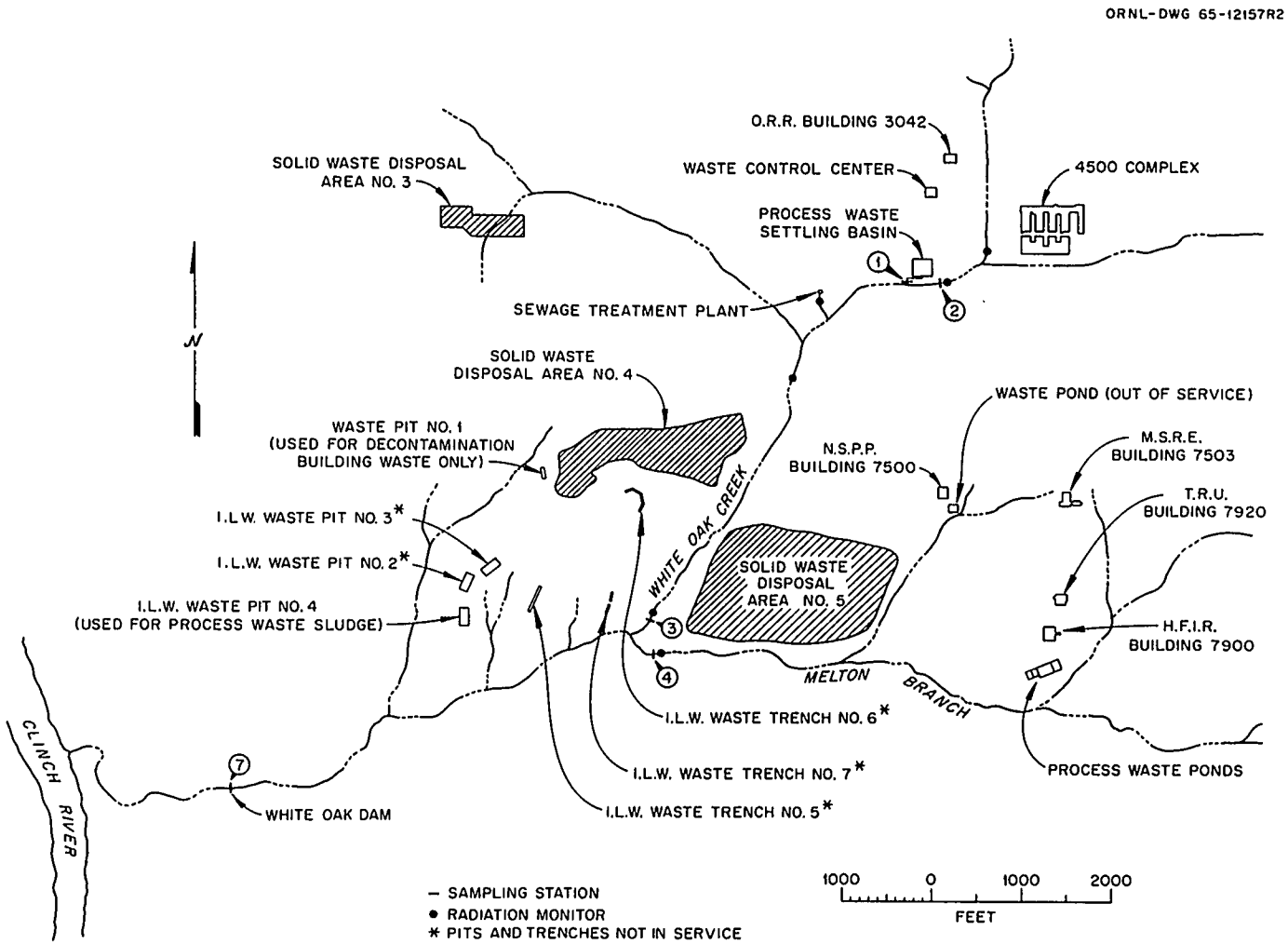

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.06	none detected	0.20	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	0.47	0.03	0.25	none detected
Total discharge from Melton Valley Area	4	0.11	< 0,01	< 0.01	none detected
Total discharge	3,4	0.58	0.03	0.25	--
White Oak Dam to Clinch River (Health Physics measurement)	7	0.29	0.13	0.07	0.09

[a]Refers to Figure 7

TABLE 2

STRONTIUM DISCHARGES, CURIES PER MONTH, AVERAGE

(refer to Figure 7 for locations of sampling stations)

	Bethel Valley			Melton Valley			
Year	Discharge to Lake, Station 3	Process Waste, Station 1	Unaccounted for (difference)	Discharge To Lake, Station 4	Unaccounted For	Total to Lake, Stations 3 & 4	Discharge to River[a]
1962	0.7	0.54	0.16	not sampled	-	0.7[b]	1.2
1963	0.8	0.41	0.39	not sampled	-	0.8[b]	0.7
1964	0.53	0.25	0.28	0.07	0.07	0.6	0.6
1965	0.41	0.12	0.29	0.04	0.04	0.45	0.35
1966	0.44	0.28	0.16	0.05	0.05	0.49	0.32
1967	0.57	0.34	0.23	0.08	0.08	0.65	0.48
1968	0.34	0.18	0.16	0.23[c]	0.07	0.57	0.27

[a]Measured at White Oak Dam by the Health Physics Division.

[b]Does not include discharges from Melton Valley.

[c]An accidental release of activity from a drilling operation at the Shale Fracturing site released approximately two curies of strontium.

TABLE 3

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 12.0×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.9×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.47	0.06	96
$^{103,106}Ru$	0.07	none detected	100
^{60}Co	none detected	none detected	-
^{137}Cs	0.88	0.20	77
Gross Beta Analysis	56 c/m/ml	7 c/m/ml	88

[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] CURIES	GROSS BETA ACTIVITY[a] % OF TOTAL	VOLUME MILLION GALLONS	VOLUME % OF TOTAL
1. Reactor Operations	10	0.37[b]	45.1	2.77	26.2
2. Radioisotope Processing Area	14	0.14	17.1	0.97	9.2
3. Buildings 3503 and 3508	3	0.06	7.3	1.49	14.1
4. Buildings 3025 and 3026	< 1	--	--	2.25	21.3
5. Building 3019	< 1	--	--	1.22	11.5
6. Fission Products Development Laboratory	58	0.17	20.7	0.24	2.3
7. Waste Evaporator, Building 2531	5	0.08	9.8	1.08	10.2
8. Buildings 3525 and 3550	< 1	--	--	0.53	5.0
9. Building 2026	< 1	--	--	0.02	0.2

[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 5

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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Technical Information Officer Date
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LIQUID WASTE

Release to Clinch River

The radioactive contamination of the river caused by ORNL waste releases was 0.3% of the MPC_w for a release to an uncontrolled area (see Figure 1). The bulk of this contamination was strontium which contributed 96% to the calculated percent of MPC_w.

White Oak Creek Monitoring

The radionuclides detected in significant amounts in the streams which drain the ORNL area are listed in Table 1. Figure 2 compares the releases of strontium into White Oak Lake on a monthly basis.

The strontium released into White Oak Lake totaled 0.64 curie. Most of this activity (0.58 curie) came from the Bethel Valley area. Comparatively small amounts of cesium (0.11 curie) and ruthenium (0.03 curie) were detected in the streams.

Process Waste

A total of 11.9 million gallons of waste was chemically treated at the Waste Treatment Plant. Operating data are summarized in Table 2. The sources of the waste discharged into the system are listed in Table 3. Figure 3 shows a monthly comparison of the strontium discharged into the creek by the process waste system. Figure 4 compares the volumes of waste generated.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 277 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	225,000
Volume transferred to evaporator	206,000
Volume of concentrate returned to tank farm	9,000
Tank Farm free space at beginning of month	540,000
Tank Farm free space at end of month	512,000

The major contributors to the system are listed below. Figure 5 shows the waste volumes handled on a monthly basis.

		Gallons
1.	High flux Isotope Reactor	48,000
2.	Building 3019	34,000
3.	Fission Products Development Laboratory	33,000
4.	4500 Complex	29,000
5.	Radioisotopes Processing Area	24,000
6.	ORR and BSR	20,000

Gaseous Waste

ORNL stacks emitted a total of 0.88 curie of gaseous activity during the period. This activity was identified as ^{131}I, and most of it (0.73 curie) was discharged from an analytical laboratory. The alpha activity detected during the period was not significant. Table 4 summarizes the stack discharges; Figure 6 compares the discharges on a monthly basis.

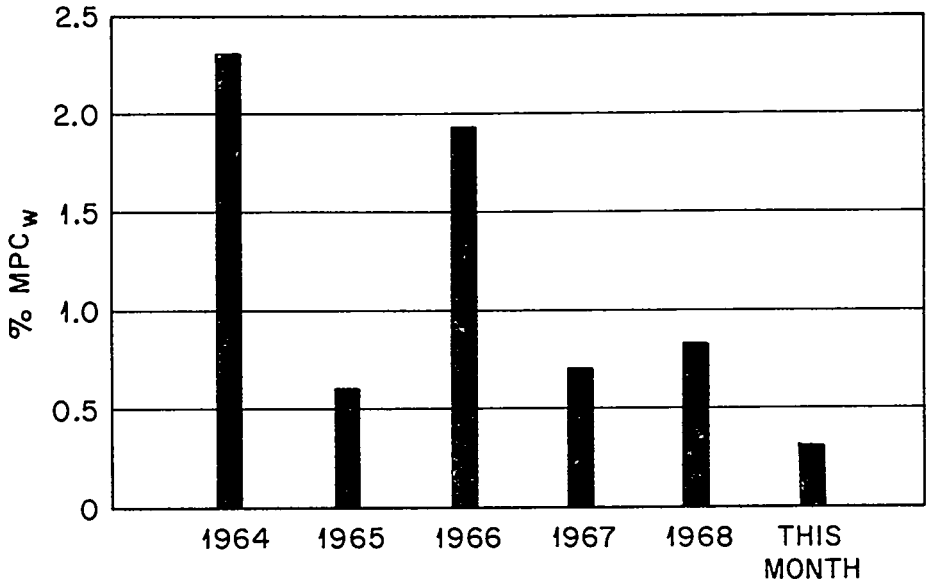

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharge (Health Physics Measurements at White Oak Dam)

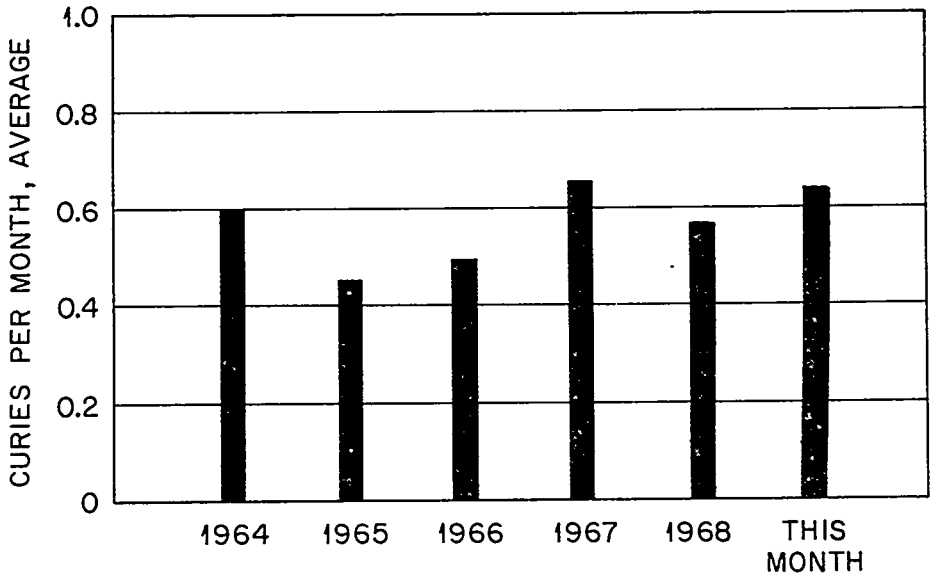

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

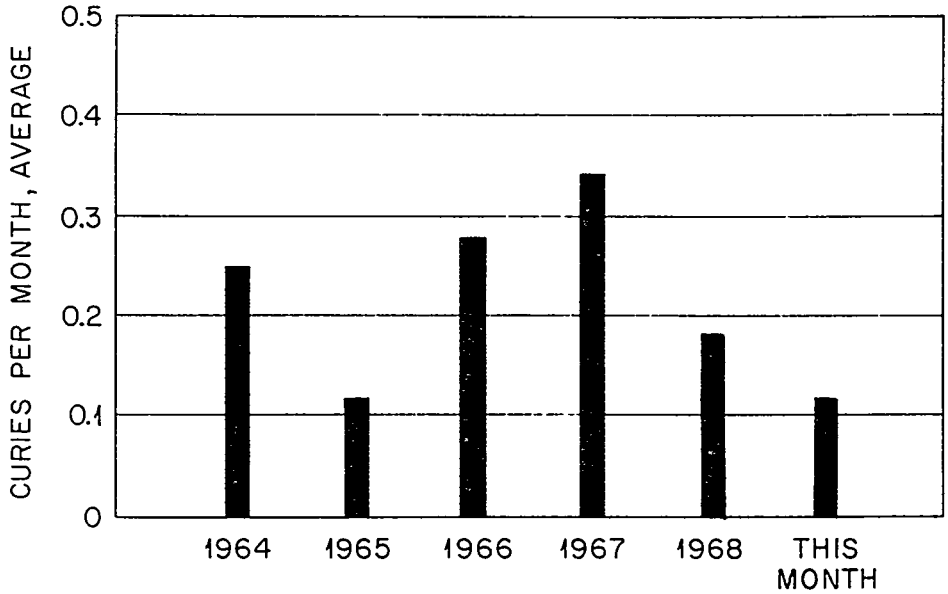

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

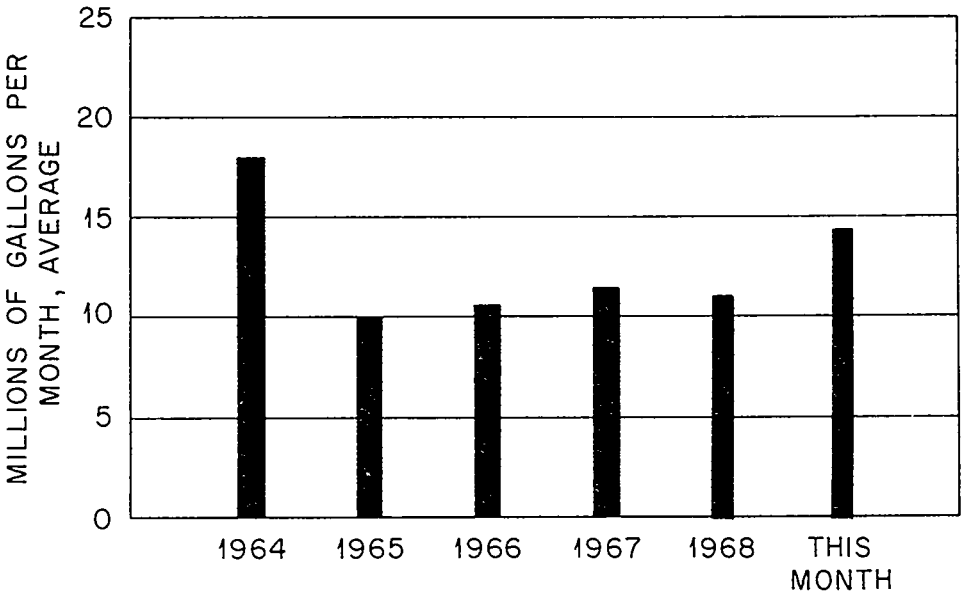

Fig. 4. Process Waste Volumes.

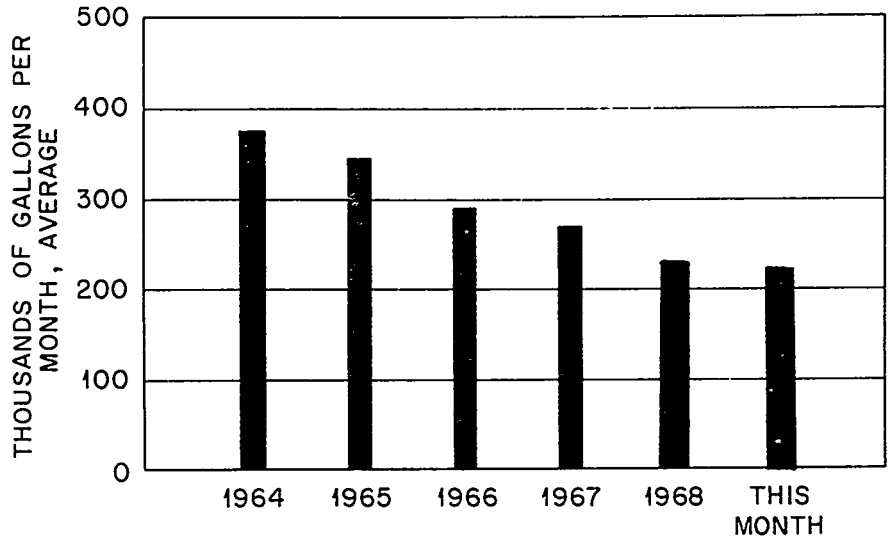

Fig. 5. Intermediate—Level Waste Volumes.

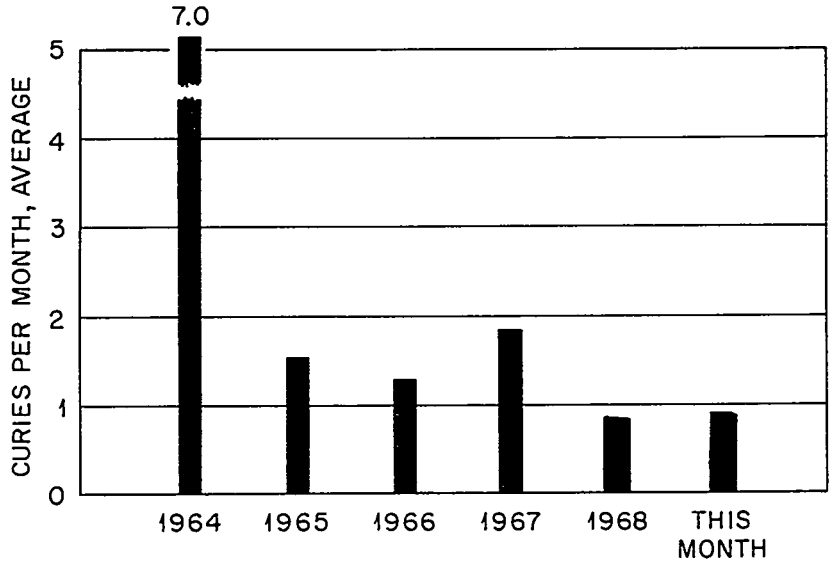

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

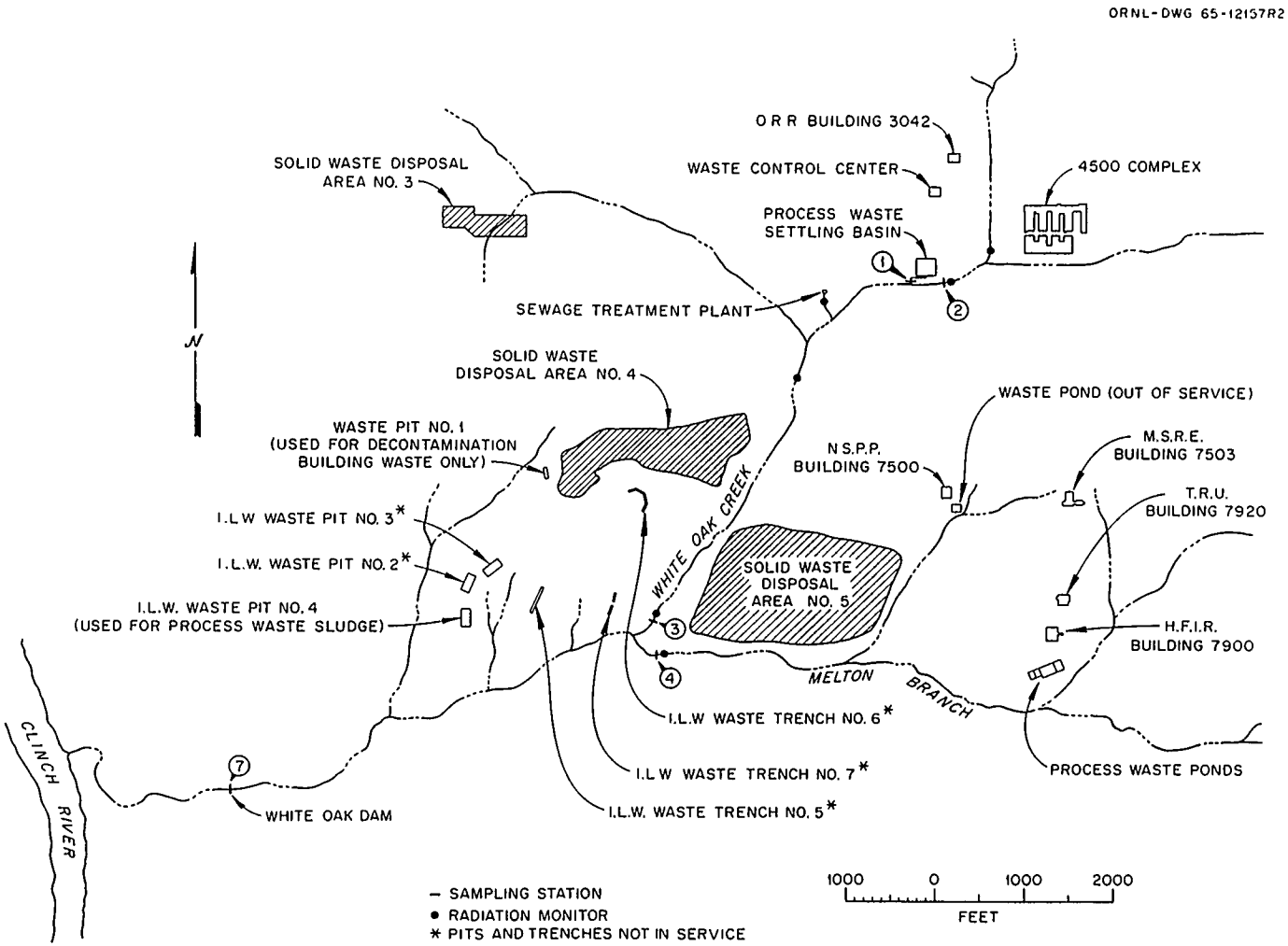

Fig. 7 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.12	none detected	0.23	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	0.58	0.03	0.11	none detected
Total discharge from Melton Valley Area	4	0.06	< 0.01	< 0.01	none detected
Total discharge	3 ,4	0.64	0.03	0.11	none detected
White Oak Dam to Clinch River (Health Physics measurement)	7	0.35	0.11	0.09	0.15

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.9×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.95	0.12	94
$^{103,106}Ru$	none detected	none detected	--
^{60}Co	0.06	none detected	100
^{137}Cs	2.53	0.23	91
Gross Beta Analysis	88 c/m/ml	7 c/m/ml	91

[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	4[b]	0.05[b]	8.1	2.59	23.9
2.	Radioisotope Processing Area	23	0.25	40.3	0.76	7.0
3.	Buildings 3503 and 3508	2	0.06	9.7	1.99	18.4
4.	Buildings 3025 and 3026	0	--	--	2.18	20.1
5.	Building 3019	0	--	--	0.93	8.6
6.	Fission Products Development Laboratory	56	0.22	35.5	0.29	2.7
7.	Waste Evaporator, Building 2531	2	0.04	6.4	1.48	13.6
8.	Buildings 3525 and 3550	0	--	--	0.58	5.3
9.	Building 2026	0	--	--	0.04	0.4

[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	0.77
Central Radioactive Gas Disposal Facilities	3039	0.11
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HRIR	7911	< 0.01
Total activity in gases released		0.88

[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 river resulting from ORNL waste discharges was 0.52% of the MPC_w (see Figure 1). Strontium contributed 89.9% to the calculated percent of MPC_w.

White Oak Creek Monitoring

The radionuclides released to the creek and the river in significant amounts are listed in Table 1. There is no apparent reason for the 0.17 curie of strontium shown as being discharged from the storm sewers at the east end of the plant (measurement at station 2) and there is doubt about the validity of the analytical results. More recent samples taken at station 2 have shown no significant discharge of activity in that area. Figure 2 shows a monthly comparison of the amounts of strontium released to White Oak Lake. There was no significant release of alpha activity.

Process Waste

A total of 11.2 million gallons of waste was decontaminated by chemical treatment. A summary of operating data is given in Table 2. The sources of waste discharged into the system are listed in Table 3. Figure 3 shows a monthly comparison of the strontium discharged into the creek by the process waste system. Figure 4 compares the volumes of waste generated.

Intermediate-Level Waste

The evaporator operated at a boil-down rate of 287 gph. A summary of operating data is given below:

		Gallons
1.	Total volume generated	192,000
2.	Volume transferred to evaporator	193,000
3.	Tank Farm free space at beginning of month	512,000
4.	Tank Farm free space at end of month	498,000
5.	Evaporator concentrate returned to tank farm	15,000

The major contributors to the system are listed below. Figure 5 shows a comparison of the waste volumes handled each month.

		Gallons
1.	Building 3039	45,000
2.	Fission Products Development Laboratory	41,000
3.	4500 Complex	23,000
4.	Radioisotopes Processing Area	22,000
5.	High Flux Isotope Reactor	18,000
6.	ORR and BSR	17,000

Gaseous Waste

A total of 5.52 curies of ^{131}I was released this month (see Table 4 and Figure 6). Most of the activity (4.71 curies) came from an intermediate-level waste tank that is ventilated by the central off-gas system at the 3039 stack. A charcoal filter has since been installed in the tank exhaust system to prevent similar releases in the future. There was no significant release of alpha activity.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station	Activity (Curies)			
	Number[a]	Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.16	none detected	0.25	0.11
Miscellaneous discharges from east end of plant	2	0.17	none detected	none detected	none detected
Total discharge from Bethel Valley Area	3	0.41	0.03	0.26	none detected
Total discharge from Melton Valley Area	4	0.12	< 0.01	0.01	none detected
Total discharge	3,4	0.53	0.03	0.27	none detected
White Oak Dam to Clinch River (Health Physics measurement)	5	0.70	0.54	0.50	0.32

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 11.2×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.2×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	2.17	0.16	93
$^{103,106}Ru$	none detected	none detected	--
^{60}Co	0.25	0.11	58
^{137}Cs	3.27	0.25	93
Gross Beta Analysis	107 c/m/ml	6 c/m/ml	94

[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	8[b]	0.29[b]	27.4	2.62	25.6
2.	Radioisotope Processing Area	61	0.49	46.2	0.58	5.7
3.	Buildings 3503 and 3508	2	0.06	5.7	2.26	22.1
4.	Buildings 3025 and 3026	< 1	--	--	2.07	20.2
5.	Building 3019	< 1	--	--	0.50	4.9
6.	Fission Products Development Laboratory	38	0.15	14.1	0.25	2.4
7.	Waste Evaporator, Building 2531	3	0.06	5.7	1.46	14.3
8.	Buildings 3525 and 3550	1	0.01	0.9	0.48	4.7
9.	Building 2026	0	--	--	0.01	0.1

[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	0.67
Central Radioactive Gas Disposal Facilities	3039	4.71
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR (from TRU operation)	7911	0.14
Total activity in gases released		5.52

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

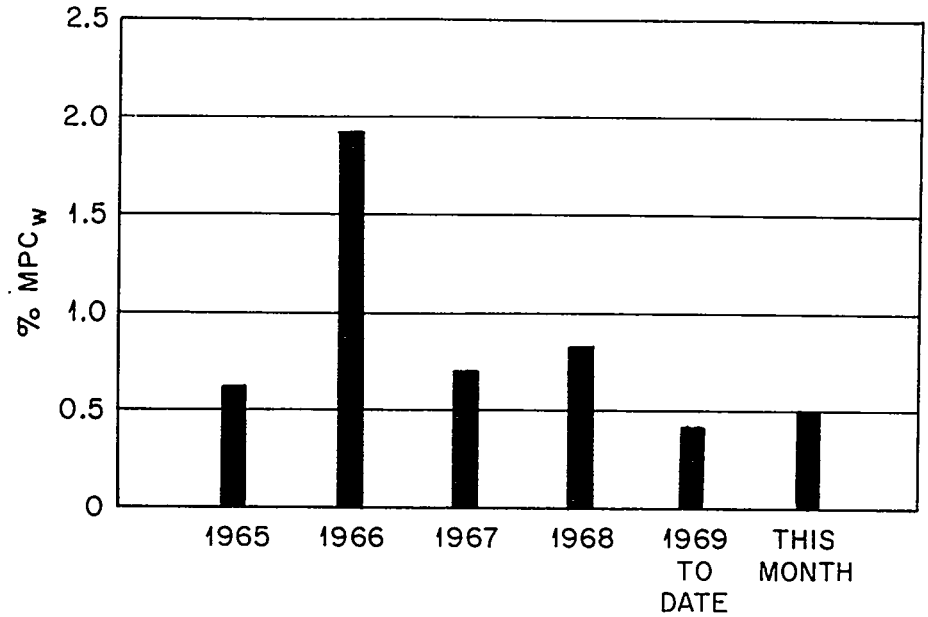

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

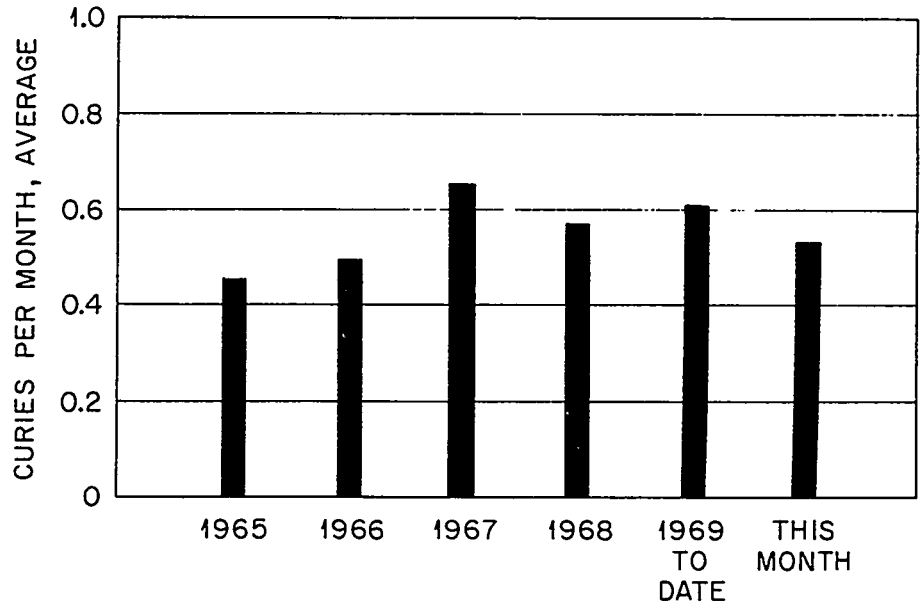

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

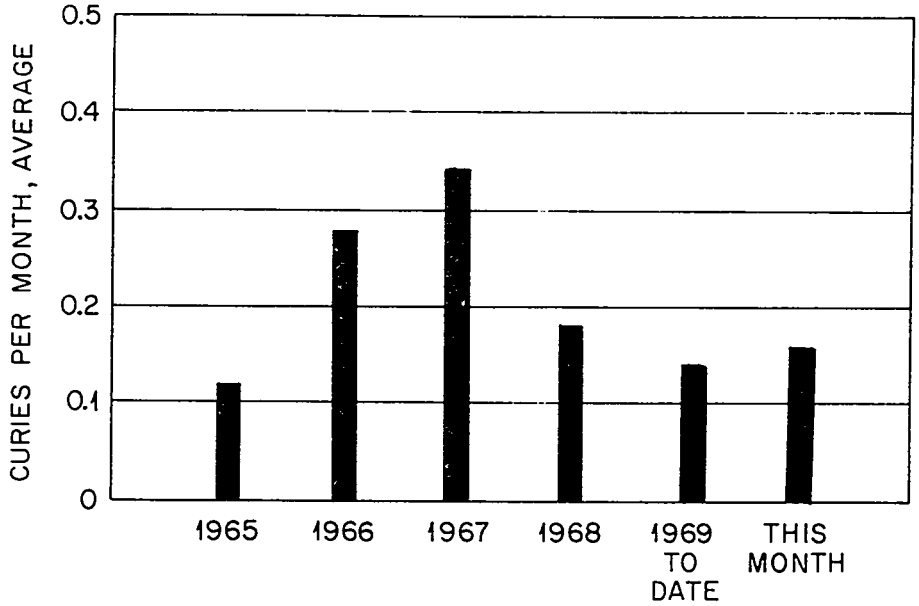

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

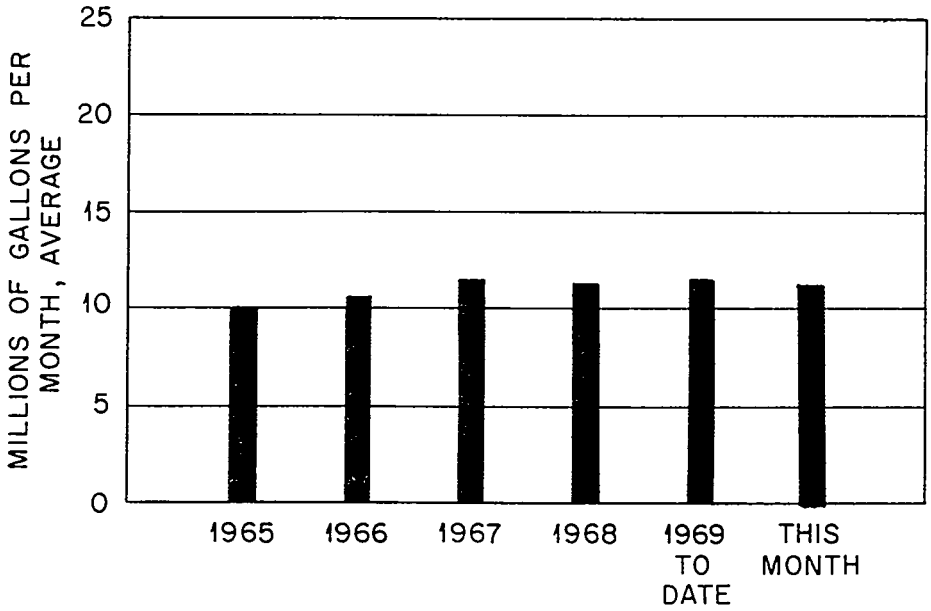

Fig. 4. Process Waste Volumes.

