DATE ISSUED MAY 30 1975

2511

MASTER

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

FOR INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER
75-1-28

DATE: January 16, 1975

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1974

TO: Distribution

FROM: G. J. Dixon and L. C. Lasher

ChemRisk Document No. 2511
(1 of 12)

NOTI
natur
Ridge
rectic
forma
shall
Union

Publicly Releasable

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

ninary
e Oak
r cor-
he in-
public
ent of

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of November, 1974, was 0.44% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.37% MPC_W and 0.05% MPC_W, respectively.

White Oak Creek Monitoring

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

Process Waste

A total of 2.5 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 146 gph.

	Gallons
Total volume generated	107,000
Volume transferred to evaporator	105,000
Tank Farm free space at beginning of month	470,000
Tank Farm free space at end of month	433,000
Evaporator concentrate returned to tank farm	35,000*
Volume of concentrate available for hydrofracture (South Tank Farm)	123,000
Volume of concentrate at hydrofracture site	57,000

*25,000 gallons were pumped back from the hydrofracture site so that an empty tank would be available in case of leaking tank at that location.

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

	Gallons
Building 3019	17,000
Fission Products Development Laboratory	14,200
ORR and BSR	13,000
High Flux Isotope Reactor	18,600
Radioisotopes Processing Area	8,300
4500 Complex	5,400
Transuranium Processing Area	1,400

GASEOUS WASTE

The ORNL stacks discharged 60 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 809 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 2.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NONRADIOACTIVE EFFLUENTS

Creek Monitoring

The dissolved oxygen content, the pH, and the temperature of White Oak Creek, Melton Branch, and the effluent at White Oak Dam are shown in Table 4. The pH of White Oak Creek was out of compliance with the standards thirty-one times.

Table 5 presents the results of the chemical monitoring at the three locations mentioned above and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

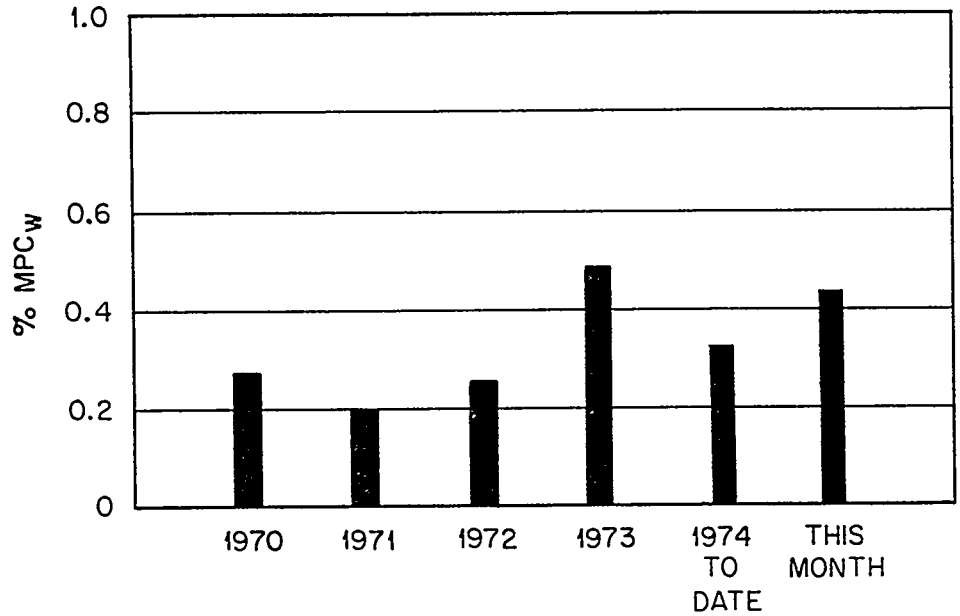


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

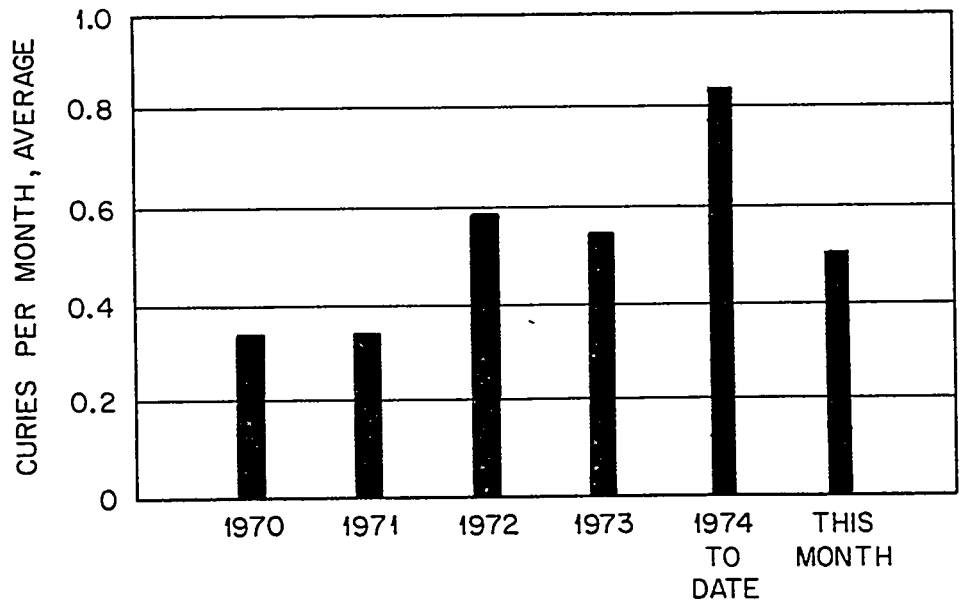


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

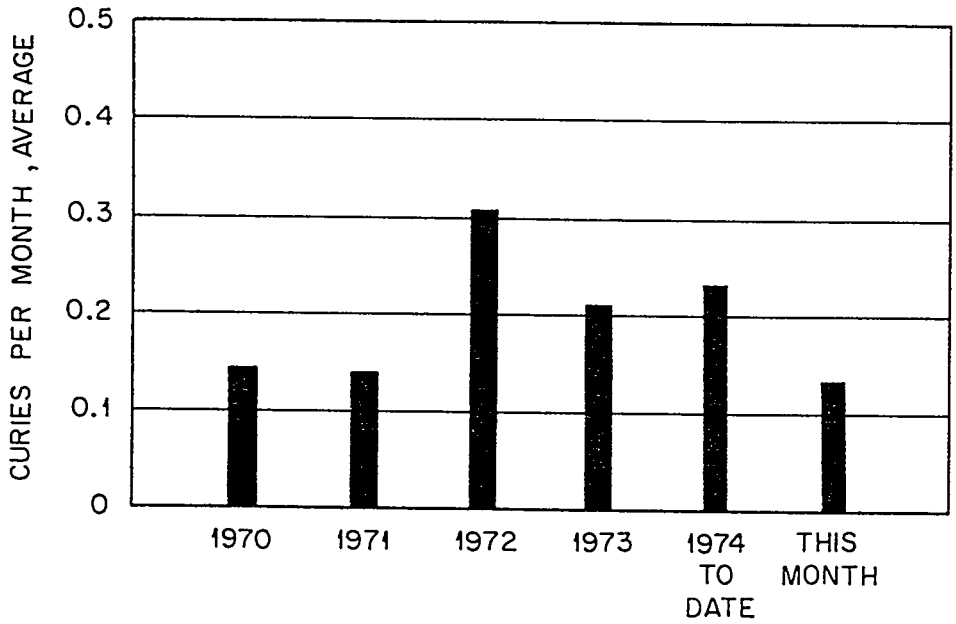


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

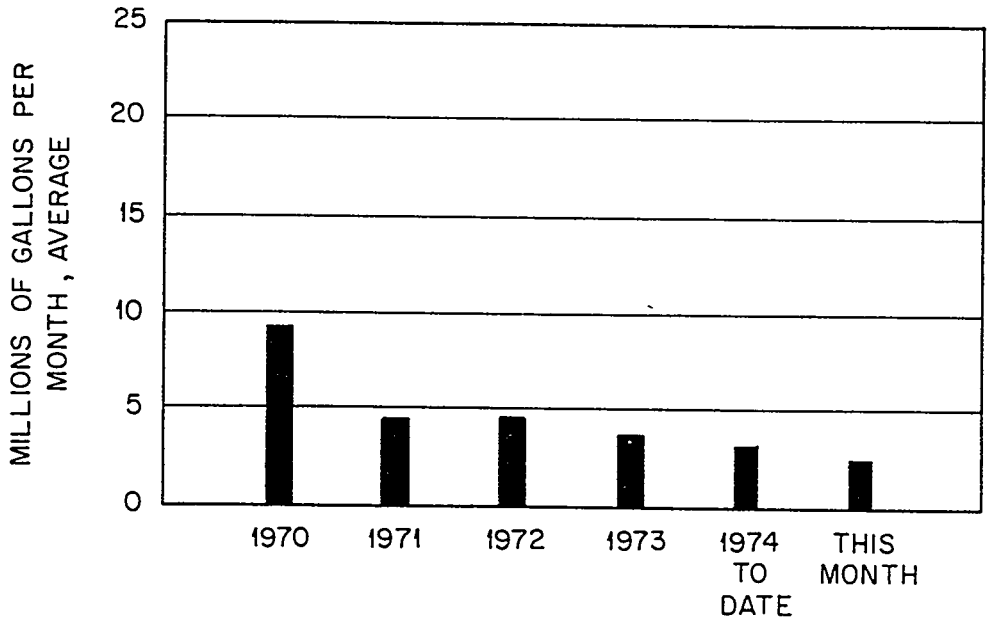


Fig 4. Process Waste Volumes.

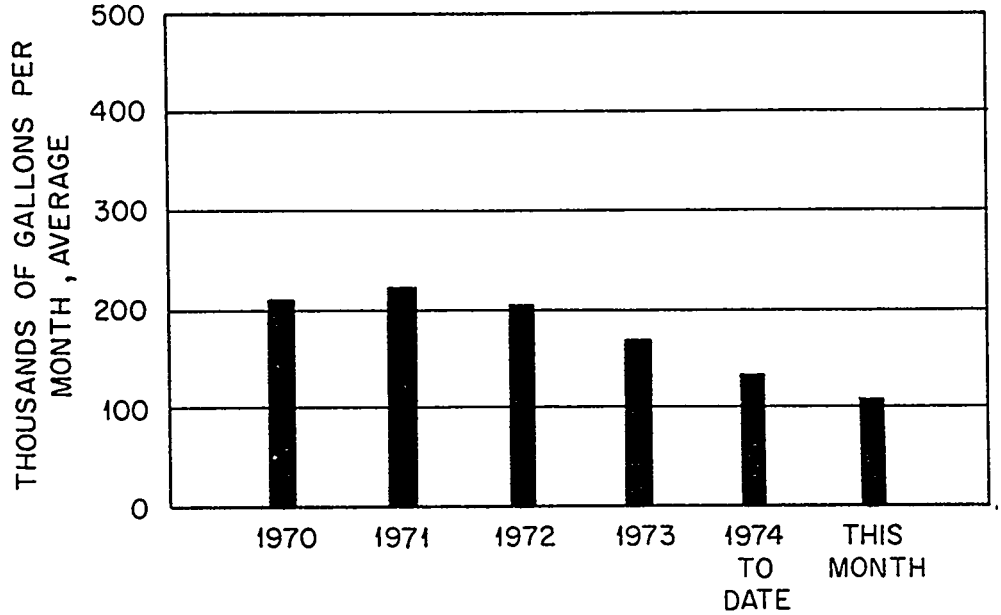


Fig 5. Intermediate – Level Waste Volumes.

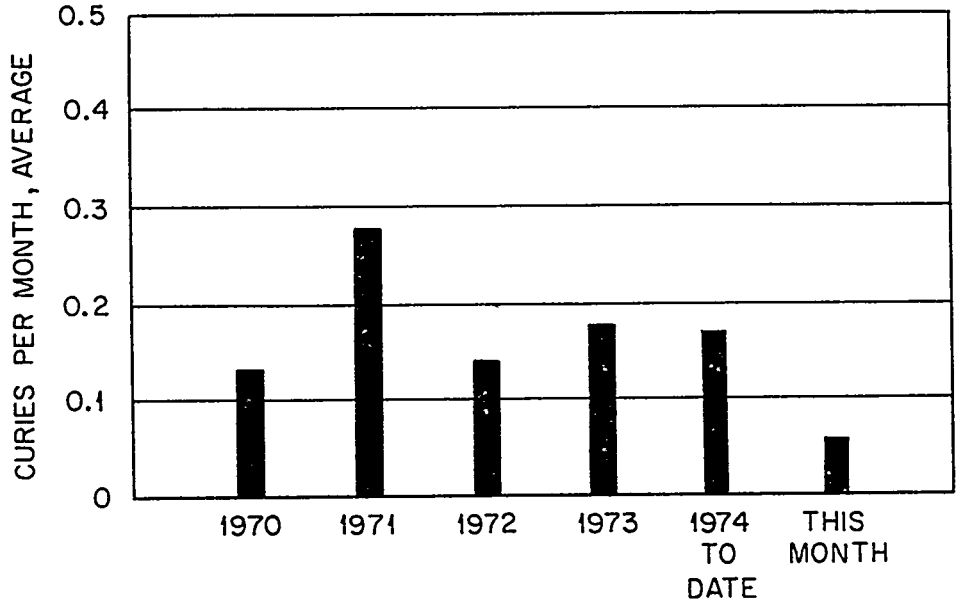


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

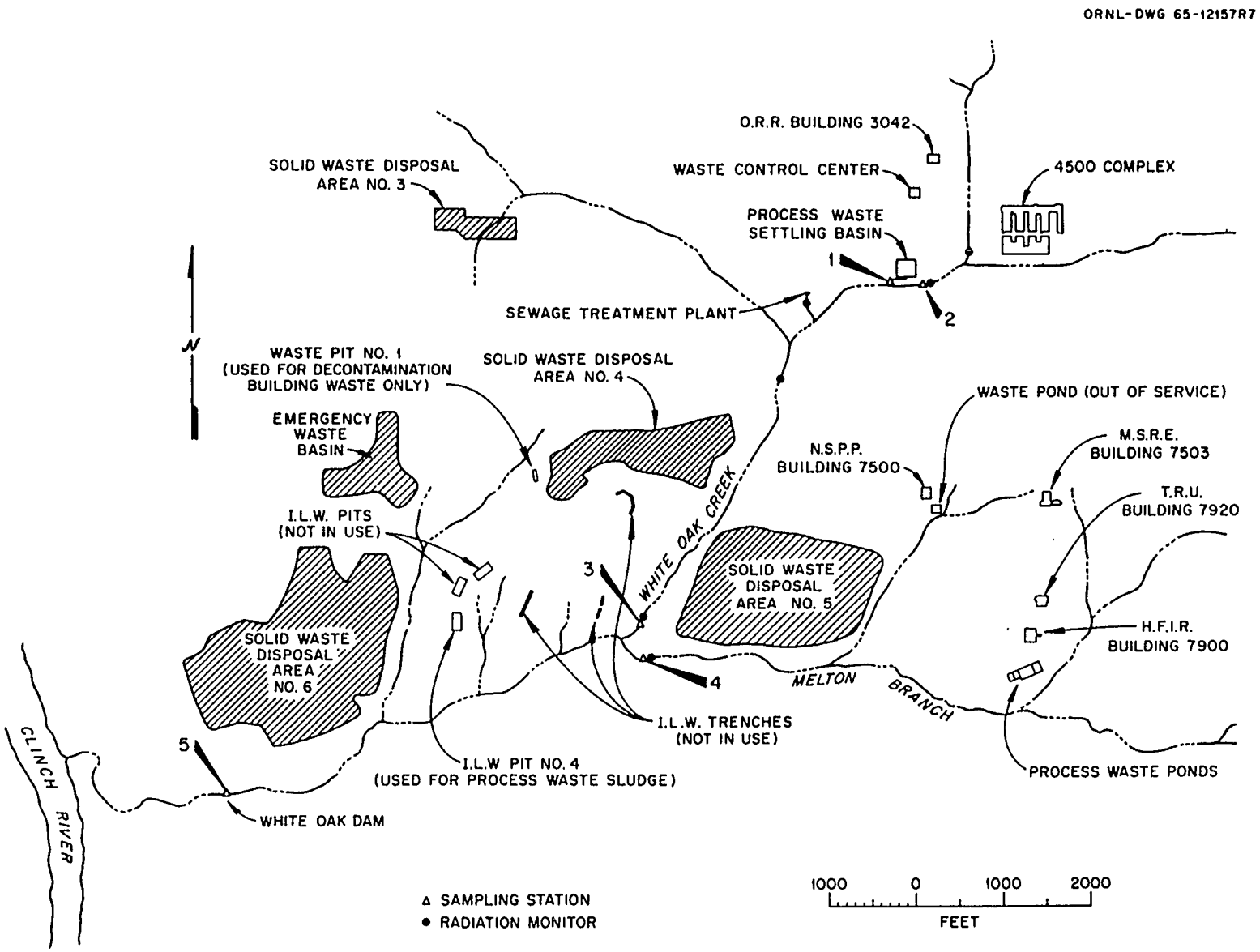


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.13	0.25
Miscellaneous discharges from east end of plant	2	0.07	0.36
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.46	1.05
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.04	0.16
Total discharge from all sources	3,4	0.50	1.21
White Oak Dam to Clinch River (Health Physics measurement)	5	0.32	0.45

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	150	0.06	13.0	0.07	2.0
2. Radioisitopes Processing Area (MH114 minus MH112)	-	0.17[c]	37.0	0.30	8.8
3. Reactor Operations (MH112)	4.8	<0.01	-	0.56	16.4
4. Buildings 3503 and 3508	≤ 0.7	<0.01	-	0.24	7.0
5. Buildings 3025 and 3026	3.5	<0.01	-	0.22	6.5
6. Building 3019	5.4	0.02	4.3	0.48	14.1
7. Fission Products Development Laboratory	-	<0.01	-	0.01	0.3
8. Waste Evaporator, Bldg. 2531	15.7	0.05	10.9	0.61	17.9
9. Building 3525	0.08	<0.01	-	0.07	2.0
10. Building 2026	0.3	<0.01	-	0.20	5.9
11. Tank Farm Drainage	42.2	0.16	34.8	0.65	19.1

[a]Counted at 30% geometry.

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

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.05	790
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	18
Total Activity in Gases Released at X-10 Site		0.06	809
Isotopes Division - Y-12 Area			4×10^{-1}
Tritium Target Fabrication Building		c (^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			1×10^{-4}
Room 265			5×10^{-4}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This discharge will be reported with the December, 1974, data.

Table 4. Dissolved Oxygen, pH and Temperature Measurements in White Oak Creek, Melton Branch; and at White Oak Dam November, 1974

Measurement[a]	Standard[b]	Sample Point[c]	Reading		Times Out of Compliance	Total Time Out of Compliance, Hrs
			Minimum	Maximum		
pH	6.5-8.5	3	5.5	> 9.5	31[d]	45.8
	<1 pH unit/day	4	6.9	8.1	None	-
	change	5	7.3	9.4	e	-
Dissolved Oxygen	5 ppm Min.	3	2.8	14.7	6	70
		4	5.8	>15.0	None	-
		5	5.1	>15.0	None	-
Temp.	<30°C	3	8.0	22.5	None	-
	< 2°C/hr	4	7.0	20.0	None	-
	change	5	8.3	20.2	None	-

[a]These measurements are continuous and are recorded.

[b]These are Tennessee Water Quality Criteria standards.

[c]Refer to Figure 7.

[d]Thirty-one excursions outside the 6.5-8.5 standard. The Steam Plant was responsible for 26 excursions, and the Building 3004 demineralizer was responsible for five excursions. In most cases, these excursions resulted in pH changes greater than one unit change per day.

[e]The high pH in White Oak Lake was apparently the result of a gradual increase in the pH due to natural causes and not to Laboratory operations. The pH remained above the 8.5 limit for approximately fourteen days.

Table 5. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.050	2.10	0.16	0.02
Zn	0.1	0.009	0.144	<0.005	<0.005
P	1	0.51	0.69	0.36	0.12
NO_3 (as N)	10	1.2	1.8	1.0	0.2
Hg	0.005	0.0019	c	0.0004	<0.0001

a. These are the Tennessee Department of Public Health guidelines.

b. Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

c. This analysis has been discontinued.

Note: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DISTRIBUTION

1. S. I. Auerbach
2. T. A. Auxier
3. E. E. Beauchamp
4. F. T. Binford
5. R. E. Blanco
6. N. E. Bolton
7. R. E. Brooksbank
8. F. N. Browder
9. F. R. Bruce
10. C. D. Cagle
11. G. C. Cain
12. L. T. Corbin
13. K. E. Cowser
14. J. A. Cox
15. F. L. Culler
16. R. C. Dahlman
17. D. M. Davis
18. G. J. Dixon
19. S. Draggan
20. J. S. Drury
21. J. O. Duguid
22. J. A. Ealy
23. L. O. Eyman
24. D. E. Ferguson
25. C. L. Fox
26. A. B. Fuller
27. J. H. Gillette
28. J. R. Gissel
29. H. W. Godbee
30. E. D. Gupton
31. E. H. Hardison, ORO
32. F. E. Harrington
33. B. L. Houser
34. S. S. Hurt
35. K. C. Jackson
    Waste Management
    Washington, D. C.
36. R. G. Jordan
37. S. V. Kaye
38. J. E. Keeton
39. E. M. King
40. L. J. King
41. D. J. Knowles
42. L. C. Lasher
43. T. F. Lomenick
44. R. V. McCord
45. D. J. Nelson
46. R. L. Newton
47. E. E. Pierce
48. R. G. Pope
49. H. Postma
50. M. E. Ramsey
51. R. A. Robinson
52. J. B. Ruch
53. R. W. Schaich
54. H. E. Seagren
55. M. J. Skinner
56. W. S. Snyder
57. S. S. Stief
58. Tsuneo Tamura
59. J. R. Thomas
60. J. R. Totter
61. D. B. Trauger
62. J. F. Wing, ORO
63. W. R. Winsbro
64. E. J. Witkowski
65-66. Central Research Library
67-68. Laboratory Records
69. Laboratory Records, ORNL-RC
70. Document Reference Section
71. Research and Technical
    Support, ORO

2511

ORNL MASTER COPY

DATE ISSUED AUG 23 1976

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

FOR INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER
ORNL/CF-76/295

DATE: August 2, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

ChemRisk Document No. 2511
(2 of 12)

NOT
natu
Ridg
recti
forme
shall
Unior

Publicly Releasable

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

minary
ne Oak
or cor-
The in-
public
ent of

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of June, 1976, was 0.63% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.54% MPC_W and 0.07% MPC_W, respectively. These values represent 0.27 Ci of ^{90}Sr and 354 Ci of ^{3}H.

White Oak Creek Monitoring

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

The solid waste burial grounds contributed ∿85% of the total strontium discharged to White Oak Lake. The overflow from the settling basin was a minor contributor (<1%) this month. The project to eliminate the settling basin discharge by piping it to the new Process Waste Treatment Plant is under way with a scheduled completion date for the middle of July.

Process Waste

A total of 3.11 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The new Process Waste Treatment Plant in its third month of operation continued to operate effectively with a >99.9% efficiency for strontium removal and ∿98% efficiency for gross beta removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 126 gph.

	Gallons
Total volume generated	100,000
Volume transferred to evaporator	91,000
Tank Farm free space at beginning of month	372,000
Tank Farm free space at end of month	358,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	140,000

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

	Gallons
Building 3019	20,000
Fission Products Development Laboratory	None
ORR and BSR	17,000
High Flux Isotope Reactor	14,000
Radioisotopes Processing Area	20,000
4500 Complex	5,900
Transuranium Processing Area	1,800

GASEOUS WASTE

The ORNL stacks discharged 90 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 136 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are comapred on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen limit was exceeded in four of four samples at the main sewage plant.
2. The BOD limit was exceeded in four of four samples at the main sewage plant.
3. The settleable solids limit was exceeded in one of four samples at the main sewage plant.
4. The chlorine residual limit was exceeded in one of ninety samples at the main sewage plant.
5. The BOD limit was exceeded in two of four samples at the 7900 area plant.
6. The suspended solids limit was exceeded in three of four samples at the 7900 area plant.
7. The chlorine residual limit was exceeded in twelve of fifty samples at the 7900 area plant.

Plans are under way for the installation of two 10 hp aerators in the ponds of the Main Sewage Treatment Plant. The installation of the aerators is expected to eliminate the main difficulties in satisfying the NPDES requirements.

Operational adjustments and the addition of timing devices are in progress in attempting to bring the 7900 area sewage plant into compliance.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, White Oak Dam, and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

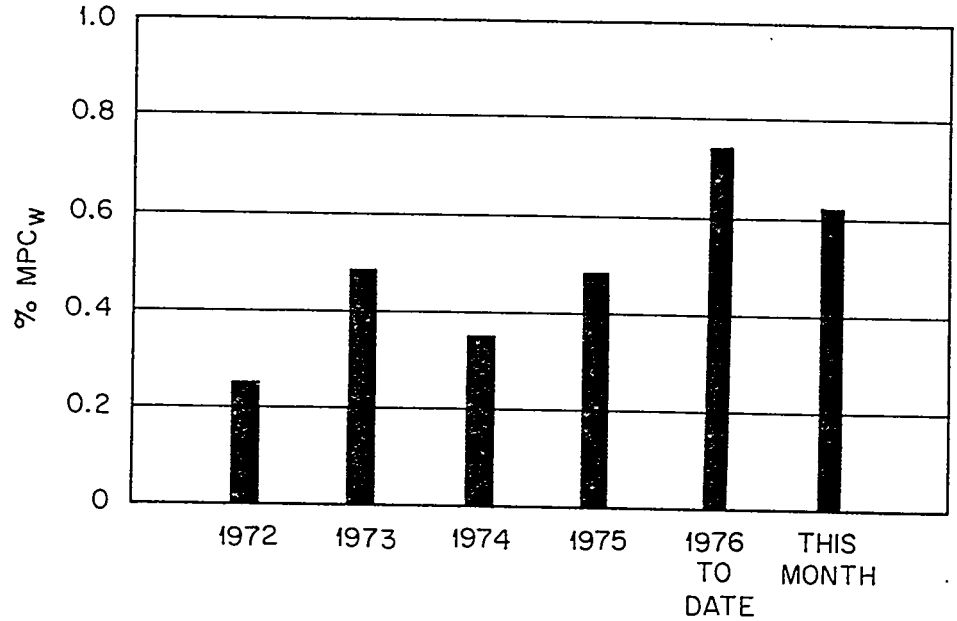


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

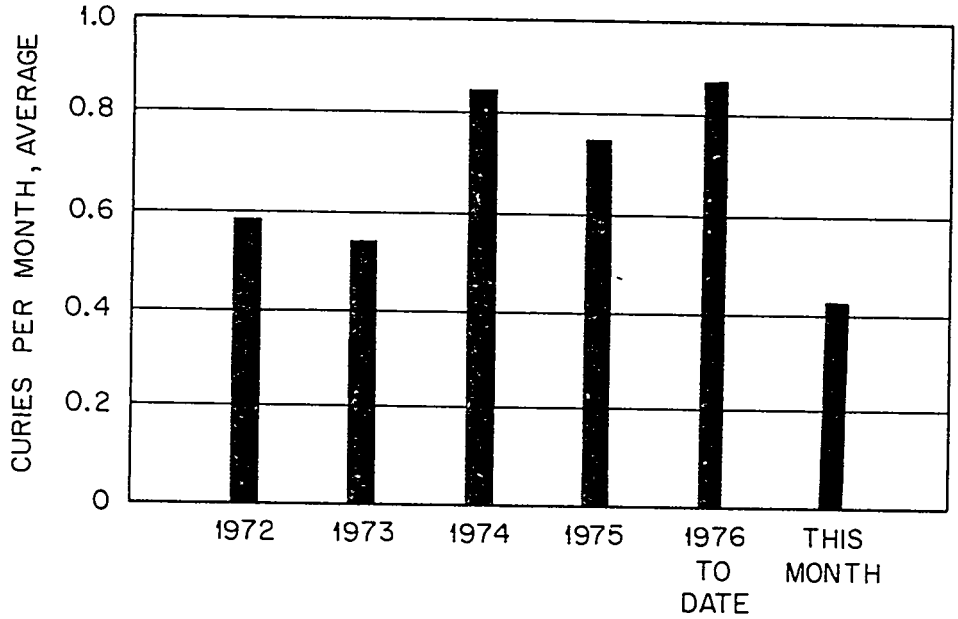


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

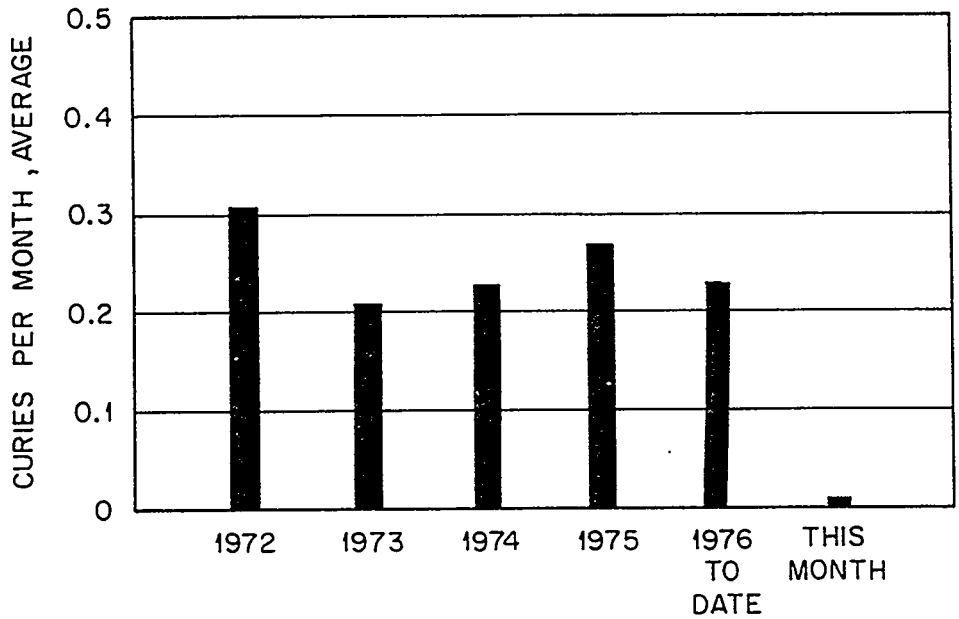


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

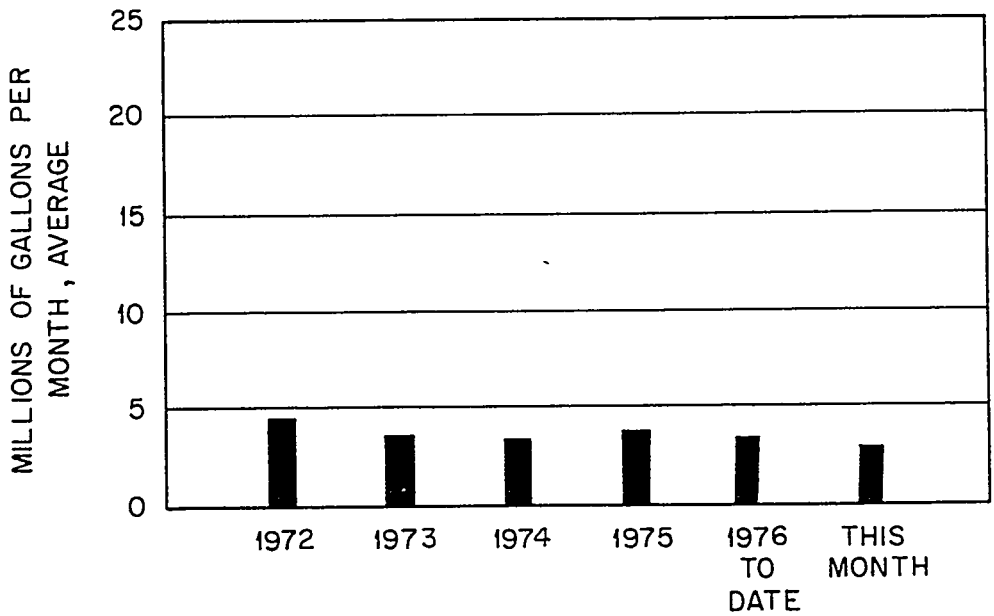


Fig 4. Process Waste Volumes.

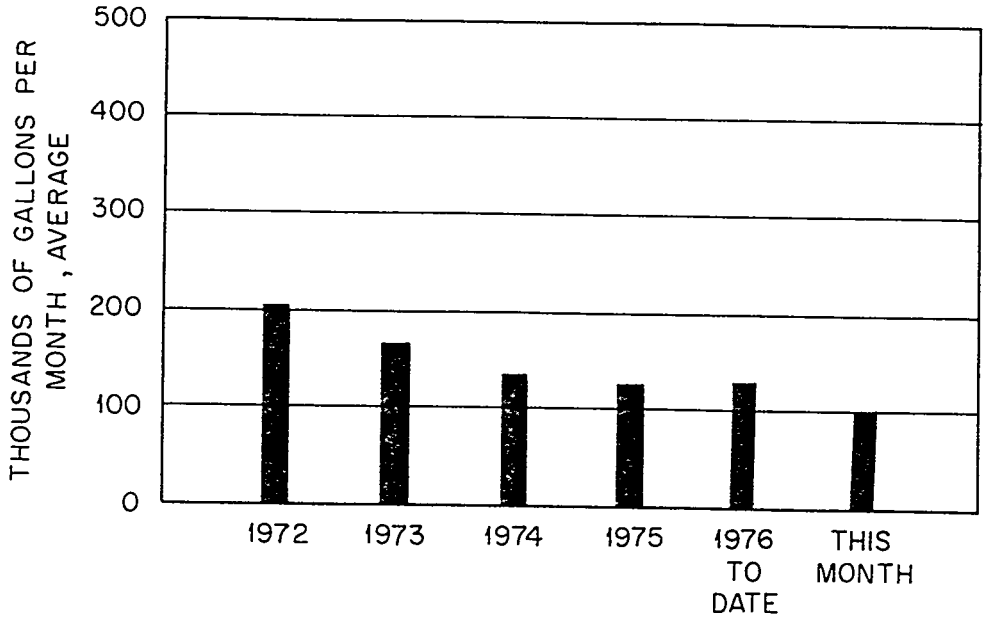


Fig 5. Intermediate – Level Waste Volumes.

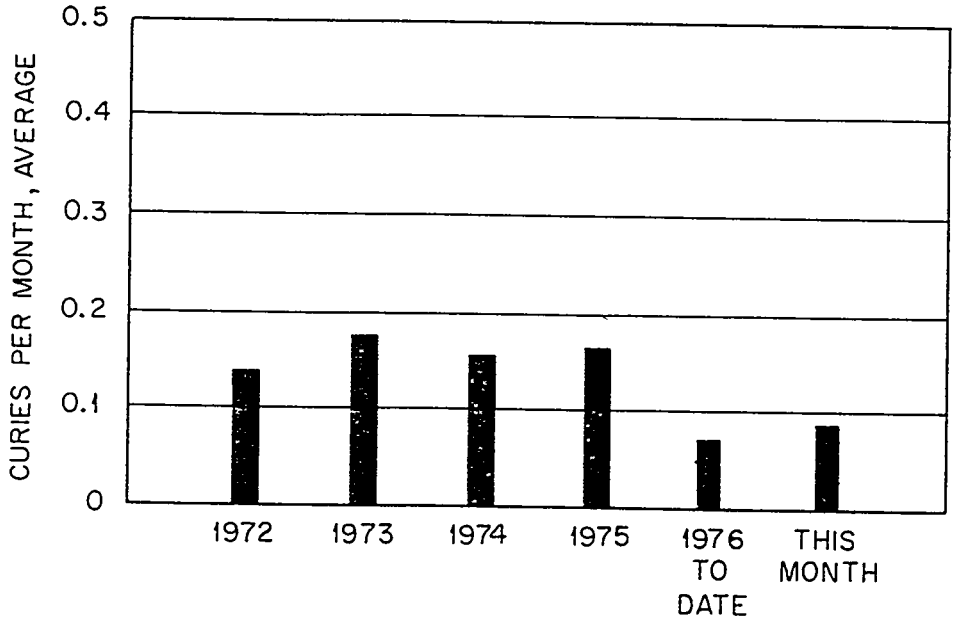


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

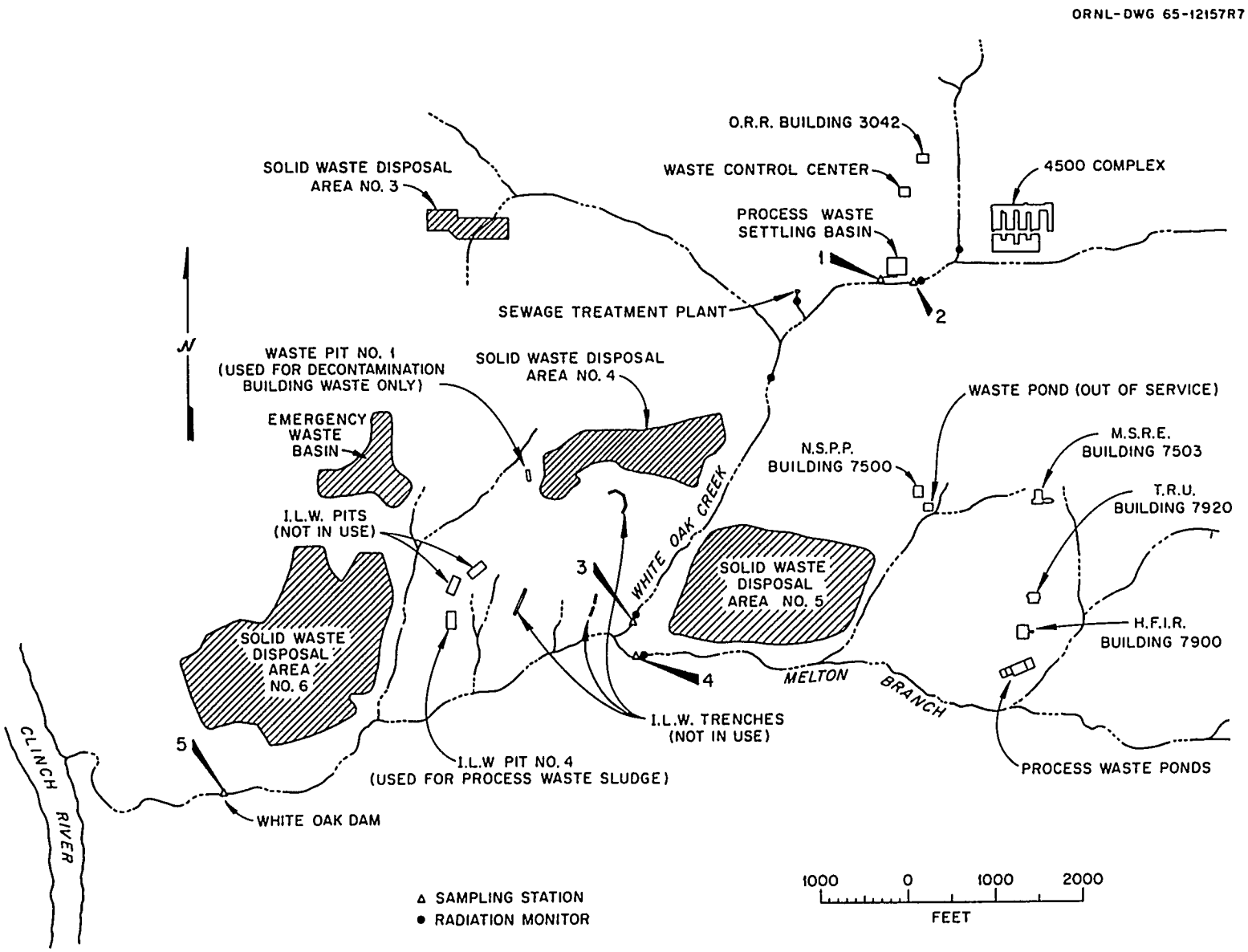


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.004[c]	0.0078
Miscellaneous discharges from east end of plant	2	0.006	0.073
Discharge from Bethel Vallye Operations and Burial Ground No. 4	3	0.388	0.519
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.047	0.081
Total discharge from all sources	3,4	0.435	0.600
White Oak Dam to Clinch River (Health Physics measurement)	5	0.27	0.340

[a]Refers to Fig. 7.

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

[c]This represents the release from the settling basin with the new Process Waste Treatment contributing only 0.0002 curies of ^{90}Sr.

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	89.7	0.036	4.07	0.07	1.76
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.260[c]	29.4	0.42	10.55
3. Reactor Operations (MH112)	2.67	0.014	1.58	0.90	22.61
4. Buildings 3503 and 3508	4.07	0.002	0.23	0.09	2.26
5. Buildings 3025 and 3026	1.53	0.002	0.23	0.26	6.53
6. Building 3019	$\leq$ 0.15	$\leq$ 0.0006	0.07	0.68	17.09
7. Fission Products Development Laboratory	-	0	0	None	0
8. Waste Evaporator, Bldg. 2531	57.7	0.170	19.23	0.52	13.07
9. Building 3525	0.93	0.0002	0.02	0.04	1.01
10. Building 2026	0.23	0.0002	0.02	0.15	3.77
11. Tank Farm Drainage	82.6	0.399	45.14	0.85	21.36

[a]Counted at 30% geometry.

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

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	
Central Radioactive Gas Disposal Facilities	3039	0.08	131.0
Radiochemical-Processing Pilot Plant	3020	0	1.0
MSRE	7912	0	
HFIR	7911	0.01	4.0
Total Activity in Gases Released at X-10 Site		0.09	136
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges			
Room 136			$\leq 2.1\times10^{-4}$
Room 265			$\leq 4.6\times10^{-5}$
Building 5505 Discharges			
Glove Box			$\leq 3.0\times10^{-4}$
Hood			$\leq 5.2\times10^{-3}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]Month of June will be included in the July, 1976 report.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.04	< 0.01	0.03	< 0.005
Zn	0.1	0.02	0.08	0.04	0.1
P	1	0.34	0.48	0.27	0.004
NO_3 (as N)	10	1.18	0.53	0.40	0.01
Hg	0.005	0.0007	c	0.0001	< 0.0001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DISTRIBUTION

1. S. I. Auerbach
2. J. A. Auxier
3. E. E. Beauchamp
4. F. T. Binford
5. R. E. Blanco
6. N. E. Bolton
7. R. E. Brooksbank
8. F. N. Browder
9. C. D. Cagle
10. G. C. Cain
11. W. R. Casto
12. L. T. Corbin
13. W. D. Cottrell
14. J. A. Cox
15. F. L. Culler
16. R. C. Dahlman
17. D. M. Davis
18. G. J. Dixon
19. S. Draggan
20. J. S. Drury
21. J. O. Duguid
22. L. O. Eyman
23. D. E. Ferguson
24. C. L. Fox
25. J. R. Gissel
26. H. W. Godbee
27. E. H. Hardison, ORO
28. F. E. Harrington
29. B. L. Houser
30. S. S. Hurt, III
31. D. G. Jacobs
32. R. G. Jordan
33. S. V. Kaye
34. J. E. Keeton
35. E. M. King
36. L. J. King
37. D. J. Knowles
38. E. Lamb
39. L. C. Lasher
40. T. F. Lomenick
41. R. V. McCord
42. R. L. Newton
43. R. G. Pope
44. H. Postma
45. M. E. Ramsey
46. C. R. Richmond
47. R. A. Robinson
48. J. B. Ruch
49. R. W. Schaich
50. H. E. Seagren
51. M. J. Skinner
52. S. S. Stief
53. Tsuneo Tamura
54. J. R. Thomas
55. D. B. Trauger
56. J. F. Wing, ORO
57. W. R. Winsbro
58. E. J. Witkowski

59-60. Central Research Library
61-62. Laboratory Records
63. Laboratory Records, ORNL-RC
64. Document Reference Section
65. Research and Technical Support, ORO

DATE ISSUED OCT 1 1976

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-76/338

DATE: August 30, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July, 1976

TO: Distribution

FROM: E. E. Beauchamp and L. C. Lasher

ChemRisk Document No. 2511
(3 of 12)

NOTI
natur
Ridge
rectic
forma
shall
Unior

Publicly Releasable

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

ninary
e Oak
ir cor-
he in-
public
ent of

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	$\leq$ 0.15	150
Radiochemical-Processing Pilot Plant	3020	0	1.4
MSRE	7512	0	0
HFIR	7911	< 0.01	15
Total Activity in Gases Released at X-10 Site		$\leq$ 0.15	165
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		2 (^{3}H)[c]	
Building 4508 Ventilation Discharges			
Room 136			2.1×10^{-4}
Room 265			4.6×10^{-5}
Building 5505 Discharges			
Glove Box			3.0×10^{-4}
Hood			5.2×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This includes the discharge for June.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b]			
		3	4	5	Clinch River
Cr	0.05	0.011	< 0.02	0.017	< 0.0001
Zn	0.1	0.026	0.12	0.022	0.008
P	1	0.30	0.74	0.29	0.008
NO_3 (as N)	10	1.07	0.20	0.09	0.06
Hg	0.005	0.002	c	0.0001	< 0.0001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

2511

DATE ISSUED OCT 22 1976

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

FOR INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER

ORNL/CF-76/363

27

76/013

DATE: October 13, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1976

TO: Distribution

36 28

FROM: E. E. Beauchamp and L. C. Lasher

Chem Risk Document No. 2511
(4 of 12)

Publicly Releasable

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

NOTI natur Ridge rectic forma shall Unior ninary e Oak r cor- he in- public ent of

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1976, was 0.07% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.06% MPC_W and 0.01% MPC_W, respectively. These values represent 0.07 Ci of ^{90}Sr and 131 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The solid waste burial grounds contributed 90% or more of total strontium discharged to White Oak Lake.

Process Waste

A total of 3.05 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with >99% efficiency for strontium removal and ∿98% for gross beta removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 146.5 gph.

	Gallons
Total volume generated	128,000
Volume transferred to evaporator	109,000
Tank Farm free space at beginning of month	353,000
Tank Farm free space at end of month	330,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydraulic disposal	153,000

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

	Gallons
Building 3019	15,400
Fission Products Development Laboratory	6,400
ORR and BSR	45,900
High Flux Isotope Reactor	12,900
Radioisotopes Processing Area	8,900
4500 Complex	14,500
Transuranium Processing Area	3,000

GASEOUS WASTE

The ORNL stacks discharged 110 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 183 μCi. Inert gases released from the 3039 and 7911 stacks averaged less that 0.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATION POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The BOD limit was exceeded in four of four samples at the main sewage plant.
2. The chlorine residual limit was exceeded in 17 of 93 samples at the main sewage plant.
3. The fecal coliform limit was exceeded in one sample from the main sewage plant.
4. The suspended solids limit was exceeded in 2 of 4 samples at the main plant.
5. The BOD limit was exceeded in 3 of 4 samples from the 7900 area plant.

6. The chlorine residual limit was exceeded in 5 of 31 samples at the 7900 area plant.

The anticipated completion date for the installation of the two 10 hp aerators at the main sewage plant is by the end of November.

The problems encountered at the 7900 area sewage plant appear to be caused by over-aeration during periods of light load on off-shifts and weekends. Automatic timers have been installed to vary the degree of aeration with the plant load.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, and at a point on the Clinch River upstream from where White Oak Creek empties into the river.

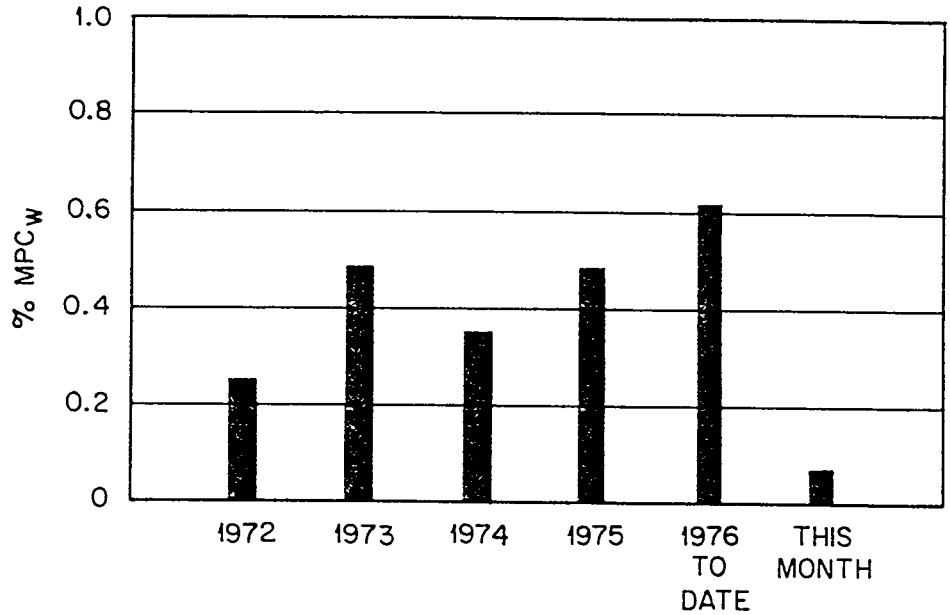


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

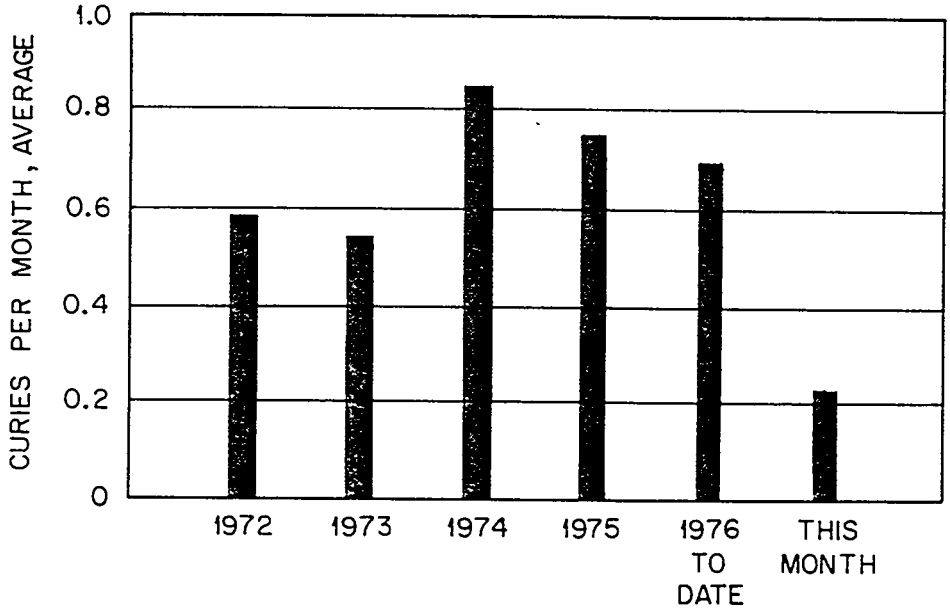


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

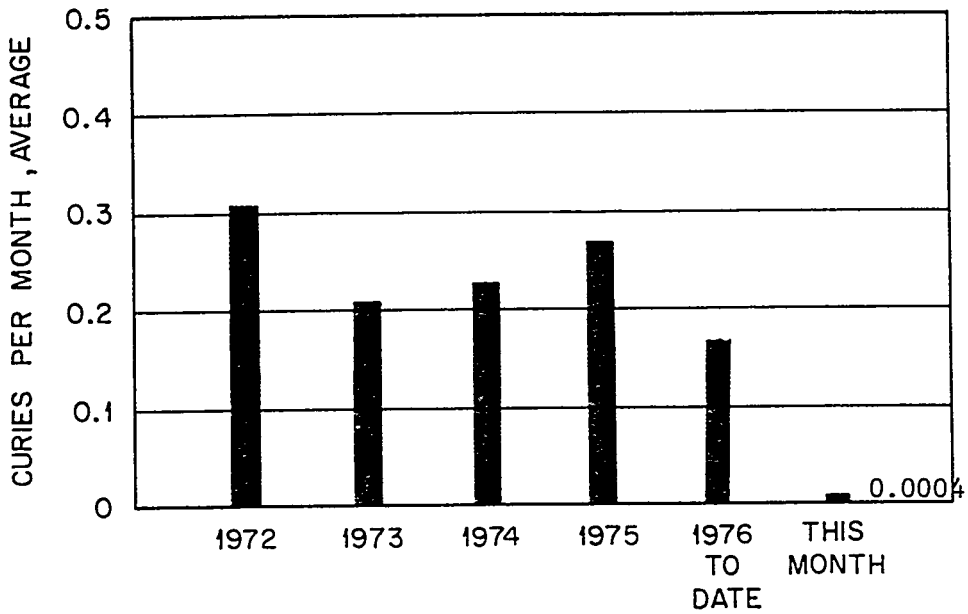


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

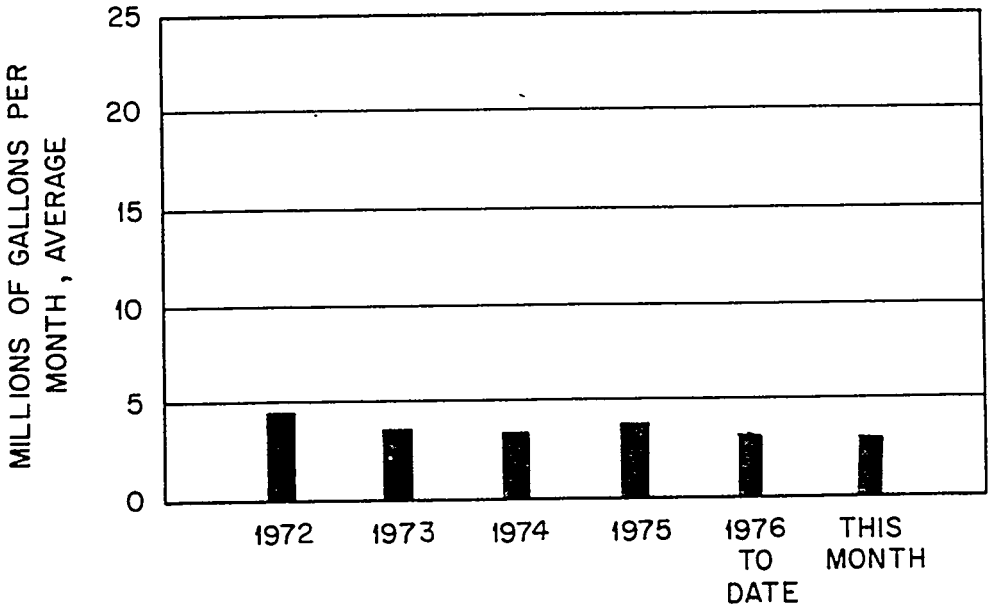


Fig 4. Process Waste Volumes.

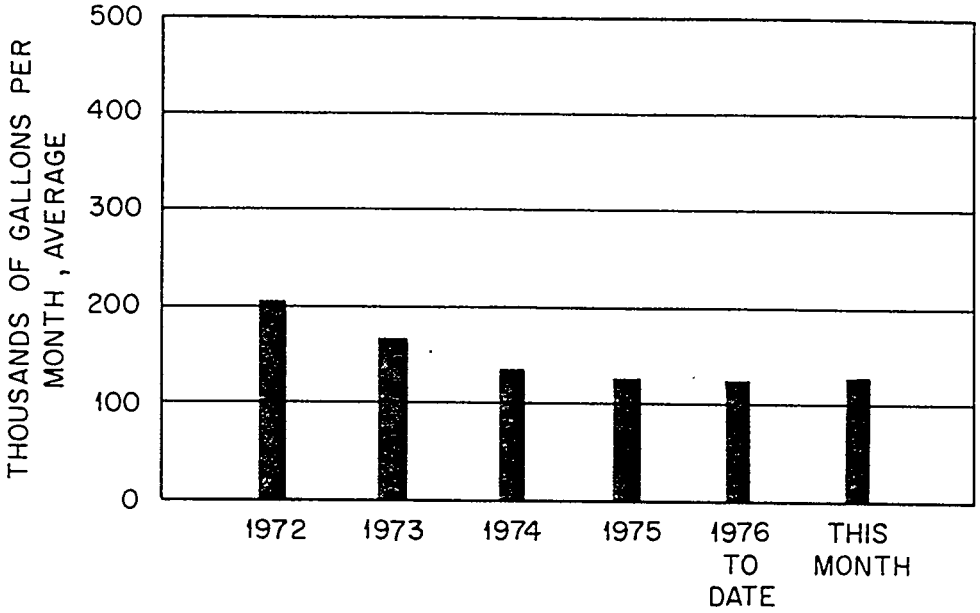


Fig 5. Intermediate – Level Waste Volumes.

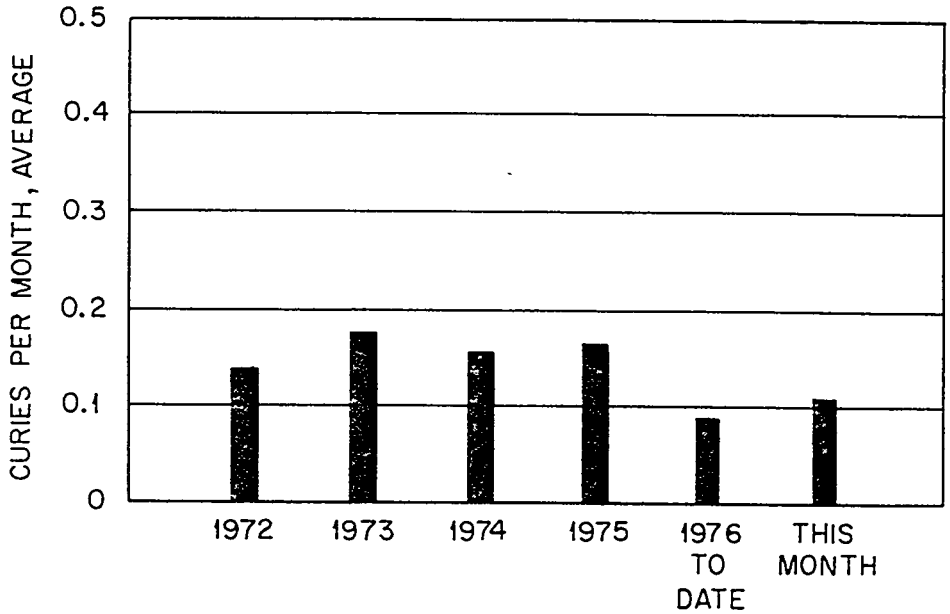


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

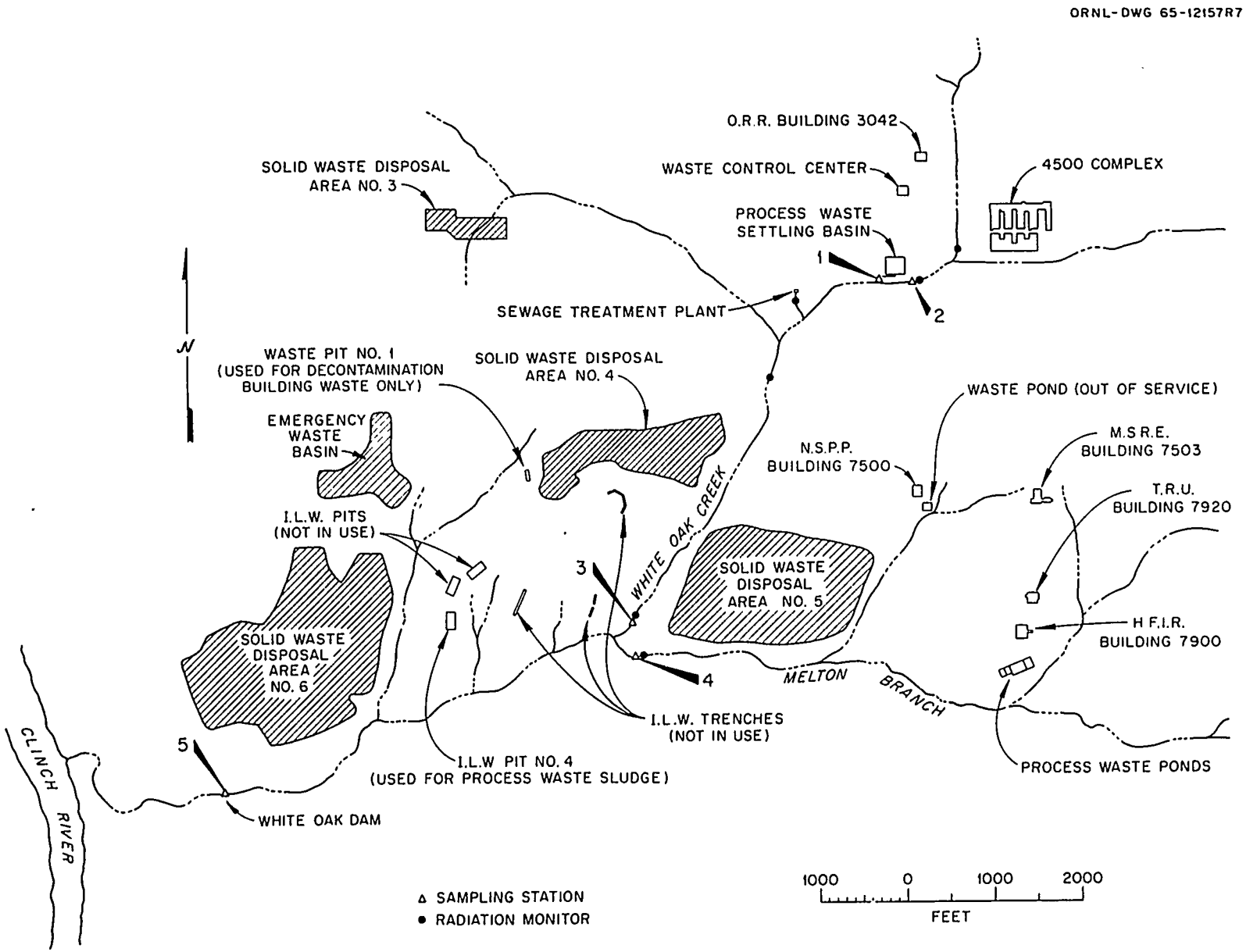


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0004	0.025
Miscellaneous discharges from east end of plant	2	0.0066	0.060
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.20	0.42
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.021	0.042
Total discharge from all sources	3,4	0.22	0.46
White Oak Dam to Clinch River (Health Physics measurement)	5	0.07	0.11

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	98.6	0.022	2.41	0.04	1.15
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.465[c]	50.9	0.31	8.93
3. Reactor Operations (MH112)	2.83	0.0095	1.04	0.59	17.00
4. Buildings 3503 and 3508	2.0	0.0017	0.19	0.15	4.32
5. Building 3025 and 3026	1.30	0.0017	0.19	0.23	6.63
6. Building 3019	1.8	0.0077	0.84	0.75	21.61
7. Waste Evaporator, Bldg. 2531	19.8	0.060	6.57	0.53	15.27
8. Building 3525	0.20	0.00005	0.01	0.04	1.15
9. Building 2026	0.96	0.0008	0.08	0.14	4.03
10. Tank Farm Drainage	88.0	0.345	37.77	0.69	19.83

[a]Counted at 30% geometry.

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

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	$\leq$ 0.10	179
Radiochemical-Processing Pilot Plant	3020	0	1
MSRE	7512	0	0
HFIR	7911	0.01	3
Total Activity in Gases Released at X-10 Site		$\leq$ 0.11	183
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		2.6(^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			3.6×10^{-4}
Room 265			8.2×10^{-5}
Building 5505 Discharges			
Glove Box			5.3×10^{-4}
Hood			9.0×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.02	< 0.01	0.015	< 0.0005
Zn	0.1	0.032	0.15	0.032	0.024
P	1	0.37	1.10	0.57	0.005
NO_3(as N)	10	1.26	0.83	1.17	0.018
Hg	0.005	0.0009	c	0.0002	< 0.00001

[a]These are the Tennessee Department of Public Health guidelines.

[b]Refer to Figure 7. The Clinch River sample was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been dicontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DISTRIBUTION

1. S. I. Auerbach
2. J. A. Auxier
3. E. E. Beauchamp
4. F. T. Binford
5. R. E. Blanco
6. N. E. Bolton
7. R. E. Brooksbank
8. F. N. Browder
9. C. D. Cagle
10. G. C. Cain
11. W. R. Casto
12. L. T. Corbin
13. J. A. Cox
14. F. L. Culler
15. R. C. Dahlman
16. D. M. Davis
17. G. J. Dixon
18. S. Draggan
19. J. S. Drury
20. J. O. Duguid
21. L. O. Eyman
22. D. E. Ferguson
23. C. L. Fox
24. J. R. Gissel
25. H. W. Godbee
26. E. H. Hardison, ORO
27. F. E. Harrington
28. B. L. Houser
29. S. S. Hurt, III
30. D. G. Jacobs
31. R. G. Jordan
32. S. V. Kaye
33. J. E. Keeton
34. E. M. King
35. L. J. King
36. D. J. Knowles
37. E. Lamb
38. L. C. Lasher
39. T. F. Lomenick
40. R. V. McCord
41. R. L. Newton
42. T. W. Oakes
43. R. G. Pope
44. H. Postma
45. M. E. Ramsey
46. C. R. Richmond
47. R. A. Robinson
48. J. B. Ruch
49. R. W. Schaich
50. H. E. Seagren
51. M. J. Skinner
52. S. S. Stief
53. Tsuneo Tamura
54. J. R. Thomas
55. D. B. Trauger
56. J. F. Wing, ORO
57. W. R. Winsbro
58. E. J. Witkowski
59-60. Central Reserach Library
61-62. Laboratory Records
63. Laboratory Records, ORNL-RC
64. D ocument Reference Section
65. Research and Technical Support, ORO

DATE ISSUED DEC 2 1976

251

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

FOR INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER
ORNL/CF-76/419

27

70115

DATE: November 16, 1976

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1976

TO: Distribution

36 28

FROM: E. E. Beauchamp and L. C. Lasher

C. Risk Document No. 2511
(5 of 12)

NOTICE
nature
Ridge
rection
formatic
shall b
Union C

Publicly Releasable

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

ary
ak
or-
in-
lic
of

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1976, was 0.14% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.12% MPC_W and 0.01% MPC_W, respectively. These values represent 0.11 Ci of ^{90}Sr and 113 Ci of ^{3}H.

White Oak Creek Monitoring

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

Process Waste

A total of 2.93 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with >99% efficiency for strontium removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 136 gph.

	Gallons
Total volume generated	95,000
Volume transferred to evaporator	98,000
Tank Farm free space at beginning of month	330,000
Tank Farm free space at end of month	330,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	198,000

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

	Gallons
Building 3019	15,500
Fission Products Development Laboratory	17,600*
ORR and BSR	12,500
High Flux Isotope Reactor	15,800
Radioisotopes Processing Area	8,900
4500 Complex	9,400
Transuranium Processing Area	2,500

*Storage tank pit has a water in-leakage problem from groundwater. This represents the volume jetted from the the storage tank pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL stacks discharged 260 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 202 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.0% and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The BOD limit was exceeded in three of five samples at the main sewage plant.
2. The ammonia nitrogen was exceeded in three of five samples at the main plant.
3. The chlorine residual limit was exceeded in five of ninety samples at the main plant and for seven of thirty samples at the 7900 area plant.

4. The suspended solids limit was exceeded in one of five samples at the main sewage plant.

The installation of the two 10 hp aerators in the ponds at the Main Sewage Treatment Plant are expected to be completed by the end of November.

The 7900 area plant operated more effectively during this month. For example, the BOD limit was not exceeded during this month whereas this parameter was exceeded in 3 of 4 samples the previous month.

Table 4 presents the results of the chemical monitoring at White Oak Creek, Melton Branch, and at a point in the Clinch River upstream from where White Oak Creek empties into the river.

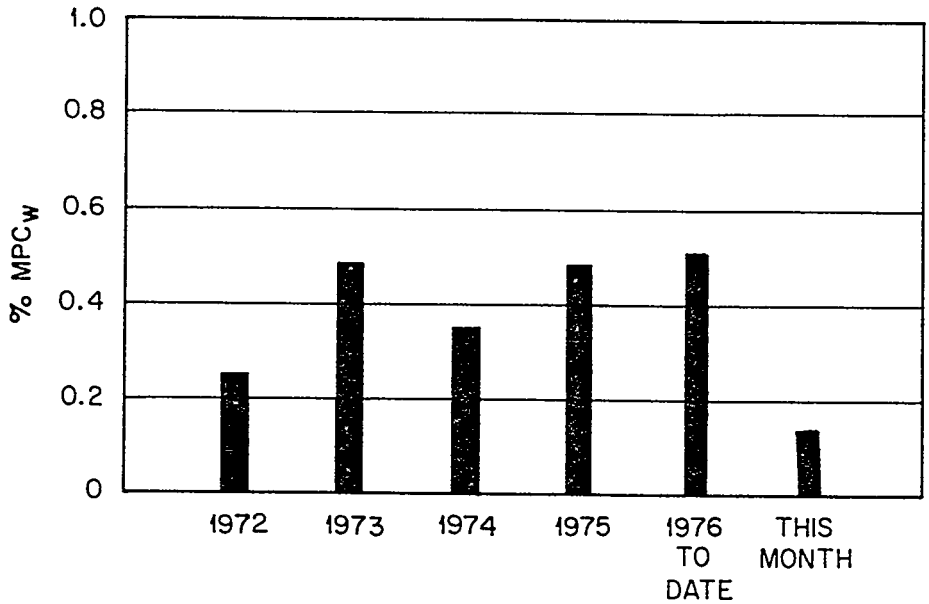


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

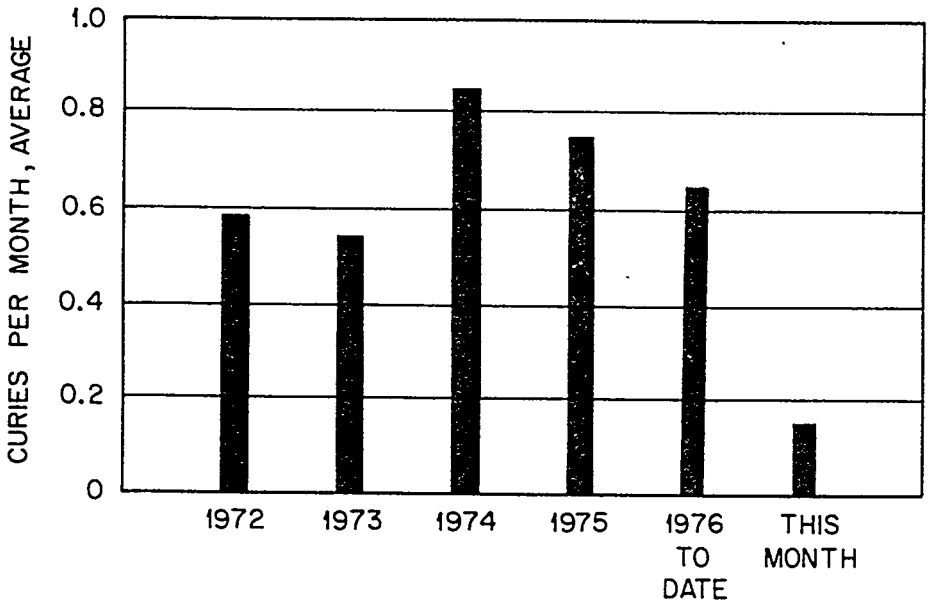


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

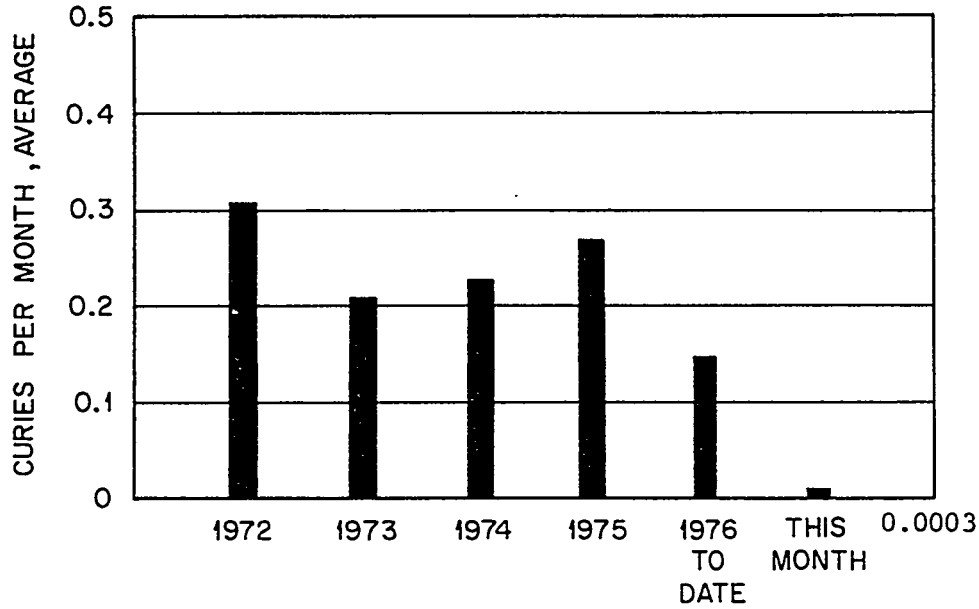


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

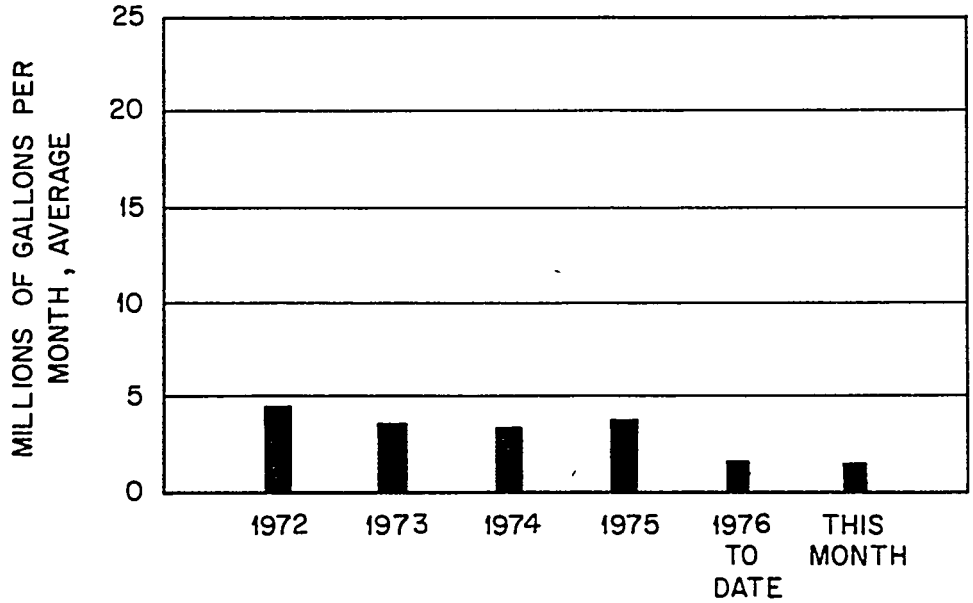


Fig 4. Process Waste Volumes.

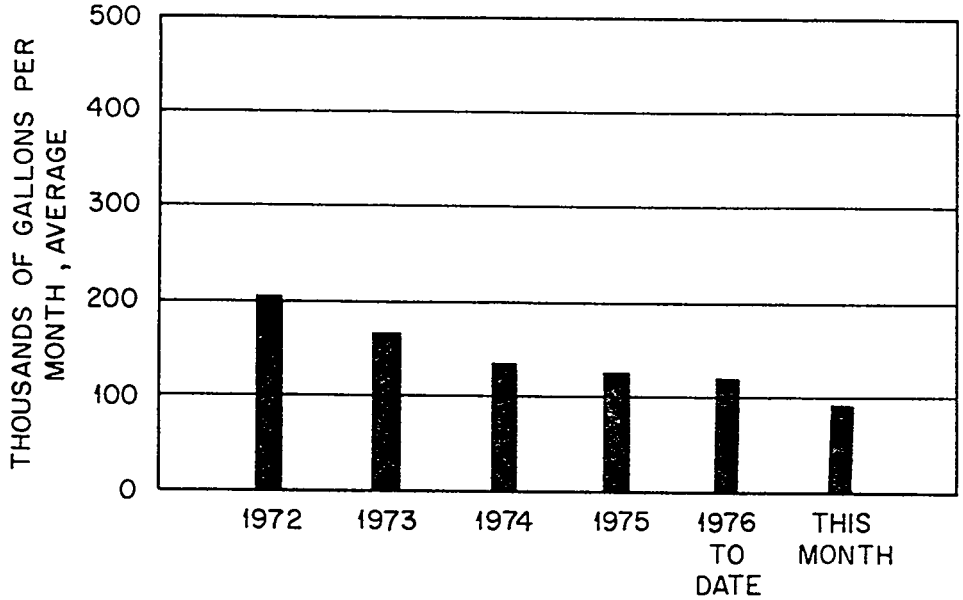


Fig 5. Intermediate – Level Waste Volumes.

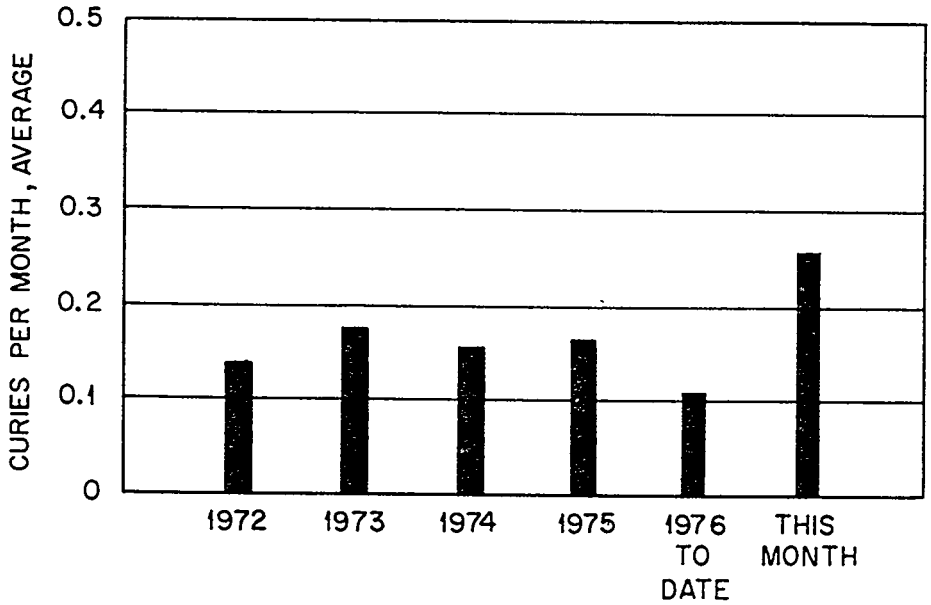


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

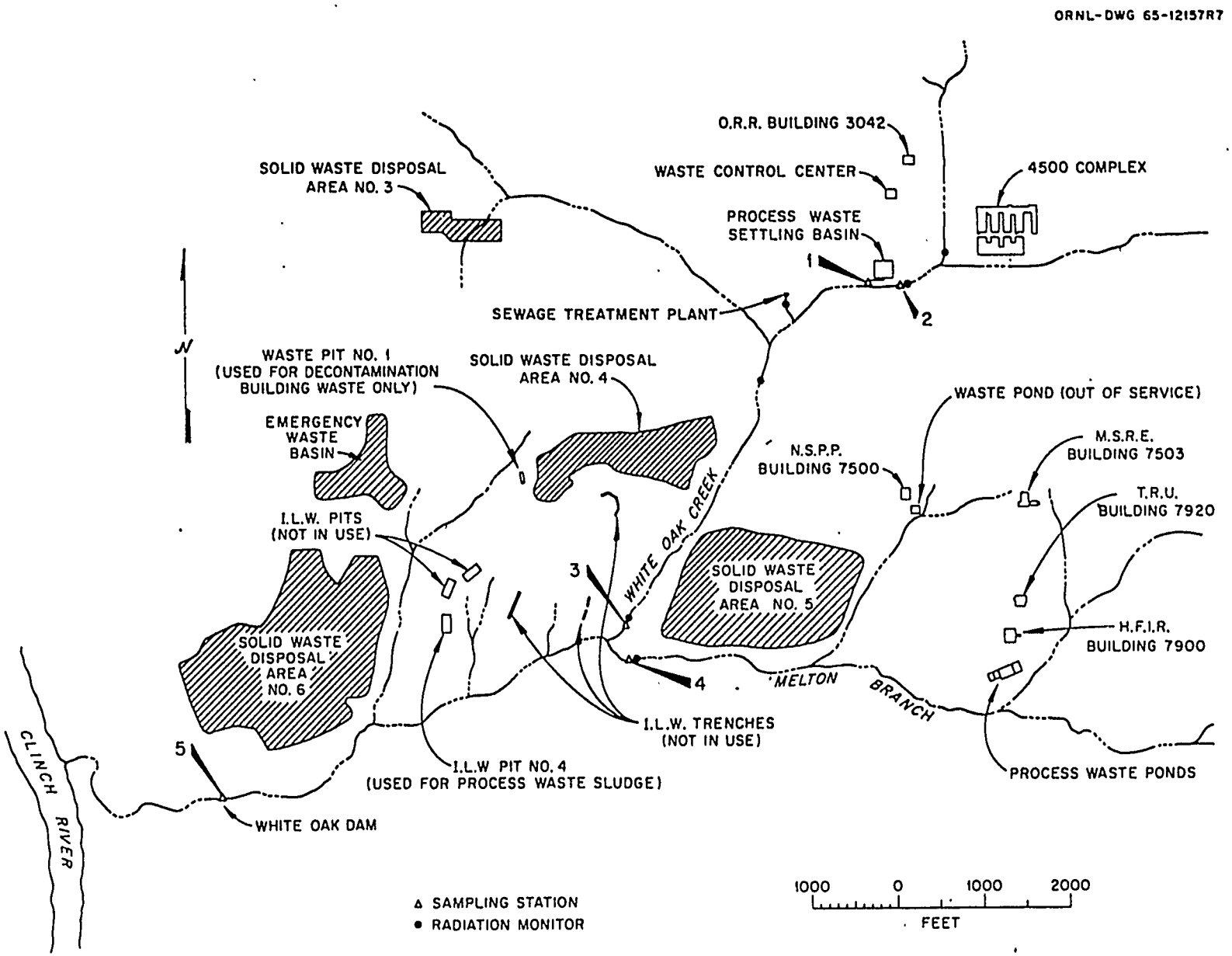


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0003	0.021
Miscellaneous discharges from east end of plant	2	0.019	$\leq$ 0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.12	0.29
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.008	0.06
Total discharge from all sources	3,4	0.13	0.35
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.16

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	93.6	0.021	2.81	0.04	1.32
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.430[c]	57.44	0.44	14.52
3. Reactor Operations (MH112)	6.65	0.015	2.00	0.39	12.87
4. Buildings 3503 and 3508	3.67	0.003	0.40	0.14	4.62
5. Buildings 3025 and 3026	1.07	0.002	0.27	0.30	9.90
6. Building 3019	4.23	0.011	1.47	0.44	14.52
7. Waste Evaporator, Bldg. 2531	8.56	0.026	3.47	0.54	17.82
8. Building 3525	0.50	0.0003	0.04	0.01	0.33
9. Building 2026	0.56	0.0003	0.04	0.10	3.30
10. Tank Farm Drainage	67.1	0.240	32.06	0.63	20.79

[a]Counted at 30% geometry.

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

[c]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurments in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	0	0
Central Radioactive Gas Disposal Facilities	3039	0.24	75.0
Radiochemical-Processing Pilot Plant	3020	0	0.2
MSRE	7512	0	0
HFIR	7911	$\leq$ 0.02	126.8
Total Activity in Gases Released at X-10 Site		$\leq$ 0.26	202
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		1(^{3}H)	
Building 4508 Ventilation Discharges			
Room 136			2.1×10^{-4}
Room 265			4.7×10^{-5}
Building 5505 Discharges			
Glove Box			3.0×10^{-4}
Hood			5.2×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	< 0.01	< 0.01	0.0097	0.00002
Zn	0.1	0.048	0.13	0.03	0.012
P	1	0.38	0.60	0.40	0.007
NO_3 (as N)	10	2.63	6.86	0.69	0.37
Hg	0.005	0.0007	c	0.00016	0.00001

[a]Tennessee water quality criteria for fish and aquatic life.

[b]Refer to Figure 7. The Clinch River samples was taken upstream from the point where White Oak Creek enters the river.

[c]This analysis has been discontinued.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

DISTRIBUTION

1. S. I. Auerbach
2. J. A. Auxier
3. E. E. Beauchamp
4. F. T. Binford
5. R. E. Blanco
6. N. E. Bolton
7. R. E. Brooksbank
8. F. N. Browder
9. C. D. Cagle
10. G. C. Cain
11. W. R. Casto
12. L. T. Corbin
13. J. A. Cox
14. F. L. Culler
15. R. C. Dahlman
16. D. M. Davis
17. G. J. Dixon
18. S. Draggan
19. J. S. Drury
20. J. O. Duguid
21. L. O. Eyman
22. D. E. Ferguson
23. C. L. Fox
24. J. R. Gissel
25. H. W. Godbee
26. E. H. Hardison, ORO
27. F. E. Harrington
28. B. L. Houser
29. S. S. Hurt, III
30. D. G. Jacobs
31. R. G. Jordan
32. S. V. Kaye
33. J. E. Keeton
34. E. M. King
35. L. J. King
36. D. J. Knowles
37. E. Lamb
38. L. C. Lasher
39. T. F. Lomenick
40. R. V. McCord
41. R. L. Newton
42. T. W. Oakes
43. R. G. Pope
44. H. Postman
45. M. E. Ramsey
46. G. W. Renfro
47. C. R. Richmond
48. R. A. Robinson
49. J. B. Ruch
50. R. W. Schaich
51. H. E. Seagren
52. M. J. Skinner
53. S. S. Stief
54. Tsuneo Tamura
55. J. R. Thomas
56. D. B. Trauger
57. J. F. Wing, ORO
58. W. R. Winsbro
59. E. J. Witkowski
60-61. Central Research Library
62-63. Laboratory Records
64. Laboratory Records, ORNL-RC
65. Document Reference Section
66. Research and Technical Support, ORO

DATE ISSUED MAR 1977

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

FOR INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER

ORNL/CF-77/65

DATE: February 23, 1977

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1976

TO: Distribution

FROM: E. E. Beauchamp[36] and L. C. Lasher[28] 27

Che...Risk Document No. 2511
(6 of 12)

NOTIC nature Ridge rectior format shall I Union

Publicly Releasable

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

nary Oak cor- e in- ublic nt of

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1976, was 0.4% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.26% MPC_W and 0.08% MPC_W, respectively. These values represent 0.3 Ci of ^{90}Sr and 923 Ci of ^{3}H.

White Oak Creek Monitoring

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

Process Waste

A total of 3.94 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2.

The Process Waste Treatment Plant continued to operate effectively with 99.89% efficiency for strontium removal.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 164 gph.

	Gallons
Total volume generated	91,000
Volume transferred to evaporator	122,000
Tank Farm free space at beginning of month	328,000
Tank Farm free space at end of month	355,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	166,000

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

	Gallons
Building 3019	18,600
Fission Products Development Laboratory (inleakage of groundwater to tank pit)	10,500
ORR and BSR	8,700
High Flux Isotope Reactor	8,800
Radioisotopes Processing Area	6,600
4500 Complex	8,900
Transuranium Processing Area	4,800

GASEOUS WASTE

The ORNL stacks discharged 40 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 85 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 0.6% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

The EPA discharge limits for White Oak Creek, Melton Branch and the two sewage plants were satisfied except for the following:

1. The ammonia nitrogen limit was exceeded in five of five samples at the main sewage plant.
2. The chlorine residual limit was exceeded in five of five samples at the 7900 area plant.
3. The suspended solids limit was exceeded in four of five samples at the 7900 area plant.

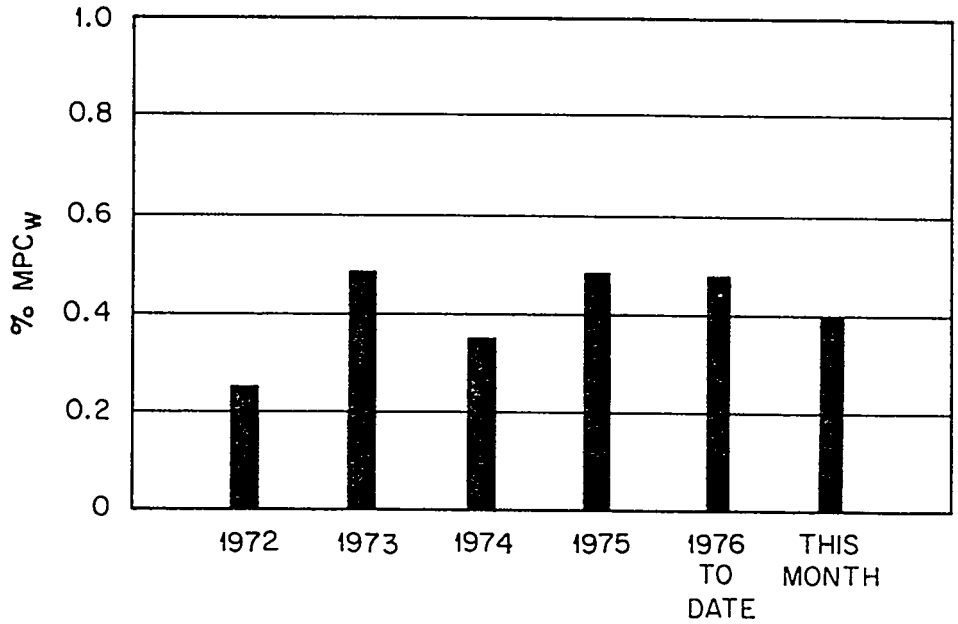


Fig 1. Calculated Percent of MPC in Clinch River Due to ORNL Discharges. (Health Physics Measurements at White Oak Dam)

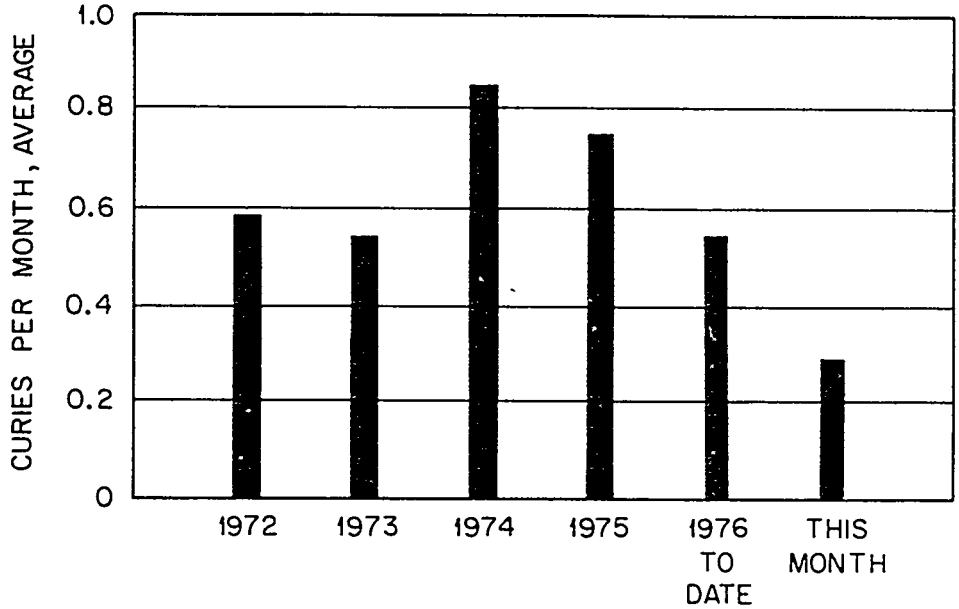


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

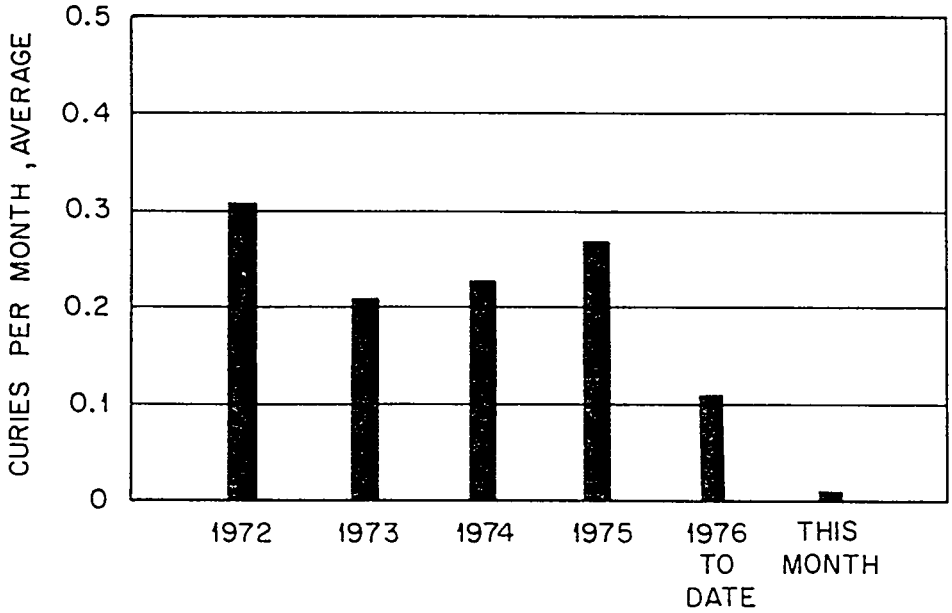


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

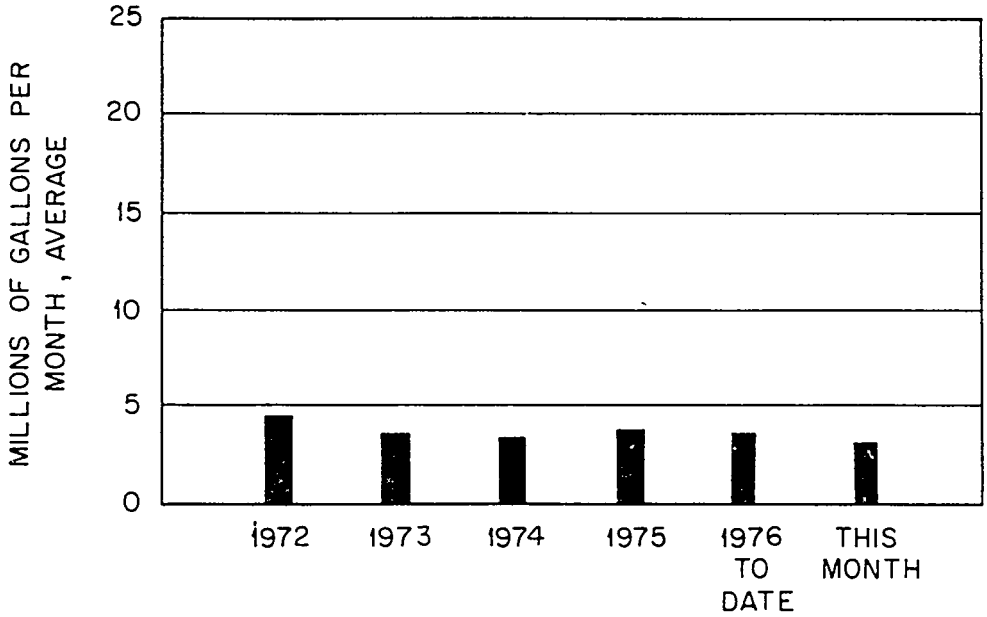


Fig 4. Process Waste Volumes.

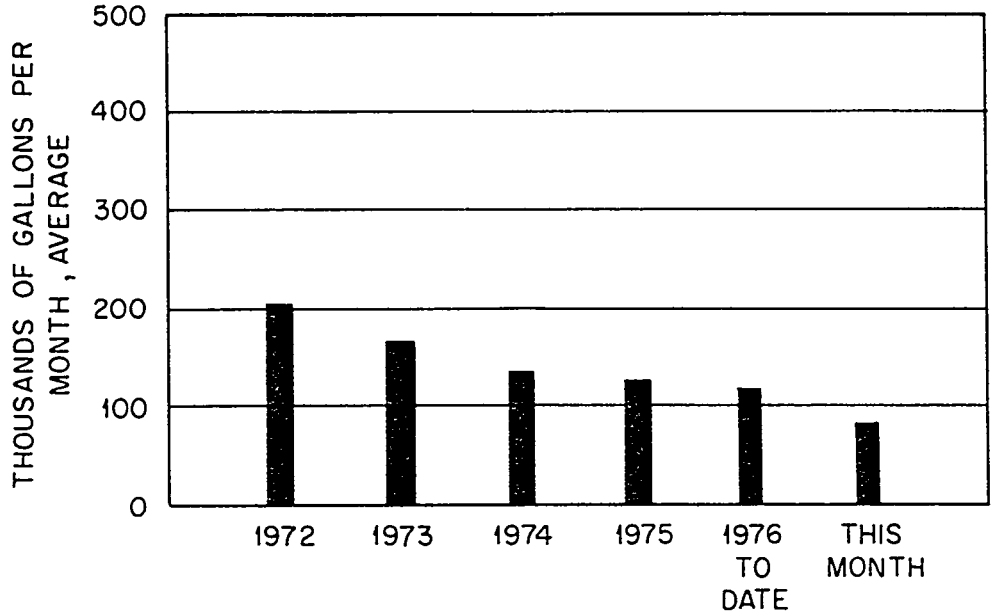


Fig-5. Intermediate – Level Waste Volumes.

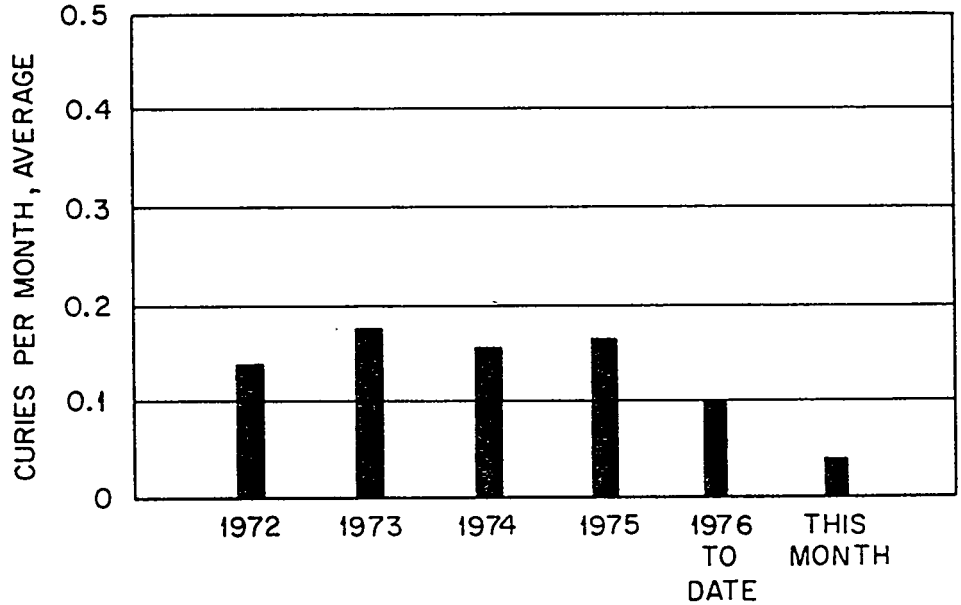


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

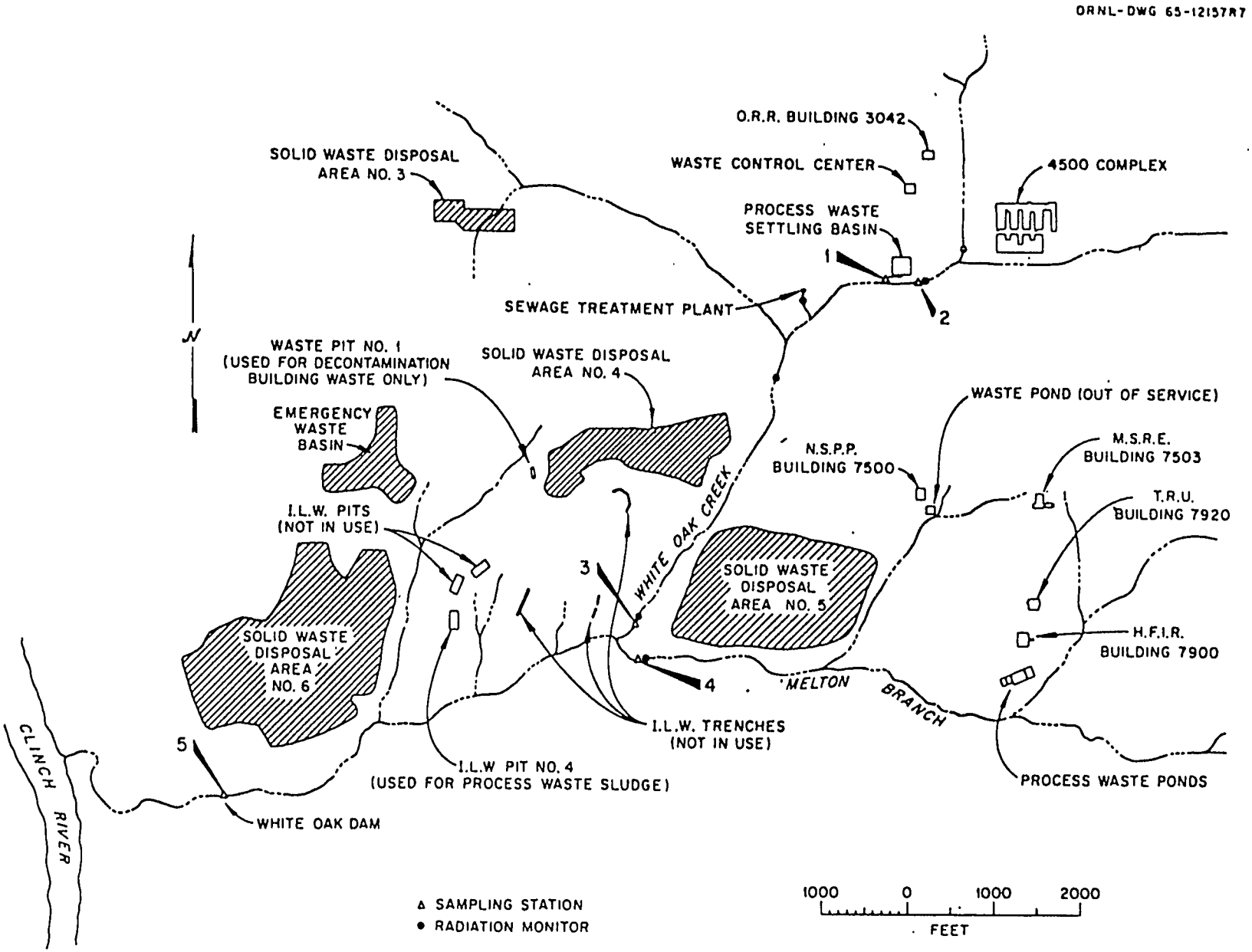


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross-Beta, Curies[b]
Process Waste	1	0.0012	0.053
Miscellaneous discharges from east end of plant	2	0.024	0.078
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.26	0.80
Discharge from Melton Valley Operations and Burial Ground No. 5.	4	0.033	0.092
Total discharge from all sources	3,4	0.29	0.89
White Oak Dam to Clinch River (Health Physics measurement)	5	0.30	0.41

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	Gross-Beta Activity Average c/m/ml[a]	Gross-Beta Curies[b]	Gross-Beta % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	101	0.023	1.5	0.04	1.1
2. Radioisotopes Processing Area (MH114 minus MH112)	-	0.27[c]	18.1	0.24	6.9
3. Reactor Operations (MH112)	2.12	0.006	0.4	0.49	14.0
4. Buildings 3503 and 3508	2.50	0.0024	0.2	0.17	4.9
5. Buildings 3025 and 3026	0.99	0.0028	0.2	0.50	14.3
6. Building 3019	9.48	0.0086	0.6	0.16	4.6
7. Waste Evaporator, Bldg. 2531	6.32	0.025	1.7	0.71	20.2
8. Building 3525	0.3	Trace	-	0.03	0.9
9. Building 2026	0.36	0.0002	0.01	0.08	2.3
10. Tank Farm Drainage	188	1.15	77.3	1.08	30.8

[a] Counted at 30% geometry.

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

[c] The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

Area	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	0
Central Radioactive Gas Disposal Facilities	3039	≤ 0.03	71
Radiochemical-Processing Pilot Plant	3020	< 0.01	1
MSRE	7512	< 0.01	0
HFIR	7911	≤ 0.01	13
Total Activity in Gases Released at X-10 Site		≤ 0.04	85
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		< 0.5(H^3)	
Building 4508 Ventilation Discharges			
Room 136			3.2×10^{-4}
Room 265			7.0×10^{-5}
Building 5505 Discharges			
Glove Box			4.5×10^{-4}
Hood			7.8×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

Table 4. Concentration of Nonradioactive Effluents

Contaminant	Standard[a] ppm	Sample Point[b] 3	4	5	Clinch River
Cr	0.05	0.02	< 0.01	0.009	< 0.0001
Zn	0.1	0.044	0.052	0.030	0.028
P	1	0.19	0.24	0.22	0.002
NO_3 (as N)	10	0.73	0.13	0.69	0.039
Hg	0.005	0.0009	c	0.0002	0.00001

[a]Tennessee water quality criteria for fish and aquatic life.

[b]Refer to Figure 7. The Clinch River samples were taken upstream from the point where White Oak Creek enters the river.

NOTE: The monthly composite samples from White Oak Creek and Melton Branch are continuous and proportional to the flow. Those from White Oak Dam and the Clinch River are daily and weekly grab samples, respectively, which are composited for the month.

ORNL/CF-77/65

DISTRIBUTION

1. W. J. Armento
2. S. I. Auerbach
3. J. A. Auxier
4. E. E. Beauchamp
5. F. T. Binford
6. R. E. Blanco
7. N. E. Bolton
8. R. E. Brooksbank
9. F. N. Browder
10. C. D. Cagle
11. G. C. Cain
12. W. R. Casto
13. L. T. Corbin
14. J. A. Cox
15. F. L. Culler
16. R. C. Dahlman
17. D. M. Davis
18. W. H. Dickson
19. G. J. Dixon
20. S. Draggan
21. J. S. Drury
22. J. O. Duguid
23. L. O. Eyman
24. D. E. Ferguson
25. C. L. Fox
26. J. R. Gissel
27. H. W. Godbee
28. E. H. Hardison, ORO
29. F. E. Harrington
30. C. F. Holloway
31. S. S. Hurt, III
32. R. G. Jordan
33. S. V. Kaye
34. E. M. King
35. L. J. King
36. D. J. Knowles
37. E. Lamb
38. L. C. Lasher
39. T. F. Lomenick
40. R. V. McCord
41. E. Newman
42. R. L. Newton
43. T. W. Oakes
44. R. G. Pope
45. H. Postma
46. M. E. Ramsey
47. G. W. Renfro
48. C. R. Richmond
49. R. A. Robinson
50. J. B. Ruch
51. R. W. Schaich
52. H. E. Seagren
53. M. J. Skinner
54. S. S. Stief
55. Tsuneo Tamura
56. J. R. Thomas
57. D. B. Trauger
58. J. F. Wing, ORO
59. W. R. Winsbro

60–61. Central Research Library
62–63. Laboratory Records
64. Laboratory Records, ORNL-RC
65. Document Reference Section
66. Research and Technical Support, ORO

OCT 19 1978

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-78/330

DATE: October 4, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August, 1978

TO: Distribution

FROM: L. C. Lasher

SPONSORED BY: J. A. Cox

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

Technical Information Officer — Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste System for the month of August was about normal. The performance of the Process Waste Treatment Plant continued to improve during the month. The total ^{90}Sr discharged to White Oak Creek was 184 mCi compared to 103 mCi for the previous month. The ORNL Stacks discharged 170 mCi of ^{131}I. There were no unusual incidents during the month.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of August, 1978, was 0.13% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.1% MPC_W and 0.03% MPC_W, respectively. These values represent 0.18 Ci of ^{90}Sr and 549 Ci of ^{3}H. The above data for July, 1978, were not available at the time that report was prepared. These data were as follows: The contamination of the Clinch River resulting from ORNL discharges was 0.11% of the MPC_W; the main contaminants were ^{90}Sr (0.07% MPC_W) and ^{3}H (0.03% MPC_W). These values represent 0.08 Ci and 221 Ci, respectively.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 191.01 and 41.32 million gallons, respectively. The July flows for Stations 3 and 4 were 151.14 and 30.79 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (184 mCi) was 81 mCi more than the amount reported for July. This increase is attributed to contamination seepage from the Solid Waste Storage areas. The amount of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek remained essentially unchanged at 1 mCi and 8 mCi, respectively.

The following tabulation shows a breakdown of ^{90}Sr entering White Oak Creek compared to that measured at Station 3. The difference is presumed to be coming from Burial Ground No. 4 and other contaminated areas along White Oak Creek.

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	13.0	
190 Ponds	1.0	
Process Waste Treatment Plant	2.0	
Sewage Treatment Plant	8.0	
	24.0	
Station 3, WOC	140	
Burial Ground No. 4		116.0
Station 4, Melton Branch	44.0	
(Burial Ground No. 5)		44.0
Total ^{90}Sr to WOC	184	
Total ^{90}Sr from Burial Grounds (Presumed)		160
% ^{90}Sr Presumed from Burial Grounds		87%

Process Waste

A total of 5.24 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATIONS DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
157	B	111.5	1884
158	C	124.5	1658
159	A	119.5	1658
160	B	118	1882
161	C	137	1822
162	A	136	1981
163	B	128	1954
164	A	117	1882

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 175 gph.

	Gallons
Total volume generated	134,000
Volume transferred to hydrofracture	83,000
Volume transferred to evaporator	130,000
Tank Farm free space at beginning of month	352,000
Tank Farm free space at end of month	428,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	37,000

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

	Gallons
Building 3019	10,400
Fission Products Development Laboratory	18,100*
ORR and BSR	15,400
High Flux Isotope Reactor	19,900
Radioisotopes Processing Area	16,500
4500 Complex	12,300
Transuranium Processing Area	1,200

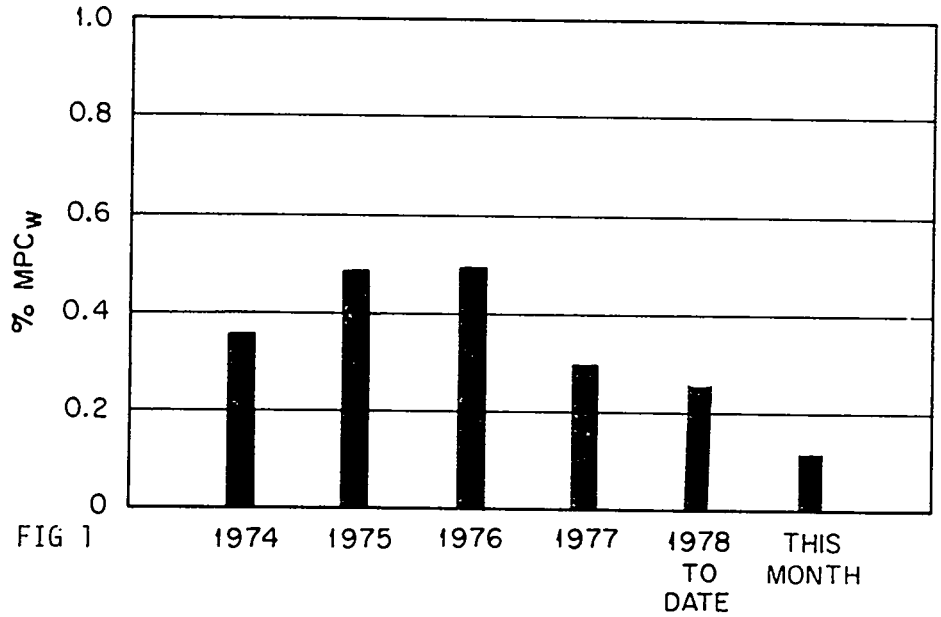
GASEOUS WASTE

The ORNL stacks discharged $\leq$ 170 mCi of ^{131}I this month. The bulk of this activity was released by the 3039 system as a result of ^{131}I processing. The filterable particulate activities released during the

*Storage tank pit has a water inleakage problem from groundwater. This represents the volume jetted from the storage tank pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

period amounted to 68 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.5% and 0.2% of the calculated maximum permissible operating level for these stacks. Indiviudal stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

ORNL-DWG 75-2539R3



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

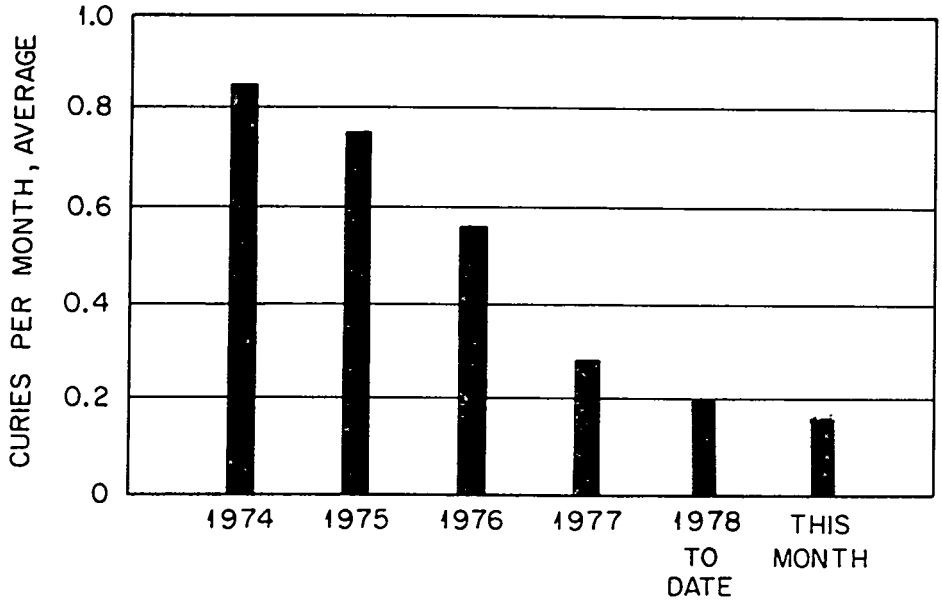


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

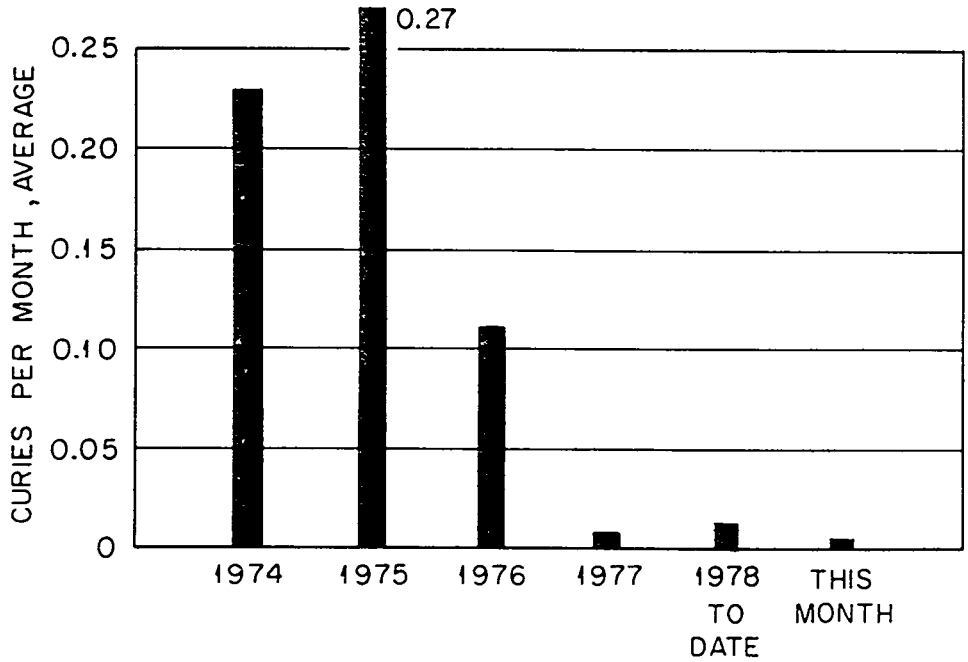


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

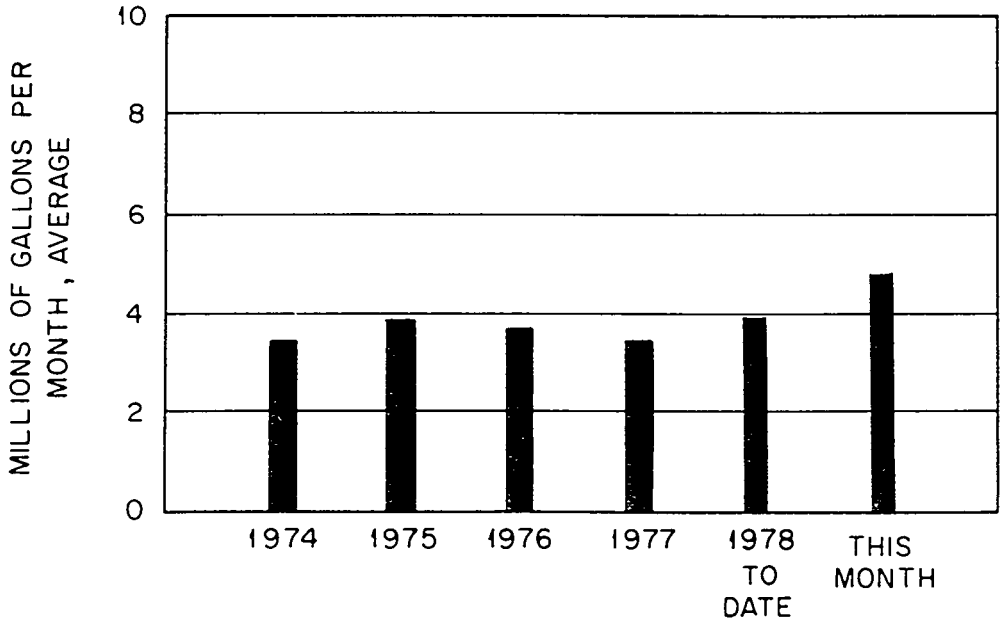


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25418R3

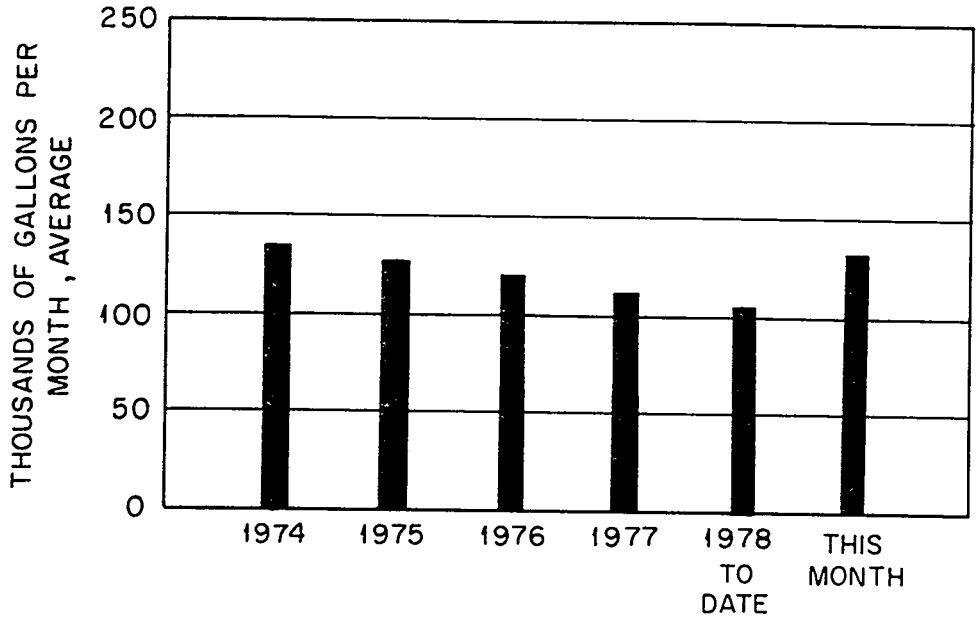


Fig 5. Intermediate – Level Waste Volumes.

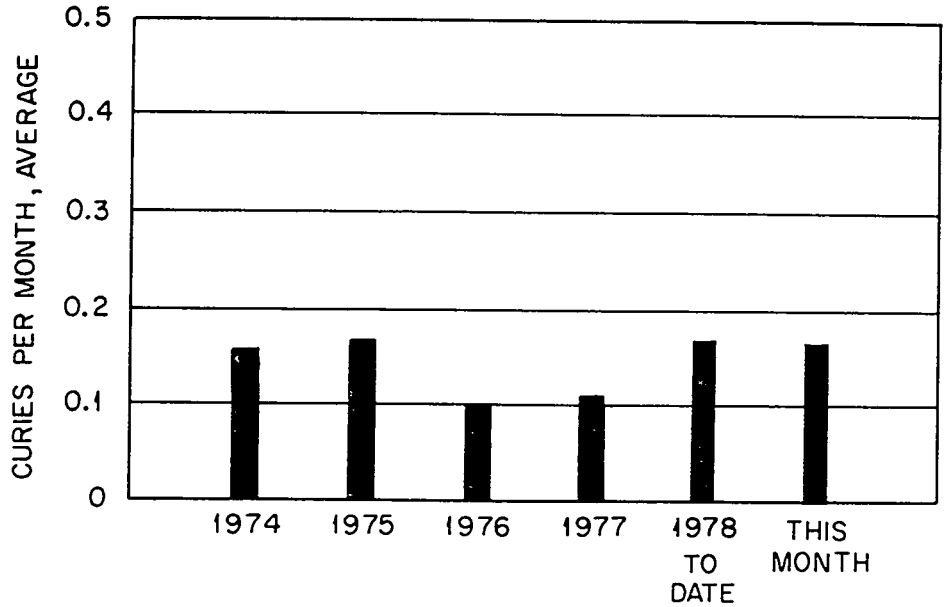


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

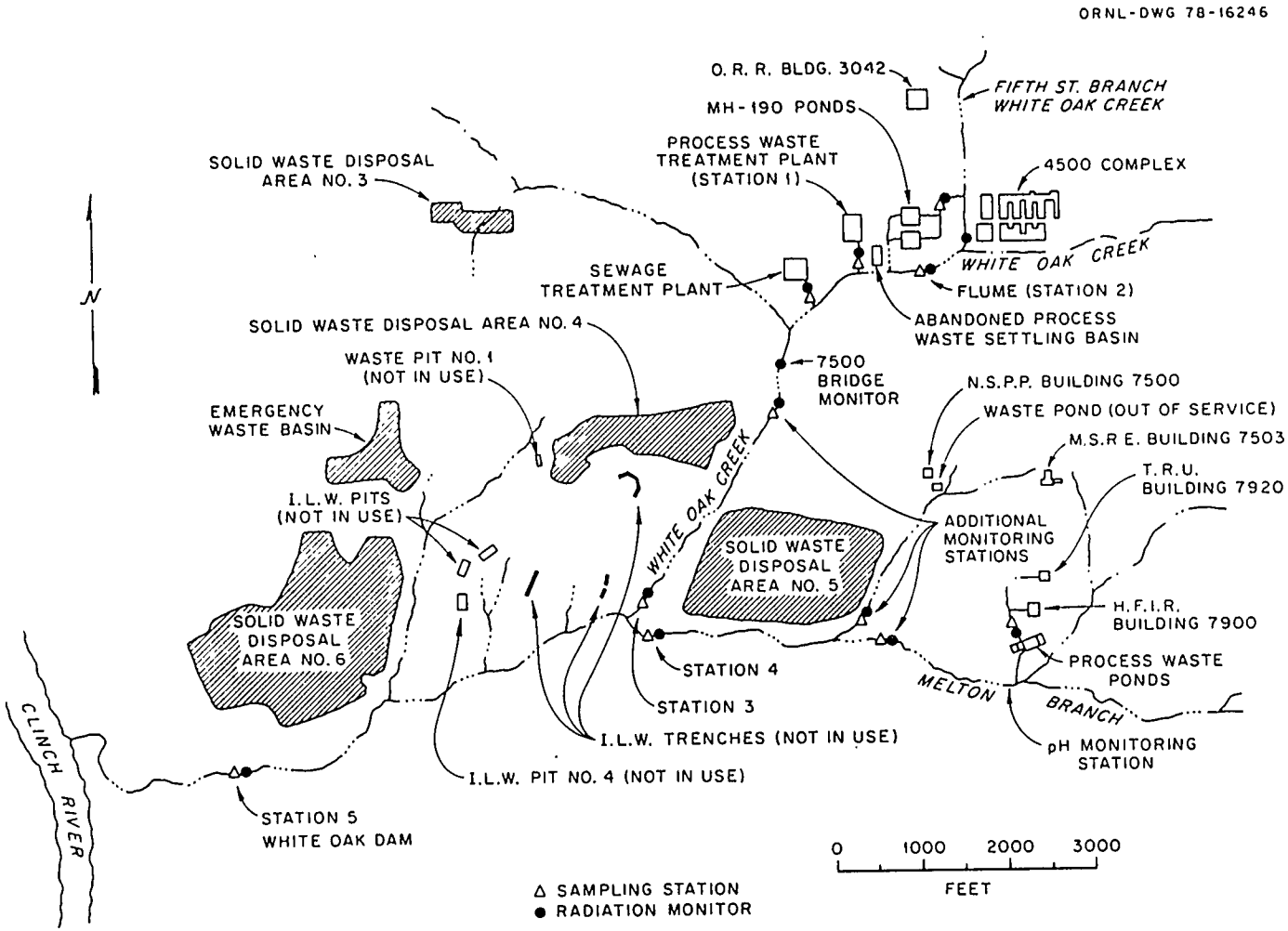


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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	0.002	0.235[c]
Miscellaneous discharges from east end of plant	2	0.013	0.073
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.140	0.221
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.044	0.063
Total discharge from all sources	3,4	0.184	0.284
White Oak Dam to Clinch River (Health Physics measurement)	5	0.18	0.31

[a]Refers to Fig. 7.

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

[c]This value appears high and is being rechecked.

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	174	0.059	6.9	0.20	4.4
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.176[a]	20.5	0.57	12.5
3. Reactor Operations (MH112)	0.84	0.001	0.1	1.05	23.0
4. Buildings 3503 and 3508	9.6	0.003	0.3	0.17	3.7
5. Buildings 3025 and 3026	4.6	0.006	0.70	0.78	17.1
6. Building 3019	8.0	0.003	0.3	0.20	4.4
7. Waste Evaporator, Building 2531	23.8	0.013	1.5	0.32	7.0
8. Building 3525	1.06	< 0.001	—	0.13	2.8
9. Building 2026	0.94	< 0.001	—	0.07	1.5
10. Tank Farm Drainage	326	0.599	69.7	1.08	23.6

[a] The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[a,b] (Microcuries)
HRLAL	2026	< 0.01	0.02
Central Radioactive Gas Disposal Facilities	3039	≤ 0.17	67
Radiochemical-Processing Pilot Plant	3020	< 0.01	0.03
MSRE	7512	< 0.01	0.02
HFIR & TRU	7911	< 0.01	0.8
Total Activity in Gases Released at X-10 Site		≤ 0.17	68
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		[c]	
Building 4508 Ventilation Discharges Room 136			$\leq 1.2 \times 10^{-4}$
Room 265			$\leq 3.5 \times 10^{-5}$
Building 5505 Glove Box			$\leq 2.3 \times 10^{-4}$
Hood			$\leq 3.9 \times 10^{-3}$

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] Data not available for this reporting period. It will be included in the report for September, 1978.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-78/357

781101

DATE: November 1, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September, 1978

27

TO: Distribution

FROM: L. C. Lasher 28

SPONSORED: J. A. Cox

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

Technical Information Officer
ORNL Site

Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of September was normal. ILW Injection No. 17 was completed during the period. The total ^{90}Sr discharged to White Oak Lake was 66 mCi compared to 184 mCi for the previous month. The ORNL Stacks discharged 200 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River - August, 1978

Radioactive contamination of the Clinch River resulting from ORNL discharges during the month of September, 1978, was 0.05% of the MPC_W (see Figure 1). The concentrations of the main contaminants, ^{90}Sr and ^{3}H, were 0.03% MPC_W and 0.02% MPC_W, respectively. These values represent 0.04 Ci of ^{90}Sr and 166 Ci of ^{3}H.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 136.2 and 22.0 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (66 mCi) was 118 mCi less than the amount reported for August. This improvement is attributed to the arid climatic conditions during the period. The amounts of ^{90} Sr released from the 190 ponds and the sanitary system into White Oak Creek decreased significantly to 0.6 mCi and 8 mCi, respectively.

The following tabulation shows a breakdown of ^{90}Sr entering White Oak Creek compared to that measured at Station 3. The difference is presumed to be coming from Burial Ground No. 4 and other contaminated areas along White Oak Creek.

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	11.0	
190 Ponds	0.6	
Process Waste Treatment Plant	2.0	
Sewage Treatment Plant	8.0	
	21.6	
Station 3, WOC	28.0	
Burial Ground No. 4		6.4
Station 4, Melton Branch	38.0	
(Burial Ground No. 5)		38.0
Total ^{90}Sr to WOC	66.0	
Total ^{90}Sr from Burial Grounds (Presumed)		44.4
% ^{90}Sr Presumed from Burial Grounds		67%

Process Waste

A total of 3.75 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
165	B	127	1899
166	C	134	1878
167	A	134.5	1985
168	B	92.5	2068
169	A	126	1928
170	B	145	1973
171	C	127	1883
172	A	112.5	1986

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 160 gph. A summary of operations is given below:

	Gallons
Total volume generated	106,000
Volume transferred to evaporator	115,000
Tank Farm free space at beginning of month	428,000
Tank Farm free space at end of month	433,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	40,000

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

	Gallons
Building 3019	3,500
Fission Products Development Laboratory	900
ORR and BSR	8,900
High Flux Isotope Reactor	7,900
Radioisotopes Processing Area	12,200
4500 Complex	28,400

Hydrofracture Operations

ILW injection No. 17 was completed on September 1, 1978. A total of 83,000 gallons of waste was slurried with 540,000 pounds of blended solids and pumped into a new slot at a depth of 802 feet. The waste contained 18,484 Ci of ^{137}Cs, 165 Ci of ^{90}Sr, 593 Ci of ^{106}Ru, and 212 Ci of ^{60}Co. The transuranic content was $\leq$ 5 μCi/kg of grout.

GASEOUS WASTE

The ORNL stacks discharged $\leq$ 200 mCi of ^{131}I this month. The bulk of this activity was released by the 3039 system as a result of ^{131}I processing. The filterable particulate activities released during the period amounted to 248 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.2% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

ORNL-DWG 75-2539R3

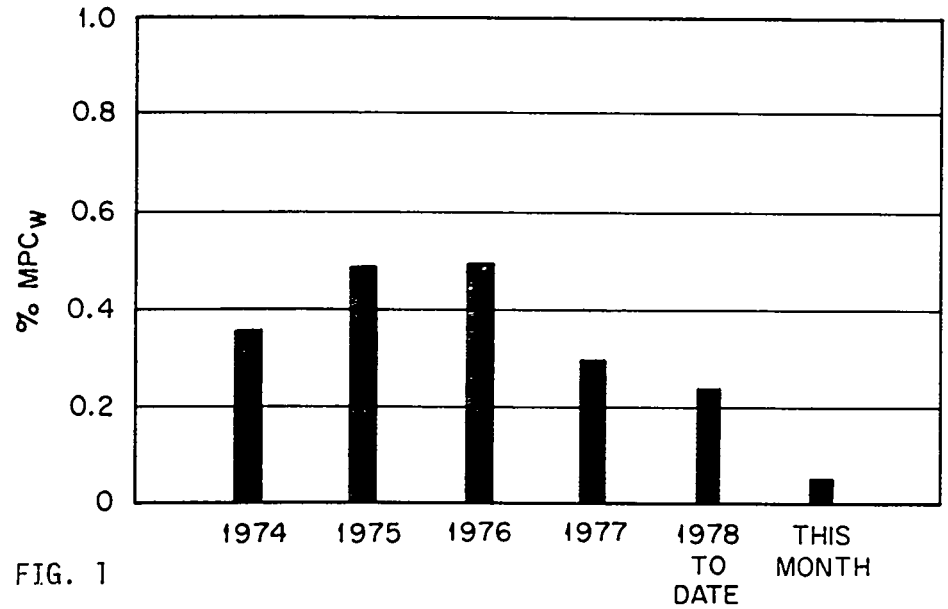


FIG. 1

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

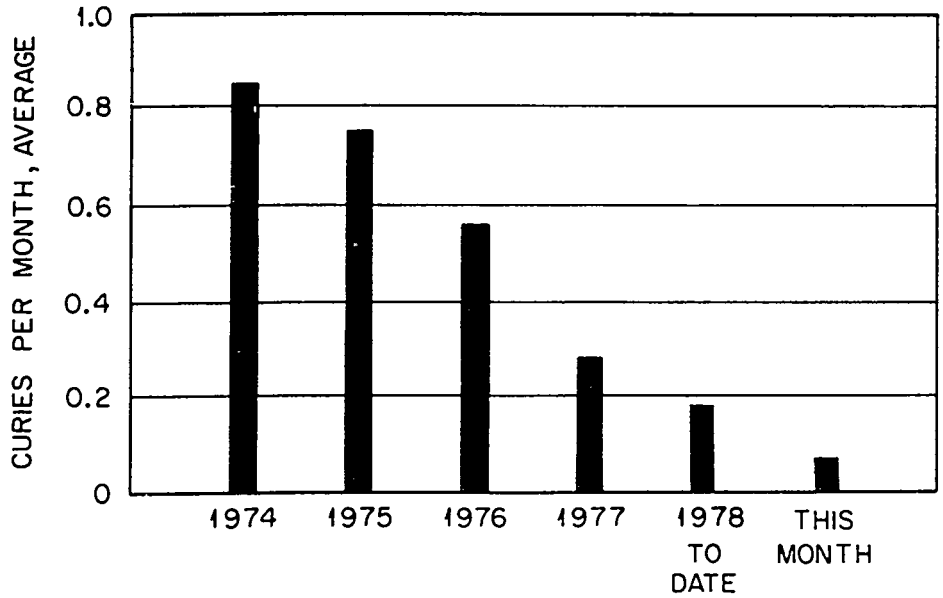


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

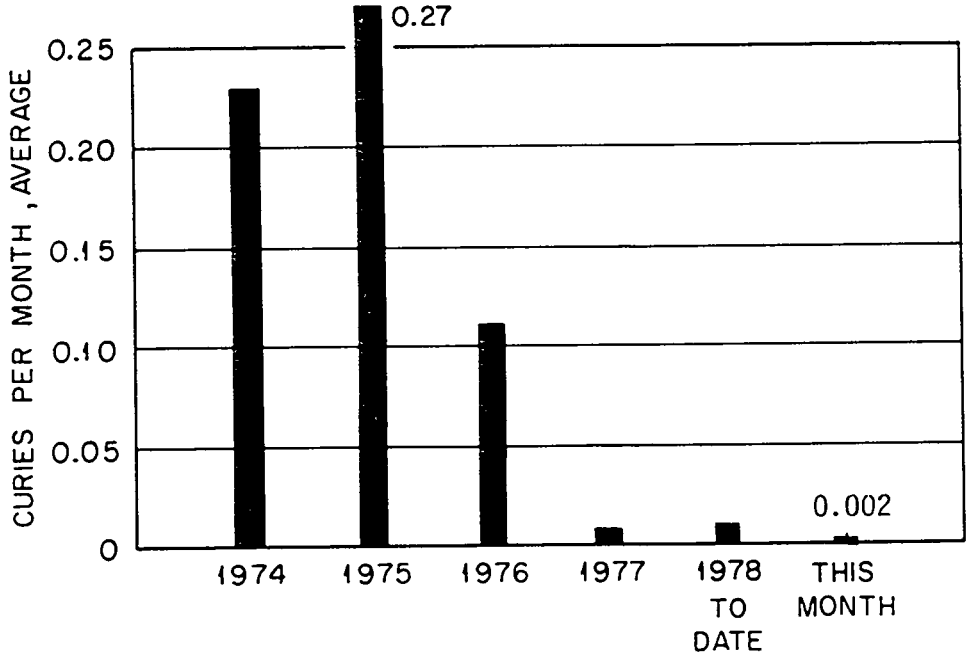


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

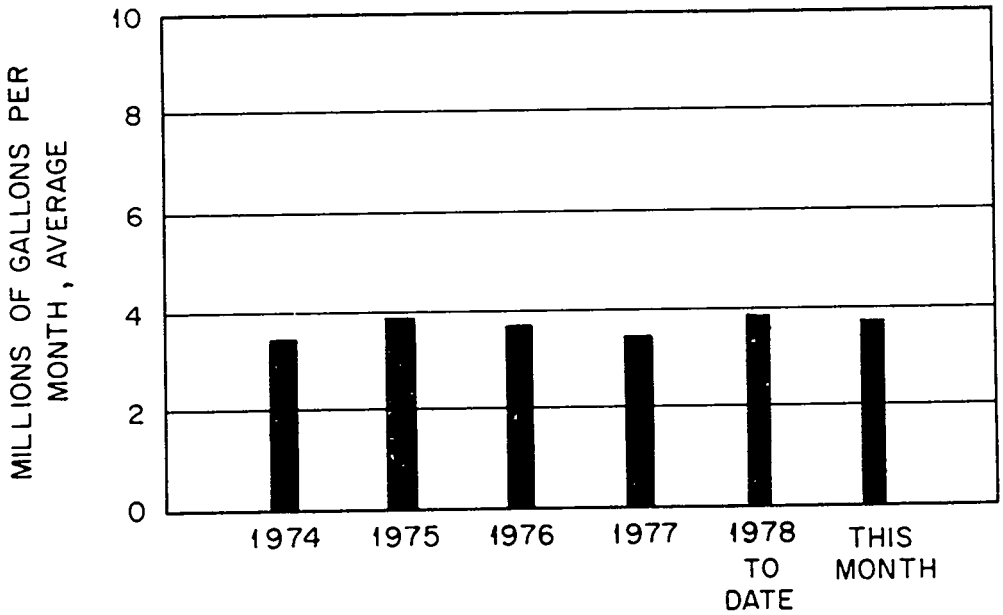


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25411R3

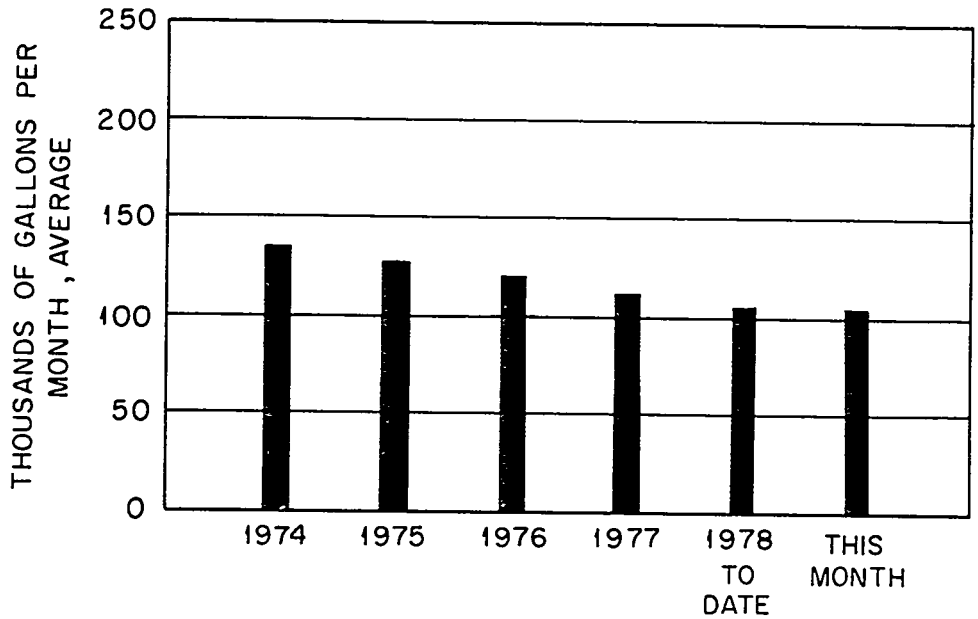


Fig 5. Intermediate – Level Waste Volumes.

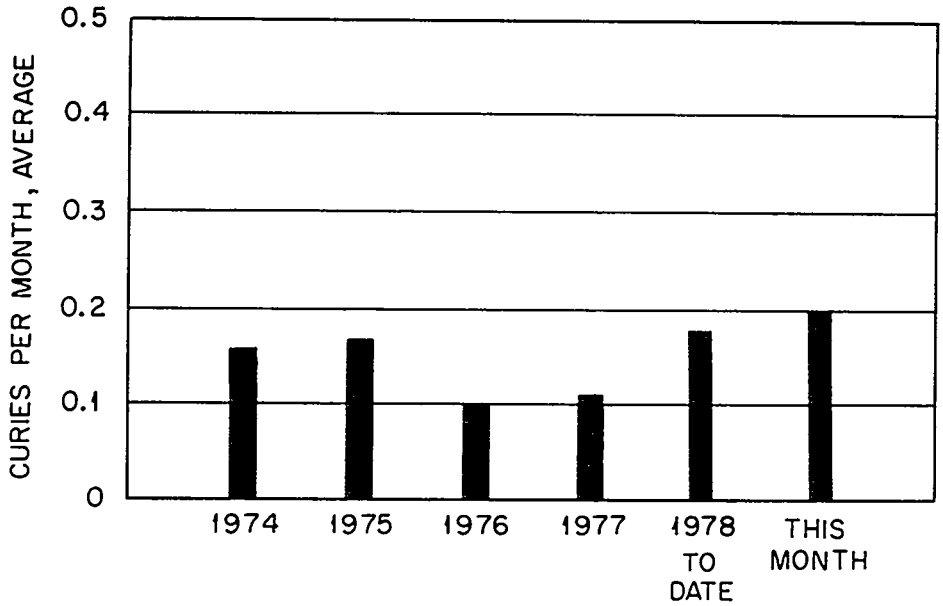


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

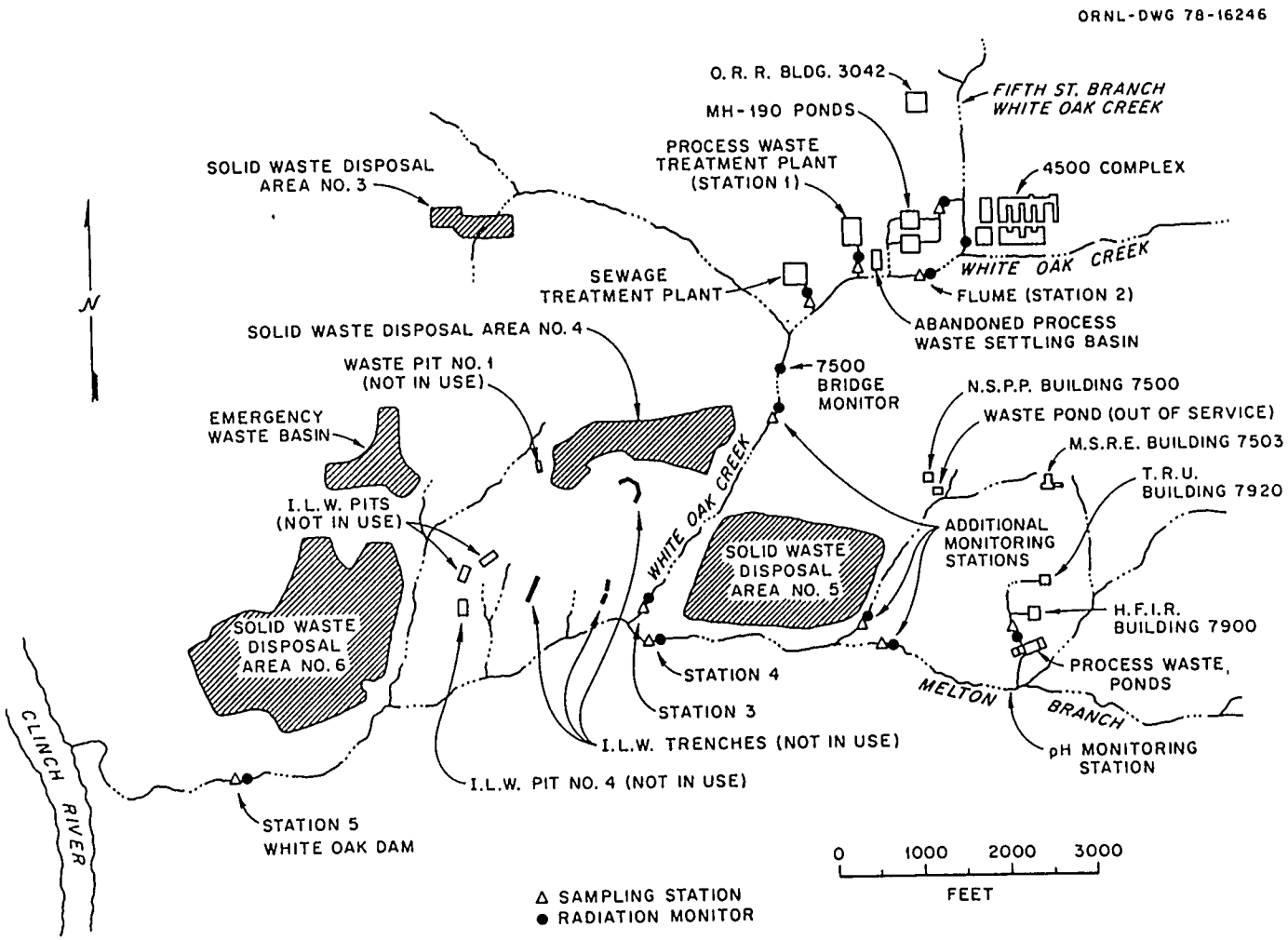


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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	0.002	0.031
Miscellaneous discharges from east end of plant	2	0.011	0.022
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.028	0.037
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.038	0.046
Total discharge from all sources	3,4	0.066	0.083
White Oak Dam to Clinch River (Health Physics measurement)	5	0.04	0.06

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	180	0.018	3.2	0.06	1.7
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.147[a]	25.9	0.60	17.1
3. Reactor Operations (MH112)	0.98	0.001	0.2	0.55	15.7
4. Buildings 3503 and 3508	3.2	0.001	0.2	0.16	4.5
5. Buildings 3025 and 3026	2.8	0.003	0.5	0.61	17.4
6. Building 3019	10.2	0.003	0.5	0.15	4.3
7. Waste Evaporator, Bldg. 2531	47.8	0.024	4.2	0.29	8.3
8. Building 3525	0.07	< 0.001	—	0.18	5.1
9. Building 2026	0.44	< 0.001	—	0.07	2.0
10. Tank Farm Drainage	260	0.371	65.3	0.84	23.9

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	0.1
Central Radioactive Gas Disposal Facilities	3039	≤ 0.20	241
Radiochemical-Processing Pilot Plant	3020	< 0.01	0.7
MSRE	7512	< 0.01	0.2
HFIR & TRU	7911	< 0.01	6
Total Activity in Gases Released at X-10 Site		≤ 0.20	248
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			3.1×10^{-4}
Room 265			0.7×10^{-4}
Building 5505 Discharges Glove Box			4.5×10^{-4}
Hood			7.7×10^{-3}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] This value not available because new instrumentation is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-78/382

DATE: December 6, 1978

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October, 1978

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED: J. A. Cox

This document has been approved for release to the public by

Donald A. Hamrin 3/27/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of October was normal. The total ^{90}Sr discharged to White Oak Lake was 58 mCi compared to 66 mCi for the previous month. The ORNL Stacks discharged 30 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

Radioactive contamination of the White Oak Creek resulting from ORNL waste discharge during the month of October was 3.8% of the MPC_W (Figure 1). The concentration of the main contaminants, ^{90}Sr and ^{3}H, were 3.2% and 0.4%, respectively. These values represent 0.03 Ci of ^{90}Sr and 110 Ci of ^{3}H.