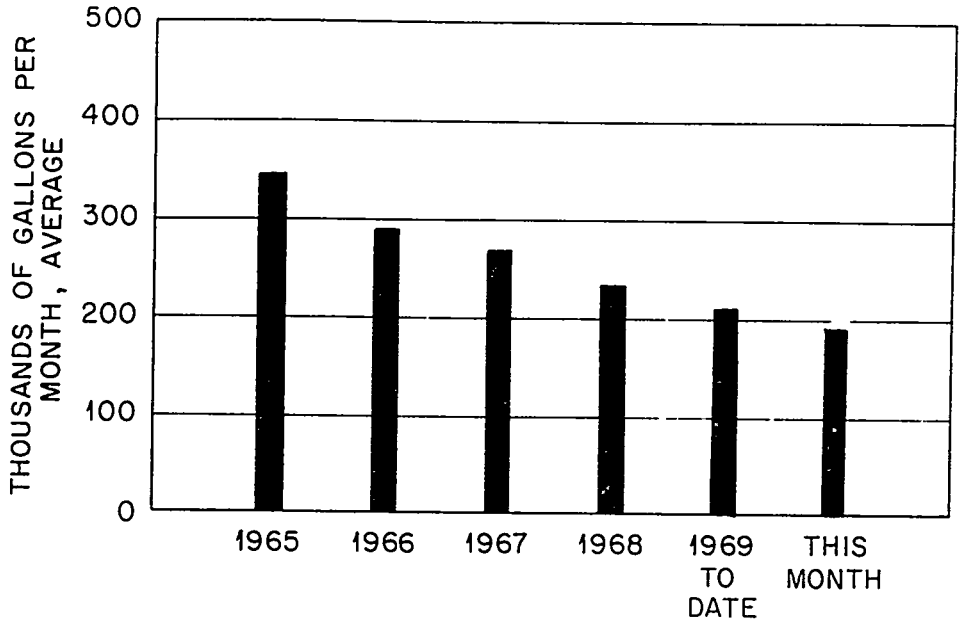

Fig. 5. Intermediate—Level Waste Volumes.

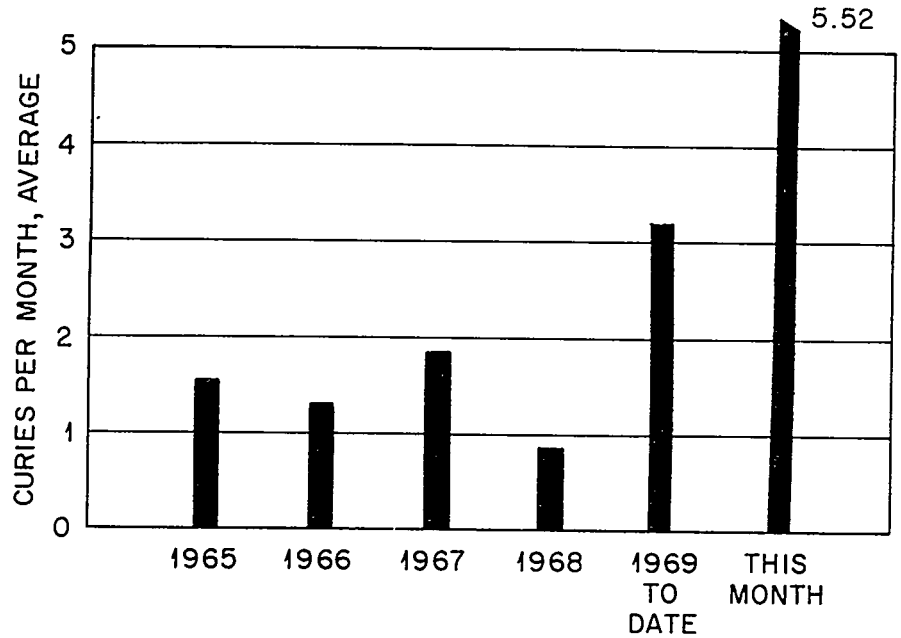

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

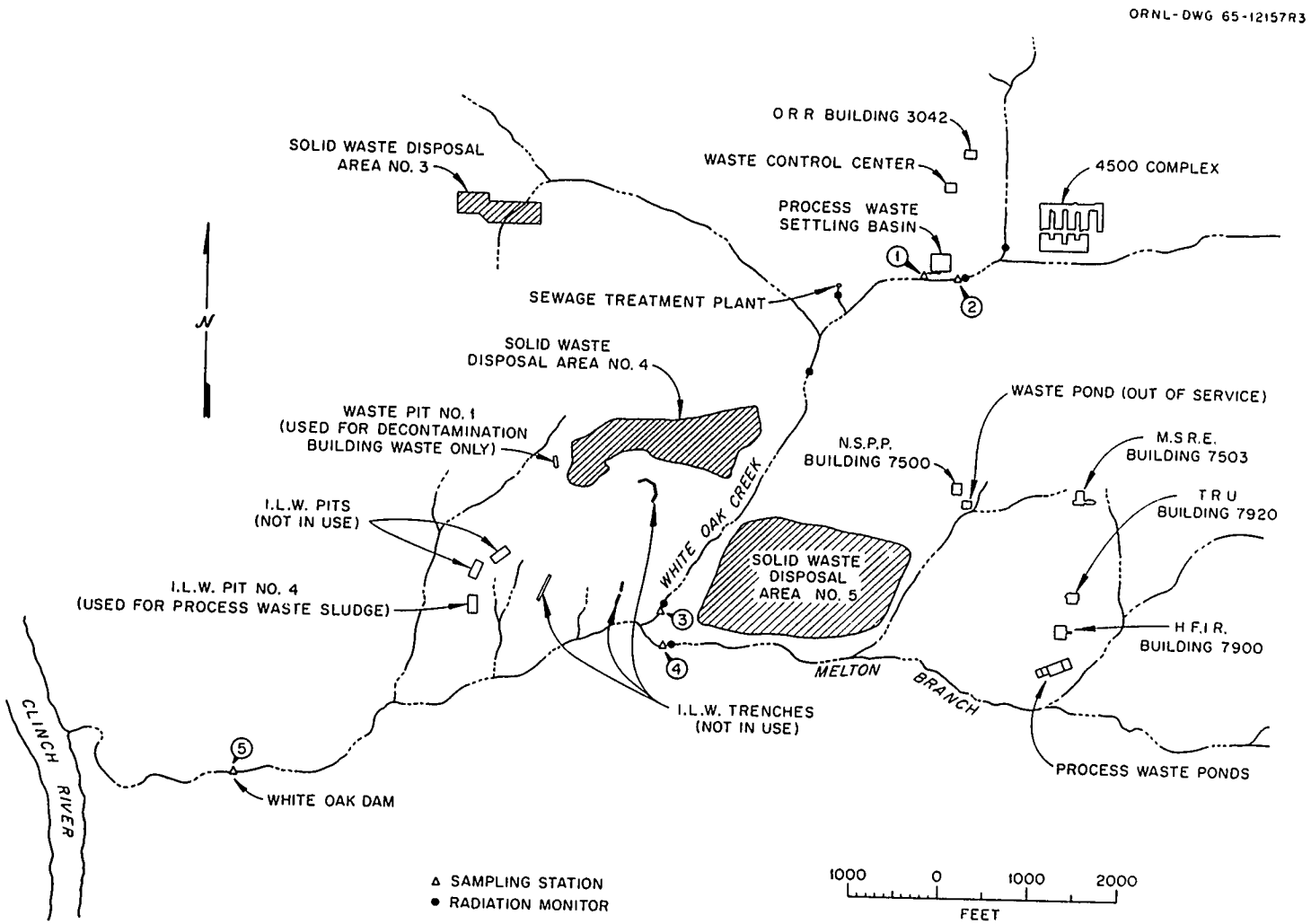

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste releases amounted to 0.50 percent of the MPC_w for a release to an uncontrolled area (see Figure 1). Strontium, contributing 85.7% to the calculated percent of MPC_w, was the primary contaminant.

White Oak Creek Monitoring

Table 1 lists the significant radionuclides discharged into the creeks which drain ORNL. The amount of cobalt detected at stations 3 and 4 are inexplicably high. Figure 2 compares the releases of strontium into White Oak Lake on a monthly basis.

Since 1964, when the routine sampling of the Melton Branch of White Oak Creek was begun, between 50 mc and 100 mc of strontium has been measured flowing through that stream each month. The source of the activity was never established until this month when intensive sampling of potential sources revealed that at least a large portion of the total strontium, as well as cesium-137, was seeping out of the waste pond used at one time for the Homogeneous Reactor operations. The amount of activity could not be measured with any accuracy without the use of expensive sampling and flow measuring equipment which could not be justified at present.

Process Waste

A total of 10.9 million gallons for contaminated water was chemically treated this month. A summary of operations is given in Table 2. The sources of waste discharged into the system are listed in Table 3. Figure 3 shows a monthly comparison of the strontium discharged from the process waste system, and Figure 4 compares the volumes of waste handled.

Intermediate-Level Waste

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

		Gallons
1.	Total volume generated	238,000
2.	Volume transferred to evaporator	228,000
3.	Tank Farm free space at beginning of month	498,000
4.	Tank Farm free space at end of month	477,000
5.	Evaporator concentrate returned to Tank Farm	11,000

The major contributors to this waste system are listed below. Figure 5 shows a comparison of the waste volumes handled each month.

		Gallons
1.	Building 3019	78,000
2.	Fission Products Development Laboratory	43,000
3.	High Flux Isotope Reactor	25,000
4.	ORR and BSR	19,000
5.	Radioisotopes Processing Area	14,000
6.	4500 Complex	12,000

Gaseous Waste

A total of 0.75 curie of ^{131}I was emitted from the ORNL stacks. Most of the activity came from the High Radiation Level Analytical Laboratory. The amount of alpha activity detected during the period was not significant. Table 4 lists the gaseous waste releases from individual areas. Figure 6 compares total stack discharges on a monthly basis.

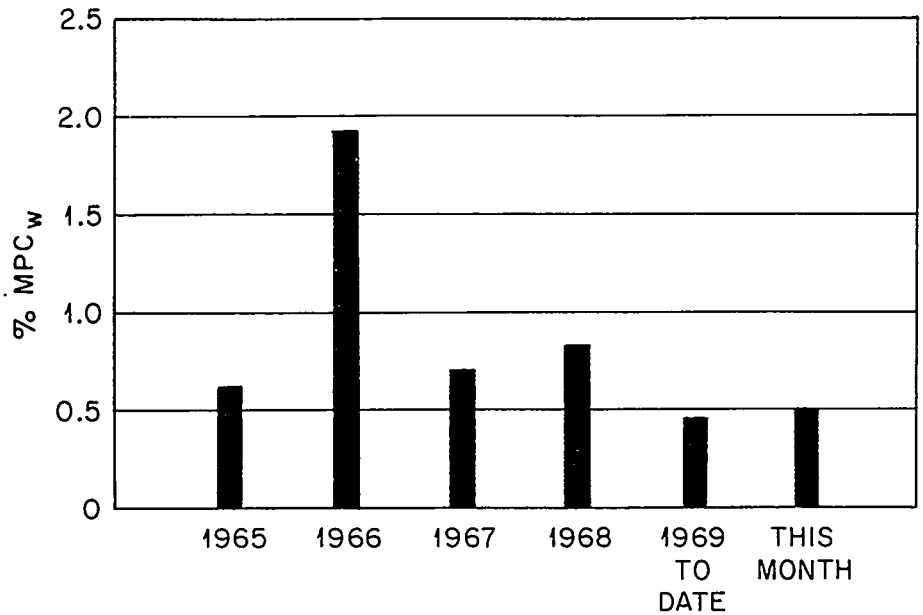

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

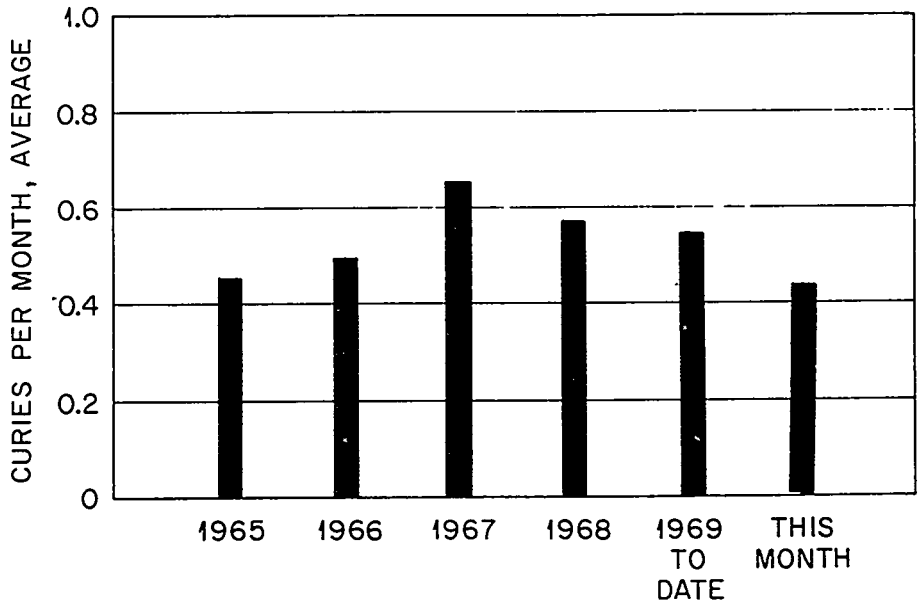

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

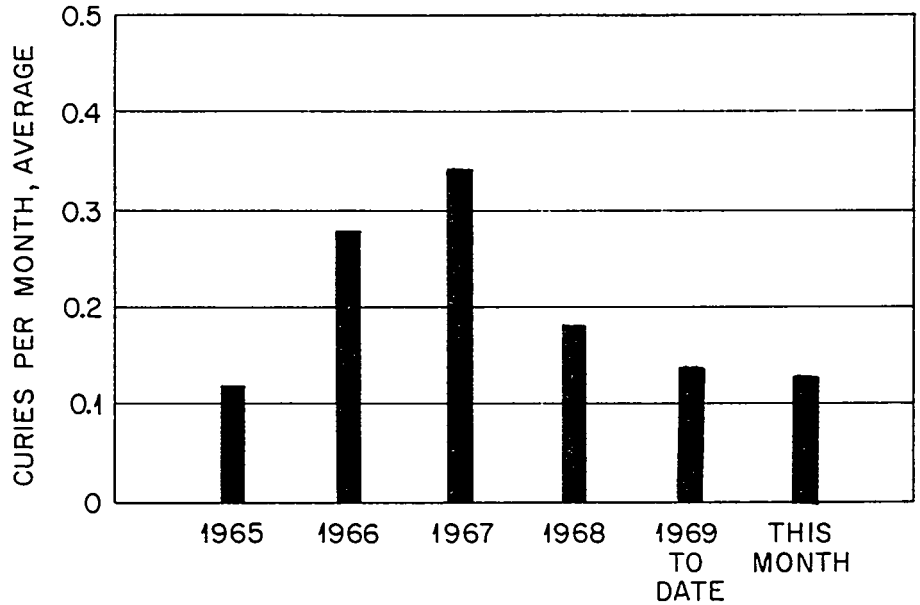

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

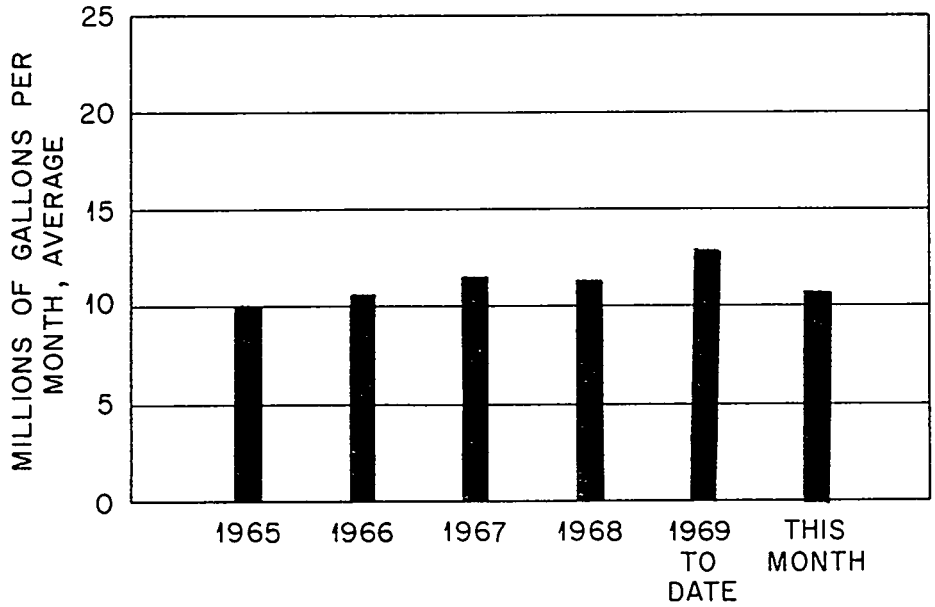

Fig. 4. Process Waste Volumes.

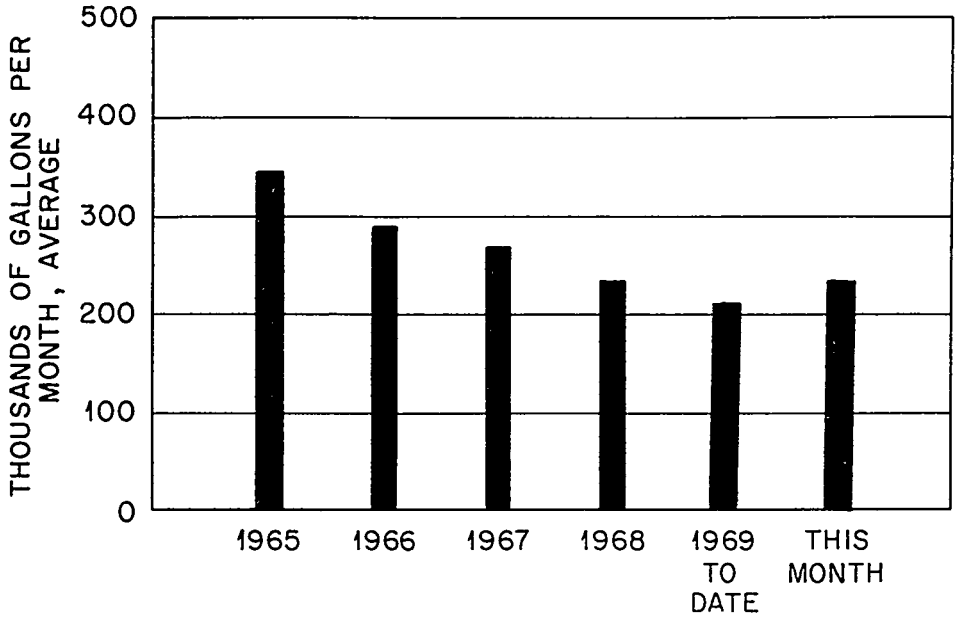

Fig. 5. Intermediate—Level Waste Volumes.

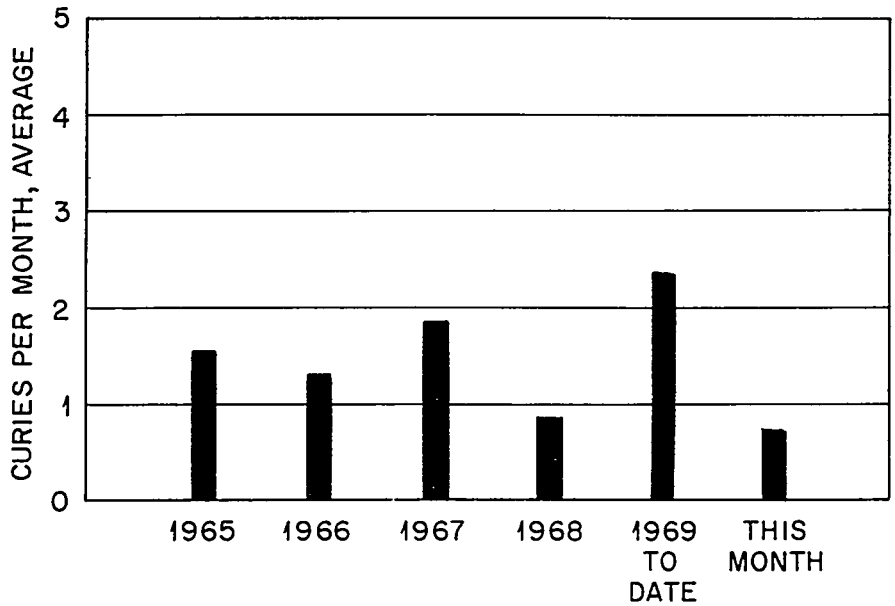

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

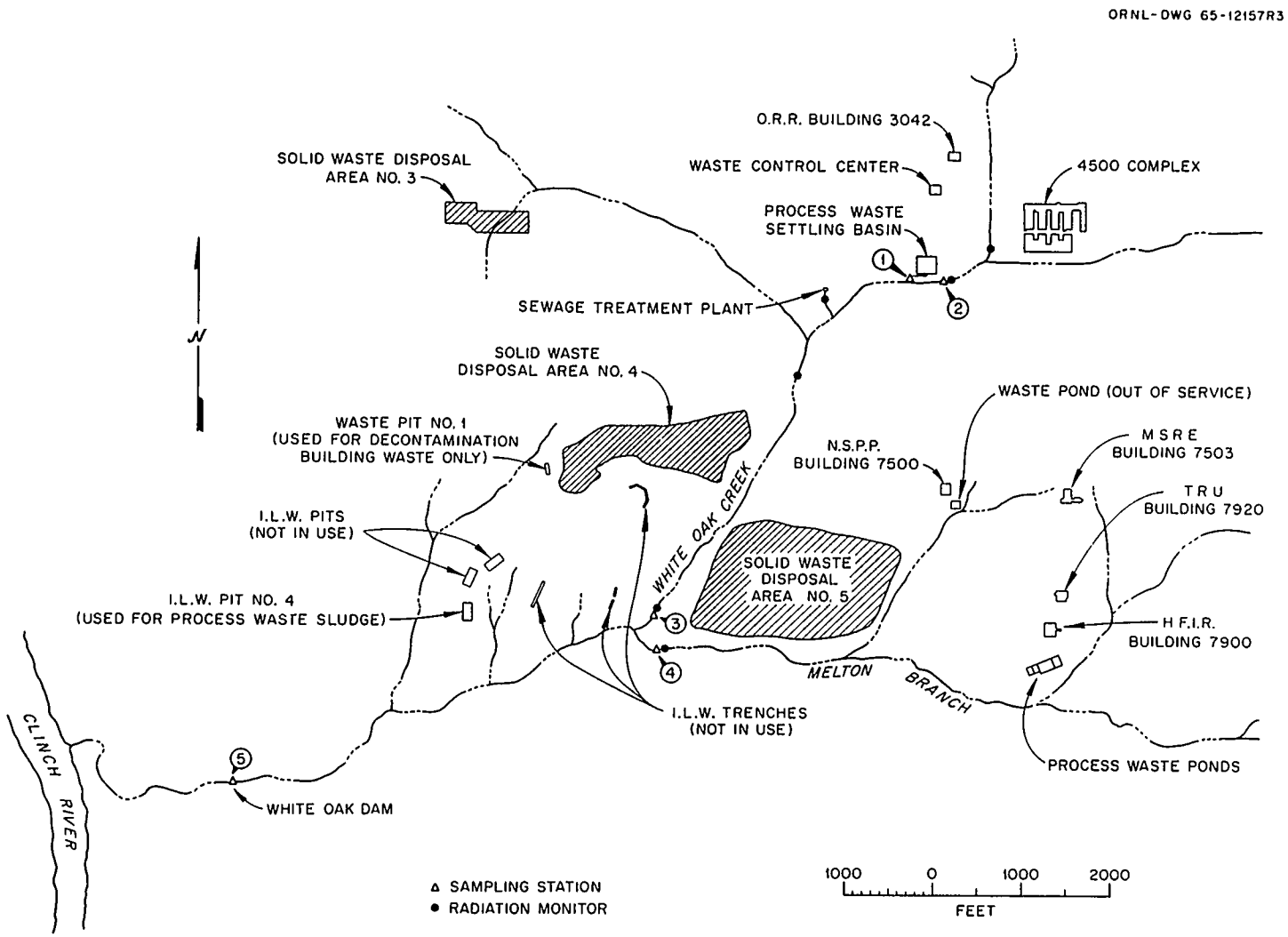

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.13	0.15	0.38	0.09
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.01	< 0.01	< 0.01
Total discharge from Bethel Valley Area	3	0.34	0.01	0.42	0.35
Total discharge from Melton Valley Area	4	0.10	< 0.01	< 0.01	0.13
Total discharge	3,4	0.44	0.01	0.42	0.48
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.09	0.17	0.13

[a]Refers to Figure 7

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 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]	3.18	0.13	96
$^{103,106}Ru$	0.13	0.14	none
^{60}Co	0.28	0.09	68
^{137}Cs	18.41	0.38	98
Gross Beta Analysis	306 c/m/ml	8 c/m/ml	97

[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	% OF TOTAL	VOLUME MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	8[b]	0.23	16.9	2.13	21.2
2.	Radioisotope Processing Area	36	0.40	29.4	0.83	8.3
3.	Buildings 3503 and 3508	3	0.11	8.1	2.48	24.7
4.	Buildings 3025 and 3026	2	0.06	4.4	2.17	21.7
5.	Building 3019	0	< 0.01	--	0.64	6.4
6.	Fission Products Development Laboratory	23	0.07	5.2	0.23	2.3
7.	Waste Evaporator, Building 2531	35	0.49	36.0	1.03	10.3
8.	Buildings 3525 and 3550	0	< 0.01	--	0.51	5.1
9.	Building 2026	0	< 0.01	--	< 0.01	--

[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	0.55
Central Radioactive Gas Disposal Facilities	3039	0.09
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR (from TRU operation)	7911	0.11
Total activity in gases released		0.75

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

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JUL 9 1969

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69-6-51

DATE: June 25, 1969

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SUBJECT: Radioactive Waste Disposal Operations Report for the Month of April 1969

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David C Hamlin 3/13/96
Technical Information Officer Date
ORNL

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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste releases amounted to 0.79% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminant was strontium which contributed 84% to the calculated percent of MPC_W.

White Oak Creek Monitoring

The significant discharges of activity into the creek are given in Table 1. A comparison of this month's strontium discharge to those of previous months is shown in Figure 2. The discharges were normal except for the ruthenium, cobalt, and cesium measured at station 2. Only trace amounts of activity are usually detected at this station. An investigation is under way to determine the source of the unusual discharge.

It was reported last month that a seep of radioactive strontium to the creek was found coming from a pond that was once used for the Homogeneous Reactor operation and that this seep contributed some portion of the total strontium activity (between 50 mc and 100 mc) that has been consistently measured in the Melton branch of the creek but the source of which was not known. A continuing search for other sources has now revealed that some strontium is also seeping from Burial Ground 5.

Process Waste

A total of 8 million gallons of contaminated water was chemically treated this month. A summary of operating data is given in Table 2.

The sources of activity discharged into the process waste system are listed in Table 3. Figure 3 compares the amount of strontium released from the system on a monthly basis, and Figure 4 shows a

monthly comparison of the volumes of waste handled.

Intermediate-Level Waste

The waste evaporator operated at a boil-down rate of 305 gph. The operating data are given below.

		Gallons
1.	Total volume generated	223,000
2.	Volume transferred to evaporator	227,000
3.	Volume of concentrate transferred to hydraulic fracturing site	74,000
4.	Tank Farm free space at beginning of month	477,000
5.	Tank Farm free space at end of month	544,000
6.	Evaporator concentrate returned to Tank Farm	11,000

A list of the major contributors to the system is given below.

		Gallons
1.	Building 3019	58,000
2.	Fission Products Development Laboratory	28,000
3.	High Flux Isotope Reactor	27,000
4.	4500 Complex	23,000
5.	ORR and BSR	22,000
6.	Radioisotopes Processing Area	14,000
7.	Transuranium Processing Plant	10,000

Figure 5 shows a comparison of the volumes of ILW handled each month.

Gaseous Waste

The total ^{131}I released by ORNL stacks was 2.05 curies. There were no significant releases of alpha activity detected during the period. A list of individual releases is shown in Table 4; total monthly releases are compared in Figure 6.

The instruments used for monitoring inert gases discharged from the 3039 and 7911 stacks have been modified and calibrated to give a quantitative indication of the level of activity being released from those stacks. The 3039 stack serves the main gas disposal facility which is used by the ORR and all other large scale operations in Bethel Valley. The 7911 stack serves the HFIR and other operations in Melton Valley. A very conservative calculation of the discharges this month, based on the assumption that all of the inert gases were ^{133}Xe, shows that the discharge from the 3039 stack were less than 1.65% of the maximum permissible operating level and that the discharge from the 7911 stack was less than 0.05% of the maximum permissible operating level.