The above MPC_W measurements were made at the confluence of White Oak Creek and the Clinch River. This change in the method of reporting Health Physics data has altered Figure 1 as follows: The average MPC_W values as shown in the figure for the calendar years 1974 through 1977 were calculated using a dilution factor for the Clinch River. The data reported for the year 1978 and the current month are the results of the measurements taken at the confluence of the two streams.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 180.8 and 19.0 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (58 mCi) was 8 mCi less than the amount reported for September. This comparatively low release of activity is attributed to the arid conditions during the period. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 1.0 mCi and 5.0 mCi, respectively.

The following tabulation shows a breakdown of ^{90}Sr entering White Oak Creek compared to that measured at Station 3. The difference is presumed to be coming from Burial Ground No. 4 and other contaminated areas along White Oak Creek.

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	28.2	
190 Ponds	1.0	
Process Waste Treatment Plant	1.5	
Sewage Treatment Plant	5.0	
	35.7	
Station 3, WOC	37.0	
Burial Ground No. 4		1.3
Station 4, Melton Branch	20.6	
(Burial Ground No. 5)		20.6
Total ^{90}Sr to WOC	57.6	
Total ^{90}Sr from Burial Grounds (Presumed)		21.9
% ^{90}Sr Presumed from Burial Grounds		38%

Process Waste

A total of 3.55 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
173	B	118.5	2095
174	C	104	1846
175	A	108	1917
176	B	112.5	1967
177	C	127.5	1981
178	A	96	1704
179	B	120	2039

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 124 gph. A summary of operations is given below:

	Gallons
Total volume generated	129,000
Volume transferred to evaporator	92,000
Tank Farm free space at beginning of month	433,000
Tank Farm free space at end of month	395,000
Evaporator concentrate returned to tank farm	1,000
Volume of concentrate available for hydrofracture	44,000

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

	Gallons
Building 3019	2,300
Fission Products Development Laboratory	3,100*
ORR and BSR	13,100
High Flux Isotope Reactor	8,900
Radioisotopes Processing Area	5,300
4500 Complex	63,200

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL stacks discharged $\leq$ 30 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 389 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.3% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES

There were no unusual incidents or equipment failures during the month.

ORNL-DWG 75-2539R3

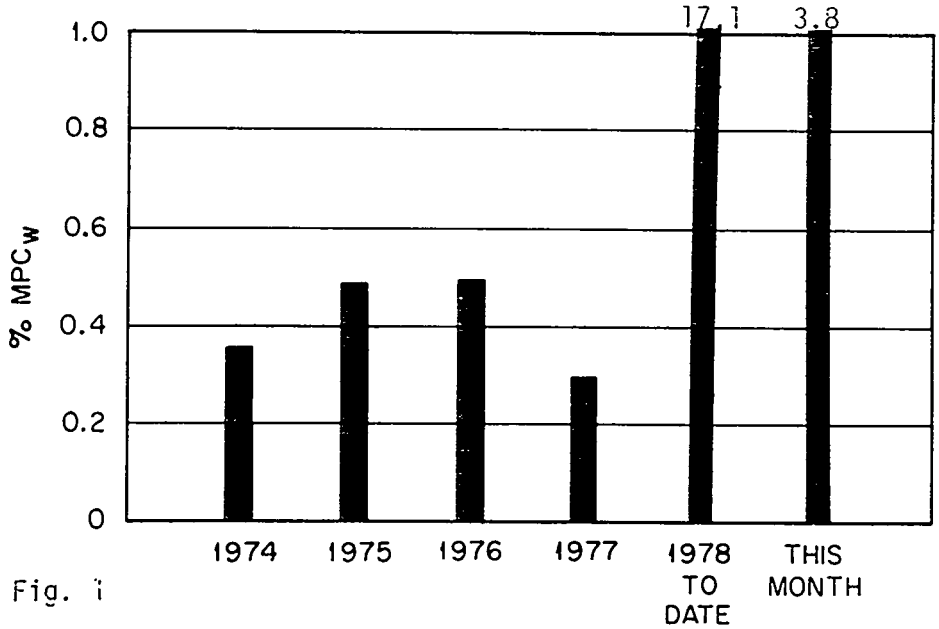


Fig. 1

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

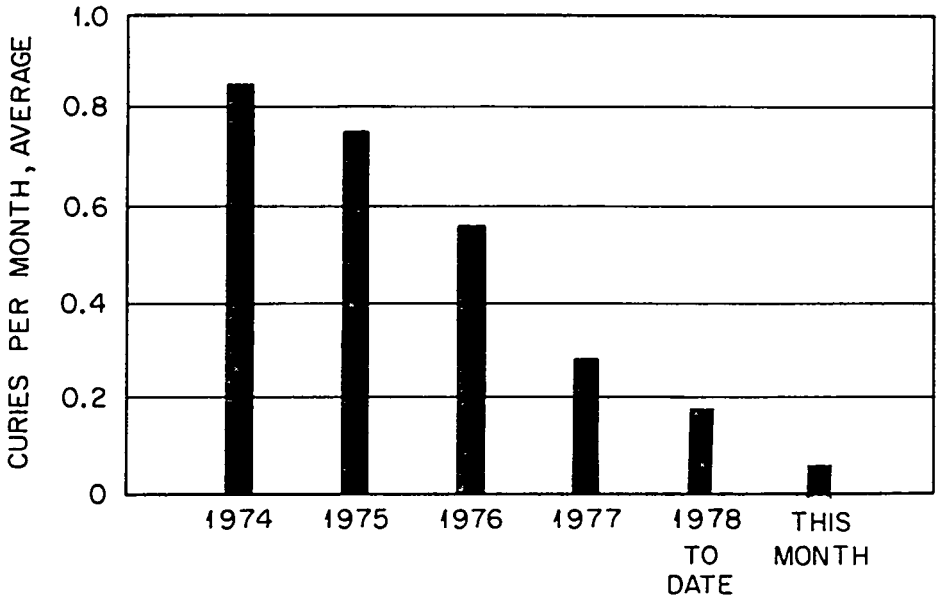


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

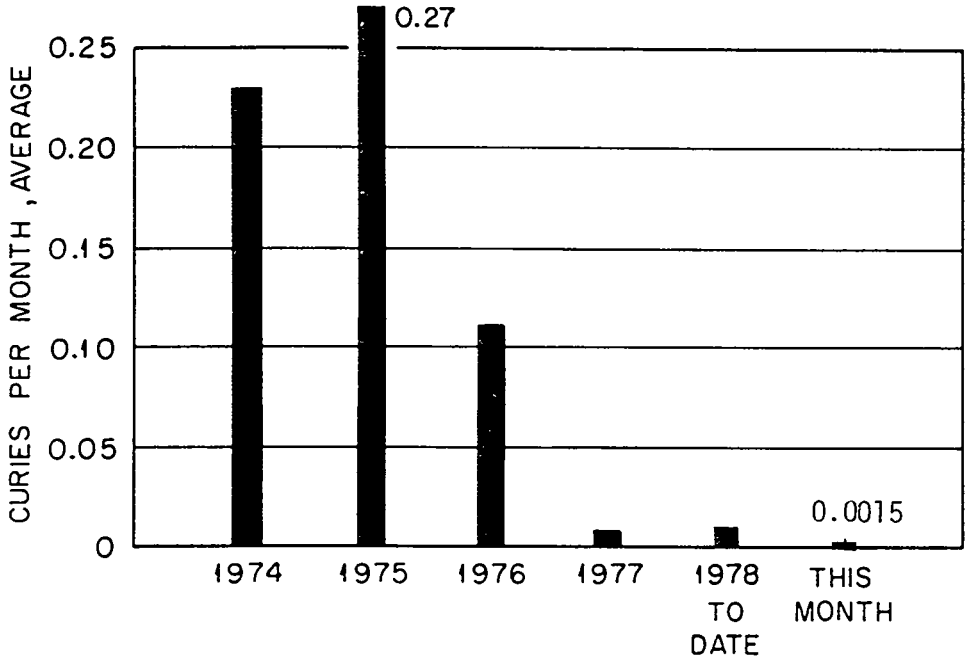


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

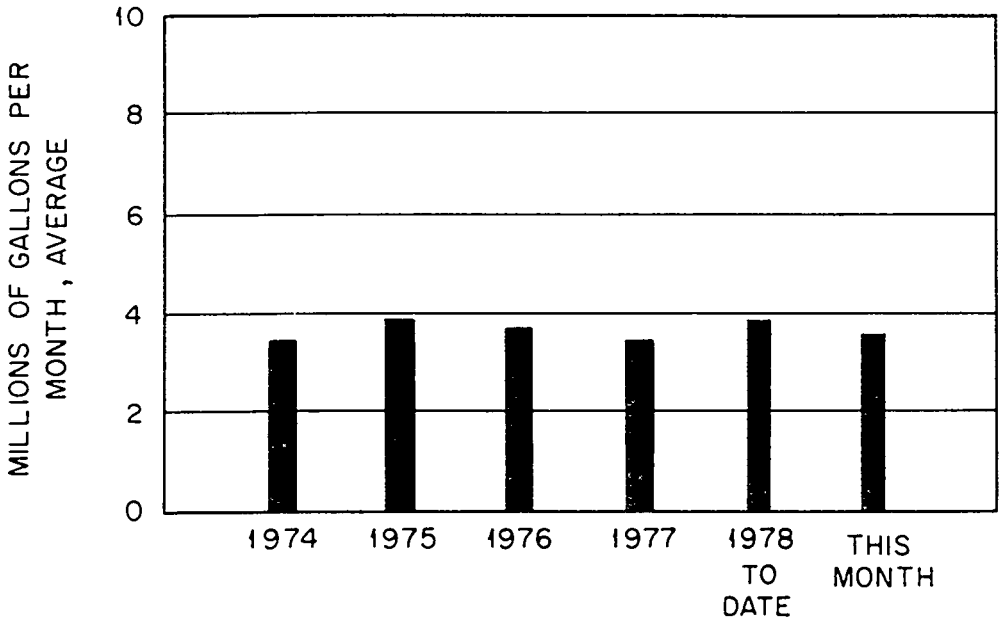


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25413

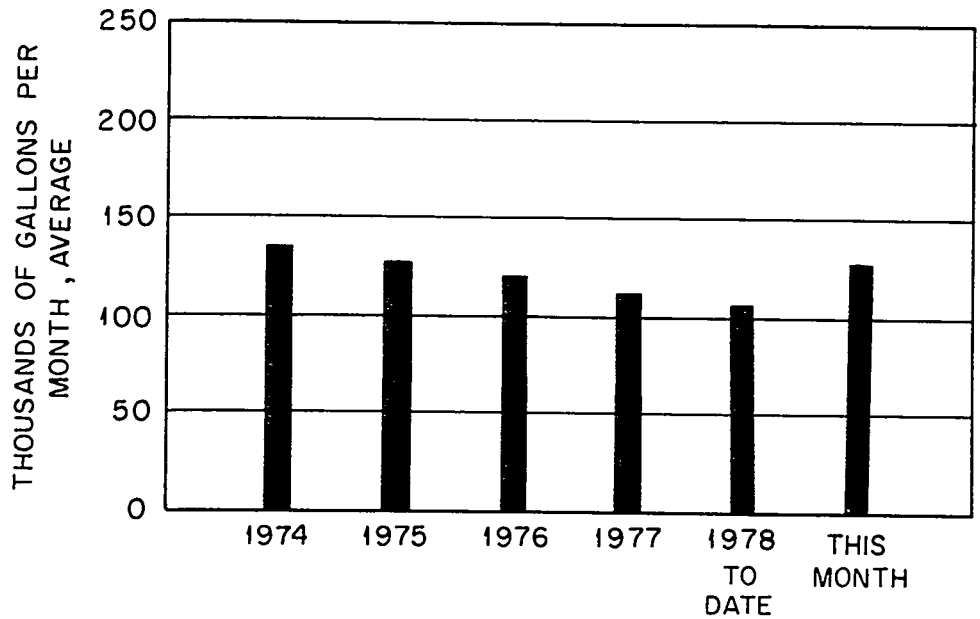


Fig 5. Intermediate – Level Waste Volumes.

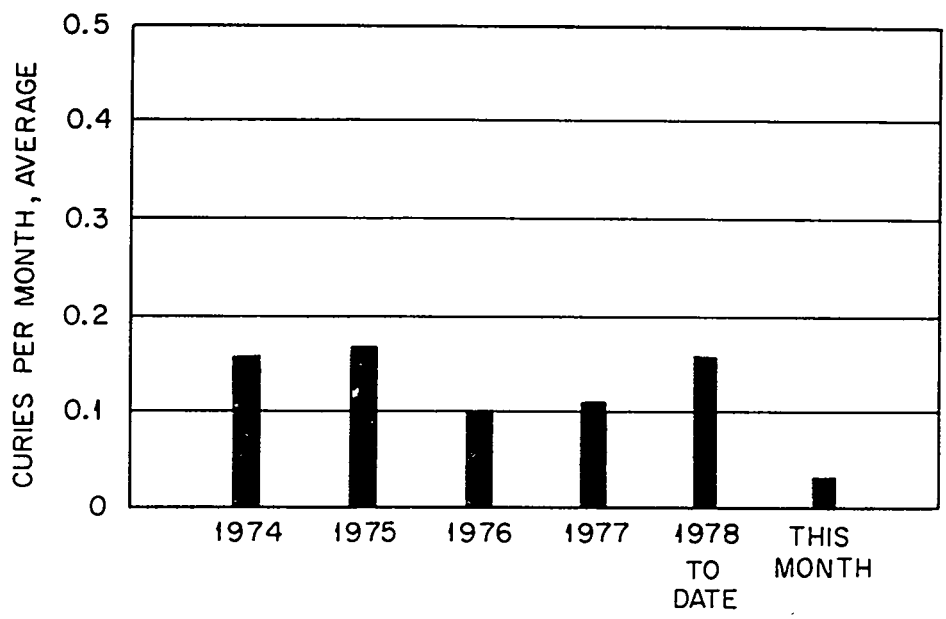


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

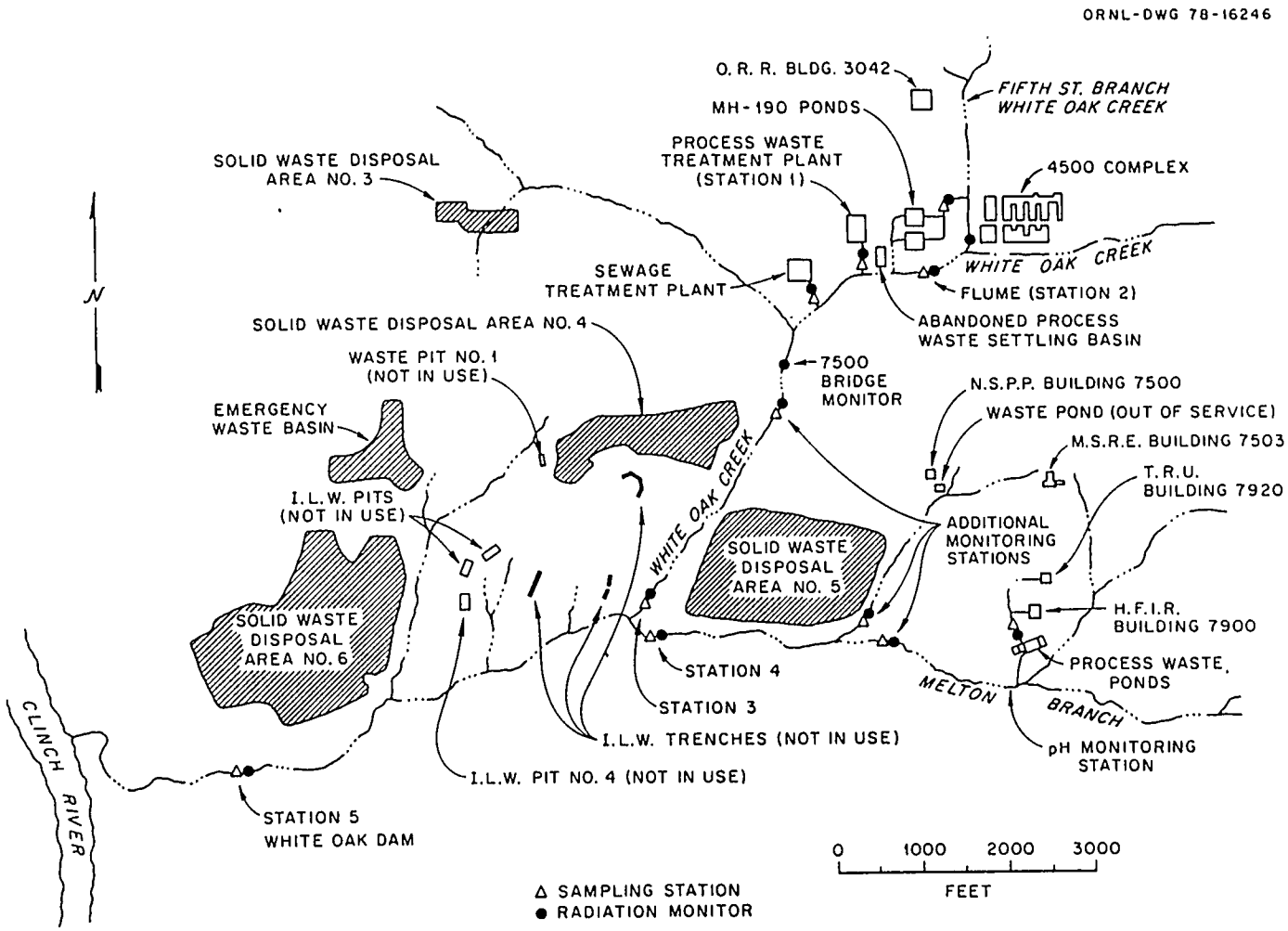


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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	0.0015	0.015
Miscellaneous discharges from east end of plant	2	0.028	0.030
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.037	0.049
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.021	0.036
Total Discharge from all sources	3,4	0.058	0.085
White Oak Dam to Clinch River (Health Physics measurement)	5	0.03	0.05

[a] Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	97	0.009	1.9	0.06	1.7
2. Radioisotopes Processing Area (MH114 minus MH112)	--	0.142[a]	30.0	0.63	17.9
3. Reactor Operations (MH112)	0.56	< 0.001	--	0.74	21.0
4. Buildings 3503 and 3508	1.1	< 0.001	--	0.24	6.8
5. Buildings 3025 and 3026	2.8	0.002	0.5	0.52	14.8
6. Building 3019	8.8	0.003	0.6	0.19	5.4
7. Waste Evaporator, Bldg. 2531	65.8	0.010	2.1	0.09	2.6
8. Building 3525	0.05	< 0.001	--	0.23	6.5
9. Building 2026	0.66	< 0.001	--	0.08	2.3
10. Tank Farm Drainage	2.44	0.307	64.9	0.74	21.0

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	2.4
Central Radioactive Gas Disposal Facilities	3039	≤ 0.02	382
Radiochemical-Processing Pilot Plant	3020	< 0.01	0.7
MSRE	7512	< 0.01	0.2
HFIR & TRU	7911	≤ 0.01	4.2
Total Activity in Gases Released at X-10 Site		≤ 0.03	389
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[d]	
Building 4508 Ventilation Discharges Room 136			$\leq 1.5 \times 10^{-4}$
Room 265			$\leq 3.5 \times 10^{-5}$
Building 5505 Discharges Glove Box			c
Hood			c

[a]Activity primarily ^{131}I as noted.
[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c]This value not available because the sample pumps were out of service.
[d]This value not available because new detection equipment is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/29

DATE: January 19, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November, 1978

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED: J. A. Cox

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

David E. Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of November was normal. The total ^{90}Sr discharged to White Oak Lake was 123 mCi compared to 58 mCi for the previous month. Two additional sampling stations located within the Melton Branch watershed were activated this month; data obtained from these stations are included in the text. The ORNL Stacks discharged 20 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November 1978, was 0.24% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 7.1% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the River.

During the month, 520 Ci of ^3H and 0.11 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 198.88 and 38.73 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (123 mCi) was 65 mCi more than the amount reported for October. This comparatively large increase apparently resulted from the runoff which occurred during periods of rainfall. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 2.3 mCi and 5.5 mCi, respectively.

The tables below list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the difference between the sum of the

listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7). Obviously, the measurements taken along the Melton Branch watershed cannot be reconciled, and to-date, there is no definite explanation for the discrepancy. Previous measurements resulting from grab sampling indicate that the release from the 7500 area is high by a factor of 5.

White Oak Creek	^{90}Sr, mCi	^{90}Sr, mCi
Flume	9.7	
190 Ponds	2.3	
Process Waste Treatment Plant	0.3	
Sewage Treatment Plant	5.5	
	17.8	
Station 3	84.5	
Burial Ground Nos. 1, 3, and 4		66.7
Melton Branch		
7900 Area (HFIR and TRU)	1.0	
7500 Area (NSPP and MSRE)	83.4	
	84.4	
Station 4	38.2	
Burial Ground No. 5		—
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	122.7	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		66.7
Percent ^{90}Sr from Burial Grounds Nos. 1, 2, 3, 4, and 5		54.4%

Process Waste

A total of 3.54 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in

Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given as follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
180	C	128	1935
181	A	118	1896
182	B	104.5	1855
183	C	97	1725
184	A	118.5	1871
185	B	116	1872
186	C	129	1899

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 213 gph. A summary of operations is given below:

	Gallons
Total volume generated	104,000
Volume transferred to evaporator	153,000
Tank Farm free space at beginning of month	395,000
Tank Farm free space at end of month	438,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture	49,000

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

	Gallons
Building 3019	4,500
Radioisotopes Processing Area	9,500
ORR and BSR	4,200

Intermediate Level Waste (continued)

	Gallons
High Flux Isotope Reactor	26,200
Fission Products Development Laboratory	3,500*
4500 Complex	25,000

GASEOUS WASTE

The ORNL Stacks discharged $\leq$20 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 170 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.2% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES

There were no unusual incidents or equipment failures during the month.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 75-2539R3

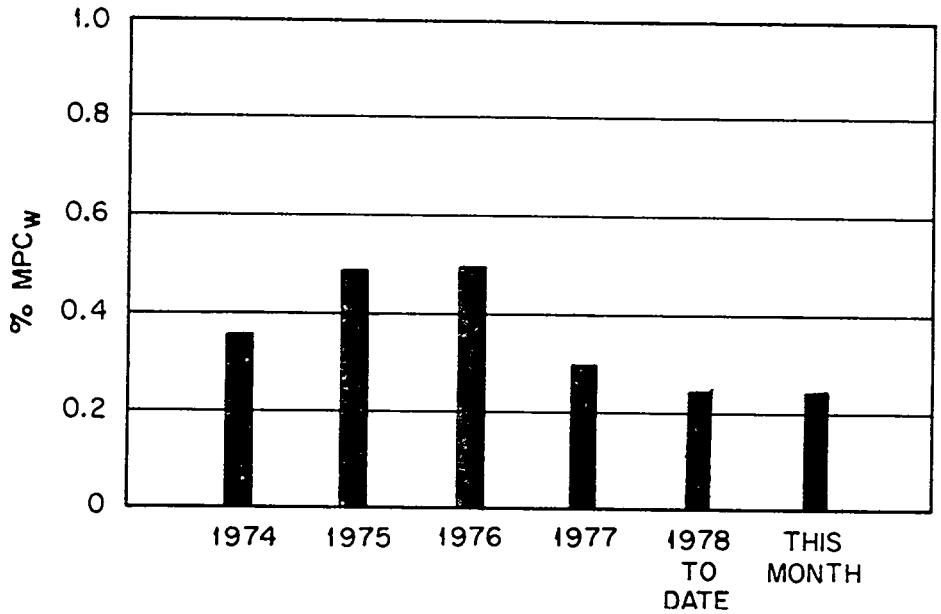


Fig. 1A. Calculated Percent of MPC_W In Clinch River Due to ORNL Discharges*
(ISHAP Measurements at White Oak Dam)

ORNL-DWG 79-7984

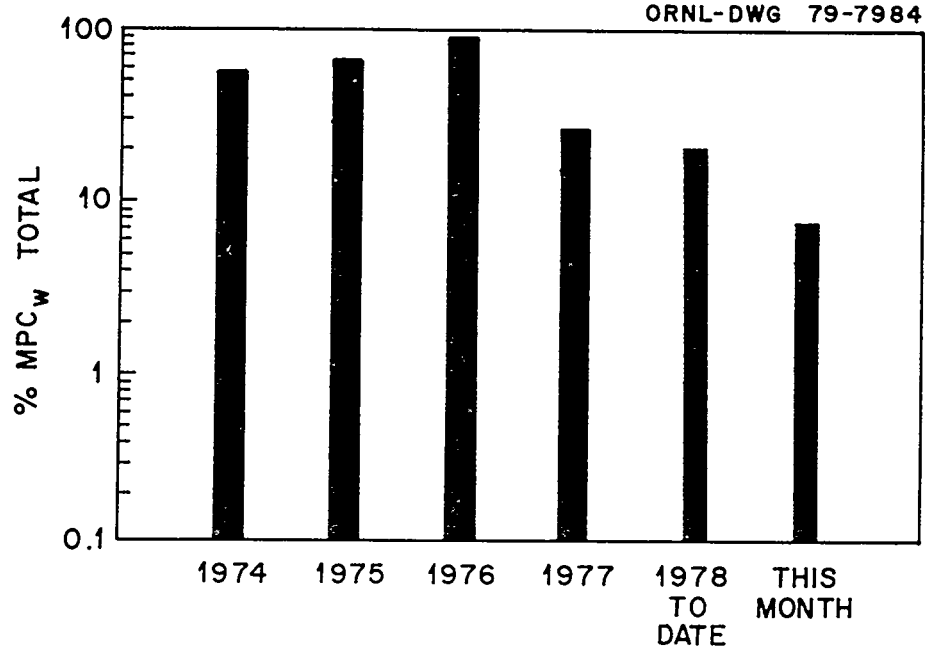


Fig. 1B. Measured Percent of MPC_W in Clinch River Due to ORNL Discharges
(ISHAP Samples at Confluence of White Oak Creek and the Clinch River)

*Tests show that complete mixing does not occur in the near reaches of the river.

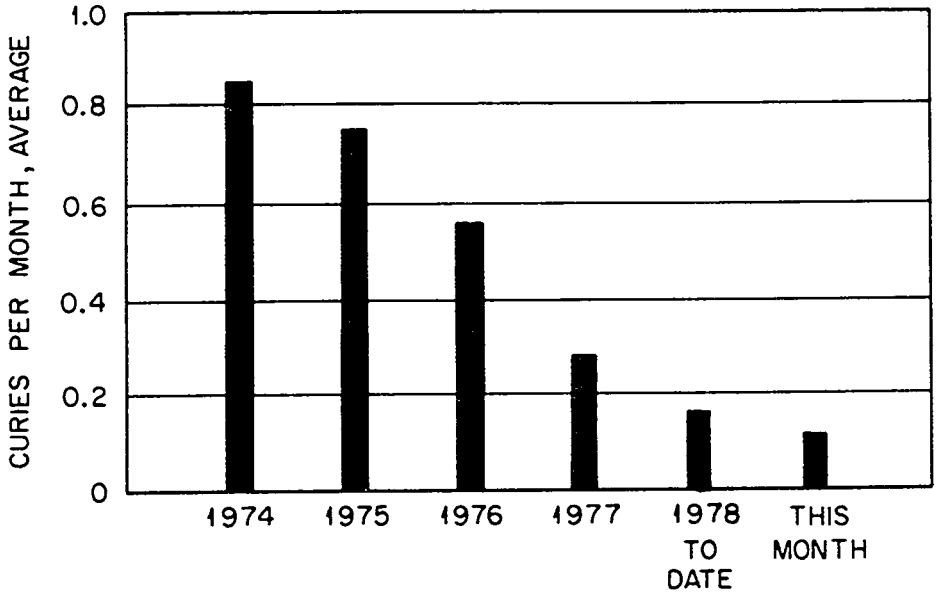


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

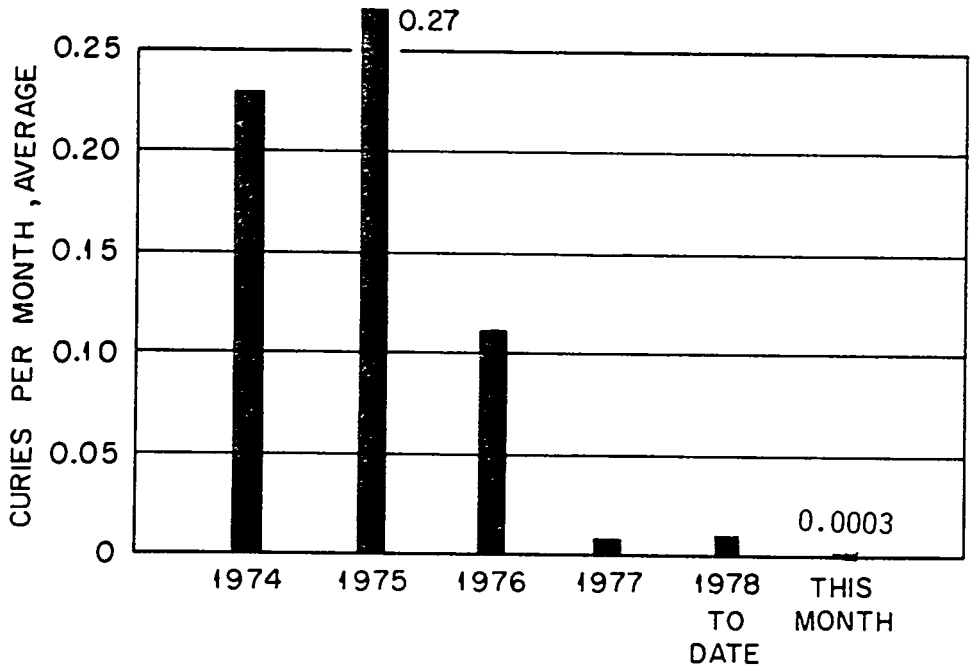


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

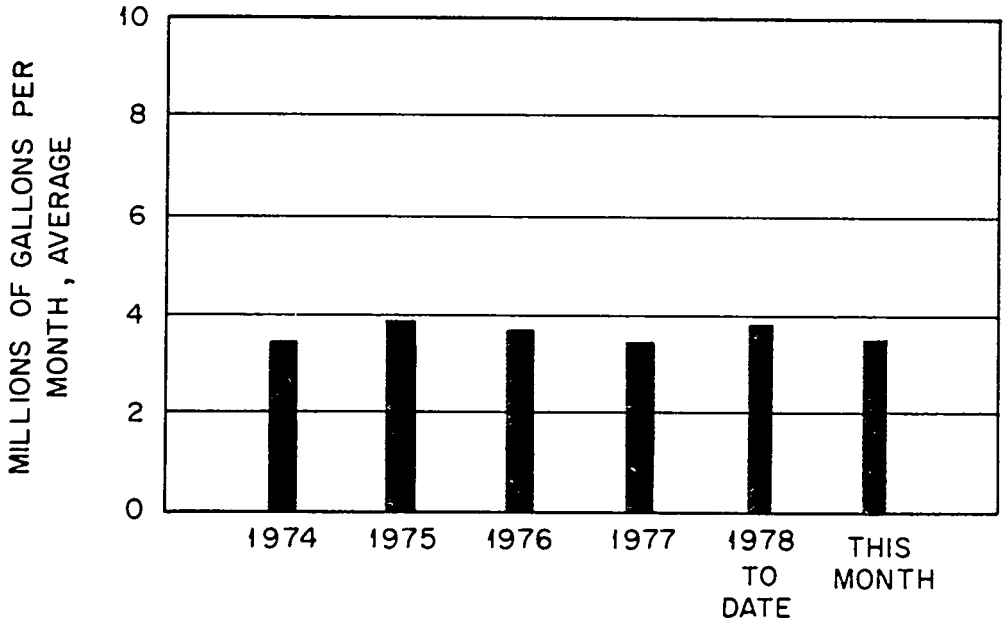


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25413

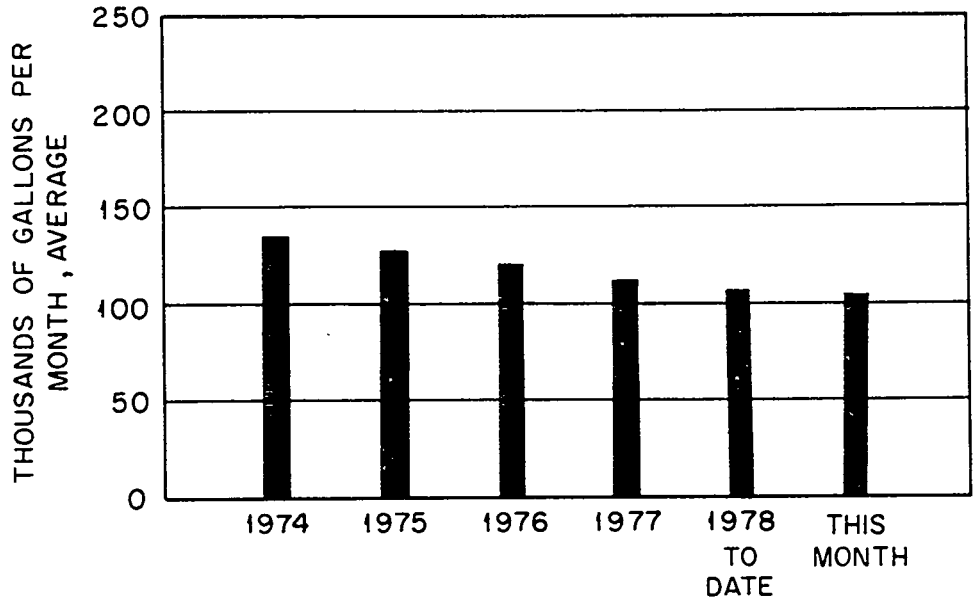


Fig 5. Intermediate – Level Waste Volumes.

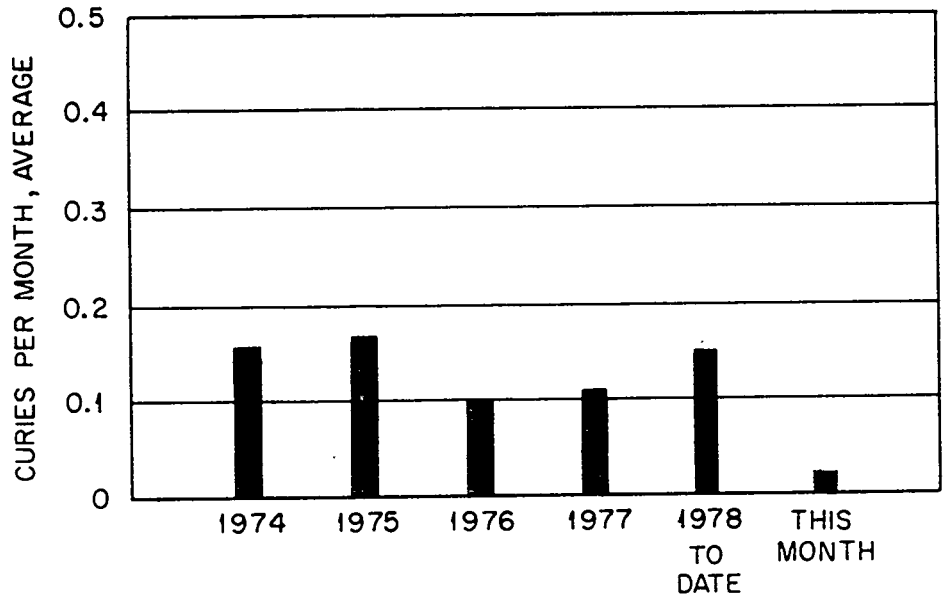


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

ORNL-DWG 78-16246

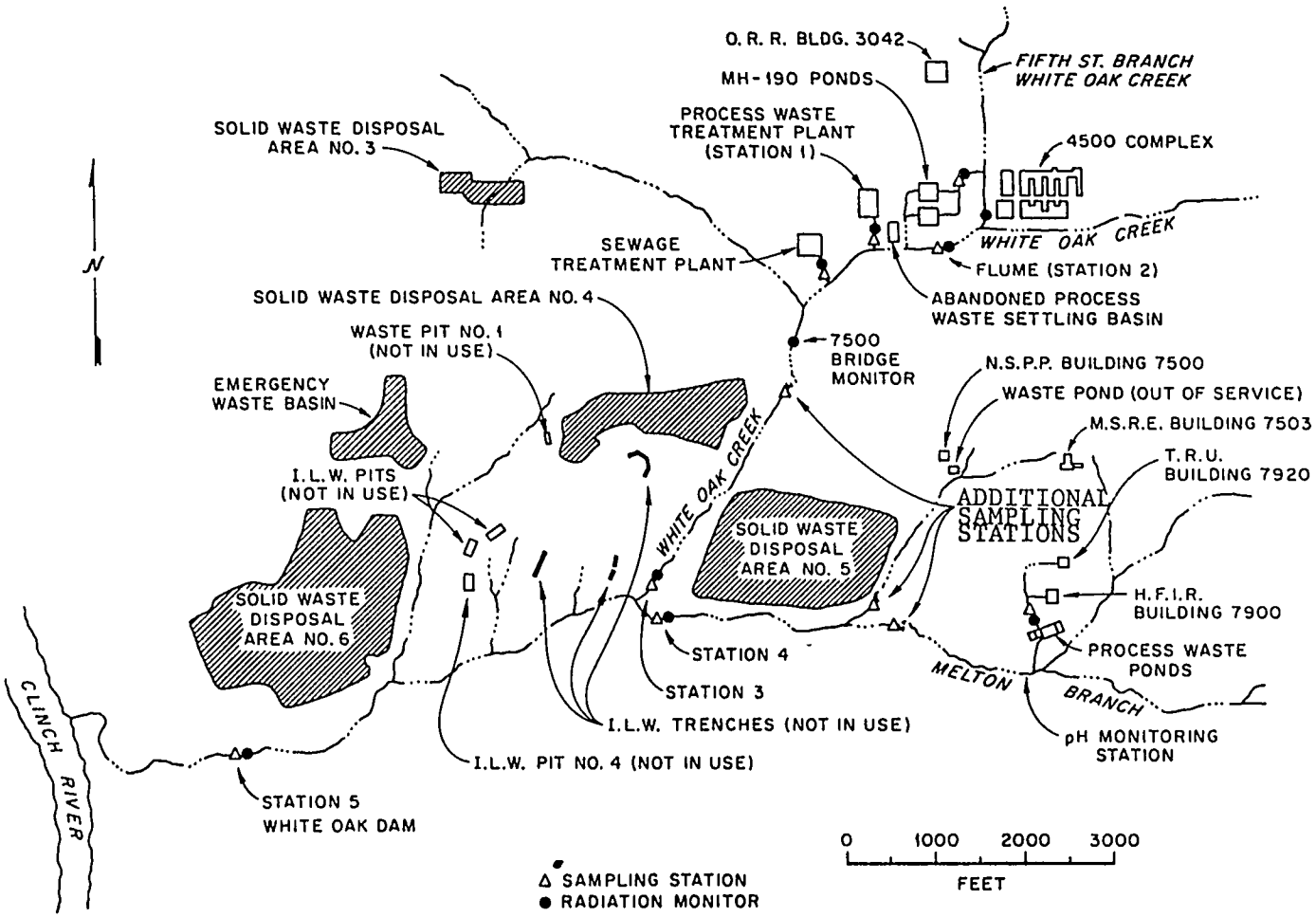


Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0003	0.007
Miscellaneous discharges from east end of plant	2	0.010	0.014
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.085	0.149
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.038	0.136
Total discharge from all sources	3,4	0.123	0.285
White Oak Dam to Clinch River (Health Physics measurement)	5	0.11	0.15

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	166	0.020	3.4	0.07	1.7
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.128[a]	22.0	0.40	9.6
3. Reactor Operations (MH112)	0.78	0.001	0.2	1.12	26.9
4. Buildings 3503 and 3508	0.85	<0.001	—	0.27	6.5
5. Buildings 3025 and 3026	2.6	0.002	0.3	0.36	8.6
6. Building 3019	8.5	0.003	0.5	0.24	5.8
7. Waste Evaporator, Bldg. 2531	74.3	0.048	8.3	0.38	9.1
8. Building 3525	0.06	<0.001		0.41	9.9
9. Building 2026	1.5	<0.001		0.07	1.7
10. Tank Farm Drainage	266	0.380	65.3	0.84	20.2

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	0.2
Central Radioactive Gas Disposal Facilities	3039	≤0.02	167
Radiochemical-Processing Pilot Plant	3020	<0.01	0.1
MSRE	7512	<0.01	0.1
HFIR & TRU	7911	<0.01	2.3
Total Activity in Gases Released at X-10 Site		≤0.02	170
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			$\leq 7.5 \times 10^{-4}$
Room 265			$\leq 1.2 \times 10^{-4}$
Building 5505 Discharges Glove Box			$\leq 1.1 \times 10^{-4}$
Hood			$\leq 6.5 \times 10^{-4}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/48

DATE: February 15, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December, 1978

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer — Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of December was normal. The total ^{90}Sr discharged to White Oak Lake was 263 mCi compared to 123 mCi for the previous month. One additional sampling station located within the White Oak Creek watershed was activated this month; however, data obtained from this station is not included in the text because of an obvious sampling anomaly. The ORNL Stacks discharged 30 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December 1978, was 0.54% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 18.9% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 1030 Ci of ^3H and 0.44 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 335.44[1] and 73.37 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (263 mCi) was 140 mCi more than the amount reported for November. The bulk of this comparatively large increase is attributed to the increased rainfall during the month. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 1 mCi and 13 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions

[1] This is a calculated value based upon flow measurements at the 7500 Bridge Weir station and a previously established flow ratio. Flow data at Station 3 are incorrect because of a leak around the Weir plate.

from Burial Ground Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the difference between the sum of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7). Previous measurements resulting from grab sampling indicate that the release from the 7500 area is still high by a factor of 4 to 5.

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	14.0	
190 Ponds	1.0	
Process Waste Treatment Plant	9.0	
Sewage Treatment Plant	13.0	
	37.0	
Station 3	217.0	
Burial Ground Nos. 1, 3, and 4		180.0

Melton Branch

7900 Area (HFIR and TRU)	3.0	
7500 Area (NSPP and MSRE)	43.0	
	46.0	
Station 4	46.0	
Burial Ground No. 5		—
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	263.0	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		180.0
Percent ^{90}Sr from Burial Grounds Nos. 1, 2, 3, 4, and 5		68.4%

Process Waste

A total of 4.61 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given as follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
187	A	135	1797
188	B	144	1917
189	C	144	1975
190	A	123	1804
191	B	136	1920
192	C	121	1877
193	A	108	1917
194	B	128	1922
195	C	135	1901
196	A	144	1910

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 206 gph. A summary of operations is given below:

	Gallons
Total volume generated	143,000
Volume tranferred to evaporator	153,000
Tank Farm free space at beginning of month	438,000
Tank Farm free space at end of month	444,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	53,000

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

	Gallons
Building 3019	12,400
Radioisotopes Processing Area	14,200
ORR and BSR	21,600
High Flux Isotope Reactor	29,000
Fission Products Development Laboratory	4,000*
4500 Complex	14,300
Transuranium Processing Area	2,500

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$30 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 127 μCi. Inert gases released from the 3039 and 7911 stacks averaged less than 1.3% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

1. The Process Waste Treatment Plant was inadvertently bypassed for a brief period when the automatic diversion system was actuated while a telephone transmission line was being repaired. Power has been removed from the automatic diversion system to prevent this from happening again.
2. A pH noncompliance occurred during the period when approximately 50 gallons of 62°Bé H_2SO_4 was flushed from a transfer truck into White Oak Creek. The procedure for this operation is being rewritten to prevent this from happening again.

ORNL-DWG 75-2539R3

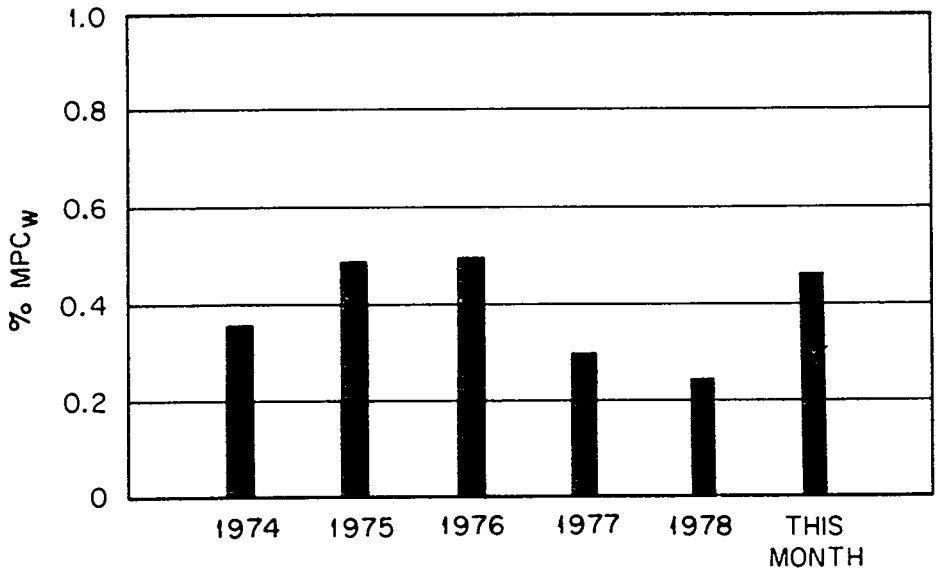


Fig. 1A. Calculated Percent of MPC_W in Clinch River Due to ORNL Discharges*
(ISHAP Measurements at White Oak Dam)

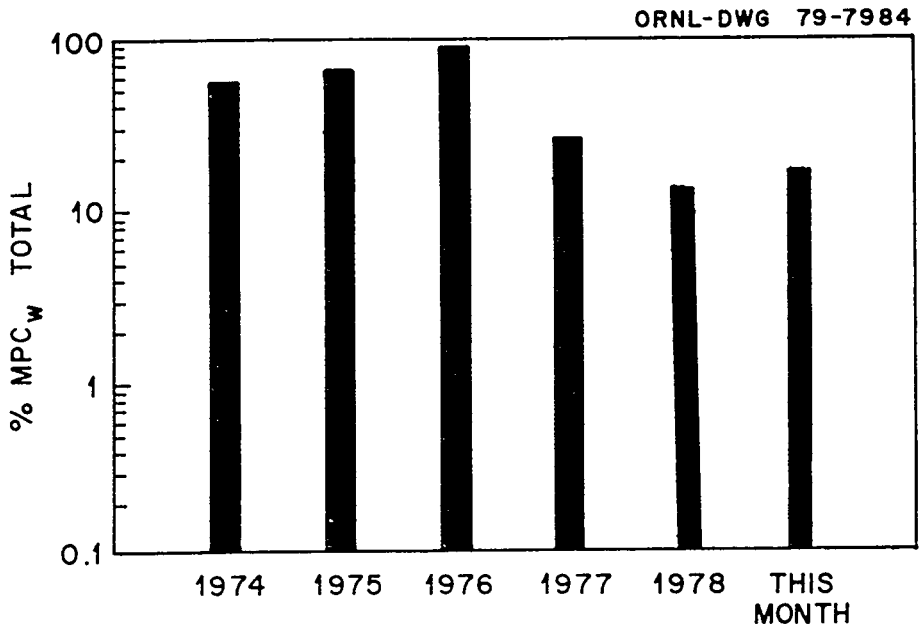


Fig. 1B. Measured Percent of MPC_W in Clinch River Due to ORNL Discharges
(ISHAP Samples at Confluence of White Oak Creek and the Clinch River)

*Tests show that complete mixing does not occur in the near reaches of the river.

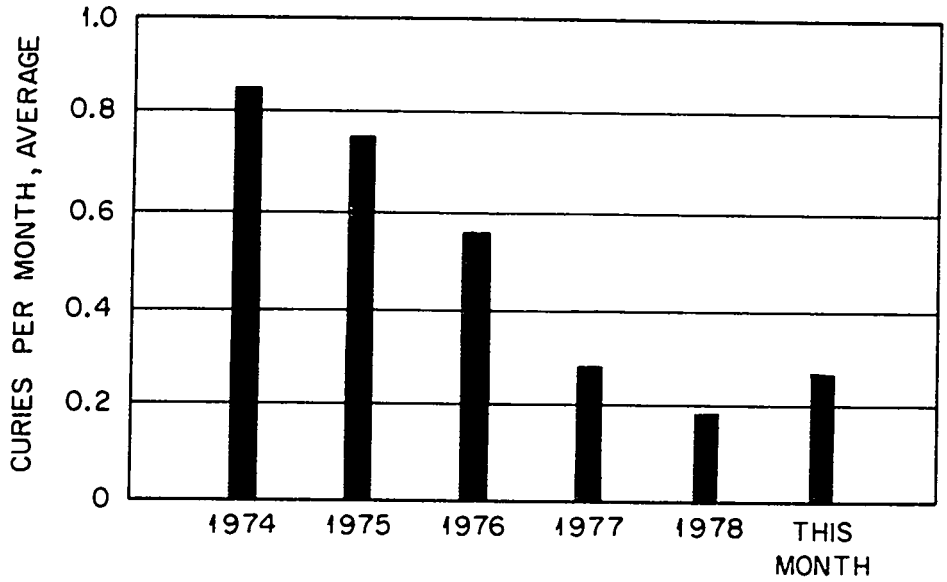


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

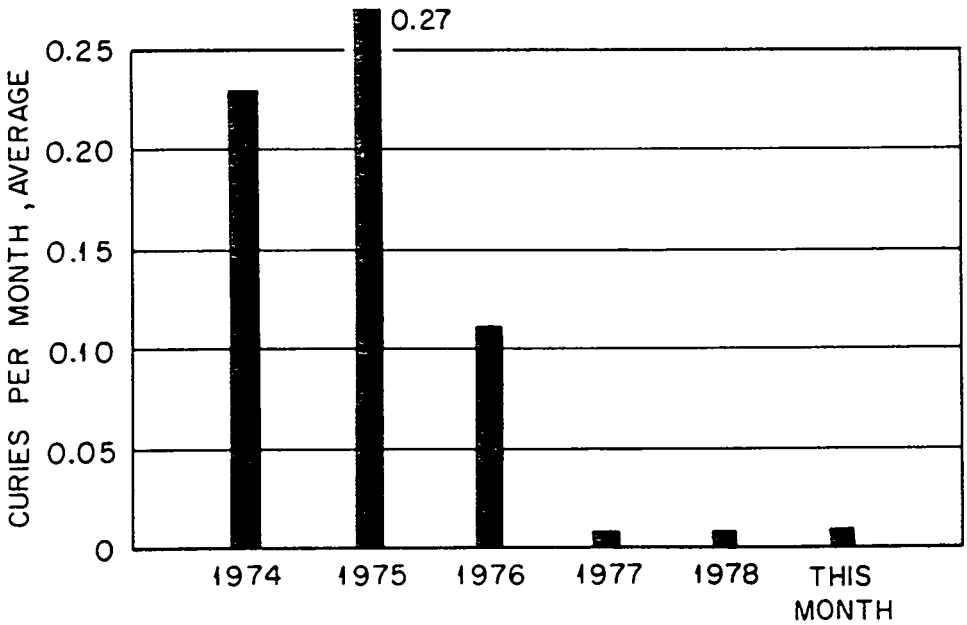


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek.

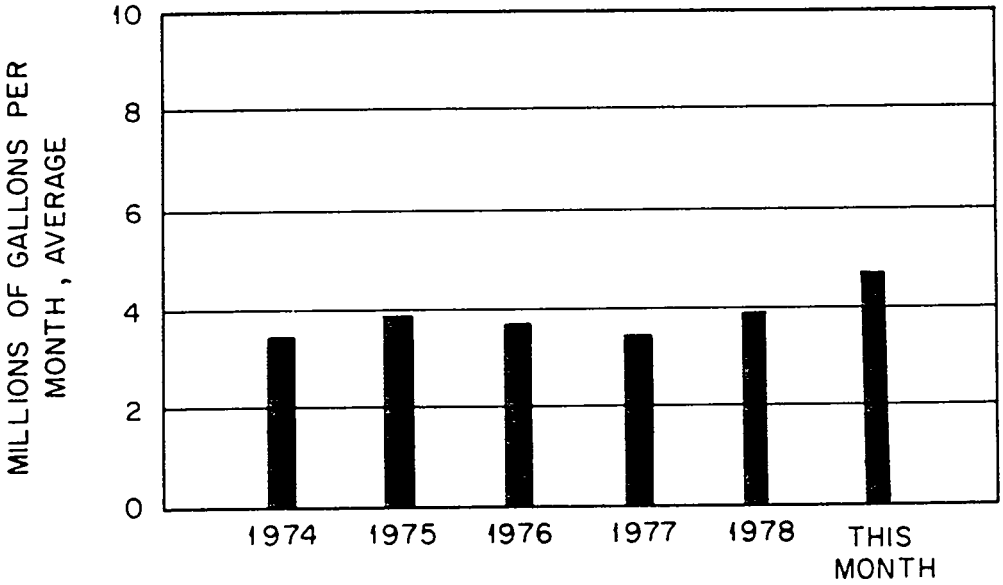


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25441R3

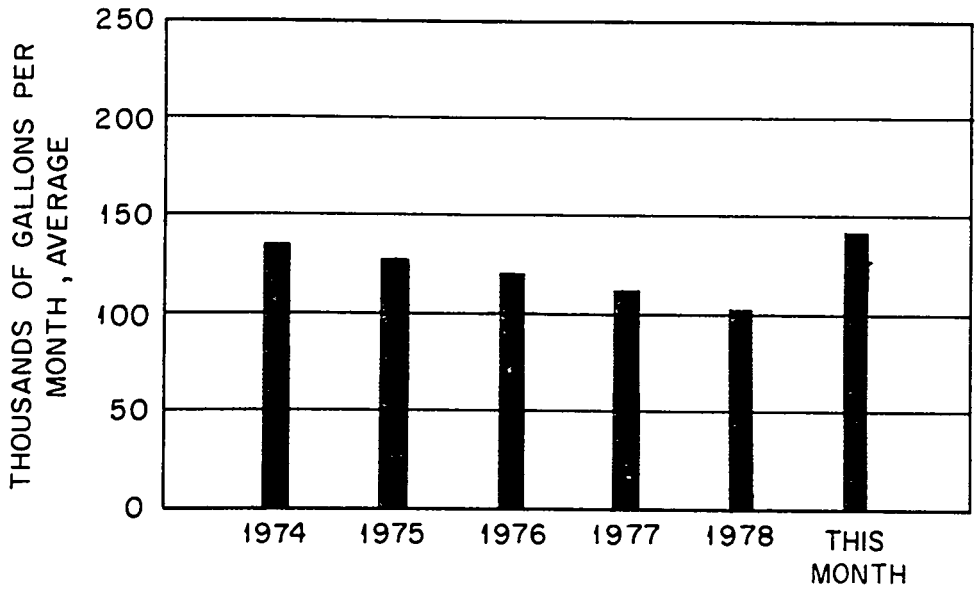


Fig 5. Intermediate – Level Waste Volumes.

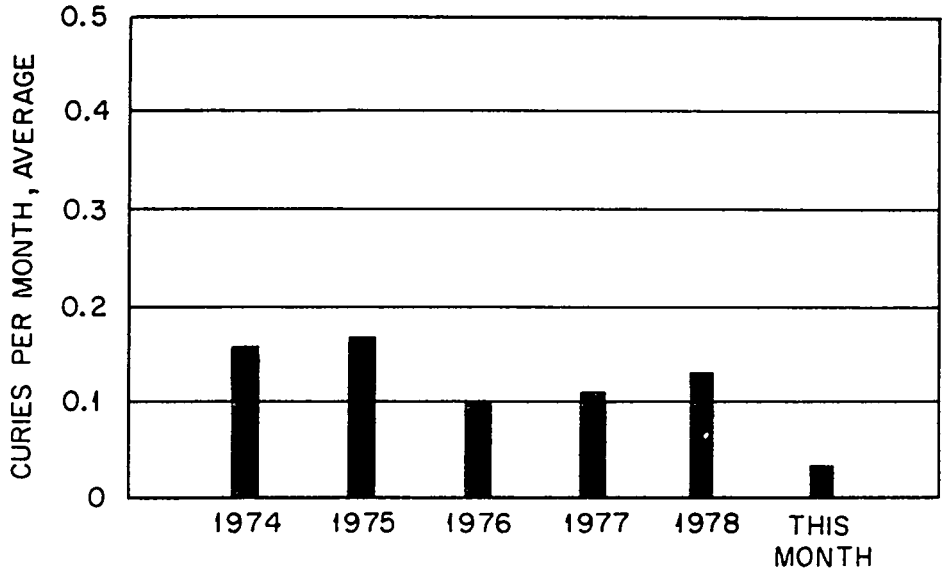


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

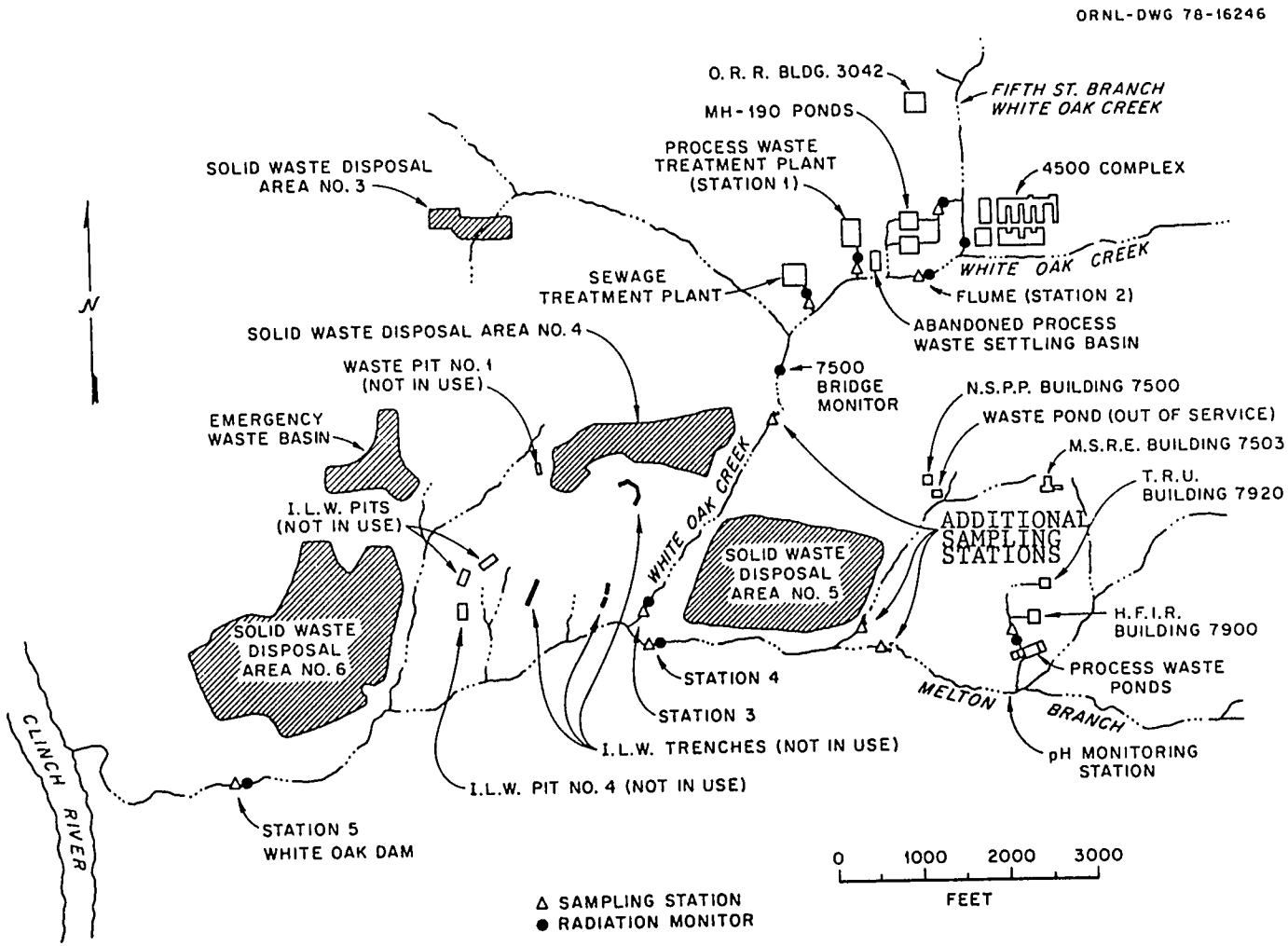


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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	0.009	0.040
Miscellaneous discharges from east end of plant	2	0.014	0.238
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.217	0.593
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.046	0.249
Total discharge from all sources	3,4	0.263	0.842
White Oak Dam to Clinch River (Health Physics Measurement)	5	0.44	0.62

[a]Refer to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	366	0.040	4.0	0.06	1.1
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.221[a]	22.1	0.63	12.1
3. Reactor Operations (MH112)	1.40	0.003	0.3	1.05	20.1
4. Buildings 3503 and 3508	0.5	<0.001	—	0.45	8.8
5. Buildings 3025 and 3026	1.8	0.002	0.2	0.67	12.8
6. Building 3019	11.8	0.006	0.6	0.30	5.7
7. Waste Evaporator, Bldg. 2531	63.2	0.041	4.1	0.38	7.3
8. Building 3525	0.6	<0.001	—	0.31	5.9
9. Building 2026	0.5	<0.001	—	0.16	3.1
10. Tank Farm Drainage	338	0.687	68.7	1.20	23.1

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	2.4
Central Radioactive Gas Disposal Facilities	3039	≤0.03	122
Radiochemical-Processing Pilot Plant	3020	<0.01	1
MSRE	7512	<0.01	<.01
HFIR & TRU	7911	<0.1	2
Total Activity in Gases Released at X-10 Site		≤0.03	127
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			$<1.54 \times 10^{-4}$
Room 265			$<3.5 \times 10^{-4}$
Building 5505 Discharges Glove Box			$<2.25 \times 10^{-4}$
Hood			$<3.87 \times 10^{-3}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

AFR 2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/67

DATE: March 12, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January, 1979

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Dennis R Hamm 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of January was normal. The total ^{90}Sr discharged to White Oak Lake was 479 mCi compared to 263 mCi for the previous month. The ORNL Stacks discharged 40 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of January 1979, was 0.1% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 14.2% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 1050 Ci of ^3H and 0.15 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 560.01* and 123.06 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (479 mCi) was 216 mCi more than the amount reported for December. The bulk of this increase is attributed to the increased rainfall during the month. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.6 mCi and 13.8 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged

*This is a calculated value based upon flow measurements at the 7500 Bridge Weir Station and a previously established flow ratio. Flow data at Station 3 are incorrect because of a leak around the weir plate.

into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the difference between the sum of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	24.2	
190 Ponds	0.6	
Process Waste Treatment Plant	2.4	
Sewage Treatment Plant	13.8	
	41.0	
7500 Sampling Station	103.0	
Burial Ground Nos. 1 and 3		62.0
Station 3	437.0	
Burial Ground No. 4		334.0

Melton Branch

7900 Area (HFIR and TRU)	0.7	
7500 Area (NSPP and MSRE)	9.5	
	10.2	
Station 4	42.1	
Burial Ground No. 5		31.9
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	479.1	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		427.9
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		89.3%

Process Waste

A total of 6.18 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given as follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
197	B	120	1855
198	C	119	1901
199	A	112	1789
200	B	120	1917
201	C	128.5	1936
202	A	130.5	1877
203	B	122	1867
204	C	134	1876
205	A	131	1906
206	B	143	1904

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 220 gph. A summary of operations is given below:

	Gallons
Total volume generated	199,000
Volume transferred to evaporator	164,000
Tank Farm free space at beginning of month	444,000
Tank Farm free space at end of month	404,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	62,000

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

	Gallons
Building 3019	15,400
Radioisotopes Processing Area	9,300
ORR and BSR	30,800
High Flux Isotope Reactor	35,900
Fission Products Development Laboratory	5,400[a]
4500 Complex	15,000
Transuranium Processing Area	2,800

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$40 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 170 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.3% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

There were no unusual occurrences during the period.

ORNL-DWG 75-2539R3

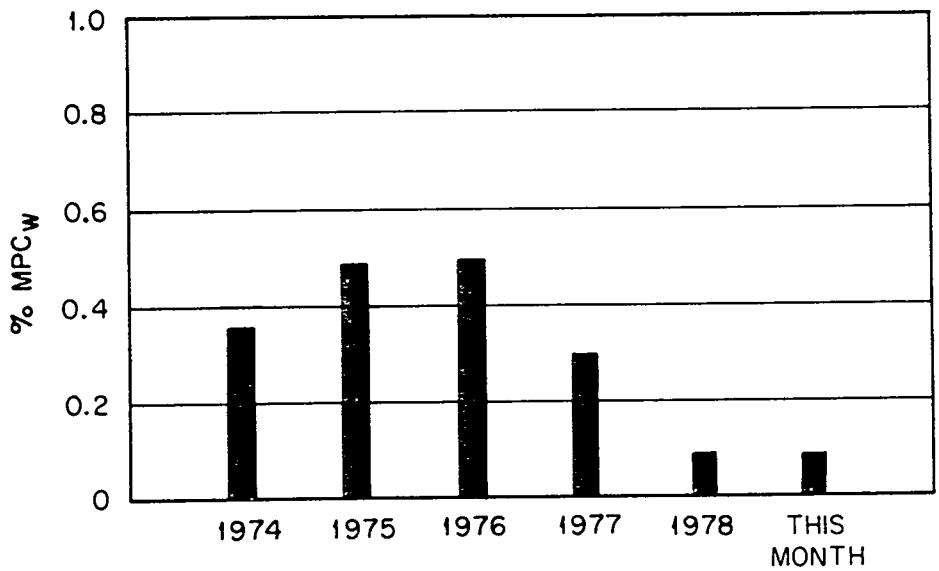


Fig. 1A. Calculated Percent of MPC_W in Clinch River Due to ORNL Discharges*
(ISHAP Measurements at White Oak Dam)

ORNL-DWG 79-7984

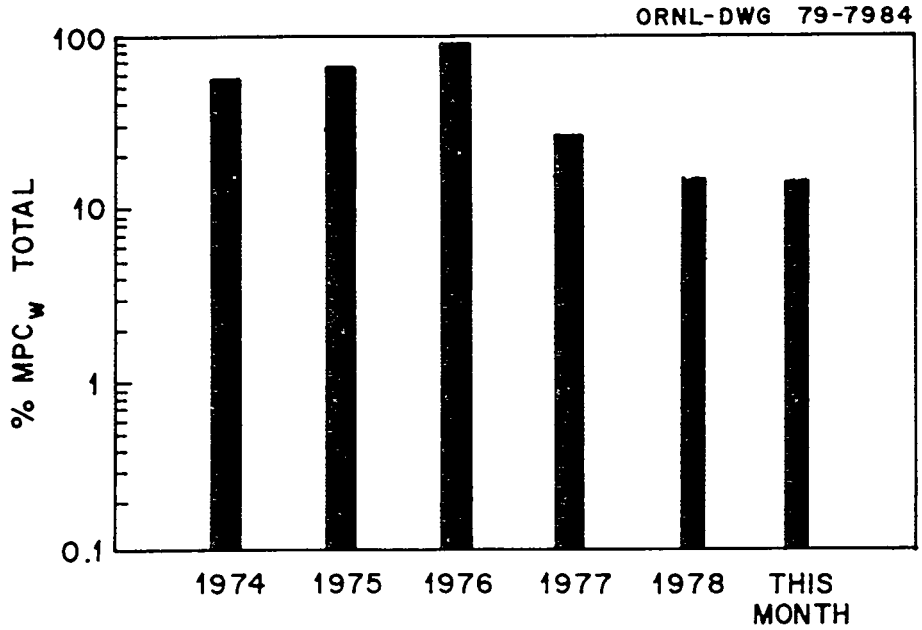


Fig. 1B. Measured Percent of MPC_W in Clinch River Due to ORNL Discharges
(ISHAP Samples at Confluence of White Oak Creek and the Clinch River)

*Tests show that complete mixing does not occur in the near reaches of the river.

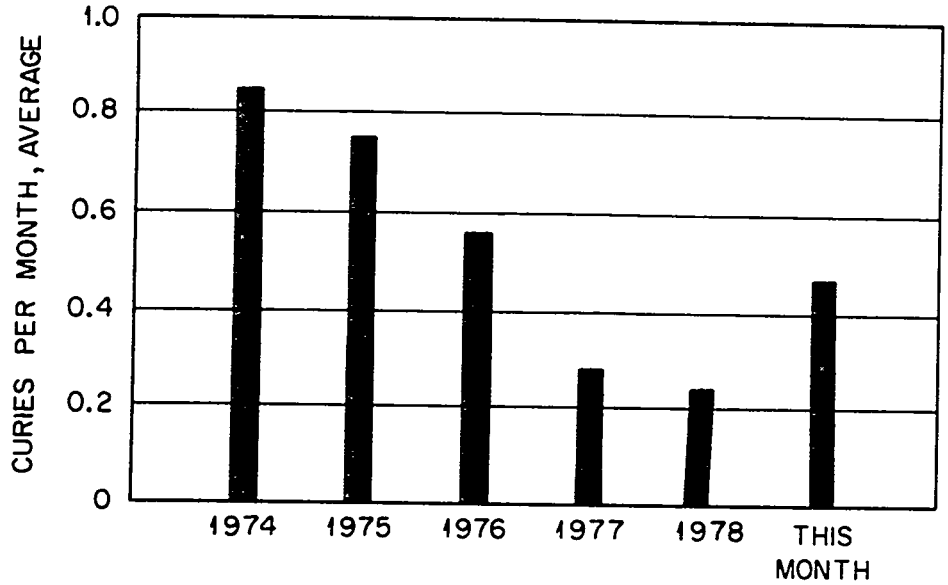


Fig 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 75-2540R3

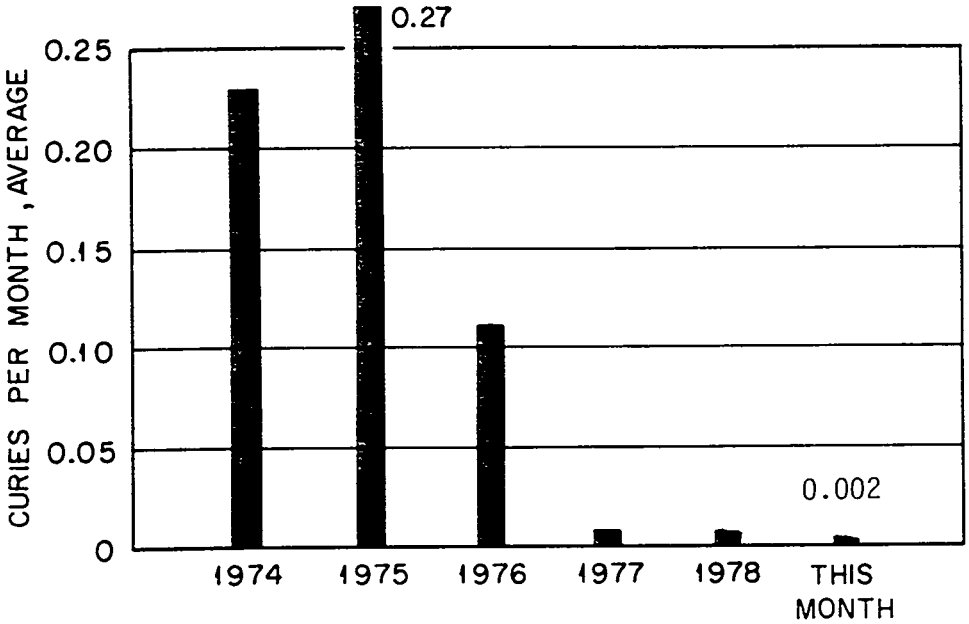


Fig 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

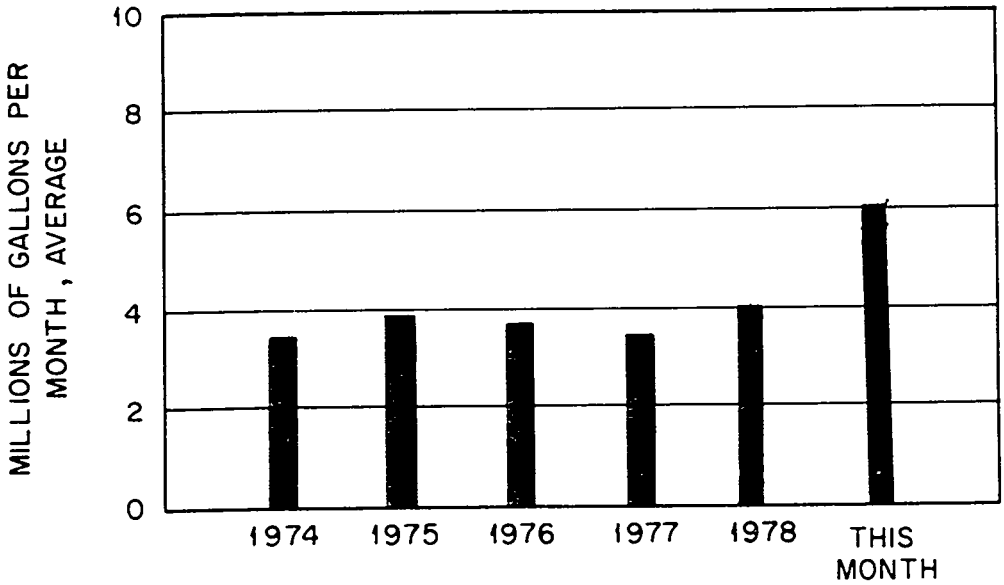


Fig 4. Process Waste Volumes.

ORNL-DWG 75-25441R3

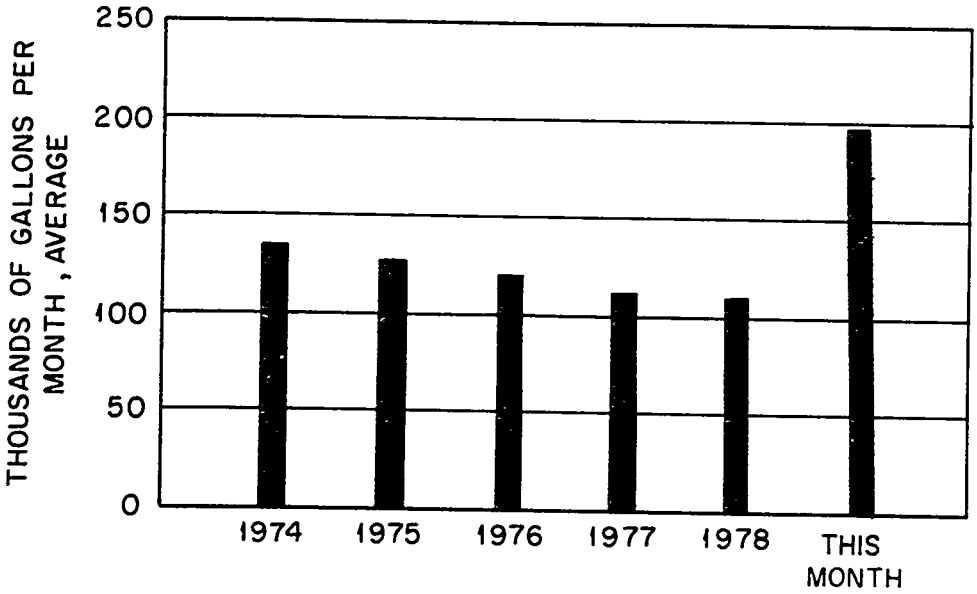


Fig 5. Intermediate – Level Waste Volumes.

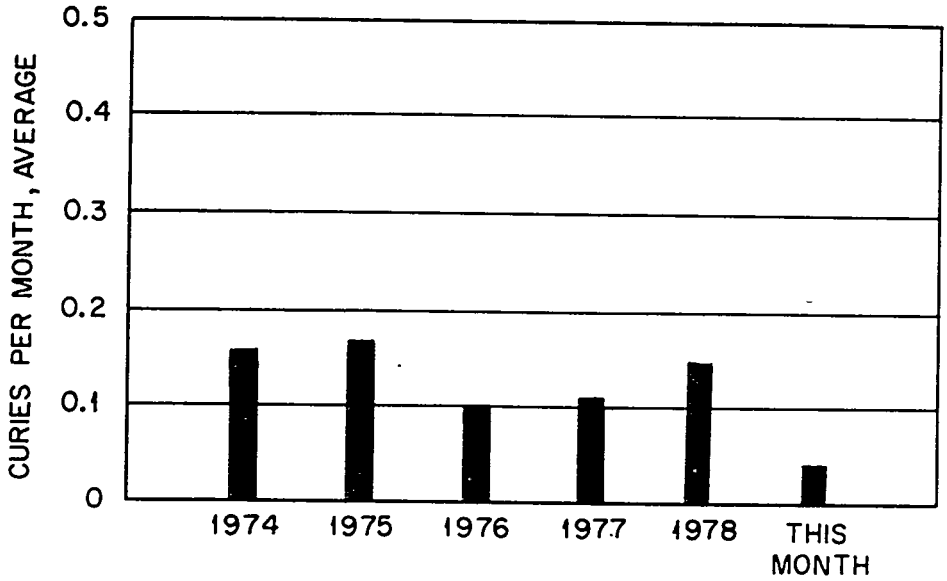


Fig 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL's Maximum Permissible Operating Level is 13 curies Per Quarter.

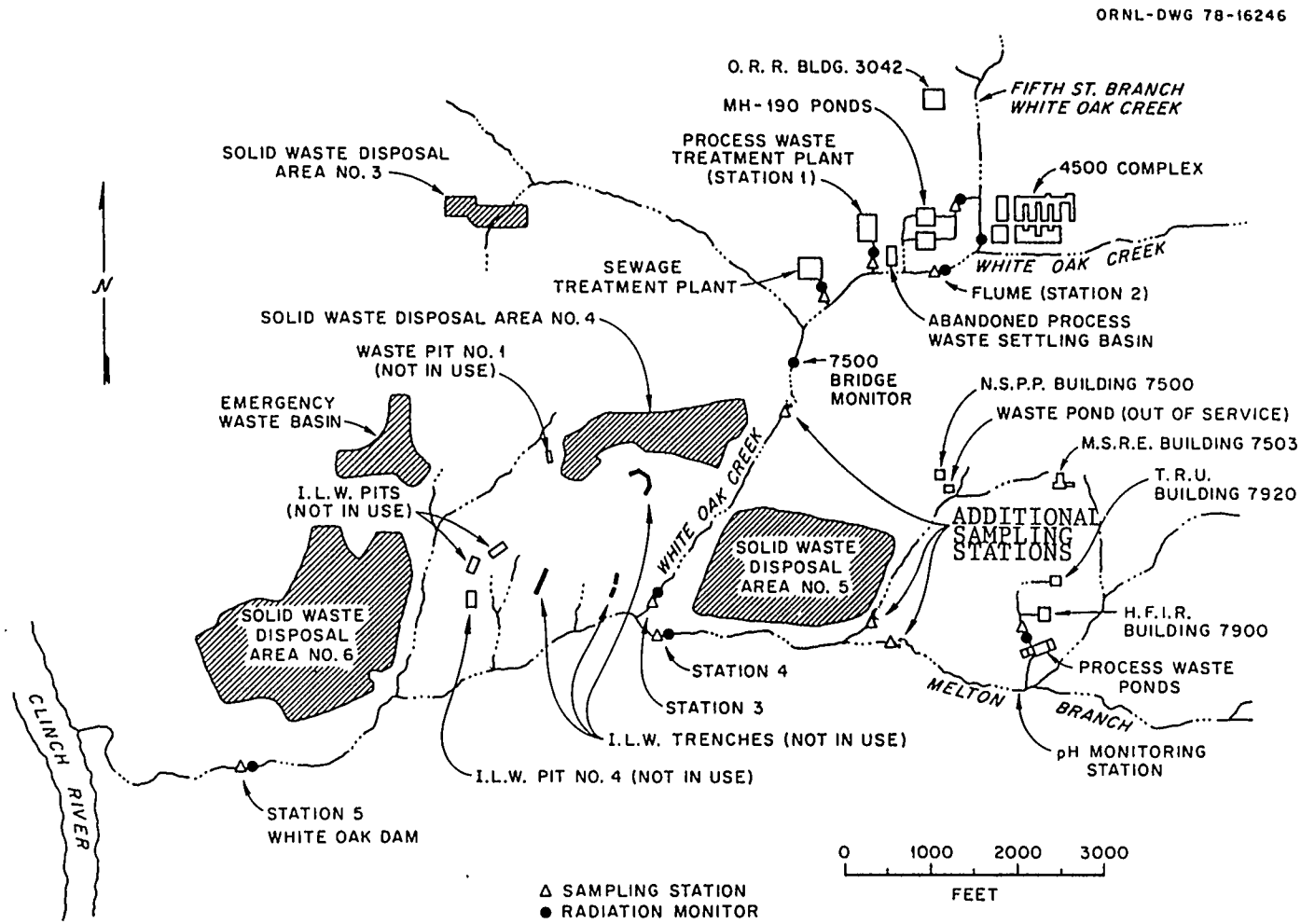


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

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	0.002	0.043
Miscellaneous discharges from east end of plant	2	0.024	0.081
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.437	0.838
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.042	0.135
Total discharge from all sources	3,4	0.479	0.973
White Oak Dam to Clinch River (Health Physics Measurement)	5	0.15	0.24

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	164	0.022	2.3	0.08	1.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.209[a]	21.8	0.79	16.2
3. Reactor Operations (MH112)	1.7	0.003	0.3	0.97	19.8
4. Buildings 3503 and 3508	0.31	<0.001	—	0.35	7.2
5. Buildings 3025 and 3026	2.6	<0.001	—	0.18	3.7
6. Building 3019	10.7	0.007	0.7	0.41	8.4
7. Waste Evaporator, Bldg. 2531	4.1	0.003	0.3	0.41	8.4
8. Building 3525	0.11	<0.001	—	0.28	5.7
9. Building 2026	0.44	<0.001	—	0.18	3.7
10. Tank Farm Drainage	339	0.714	74.6	1.24	25.3

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.02
Central Radioactive Gas Disposal Facilities	3039	≤0.04	<119
Radiochemical-Processing Pilot Plant	3020	<0.01	<0.88
MSRE	7512	<0.01	<0.29
HFIR & TRU	7911	<0.1	<8.60
Total Activity in Gases Released at X-10 Site		≤0.04	<128.79
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			$\leq 5.2 \times 10^{-5}$
Room 265			5.1×10^{-5}
Building 5505 Discharges Glove Box			3.8×10^{-4}
Hood			$\leq 1.3 \times 10^{-3}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-79/166

DATE: April 23, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer ORNL Site — Date 7/12/96

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of February was normal. The total ^{90}Sr discharged to White Oak Lake was 207 mCi compared to 479 mCi for the previous month. The ORNL Stacks discharged $\leq$10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of February 1979, was 0.17% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 31.0% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 1096 Ci of ^3H and 0.26 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 316.45 and 86.01 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (207 mCi) was 272 mCi less than the amount reported for January. This substantially lower discharge is attributed to the diminished rainfall during the period. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.8 mCi and 10.4 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground

No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek	^{90}Sr, mCi	^{90}Sr, mCi
Flume	11.1	
190 Ponds	0.8	
Process Waste Treatment Plant	1.5	
Sewage Treatment Plant	10.4	
	23.8	
7500 Sampling Station	53.3	
Burial Ground Nos. 1 and 3		29.5
Station 3	151.0	
Burial Ground No. 4		97.7
Melton Branch		
7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	8.7	
	8.9	
Station 4	55.6	
Burial Ground No. 5		46.7
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	206.6	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		173.9
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		84.2%

Process Waste

A total of 5.53 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
207	C	136	1948
208	A	113	1859
209	B	104	1846
210	C	136	1933
211	A	137	1930
212	B	120	1768
213	C	135	1868
214	A	147	1938

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 210 gph. A summary of operations is given below:

	Gallons
Total volume generated	108,000
Volume transferred to evaporator	141,000
Tank Farm free space at beginning of month	404,000
Tank Farm free space at end of month	430,000
Evaporator concentrate returned to tank farm	7,000
Volume of concentrate available for hydrofracture	67,000

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

	Gallons
Building 3019	10,000
Radioisotopes Processing Area	5,300
ORR and BSR	11,300
High Flux Isotope Reactor	13,400
Fission Products Development Laboratory	27,300[a]
4500 Complex	8,300
Transuranium Processing Area	2,900

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 156 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.5% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stacks releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

There were no unusual occurrences during the period.

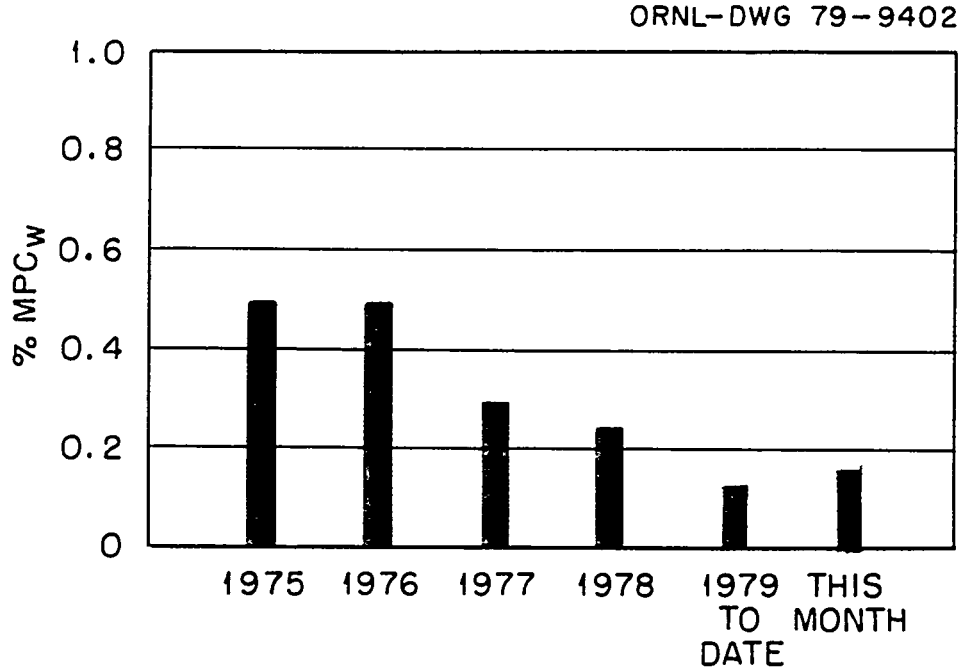


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam). Assumes dilution in Clinch River.

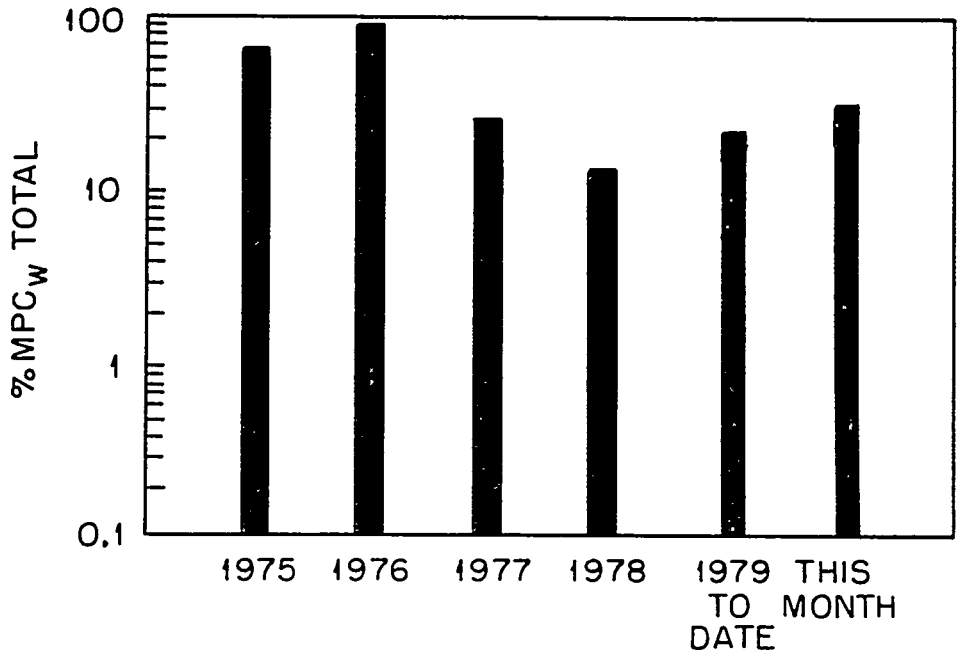


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

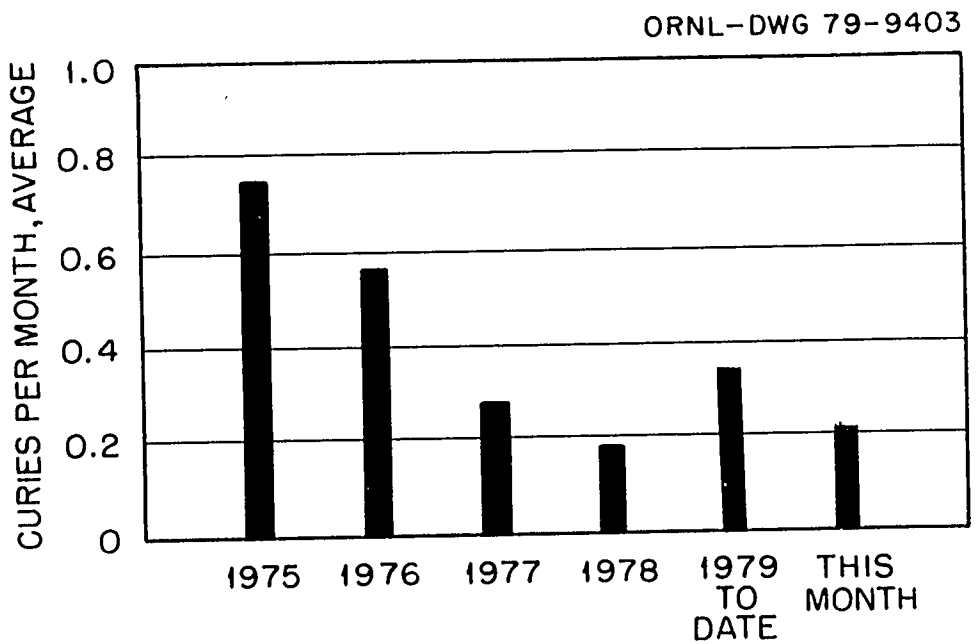


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

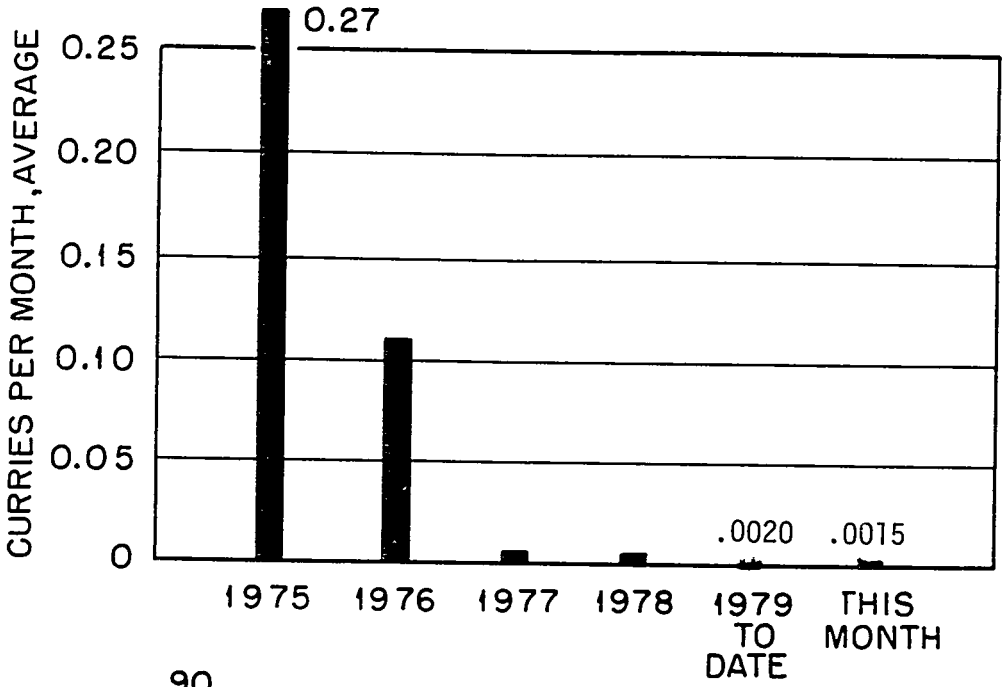


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

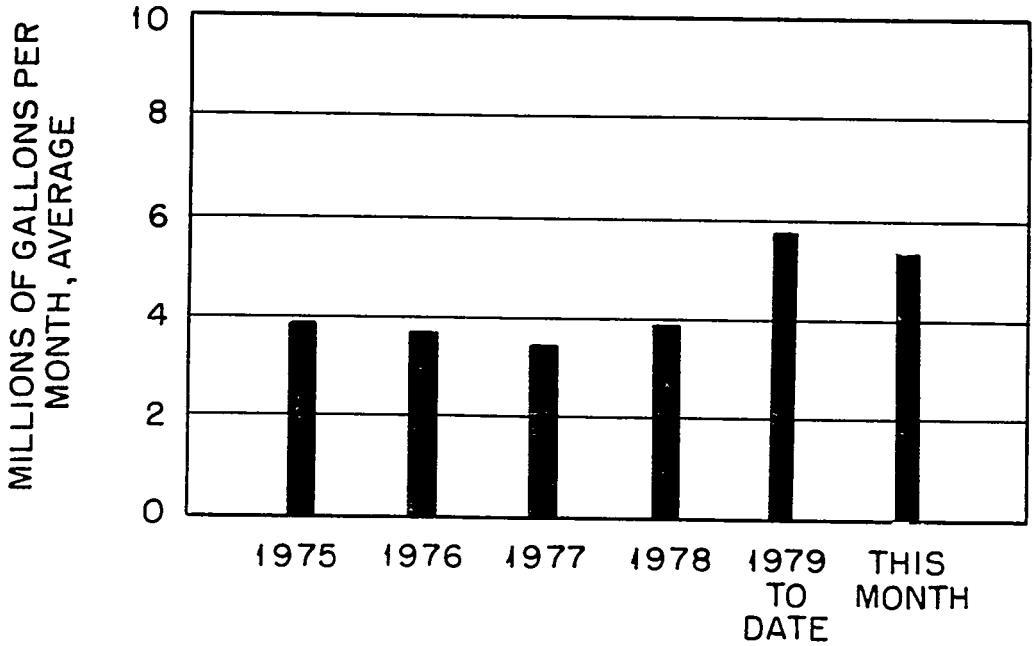


Fig. 4. Process Waste Volumes.

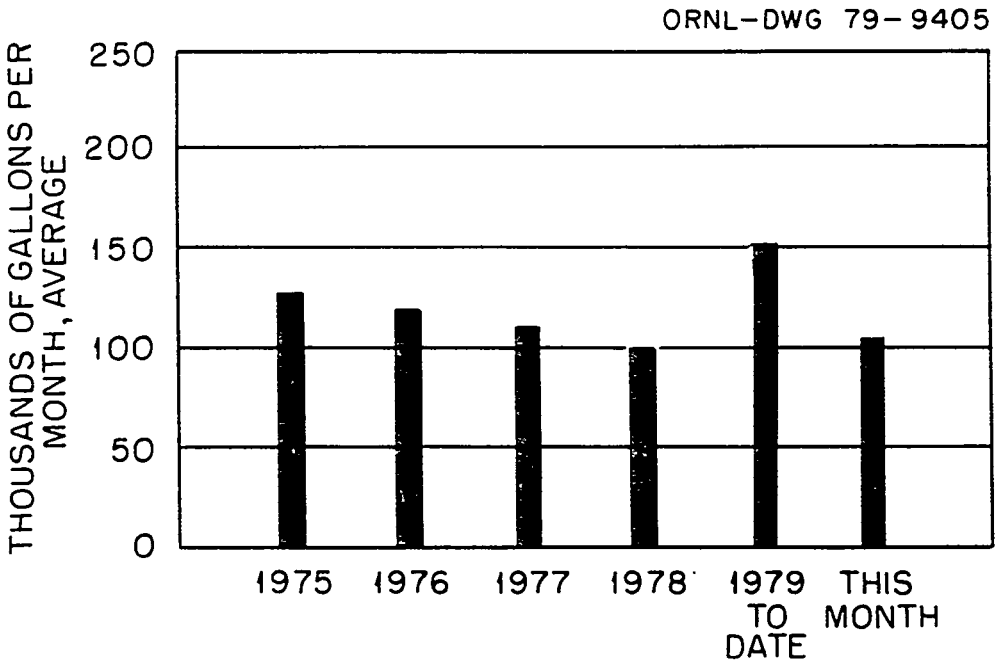


Fig. 5. Intermediate-Level Waste Volumes.

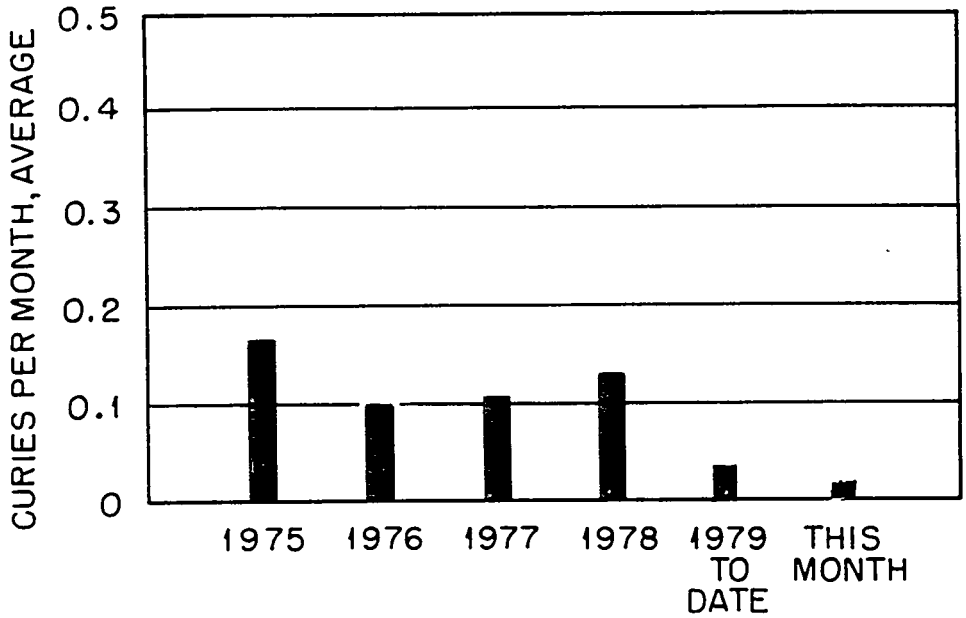


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

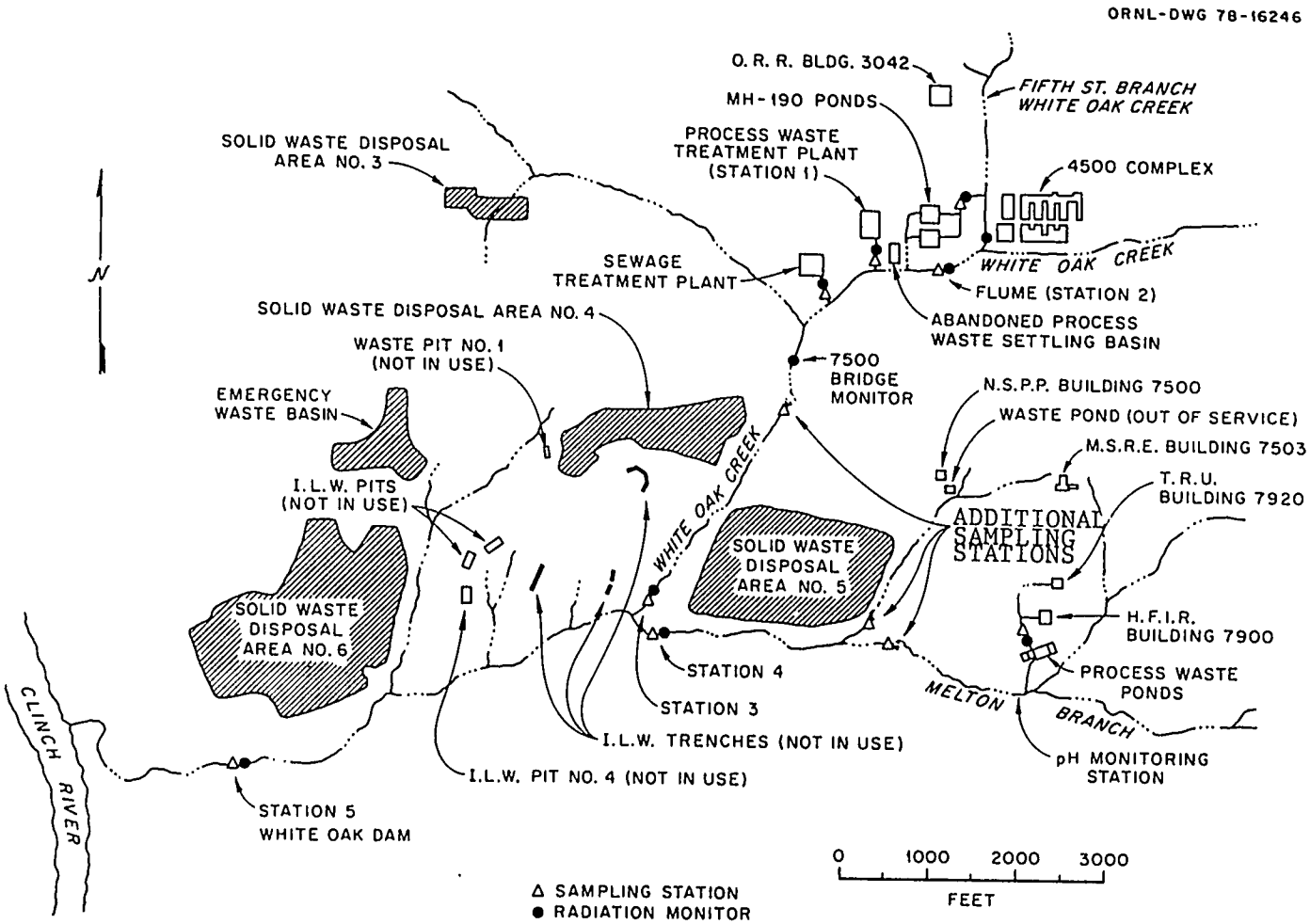


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.002	0.023
Miscellaneous discharges from east end of plant	2	0.011	0.159
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.151	0.559
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.056	0.035
Total discharge from all sources	3,4	0.207	0.594
White Oak Dam to Clinch River (Health Physics Measurement)	5	0.26	0.31

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	123	0.019	2.3	0.09	2.3
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.203[a]	25.0	0.65	16.6
3. Reactor Operations (MH112)	1.8	0.002	0.3	0.66	16.8
4. Buildings 3503 and 3508	0.28	<0.001	—	0.44	11.2
5. Buildings 3025 and 3026	2.1	<0.001	—	0.24	6.1
6. Building 3019	8.1	0.003	0.4	0.20	5.1
7. Waste Evaporator, Bldg. 2531	7.0	0.004	0.5	0.30	7.7
8. Building 3525	0.10	<0.001	—	0.20	5.1
9. Building 2026	1.5	<0.001	—	0.13	3.3
10. Tank Farm Drainage	338	0.528	71.5	1.01	25.8

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	0.6
Central Radioactive Gas Disposal Facilities	3039	≤0.01	156
Radiochemical-Processing Pilot Plant	3020	<0.01	1.7
MSRE	7512	<0.01	<0.5
HFIR & TRU	7911	<0.01	13
Total Activity in Gases Released at X-10 Site		≤0.010	172
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			2.5×10^{-3}
Room 265			$<5.77 \times 10^{-4}$
Building 5505 Discharges Glove Box			d
Hood			$<3.75 \times 10^{-3}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

[d]This value not available because of equipment failure.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-79/172

DATE: April 25, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March 1979

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer
ORNL Site
Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of March was normal. The total ^{90}Sr discharged to White Oak Lake was 203 mCi compared to 207 mCi for the previous month. The ORNL Stacks discharged 10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of March 1979, was 0.1% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 34.9% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 621 Ci of ^3H and 0.15 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 341.75 and 83.98 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (203 mCi) was 4 mCi less than the amount reported for February. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.9 mCi and 14.5 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground

No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek	^{90}Sr, mCi	^{90}Sr, mCi
Flume	10.5	
190 Ponds	0.9	
Process Waste Treatment Plant	0.7	
Sewage Treatment Plant	14.5	
	26.6	
7500 Sampling Station	46.4	
Burial Ground Nos. 1 and 3		19.8
Station 3	139.4	
Burial Ground No. 4		93.0
Melton Branch		
7900 Area (HFIR and TRU)	0.3	
7500 Area (NSPP and MSRE)	6.6	
	6.9	
Station 4	64.2	
Burial Ground No. 5		57.3
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	203.6	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		170.1
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		83.5%

Process Waste

A total of 6.29 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
215	B	138	1931
216	C	128	1832
217	A	128	1933
218	B	134	1943
219	C	124	1922
220	A	109	1935
221	B	108	1917
222	C	108	1917
223	A	112	1988

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 181 gph. A summary of operations is given below:

	Gallons
Total volume generated	112,000
Volume transferred to evaporator	135,000
Tank Farm free space at beginning of month	430,000
Tank Farm free space at end of month	448,000
Evaporator concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	71,000

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

	Gallons
Building 3019	7,100
Radioisotopes Processing Area	8,200
ORR and BSR	4,200
High Flux Isotope Reactor	16,300
Fission Products Development Laboratory	13,000[a]
4500 Complex	13,100
Transuranium Processing Area	2,800

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to <154 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.3% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

There were no unusual occurrences during the period.

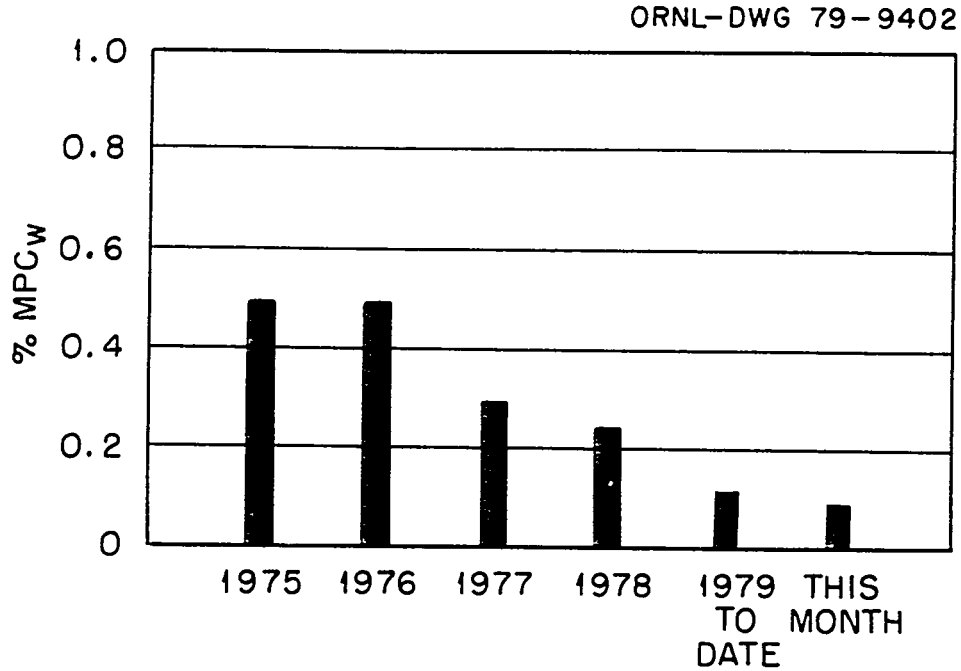


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam). Assumes Dilution in Clinch River.

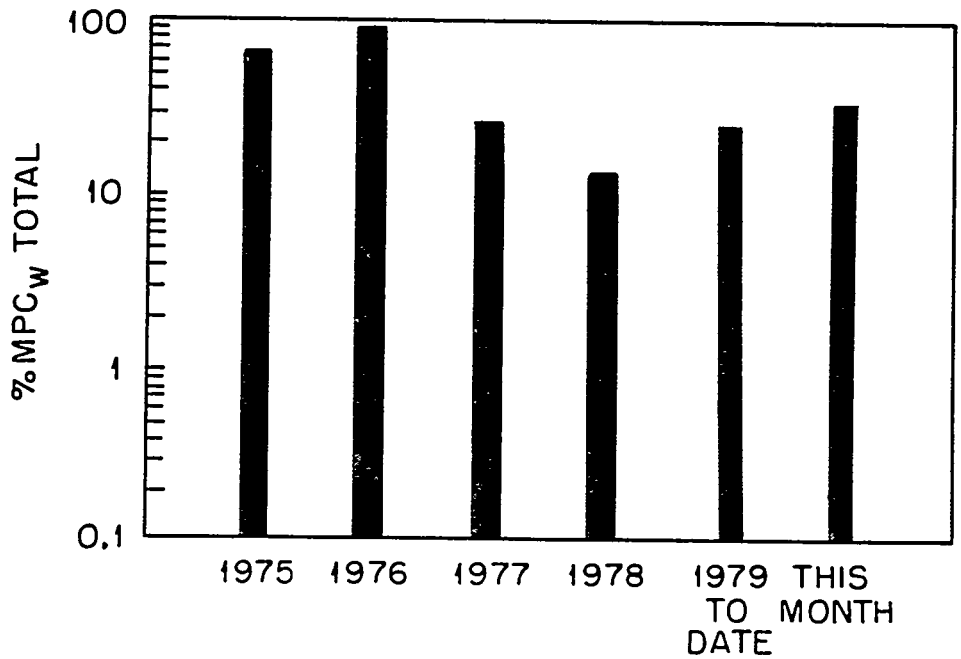


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

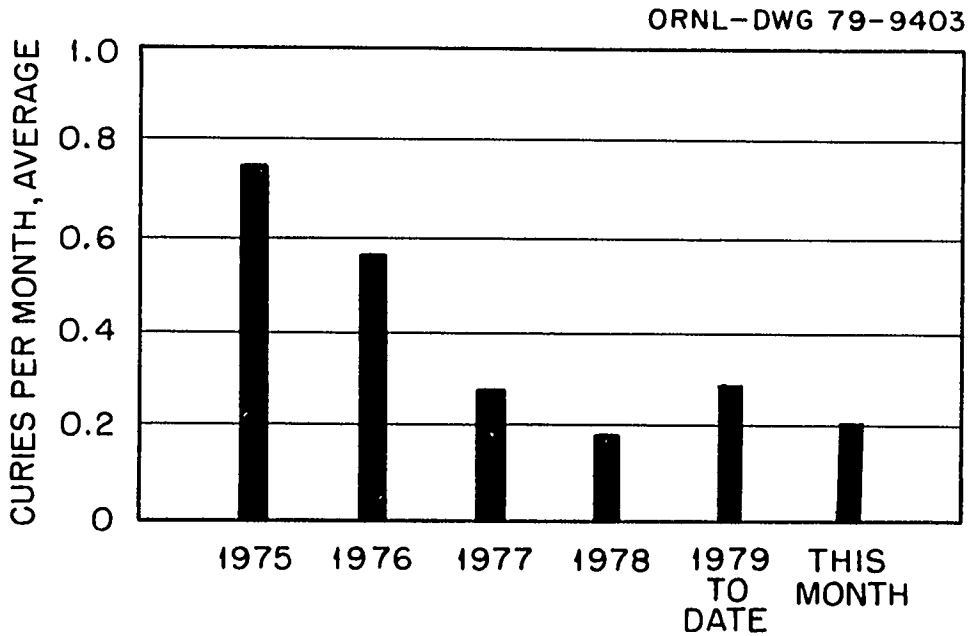


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

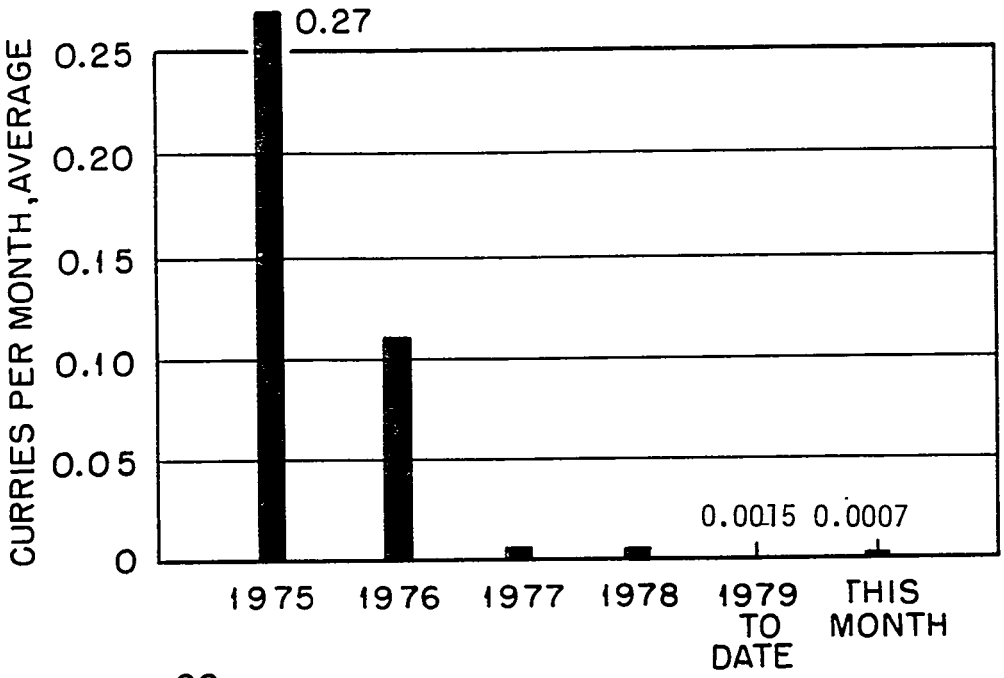


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

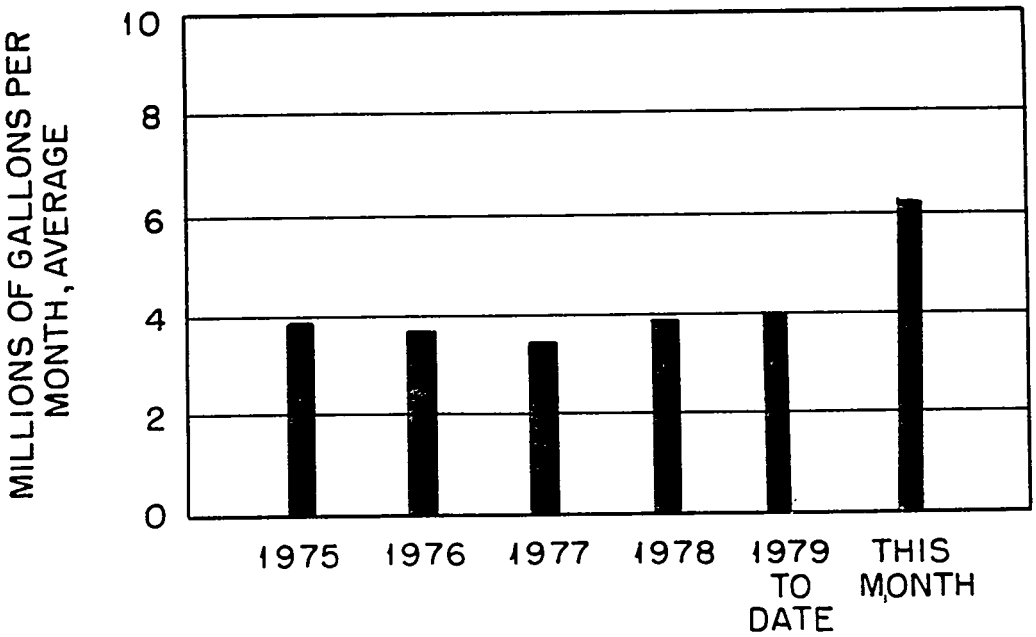


Fig. 4. Process Waste Volumes.

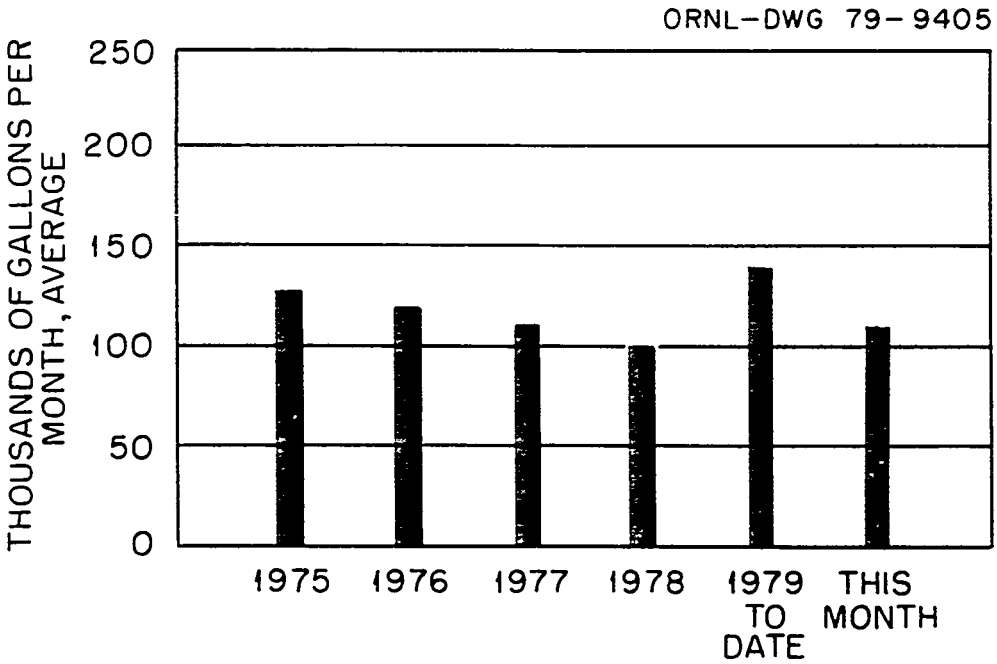


Fig. 5. Intermediate-Level Waste Volumes.

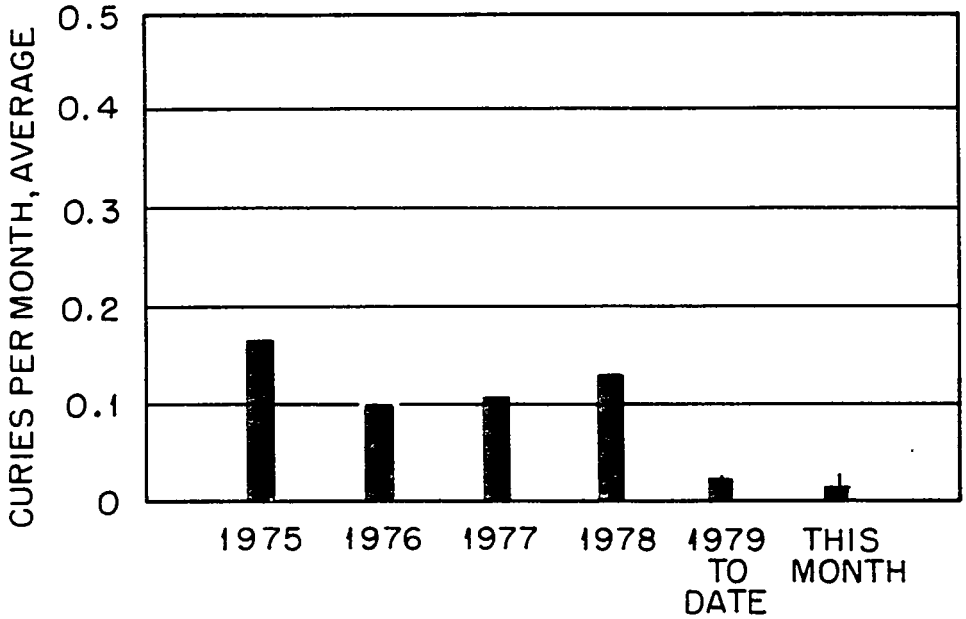


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

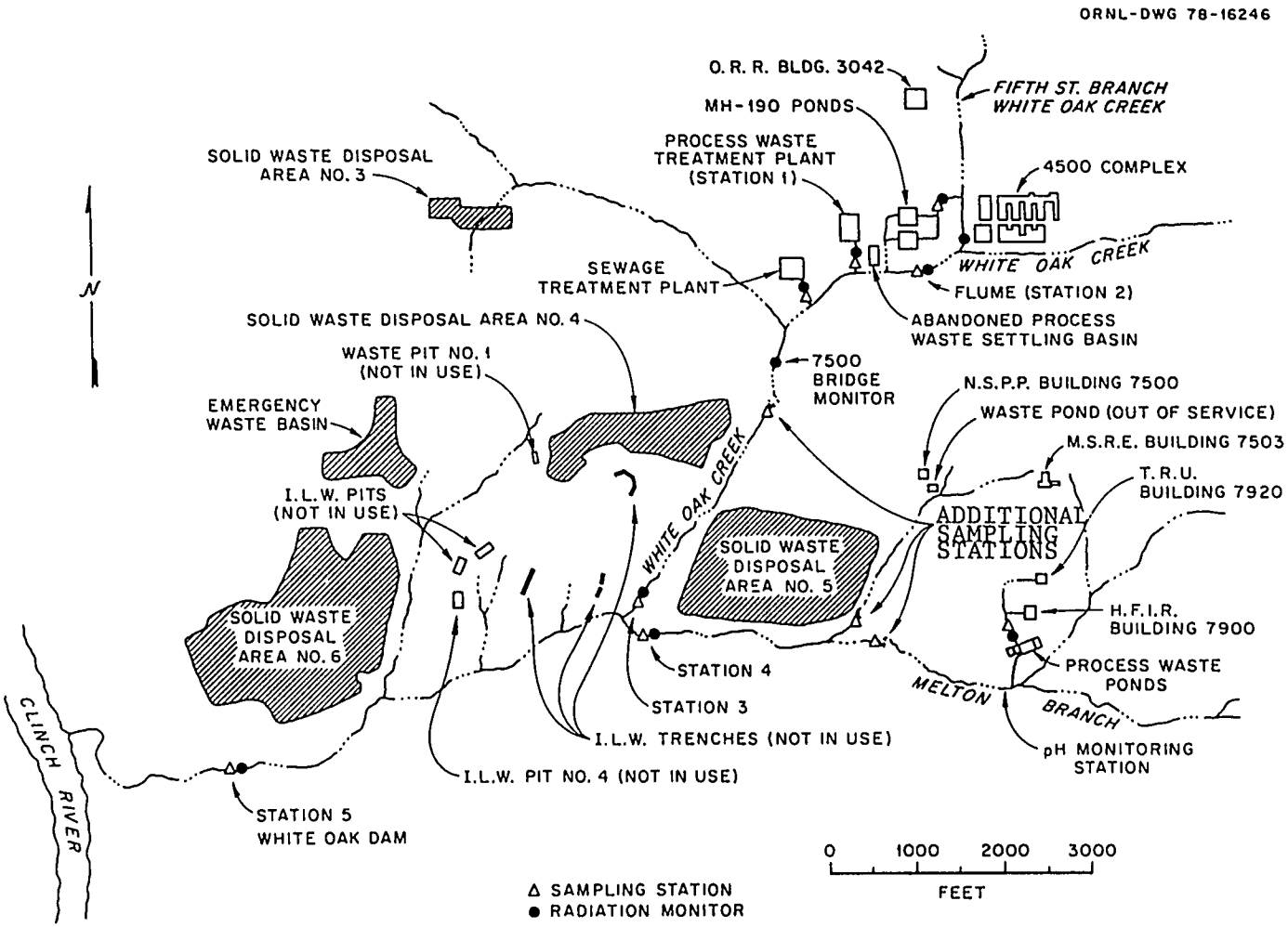


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0007	0.030
Miscellaneous discharges from east end of plant	2	0.011	<0.052
Discharge from Bethel Valley Operations and Burial Ground Nos. 1, 3 and 4	3	0.139	0.372
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.064	<0.194
Total discharge from all sources	3,4	0.203	<0.566
White Oak Dam to Clinch River (Health Physics Measurement)	5	0.15	0.20

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	50.6	0.011	0.9	0.13	2.4
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.263[a]	22.7	0.63	11.5
3. Reactor Operations (MH112)	2.5	0.003	0.3	0.63	11.5
4. Buildings 3503 and 3508	0.25	0.001	0.1	1.09	19.9
5. Buildings 3025 and 3026	2.1	0.001	0.1	0.35	6.4
6. Building 3019	5.9	0.003	0.3	0.26	4.8
7. Waste Evaporator, Bldg. 2531	8.7	0.006	0.5	0.40	7.3
8. Building 3525	0.08	<0.001	—	0.21	3.8
9. Building 2026	0.62	<0.001	—	0.12	2.2
10. Tank Farm Drainage	310	0.87	75.1	1.65	30.2

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.5
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<138
Radiochemical-Processing Pilot Plant	3020	<0.01	<1
MSRE	7512	<0.01	<0.7
HFIR & TRU	7911	<0.01	<14
Total Activity in Gases Released at X-10 Site		≤0.01	<154.2
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^3H)[c]	
Building 4508 Ventilation Discharges Room 136			$<7.7 \times 10^{-4}$
Room 265			$<1.8 \times 10^{-4}$
Building 5505 Discharges Glove Box			$<1.1 \quad 10^{-3}$
Hood			d

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

[d]Data not available because of sampling equipment failure.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/225

DATE: July 11, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April, 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of April was normal. The total ^{90}Sr discharged to White Oak Lake was 270 mCi compared to 203 mCi for the previous month. The ORNL Stacks discharged $\leq$10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of April 1979, was 0.21% of the MPC_W (Figure 1A). Results of samples taken at the confluence of White Oak Creek and the Clinch River were not available at the time this report was prepared and consequently there are no measured values to depict in Figure 1B.

During the month, 683 Ci of ^{3}H and 0.17 Ci of ^{90}Sr passed over White Oak Dam. These were the main contaminants in White Oak Creek.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 392.22 and 86.91 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (270 mCi) was 67 mCi more than the amount reported for March. The bulk of this increase apparently came from the burial ground drainage systems as a result of an increase in the amount of rainfall during the period. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.6 mCi and 14.0 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground

No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek	^{90}Sr, mCi	^{90}Sr, mCi
Flume	18.4	
190 Ponds	0.6	
Process Waste Treatment Plant	0.8	
Sewage Treatment Plant	14.0	
	33.8	
7500 Sampling Station	57.6	
Burial Ground Nos. 1 and 3 and Flood Plain		23.8
Station 3	187.0	
Burial Ground No. 4		129.4
Melton Branch		
7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	4.1	
	4.3	
Station 4	82.7	
Burial Ground No. 5		78.4
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	269.7	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		231.6
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		85.9%

Process Waste

A total of 5.46 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
224	B	144	1989
225	C	145	1984
226	A	136	1916
227	B	147	1913
228	C	148.5	1978
229	A	142	1978
230	B	129	1892
231	C	109.5	1944

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 178 gph. A summary of operations is given below:

	Gallons
Total volume generated	126,000
Volume transferred to evaporator	128,000
Tank Farm free space at beginning of month	448,000
Tank Farm free space at end of month	446,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	76,000

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

	Gallons
Building 3019	6,928
Radioisotopes Processing Area	10,062
ORR and BSR	14,025
High Flux Isotope Reactor	32,246
Fission Products Development Laboratory	7,600[a]
4500 Complex	8,869
Transuranium Processing Area	1,300

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 314 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.8% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OF UNUSUAL INCIDENTS

1. An NPDES noncompliance occurred on April 24 when the maximum pH limit was exceeded at Monitoring Station Number 4 for a period of 2 hours. The source was traced to the 7900 area Process Waste System; however, the specific cause was not determined.

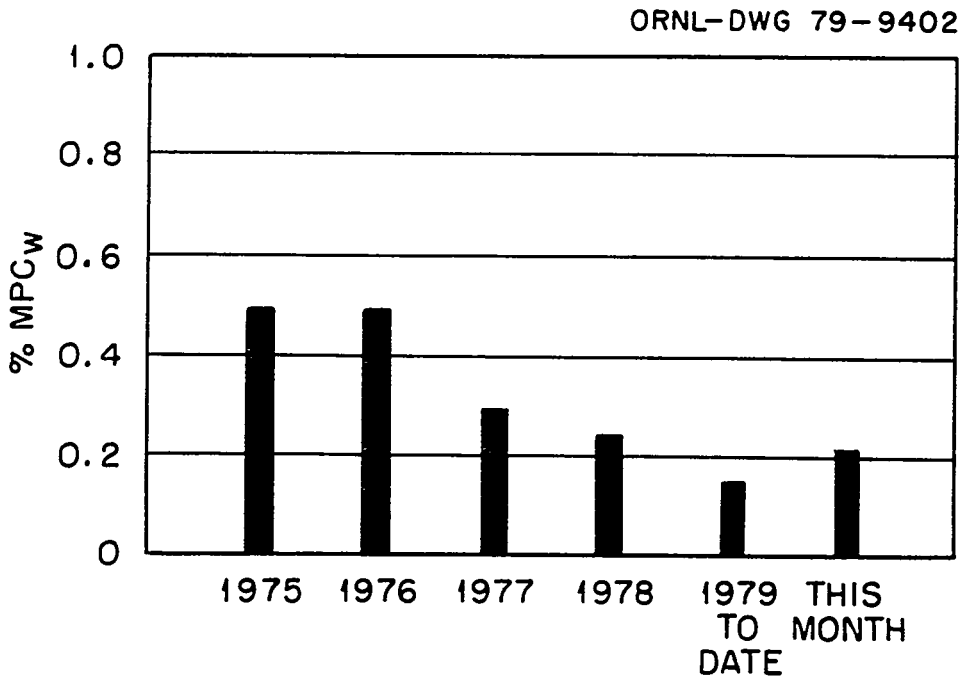


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

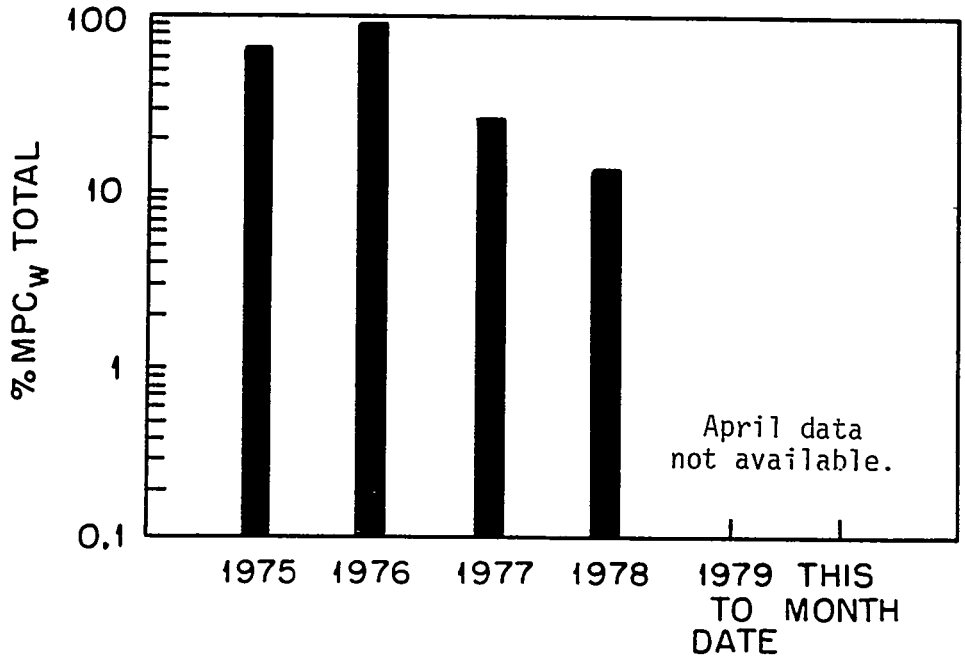


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

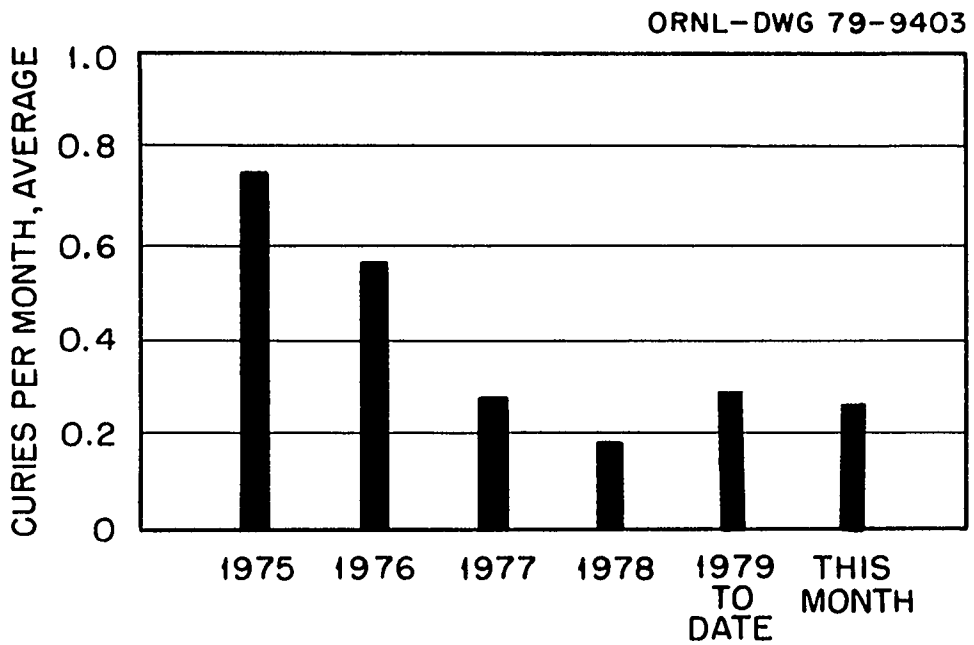


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

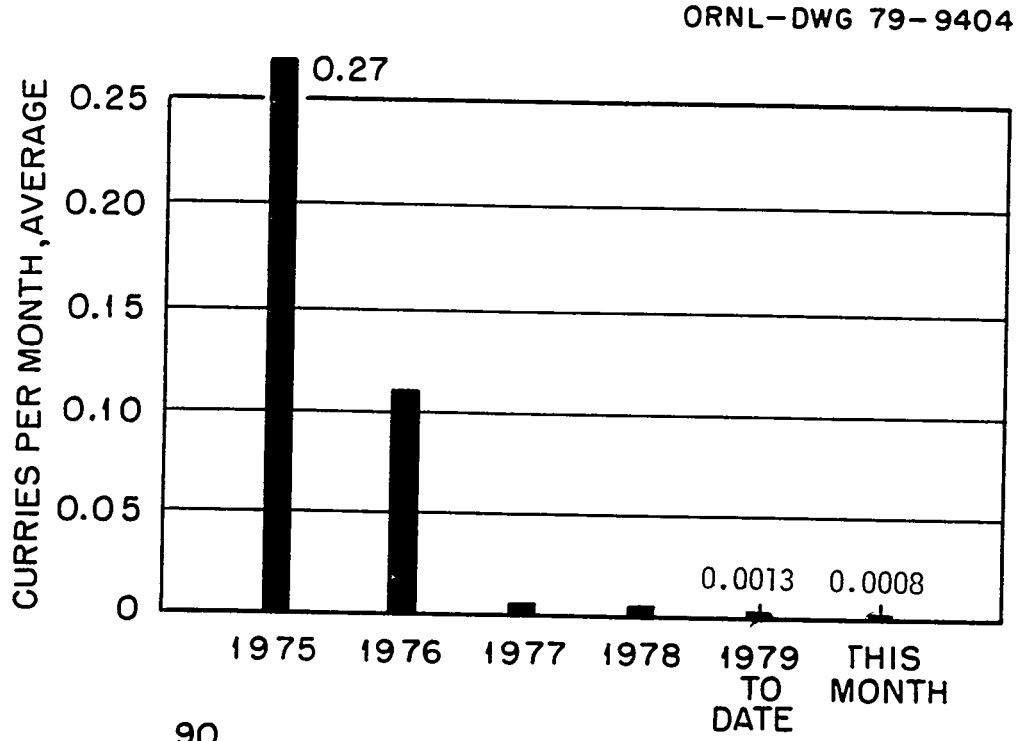


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

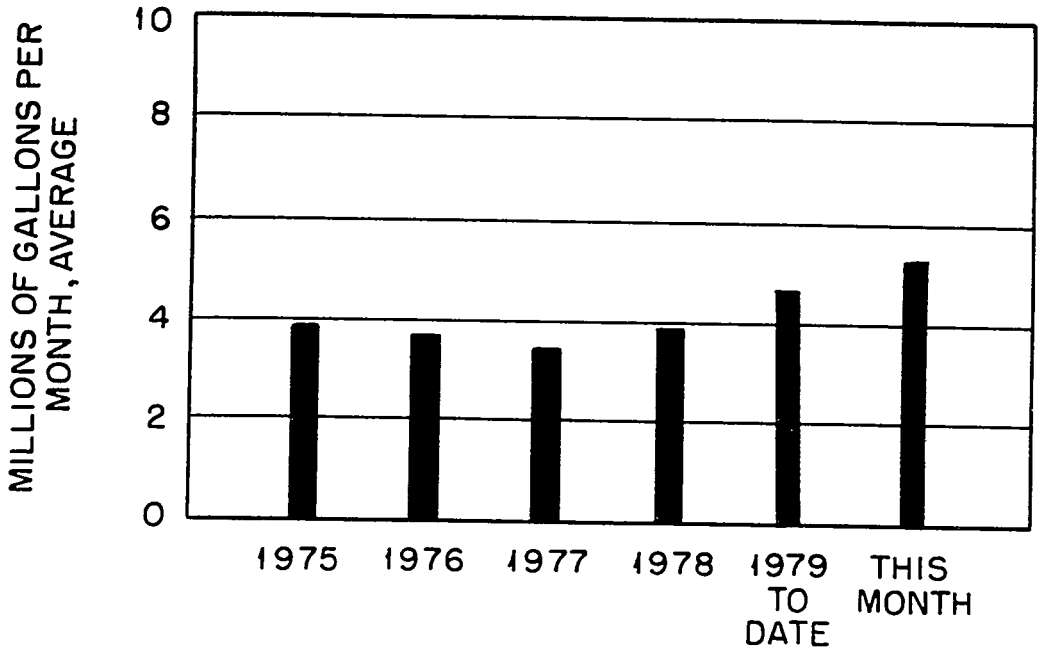


Fig. 4. Process Waste Volumes.

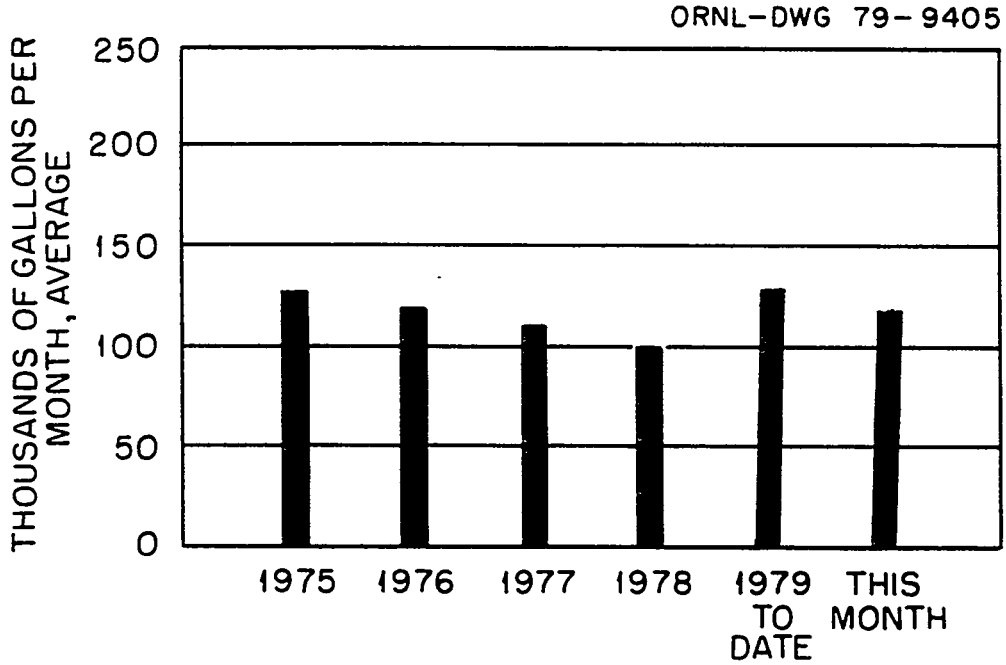


Fig. 5. Intermediate-Level Waste Volumes.