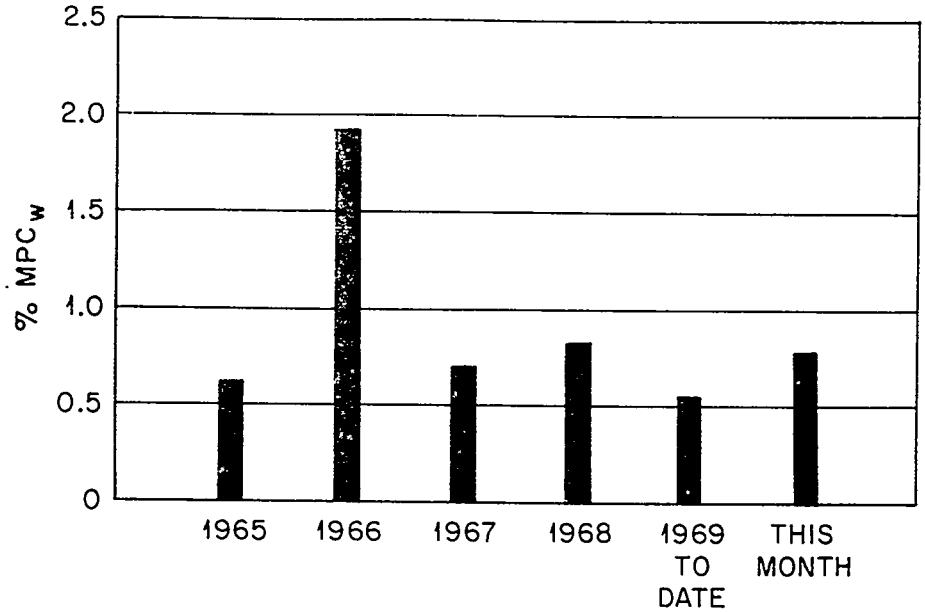

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

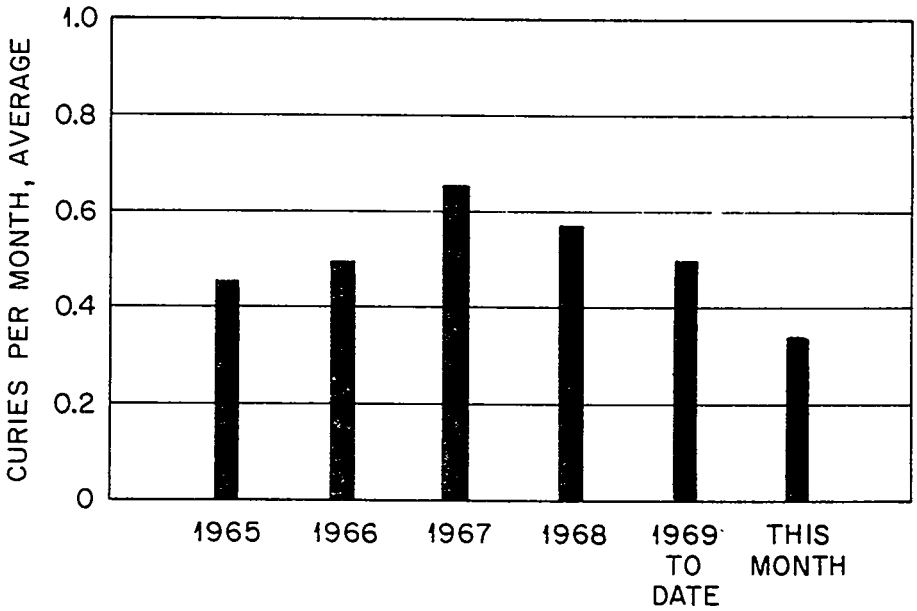

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

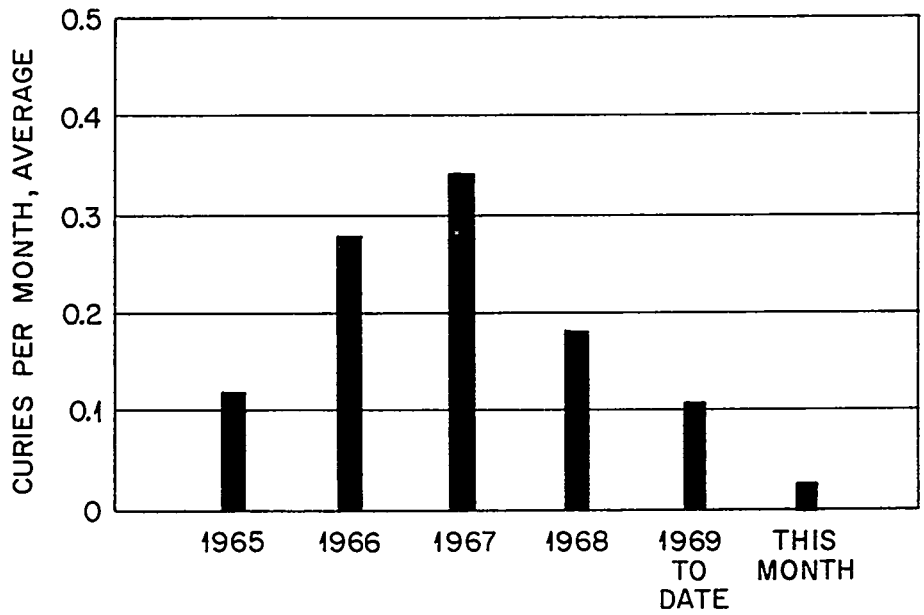

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

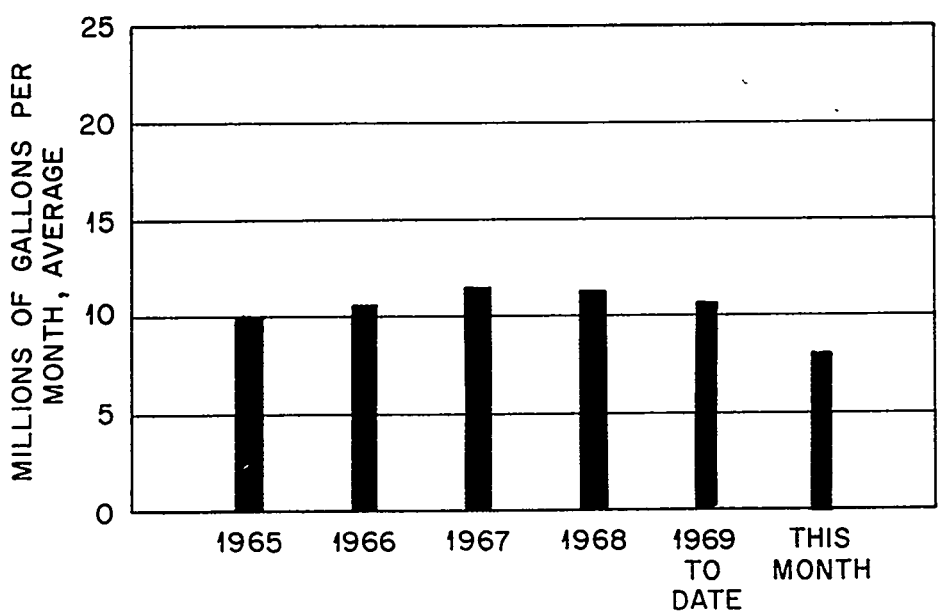

Fig. 4. Process Waste Volumes.

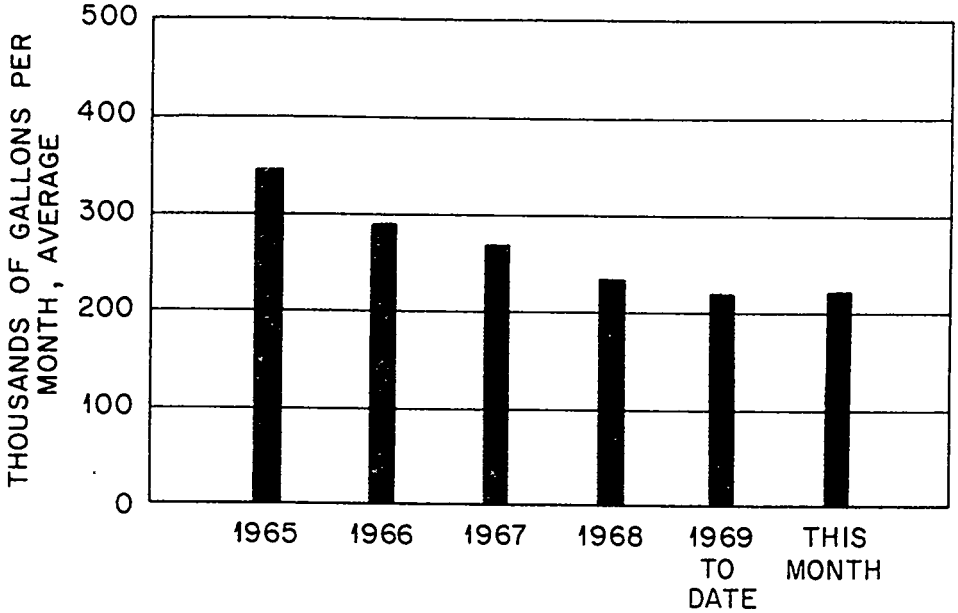

Fig. 5. Intermediate—Level Waste Volumes.

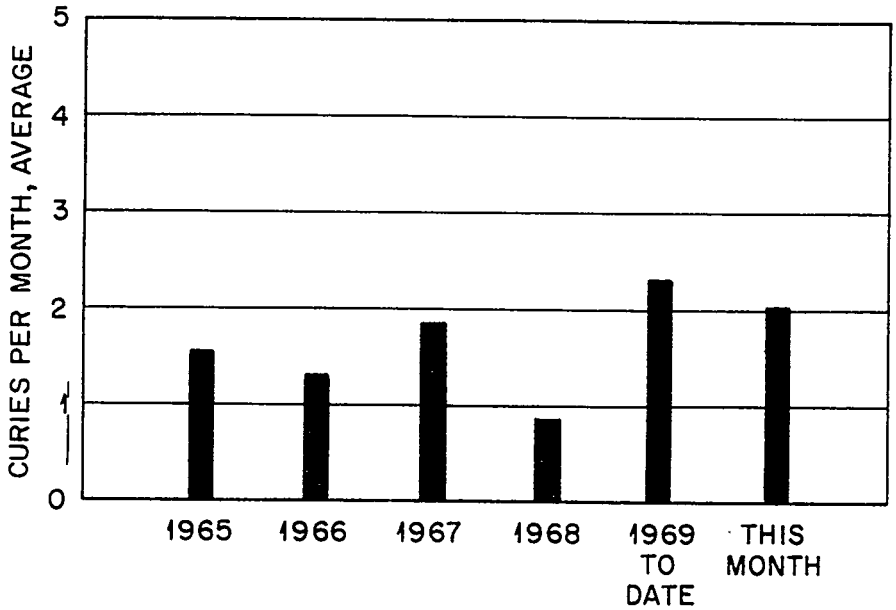

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

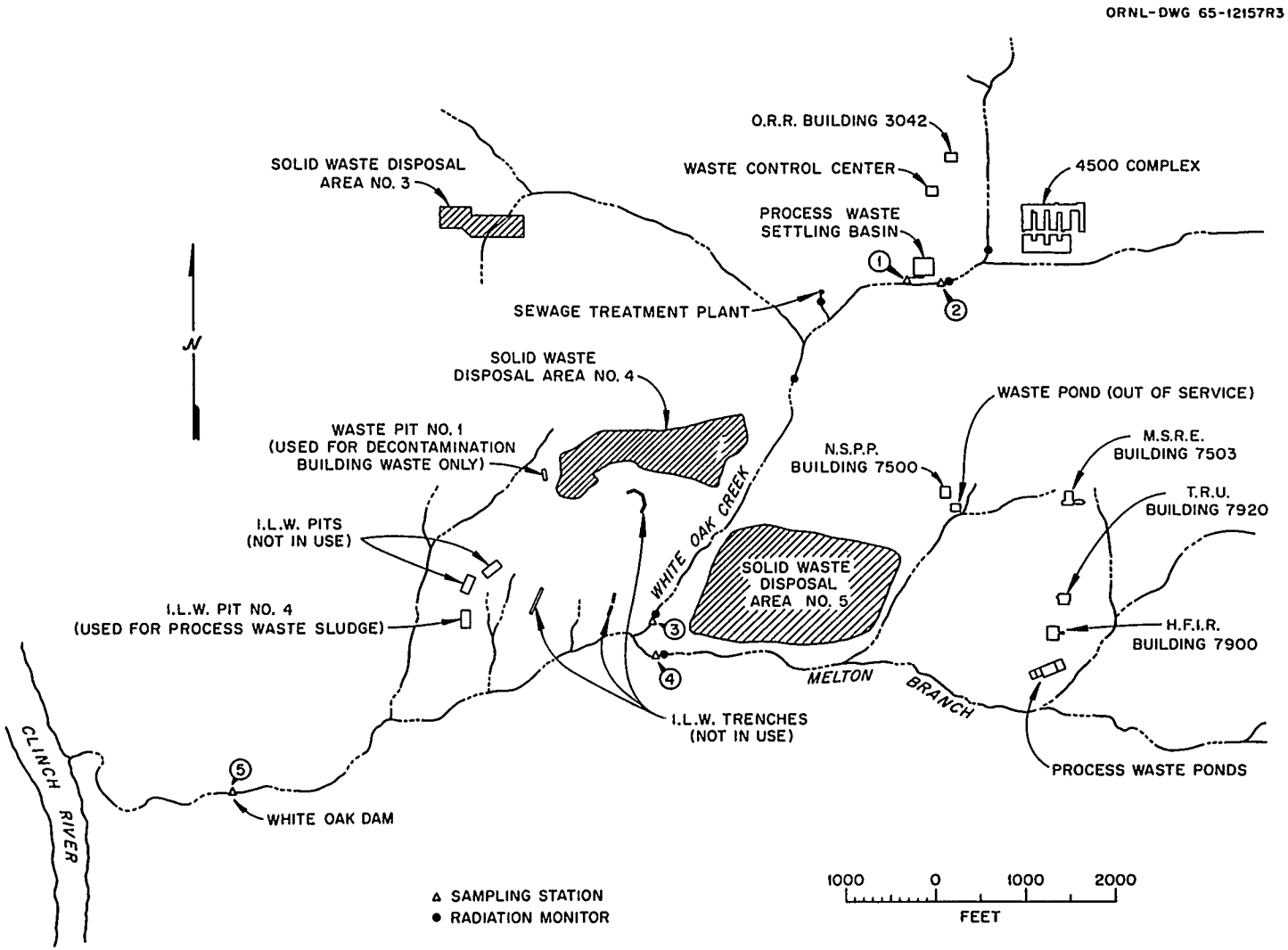

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.03	0.06	0.40	0.13
Miscellaneous discharges from east end of plant	2	< 0.01	0.69	0.22	0.16
Total discharge from Bethel Valley Area	3	0.27	0.01	0.15	0.14
Total discharge from Melton Valley Area	4	0.07	< 0.01	< 0.01	0.09
Total discharge	3,4	0.34	0.01	0.15	0.23
White Oak Dam to Clinch River (Health Physics measurement)	5	0.26	0.19	0.12	0.15

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 8×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.2×10^6 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	0.03	96
$^{103,106}Ru$	0.04	0.06	none
^{60}Co	0.27	0.13	52
^{137}Cs	1.47	0.40	73
Gross Beta Analysis	64 c/m/ml	9 c/m/ml	85

[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	9[b]	0.26	11.1	2.16	23.6
2.	Radioisotope Processing Area	128	1.40	59.6	0.81	8.8
3.	Buildings 3503 and 3508	3	0.09	3.8	2.22	24.2
4.	Buildings 3025 and 3026	1	0.03	1.3	1.92	20.9
5.	Building 3019	0	--	--	0.63	6.9
6.	Fission Products Development Laboratory	24	0.08	3.4	0.24	2.6
7.	Waste Evaporator, Building 2531	47	0.48	20.4	0.76	8.3
8.	Buildings 3525 and 3550	1	0.01	0.4	0.43	4.7
9.	Building 2026	< 1	--	--	< 0.01	--

[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	1.23
Central Radioactive Gas Disposal Facilities	3039	0.82
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR (from TRU operation)	7911	< 0.01
Total activity in gases released		2.05

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

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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 river caused by ORNL waste releases amounted to 0.39% of the MPC_w for a release to an uncontrolled area (see Figure 1). The main contaminant, strontium, accounted for 88% of the calculated percent of MPC_w.

White Oak Creek Monitoring

A list of the most significant radionuclides released by ORNL is given in Table 1. With the exception of the minor amount of activity detected at monitoring station No. 2, the measurements were normal. A monthly comparison of the strontium released into White Oak Lake is shown in Figure 2.

Process Waste

Six million gallons of contaminated water were chemically treated this month. An additional 2 million gallons were released directly to the creek without treatment when the Treatment Plant was shut down to unplug circulating lines. The fact that one-fourth of the waste was not treated accounts for the relatively low strontium removal shown in Table 2.

The sources of process waste are listed in Table 3. Figure 3 compares the strontium released into White Oak Creek on a monthly basis. Figure 4 compares the volumes of waste handled each month.

Intermediate-Level Waste

The waste evaporator operated at a boil-down rate of 270 gph. A summary of operations is given below:

		Gallons
1.	Total volume generated	203,000
2.	Volume transferred to evaporator	201,000
3.	Tank Farm free space at beginning of month	544,000
4.	Tank Farm free space at end of month	534,000
5.	Evaporator concentrate returned to Tank Farm	8,000

The major contributors to the ILW system are listed below. Figure 5 shows a comparison of the volumes handled each month.

		Gallons
1.	Building 3019	58,000
2.	Fission Products Development Laboratory	36,000
3.	ORR and BSR	25,000
4.	High Flux Isotope Reactor	22,000
5.	4500 Complex	21,000
6.	Radioisotopes Processing Area	15,000

Gaseous Waste

The ORNL stacks discharged 1.71 curies of ^{131}I. Most of this activity was released from the 2026 stack (see Table 4 and Figure 6).

The inert gas discharges for the 7911 and 3039 stacks, based on direct radiation readings and the conservative assumption that all inert gases were ^{133}Xe, were < 0.07% and < 2,15%, respectively, of the maximum permissible operating level. There was no significant release of alpha activity.

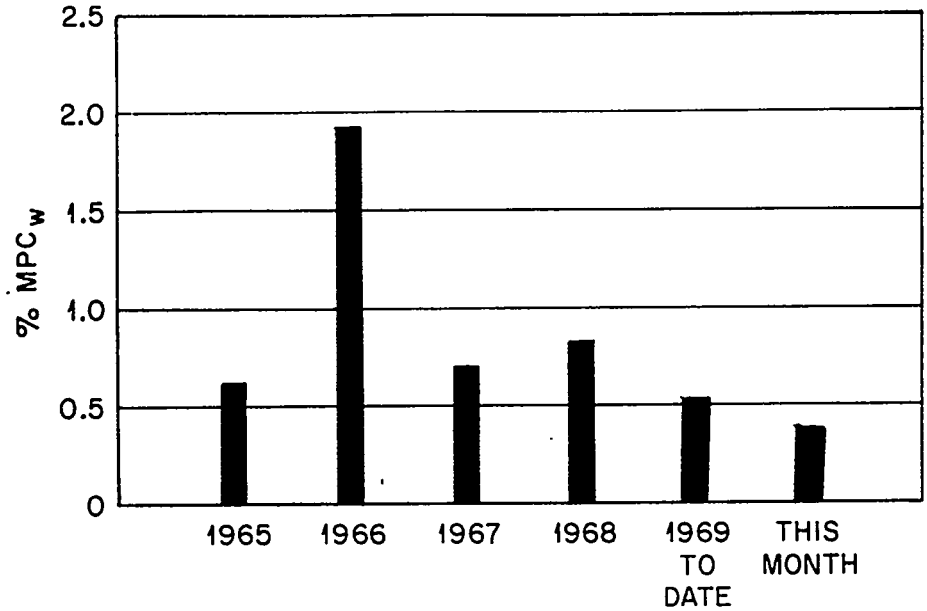

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

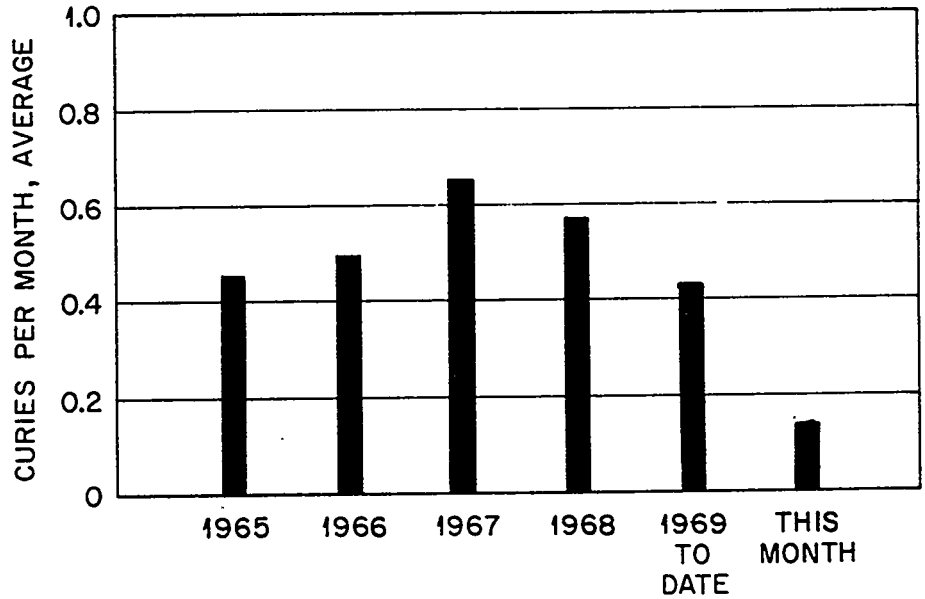

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

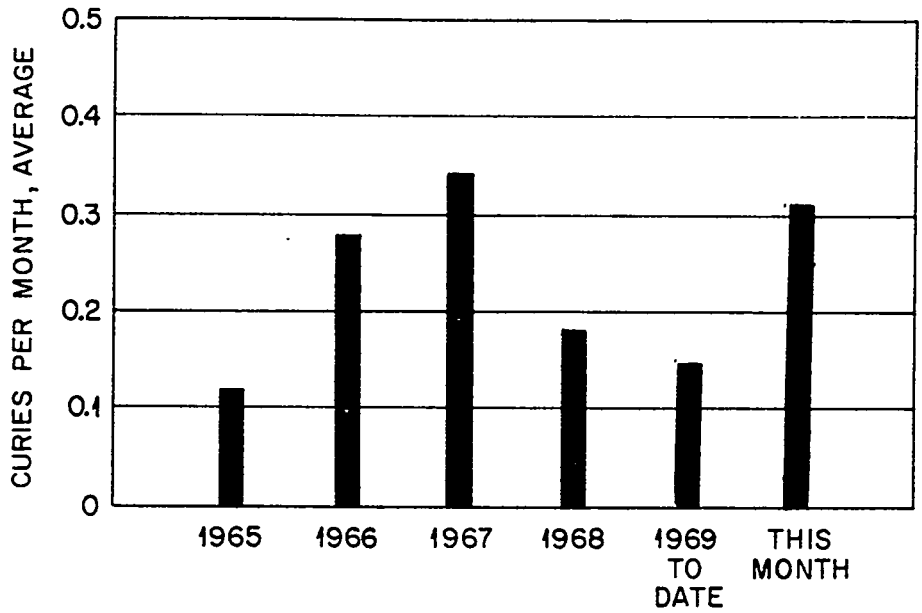

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

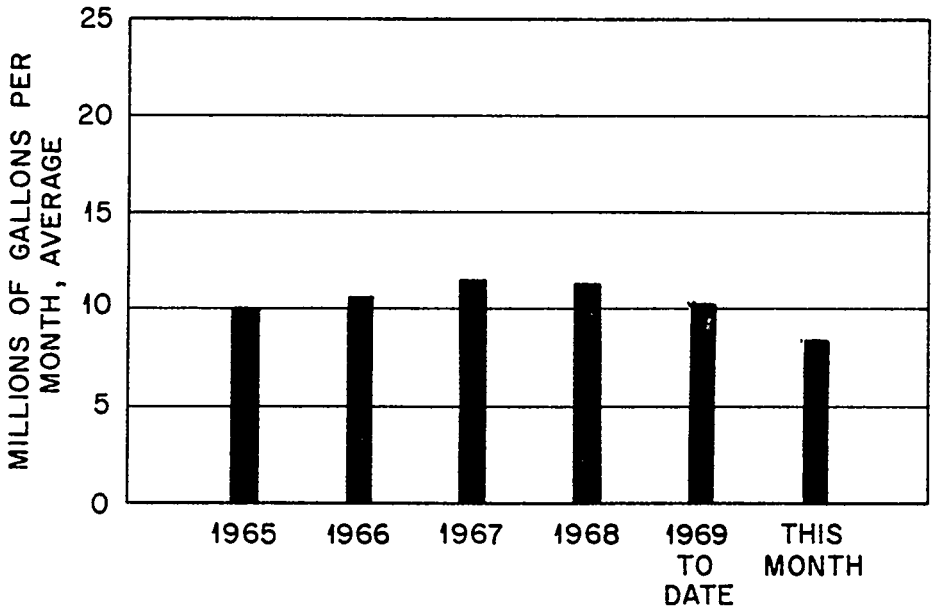

Fig. 4. Process Waste Volumes.

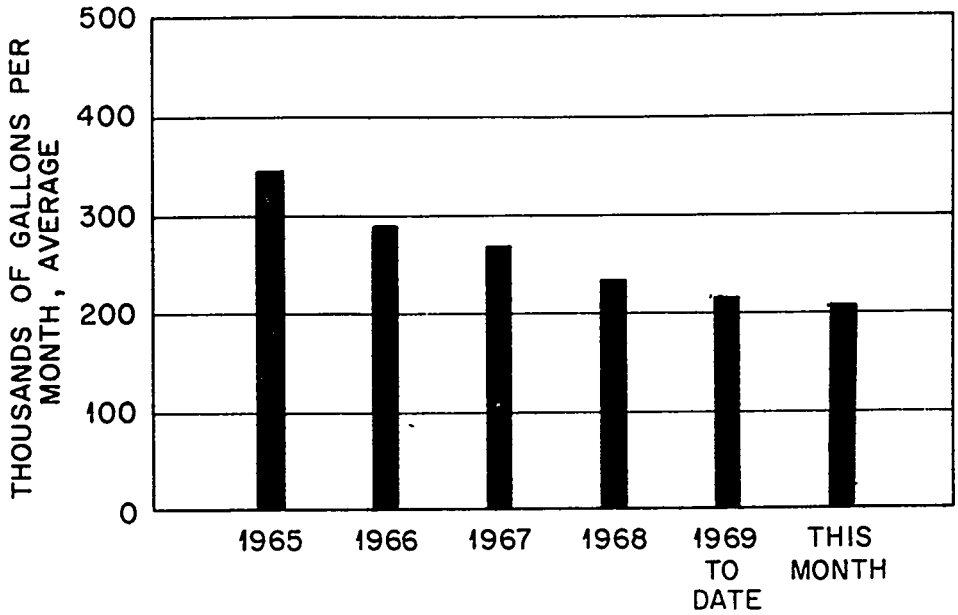

Fig. 5. Intermediate—Level Waste Volumes.

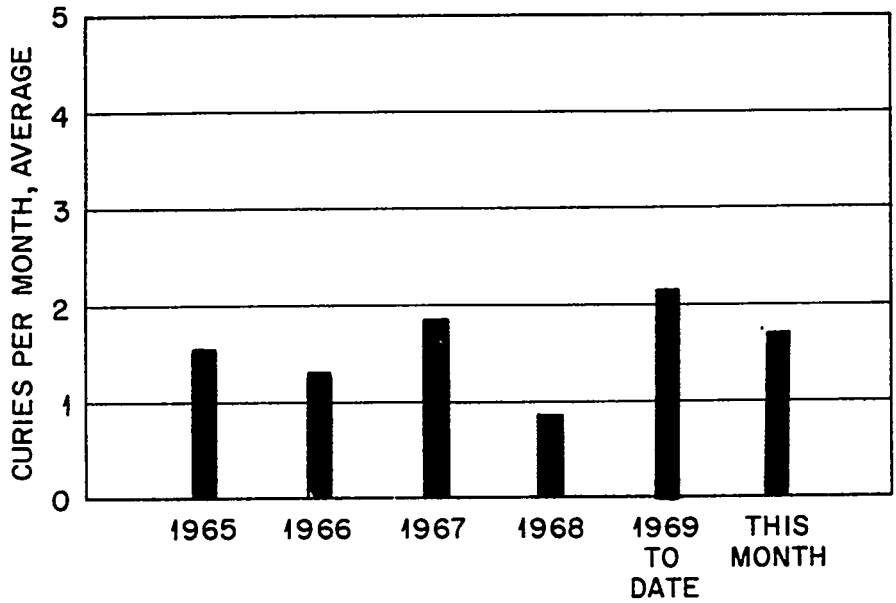

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

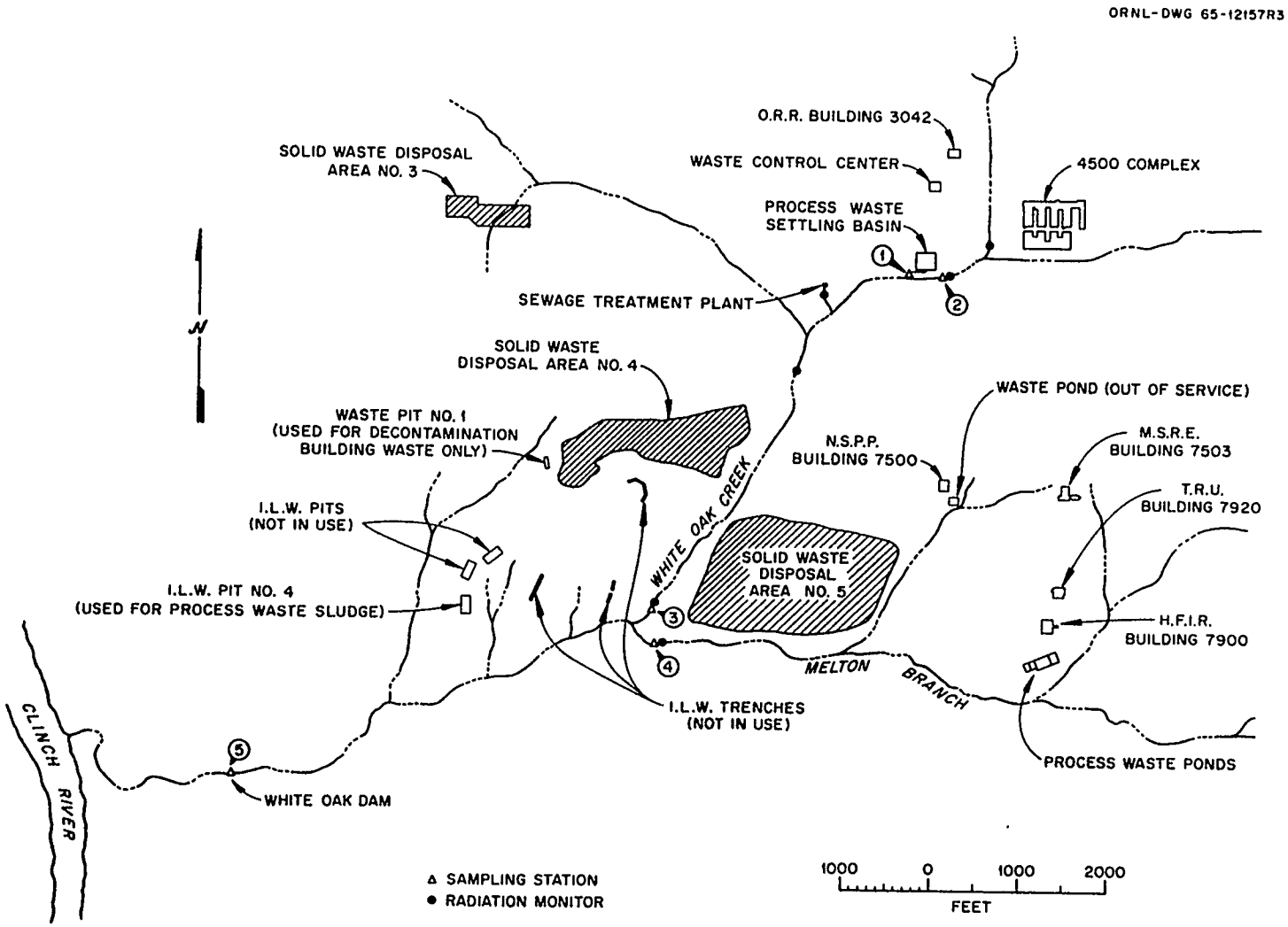

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.31	0.06	0.73	0.10
Miscellaneous discharges from east end of plant	2	< 0.01	< 0.09	< 0.04	< 0.02
Discharge from Bethel Valley Area	3	0.11	< 0.01	0.26	0.09
Discharge from Melton Valley Area	4	0.04	< 0.01	0.01	0.03
Total discharge to White Oak Lake	3,4	0.15	< 0.01	0.27	0.12
White Oak Dam to Clinch River (Health Physics measurement)	5	0.23	0.07	0.09	0.06

[a] Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 6.3×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 10.9×10^6 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	0.31	66
$^{103,106}Ru$	0.26	0.06	77
^{60}Co	0.18	0.10	44
^{137}Cs	4.42	0.73	83
Gross Beta Analysis	136 c/m/ml	11 c/m/ml	88

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

TABLE 5

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVIEY[a]		VOLUME	
			CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	12[b]	0.46	45.6	2.73	28.1
2.	Radioisotope Processing Area	20	0.30	29.7	1.13	11.7
3.	Buildings 3503 and 3508	2	0.06	5.9	1.98	20.4
4.	Buildings 3025 and 3026	2	0.06	5.9	1.98	20.4
5.	Building 3019	< 1	--	--	0.60	6.2
6.	Fission Products Development Laboratory	18	0.07	6.9	0.27	2.8
7.	Waste Evaporator, Building 2531	7	0.05	5.0	0.55	5.7
8.	Buildings 3525 and 3550	1	0.01	1.0	0.45	4.7

[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	1.57
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		1.71

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

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DATE: August 13, 1969

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of June 1969

TO: Distribution

FROM: 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 measured in the discharge to the river was 0.33% of the MPC_w for a release to an uncontrolled area (see Figure 1). Strontium, the major contaminant, contributed 91% to the calculated percent of MPC_w.