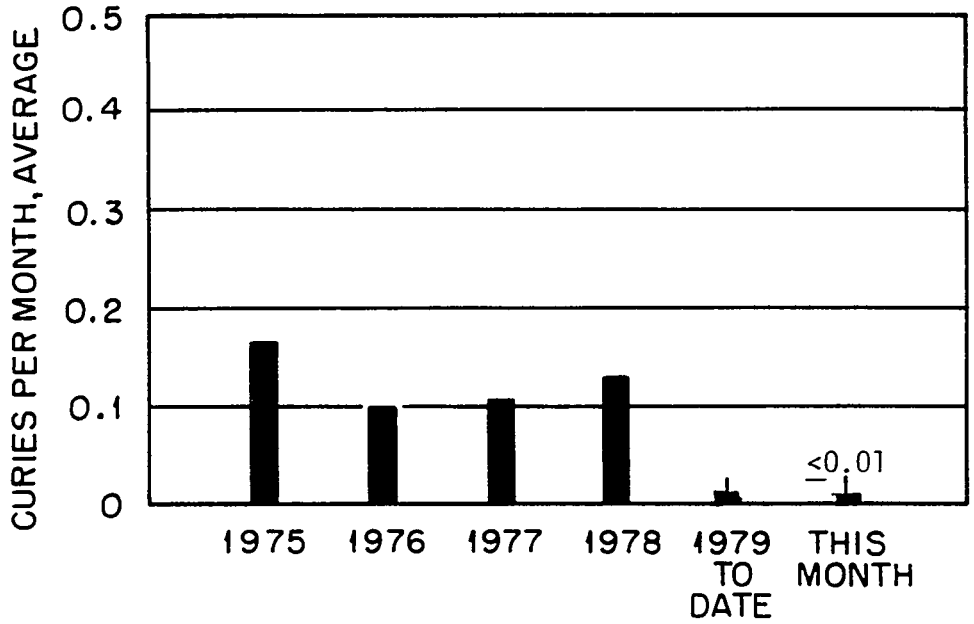


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

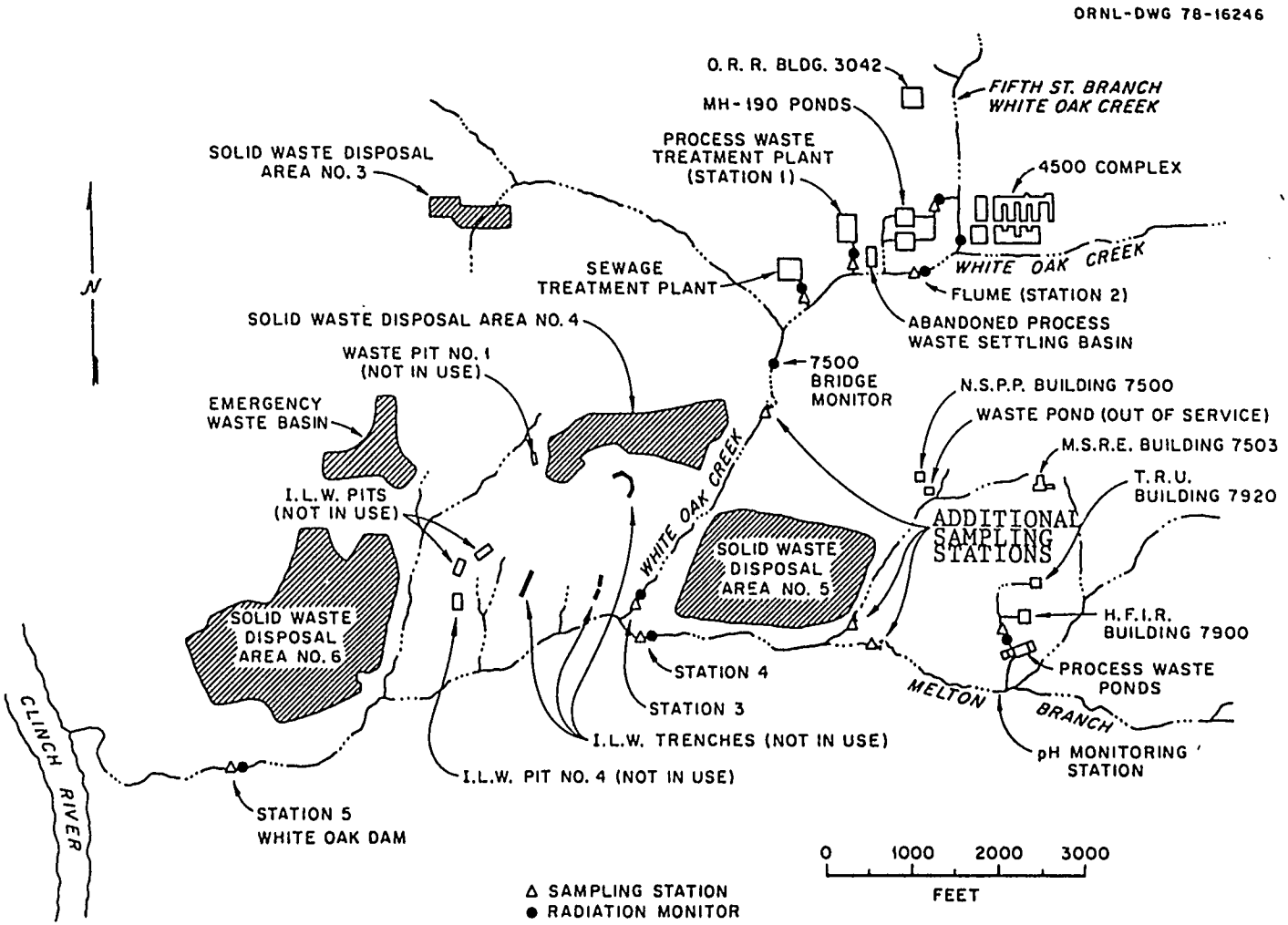


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0008	0.043
Miscellaneous discharges from east end of plant	2	0.018	0.048
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.187	0.440
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.083	0.236
Total discharge from all sources	3,4	0.270	0.676
White Oak Dam to Clinch River (Health Physics Measurement)		0.17	0.21

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	26.2	0.006	0.5	0.15	2.7
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.266[a]	23.3	0.63	11.4
3. Reactor Operations (MH112)	4.3	0.005	0.4	0.66	12.0
4. Buildings 3503 and 3508	0.18	<0.001	—	1.18	21.4
5. Buildings 3025 and 3026	1.2	<0.001	—	0.36	6.5
6. Building 3019	2.8	0.001	0.1	0.273	4.9
7. Waste Evaporator, Bldg. 2531	31.0	0.017	1.5	0.32	5.8
8. Building 3525	0.06	<0.001	—	0.29	5.3
9. Building 2026	0.37	<0.001	—	0.04	0.7
10. Tank Farm Drainage	308	0.848	74.2	1.62[b]	29.3

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[b]The flowmeter is temporarily out of service. This is a calculated value obtained from the difference between the totalized diversion box flow and the sum of the monitoring station flows.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.9
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<294
Radiochemical-Processing Pilot Plant	3020	<0.01	4.6
MSRE	7512	<0.01	<0.6
HFIR & TRU	7911	<0.01	<17
Total Activity in Gases Released at X-10 Site		≤0.010	314.1
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H[c])	
Building 4508 Ventilation Discharges Room 136			5.1×10^{-4}
Room 265			$<1.17 \times 10^{-4}$
Building 5505 Discharges Glove Box			$<2.25 \times 10^{-3}$
Hood			$<1.29 \times 10^{-2}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is still being tested.

DATE RECEIVED AUG 8 1979

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/246

DATE: July 24, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

David R. Hamm 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of May was normal. ILW Injection No. 18 was completed during the period. The total ^{90}Sr discharged to White Oak Lake was 267 mCi compared to 270 mCi for the previous month. The ORNL Stacks discharged 30 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The data normally reported for the effluent from White Oak Dam to the Clinch River was not available at the time this report was prepared.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 424.60 and 69.88 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (266.8 mCi) was 3.2 mCi less than the amount reported for April. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek decreased slightly to 0.7 mCi and 12.3 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Cree) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	12.8	
190 Ponds	0.7	
Process Waste Treatment Plant	1.2	
Sewage Treatment Plant	12.3	
	27.0	
7500 Sampling Station	57.6	
Burial Ground Nos. 1, 3 and the Flood Plain South of Bldg. 2519		30.6
Station 3	188.4	
Burial Ground No. 4		130.8

Melton Branch

7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	6.8	
	7.0	
Station 4	78.4	
Burial Ground No. 5		71.4
Total ^{90}Sr to White Oak Lake (Stations 3 and 4)	266.8	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		232.8
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5		87.3

Process Waste

A total of 6.20 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
232	A	127½	1956
233	B	124	1903
234	C	119½	1796
235	A	116	1903
236	B	96	1624
237	C	116	1988
238	A	120	1957
239	B	135	1936
240	C	136	1978

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 156 gph. A summary of operations is given below:

	Gallons
Total volume generated	137,000
Volume transferred to evaporator	112,000
Volume transferred to Shale Fracture	64,000
Tank Farm free space at beginning of month	446,000
Tank Farm free space at end of month	481,000
Evaporator concentrate returned to tank farm	4,000
Volume of concentrate available for hydrofracture	20,000

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

	Gallons
Building 3019	9,700
Radioisotopes Processing Area	14,700
ORR and BSR	5,300
High Flux Isotope Reactor	22,000
Fission Products Development Laboratory	15,000[a]
4500 Complex	9,800
Transuranium Processing Area	2,500

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

Hydrofracture Operations

ILW Injection No. 18 was completed on May 19, 1979. A total of 83,000 gallons of waste was slurried with 540,000 pounds of blended cement and fly ash and pumped into a new slot at a depth of 784.0 feet. The waste contained 129 Ci of ^{60}Co, 13,594 Ci of ^{137}Cs, 227 Ci of ^{134}Cs, and 23 Ci of ^{90}Sr. The transuranic content was <1 μCi/kg of grout. The slot was overdisplaced with water at the termination of the injection.

GASEOUS WASTE

The ORNL Stacks discharged <10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to <104 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.1% and 0.33% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

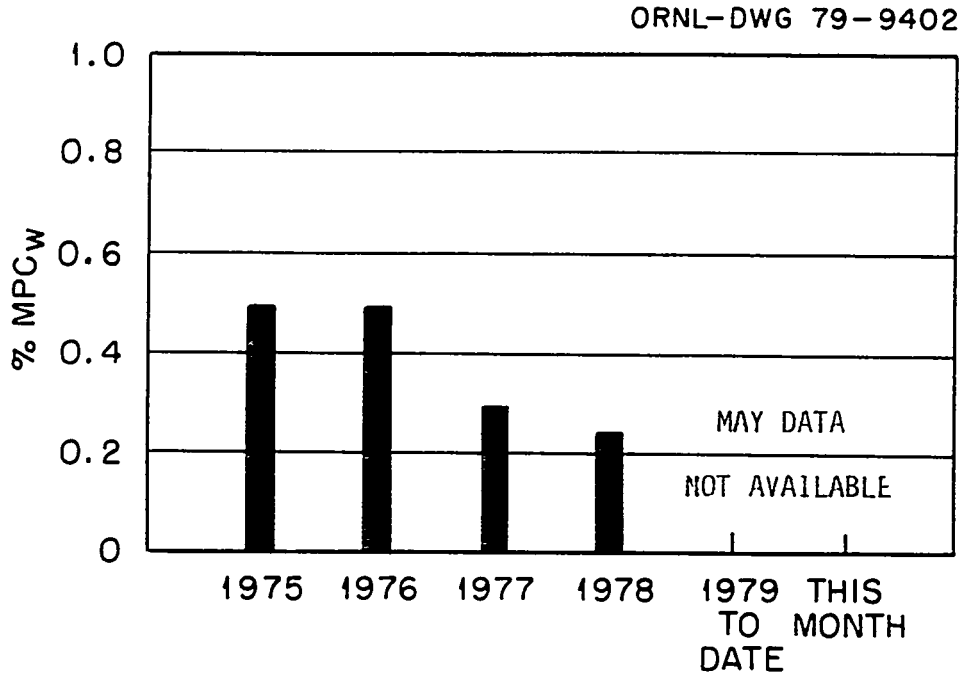


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

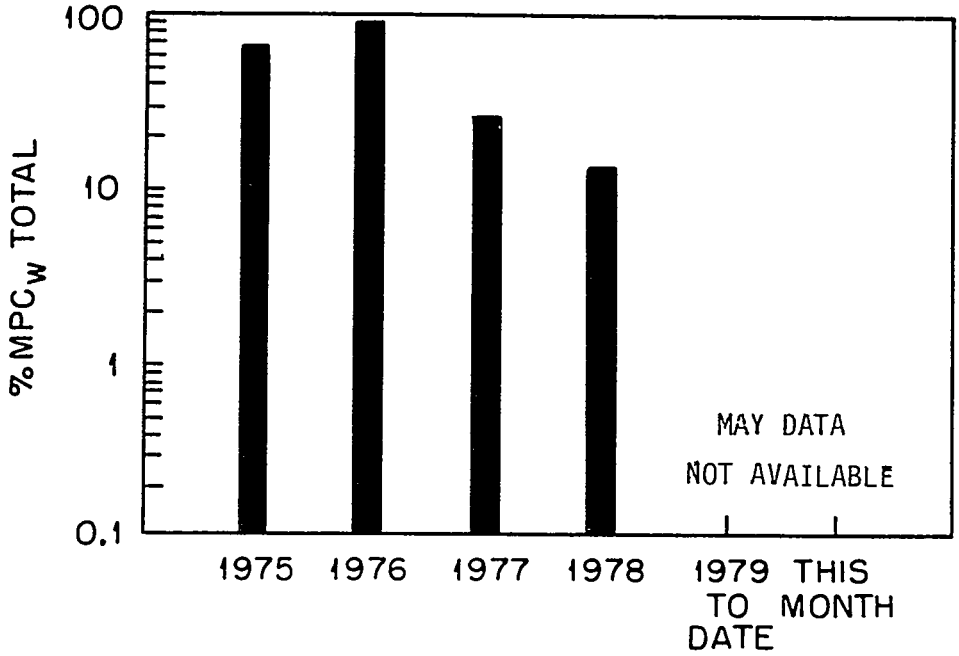


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

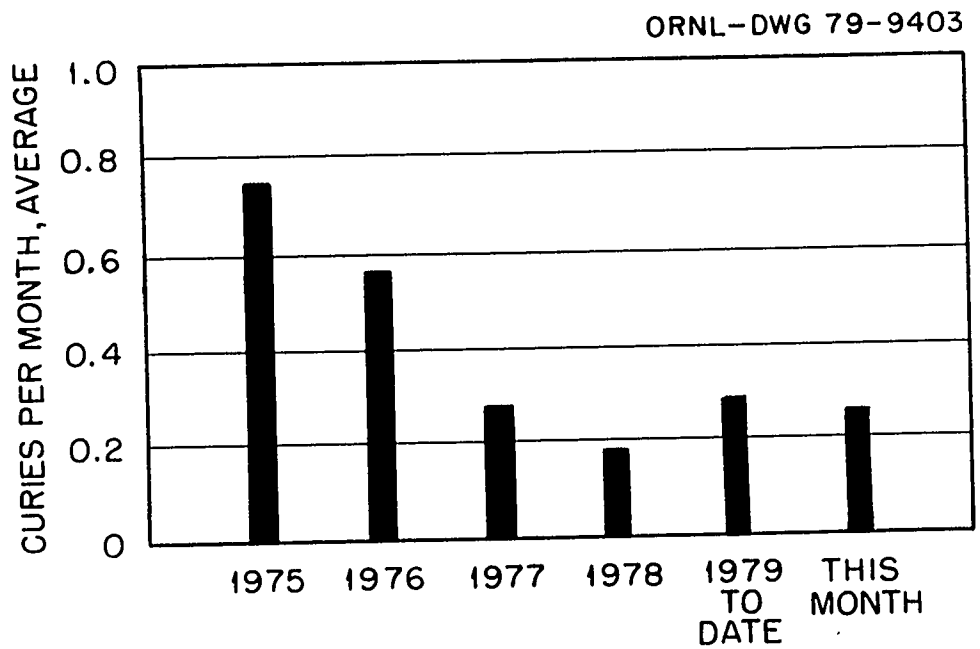


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

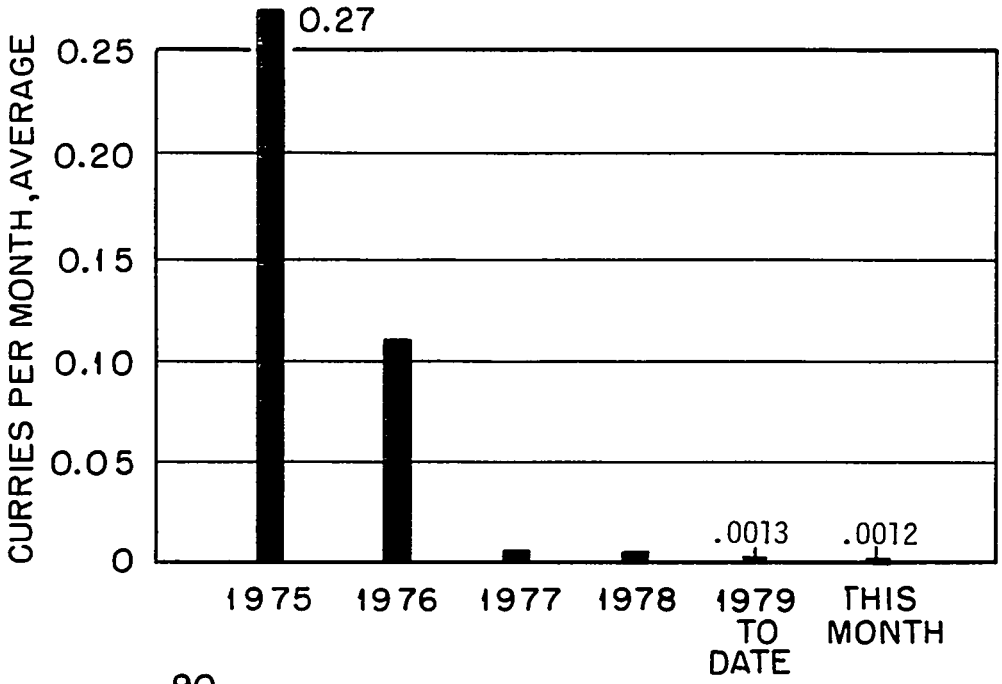


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

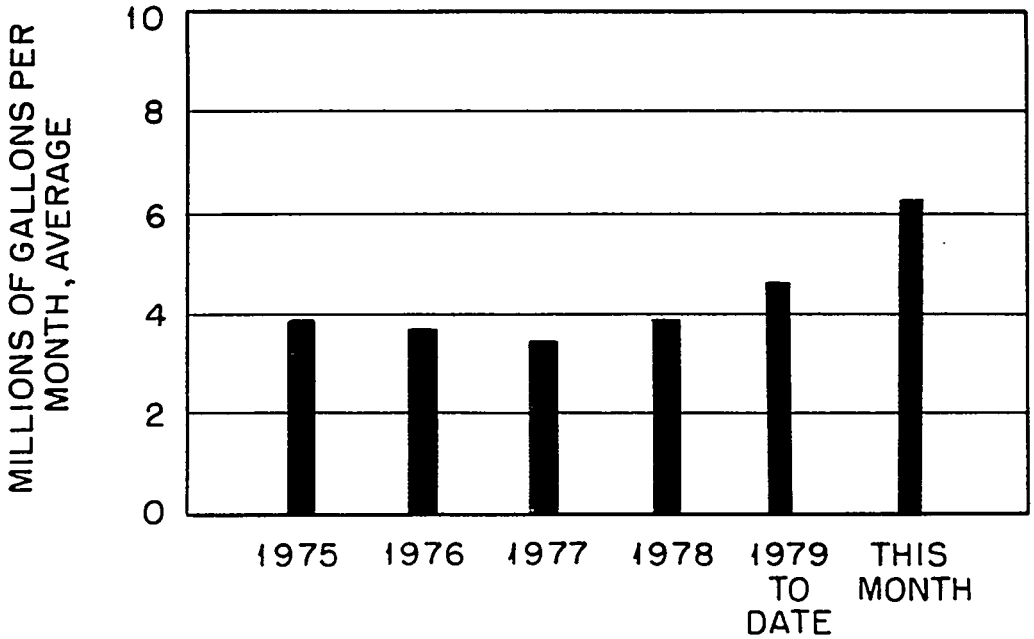


Fig. 4. Process Waste Volumes.

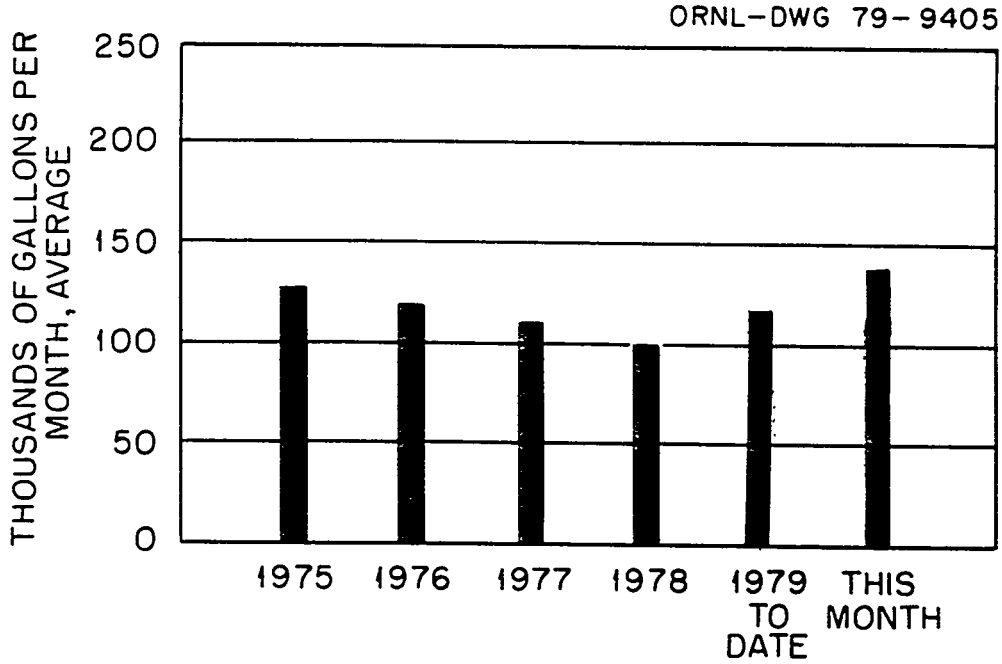


Fig. 5. Intermediate-Level Waste Volumes.

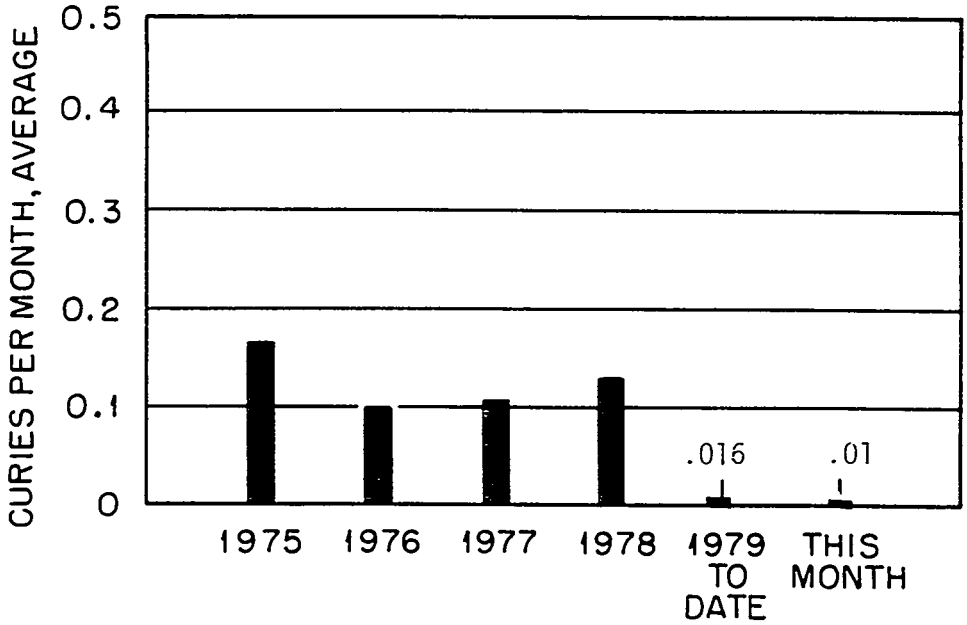


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

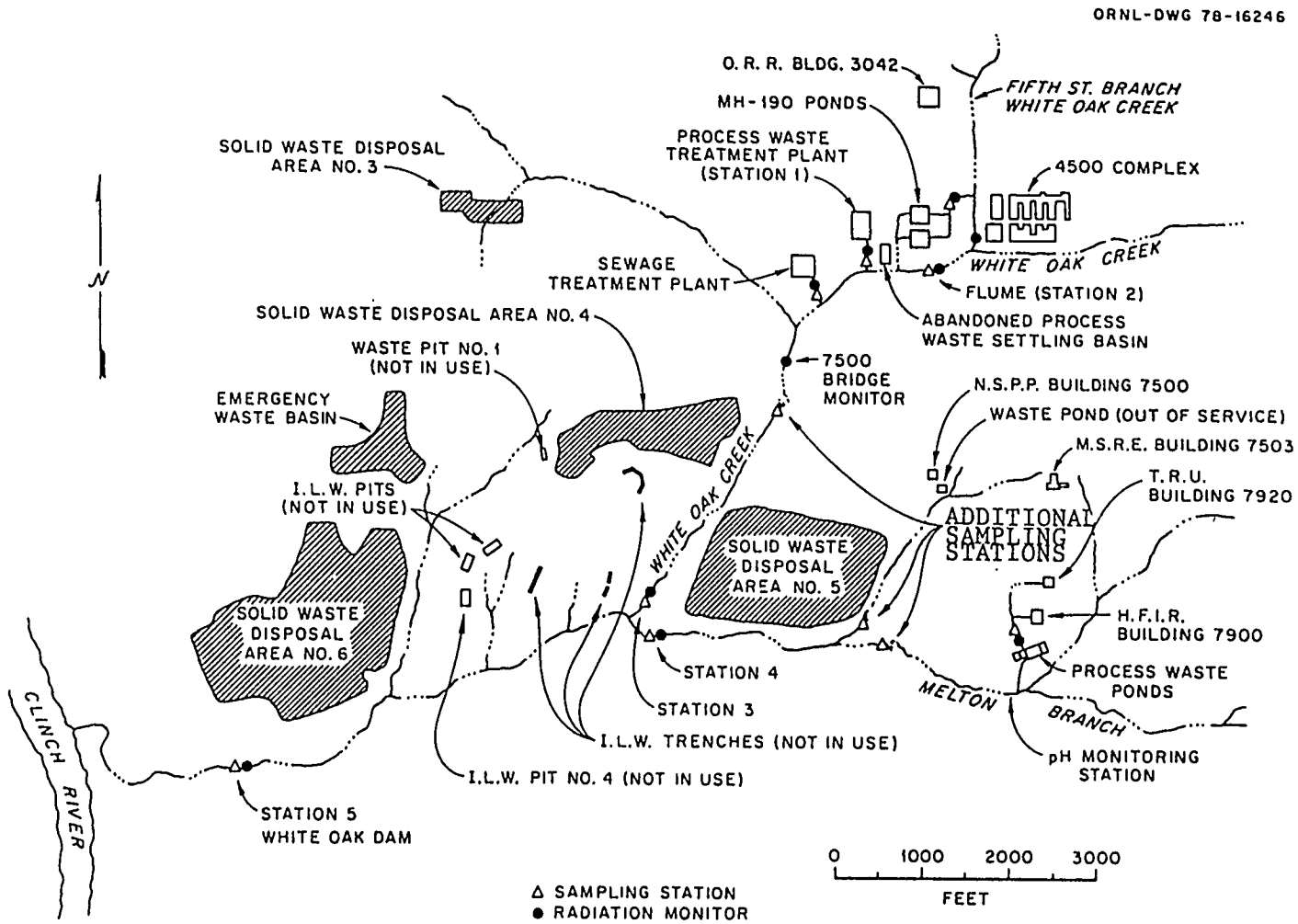


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0012	0.125
Miscellaneous discharges from east end of plant	2	0.013	<0.043
Discharge from Bethel Valley Operations and Burial Ground Nos. 1, 3 and 4	3	.188	0.722
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.078	0.214
Total discharge from all sources	3,4	.266	0.936
White Oak Dam to Clinch River (Health Physics Measurement)	5	c	c

[a]Refers to Fig. 7.

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

[c]Data not available at this time.

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	24.8	0.008	0.5	0.18	2.5
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.458[a]	27.8	0.63	8.8
3. Reactor Operations (MH112)	1.9	0.002	0.1	0.67	9.4
4. Buildings 3503 and 3508	0.17	<0.001	—	1.22	17.1
5. Buildings 3025 and 3026	0.84	<0.001	—	0.60	8.4
6. Building 3019	1.9	0.001	0.1	0.31	4.3
7. Waste Evaporator, Bldg. 2531	26.8	0.013	0.8	0.28	3.9
8. Building 3525	2.00	0.003	0.2	0.94	13.1
9. Building 2026	1.00	<0.001	—	0.04	0.6
10. Tank Farm Drainage	298	1.16	70.5	2.28	31.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.52
Central Radioactive Gas Disposal Facilities	3039	≤0.03	<91.1
Radiochemical-Processing Pilot Plant	3020	<0.01	<0.8
MSRE	7512	<0.01	<0.52
HFIR & TRU	7911	<0.01	<11
Total Activity in Gases Released at X-10 Site		≤0.01	<103.94
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			$<3.6 \times 10^{-4}$
Room 265			$<5.8 \times 10^{-4}$
Building 5505 Discharges Glove Box			$<2.0 \times 10^{-3}$
Hood			$<2.2 \times 10^{-2}$

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/260

DATE: August 3, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Daniel R. Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of June was normal. The total ^{90}Sr discharged to White Oak Lake was 237 mCi compared to 266 mCi for the previous month. The ORNL Stacks discharged $\leq$10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The data normally reported for the effluent from White Oak Dam to the Clinch River was not available at the time this report was prepared.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 280.20 and 48.81 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (237 mCi) was 29 mCi less than the amount reported for May. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.7 mCi and 10.3 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	16.0	
190 Ponds	0.7	
Process Waste Treatment Plant	0.8	
Sewage Treatment Plant	10.3	
	27.8	
7500 Sampling Station	68.6	
Burial Ground Nos. 1 and 3 and Flood Plain		40.8
Station 3	129.0	
Burial Ground No. 4		60.4

Melton Branch

7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	7.3	
	7.4	
Station 4	108.0	
Burial Ground No. 5		100.6
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	237.0	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		201.8
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		85.1%

Process Waste

A total of 5.76 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
241	A	142	2017
242	B	136	1931
243	C	135	1933
244	A	120	1862
245	B	112	1863
246	C	124	1989
247	A	137	2014
248	B	136.5	1817
249	C	125	1975

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 178 gph. A summary of operations is given below:

	Gallons
Total volume generated	108,000
Volume transferred to evaporator	114,000
Tank Farm free space at beginning of month	481,000
Tank Farm free space at end of month	485,000
Evaporator concentrate returned to tank farm	2,000
Volume of concentrate available for hydrofracture	25,000

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

	Gallons
Building 3019	8,043
Radioisotopes Processing Area	14,816
ORR and BSR	9,995
High Flux Isotope Reactor	7,279
Fission Products Development Laboratory	3,305[a]
4500 Complex	9,255
Transuranium Processing Area	0

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 156 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.3% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

A spill of approximately 25 gallons of nitric acid occurred at the Process Waste Treatment Plant acid unloading station when a stainless steel flexible transfer hose separated at a coupling joint. The acid was neutralized to a pH of 7.0—8.0 units with slaked lime and then flushed into White Oak Creek via a plant drain line.

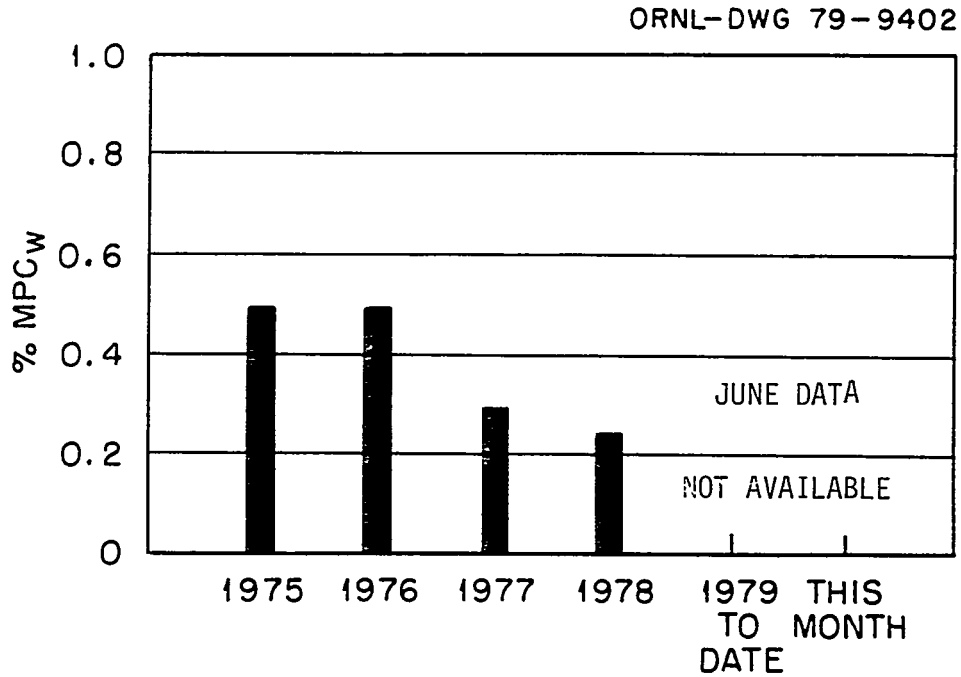


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

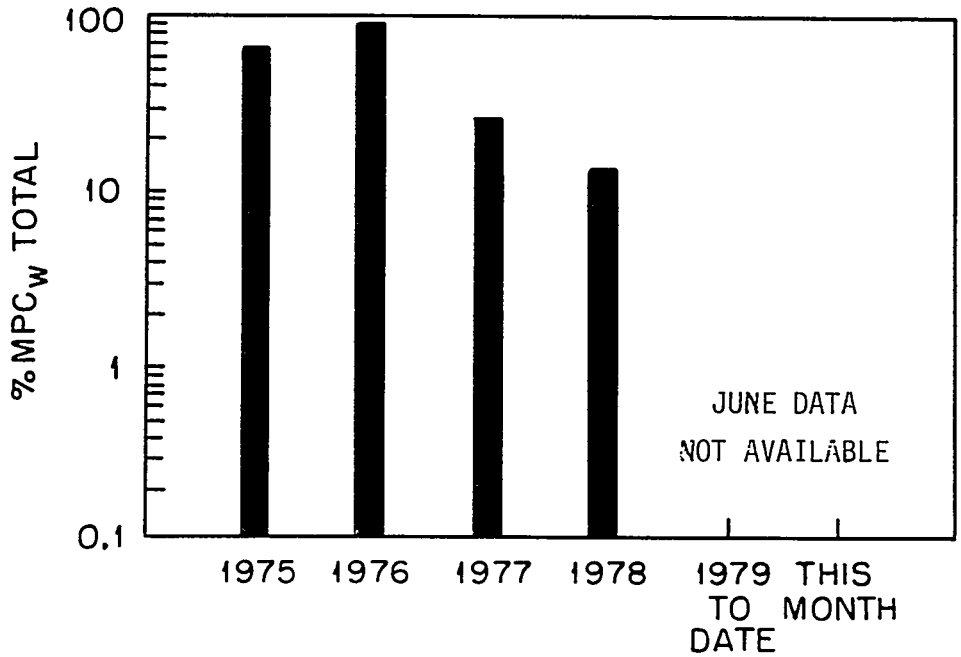


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the major reaches of the river.

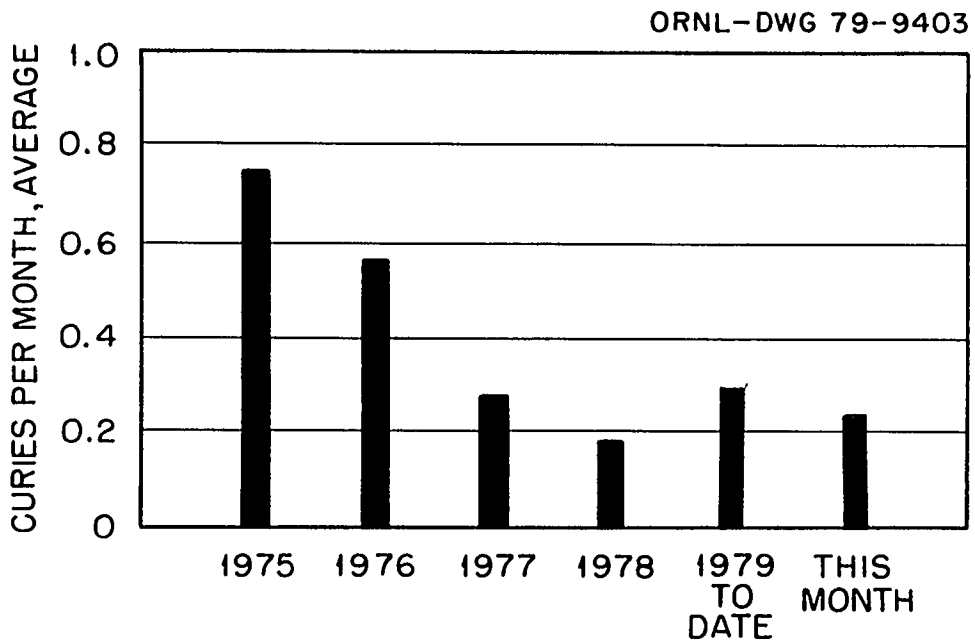


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

ORNL-DWG 79-9404

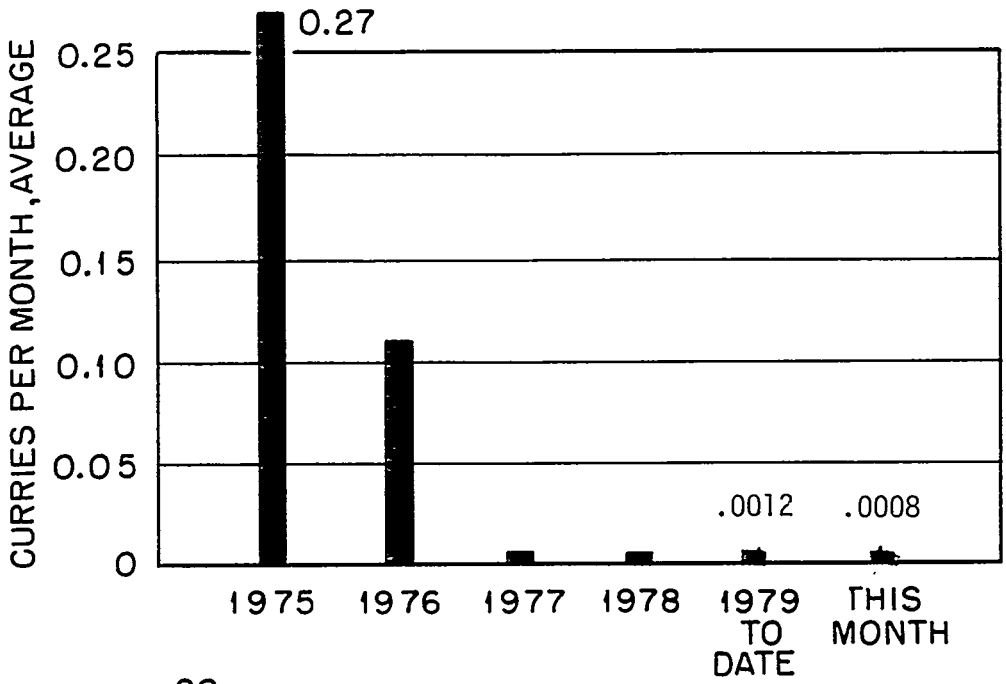


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

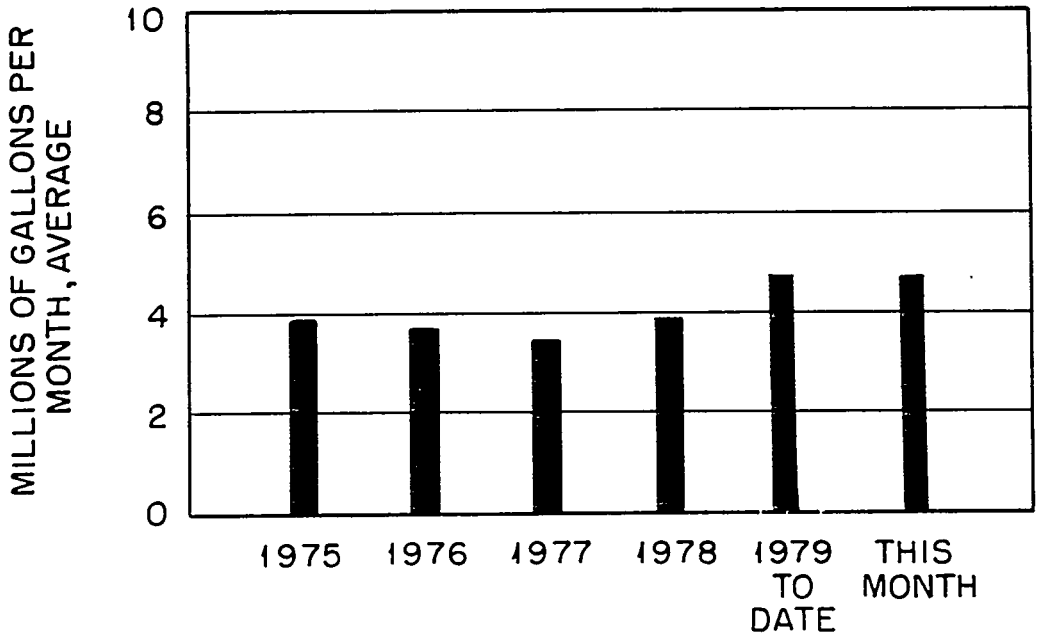


Fig. 4. Process Waste Volumes.

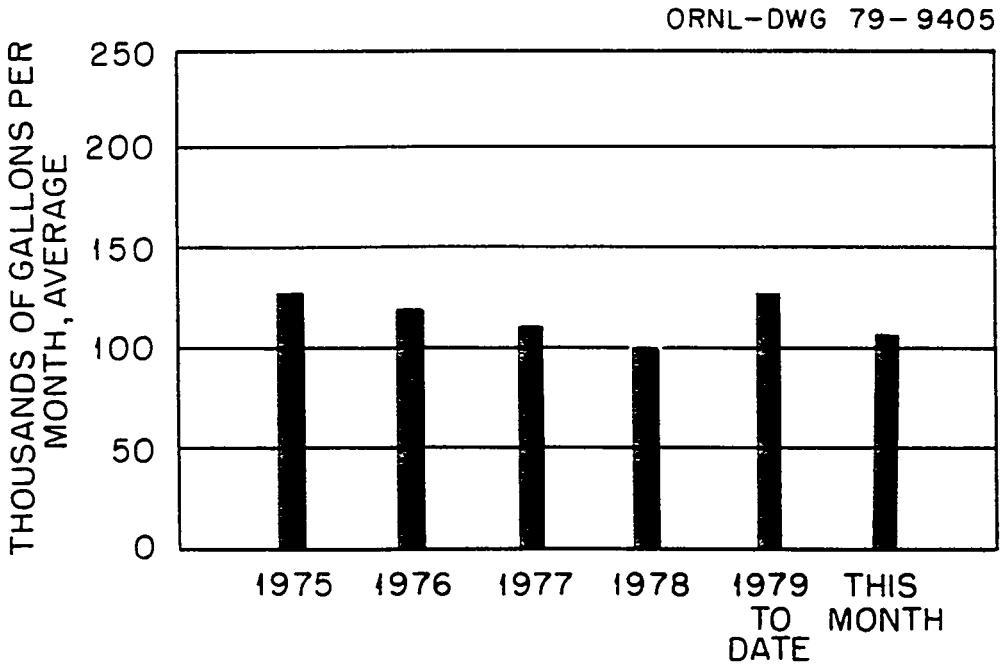


Fig. 5. Intermediate-Level Waste Volumes.

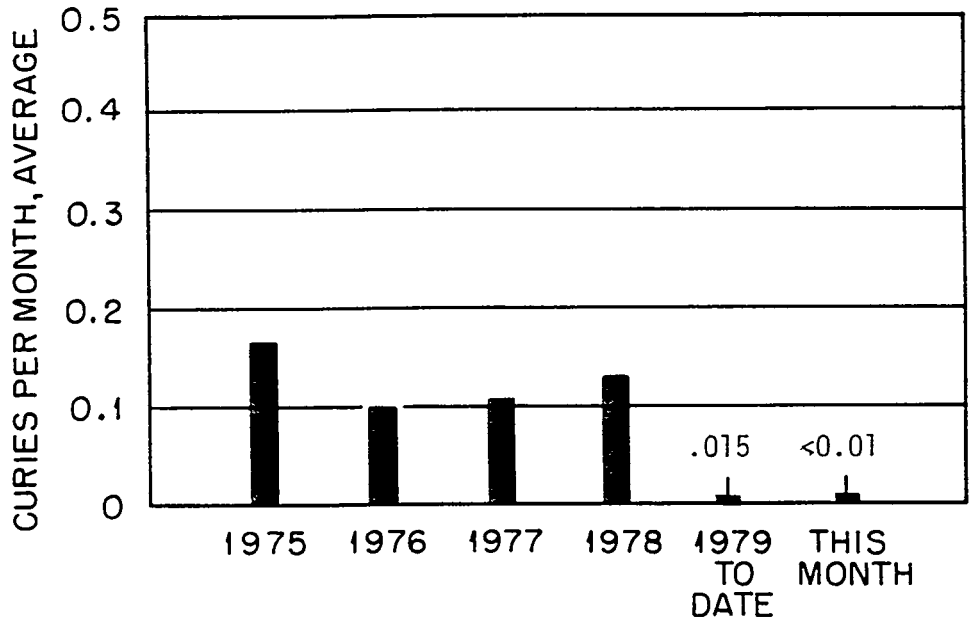


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

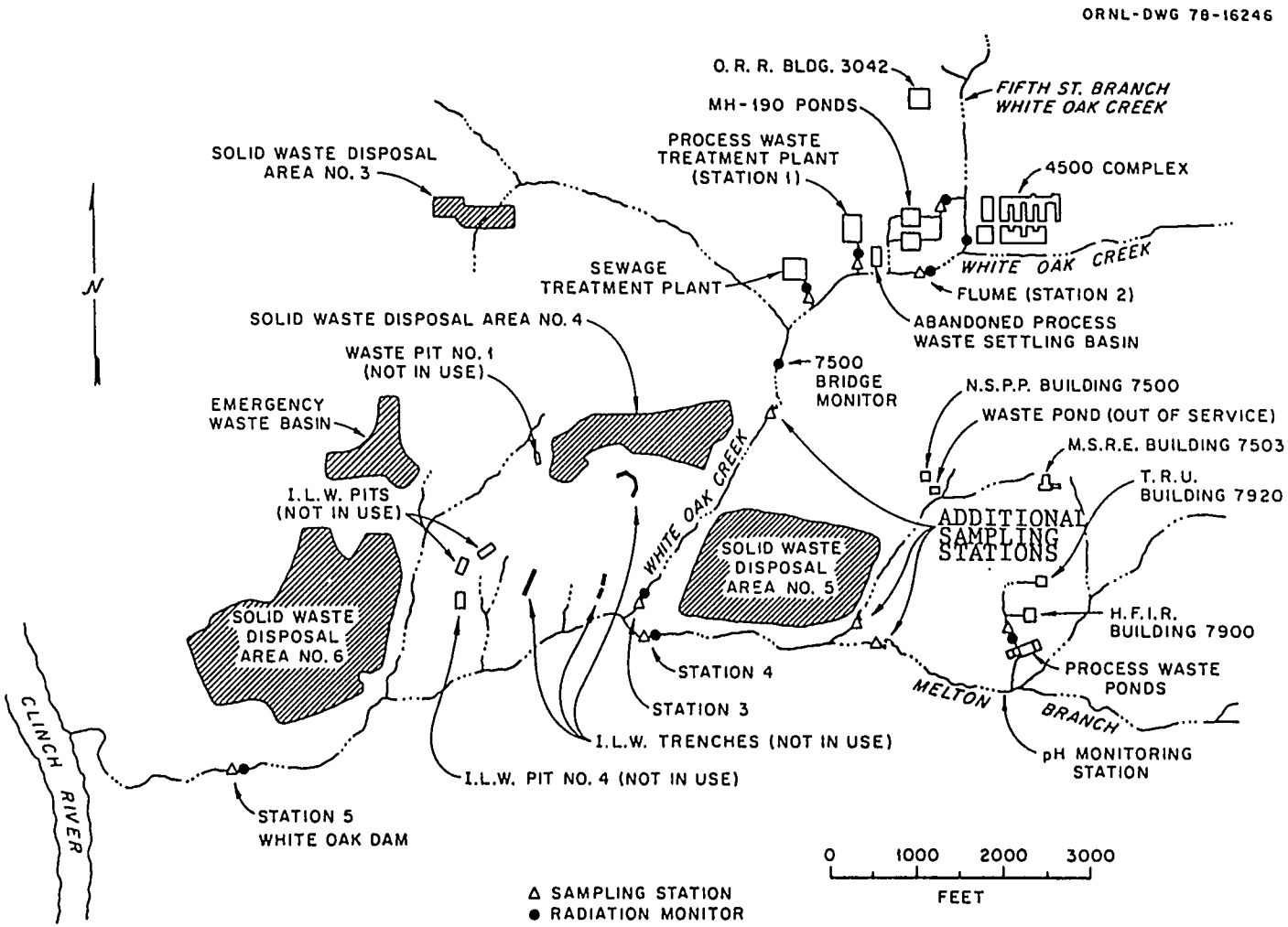


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0008	0.077
Miscellaneous discharges from east end of plant	2	0.016	0.012
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.129	0.442
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.108	0.315
Total discharge from all sources	3,4	0.237	0.757
White Oak Dam to Clinch River (Health Physics Measurement)		NOT AVAILABLE	NOT AVAILABLE

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	26.4	0.008	0.9	0.17	4.7
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.480[a]	51.0	0.72	20.0
3. Reactor Operations (MH112)	4.4	0.004	0.4	0.54	15.0
4. Buildings 3503 and 3508	0.20	<0.001	—	0.14	3.9
5. Buildings 3025 and 3026	0.86	<0.001	—	0.53	14.7
6. Building 3019	1.5	<0.001	—	0.247	6.9
7. Waste Evaporator, Bldg. 2531	128	0.059	6.3	0.27	7.5
8. Building 3525	0.28	<0.001	—	0.05	1.4
9. Building 2026	0.11	<0.001	—	0.03	0.8
10. Tank Farm Drainage	255	0.390	41.4	0.90[b]	25.1

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[b]The flowmeter is temporarily out of service. This is a calculated value obtained from the differences between the totalized diversion box flow and the sum of the monitoring station flows.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.2
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<143
Radiochemical-Processing Pilot Plant	3020	<0.01	1.3
MSRE	7512	<0.01	<0.3
HFIR & TRU	7911	<0.01	<11
Total Activity in Gases Released at X-10 Site		≤0.010	155.8
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			5.30×10^{-4}
Room 265			2.91×10^{-4}
Building 5505 Discharges Glove Box			1.88×10^{-3}
Hood			3.23×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

2511

OCT 4 1979

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/281

DATE: September 10, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Denise A Hamm 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of July was routine. The total ^{90}Sr discharged to White Oak Lake was 392.4 mCi compared to 237 mCi for the previous month. The ORNL Stacks discharged $\leq$10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of July 1979 was 0.43% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 28.4% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.52 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 524.73 and 103.25 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (392 mCi) was 155 mCi more than the amount reported for June . The bulk of this increase came from the burial grounds and flood plains, and it is attributed to the heavy rainfall which occurred during the period. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.8 mCi and 16.6 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Grounds Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums

of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	26.9	
190 Ponds	0.8	
Process Waste Treatment Plant	3.5	
Sewage Treatment Plant	16.6	
	47.8	
7500 Sampling Station	128.5	
Burial Grounds Nos. 1 and 3 and Flood Plain		80.7
Station 3	276.5	
Burial Ground No. 4		148.0

Melton Branch

7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	10.0	
	10.2	
Station 4	115.9	
Burial Ground No. 5		105.7
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	392.4	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		334.4
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		85.2%

Process Waste

A total of 6.33 million gallons of contaminated water was chemically treated this month. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
250	A	122	1925
251	B	150	2009
252	C	128	1848
253	A	128	2024
254	B	137	1983
255	C	129.5	1981
256	A	149	2055
257	B	108	1811
258	C	120	1985
259	A	126	1992

Channeled flow through the IX columns caused by packing during periods of capacity operation probably accounted for most of the 2.7 millicurie increase in the total amount of ^{90}Sr discharged from the PWPT during the period. The overall ^{90}Sr removal during the period amounted to 99.6%.

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 234 gph. A summary of operations is given below:

	Gallons
Total volume generated	194,000
Volume transferred to evaporator	171,000
Tank Farm free space at beginning of month	485,000
Tank Farm free space at end of month	459,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	30,000

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

	Gallons
Building 3019	15,000
Radioisotopes Processing Area	29,000
ORR and BSR	23,400
High Flux Isotope Reactor	7,900
Fission Products Development Laboratory	12,900[a]
4500 Complex	25,600
Transuranium Process Area	4,300

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 141 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.9% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

On July 15, the pump pit at the Melton Valley Central Pumping Station (Bldg. 7567) was flooded with approximately 12,000 gallons of surface water during a severe rainstorm. An open pipe trench (a part of new construction in the area) provided a path into the pump pit. Two pump motors, submerged during the flood, were salvaged by "baking out" the windings. The water accumulated in the pit was pumped into the collection tank system, and the silt was shoveled into drums and buried.

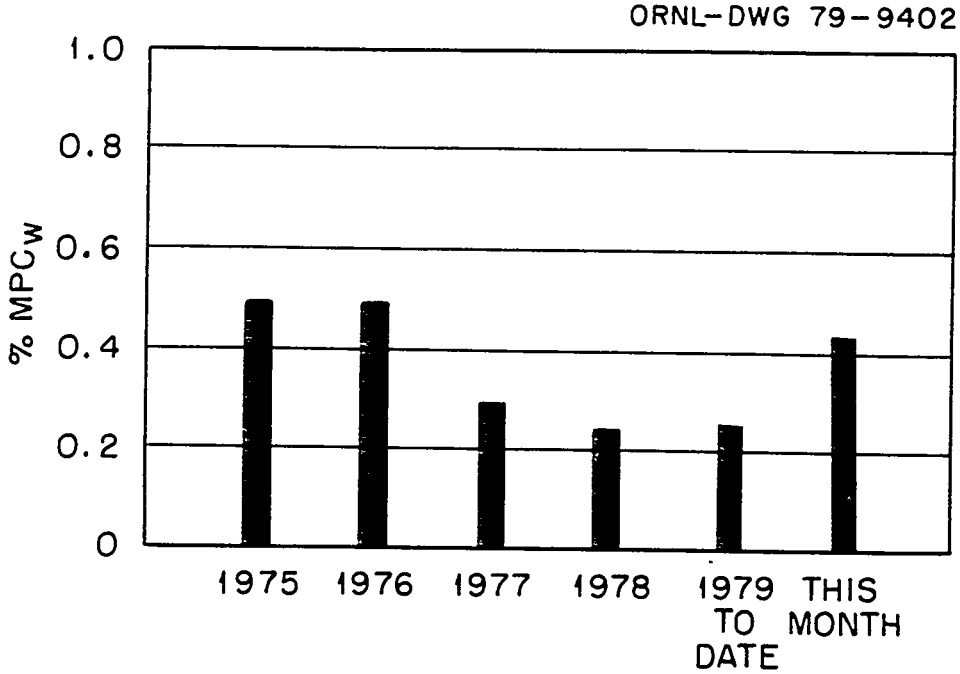


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

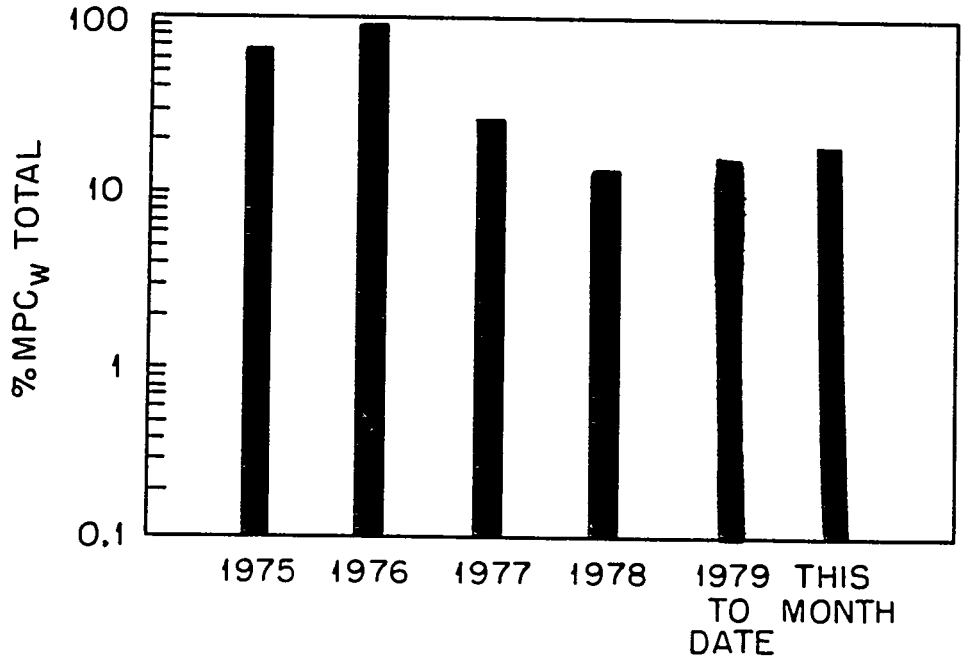


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

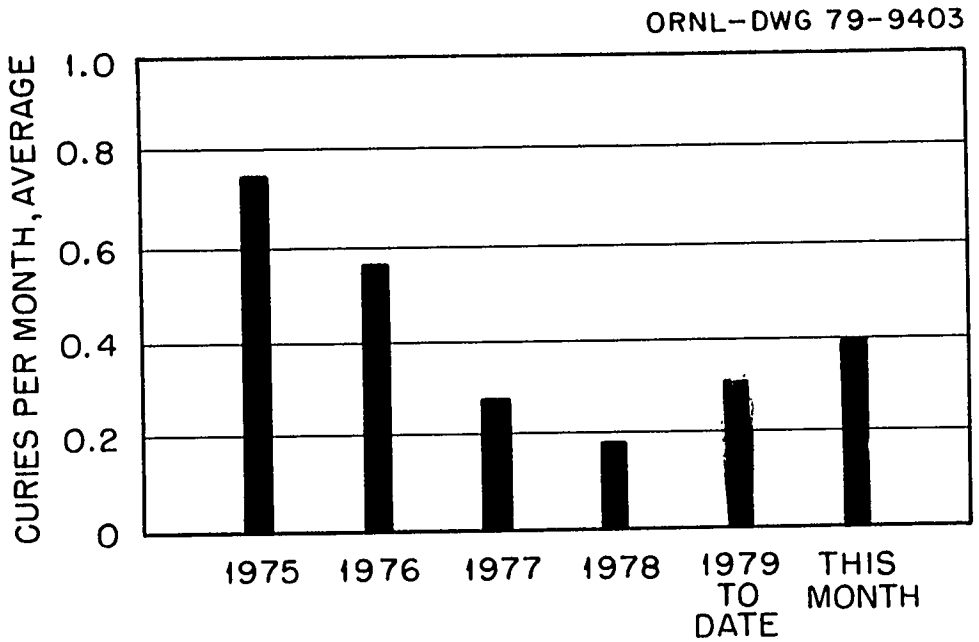


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

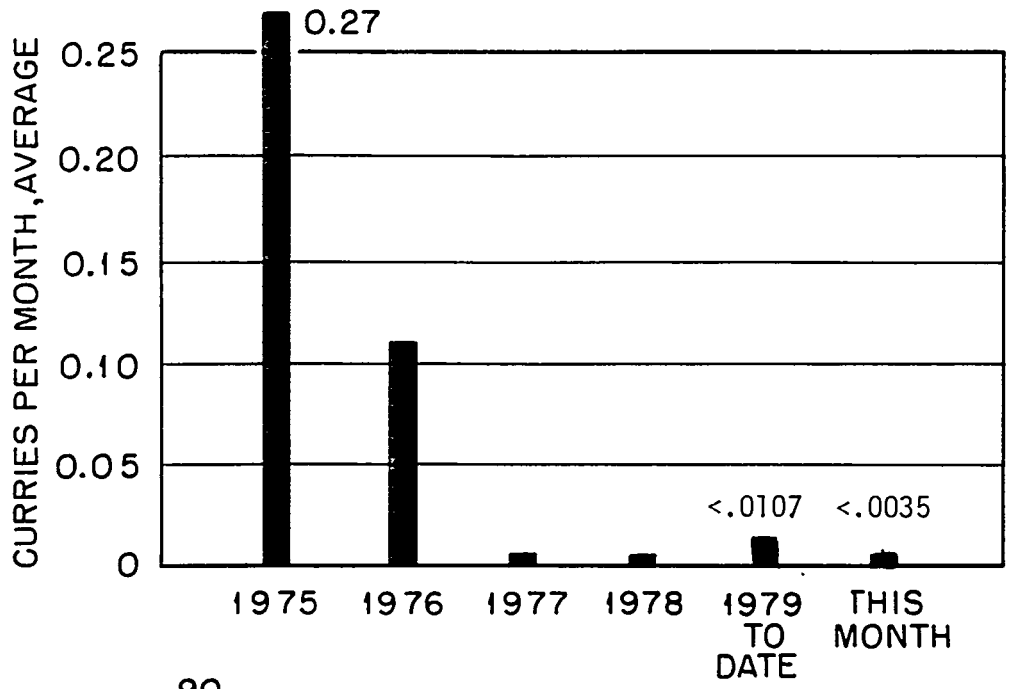


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

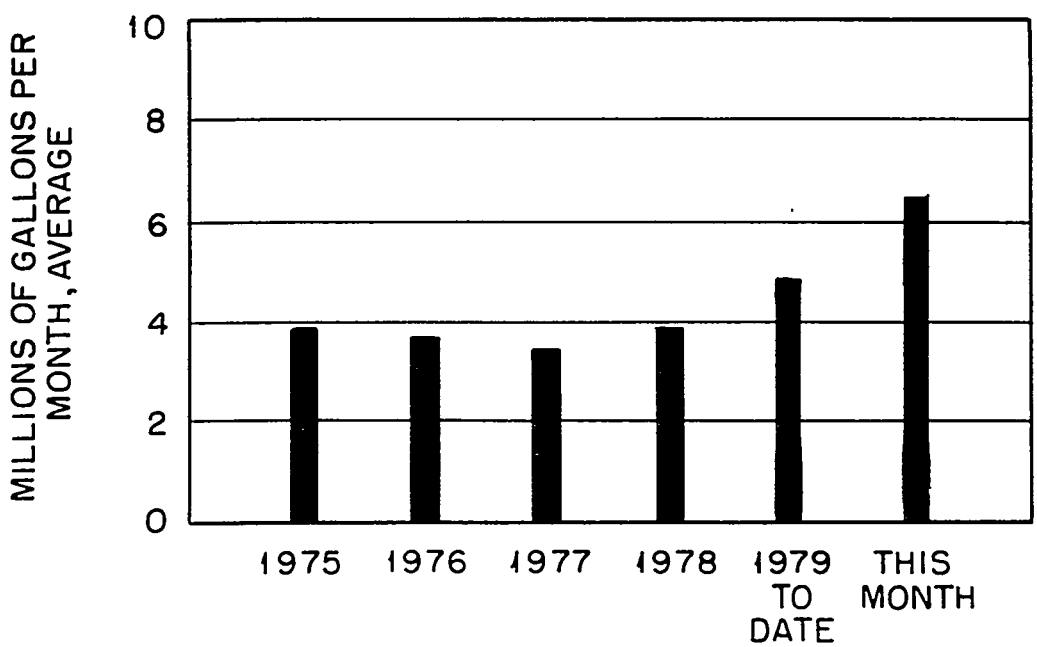


Fig. 4. Process Waste Volumes.

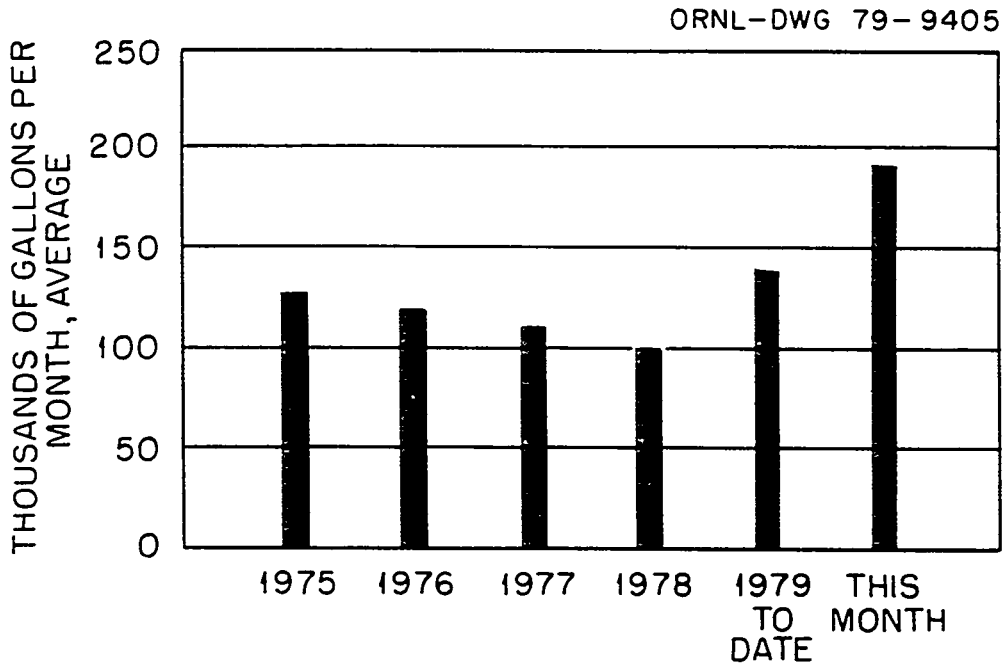


Fig. 5. Intermediate-Level Waste Volumes.

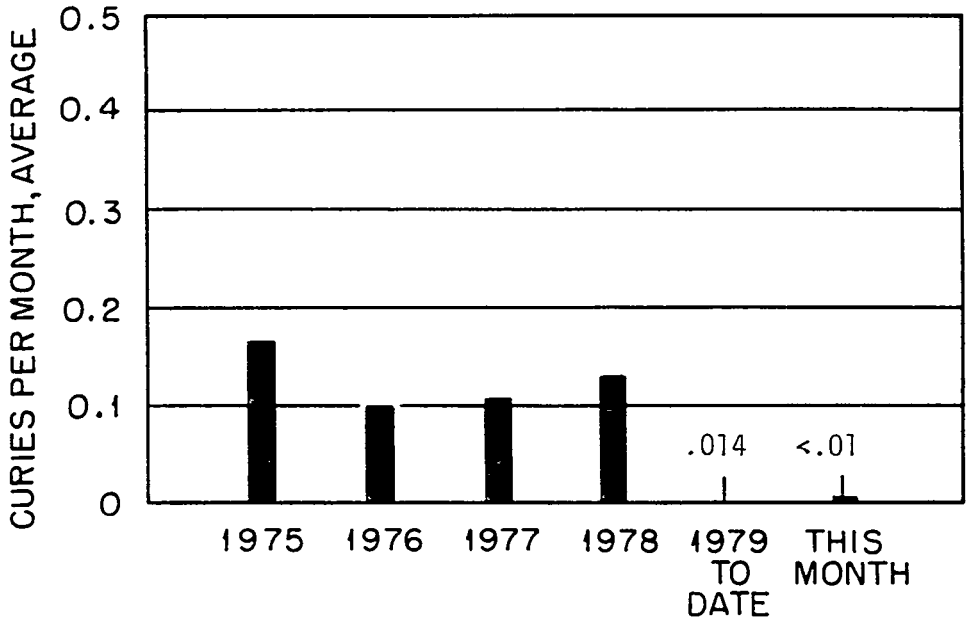


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

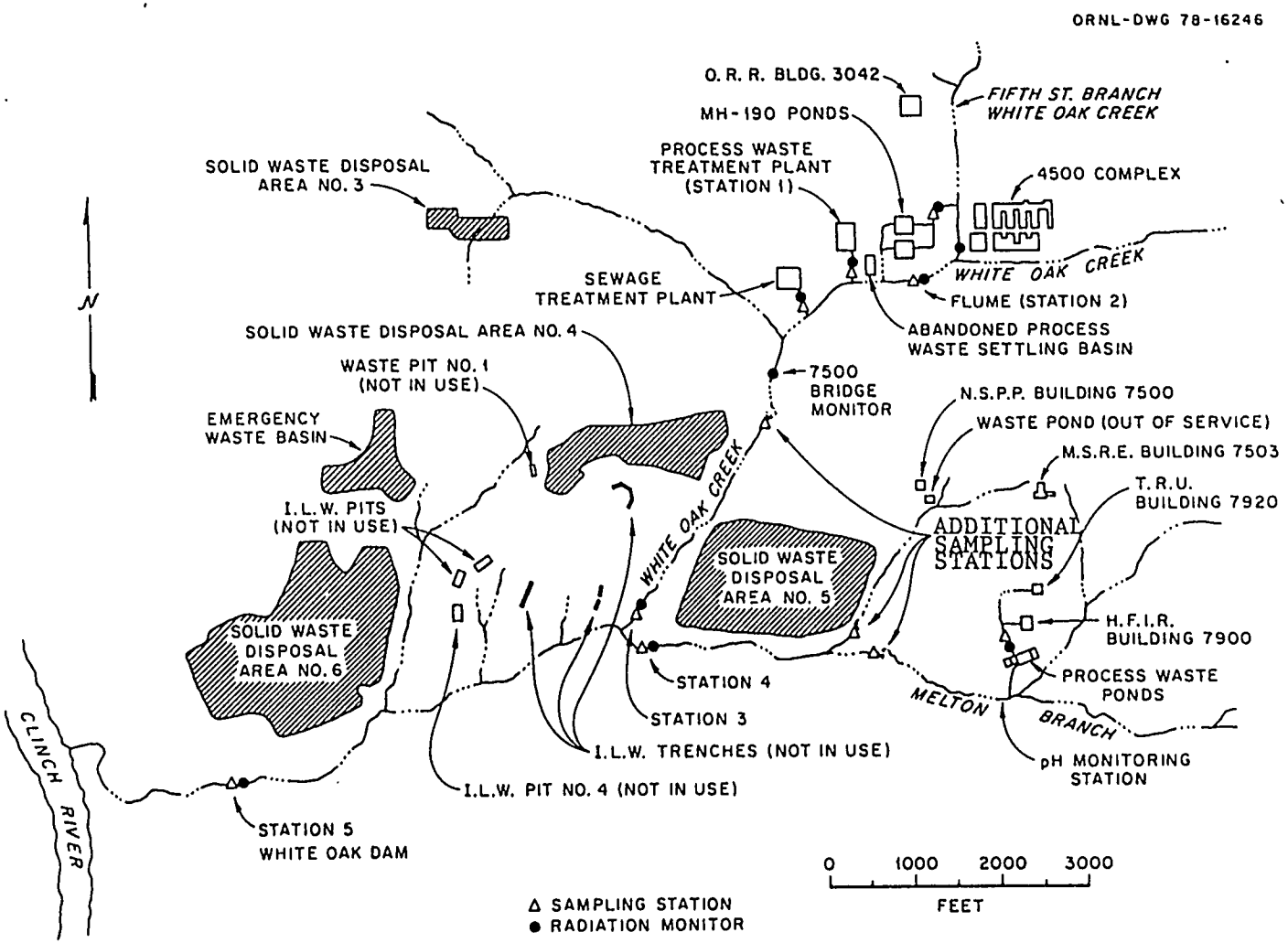


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0035	0.138
Miscellaneous discharges from east end of plant	2	0.027	0.065
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.277	0.981
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.116	0.333
Total discharge from all sources	3,4	0.393	1.314
White Oak Dam to Clinch River (Health Physics Measurement)		0.52	0.78

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	28.1	0.006	0.5	0.14	3.4
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.653[a]	57.1	0.64	15.6
3. Reactor Operations (MH112)	3.4	0.006	0.5	1.08	26.4
4. Buildings 3503 and 3508	0.57	<0.001	—	0.19	4.6
5. Buildings 3025 and 3026	1.00	<0.001	—	0.42	10.2
6. Building 3019	5.8	0.002	0.2	0.24	5.8
7. Waste Evaporator, Bldg. 2531	73	0.050	4.4	0.40	9.8
8. Building 3525	0.29	<0.001	—	0.05	1.2
9. Building 2026	0.12	0.002	0.2	0.04	1.0
10. Tank Farm Drainage	278	0.425	37.1	0.90[b]	22.0

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[b]The flowmeter is temporarily out of service. This is a calculated value obtained from the differences between the totalized diversion box flow and the sum of the monitoring station flows.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.7
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<126.3
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.6
MSRE	7512	<0.01	<0.6
HFIR & TRU	7911	<0.01	<12.2
Total Activity in Gases Released at X-10 Site		≤0.010	<141.4
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			$<2.58 \times 10^{-3}$
Room 265			$<2.91 \times 10^{-4}$
Building 5505 Discharges Glove Box			$<7.51 \times 10^{-3}$
Hood			3.23×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

OCT 11 1979

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/290

79516

DATE: September 28, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

This document has been approved for release to the public by

Technical Information Officer 7/12/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or cor-
[illegible]
shall be made without the approval of the Law Department of
Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of August was normal. The total ^{90}Sr discharged to White Oak Lake was 141 mCi compared to 392 mCi for the previous month. The ORNL Stacks discharged $\leq$10 mCi of ^{131}I.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of August 1979 was 0.10% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 8.53% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.14 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 225.49[a] and 30.49 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (141 mCi) was 251 mCi less than the amount reported for July. This comparatively low release of activity is attributed to a much lesser amount of rainfall in August than in July. The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.6 mCi and 10.6 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions

---

[a]Due to leaks around the weir at White Oak Creek (Station 3), this figure was arrived at by using the flows at the 7500 Road Bridge and a multiplication factor.

from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	8.8	
190 Ponds	0.6	
Process Waste Treatment Plant	6.4	
Sewage Treatment Plant	10.6	
	26.4	
7500 Sampling Station	62.1	
Burial Grounds Nos. 1 and 3 and Flood Plain		35.7
Station 3	95.8	
Burial Ground No. 4		33.7

Melton Branch

7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	4.9	
	5.0	
Station 4	45.6	
Burial Ground No. 5		40.6
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	141.4	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		110.0
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		77.8%

Process Waste

A total of 5.15 million gallons of contaminated water was chemically treated this month. Only 4.7 million gallons were actually released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
260	B	120	1917
261	C	120	1917
262	A	144	1969
263	B	171	1990
264	C	149	1990
265	A	150	2040
266	B	139	2001
267	C	140.5	1974
268	A	145.5	1962

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 199 gph. A summary of operations is given below:

	Gallons
Total volume generated	138,000
Volume transferred to evaporator	154,000
Tank Farm free space at beginning of month	459,000
Tank Farm free space at end of month	470,000
Evaporator Concentrate returned to tank farm	5,000
Volume of concentrate available for hydrofracture	36,000

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

	Gallons
Building 3019	5,518
Radioisotopes Processing Area	20,803
ORR and BSR	12,576
High Flux Isotope Reactor	18,123
Fission Products Development Laboratory	4,763[a]
4500 Complex	14,437
Transuranium Processing Area	8,820

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 173 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.4% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

EQUIPMENT FAILURES OR UNUSUAL INCIDENTS

Approximately 200 gallons of raw ILW were inadvertently spilled onto the ground in the North Tank Farm while attempting to jet the contents of W-1A to W-5 on August 29, 1979. An apparent blockage in the transfer line caused the ILW to backflow into an inactive diversion box system and spill onto the ground. The flow into the diversion box was through a line with a valve in the closed position but due to age or some other reason the valve apparently was not properly seated. The plug was caused by bread that was stuffed into the line to create a blockage so that maintenance personnel could purge the line with an inert gas and make a satisfactory weld. The bread normally breaks up as soon as it becomes wet. In this case, more bread than normal was apparently used and the breaking up process took longer than usual.

All contaminated earth was covered with plastic until it was removed on August 31. The plug in the ILW line was removed and successful transfers have since been made through the line.

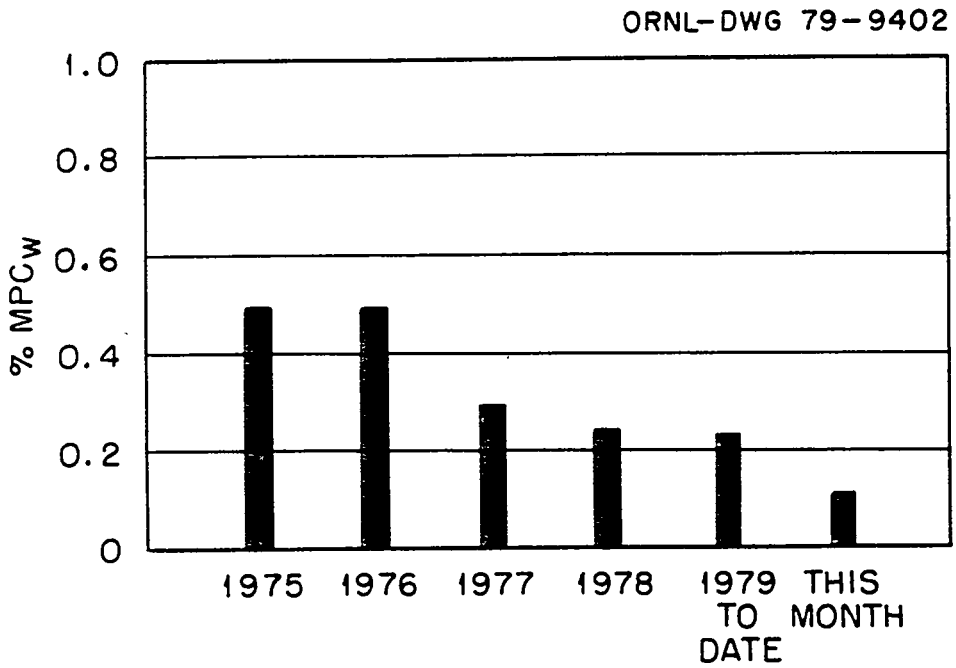


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

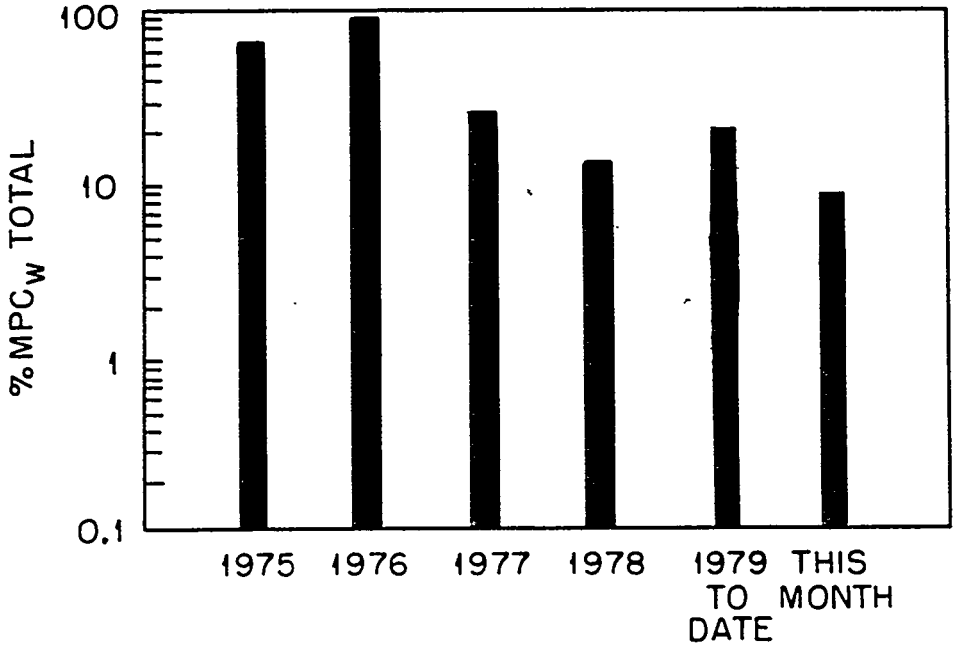


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

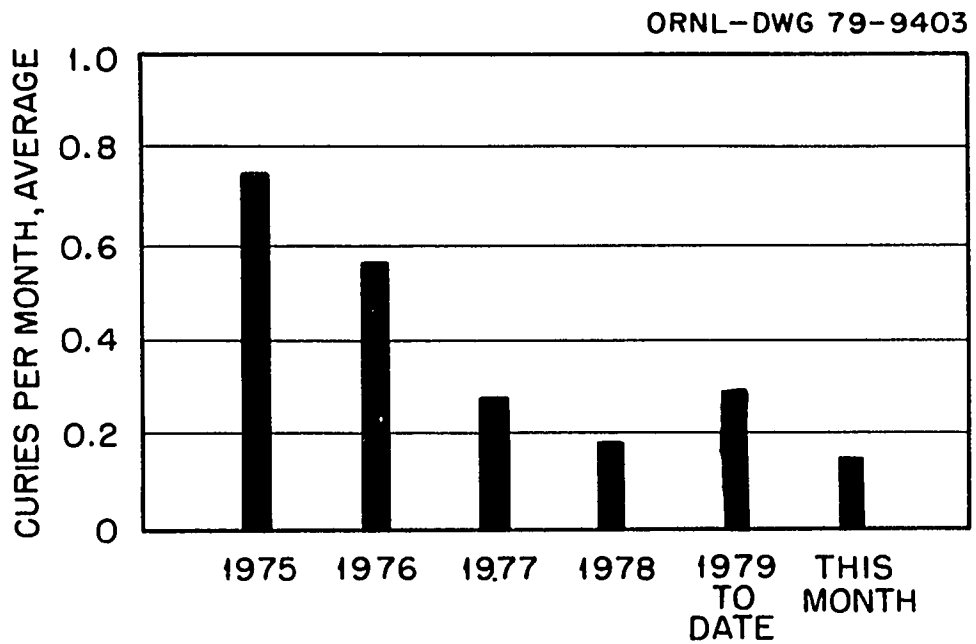


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

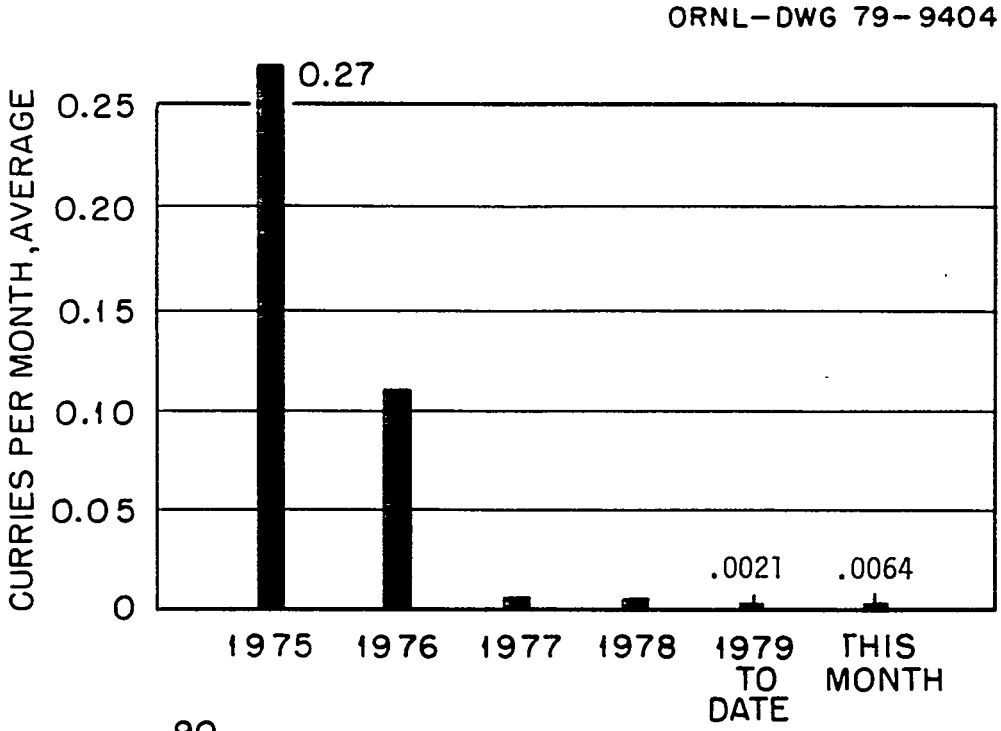


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

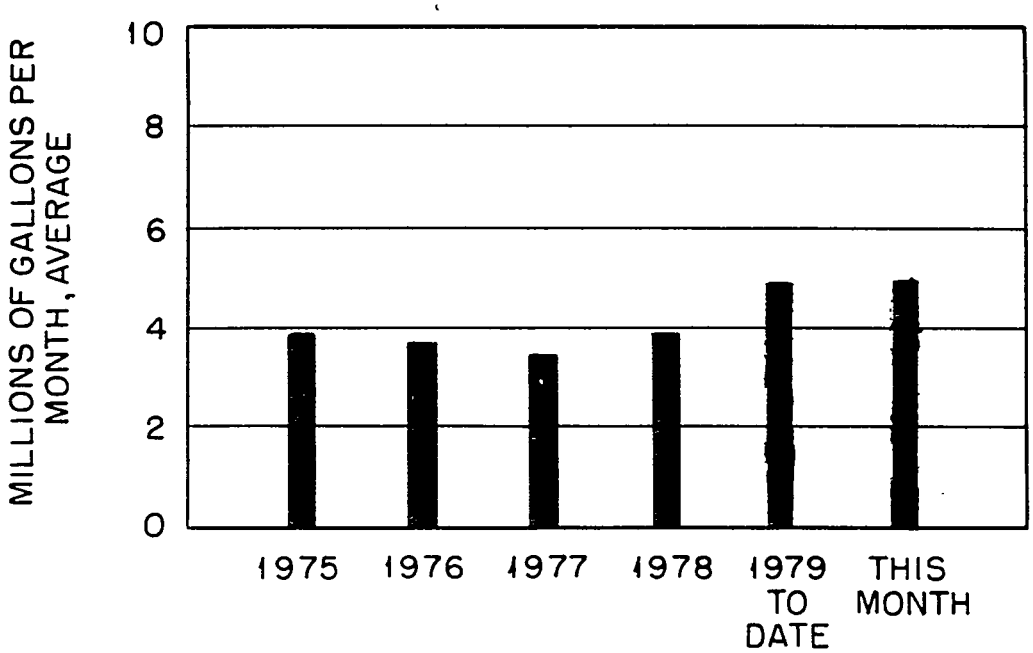


Fig. 4. Process Waste Volumes.

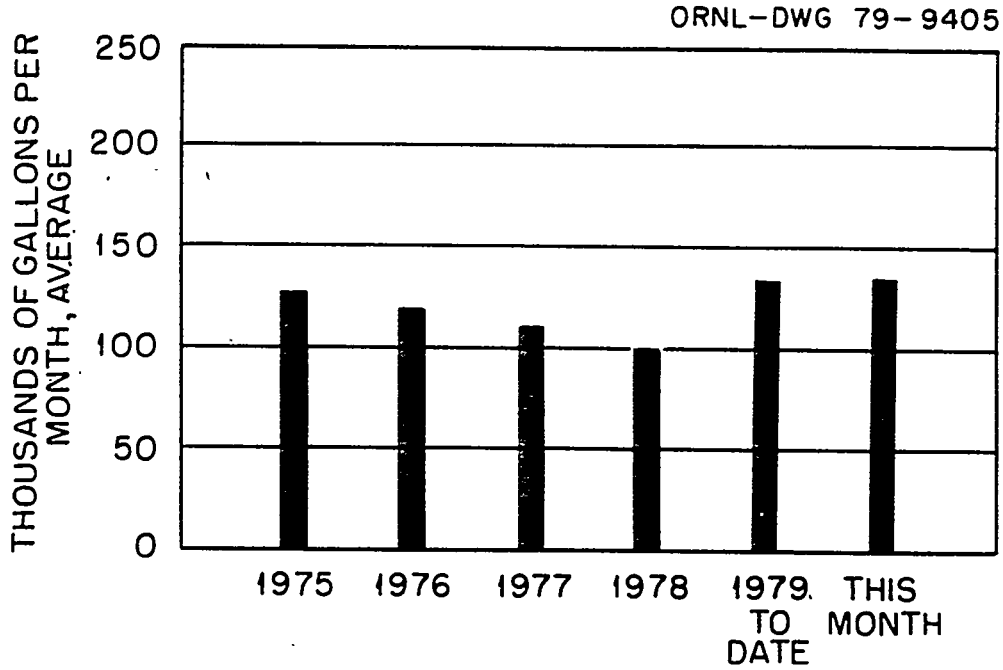


Fig. 5. Intermediate-Level Waste Volumes.

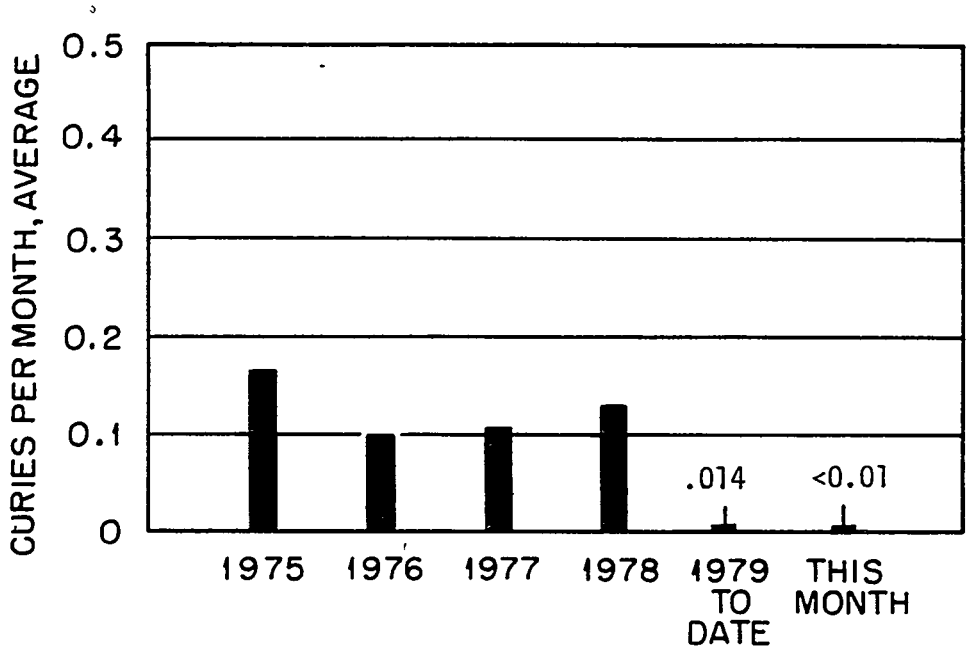


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

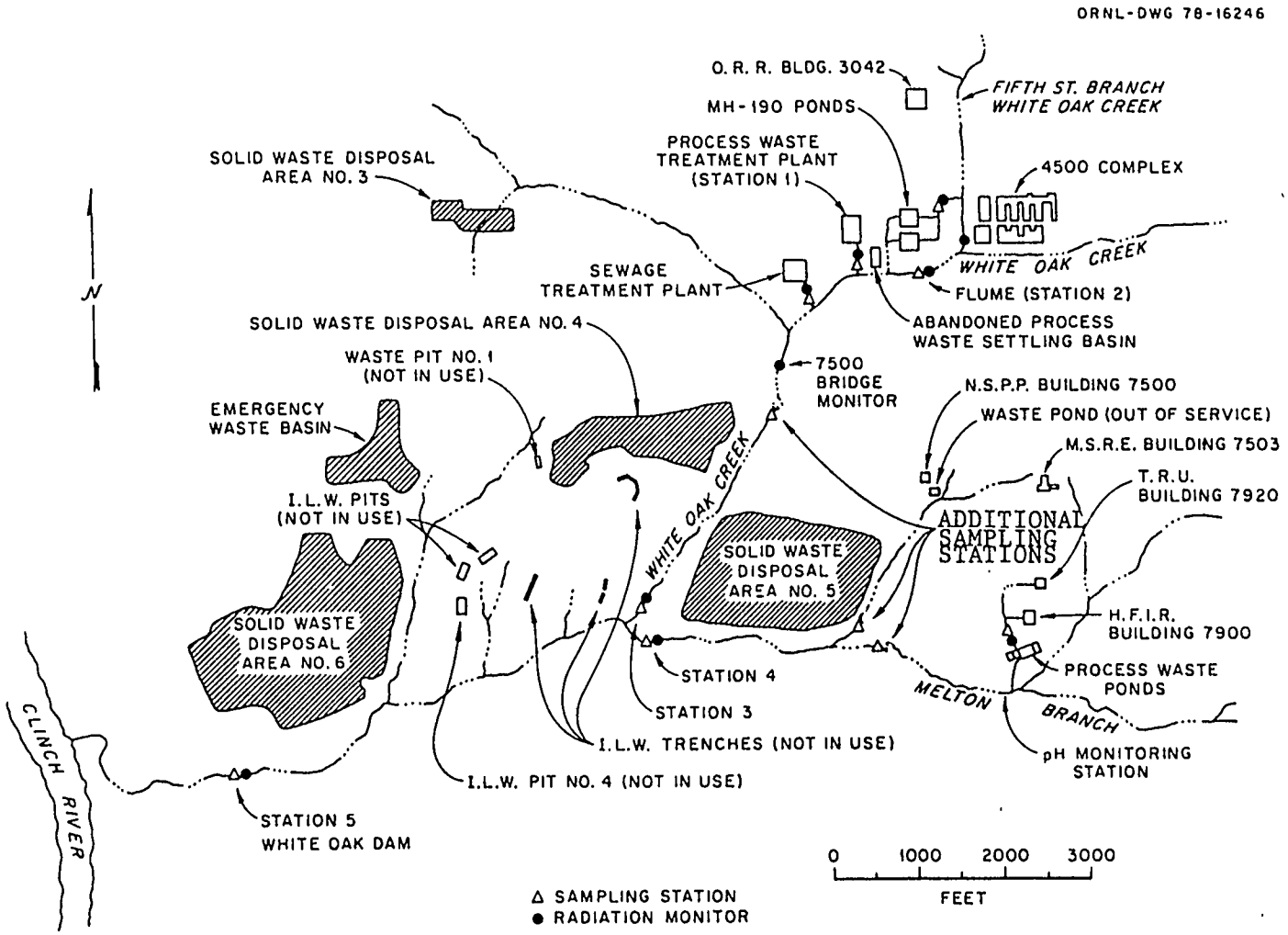


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0064	0.136
Miscellaneous discharges from east end of plant	2	0.009	0.059
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.096	0.253
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.045	0.157
Total discharge from all sources	3,4	0.141	0.410
White Oak Dam to Clinch River (Health Physics Measurement)		0.14	0.22

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	24.8	0.005	0.5	0.11	2.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.559[a]	56.8	1.02	23.7
3. Reactor Operations (MH112)	1.9	0.027	2.7	0.83	19.3
4. Buildings 3503 and 3508	0.34	<0.001	—	0.16	3.7
5. Buildings 3025 and 3026	0.77	<0.001	—	0.52	12.1
6. Building 3019	2.1	0.001	0.1	0.334	7.7
7. Waste Evaporator, Bldg. 2531	60.6	0.029	2.9	0.28	6.5
8. Building 3525	0.09	<0.001	—	0.06	1.4
9. Building 2026	0.09	<0.001	—	0.09	2.1
10. Tank Farm Drainage	238	0.363	37.0	0.90	20.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.7
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<158.3
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.7
MSRE	7512	<0.01	<0.7
HFIR & TRU	7911	<0.01	<13.0
Total Activity in Gases Released at X-10 Site		<0.010	172.7
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			1.29×10^{-3}
Room 265			8.49×10^{-4}
Building 5505 Discharges Glove Box			1.88×10^{-3}
Hood			3.23×10^{-2}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] This value not available because new detection equipment is being installed.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/312

79/106

DATE: November 8, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer
ORNL Site

7/12/96
Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of September was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 114 mCi; this was 27 mCi less than the previous month. Drainage from the burial grounds and contaminated flood plains accounted for 83% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I, and it amounted to ≤ 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of September 1979 was 0.14% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 4.59% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.11 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 201.41* and 30.58 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (114 mCi) was 27 mCi less than the amount reported for August. This slight improvement is attributed to a decreased precipitation rate during the period.

The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.3 mCi and 5.1 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions

---

*Due to leaks around the weir at White Oak Creek (Station 3), this figure was arrived at by using the flows at the 7500 Road Bridge and a multiplication factor.

from Burial Ground Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (See Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	8.6	
190 Ponds	0.3	
Process Waste Treatment Plant	4.0	
Sewage Treatment Plant	5.1	
	18.0	
7500 Sampling Station	64.7	
Burial Grounds Nos. 1 and 3 and Flood Plain		46.7
Station 3	61.6	
Burial Ground No. 4		*

Melton Branch

7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	5.1	
	5.2	
Station 4	52.0	
Burial Ground No. 5		46.8
Total ^{90}Sr to White Oak Lake (Station 3 & 4)	113.6	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		93.5
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		82.3

*The above summation indicates that drainage from Burial Ground No. 4 did not contribute ^{90}Sr to the watershed. This is undoubtedly an error which may have resulted from such irregularities as the partial loss of flow measurement at Station No. 3 and a possible sample error at the 7500 station. All of the sampling and monitoring stations will be examined in an effort to define and correct the problem.

Process Waste

A total of 5.31 million gallons of contaminated water was chemically treated this month. Only 4.8 million gallons were actually released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
269	B	142	1988
270	C	136.5	1899
271	A	144	1935
272	B	143	1920
273	C	136	2011
274	A	103	1498
275	B	122.5	1782
276	C	136.5	1968
277	A	142.5	2024

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 140 gph. A summary of operations is given below:

	Gallons
Total volume generated	106,000
Volume transferred to evaporator	104,000
Tank Farm free space at beginning of month	470,000
Tank Farm free space at end of month	465,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	40,000

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

	Gallons
Building 3019	4,379
Radioisotopes Processing Area	5,425
ORR and BSR	6,260
High Flux Isotope Reactor	7,900
Fission Products Development Laboratory	3,360[a]
4500 Complex	46,514
Transuranium Processing Area	2,000

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 182 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.1% and 0.1% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

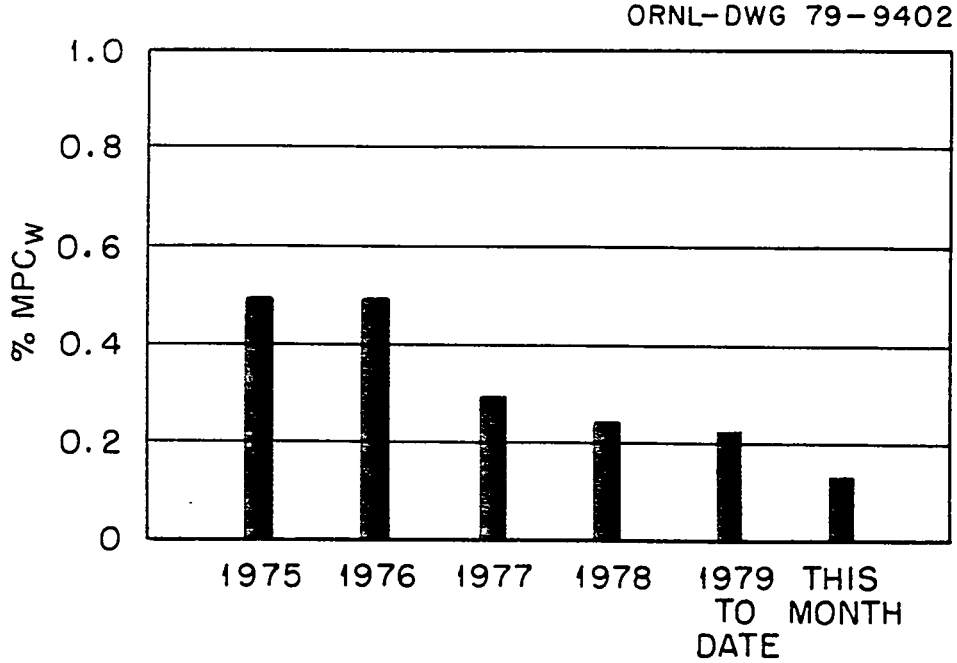


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISHAP Measurements at White Oak Dam).

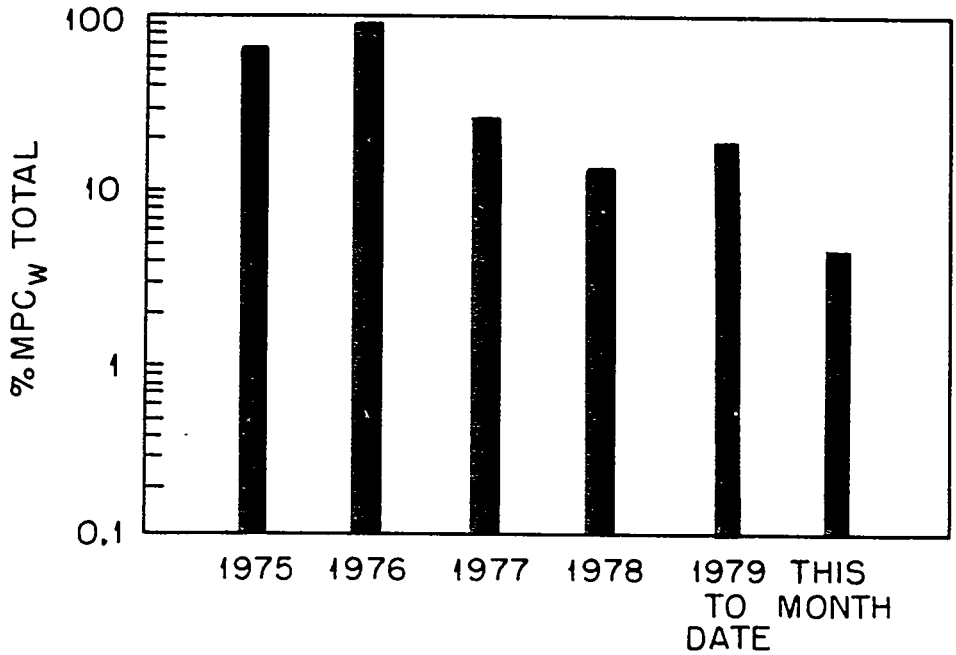


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISHAP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

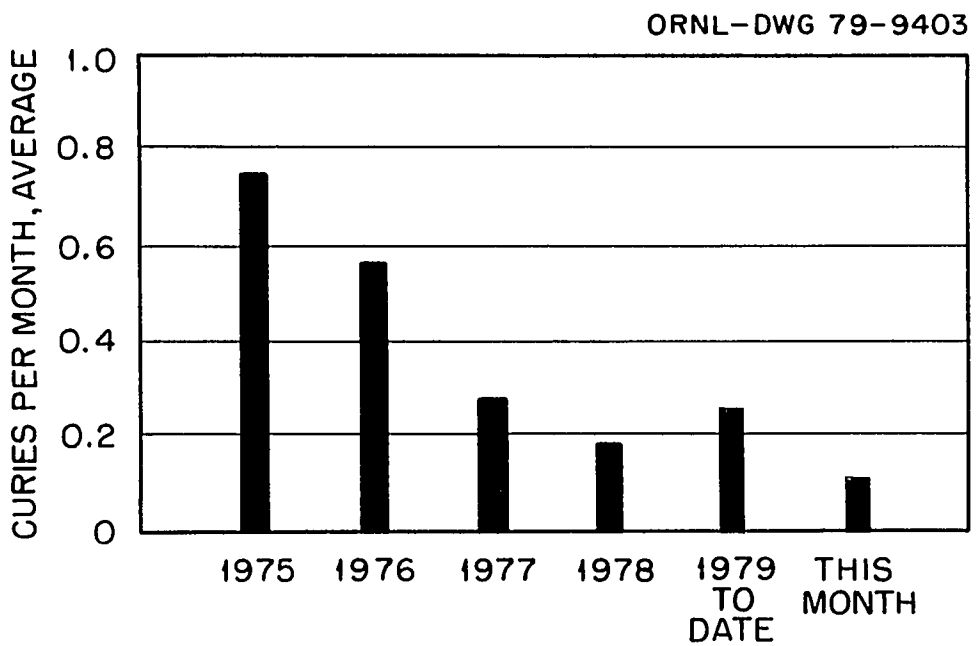


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

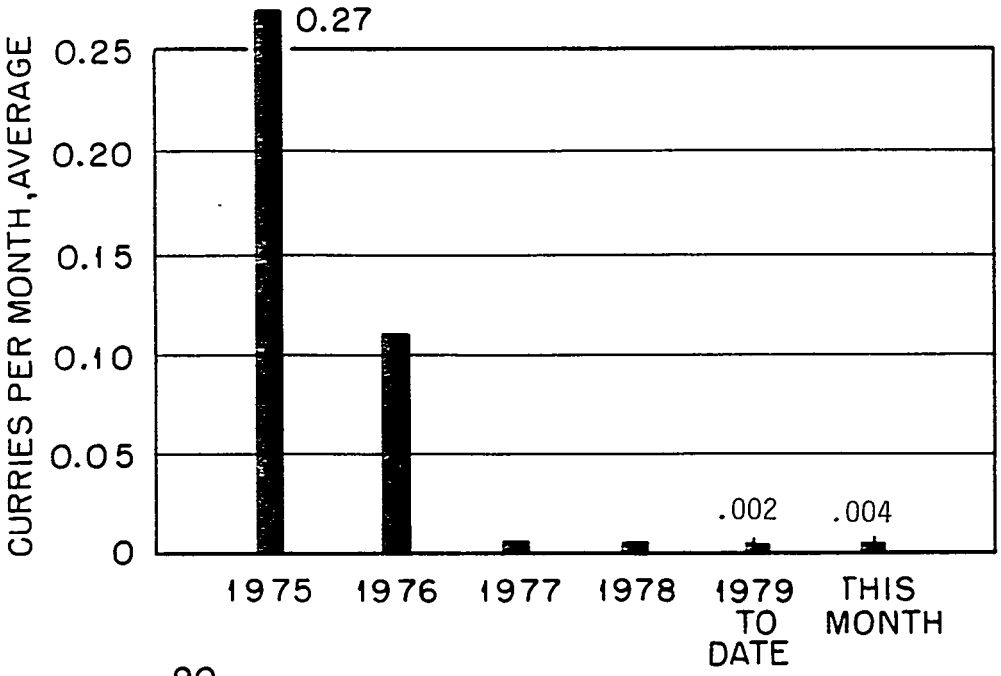


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

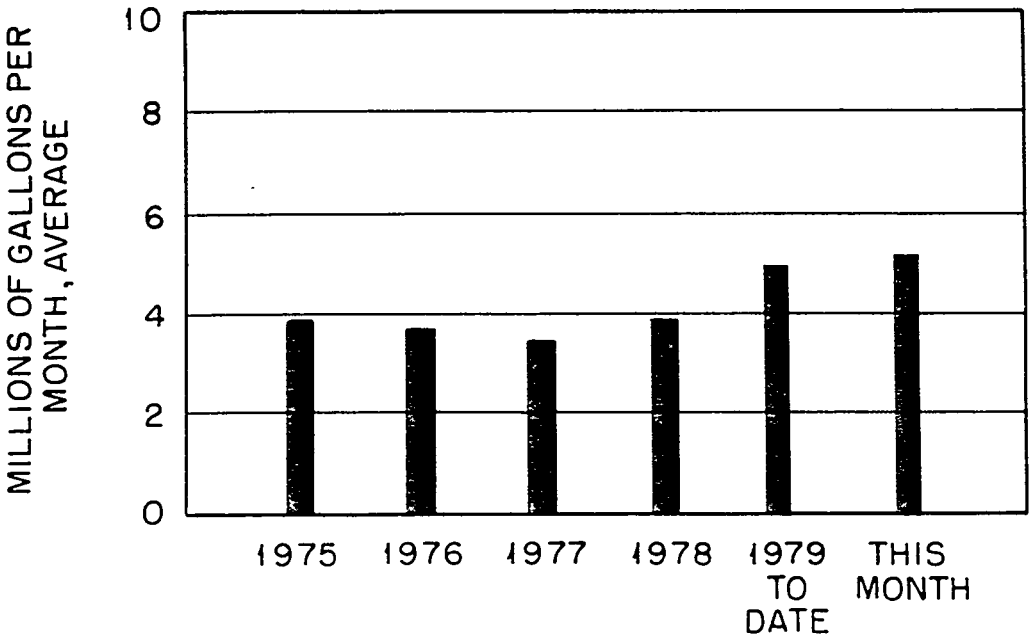


Fig. 4. Process Waste Volumes.

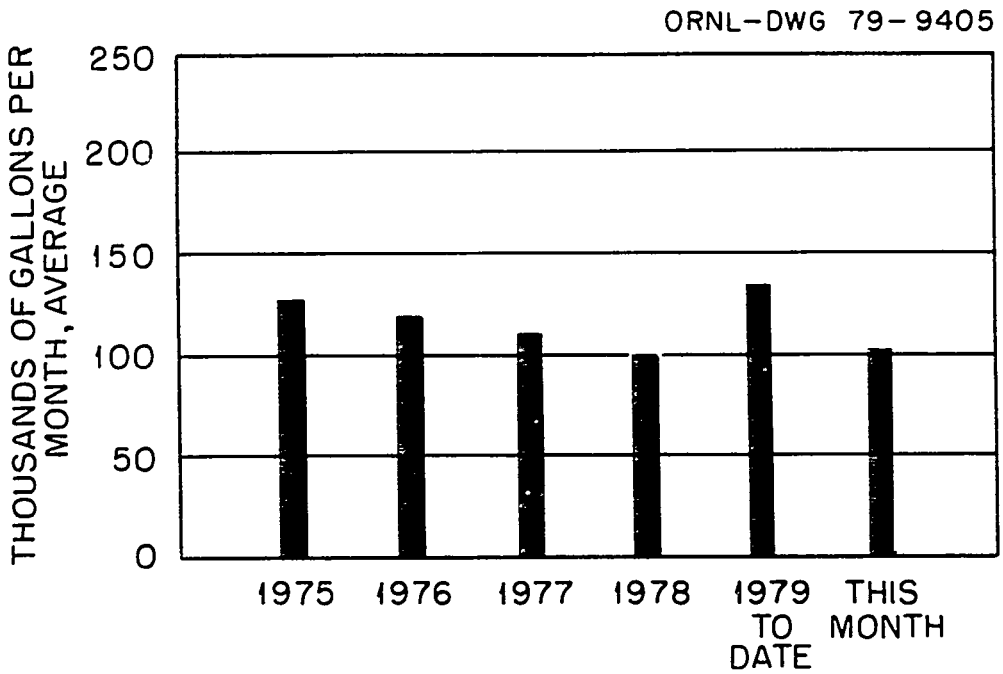


Fig. 5. Intermediate-Level Waste Volumes.

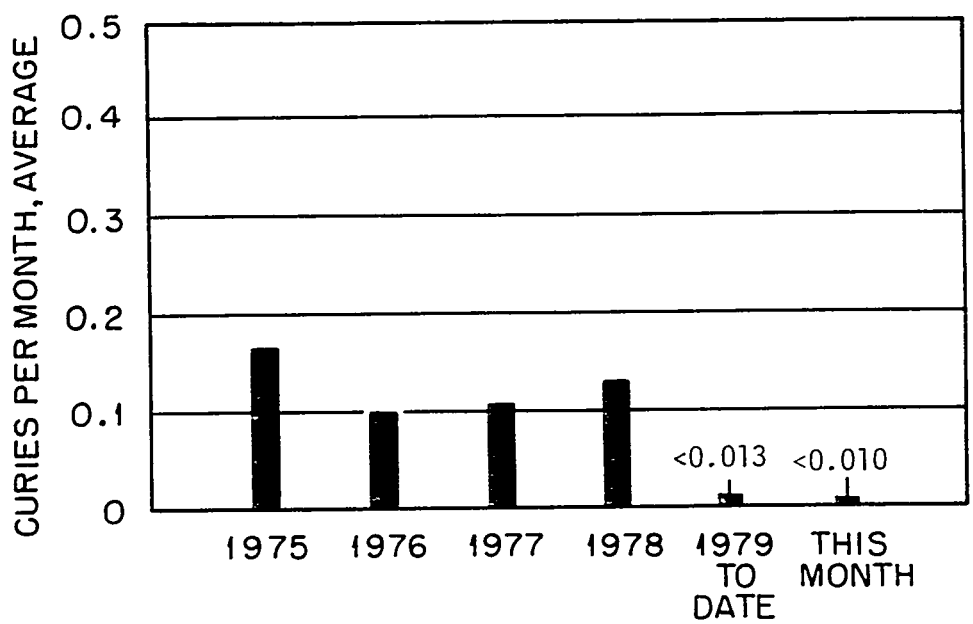


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

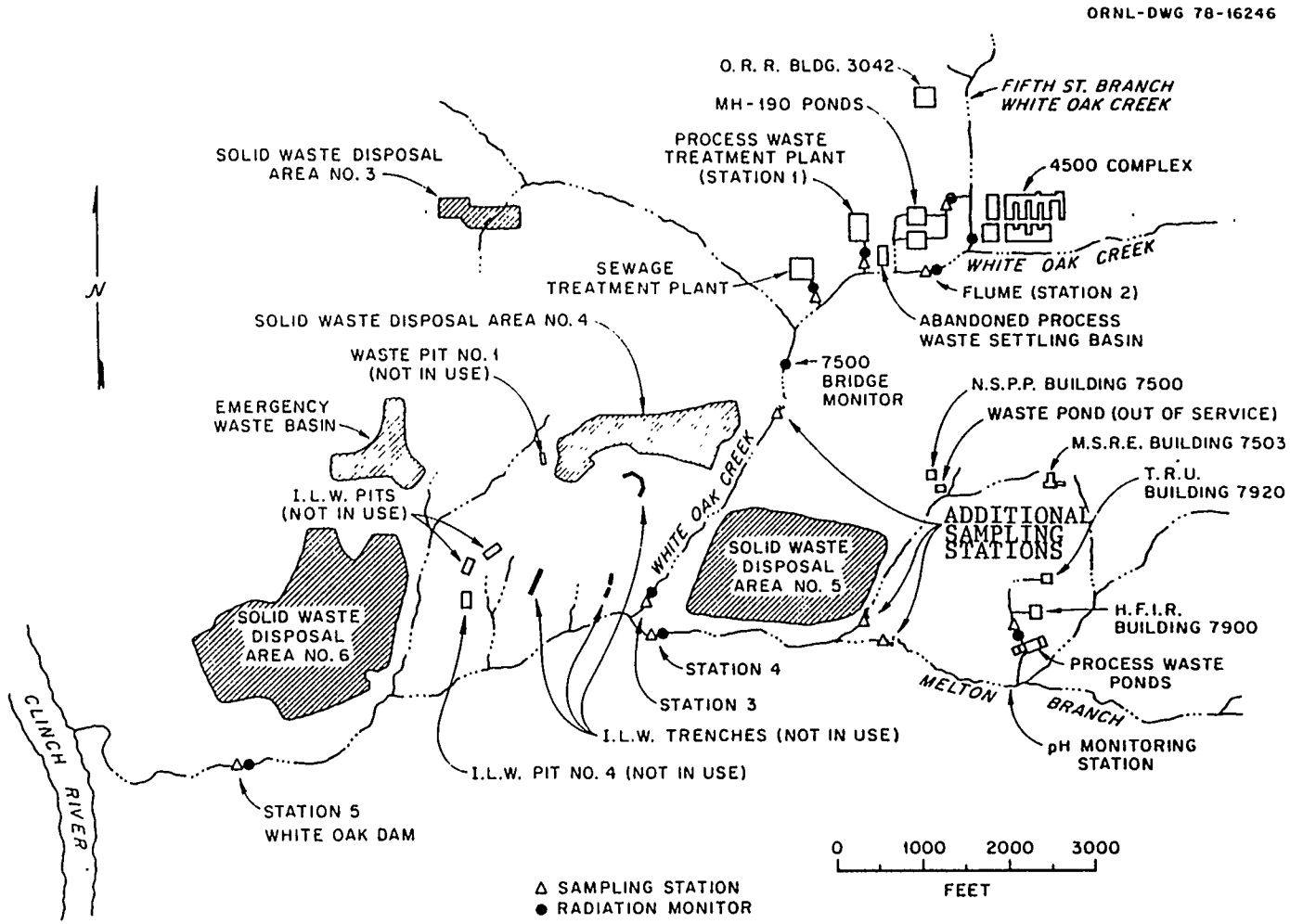


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.004	0.123
Miscellaneous discharges from east end of plant	2	0.009	0.030
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.062	0.260
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.052	0.145
Total discharge from all sources	3,4	0.114	0.405
White Oak Dam to Clinch River (Health Physics Measurement)		0.11	0.16

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	28	0.005	0.5	0.12	3.0
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.698[a]	64.1	0.75	19.0
3. Reactor Operations (MH112)	4.0	0.04	3.7	0.60	15.2
4. Buildings 3503 and 3508	0.19	<0.001	—	0.20	5.1
5. Buildings 3025 and 3026	0.4	<0.001	—	0.71	18.0
6. Building 3019	1.1	<0.001	—	0.147	3.7
7. Waste Evaporator, Bldg. 2531	87	0.048	4.4	0.32	8.1
8. Building 3525	0.07	<0.001	—	0.15	3.8
9. Building 2026	0.08	<0.001	—	0.05	1.3
10. Tank Farm Drainage	195	0.298	27.3	0.90	22.8

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.4
Central Radioactive Gas Disposal Facilities	3039	≤0.01	170.9
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.5
MSRE	7512	<0.01	<0.5
HFIR & TRU	7911	<0.01	<9.1
Total Activity in Gases Released at X-10 Site		<0.010	<182.4
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		27 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			7.00×10^{-4}
Room 265			2.06×10^{-3}
Building 5505 Discharges Glove Box			4.129×10^{-3}
Hood			2.91×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-79/328

791205

DATE: December 14, 1979

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer 7/22/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

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	0.005	0.246
Miscellaneous discharges from east end of plant	2	0.009	0.129
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.080	0.772
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.042	0.153
Total discharge from all sources	3,4	0.122	1.300
White Oak Dam to Clinch River (Health Physics Measurement)			

[a]Refers to Fig. 7.

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

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/17

80022

DATE: January 23, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November 1979.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Dimitri Hamrin 7/1/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of November was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 269.6 mCi; this was 147.8 mCi more than the previous month. Drainage from the burial grounds and contaminated flood plains accounted for 81.5% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I, and it amounted to ≤ 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November 1979 was 0.19% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 9.8% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.16 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 291.13* and 90.15 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (269.6 mCi) was 147.8 mCi more than the amount reported for October. This comparatively high release of activity is attributed to an increase in the amount of rainfall which occurred during the period.

The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 5.4 mCi and 14.7 mCi, respectively.

---

*Due to leaks around the weir at White Oak Creek (Station 3), this figure was arrived at by using the flows at the 7500 Road Bridge and a multiplication factor. A major leak was sealed by riprapping and applying a cement seal to the east bank; however, additional leaks have since developed along the opposite bank.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	18.9	
190 Ponds	5.4	
Process Waste Treatment Plant	3.8	
Sewage Treatment Plant	14.7	
	42.8	
7500 Sampling Station	107.3	
Burial Grounds Nos. 1 and 3 and Flood Plain		64.5
Station 3	193.0	
Burial Ground No. 4		85.7

Melton Branch

7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	6.9	
	7.1	
Station 4	76.6	
Burial Ground No. 5		69.5
Total ^{90}Sr to White Oak Lake (Station 3 & 4)	269.6	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4 and 5 and Flood Plain		219.7
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4 and 5 and Flood Plain		81.5

Process Waste

A total of 5.84 million gallons of contaminated water was chemically treated this month. Only 5.23 million gallons were actually released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
289	A	152	2002
290	B	147	1820
291	C	136	1830
292	A	136	1978
293	B	137	1970
294	C	136	1931
295	A	135	1917
296	B	136	1931
297	C	137	1931

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 214 gph. A summary of operations is given below:

	Gallons
Total volume generated	153,000
Volume transferred to evaporator	154,000
Tank Farm free space at beginning of month	446,000
Tank Farm free space at end of month	441,000
Evaporator concentrate returned to tank farm	6,000
Volume of concentrate available for hydrofracture	50,000

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

	Gallons
Building 3019	12,444
Radioisotopes Processing Area	9,331
ORR and BSR	22,760
High Flux Isotope Reactor	17,457
Fission Products Development Laboratory	7,677[a]
4500 Complex	24,543
Transuranium Processing Area	7,312

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 159.8 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.0% and 0.1% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

ORNL-DWG 79-9402

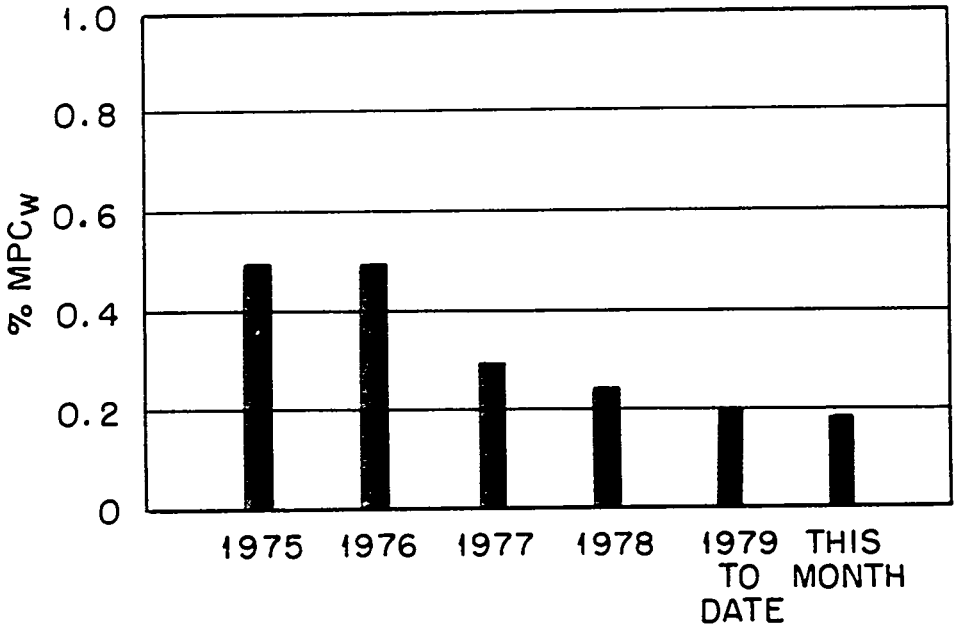


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

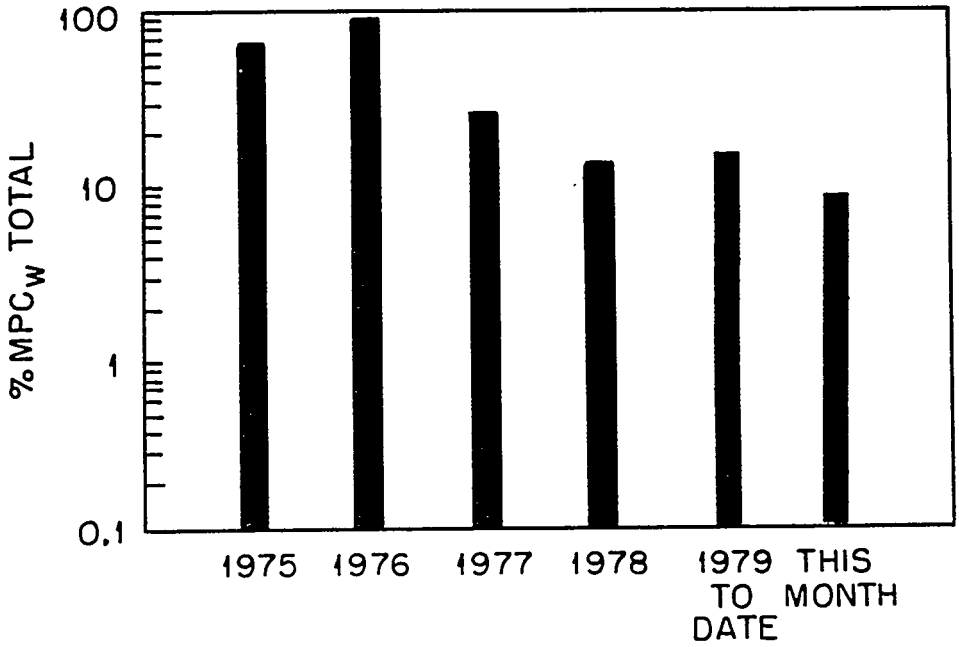


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

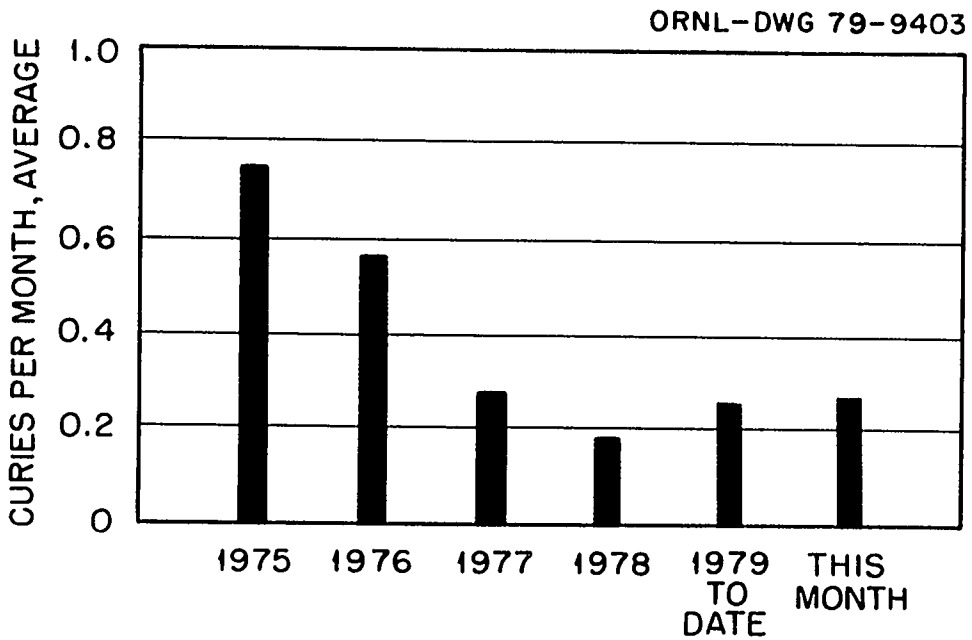


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

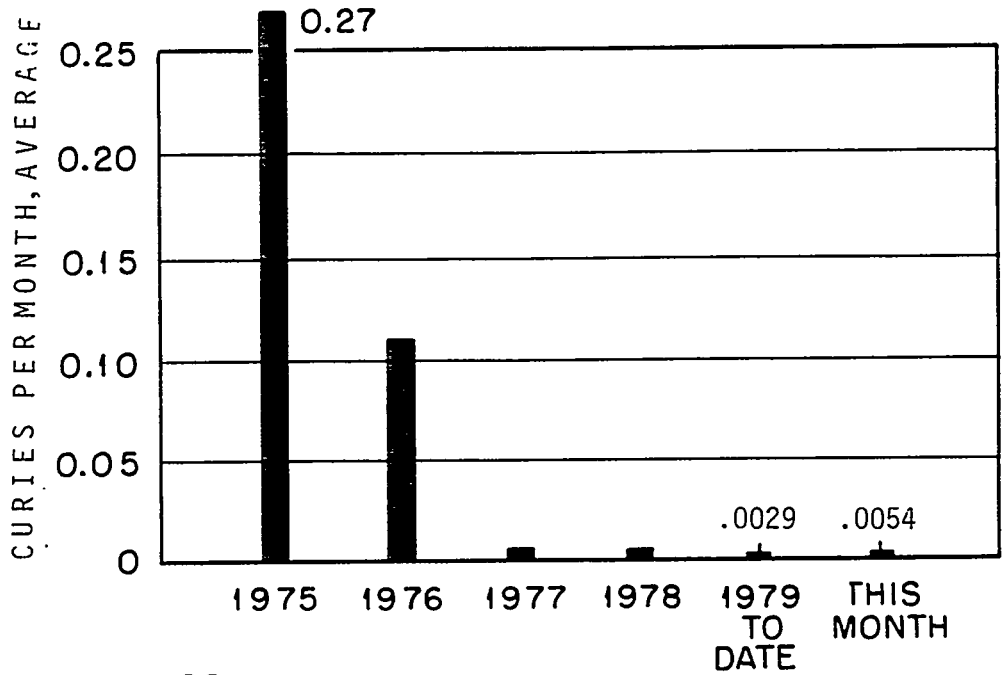


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

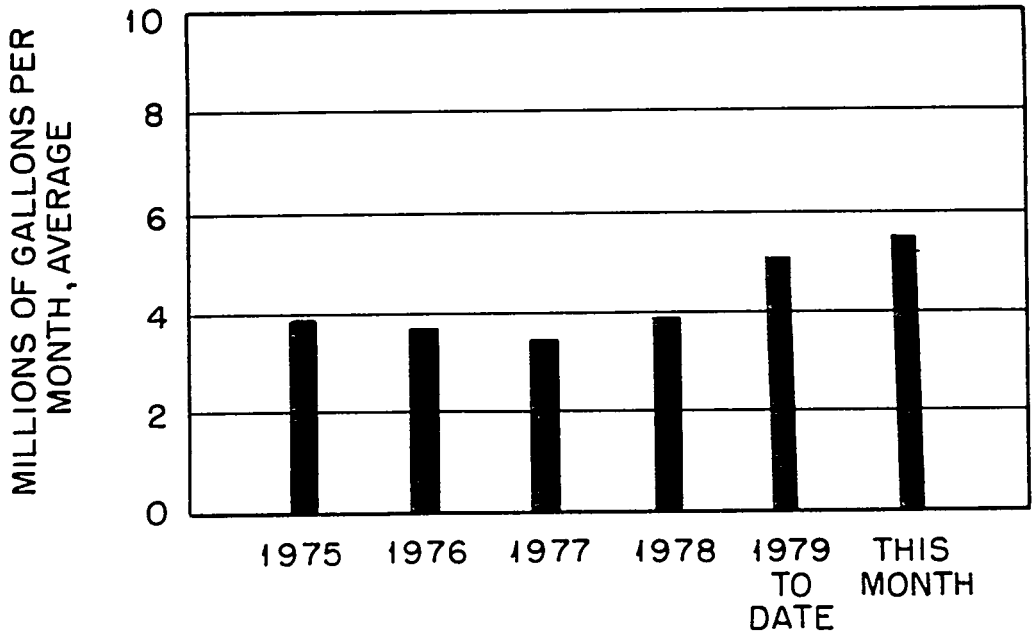


Fig. 4. Process Waste Volumes.

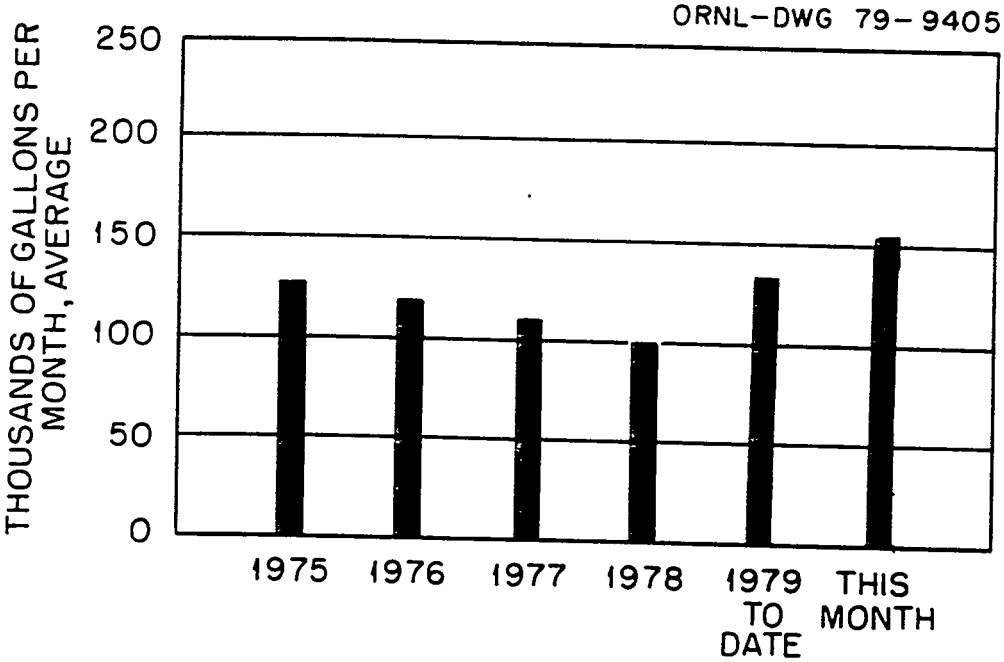


Fig. 5. Intermediate-Level Waste Volumes.

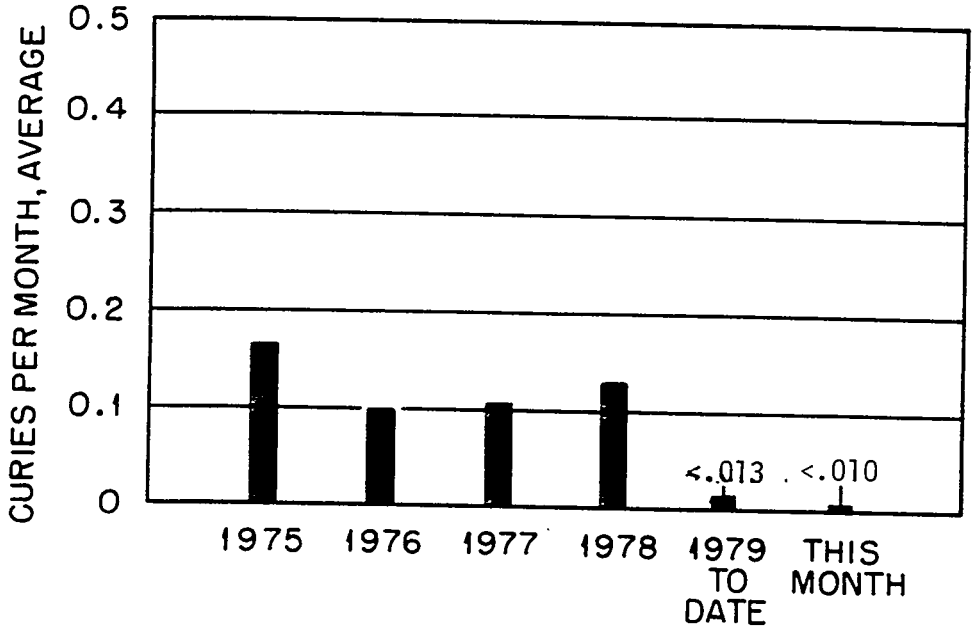


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

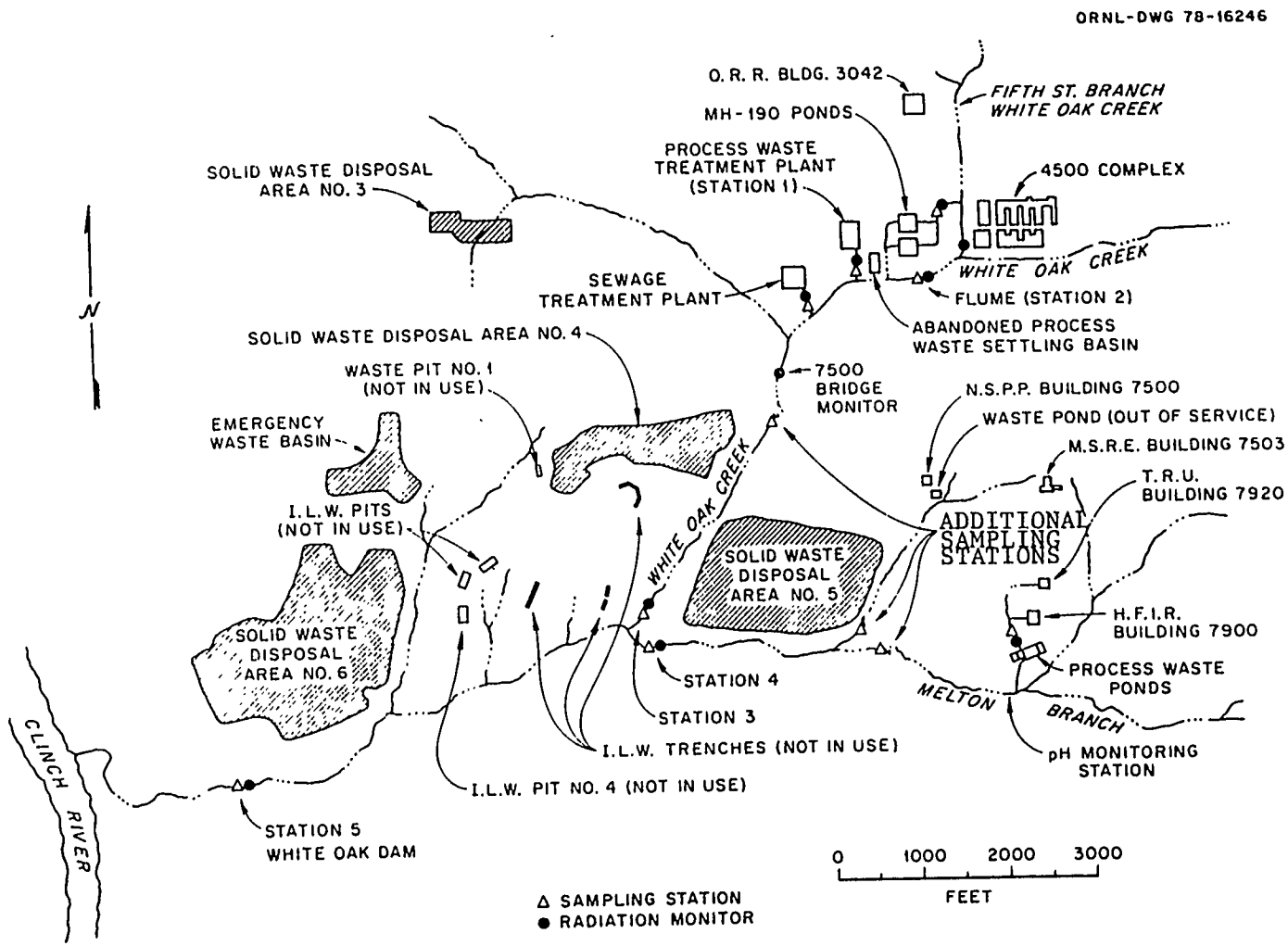


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.004	0.162
Miscellaneous discharges from east end of plant	2	0.019	0.272
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.193	1.480
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.077	0.444
Total discharge from all sources	3,4	0.270	2.358
White Oak Dam to Clinch River (Health Physics Measurement)		0.16	0.30

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr Curies	^{90}Sr % of Total	Volume Million Gallons	Volume % of Total
1. Radioisotopes Processing Area (MH234)	52	0.016	1.5	0.18	3.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.595[a]	55.8	1.47	29.6
3. Reactor Operations (MH112)	4.3	0.006	0.6	0.82	16.5
4. Buildings 3503 and 3508	0.27	<0.001	—	0.23	4.6
5. Buildings 3025 and 3026	1.6	<0.001	—	0.33	6.5
6. Building 3019	1.6	<0.001	—	0.24	4.8
7. Waste Evaporator, Bldg. 2531	34	0.017	1.6	0.30	6.0
8. Building 3525	0.14	<0.001	—	0.24	4.8
9. Building 2026	0.06	0.002	—	0.13	2.6
10. Tank Farm Drainage	245	0.430	40.5	1.03	20.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.10	<0.5
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<146.4
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.4
MSRE	7512	<0.01	<0.4
HFIR & TRU	7911	<0.01	<11.1
Total Activity in Gases Released at X-10 Site		<0.010	<159.8
Chem. Tech. Division - Y-12 Area			0
Tritium Target Fabrication Building		5 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			7.72×10^{-4}
Room 265			4.08×10^{-4}
Building 5505 Discharges Glove Box			c
Hood			3.87×10^{-2}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] This value could not be obtained due to an equipment malfunction.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-80/30

DATE: February 12, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December 1979

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of December was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 131.7 mCi; this is 137.9 mCi less than the previous month. Drainage from the burial grounds and contaminated flood plains accounted for 76% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I, and it amounted to $\leq$0.20 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December 1979 was 0.22% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 18.4% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.16 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 181.57 and 55.52 million gallons, respectively.

The total release of ^{90}Sr into White Oak Lake (132 mCi) was 137.9 mCi less than the amount reported for September. This comparatively low release of activity is attributed to a much lesser amount of rainfall in December than in November.

The amounts of ^{90}Sr released from the 190 ponds and the sanitary system into White Oak Creek were 0.8 mCi and 8.6 mCi, respectively.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Grounds Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums

of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek	^{90}Sr, mCi	^{90}Sr, mCi
Flume	13.1	
190 Ponds	0.8	
Process Waste Treatment Plant	4.8	
Sewage Treatment Plant	8.6	
	27.3	
7500 Sampling Station	43.3	
Burial Grounds Nos. 1 and 3 and Flood Plain		16.0
Station 3	86.4	
Burial Ground No. 4		43.1
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	3.7	
	3.8	
Station 4	45.3	
Burial Ground No. 5		41.5
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	131.7	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		100.6
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		76.4

Process Waste

A total of 5.40 million gallons of contaminated water was chemically treated this month. Only 4.6 million gallons were actually released to the creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
298	A	138	1999
299	B	146.5	2033
300	A	95.5	1417
301	C	113.5	2015
302	A	111	1970
303	B	104	1846
304	C	120	1965
305	A	117	1938

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 137.5 gph. A summary of operations is given below:

	Gallons
Total volume generated	106,000
Volume transferred to evaporator	94,000
Tank Farm free space at beginning of month	441,000
Tank Farm free space at end of month	426,000
Evaporator concentrate returned to tank farm	3,000
Volume of concentrate available for hydrofracture	53,000

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

	Gallons
Building 3019	2,870
Radioisotopes Processing Area	2,574
ORR and BSR	10,106
High Flux Isotope Reactor	18,165
Fission Products Development Laboratory	2,140[a]
4500 Complex	21,760

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$20 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 241 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.0 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

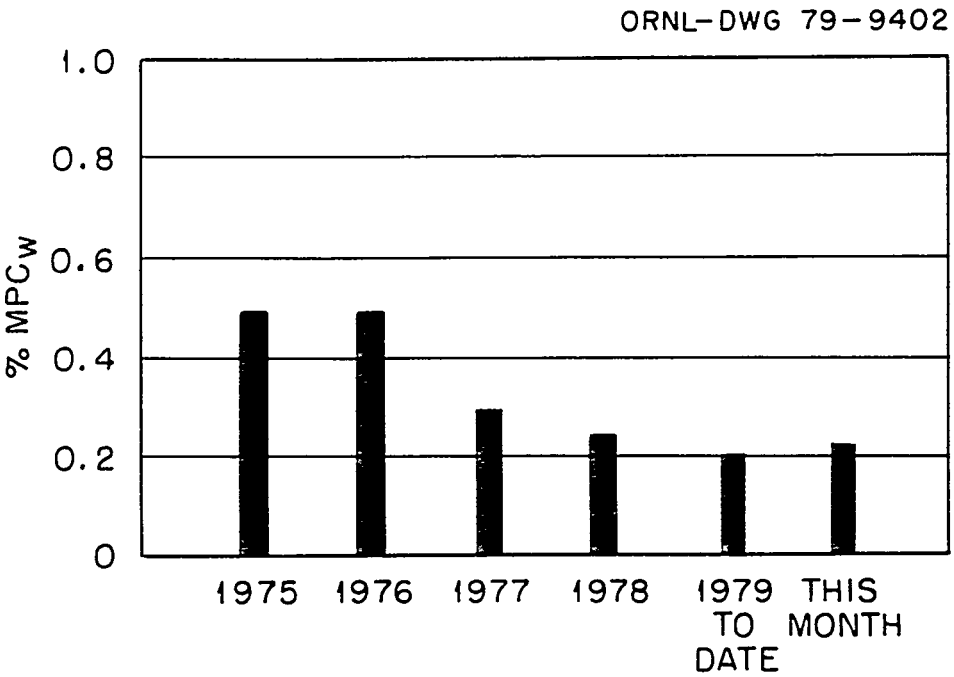


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP) Measurements at White Oak Dam).