White Oak Creek Monitoring

A list of the most significant radionuclides discharged into White Oak Lake from ORNL sources is given in Table 1. Figure 2 compares the amounts of strontium released into White Oak Lake on a monthly basis.

Process Waste

A total of 9.1 million gallons of slightly contaminated water was chemically treated this month. Operating data are listed in Table 2. The amounts of strontium released each month from the process waste system into White Oak Creek are compared in Figure 3. Figure 4 compares the volumes of process waste handled.

Intermediate-Level Waste

The evaporator operated at a boil-down rate of 258 gph. A summary of operating data is listed below:

		Gallons
1.	Total volume generated	175,000
2.	Volume transferred to evaporator	186,000
3.	Tank Farm free space at beginning of the month	534,000
4.	Tank Farm free space at the end of the month	538,000
5.	Evaporator concentrate returned to the Tank Farm	7,000

A list of the major contributors to the ILW system is given below. A comparison of volume generated each month is shown in Figure 5.

		Gallons
1.	Building 3019	41,400
2.	Fission Products Development Laboratory	36,500
3.	ORR and BSR	23,600
4.	High Flux Isotope Reactor	21,600
5.	Radioisotopes Processing Area	15,400
6.	4500 Complex	15,300

Shale Fracturing Disposal of ILW, Injection 6

A total of 79,350 gallons of concentrated ILW was injected into the existing fracture at a depth of 842 feet. The waste contained 89,000 curies of cesium, 8,900 curies of strontium, 100 curies of ruthenium, and 200 curies of cobalt. The slot was overdisplaced with water at the end 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	184,600	2.01
Kingston fly ash	183,400	2.00
Attapulgite	80,000	0.87
Grundite	46,800	0.51
Total weight of solids	494,800	5.39

Liquids	Gallons
Water only	800
Water with solids	200
ILW with solids	79,350

Liquids	Gallons
Water with solids	10,300
Water only	1,100
Total volume of liquids	91,750

Gaseous Waste

The ORNL stacks released a total of 1.62 curies of gaseous ^{131}I. There was no significant release of alpha activity. Table 4 lists the discharges from the individual stacks. Figure 6 compares the discharges on a monthly basis.

The inert gas discharges from the 7911 and 3039 stacks (all of the inert gases were assumed to be ^{133}Xe) averaged < 0.75 and < 3.34 percent, respectively, of the calculated maximum permissible operating levels.

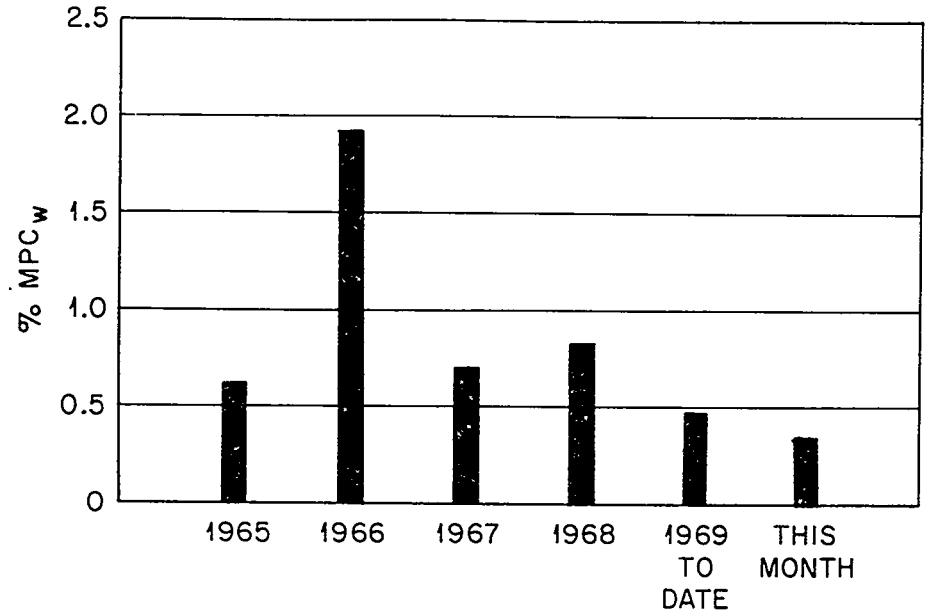

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

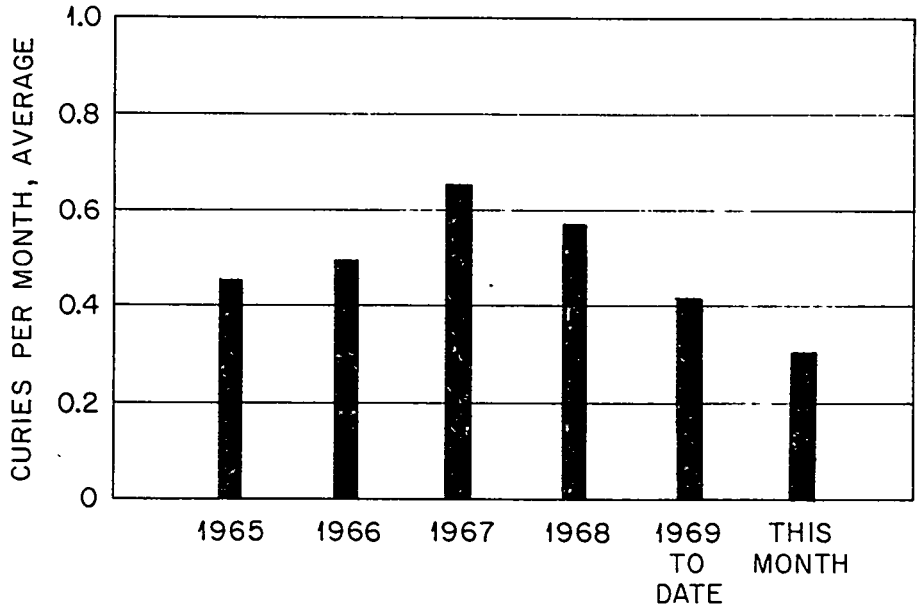

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

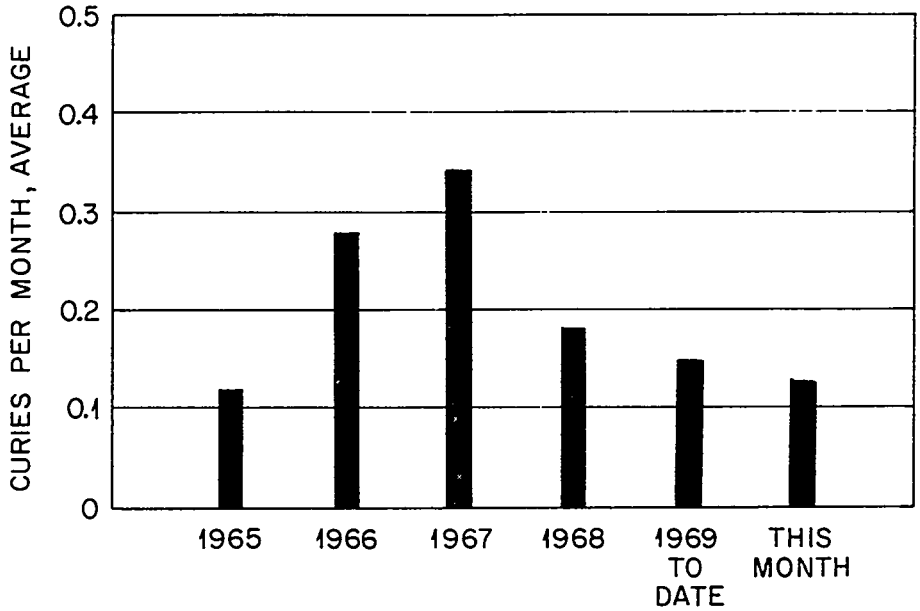

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

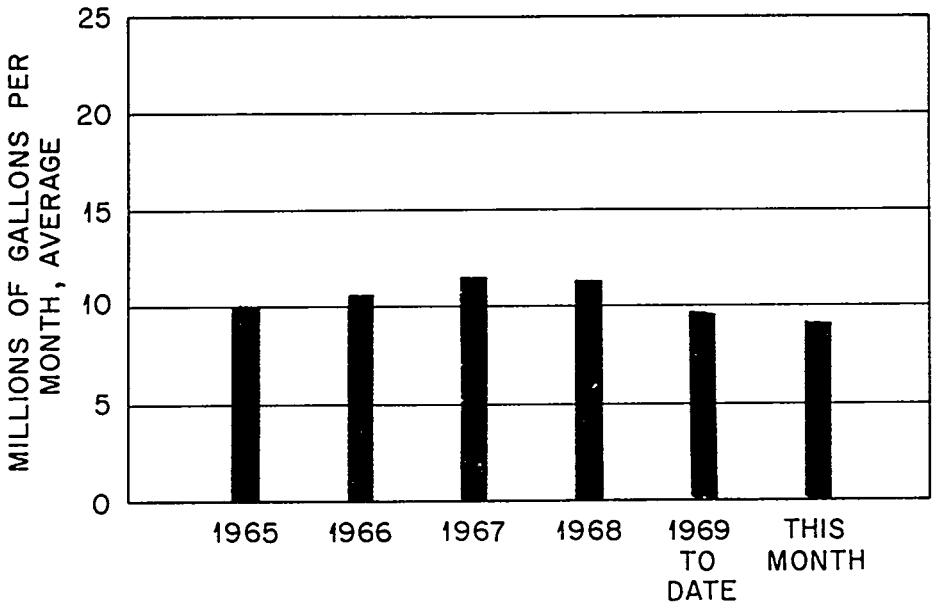

Fig. 4. Process Waste Volumes.

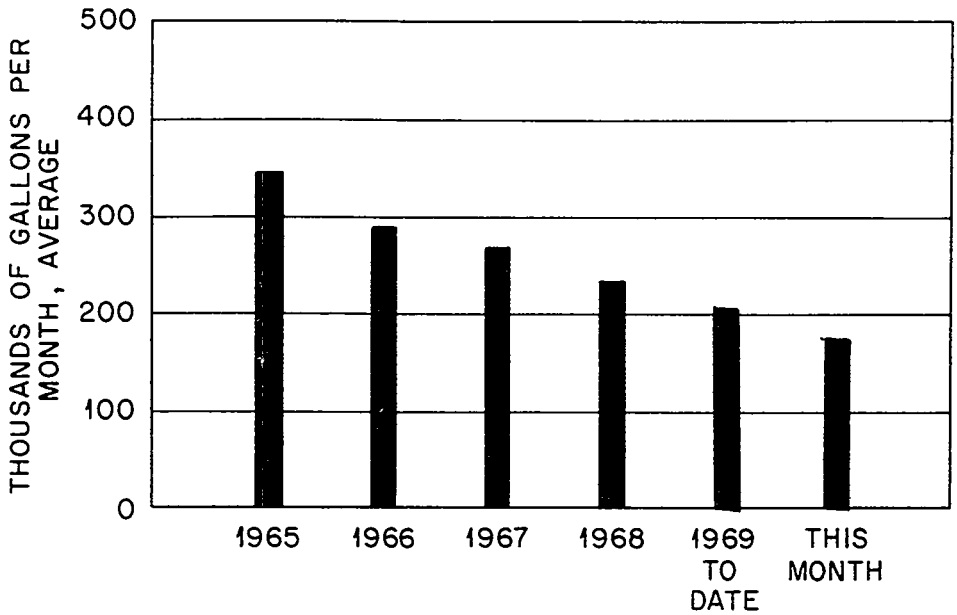

Fig. 5. Intermediate—Level Waste Volumes.

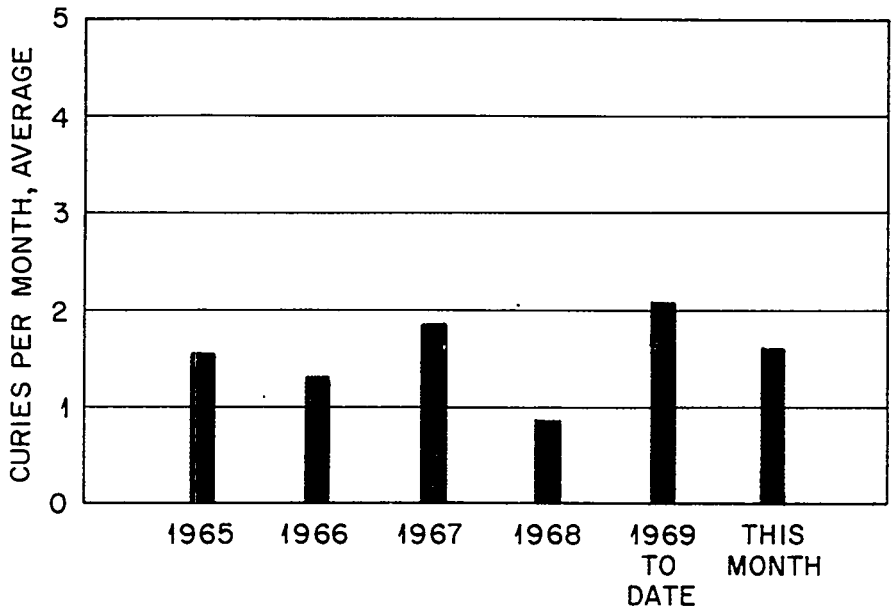

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

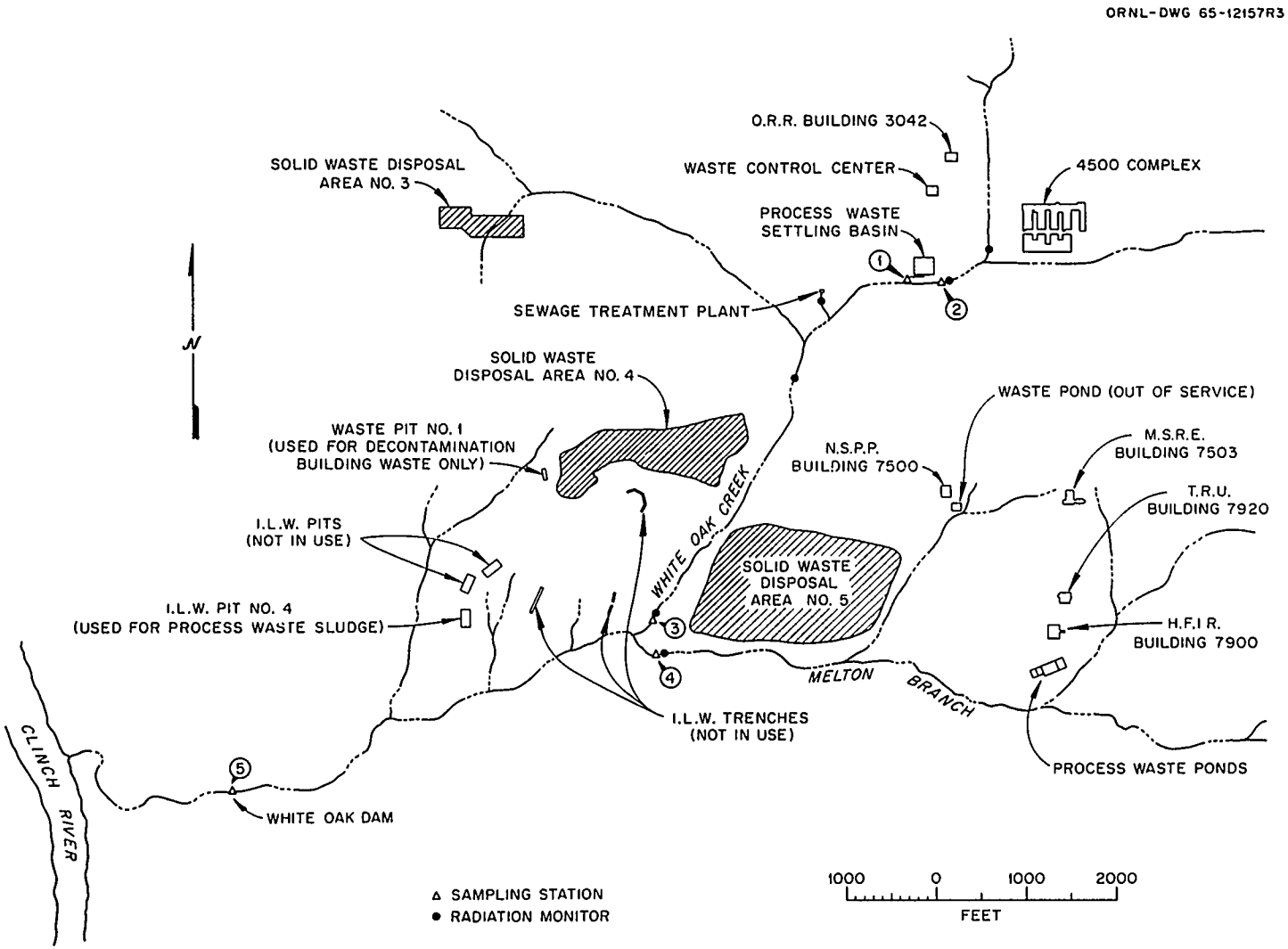

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Activity (Curies)			
		Total Sr	^{106}Ru	^{136}Cs	^{60}Co
Process waste	1	0.13	none detected	0.49	0.05
Miscellaneous discharges from east end of plant	2	< 0.01	none detected	none detected	none detected
Discharge from Bethel Valley Area	3	0.23	< 0.01	0.18	0.08
Discharge from Melton Valley Area	4	0.08	< 0.01	< 0.01	none detected
Total discharge to White Oak Lake	3,4	0.31	< 0.01	0.18	0.08
White Oak Dam to Clinch River (Health Physics measurement)	5	0.27	0.21	0.11	0.06

[a] Refers to Figure 7

TABLE 2

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: 12.2×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.32	0.13	90
$^{103,106}Ru$	0.10	none detected	100
^{60}Co	0.13	0.05	62
^{137}Cs	6.15	0.49	92
Gross Beta Analysis	141 c/m/ml	9 c/m/ml	94

[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	13[b]	0.42	55.3	2.30	23.1
2.	Radioisotope Processing Area	10	0.15	19.7	1.10	11.1
3.	Buildings 3503 and 3508	3	0.11	14.5	2.55	25.7
4.	Buildings 3025 and 3026	2	0.01	1.3	2.06	20.7
5.	Building 3019	1	0.01	1.3	0.60	6.1
6.	Fission Products Development Laboratory	2	0.01	1.3	0.29	2.9
7.	Waste Evaporator, Building 2531	5	0.04	5.3	0.52	5.2
8.	Buildings 3525 and 3550	2	0.01	1.3	0.51	5.1
9.	Building 2026	2	< 0.001	--	0.01	0.1

[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	0.30
Central Radioactive Gas Disposal Facilities	3039	1.22
Radiochemical Processing Pilot Plant	3020	0.02
MSRE	7512	0.01
HFIR	7911	0.07
Total activity in gases released		1.62

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

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ORNL
CENTRAL FILES NUMBER
69-9-58

DATE: September 29, 1969

COPY NO. 44

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LIQUID WASTE

Release to Clinch River

The radioactive contamination measured in the White Oak Lake discharge into the river was 0.23% of the MPC_W for a release to an uncontrolled area (see Figure 1). The major contaminant was strontium which contributed 81% to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 is a list of the most significant radionuclides discharged into White Oak Lake from ORNL. Figure 2 compares the amounts of strontium released into White Oak Creek on a monthly basis.

Process Waste

A total of 10.2 million gallons of contaminated water was treated this month. Operating data are listed in Table 2. Figure 3 compares the amounts of strontium released each month from the process waste system into White Oak Creek; the volumes processed each month are compared in Figure 4.

Intermediate-Level Waste

A 2100-gallon spill occurred when a coupling in the waste transfer line from Melton Valley to the tank farm failed between the MSRE and the NSPP. The resultant contamination (^{244}Cm, plus a mixture of fission products) was cleaned up in about two weeks. The amount of radioactivity released into the Clinch River from the spill was not significant.

The evaporator operated at an average boil-down rate of 255 gph. A summary of operating data is given below:

		Gallons
1.	Total volume generated	225,000
2.	Volume transferred to evaporator	190,000
3.	Tank Farm free space at the beginning of the month	538,000
4.	Tank Farm free space at the end of the month	498,000
5.	Evaporator concentrate returned to tank farm	5,000

The major contributors to the ILW system are listed below; Figure 5 shows a comparison of the volumes generated each month.

		Gallons
1.	Building 3019	57,000
2.	ORR and BSR	35,000
3.	High Flux Isotope Reactor	18,000
4.	Fission Products Development Laboratory	18,000
5.	4500 Complex	14,000
6.	Radioisotopes Processing Area	13,000
7.	Nuclear Safety Pilot Plant	11,000

Gaseous Waste

A total of 0.36 curies of ^{131}I was discharged from the ORNL stacks. There was no significant release of alpha activity. Table 4 lists the discharges from the individual stacks. Figure 6 compares the discharges on a monthly basis.

The inert gas discharges from the 7911 and the 3039 stacks (calculated as ^{133}Xe) averaged <0.34 and <2.28 percent, respectively of the calculated Maximum Permissible Operating Level.

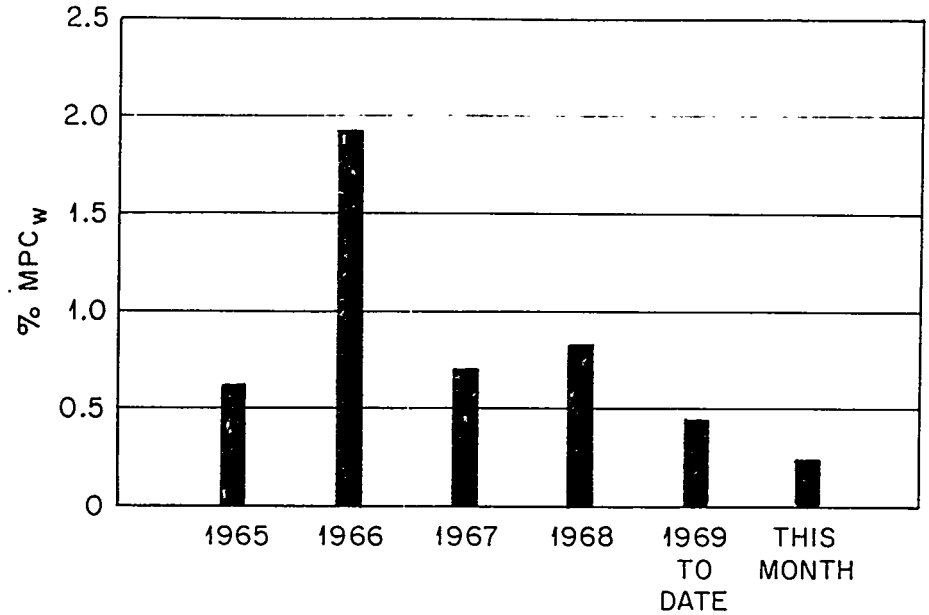

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

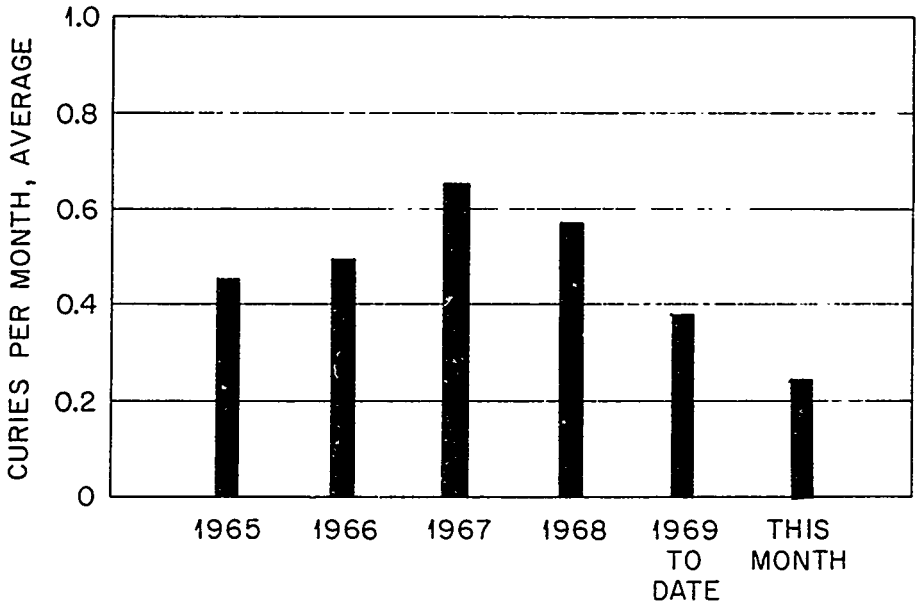

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

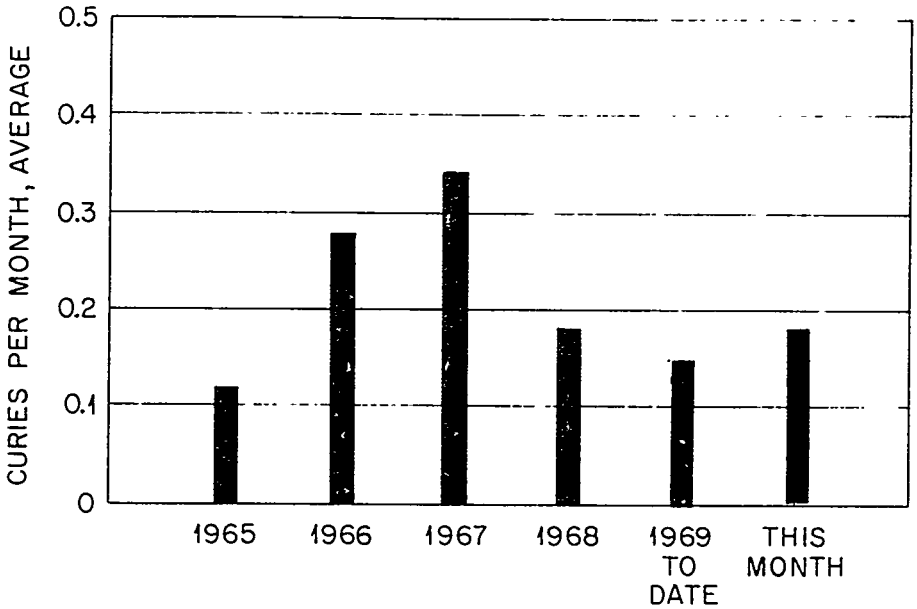

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

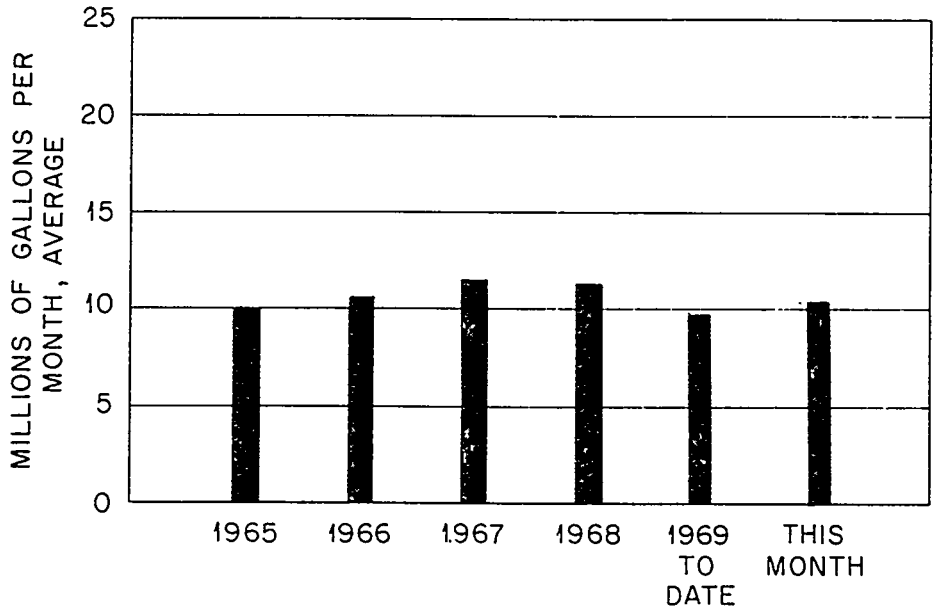

Fig. 4. Process Waste Volumes.

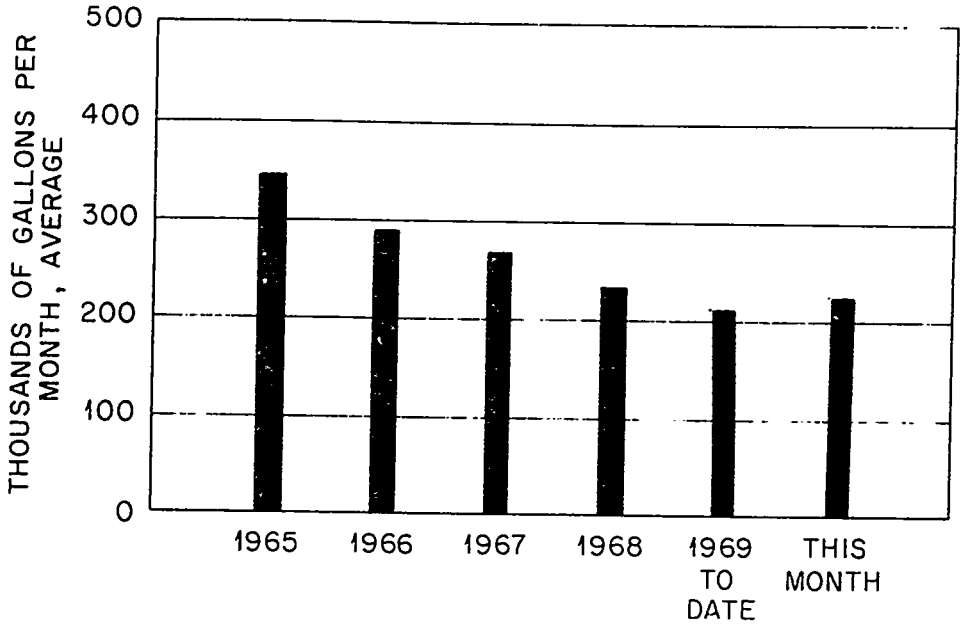

Fig. 5. Intermediate—Level Waste Volumes.

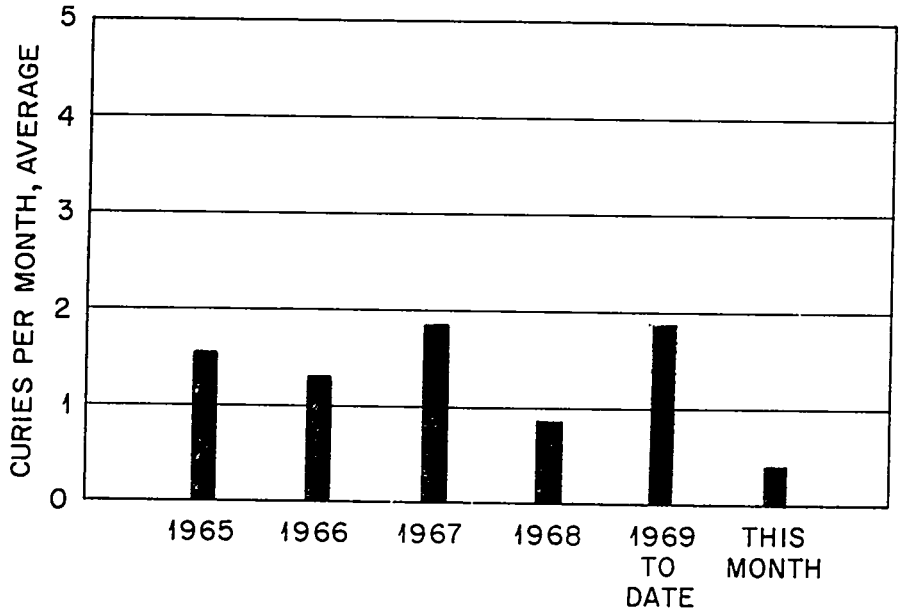

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

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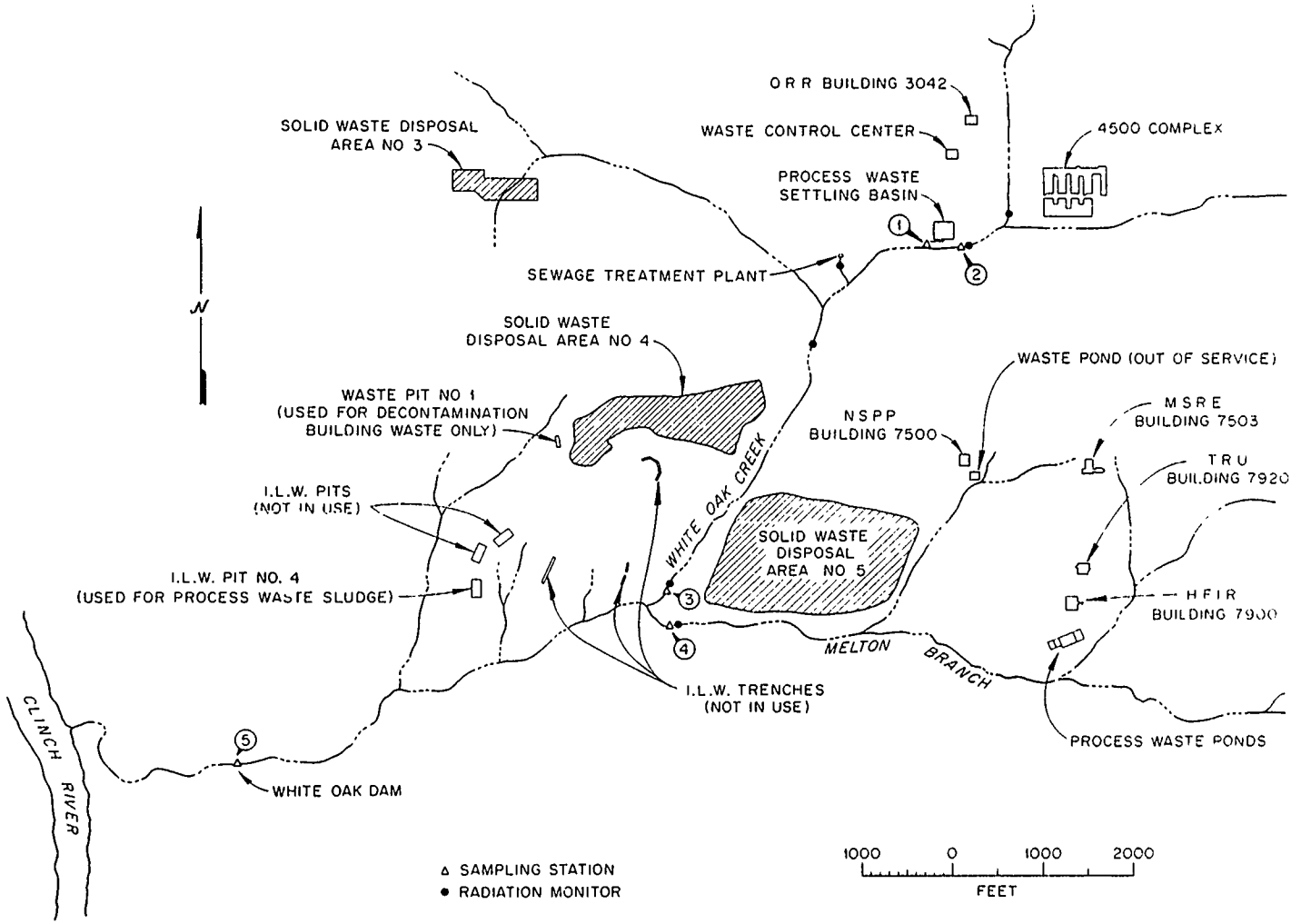

Fig 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station	Activity (Curies)			
	Number[a]	Total Sr	^{106}Ru	^{136}Cs	^{60}Co
Process waste	1	0.18	< 0.01	0.29	0.01
Miscellaneous discharges from east end of plant	2	0.01	< 0.01	< 0.01	< 0.01
Discharge from Bethel Valley Area	3	0.17	< 0.01	0.07	0.01
Discharge from Melton Valley Area	4	0.07	0.02	< 0.01	0.02
Total Discharge from all sources	3,4	0.24	0.02	0.07	0.03
White Oak Dam to Clinch River (Health Physics measurement)	5	0.25	0.09	0.05	0.03

[a] Refers to Figure 7

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: 11.7×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.26	0.18	86
$^{103,106}Ru$	0.05	< 0.01	> 75
^{60}Co	0.04	0.01	75
^{137}Cs	0.69	0.29	58
Gross Beta Analysis	46 c/m/ml	10 c/m/ml	78

[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] CURIES	% OF TOTAL	MILLION GALLONS	% OF TOTAL
1.	Reactor Operations	16[b]	0.50[b]	47.2	2.27	22.9
2.	Radioisotope Processing Area	19	0.29	27.3	1.21	12.2
3.	Buildings 3503 and 3508	3	0.09	8.5	2.25	22.7
4.	Buildings 3025 and 3026	0	--	--	2.30	23.3
5.	Building 3019	0	--	--	0.49	4.9
6.	Fission Products Development Laboratory	15	0.06	5.7	0.31	3.1
7.	Waste Evaporator, Building 2531	17	0.12	11.3	0.52	5.3
8.	Buildings 3525 and 3550	0	--	--	0.55	5.6

[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	0.03
Central Radioactive Gas Disposal Facilities	3039	0.30
Radiochemical Processing Pilot Plant	3020	< 0.01
MSRE	7512	< 0.01
HFIR, TRU	7911	0.03
Total activity in gases released		0.36

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

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OCT 29 1969
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LIQUID WASTE

Release to Clinch River

Radioactive contamination of the river caused by ORNL waste releases amounted to 0.35% of the MPC_w for a release to an uncontrolled area (see Figure 1). The major contaminant, strontium, contributed 89.5% to the calculated percent of MPC_w.

White Oak Creek Monitoring

Significant nuclides detected in the streams draining ORNL are listed in Table 1. Figure 2 compares the amounts of strontium released into White Oak Lake on a monthly basis.

Process Waste System

A summary of the Process Waste Treatment Plant operation is given in Table 2. Figure 3 shows a monthly comparison of the amounts of strontium discharged into White Oak Creek, and Figure 4 compares the volumes of waste handled each month.

Intermediate-Level Waste

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

		Gallons
1.	Total volume generated	221,000
2.	Volume transferred to evaporator	228,000
3.	Tank farm free space at beginning of month	400,000
4.	Tank farm free space at end of month	497,000
5.	Evaporator condensate returned to tank farm	8,000

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

		Gallons
1.	Building 3019	48,000
2.	ORR and BSR	30,000
3.	High Flux Isotope Reactor	27,000
4.	4500 Complex	20,000
5.	Fission Products Development Laboratory	17,000
6.	Radioisotopes Processing Area	17,000

Gaseous Waste

ORNL stacks discharged 0.28 curies of gaseous ^{131}I this month (see Table 4 and Figure 6). Inert gas discharges (calculated as ^{133}Xe) from the 3039 and 7911 stacks averaged 1.88% and 0.25%, respectively, of the calculated Maximum Permissible Operating Level. There were no significant releases of alpha or particulate activities.

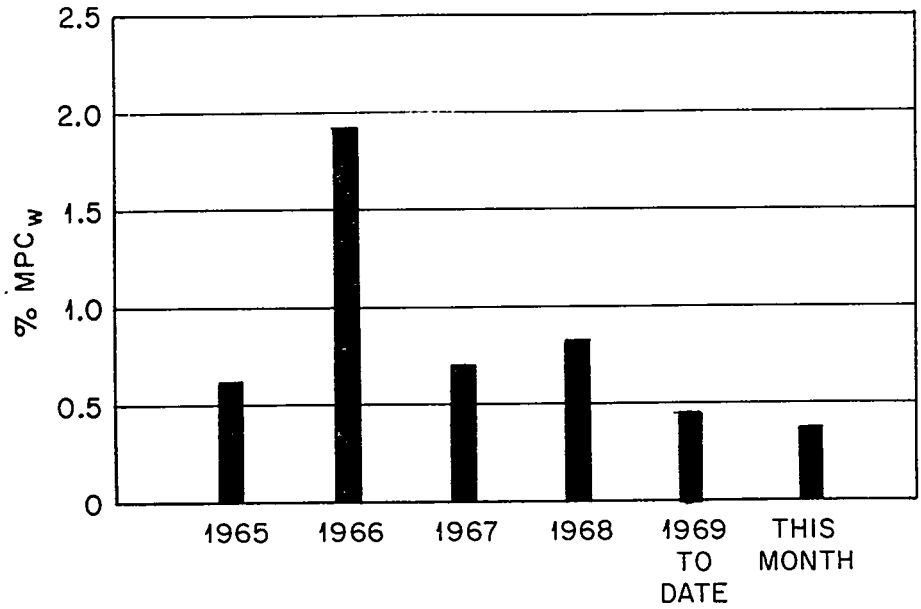
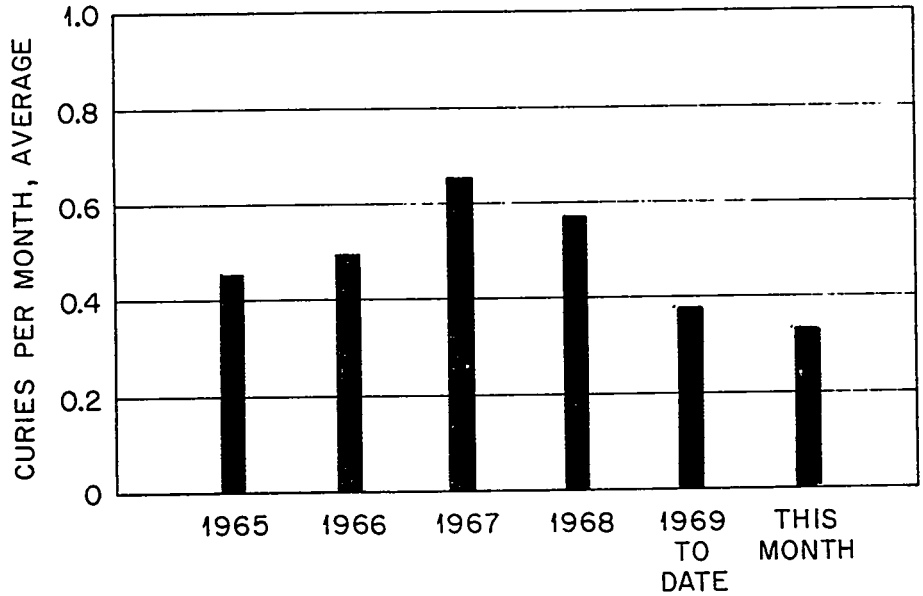


Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)



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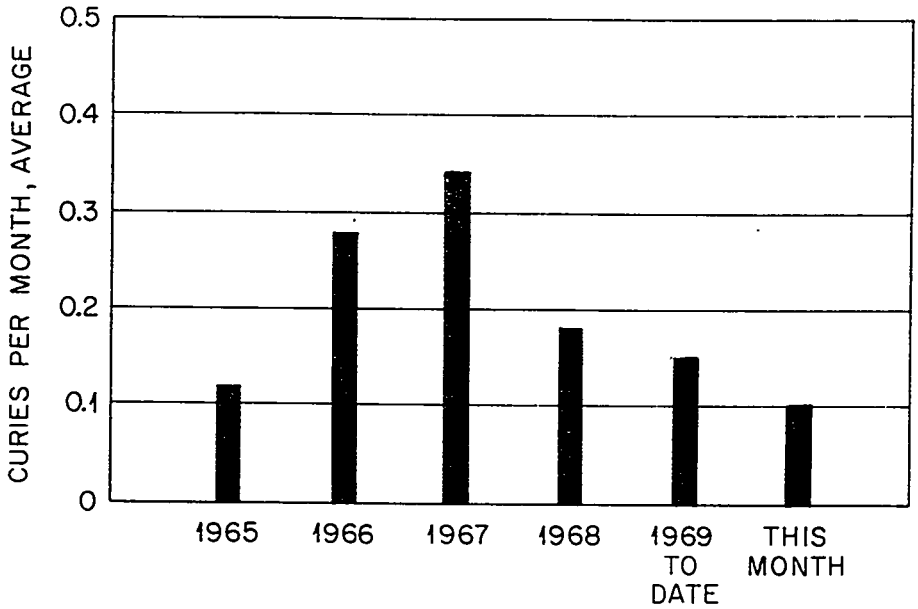

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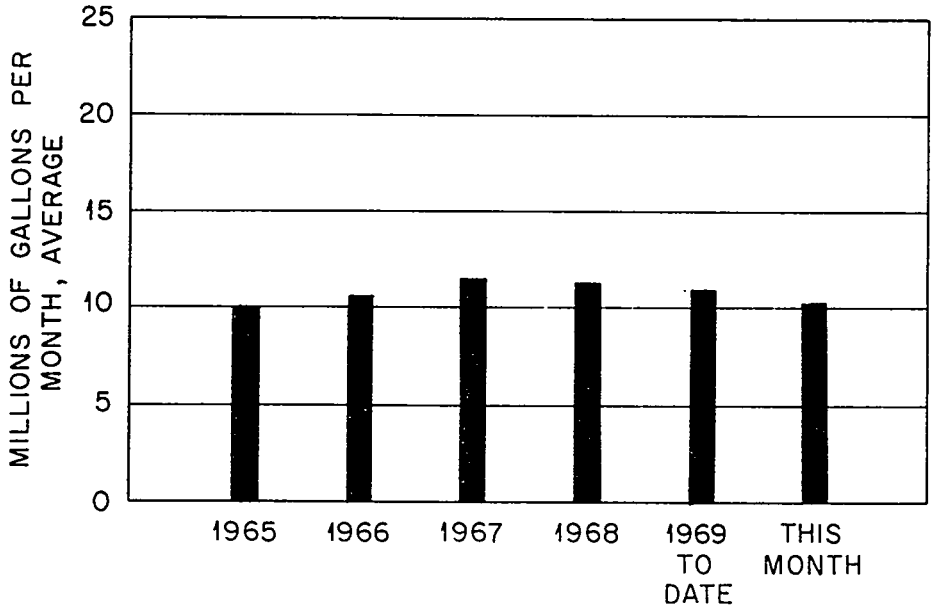


Fig. 4. Process Waste Volumes.

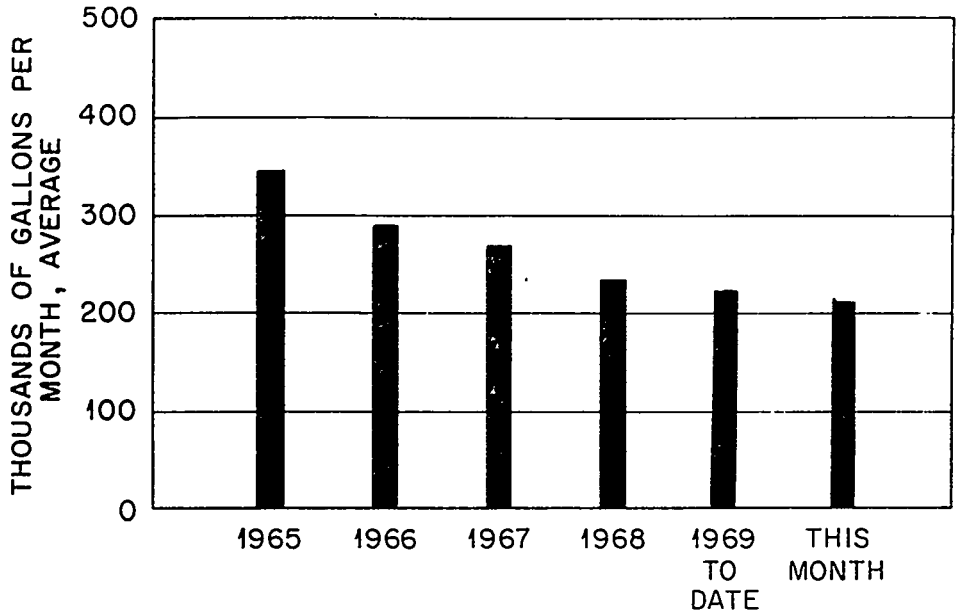
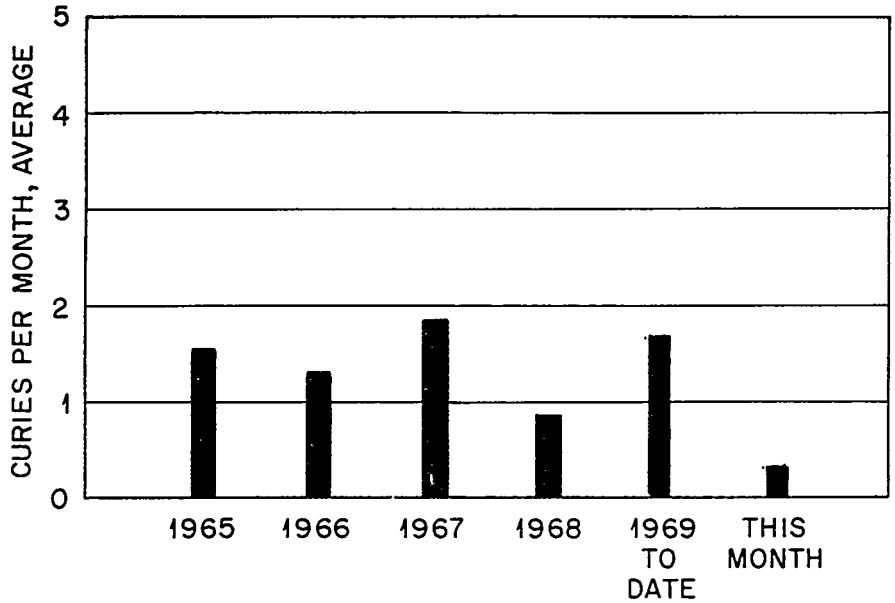


Fig. 5. Intermediate—Level Waste Volumes.



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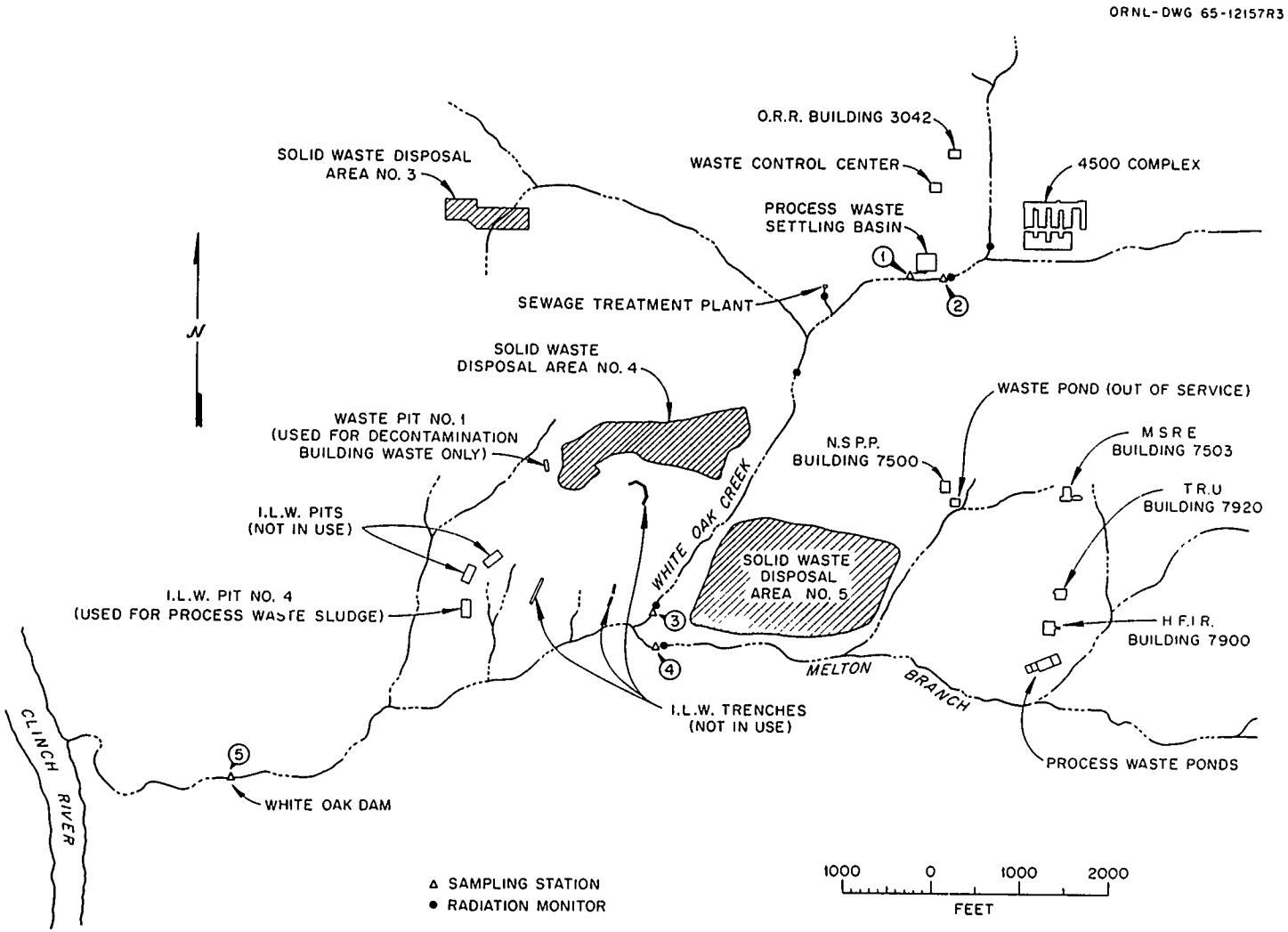

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ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Activity (Curies)			
		Total Sr	^{106}Ru	^{136}Cs	^{60}Co
Process waste	1	0.10	0.03	0.17	$<$ 0.01
Miscellaneous discharges from east end of plant	2	0.05	0.12	0.04	0.03
Discharge from Bethel Valley Area	3	0.28	$<$ 0.01	0.33	0.08
Discharge from Melton Valley Area	4	0.05	$<$ 0.01	$<$ 0.01	0.03
Discharge from all sources	3,4	0.33	-	0.33	0.11
White Oak Dam to Clinch River (Health Physics measurement)	5	0.32	0.07	0.09	0.03

[a]Refers to Figure 7

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 12.0×10^6 gal

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[a]	1.32	0.10	92
$^{103,106}Ru$	0.09	0.03	67
^{60}Co	0.02	<0.01	>75
^{137}Cs	1.48	0.17	89
Gross Beta Analysis	50 c/m/ml	6 c/m/ml	88

[a]Past analyses 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	9	0.37[b]	54.4	2.89	31.3
2. Radioisotope Processing Area	15	0.15	22.0	0.74	8.0
3. Buildings 3503 and 3508	3	0.05	7.4	1.24	13.5
4. Buildings 3025 and 3026	0	-	-	2.45	26.6
5. Building 3019	0	-	-	0.49	5.3
6. Fission Products Development Laboratory	12	0.05	7.4	0.32	3.5
7. Waste Evaporator, Building 2531	7	0.06	8.8	0.62	6.7
8. Buildings 3525 and 3550	0	-	-	0.47	5.1
9. Building 2026	-	-	-	0.01	-

[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	0.06
Central Radioactive Gas Disposal Facilities	3039	0.22
Radiochemical Processing Pilot Plant	3020	$<$ 0.01
MSRE	7512	$<$ 0.01
HFIR	7911	$<$ 0.01
Total activity in gases released		0.28

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

2018

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CENTRAL FILES NUMBER
69-10-76

DATE ISSUED: NOV 5 - 1969

DATE: October 27, 1969

COPY NO. 44

SUBJECT: Radioactive Waste Disposal Operations Report for the Month of September 1969

TO: Distribution

FROM: 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

The release of radioactivity to the Clinch River was 0.35% of the MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium and iodine which contributed 85% and 9%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

A list of significant nuclides discharged into White Oak Lake is given in Table 1. Figure 2 presents a monthly comparison of the amounts of strontium released into White Oak Lake.

Process Waste System

A summary of the Waste Treatment Plant operations is given in Table 2. The main contributors to the system are listed in Table 3. Figure 3 compares, on a monthly basis, the strontium released into White Oak Creek. Figure 4 shows the volumes of waste handled.

Intermediate-Level Waste

The evaporator continued to operate at a moderate, average boil-down rate of 307 gph. A summary of operation is listed below:

		Gallons
1.	Total volume generated	245,000
2.	Volume transferred to evaporator	221,000
3.	Tank farm free space at the beginning of the month	497,000

		Gallons
4.	Tank farm free space at the end of the month	465,000
5.	Evaporator concentrate returned to tank farm	8,000

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

		Gallons
1.	ORR and BSR	64,000
2.	Building 3019	46,000
3.	Fission Products Development Laboratory	20,000
4.	4500 Complex	17,000
5.	Radioisotopes Processing Area	17,000
6.	High Flux Isotope Reactor	11,000

Gaseous Waste

ORNL stacks discharged a total of 0.67 curie of gaseous iodine with TRU discharging almost one-half of the total through the HFIR stack (see Table 4 and Figure 6). There were no significant releases of alpha or particulate activities.

Inert gases discharged from the 3039 and 7911 stacks averaged <2.51% and <0.36 %, respectively, of the calculated Maximum Permissible Operating Level. The calculations were based on the assumption that all of the inert gases were ^{133}Xe.

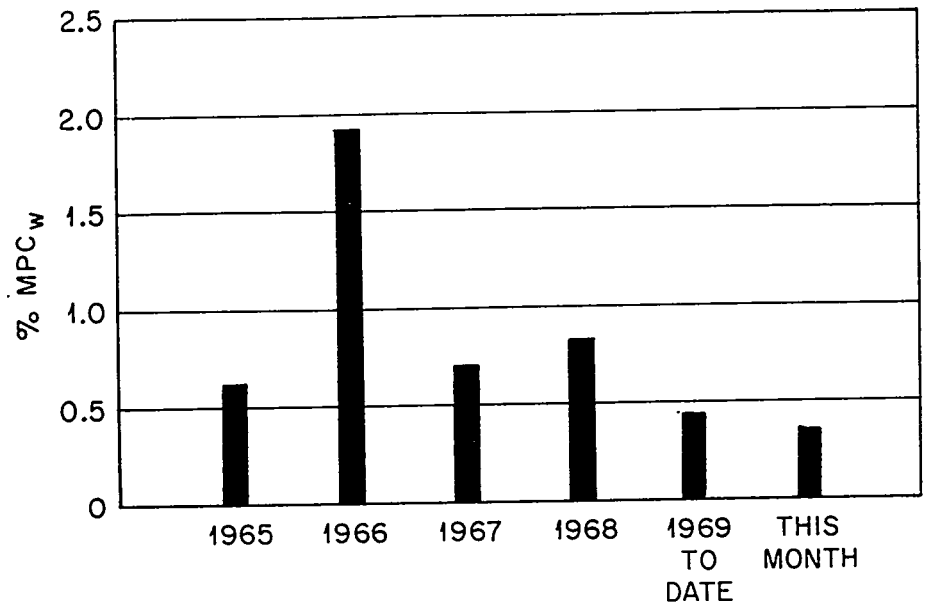

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

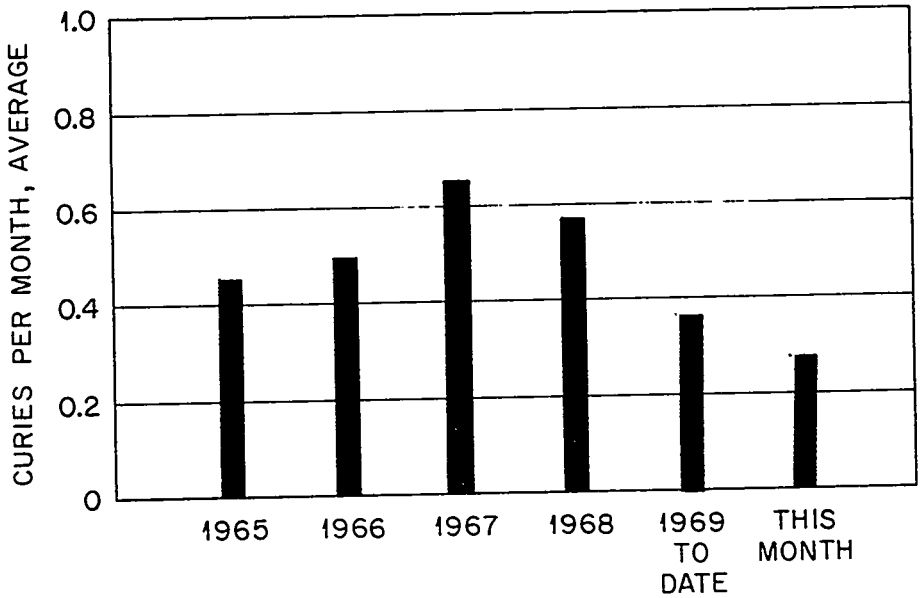

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

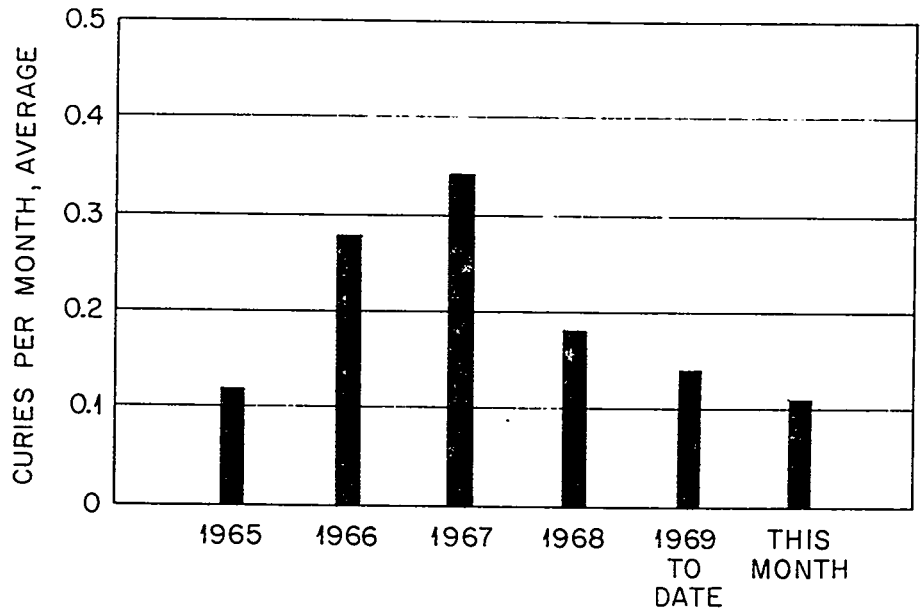

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

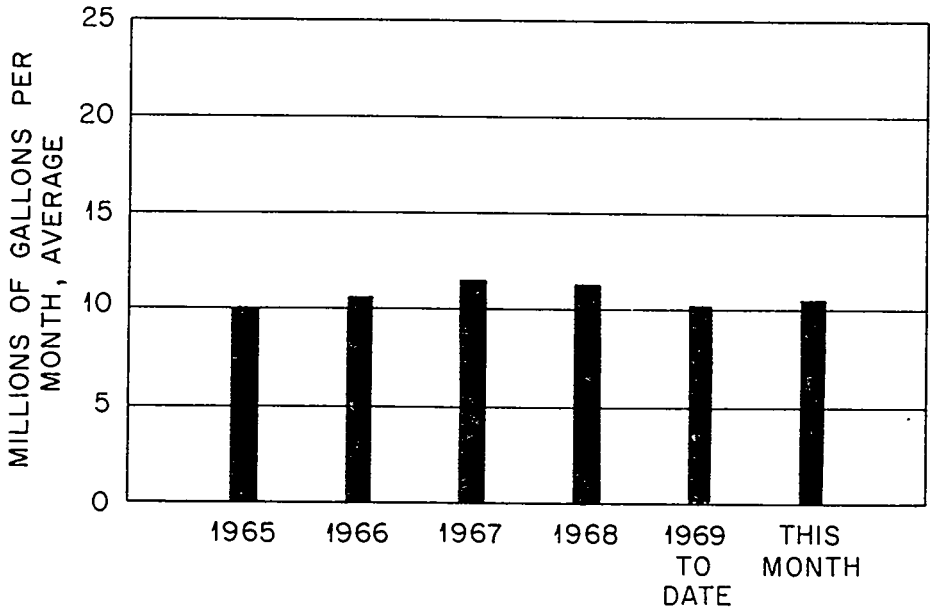

Fig. 4. Process Waste Volumes.