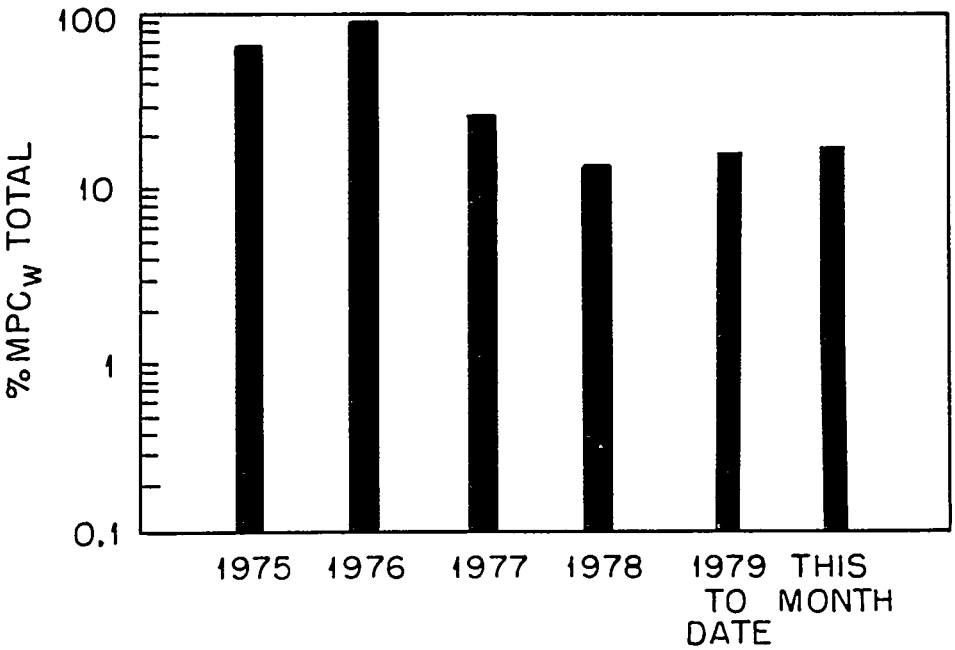


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP) Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

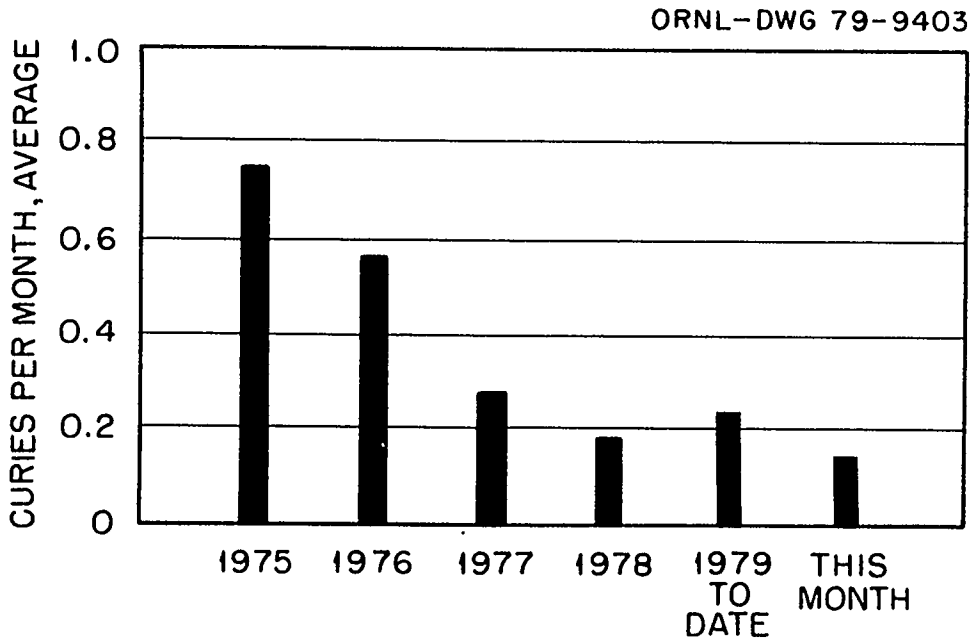


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

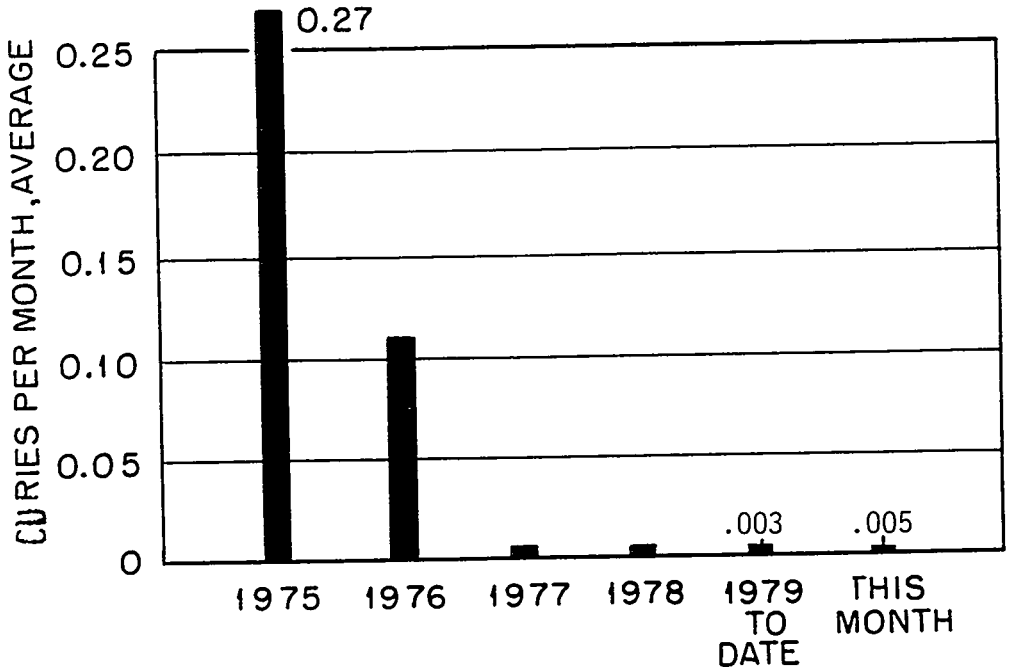


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

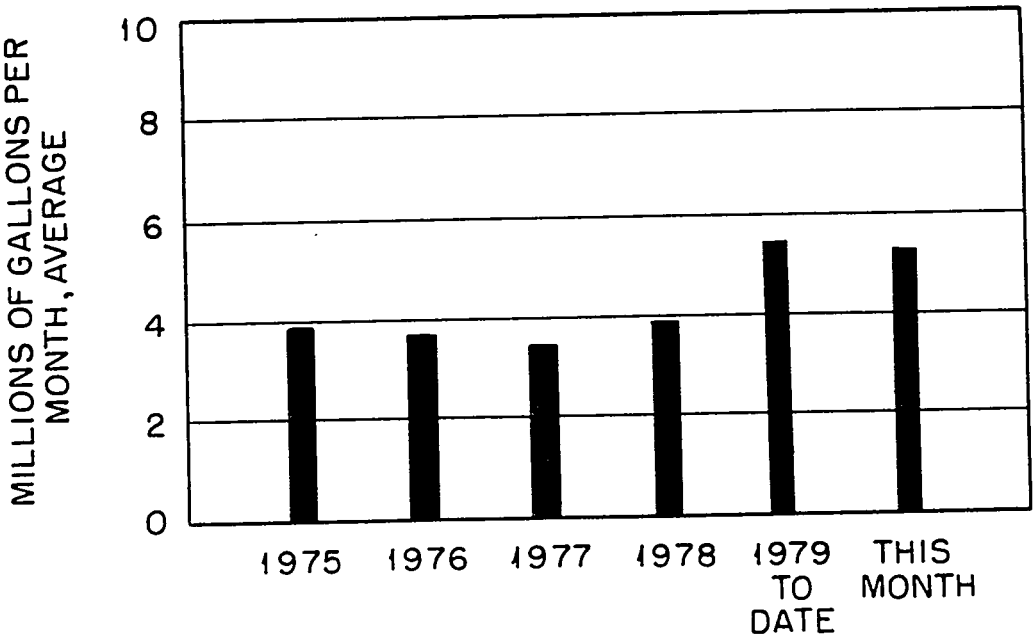


Fig. 4. Process Waste Volumes.

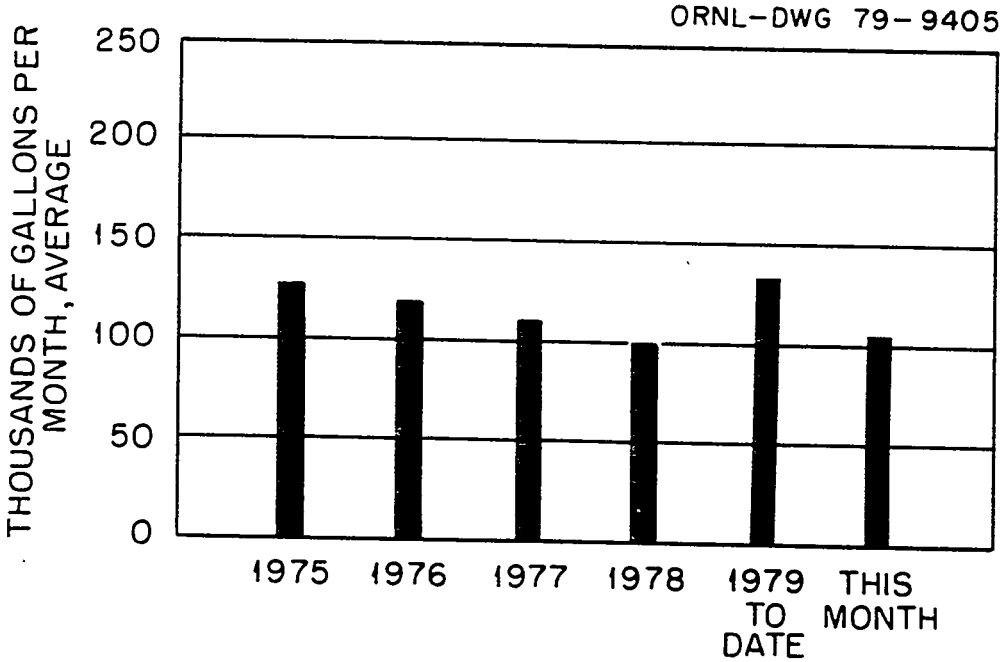


Fig. 5. Intermediate-Level Waste Volumes.

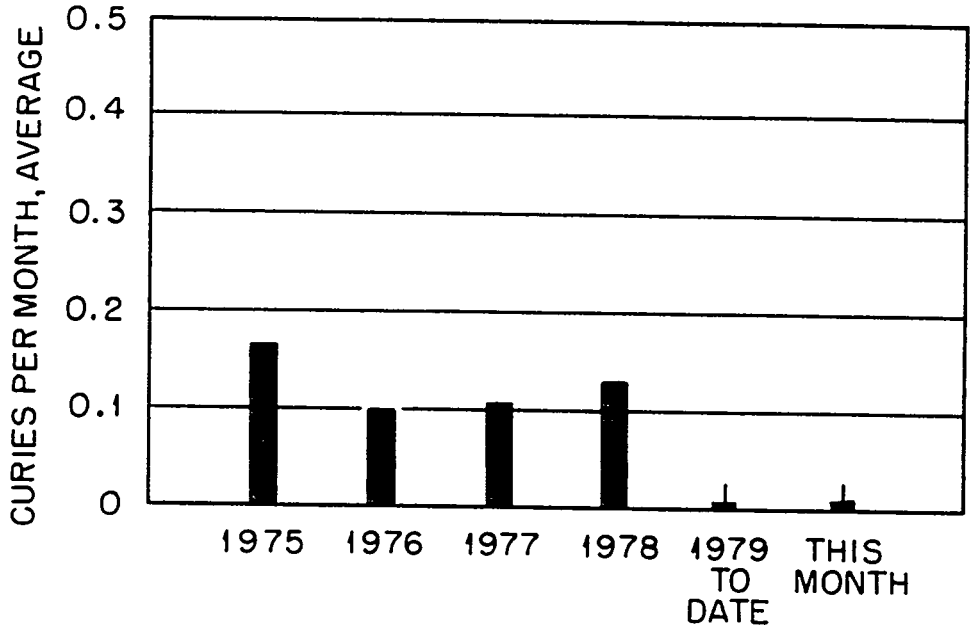


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

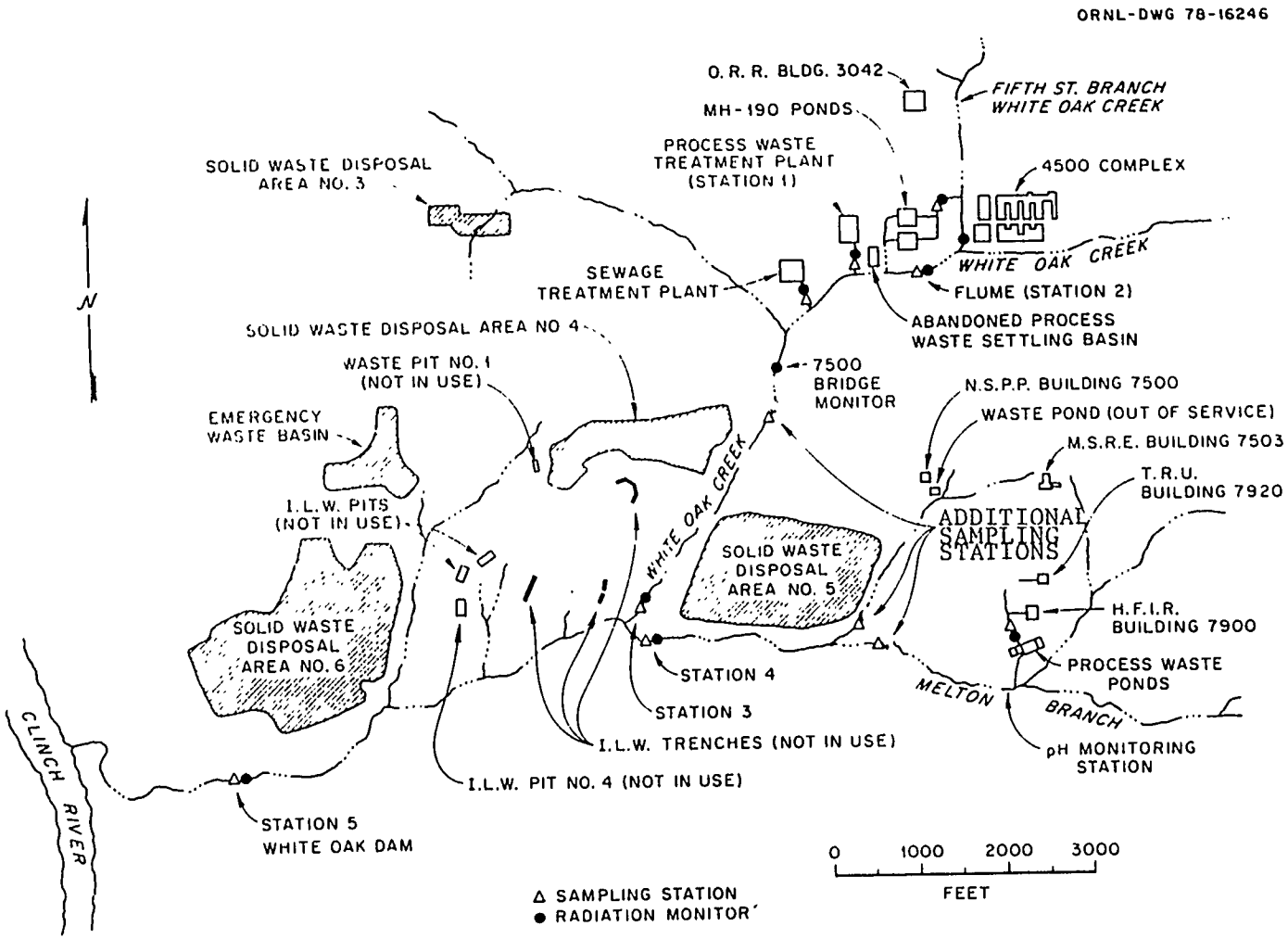


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0008	0.173
Miscellaneous discharges from east end of plant	2	0.013	0.166
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.086	0.648
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.045	0.189
Total discharge from all sources	3,4	0.131	0.837
White Oak Dam to Clinch River (Health Physics Measurement)		0.16	0.46

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr dpm/ml	^{90}Sr		Volume	
		Curies	% of Total	Million Gallons	% of Total
1. Radioisotopes Processing Area (MH234)	28	0.009	1.1	0.19	5.2
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.504[a]	60.8	0.65	17.7
3. Reactor Operations (MH112)	6.2	0.005	0.6	0.51	13.9
4. Buildings 3503 and 3508	0.07	<0.001	—	0.48	13.1
5. Buildings 3025 and 3026	0.9	<0.001	—	0.30	8.2
6. Building 3019	0.5	<0.001	—	0.22	6.0
7. Waste Evaporator, Bldg. 2531	46	0.015	1.8	0.19	5.2
8. Building 3525	0.09	<0.001	—	0.24	6.5
9. Building 2026	10.6	0.002	0.2	0.10	2.7
10. Tank Farm Drainage	220	0.294	35.5	0.79	21.5

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.8
Central Radioactive Gas Disposal Facilities	3039	≤0.02	<227.6
Radiochemical-Processing Pilot Plant	3020	<0.01	<2.0
MSRE	7512	<0.01	<0.8
HFIR & TRU	7911	<0.01	<9.6
Total Activity in Gases Released at X-10 Site		≤0.020	<240.8
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		$4(^{3}H)$	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			5.25×10^{-4}
Building 5505 Discharges Glove Box			2.25×10^{-3}
Hood			5.81×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

DATE ... APR 16 1980

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/62

800331

DATE: March 31, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

David R Hamrin 7/10/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of January was normal. Data from the sampling stations located along the watersheds indicate that only 128 mCi of ^{90}Sr was discharged into White Oak Lake during the period. However, the samples were apparently mishandled/mislabeled in transit, and the actual release for Station No. 3 is believed to be about 3 times the posted value. The activity emitted with the gaseous wastes remained low. The bulk of this contamination was identified as ^{131}I, and the total amount released was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of January 1980 was 0.19% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 25.0% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.29 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 1.32×10^6 and 0.47×10^6 cubic meters, respectively.

The ^{90}Sr discharge obtained from measurements at White Oak Creek Station No. 3 is obviously in error because this amount is less than that obtained from the summation of the upstream stations. Utilizing an annual average contribution from Burial Ground No. 4 of 0.048 Ci, the White Oak Creek discharge is estimated to be 0.144 Ci, and the subsequent total release into White Oak Lake would be 0.233 Ci. This compares favorably with the reported release from White Oak Dam (0.29 Ci)

Periods of high precipitation during the reporting period caused significant increases in the amounts of ^{90}Sr contributed by the 190 Pond

System (2.5 mCi) and the Sanitary System (33.4 mCi).

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	21.0	
190 Ponds	2.5	
Process Waste Treatment Plant	4.6	
Sewage Treatment Plant	33.8	
	61.9	
7500 Sampling Station	95.3	
Burial Grounds Nos. 1 and 3 and Flood Plain		33.4
Station 3	39.4	
Burial Ground No. 4		—

Melton Branch

7900 Area (HFIR and TRU)	0.4	
7500 Area (NSPP and MSRE)	3.4	
	3.8	
Station 4	88.9	
Burial Ground No. 5		85.1
Total ^{90}Sr to White Oak Lake (Stations 3 & 4)	128.3	
Total ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		118.5
Percent ^{90}Sr from Burial Grounds Nos. 1, 3, 4, and 5 and Flood Plain		92.4

Process Waste

A total of 2.55×10^4 cubic meters of contaminated water was chemically treated this month. Only 2.51×10^4 cubic meters were actually released to the creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
306	B	144	1949
307	C	150	2142
308	A	117.5	1884
309	B	132.5	1925
310	C	141	1929
311	A	144	1923
312	B	127.5	1997
313	C	119	1842
314	A	128	1925
315	B	124	1985
316	C	111	1890

Intermediate Level Waste

The waste evaporator operated at an average boildown rate of 0.78 m^3/hr. A summary of operations is given below:

	Cubic Meters
Total volume generated	601.8
Volume transferred to evaporator	586.7
Tank Farm free space at beginning of month	1612.0
Tank Farm free space at end of month	1616.2
Evaporator concentrate returned to tank farm	19.7
Volume of concentrate available for hydrofracture	215.7

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

	Cubic Meters
Building 3019	38.80
Radioisotopes Processing Area	39.15
ORR and BSR	112.17
High Flux Isotope Reactor	53.93
Fission Products Development Laboratory	25.89[a]
4500 Complex	75.53
Transuranium Processing Area	43.64

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 241 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.4 and 0.5% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

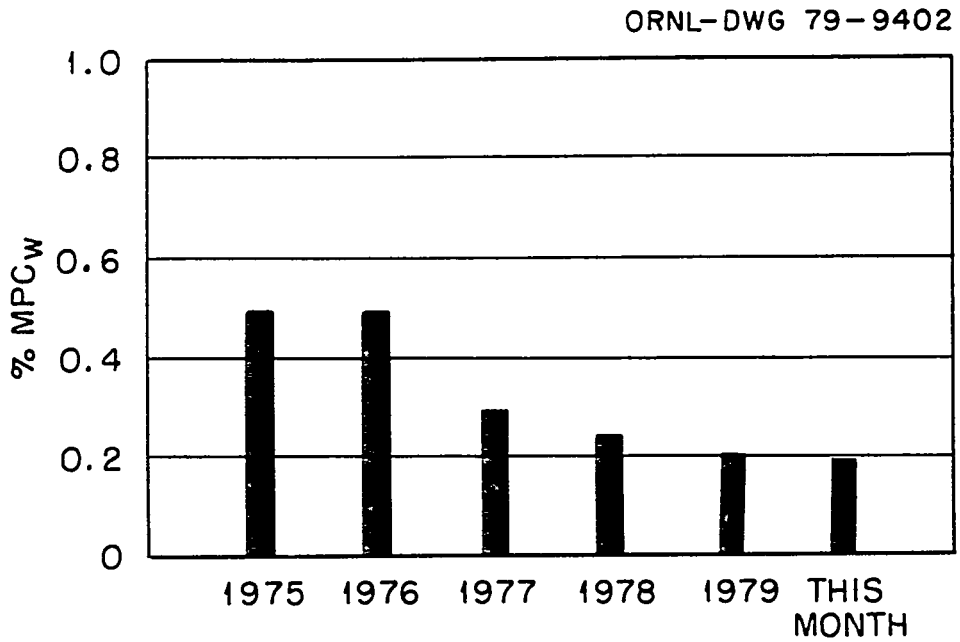


Fig.1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges* (ISAHP Measurements at White Oak Dam).

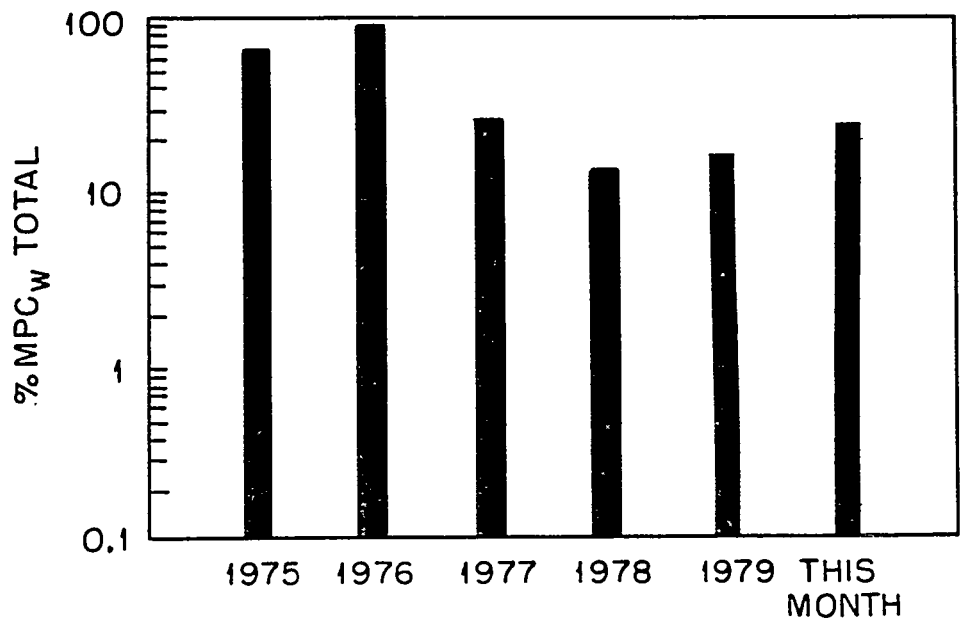


Fig.1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

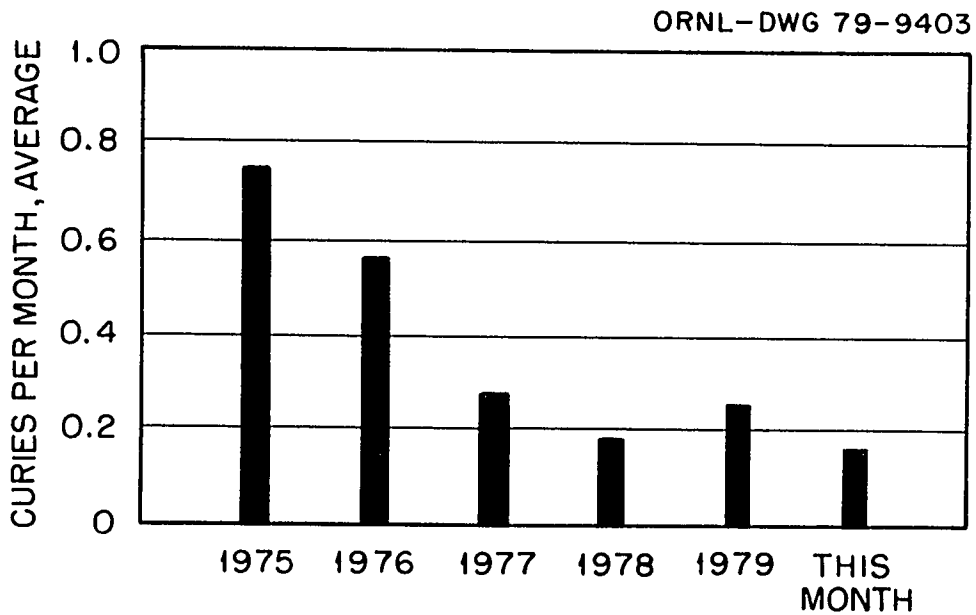


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

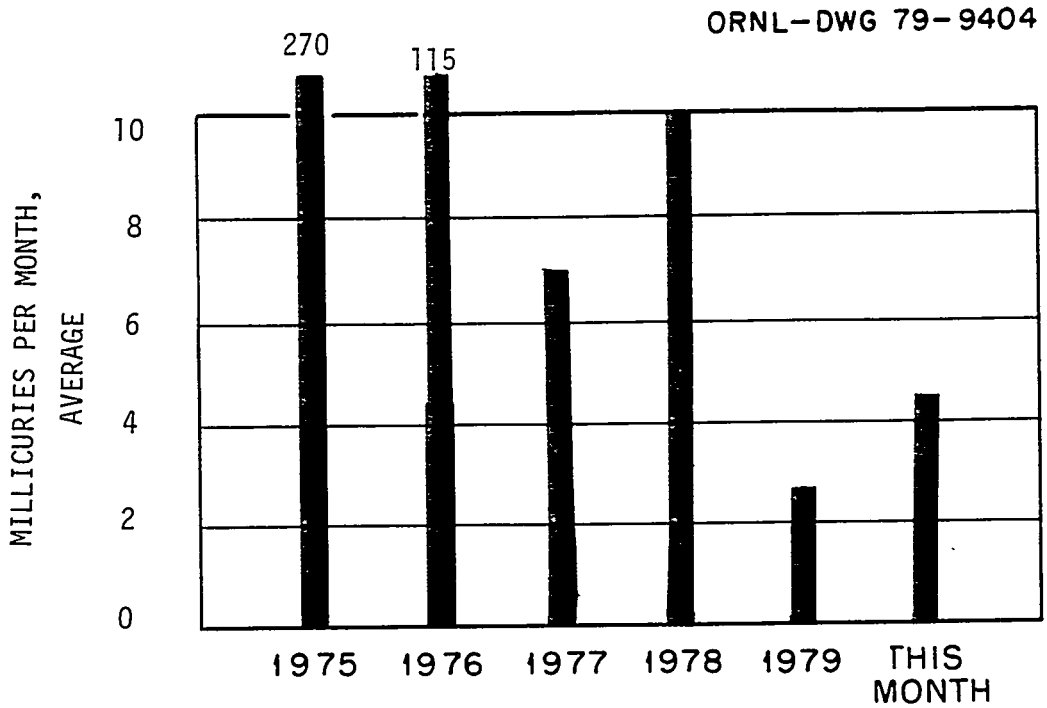


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

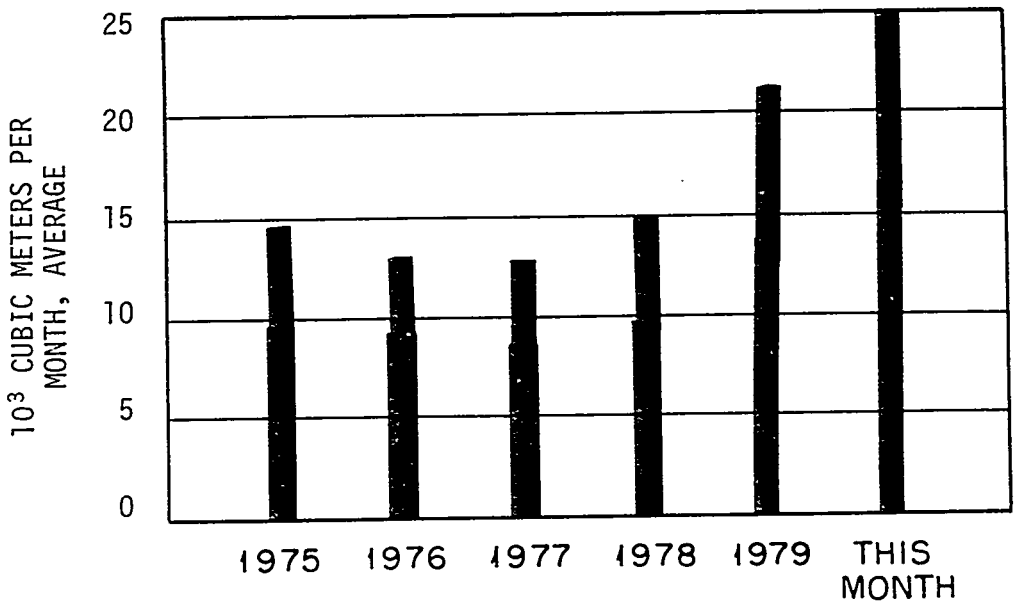


Fig. 4. Process Waste Volumes.

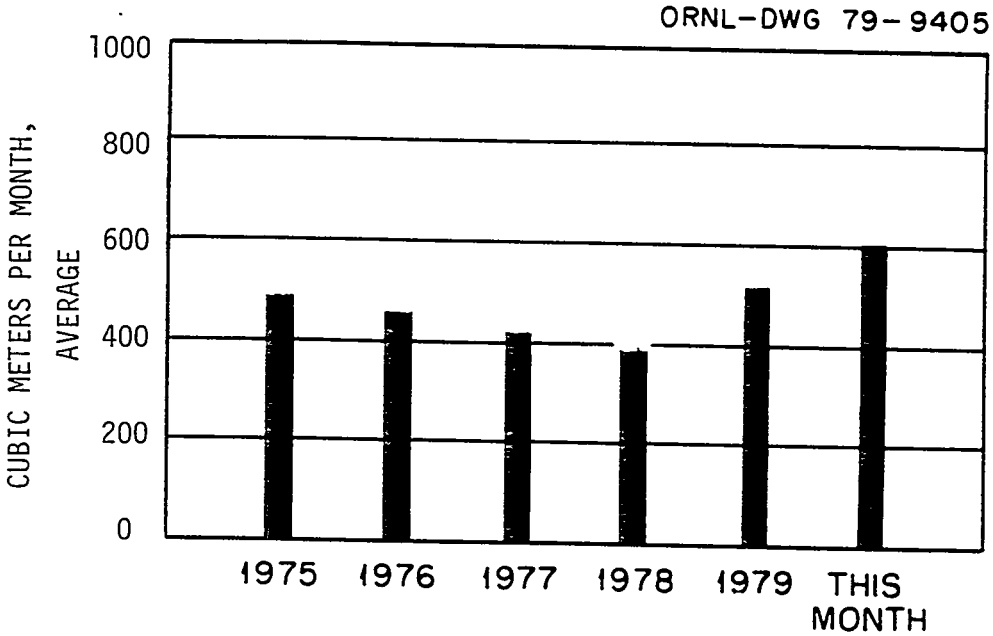


Fig. 5. Intermediate-Level Waste Volumes.

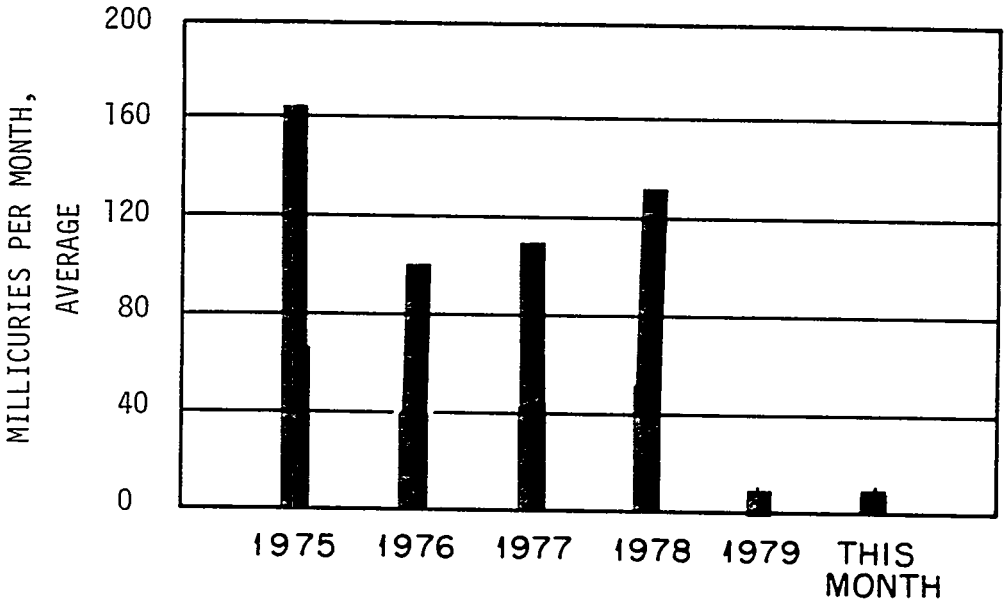


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

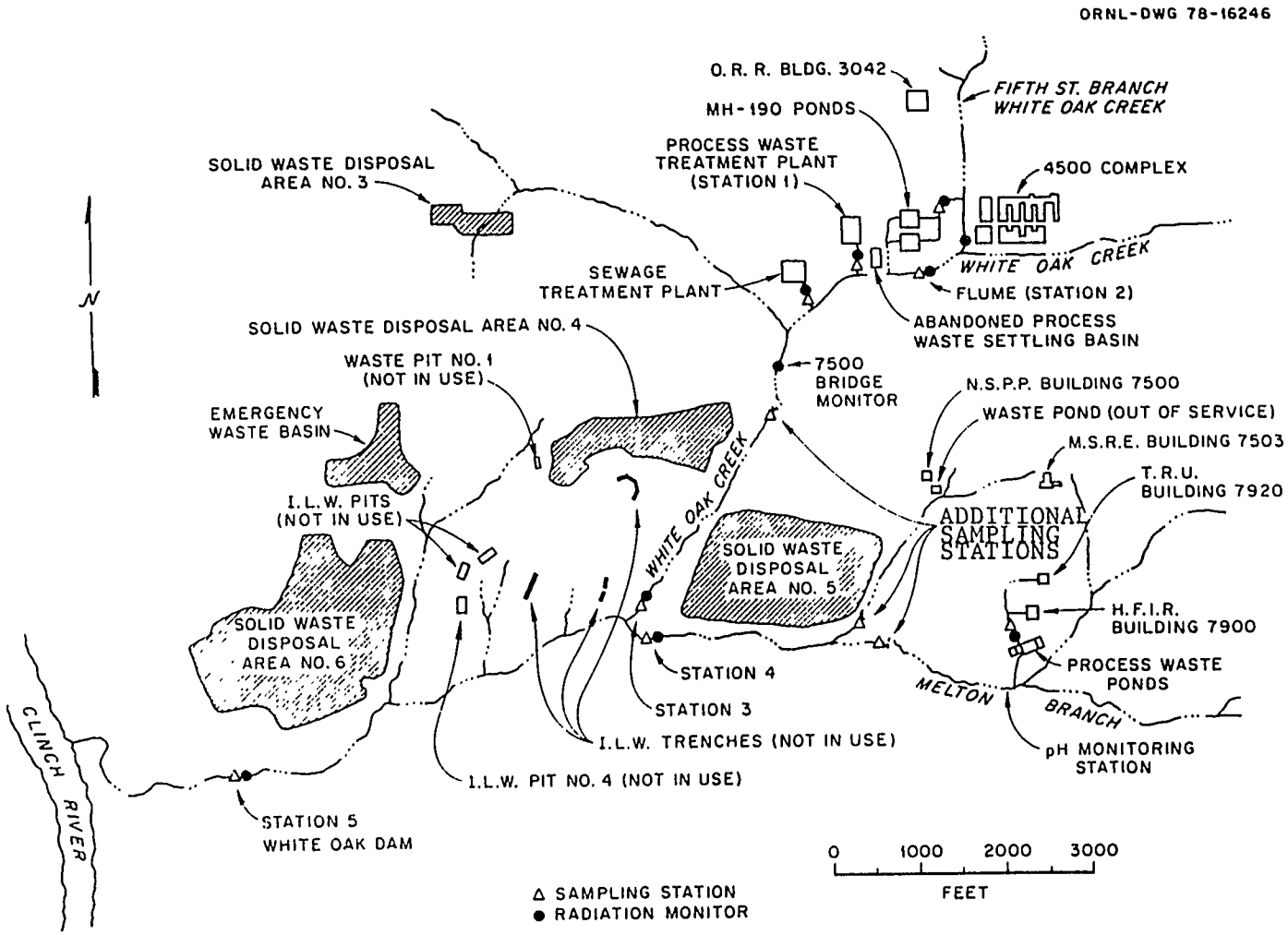


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.005	0.161
Miscellaneous discharges from east end of plant	2	0.021	0.510
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.039	0.818
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.089	0.726
Total discharge from all sources	3,4	0.128	1.544
White Oak Dam to Clinch River (ISAHP Measurement)		0.29	0.80

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr BQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	10^3 m^3	% of Total
1. Radioisotopes Processing Area (MH234)	640	0.017	0.8	0.99	7.9
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.519[a]	25.2	1.89	15.6
3. Reactor Operations (MH112)	110	0.010	0.5	3.27	26.0
4. Buildings 3503 and 3508	1.6	<0.001	—	1.97	15.7
5. Buildings 3025 and 3026	30	0.001	<0.1	1.44	11.4
6. Building 3019	2.2	0.001	<0.1	0.86	6.8
7. Waste Evaporator, Bldg. 2531	30,000	0.798	38.7	0.99	7.9
8. Building 3525	1.2	<0.001	—	0.03	0.2
9. Building 2026	11.0	0.001	<0.1	0.01	0.1
10. Tank Farm Drainage	6200	0.716	34.7	1.13	9.0

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.5
Central Radioactive Gas Disposal Facilities	3039	≤0.01	<113.6
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.5
MSRE	7512	<0.01	<0.5
HFIR & TRU	7911	<0.01	<43.3
Total Activity in Gases Released at X-10 Site		≤0.01	<156.9
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		7 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-4}
Room 265			7.0×10^{-5}
Building 5505 Discharges Glove Box			4.50×10^{-4}
Hood			8.60×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

LRD-ORNL-RC

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/67

DATE: April 22, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February 1980.

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer
ORNL Site

Date 7/12/96

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

Technical Information Officer
ORNL Site

Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of February was normal. Two additional sampling stations (East Weir and West Weir) which measure the activity released from the abandoned ILW disposal pit area were activated during the period. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 343 mCi; this is 215 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 92% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of February 1980 was 0.25% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 44.3% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.21 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 87.4×10^4 and 26.3×10^4 cubic meters, respectively.

The total release of ^{90}Sr into White Oak Lake (343 mCi) was 215 mCi more than the amount reported for January. The bulk of this increase is attributed to periods of heavy rainfall which occurred during the reporting period.

The amount of ^{90}Sr released from the 190 pond system into White Oak Creek was 0.9 mCi. The discharge from the sanitary system is not available because of equipment failure.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds and the dis-

charge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at monitoring stations 3 and 4, (see Figure 7).

	^{90}Sr, mCi	^{90}Sr, mCi
White Oak Creek		
Flume	16.1	
190 Ponds	0.9	
Process Waste Treatment Plant	1.9	
Sewage Treatment Plant	NA	
	18.9	
7500 Sampling Station	203.7	
Sewage Treatment Plant, Burial Grounds Nos. 1 and 3, and Flood Plains		184.8
Station No. 3	205.3	
Burial Ground No. 4		1.6*
Melton Branch		
7900 Area (HFIR and TRU)	0.4	
7500 Area (NSPP and MSRE)	6.8	
	7.2	
Station No. 4	99.4	
Burial Ground No. 5		92.2
ILW Pit Disposal Area		
East Weir		1.4
West Weir		37.2
		38.6

*This value is low compared to previous data. The value for the 7500 Sampling Station appears to be high and this would result in a low value for the discharge from Burial Ground No. 4.

(continuation)

	^{90}Sr, mCi	^{90}Sr, mCi
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	343.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area and Flood Plains		317.2
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		92.4

Process Waste

A total of 2.21×10^4 cubic meters of contaminated water was chemically treated this month. Only 2.09×10^4 cubic meters were actually released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
317	A	112	1946
318	B	120	1942
319	C	125.5	1944
320	A	133	1990
321	B	154	1930
322	C	144	1873
323	A	136	1984
324	B	128	1974
325	C	120	1931
326	A	123	1907

Intermediate Level Waste

The new Evaporator Annex, Service Tanks, and Collection Header systems were placed in operation February 26. This new equipment provides a spare waste evaporator and a contained waste storage system. The existing evaporator which has been in continuous service since 1965 will eventually be decontaminated, inspected, and restored to standby status. The six gunite tanks which comprise the South Tank Farm have been removed from service. These tanks are scheduled for cleanout and retirement.

The waste evaporator operated at an average boildown rate of 0.82 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	480.1
Volume transferred to evaporators	572.2
South Tank Farm free space at beginning of month	1616.2
South Tank Farm free space at end of month	1748.5
Evaporator concentrate returned to South Tank Farm	18.1
Volume of concentrate available for hydrofracture	484.1
Service Tank Inventory:	
W-21	44.2
W-22 (Standby, normally empty)	6.9
W-23 (Evaporator concentrate)	7.5

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

(continuation)

	Cubic Meters
Building 3019	5.3
Radioisotopes Processing Area	6.0
ORR and BSR	11.6
High Flux Isotope Reactor	60.6
Fission Products Development Laboratory	26.7[a]
4500 Complex	426.6[b]

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The filterable particulate activities released during the period amounted to 92 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.8 and 0.1% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

[b]The bulk of this waste is from a pilot plant operation located in Bldg. 4505.

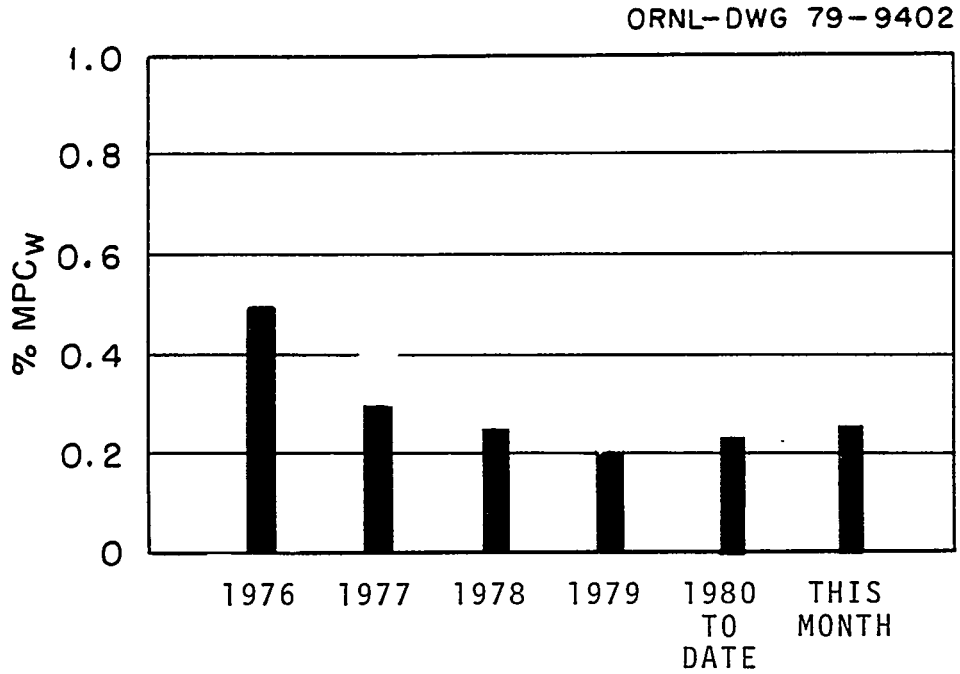


Fig.1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges* (ISAHP Measurements at White Oak Dam).

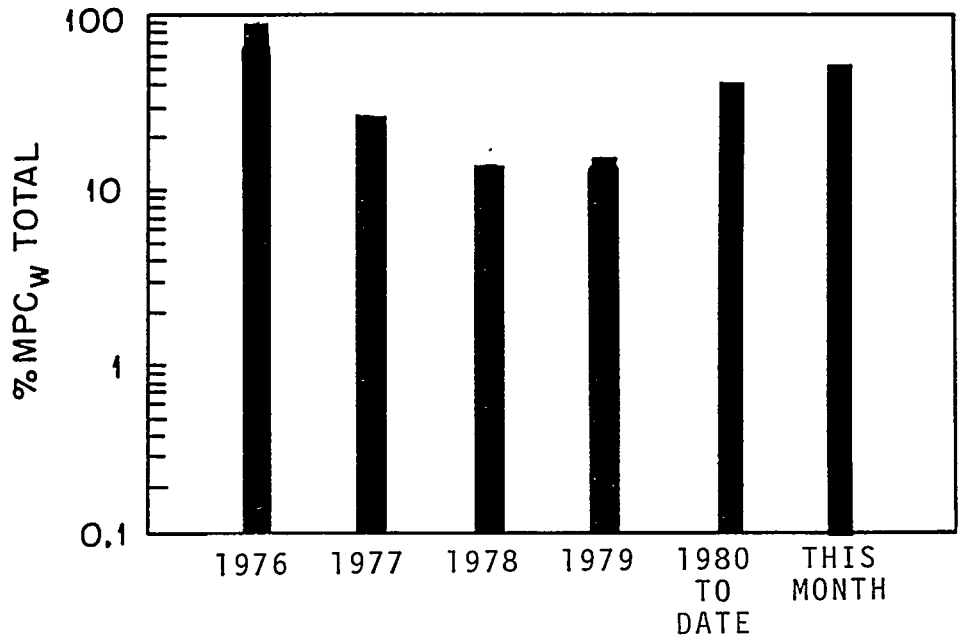


Fig.1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

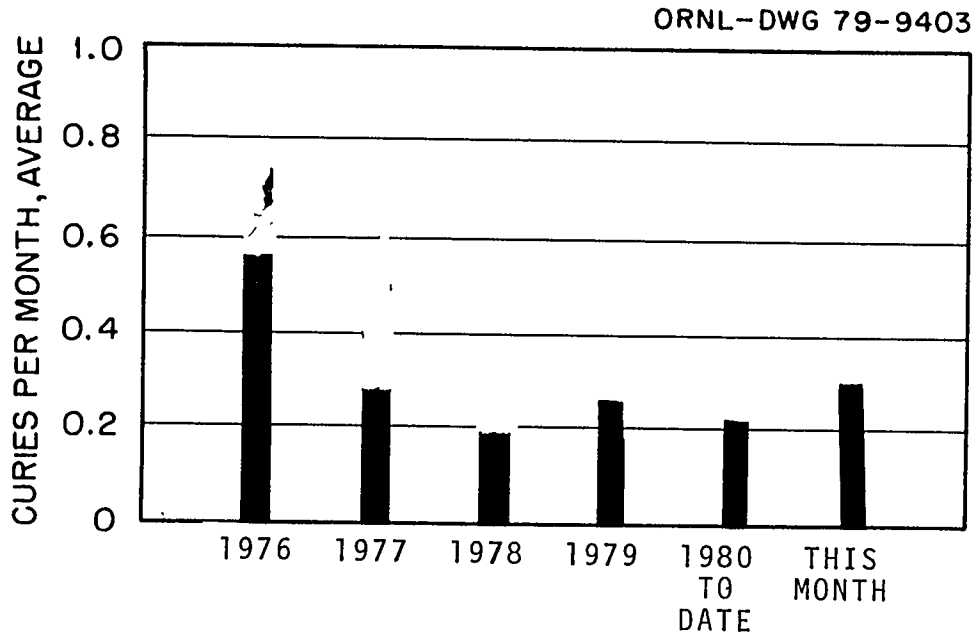


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404

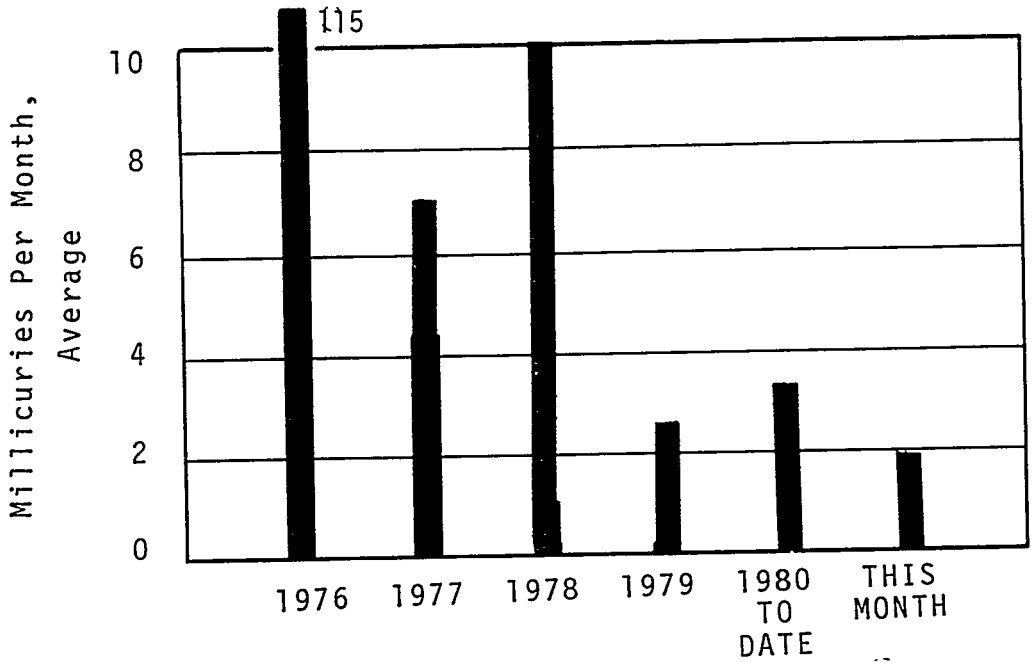


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

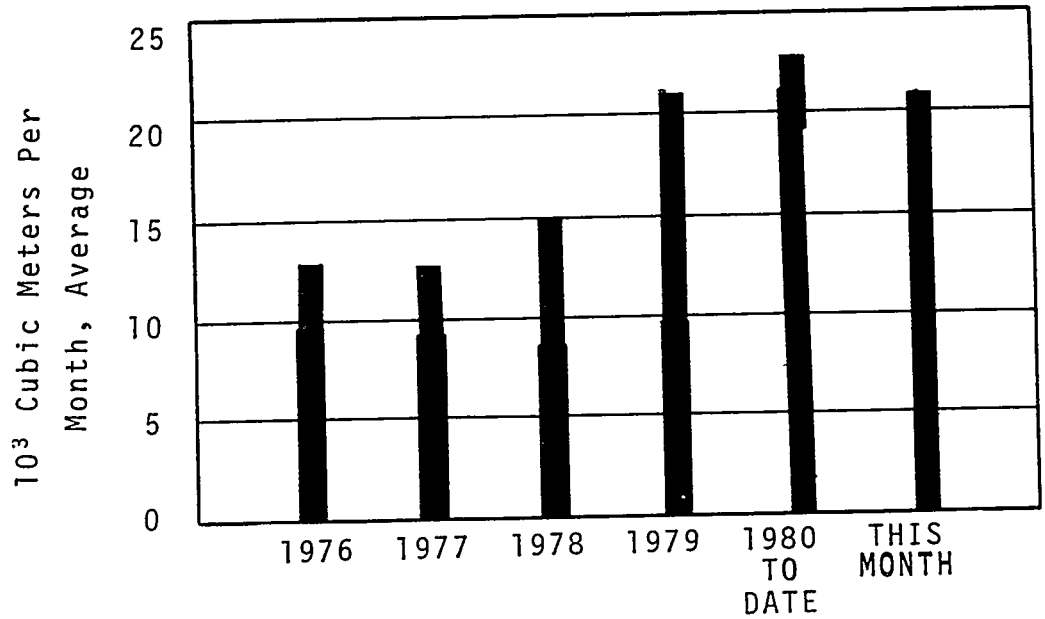


Fig. 4. Process Waste Volumes.

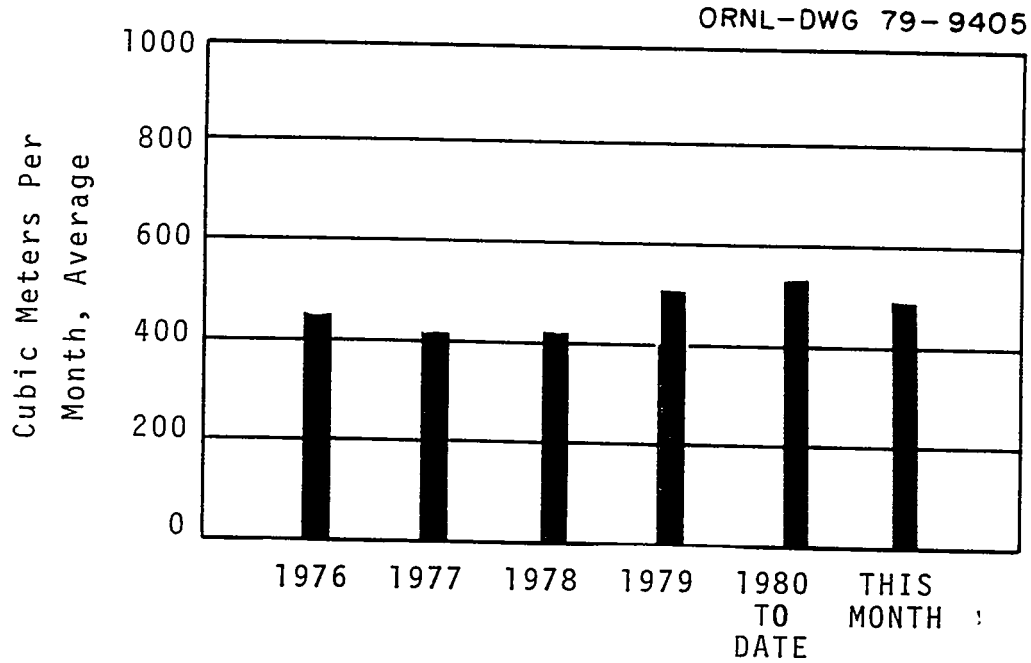


Fig. 5. Intermediate-Level Waste Volumes.

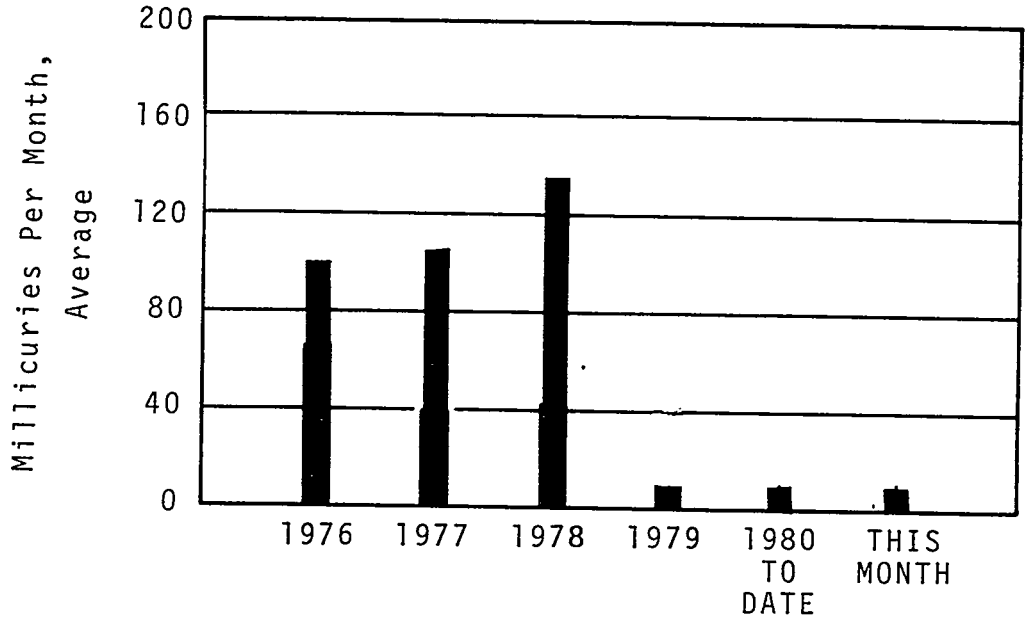


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

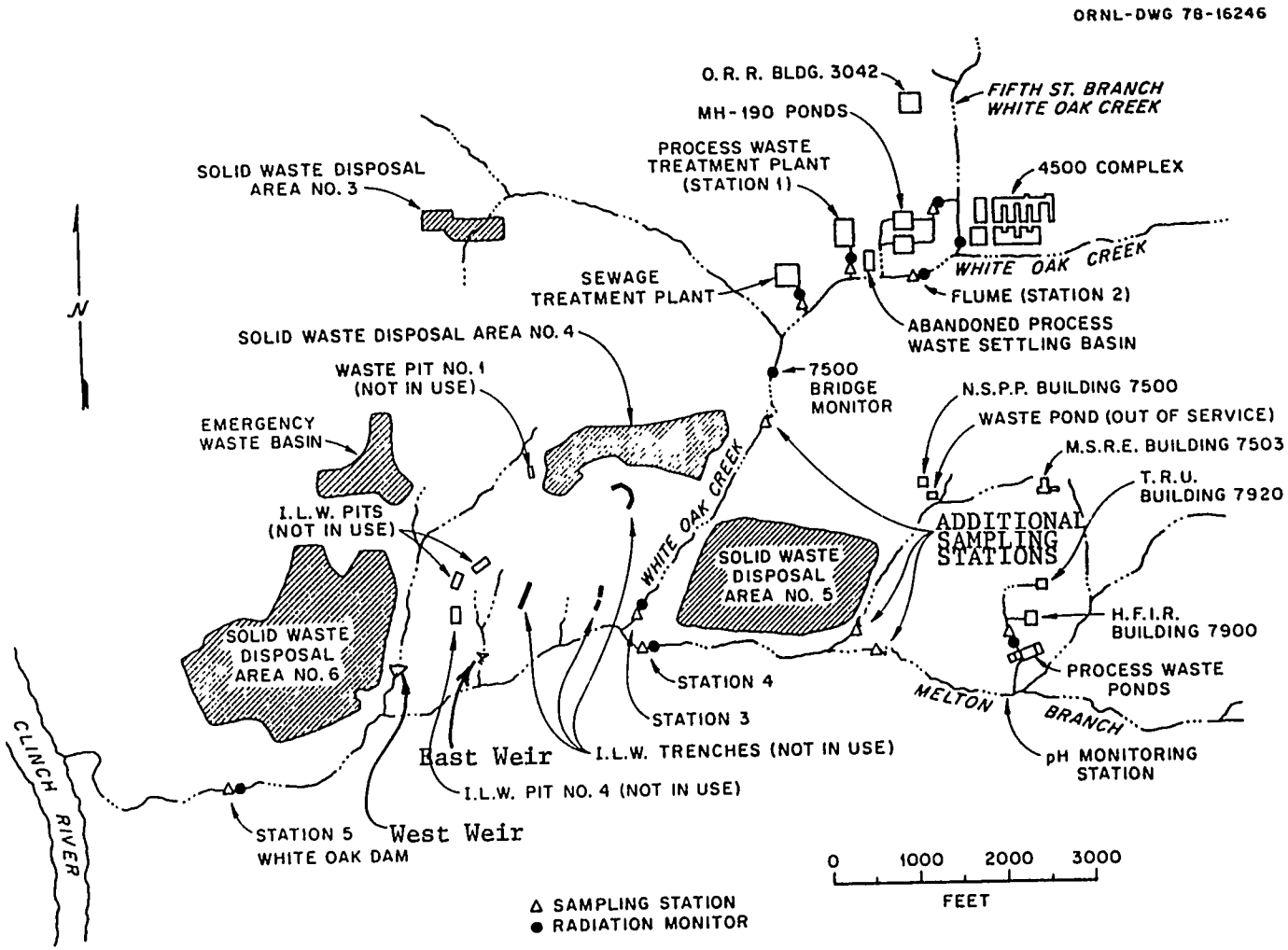


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0009	0.043
Miscellaneous discharges from east end of plant	2	0.016	0.326
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.205	0.873
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.099	0.298
Total discharge from all sources	3,4	0.343[c]	1.171
White Oak Dam to Clinch River (ISAHP Measurement)		0.21	0.51

[a]Refers to Fig. 7.

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

[c]Includes 0.039 Ci from East Weir and West Weir.

Table 2. Process-Waste Discharges

	^{90}Sr BQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
1. Radioisotopes Processing Area (MH234)	840	0.024	1.7	1.05	5.9
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.492	34.0	2.54	14.4
3. Reactor Operations (MH112)	110	0.006	0.4	2.07	11.8
4. Buildings 3503 and 3508	2.5	<0.001	—	2.81	16.0
5. Buildings 3025 and 3026	9.9	0.001	0.1	2.45	13.9
6. Building 3019	13	<0.001	—	0.84	4.8
7. Waste Evaporator, Bldg. 2531	17400	0.545	37.6	1.16	6.6
8. Building 3525	0.8	<0.001	—	1.06	6.0
9. Building 2026	8.1	<0.001	—	0.57	3.2
10. Tank Farm Drainage	4600	0.380	26.2	3.06	17.4

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.2
Central Radioactive Gas Disposal Facilities	3039	<0.01	<84.5
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.5
MSRE	7512	<0.01	<0.2
HFIR & TRU	7911	<0.01	<5.5
Total Activity in Gases Released at X-10 Site		<0.01	<91.9
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		4 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			3.50×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			1.16×10^{-1}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]This value not available because new detection equipment is being installed.

LRD - ORNL - RC

2511

MAY 15 1980

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/84

DATE: May 5, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

David R. Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of March was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 436 mCi; this is 93 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 96% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of March 1980 was 0.69% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 36.1% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.37 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the White Oak Creek sampling stations are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 186×10^4 and 60.1×10^4 cubic meters, respectively.

The total release of ^{90}Sr into White Oak Lake (436 mCi) was 93 mCi more than the amount reported for February. The bulk of this increase is attributed to periods of heavy rainfall which occurred during the reporting period.

The amount of ^{90}Sr released from the 190 pond system into White Oak Creek was 0.6 mCi. The discharge from the sanitary system is not available because of equipment failure.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and the Melton Branch watersheds and the

discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4, (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	15.0	
190 Ponds	0.6	
Process Waste Treatment Plant	1.4	
Sewage Treatment Plant	*	
	17.0	
7500 Sampling Station	135.5	
Sewage Treatment Plant, Burial Grounds Nos. 1 and 3, and Flood Plains		118.5
Station No. 3	311.1	
Burial Ground No. 4		175.6

Melton Branch

7900 Area (HFIR and TRU)	0.6	
7500 Area (NSPP and MSRE)	9.2	
	9.8	
Station No. 4	124.9	
Burial Ground No. 5		115.1

*Data incomplete: the sample system was reactivated late in the period.

ILW Pit Disposal Area

	^{90}Sr, mCi	^{90}Sr, mCi
East Weir		0.4
West Weir		8.7
		9.1
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	436.0	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area and Flood Plains		418.3
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		95.9

Process Waste

A total of 2.83×10^4 cubic meters of contaminated water was chemically treated this month. Only 2.67×10^4 cubic meters were actually released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
327	B	120	1917
328	C	164	2393
329	A	132	1737
330	B	106	1522
331	C	136	1891
332	A	141	1925
333	B	165	2647
334	C	169	2853
335	A	167	2819

Intermediate Level Waste

The waste evaporators were operated in parallel during the reporting period. The combined average boildown rate was 0.83 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	1123.4
Volume transferred to evaporators	1171.0
South Tank Farm Inventory:	
Beginning of month	833.0
End of month	757.2
Volume of concentrate available for hydrofracture	354.5
Service Tank Inventory:	
W-21, Beginning of month	44.2
W-21, End of month	72.4
W-22, Beginning of month*	6.9
W-22, End of month	2.4
W-23, Beginning of month**	7.5
W-23, End of month	47.1

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

Building 3019	42.8
Radioisotopes Processing Area	48.7
ORR and BSR	32.3
High Flux Isotope Reactor	24.6

*Standby tank, normally empty.

**Evaporator concentrate.

	Cubic Meters
Fission Products Development Laboratory	46.1[a]
4500 Complex	846.3[b]

GASEOUS WASTE

The ORNL stacks discharged $\leq$10 mCi of ^{131}I this month. The long-lived filterable activities released during the period amounted to 5.9 mCi. This release is approximately 100 times higher than the norm. The bulk of it was detected over the 3-day sample period ending March 18; the major constituents were identified as a 1.6 mix of ^{134}Cs and ^{137}Cs. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.1 and 0.1% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

[b]The bulk of this waste is from a pilot plant operation located in Building 4505.

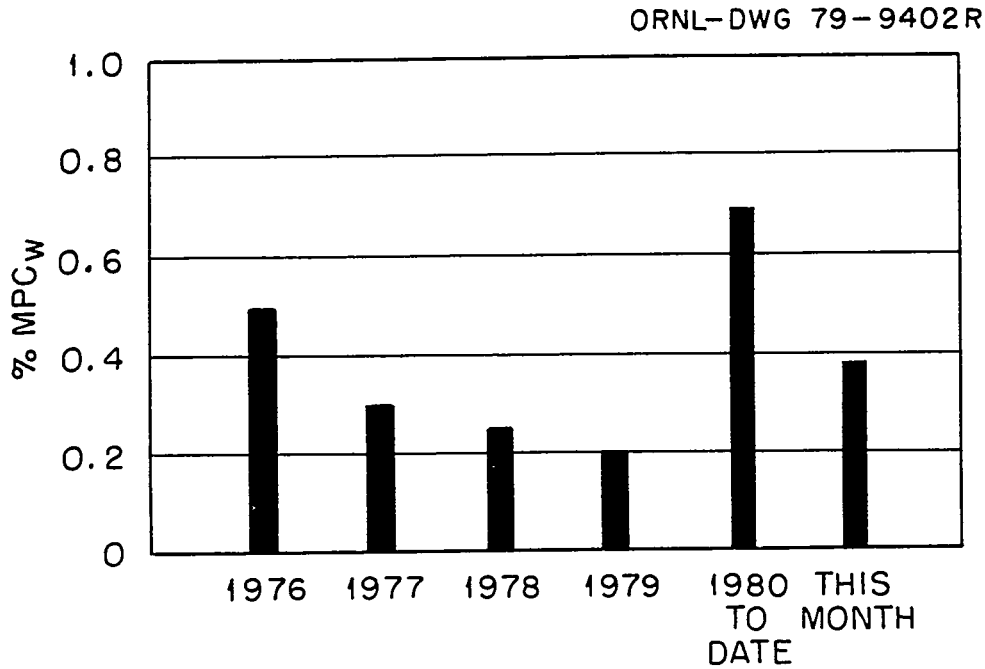


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

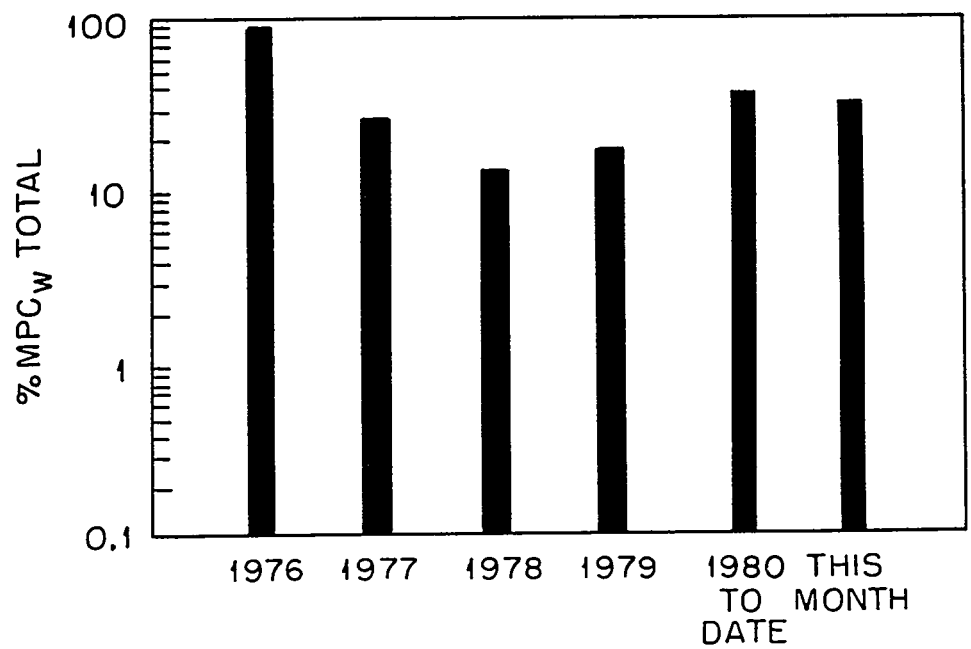


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

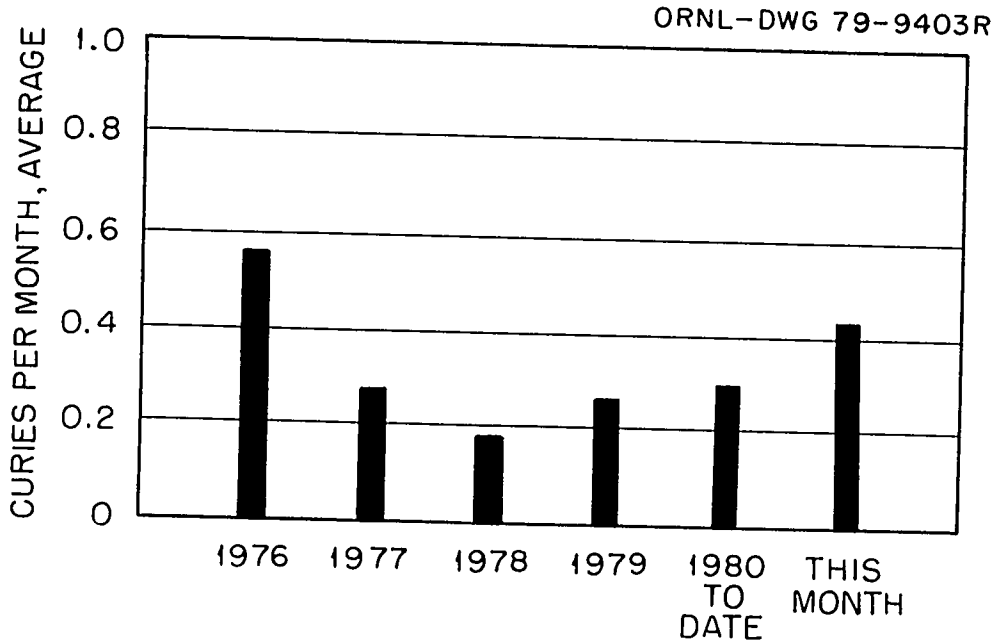


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

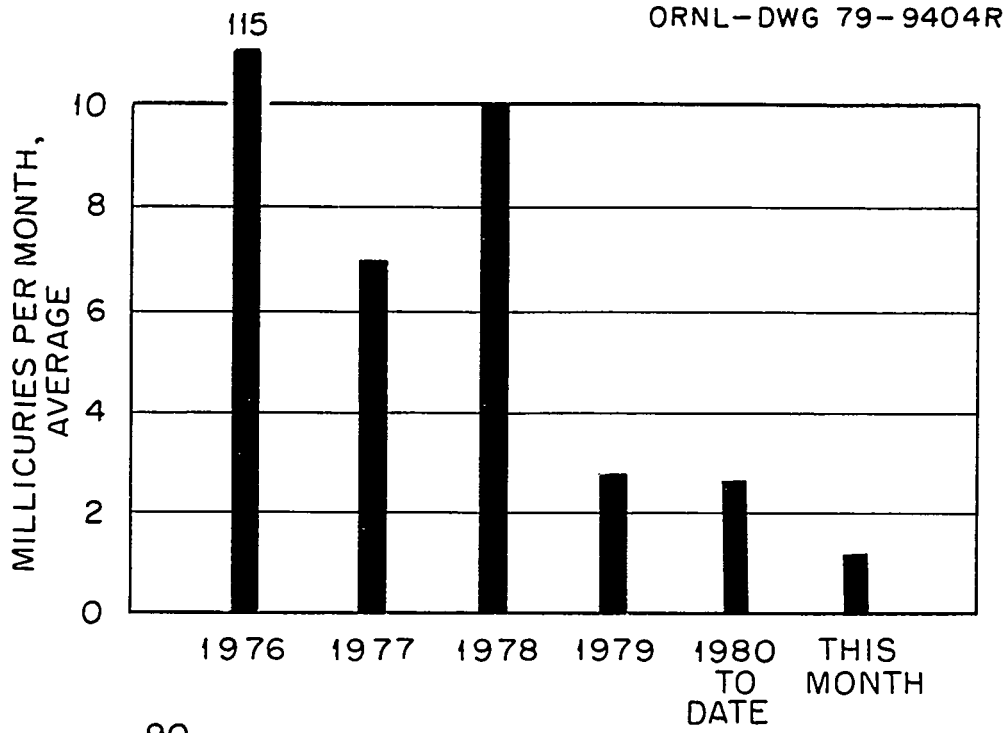


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

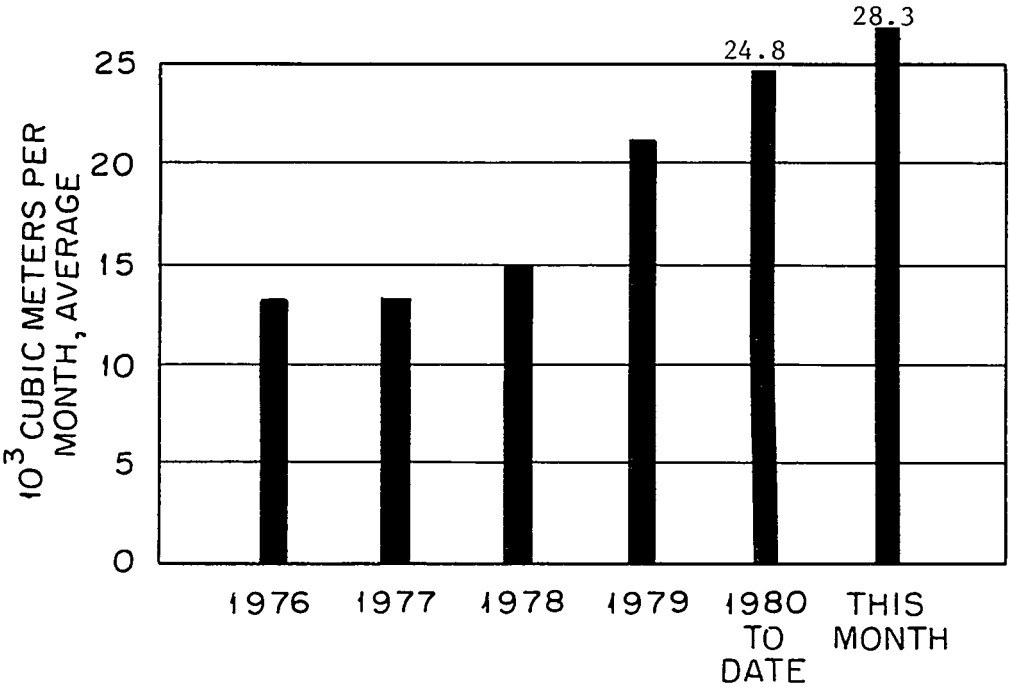


Fig. 4. Process Waste Volumes.

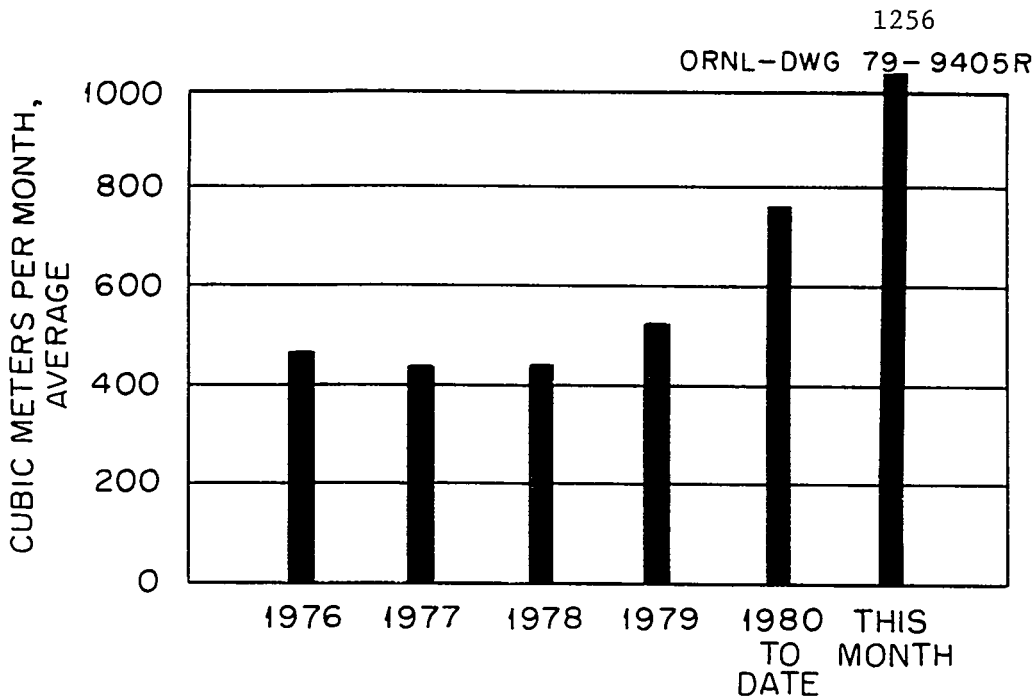


Fig. 5. Intermediate-Level Waste Volumes.

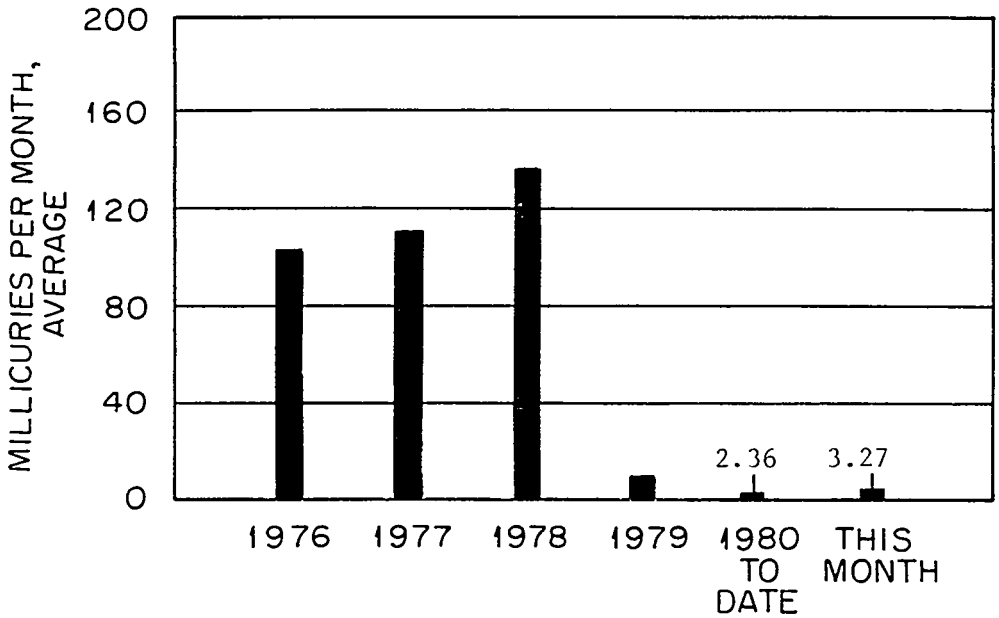


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

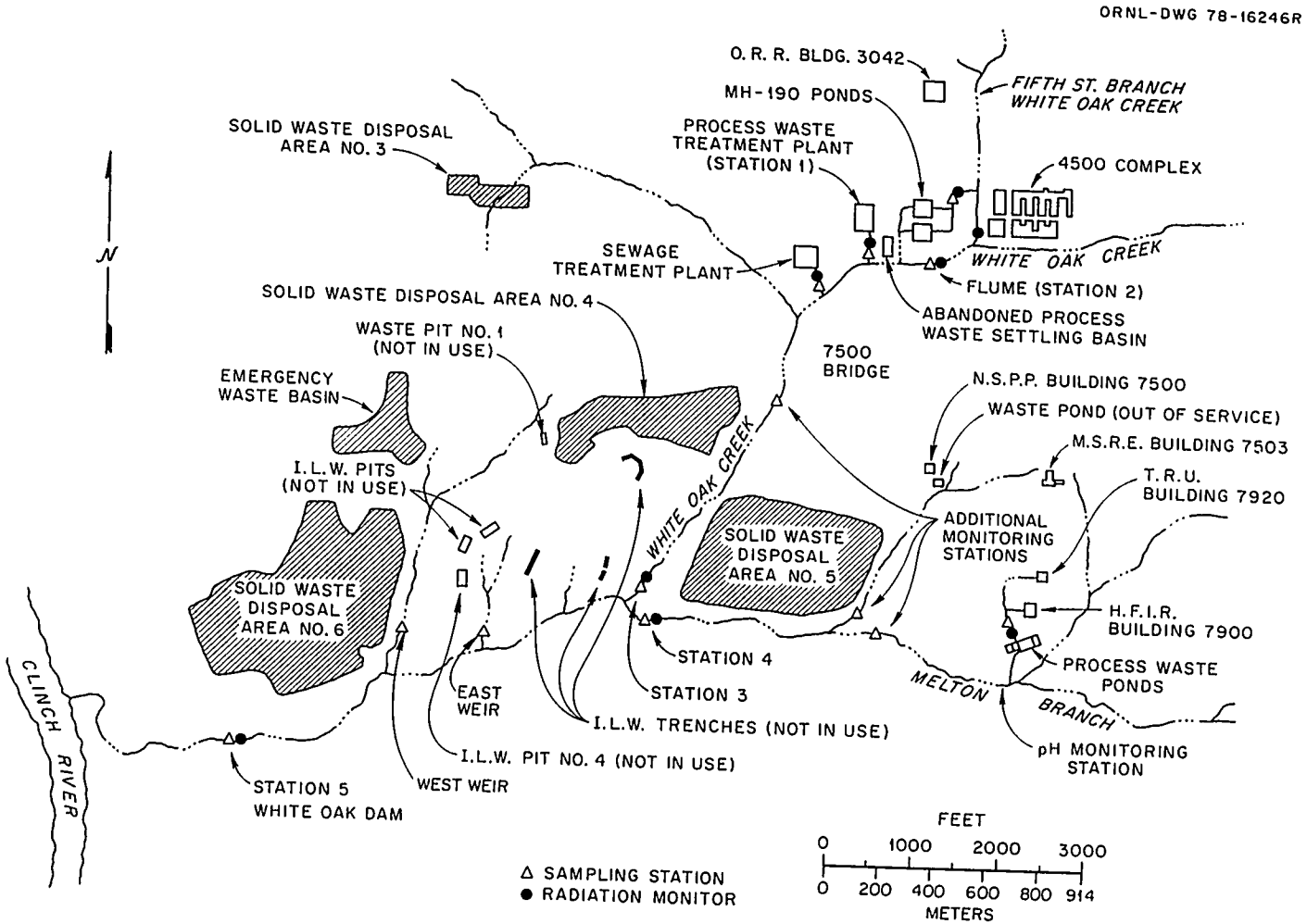


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released in Liquid Wastes to White Oak Creek

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta, Curies[b]
Process Waste	1	0.0014	0.140
Miscellaneous discharges from east end of plant	2	0.015	0.348
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.311	1.606
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.125	0.125
Total discharge from all sources	3,4	0.445[c]	1.731
White Oak Dam to Clinch River (ISAHP Measurement)		0.37	0.62

[a]Refers to Fig. 7.

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

[c]This includes 9.1 mCi from the East and West Weir.

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
1. Radioisotopes Processing Area (MH234)	1000	0.019	1.3	0.72	3.1
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.639[a]	43.0	3.68	15.8
3. Reactor Operations (MH112)	82	0.008	0.6	3.49	15.0
4. Buildings 3503 and 3508	16	0.001	0.1	2.56	11.0
5. Buildings 3025 and 3026	69	0.005	0.3	2.62	11.3
6. Building 3019	54	0.002	0.1	1.24	5.3
7. Waste Evaporator, Bldg. 2531	3750	0.278	19.0	2.74	11.8
8. Building 3525	2.6	<0.001	—	1.18	5.1
9. Building 2026	3.9	<0.001	—	0.67	2.9
10. Tank Farm Drainage	4420	0.522	35.6	4.37	18.7

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.9
Central Radioactive Gas Disposal Facilities	3039	<0.01	<5,863.0
Radiochemical-Processing Pilot Plant	3020	<0.01	<2.5
MSRE	7512	<0.01	<0.9
HFIR & TRU	7911	<0.01	<12.6
Total Activity in Gases Released at X-10 Site		<0.01	5879.9
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		19.8 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			6.99×10^{-4}
Building 5505 Discharges Glove Box			9.00×10^{-3}
Hood			3.87×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

2511

DATE ISSUED JUN 12 1980

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/201

DATE: May 23, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of April was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 292 mCi; this is 144 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 84% of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of April 1980 was 0.27% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 37.0% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.20 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 120×10^4 and 31×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 292 mCi of ^{90}Sr into White Oak Lake. This release was 144 mCi less than the amount reported for March — the decrease is attributed to a lower precipitation rate during the period.

The release of ^{90}Sr from the 190 pond handling system was about normal (0.4 mCi). However, a relatively high amount (31.3 mCi) was released from the sanitary system. This system was sampled in sections and some inleakage was found throughout. The bulk of the contamination, however, appears to have originated from the Fourth Street Section and

the area southeast of Building 3500.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	6.3	
190 Ponds	0.4	
Process Waste Treatment Plant	0.7	
Sewage Treatment Plant	31.3	
	38.7	
7500 Sampling Station	114.0	
Burial Grounds Nos. 1 and 3, and Flood Plains		75.3
Station No. 3	194.9	
Burial Ground No. 4		80.9

Melton Branch

7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	8.3	
	8.4	
Station No. 4	92.1	
Burial Ground No. 5		83.7

ILW Pit Disposal Area

East Weir		0.1
West Weir		4.8
		4.9

	^{90}Sr, mCi	^{90}Sr, mCi
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	291.9	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		244.8
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		83.9

Process Waste

A total of 2.74×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 2.37×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
336	B	168	2678
337	C	152	2372
338	A	142	2274
339	B	147.5	2426
340	C	144	2383
341	A	184	2718
342	B	199	2905
343	C	238	3046
344	A	313	3822

Intermediate Level Waste

The waste evaporators were operated in parallel during the reporting period. The combined average boildown rate was 0.81 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	1022.6
Volume transferred to evaporators	1148.4
South Tank Farm Inventory:	
Beginning of Month	757.2
End of Month	711.1
Volume of concentrate available for hydrofracture	354.5
Service Tank Inventory:	
W-21, Beginning of Month	72.4
W-21, End of Month	16.0
W-22, Beginning of Month*	2.4
W-22, End of Month	2.4
W-23, Beginning of Month**	47.1
W-23, End of Month	48.0

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

Building 3019	18.1
Radioisotopes Processing Area	44.3
ORR and BSR	20.4
High Flux Isotope Reactor	29.8
Fission Products Development Laboratory	29.7[a]
4500 Complex	895.3[b]
Building 7920	6.0

*Standby tank, normally empty.
**Evaporator concentrate.

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

[b]The bulk of this waste is from a pilot plant operation located in Bldg. 4505.

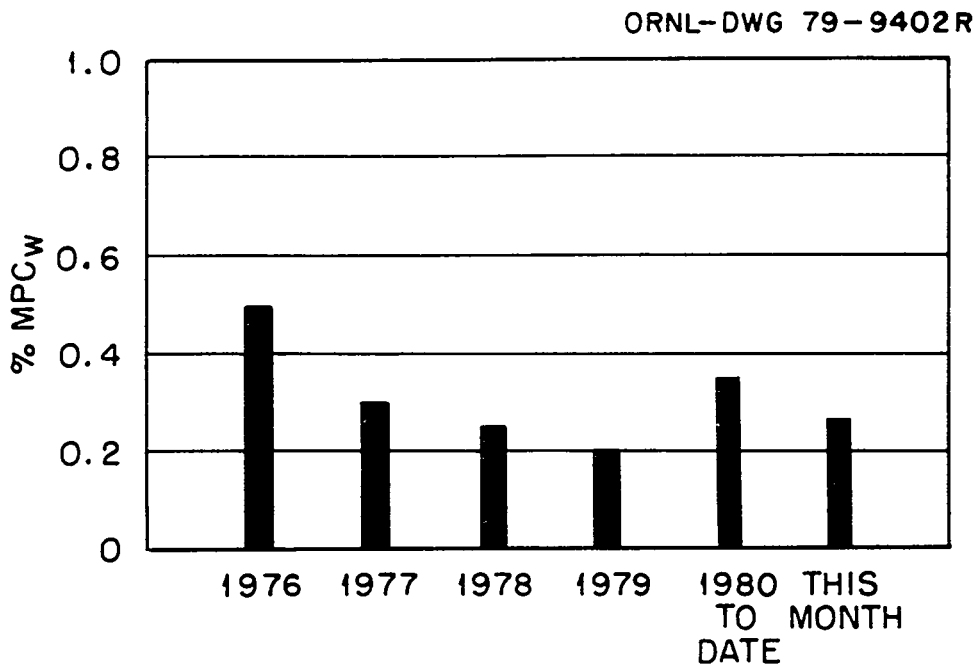


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

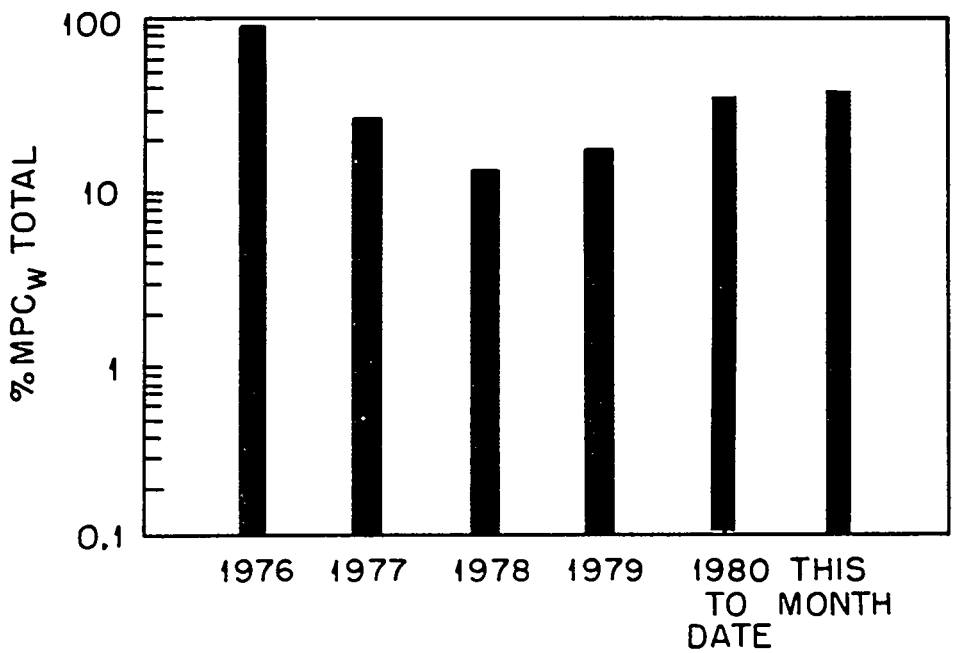


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

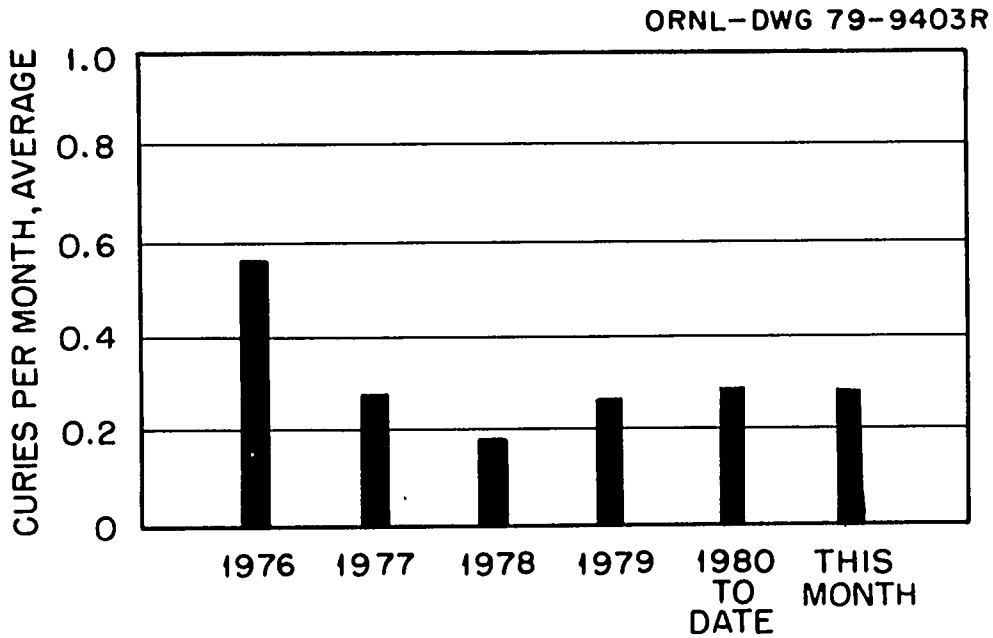


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

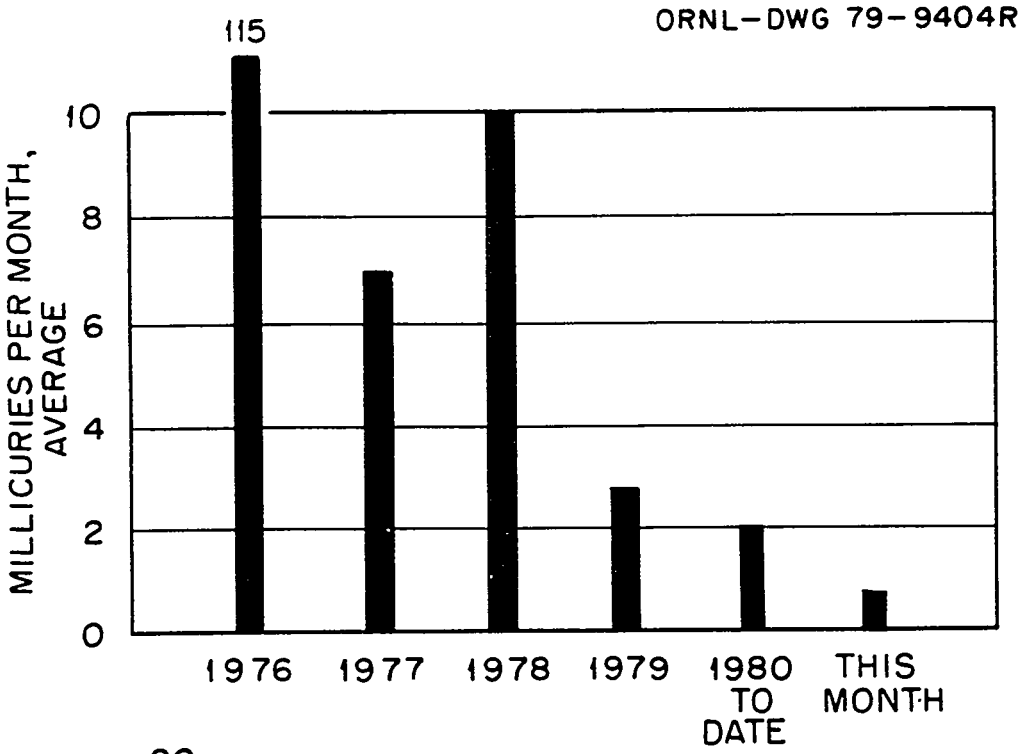


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

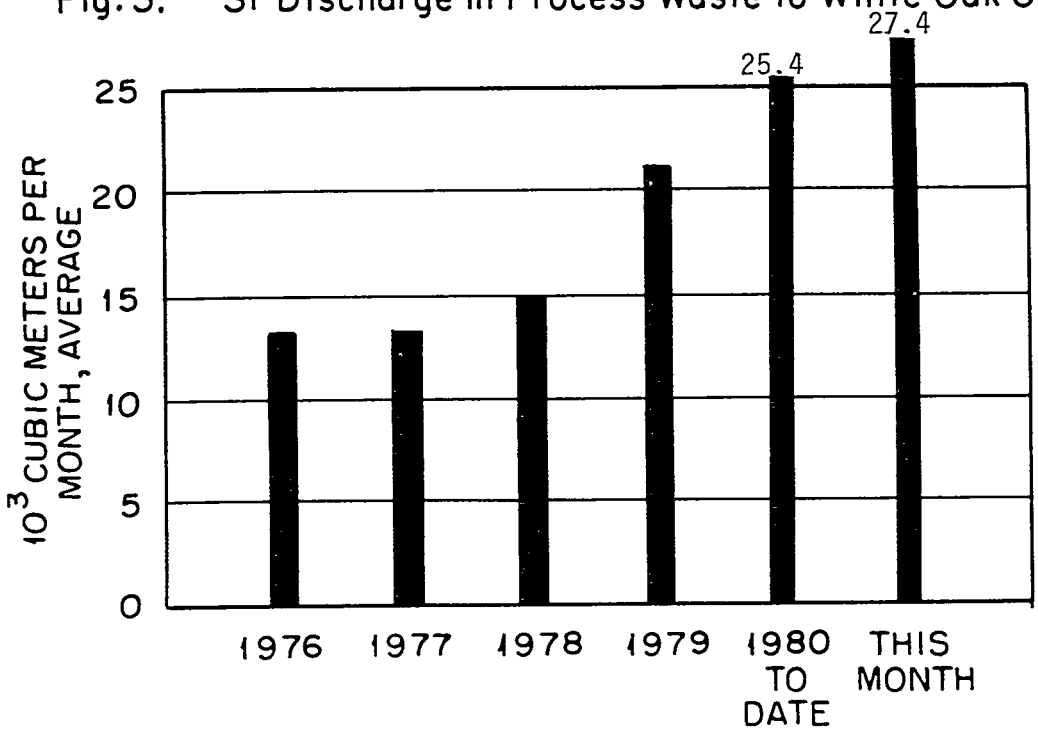


Fig. 4. Process Waste Volumes.

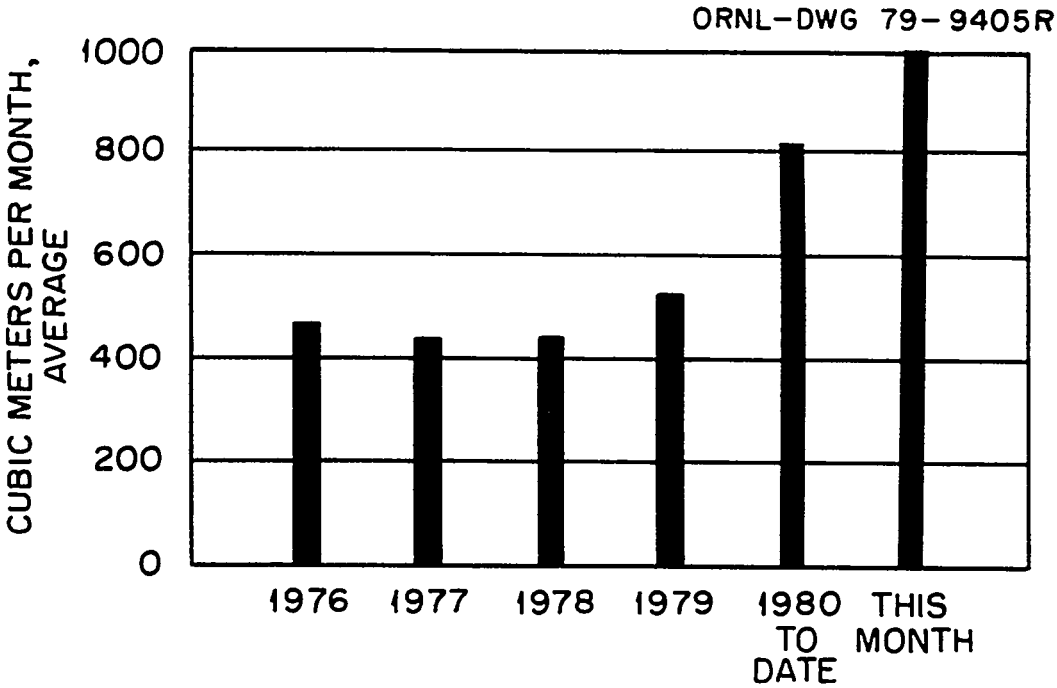


Fig. 5. Intermediate-Level Waste Volumes.

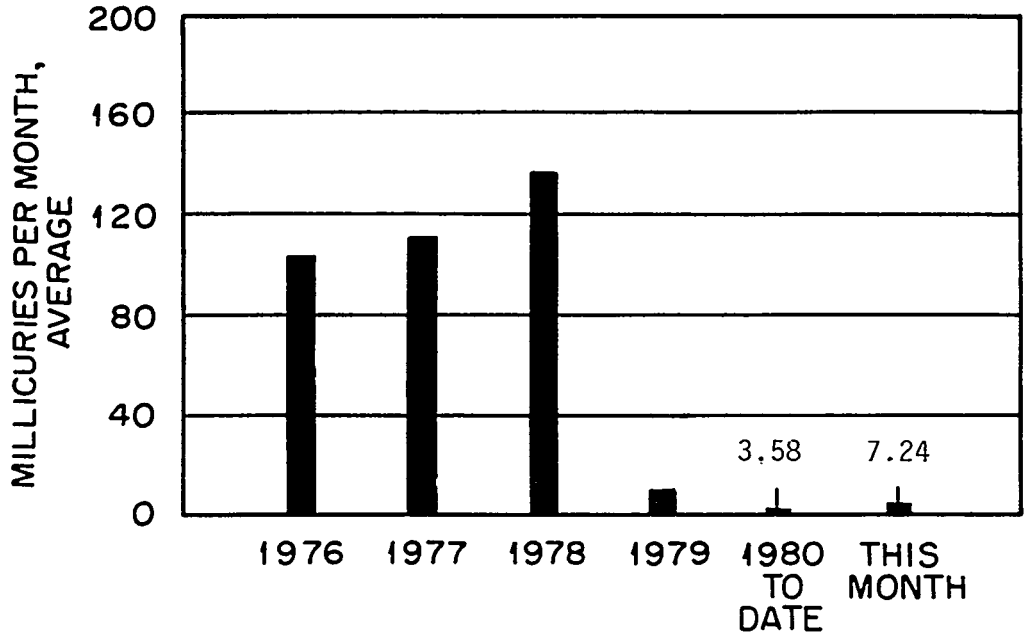


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

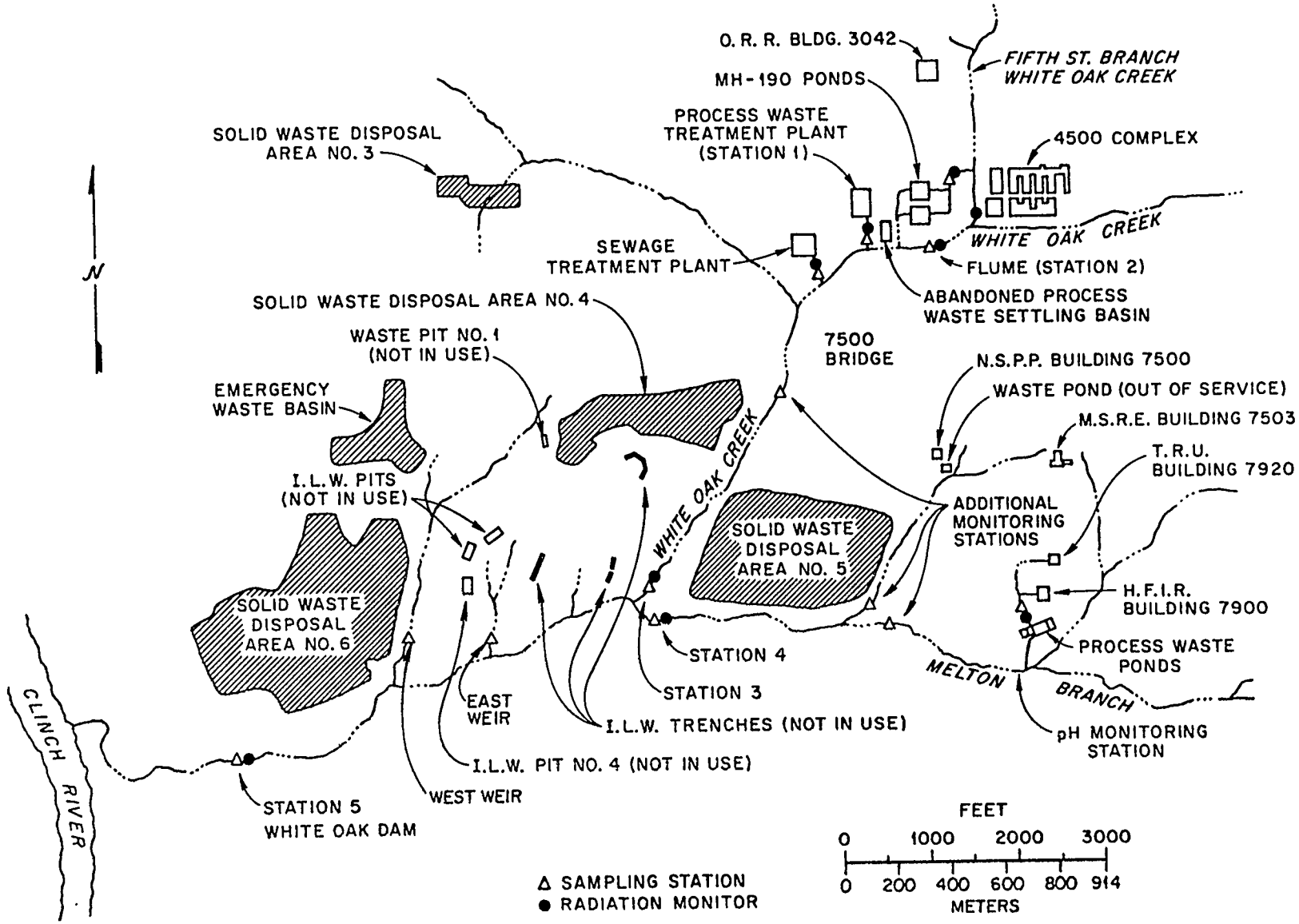


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.195	0.102
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.092	0.385
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.005	—
Total discharge from all sources		0.292	0.487
White Oak Dam to Clinch River (ISAHP Measurement)		0.20	0.68

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
1. Radioisotopes Processing Area (MH234)	780	0.017	1.8	0.80	4.0
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.500[a]	52.6	3.70	18.4
3. Reactor Operations (MH112)	79	0.006	0.6	2.70	13.5
4. Buildings 3503 and 3508	18	0.001	0.1	2.87	14.3
5. Buildings 3025 and 3026	14	<0.001	—	1.70	8.5
6. Building 3019	29	<0.001	—	0.86	4.3
7. Waste Evaporator, Bldg. 2531	620	0.049	5.2	2.91	14.5
8. Building 3525	0.6	<0.001	—	0.75	3.7
9. Building 2026	0.9	<0.001	—	0.62	3.1
10. Tank Farm Drainage	4420	0.377	39.7	3.16	15.7

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.7
Central Radioactive Gas Disposal Facilities	3039	<0.01	<225.8
Radiochemical-Processing Pilot Plant	3020	<0.01	<1.8
MSRE	7512	<0.01	<0.7
HFIR & TRU	7911	<0.01	<11.0
Total Activity in Gases Released at X-10 Site		<0.01	<240.0
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		4.0 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			6.99×10^{-4}
Building 5505 Discharges Glove Box			6.76×10^{-3}
Hood			4.50×10^{-3}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

DATE ISSUED JUL 28 1980

2511

ORNL
MASTER COPY

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/227

DATE: June 30, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer 7/17/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of May was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 264 mCi; this is 28 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for the bulk of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of May 1980 was 0.20% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 27.0% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.10 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 89×10^4 and 23×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 257 mCi of ^{90}Sr into White Oak Lake. This release was 35 mCi less than the amount reported for April. However, the data resulting from measurements taken at the 7500 Sample Station appears erroneous when compared to that of previous months — a more realistic gross based on the sum of the upstream measurements and the mean uncontrolled releases from previous months would be about 130 mCi. The sample collection was apparently cross contaminated during handling; procedures have been upgraded in an effort to prevent a reoccurrence.

The controlled releases into White Oak Creek were normal: A total of 0.7 mCi of ^{90}Sr was released from the 190 pond system, and an additional 0.8 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system, abated by dry weather, amounted to 15 mCi.

The following tables list the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	10.3	
190 Ponds	0.7	
Process Waste Treatment Plant	0.8	
Sewage Treatment Plant	15.2	
	27.0	
7500 Sampling Station	253.0[a]	
Burial Grounds Nos. 1 and 3, and Flood Plains		103.0[b]
Station No. 3	163.2	
Burial Ground No. 4		33.2

[a]Data believed to be in error. The estimated total is 130 mCi; see text above.

[b]An estimation based upon a mean value for the uncontrolled releases which was derived from previous months' data.

Melton Branch

	^{90}Sr, mCi	^{90}Sr, mCi
7900 Area (HFIR and TRU)	0.4	
7500 Area (NSPP and MSRE)	7.2	
	7.6	
Station No. 4	94.2	
Burial Ground No. 5		86.6
ILW Pit Disposal Area		
East Weir		0.4
West Weir		6.8
		7.2
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	264.6	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		230.0
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		86.9

Process Waste

A total of 2.53×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.99×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
345	B	216	2557
346	C	206	2505
347	A	198.5	2509
348	B	193	2464
349	C	200	2572

Intermediate Level Waste

The waste evaporators were operated in parallel during the reporting period. The combined average boildown rate was 0.70 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	1111.6
Volume transferred to evaporators	1047.2
South Tank Farm Inventory:	
Beginning of Month	711.1
End of Month	700.7
Volume of concentrate available for hydrofracture	354.3
Service Tank Inventory:	
W-21, Beginning of Month	16.0
W-21, End of Month	18.6
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	48.0
W-23, End of Month	109.8

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

Building 3525	7.7
Building 3019	21.4
Radioisotopes Processing Area	52.3
ORR and BSR	68.4
High Flux Isotope Reactor	81.2

[1]Standby tank, normally empty.
[2]Evaporator concentrate.

	Cubic Meters
Fission Products Development Laboratory	30.8[a]
4500 Complex	990.0[b]
Building 7920	11.5
Building 3544	31.6

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The total amount of filterable particulate activities released during the period was less than 169 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.0 and 0.1% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

[b]The bulk of this waste is from a pilot plant operation located in Building 4505.

ORNL-DWG 79-9402R

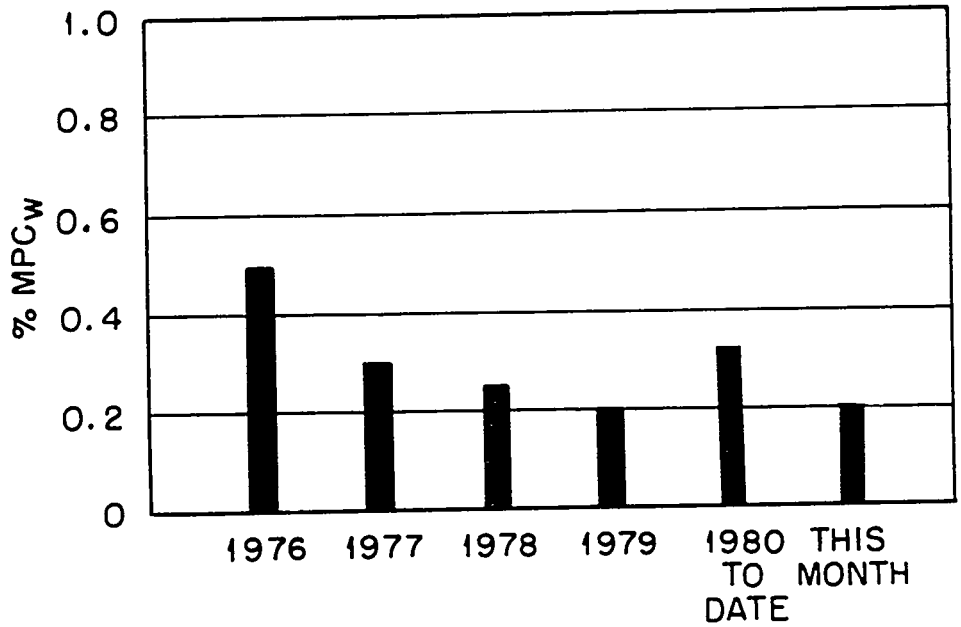


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

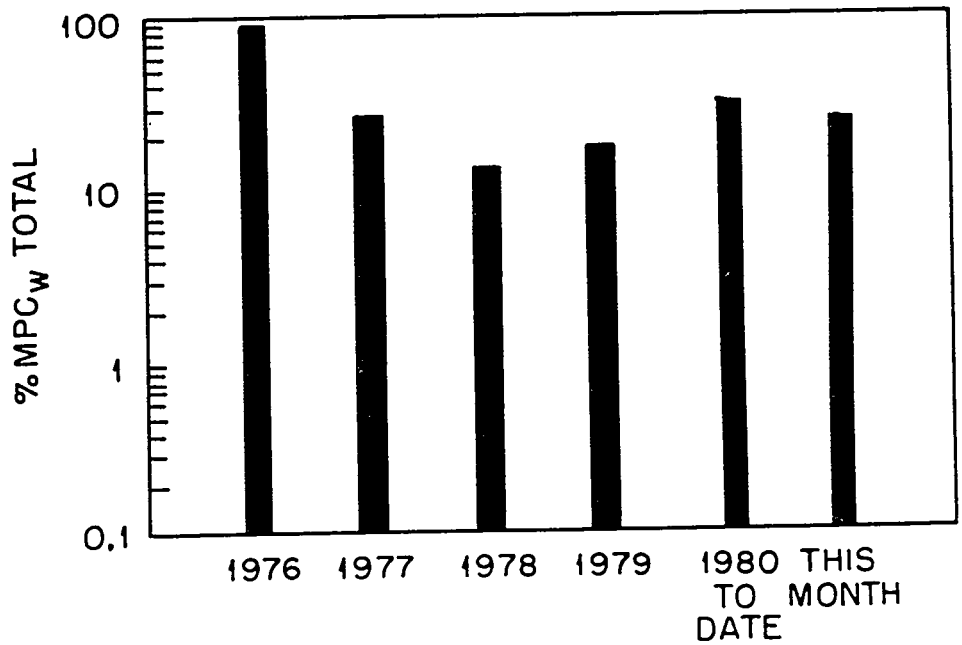


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

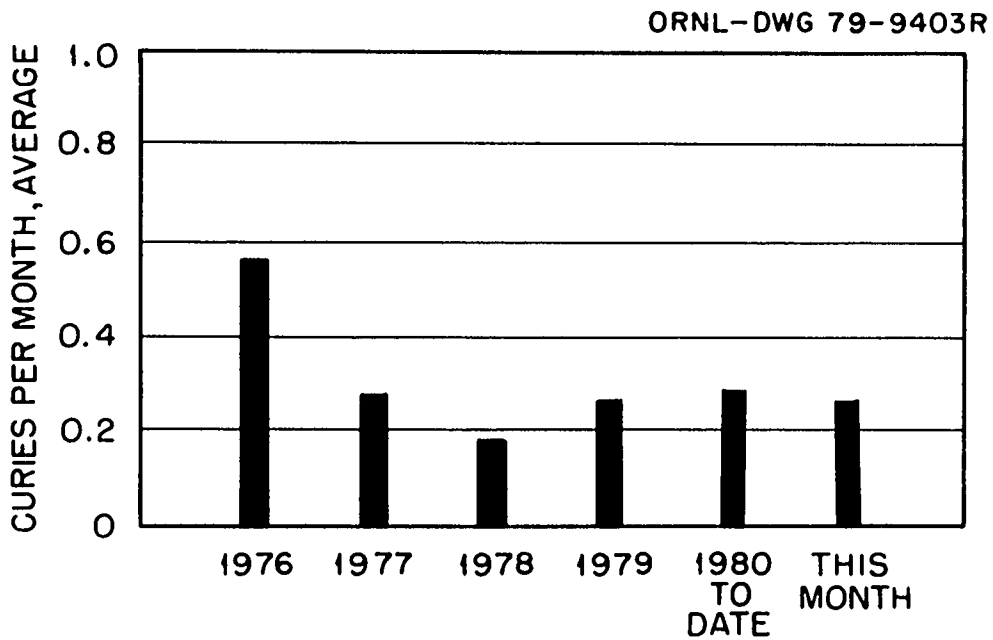


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

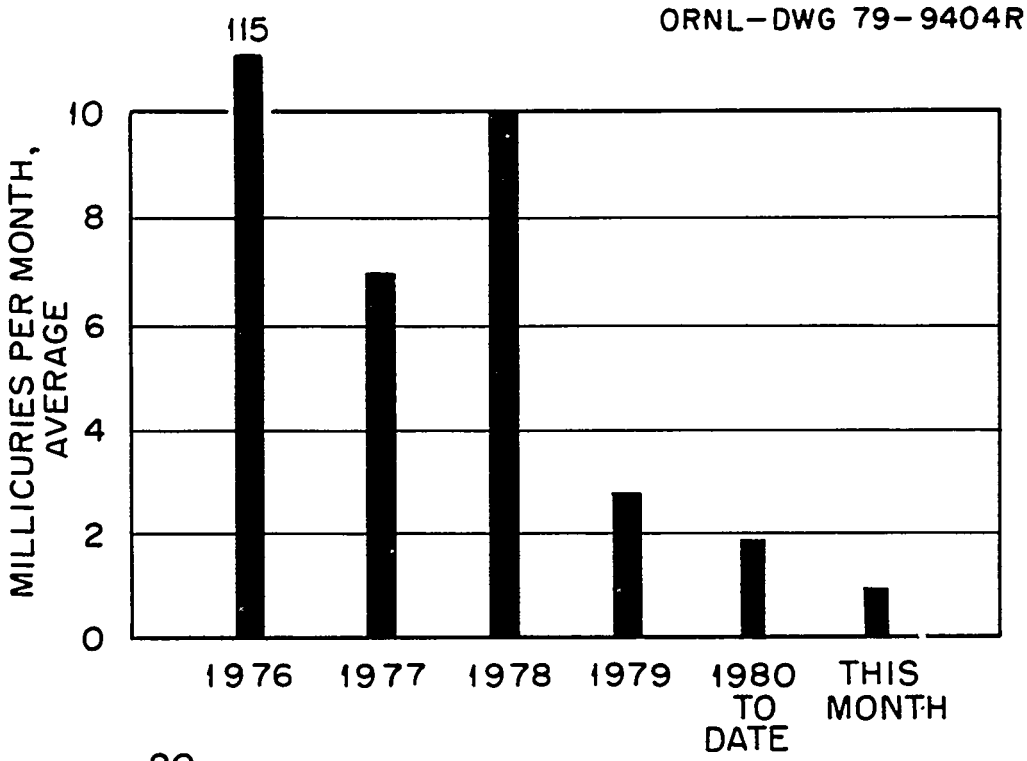


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

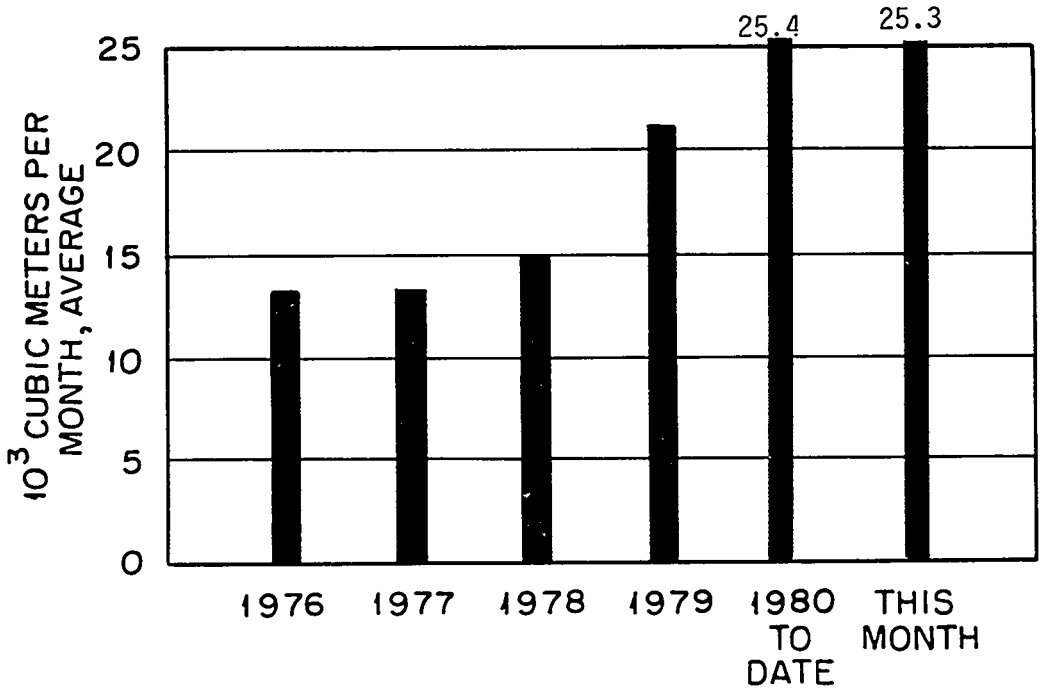


Fig. 4. Process Waste Volumes.

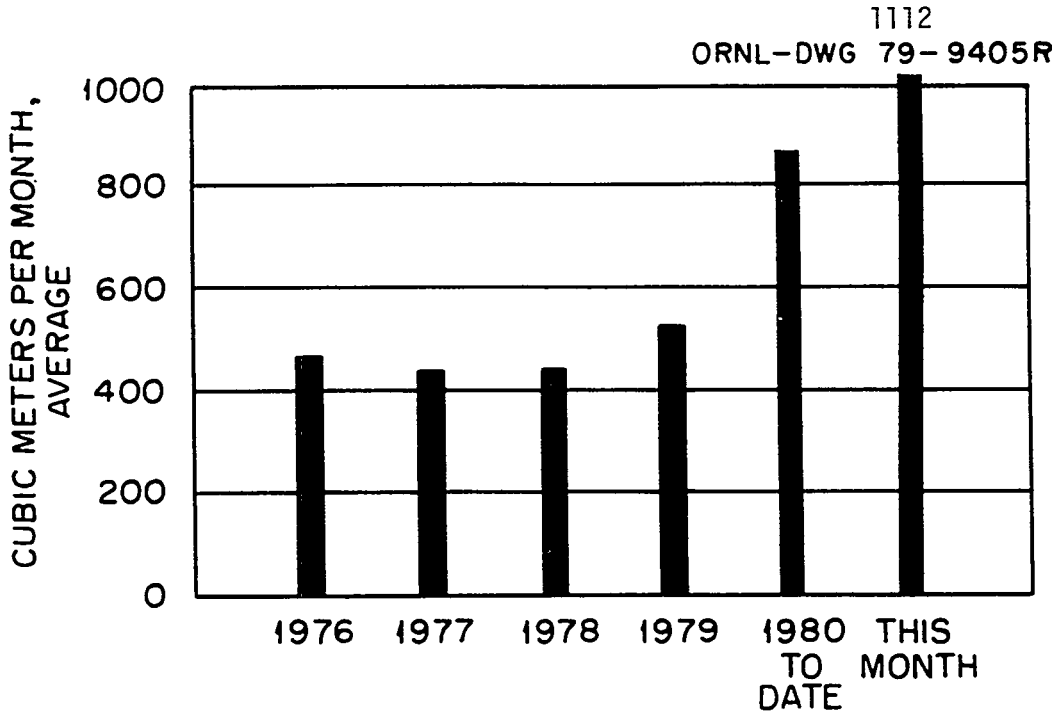


Fig. 5. Intermediate-Level Waste Volumes.

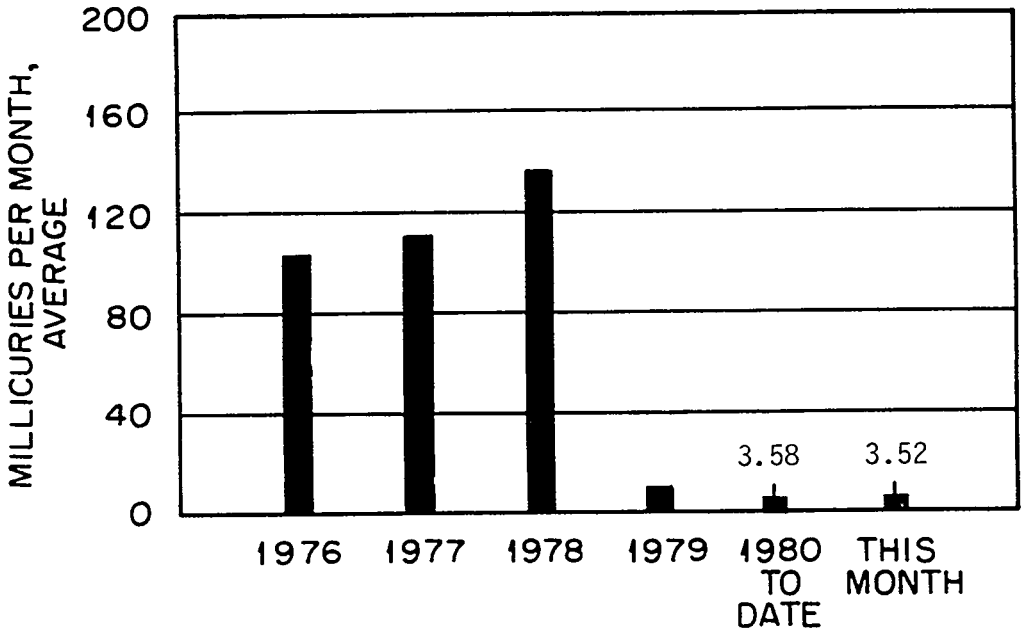


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

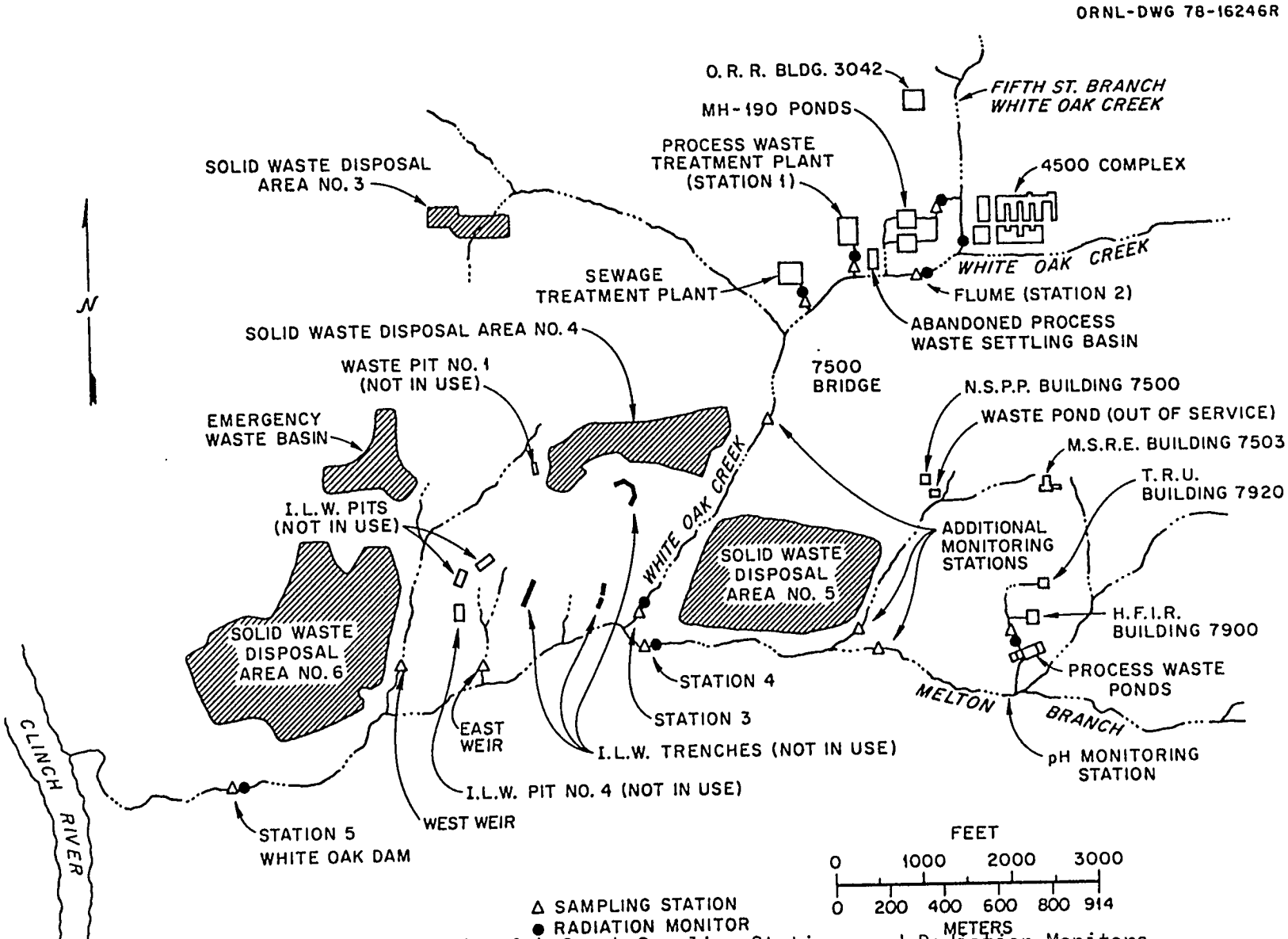


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.163	0.623
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.094	0.383
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.007	—
Total discharge from all sources		0.264	1.006
White Oak Dam to Clinch River (ISAHP Measurement)		0.10	0.24

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	660	0.009	1.2	0.50	3.0
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.361[a]	49.7	3.08	18.7
3. Reactor Operations (MH112)	120	0.007	1.0	2.08	12.7
4. Buildings 3503 and 3508	40	0.002	0.3	1.91	11.6
5. Buildings 3025 and 3026	9.3	<0.001	—	1.53	9.3
6. Building 3019	17	<0.001	—	0.76	4.6
7. Waste Evaporator, Bldg. 2531	900	0.063	8.7	2.61	15.9
8. Building 3525	1.0	<0.001	—	0.48	2.9
9. Building 2026	0.6	<0.001	—	0.73	4.4
10. Tank Farm Drainage	3800	0.284	39.1	2.76	16.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.8
Central Radioactive Gas Disposal Facilities	3039	<0.01	<150.4
Radiochemical-Processing Pilot Plant	3020	<0.01	<2.4
MSRE	7512	<0.01	<0.8
HFIR & TRU	7911	<0.01	<14.7
Total Activity in Gases Released at X-10 Site		<0.01	<169.1
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		10.0 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			3.50×10^{-4}
Building 5505 Discharges Glove Box			9.01×10^{-3}
Hood			3.87×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/259

80 [illegible]

DATE: August 18, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

David R. Hermann 7/10/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of June was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 100 mCi; this is 164 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 69 percent of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of June 1980 was 0.05% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 10.2% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.03 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 62×10^4 and 7×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 99 mCi of ^{90}Sr into White Oak Lake. This low release (158 mCi less than the amount reported for May) reflects the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal: A total of 0.3 mCi of ^{90}Sr was released from the 190 pond system, and an additional 4.1 mCi were released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 12.9 mCi.

Burial Ground No. 3 Surveillance

A sample program consisting of grab samples taken from the Northwest Tributary and Raccoon Creek, the two streams that drain this disposal area, was initiated during the period. Analysis of the composite of samples taken from the Northwest Tributary indicates that about 4 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek ceased flowing 10 days into the period: the two-day composite analysis result was 2.3 Bq/ℓ.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	7.8	
190 Ponds	0.3	
Process Waste Treatment Plant	4.1	
Sewage Treatment Plant	12.9	
	25.1	
7500 Sampling Station	40.6	
Burial Grounds Nos.1 and 3, and Flood Plains		15.5[a]
Station No. 3	58.6	
Burial Ground No. 4		18.0

[a]Composited grab samples from the Northwest Tributary (Figure 7) indicate that the release from Burial Ground No. 3 amounted to about 4 millicuries.

Melton Branch

	^{90}Sr, mCi	^{90}Sr, mCi
7900 Area (HFIR and TRU)	0.3	
7500 Area (NSPP and MSRE)	5.4	
	5.7	
Station No. 4	40.8	
Burial Ground No. 5		35.1
ILW Pit Disposal Area		
East Weir		0.1
West Weir		0.9
		1.0
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	100.0	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		68.6
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		68.6

Process Waste

A total of 2.73×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.77×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
350	A	192	2484
351	B	200	2435
352	C	233	2614
353	A	222	2450
354	B	220.5	2544
355	C	217	2595
356	A	221	2592

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 1.11 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	832.1
Volume transferred to evaporators	801.0
South Tank Farm Inventory:	
Beginning of Month	700.7
End of Month	700.7
Volume of concentrate available for hydrofracture	354.3
Service Tank Inventory:	
W-21, Beginning of Month	18.6
W-21, End of Month	48.7
W-22, Beginning of Month[1]	2.4

[1]Standby tank, normally empty.

	Cubic Meters
W-22, End of Month	2.4
W-23, Beginning of Month[2]	109.8
W-23, End of Month	123.3

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

Building 3525	2.7
Building 3019	13.7
Radioisotopes Processing Area	26.6
ORR and BSR	68.1
High Flux Isotope Reactor	30.5
Fission Products Development Laboratory	8.7[a]
4500 Complex	666.6[b]
Building 7920	18.0
Building 3544	36.6

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

[b]The bulk of this waste is from a pilot plant operation located in Building 4505.

[2]Evaporator Concentrate.

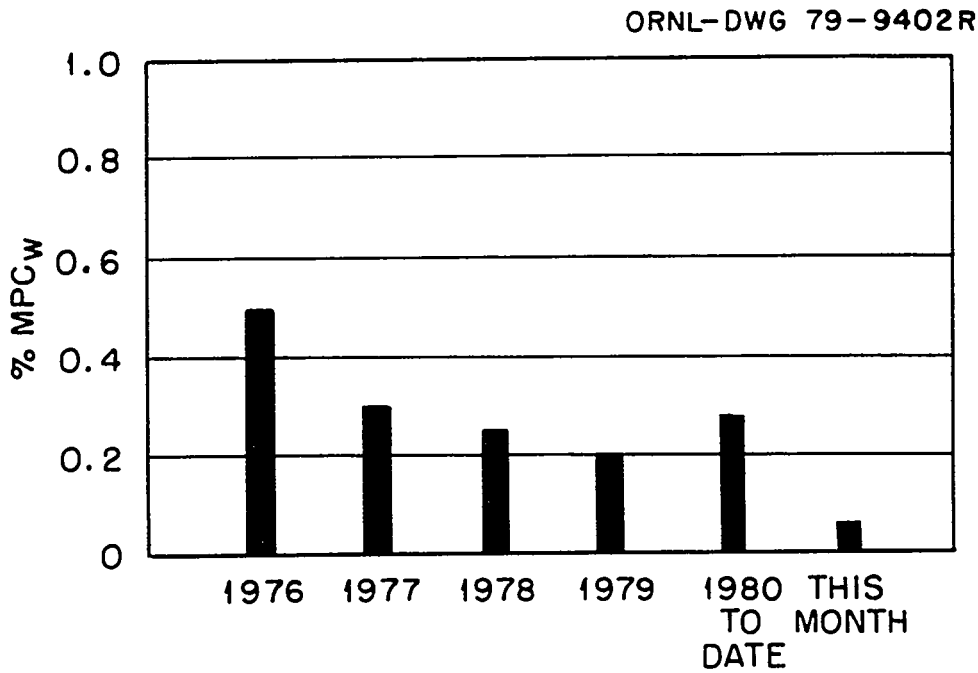


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

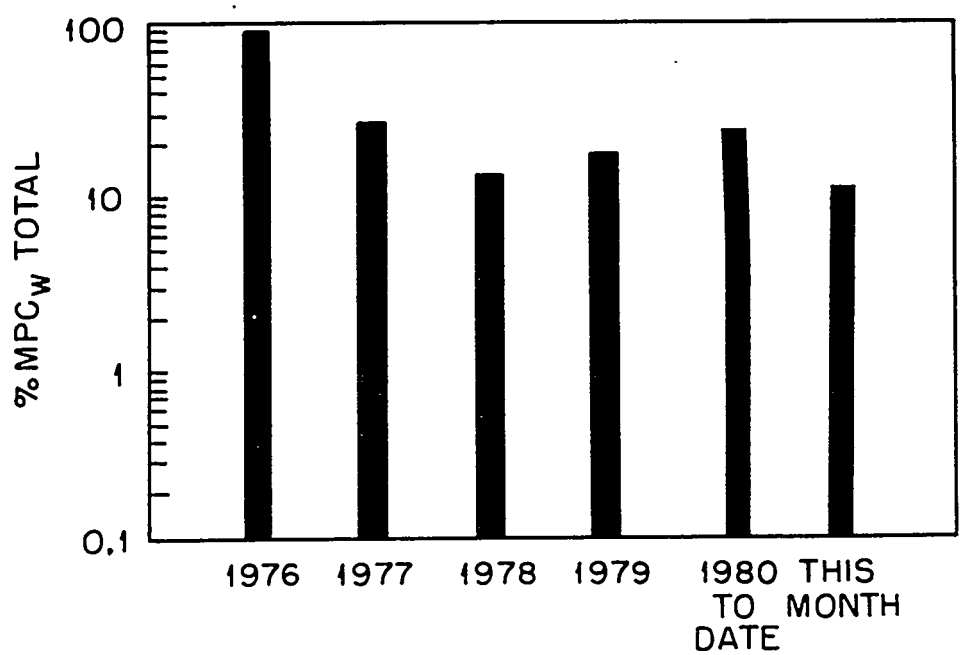


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

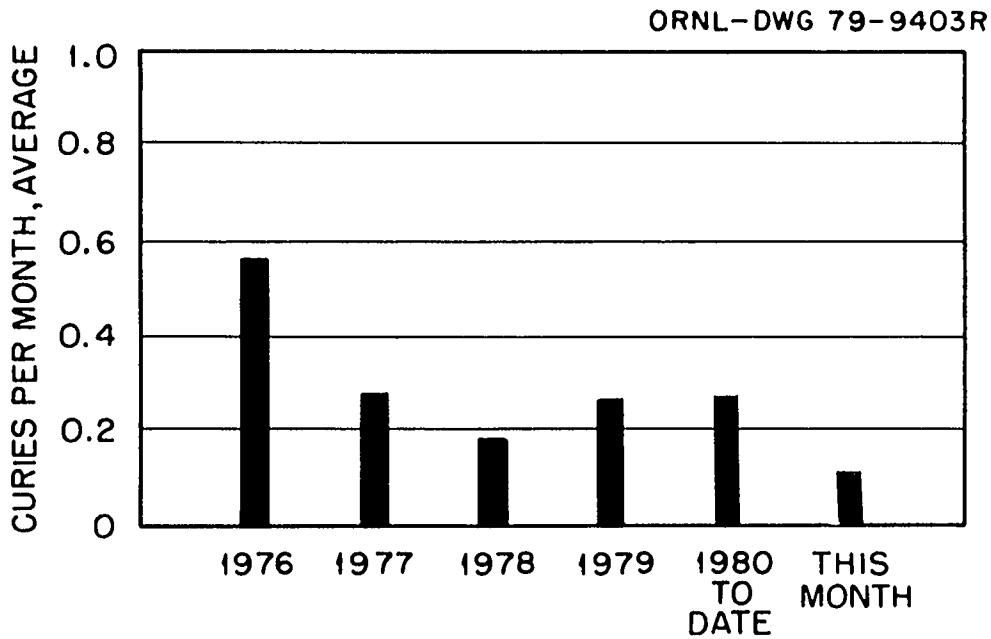


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

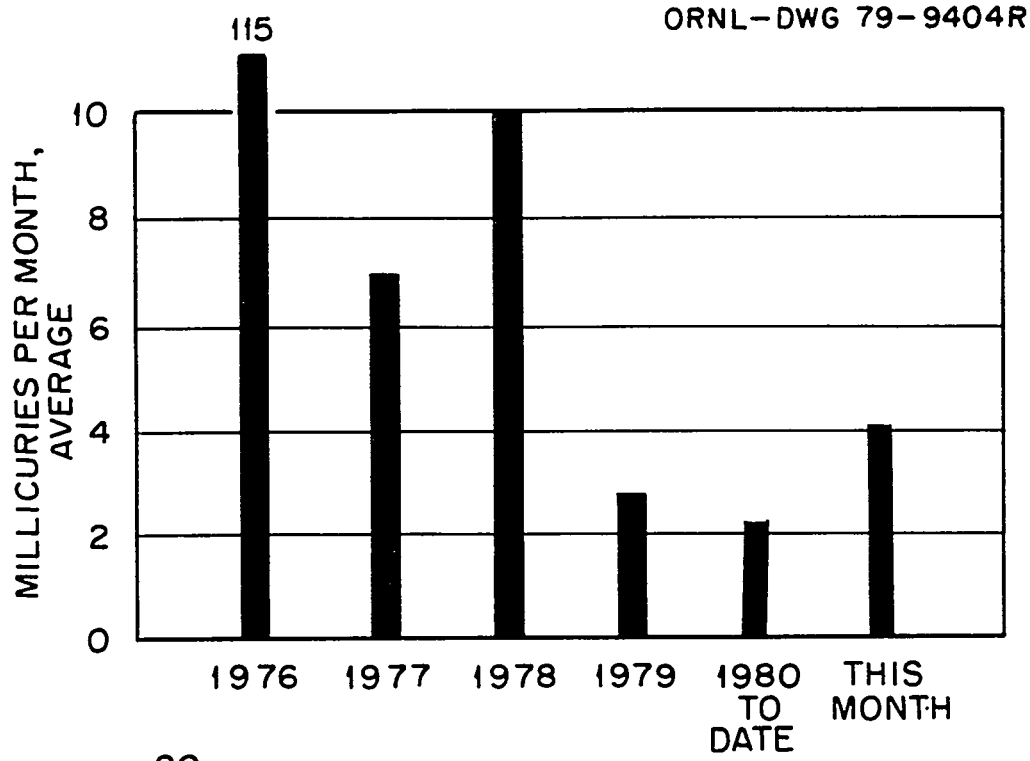


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

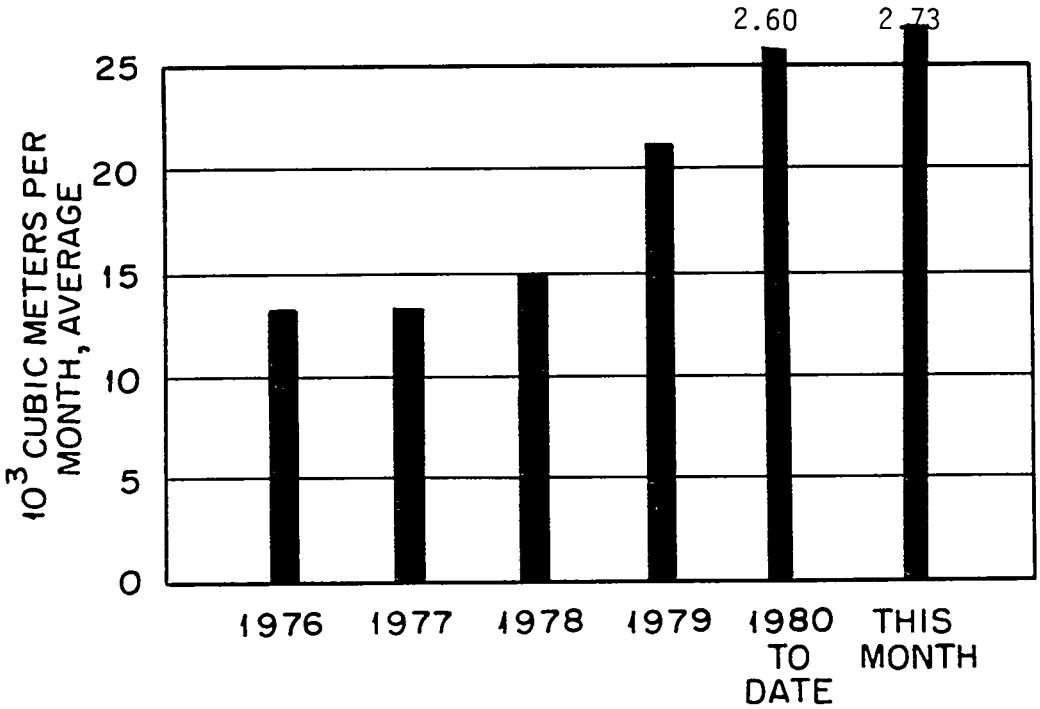


Fig. 4. Process Waste Volumes.

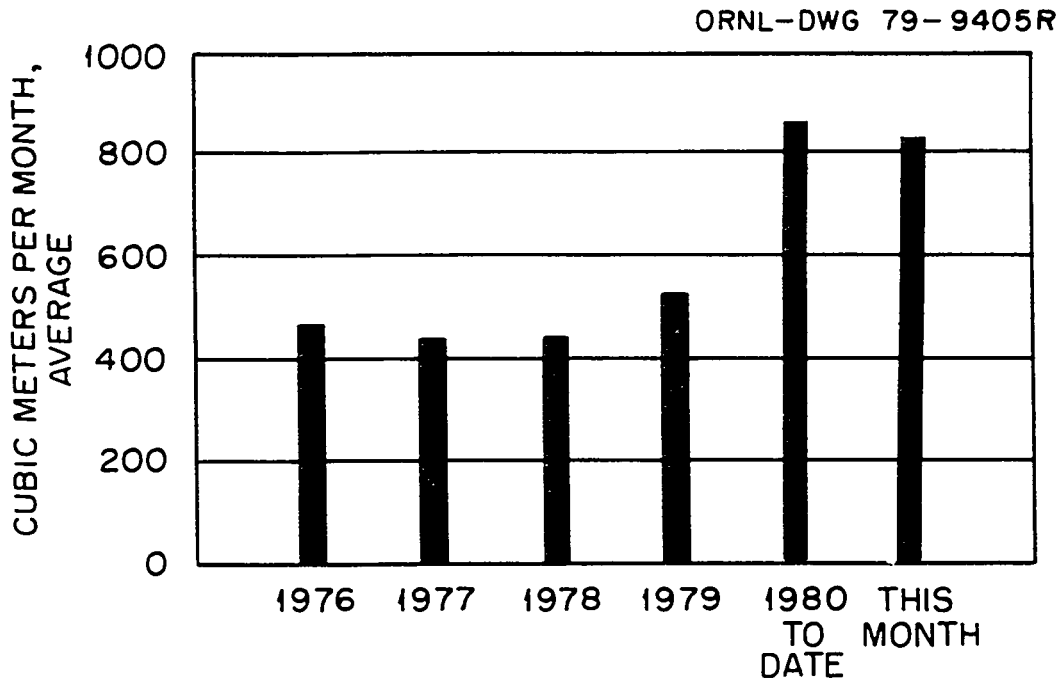


Fig. 5. Intermediate-Level Waste Volumes.

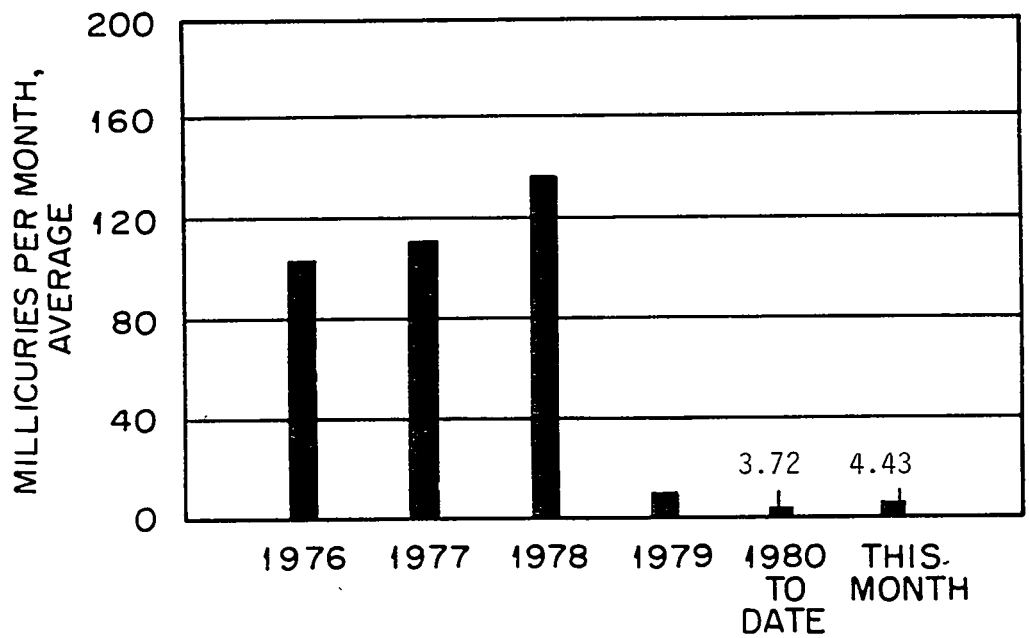


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

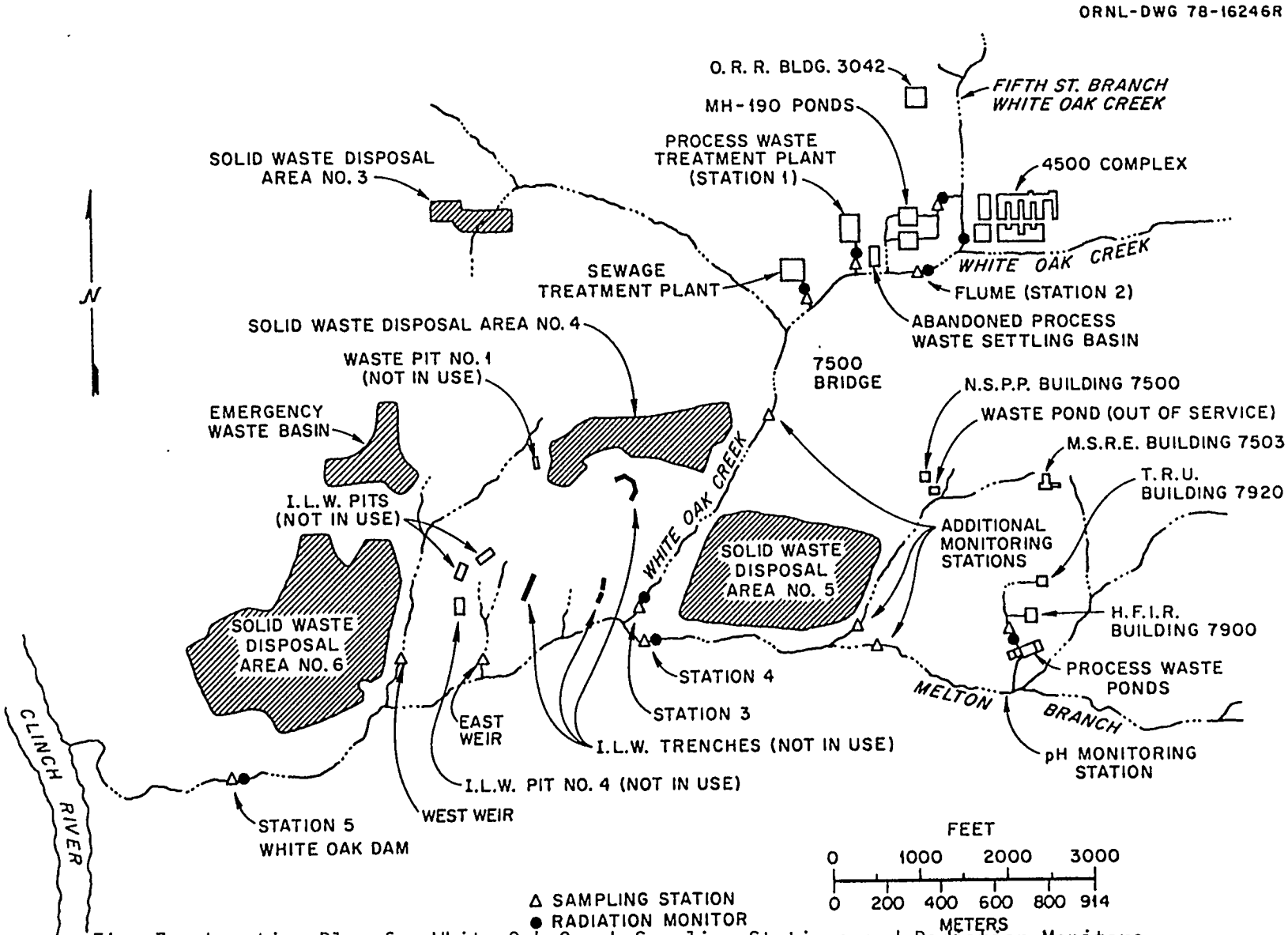


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.059	0.506
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.041	0.150
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.001	—
Total discharge from all sources		0.101	0.656
White Oak Dam to Clinch River (ISAHP Measurement)		0.03	0.10

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
1. Radioisotopes Processing Area (MH234)	460	0.007	1.3	0.58	3.8
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.273[a]	49.9	1.48	9.8
3. Reactor Operations (MH112)	26	0.002	0.4	3.16	20.9
4. Buildings 3503 and 3508	23	<0.001	—	1.74	11.5
5. Buildings 3025 and 3026	3.8	<0.001	—	2.07	13.7
6. Building 3019	0.6	<0.001	—	0.66	4.4
7. Waste Evaporator, Bldg. 2531	1320	0.056	10.2	1.57	10.4
8. Building 3525	4.5	<0.001	—	0.50	3.3
9. Building 2026	12	<0.001	—	0.76	5.0
10. Tank Farm Drainage	3000	0.209	38.2	2.58	17.2

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<0.9
Central Radioactive Gas Disposal Facilities	3039	<0.01	<133.4
Radiochemical-Processing Pilot Plant	3020	<0.01	<2.5
MSRE	7512	<0.01	<0.7
HFIR & TRU	7911	<0.01	<15.3
Total Activity in Gases Released at X-10 Site		<0.01	<152.8
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		$1.5^{(3H)}$	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			1.05×10^{-3}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.57×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

SEP 30 1980

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-80/275

DATE: September 18, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer ORNL Site — Date 7/13/96

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of July was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 46 mCi; this is 54 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 54 percent of this total. The activity emitted with the gaseous wastes from ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of July 1980 was 0.03% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 6.8% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.02 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaties to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 54×10^4 and 7×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 46 mCi of ^{90}Sr into White Oak Lake. This low release (53 mCi less than the amount reported for June) continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal. A total of 0.3 mCi of ^{90}Sr was released from the 190 pond system, and an additional 1.5 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 11.5 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area to White Oak Creek, indicates that about 6 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. There was no seepage from the West fault into Raccoon Creek due to the conditions prevalent during the month of July.

White Oak Creek

	^{90}Sr, mCi	^{90}Sr, mCi
Flume	4.3	
190 Ponds	0.3	
Process Waste Treatment Plant	1.5	
Sewage Treatment Plant	11.5	
	17.6	
7500 Sampling Station	29.1	
Burial Grounds Nos. 1 and 3, and Flood Plains		11.5[a]
Station No. 3	35.2	
Burial Ground No. 4		6.1

[a]Composited grab samples from the Northwest Tributary (Figure 7) indicate that the release from Burial Ground No. 3 amounted to about 6 millicuries.

Melton Branch

	^{90}Sr, mCi	^{90}Sr, mCi
7900 Area (HFIR and TRU)	<0.1	
7500 Area (NSPP and MSRE)	3.7	
	3.7	
Station No. 4	11.0	
Burial Ground No. 5		7.3
ILW Pit Disposal Area		
East Weir		<0.1
West Weir		<0.1
		<0.1
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	46.2	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		24.9
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		53.9

Process Waste

A total of 2.28×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 2.16×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A breakthrough of cesium occurred during loading cycle No. 22 of ion-exchange column "C", (terminating the cycle prematurely). (Run No. 364, see table below.) This is compatible with laboratory bench work which predicted significant resin deterioration after 20 loading cycles. The loading cycles are normally terminated on the basis of calculated hardness loading. The resin will be allowed to deteriorate to a volume capacity

of 1000 bed volumes, and then it will be replaced. A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
357	B	188	2441
358	C	184	2499
359	A	176	2388
360	B	200	2546
361	C	170	2271
362	A	168	2448
363	B	211	2499
364	C	163	1907

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.80 m^3/hr. A summary of storage operations is given below:

	Cubic Meters
Total volume generated	611.8
Volume transferred to evaporators	598.3
South Tank Farm Inventory:	
Beginning of Month	700.7
End of Month	700.7
Volume of concentrate available for hydrofracture	354.3
Service Tank Inventory:	
W-21, Beginning of Month	48.7
W-21, End of Month	62.2

Continuation of Service Tank Inventory:	Cubic Meters
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	123.3
W-23, End of Month	148.1

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

Building 3525	9.3
Building 3019	10.6
Radioisotopes Processing Area	30.0
ORR and BSR	81.5
High Flux Isotope Reactor	164.9
Fission Products Development Laboratory	54.1[a]
4500 Complex	89.0
Building 7920	41.0
Building 3544	46.4

GASEOUS WASTE

The ORNL Stacks discharged $\leq$10 mCi of ^{131}I this month. The total amount of filterable particulate activities released during the period was less than 194 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.9 and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

[1]Standby tank, normally empty
[2]Evaporator Concentrate

[a]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R

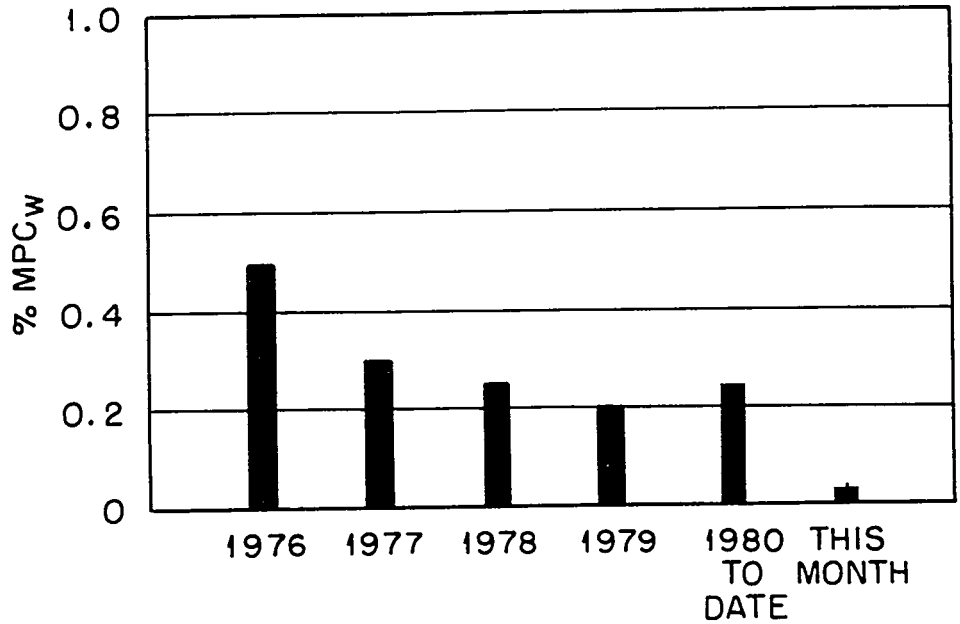


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

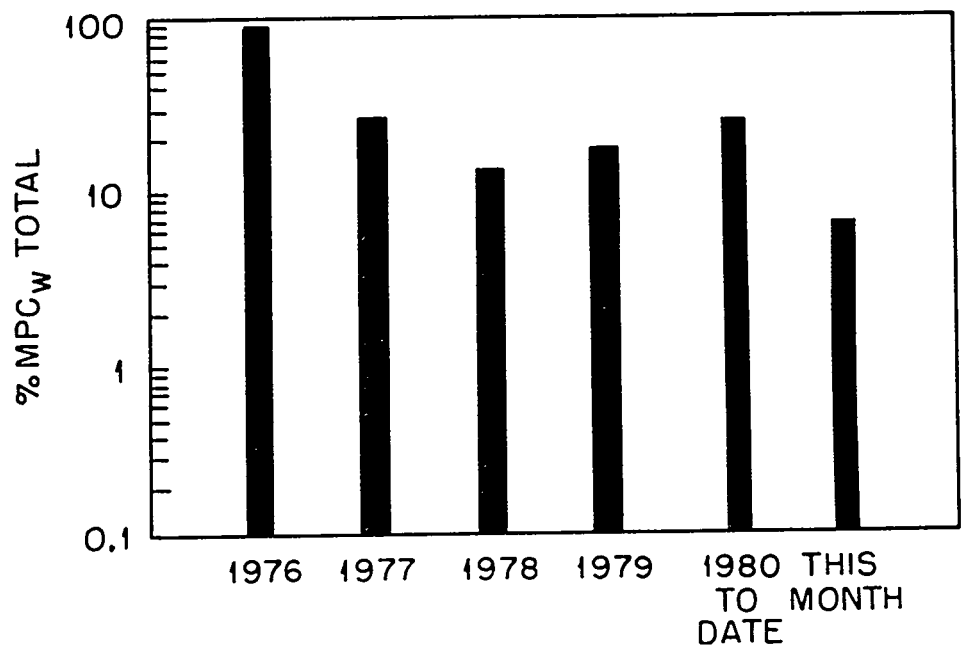


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

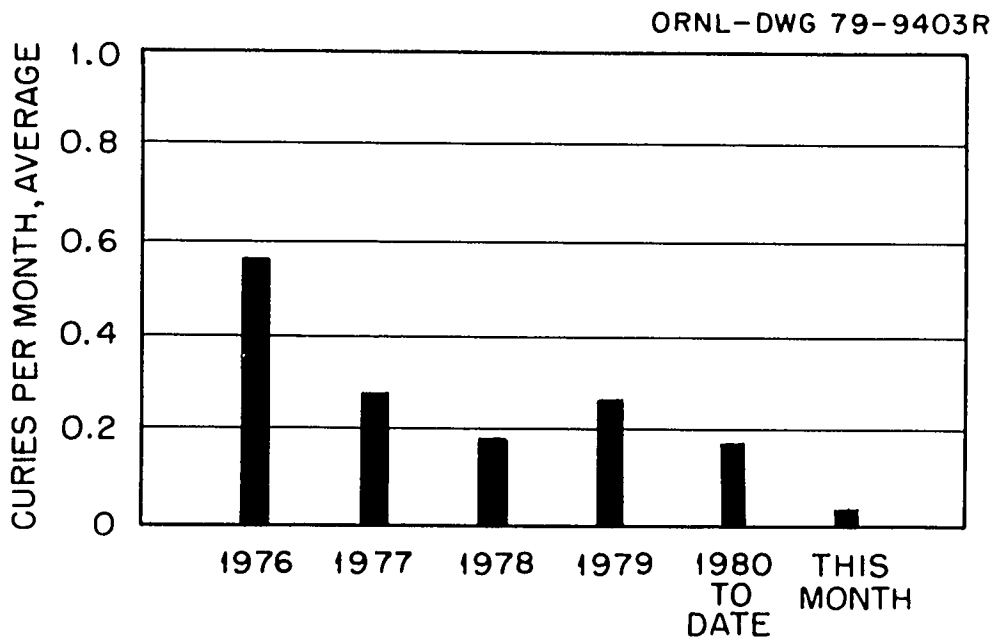


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

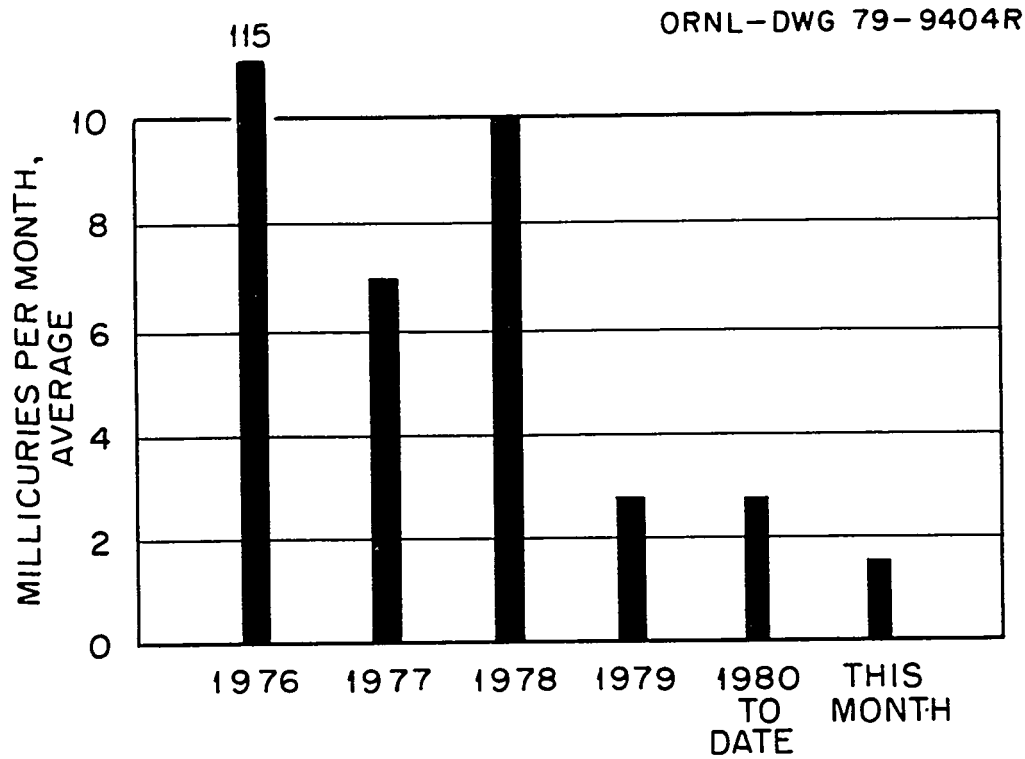


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

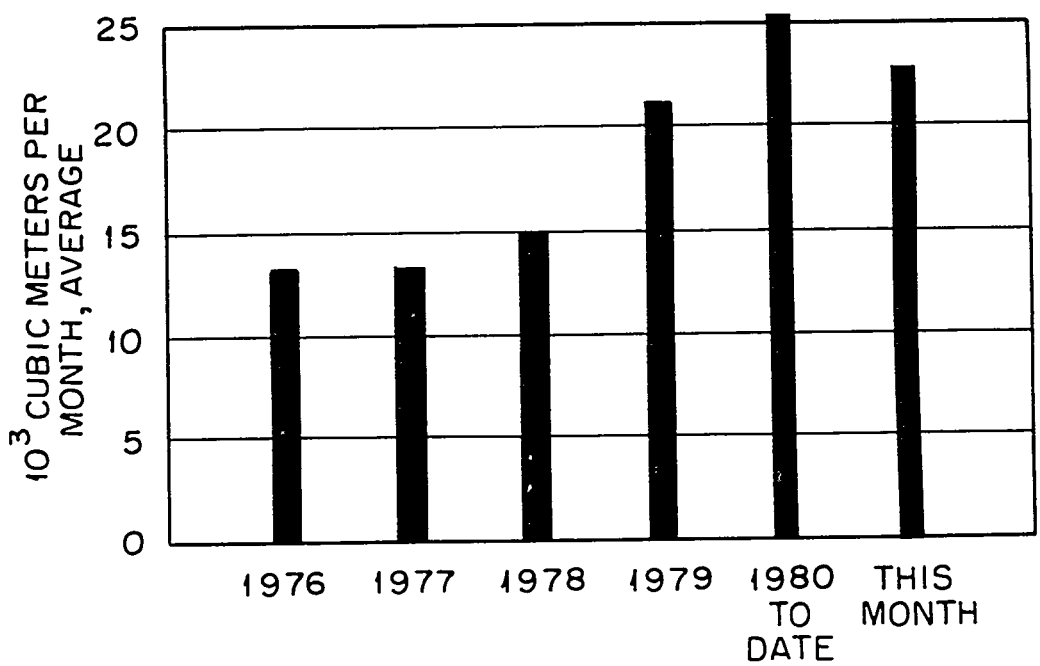


Fig. 4. Process Waste Volumes.

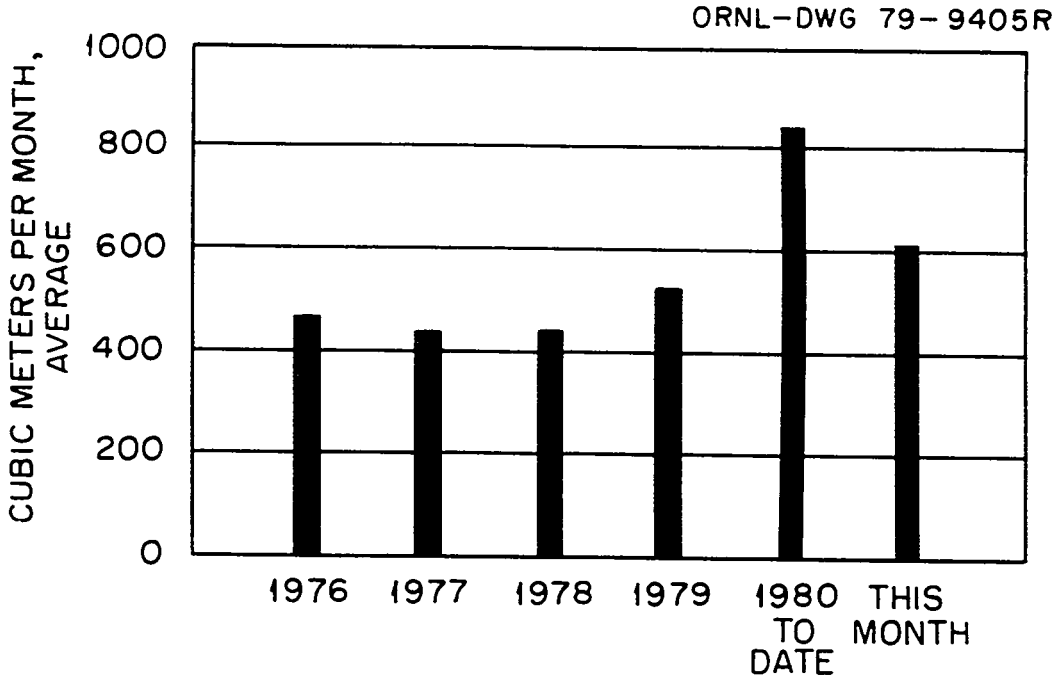


Fig. 5. Intermediate-Level Waste Volumes.

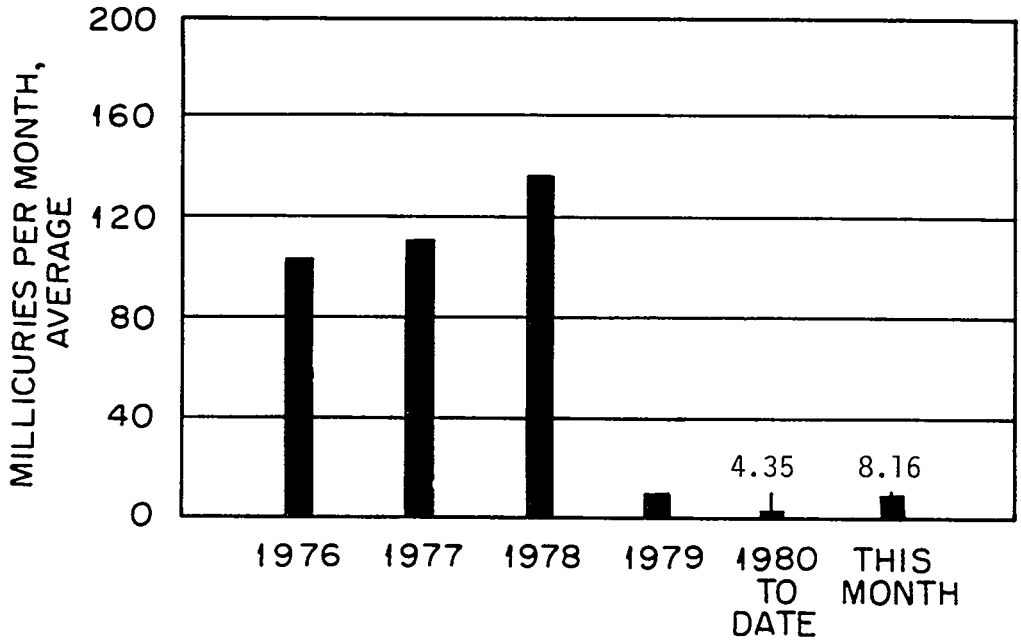


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

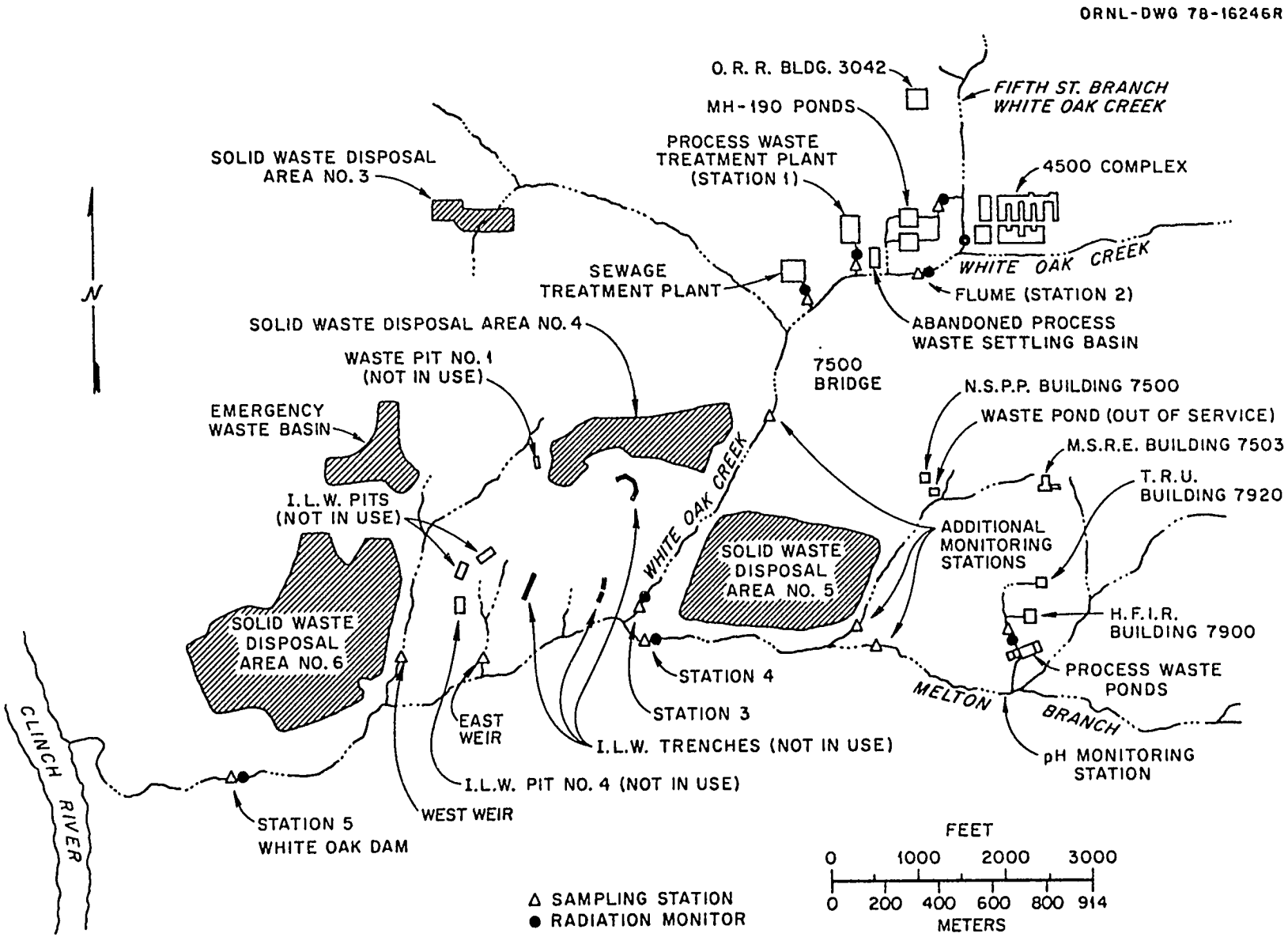


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Rotation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.035	0.394
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.011	0.061
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.046	0.455
White Oak Dam to Clinch River (ISAHP Measurement)		0.02	0.07

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	42	0.001	0.2	1.22	7.9
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.294	62.0	2.00	13.0
3. Reactor Operations (MH112)	28	0.002	0.4	2.90	18.9
4. Buildings 3503 and 3508	6.6	<0.001	—	0.53	3.5
5. Buildings 3025 and 3026	7.0	<0.001	—	2.00	13.0
6. Building 3019	25.0	<0.001	—	0.68	4.4
7. Waste Evaporator, Bldg. 2531	740	0.030	6.3	1.49	9.7
8. Building 3525	72	0.001	—	0.78	5.1
9. Building 2026	2.2	<0.001	—	0.89	5.8
10. Tank Farm Drainage	1900	0.147	31.1	2.87	18.7

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<172
Radiochemical-Processing Pilot Plant	3020	<0.01	<3
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<17
Total Activity in Gases Released at X-10 Site		<0.01	<194
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		6 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			7.00×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			3.88×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

2511

27

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/296

901001

DATE: October 3, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer 7/22/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.035	0.579
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.009	0.065
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.044	0.644
White Oak Dam to Clinch River (ISAHP Measurement)		0.030	0.06

[a]Refers to Fig. 7.

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

2511

NOV 1980

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/325

DATE: November 7, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

SPONSORED BY: J. A. Cox

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

Technical Information Officer
ORNL Site

Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of September was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 38 mCi; this is 6 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 57 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 10 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 11 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of September 1980 was 0.02% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 5.26% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.01 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 50×10^4 and 7×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 38 mCi of ^{90}Sr into White Oak Lake. This low release (6 mCi less than the amount reported for August) continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal. A total of 0.9 mCi of ^{90}Sr was released from the 190 pond system, and an additional 0.7 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 8.2 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area to White Oak Creek, indicates that about 6.5 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. There was no seepage from the West fault into Raccoon Creek due to the conditions prevalent during the month.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	5.3	
190 Ponds	0.9	
Process Waste Treatment Plant	0.7	
Sewage Treatment Plant	8.2	
	15.1	
7500 Sampling Station	29.1	
Burial Grounds Nos. 1 and 3, and Flood Plains		14.0[a]
Station No. 3	32.2	
Burial Ground No. 4		3.1

[a]Composited grab samples from the Northwest Tributary (Figure 7) indicate that the release from Burial Ground No. 3 amounted to about 6.5 millicuries.

Melton Branch

	^{90}Sr Discharge (mCi) By Measurement	By Difference
7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	2.6	
	2.8	
Station No. 4	5.6	
Burial Ground No. 5		2.8
ILW Pit Disposal Area		
East Weir		<0.1
West Weir		<0.01
		<0.1
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	37.9	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		20.0
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		52.8

Process Waste

A total of 2.08×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.82×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
374	B	95	1686
375	C	131	2224
376	A	170	2388
377	B	116	1645
378	C	122.5	2204
379	A	96	1743
380	B	129	1875
381	C	134	1836

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.33 m^3/hr.

About 135 m^3 of waste fluid (tabulated data below) were pumped into gunite tank W-6 while clearing a plug in the intervalley ILW transfer line. The plug was located at the foot of Haw Ridge, several hundred feet downstream from the pumping station. It was caused by an accumulation of demineralizer resin which is routinely flushed from the units located at the HFIR. (The collection tank, as designed, serves as a catch tank for resin carry-over.) It is tentatively planned to intercept the carry-over resin at the HFIR location-the resin then would be packaged and buried.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	235.1
Volume transferred to evaporators	234.3
South Tank Farm Inventory:	
Beginning of Month	700.7

	Cubic Meters
End of Month	834.8*
Volume of concentrate available for hydrofracture	354.3
Service Tank Inventory:	
W-21, Beginning of Month	16.9
W-21, End of Month	17.7
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	160.6
W-23, End of Month	165.2

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

Building 3525	6.0
Building 3019	12.2
Radioisotopes Processing Area	34.0
ORR and BSR	49.9
High Flux Isotope Reactor	70.0
Fission Products Development Laboratory	10.0[3]
4500 Complex	16.6
Building 3544	53.6
Transuranium Processing Area	57.8

GASEOUS WASTE

The ORNL Stacks discharged <11 mCi of ^{131}I this month. The total amount of filterable particulate activities released during the period was less than 175 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.0 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

*See text above.
[1]Standby tank, normally empty
[2]Evaporator Concentrate
[3]The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R

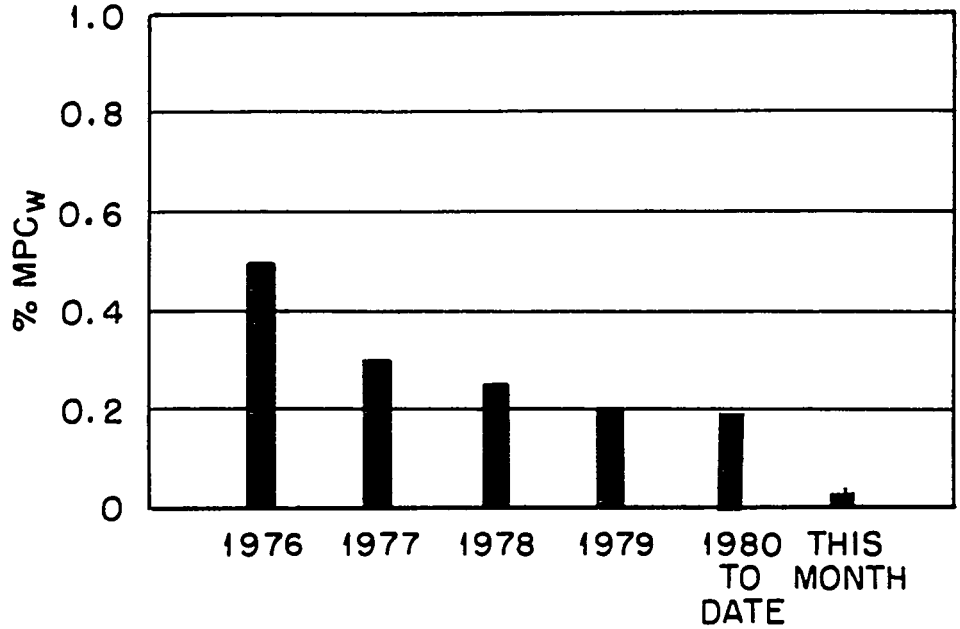


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

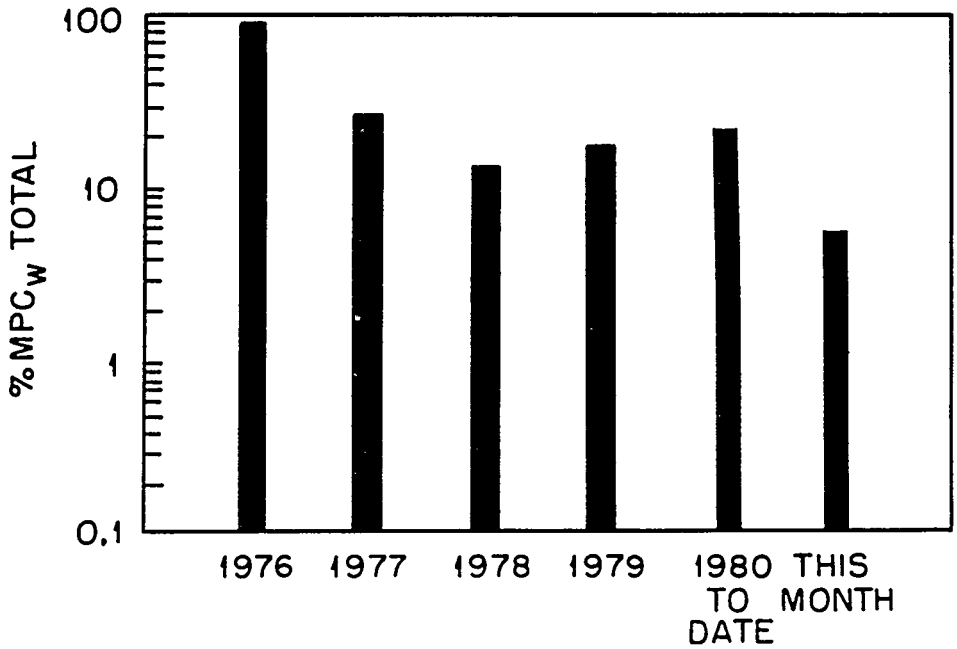


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

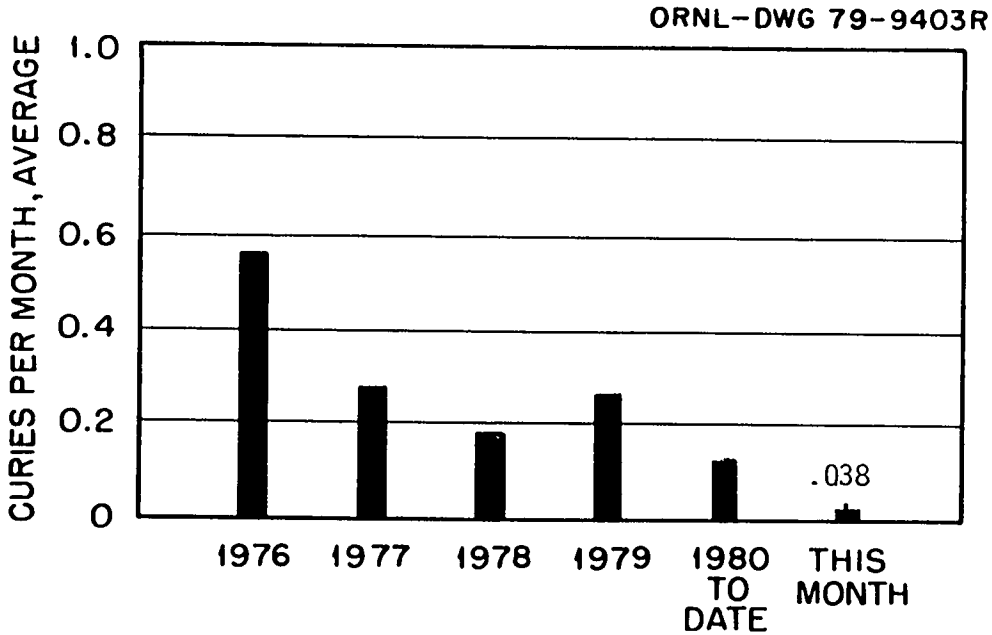


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

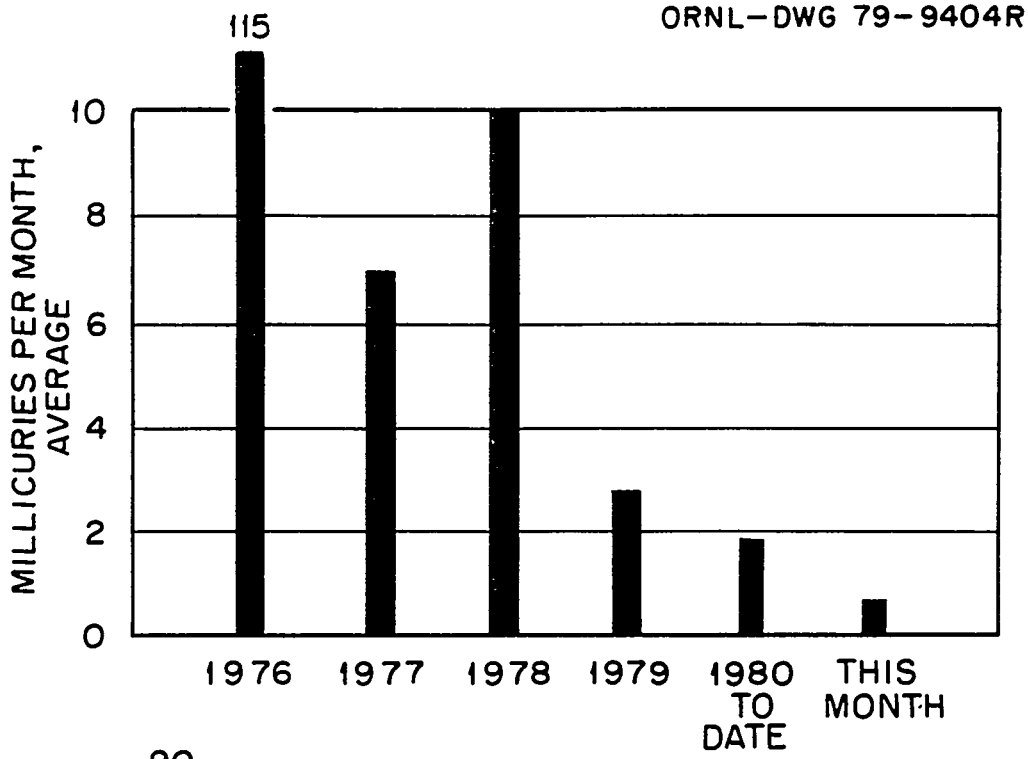


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

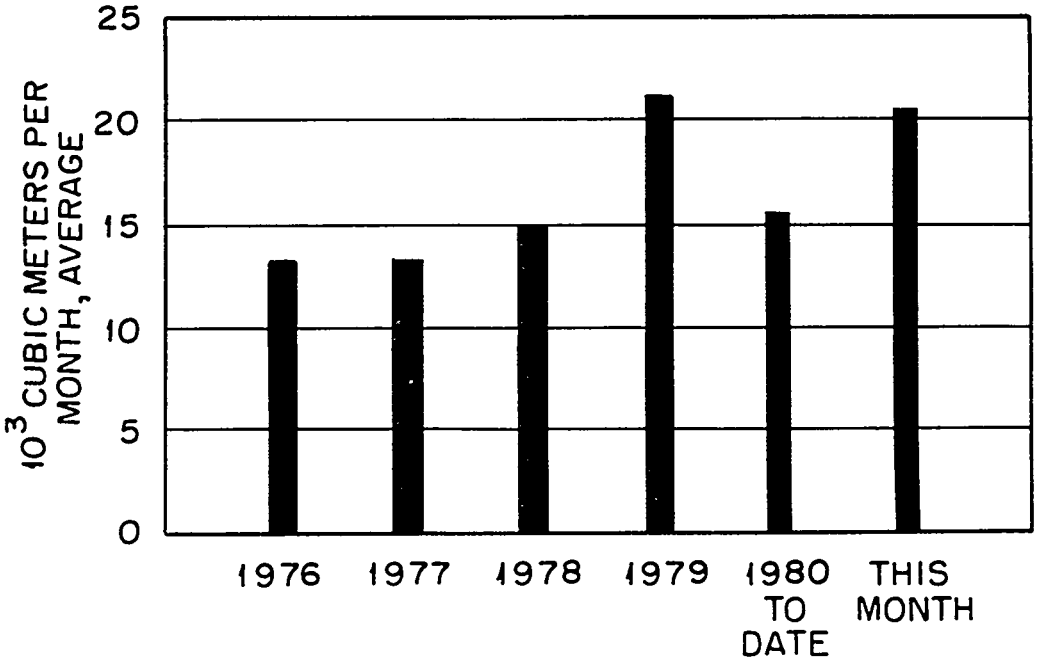


Fig. 4. Process Waste Volumes.

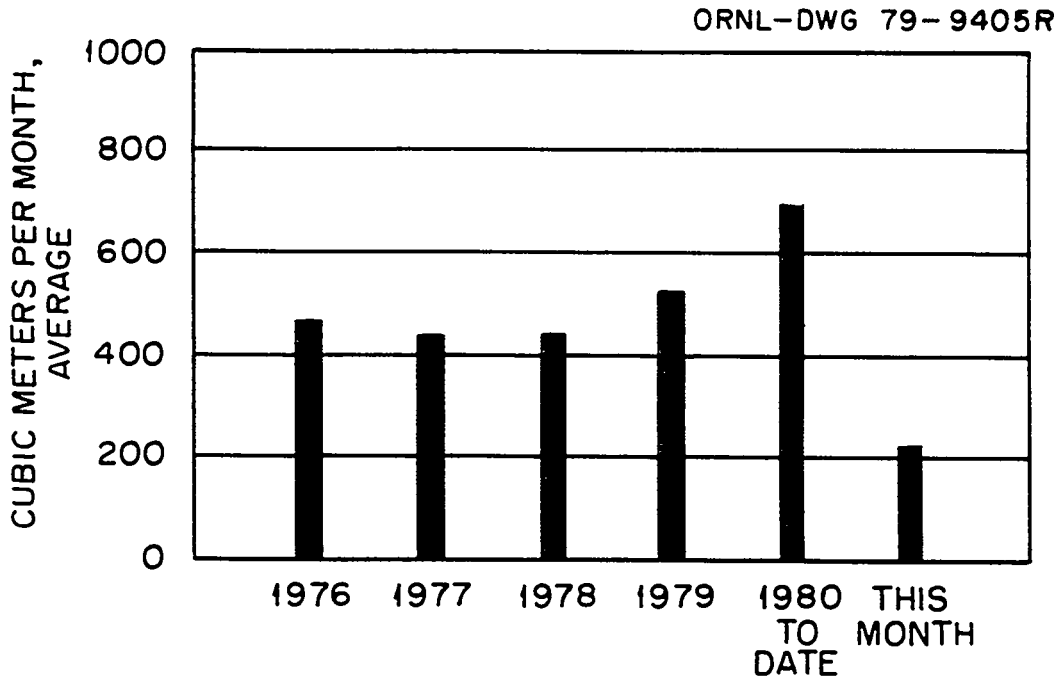


Fig. 5. Intermediate-Level Waste Volumes.

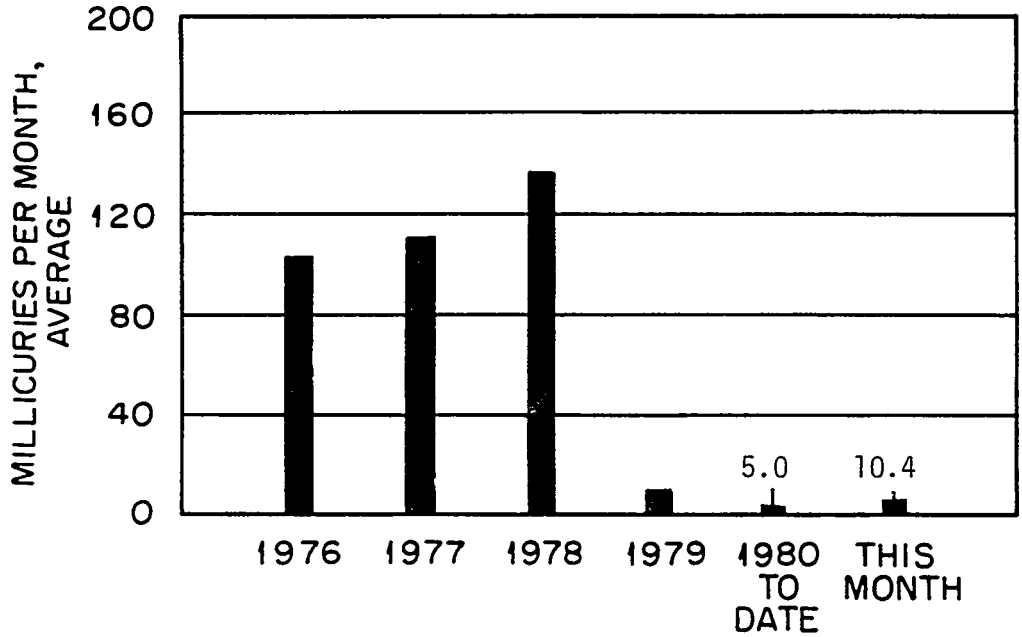


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

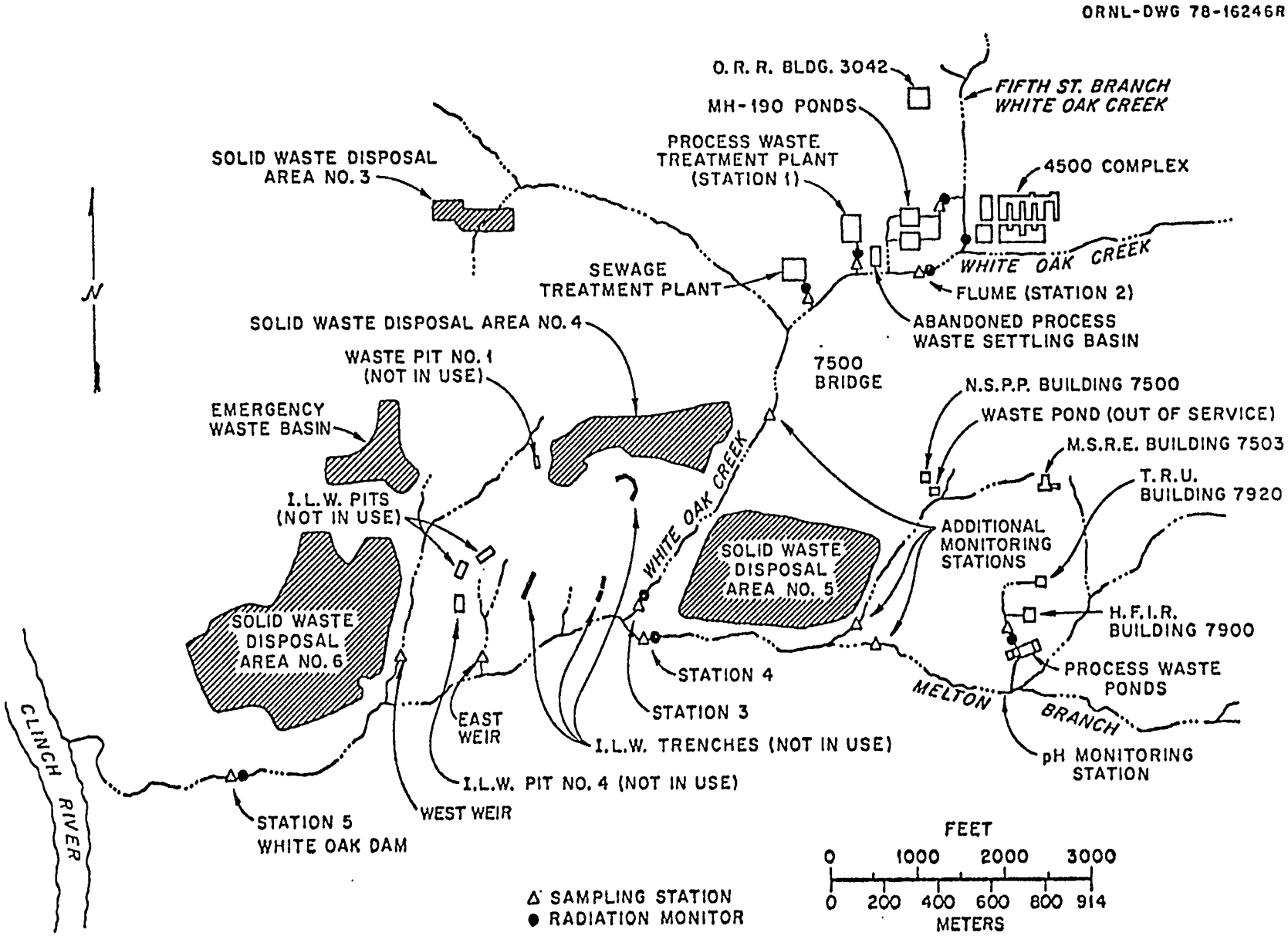


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Rotation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.032	0.360
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.006	0.054
Discharge from ILW Pits and Trenches	East Weir	$\leq$0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.030	0.414
White Oak Dam to Clinch River (ISAHP Measurement)		0.01	0.04

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	1140	0.08	9.1	2.57	15.8
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.283	32.3	1.61	9.9
3. Reactor Operations (MH112)	32	0.002	0.2	2.69	16.5
4. Buildings 3503 and 3508	7.6	<0.001	—	0.54	3.3
5. Buildings 3025 and 3026	3.2	<0.001	—	1.74	10.7
6. Building 3019	12.0	<0.001	—	1.38	8.5
7. Waste Evaporator, Bldg. 2531	16,900	0.360	41.1	0.79	4.9
8. Building 3525	0.8	<0.001	—	0.73	4.5
9. Building 2026	1.6	<0.001	—	1.54	9.5
10. Tank Farm Drainage	2080	0.151	17.3	2.69	16.4

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<86
Radiochemical-Processing Pilot Plant	3020	<0.01	<3
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<86
Total Activity in Gases Released at X-10 Site		<0.01	<175
Chem. Tech. Division - Y-12 Area			0.4
Tritium Target Fabrication Building		(^{3}H)[c]	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-2}
Room 265			7.00×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.74×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of eight days and then measuring the activity.

[c]Data not available-sample equipment failure.

1980 ORNL 2511
MASTER

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-80/357

DATE: December 16, 1980

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of October 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. A. Cox

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

David R. Hamrin 7/12/90
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of October was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 84 mCi; this is 46 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 60 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 20 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 9 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of October 1980 was 0.03% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 3.20% of the MPC_W (Figure 1B). This represents the maximum percentage MPC_W in the river.

During the month, 0.02 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium activity released into White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 54×10^4 and 7×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 84 mCi of ^{90}Sr into White Oak Lake. This low release continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were slightly higher than normal. Most of the activity (15.4 mCi) was pumped from a monitoring tank dry well system and released into White Oak Creek via the 190 pond system. (The dry well system was temporarily rerouted for approximately a week in an effort to reduce the load on the Process Waste Treatment Plant.) An additional 3.4 mCi was released from the Process Waste

Treatment Plant.

The release from the sanitary system amounted to 4.7 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area to White Oak Creek, indicates that about 11.2 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. There was no seepage from the West fault into Raccoon Creek due to the conditions prevalent during the month.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	8.7	
190 Ponds	15.4	
Process Waste Treatment Plant	3.4	
Sewage Treatment Plant	4.7	
	32.2	
7500 Sampling Station	50.1	
Burial Grounds Nos. 1 and 3, and Flood Plains		17.9
Station No. 3	70.4	
Burial Ground No. 4		20.3

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Melton Branch		
7900 Area (HFIR and TRU)	<0.1	
7500 Area (NSPP and MSRE)	1.7	
	1.7	
Station No. 4	13.2	
Burial Ground No. 5		11.5
ILW Pit Disposal Area		
East Weir		<0.1
West Weir		<0.01
		<0.1
Total ^{90}Sr to White Oak Lake (Station Nos.3 and 4 Plus Ground Disposal Area)	83.7	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		49.8
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		59.5

Process Waste

A total of 2.30×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.81×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	Bed Volumes
382	A	147.5	1988
383	B	148.5	1974
384	C	143	1862
385	A	144	1560
386	B	114	1828
387	C	161	2218
388	A	166	2404
389	B	181	2372

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.54 m^3/hr.

The new Melton Valley Waste Storage Facility was approved for limited service. A total of 358 m^3 of evaporator concentrate was pumped from service tank W-23 and gunite tanks W-8 and W-10 to this facility during the period.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	350.8
Volume transferred to evaporators	401.0
South Tank Farm Inventory:	
Beginning of Month	834.8
End of Month	596.8*
Service Tank Inventory:	
W-21, Beginning of Month	17.7
W-21, End of Month	28.4

*See text on next page.

	Cubic Meters
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	165.2
W-23, End of Month	50.9*

Melton Valley Waste Storage Facility Inventory:

Tanks W-24 through W-31 empty at beginning of month

W-24, End of Month	166.5
W-25, End of Month	162.8
W-26, End of Month	28.4

Tanks W-27 through W-31 empty at end of month

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

Building 3525	6.9
Building 3019	8.2
Radioisotopes Processing Area	33.7
ORR and BSR	98.1
High Flux Isotope Reactor	41.7
Fission Products Development Laboratory	17.1**
4500 Complex	38.1
Building 3544	32.8
Transuranium Processing Area	19.2

GASEOUS WASTE

The ORNL Stacks discharged <9 mCi of ^{131}I this month. The total amount of filterable particulate activities released during the period was less than 181 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 1.0 and 0.1% of the calculated maximum permissible

*See text above
[1]Standby tank, normally empty
[2]Evaporator Concentrate
**The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

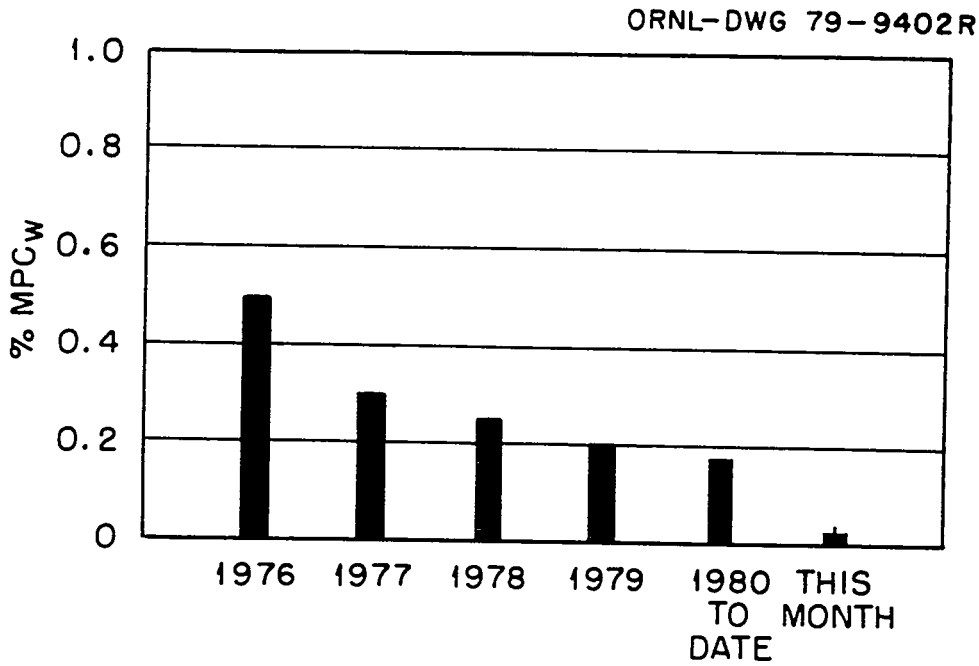


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

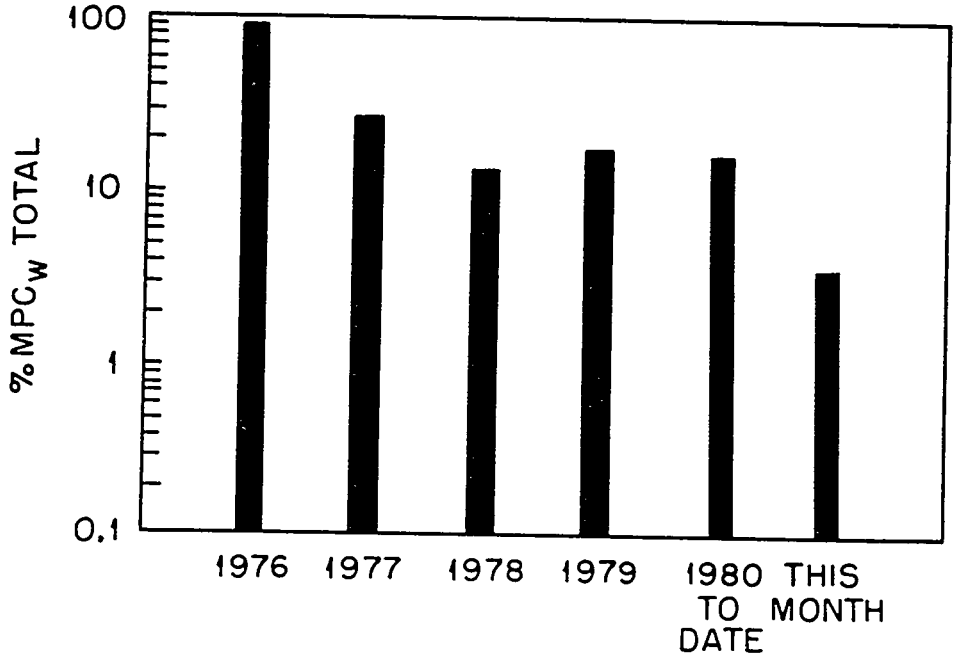


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

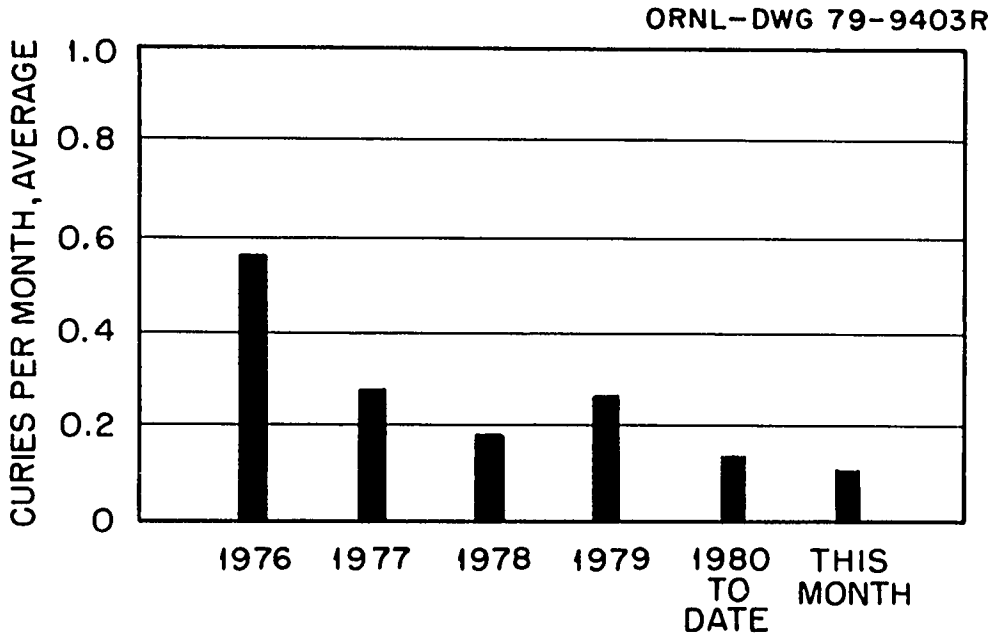


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

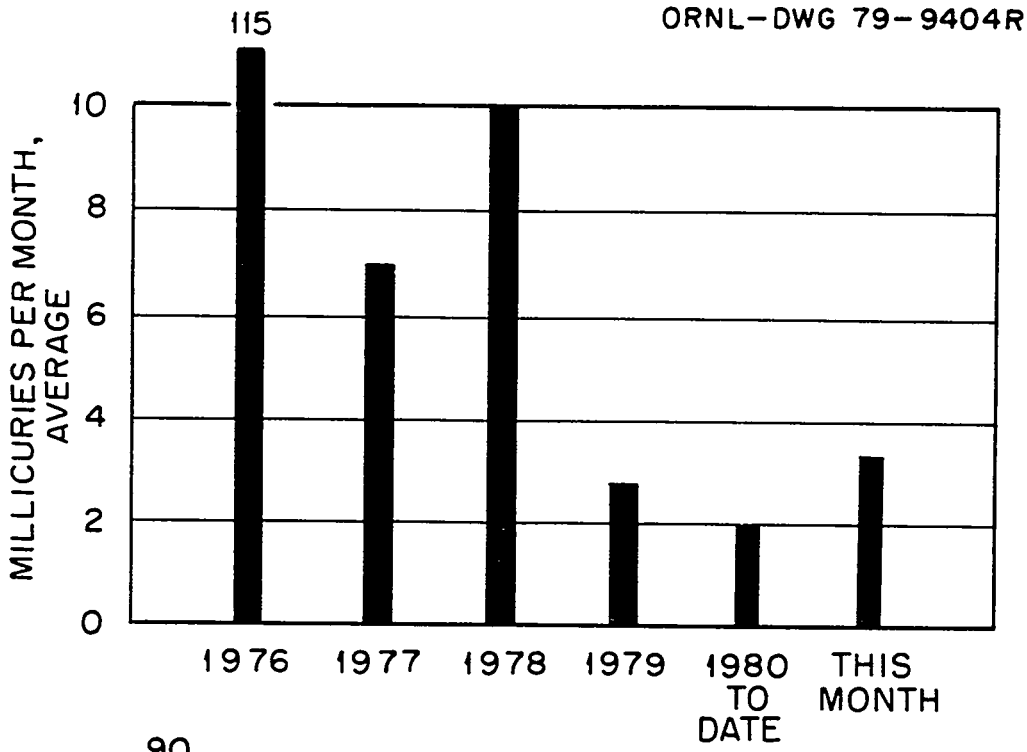


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

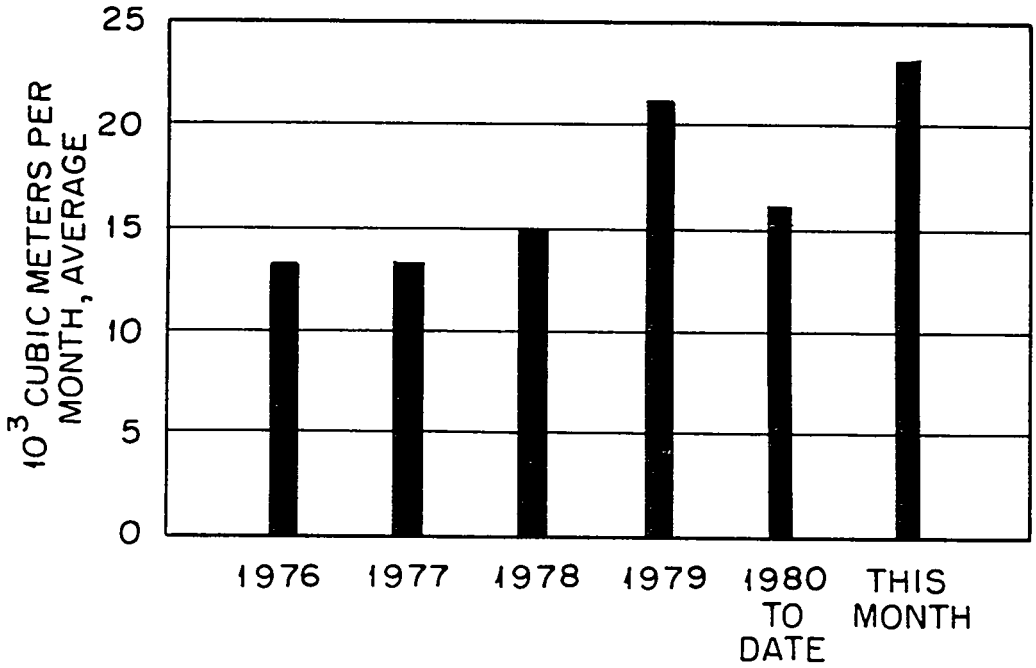


Fig. 4. Process Waste Volumes.

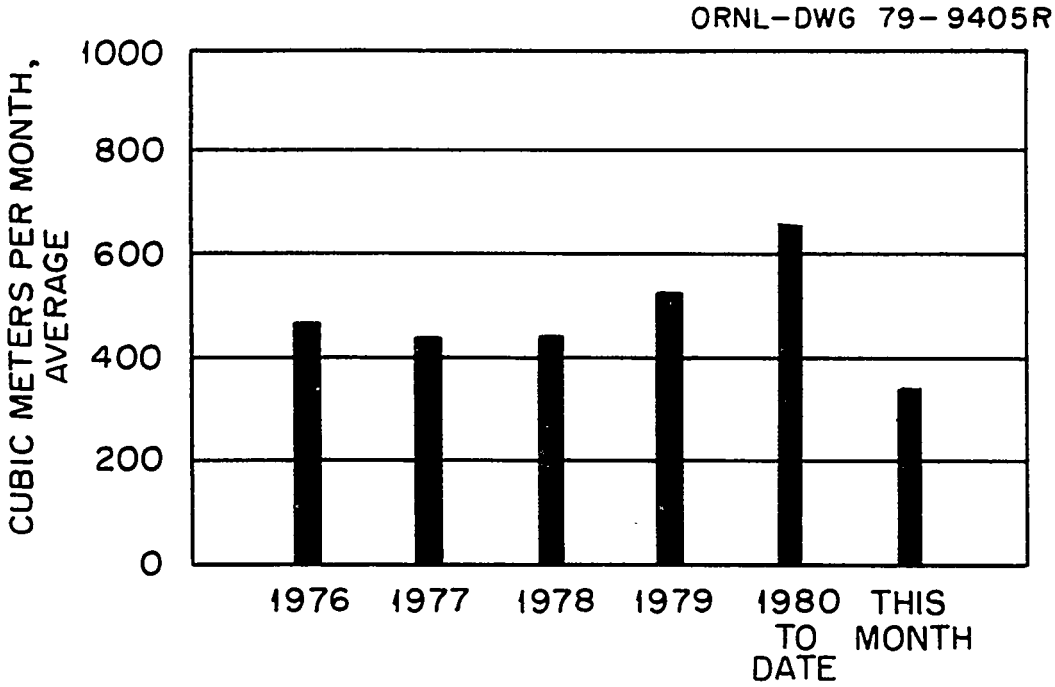


Fig. 5. Intermediate-Level Waste Volumes.

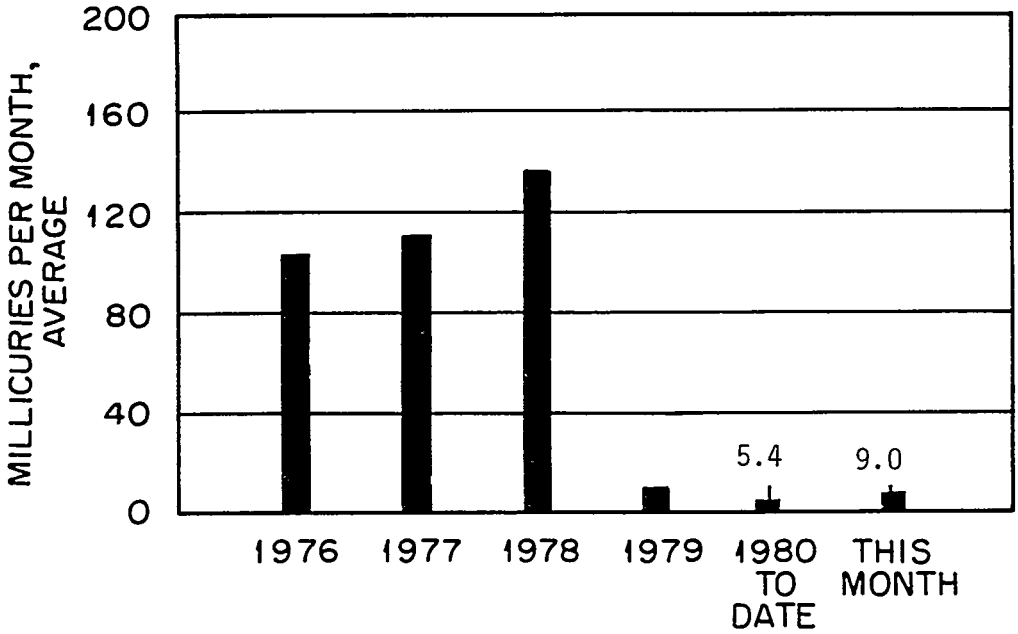


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter

ORNL-DWG 78-16246R

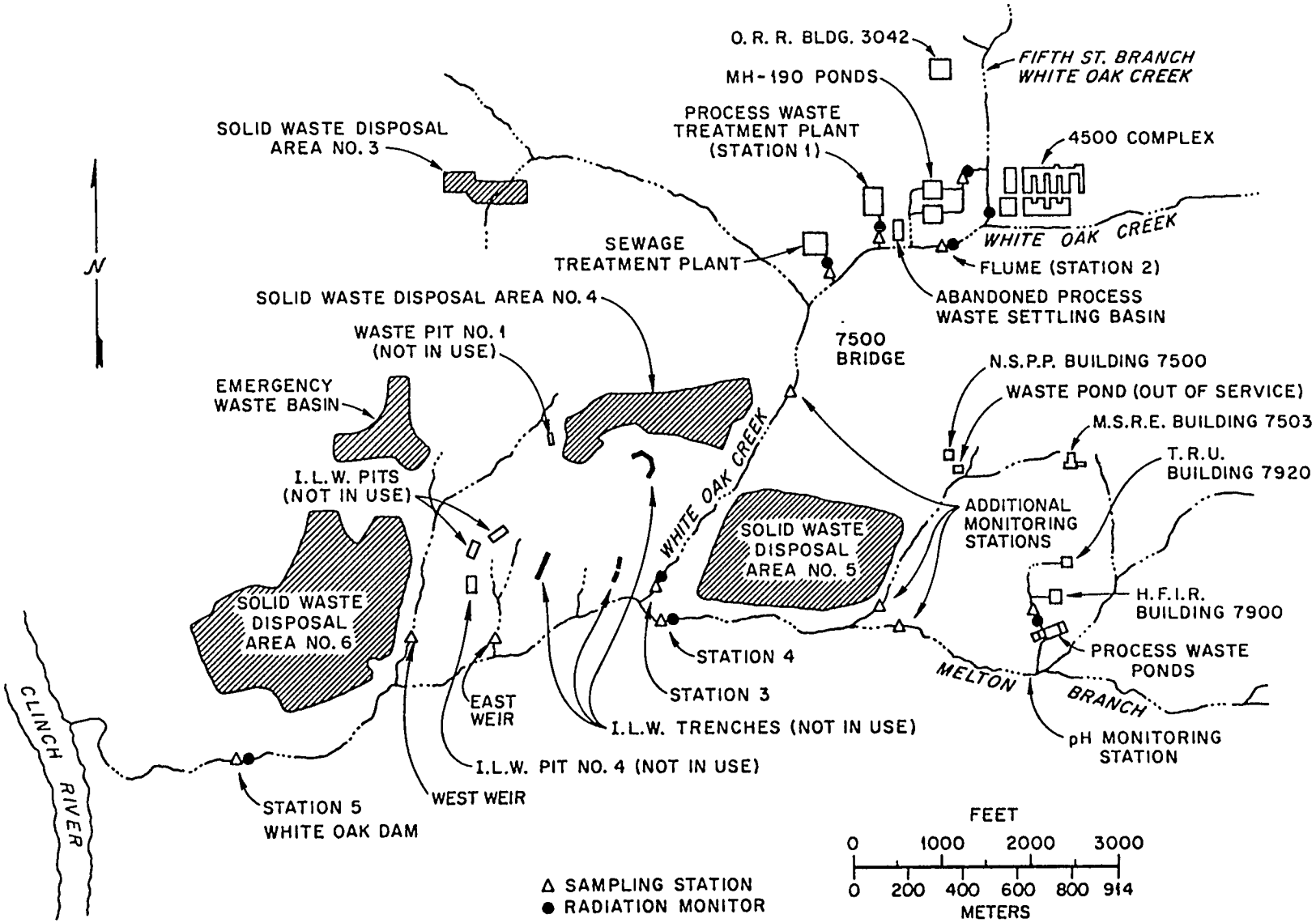


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Rotation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.070	0.455
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.013	0.065
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.083	0.520
White Oak Dam to Clinch River (ISAHP Measurement)		0.02	0.04

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
1. Radioisotopes Processing Area (MH234)	910	0.06	10.1	2.48	14.1
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.299[a]	50.1	1.70	9.6
3. Reactor Operations (MH112)	35	0.002	0.3	2.29	13.0
4. Buildings 3503 and 3508	3.1	<0.001	—	0.87	4.9
5. Buildings 3025 and 3026	1.3	<0.001	—	3.37	19.1
6. Building 3019	8.4	<0.001	—	1.36	7.7
7. Waste Evaporator, Bldg. 2531	2700	0.07	11.7	0.98	5.6
8. Building 3525	0.7	<0.001	—	0.78	4.4
9. Building 2026	10	<0.001	—	1.15	6.5
10. Tank Farm Drainage	2300	0.166	27.8	2.67	15.1

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<156
Radiochemical-Processing Pilot Plant	3020	<0.01	<8
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<14
Total Activity in Gases Released at X-10 Site		<0.01	<181
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		1 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.08×10^{-3}
Room 265			7.00×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.75×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

2511

DATE ISSUED

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/16

DATE: January 21, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of November 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. A. Cox

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

Technical Information Officer 7/12/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of November was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 75 mCi; this is 9 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 68 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 30 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 3 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November 1980 was 0.10% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 22.7% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.03 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 57×10^4 and 6×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 74.5 mCi of ^{90}Sr into White Oak Lake. This low release continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal. A total of 1.2 mCi of ^{90}Sr was released from the 190 pond system, and an additional 2.0 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 9.0 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the

discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area, indicates that about 8.0 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Flume	8.5	
190 Ponds	1.2	
Process Waste Treatment Plant	2.0	
Sewage Treatment Plant	9.0	
	20.7	
7500 Sampling Station	38.7	
Burial Grounds Nos. 1 and 3, and Flood Plains		18.0
Station No. 3	58.3	
Burial Ground No. 4		19.6

Melton Branch

7900 Area (HFIR and TRU)	<0.1	
7500 Area (NSPP and MSRE)	3.0	
	3.0	
Station No. 4	16.2	

(Continuation of Melton Branch)	^{90}Sr Discharge (mCi) By Measurement	By Difference
Burial Ground No. 5		13.2
ILW Pit Disposal Area		
East Weir		<0.1
West Weir		<0.1
		<0.1
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	74.5	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		50.8
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		68.2

Process Waste

A total of 2.17×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 2.00×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
390	C	173.5	2940
391	A	167	3258
392	B	161	3150
393	C	160	2967
394	A	150	2645
395	B	127.5	2488
396	C	143.5	2540
397	A	125.5	2461

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.47 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	338.9
Volume transferred to evaporators	337.7
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	28.4
W-21, End of Month	29.6
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	39.7
W-23, End of Month	52.1

[1]Standby tank, normally empty
[2]Evaporator Concentrate

	Cubic Meters
Melton Valley Waste Storage Facility Inventory:	
W-24, No change during the period	166.5
W-25, No change during the period	162.8
W-26, No change during the period	28.4

Tanks W-27 through W-31 remain empty.

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

Building 3525	3.8
Building 3019	18.4
Radioisotopes Processing Area	22.4
ORR and BSR	87.6
High Flux Isotope Reactor	49.6
Fission Products Development Laboratory	59.5*
4500 Complex	35.0
Building 3544	51.6
Transuranium Processing Area	17.8

GASEOUS WASTE

The ORNL Stacks discharged <3 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 122 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

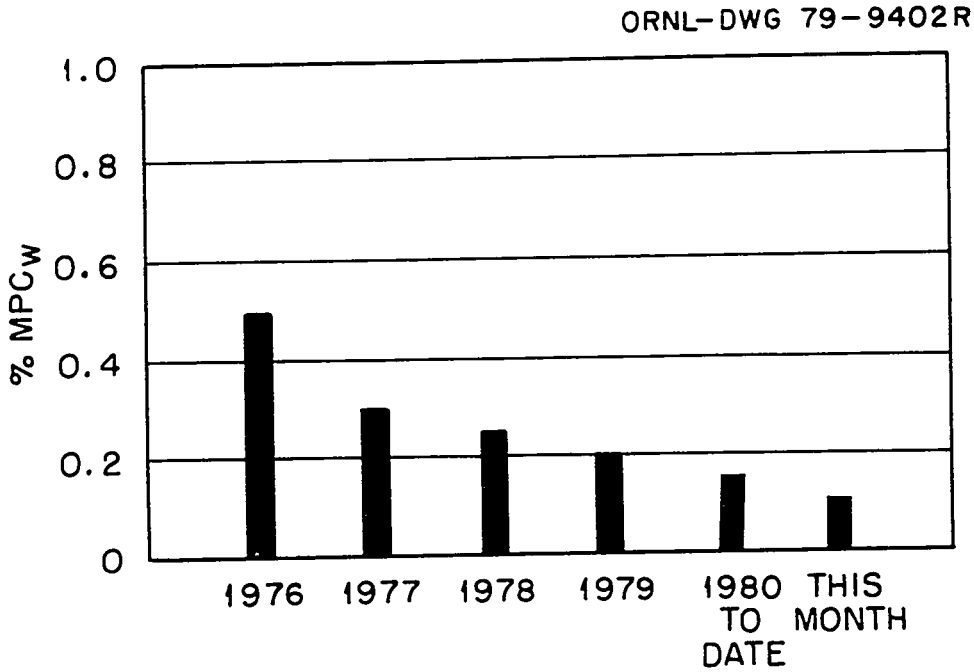


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Measurements at White Oak Dam).

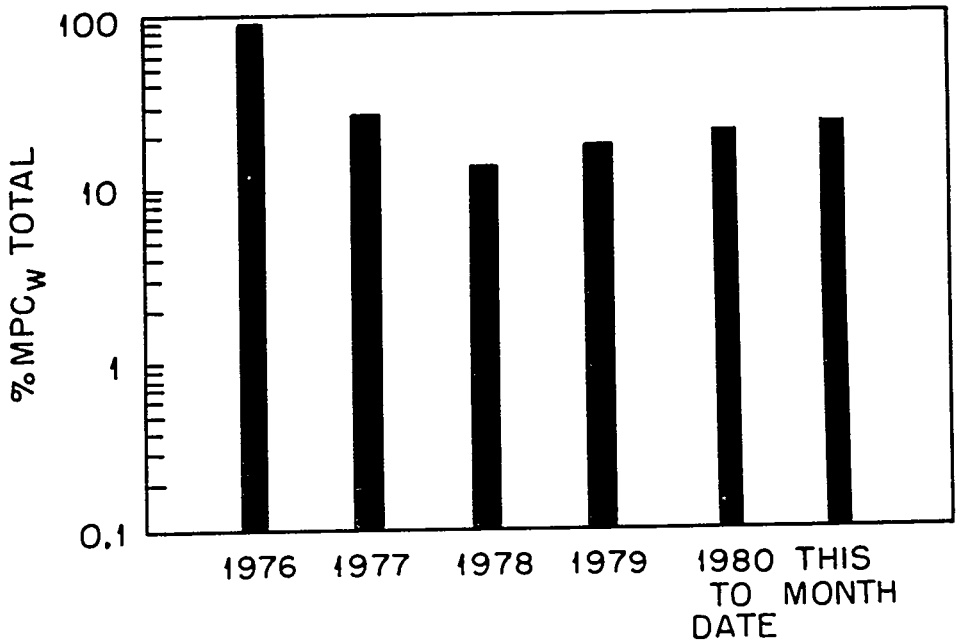


Fig. 1B. Measured Percent of MPC_W in White Oak Creek at the Confluence of White Oak Creek and the Clinch River due to ORNL Discharges (ISAHP Measurements).

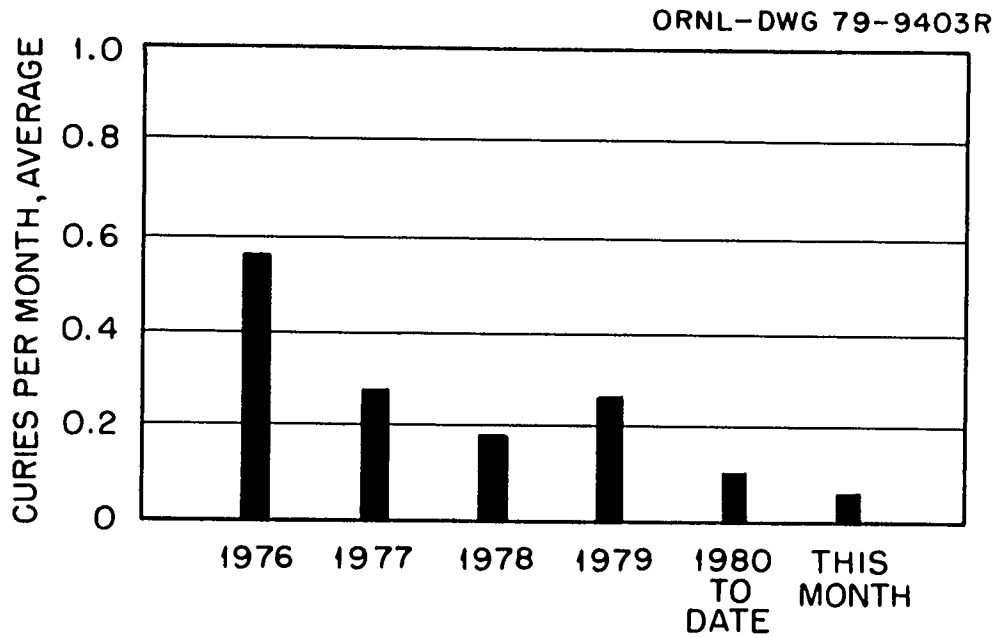


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

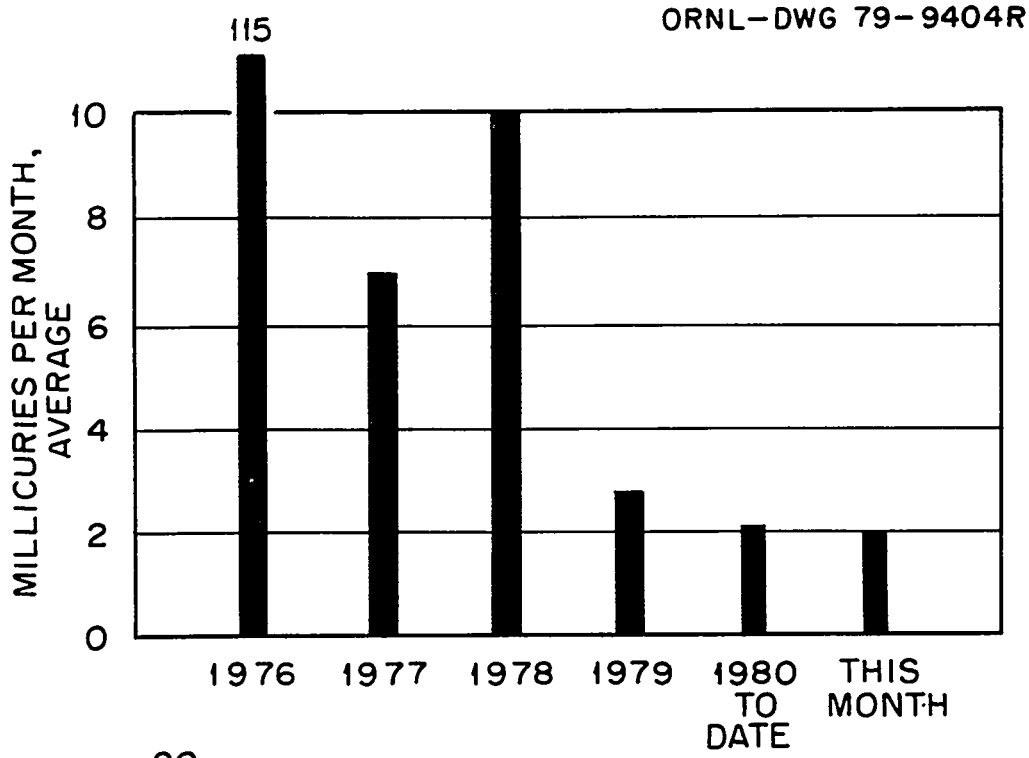


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

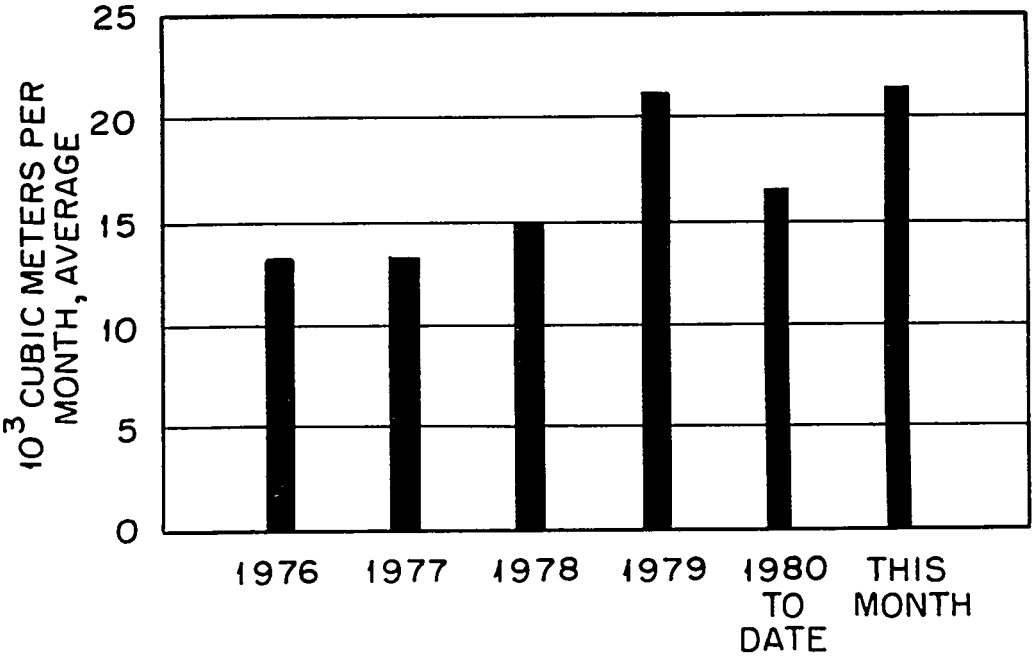


Fig. 4. Process Waste Volumes.

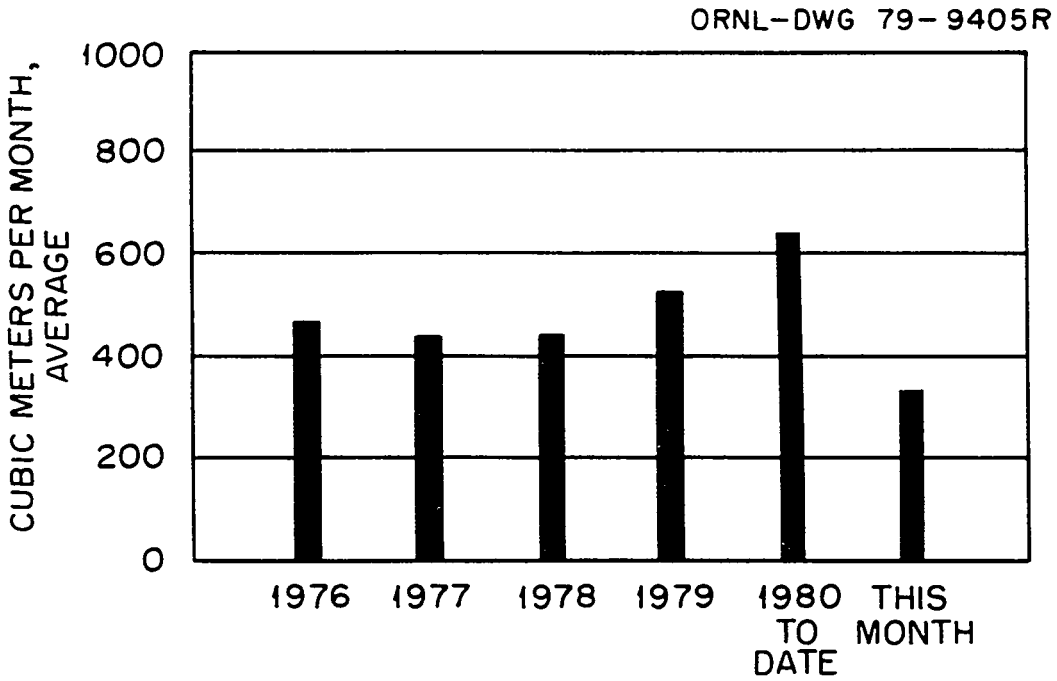


Fig. 5. Intermediate-Level Waste Volumes.

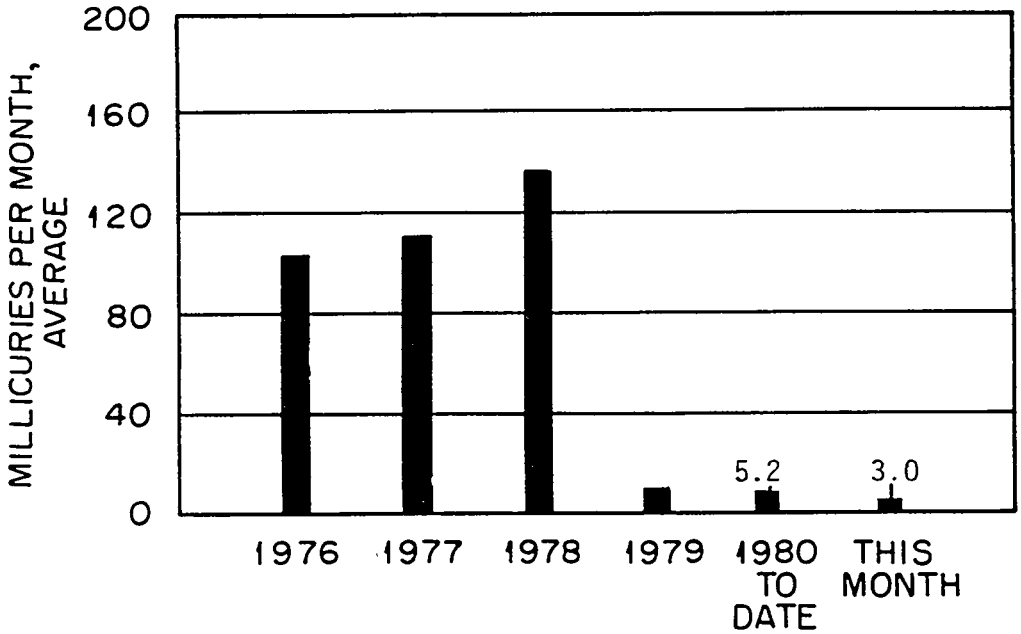


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

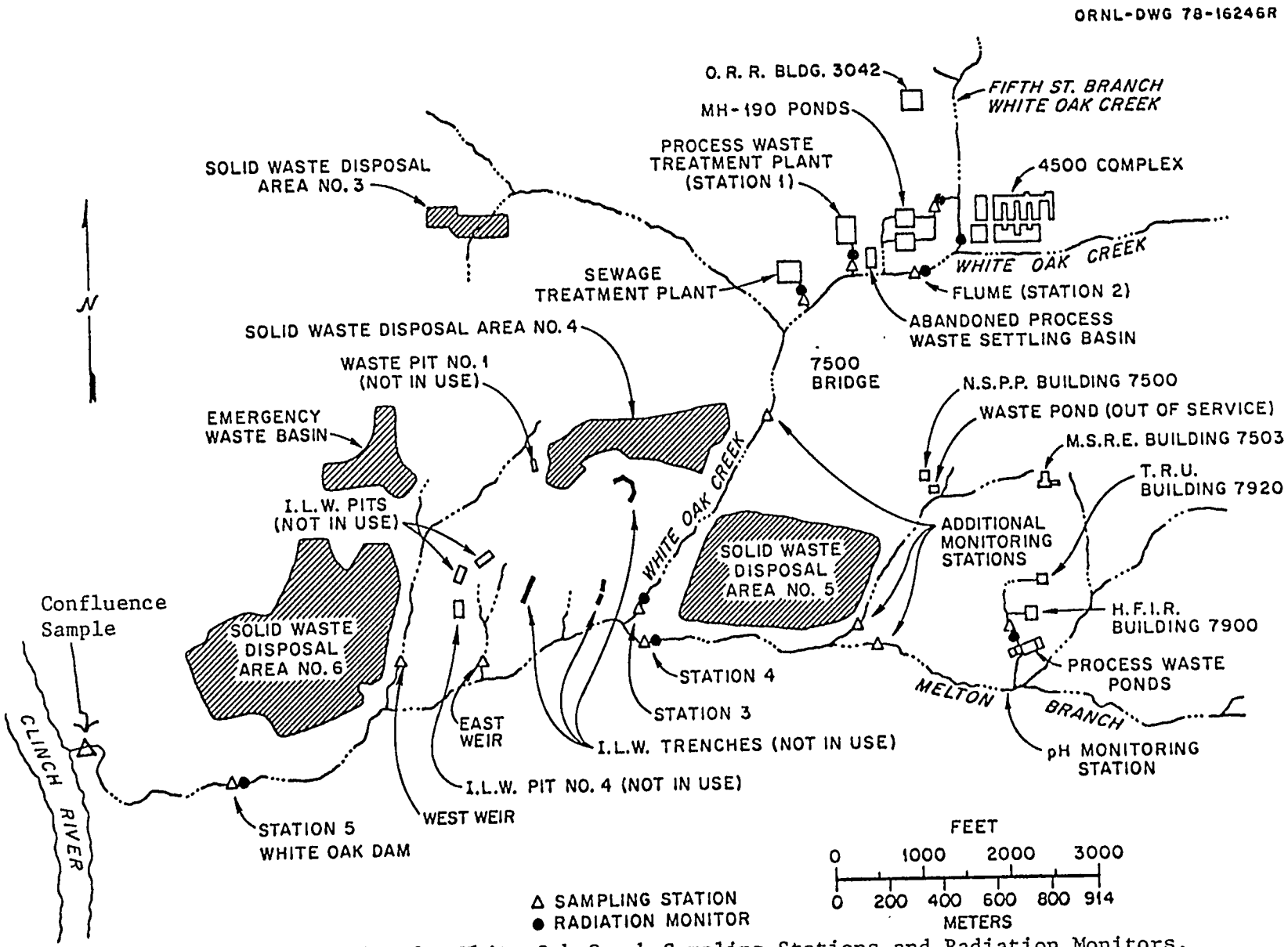


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.058	0.244
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.016	0.075
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.074	0.319
White Oak Dam to Clinch River (ISAHP Measurement)		0.03	0.190

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	44	0.003	0.7	2.53	13.4
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.350	79.8	3.32	17.5
3. Reactor Operations (MH112)	39	0.003	0.7	2.89	15.3
4. Buildings 3503 and 3508	4.3	<0.001	—	0.87	4.6
5. Buildings 3025 and 3026	3.	<0.001	—	2.12	11.2
6. Building 3019	160	0.005	1.1	1.19	6.3
7. Waste Evaporator, Bldg. 2531	240	0.008	1.8	1.20	6.3
8. Building 3525	2.7	<0.001	—	0.82	4.3
9. Building 2026	0.4	<0.001	—	1.12	5.9
10. Tank Farm Drainage	870	0.07	15.9	2.88	15.2

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<92
Radiochemical-Processing Pilot Plant	3020	<0.01	<16
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<13
Total Activity in Gases Released at X-10 Site		<0.01	<123
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		5 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			4.63×10^{-3}
Room 265			1.05×10^{-3}
Building 5505 Discharges Glove Box			1.50×10^{-2}
Hood			1.72×10^{-1}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

DATE ISSUED FEB 26 1981

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE, TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/28

DATE: February 9, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of December 1980

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. A. Cox

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

David R. Hamrin 7/15/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of December was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 64 mCi; this is 11 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 55 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 40 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 5 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December 1980 was 0.26% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 13.1% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.04 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium measurements made at the sampling stations in the tributaries to White Oak Lake are compared on a monthly basis in Figure 2. Table 1 lists the strontium releases from all sources into White Oak Lake. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 53×10^4 and 5.4×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 64.3 mCi of ^{90}Sr into White Oak Lake. This low release continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal. A total of 2.0 mCi of ^{90}Sr was released from the 190 pond system, and an additional 2.4 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 9.5 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area, indicates that about 9.2 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	10.0	
190 Ponds	2.0	
Process Waste Treatment Plant	2.4	
Sewage Treatment Plant	9.5	
	23.9	
7500 Sampling Station	40.0	
Burial Grounds Nos. 1 and 3, and Flood Plains		16.1
Station No. 3	47.2	
Burial Ground No. 4		7.2

Melton Branch

	^{90}Sr Discharge (mCi) By Measurement	By Difference
7900 Area (HFIR and TRU)	<0.1	
7500 Area (NSPP and MSRE)	4.5	
	4.5	
Station No. 4	16.3	
Burial Ground No. 5		11.8

ILW Pit Disposal Area

East Weir	0.1	
West Weir	0.7	
	0.8	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	64.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		35.1
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		54.6

Process Waste

A total of 2.26×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.96×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
398	B	119.5	2467
399	C	118	2505
400	A	139	2520
401	B	137	2525
402	C	113	2577
403	A	140	2618
404	B	147	2518
405	C	170	2500
406	A	167.5	2519

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.46 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	356.2
Volume transferred to evaporators	339.3
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	29.6
W-21, End of Month	46.5
W-22, Beginning of Month[1]	2.4
W-22, End of Month	2.4
W-23, Beginning of Month[2]	52.1
W-23, End of Month	66.0

[1]Standby tank, normally empty

[2]Evaporator Concentrate

	Cubic Meters
Melton Valley Waste Storage Facility Inventory:	
W-24, No change during the period	166.5
W-25, No change during the period	162.8
W-26, Beginning of Month	28.4
W-26, End of Month	30.7*

Tanks W-27 through W-31 remain empty.

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

Building 3525	5.9
Building 3019	13.6
Radioisotopes Processing Area	22.8
ORR and BSR	130.2
High Flux Isotope Reactor	23.2
Fission Products Development Laboratory	23.5**
4500 Complex	36.3
Building 3544	36.6
Transuranium Processing Area	8.6

GASEOUS WASTE

The ORNL Stacks discharged <5 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 158 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.8 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

*This increase due primarily to maintenance operation of the circulating pumps. There was also some leakage into the vault sumps, during wet weather.
**The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

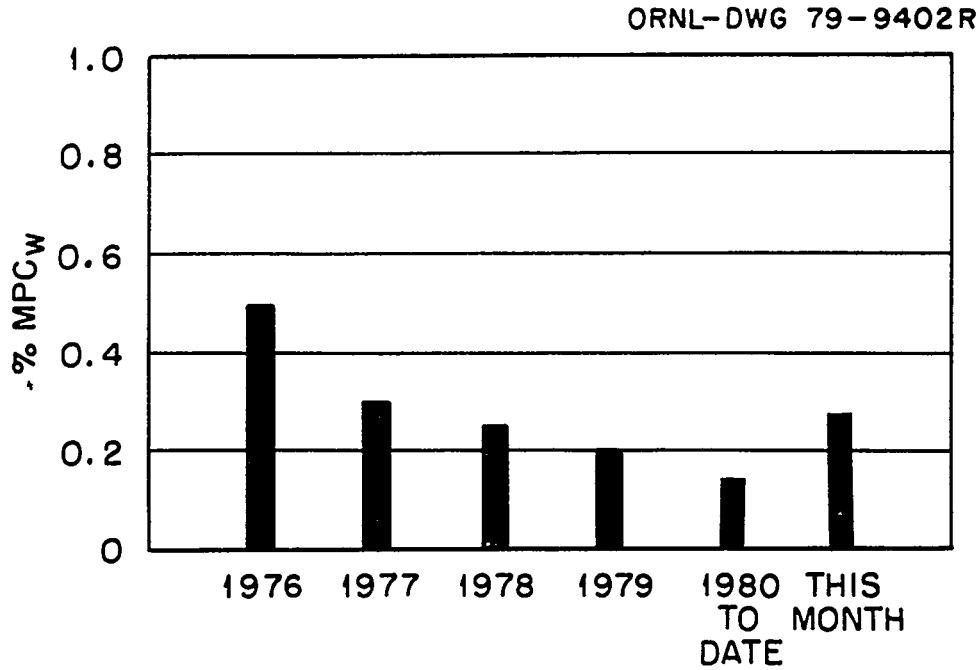


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Measurements at White Oak Dam).

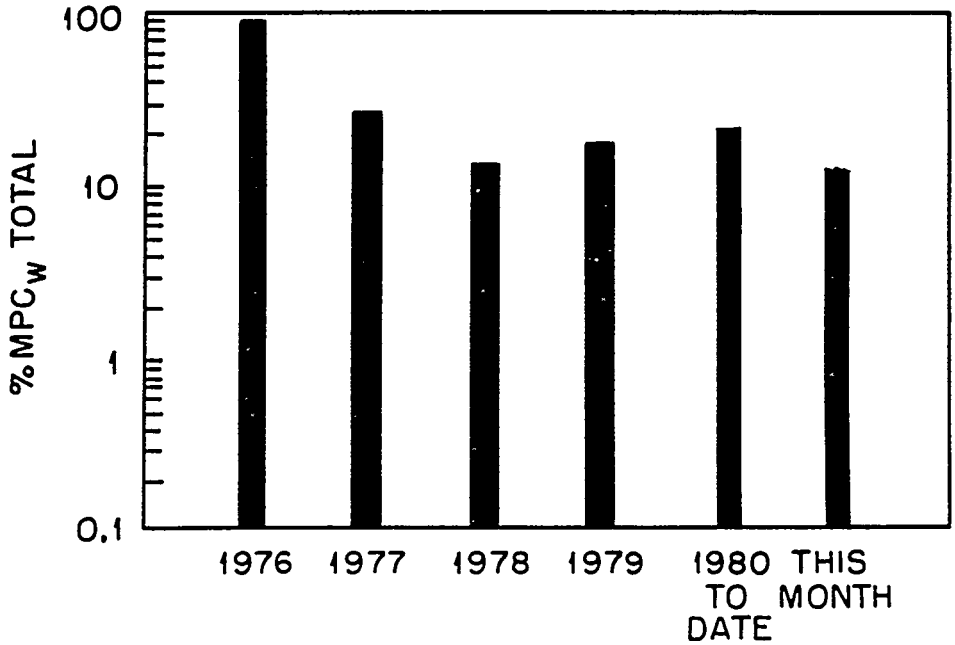


Fig. 1B. Measured Percent of MPC_W in White Oak Creek at the Confluence of White Oak Creek and the Clinch River due to ORNL Discharges (ISAHP Measurements).

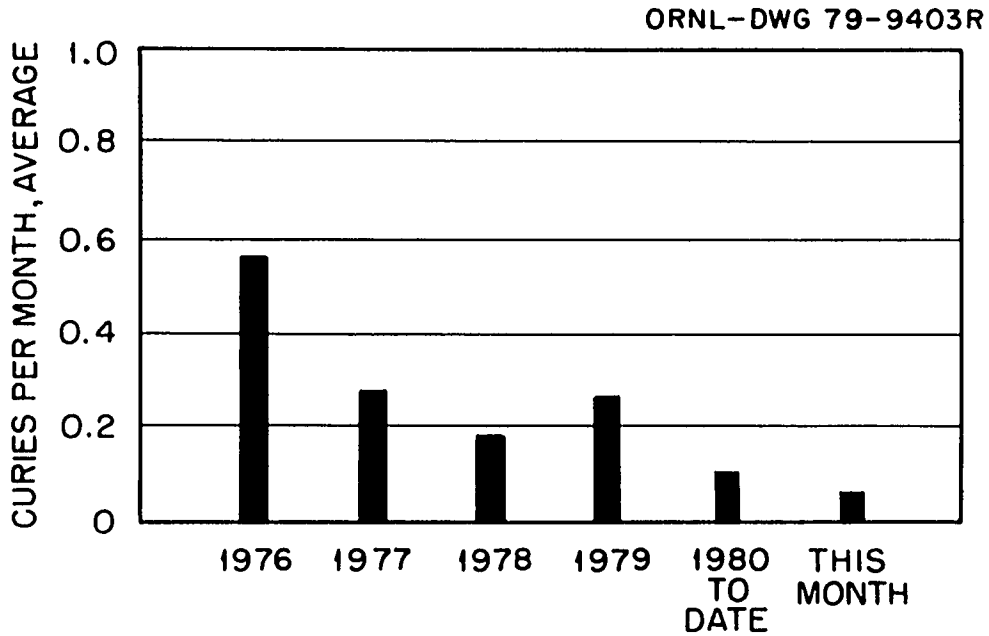


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

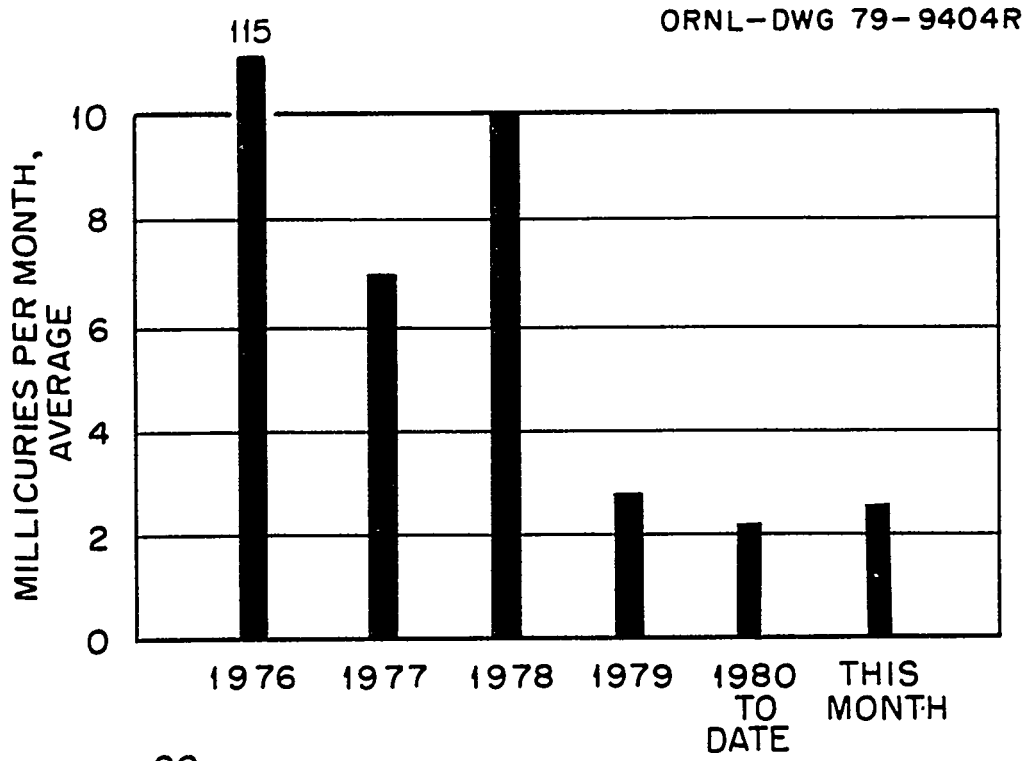


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

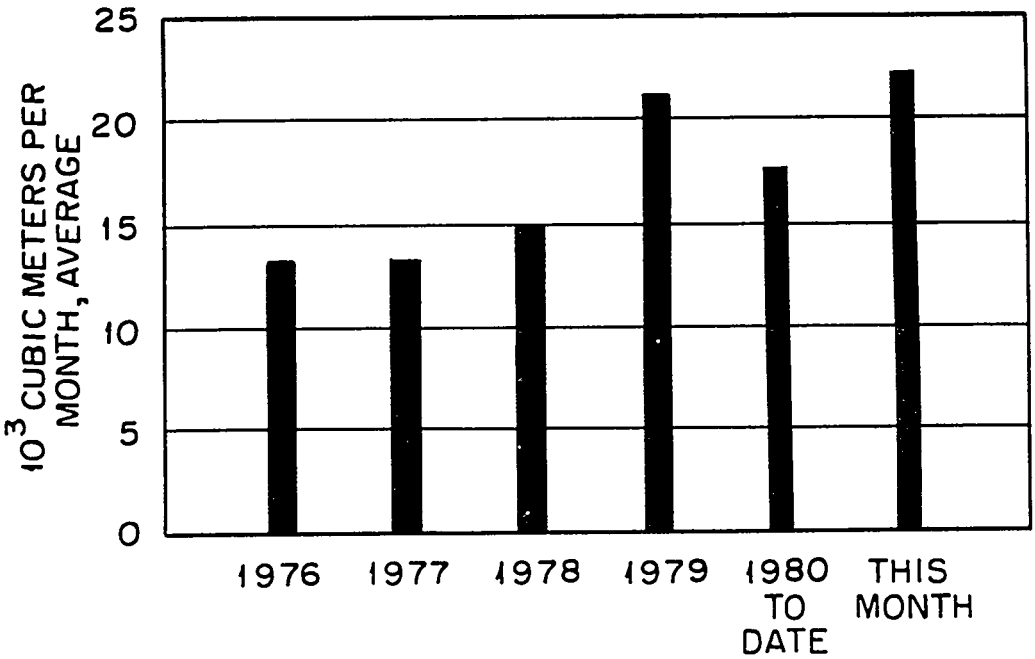


Fig. 4. Process Waste Volumes.

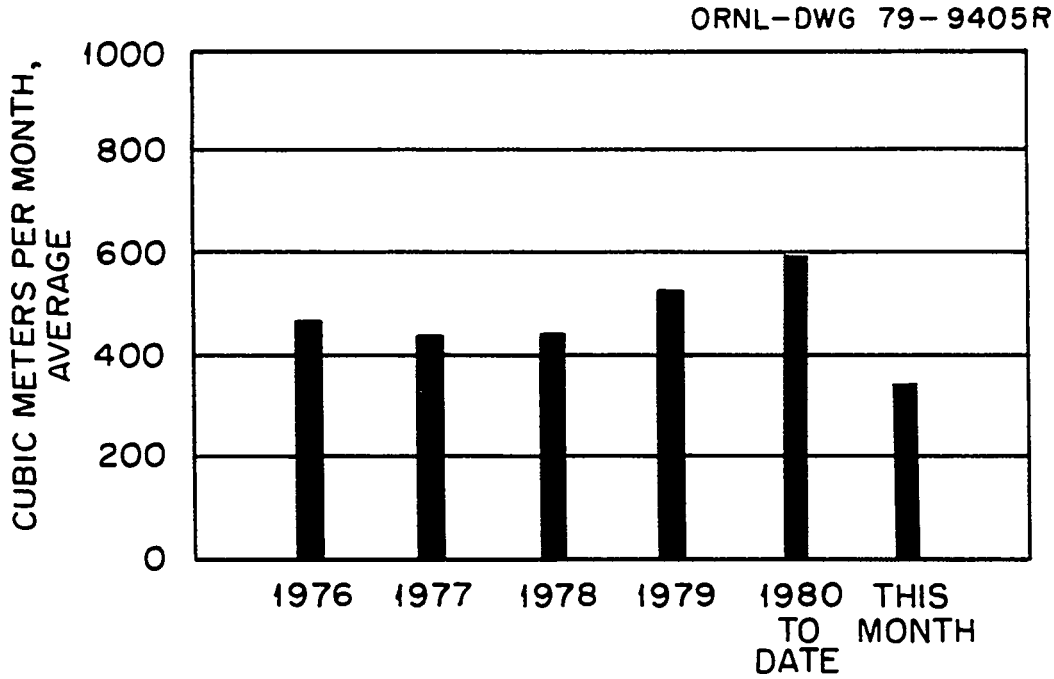


Fig. 5. Intermediate-Level Waste Volumes.

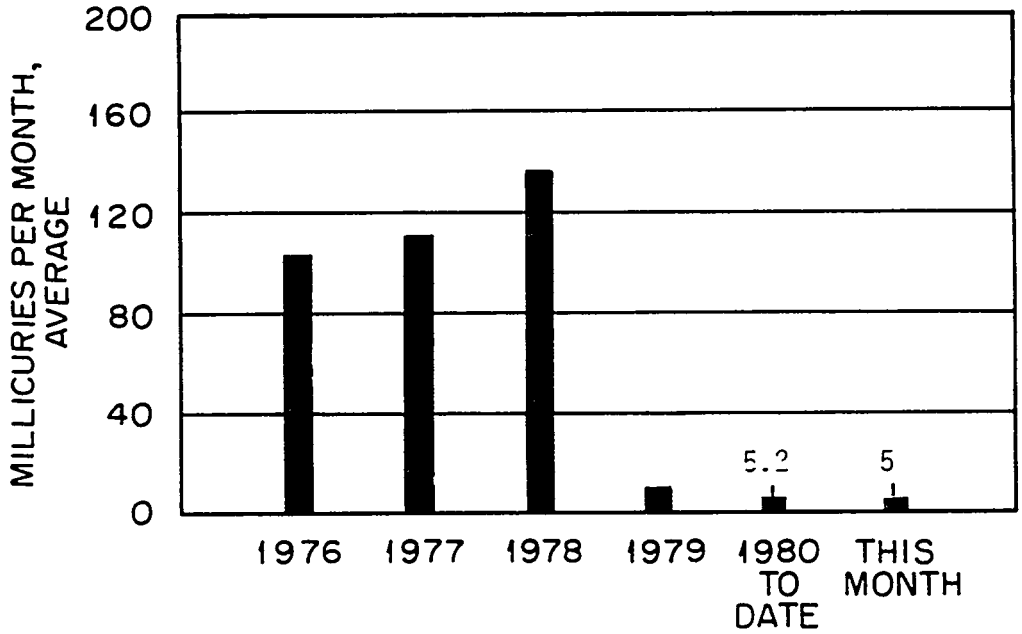


Fig. 6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 Curies per Quarter.

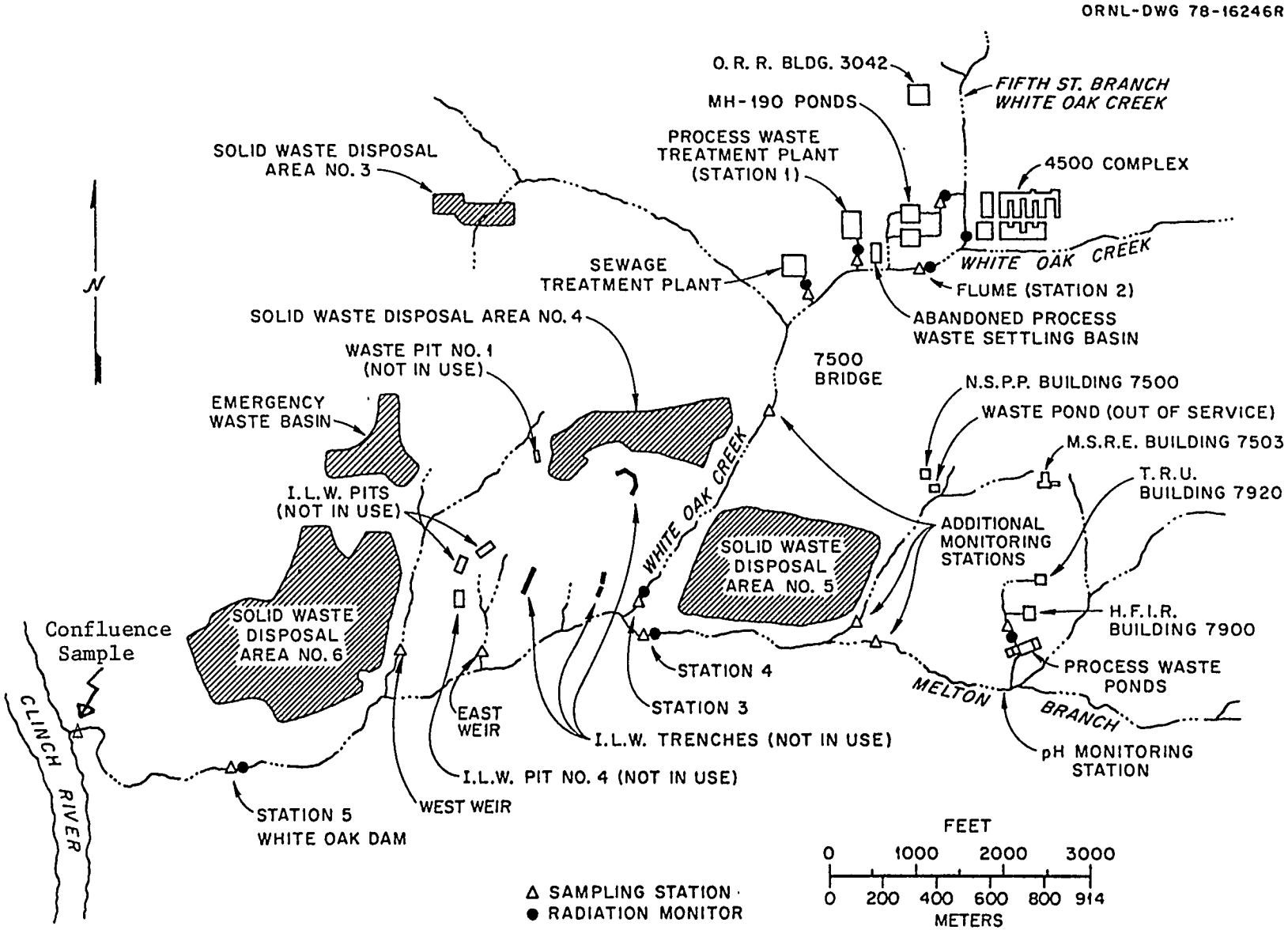


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.047	0.399
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.016	0.089
Discharge from ILW Pits and Trenches	East Weir	<0.001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.063	0.488
White Oak Dam to Clinch River (ISAHP Measurement)		0.040	0.210

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume 10^3m^3	Volume % of Total
1. Radioisotopes Processing Area (MH234)	1600	0.136	14.3	3.15	15.3
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.477	50.3	3.80	18.4
3. Reactor Operations (MH112)	51	0.004	0.4	2.80	13.6
4. Buildings 3503 and 3508	1.3	<0.001	—	0.97	4.7
5. Buildings 3025 and 3026	4	<0.001	—	2.44	11.8
6. Building 3019	40	0.001	0.1	1.01	4.9
7. Waste Evaporator, Bldg. 2531	2300	0.100	10.5	1.59	7.7
8. Building 3525	2.7	<0.001	—	0.96	4.7
9. Building 2026	1.7	<0.001	—	1.21	5.9
10. Tank Farm Drainage	3200	0.230	24.4	2.67	13.0

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<137
Radiochemical-Processing Pilot Plant	3020	<0.01	<5
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<14
Total Activity in Gases Released at X-10 Site		<0.01	<158
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		45 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			1.05×10^{-3}
Building 5505 Discharges Glove Box			5.00×10^{-3}
Hood			2.58×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/54

DATE: March 10, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of January 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. A. Cox

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

Technical Information Officer ORNL Site — Date 7/12/96

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of January was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 54.4 mCi; this is 10 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 67 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 54 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 5 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of January 1981 was 0.18% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 25.4% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.05 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake is shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 52×10^4 and 9×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 50.3 mCi of ^{90}Sr into White Oak Lake. This low release continues to reflect the arid conditions during the reporting period.

The controlled releases into White Oak Creek were normal. A total of 0.8 mCi of ^{90}Sr was released from the 190 pond system, and an additional 1.5 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 4.2 mCi.

The following tabulation lists the measured amounts of ^{90}Sr dis-

charged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drains the Burial Ground No. 3 disposal area, indicates that about 8.9 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	9.0	
190 ponds	0.8	
Process Waste Treatment Plant	1.5	
Sewage Treatment Plant	4.2	
	15.5	
7500 Sampling Station	26.8	
Burial Grounds Nos. 1 and 3, and Flood Plains		11.3
Station No. 3	39.7	
Burial Ground No. 4		12.9
Melton Branch		
7900 Area (HFIR and TRU)	0.5	
7500 Area (NSPP and MSRE)	3.0	
	3.5	

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Station No. 4	10.6	
Burial Ground No. 5		7.1
ILW Pit Disposal Area		
East Weir	3.6	
West Weir	0.5	
	4.1	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	54.4	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		35.4
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		65.1

Process Waste

A total of 1.82×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.78×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
407	B	149.5	2541
408	C	169.5	2532
409	A	182.5	2573
410	B	133	2589
411	C	139	2391
412	A	135	2405
413	B	135	2571
414	C	147.5	2522

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.41 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	359.7
Volume transferred to evaporators	305.6
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	29.6
W-21, End of Month	35.2
W-22, Beginning of Month	2.4
W-22, End of Month	50.9
W-23, Beginning of Month	52.1
W-23, End of Month	74.7

	Cubic Meters
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	166.8
W-24, End of Period	136.8
W-25, Beginning of Period	154.9
W-25, End of Period	139.1
W-26, Beginning of Period	30.7
W-26, End of Period	87.0

Tanks W-27 through W-31 remain empty.

Tank WC-20, a new collection/monitoring tank, was placed in service late in the month. This waste handling facility, consisting of a ventilated tank contained within a concrete vault, will handle the ILW generated at the TRU Facility. A list of major contributors of intermediate level waste is given below. Figure 5 compares the volumes of ILW generated each month.

Building 3525	4.9
Building 3019	30.6
Radioisotopes Processing Area	12.6
ORR and BSR	79.4
High Flux Isotope Reactor	12.2
Fission Products Development Laboratory	35.5*
4500 Complex	46.1
Building 3544	33.2
Transuranium Processing Area	8.5

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged <5 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 142 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

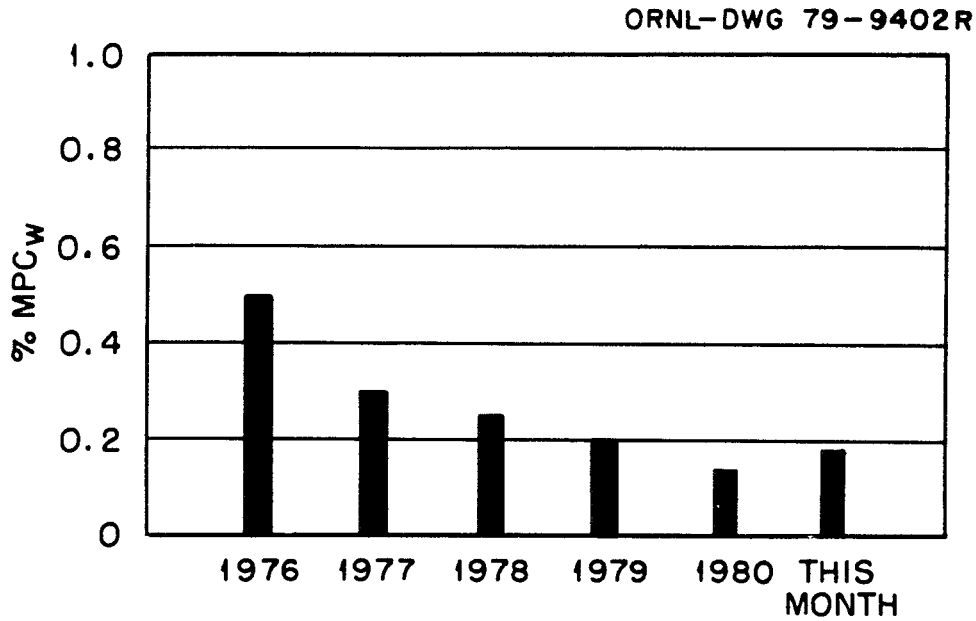


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Measurements at White Oak Dam).

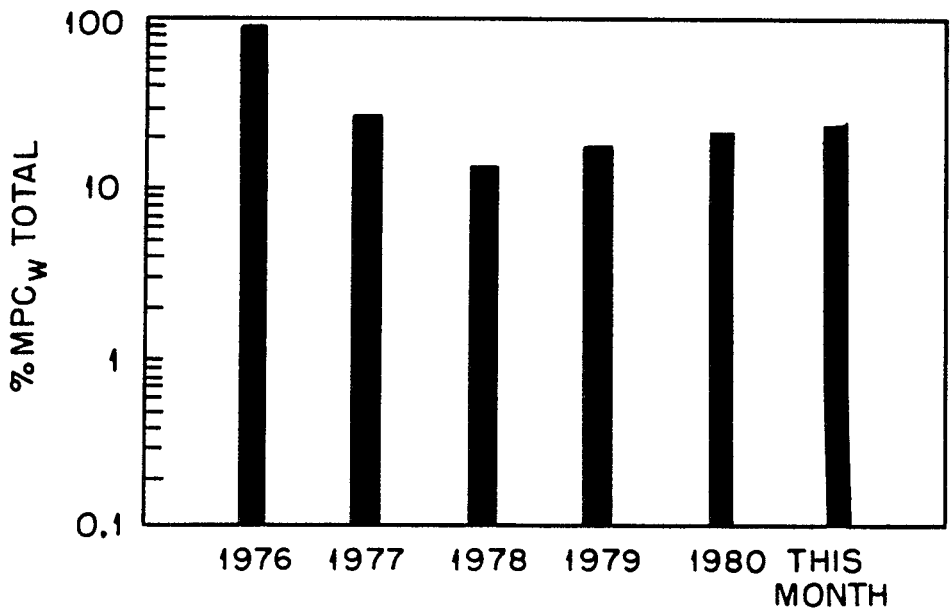


Fig. 1B. Measured Percent of MPC_W in White Oak Creek at the Confluence of White Oak Creek and the Clinch River due to ORNL Discharges (ISAHP Measurements).

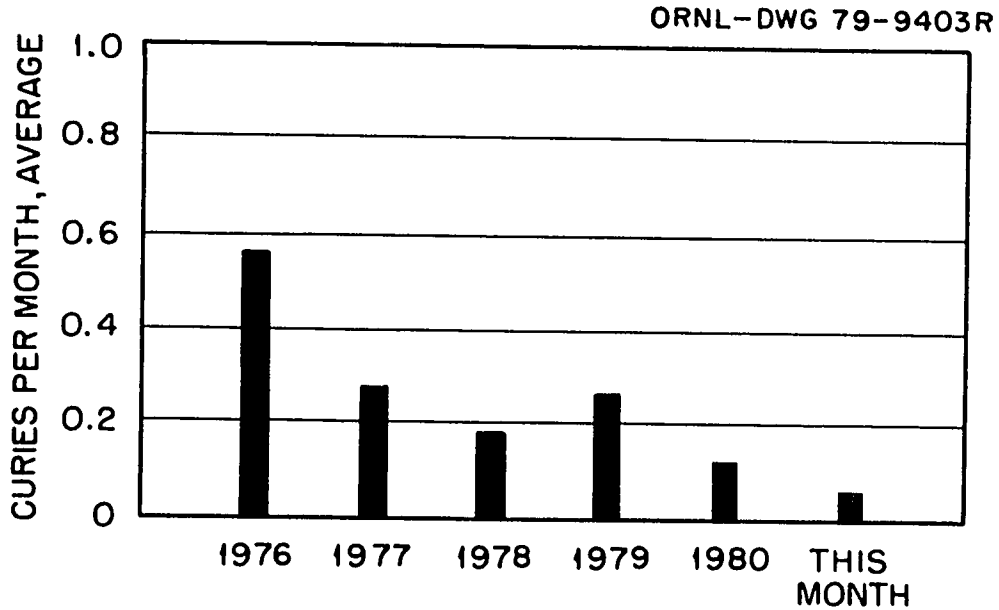


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

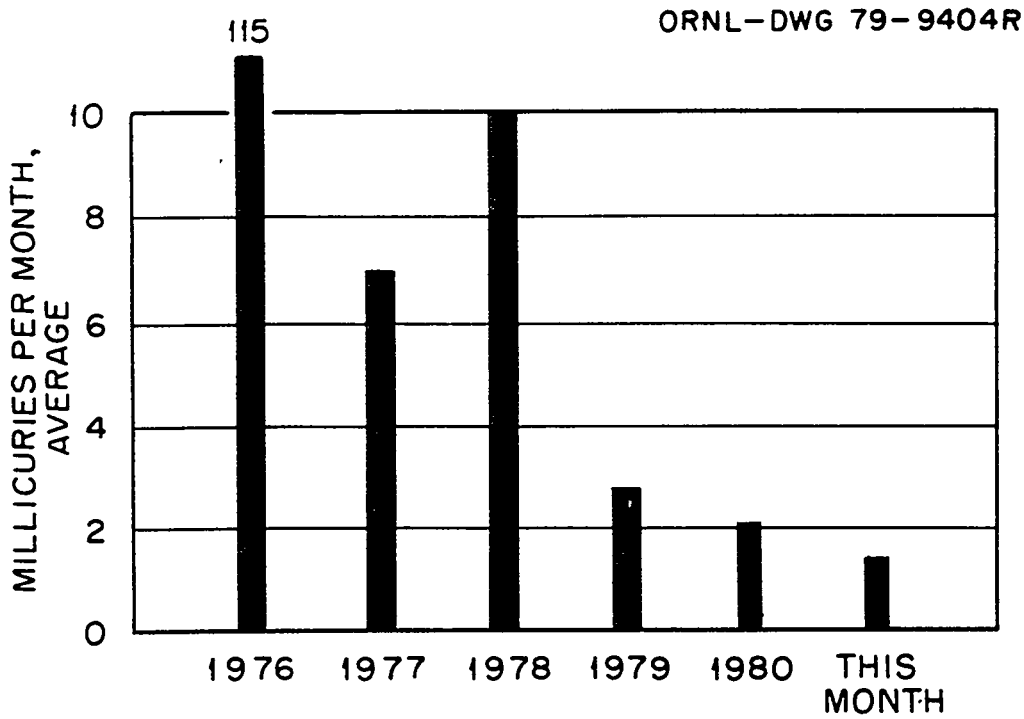


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

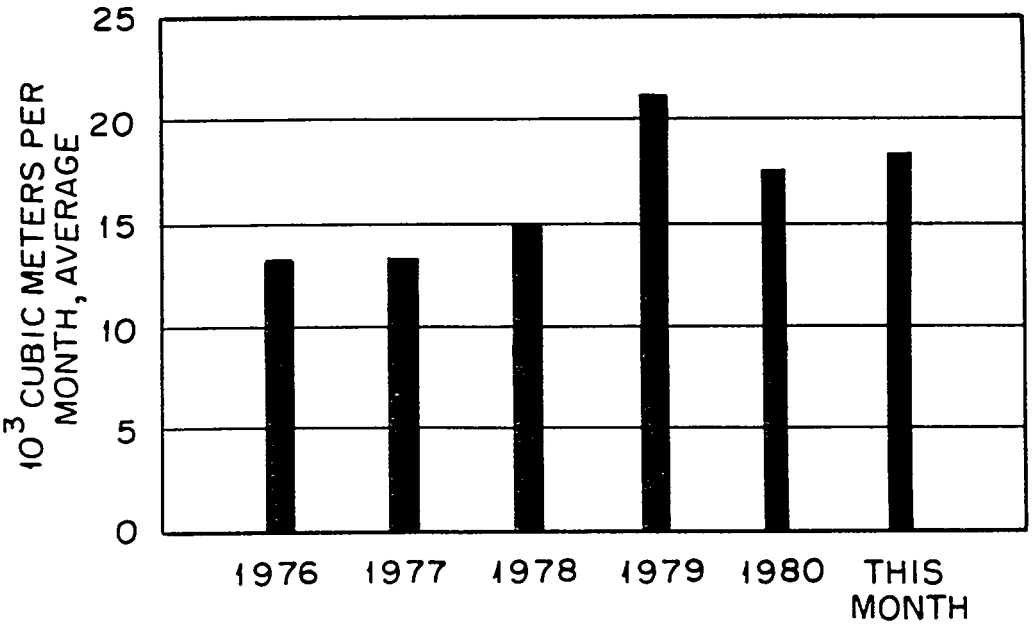


Fig. 4. Process Waste Volumes.

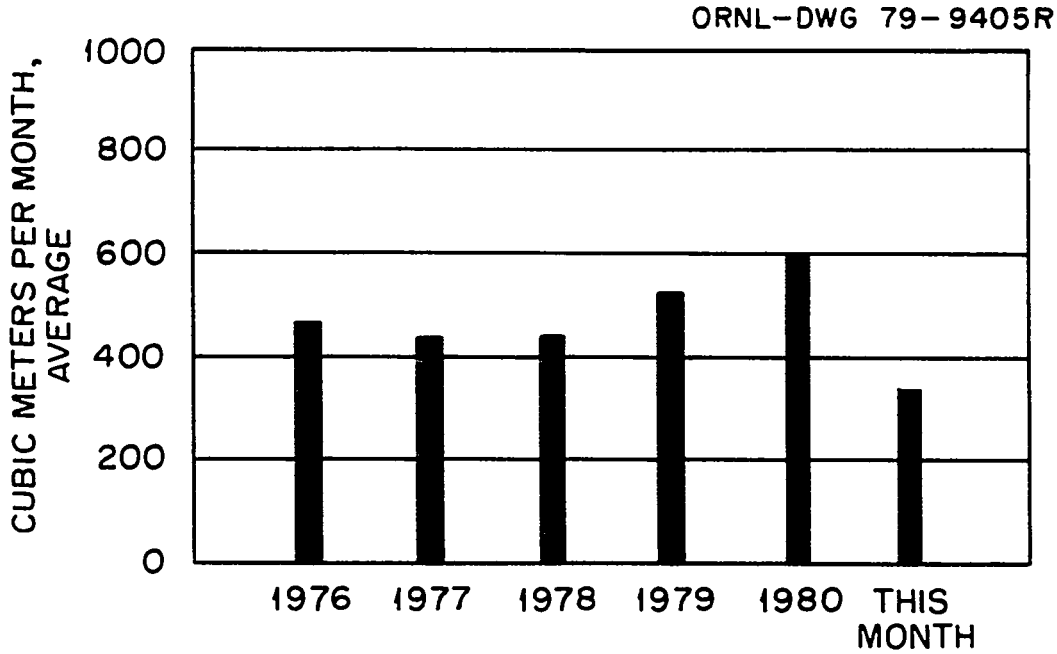


Fig. 5. Intermediate-Level Waste Volumes.

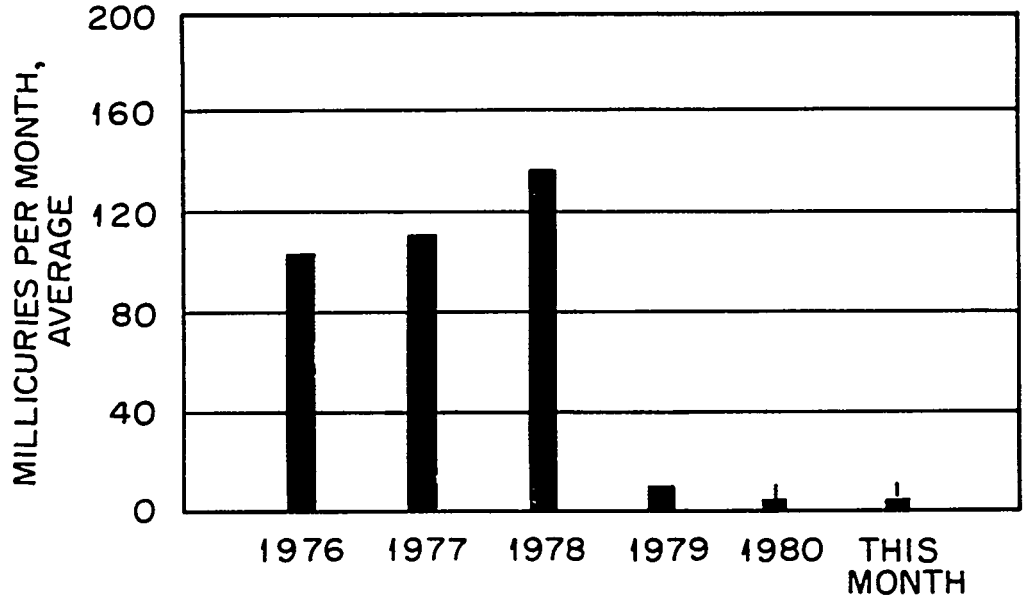


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

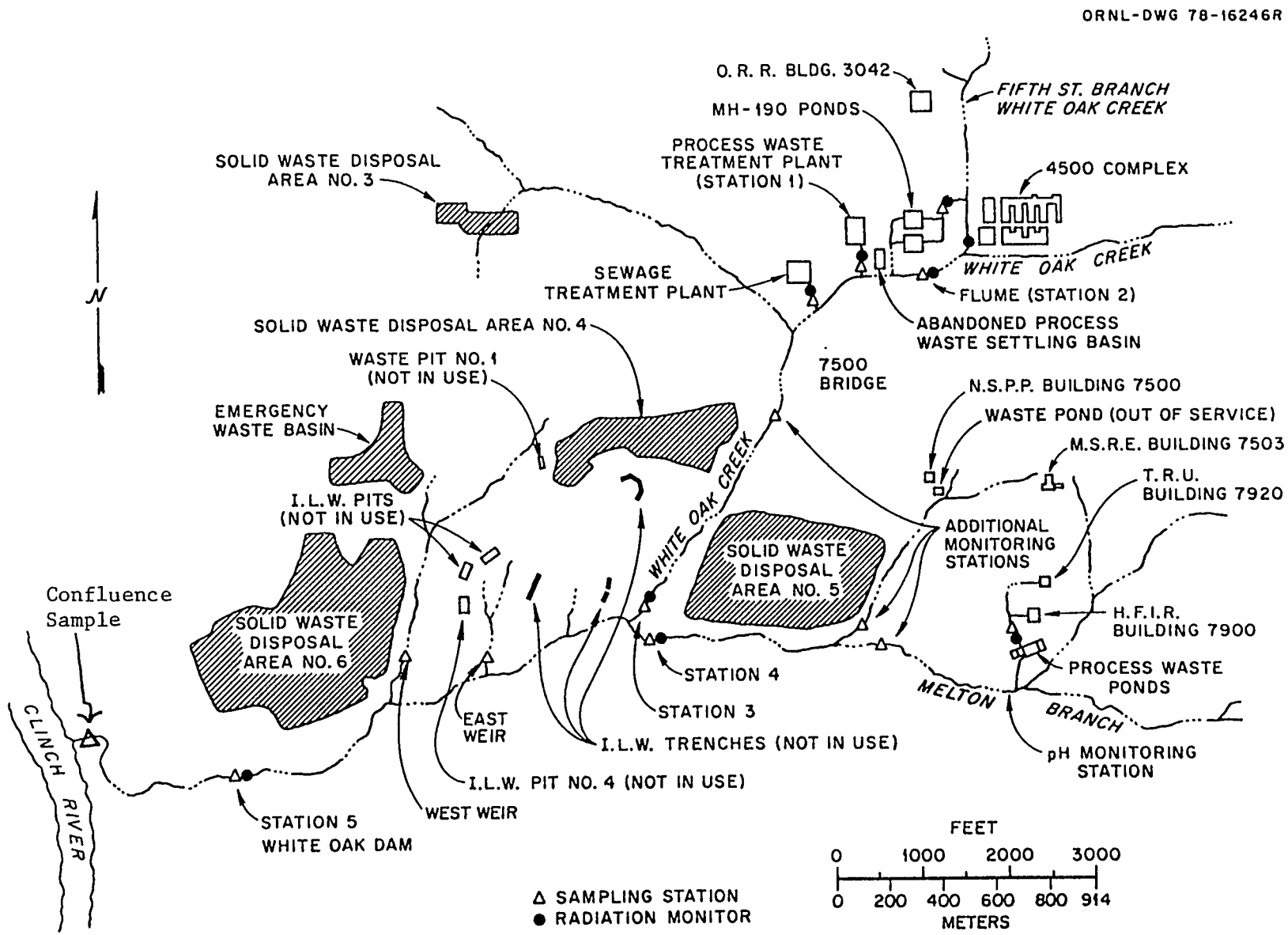


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0397	0.425
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0106	0.063
Discharge from ILW Pits and Trenches	East Weir	0.0041	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	<0.001	—
Total discharge from all sources		0.0544	0.488
White Oak Dam to Clinch River (ISAHP Measurement)		0.054	0.220

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	704	0.087	11.7	4.57	22.0
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.410[a]	55.2	3.65	17.6
3. Reactor Operations (MH112)	26	0.001	0.1	1.93	9.3
4. Buildings 3503 and 3508	2.9	<0.001	—	1.30	6.3
5. Buildings 3025 and 3026	83	0.005	0.6	2.02	9.8
6. Building 3019	1.6	<0.001	—	1.19	5.8
7. Waste Evaporator, Bldg. 2531	2850	0.091	12.2	1.19	5.8
8. Building 3525	0.8	<0.001	—	1.32	6.4
9. Building 2026	1.8	<0.001	—	1.17	5.7
10. Tank Farm Drainage	2360	0.149	20.2	2.34	11.3

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<132
Radiochemical-Processing Pilot Plant	3020	<0.01	<2
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<8
Total Activity in Gases Released at X-10 Site		<0.01	<142
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		141 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			3.50×10^{-4}
Building 5505 Discharges Glove Box			2.25×10^{-3}
Hood			3.87×10^{-2}

[a]Activity primarily ^{131}I except as noted.
[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c]No data available at this time.