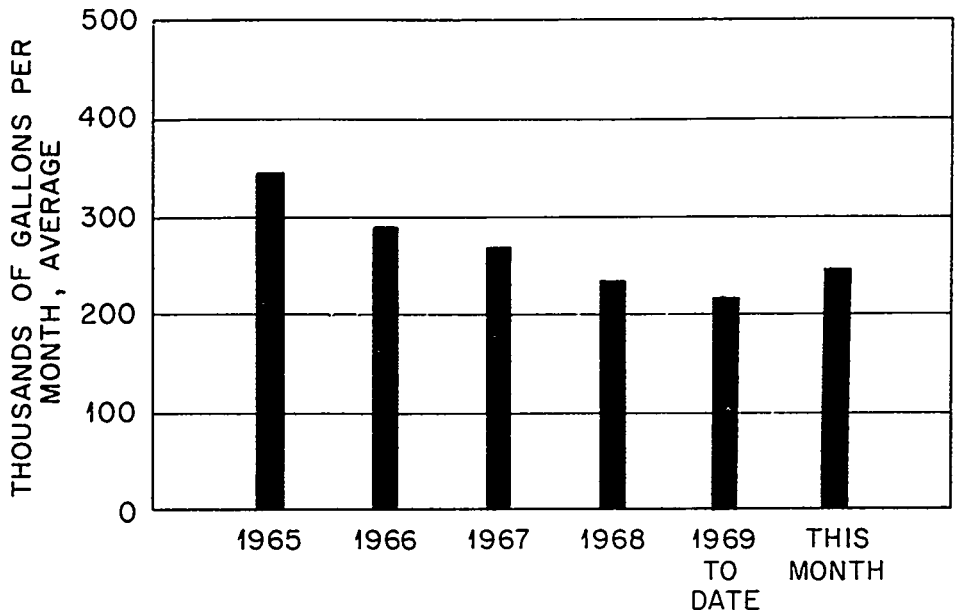

Fig. 5. Intermediate—Level Waste Volumes.

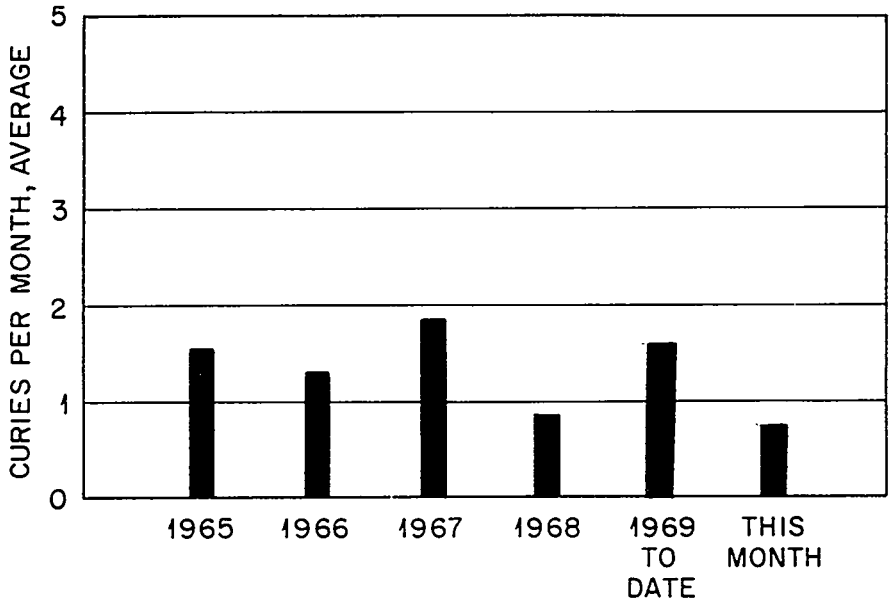

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

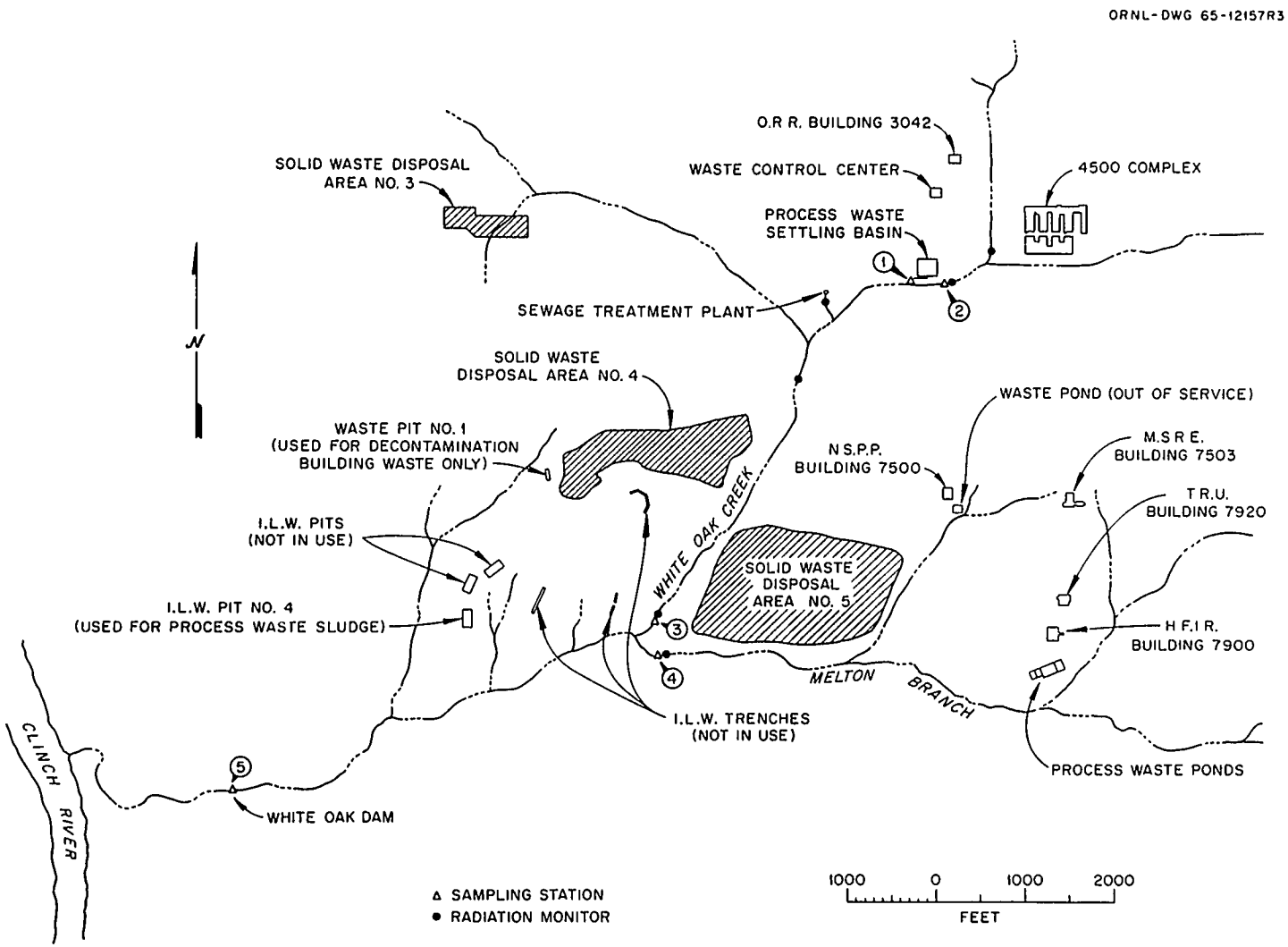

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

TABLE 1

ACTIVITY RELEASED IN LIQUID WASTES TO WHITE OAK CREEK

	Monitoring Station Number[a]	Activity (Curies)			
		Total Sr	^{106}Ru	^{137}Cs	^{60}Co
Process waste	1	0.11	0.02	0.24	<0.01
Miscellaneous discharges from east end of plant	2	0.02	<0.01	<0.01	<0.01
Total discharge from Bethel Valley Area	3	0.20	<0.01	0.10	<0.01
Total discharge from Melton Valley Area	4	0.07	<0.01	<0.01	<0.01
Total discharge from all sources	3,4	0.27	<0.02	0.10	<0.02
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.20	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: 10.4×10^6 gal

Total Waste Volume Discharged to White Oak Creek This Month: 11.3×10^6 gal

Nuclides	Plant Influent (Curies)	Plant Effluent and Settling Basin Discharge (Curies)	Percent Removed by Treatment Plant and Settling Basin
Total Sr[a]	0.94	0.11	88
$^{103,106}Ru$	0.10	0.02	80
^{60}Co	0.01	<0.01	--
^{137}Cs	2.73	0.24	91
Gross Beta Analysis	75 c/m/ml	6 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	% of Total	Million Gallons	% of Total
1. Reactor Operations	7	0.26[b]	52	2.70	34.4
2. Radioisotope Processing Area	13	0.12	24	0.70	8.9
3. Buildings 3503 and 3508	2	0.02	4	0.70	8.9
4. Buildings 3025 and 3026	1	0.03	6	2.10	26.8
5. Building 3019	<1	<0.01	--	0.55	7.0
6. Fission Products Development Laboratory	12	0.02	4	0.15	1.9
7. Waste Evaporator, Building 2531	7	0.05	10	0.54	6.9
8. Buildings 3525 and 3550	<1	<0.01	--	0.40	5.1

[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 Radioisotope Area.

TABLE 4

ACTIVITY RELEASED IN GASEOUS WASTES

Area	Stack No.	Activity[a] (Curies)
HRLAL	2026	0.25
Central Radioactive Gas Disposal Facilities	3039	0.11
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	0.31
Total activity in gases released		0.67

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

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DATE: February 20, 1970

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FROM: L. C. Lasher

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

Radioactive contamination of the river by discharges from ORNL was 0.41% of the MPC_W for a release to an uncontrolled area (see Figure 1). The most significant nuclides were strontium and iodine which accounted for 91% and 7%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

The amounts of strontium measured in the waste streams which discharge into White Oak Lake are listed in Table 1. Figure 2 compares these releases on a monthly basis.

Process Waste System

This system handled 9.5 million gallons of slightly contaminated water. Treatment efficiency, derived from gross beta analysis of the influent and effluent streams, was 87%. Table 2 lists the sources of waste discharged into the system. Figure 3 compares the amounts of strontium discharged into White Oak Creek and Figure 4 compares the waste volumes handled.

Intermediate-Level Waste

The evaporator operated at a boil-down rate of 347 gph. A summary of operating data is given below:

	Gallons
Total volume generated	316,000
Volume transferred to evaporator	258,000
Tank farm free space at beginning of month	458,000
Tank farm free space at end of month	404,000
Evaporator concentrate returned to tank farm	4,000
Total evaporator concentrate in storage	73,000

The main contributors to the system are given below. Figure 5 compares the volumes handled on a monthly basis.

	Gallons
Building 3019	97,000
Fission Products Development Laboratory	32,000
ORR and BSR	29,000
4500 Complex	22,000
High Flux Isotope Reactor	17,000
Radioisotope Processing Area	12,000

Gaseous Waste

The ORNL stacks released a total of 1.25 curies of gaseous ^{131}I (see Figure 6). Over one-half of this activity (0.79 curie) came from the 7512 stack. Alpha activity detected during the period was not significant. The individual stack discharges are listed in Table 3.

Inert gases released from the 3039 and 7911 stacks averaged 0.80% and 0.21% of the calculated maximum permissible operating level. For the purpose of these calculations, this activity was assumed to be ^{133}Xe.

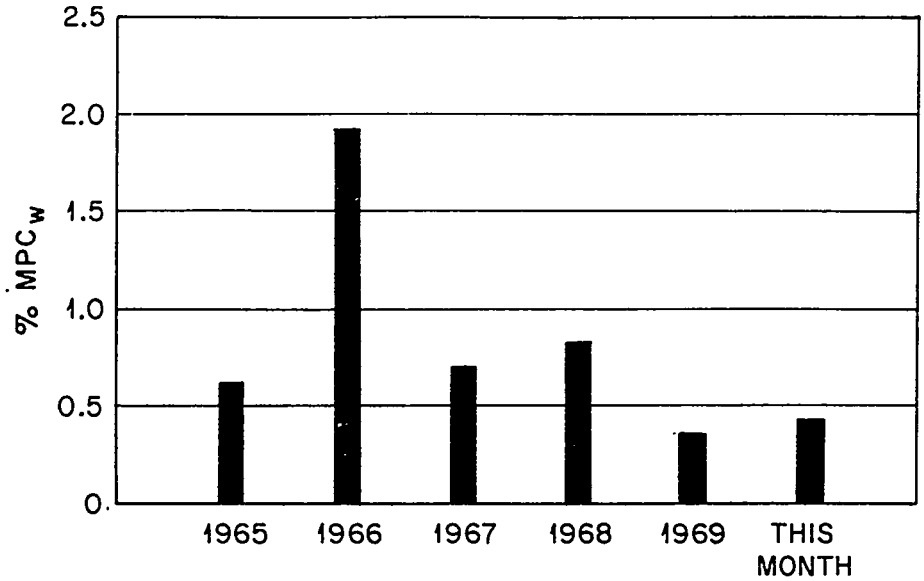

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

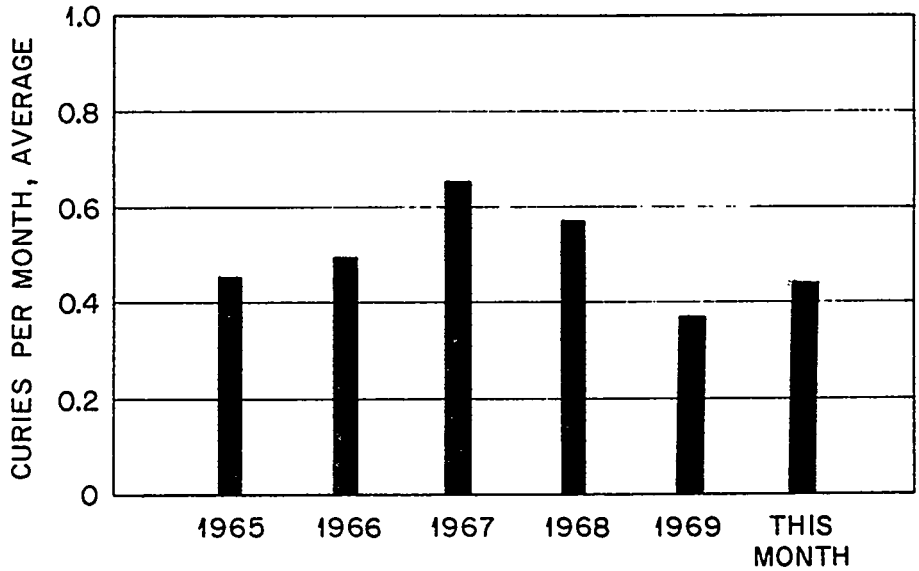

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

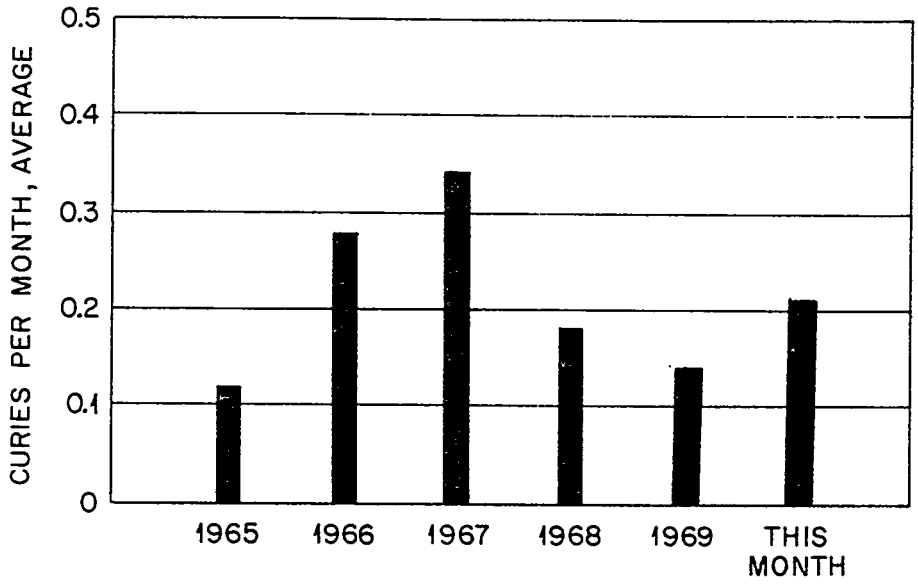

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

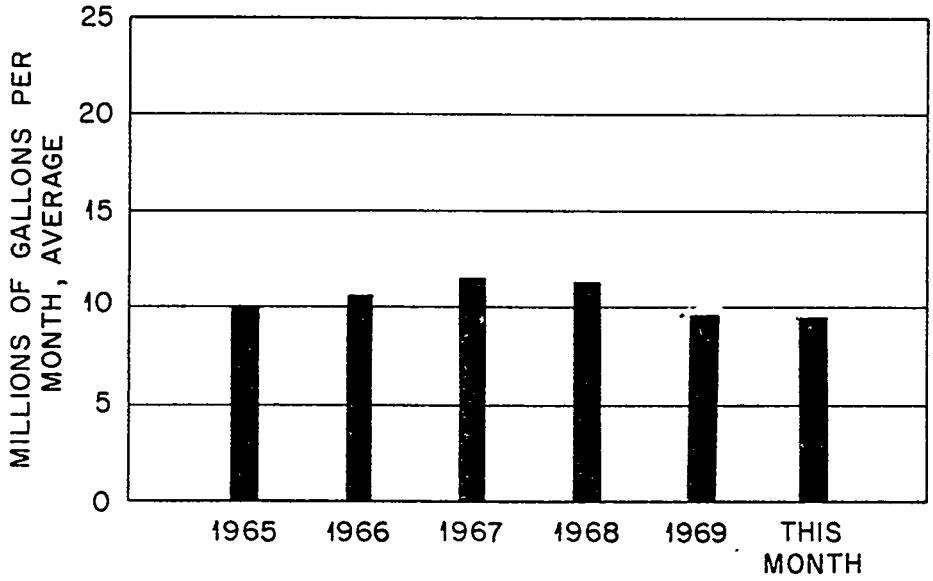

Fig. 4. Process Waste Volumes.

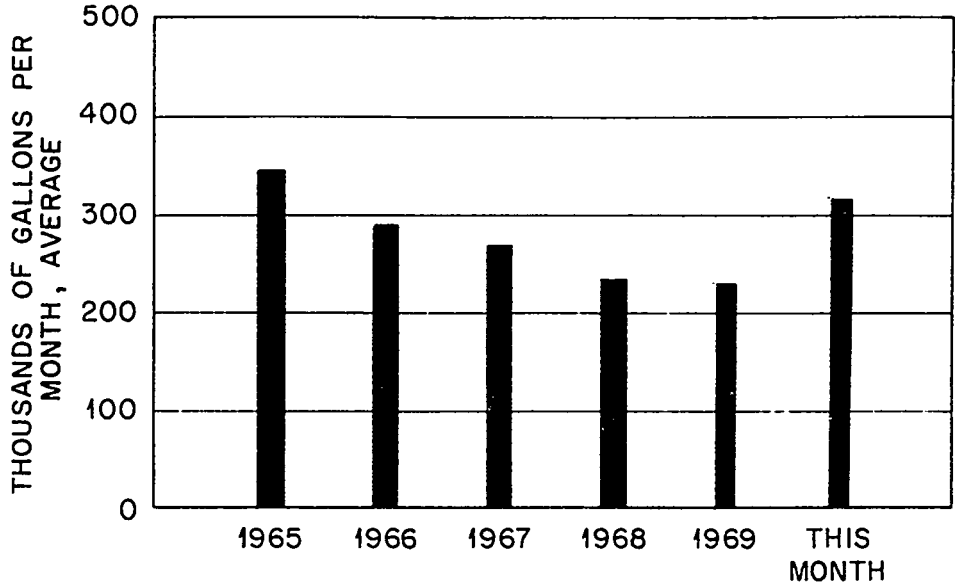

Fig. 5. Intermediate—Level Waste Volumes.

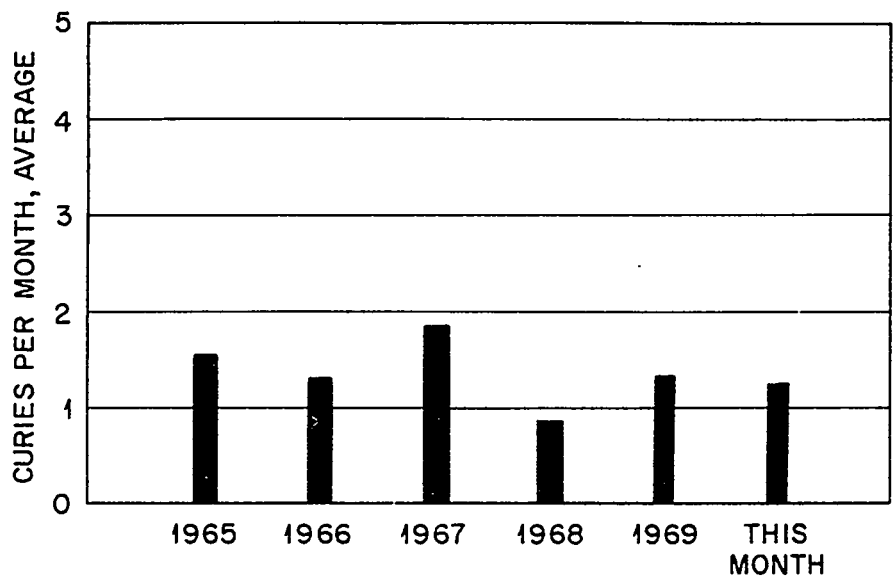

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

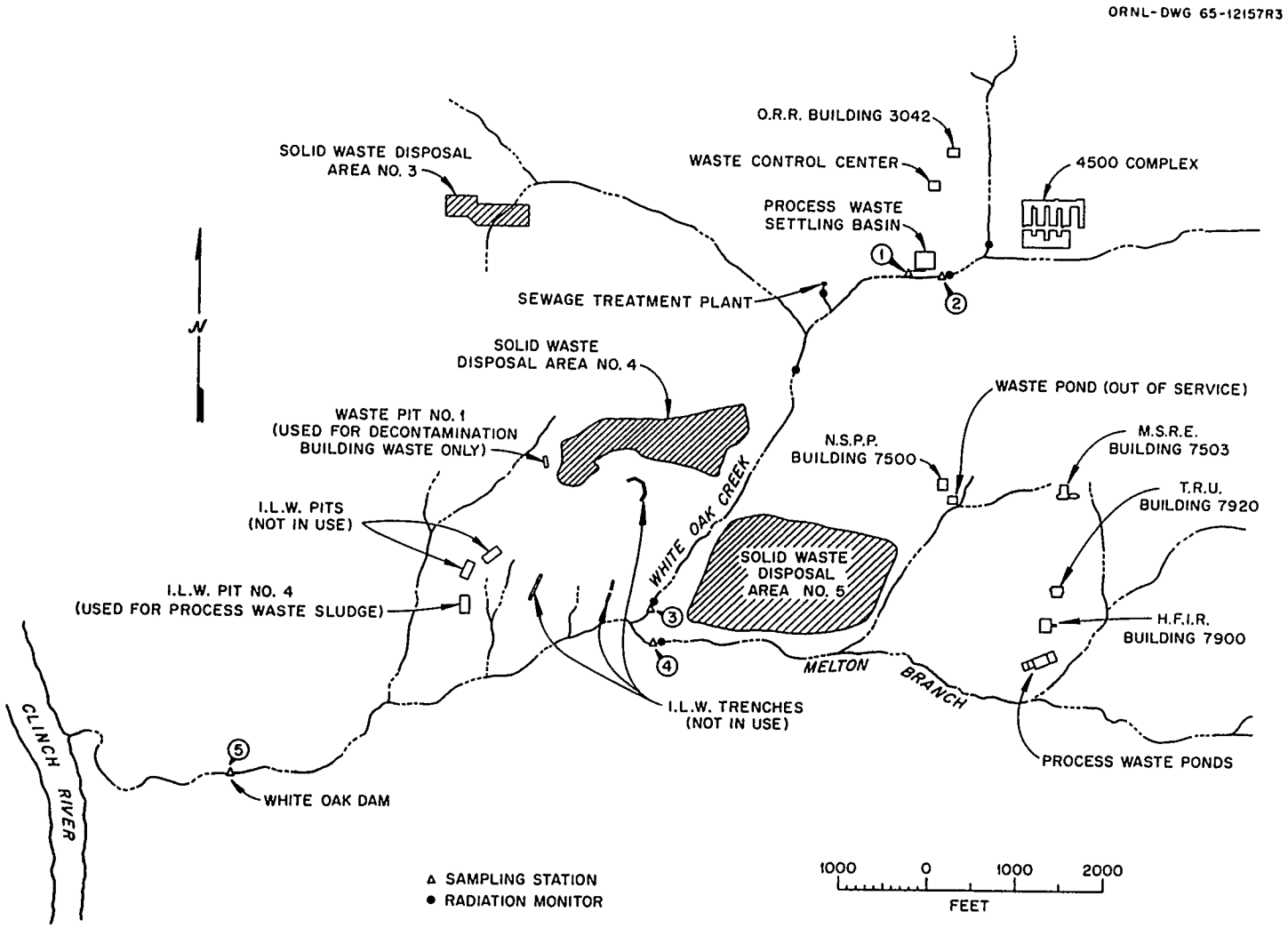

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.21	0.98
Miscellaneous discharges from east end of plant	2	0.04	0.53
Discharge from Bethel Valley Area	3	0.34	0.87
Discharge from Melton Valley Area	4	0.10	0.64
Total discharge from all sources	3,4	0.44	1.51
White Oak Dam to Clinch River (Health Physics measurement)	5	0.20	0.56

[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	22[b]	0.60[b]	50.5	4.03	39.6
2. Radioisotope Processing Area	97	0.39	32.8	0.60	5.9
3. Buildings 3503 and 3508	12	0.06	5.0	0.73	7.2
4. Buildings 3025 and 3026	4	0.06	5.0	2.23	21.9
5. Building 3019	3	<0.01	--	0.36	3.6
6. Fission Products Development Laboratory	89	0.06	5.0	0.13	1.3
7. Waste Evaporator, Building 2531	7	0.02	1.7	1.43	14.1
8. Buildings 3525 and 3550	2	<0.01	--	0.65	6.4

[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	0.28
Central Radioactive Gas Disposal Facilities	3029	0.18
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	0.79
HFIR	7911	<0.01
Total activity in gases released		1.25

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

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CENTRAL FILES NUMBER
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APR 10 1970

DATE: April 3, 1970

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

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David E Hamm 3/13/96
Technical Information Officer Date
ORNL

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LIQUID WASTE

Release to Clinch River

The radioactive nuclides released to the Clinch River from ORNL sources amounted to 0.42% of the MPC_W for a radioactive release to an uncontrolled area (see Figure 1). The main activities were strontium, tritium, and iodine which accounted for 73.2%, 19.0%, and 4.5%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

The strontium released to the lake this month was 0.72 curie as compared to an average of 0.38 curie per month during the year 1969 (see Figure 2). The discharge from the process waste system accounted for the entire increase. The discharges into the creek from all sources are listed in Table 1.

Process Waste System

A total of 10.3 million gallons was treated this month. The efficiency of the plant, determined by gross beta analyses, was only 76% as compared to 85% to 90% in previous months. The drop in efficiency is reflected in the increase in the strontium release shown in Figure 3. There was no apparent reason for the loss of efficiency. The volume of waste generated this month as compared to previous months is shown in Figure 4.

Intermediate-Level Waste

The evaporator operated at an average boil-down rate of 363 gph. A summary of operating data is given below:

	Gallons
Total volume generated	271,000
Volume transferred to evaporator	270,000
Tank farm free space at beginning of month	404,000
Tank farm free space at end of month	396,000
Evaporator concentrate returned to tank farm	7,000
Total volume of concentrate in tank farm	82,000

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

	Gallons
Building 3019	81,000
ORR and BSR	28,000
High Flux Isotope Reactor	26,000
Fission Products Development Laboratory	26,000
4500 Complex	23,000
Radioisotopes Processing Area	17,000

Gaseous Waste

A total of 190 millicuries of ^{131}I was discharged from the ORNL stacks. The amount of alpha and particulate activities released during the period was not significant. Inert gases (calculated as ^{133}Xe) released from the 3039 and 7911 stacks averaged less than 0.64% and 0.11% of the calculated Maximum Permissible Operating Level for these stacks. Table 3 lists the individual stack releases; Figure 6 compares the total stack discharges on a monthly basis.

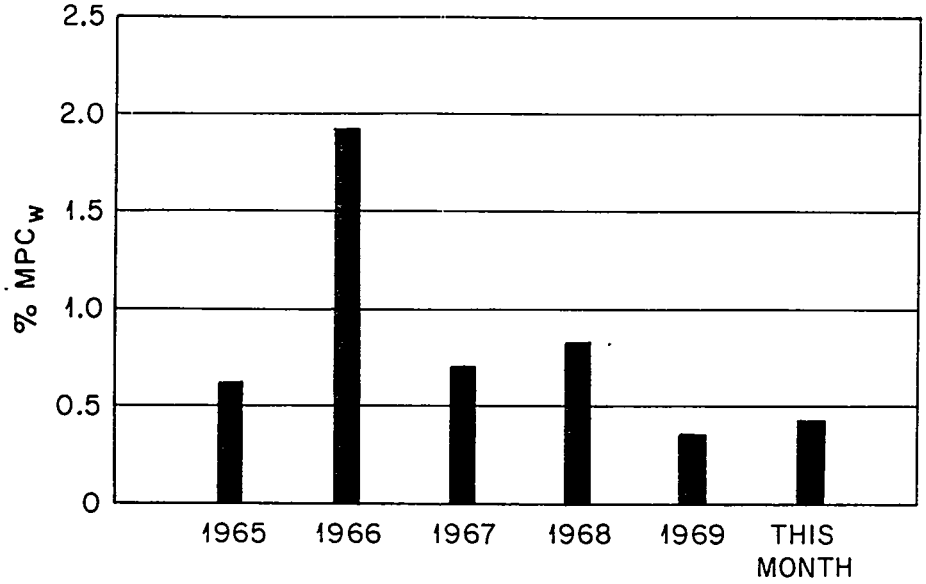

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

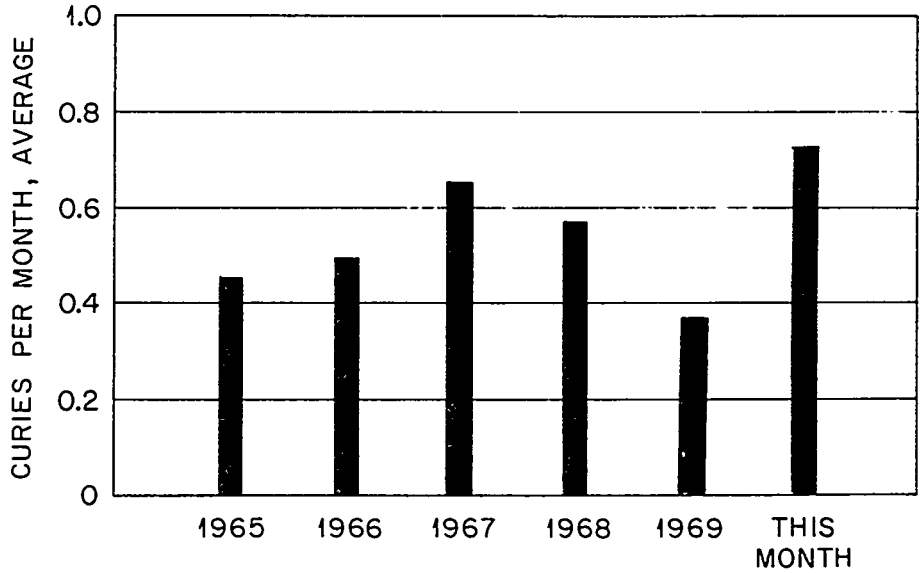

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

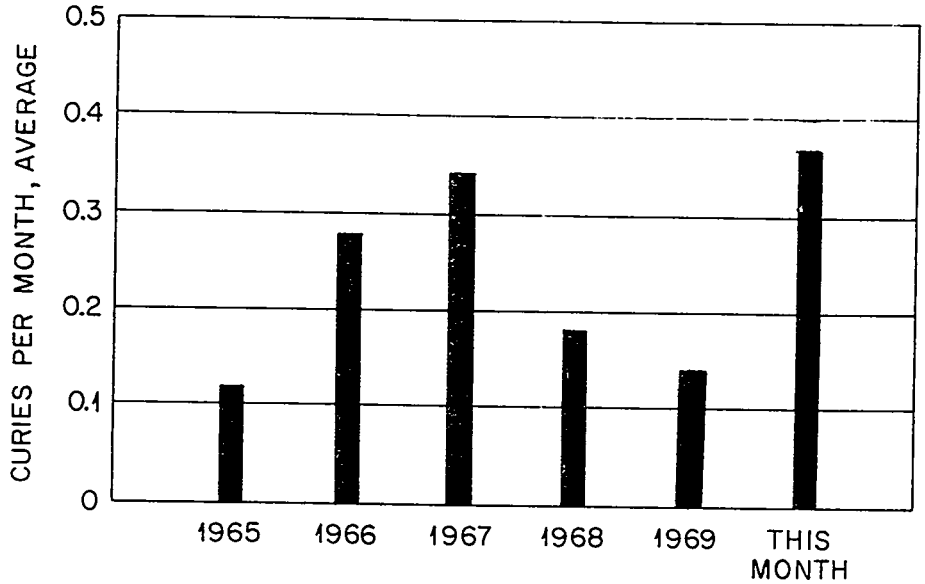

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

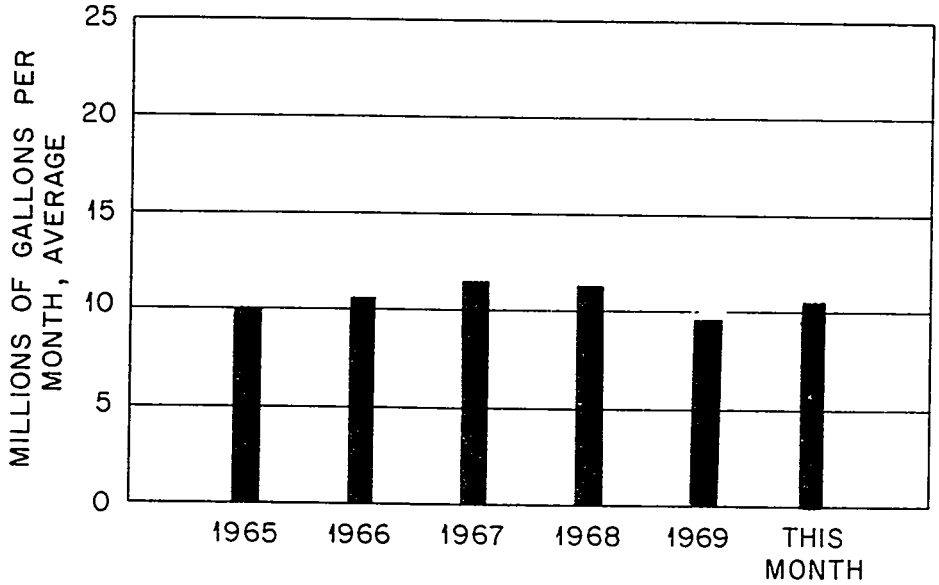

Fig. 4. Process Waste Volumes.

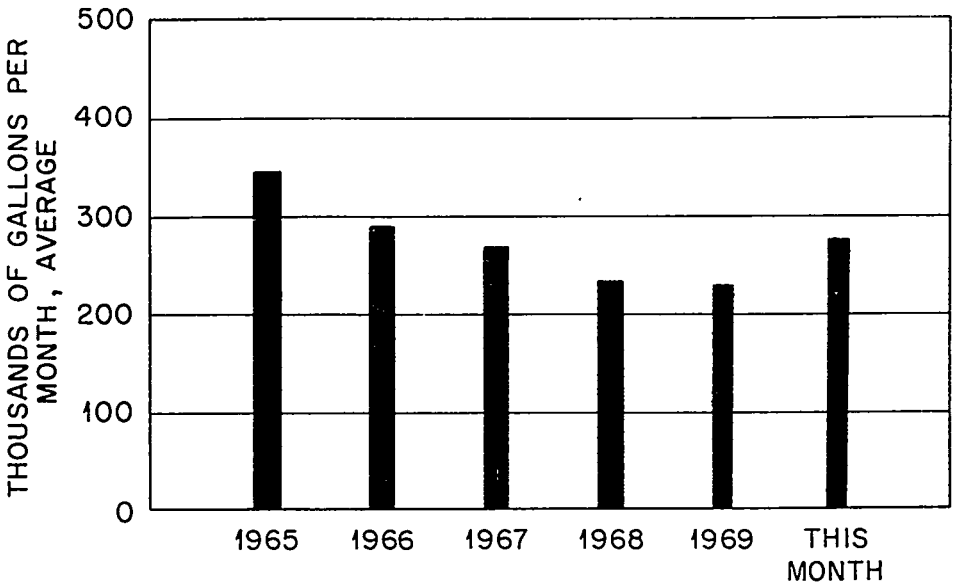

Fig. 5. Intermediate—Level Waste Volumes.

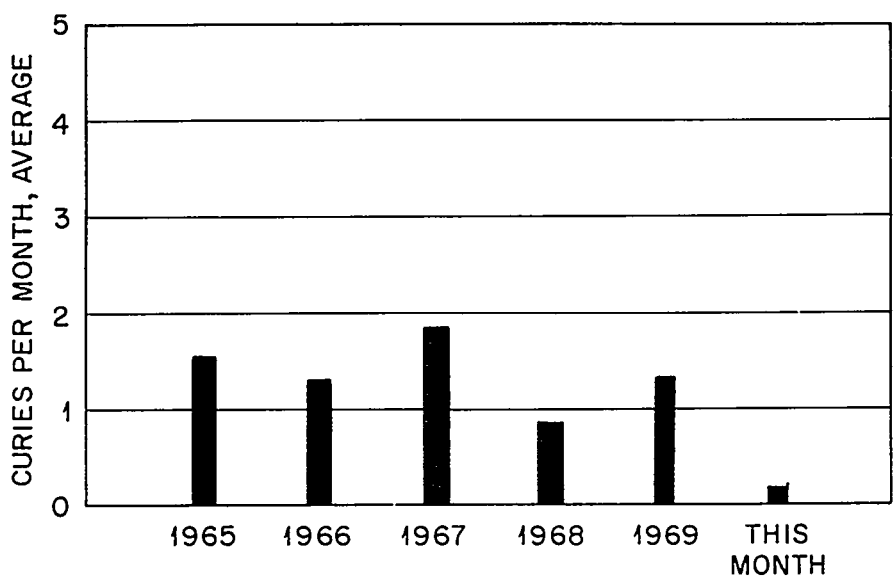

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

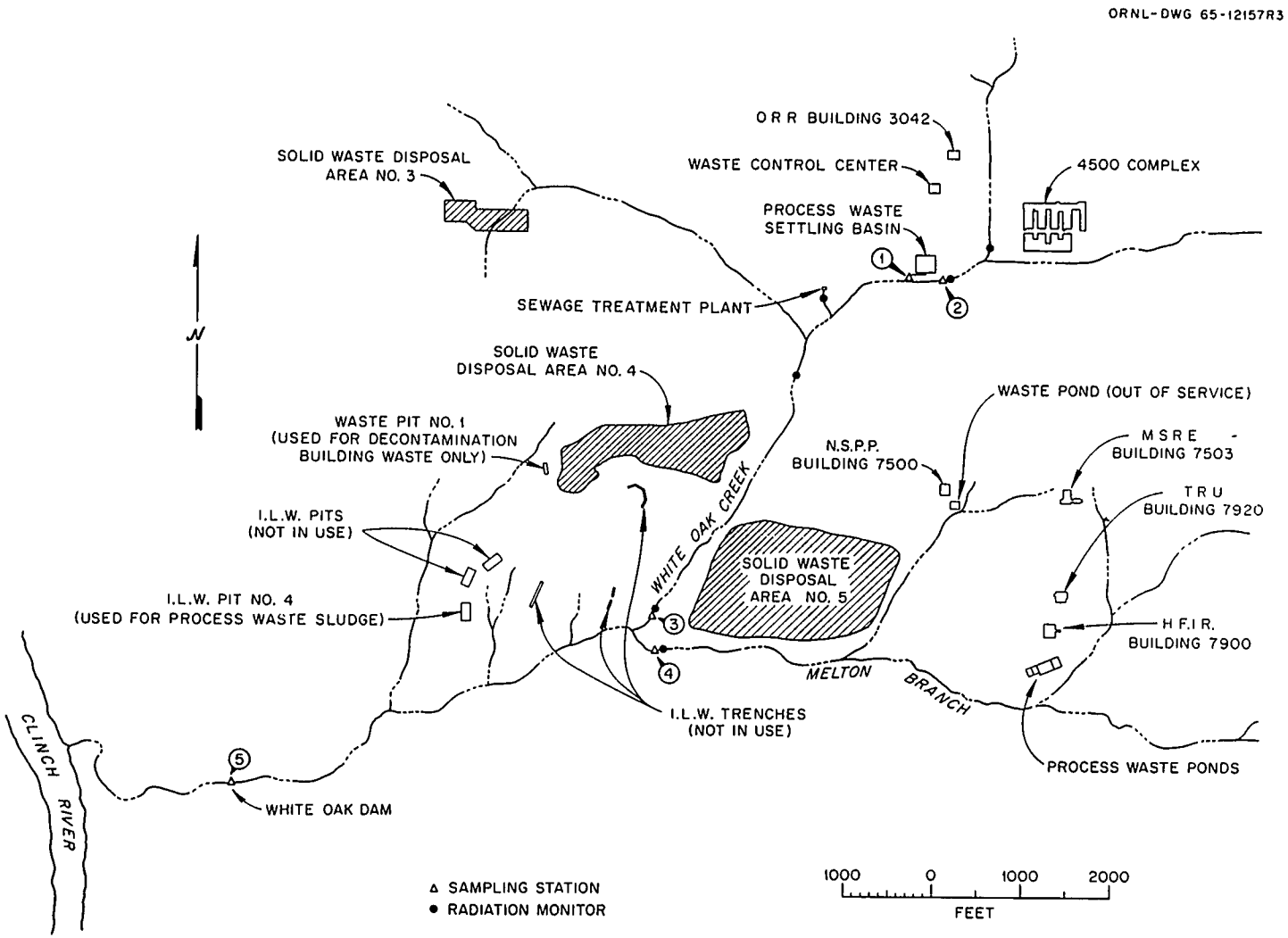

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.37	1.47
Miscellaneous discharges from east end of plant	2	0.03	2.07
Discharge from Bethel Valley Area	3	0.61	5.61
Discharge from Melton Valley Area	4	0.11	2.18
Total discharge from all sources	3,4	0.72	7.79
White Oak Dam to Clinch River (Health Physics measurement)	5	1.09	4.27

[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	20[b]	0.63[b]	48.4	4.63	41.8
2. Radioisotope Processing Area	95	0.39	30.0	0.64	5.8
3. Buildings 3503 and 3508	14	0.08	6.1	0.68	6.1
4. Buildings 3025 and 3026	2	0.03	2.3	2.19	20.0
5. Building 3019	5	0.01	0.8	0.42	3.8
6. Fission Products Development Laboratory	70	0.01	7.7	0.17	1.6
7. Waste Evaporator, Building 2531	5	0.05	3.9	1.52	13.8
8. Buildings 3525 and 3550	2	0.01	0.8	0.79	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.

[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	0.09
Radiochemical Processing Pilot Plant	3020	0.04
MSRE	7512	0.02
HFIR	7911	0.03
Total activity in gases released		0.19

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

2018

45

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ORNL
CENTRAL FILES NUMBER
70-4-19

DATE ISSUED: APR 17 1970

DATE: April 13, 1970

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

TO: Distribution

FROM: L. C. Lasher

This document has been approved for release to the public by

David F. Hamm 3/13/96
Technical Information Officer Date

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LIQUID WASTE

Release to Clinch River

The radioactive contamination in liquid waste released from ORNL amounted to 0.30% of the MPC_W for a release to an uncontrolled area (see Figure 1). The primary contaminants were strontium, iodine, and tritium; these nuclides accounted for 74%, 8%, and 15%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

The release of activity to White Oak Creek and a comparison of the release to that of previous months are given in Figure 2 and Table 1. There is no apparent explanation for the higher-than-normal release of strontium to the lake shown in Figure 2 although the activity was probably leached from the solid-waste burial ground.

Process Waste System

A total of 10.3 million gallons of waste was processed this month. The process removed 89% of the gross activity. The sources of waste released into the system are listed in Table 2. Figure 3 shows a monthly comparison of the amounts of strontium released from this system 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 308 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	234,000
Volume transferred to evaporator	229,000
Tank farm free space at beginning of month	396,000
Tank farm free space at end of month	388,000
Evaporator concentrate returned to tank farm	3,000
Total volume of concentrate in tank farm	86,000

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

	Gallons
ORR and BSR	65,000
Building 3019	37,000
4500 Complex	21,000
Radioisotopes Processing Area	18,000
High Flux Isotope Reactor	16,000
Fission Products Development Laboratory	16,000

Gaseous Waste

A total of 130 millicuries of ^{131}I was released from the stacks at ORNL. There was no significant release of particulate or alpha activity. The amount of inert gases released from the 3039 and 7911 stacks was less than 1.61 and 0.09 percent, respectively, of the maximum permissible discharge level for these stacks. Individual stack releases are listed in Table 3. Figure 6 shows a monthly comparison of the stack emissions.

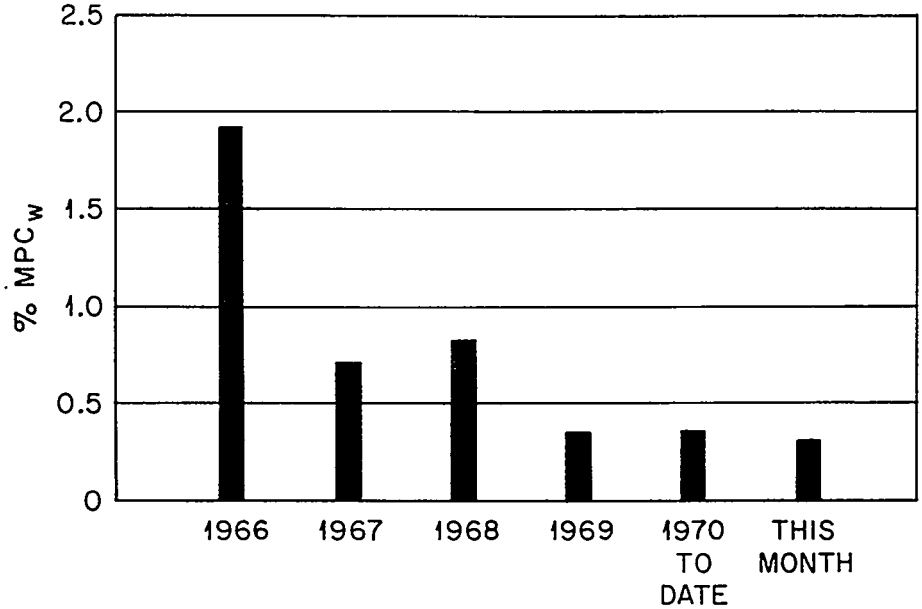

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

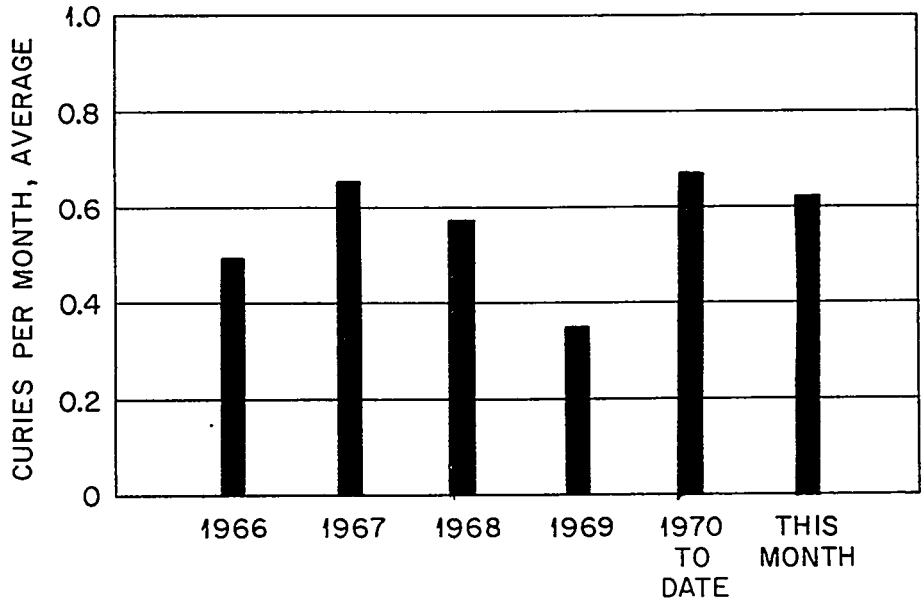

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

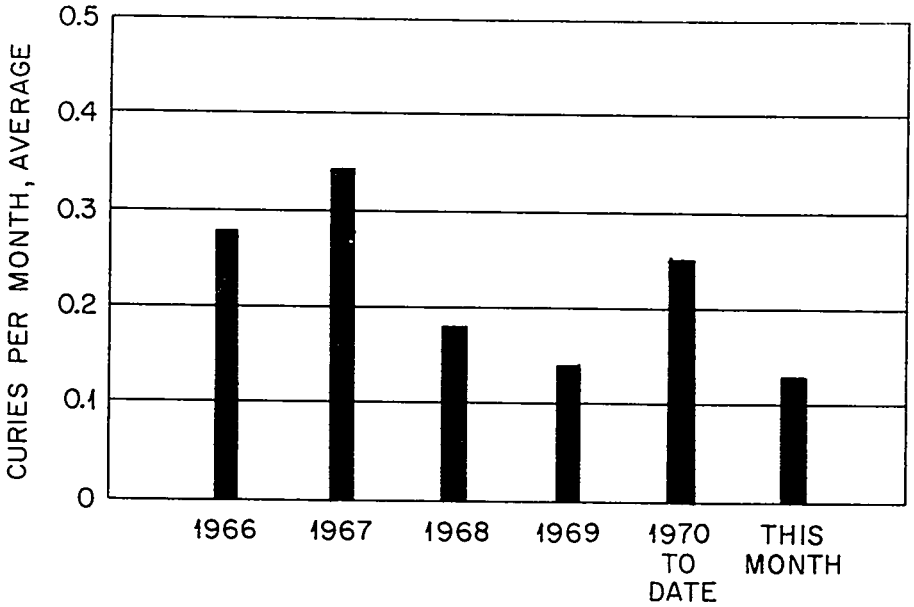

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

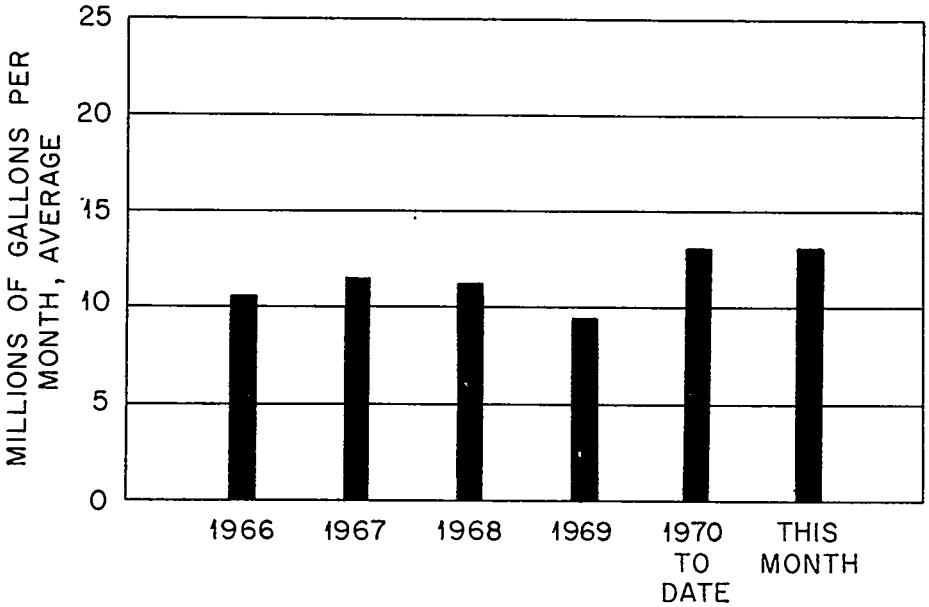

Fig. 4. Process Waste Volumes.

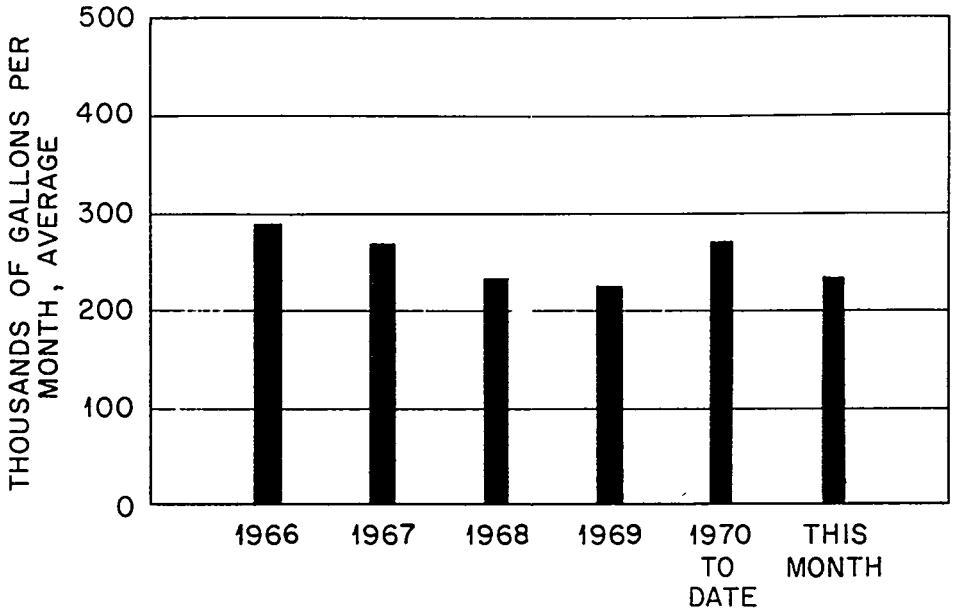

Fig. 5. Intermediate—Level Waste Volumes.

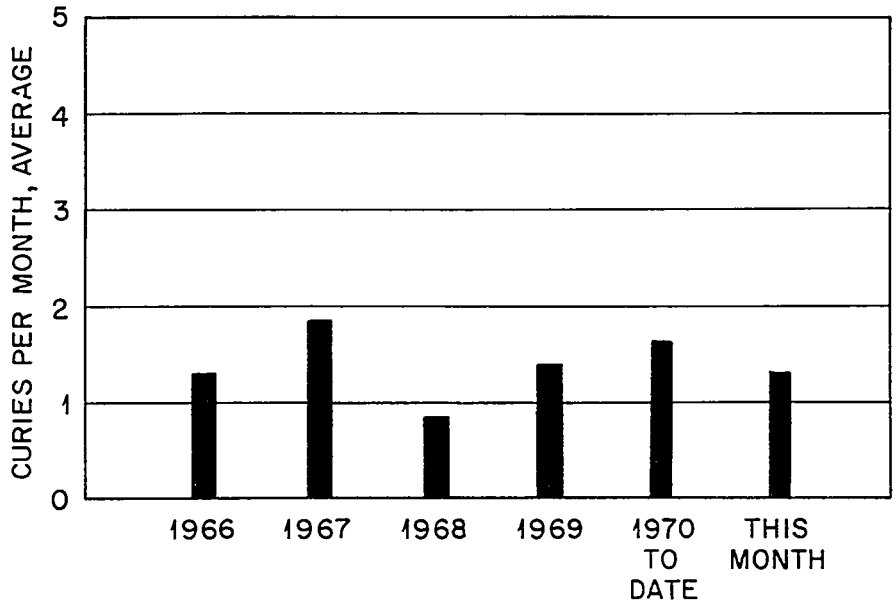

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

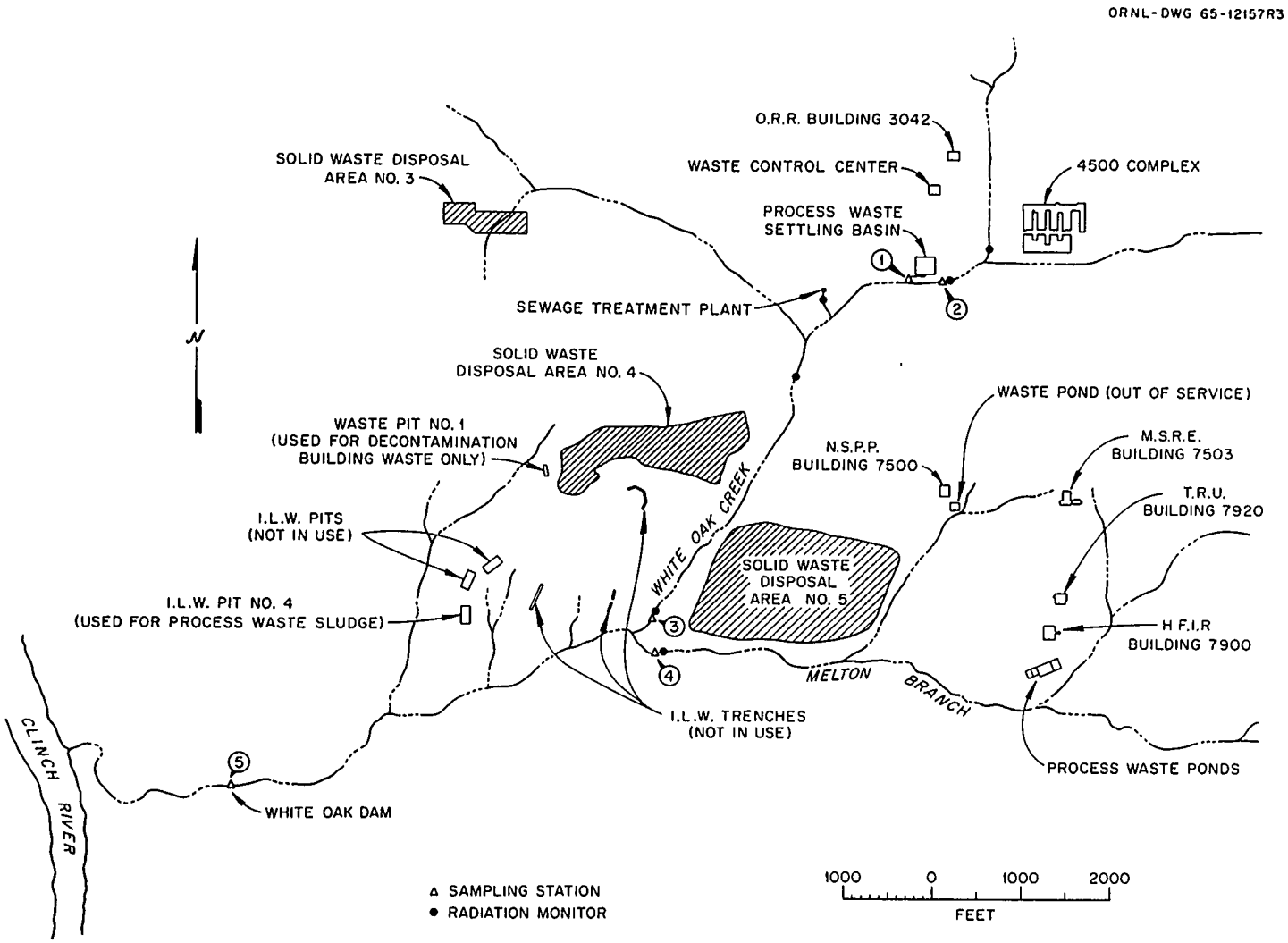

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.13	0.57
Miscellaneous discharges from east end of plant	2	0.03	0.55
Discharge from Bethel Valley Area	3	0.49	1.95
Discharge from Melton Valley Area	4	0.13	0.94
Total discharge from all sources	3,4	0.62	2.89
White Oak Dam to Clinch River (Health Physics measurement)	5	0.39	1.45

[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	19.5[b]	0.57	65.5	4.28	45.1
2. Radioisotope Processing Area	47.4	0.13	14.9	0.44	4.6
3. Buildings 3503 and 3508	8.3	0.03	3.5	0.61	6.4
4. Buildings 3025 and 3026	1.0	0.01	1.1	0.72	7.6
5. Building 3019	3.2	0.01	1.1	0.30	3.2
6. Fission Products Development Laboratory	83.7	0.07	8.1	0.13	1.4
7. Waste Evaporator, Building 2531	4.9	0.04	4.7	1.30	13.7
8. Buildings 3525 and 3550	1.2	0.01	1.1	1.71	18.0

[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 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	0.03
Total activity in gases released		0.13

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

2019

OAK RIDGE NATIONAL LABORATORY
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Special Distribution

ORNL
CENTRAL FILES NUMBER
70-5-41

DATE ISSUED: MAY 26 1970

DATE: May 18, 1970

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

TO: Distribution

FROM: L. C. Lasher

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

Radioactive contamination of the Clinch River resulting from ORNL waste discharges was 0.38% of the MPC_W for a radioactive release to an uncontrolled area (see Figure 1). The primary contaminants were strontium, tritium, and iodine which accounted for 73.8%, 18.5%, and 4.2%, respectively, of the calculated percent of MPC_W.

White Oak Creek Monitoring

The amounts of radioactivity discharged to White Oak Lake are listed in Table 1. A monthly comparison of these releases is shown in Figure 2.

Process Waste System

A total of 10.9 million gallons of process waste was chemically treated this month. The treatment removed 91% of the gross activity. Sources of waste released into the system are listed in Table 2. A monthly comparison of the amounts of strontium released into White Oak Creek is shown in Figure 3. The volumes handled during the period are compared to those of previous months in Figure 4.

Intermediate-Level Waste

The waste evaporator operated at an average boil-down rate of 372 gph. A summary of operating data is listed below.

	Gallons
Total volume generated	246,000
Volume transferred to evaporator	277,000
Volume transferred to shale fracture storage	76,000
Tank farm free space at beginning of month	388,000
Tank farm free space at end of month	487,000
Evaporator concentrate returned to tank farm	8,000
Total volume of concentrate in tank farm	24,000

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	40,000
Building 3019	27,000
High Flux Isotope Reactor	25,000
4500 Complex	22,000
Fission Products Development Laboratory	20,000
Radioisotopes Processing Area	19,000

Gaseous Waste

A total of 360 millicuries of ^{131}I was released from the stacks at ORNL. There was no significant release of particulate or alpha activity. The amount of inert gases released from the 3039 and 7911 stacks was less than 2.08% and 0.17%, respectively, of the maximum permissible discharge calculated for these stacks. Individual stack releases are listed in Table 3. Figure 6 shows a monthly comparison of the stack emissions.