2511

DATE RECEIVED APR 1981

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/71

DATE: April 10, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of February 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. A. Cox

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

David R Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of February was normal. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 168.0 mCi; this is 113.6 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 73 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 160 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 5 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of Februarv 1981 was 1.25% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 51.1% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.16 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 81×10^4 and 24×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 160.6 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into White Oak Creek were normal. A total of 0.2 mCi of ^{90}Sr was released from the 190 pond system, and an additional 1.3 mCi was released via the Process Waste Treatment Plant.

The release from the sanitary system amounted to 14.9 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the

discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drain the Burial Ground No. 3 disposal area, indicates that about 13.6 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	14.4	
190 Ponds	0.4	
Process Waste Treatment Plant	1.3	
Sewage Treatment Plant	14.9	
	31.0	
7500 Sampling Station	59.2	
Burial Grounds Nos. 1 and 3, and Flood Plains		28.2
Station No. 3	122.0	
Burial Ground No. 4		62.8

Melton Branch

7900 Area (HFIR and TRU)	0.2
7500 Area (NSPP and MSRE)	6.3
	6.5

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Station No. 4	38.6	
Burial Ground No. 5		32.1
ILW Pit Disposal Area		
East Weir	7.0	
West Weir	0.4	
	7.4	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	168.0	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		123.1
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		73.4

Process Waste

A total of 2.21×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 2.05×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the following page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
415	A	158	2511
416	B	160	2543
417	C	148	2507
418	A	140	2564
419	B	137	2493
420	C	130	2399
421	A	136.5	2408
422	B	147	2456

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.70 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	470.4
Volume transferred to evaporators	473.0
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	35.2
W-21, End of Month	57.7
W-22, Beginning of Month	50.9
W-22, End of Month	25.8
W-23, Beginning of Month	74.7
W-23, End of Month	87.0

	Cubic Meters
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	136.8
W-24, End of Period	134.6
W-25, Beginning of Period	154.9
W-25, End of Period	139.1
W-26, Beginning of Period	87.0
W-26, End of Period	89.3

Tanks W-27 through W-31 remain empty.

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

Building 3525	4.0
Building 3019	29.4
Radioisotopes Processing Area	42.2
ORR and BSR	146.2
High Flux Isotope Reactor	47.3
Fission Products Development Laboratory	29.0*
4500 Complex	51.5
Building 3544	48.6
Transuranium Processing Area	19.9

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged <5 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 192 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.8 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

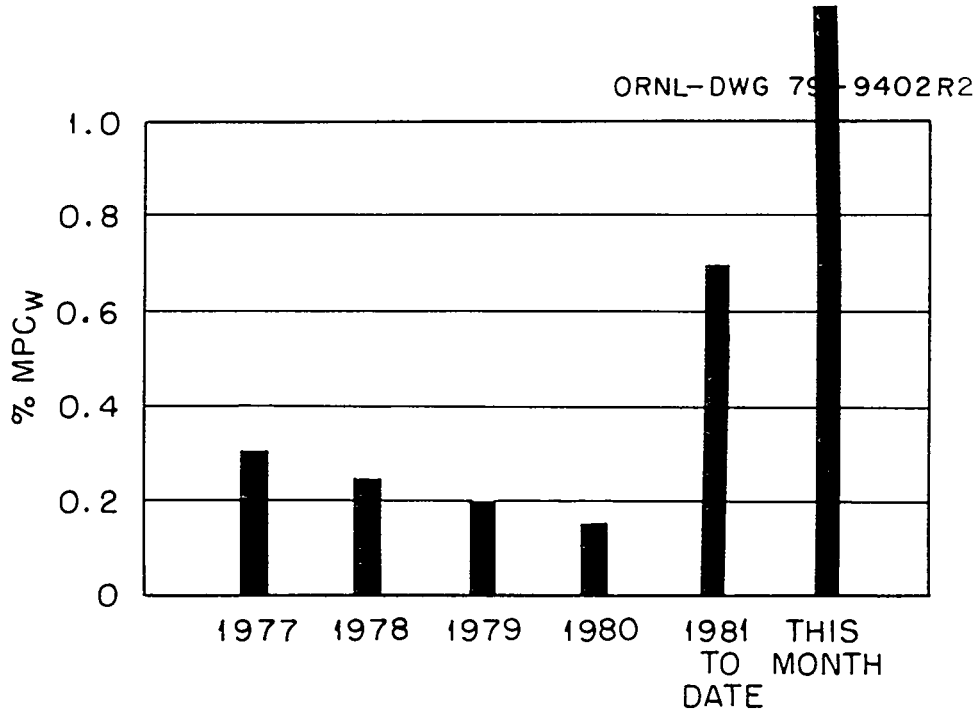


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

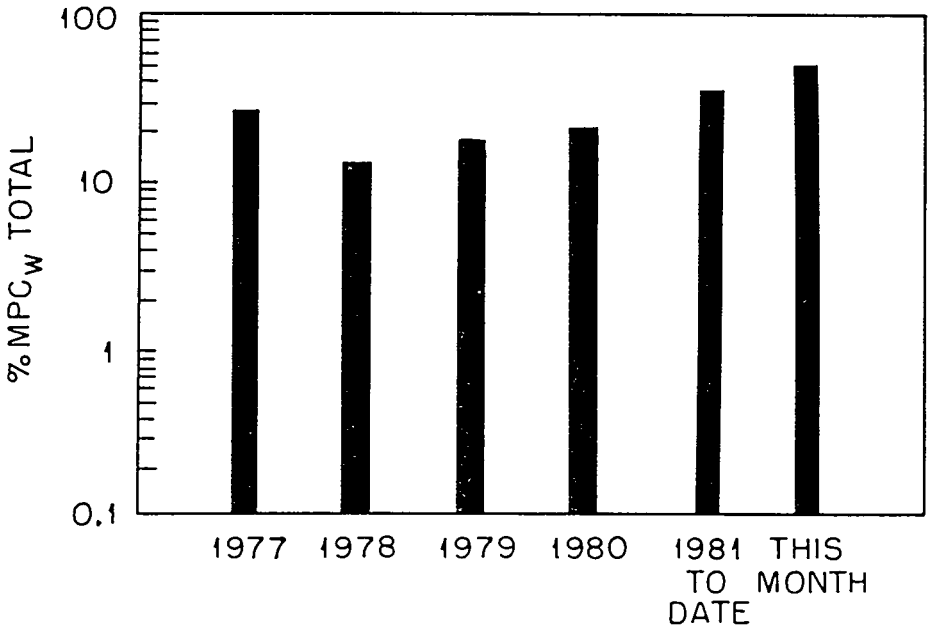


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

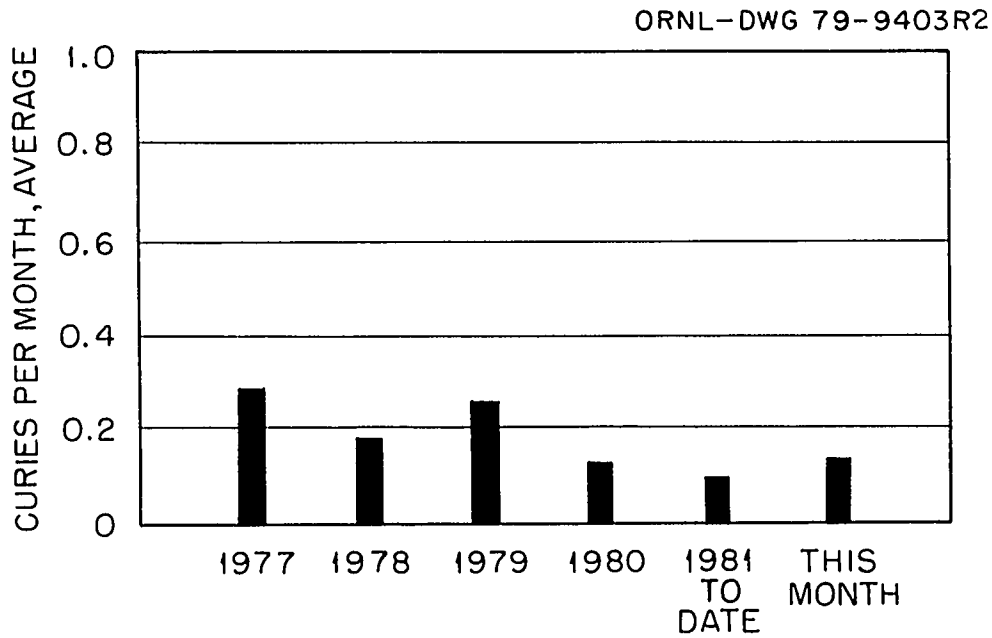


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

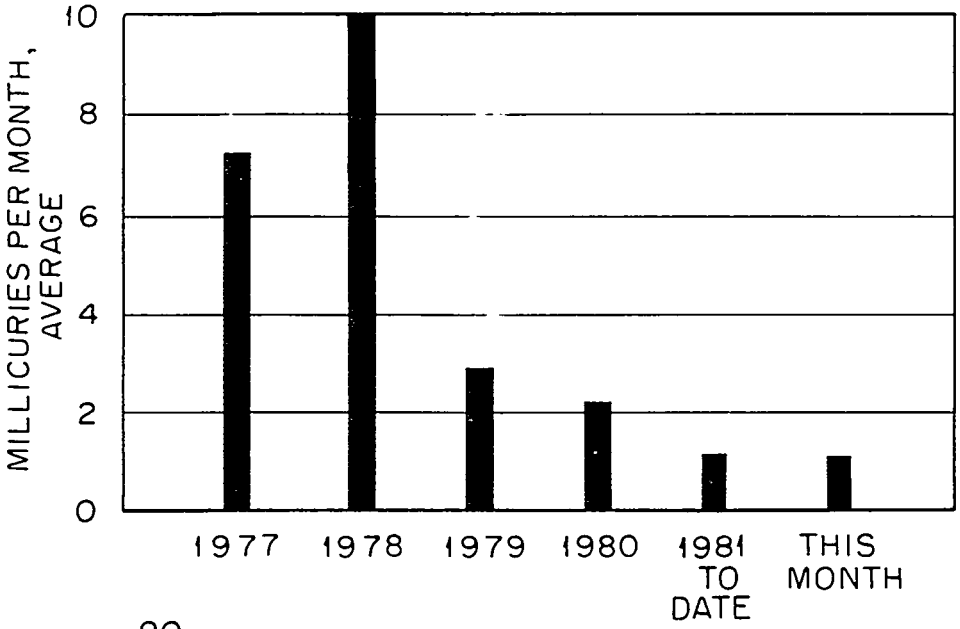


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

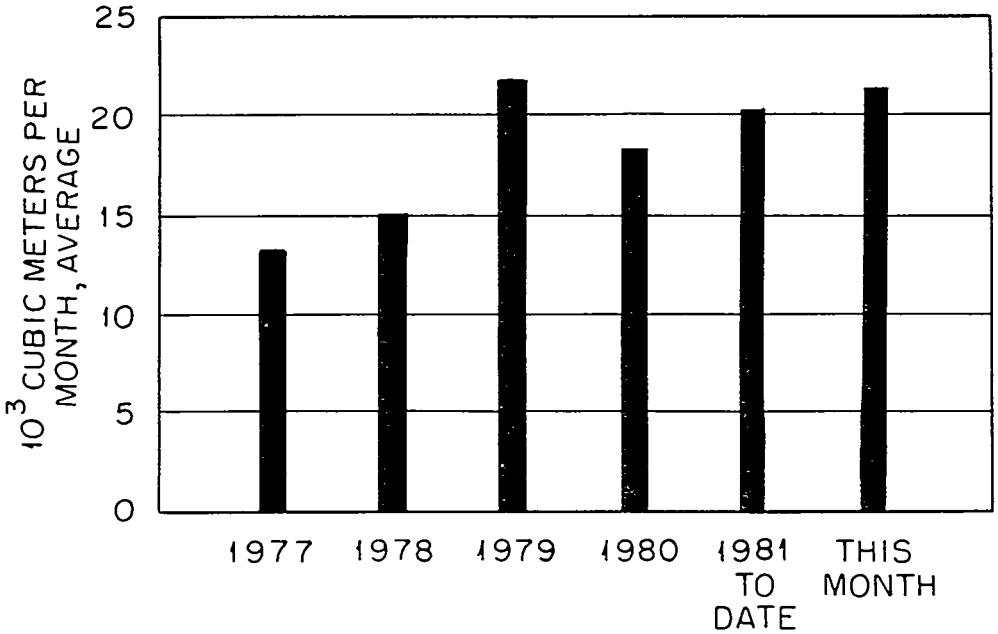


Fig. 4. Process Waste Volumes.

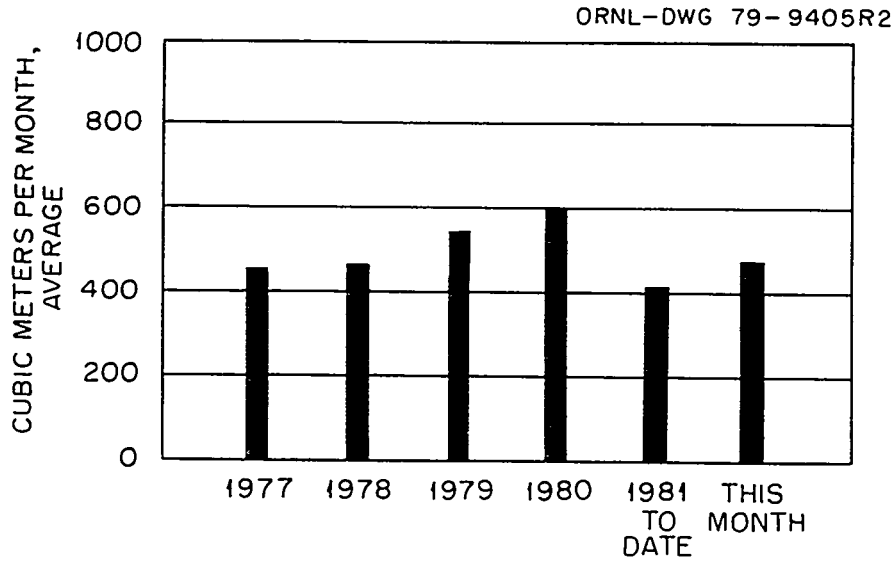


Fig. 5. Intermediate-Level Waste Volumes.

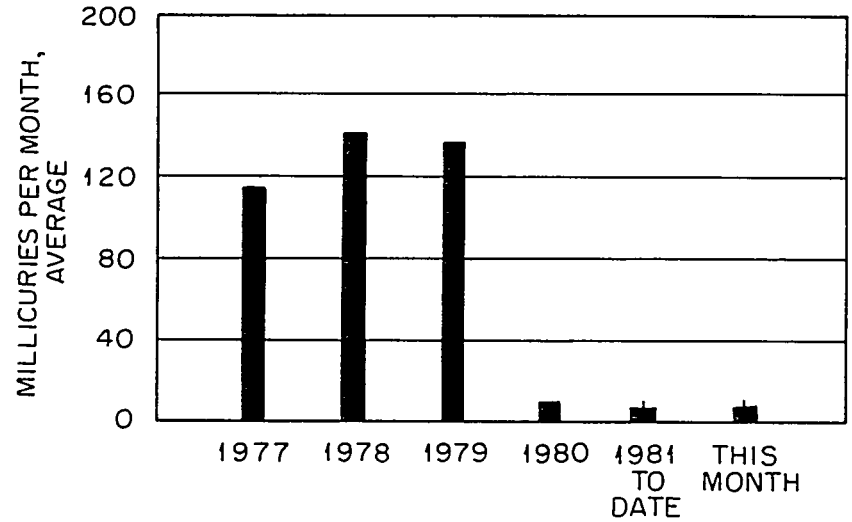


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

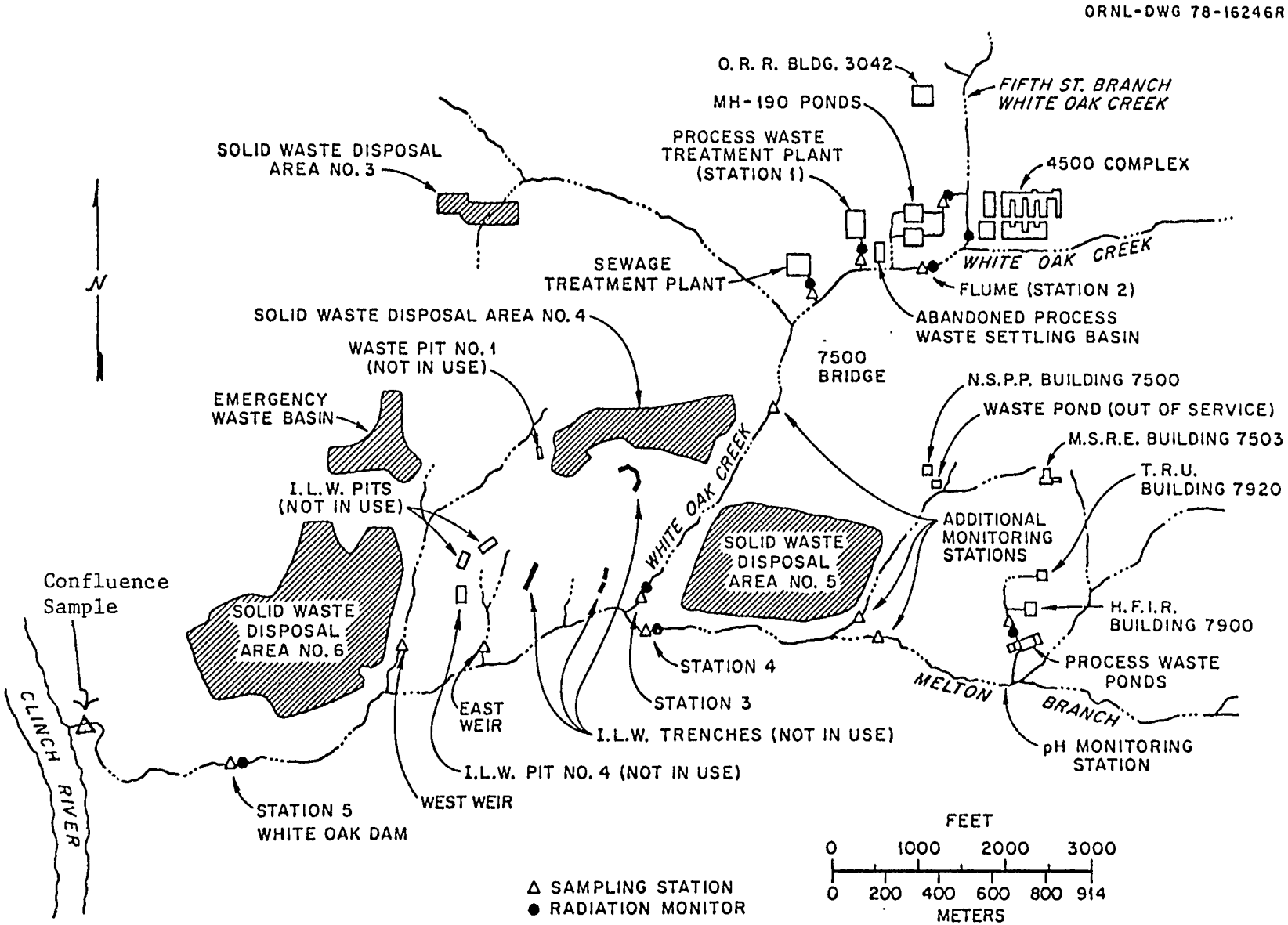


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1220	0.828
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0386	0.209
Discharge from ILW Pits and Trenches	East Weir	0.0004	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0070	—
Total discharge from all sources		0.1680	1.037
White Oak Dam to Clinch River (ISAHP Measurement)		0.160	0.56

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	720	0.105	12.4	5.39	25.2
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.235[a]	27.8	1.60	7.5
3. Reactor Operations (MH112)	76	0.006	0.7	2.88	13.5
4. Buildings 3503 and 3508	14	<0.001	—	1.15	5.4
5. Buildings 3025 and 3026	11	<0.001	—	1.99	9.3
6. Building 3019	50	0.002	0.2	1.23	5.8
7. Waste Evaporator, Bldg. 2531	3400	0.164	19.4	1.79	8.4
8. Building 3525	1.8	<0.001	—	1.10	5.1
9. Building 2026	6.1	0.001	—	1.16	5.4
10. Tank Farm Drainage	4000	0.332	39.5	3.07	14.4

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<163
Radiochemical-Processing Pilot Plant	3020	<0.01	<3
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<24
Total Activity In Gases Released At X-10 Site		<0.01	<192
Chem. Tech. Division — Y-12 Area			(c)
Tritium Target Fabrication Building		4 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			3.50×10^{-4}
Building 5505 Discharges Glove Box			2.25×10^{-3}
Hood			3.87×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

2511

DATE ISSUED MAY 22

ORNL

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/83

DATE: May 7, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of March 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. H. Swanks

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

David R Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of March was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 113.3 mCi; this is 54.7 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 64 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 71 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 7 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of March 1981 was 1.40% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 41.8% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.071 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 68×10^4 and 15×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 110.3 mCi of ^{90}Sr into White Oak Lake.

The amount of ^{90}Sr (14.2 mCi) released by the Process Waste Treatment Plant was high; about 1 mCi per month is the normal discharge from this system. Most of this contamination was probably released during the last four days of the period, and it was the result of poor ion exchange caused by handling feed water saturated with interfering ions. A total of 0.4 mCi of ^{90}Sr was released from the 190 pond systems. The release from the sanitary system amounted to 7.7 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drain the Burial Ground No. 3 disposal area, indicates that about 10.8 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	11.1	
190 Ponds	0.4	
Process Waste Treatment Plant	14.2	
Sewage Treatment Plant	7.7	
	33.4	
7500 Sampling Station	46.7	
Burial Grounds Nos. 1 and 3, and Flood Plains		13.3
Station No. 3	81.5	
Burial Ground No. 4		34.8

Melton Branch

	^{90}Sr Discharge (mCi) By Measurement	By Difference
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	4.5	
	4.6	
Station No. 4	28.8	
Burial Ground No. 5		24.2
ILW Pit Disposal Area		
East Weir	<0.1	
West Weir	3.0	
	3.0	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	113.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		72.3
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		63.8

Process Waste

A total of 1.99×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.70×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

On March 27, demineralizer strip solution was inadvertently dumped into the collection system thus saturating it with Na+ ions. Since the columns are in the Na form during the loading phase, the ion exchange process deteriorated, and as a result, the ^{90}Sr content of the plant effluent during the remainder of the month was higher than normal.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
423	C	125	2592
424	A	153.5	2539
425	B	148.5	2323
426	C	129	2561
427	A	122	2440
428	B	132.5	2456
429	C	135.5	2538
430	A	148	2495

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.43 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	450.6
Volume transferred to evaporators	320.4
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	57.7
W-21, End of Month	93.8
W-22, Beginning of Month	25.8
W-22, End of Month	36.4
W-23, Beginning of Month	87.0
W-23, End of Month	100.8

	Cubic Meters
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	134.6
W-24, End of Period	141.3
W-25, Beginning of Period	139.1
W-25, End of Period	139.1
W-26, Beginning of Period	89.3
W-26, End of Period	123.3

Tanks W-27 through W-31 remain empty.

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

Building 3525	4.4
Building 3019	39.7
Radioisotopes Processing Area	30.4
ORR and BSR	51.1
High Flux Isotope Reactor	72.7
Fission Products Development Laboratory	18.5*
4500 Complex	23.4
Building 3544	45.1
Transuranium Processing Area	9.1

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

GASEOUS WASTE

The ORNL Stacks discharged <7 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 124 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.6 and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

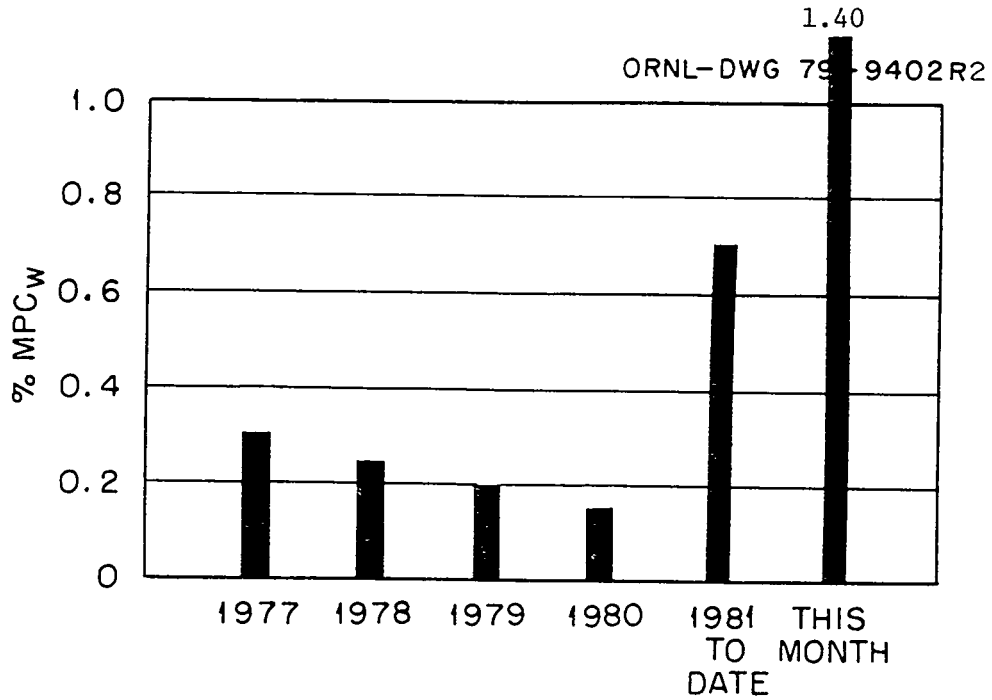


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

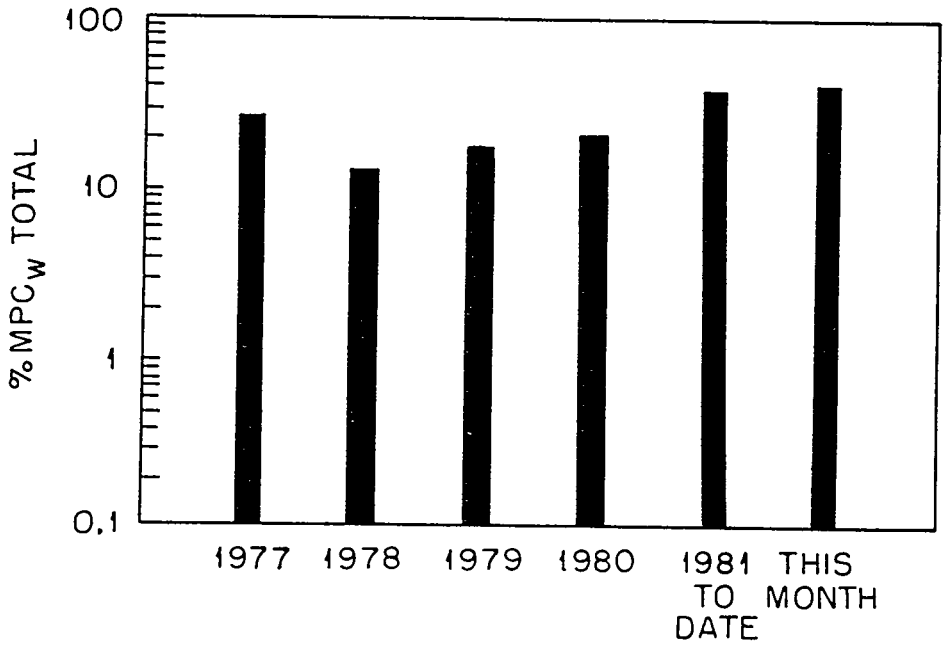


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

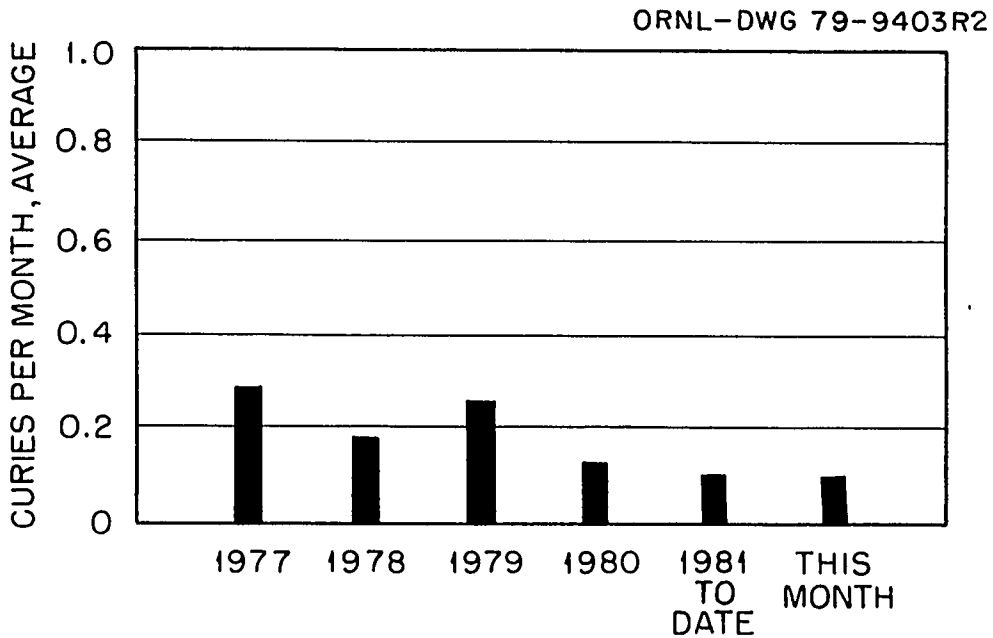


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

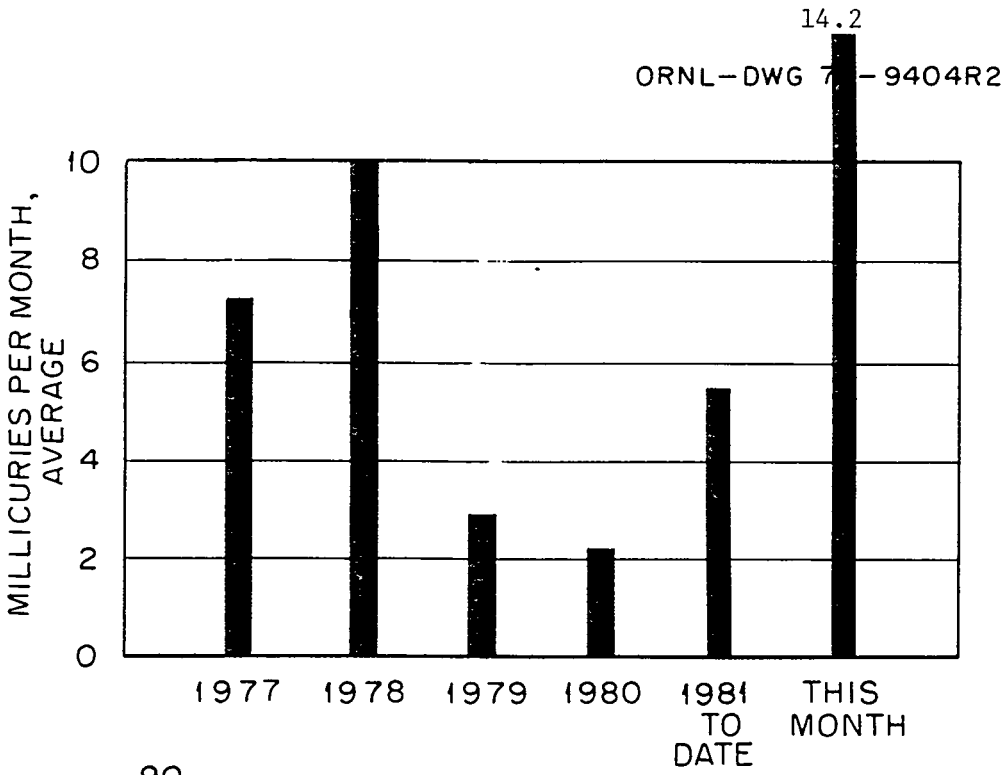


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

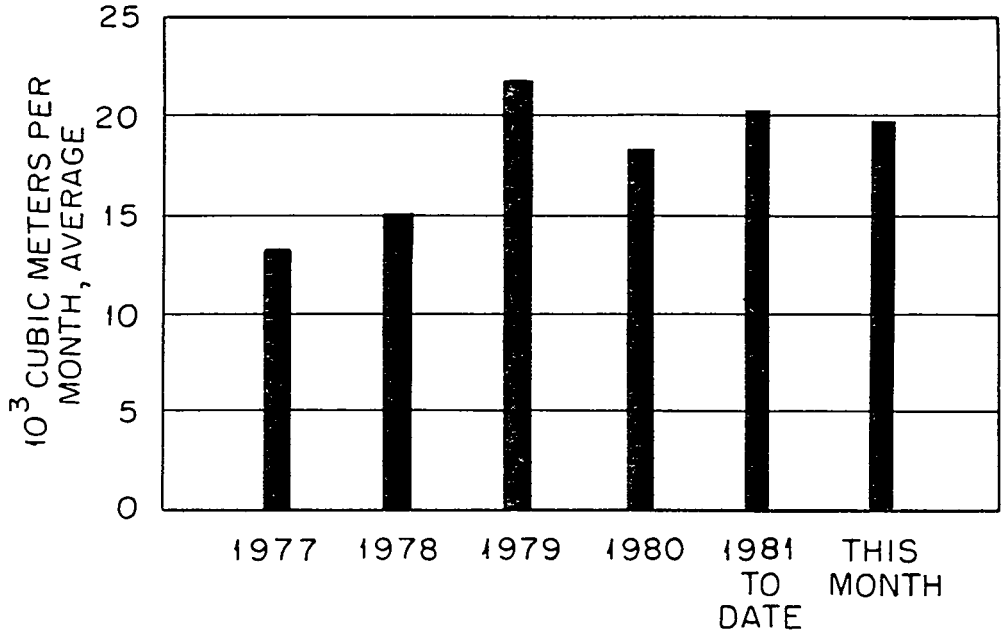


Fig. 4. Process Waste Volumes.

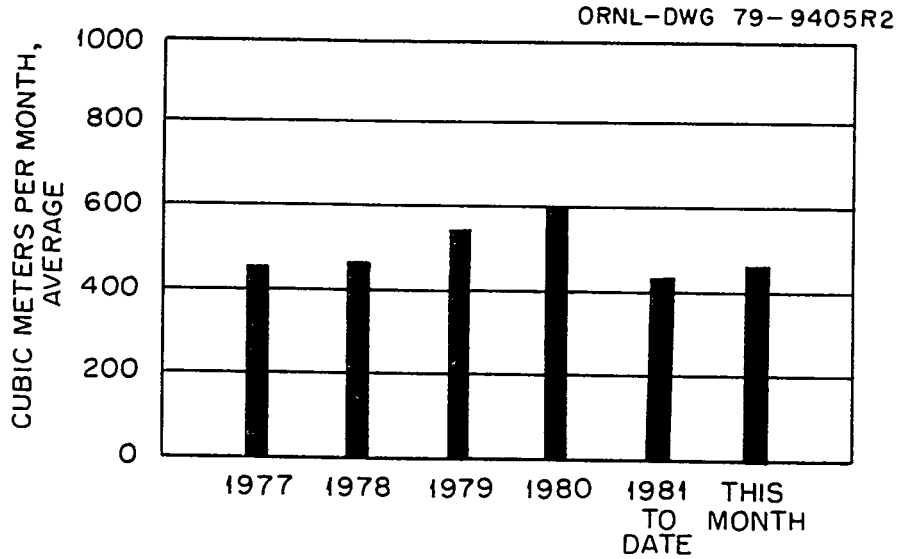


Fig. 5. Intermediate-Level Waste Volumes.

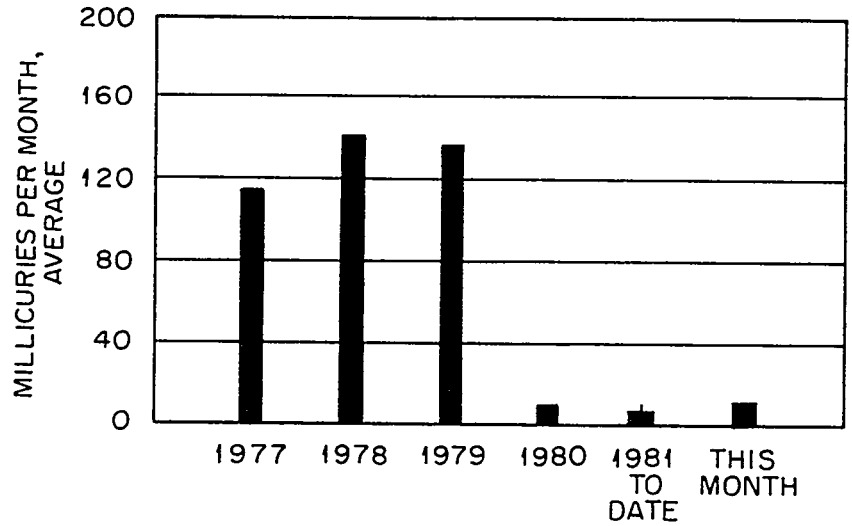


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

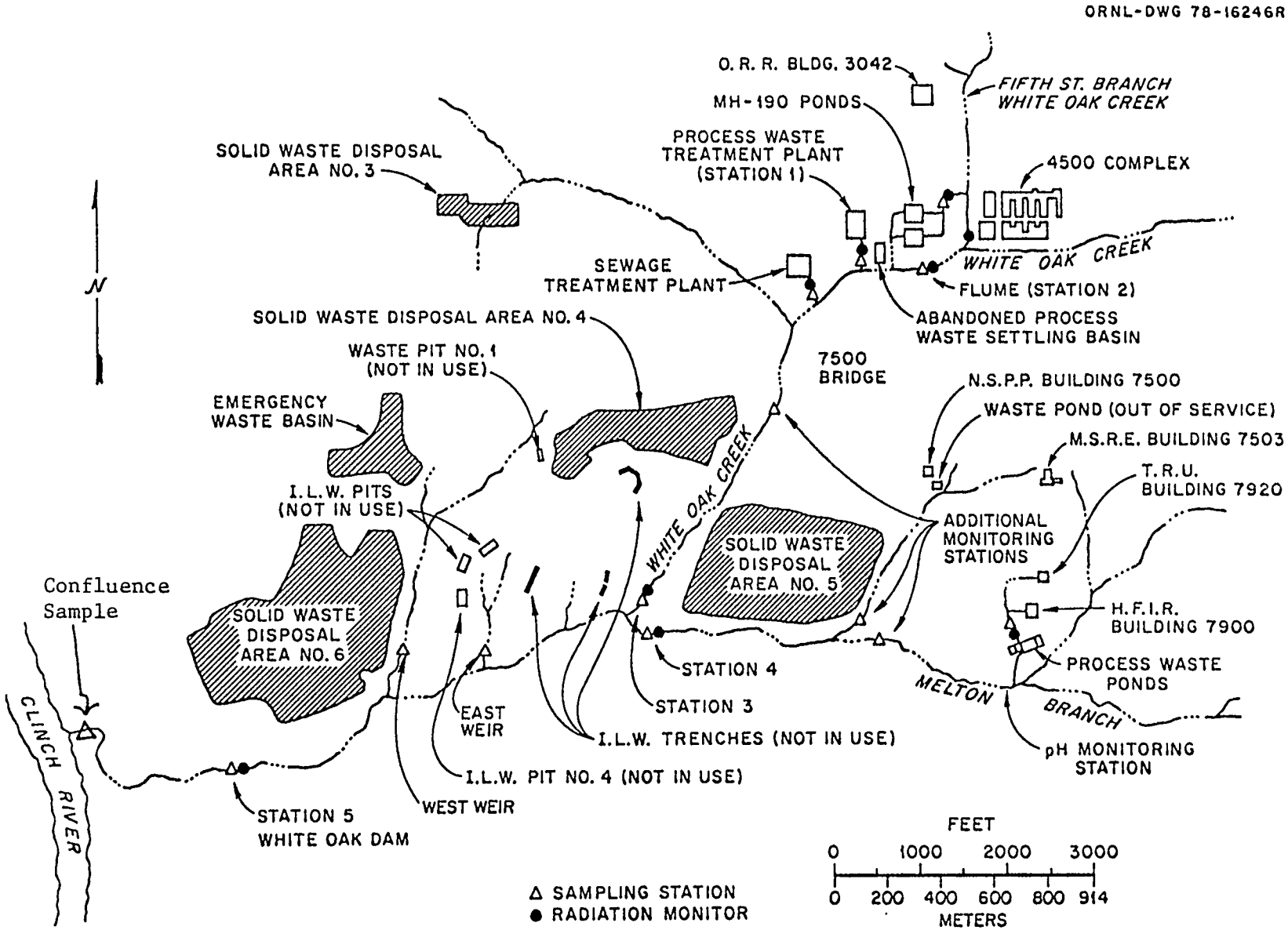


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0815	0.370
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0288	0.061
Discharge from ILW Pits and Trenches	East Weir	<0.001	——
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0030	——
Total discharge from all sources		0.1133	0.431
White Oak Dam to Clinch River (ISAHP Measurement)		0.071	0.22

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	750	0.100	17.5	4.93	28.1
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.182[a]	31.9	1.15	6.5
3. Reactor Operations (MH112)	35	0.001	0.2	1.95	11.1
4. Buildings 3503 and 3508	9.4	<0.001	—	1.05	6.0
5. Buildings 3025 and 3026	57	0.002	0.4	1.48	8.4
6. Building 3019	7.4	<0.001	—	1.11	6.3
7. Waste Evaporator, Bldg. 2531	2400	0.072	12.6	1.11	6.3
8. Building 3525	0.5	<0.001	—	1.05	6.0
9. Building 2026	3.4	<0.001	—	1.34	7.6
10. Tank Farm Drainage	3300	0.214	37.4	2.40	13.7

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	<0.01	≤1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<92
Radiochemical-Processing Pilot Plant	3020	<0.01	≤1
MSRE	7512	<0.01	<6
HFIR & TRU	7911	<0.01	<24
Total Activity In Gases Released At X-10 Site		<0.01	<124
Chem. Tech. Division — Y-12 Area			[c]
Tritium Target Fabrication Building		210 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.54×10^{-3}
Room 265			3.50×10^{-4}
Building 5505 Discharges Glove Box			2.25×10^{-3}
Hood			3.87×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

DATE ISSUED JUN 2 2 1981

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/182

DATE: June 5, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of April 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. H. Swanks

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

David L. Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory It is subject to revision or correction and therefore does not represent a final report The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of April was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 147.8 mCi; this is 34.5 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 77 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 214 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of April 1981 was 1.37% of the MPC_W (Figure 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 45.1% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.214 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 80×10^4 and 22×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 145.2 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 2.4 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 1.0 mCi of ^{90}Sr was released from the 190 pond system; and an additional 11.1 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the

discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

Analysis of the composite of grab samples taken from the Northwest Tributary, one of two streams that drain the Burial Ground No. 3 disposal area, indicates that about 10.5 mCi of ^{90}Sr were discharged into White Oak Creek via this stream. The seepage from the West fault into Raccoon Creek (Burial Ground No. 3) was not significant during the period.

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	14.3	
190 Ponds	1.0	
Process Waste Treatment Plant	2.4	
Sewage Treatment Plant	11.1	
	28.8	
7500 Sampling Station	51.9	
Burial Grounds Nos. 1 and 3, and Flood Plains		23.1
Station No. 3	108.5	
Burial Ground No. 4		56.6

Melton Branch

	^{90}Sr Discharge (mCi) By Measurement	By Difference
7900 Area (HFIR and TRU)	1.1	
7500 Area (NSPP and MSRE)	4.3	
	5.4	
Station No. 4	36.7	
Burial Ground No. 5		31.3
ILW Pit Disposal Area		
East Weir	0.3	
West Weir	2.3	
	2.3	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	147.8	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		113.3
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		76.8

Process Waste

A total of 2.10×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.86×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given on the next page.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
431	B	155	2490
432	C	144	2417
433	A	156	2440
434	B	114.5	1892
435	C	122.5	2469
436	A	158	2523
437	B	159	2476
438	C	127	2546
439	A	79.5	1773

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.63 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	378.9
Volume transferred to evaporators	456.0
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	93.8
W-21, End of Month	30.7
W-22, Beginning of Month	36.4
W-22, End of Month	22.4
W-23, Beginning of Month	100.8
W-23, End of Month	118.8
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	141.3
W-24, End of Period	118.8
W-25, Beginning of Period	139.1
W-25, End of Period	140.2

	Cubic Meters
Continuation of Melton Valley Waste Storage Facility Inv.:	
W-26, Beginning of Period	123.3
W-26, End of Period	110.9
W-27, Beginning of Period	0
W-27, End of Period	35.2

Tanks W-28 through W-31 remain empty.

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

Building 3525	7.6
Building 3019	25.4
Radioisotopes Processing Area	65.4
ORR and BSR	107.6
High Flux Isotope Reactor	19.2
Fission Products Development Laboratory	34.9*
4500 Complex	32.3
Building 3544	27.3
Transuranium Processing Area	2.4

GASEOUS WASTE

The ORNL Stacks discharged <10 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 150 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.6% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

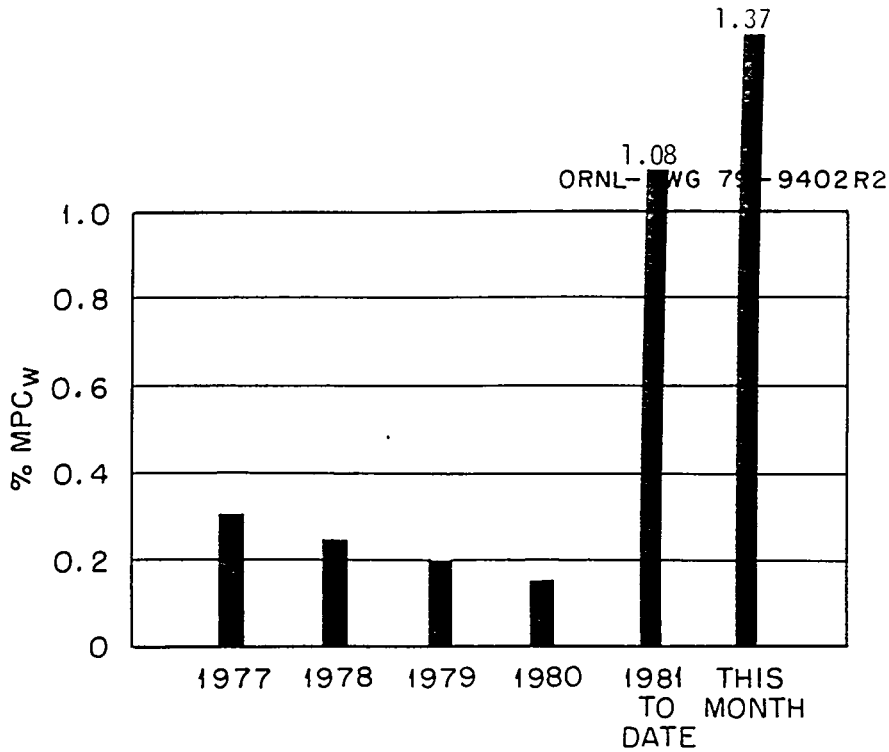


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

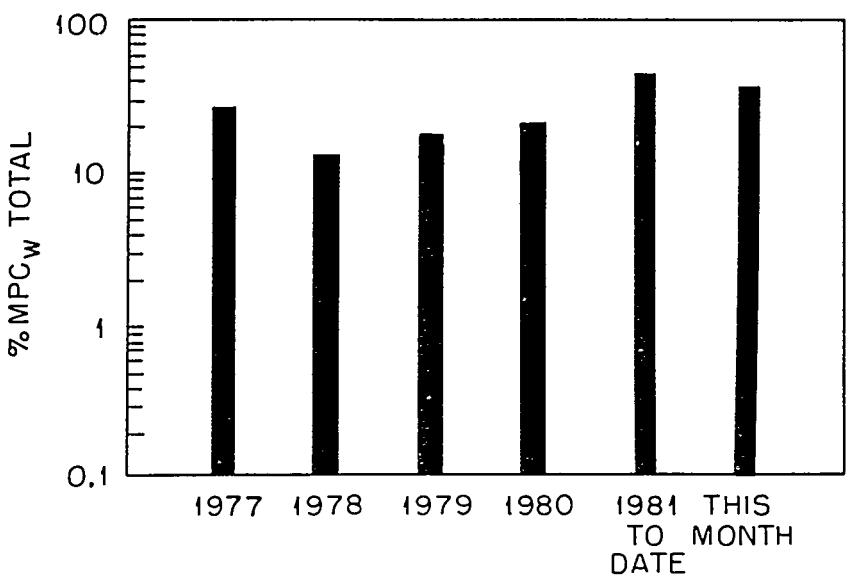


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

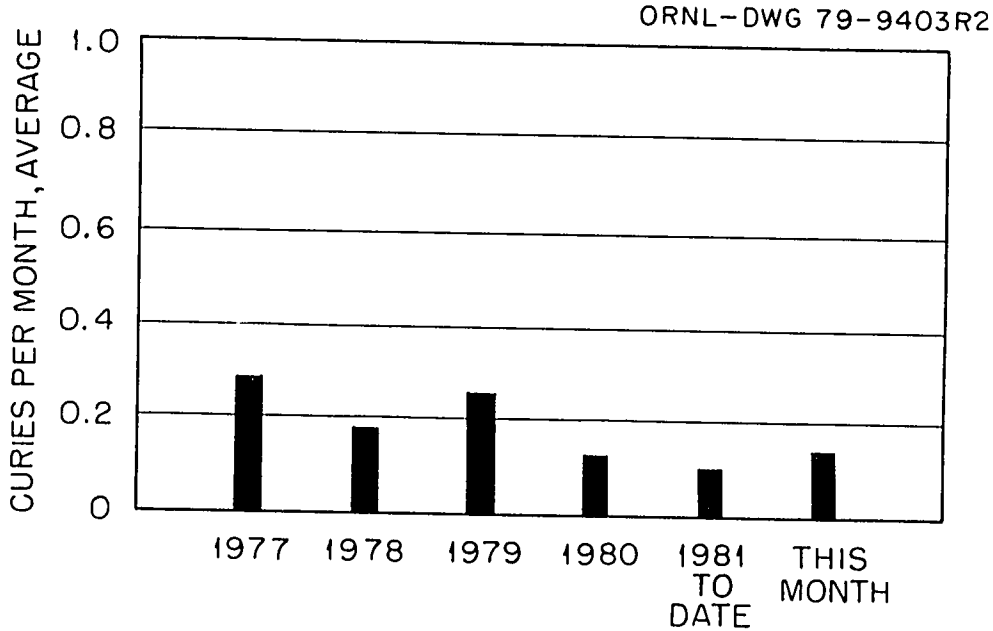


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

ORNL-DWG 79-9404R2

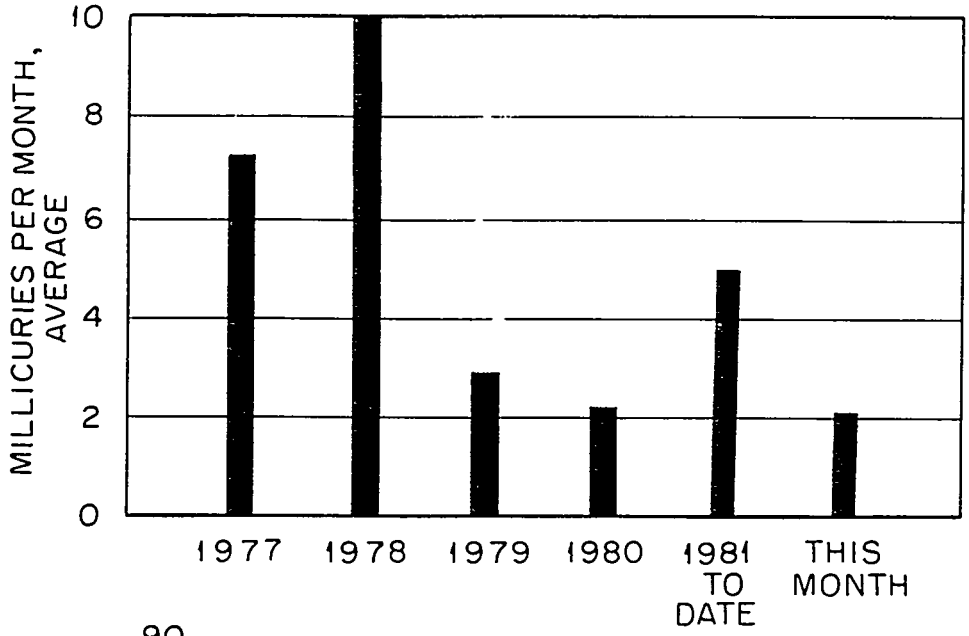


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

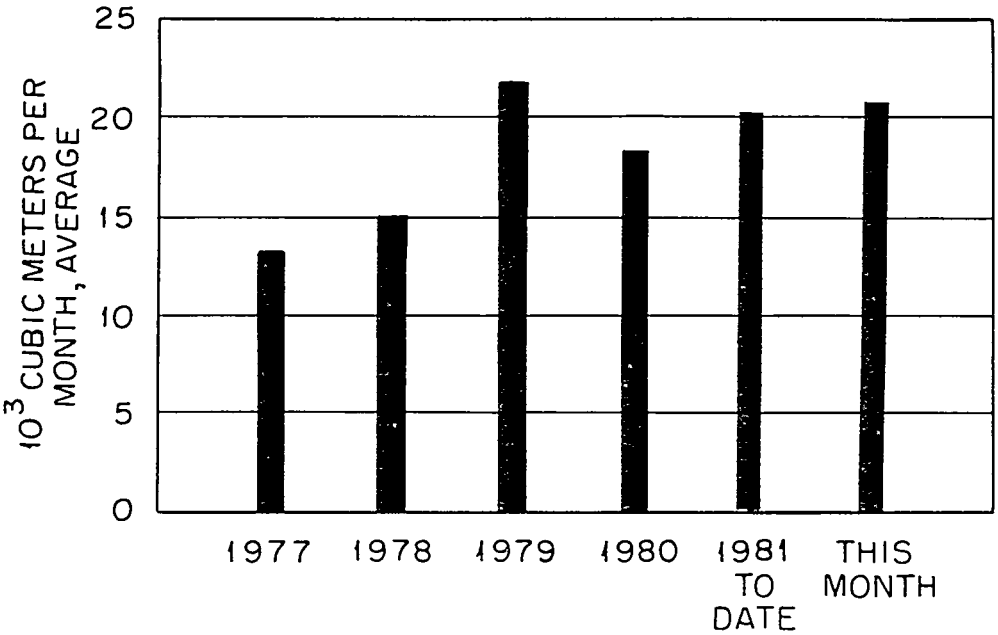


Fig. 4. Process Waste Volumes.

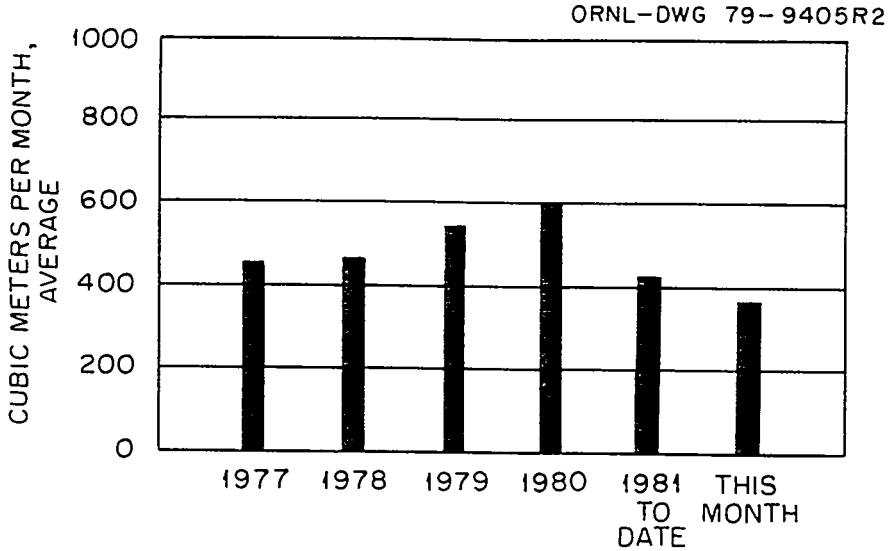


Fig. 5. Intermediate-Level Waste Volumes.

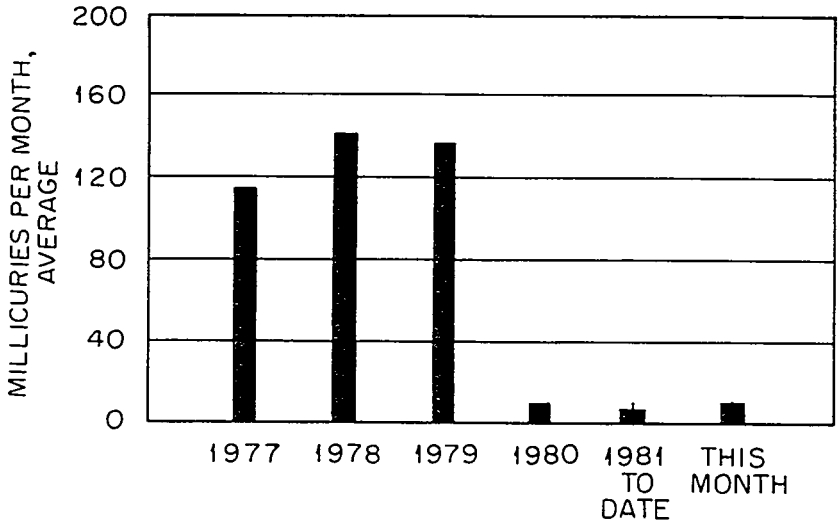


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

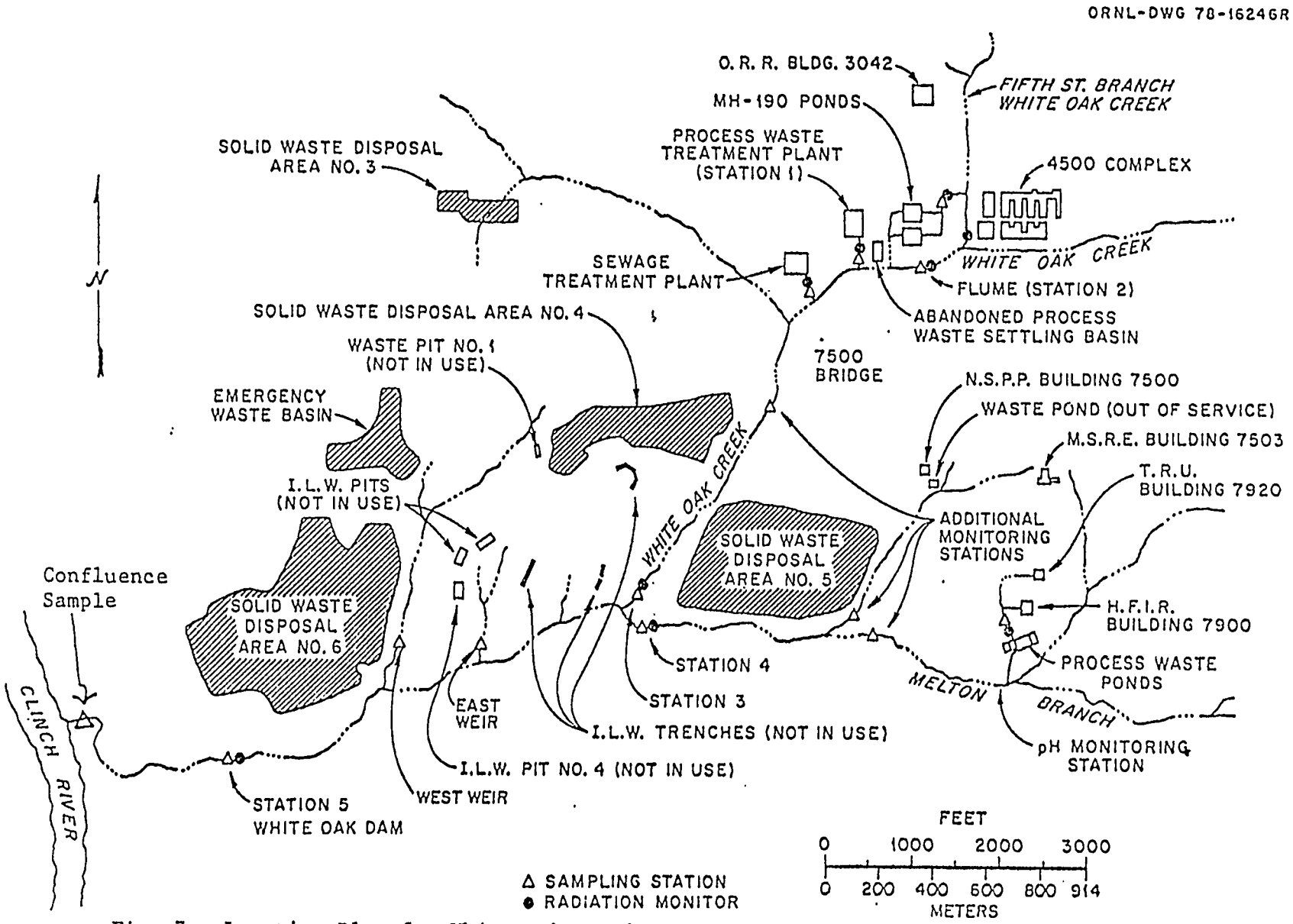


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1085	0.564
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0367	0.130
Discharge from ILW Pits and Trenches	East Weir	0.0003	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0023	—
Total discharge from all sources		.1478	0.694
White Oak Dam to Clinch River (ISAHP Measurement)		0.214	0.547

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	910	0.106	10.3	4.31	21.5
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.265[a]	25.7	1.53	7.6
3. Reactor Operations (MH112)	53	0.005	0.5	3.74	18.7
4. Buildings 3503 and 3508	5.5	<0.001	—	1.21	6.0
5. Buildings 3025 and 3026	21	<0.001	—	1.41	6.7
6. Building 3019	28	<0.001	—	1.06	5.2
7. Waste Evaporator, Bldg. 2531	8300	0.380	36.8	1.70	8.4
8. Building 3525	3.8	<0.001	—	1.18	5.8
9. Building 2026	0.8	<0.001	—	1.62	8.0
10. Tank Farm Drainage	4200	0.276	26.7	2.44	12.1

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	≤1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<128
Radiochemical-Processing Pilot Plant	3020	<0.01	≤1
MSRE	7512	<0.01	<5
HFIR & TRU	7911	<0.01	<17
Total Activity in Gases Released at X-10 Site		<0.01	<152
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		84 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			7.00×10^{-4}
Building 5505 Discharges Glove Box			2.25×10^{-3}
Hood			3.87×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

2511

A-G

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/205

DATE: July 9, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of May 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. H. Swanks

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

Technical Information Officer 7/17/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory It is subject to revision or correction and therefore does not represent a final report The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of May was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 89.4 mCi; this is 58.4 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 63 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 98 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 9 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of May 1981 was 1.1% of the MPC_W (Figure 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 16.1% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.098 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 50×10^4 and 8×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 88.5 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 2.3 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.5 mCi of ^{90}Sr was released from the 190 pond system; and an additional 11.4 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

White Oak Creek

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Flume	12.7	
190 Ponds	0.5	
Process Waste Treatment Plant	2.3	
Sewage Treatment Plant	11.4	
	26.9	
7500 Sampling Station	47.5	
Burial Grounds Nos. 1 and 3, and Flood Plains		20.6
Station No. 3	67.4	
Burial Ground No. 4		19.9
Melton Branch		
7900 Area (HFIR and TRU)	0.8	
7500 Area (NSPP and MSRE)	4.3	
	5.1	
Station No. 4	21.1	
Burial Ground No. 5		16.0

ILW Pit Disposal Area

	^{90}Sr Discharge (mCi) By Measurement	By Difference
East Weir	<0.1	
West Weir	0.9	
	0.9	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	89.4	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		56.6
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		63.3

Process Waste

A total of 1.97×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.88×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below.

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
440	B	121	1904
441	C	136	2285
442	A	139	2571
443	B	99	1897
444	C	142	2541
445	A	131	2165
446	B	78	1608
447	C	120.5	2154

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.59 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	409.8
Volume transferred to evaporators	436.3
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	30.7
W-21, End of Month	26.4
W-22, Beginning of Month	22.4
W-22, End of Month	53.2
W-23, Beginning of Month	118.8
W-23, End of Month	125.6
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	118.8
W-24, End of Period	118.8
W-25, Beginning of Period	140.2
W-25, End of Period	135.7
W-26, Beginning of Period	110.9
W-26, End of Period	105.3
W-27, Beginning of Period	35.2
W-27, End of Period	80.3

Tanks W-28 through W-31 remain empty.

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

	Cubic Meters
Building 3525	8.3
Building 3019	42.5
Radioisotopes Processing Area	63.9
ORR and BSR	78.1
High Flux Isotope Reactor	116.3
Fission Products Development Laboratory	16.7*
4500 Complex	32.7
Building 3544	50.8
Transuranium Processing Area	10.1

GASEOUS WASTE

The ORNL Stacks discharged <9 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 101 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

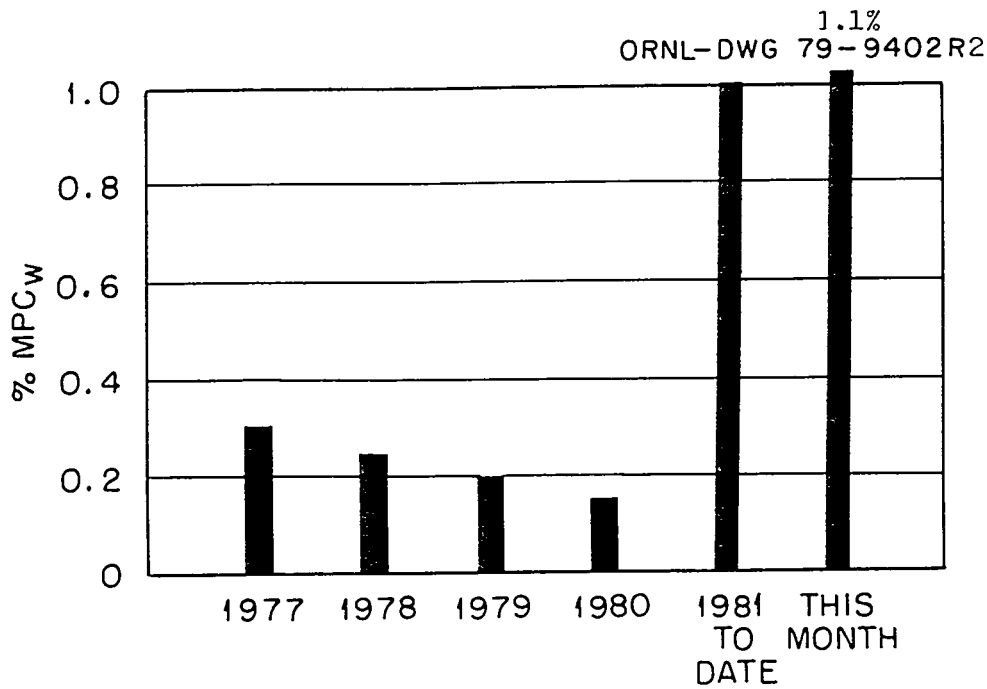


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

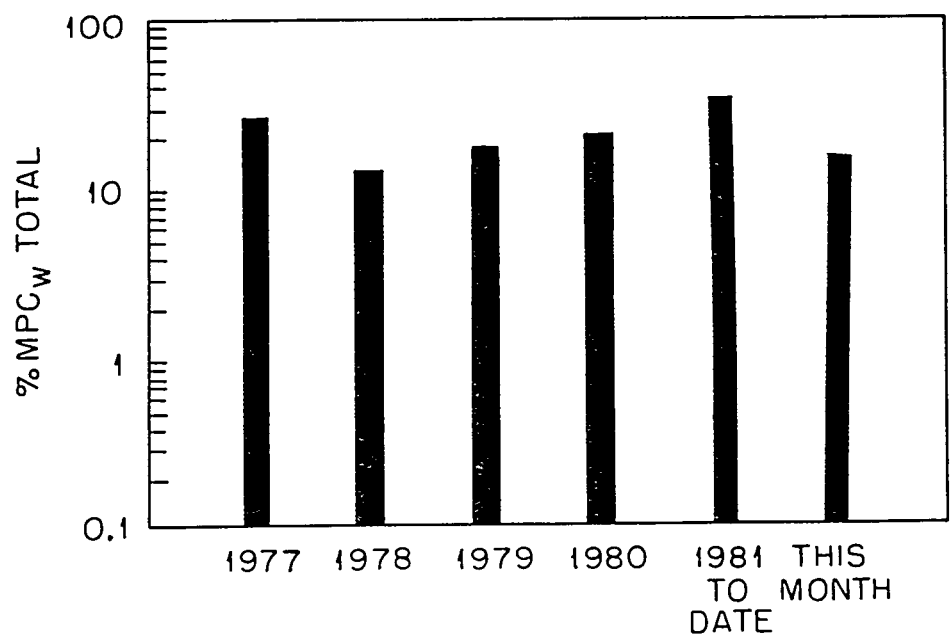


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

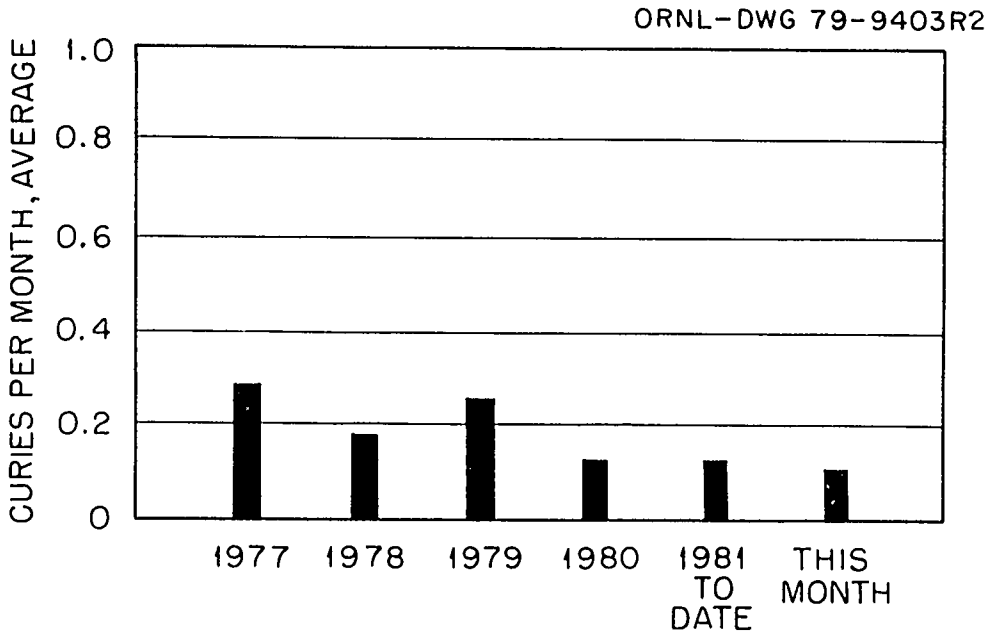


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

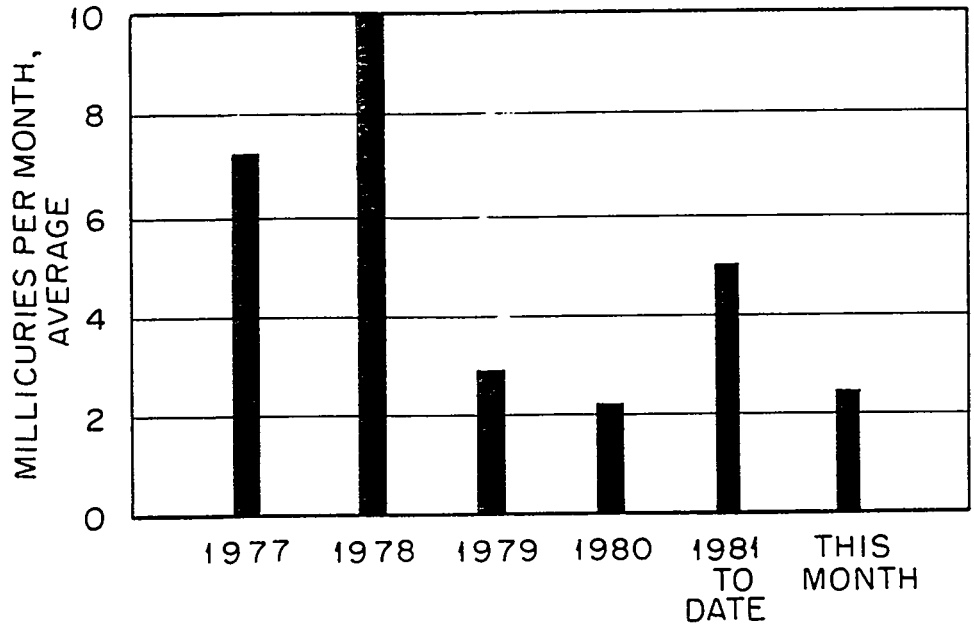


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

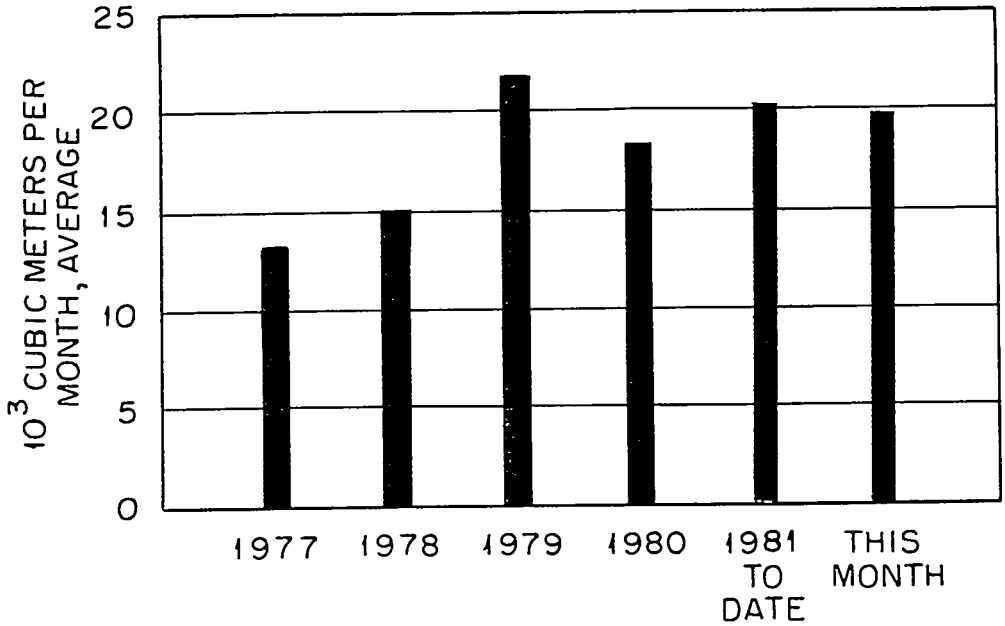


Fig. 4. Process Waste Volumes.

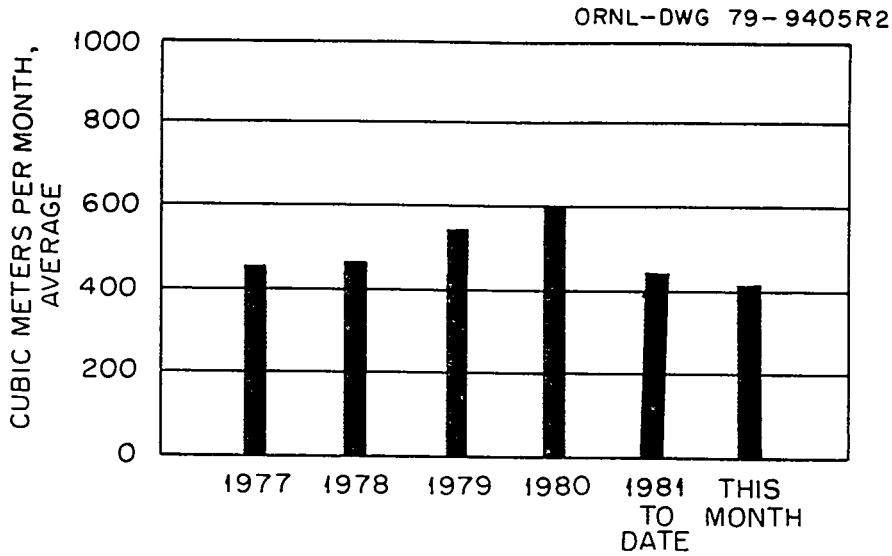


Fig. 5. Intermediate-Level Waste Volumes.

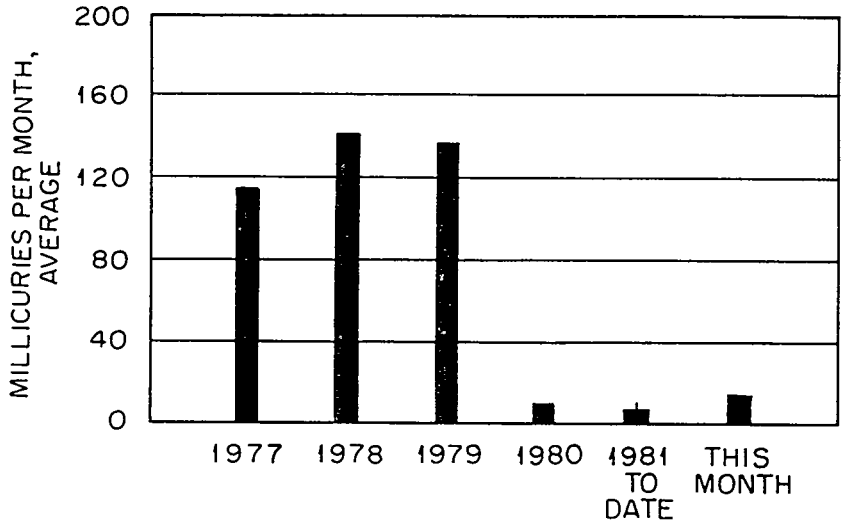


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

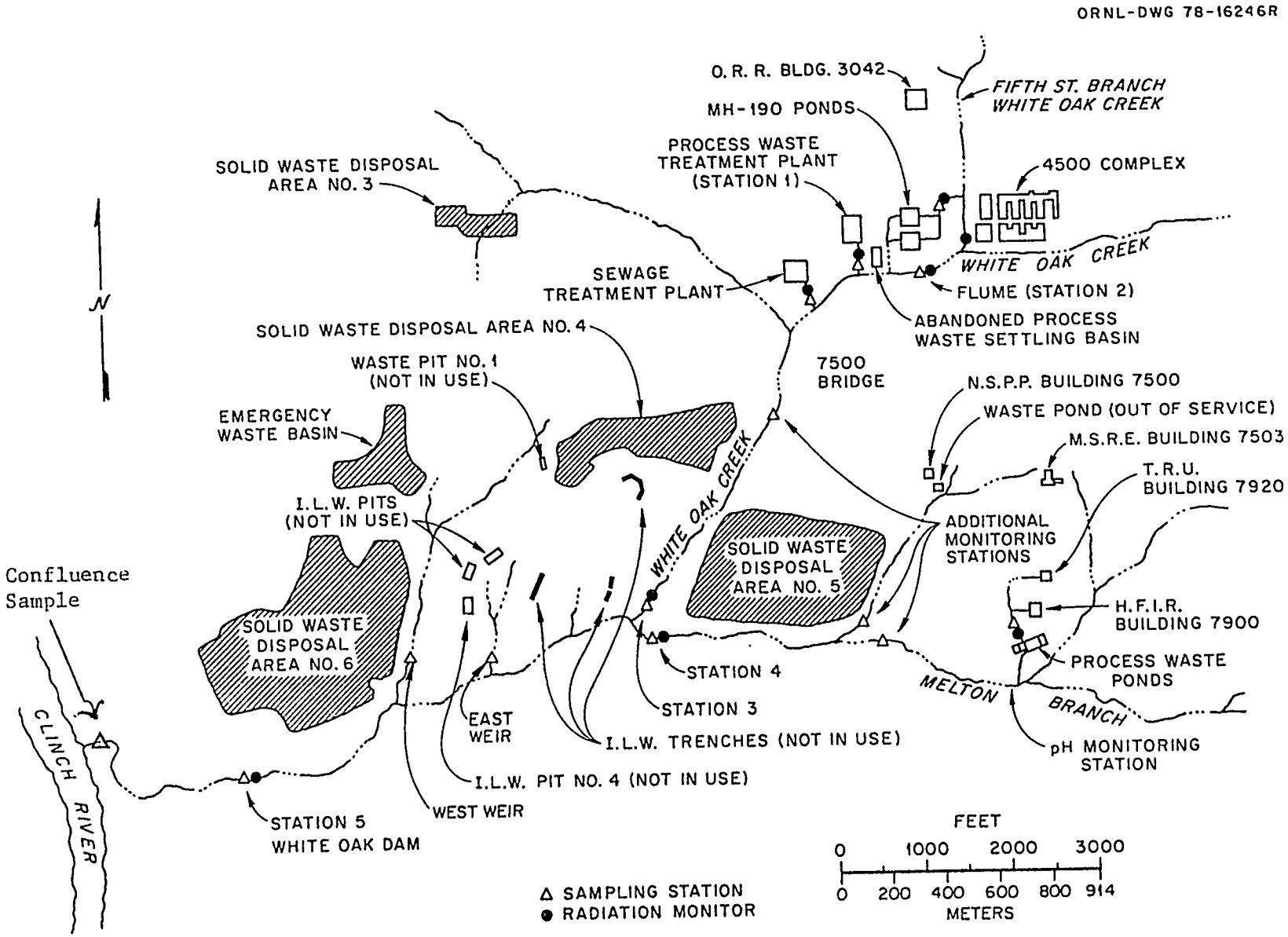


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0674	0.243
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0211	0.049
Discharge from ILW Pits and Trenches	East Weir	<0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0009	—
Total discharge from all sources		0.0894	0.292
White Oak Dam to Clinch River (ISAHP Measurement)		0.098	0.047

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	680	0.100	13.1	5.43	26.4
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.298[a]	40.0	1.85	9.0
3. Reactor Operations (MH112)	29	0.002	0.3	2.99	14.6
4. Buildings 3503 and 3508	2.7	<0.001	—	1.15	5.6
5. Buildings 3025 and 3026	8.7	<0.001	—	1.97	9.6
6. Building 3019	11	<0.001	—	1.07	5.2
7. Waste Evaporator, Bldg. 2531	3300	0.106	13.9	1.19	5.8
8. Building 3525	0.6	<0.001	—	1.23	6.0
9. Building 2026	2.4	<0.001	—	1.19	5.8
10. Tank Farm Drainage	3900	0.259	32.7	2.46	12.0

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Bldg. 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<75
Radiochemical-Processing Pilot Plant	3020	<0.01	<5
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<20
Total Activity in Gases Released at X-10 Site		<0.01	<101
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		(^{3}H) (c)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			4.67×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.74×10^{-2}

[a] Activity primarily ^{131}I except as noted.
[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c] No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER
ORNL/CF-81/277

DATE: September 9, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of June 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. H. Swanks

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

Technical Information Officer 7/14/96
ORNL Site Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Members of the bargaining group at ORNL struck the facility on June 20 because of a failure to negotiate a new contract. The waste disposal operations were handled by supervisory personnel for the remainder of the reporting period.

Operation of the Liquid and Gaseous Waste Systems for the month of June was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 186.0 mCi; this is 96.6 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 76 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 239 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 2 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of June 1981 was 0.6% of the MPC_W (Figure 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 62.4% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.239 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 78×10^4 and 11×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 185.2 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 0.7 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.2 mCi of ^{90}Sr was released from the 190 pond system; and an additional 32.1 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7).

White Oak Creek

	^{90}Sr Discharge (mCi) By Measurement	By Difference
Flume	7.1	
190 Ponds	0.2	
Process Waste Treatment Plant	0.7	
Sewage Treatment Plant	32.1	
	40.1	
7500 Sampling Station	106.0	
Burial Grounds Nos. 1 and 3, and Flood Plains		65.9
Station No. 3	163.0	
Burial Ground No. 4		57.0

Melton Branch

7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	4.6	
	4.8	
Station No. 4	22.2	
Burial Ground No. 5		17.4

ILW Pit Disposal Area

	^{90}Sr Discharge (mCi) By Measurement	By Difference
East Weir	<0.1	
West Weir	0.8	
	0.8	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	186.0	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		141.1
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		75.9

Process Waste

The A and B IX colums were recharged with new CS-100 resin (45 ft^3 each) during the reporting period.

A total of 2.14×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 2.04×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of column operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs	m^3 Treated
448	A	109.5	1768
449	B	108.5	1881
450	C	119	1896
451	B	83	1354
452	A	113.5	1893
453	C	82	1529
454	B	65.5	1199
455	A	81.5	1273
456	C	86	1167
457	B	96	1209
458	A	93.5	1186
459	B	71.5	975
460	C	159	1295

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.65 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	454.6
Volume transferred to evaporators	465.5
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	26.4
W-21, End of Month	45.4
W-22, Beginning of Month	53.2
W-22, End of Month	23.3
W-23, Beginning of Month	125.6
W-23, End of Month	148.1
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	118.8
W-24, End of Period	119.9
W-25, Beginning of Period	135.7
W-25, End of Period	136.8
W-26, Beginning of Period	64.9
W-26, End of Period	64.9
W-27, Beginning of Period	80.3
W-27, End of Period	89.3

Tanks W-28 through W-31 remain empty.

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

	Cubic Meters
Building 3525	9.50
Building 3019	42.5
Radioisotopes Processing Area	49.8
ORR and BSR	122.1
High Flux Isotope Reactor	17.7
Fission Products Development Laboratory	42.1*
4500 Complex	44.2
Building 3544	60.7
Transuranium Processing Area	4.0

GASEOUS WASTE

The ORNL Stacks discharged < 2 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 50 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.8% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R2

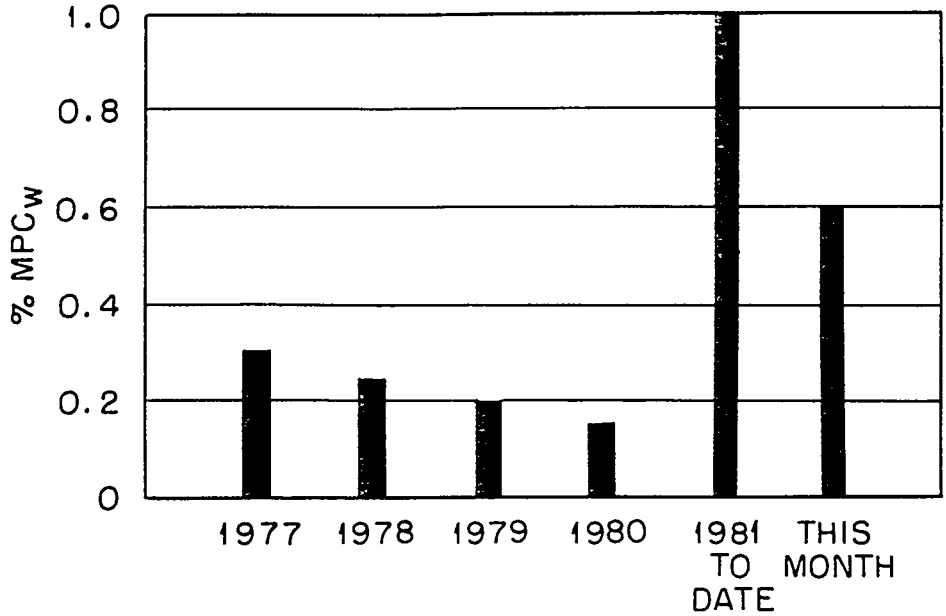


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

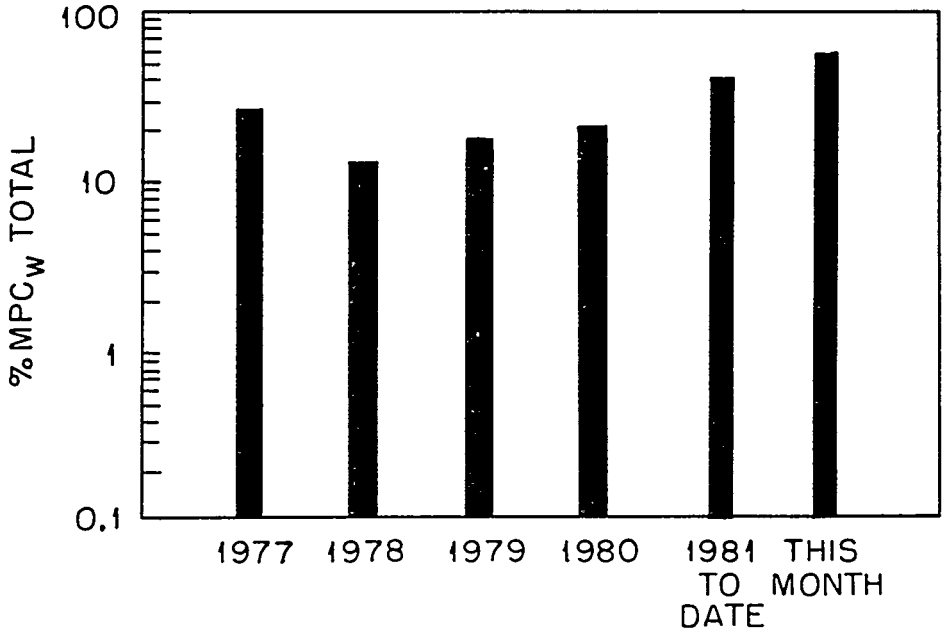


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

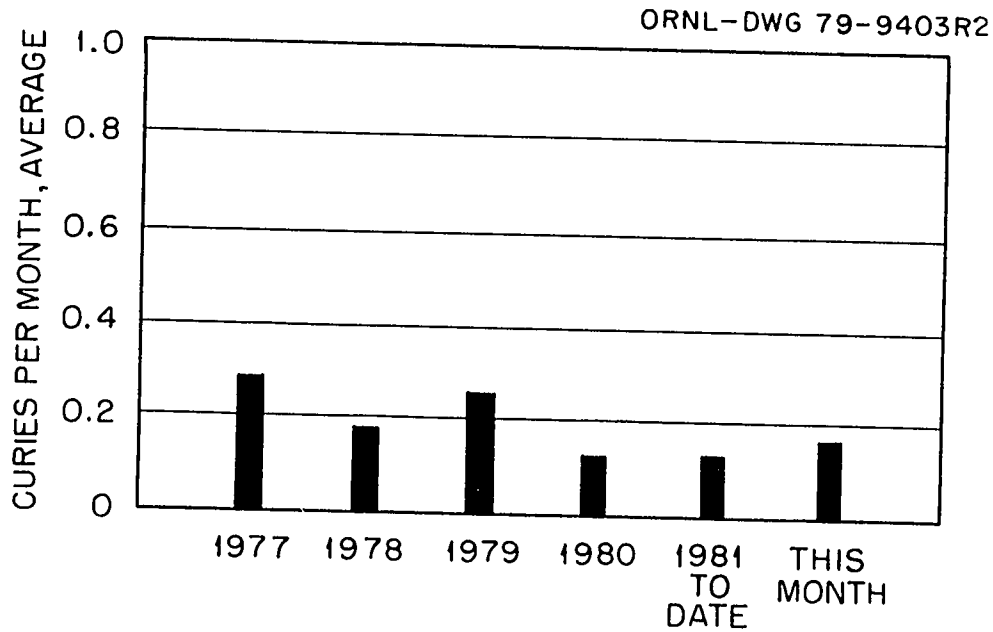


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

ORNL-DWG 79-9404R2

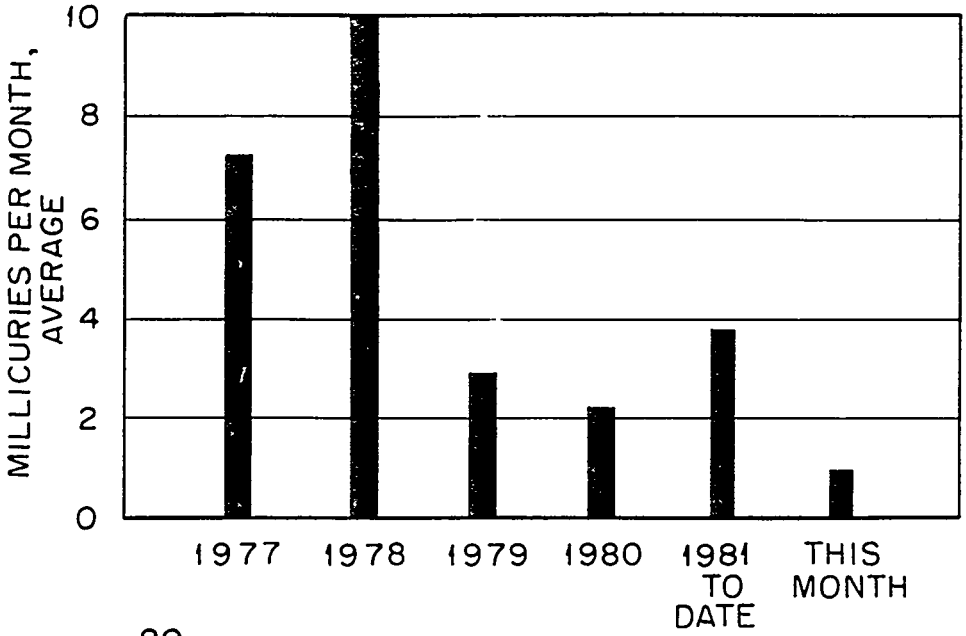


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

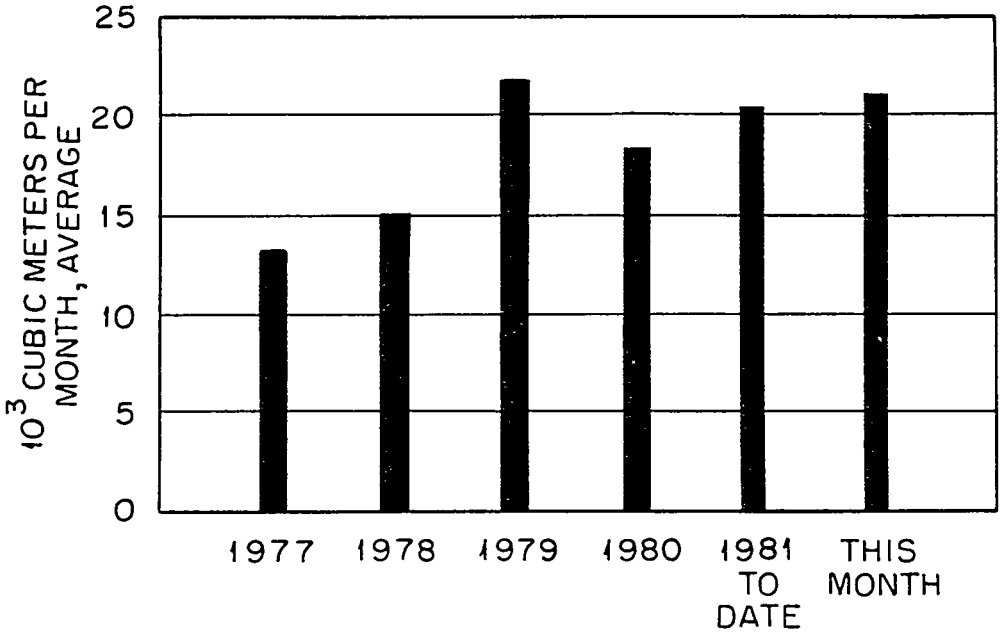


Fig. 4. Process Waste Volumes.

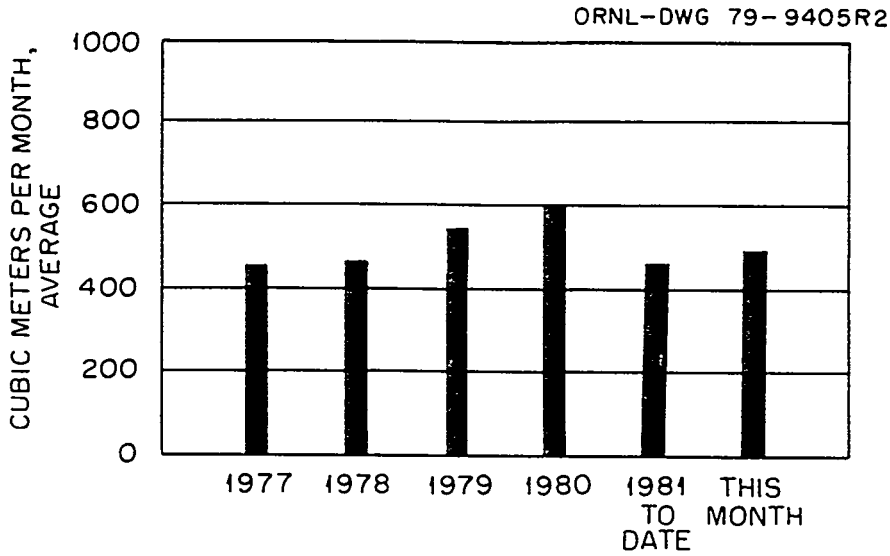


Fig. 5. Intermediate-Level Waste Volumes.

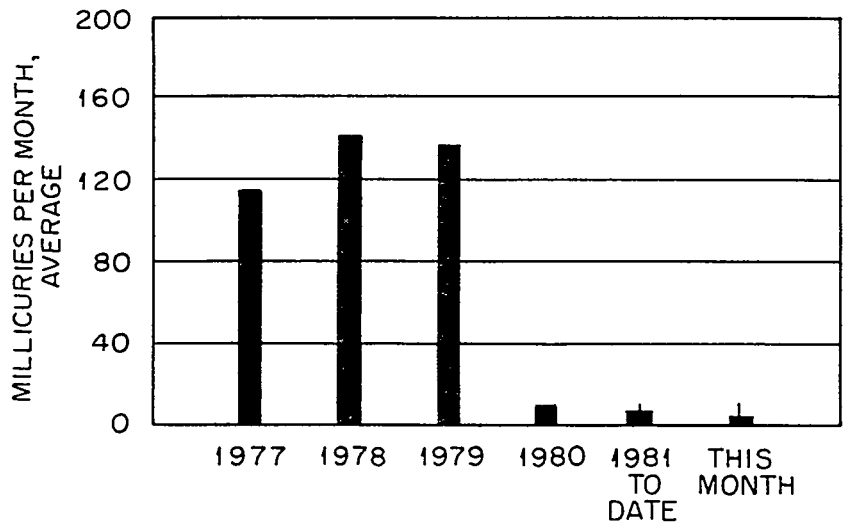


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

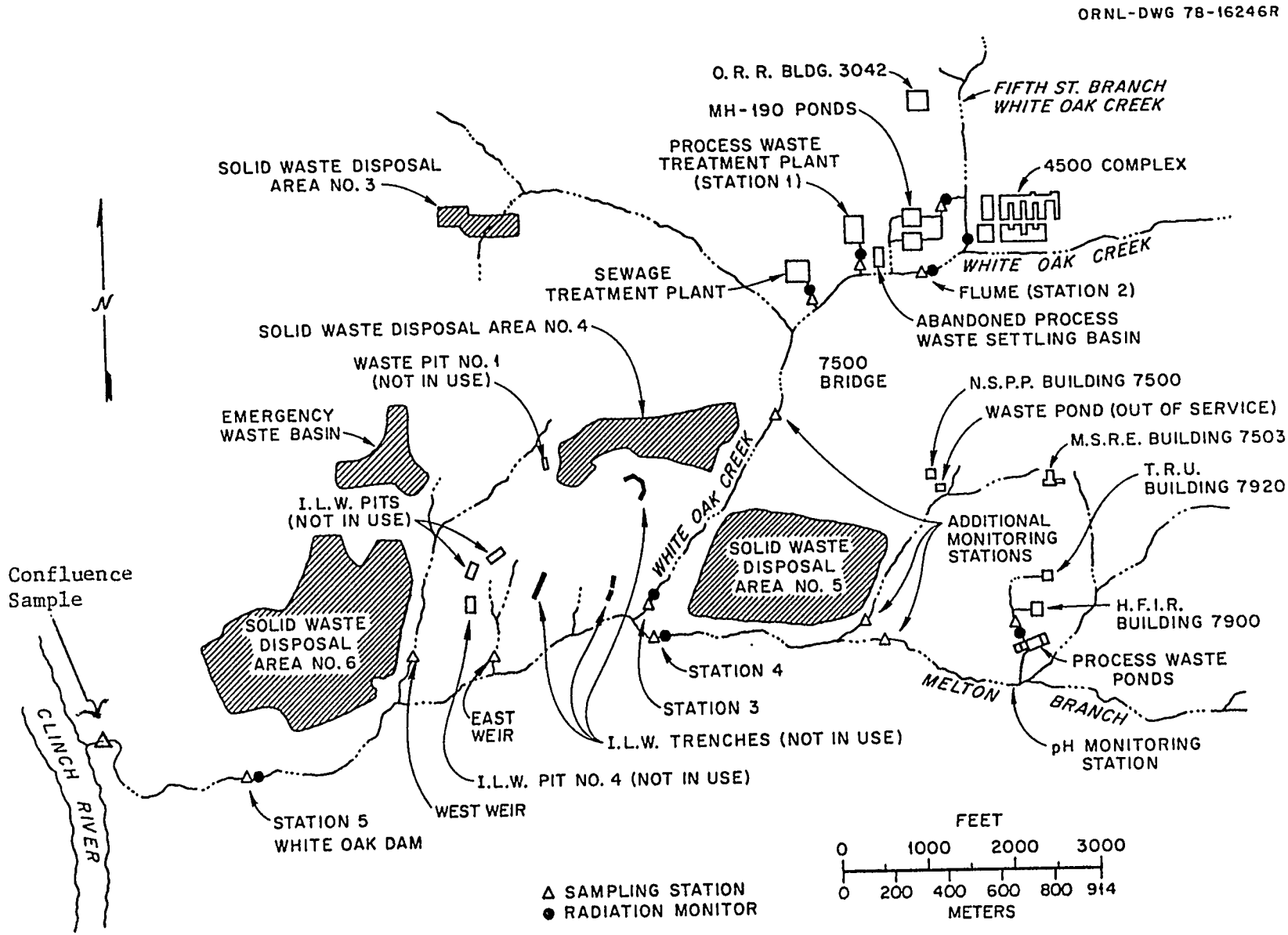


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1632	0.593
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0222	0.091
Discharge from ILW Pits and Trenches	East Weir	<0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0008	—
Total discharge from all sources		0.1862	0.684
White Oak Dam to Clinch River (ISAHP Measurement)		0.239	0.721

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	1900	0.158	13.6	3.08	15.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.350	30.2	1.86	9.4
3. Reactor Operations (MH112)	45	0.002	0.2	3.56	18.1
4. Buildings 3503 and 3508	10	<0.001	—	1.18	6.0
5. Buildings 3025 and 3026	14	<0.001	—	1.74	8.8
6. Building 3019	7.3	<0.001	—	1.20	6.1
7. Waste Evaporator, Bldg. 2531	6300	0.316	27.3	1.86	9.4
8. Building 3525	2.1	<0.001	—	1.25	6.3
9. Building 2026	0.9	<0.001	—	1.06	5.4
10. Tank Farm Drainage	4200	0.332	28.7	2.93	14.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Bldg. 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<35
Radiochemical-Processing Pilot Plant	3020	<0.01	≤1
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<14
Total Activity in Gases Released at X-10 Site		<0.01	< 50
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		856 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			7.00×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.74×10^{-2}

[a] Activity primarily ^{131}I except as noted.
[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-81/288

DATE: October 5, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of July 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. H. Swanks

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

David R. Hamrin 7/12/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

The hourly employees at ORNL remained on strike through the month. Consequently, the waste disposal facilities were operated by supervisory personnel during this period.

Operation of the Liquid and Gaseous Waste Systems for the month of July was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 72.9 mCi; this is 113.1 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 62 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 66 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 2 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of July 1981 was 0.1% of the MPC_W (Figure 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 12.3% of the MPC_W (Figure 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.066 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Figure 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 43×10^4 and 4×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 72.9 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 1.6 mCi of ^{90}Sr was released by the Process Waste Treatment Plant and 0.2 mCi of ^{90}Sr was released from the 190 pond system. The release from the sanitary system is not available because the sample collection was accidently discarded. The release from this point is assumed to be about 14 mCi (6 month average) because the radwaste monitor at this release point indicated normal operation during this period.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Figure 7),

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	9.7	
190 Ponds	0.2	
Process Waste Treatment Plant	1.6	
Sewage Treatment Plant	13.6*	
	25.1	
7500 Sampling Station	55.1	
Burial Grounds Nos. 1 and 3, and Flood Plains		30.0*
Station No. 3	62.4	
Burial Ground No. 4		7.3
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	3.2	
	3.3	
Station No. 4	10.5	
Burial Ground No. 5		7.2

*This is an estimated value based upon the averaged release from the STP system during the first six months of 1981. The composite sample collected during the period was inadvertently discarded.

ILW Pit Disposal Area

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
East Weir	<0.1	
West Weir	1.3	
	1.3	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 Plus Ground Disposal Area)	74.2	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		45.8*
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		61.7*

Process Waste

A total of 2.31×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.64×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as the backwashing of filters.

A monthly comparison of the strontium activity released from the process waste system to White Oak Creek is shown in Figure 3. The main contributors to the system are listed in Table 2. A brief summary of column operations is given below:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs.	m^3 Treated
461	A		2637
462	B		2656
463	A		3406
464**	A		1251
465	B		3312
466	A		3241
467	B		3406
468	A		3146

*Estimated value.

**Loading cycle No. 464 was terminated prematurely as a result of a records keeping error.

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.4 m^3/hr. During the month, W-23 (storage tank for evaporator bottoms) was pumped to the MVWSF.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	321.9
Volume transferred to evaporators	301.1
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	45.4
W-21, End of Month	16.0
W-22, Beginning of Month	23.3
W-22, End of Month	73.5
W-23, Beginning of Month	148.1
W-23, End of Month	21.5
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	119.9
W-24, End of Period	141.3
W-25, Beginning of Period	136.8
W-25, End of Period	136.8
W-26, Beginning of Period	64.9
W-26, End of Period	125.6
W-27, Beginning of Period	89.3
W-27, End of Period	125.6
W-29, Beginning of Period	0
W-29, End of Period	53.2

Tanks W-28, W-30, and W-31 remain empty.

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

	Cubic Meters
Building 3525	5.3
Building 3019	6.2
Radioisotopes Processing Area	37.5
ORR and BSR	70.1
High Flux Isotope Reactor	95.1
4500 Complex	59.6
Building 3544	27.2
Transuranium Processing Area	21.5

GASEOUS WASTE

The ORNL Stacks discharged <2 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 76 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

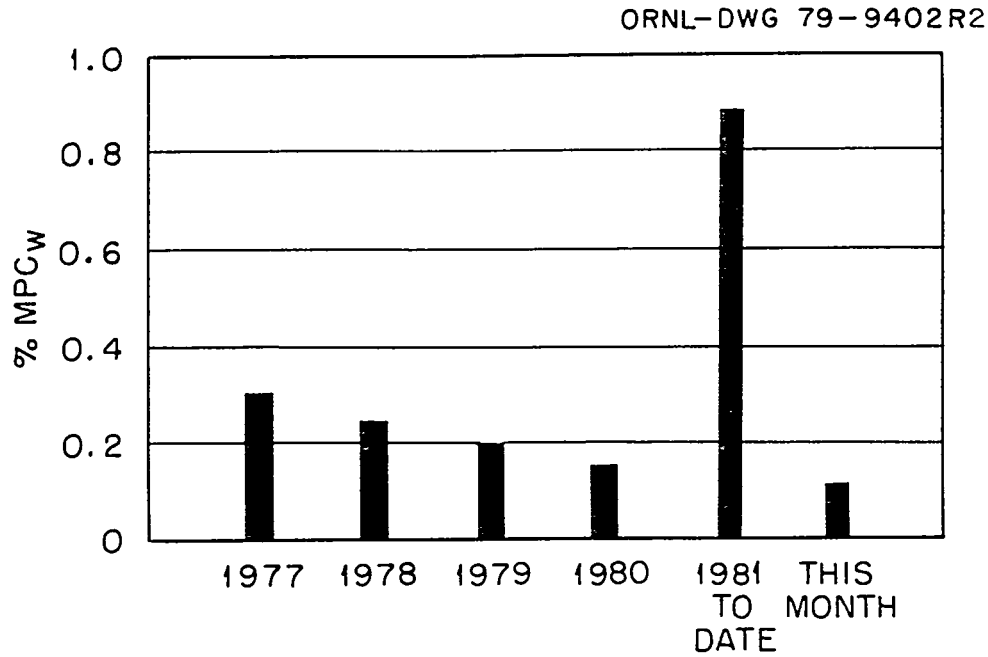


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

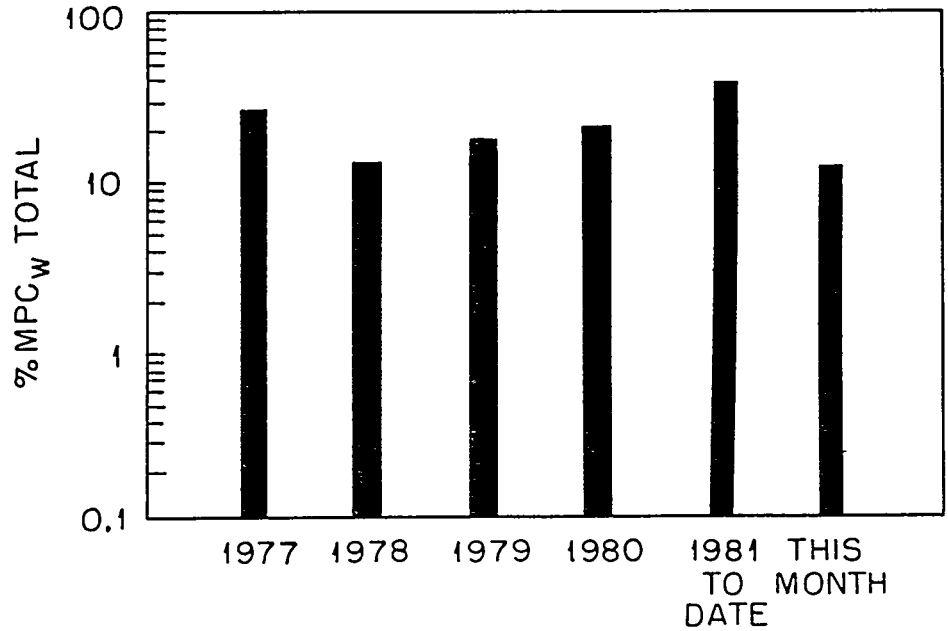


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

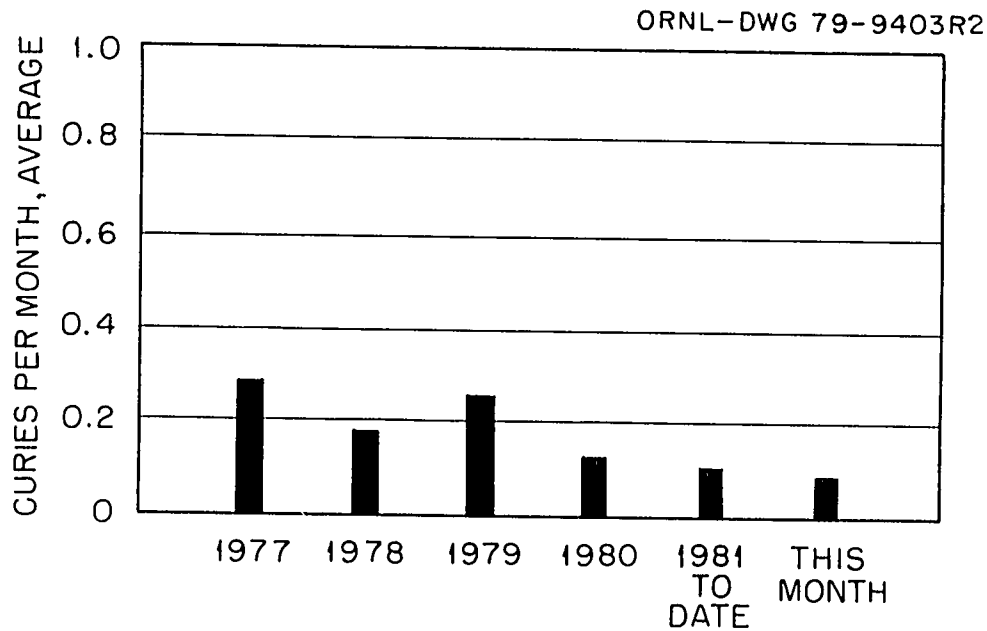


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

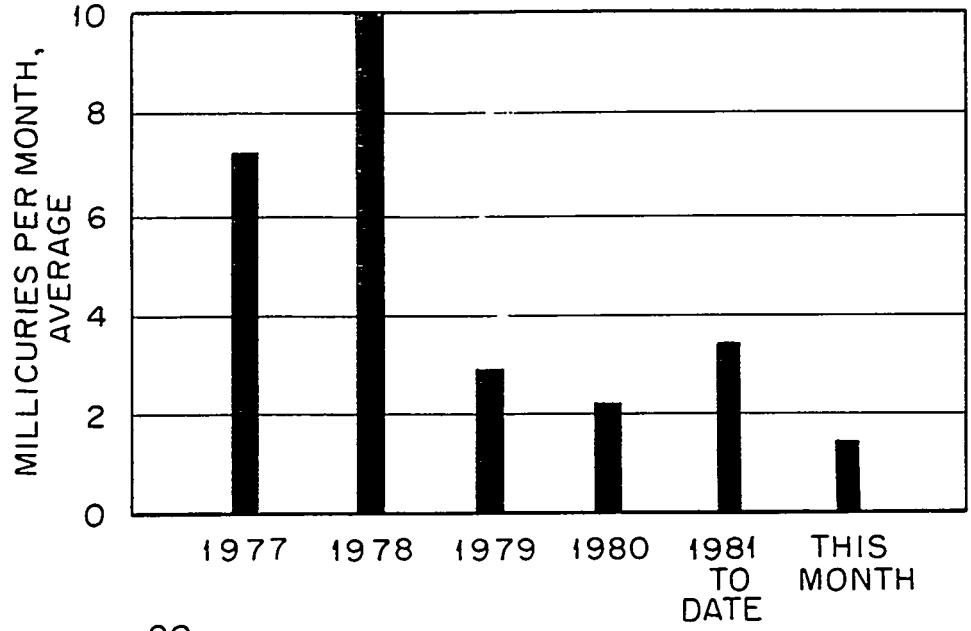


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

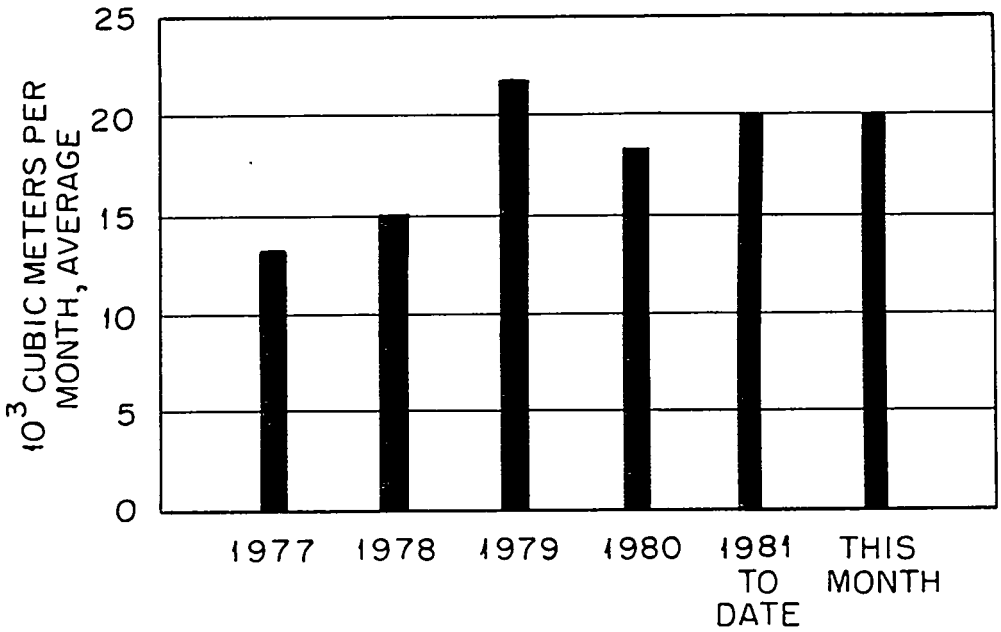


Fig. 4. Process Waste Volumes.

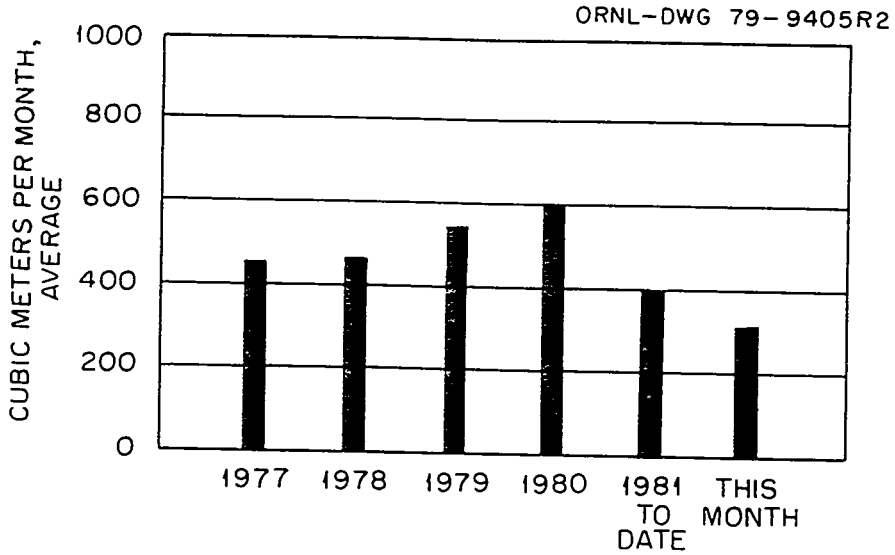


Fig. 5. Intermediate-Level Waste Volumes.

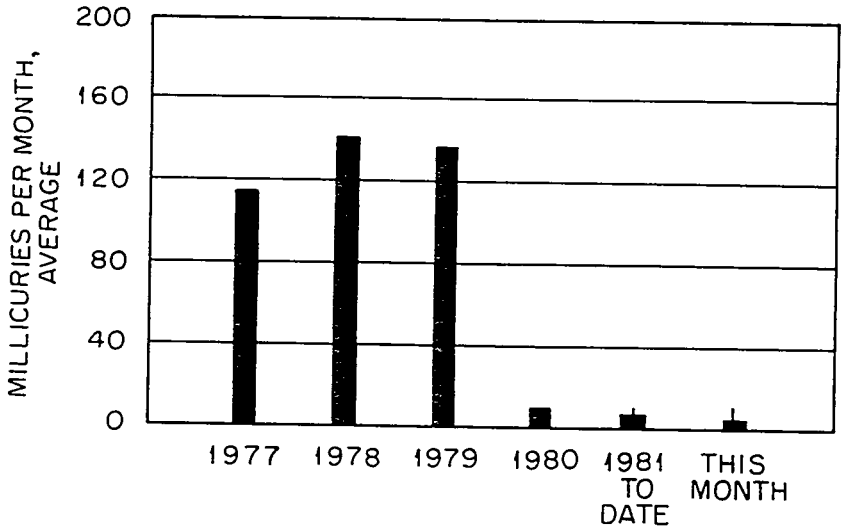


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

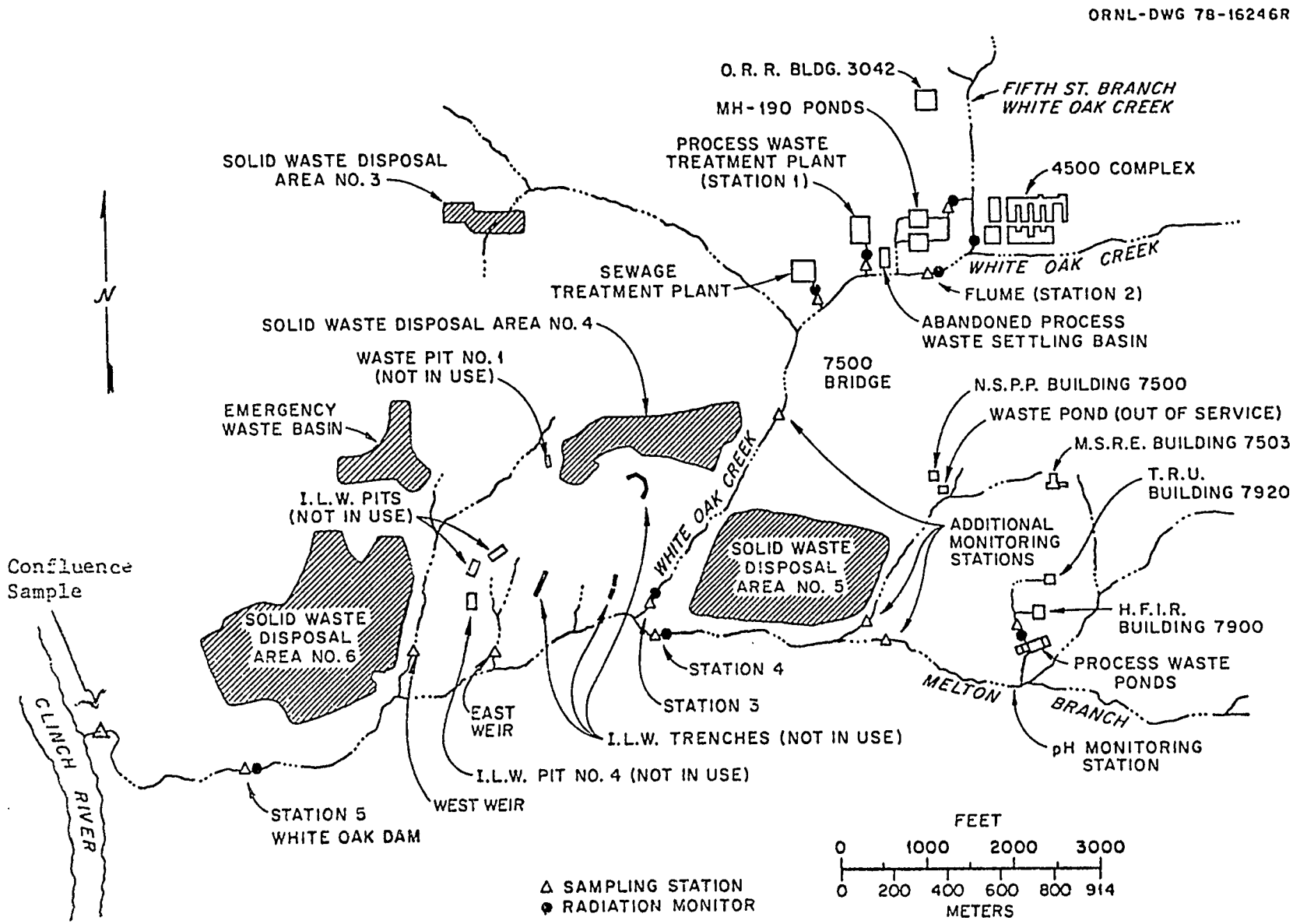


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0624	0.243
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0105	0.039
Discharge from ILW Pits and Trenches	East Weir	<0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0001	—
Total discharge from all sources		0.0730	0.282
White Oak Dam to Clinch River (ISAHP Measurement)		0.066	0.400

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	1600	0.066	10.3	1.52	9.3
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.317[a]	49.7	1.96	12.0
3. Reactor Operations (MH112)	42	0.003	0.5	2.74	16.8
4. Buildings 3503 and 3508	2.3	<0.001	—	1.37	8.4
5. Buildings 3025 and 3026	6.0	<0.001	—	1.79	11.0
6. Building 3019	10	<0.001	—	1.10	6.7
7. Waste Evaporator, Bldg. 2531	1300	0.050	7.8	1.42	8.7
8. Building 3525	5.4	<0.001	—	0.87	5.3
9. Building 2026	0.8	<0.001	—	1.15	7.0
10. Tank Farm Drainage	3100	0.202	31.7	2.42	14.8

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	<46
Radiochemical-Processing Pilot Plant	3020	<0.01	<12
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	<16
Total Activity in Gases Released at X-10 Site		<0.01	<76
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		19 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			(c)
Room 265			4.67×10^{-4}
Building 5505 Discharges Glove Box			4.50×10^{-3}
Hood			7.74×10^{-2}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER

ORNL/CF-81/290

DATE: October 6, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of August 1981

TO: Distribution

FROM: L. C. Lasher 27 and C. B. Scott 27

Sponsored by: J. H. Swanks

This document has been approved for release to the public by

Technical Information Officer ORNL Site — Date

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Members of the bargaining group at ORNL struck the facility on June 20 because of a failure to negotiate a new contract. The waste disposal operations were handled by supervisory personnel until August 3, when the new contract was ratified.

Operation of the Liquid and Gaseous Waste Systems for the month of August was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 83.6 mCi; this is 10.7 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 62 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 58.6 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 4 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of August 1981 was 0.1% of the MPC_W (Fig. 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 18.0% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.058 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 48×10^4 and 4×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 82.9 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 2.2 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.2 mCi of ^{90}Sr was released from the 190 pond system; and and an additional 11.3 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge

into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 7).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	16.3	
190 Ponds	0.2	
Process Waste Treatment Plant	2.2	
Sewage Treatment Plant	11.3	
	30.0	
7500 Sampling Station	67.3	
Burial Grounds Nos. 1 and 3, and Flood Plains		37.3
Station No. 3	77.3	
Burial Ground No. 4		10.0
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	1.8	
	1.9	
Station No. 4	5.6	
Burial Ground No. 5		3.7
ILW Pit Disposal Area		
East Weir	0.1	
West Weir	0.6	
	0.7	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 plus Ground Disposal Area)	83.6	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		51.7
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		61.8

Process Waste

The PWTP process was altered at the beginning of the month for the purpose of evaluating the effectiveness of a new flow sheet which eliminates the head end precipitation step and the subsequent sludge handling procedures. B and C IX columns were recharged with 45 ft^3 of Dowex HCR-WZ (50W-X8) resin and these columns purify the low-level waste removing the hardness, the chemical ions, and the radioactive ions. The product quality is the equivalent of the original scavenger-precipitation process.

A total of 1.64×10^4 cubic meters of contaminated water was chemically treated this month. Of this amount, 1.37×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of column operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hrs	m^3 Treated
469	B	211.5	1881
470	B	45	1022
471	C	42	954
472	B	32.5	738
473	C	62	1409
474	B	44.5	1011
475	C	52.5	1306
476	B	54	1227
477	C	50	1146
478	B	48.5	1102
479	B	15.5	352
480	B	24	545
481	C	34	750
482	B	32	651
483	C	64	1453

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.53 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	377.7
Volume transferred to evaporators	392.1
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	45.4
W-21, End of Month	23.3
W-22, Beginning of Month	23.3
W-22, End of Month	31.8
W-23, Beginning of Month	21.5
W-23, End of Month	46.5
Melton Valley Waste Storage Facility Inventory:	
W-24, Beginning of Period	119.9
W-24, End of Period	139.1
W-25, Beginning of Period	136.8
W-25, End of Period	145.8
W-26, Beginning of Period	64.9
W-26, End of Period	116.5
W-27, Beginning of Period	89.3
W-27, End of Period	127.8
W-29, Beginning of Period	53.2
W-29, End of Period	53.2

Tanks W-28, W-30, and W-31 remain empty.

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

	Cubic Meters
Building 3525	3.1
Building 3508	4.5
Radioisotopes Processing Area	66.2
ORR and BSR	63.7
High Flux Isotope Reactor	15.5
Fission Products Development Laboratory	68.1*
4500 Complex	19.2
Building 3544	36.5
Transuranium Processing Area	4.6

GASEOUS WASTE

The ORNL Stacks discharged <2 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 66 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R2

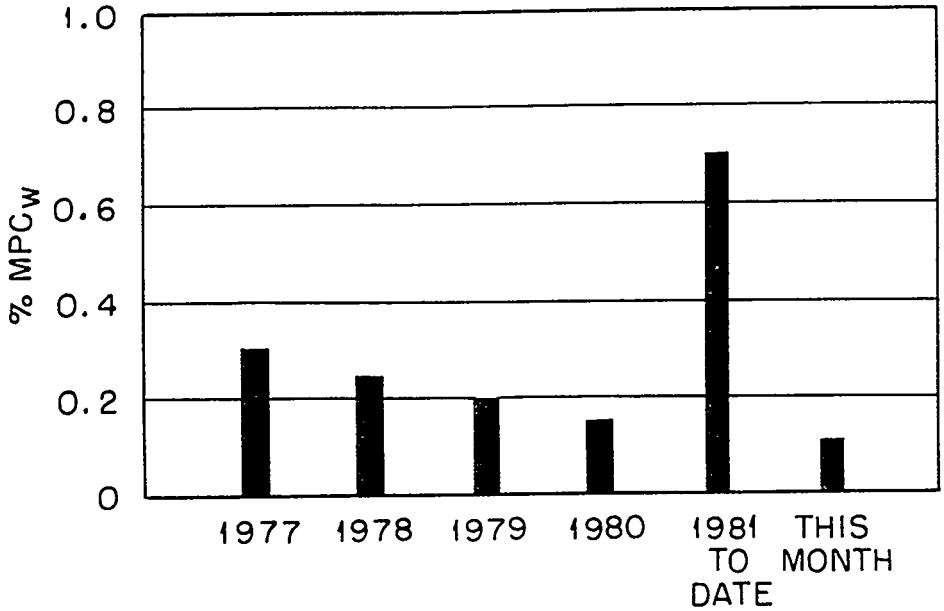


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

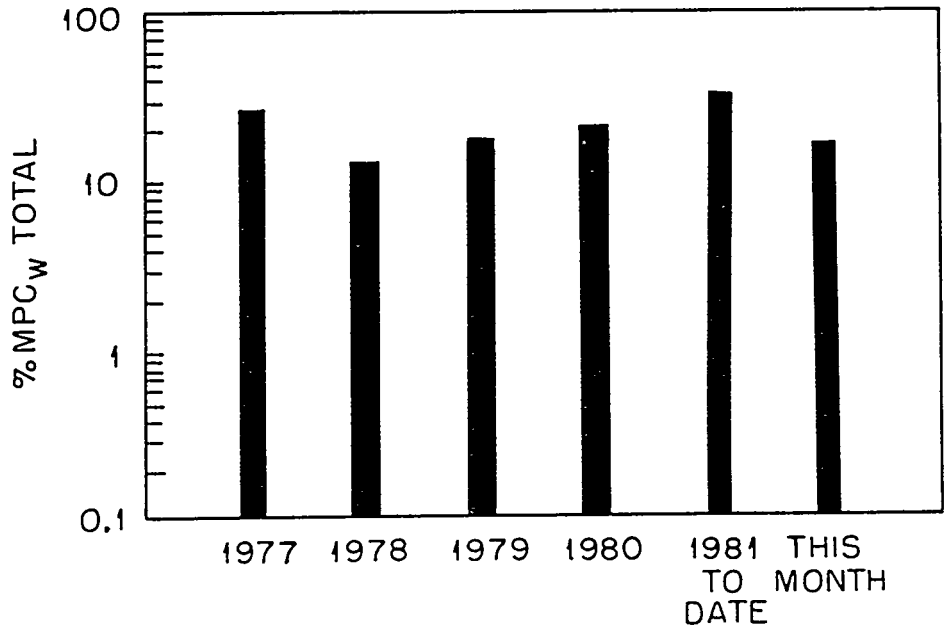


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

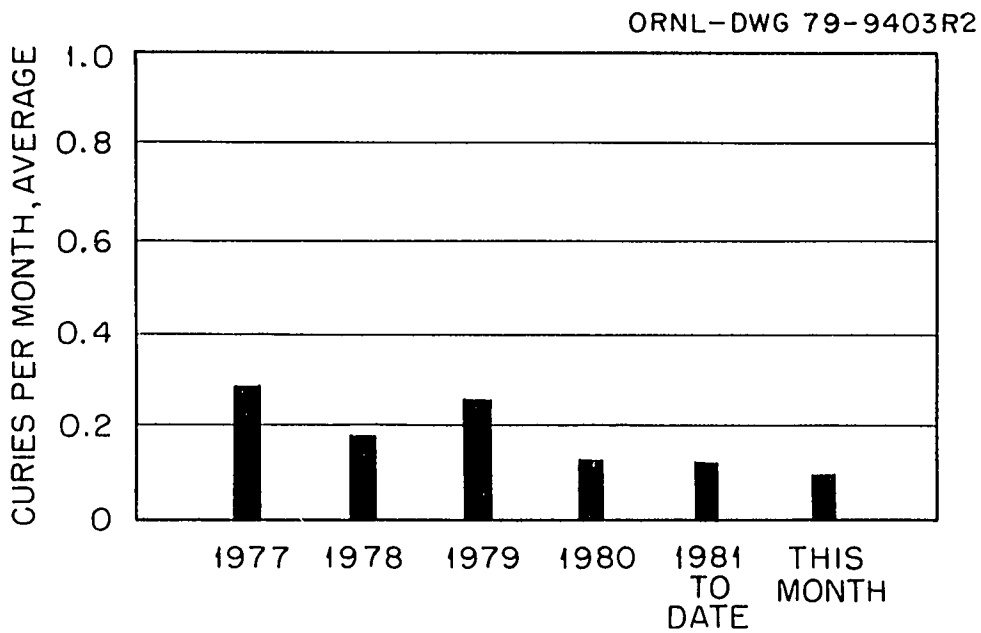


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

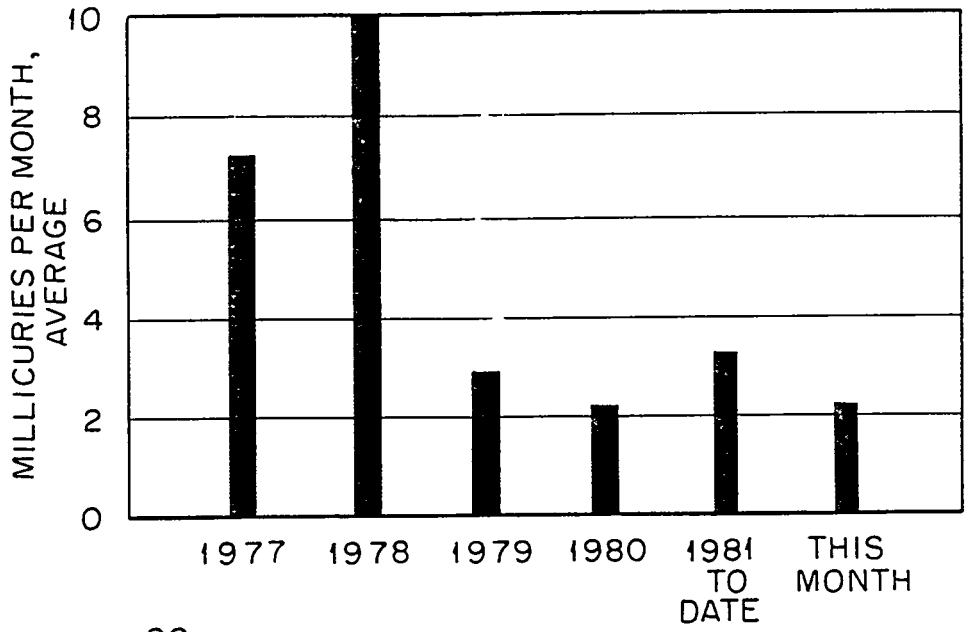


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

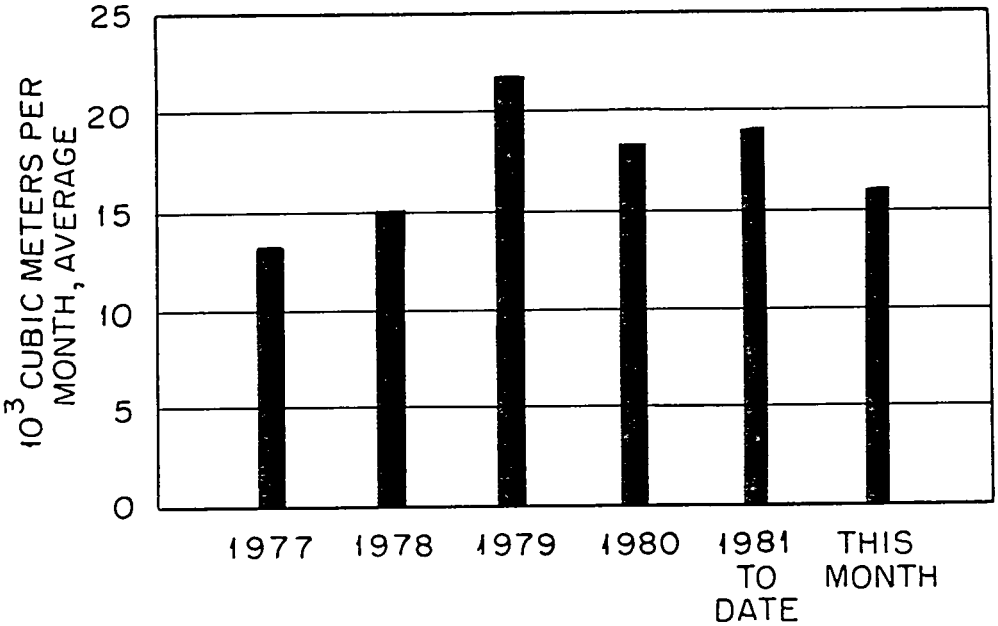


Fig. 4. Process Waste Volumes.

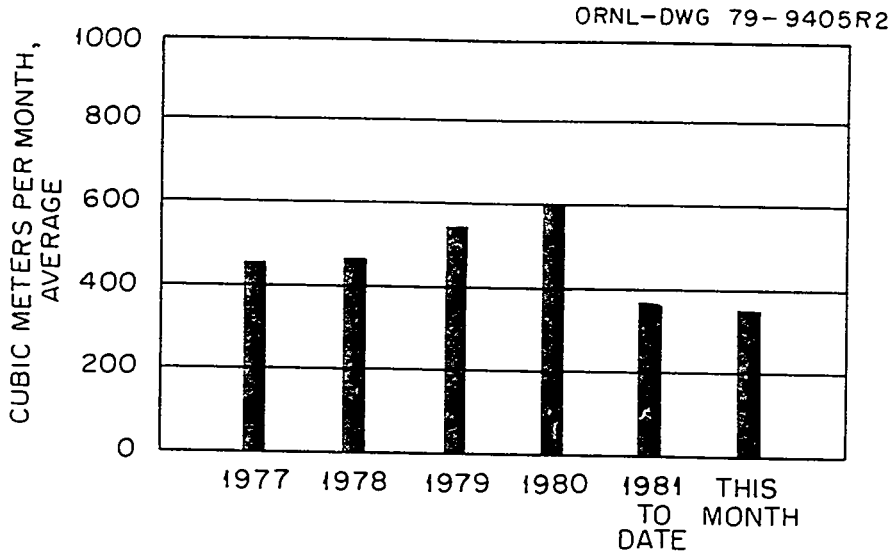


Fig. 5. Intermediate-Level Waste Volumes.