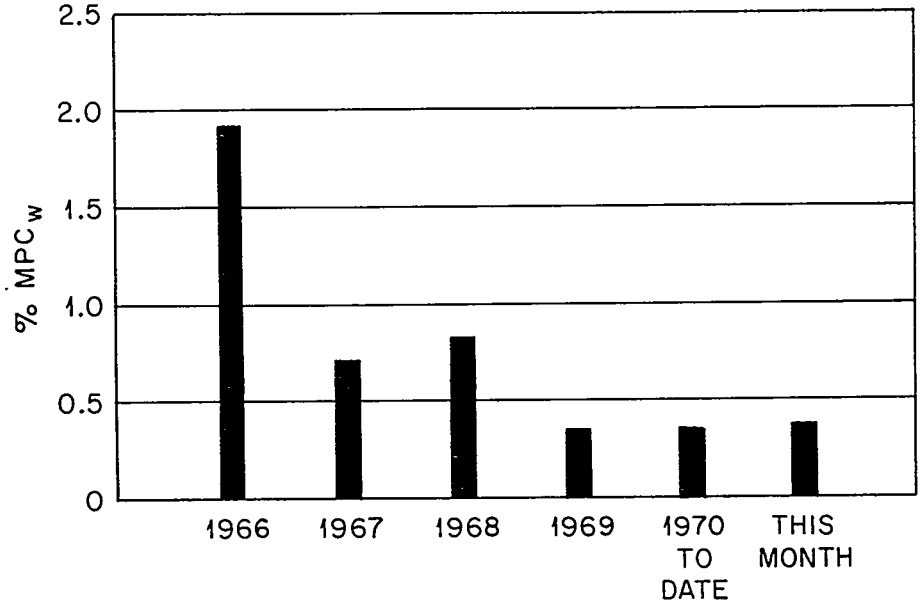

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

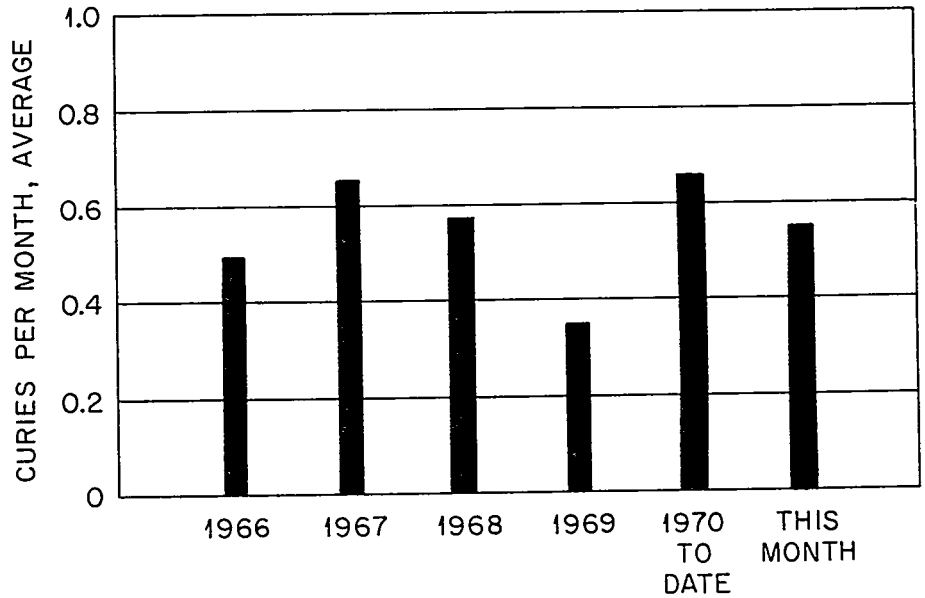

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

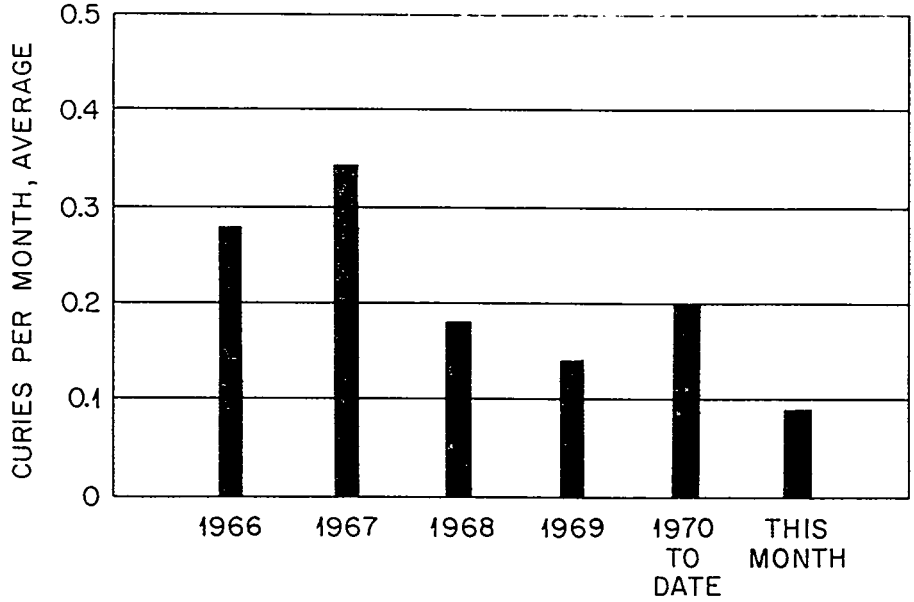

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

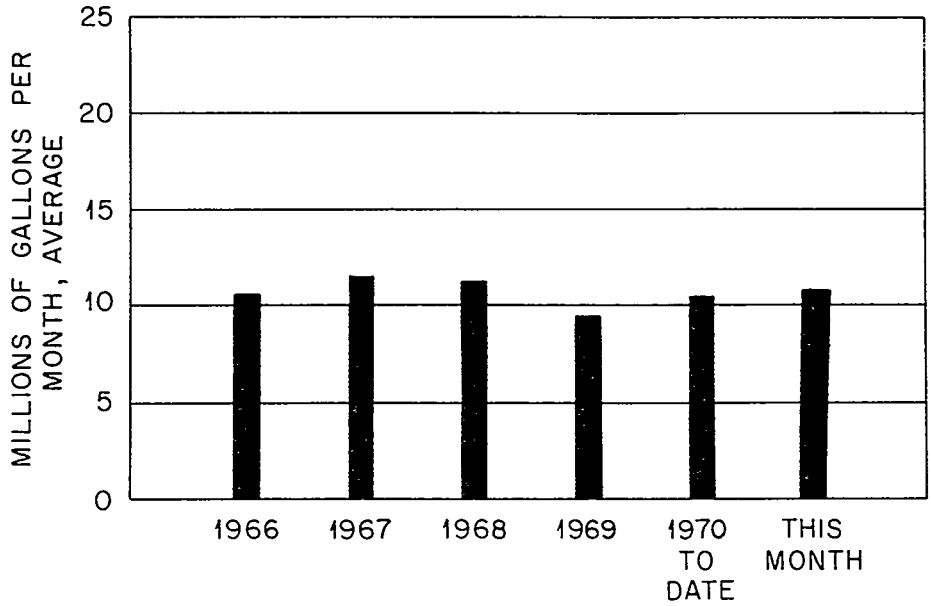

Fig. 4. Process Waste Volumes.

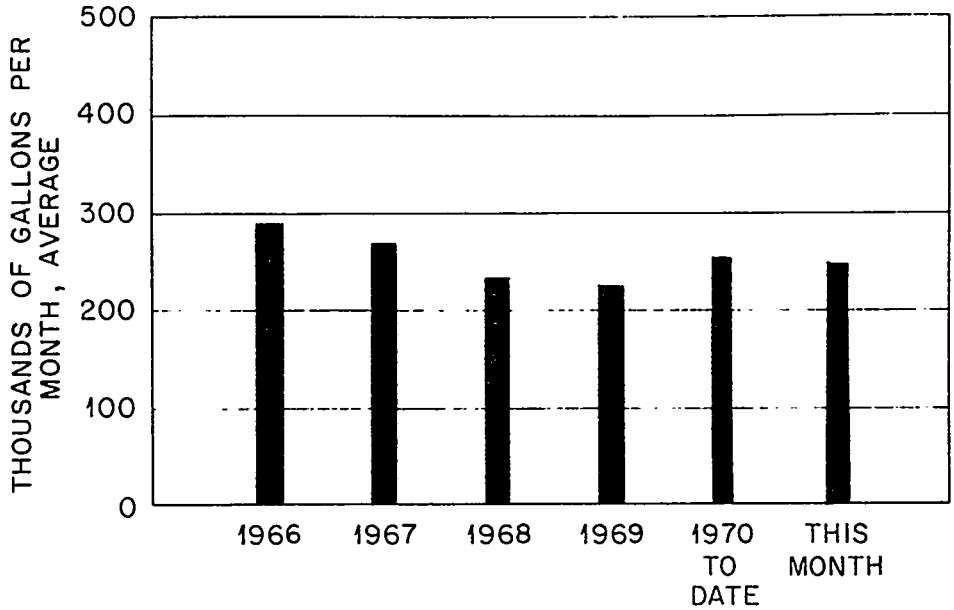

Fig. 5. Intermediate—Level Waste Volumes.

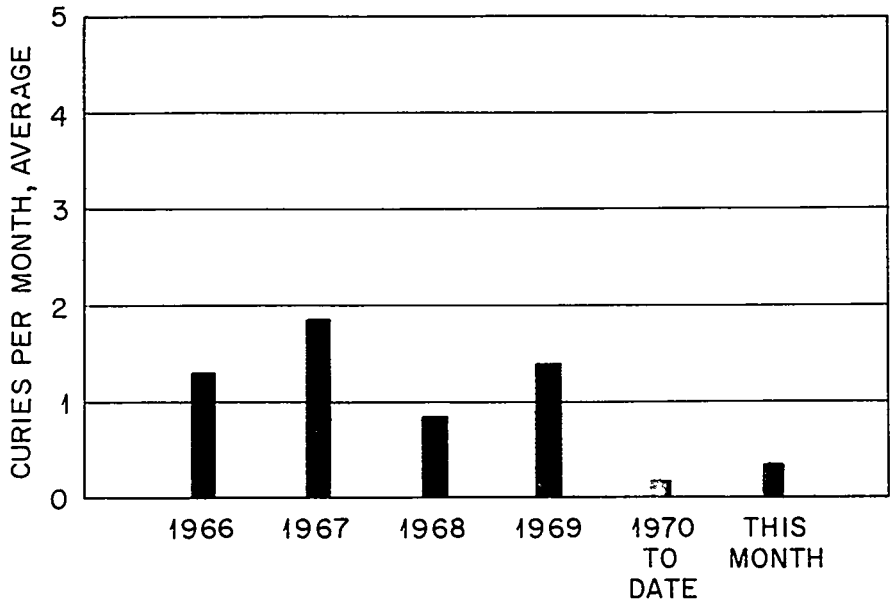

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

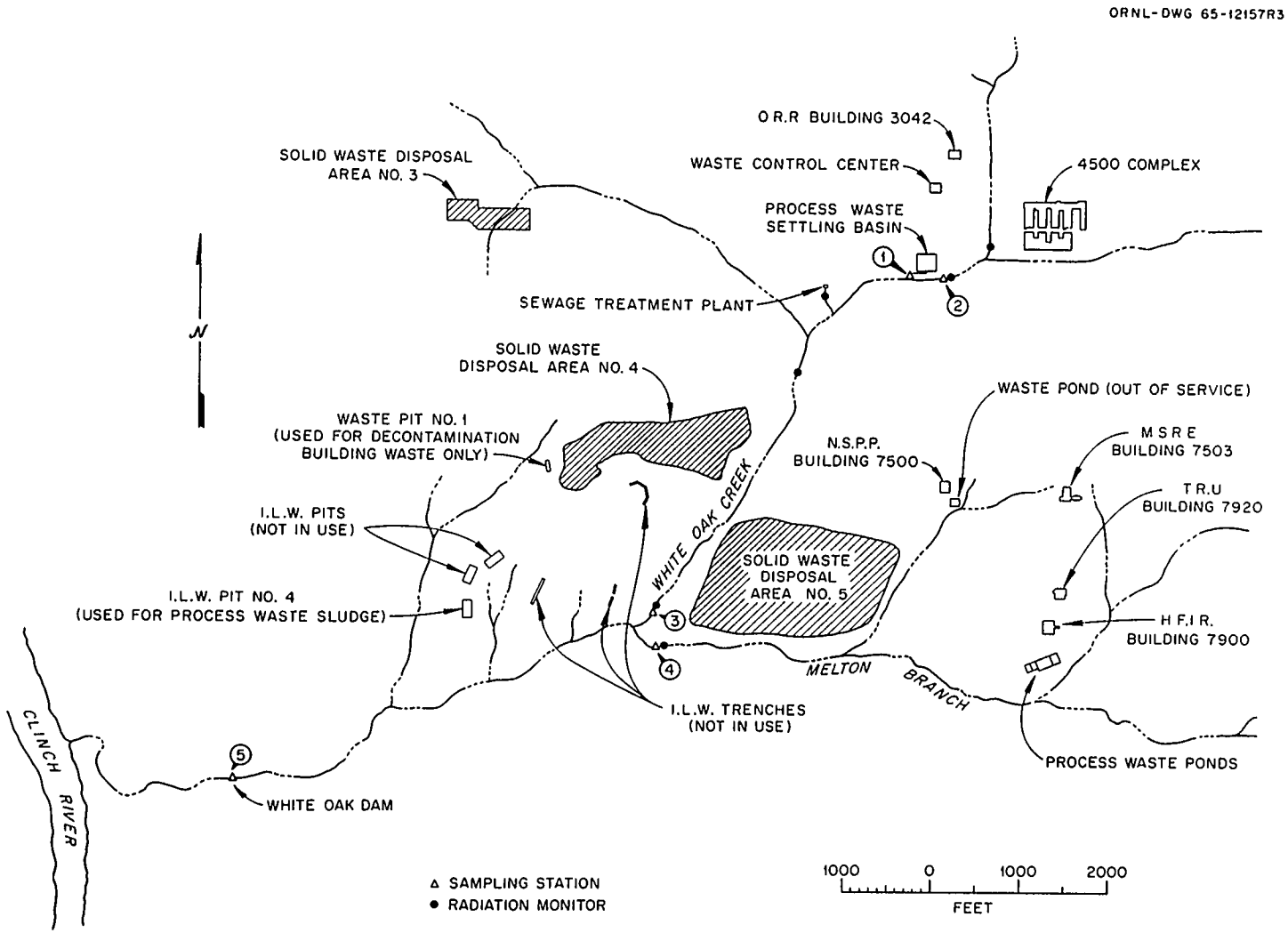

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.41
Miscellaneous discharges from east end of plant	2	0.02	1.37
Discharge from Bethel Valley Area	3	0.43	1.72
Discharge from Melton Valley Area	4	0.12	0.64
Total discharge from all sources	3,4	0.55	2.36
White Oak Dam to Clinch River (Health Physics measurement)	5	0.28	0.98

[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	24[b]	0.60[b]	53.6	3.71	37.9
2. Radioisotope Processing Area	73	0.32	28.6	0.66	6.7
3. Buildings 3503 and 3508	6	0.03	2.7	0.66	6.7
4. Buildings 3025 and 3026	2	0.03	2.7	2.02	20.6
5. Building 3019	2	0.01	0.8	0.36	3.7
6. Fission Products Development Laboratory	40	0.08	7.1	0.26	2.6
7. Waste Evaporator, Building 2531	4	0.04	3.6	1.34	13.7
8. Buildings 3525 and 3550	2	0.01	0.9	0.79	8.1

[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	<0.01
Central Radioactive Gas Disposal Facilities	3039	0.36
Radiochemical Processing Pilot Plant	3020	<0.01
MSRE	7512	<0.01
HFIR	7911	<0.01
Total activity in gases released		0.36

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

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ORNL Not
CENTRAL FILES NUMBER
70-7-16

RECEIVED: JUL 15 1970

DATE: July 9 1970

SUBJECT: Radioactive Waste Disposal Operations Report For The Month of April 1970

TO: Distribution

FROM: L. C. Lasher

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

David L. Hamilton 7/13/96
Technical Information Officer Date
ORNL

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LIQUID WASTE

Release to Clinch River

Radioactive contamination in the river caused by ORNL waste discharges was 0.73% of the calculated MPC_W for a release to an uncontrolled area (see Figure 1). The main contaminants were strontium, tritium, and iodine which contributed 72.9%, 17.8%, and 6.3%, respectively, to the calculated percent of MPC_W.

White Oak Creek Monitoring

Table 1 lists the releases of radioactivitity into White Oak Lake. A monthly comparison of the amounts of strontium released into White Oak Lake is shown in Figure 2.

Process Waste System

A total of 10.8 million gallons of contaminated water was chemically treated this month. Beta count results indicate that 90% of the activity was removed by the process. Sources of waste released into the system are listed in Table 2. Figure 3 compares, on a monthly basis, the strontium released to White Oak Creek. Figure 4 shows the volumes handled each month.

Intermediate-Level Waste

The waste evaporator operated at a boil-down rate of 315 gph. A summary of operating data is listed below:

	Gallons
Total volume generated	239,000
Volume transferred to evaporator	227,000
Tank farm free space at beginning of month	487,000
Tank farm free space at end of month	469,000
Evaporator concentrate returned to tank farm	6,000
Total volume of concentrate in tank farm	33,000

A list of the major contributors to the system is given below. Figure 5 compares to volumes of 1LW generated each month.

	Gallons
ORR and BSR	38,000
High Flux Isotope Reactor	25,000
Building 3019	23,000
Building 3026	22,000
Fission Products Development Laboratory	15,000
4500 Complex	15,000
Radioisotopes Processing Area	11,000

Gaseous Waste

A Total of 80 millicuries of ^{131}I was released from the ORNL stacks. There was no significant release of particulate or alpha activity. Inert gas releases from the 3039 and 7911 stacks averaged less than 1.7% and 0.4%, respectively, of the calculated maxumun permissible discharge for these stacks. Individual stack releases are listed in Table 3. Figure 6 compares the stack emissions on a monthly basis.

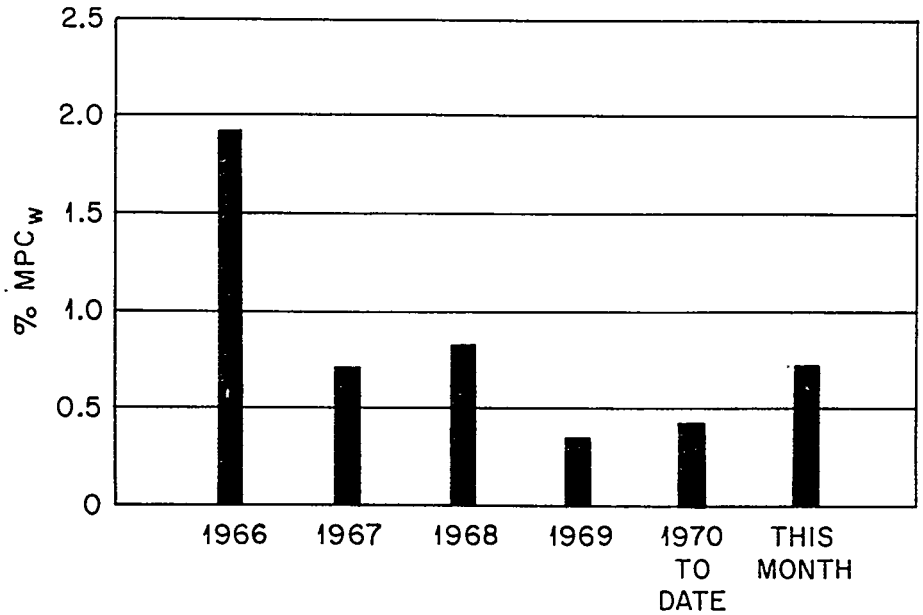

Fig. 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

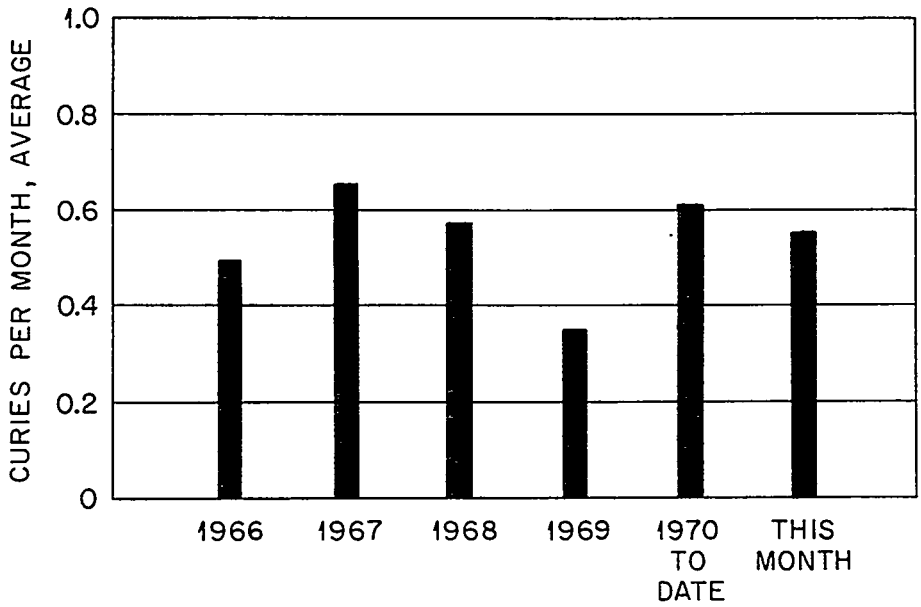

Fig. 2. Total ^{89}Sr and ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

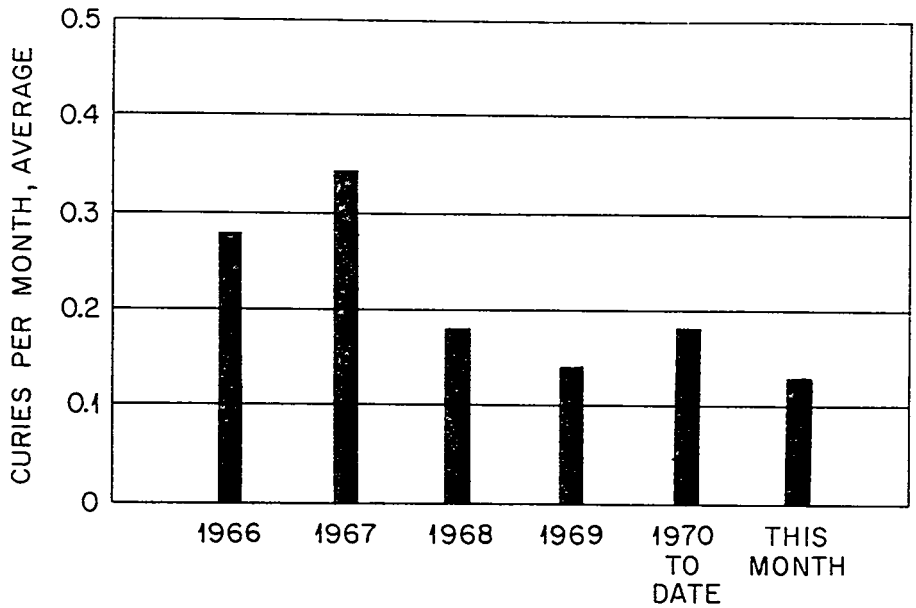

Fig. 3. ^{89}Sr and ^{90}Sr Discharge in Process Waste to White Oak Creek.

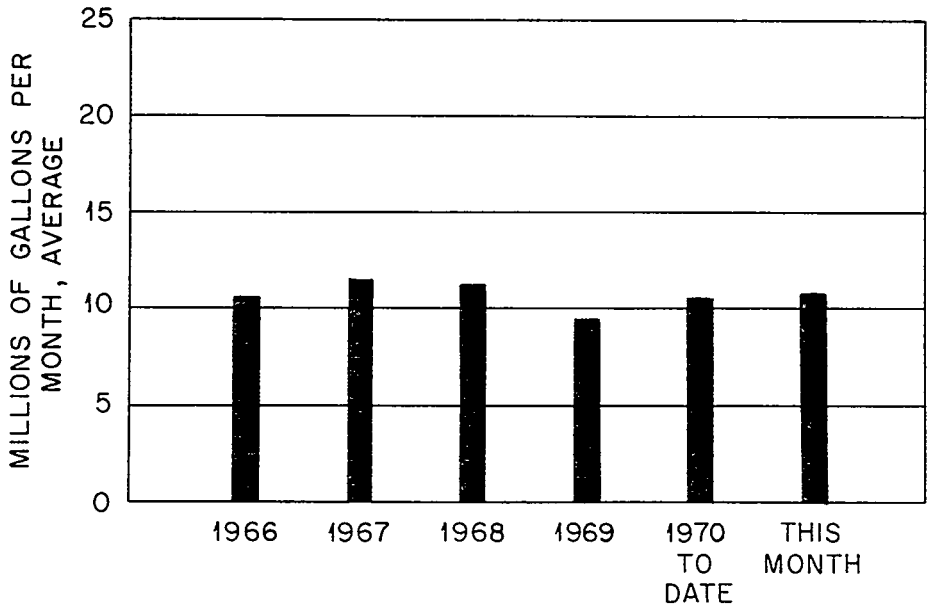

Fig. 4. Process Waste Volumes.

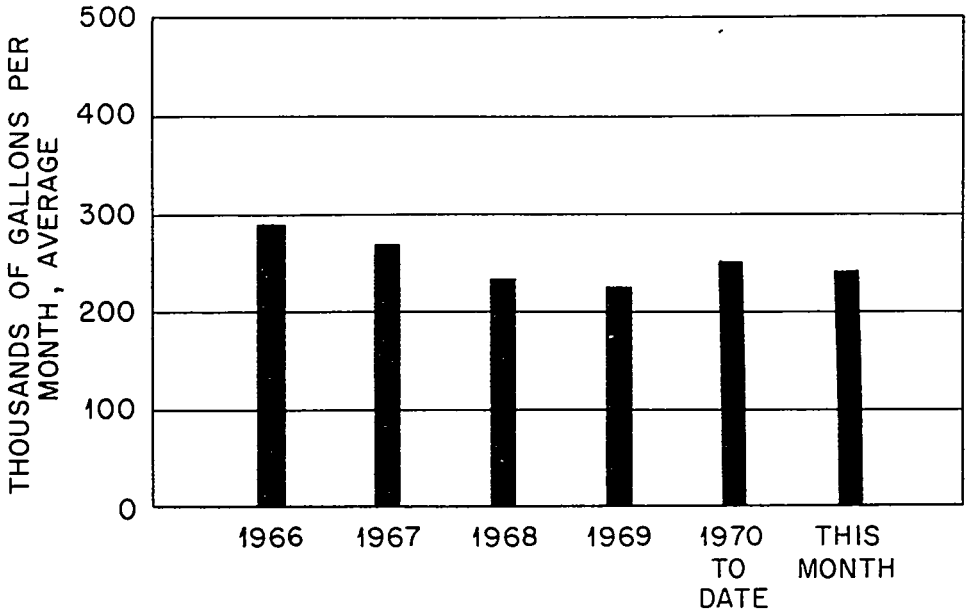

Fig. 5. Intermediate—Level Waste Volumes.

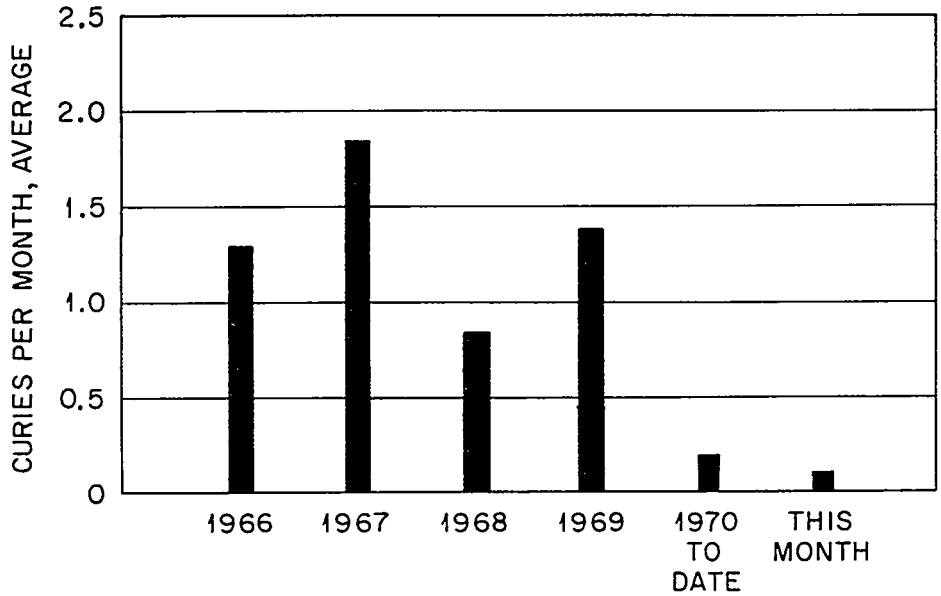

Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

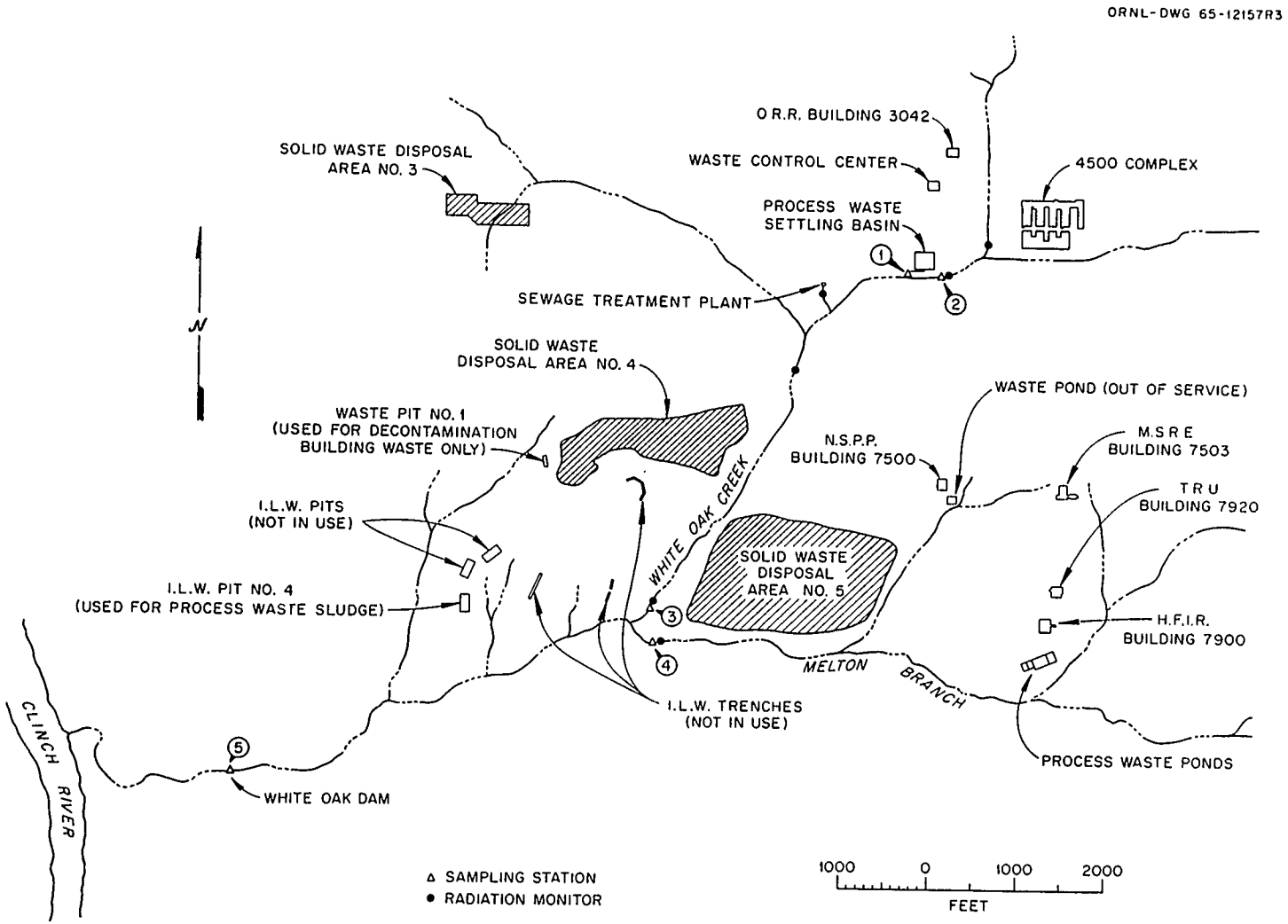

Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

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	0.13	0.46
Miscellaneous discharges from east end of plant	2	0.04	$<$ 3.11
Discharge from Bethel Valley Area	3	0.45	$<$ 3.95
Discharge from Melton Valley Area	4	0.10	$<$ 1.52
Total discharge from all sources	3,4	0.55	$<$ 5.47
White Oak Dam to Clinch River (Health Physics measurement)	5	0.62	2.19

[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	33	0.67[b]	46.2	3.0	32.3
2. Radioisotope Processing Area	106	0.50	34.5	0.7	7.5
3. Building 3503 and 3508	11	0.05	3.4	0.7	7.5
4. Buildings 3025 and 3026	1	0.02	1.4	2.3	24.7
5. Building 3019	5	0.02	1.4	0.6	6.5
6. Fission Products Development Laboratory	79	0.16	11.0	0.3	3.2
7. Waste Evaporator, Building 2531	2	0.01	0.7	1.0	10.8
8. Buildings 3525 and 3550	5	0.02	1.4	0.7	7.5

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

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	0.05
Total activity in gases released		0.08

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