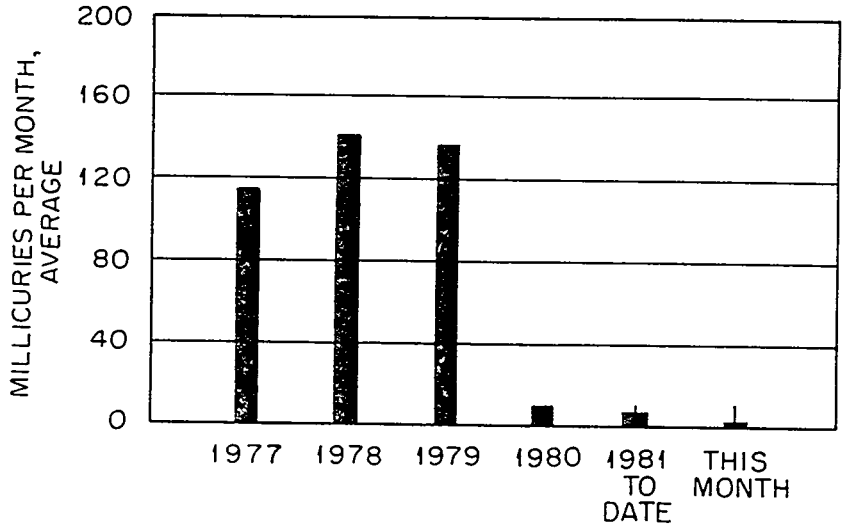


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

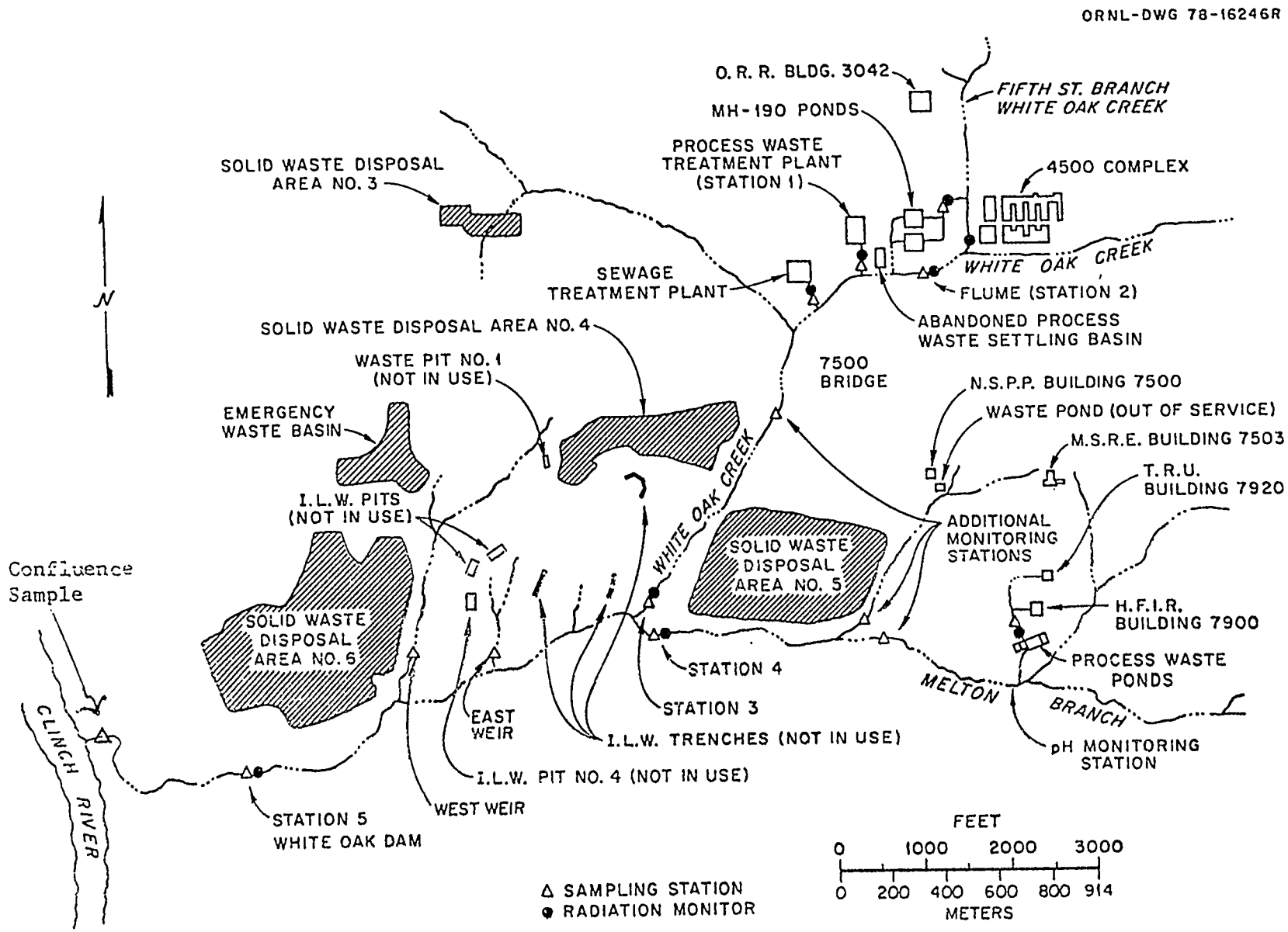


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0773	0.206
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0056	0.026
Discharge from ILW Pits and Trenches	East Weir	< 0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0006	—
Total discharge from all sources		0.0835	0.232
White Oak Dam to Clinch River (ISAHP Measurement)		0.0586	0.111

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	1600	0.082	10.9	1.90	11.6
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.325	43.1	2.04	12.5
3. Reactor Operations (MH112)	96	0.006	0.8	2.41	14.8
4. Buildings 3503 and 3508	3	<0.001	—	0.98	6.0
5. Buildings 3025 and 3026	11	<0.001	—	2.03	12.4
6. Building 3019	11	0.001	—	1.17	7.2
7. Waste Evaporator, Bldg. 2531	4700	0.147	19.5	1.16	7.1
8. Building 3525	54	0.001	—	0.98	6.0
9. Building 2026	2.2	<0.001	—	1.49	9.1
10. Tank Farm Drainage	3300	0.193	25.6	2.17	13.3

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Bldg. 3047 The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	1
Central Radioactive Gas Disposal Facilities	3039	<0.01	40
Radiochemical-Processing Pilot Plant	3020	<0.01	12
MSRE	7512	<0.01	1
HFIR & TRU	7911	<0.01	14
Total Activity in Gases Released at X-10 Site		<0.01	66
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		28 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			1.40×10^{-4}
Building 5505 Discharges Glove Box			6.75×10^{-3}
Hood			7.74×10^{-2}

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

[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c]No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

DATE ISSUED DEC 29

INTERNAL USE ONLY

ORNL
CENTRAL FILES NUMBER

ORNL/CF-81/329

DATE: November 23, 1981

SUBJECT: Radioactive Waste Disposal Operations and Effluent Monitoring Report for the Month of September 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. H. Swanks

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

Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of September was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 113.3 mCi; this is 29.7 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 68 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 87.0 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 4 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of September 1981 was 0.1% of the MPC_W (Fig. 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 13.5% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.087 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 49×10^4 and 2×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 112.6 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 0.9 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.2 mCi of ^{90}Sr was released from the 190 pond system; and and an additional 12.3 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge

into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 7).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	20.9	
190 Ponds	0.2	
Process Waste Treatment Plant	0.9	
Sewage Treatment Plant	12.3	
	34.3	
7500 Sampling Station	106.0	
Burial Grounds Nos. 1 and 3, and Flood Plains		71.7
Station No. 3	108.9	
Burial Ground No. 4		2.9
Melton Branch		
7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	1.8	
	2.0	
Station No. 4	3.7	
Burial Ground No. 5		1.7
ILW Pit Disposal Area		
East Weir	0.1	
West Weir	0.6	
	0.7	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 plus Ground Disposal Area)	113.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		77.0
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		68.0

Process Waste

A total of 1.70×10^4 cubic meters of contaminated waste was chemically treated this month. Of this amount, 1.23×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as backwashing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of column operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hours	m^3 Treated
484	B	32	725
485	C	31	703
486	B	30.5	691
487	C	39.5	1274
488	B	28	635
489	C	47	772
490	B	41	930
491	C	41.5	942
492	B	31.5	556
493	C	44	998
494	B	32.5	737
495	C	40	828
496	B	28.5	749
497	C	43.5	986
498	B	49.5	1112
499	C	55	1247
500	B	40.5	824
501	C	50.5	1258
502	B	46.5	1054

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.43 m /hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	337.6
Volume transferred to evaporators	312.6
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	23.3
W-21, End of Month	57.7
W-22, Beginning of Month	31.8
W-22, End of Month	22.4
W-23, Beginning of Month	46.5
W-23, End of Month	69.0
Melton Valley Waste Storage Facility Inventory:	
No change during the period	582.4

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

	Cubic Meters
Building 3019	11.5
Building 3508	4.8
Building 3525	8.7
Radioisotopes Processing Area	65.1
ORR and BSR	103.6
High Flux Isotope Reactor	39.3
Fission Products Development Laboratory	6.7*
4500 Complex	17.7
Building 3544	21.7
Transuranium Processing Area	3.9

GASEOUS WASTE

The ORNL Stacks discharged <4 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 72 μCi. Inert gases released from the 3029 and 7911 Stacks averaged less than 0.7% and 0.4% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R2

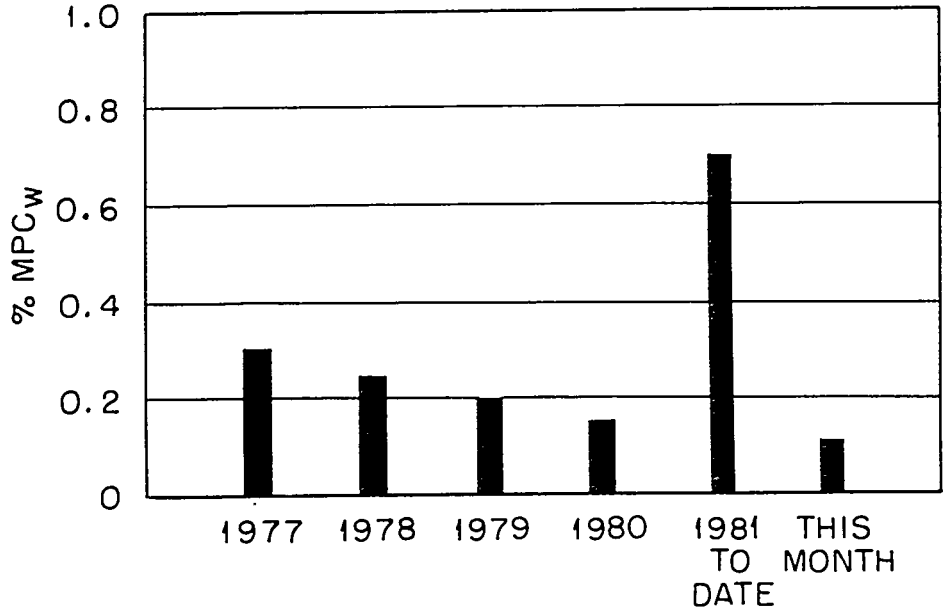


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

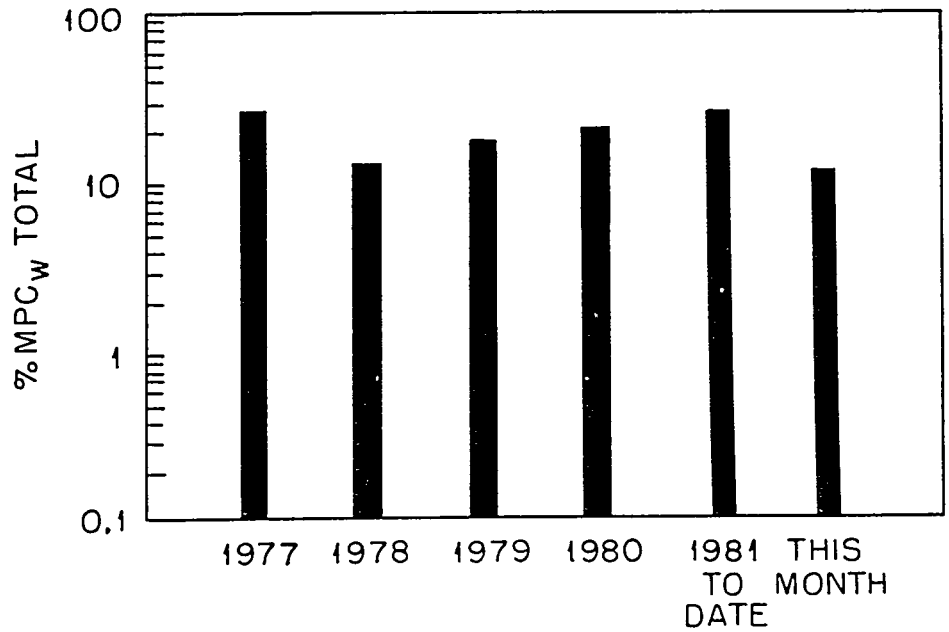


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

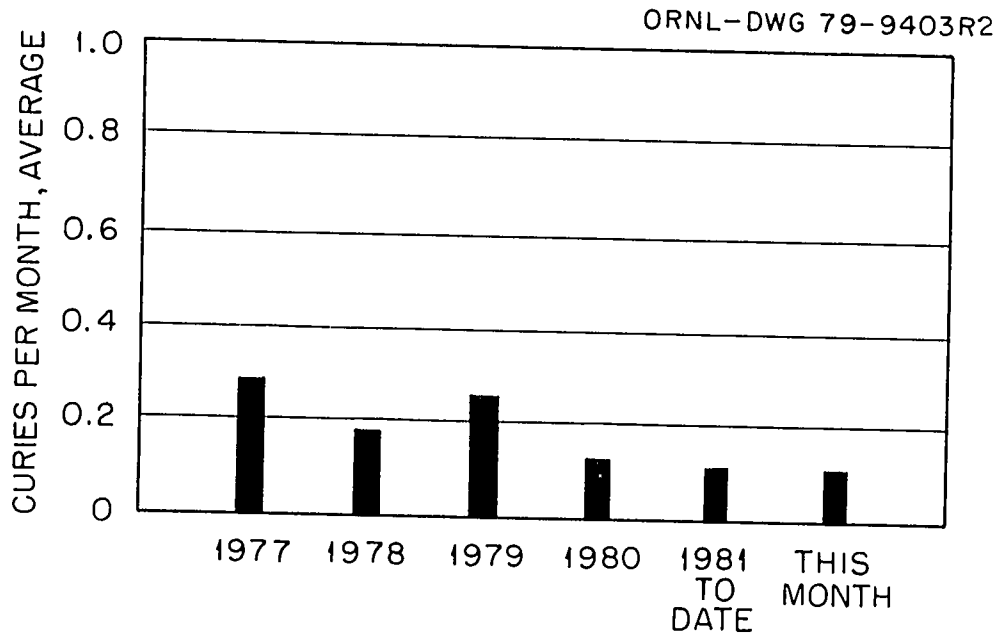


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

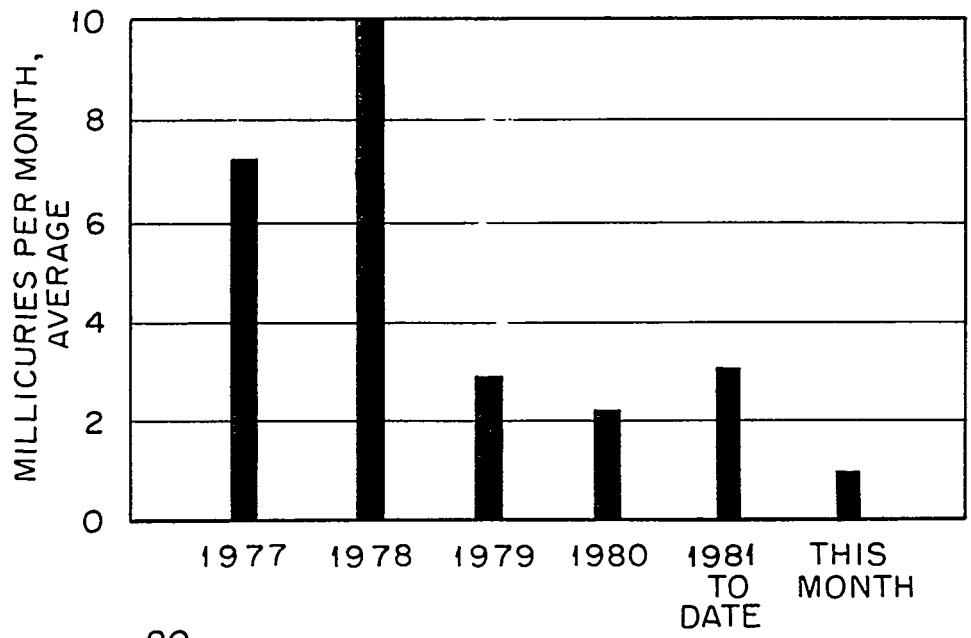


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

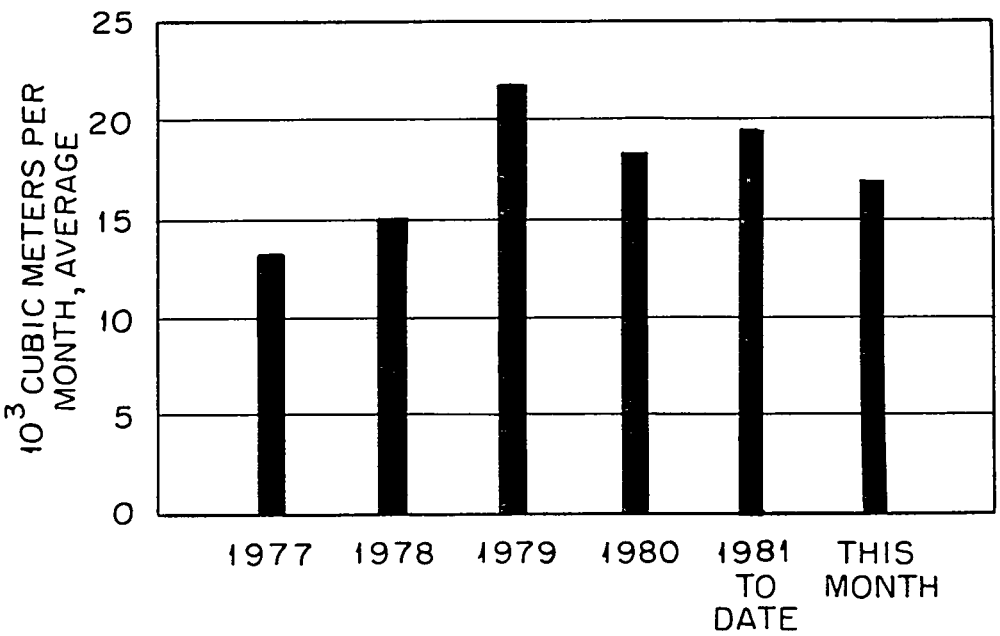


Fig. 4. Process Waste Volumes.

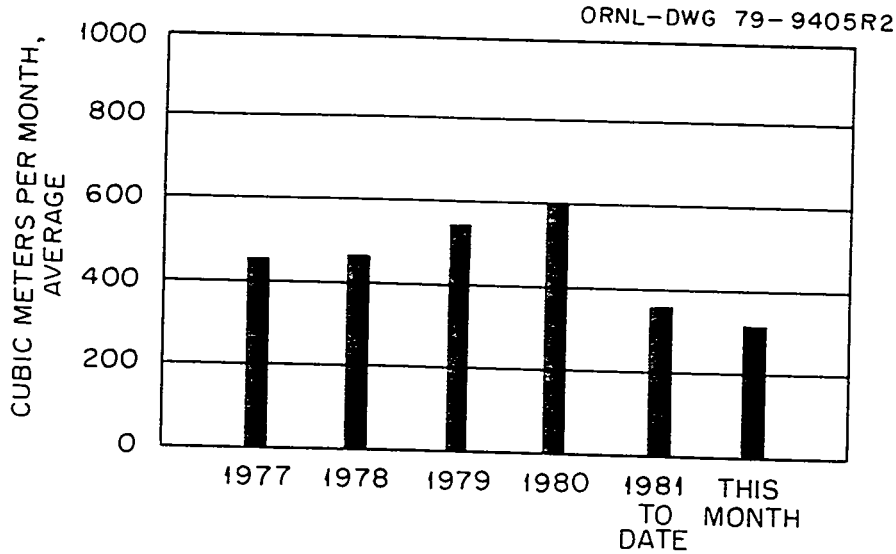


Fig. 5. Intermediate-Level Waste Volumes.

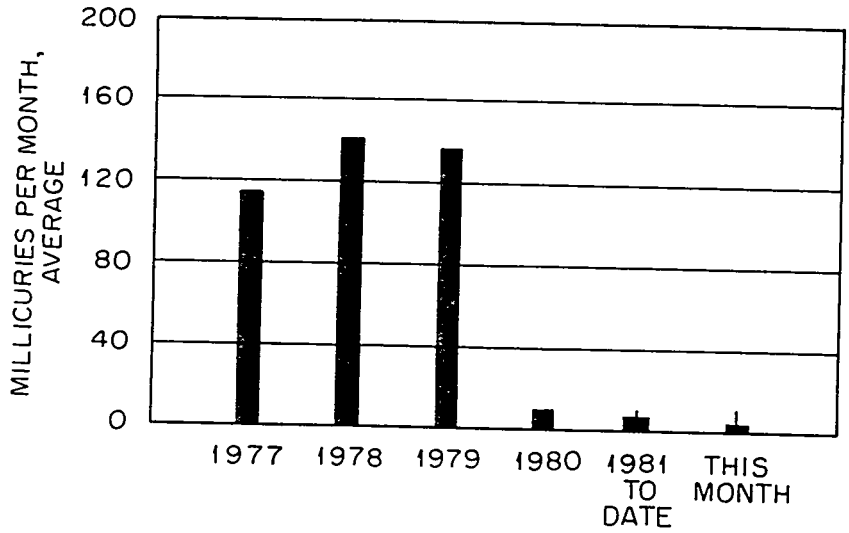


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

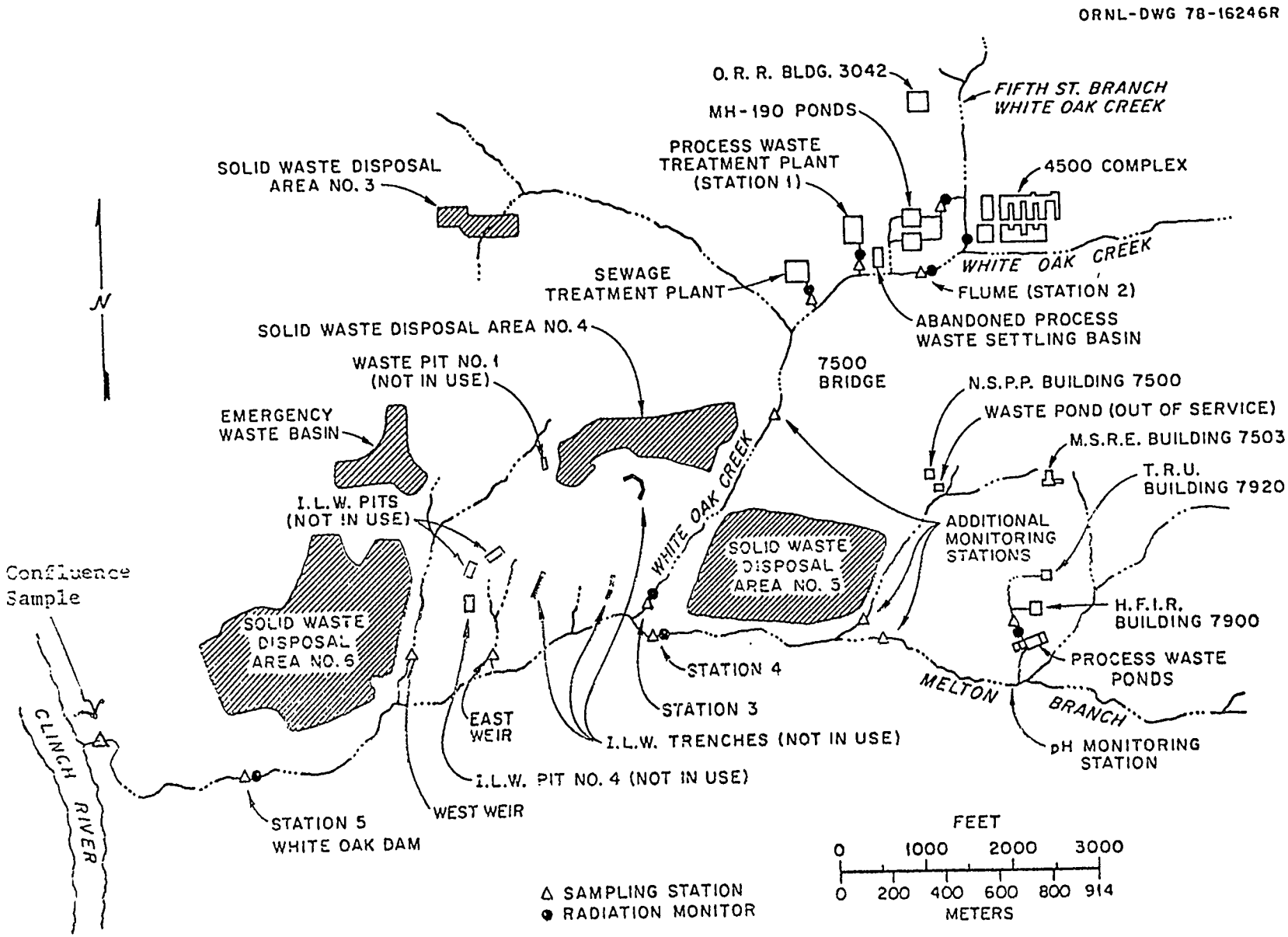


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1089	0.289
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0038	0.013
Discharge from ILW Pits and Trenches	East Weir	<0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0006	—
Total discharge from all sources		0.1133	0.302
White Oak Dam to Clinch River (ISAHP Measurement)		0.0870	0.305

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr β_Q/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH234)	2300	0.113	14.5	1.81	12.0
2. Radioisotopes Processing Area (MH114 minus MH112)	___	0.213	27.3	1.36	9.0
3. Reactor Operations (MH112)	50	0.003	0.4	2.47	16.4
4. Buildings 3503 and 3508	3.7	<0.001	___	0.64	4.3
5. Buildings 3025 and 3026	8	0.001	___	1.93	12.8
6. Building 3019	15	<0.001	___	1.03	6.8
7. Waste Evaporator, Bldg. 2531	8000	0.230	29.5	1.07	7.1
8. Building 3525	3.8	<0.001	___	0.92	6.1
9. Building 2026	890	0.032	4.1	1.33	8.8
10. Tank Farm Drainage	2800	0.188	24.2	2.49	16.7

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	<1
Central Radioactive Gas Disposal Facilities	3039	<0.01	56
Radiochemical-Processing Pilot Plant	3020	<0.01	11
MSRE	7512	<0.01	<1
HFIR & TRU	7911	<0.01	5
Total Activity in Gases Released at X-10 Site		<0.01	72
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		0.5 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			2.8×10^{-4}
Building 5505 Discharges Glove Box			1.05×10^{-2}
Hood			7.74×10^{-2}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] No data available at this time.

2511

ORNL

MASTER COPY

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION

POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-82/25

DATE: December 28, 1981

SUBJECT: Radioactive Liquid and Gaseous Waste Disposal Operations and Effluent Monitoring Report for the Month of October 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored By: J. H. Swanks

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

Donald R. Hamrin 7/15/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of October was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 102.6 mCi; this is 10.7 mCi less than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 70 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 124.0 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 2 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of October 1981 was 0.2% of the MPC_W (Fig. 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 6.4% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.124 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 50×10^4 and 3×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 102.1 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 0.8 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.3 mCi of ^{90}Sr was released from the 190 pond system; and an additional 16.0 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge

into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3, and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Station 3 and 4 (see Fig. 7).

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	13.4	
190 Ponds	0.3	
Process Waste Treatment Plant	0.8	
Sewage Treatment Plant	16.0	
	30.5	
7500 Sampling Station	84.6	
Burial Grounds Nos. 1 and 3, and Flood Plains		54.1
Station No. 3	97.2	
Burial Ground No. 4		12.6
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	0.3	
	0.4	
Station No. 4	4.9	
Burial Ground No. 5		4.5
ILW Pit Disposal Area		
East Weir	0.1	
West Weir	0.4	
	0.5	
Total ^{90}Sr to White Oak Lake (Station Nos. 3 and 4 plus Ground Disposal Area)	102.6	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		71.7
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		69.9

Process Waste

A total of 1.58×10^4 cubic meters of contaminated waste was chemically treated this month. Of this amount, 1.47×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as back-washing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of column operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hours	m^3 Treated
503	C	52	1,180
504	B	37.5	852
505	C	55	1,256
506	B	48.5	1,101
507	C	38.5	874
508	B	35	794
509	C	46.5	1,055
510	B	18	409
511	C	32.5	738
512	B	31	704
513	C	37	841
514	B	34	734
515	C	14.5	329
516	B	26	591
517	C	26.5	692
518	B	26	591
519	C	27	619
520	B	31	697
521	C	39	880
522	B	39	885
523	C	24	545

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.45 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	388.9
Volume transferred to evaporators	334.2
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	57.7
W-21, End of Month	20.5
W-22, Beginning of Month	22.4
W-22, End of Month	114.3
W-23, Beginning of Month	69.0
W-23, End of Month	104.2
Melton Valley Waste Storage Facility Inventory:	
No change during the period	582.4

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

	Cubic Meters
Building 3019	15.1
Building 3508	1.7
Building 3525	3.4
Radioisotopes Processing Area	56.3
ORR and BSR	102.3
High Flux Isotope Reactor	51.1
Fission Products Development Laboratory	28.4*
4500 Complex	31.5
Building 3544	51.3
Transuranium Processing Area	6.6

Gaseous Waste

The ORNL Stacks discharged < 2 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 237 μCi. Inert gases released from the 3029 and 7911 Stacks averaged less than 0.7% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Figure 6.

The demolition phase (removal of the Cottrell Precipitator and miscellaneous inactive off-gas lines) of the Off Gas and Cell Ventilation Improvements project was started this month.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

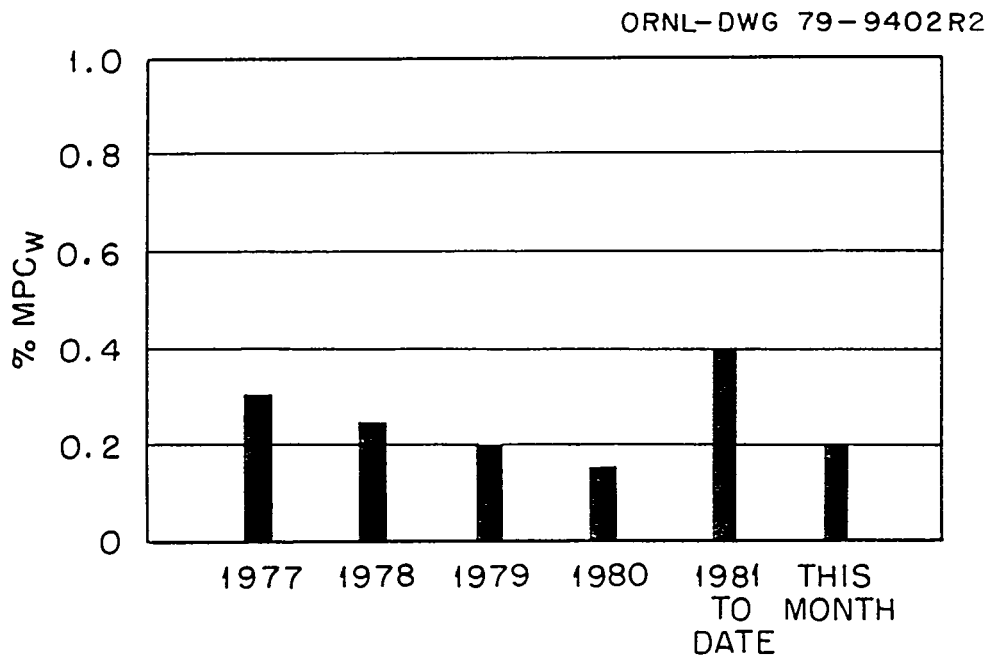


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

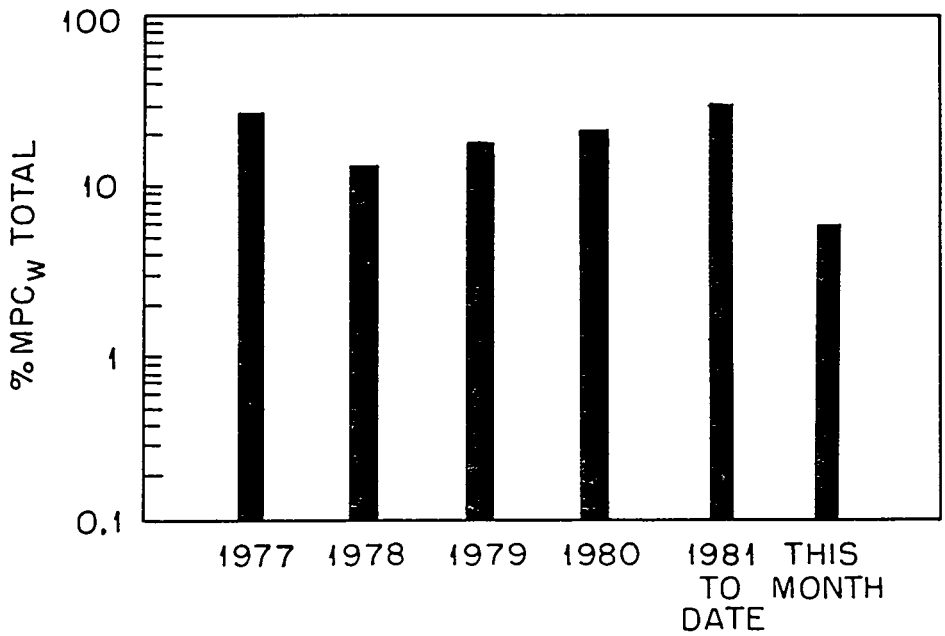


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

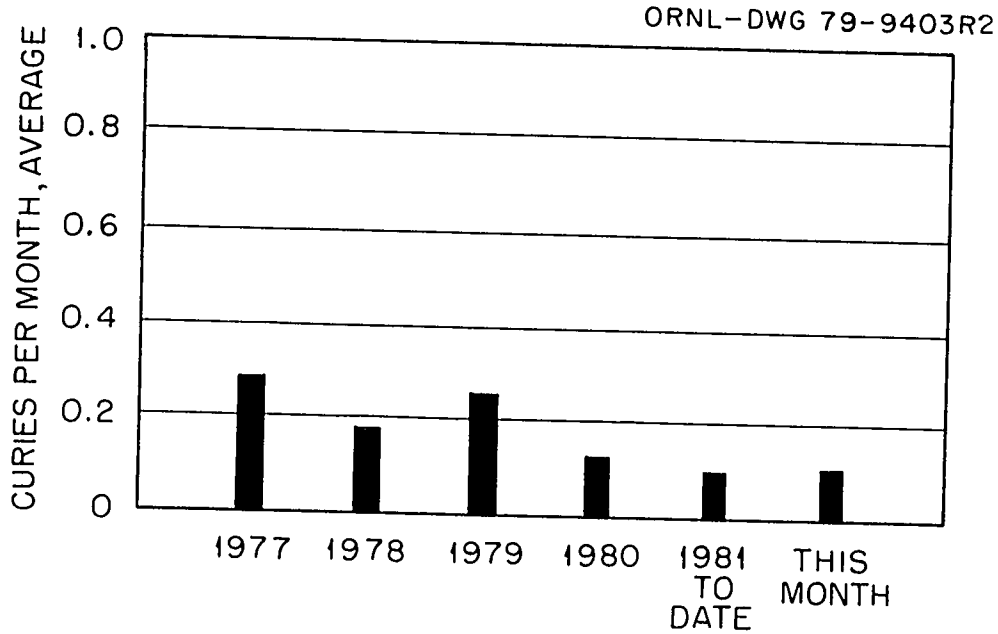


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

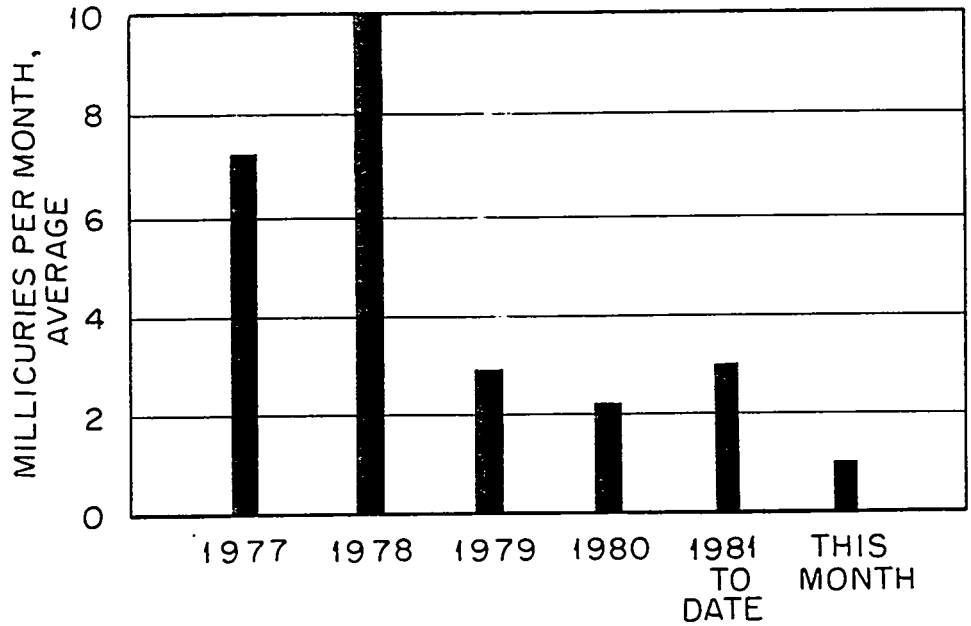


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

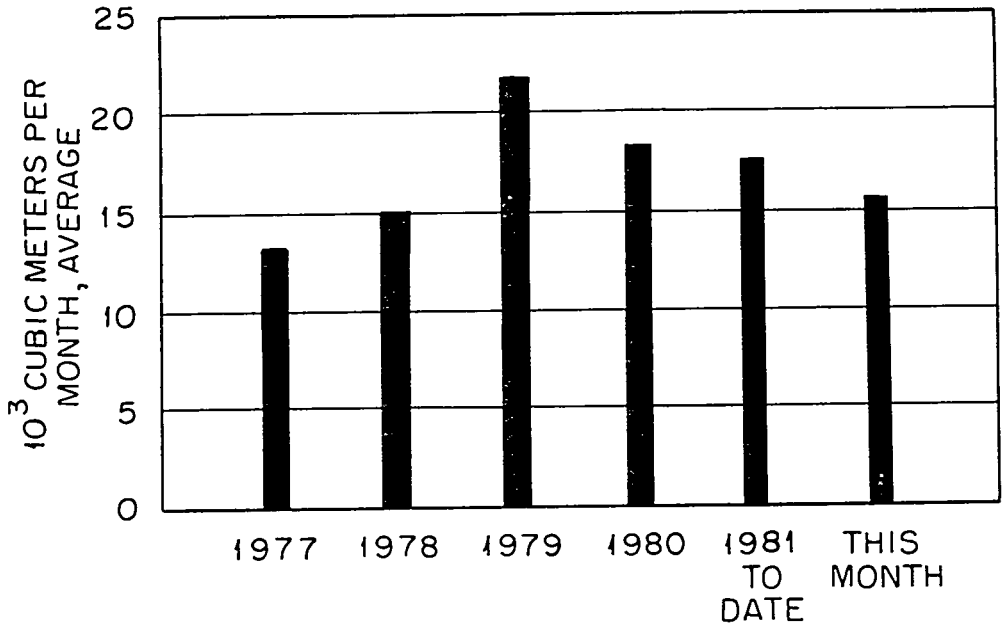


Fig. 4. Process Waste Volumes.

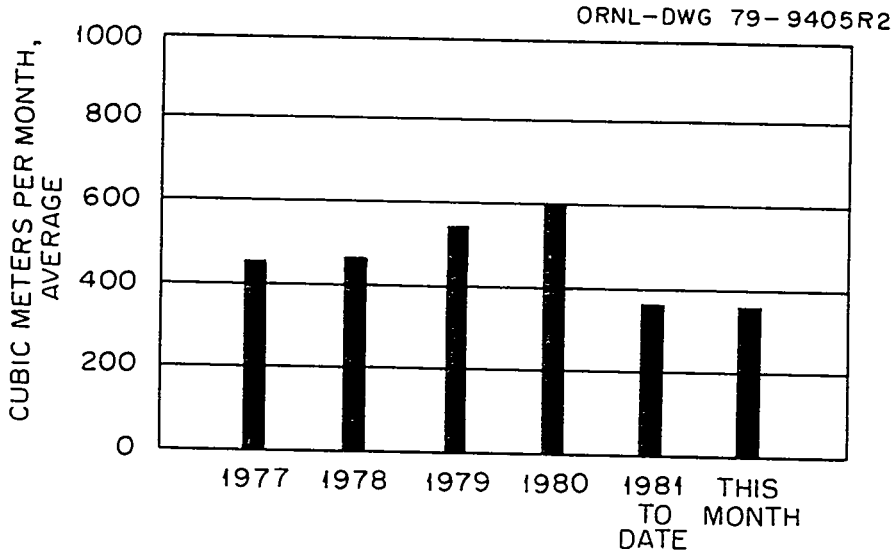


Fig. 5. Intermediate-Level Waste Volumes.

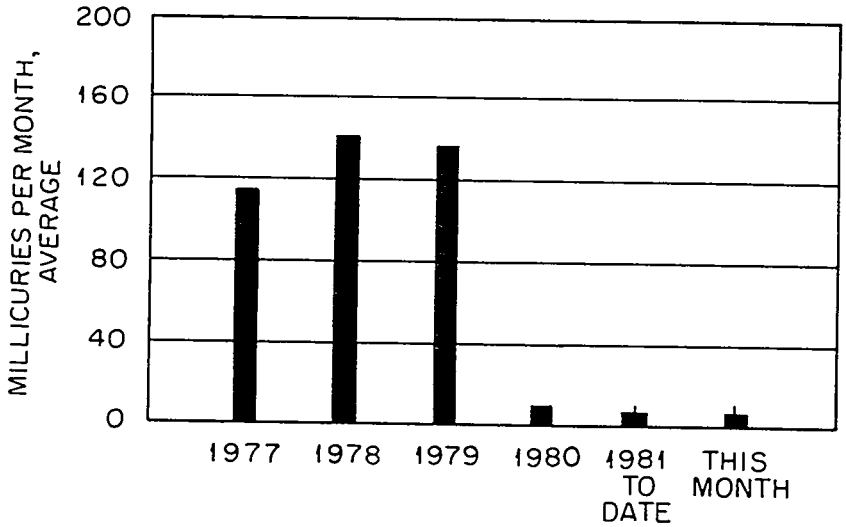


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

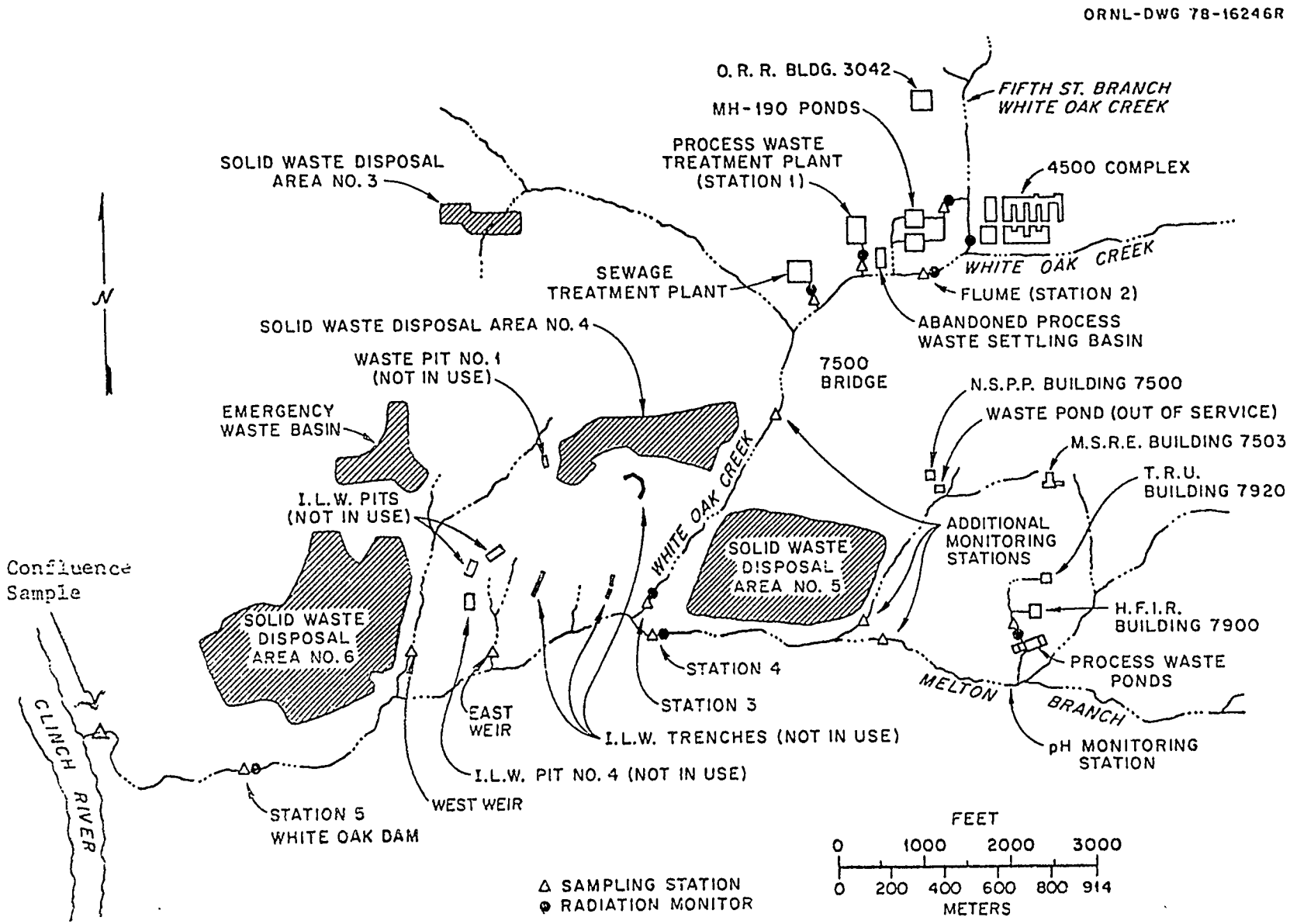


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.0972	0.432
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0049	0.020
Discharge from ILW Pits and Trenches	East Weir	<0.0001	—
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0005	—
Total discharge from all sources		0.1026	0.452
White Oak Dam to Clinch River (ISAHP Measurement)		0.1240	0.378

[a]Refers to Fig. 7.

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

Table 2. Process-Waste Discharges

	^{90}Sr βQ/ℓ	^{90}Sr Curies	^{90}Sr % of Total	Volume $10^3 m^3$	Volume % of Total
1. Radioisotopes Processing Area (MH1234)	1800	0.119	16.0	2.44	14.8
2. Radioisotopes Processing Area (MH114 minus MH112)	—	0.251	33.7	1.74	10.6
3. Reactor Operations (MH112)	48	0.003	0.4	2.36	14.4
4. Buildings 3503 and 3508	2.2	< 0.001	—	0.64	3.9
5. Buildings 3025 and 3026	9.4	< 0.001	—	2.50	15.2
6. Building 3019	16	< 0.001	—	1.12	6.8
7. Waste Evaporator, Bldg. 2531	5500	0.188	25.3	1.27	7.7
8. Building 3525	3.4	< 0.001	—	1.04	6.3
9. Building 2026	7	< 0.001	—	1.33	8.1
10. Tank Farm Drainage	3400	0.183	24.6	2.00	12.2

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	2
Central Radioactive Gas Disposal Facilities	3039	<0.01	96
Radiochemical-Processing Pilot Plant	3020	<0.01	25
MSRE	7512	<0.01	< 1
HFIR & TRU	7911	<0.01	114
Total Activity in Gases Released at X-10 Site		<0.01	237
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		191 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			3.09×10^{-3}
Room 265			2.8×10^{-4}
Building 5505 Discharges Glove Box			1.05×10^{-2}
Hood			7.74×10^{-2}

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

[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[c] No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

ORNL
MASTER COPY

Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-82/24

DATE: January 13, 1982

SUBJECT: Radioactive Liquid and Gaseous Waste Disposal Operations and Effluent Monitoring Report for the Month of November 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. H. Swanks

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

Daniel Hamm 7/15/16
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of November was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 139.4 mCi; this is 36.8 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 64 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 118 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 4 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November 1981 was 0.3% of the MPC_W (Fig. 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 7.7% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.118 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 50×10^4 and 4×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 138.9 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 3.3 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.2 mCi of ^{90}Sr was released from the 190 pond system; and an additional 28.2 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the ILW pit disposal area. Contributions from

Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 7).

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	14.5	
190 Ponds	0.2	
Process Waste Treatment Plant	3.3	
Sewage Treatment Plant	28.2	
	46.2	
7500 Sampling Station	101.4	
Burial Grounds Nos. 1 and 3, and Flood Plains		55.2
Station No. 3	130.0	
Burial Ground No. 4		28.6

Melton Branch

7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	3.9	
	4.0	
Station No. 4	8.9	4.9
Burial Ground No. 5		

ILW Pit Disposal Area

East Weir	0.1	
West Weir	0.4	
	0.5	
Total ^{90}Sr to White Oak Lake (Stations No. 3 and No. 4 plus Ground Disposal Area)	139.4	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		89.2
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		64.0

Process Waste

A total of 1.61×10^4 cubic meters of contaminated waste was chemically treated this month. Of this amount, 1.54×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as back-washing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of columnoperations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hours	m^3 Treated
524	B	29	612
525	C	24	545
526	B	31	704
527	C	39	885
528	B	32	727
529	C	27.5	715
530	B	32.5	738
531	C	51	1158
532	B	34	773
533	C	32.5	738
534	B	32.5	774
535	C	65.5	1177
536	A	61	1075
537	B	48	873
538	C	55	936
539	A	24	466
540	C	42	885
541	A	46	920
542	B	45	746
543	C	44	700

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.63 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	400.8
Volume transferred to evaporators	453.6
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	20.5
W-21, End of Month	22.4
W-22, Beginning of Month	114.3
W-22, End of Month	60.0
W-23, Beginning of Month	104.2
W-23, End of Month	143.6
Melton Valley Waste Storage Facility Inventory:	
No Change during the period	582.4

Preoperational testing of the equipment at the New Hydrofracture Facility (Bldg. 7860) was started during the period; testing and calibration of the instrument and controls systems have been completed.

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

	Cubic Meters
Building 3019	17.9
Building 3508	1.1
Building 3525	3.4
Radioisotopes Processing Area	36.7
ORR and BSR	67.0
High Flux Isotope Reactor	38.2
Fission Products Development Laboratory	10.4*
4500 Complex	22.3
Building 3544	60.7
Transuranium Processing Area	9.5

Gaseous Waste

The ORNL Stacks discharged <4 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 204 μCi. Inert gases released from the 3029 and 7911 Stacks averaged less than 0.9% and 0.3% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW, since it was designed in this fashion.

ORNL-DWG 79-9402R2

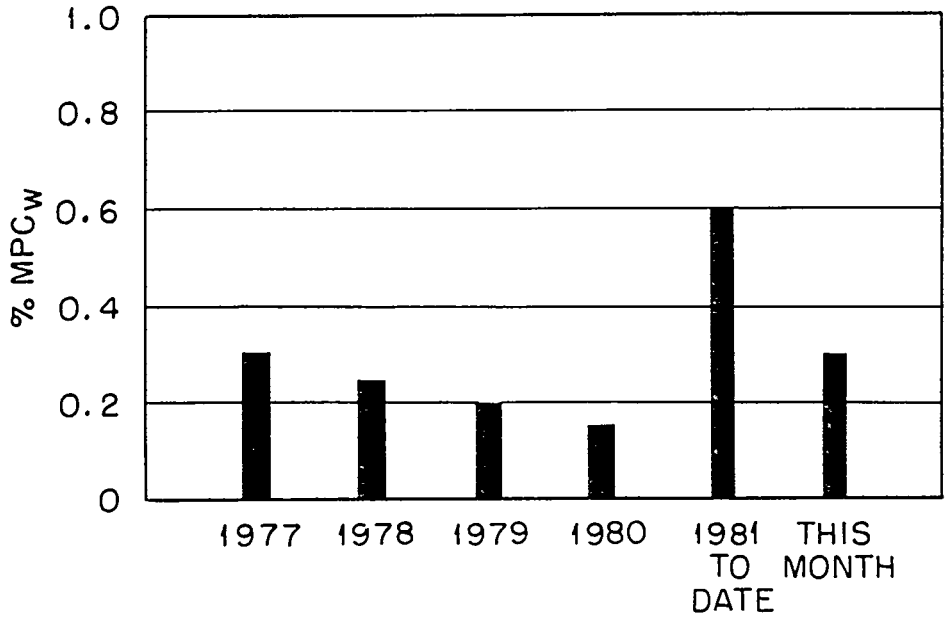


Fig. 1A. Calculated Percent of MPC$_W$ in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

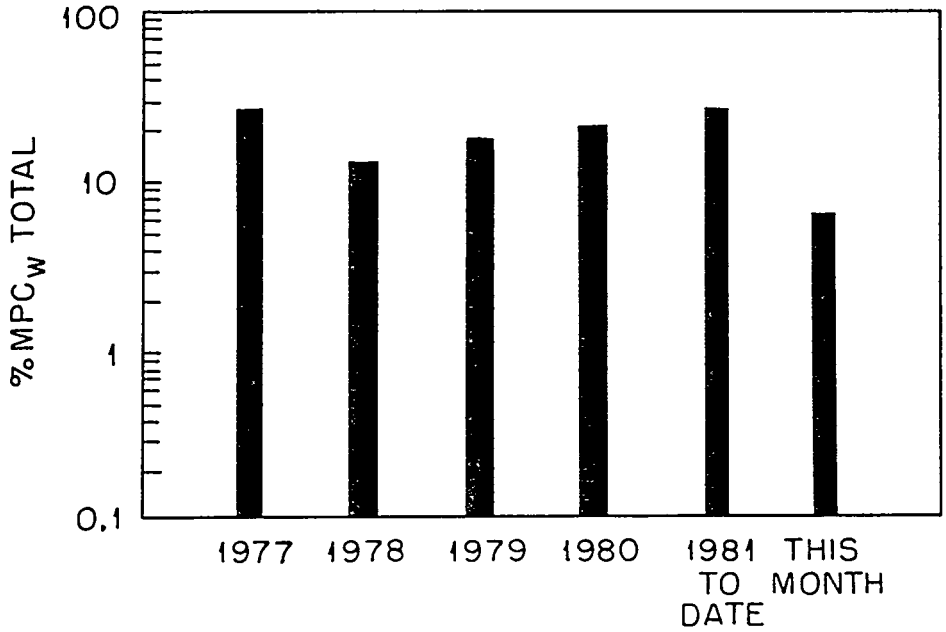


Fig. 1B. Measured Percent of MPC$_W$ in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

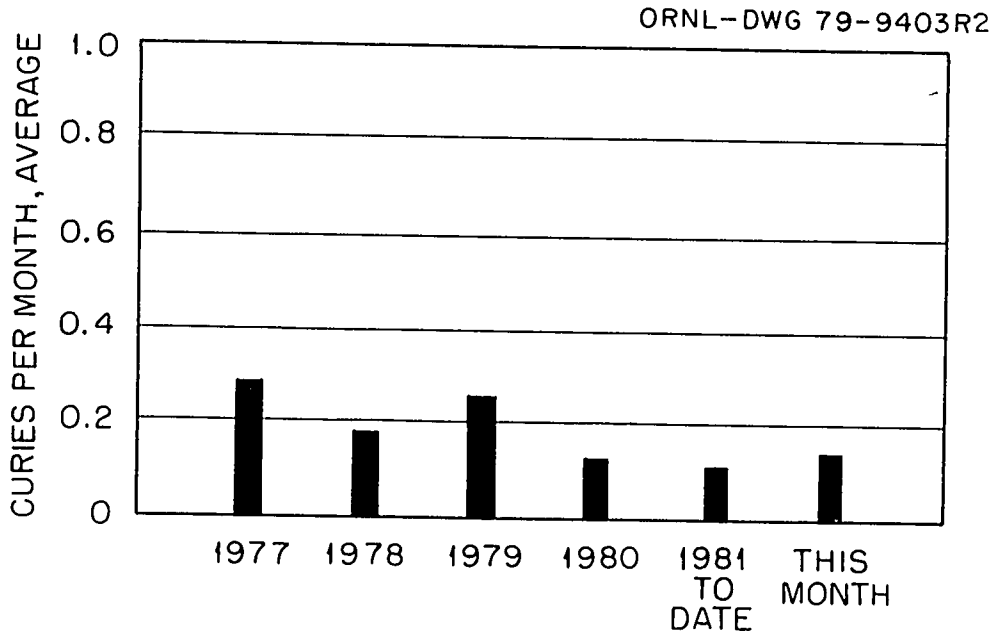


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 7).

ORNL-DWG 79-9404R2

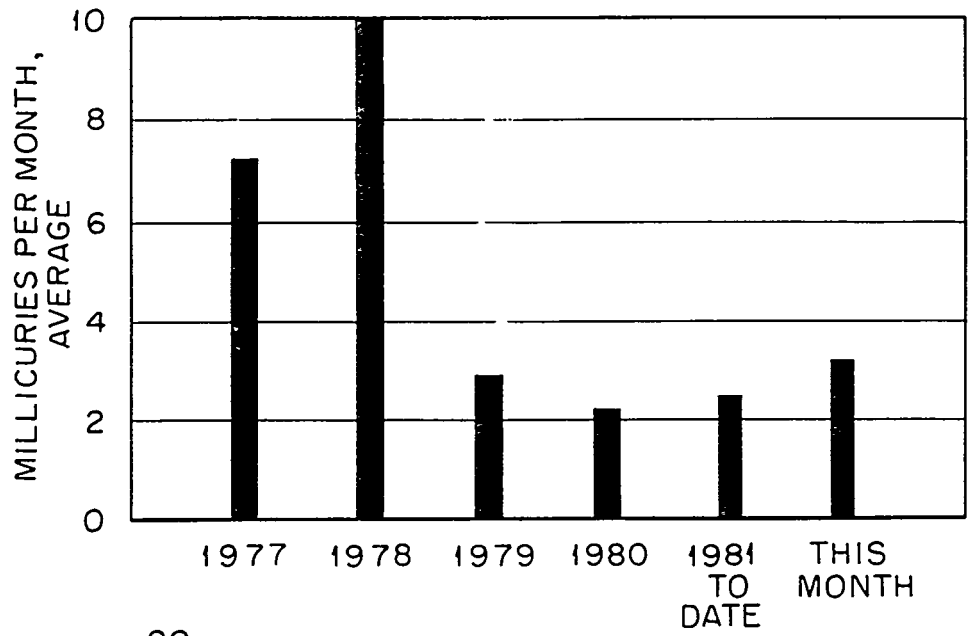


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

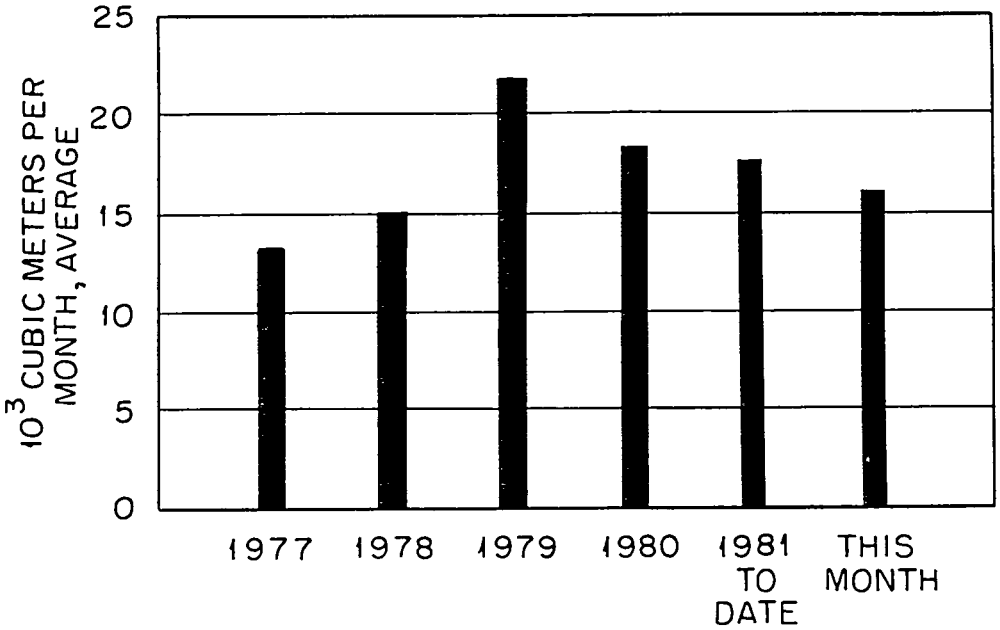


Fig. 4. Process Waste Volumes.

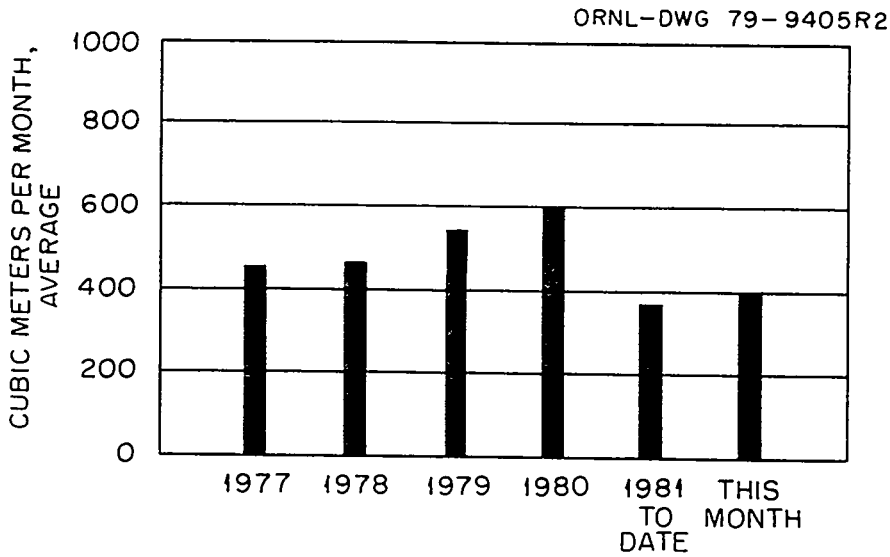


Fig. 5. Intermediate-Level Waste Volumes.

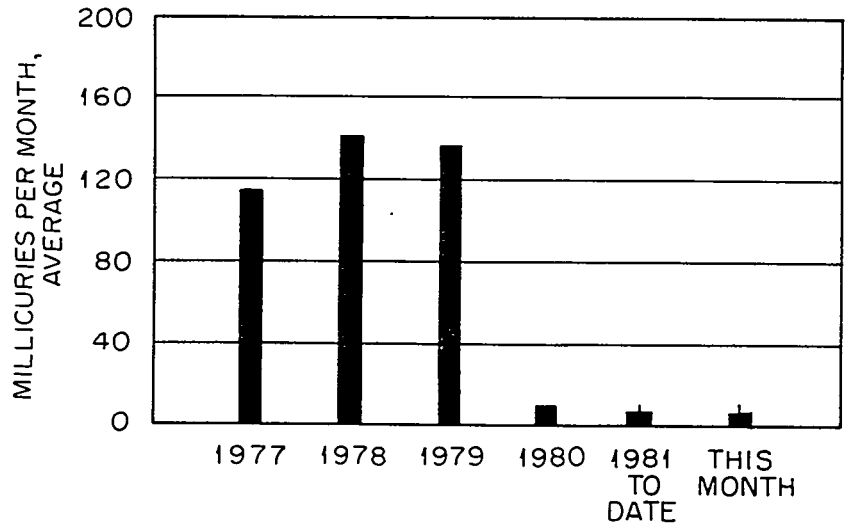


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

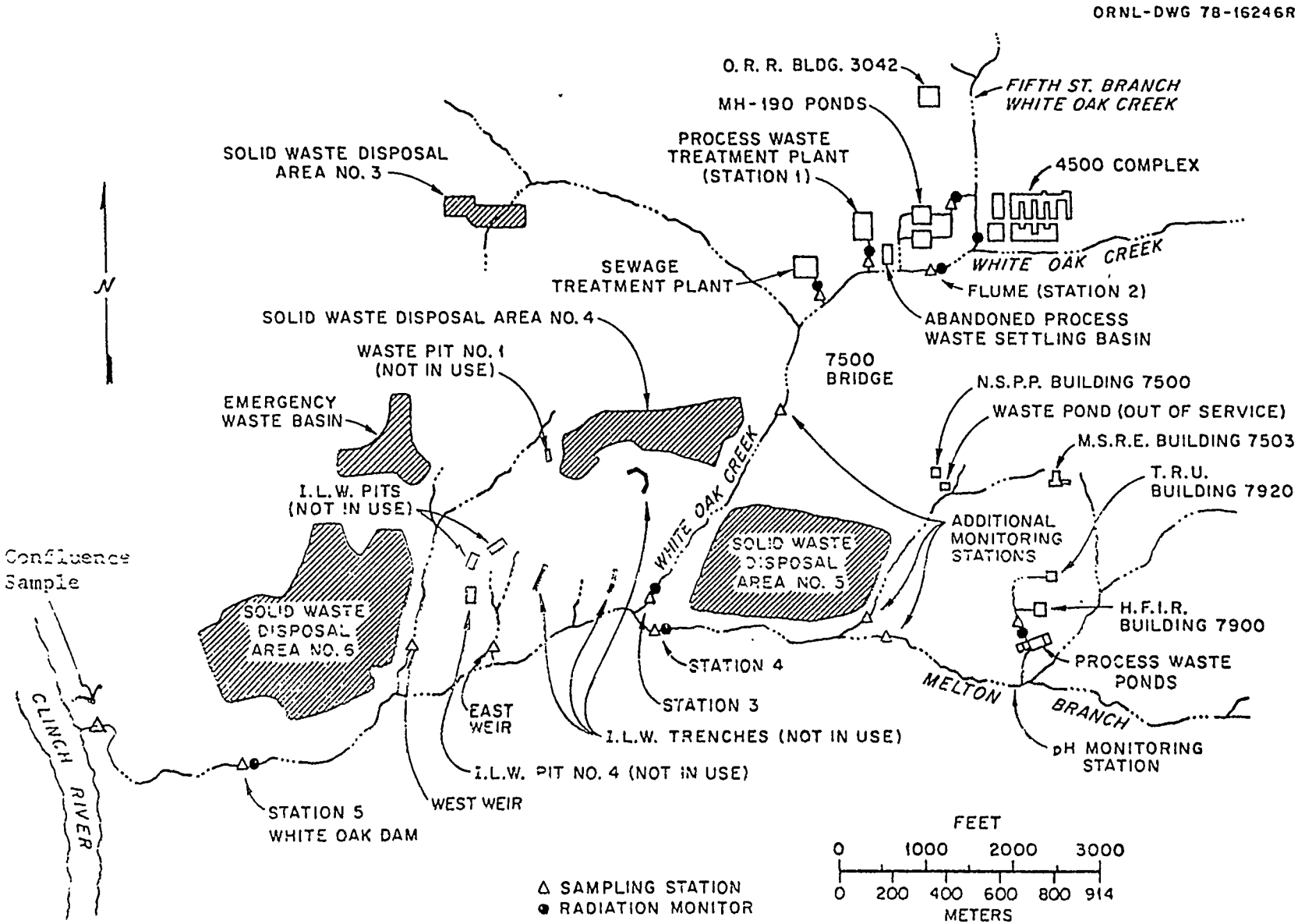


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1300	0.447
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0089	0.035
Discharge from ILW Pits and Trenches	East Weir	0.0001	----
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0004	----
Total discharge from all sources		0.1393	0.482
White Oak Dam to Clinch River (ISAHP Measurement)		0.1175	0.022

[a]Refers to Figure 7.

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

Table 2. Process-Waste Disharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% pf Total
Radioisotopes Processing Area (MH234)	1800	0.135	17.1	2.78	16.0
Radioisotopes Processing Area (MH114 minus MH112)	---	0.235[a]	29.7	2.32	13.4
Reactor Operations (MH112)	42	0.002	0.3	1.68	9.7
Buildings 3503 and 3508	2	<0.001	---	0.96	5.5
Buildings 3025 and 3026	8.4	<0.001	---	2.39	13.8
Building 3019	14	<0.001	---	1.02	5.9
Waste Evaporator, Bldg. 2531	4700	0.186	23.5	1.47	8.5
Building 3525	1.9	<0.001	---	1.29	7.4
Building 2026	5.6	<0.001	---	1.20	6.9
Tank Farm Drainage	3900	0.233	29.4	2.22	12.9

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	< 1
Central Radioactive Gas Disposal Facilities	3039	< 0.01	105
Radiochemical-Processing Pilot Plant	3020	< 0.01	71
MSRE	7512	< 0.01	<1
HFIR and TRU	7911	< 0.01	28
Total Activity in Gases Released at X-10 Site		<0.01	204
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		77 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			6.18×10^{-3}
Room 265			5.60×10^{-4}
Building 5505 Discharges Glove Box			2.10×10^{-2}
Hood			1.55×10^{-1}

[a]Activity primarily ^{131}I except as noted.
[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c]No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
UNION CARBIDE CORPORATION
NUCLEAR DIVISION
POST OFFICE BOX X
OAK RIDGE TENNESSEE 37830

ORNL MASTER COPY

Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-82/45

DATE: March 1, 1982

SUBJECT: Radioactive Liquid and Gaseous Waste Disposal Operations and Effluent Monitoring Report for the Month of December 1981

TO: Distribution

FROM: L. C. Lasher and C. B. Scott

Sponsored by: J. H. Swanks

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

Daniel R. Hamrin 7/15/96
Technical Information Officer Date
ORNL Site

NOTICE This document contains information of a preliminary nature and was prepared primarily for internal use at the Oak Ridge National Laboratory. It is subject to revision or correction and therefore does not represent a final report. The information is only for official use and no release to the public shall be made without the approval of the Law Department of Union Carbide Corporation, Nuclear Division.

SUMMARY

Operation of the Liquid and Gaseous Waste Systems for the month of December was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 191.1 mCi; this is 51.7 mCi more than the previous month. Drainage from the burial grounds, contaminated flood plains, and the dormant pit disposal area accounted for 63 percent of this total. The Industrial Safety and Applied Health Physics Division measured a 225 mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as ^{131}I; the total release was less than 5 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December 1981 was 0.6% of the MPC_W (Fig. 1A). The high percentages shown on the bar graph are due to low stream flows and not to increased discharges to the river. Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 31.4% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.225 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross-beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are shown in Fig. 2. The flows for White Oak Creek and Melton Branch as measured at Stations 3 and 4 were 65×10^4 and 8×10^4 cubic meters, respectively.

The White Oak Creek and Melton Branch watersheds discharged a total of 189.5 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: A total of 0.8 mCi of ^{90}Sr was released by the Process Waste Treatment Plant; 0.7 mCi of ^{90}Sr was released from the 190 pond system; a total of 54.4 mCi of ^{90}Sr was released from the sanitary system. This release is twice the amount reported last month, and it reflects the precipitation rate which increased during the period.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watershed and the discharge

into White Oak Lake from the ILW pit disposal area. Contributions from Burial Grounds Nos. 1, 3 and 4 (White Oak Creek) and Burial Ground No. 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 7).

White Oak Creek

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
Flume	10.9	
190 Ponds	0.7	
Process Waste Treatment Plant	0.8	
Sewage Treatment Plant	54.4	
	66.8	
7500 Sampling Station	110.5	
Burial Grounds Nos. 1 and 3, and Flood Plains		43.7
Station No. 3	175.0	
Burial Ground No. 4		64.5

Melton Branch

7900 Area (HFIR and TRU)	0.2	
7500 Area (NSPP and MSRE)	1.4	
	1.6	
Station No. 4	14.5	12.9
Burial Ground No. 5		

ILW Pit Disposal Area

East Weir	0.1	
West Weir	0.5	
	1.6	
Total ^{90}Sr to White Oak Lake (Stations No. 3 and No. 4 plus Ground Disposal Area)	191.1	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		121.1
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Flood Plains		63.4

Process Waste

A total of 1.93×10^4 cubic meters of contaminated waste was chemically treated this month. Of this amount, 1.86×10^4 cubic meters were released to the Creek; the remainder was used for process operations such as back-washing of filters.

A monthly comparison of the strontium activity released from the process-waste system to White Oak Creek is shown in Fig. 3. The main contributors to the system are listed in Table 2. A brief summary of column operations follows:

ION EXCHANGE COLUMN OPERATION DATA

Run No.	Column	Run Time, Hours	m^3 Treated
544	B	51.5	889
545	C	48	826
546	A	47.5	636
547	B	39.5	673
548	C	26	568
549	A	28.5	636
550	B	29.5	585
551	C	41.5	842
552	A	48.5	826
553	B	36.5	638
554	C	63.5	1130
555	A	56.5	990
556	B	51.5	988
557	C	64	1090
558	A	42.5	718
559	B	51	1158
560	C	41.5	943
561	A	34.5	724
562	B	44	674
563	C	51	782
564	B	50.5	688
565	A	49	773
566	B	40.5	670
567	C	37.5	667
568	A	42	715

Intermediate Level Waste

The Annex Waste Evaporator 2A-2 was operated during the reporting period. The average boildown rate was 0.56 m^3/hr.

A summary of storage operations is given below:

	Cubic Meters
Total volume generated	405.8
Volume transferred to evaporators	417.7
South Tank Farm Inventory:	
No change during the period	596.8
Service Tank Inventory:	
W-21, Beginning of Month	22.4
W-21, End of Month	29.6
W-22, Beginning of Month	60.0
W-22, End of Month	40.9
W-23, Beginning of Month	143.6
W-23, End of Month	156.6
Melton Valley Waste Storage Facility Inventory:	
No Change during the period	582.4

Preoperational testing of the equipment at the New Hydrofracture Facility (Bldg. 7860) was continued during the period.

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

	Cubic Meters
Building 3019	17.7
Building 3508	0.9
Building 3525	2.7
Radioisotopes Processing Area	66.7
ORR and BSR	82.0
High Flux Isotope Reactor	54.7
Fission Products Development Laboratory	9.5*
4500 Complex	19.2
Building 3544	48.4
Transuranium Processing Area	9.1

Gaseous Waste

The ORNL Stacks discharged <5 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was less than 85 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.7% and 0.2% of the calculated maximum permissible operating level for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 6.

*The storage tank pit has an inleakage problem from groundwater and this is the volume of water jetted from the pit during the month. The "pit" can only be jetted to ILW since it was designed in this fashion.

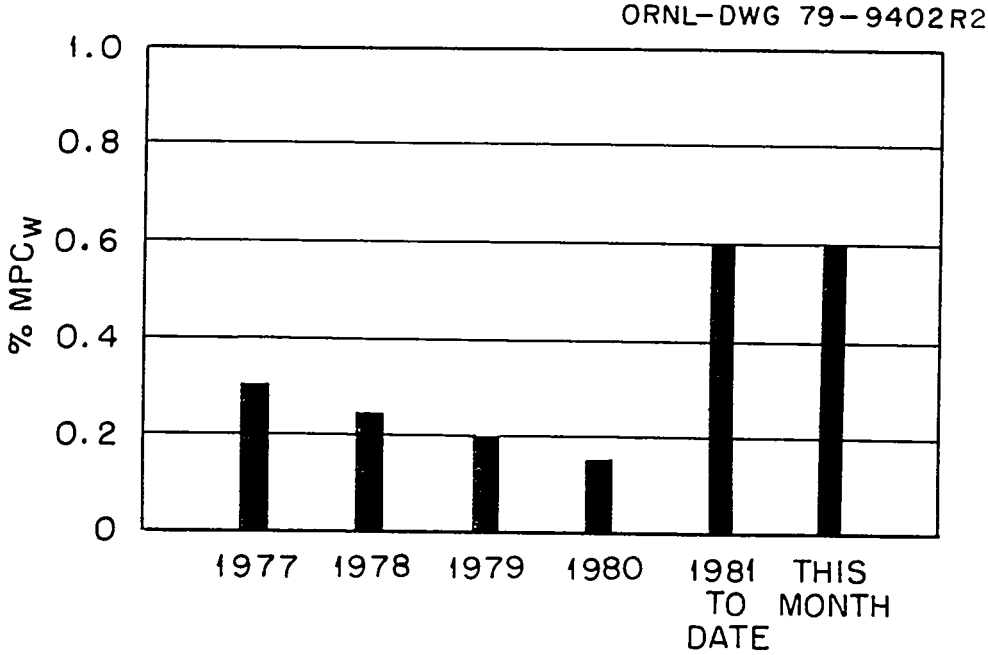


Fig. 1A. Calculated Percent of MPC_W in Clinch River due to ORNL Discharges*(ISAHP Measurements at White Oak Dam).

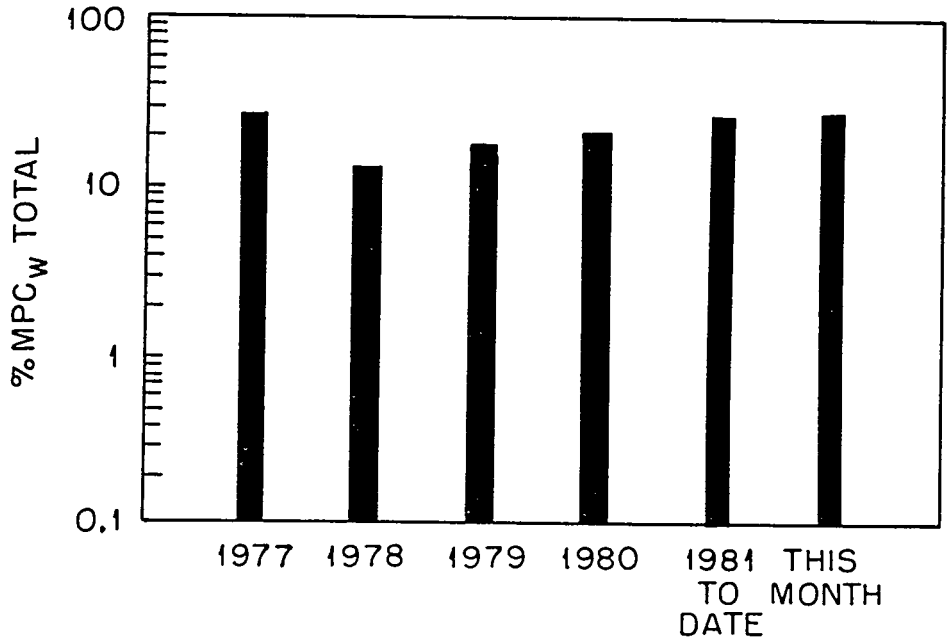


Fig. 1B. Measured Percent of MPC_W in Clinch River due to ORNL Discharges (ISAHP Samples at Confluence of White Oak Creek and the Clinch River).

*Tests show that complete mixing does not occur in the near reaches of the river.

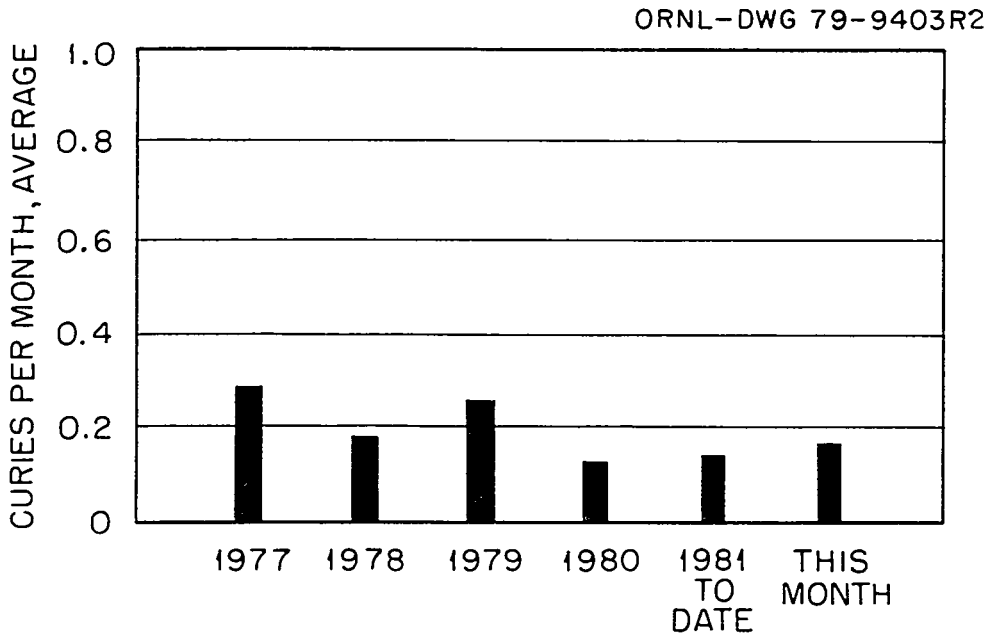


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.7).

ORNL-DWG 79-9404R2

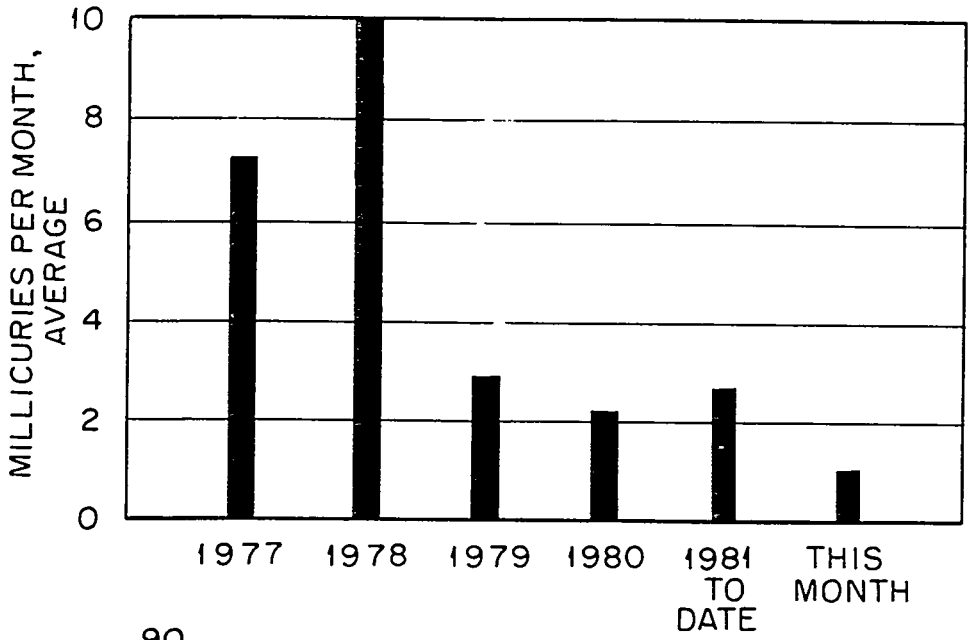


Fig. 3. ^{90}Sr Discharge in Process Waste to White Oak Creek

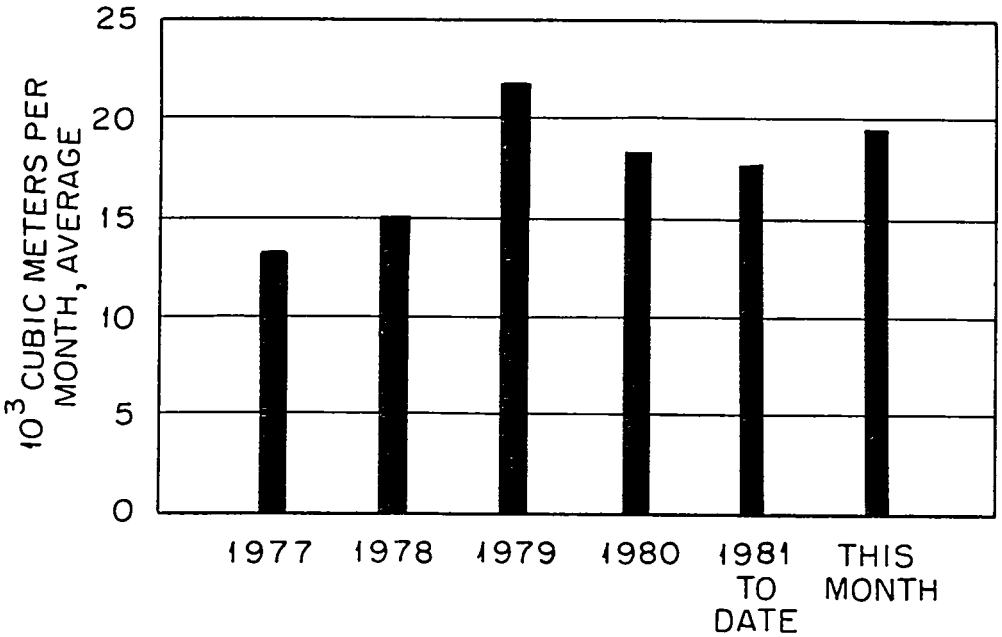


Fig. 4. Process Waste Volumes.

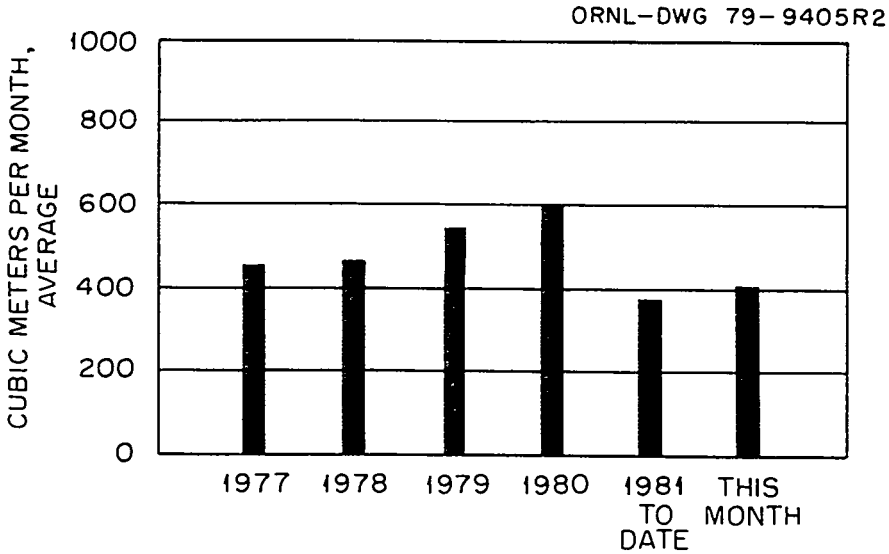


Fig. 5. Intermediate-Level Waste Volumes.

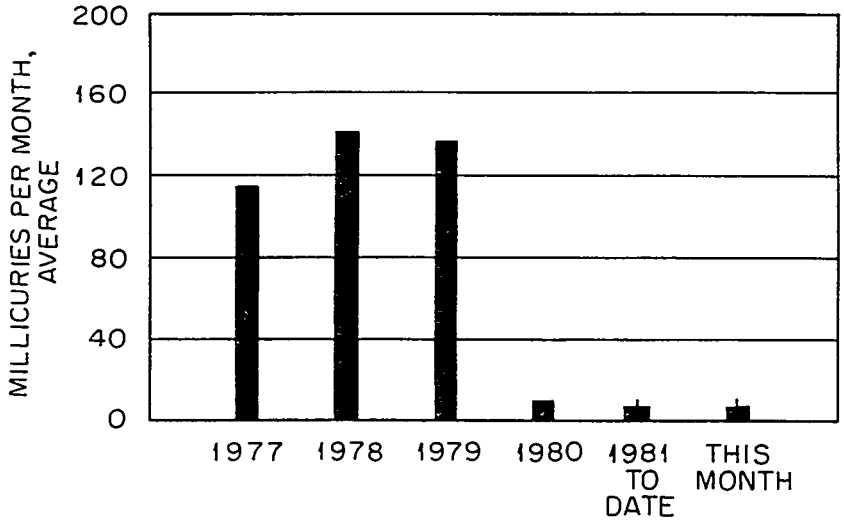


Fig.6. Total Activity Released in Gaseous Waste (Mainly ^{131}I; Does not Include Rare Gases or Other Non-Adsorbable Species). ORNL'S Maximum Permissible Operating Level is 13 curies per Quarter.

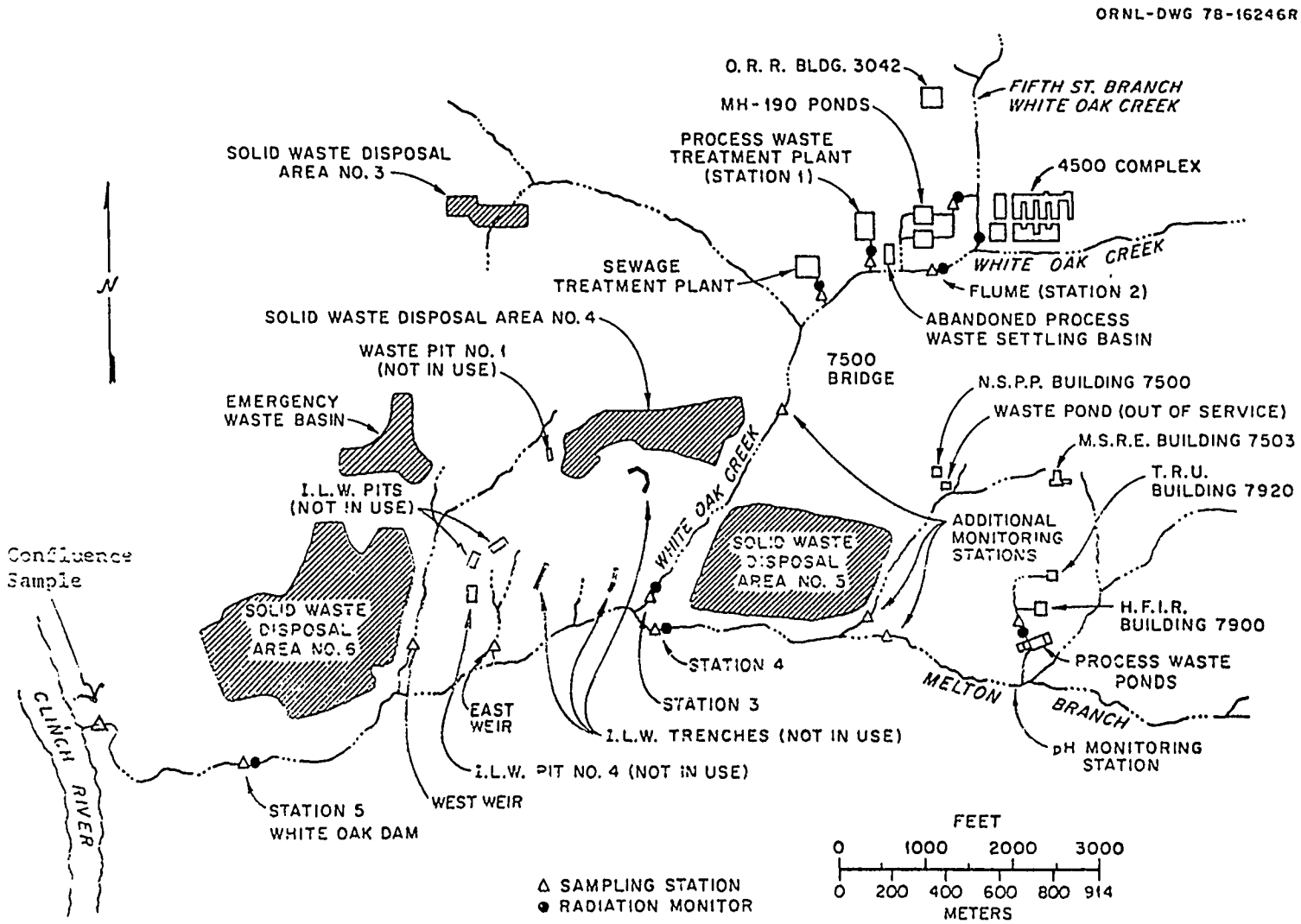


Fig. 7. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr, Curies	Gross Beta Curies[b]
Discharge from Bethel Valley Operations and Burial Ground No. 4	3	0.1750	0.595
Discharge from Melton Valley Operations and Burial Ground No. 5	4	0.0145	0.074
Discharge from ILW Pits and Trenches	East Weir	0.0001	----
Discharge from ILW Pits and Burial Ground No. 6	West Weir	0.0015	----
Total discharge from all sources		0.1911	0.669
White Oak Dam to Clinch River (ISAHP Measurement)		0.2250	0.520

[a]Refers to Figure 7.

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

Table 2. Process-Waste Disharges

	^{90}Sr βQ/ℓ	^{90}Sr		Volume	
		Curies	% of Total	$10^3 m^3$	% of Total
Radioisotopes Processing Area (MH234)	2200	0.165	18.7	2.78	14.3
Radioisotopes Processing Area (MH114 minus MH112)	---	0.267	30.3	2.33	12.0
Reactor Operations (MH112)	40	0.003	0.3	2.68	13.8
Buildings 3503 and 3508	1.2	<0.001	---	1.17	6.0
Buildings 3025 and 3026	12	<0.001	---	2.17	11.1
Building 3019	350	0.013	1.5	1.36	7.0
Waste Evaporator, Bldg. 2531	1500	0.054	6.1	1.34	6.9
Building 3525	0.7	<0.001	---	1.50	7.7
Building 2026	4.4	<0.001	---	1.15	5.9
Tank Farm Drainage	4700	0.380	43.1	2.99	15.3

[a]The activity entered the process-waste system with inleakage of contaminated ground water under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (Curies)	Filterable Particulate Activity[b] (Microcuries)
HRLAL	2026	< 0.01	< 1
Central Radioactive Gas Disposal Facilities	3039	< 0.01	69
Radiochemical-Processing Pilot Plant	3020	< 0.01	4
MSRE	7512	< 0.01	<1
HFIR and TRU	7911	< 0.01	12
Total Activity in Gases Released at X-10 Site		< 0.01	85
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		12 (^{3}H)	
Building 4508 Ventilation Discharges Room 136			1.55×10^{-3}
Room 265			1.40×10^{-4}
Building 5505 Discharges Glove Box			5.25×10^{-3}
Hood			3.87×10^{-2}

[a] Activity primarily ^{131}I except as noted.
[b] These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c] No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/85

DATE: March 8, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF NOVEMBER 1984

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(7 of 12)

NOTICE:

Publicly Releasable

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

SUMMARY

A total of 176-mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for 88% of this total. The Environmental and Occupational Safety Division measured a 200-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; approximately 1878 microcuries of ^{131}I were discharged during the reporting period.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of November was 0.5% of the MPC_W (Fig. 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 10% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.2 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 2. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 53.0×10^4 m^3 and 16.7×10^4 m^3, respectively. Figure 2A shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 169 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were as follows: a total of 0.2 mCi of ^{90}Sr was released by the Process Waste Treatment Plant, 0.4 mCi of ^{90}Sr was released from the 190 pond system, and a total of 8.6 mCi of ^{90}Sr was released from the sanitary system.

fo__owing tabulation lists the measured amounts of ^{90}Sr discharged
White Oak Creek and Melton Branch watersheds and the discharge into
ak Lake from the liquid LLW pit disposal area. Contributions from
Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton
are calculated as the differences between the sums of the listed
streams and the measurements at Stations 3 and 4 (see Fig. 3).

reporting period.

	^{90}Sr Discharge (mCi)		m^3
	By Measurement	By Difference	
White Oak Creek			
ume	8.1		443.6
0 Ponds	0.4		402.9
rocess Waste Treatment Plant	0.2		
wage Treatment Plant	8.6		
	17.3		
00 Sampling Station	53.0		226.0
ri Grounds 1 and 3 and Floodplains		35.7	226.0
tation 3	120.0		
rial Ground 4		67	
Melton Branch			25.6
00 Area (HFIR and TRU)	0.2		71.0
00 Area (NSPP and MSRE)	3.6		69.0
	3.8		
tation 4	49		34.5
rial Ground 5		45.2	
Liquid LLW Pit Disposal Area			135.9
st Weir	0.2		65.6
est Weir	6.9		
	7.1		
tal ^{90}Sr to White Oak Lake (Stations 3 and 4 Plus Ground Disposal Area)	176.1		716.4
tal ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		155	787.2
to ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		88.0	

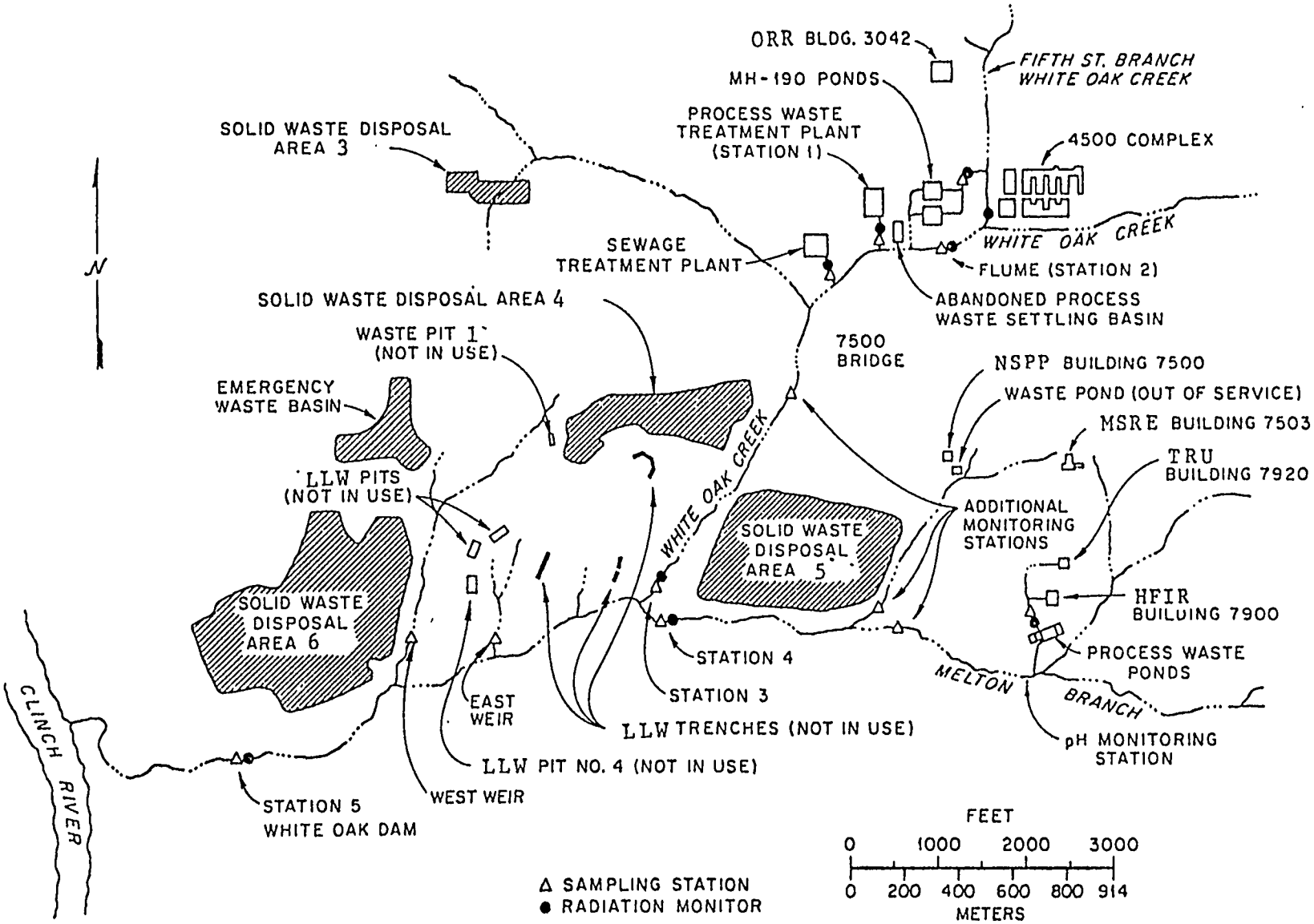


Fig. 3 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

ORNL-DWG 83C-11100B

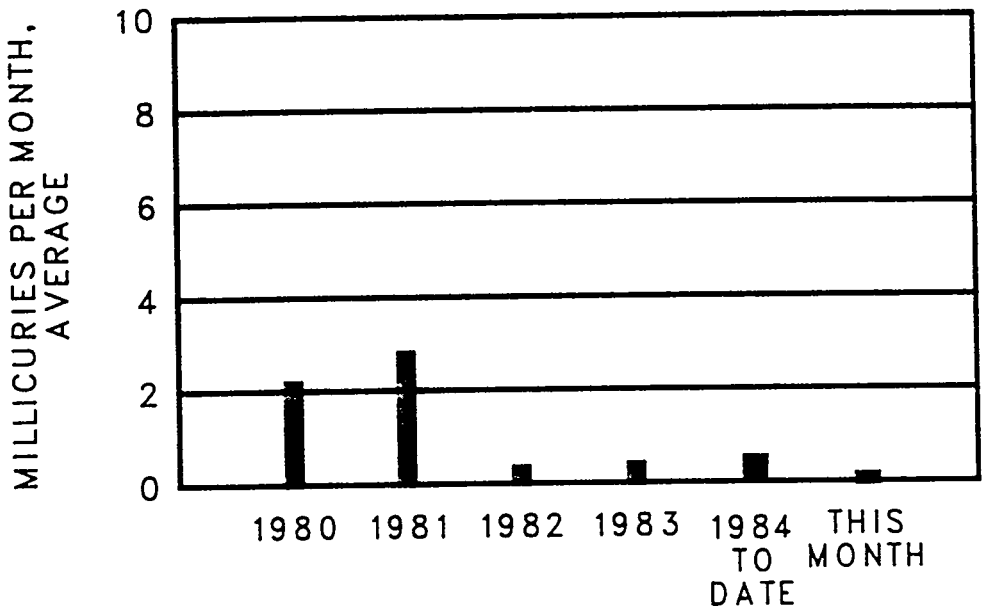


Fig. 4. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

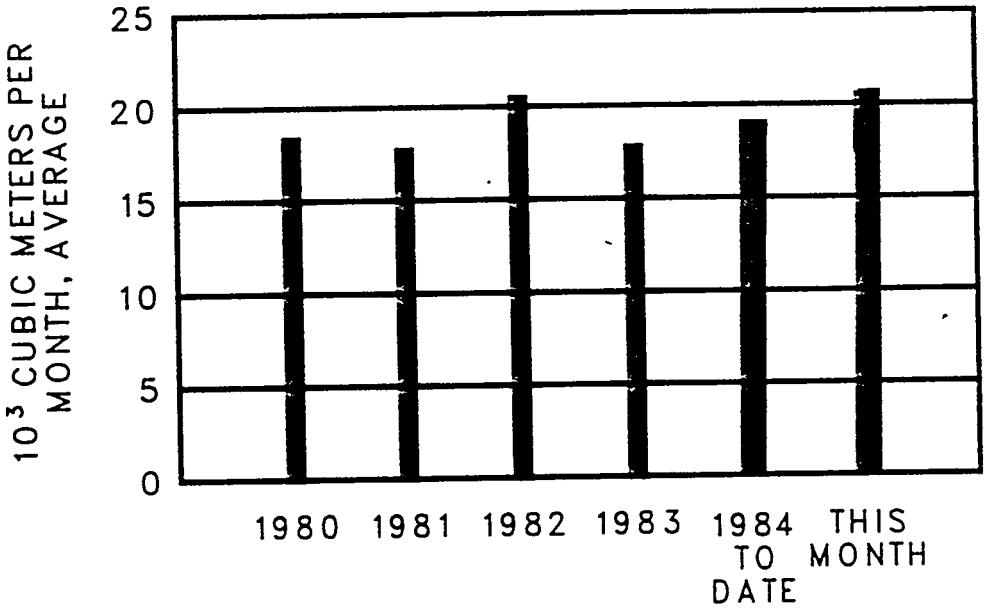


Fig. 5. Process Waste Volumes Treated in the PWTP.

ORNL-DWG 83C-11101B

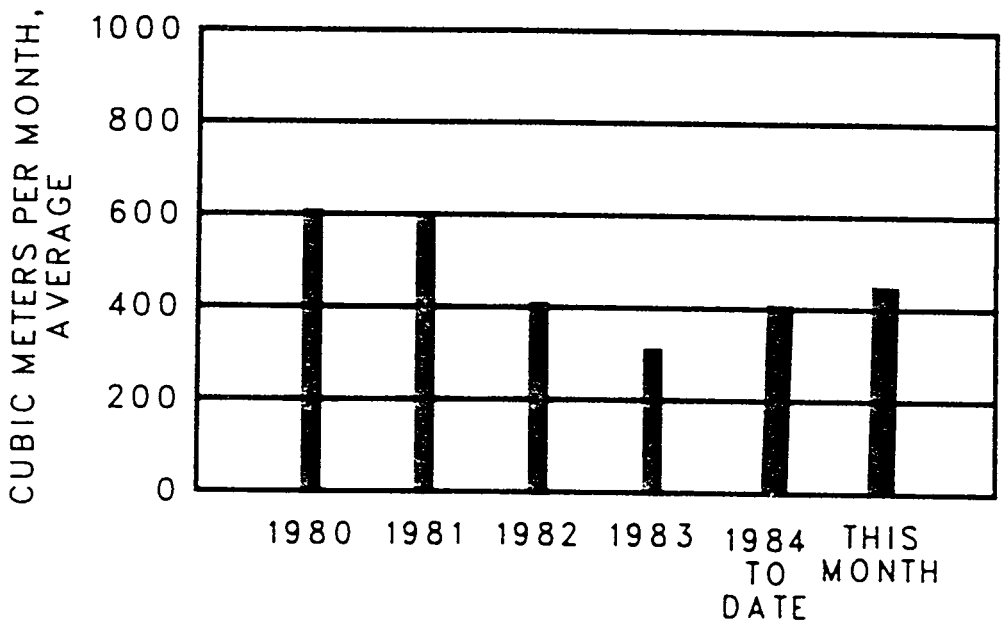


Fig. 6. Low-Level Waste Volume Generated this Month.

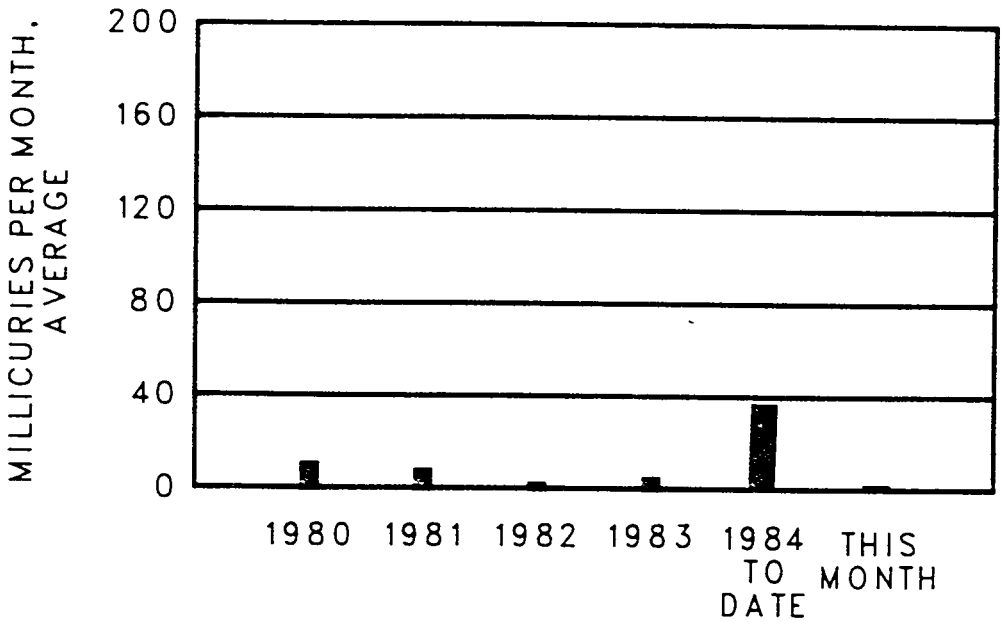


Fig. 7. Total Activity Released in Gaseous Waste (mainly ^{131}I, not including rare gases or other non-filterable species). Maximum Permissible Operating Level Is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.120	0.264
Discharge from Melton Valley Operations and Burial Ground 5	4	0.049	0.103
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits Burial Ground 6	West Weir	0.007	-----
Total Discharge from All Sources		0.176	0.367
White Oak Dam to Clinch River (EOS Measurements)		0.200	0.390

[a]Refers to Figure 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	4500	0.366	34.3	3.0	11.1
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.317[a]	29.7	5.8	21.5
Reactor Operations (MH 112)	7.2	0.001	0.1	4.9	18.1
Buildings 3503 and 3508 (MH 229)	0.4	<0.001	---	2.2	8.1
Buildings 3025 and 3026 (MH 149)	2.5	<0.001	---	1.9	7.0
Building 3019 (MH 25)	1100	<0.004	0.4	0.1	0.4
Waste Evaporator, Bldg. 2531 (MH 243)	270	0.011	1.0	1.5	5.6
Building 3525 (MH 235)	120	<0.006	0.6	1.7	6.3
Building 2026 (MH 240)	0.6	<0.001	---	0.8	3.0
Tank Farm Drainage	2600	0.361	33.9	5.1	18.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity[a] (μCi)	Filterable Particulate Activity[b] (μCi)
HRLAL	2026	<1	<1
Central Radioactive Gas Disposal Facilities	3039	$\leq$198	48
Radiochemical-Processing Pilot Plant	3020	<1	1
MSRE	7512	<0.1	<0.1
HFIR and TRU	7911	$\leq$1680	30
Activity in Gases Released at X-10 Site		$\leq$1878	79
Chem. Tech. Division - Y-12 Area			(c)
Tritium Target Fabrication Building		(c)	---
Building 4508 Ventilation Discharges Room 265			1.8×10^{-4}
Building 5505 Discharges Glove Box			9.0×10^{-4}

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.
[b]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.
[c]No data available at this time.

DISTRIBUTION

ORNL/CF -85/85

1. H. L. Adair
2. W. J. Armento
3. J. B. Berry
4. S. E. Breeding
5. G. H. Burger
6. H. M. Butler
7. C. D. Cagle
8. G. C. Cain
9. R. M. Canon
10. G. H. Coleman
11. B. L. Corbett
12. N. H. Cutshall
13. K. D. Daniels
14. G. J. Dixon
15. D. E. Ferguson
16. C. L. Fox
17. J. R. Gissel
18. H. W. Godbee
19. T. Grizzard
20. F. E. Harrington
21. R. E. Helms
22. F. J. Homan
23. D. D. Huff
24. R. F. Jordan
25-26. E. M. King
27. W. E. Laing
28-30. L. C. Lasher
31. R. E. Leuze
32. R. V. McCord
33. E. Newman
34. T. E. Oakes
35. W. F. Ohnesorge, Jr.
36. H. Postma
37. E. L. Preston
38. A. L. Rivera
39. P. S. Rohwer
40. T. H. Row
41. J. A. Setaro
42. T. F. Scanlan
43. R. W. Schaich
44. T. G. Scott
45. B. P. Spalding
46. J. H. Swanks
47. J. Switek
48. Tsuneo Tamura
49. D. B. Trauger
50. W. T. Thompson
51. H. W. Hibbitts, DOE-ORO
52. J. A. Lenhard, DOE-ORO
53-54. Laboratory Records
55. Laboratory Records, ORNL RC
56. ORNL Patent Office

254

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF -85/86

DATE: March 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF DECEMBER 1984

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(8 of 12)

NOTICE: **Publicly Releasable**

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

al patent
mation is
be given
ance with

SUMMARY

Operation of the Waste Monitoring and Collection Systems for the month of December was routine. The total amount of ^{90}Sr discharged into White Oak Lake from ORNL sources was 135 mCi; drainage from the burial grounds, contaminated floodplains, and the dormant pit disposal area accounted for 74% of this total. The Environmental and Occupational Safety Division measured a 160 mCi release of ^{90}Sr at the White Oak Dam sample station (0.2% MPC_W in the Clinch River for recorded flows).

The radioactivity in the gaseous wastes released by the stack systems was primarily short-lived mixed fission products; approximately 2 mCi of ^{131} were detected during the period.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The calculated radioactive contamination in the Clinch River resulting from contamination in White Oak Creek for the month of December was 0.2% of the MPC_W (Fig. 1A). Samples taken at the confluence of White Oak Creek and the Clinch River indicated the radioactive contamination to be 12% of the MPC_W (Fig. 1B). At this sample point, very little dilution from the river has occurred; therefore, this value represents the maximum percentage MPC_W in the river that could result from ORNL waste releases.

During the month, 0.160 Ci of ^{90}Sr passed over White Oak Dam.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 2. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 71.9×10^4 and 12.1×10^4 m^3, respectively. Figure 2A shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 124 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were normal: a total of 0.3 mCi of ^{90}Sr was released by the Process Waste Treatment Plant, 0.2 mCi of ^{90}Sr was released from the 190 pond system, and a total of 16.0 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 3).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	5.5	
190 Ponds	0.2	
Process Waste Treatment Plant	0.3	
Sewage Treatment Plant	16.0	
	22.0	
7500 Sampling Station	67.0	
Burial Grounds 1 and 3 and Floodplains		45.0
Station 3	91.0	
Burial Ground 4		24.0
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	13.0	
	13.1	
Station 4	33.0	
Burial Ground 5		19.9
Liquid LLW Pit Disposal Area		
East Weir	0.4	
West Weir	11.0	
	11.4	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	135.4	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		100.3
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		74.1%

Process Waste

A total of 2.04×10^4 m^3 of process waste was treated by ion exchange and released to White Oak Creek.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 4; the waste volume processed, compared to previous months, is shown in Fig. 5. The main contributors to the system are listed in Table 2. A total of 41 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	40.5	20.5	26.5
Bed Volume (1 BV = $1.3m^3$)	604	313	387

Liquid Low-Level Waste

Both of the evaporator systems were operated in parallel during the month. The average boil-down rate was 0.54 m^3/h.

A summary of storage operations is given below:

	m^3
Total Volume Generated	452.1
Volume Transferred to Evaporators	403.7
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Service Tank Inventory:	
W-21, Beginning of Month	71.0
W-21, End of Month	103.6
W-22, Beginning of Month	34.5
W-22, End of Month	29.3
W-23, Beginning of Month	65.6
W-23, End of Month	121.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	787.2
Total Volume at End of Month	795.8

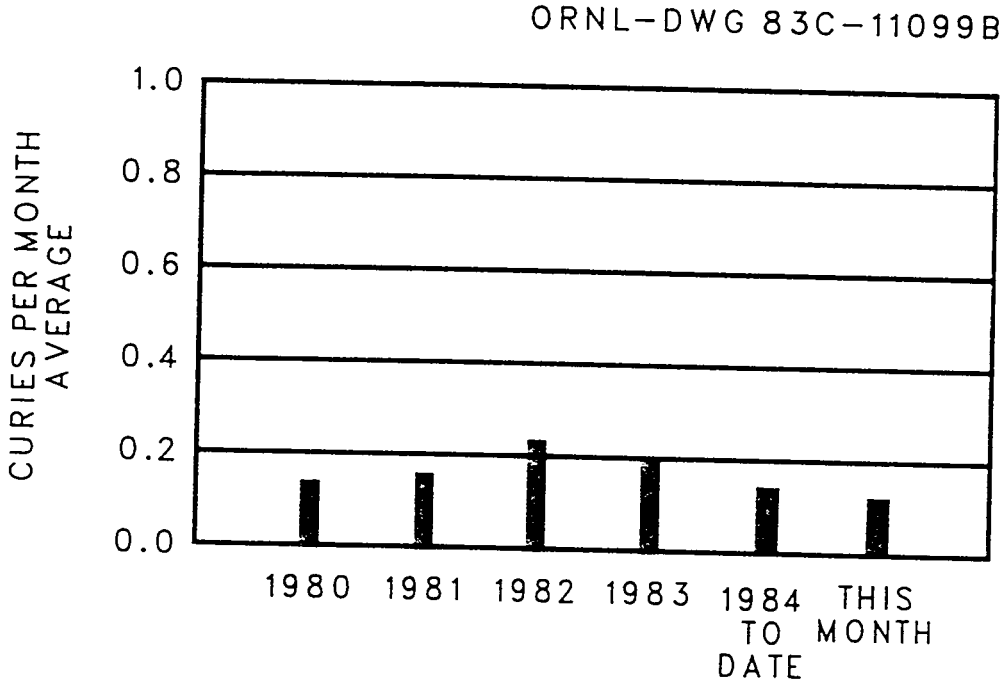


Fig. 2. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.3)

ORNL-DWG 85C-9237

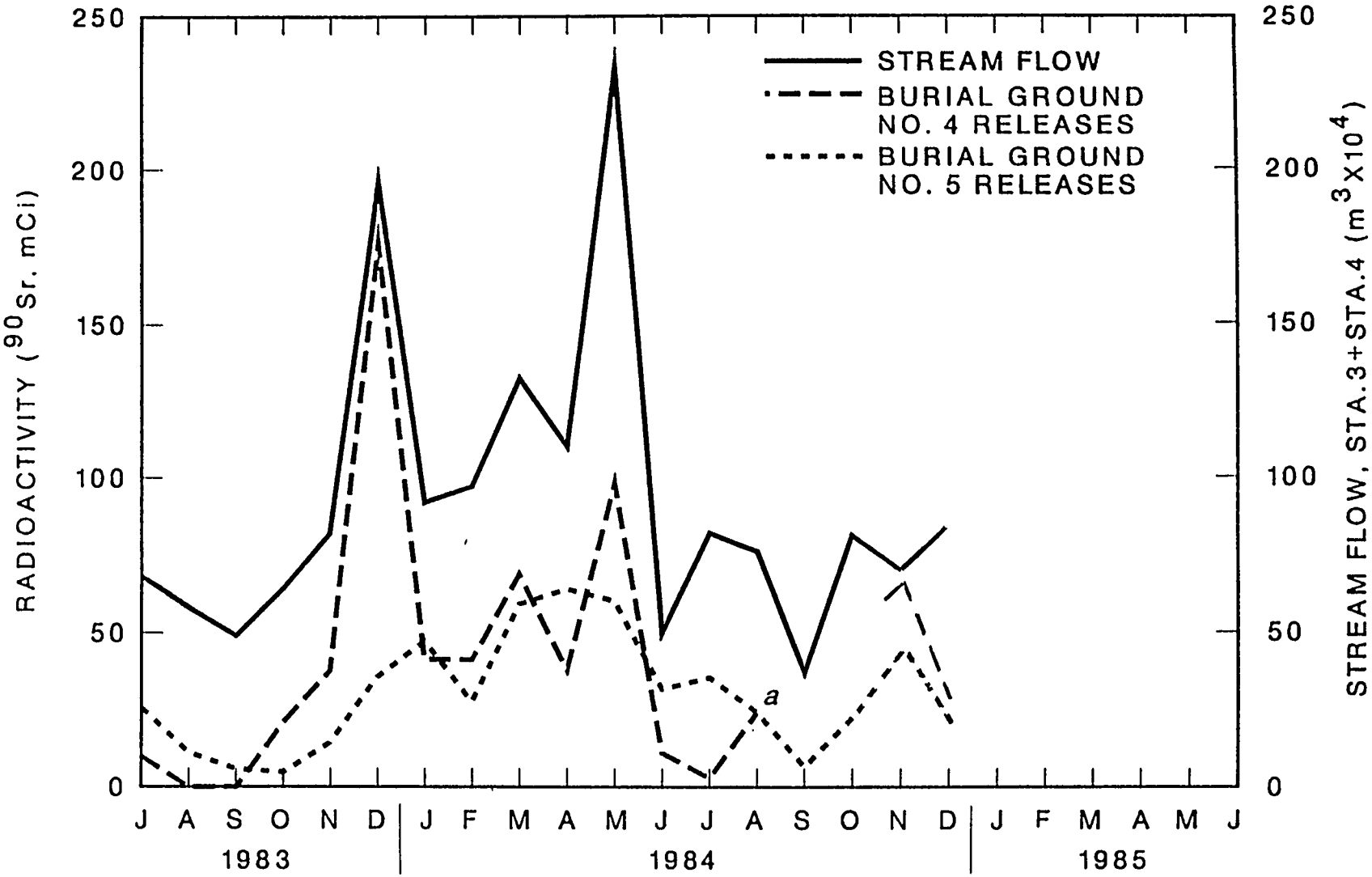


Fig. 2A. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a] Not reported because of uncertainties with flow data & possible cross-contamination of sample

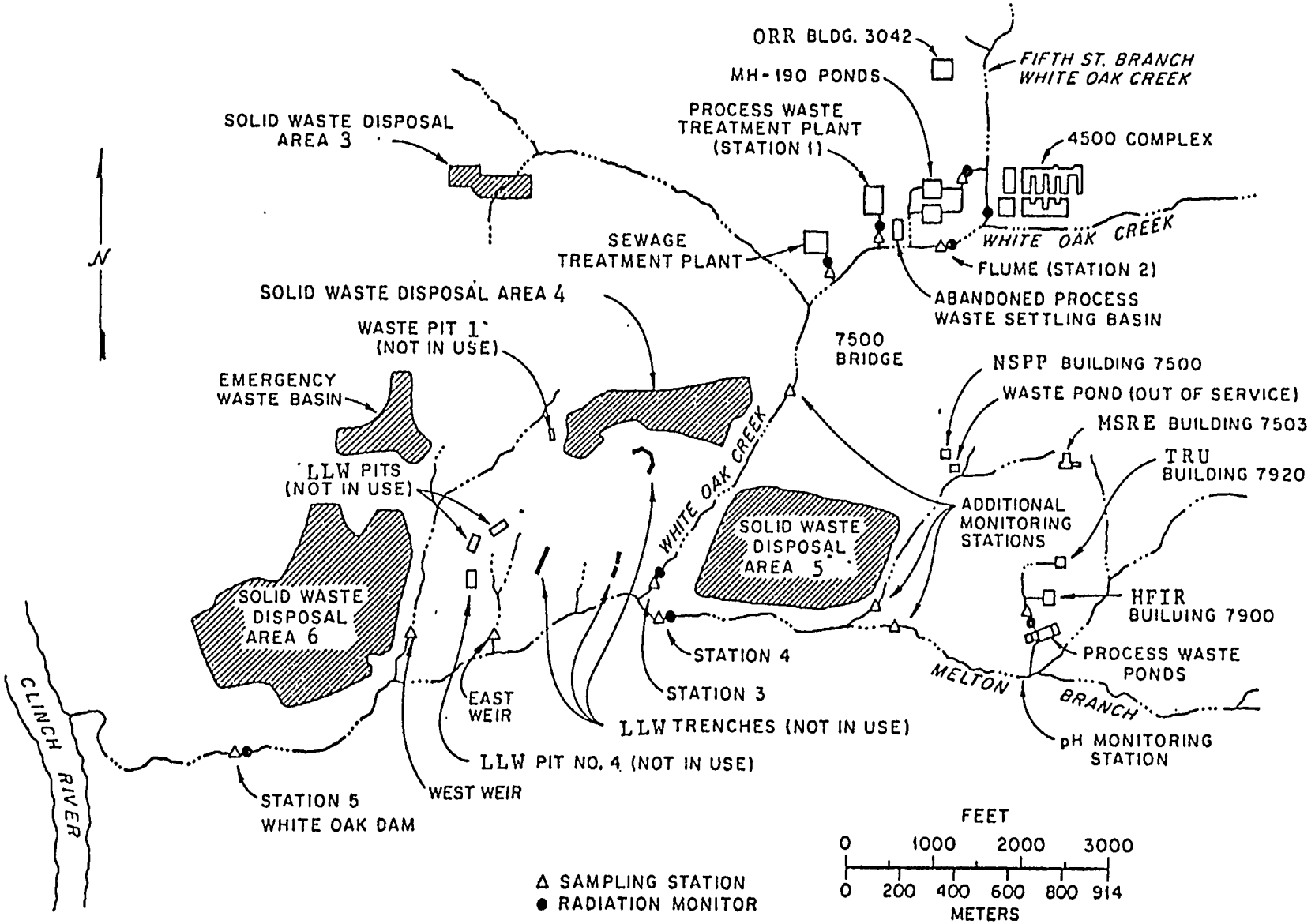


Fig. 3 Location Plan for White Oak Creek Sampling Stations and Radiation Monitors

ORNL-DWG 83C-11100B

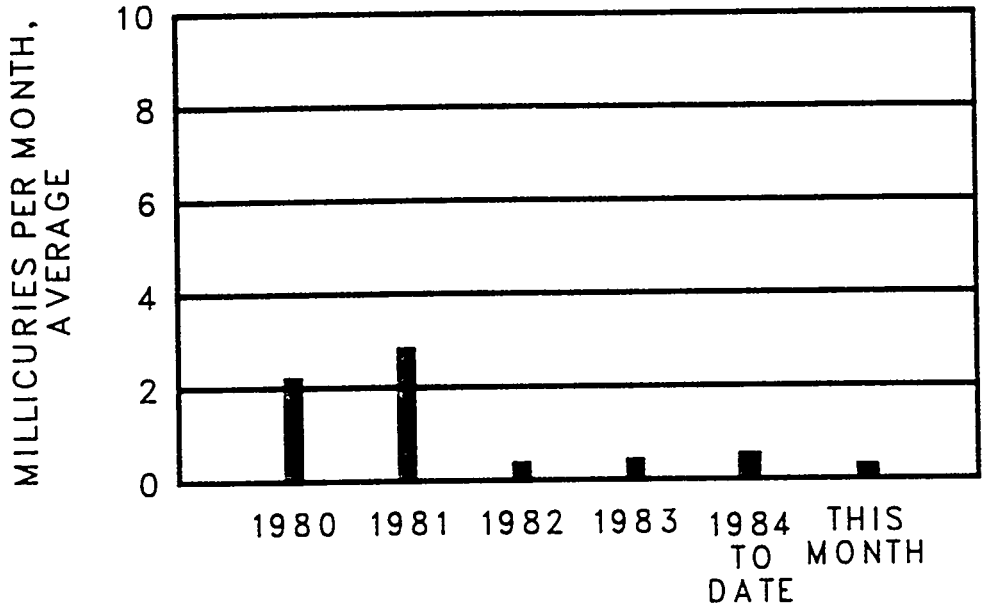


Fig. 4. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

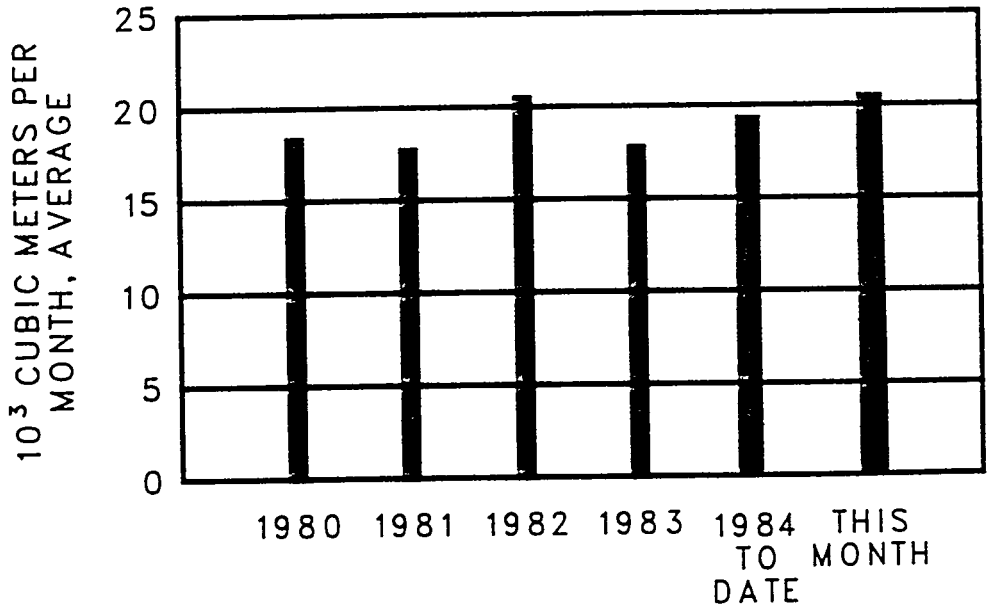


Fig. 5. Process Waste Volumes Treated in the PWTP.

ORNL-DWG 83C-11101B

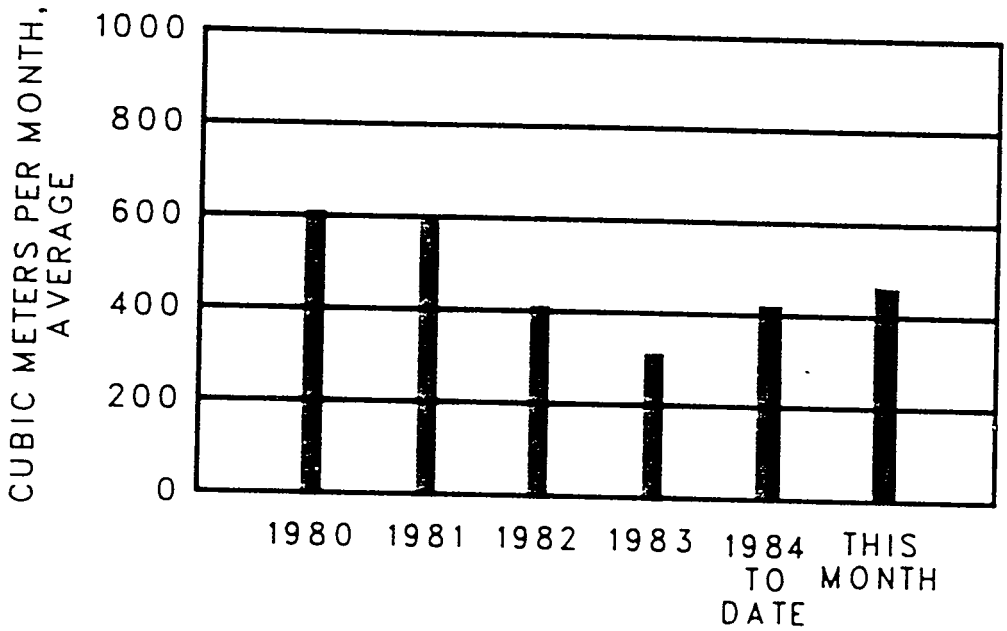


Fig. 6. Liquid Low-Level Waste Volume Generated This Month.

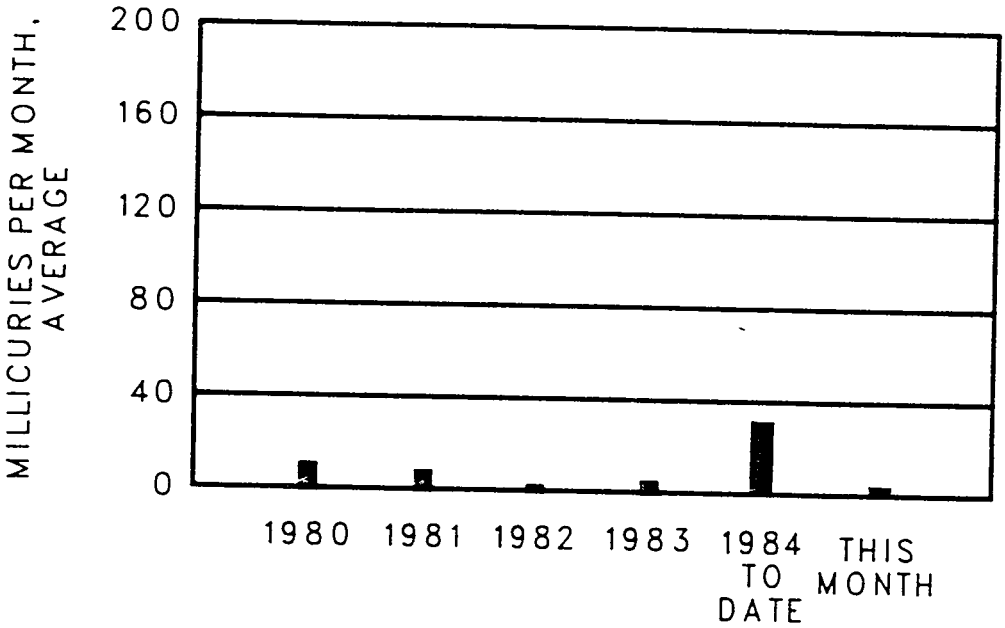


Fig. 7. Total Activity Released in Gaseous Waste (mainly ^{131}I, not including rare gases or other filterable species). Maximum Permissible Operating Level Is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.091	0.144
Discharge from Melton Valley Operations and Burial Ground 5	4	0.033	0.069
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW, Pits and Burial Ground 6	West Weir	0.011	-----
Total Discharge from All Sources		0.135	0.213
White Oak Dam to Clinch River (EOS Measurements)		0.160	0.350

[a]Refers to Fig. 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	4500	0.004	1.5	0.12	0.5
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.052[a]	19.0	5.0	18.8
Reactor Operations (MH 112)	14	0.001	0.3	2.94	11.0
Buildings 3503 and 3508 (MH 229)	0.53	<0.001	---	2.12	8.0
Buildings 3025 and 3026 (MH 149)	2.6	<0.001	---	1.87	7.0
Building 3019 (MH 25)	1200	<0.004	1.5	0.13	0.5
Waste Evaporator, Bldg. 2531 (MH 243)	600	0.025	9.1	1.57	5.9
Building 3525 (MH 235)	4.1	0.001	----	1.38	5.2
Building 2026 (MH 240)	0.39	<0.001	---	0.95	3.6
Tank Farm Drainage	2500	0.188	68.6	10.5	39.5

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Stack No.	Activity (mCi)	Filterable Particulate Activity[a] (μCi)
HRLAL	2026	2	<1
Central Radioactive Gas Disposal Facilities	3039	$\leq$389	87
Radiochemical-Processing Pilot Plant	3020	1	1
MSRE	7512	<1.0	<1
HFIR and TRU	7911	$\leq$1360	7
Activity in Gases Released at X-10 Site		$\leq$1752	95
Chem. Tech. Division - Y-12 Area			(b)
Tritium Target Fabrication Building		(b)	----
Building 4508 Ventilation Discharges Room 265			1.8×10^{-4}
Building 5505 Discharges Glove Box			8.8×10^{-4}

[a]These values were obtained by allowing the filter papers used in the samplers to decay for a period of four days and then measuring the activity.

[b]No data available at this time.

2511

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/328

DATE: June 15, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF JANUARY 1985

TO: Distribution

FROM: L. C. Lasher

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(9 of 12)

NOTICE:

Publicly Releasable

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

patent
ıation is
ɔe given
ıce with

SUMMARY

A total of 185.3 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from burial grounds, contaminated floodplains, and the dormant pit disposal area accounted for 46.8% of this total. Of this total, 90 mCi of ^{90}Sr were released from the Sanitary System into White Oak Creek. The bulk of this release resulted from an infiltration of contaminated ground water into the sanitary drain pipe located at the northwest corner of Bldg. 3019. The activity emitted with the gaseous waste from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total release of ^{131}I was less than 1 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 410 mCi of ^{90}Sr were released from White Oak Lake during the period. This amount is significantly greater than the 185.3 mCi output from monitoring Stations 3 and 4. The ongoing surveillance activities at the inactive ground disposal areas and SWSA 6 do not account for this discrepancy, and it is attributed to seasonal flood water fluctuations. On January 26, the ^{90}Sr Department of Energy concentration guide for water (CG_w) was exceeded at White Oak Dam. Most of this contamination was

released into White Oak Creek from the sanitary sewer system which became contaminated by a groundwater source near Bldg. 3019. The mean weekly discharges of ^{90}Sr, ^{3}H, TRU and gross beta activities are shown in Figures 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 83.3×10^4 and 25.4×10^4 m^3, respectively. Figure 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 181 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek from the Process Waste Treatment Plant and the 190 Pond System were normal at 0.14 and 0.5 mCi, respectively. However, the infiltration of contaminated ground water in the vicintity of Bldg. 3019 elevated the ^{90}Sr release from the sanitary system to 90 mCi.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	8.0	
190 Ponds	0.5	
Process Waste Treatment Plant	0.14	
Sewage Treatment Plant	90.0	
	98.6	
7500 Sampling Station	a	
Burial Grounds 1 and 3 and Floodplains		b
Station 3	140.0	
Burial Ground 4		b
Melton Branch		
7900 Area (HFIR and TRU)	0.1	
7500 Area (NSPP and MSRE)	6.6	
Station 4	41.0	
Burial Ground 5		34.3
Liquid LLW Pit Disposal Area		
East Weir	<0.1	
West Weir	4.3	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	185.3	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		86.7
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		46.8

[a]Analysis of the composite sample at this station indicates a throughput of 650 mCi which by comparison with the other watershed monitors is in error. The error is attributed to sample cross-contamination.
[b]Unknown because of inconsistent data.

Process Waste

A total of 2.08×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 2.0×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 40 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	81	19	28
Bed Volume Treated (1 BV = 1.3 m^3)	1002	327	510

Liquid Low-Level Waste

Both of the evaporator systems were operated in parallel during the month. The average boil-down rate was 0.55 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 and W-22	441.3
Volume of LLW Feed to Evaporators	412.2
Volume of Evaporator Concentrate Transferred to W-23	34.3
Service Tank Inventory:	
W-21, Beginning of Month	103.6
W-21, End of Month	44.8
W-22, Beginning of Month	29.3
W-22, End of Month	110.5
W-23, Beginning of Month	121.0
W-23, End of Month	155.3
South Tank Farm Inventory:	
Beginning of Month	266.0
End of Month	266.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	795.8
Total Volume at End of Month	795.8

Note: Liquid Low-Level Waste is pumped from the area collection tanks into W-21 and W-22 which serve as feed tanks for the evaporators. Evaporator concentrate is stored in tank W-23 prior to transfer to the Melton Valley Storage Tanks.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of liquid LLW generated each month.

	m^3
Transuranium Processing Area	2.6
Building 3019	20.0
Building 3525	24.8
Radioisotopes Processing Area	24.6
ORR and BSR	102.2
High Flux Isotope Reactor	89.7
Fission Products Development Laboratory	29.0[a]
4500 Complex	19.0
Building 3544	112.6

[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetted from the pit during the month. The pit can only be jetted to LLW, since it was designed in this fashion.

Gaseous Waste

The ORNL stacks discharged approximately 809 μCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was 190 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 0.67% and 0.14%, respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

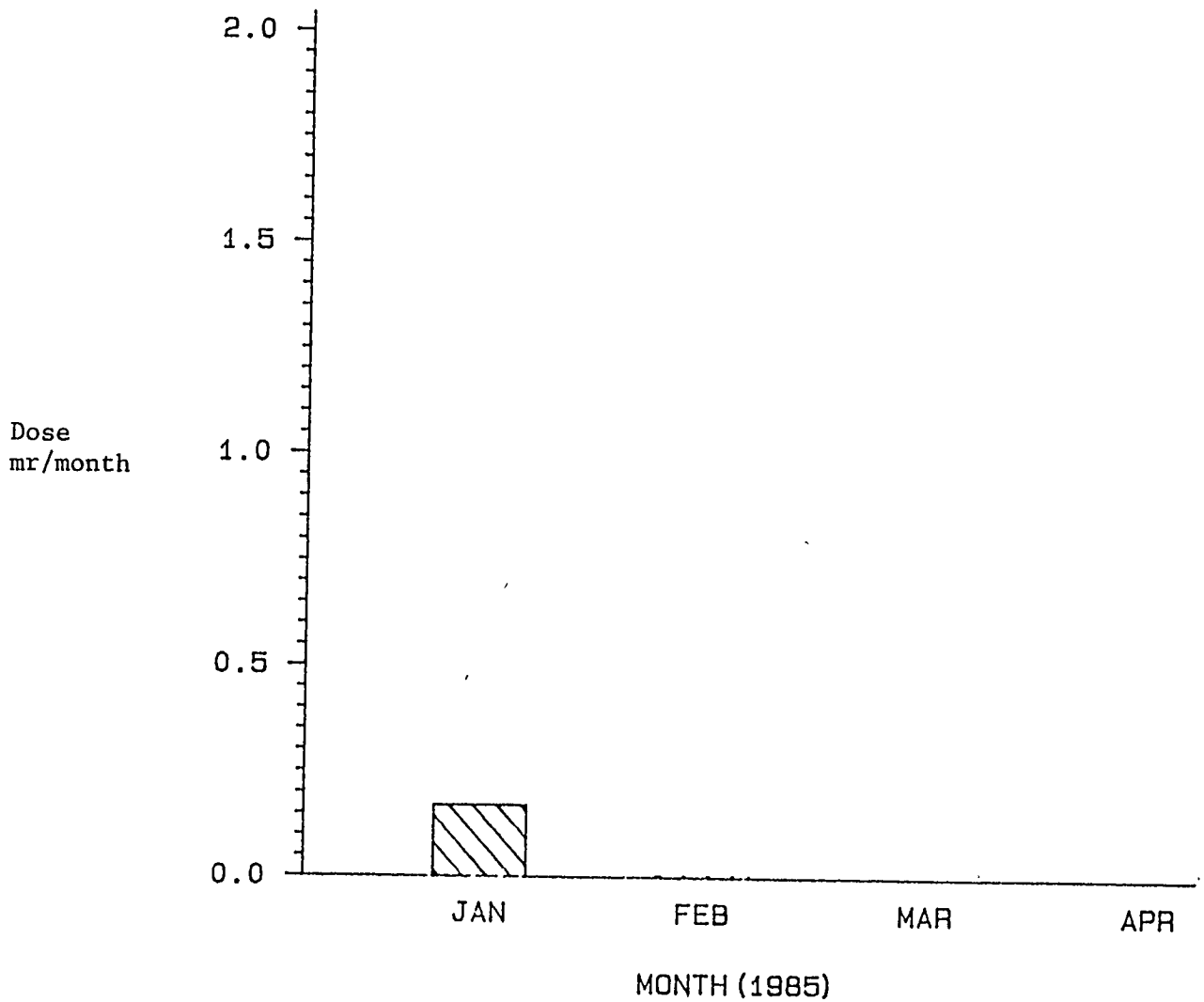


Fig. 1. Body Dose (mREM) Resulting from the Ingestion of Water at the Confluence of White Oak Creek and Clinch River.

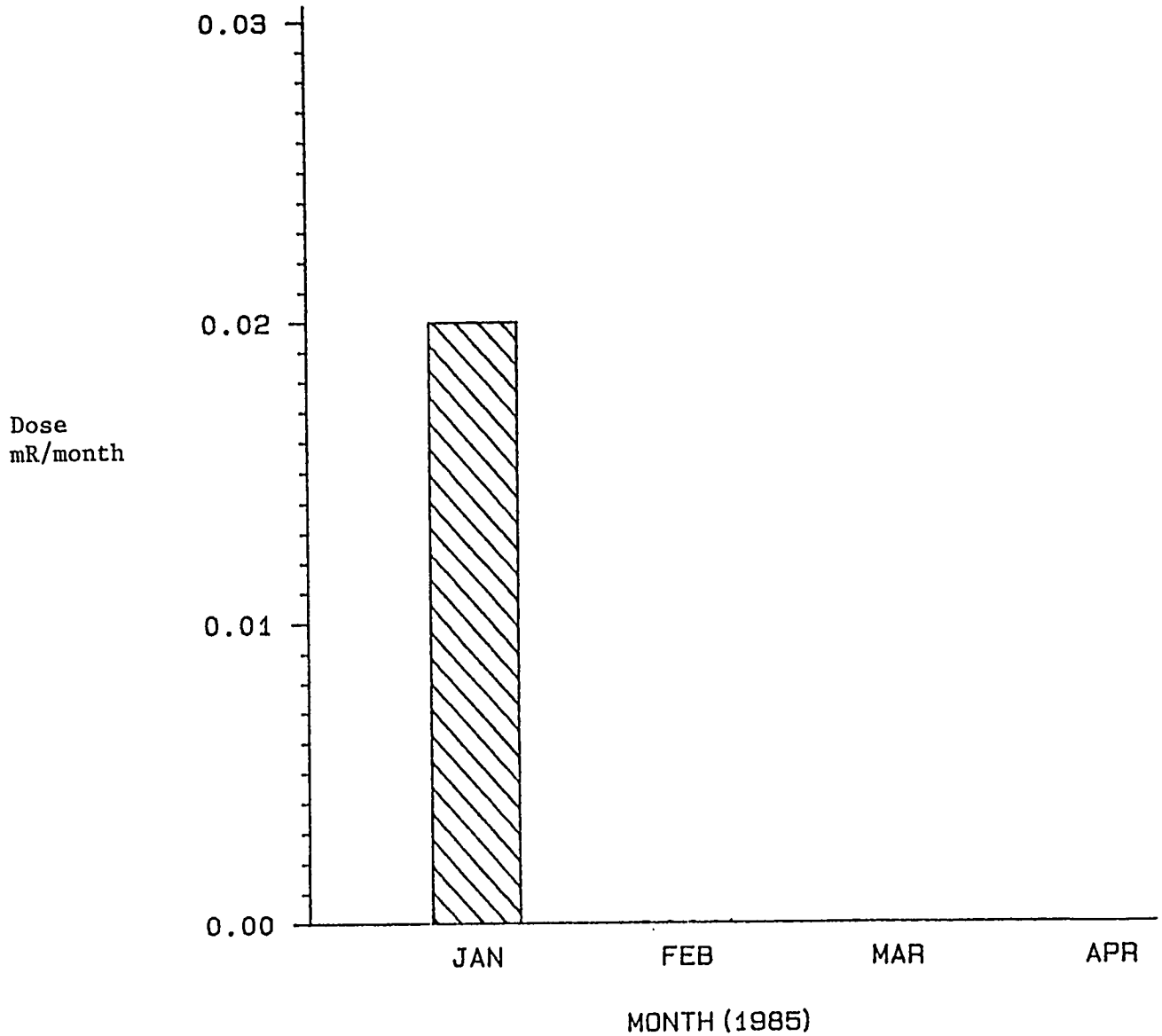


Fig. 2. Calculated Body Dose (mREM) Resulting from the Ingestion of Clinch River Water Below the Discharge of White Oak Dam.

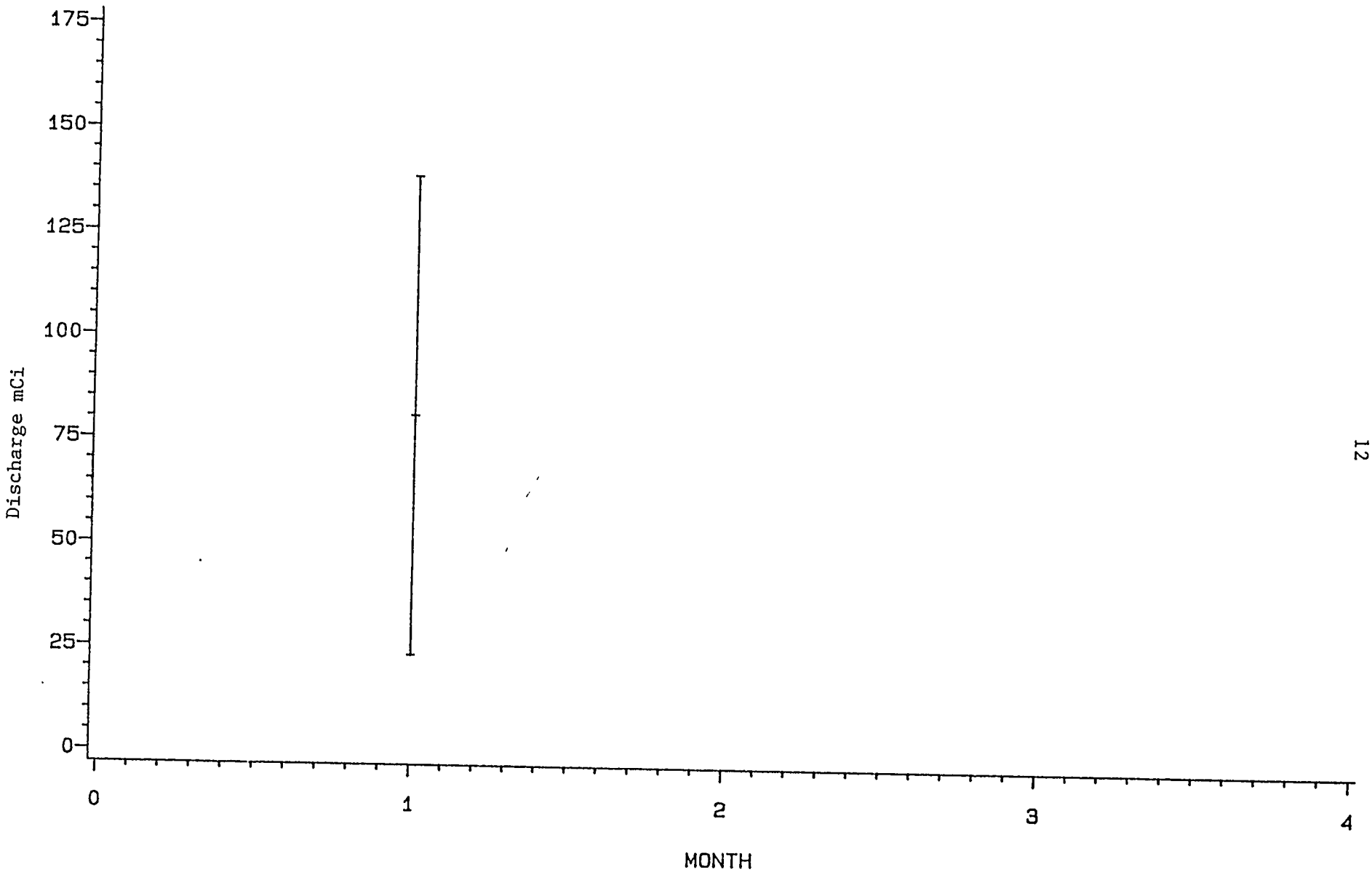


Fig. 3. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 — Analysis of ^{90}Sr.

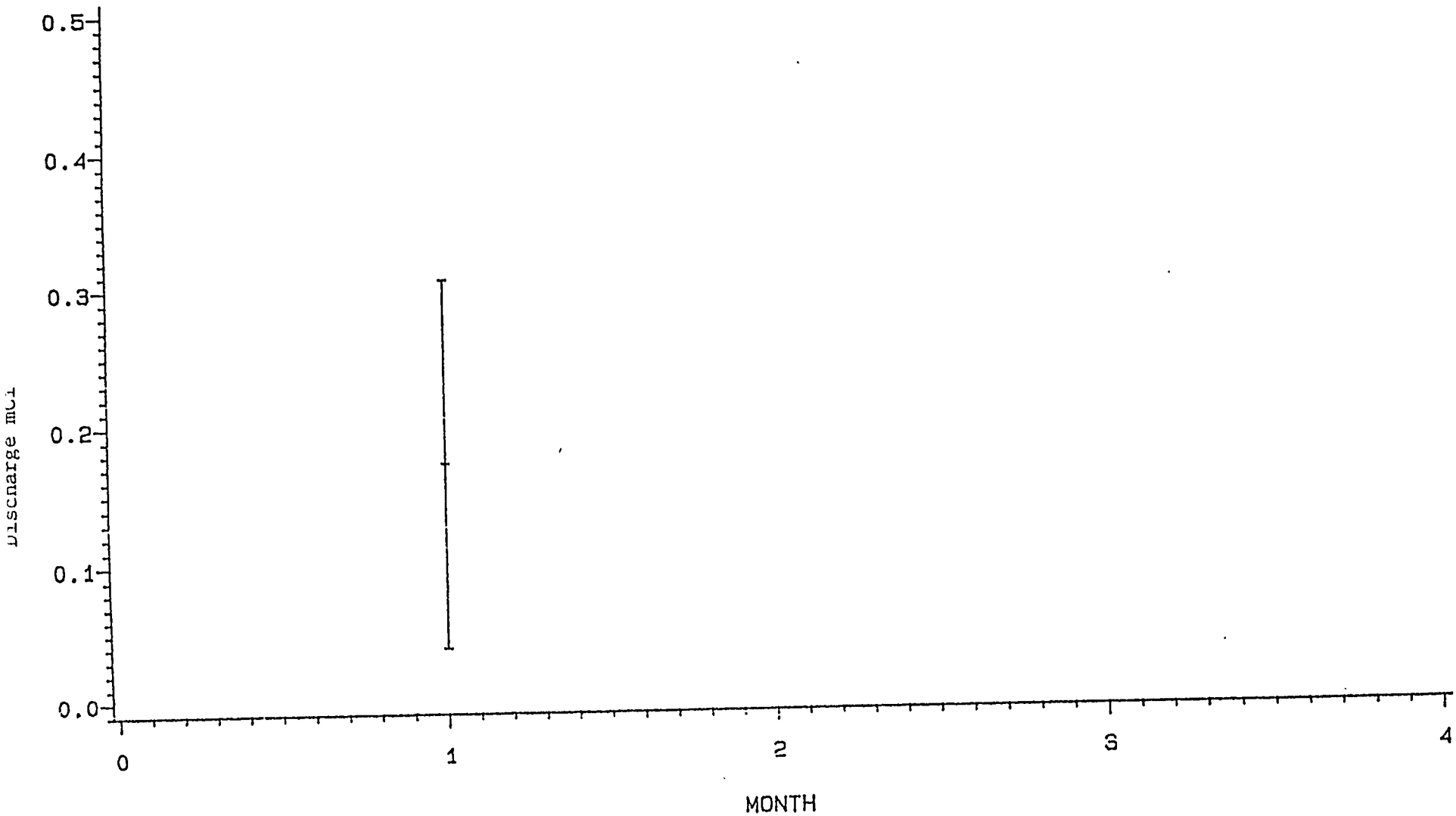


Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 — Analysis of TRU.

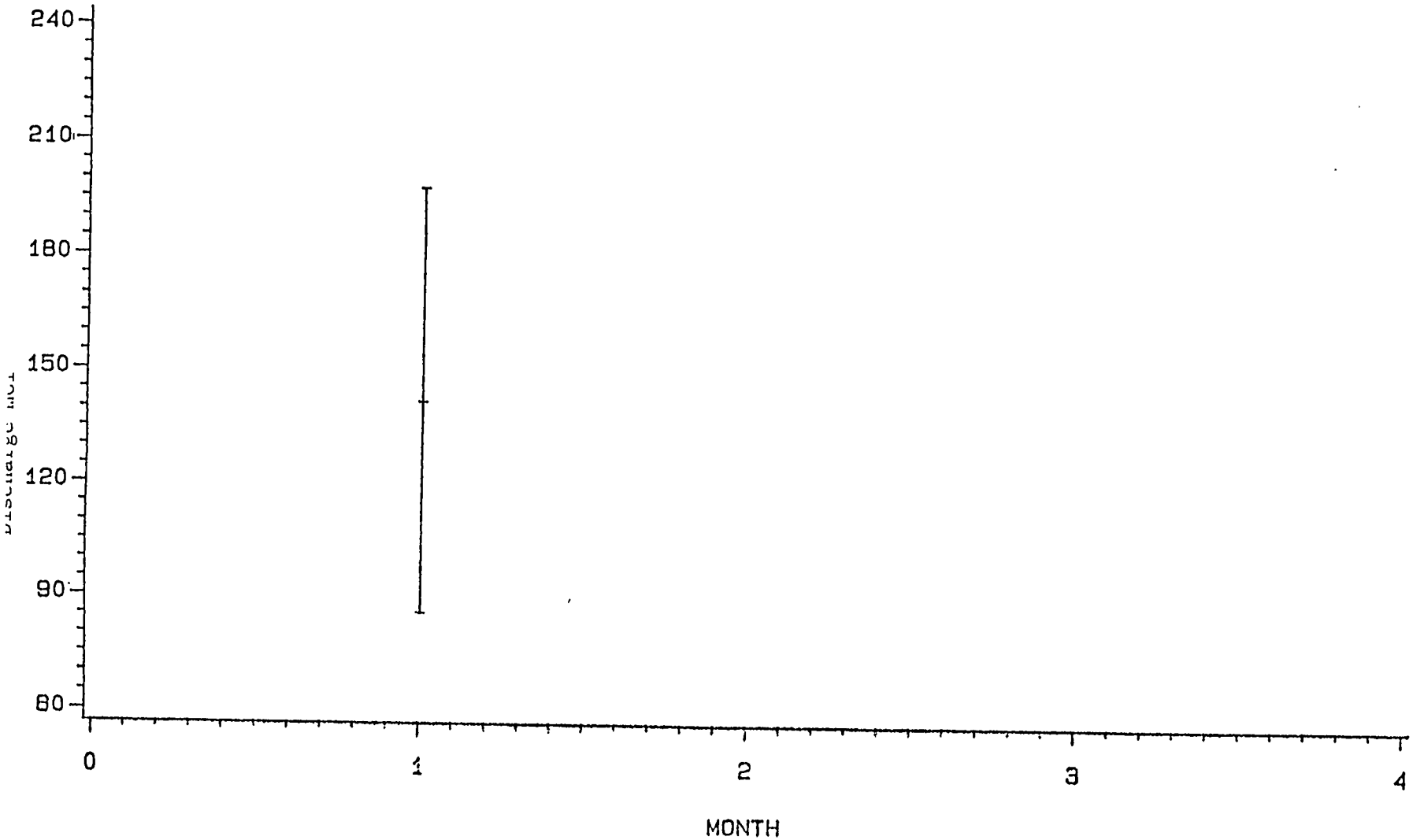


Fig. 5. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 — Analysis of ^{3}H.

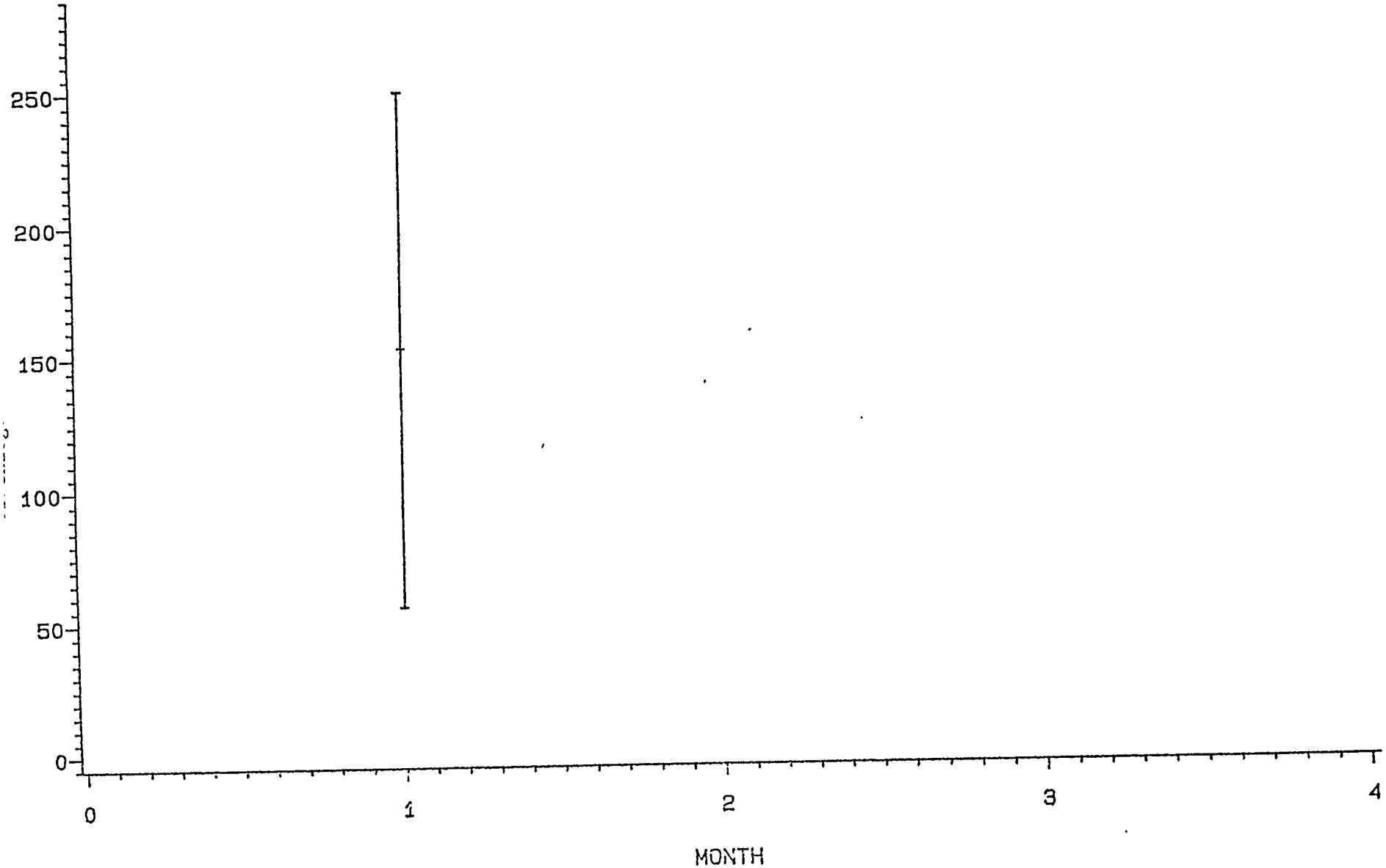


Fig. 6. Mean Weekly Discharges and 95% Confidence Intervals from White Oak Dam During 1985 -- Analysis of Gross Beta.

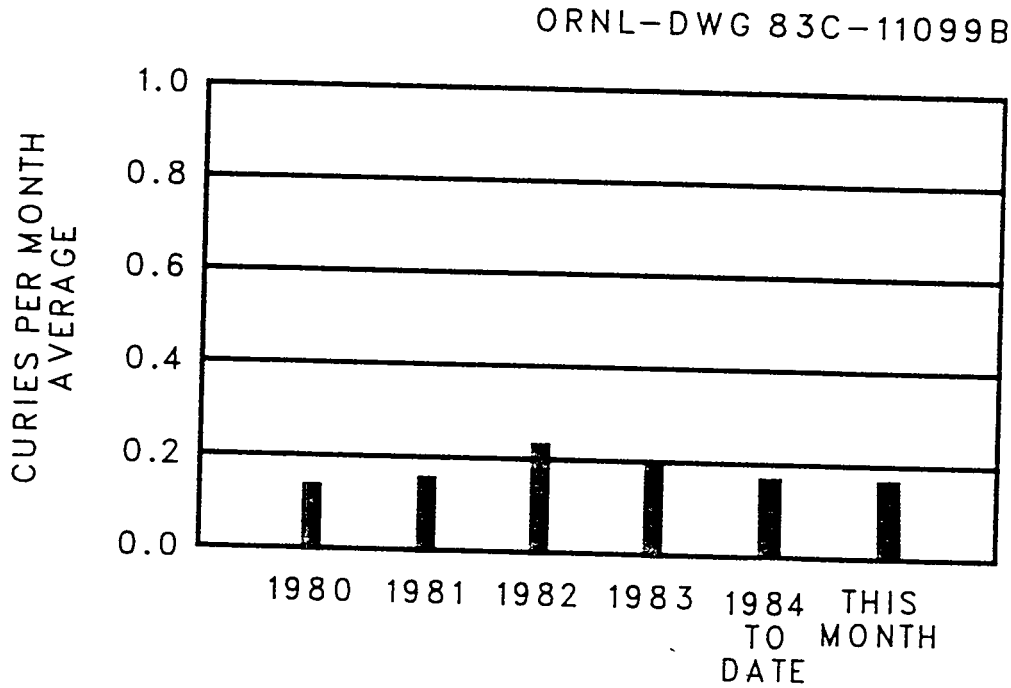


Fig. 7. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig.3)

ORNL-DWG 85C-9237A

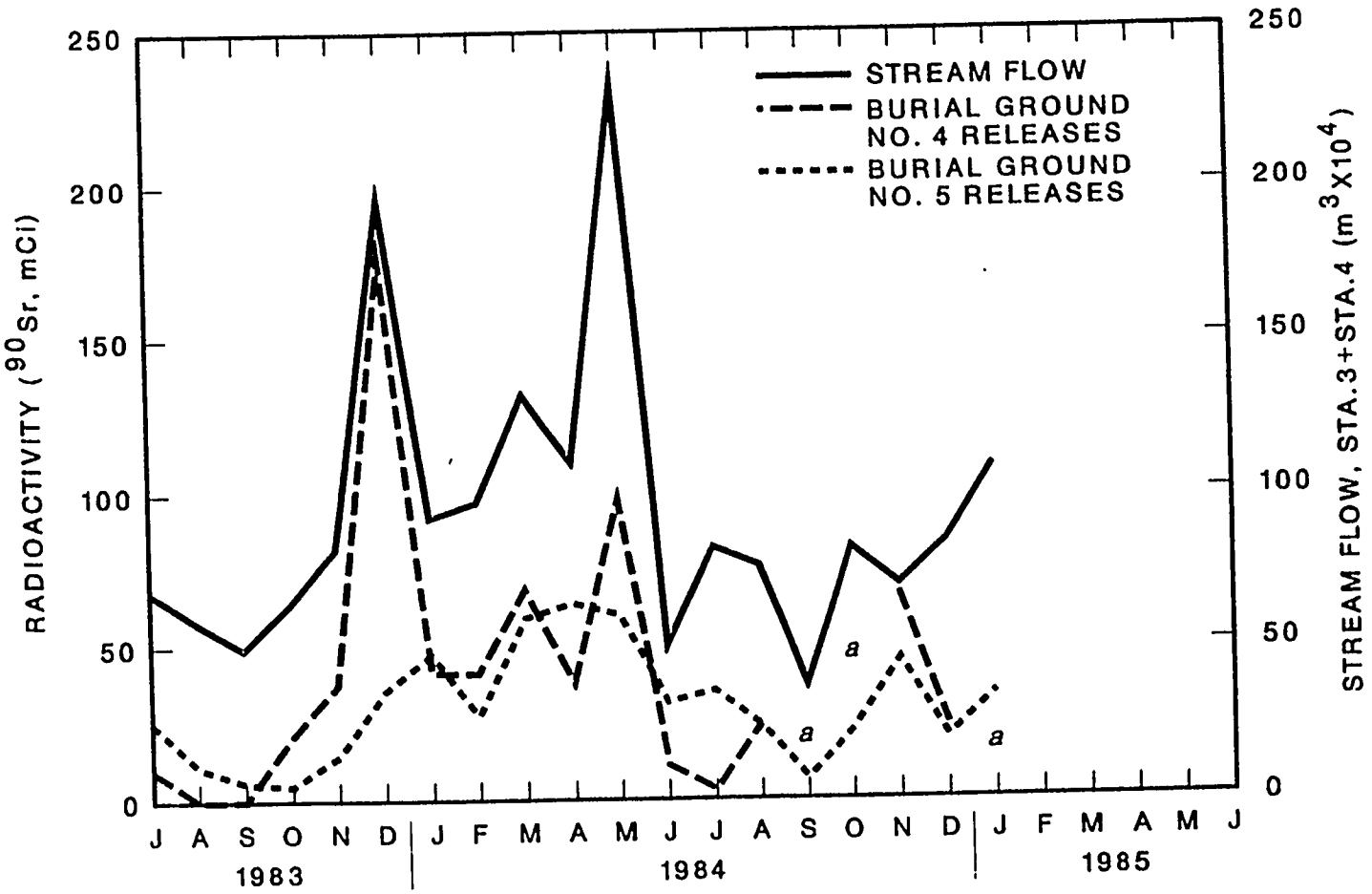


Fig. 8. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a]Not reported because of uncertainties with flow data & possible cross-contamination of sample

ORNL-DWG 78-16246R2

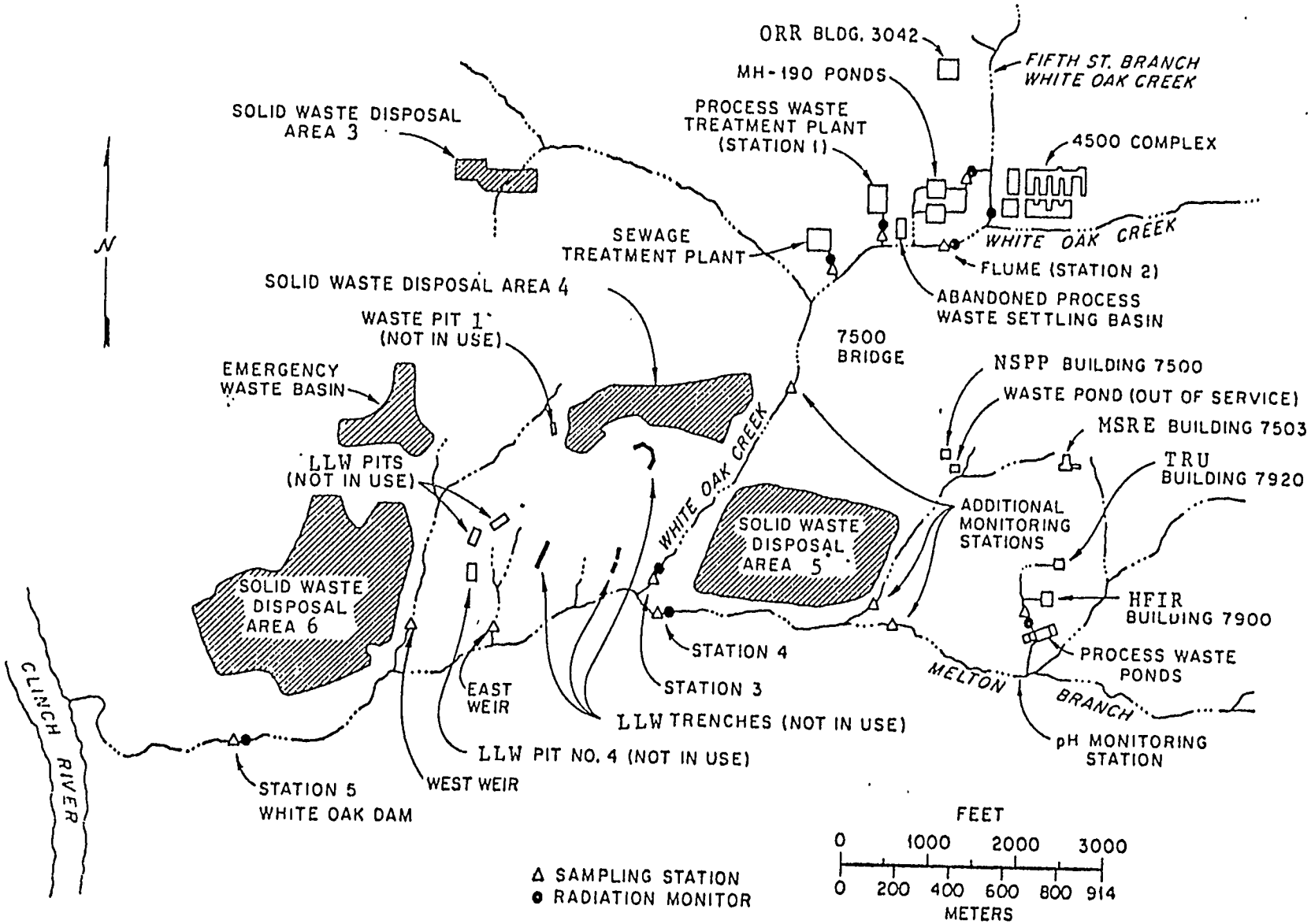


Fig. 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

ORNL-DWG 83C-11100C

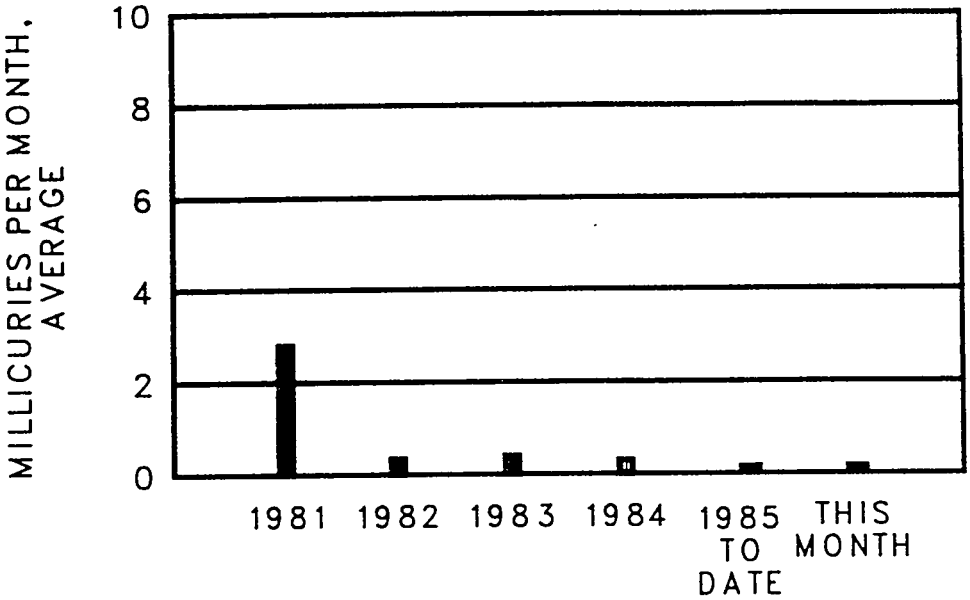


Fig. 10. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

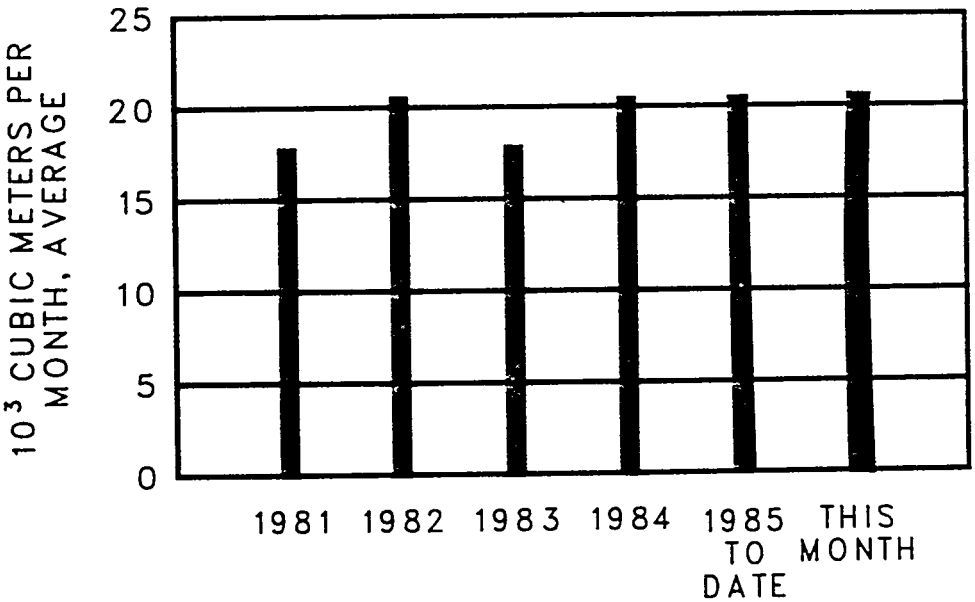


Fig. 11. Process Waste Volumes Treated in the PWTP.

ORNL-DWG 83C-11101C

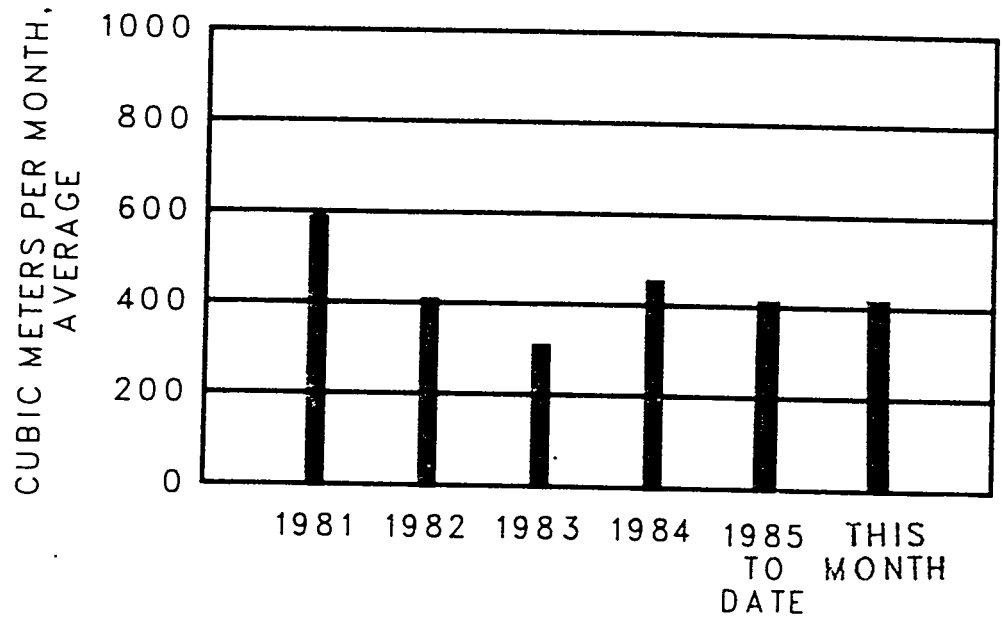


Fig. 12. Low-Level Waste Volume Generated this Month.

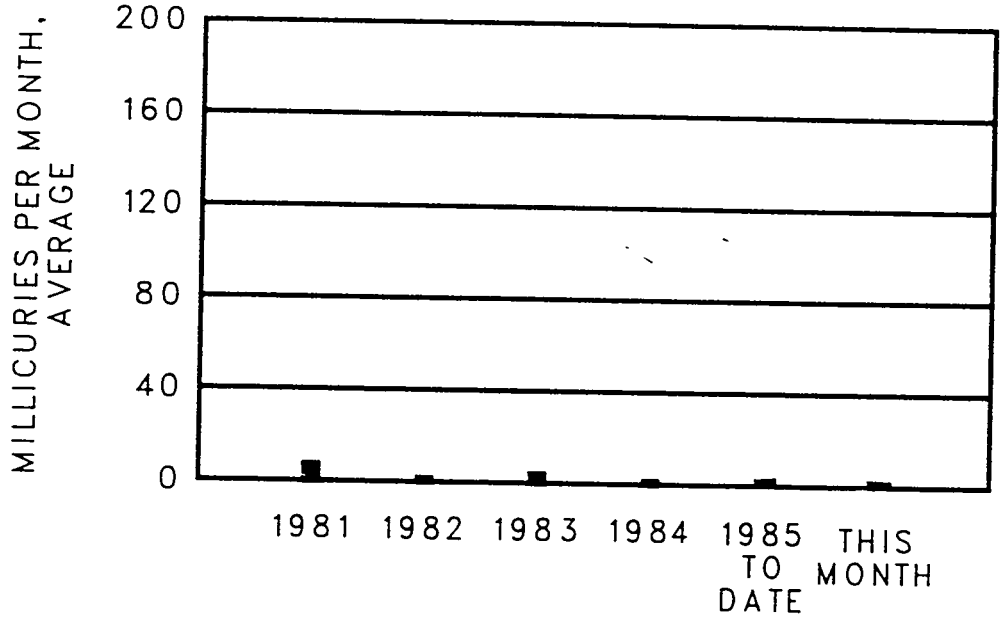


Fig. 13. Total Activity Released in Gaseous Waste (Mainly ^{131}I; not Including rare gases or other nonfilterable species). Maximum Permissible Operating Level is 13 Ci/Quarter.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.140	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.041	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.0001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.004	-----
Total Discharge from All Sources		0.185	
White Oak Dam to Clinch River (EOS Measurements)		0.410	0.76

[a]Refers to Fig. 3.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	5700	0.726	55.6	4.71	18.1
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.180[a]	13.8	3.2	12.3
Reactor Operations (MH 112)	13	0.001	0.1	3.49	13.4
Buildings 3503 and 3508 (MH 229)	0.49	<0.001	---	2.53	9.4
Buildings 3025 and 3026 (MH 149)	2.2	<0.001	---	1.74	6.7
Building 3019 (MH 25)	450	0.001	0.1	0.11	0.4
Waste Evaporator, Bldg. 2531 (MH 243)	470	0.019	1.4	1.53	5.9
Building 3525 (MH 235)	2.2	<0.001	---	1.85	7.0
Building 2026 (MH 240)	2.2	<0.001	---	0.80	3.1
Tank Farm Drainage	2300	0.379	29.0	6.09	23.4

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Activity (mCi)	Filterable Particulate Activity[a] (Ci)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.0001	1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤0.3	15	580
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<1	
MSRE - Stack No. 7512	<0.001	<0.001	
HFIR and TRU - Stack No. 7911	≤0.5	74	97
Activity in Gases Released at X-10 Site	≤0.8	190	
Tritium Target Fabrication Building		14 (^{3}H)	
Building 4508 Ventilation Discharges Room 265		No sample 1.1×10^{-4}	
Building 5505 Discharges Glove Box		1.3×10^{-3} 1.8×10^{-2}	

[a]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

DISTRIBUTION

ORNL/CF-85

1. H. L. Adair
2. W. J. Armento
3. J. B. Berry
4. J. S. Bogard
5. S. E. Breeding
6. G. H. Burger
7. H. M. Butler
8. C. D. Cagle
9. G. C. Cain
10. R. M. Canon
11. G. H. Coleman
12. N. H. Cutshall
13. K. D. Daniels
14. G. J. Dixon
15. D. E. Ferguson
16. C. L. Fox
17. J. R. Gissel
18. H. W. Godbee
19. T. Grizzard
20. F. E. Harrington
21. R. E. Helms
22. F. J. Homan
23. D. D. Huff
24. R. F. Jordan
25. W. E. Laing
26-30. L. C. Lasher
31. R. E. Leuze
32. R. V. McCord
33. E. Newman
34. T. W. Oakes
35. W. F. Ohnesorge, Jr.
36. H. Postma
37. E. L. Preston
38. A. L. Rivera
39. P. S. Rohwer
40. T. H. Row
41. J. A. Setaro
42. T. F. Scanlan
43. T. G. Scott
44. C. B. Scott
45. B. P. Spalding
46. J. H. Swanks
47. J. Switek
48. Tsuneo Tamura
49. D. B. Trauger
50. W. T. Thompson
51. H. W. Hibbitts, DOE-ORO
52. J. A. Lenhard, DOE-ORO

53-54. Laboratory Records
55. Laboratory Records, ORNL RC
56. ORNL Patent Office

2511

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/433

DATE: September 7, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF MAY 1985

TO: Distribution

FROM: C. B. Scott

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(10 of 12)

NOTICE:

Publicly Releasable

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

patent
ıation is
be given
nce with

SUMMARY

A total of 67 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for the bulk of this total. The Environmental and Occupational Safety Division measured a 120-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total ^{131}I release was less than 9 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 120 mCi of ^{90}Sr was released from White Oak Lake during the period. The H^3 released over the dam amounted to 210 Ci, and the TRU assay was 0.9 mCi at this station. The mean weekly discharges of ^{90}Sr, H^3, TRU, and gross beta activities are shown in Fig. 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 45.4×10^4 and 5.7×10^4 m^3, respectively. Fig. 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 66 mCi of ^{90}Sr into White Oak Lake.

The controlled releases into the White Oak Creek during the period were as follows: a total of 0.10 mCi of ^{90}Sr was released by the Process Waste Treatment Plant, 0.33 mCi of ^{90}Sr was released from the 190 pond system, and a total of 7.6 mCi of ^{90}Sr was released from the sanitary system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	5.50	
190 Ponds	0.33	
Process Waste Treatment Plant	0.10	
Sewage Treatment Plant	7.60	
	13.5	
7500 Sampling Station	40.3[a]	
Burial Grounds 1 and 3 and Floodplains		26.8
Station 3	50.0	
Burial Ground 4		9.7
Melton Branch		
7900 Area (HFIR and TRU)	0.09	
7500 Area (NSPP and MSRE)	3.5	
	3.59	
Station 4	16.0	
Burial Ground 5		12.4
Liquid LLW Pit Disposal Area		
East Weir	0.01	
West Weir	0.95	
	0.96	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	67.0	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		49.9
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		74.4

[a]The flow at this station was adjusted on the basis of the other watershed measurements.

Process Waste

A total of 1.83×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 1.75×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 32 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	40	24.0	28.3
Bed Volume (1 BV = 1.3 m^3)	532	373	455

Liquid Low-Level Waste

The problem with both the jet transfer system and the density indicator continued during the period, and the A-2 system remained out of service during repairs. The 2A-2 system boil-down rate was 0.26 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 or W-22	252.8
Volume of LLW Feed Transferred to Evaporators	189.9
Volume of Evaporator Concentrate Transferred to W-23	22.0
Service Tank Inventory:	
W-21, Beginning of Month	36.6
W-21, End of Month	29.9
W-22, Beginning of Month	29.3
W-22, End of Month	98.9
W-23, Beginning of Month	166.2
W-23, End of Month	67.0*
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	973.3
Total Volume at End of Month	1095.0

Note: Liquid low-level waste is pumped from the area collection tanks into W-21 and W-22, which act as feed tanks for the evaporators. Evaporator concentrate is stored in W-23 prior to transfer to Melton Valley Storage Tanks.

*124.4 m^3 of evaporator concentrate were transferred from W-23 to the MVWSF during the month.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of LLW generated each month.

	m^3
Building 3019	8.9
Building 3525	15.0
Radioisotopes Processing Area	27.8
ORR and BSR	17.4
High Flux Isotope Reactor	31.3
Fission Products Development Laboratory	28.7
4500 Complex	9.6
Building 3544	49.1
Transuranium Processing Area	8.2

Gaseous Waste

Most of the gaseous activity released by the stack systems during the period was identified as short-lived mixed fission products; measurements indicated that approximately 9 mCi of ^{131}I were discharged. The total amount of active particulates released during the period was 5.8 mCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 3.5% and 0.7%, respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.050	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.016	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	-----
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	<0.001	-----
Total Discharge from All Sources		0.066	
White Oak Dam to Clinch River (EOS Measurements)		0.120	0.19

[a]Refers to Fig. 9.
[b]Approximation based on an estimated average counting efficiency for a mixture of radionuclides normally present in White Oak Creek discharges to the Clinch River. The method of analysis used in determining gross beta activity is not sensitive to energies below that of ^{90}Sr.

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	2300	0.394	65.3	6.34	29.4
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.008[a]	1.3	0.46	2.1
Reactor Operations (MH 112)	10	0.002	0.3	5.86	27.2
Buildings 3503 and 3508 (MH 229)	0.29	<0.001	---	2.29	10.6
Buildings 3025 and 3026 (MH 149)	3.4	<0.001	---	1.03	4.8
Building 3019 (MH 25)	3500	0.002	0.3	0.02	0.1
Waste Evaporator, Bldg. 2531 (MH 243)	3200	0.077	12.8	0.89	4.1
Building 3525 (MH 235)	1.2	<0.001	---	0.54	2.5
Building 2026 (MH 240)	0.52	<0.001	---	1.83	8.5
Tank Farm Drainage	1900	0.12	20.0	2.3	10.7

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Activity[a] (mCi)	Filterable Particulate Activity[b] (μCi)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.001	<1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤0.5	5752	3038
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<1	
MSRE - Stack No. 7512	<0.001	<1	
HFIR and TRU - Stack No. 7911	≤8.1	52	461
Activity in Gases Released at X-10 Site	≤8.6	5805	

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.
[b]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

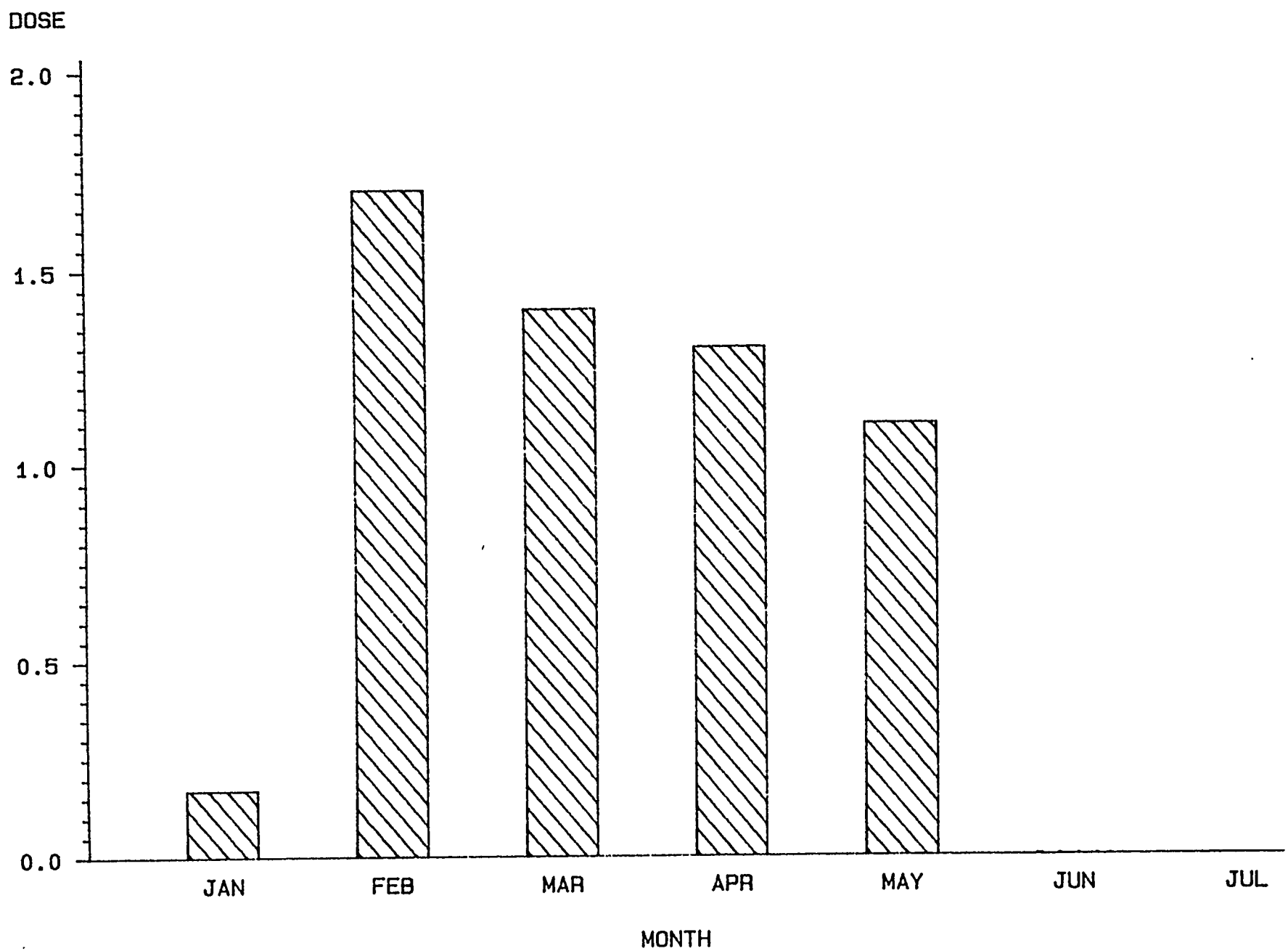


Fig. 1. Body Dose (mrem) Resulting From the Ingestion of Water at the Confluence of White Oak Creek and Clinch River.

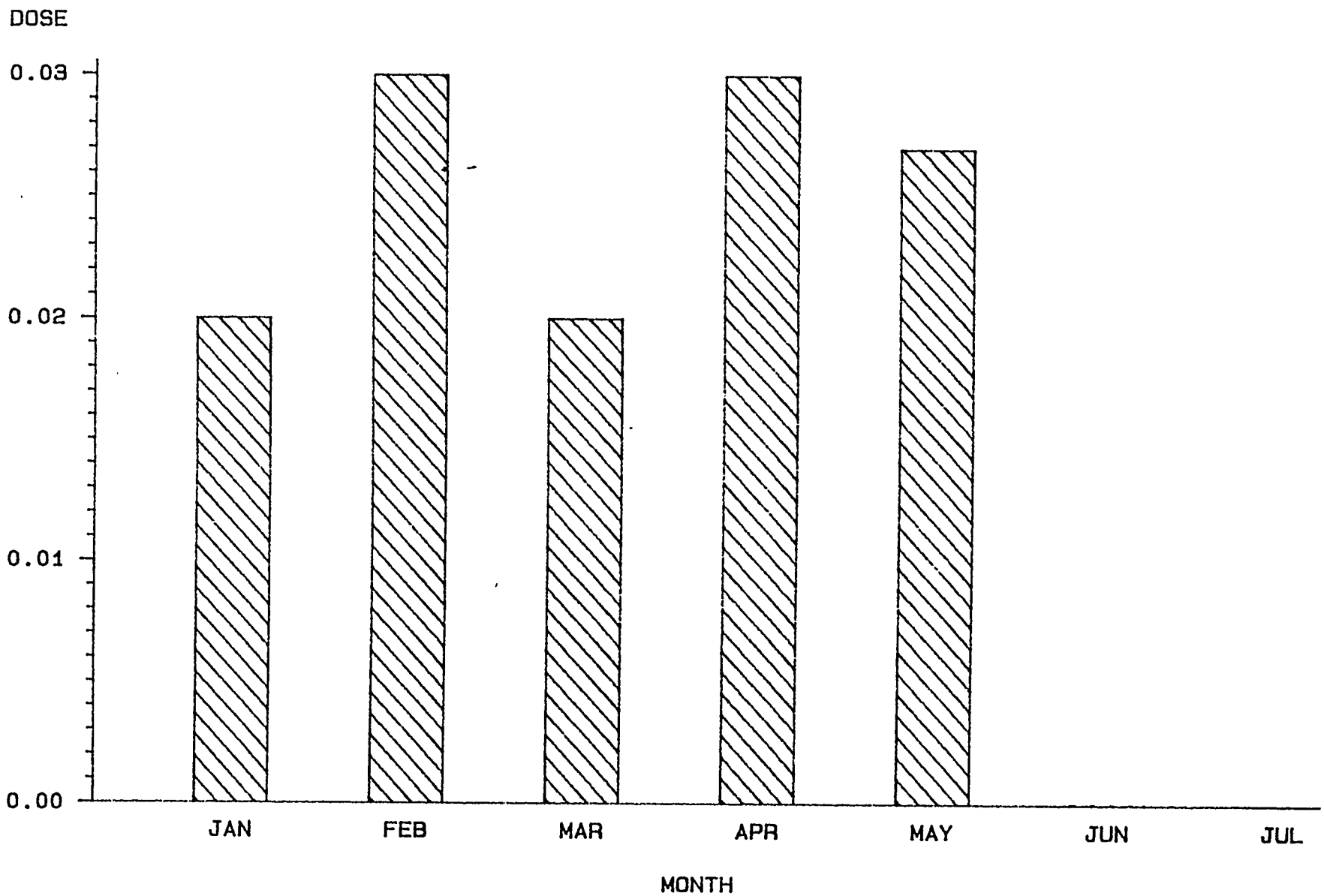


Fig. 2. Calculated Body Dose (mrem) Resulting From the Ingestion of Clinch River Water Below the Discharge of White Oak Dam.

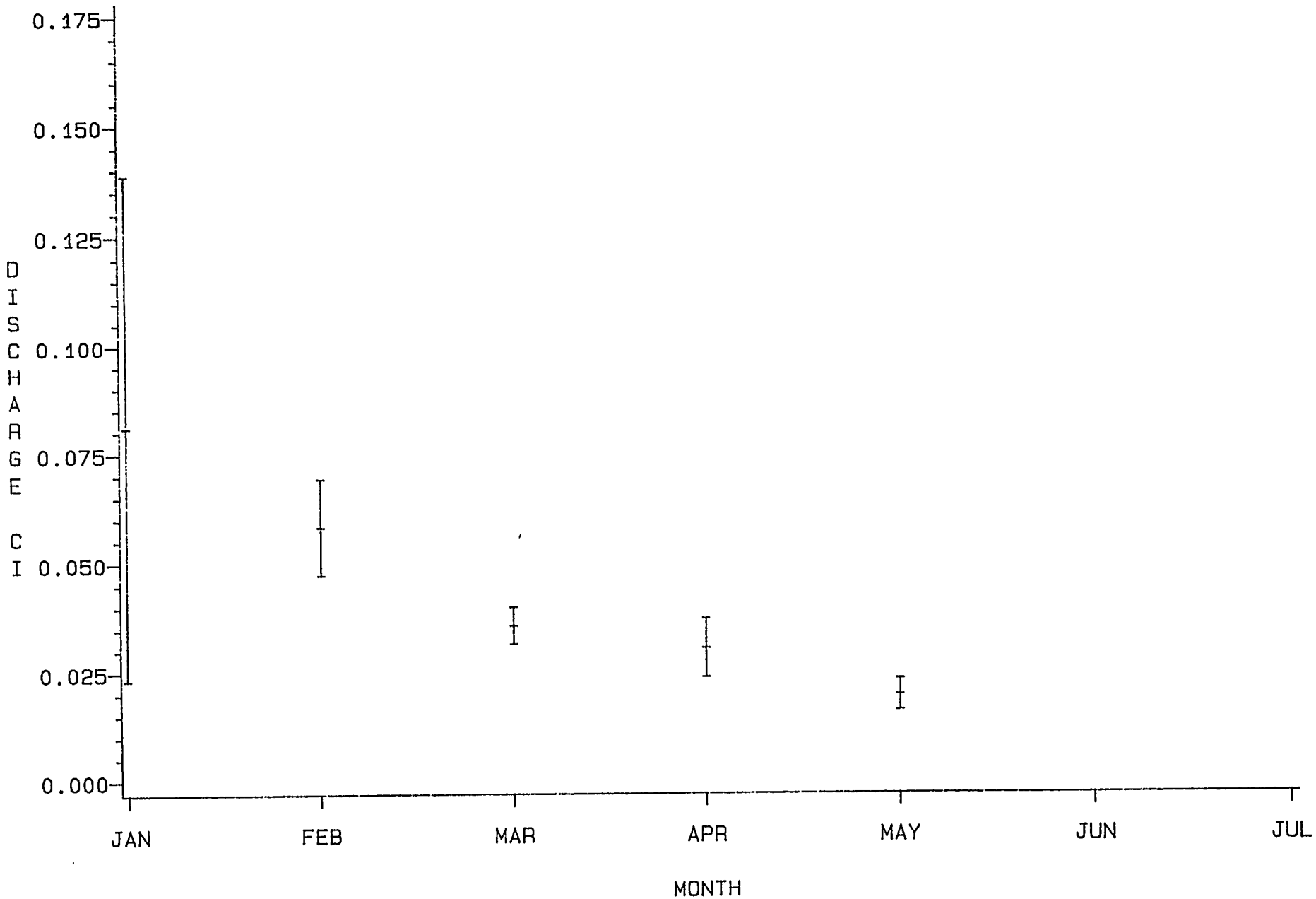


Fig. 3. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - SR-90.

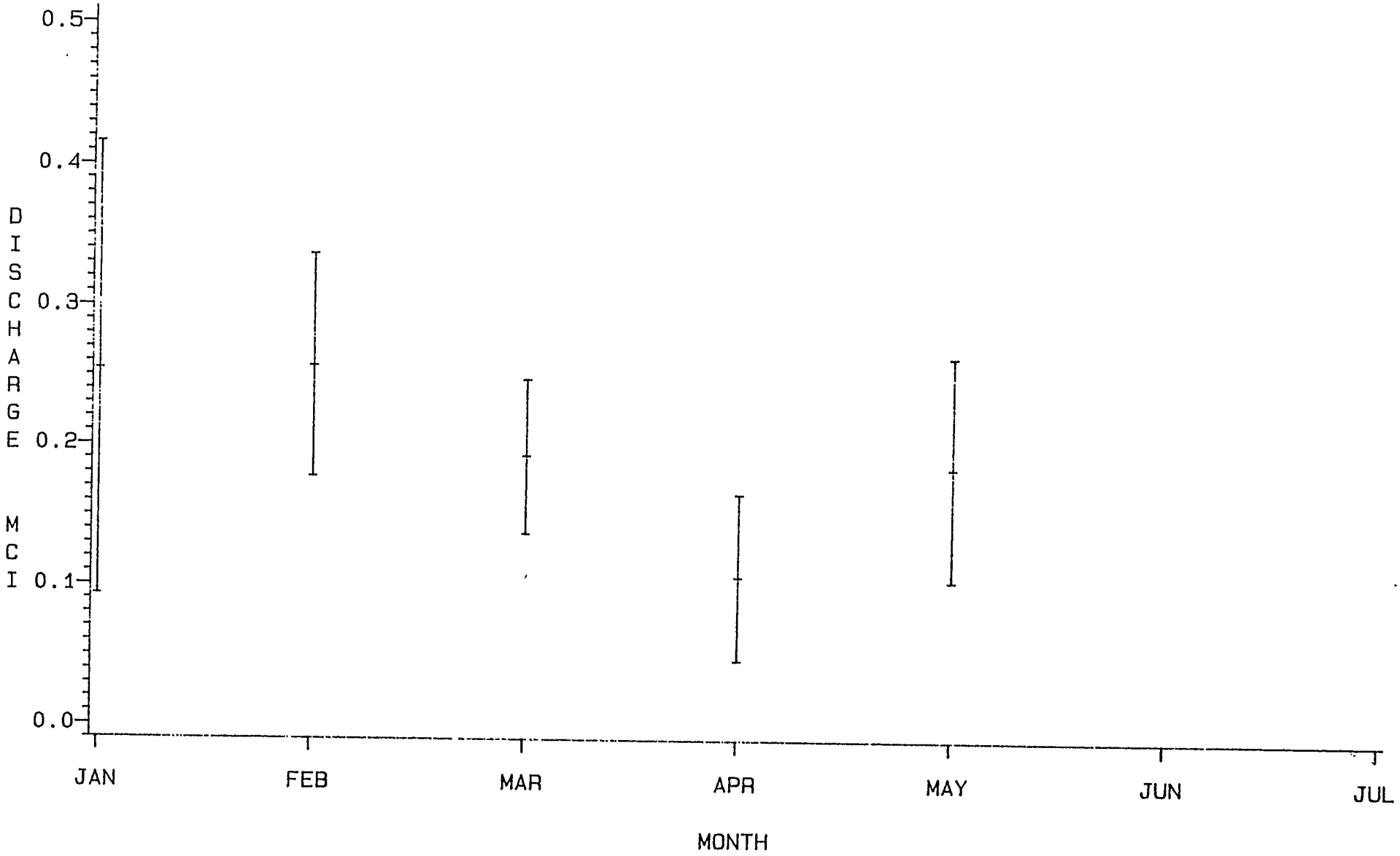


Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - TRU.

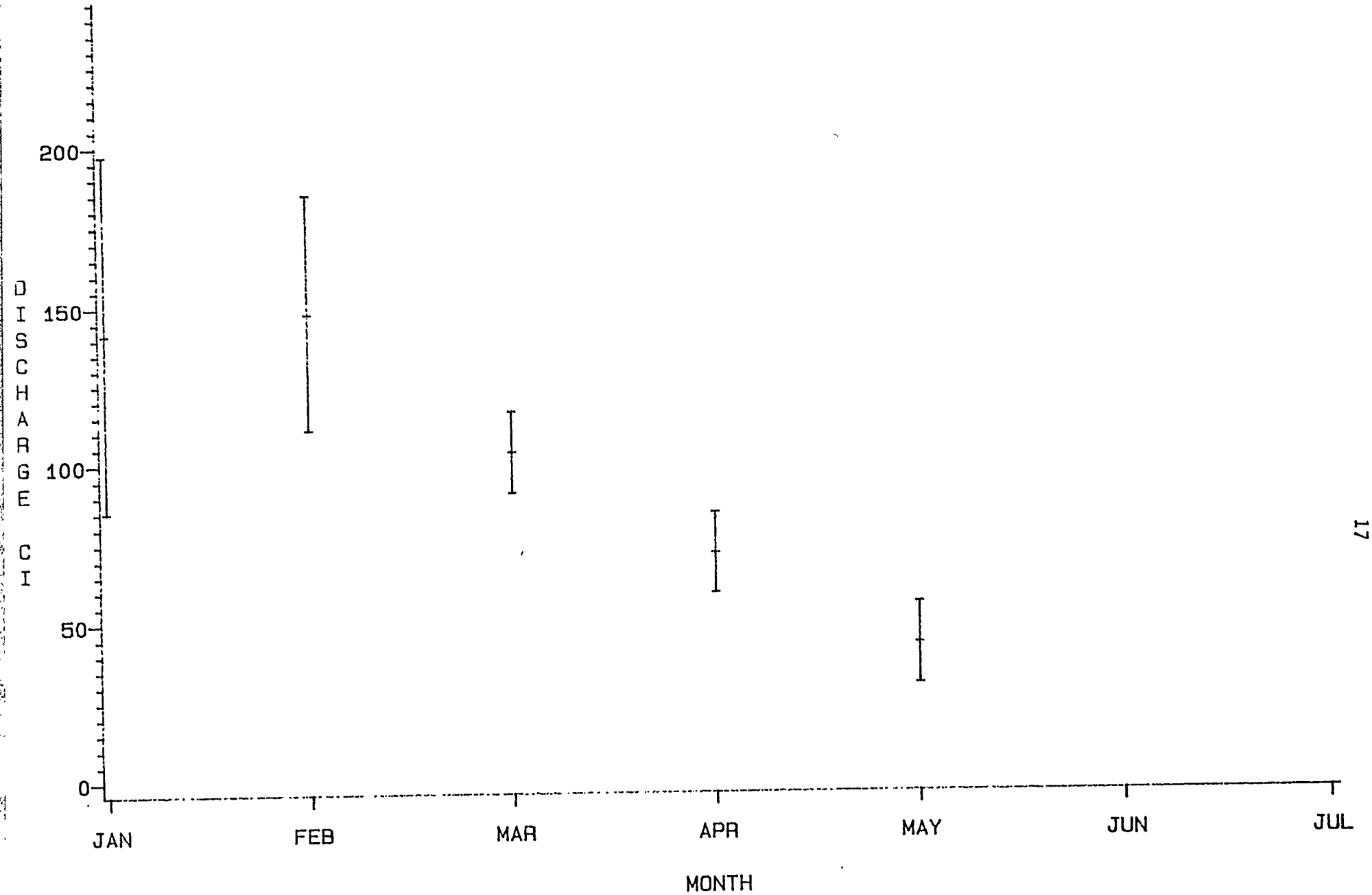


Fig. 5. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - H-3.

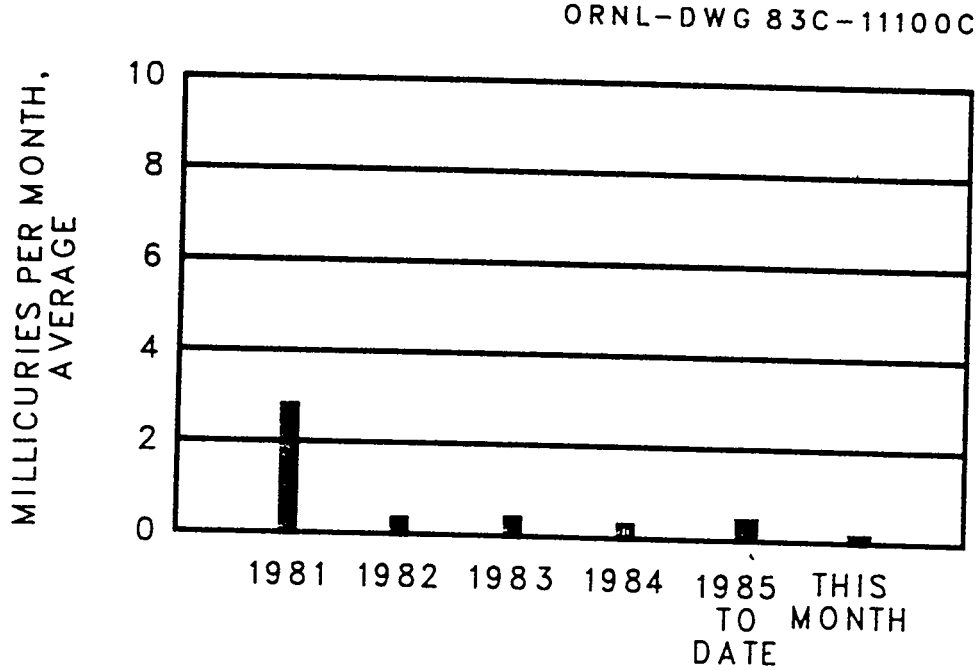


Fig. 10. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

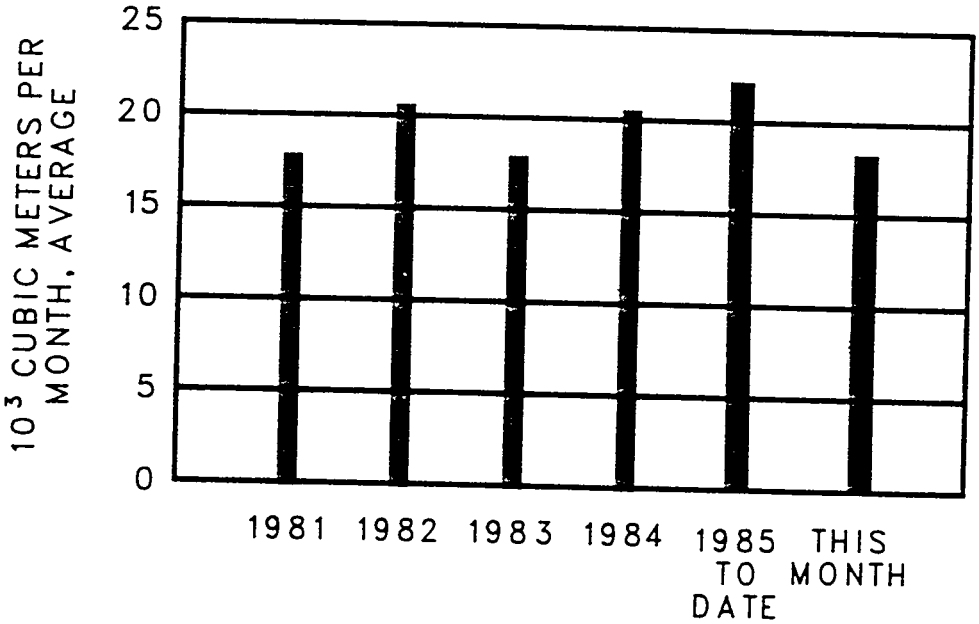


Fig. 11. Process Waste Volumes Treated in the PWTP.

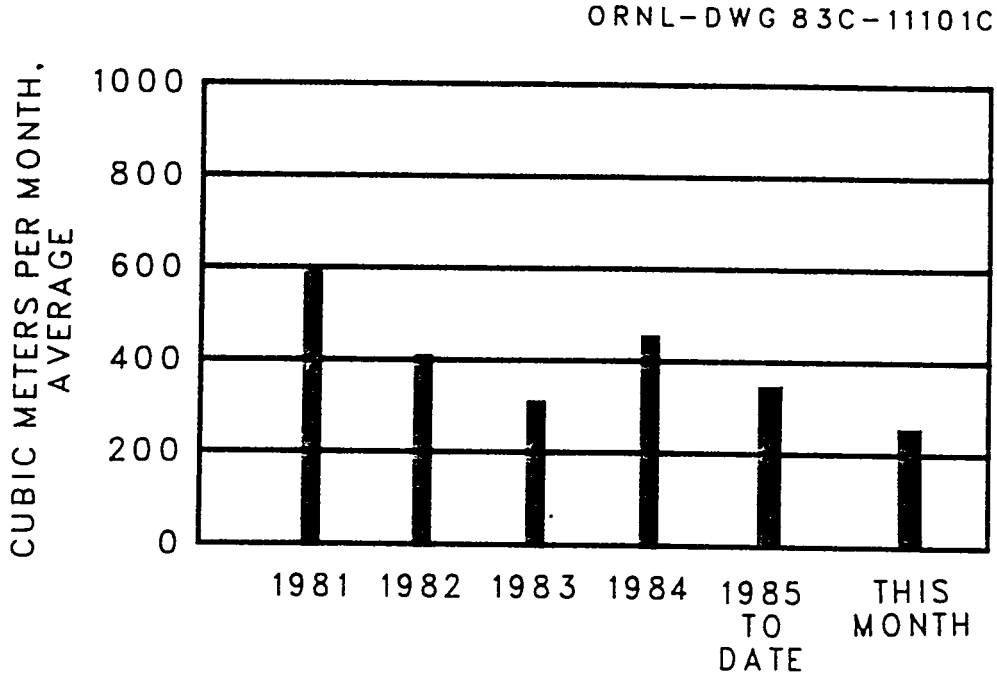


Fig. 12. Low-Level Waste Volume Generated this Month.

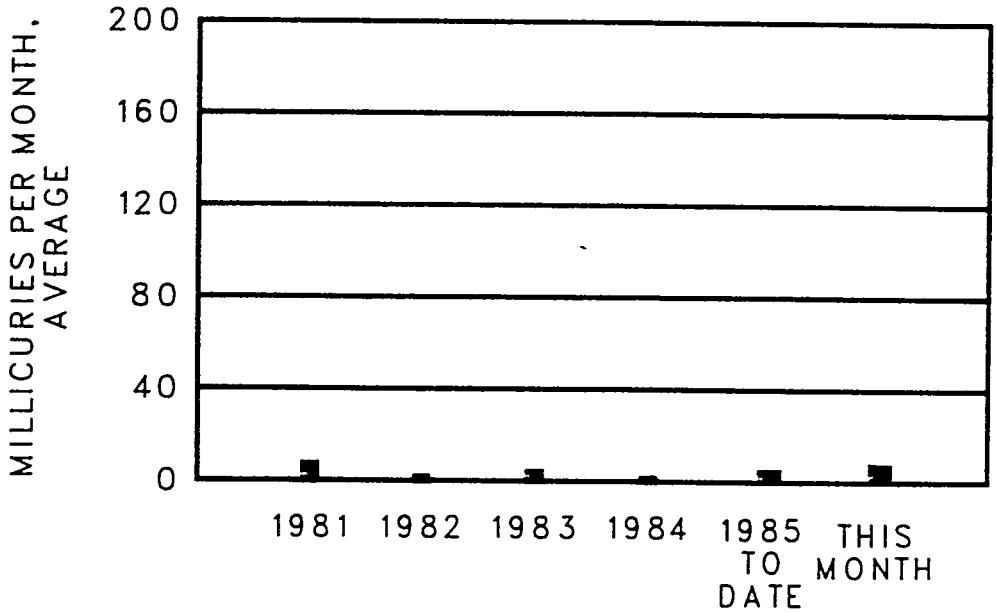


Fig. 13. Total Activity Released in Gaseous Waste (Mainly ^{131}I; not including rare gases or other nonfilterable species). Maximum Permissible Operating Level is 13 Ci per Quarter.

2511

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/434

DATE: September 7, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF JUNE 1985

TO: Distribution

FROM: C. B. Scott

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(11 of 12)

NOTICE: **Publicly Releasable**

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

l patent
nation is
be given
nce with

SUMMARY

A total of 104 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for 81% of this total. The Environmental and Occupational Safety Division measured a 100-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total ^{131}I release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

Liquid Waste

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 100 mCi of ^{90}Sr was released from White Oak Lake during the period. The H^3 released over the dam amounted to 130 Ci, and the TRU assay was 0.4 mCi at this station. The mean weekly discharges of ^{90}Sr, H^3, TRU, and gross beta activities are shown in Fig. 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 83.3×10^4 and 6.4×10^4 m^3, respectively. Fig. 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 103 mCi of ^{90}Sr into White Oak Lake.

The Process Waste Treatment Plant and the 190 pond system released 0.12 and 0.21 mCi of ^{90}Sr into White Oak Creek during the period. A total of 5.1 mCi of ^{90}Sr was released from the sanitary waste system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
White Oak Creek		
Flume	10.0	
190 Ponds	0.21	
Process Waste Treatment Plant	0.12	
Sewage Treatment Plant	5.1	
	15.43	
7500 Sampling Station	86.1[a]	
Burial Grounds 1 and 3 and Floodplains		70.7
Station 3	93.5	
Burial Ground 4		7.4
Melton Branch		
7900 Area (HFIR and TRU)	0.29	
7500 Area (NSPP and MSRE)	3.70	
	3.99	
Station 4	9.6	
Burial Ground 5		5.6
Liquid LLW Pit Disposal Area		
East Weir	<0.01	
West Weir	0.73	
	0.73	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	103.8	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		84.4
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		81.3

[a]The flow at this station was adjusted on the basis of the other watershed measurements.

Process Waste

A total of 2.32×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 2.24×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 38 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	43.0	27.5	34.5
Bed Volume (1 BV = 1.3 m^3)	581	366	478

Liquid Low-Level Waste

Both evaporator systems operated normally during the month. The average boil-down rate was 0.24 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 or W-22	339.3
Volume of LLW Feed Transferred to Evaporators	347.0
Volume of Evaporator Concentrate Transferred to W-23	41.4
Service Tank Inventory:	
W-21, Beginning of Month	64.4
W-21, End of Month	82.9
W-22, Beginning of Month	107.5
W-22, End of Month	81.3
W-23, Beginning of Month	94.5
W-23, End of Month	135.9
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	1095.0
Total Volume at End of Month	1095.0

Note: Liquid low-level waste is pumped from the area collection tanks into W-21 and W-22, which act as feed tanks for the evaporators. Evaporator concentrate is stored in W-23 prior to transfer to Melton Valley Storage Tanks.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of LLW generated each month.

	m^3
Transuranium Processing Area	8.6
Building 3019	18.9
Building 3525	24.0
Radioisotopes Processing Area	54.3
ORR and BSR	16.6
High Flux Isotope Reactor	32.7
Fission Products Development Laboratory	28.9[a]
4500 Complex	1.7
Building 3544	100.9

Gaseous Waste

The ORNL stacks discharged approximately 9.9 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was 224 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 4.5% and 0.6% respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

---

[a]The storage tank pit has an inleakage problem from groundwater, and this is the volume of water jetter from the pit during the month. The pit can only be jetted to LLW, since it was designed in this fashion.

Table 1. Activity Released to White Oak Lake

	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.094	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.010	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.0003	
Total Discharge from All Sources		0.104	
White Oak Dam to Clinch River (EOS Measurements)		0.074	0.160

[a]Refers to Fig. 9.

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

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	2600	0.428	67.8	6.09	25.4
Radioisotopes Processing Area (MH 114 minus MH 112)	---	0.010[a]	1.6	0.50	2.1
Reactor Operations (MH 112)	6.5	0.001	0.2	6.42	26.8
Buildings 3503 and 3508 (MH 229)	8.1	<0.001	---	2.43	10.1
Buildings 3025 and 3026 (MH 149)	5.0	<0.001	---	1.01	4.2
Building 3019 (MH 25)	4500	0.009	1.4	0.07	0.3
Waste Evaporator, Bldg. 2531 (MH 243)	2000	0.053	8.4	0.98	4.1
Building 3525 (MH 235)	5.6	<0.001	---	0.84	3.5
Building 2026 (MH 240)	2.8	<0.001	---	3.26	13.6
Tank Farm Drainage	2000	0.130	20.6	2.40	9.9

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

Table 3. Activity Released in Gaseous Wastes

	Activity[a] (mCi)	Filterable Particulate Activity[b] (μCi)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.001	<1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤1.3	2981	3431
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<2	
MSRE - Stack No. 7512	<0.001	<1	
HFIR and TRU - Stack No. 7911	≤7.9	17	
Activity in Gases Released at X-10 Site	≤9.2	3000	446

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.
[b]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

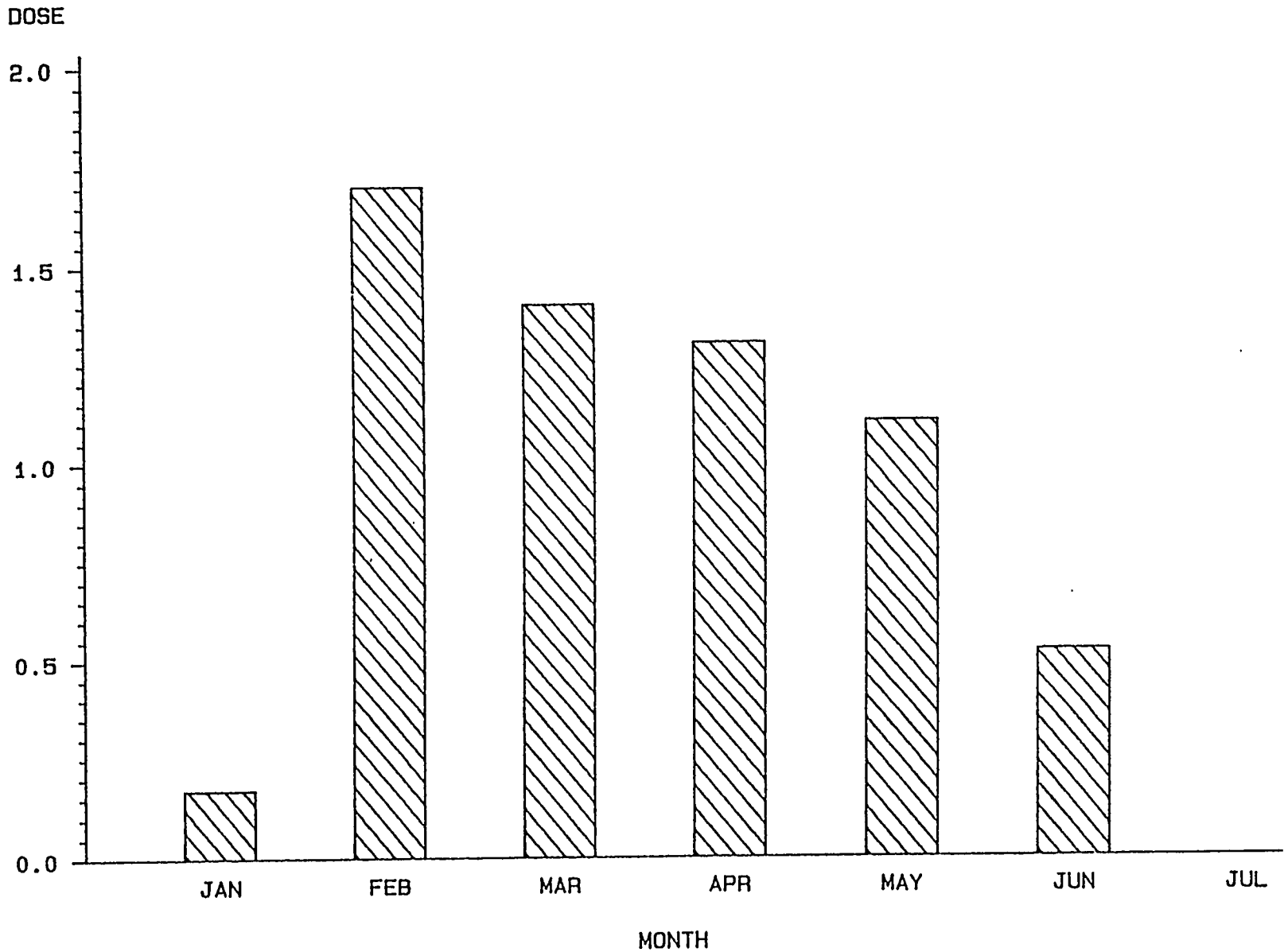


Fig. 1. Body Dose (mrem) Resulting From the Ingestion of Water at the Confluence of White Oak Creek and Clinch River.

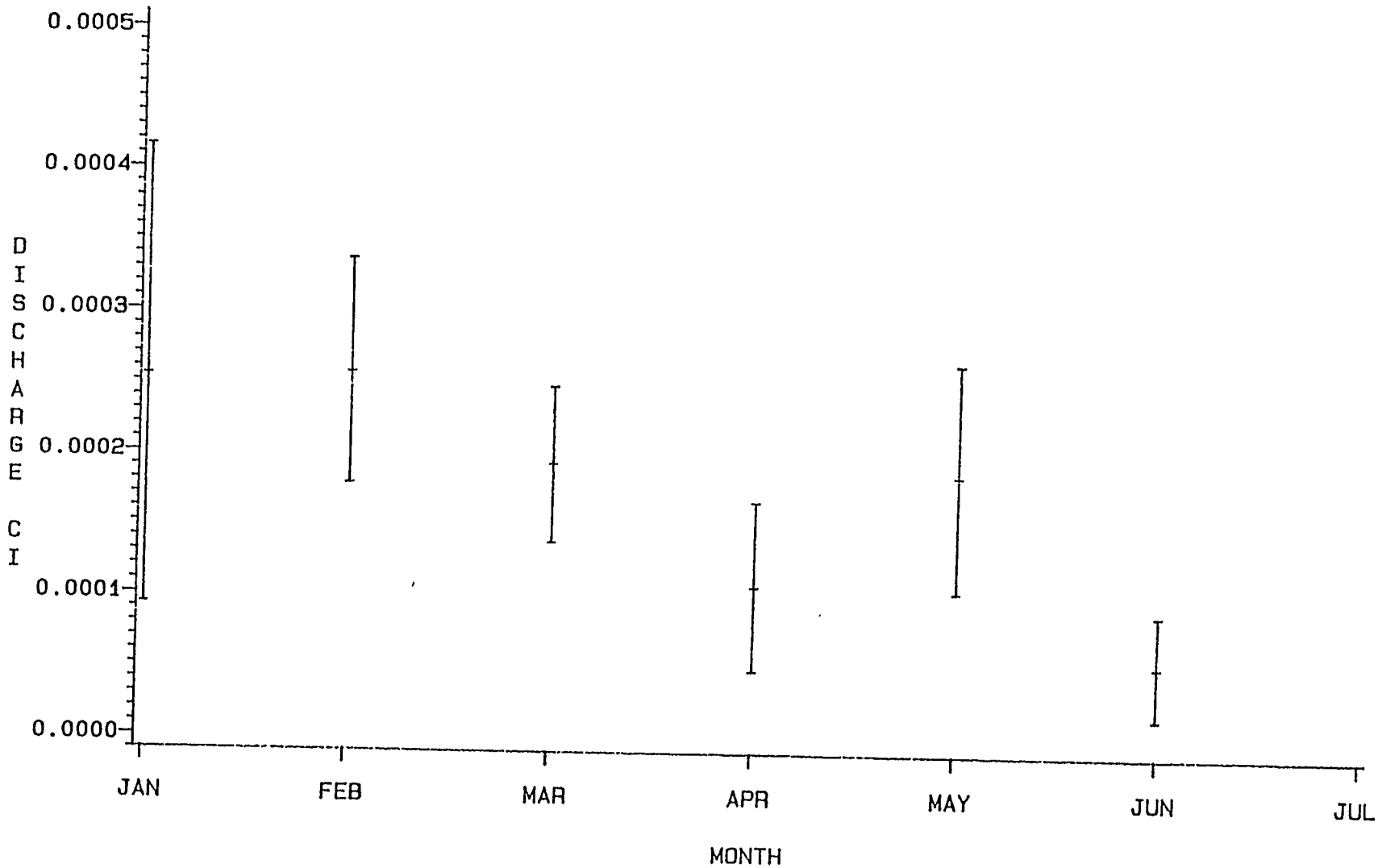


Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - TRU.

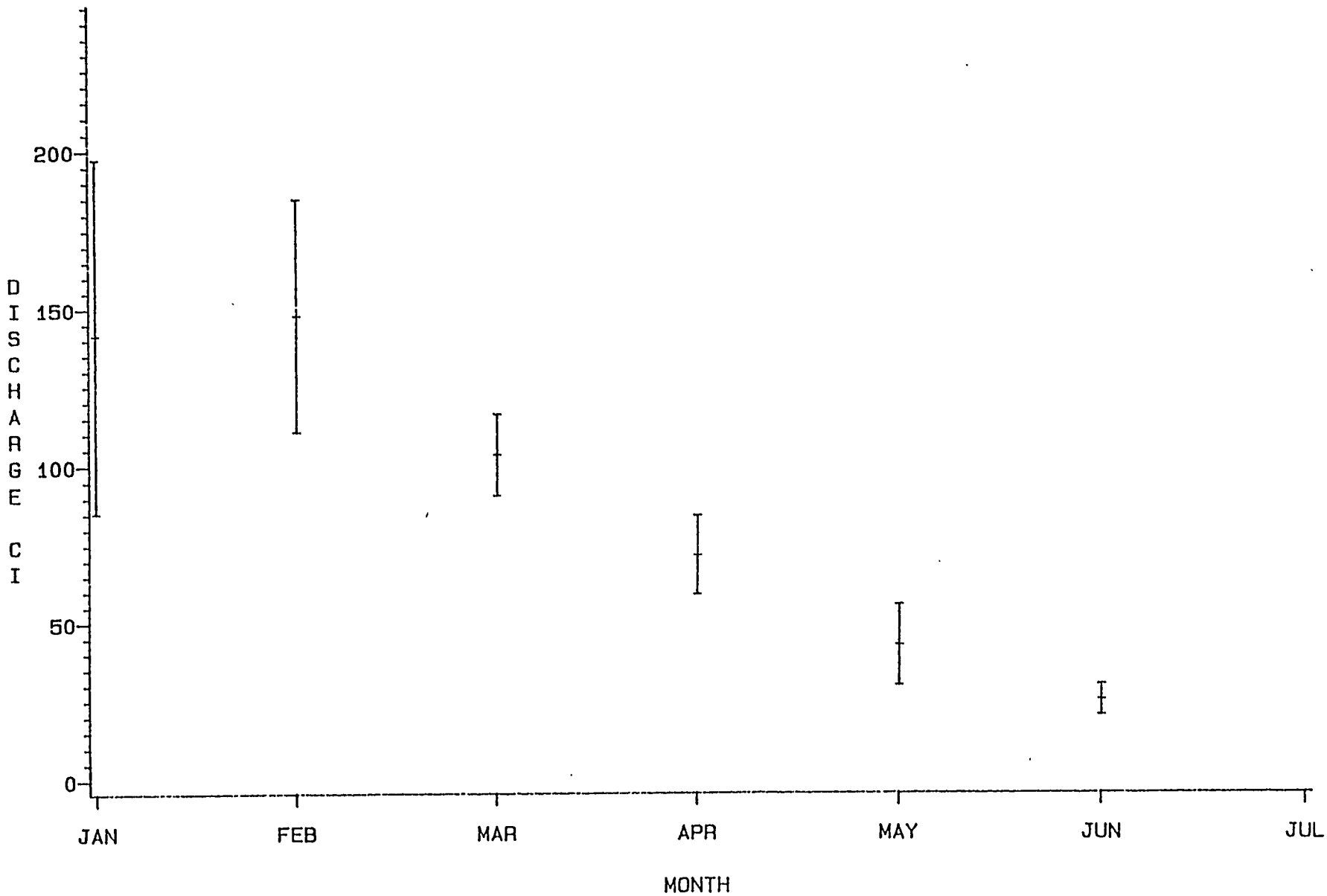


Fig. 5. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - H-3.

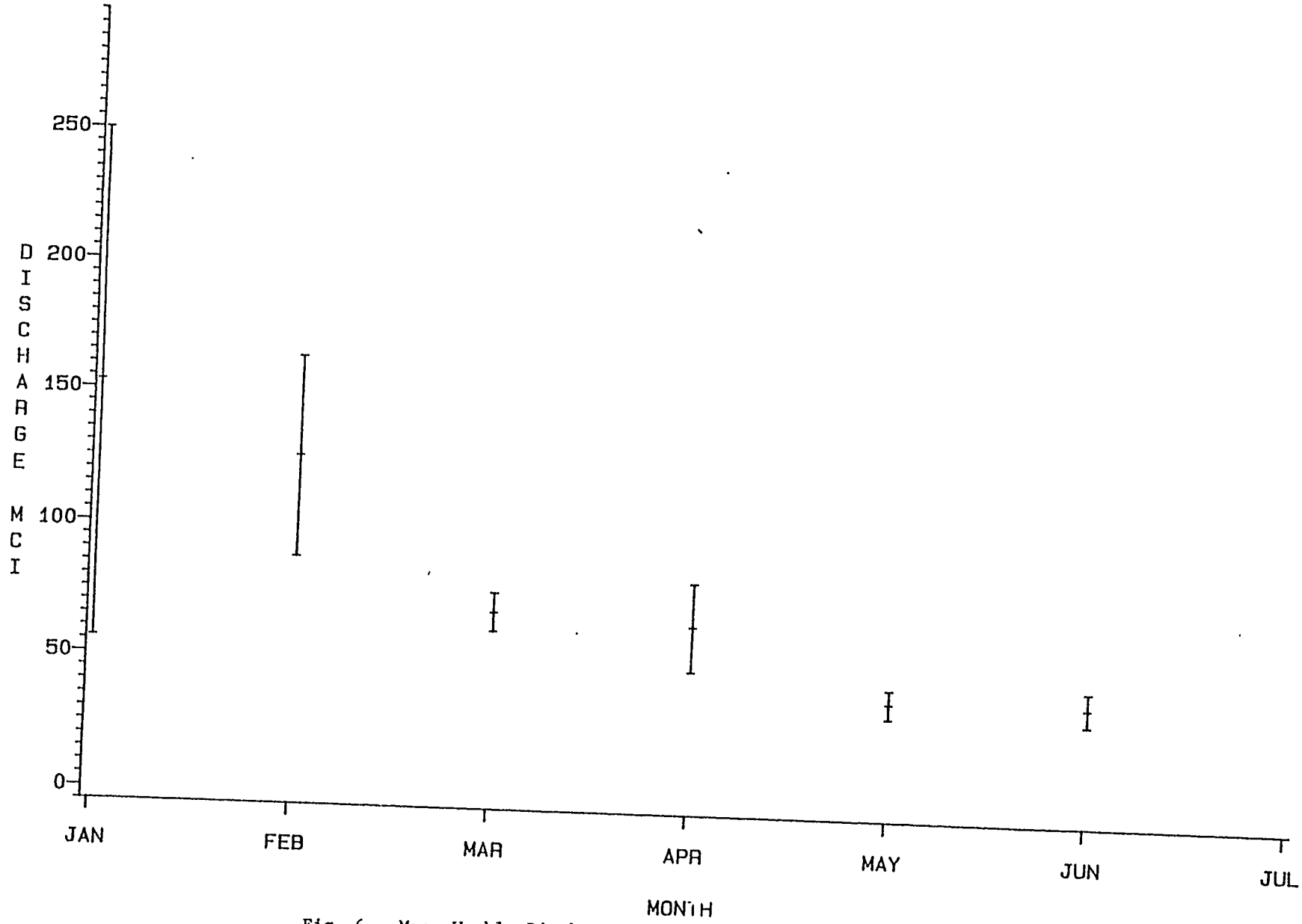


Fig. 6. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dame During 1985 - Gross Beta.

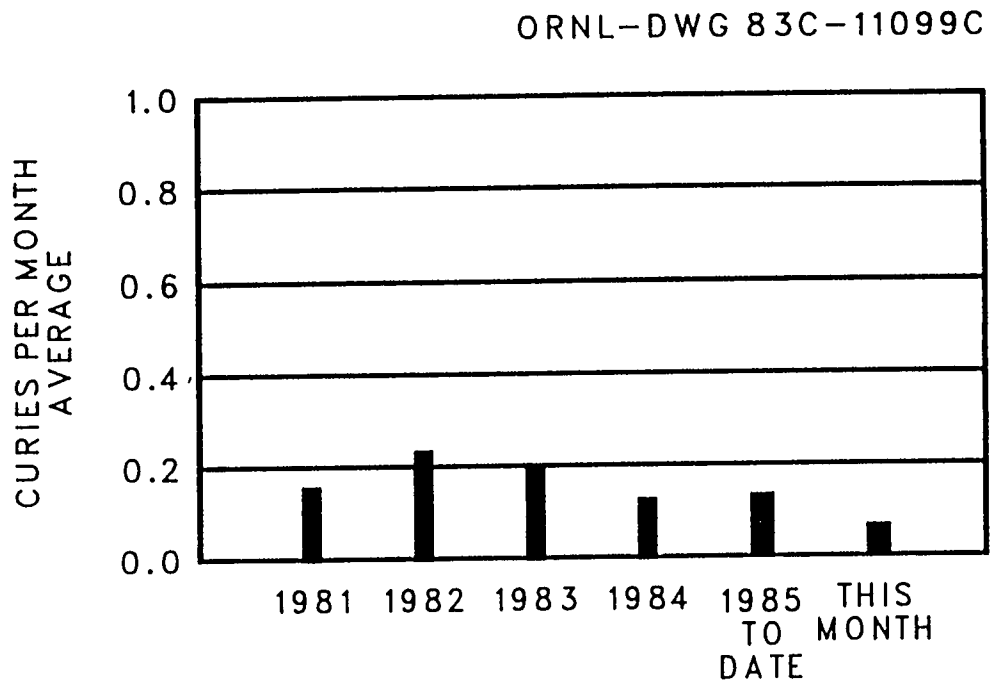


Fig. 7. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 9).

ORNL-DWG 85C-13978R2

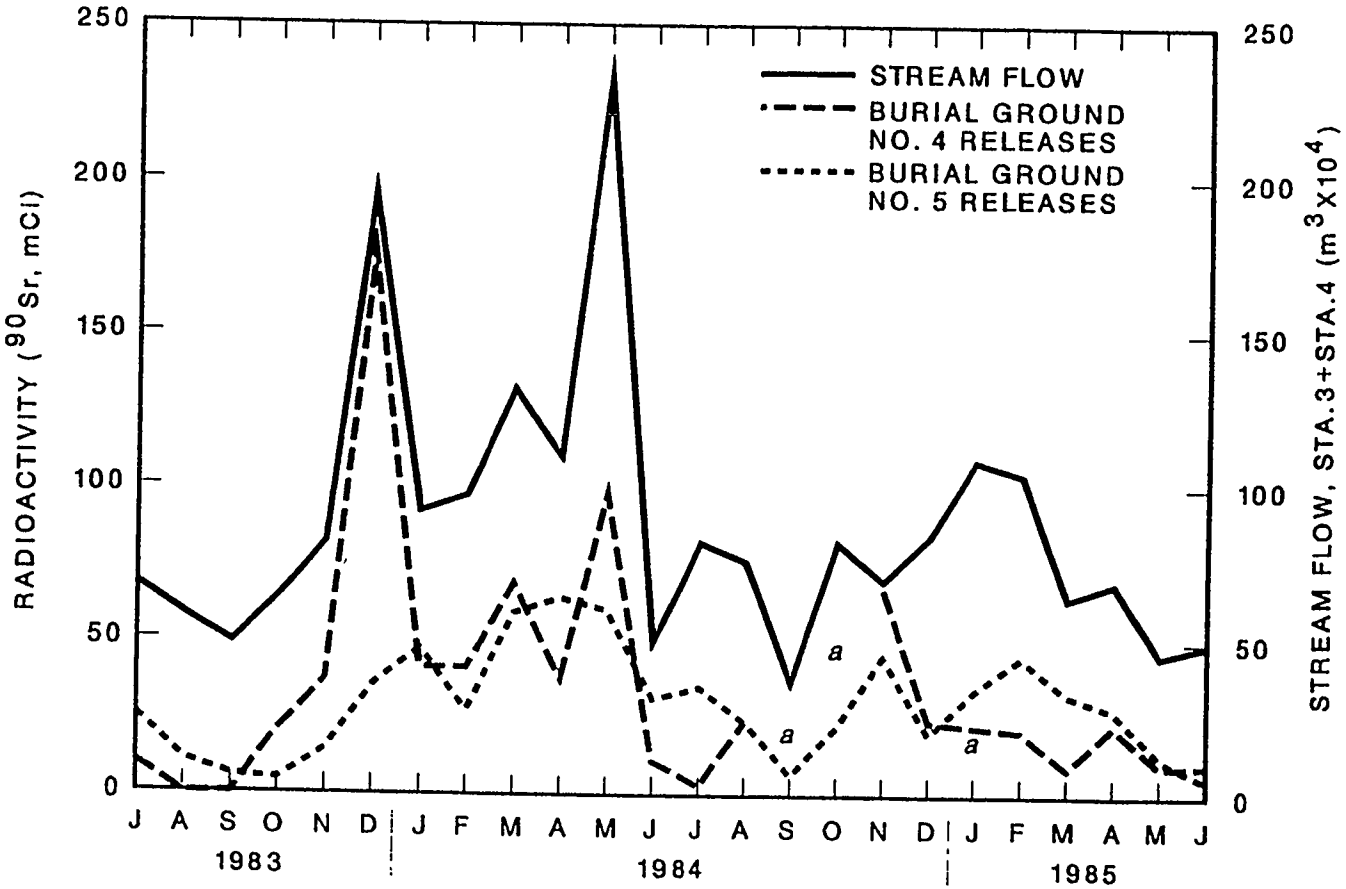


Fig. 8. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a] Not reported because of uncertainties with flow data & possible cross-contamination of sample

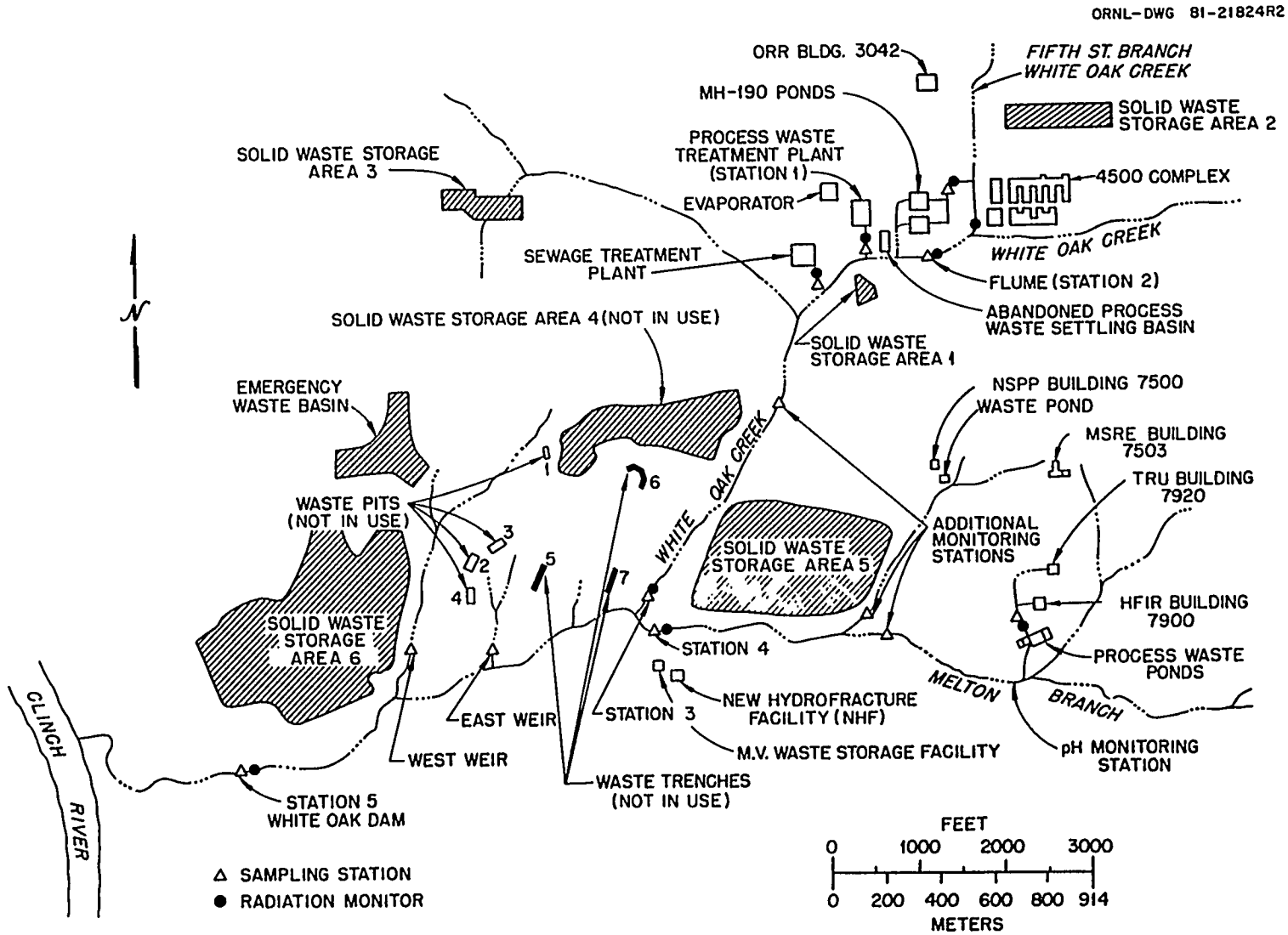


FIG. 9. LOCATION PLAN FOR WHITE OAK CREEK SAMPLING STATIONS AND RADIATION MONITORS.

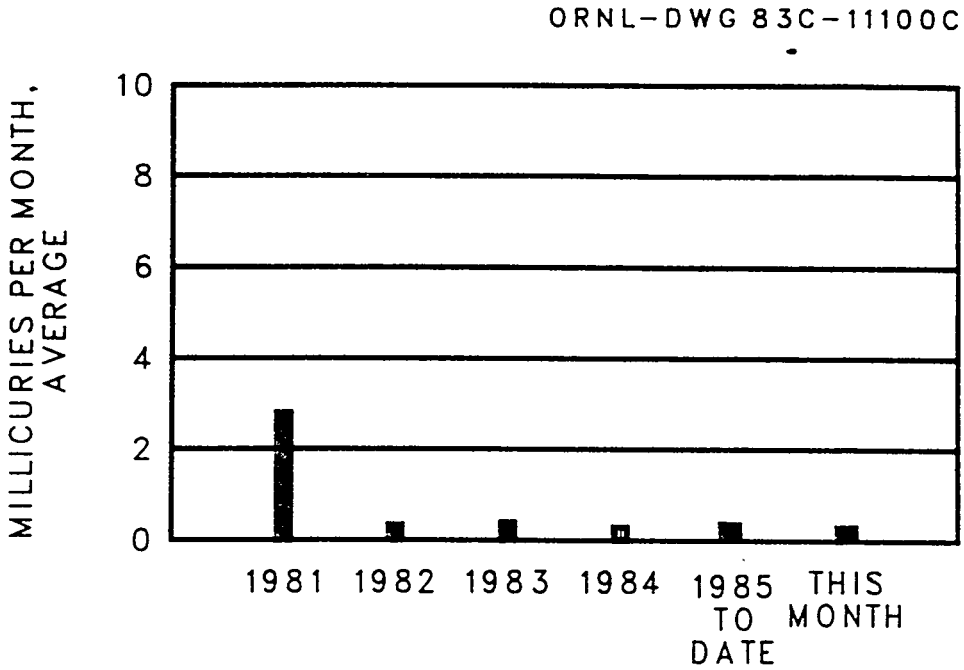


Fig. 10. ^{90}Sr Discharges in Waste from PWTP to White Oak Creek.

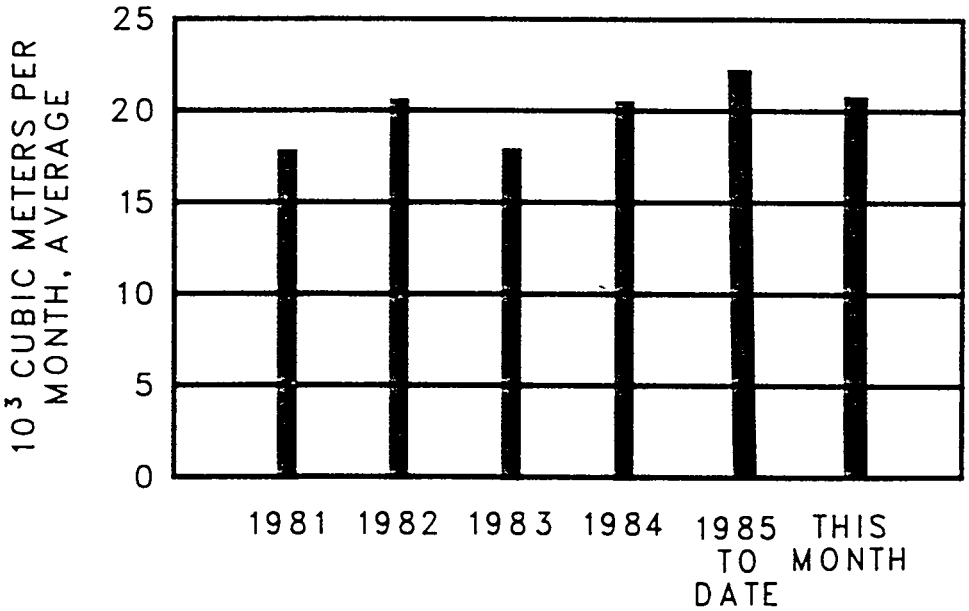


Fig. 11. Process Waste Volumes Treated in the PWTP.

ORNL-DWG 83C-11101C

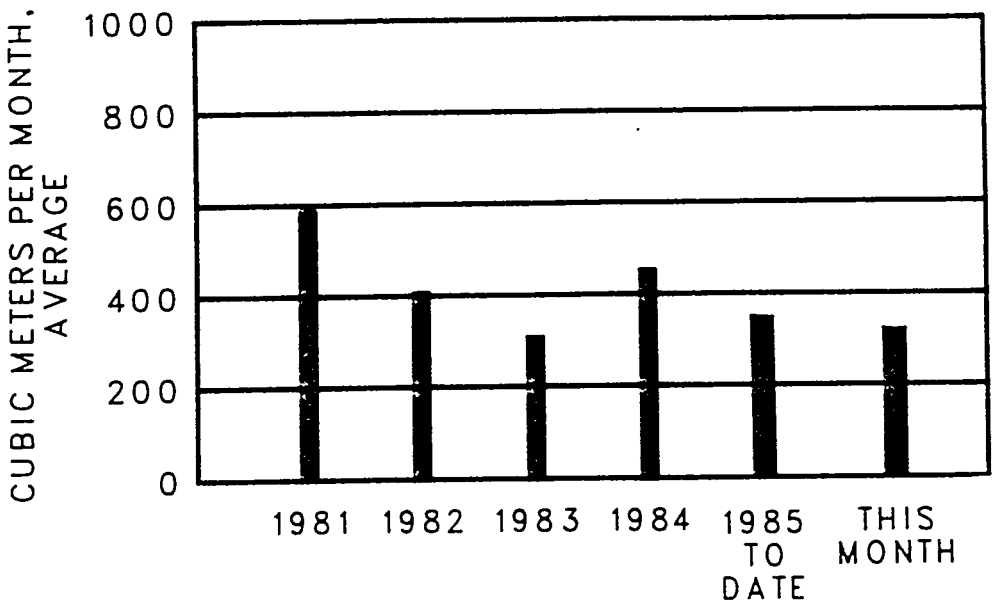


Fig. 12. Low-Level Waste Volume Generated This Month.

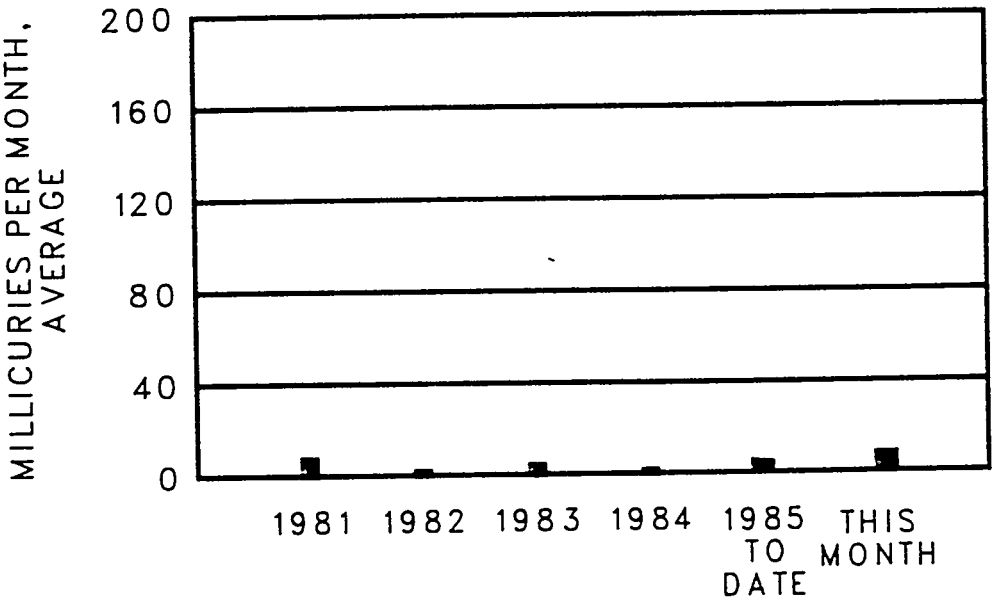


Fig. 13. Total Activity Released in Gaseous Waste (Mainly ^{131}I; not including rare gases or other nonfilterable species). Maximum Permissible Operating Level is 13 Ci per Quarter.

DISTRIBUTION

ORNL/CF-85/434

1. H. L. Adair
2. F. S. Adams
3. W. J. Armento
4. J. B. Berry
5. J. E. Blevins
6. S. E. Breeding
7. G. H. Burger
8. H. M. Butler
9. C. D. Cagle
10. G. C. Cain
11. R. M. Canon
12. G. H. Coleman
13. N. H. Cutshall
14. K. D. Daniels
15. G. J. Dixon
16. D. E. Ferguson
17. C. L. Fox
18. H. W. Godbee
19. T. Grizzard
20. F. E. Harrington
21. R. E. Helms
22. F. J. Homan
23. D. D. Huff
24. R. F. Jordan
25. J. M. Kennerly
26. W. E. Laing
27. L. C. Lasher
28. R. E. Leuze
29. R. V. McCord
30. E. Newman
31. T. E. Oakes
32. W. F. Ohnesorge, Jr.
33. D. J. Peterson
34. H. Postma
35. G. D. Price
36. A. L. Rivera
37. P. S. Rohwer
38. T. H. Row
39. J. A. Setaro
40. T. F. Scanlan
41-43. C. B. Scott
44. T. G. Scott
45. B. P. Spalding
46. J. H. Swanks
47. J. Switek
48. Tsuneo Tamura
49. D. B. Trauger
50. W. T. Thompson
51. L. C. Williams

52. H. W. Hibbitts, DOE-ORO
53. J. A. Lenhard, DOE-ORO

54-55. Laboratory Records
56. Laboratory Records, ORNL RC
57. ORNL Patent Office

OAK RIDGE NATIONAL LABORATORY

OPERATED BY MARTIN MARIETTA ENERGY SYSTEMS, INC.
POST OFFICE BOX X, OAK RIDGE, TENNESSEE 37831

For Internal Use Only

ORNL
CENTRAL FILES NUMBER

ORNL/CF-85/435

DATE: September 25, 1985

SUBJECT: RADIOACTIVE LIQUID AND GASEOUS WASTE DISPOSAL OPERATIONS AND EFFLUENT MONITORING REPORT FOR THE MONTH OF JULY 1985

TO: Distribution

FROM: C. B. Scott

Sponsor: J. H. Swanks

ChemRisk Document No. 2511
(12 of 12)

NOTICE:

Publicly Releasable

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

l patent
mation is
be given
ance with

SUMMARY

A total of 104 mCi of ^{90}Sr was discharged to White Oak Lake from ORNL sources; drainage from the burial grounds, contaminated flood-plains, and the dormant pit disposal area accounted for 80% of this total. The Environmental and Occupational Safety Division measured a 100-mCi release of ^{90}Sr at the White Oak Dam sample station during the period. The activity emitted with the gaseous wastes from the ORNL stacks remained low. The bulk of this contamination was identified as short-lived mixed fission products; the total ^{131}I release was less than 10 mCi.

RADIOACTIVE EFFLUENTS

LIQUID WASTE

Release to Clinch River

The resultant dose to the body of an individual drinking water at the confluence of White Oak Creek and the Clinch River is shown in Fig. 1. This calculation is based on measurements of radioactivity at this location, and it represents the maximum possible dose that a member of the general public could receive from the ingestion of water released from the ORNL reservation.

The calculated dose resulting from the ingestion of Clinch River water downstream from the White Oak Creek confluence (Fig. 2) is based on the measurement of radioactivity released from White Oak Dam, and it assumes that complete mixing with the river water has occurred.

For all dose calculations based on the ingestion of water, an individual was assumed to drink 2.2 liters per day for the full month covered by this report. The dose calculations are based on assumptions given in ICRP 26/30 and using EPA weighting factors.

A total of 100 mCi of ^{90}Sr was released from White Oak Lake during the period. The ^{3}H released over the dam amounted to 130 Ci, and the TRU assay was 0.4 mCi at this station. The mean weekly discharges of ^{90}Sr, ^{3}H, TRU, and gross beta activities are shown in Figs. 3, 4, 5, and 6.

White Oak Creek Monitoring

The strontium and gross beta activity measurements made at the sampling stations in the tributaries to White Oak Lake are listed in Table 1. A monthly comparison of the strontium released into White Oak Lake is shown in Fig. 7. The total flows for White Oak Creek and Melton Branch, as measured at Stations 3 and 4, were 83.3×10^4 and 6.4×10^4 m^3, respectively. Fig. 8 shows the stream flow (Station 3 plus Station 4) and radioactivity releases from Burial Grounds 4 and 5 for recent months.

The White Oak Creek and Melton Branch watersheds discharged a total of 103 mCi of ^{90}Sr into White Oak Lake.

The Process Waste Treatment Plant and the 190 pond system released 0.12 and 0.21 mCi of ^{90}Sr into White Oak Creek during the period. A total of 6.5 mCi of ^{90}Sr was released from the sanitary waste system.

The following tabulation lists the measured amounts of ^{90}Sr discharged into the White Oak Creek and Melton Branch watersheds and the discharge into White Oak Lake from the LLW pit disposal area. Contributions from Burial Grounds 1, 3, and 4 (White Oak Creek) and Burial Ground 5 (Melton Branch) are calculated as the differences between the sums of the listed branch streams and the measurements at Stations 3 and 4 (see Fig. 9).

	^{90}Sr Discharge (mCi)	
	By Measurement	By Difference
WHITE OAK CREEK		
Flume	10.0	
190 Ponds	0.21	
Process Waste Treatment Plant	0.12	
Sewage Treatment Plant	6.5	
	16.83	
7500 Sampling Station	86.1[a]	
Burial Grounds 1 and 3 and Floodplains		69.3
Station 3	93.5	
Burial Ground 4		7.4
MELTON BRANCH		
7900 Area (HFIR and TRU)	0.29	
7500 Area (NSPP and MSRE)	3.70	
	3.99	
Station 4	9.6	
Burial Ground 5		5.6
LIQUID LLW PIT DISPOSAL AREA		
East Weir	<0.01	
West Weir	0.73	
	0.73	
Total ^{90}Sr to White Oak Lake (Stations 3 and 4 plus Ground Disposal Area)	103.8	
Total ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		83.0
Percent ^{90}Sr from Burial Grounds, Ground Disposal Area, and Floodplains		80.0

[a]The flow at this station was adjusted on the basis of the other watershed measurements.

PROCESS WASTE

A total of 2.32×10^4 m^3 of process waste was treated by ion exchange. Of this amount, 2.24×10^4 m^3 were released to White Oak Creek; the remainder was used for process operations such as backwashing of filters.

The strontium activity released from the process waste system to White Oak Creek, compared to previous months, is shown in Fig. 10; the waste volume processed, compared to previous months, is shown in Fig. 11. The main contributors to the system are listed in Table 2. A total of 38 ion exchange column runs was made. The following is a summary of the column operation experienced:

	Maximum	Minimum	Average
Run time (h)	43.0	27.5	34.5
Bed Volume (1 BV = 1.3 m^3)	581	366	478

LIQUID LOW-LEVEL WASTE

Both evaporator systems operated normally during the month. The average boil-down rate was 0.24 m^3/h.

A summary of storage operations is given below:

	m^3
Volume Transferred to Service Tanks W-21 or W-22	339.3
Volume of LLW Feed Transferred to Evaporators	347.0
Volume of Evaporator Concentrate Transferred to W-23	41.4
Service Tank Inventory:	
W-21, Beginning of Month	64.4
W-21, End of Month	82.9
W-22, Beginning of Month	107.5
W-22, End of Month	81.3
W-23, Beginning of Month	94.5
W-23, End of Month	135.9

	m^3
South Tank Farm Inventory:	
Beginning of Month	261.0
End of Month	261.0
Melton Valley Waste Storage Facility Inventory:	
Total Volume at Beginning of Month	1095.0
Total Volume at End of Month	1095.0

NOTE: Liquid low-level waste is pumped from the area collection tanks into W-21 and W-22, which act as feed tanks for the evaporators. Evaporator concentrate is stored in W-23 prior to transfer to Melton Valley Storage Tanks.

A list of major contributors of low-level waste is given below. Figure 12 compares the volumes of LLW generated each month.

	m^3
Transuranium Processing Area	8.6
Building 3019	18.9
Building 3525	24.0
Radioisotopes Processing Area	54.3
ORR and BSR	16.6
High Flux Isotope Reactor	32.7
Fission Products Development Laboratory	28.9[a]
4500 Complex	1.7
Building 3544	100.9

GASEOUS WASTE

The ORNL stacks discharged approximately 9.9 mCi of gaseous ^{131}I this month. The total amount of active particulates released during the period was 224 μCi. Inert gases released from the 3039 and 7911 Stacks averaged less than 4.5% and 0.6% respectively, of the calculated maximum permissible operating levels for these stacks. Individual stack releases are listed in Table 3; the total releases are compared on a monthly basis in Fig. 13.

Table 1. Activity Released to White Oak Lake

Description	Monitoring Station Number[a]	Total Sr (Ci)	Gross Beta (Ci)[b]
Discharge from Bethel Valley Operations and Burial Ground 4	3	0.094	
Discharge from Melton Valley Operations and Burial Ground 5	4	0.010	
Discharge from Liquid LLW Pits and Trenches	East Weir	<0.001	
Discharge from Liquid LLW Pits and Burial Ground 6	West Weir	0.001	
Total Discharge from All Sources		0.105	
White Oak Dam to Clinch River (EOS Measurements)		0.100	0.320

[a]Refers to Fig. 9.

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

Table 2. Process-Waste Discharges

	^{90}Sr Bq/L	Ci	% of Total	10^3 m^3	% of Total
Radioisotopes Processing Area (MH 234)	1700	0.328	50.7	7.15	31.8
Radioisotopes Processing Area (MH 114 minus MH 112)	1000	0.012[a]	1.9	0.50	2.2
Reactor Operations (MH 112)	15	0.002	0.3	4.33[b]	19.2
Buildings 3503 and 3508 (MH 229)	3.9	<0.001	---	1.88	8.4
Buildings 3025 and 3026 (MH 149)	3.4	<0.001	---	1.30	5.8
Building 3019 (MH 25)	5000	0.017	2.6	0.13	0.6
Waste Evaporator, Bldg. 2531 (MH 243)	480	0.009	1.4	0.70	3.1
Building 3525 (MH 235)	2.0	<0.001	---	0.55	2.4
Building 2026 (MH 240)	34	<0.001	---	1.05	4.7
Tank Farm Drainage	2100	0.279	43.1	4.92	21.8

[a]The activity entered the process-waste system with inleakage of contaminated groundwater under Building 3047. The value given was obtained by difference in measurements in manholes 112 and 114.

[b]Flow estimated from previous data.

Table 3. Activity Released in Gaseous Wastes

Description	Activity[a] (mCi)	Filterable Particulate Activity[b] (μCi)	Inert Gases (Ci)
HRLAL - Stack No. 2026	<0.001	<1	
Central Radioactive Gas Disposal Facilities - Stack No. 3039	≤1.3	195	5078
Radiochemical-Processing Pilot Plant Stack No. 3020	<0.001	<1	
MSRE - Stack No. 7512	<0.001	<1	
HFIR and TRU - Stack No. 7911	≤8.6	28	4377
Activity in Gases Released at X-10 Site	≤9.9	224	

[a]Activity primarily ^{131}I except as noted. Does not include noble gases.

[b]These values were obtained by allowing the filter papers used in the samples to decay for a period of four days and then measuring the activity.

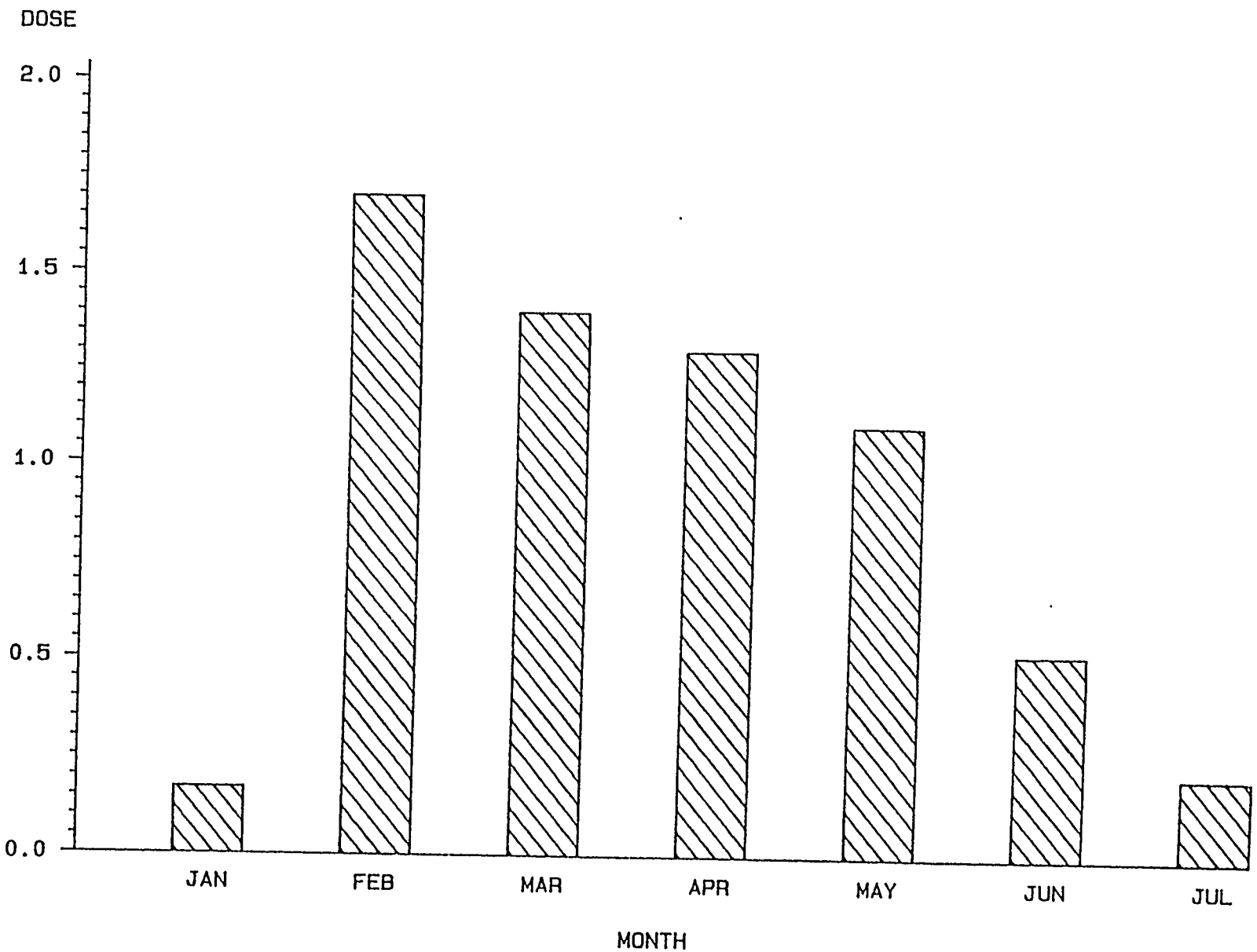


Fig. 1. Body Dose (mrem) Resulting From the Ingestion of Water at the Confluence of White Oak Creek and Clinch River

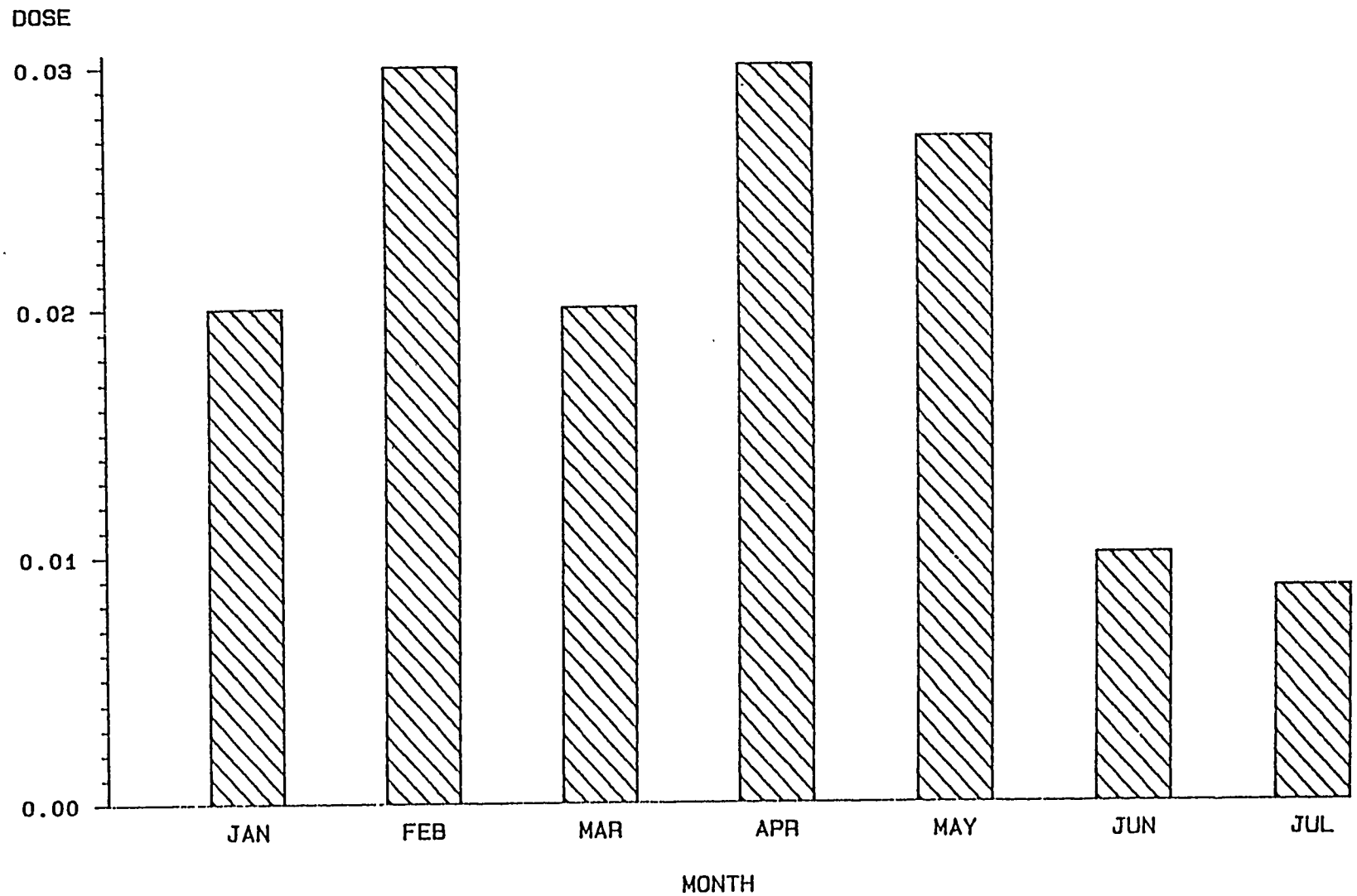


Fig. 2. Calculated Body Dose (mrem) Resulting From the Ingestion of Clinch River Water Below the Discharge of White Oak Dam

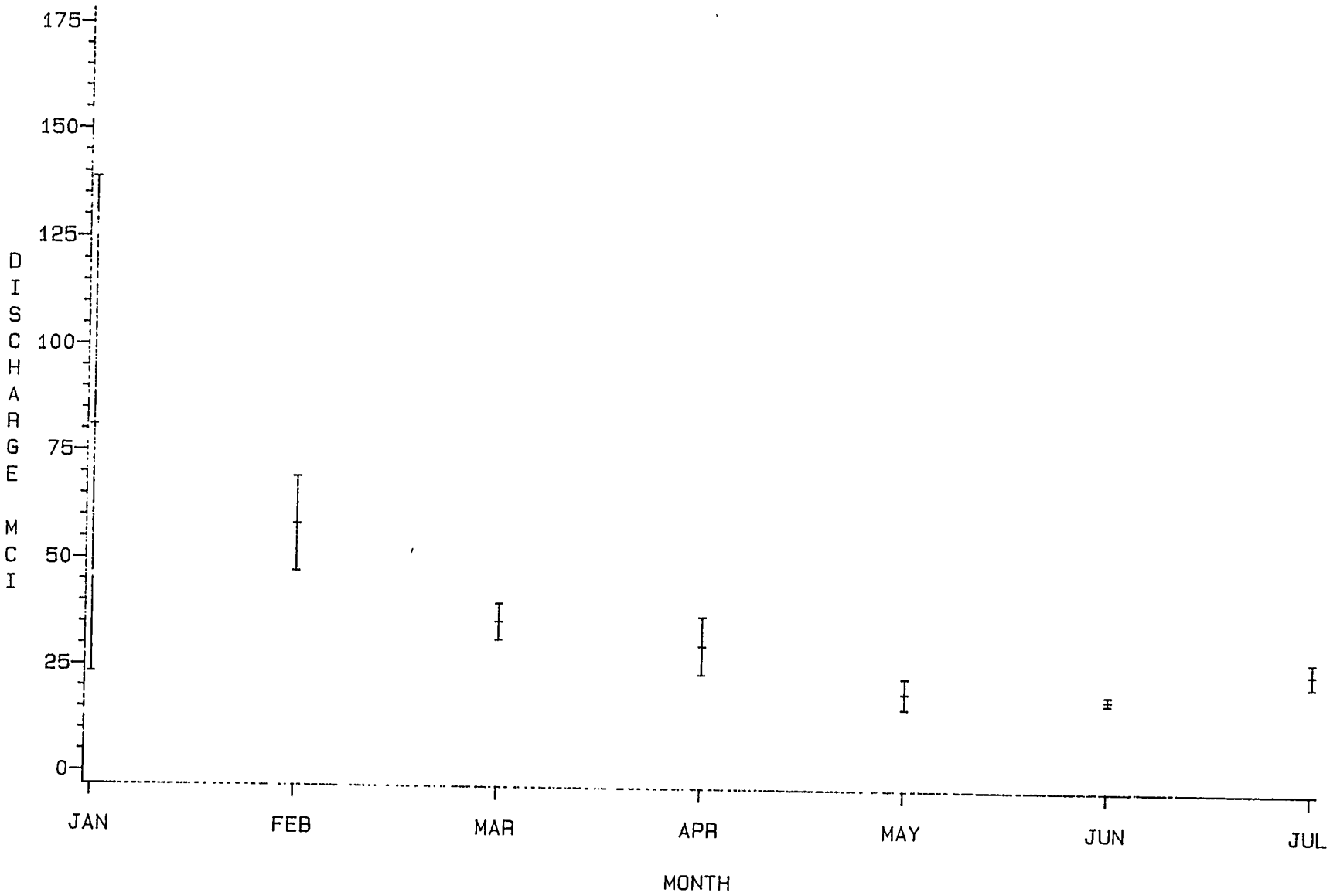


Fig. 3. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - SR-90

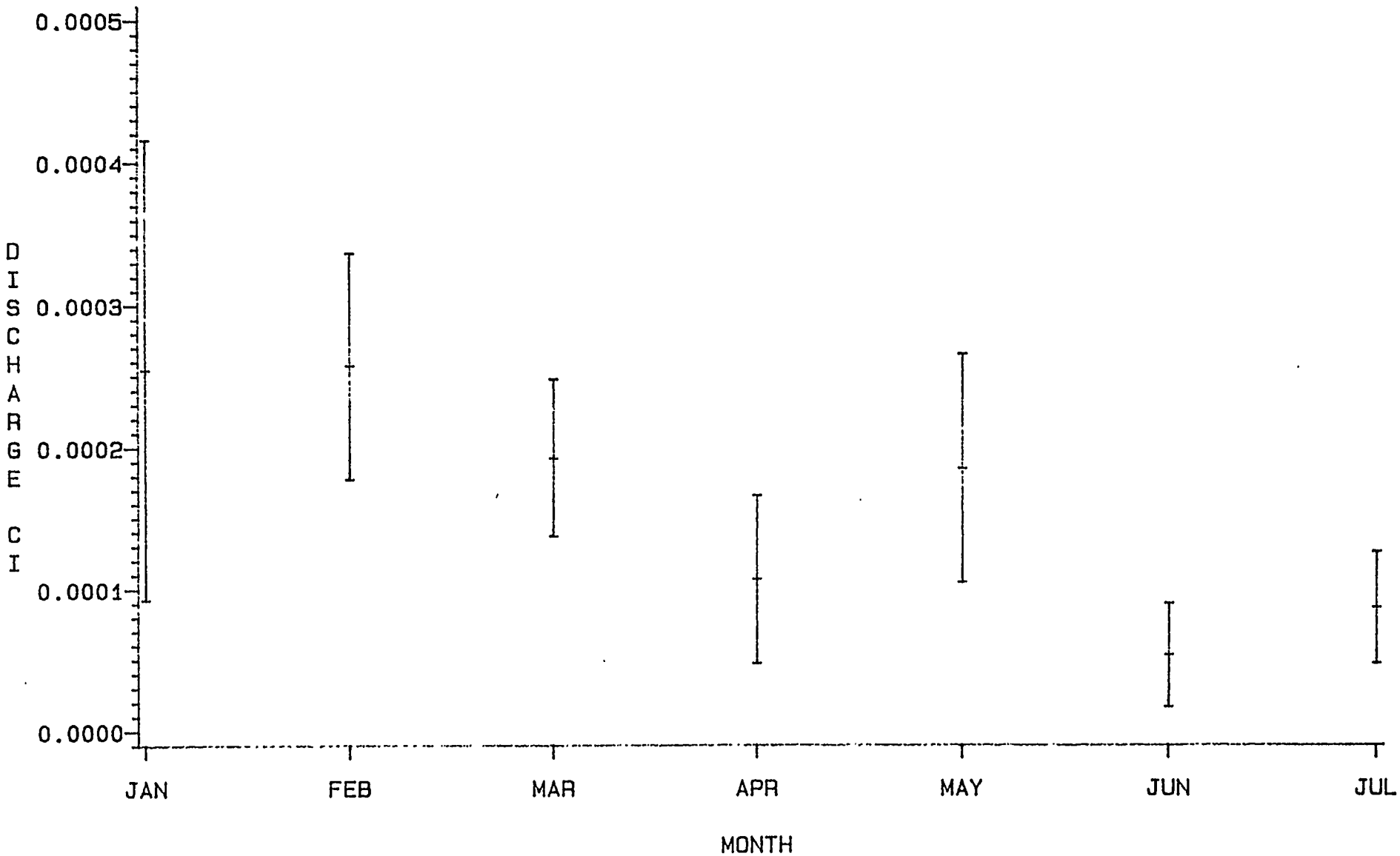


Fig. 4. Mean Weekly Discharges and 95% Confidence Intervals From White Oak Dam During 1985 - TRU

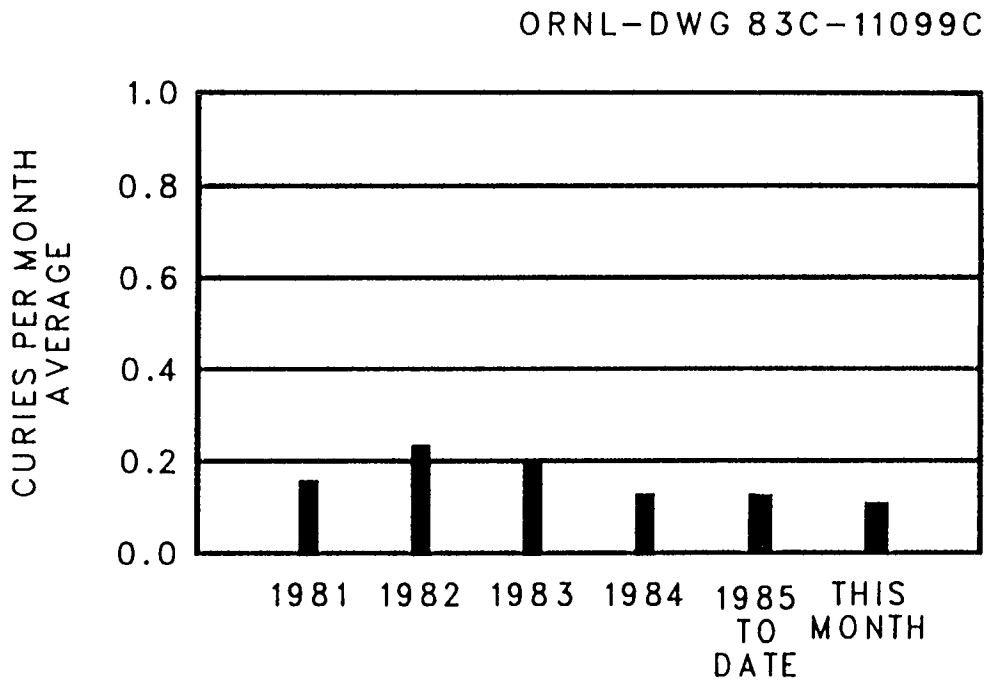


Fig. 7. ^{90}Sr Released to White Oak Lake as Measured at Sampling Stations 3 and 4 (See Fig. 9).

ORNL-DWG 85C-16121A

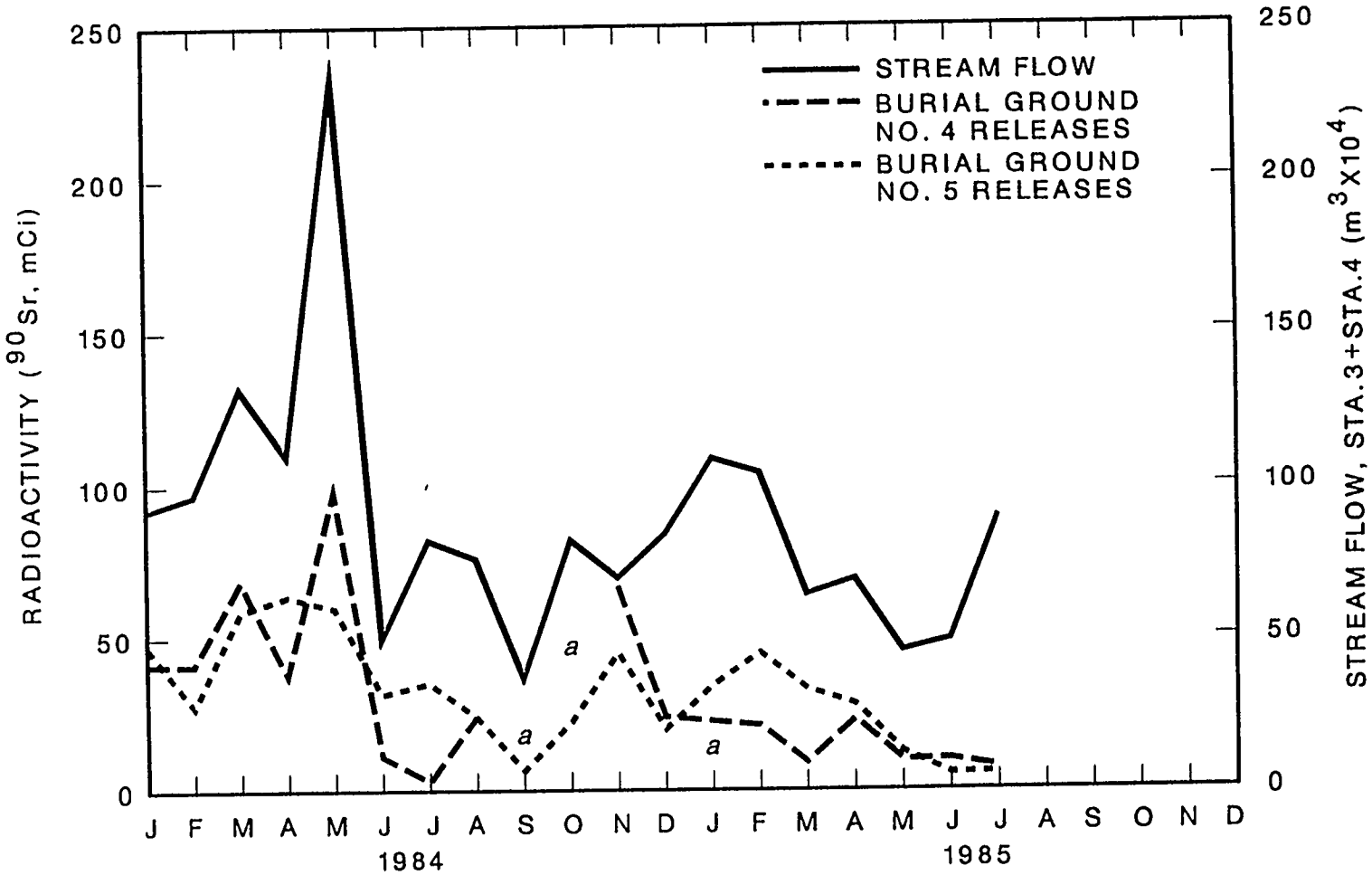


Fig. 8. Stream Flow and Radioactivity Released to White Oak Creek by Burial Grounds 4 and 5.

[a]Not reported because of uncertainties with flow data & possible cross-contamination of sample.

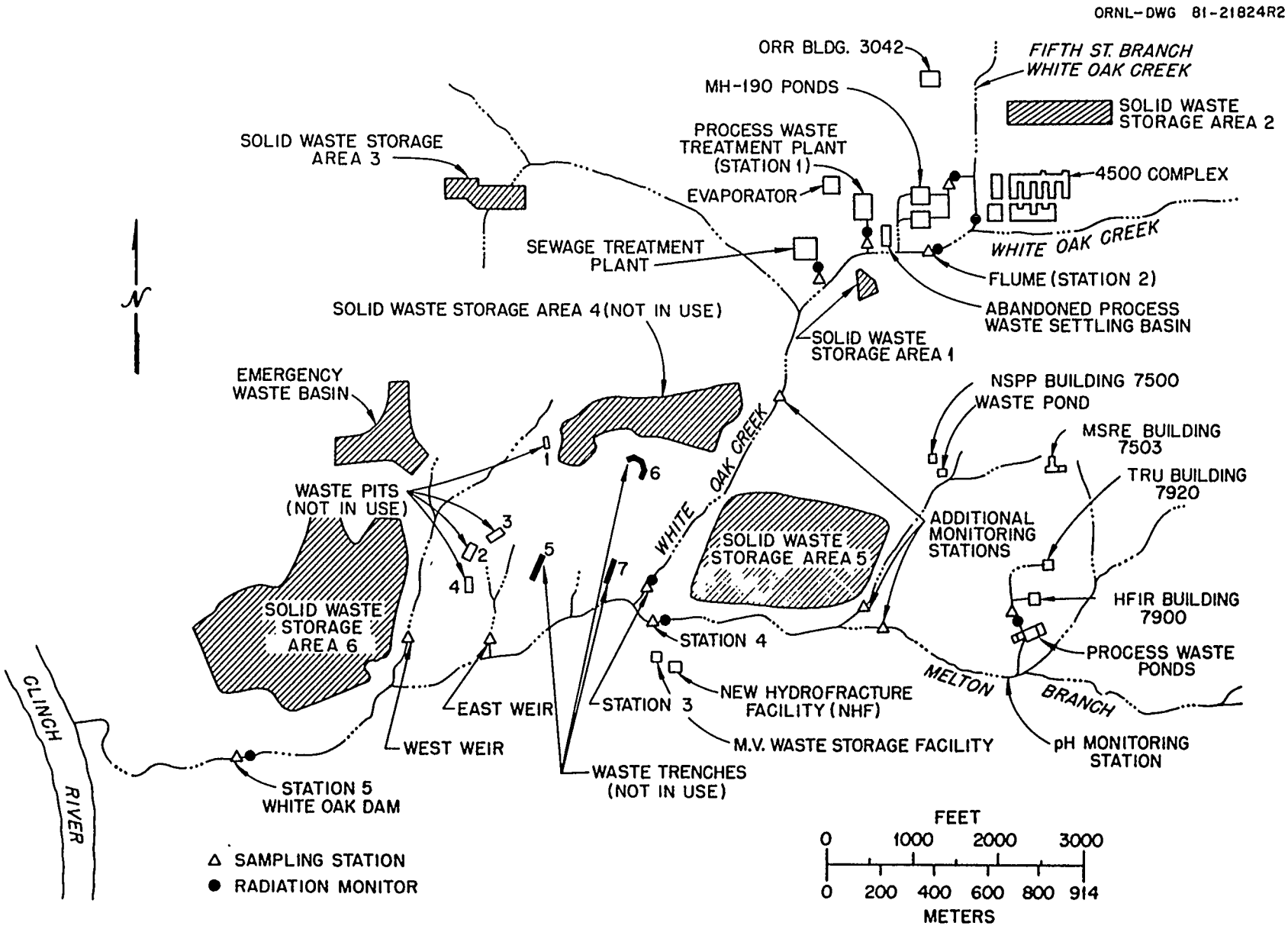


Fig 9. Location Plan for White Oak Creek Sampling Stations and Radiation Monitors.

ORNL-DWG 83C-11100C

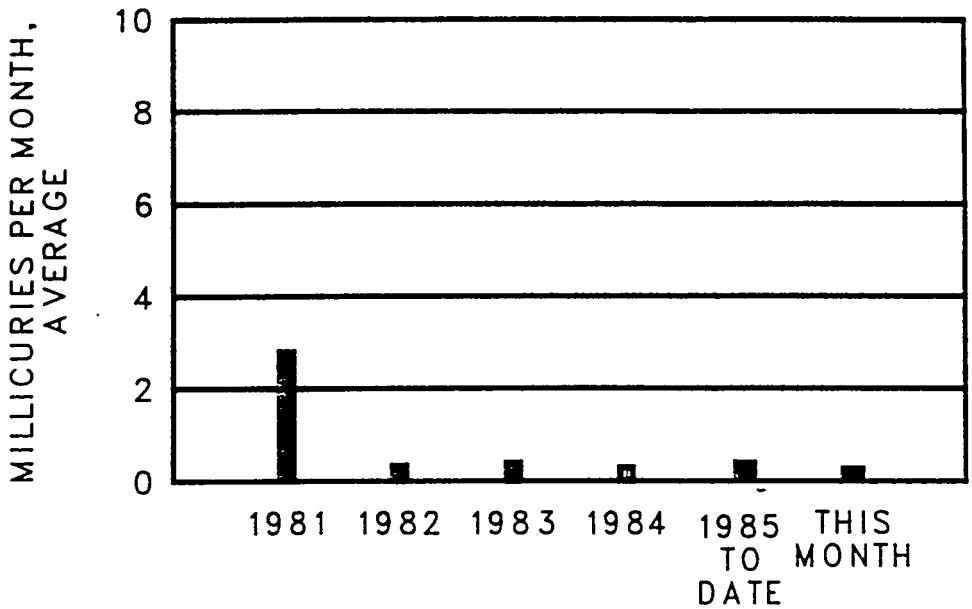


Fig. 10. ^{90}Sr Discharges in Waste From PWTP to White Oak Creek.

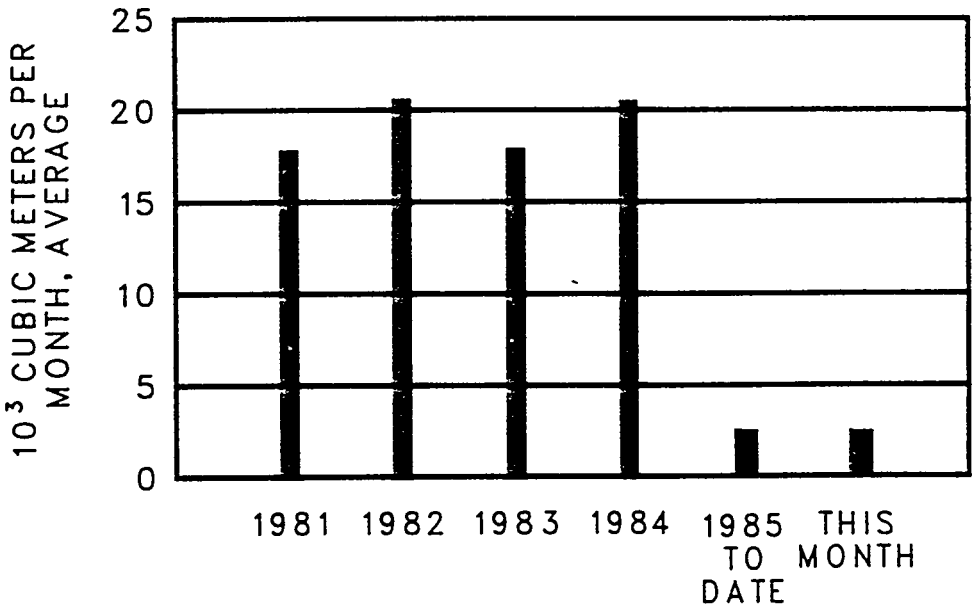


Fig. 11. Process Waste Volumes Treated In The PWTP.