1828

UCN-2383
(3 11-60)

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OAK RIDGE NATIONAL LABORATORY
Operated by
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation
UCC
Post Office Box X
Oak Ridge, Tennessee

COPY NO. 29

DATE: February 16, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for December 1961

TO: Distribution

FROM: J. F. Manneschmidt

Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity discharged to the environment from the Laboratory waste disposal system during the month of December is given in Table 1. Also shown in Table 1, are the released quantities of the three most significant radionuclides - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the Settling Basin - Waste Treatment Plant discharge; the seepage streams in the waste pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of the various sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

The process waste collection system and treatment plant functioned normally during the month. The entire volume of low level waste passed through the treatment plant and 0.9 c. of activity were discharged to White Oak Creek. Of this, 0.4 c. was Sr^{90}. Composite sampling at the manhole monitoring stations indicated that 66% of the discharged Sr^{90} originated in the Reactor and Isotopes Areas.

A summary of plant operations is given in Table 2; volumes are shown in Figure 2.

Intermediate Level Waste

A total of 409,000 gals. of intermediate level waste were transferred to the soil disposal areas during the month (Figure 2). This represents a volume increase of 70% over the total reported for November.

TABLE I

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

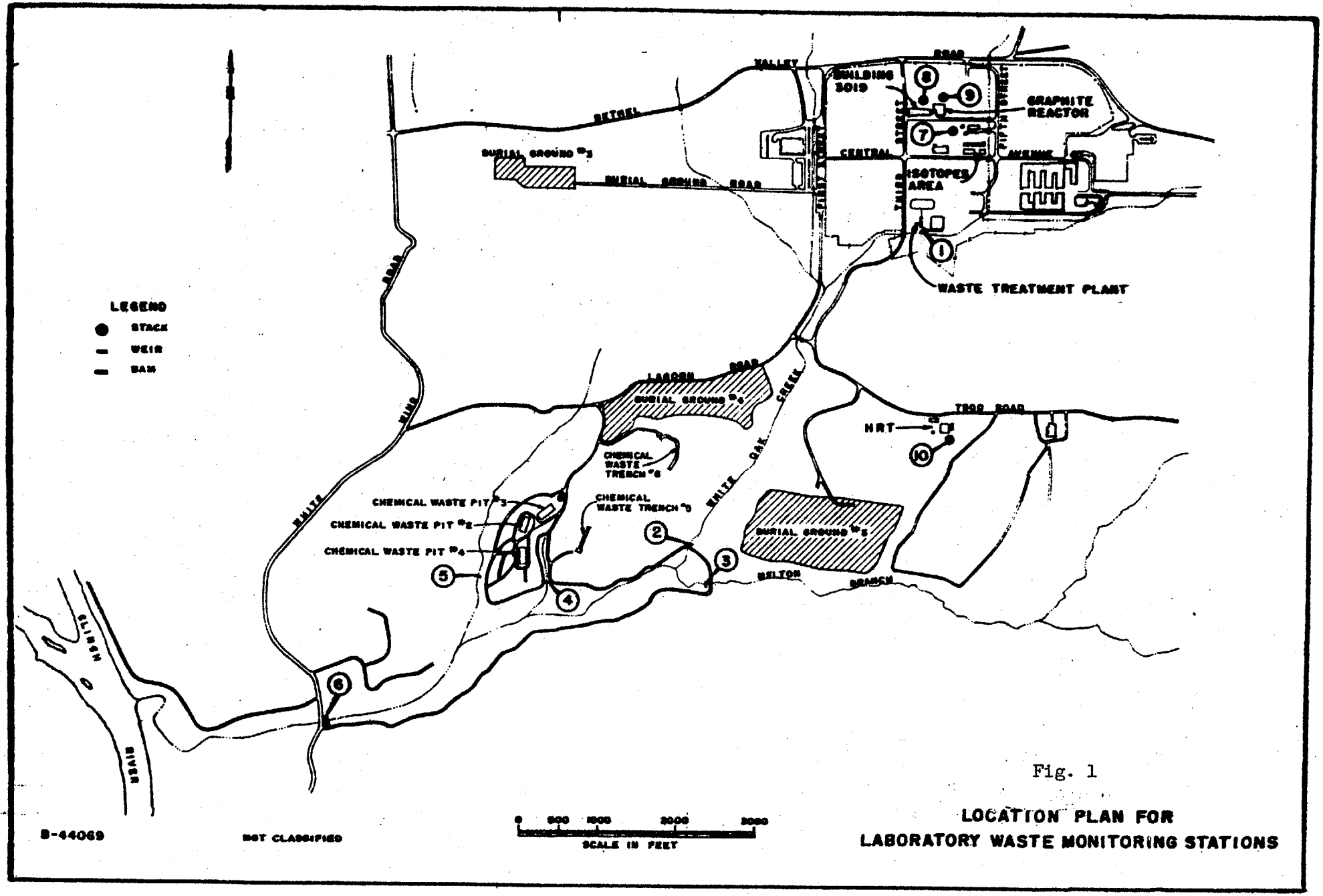
SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.4	0.08	0.1	0.9
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0	0	0	0
7500 Waste to Melton Branch	3	0.03	0.3	0.03	0.1
East Waste Pit Seepage to White Oak Creek	4	0.001	303.	0.07	305.
West Waste Pit Seepage to White Oak Creek	5	0.003	390.	0.1	393.
Total Liquid Waste Discharged to White Oak Lake		0.4	693.	0.3	699.
White Oak Dam to Clinch River	6	0.8	277.	1.5	295.
Gaseous Waste[3]					
3039 Stack	7				1.30
3020 Stack	8				Less than 0.01
3018 Stack	9				0.25
7500 Stack	10				- -
Total Gaseous Waste Discharged to Environment					1.54

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

TX-3142 (11-61)



B-44069

NOT CLASSIFIED

Fig. 1

LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS

TABLE II

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 9.9×10^6 gal.

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 11.3×10^6 gal.

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT (Curies)	PER CENT REMOVED	DISCHARGE TO WHITE OAK CREEK (Curies)
Sr^{89}	0.08	0.03	63	None Detected
Sr^{90}	1.4	0.5	68	0.4
$Ru^{103,106}$	0.1	0.07	42	0.08
Co^{60}	0.2	0.09	47	0.06
Cs^{137}	0.8	0.1	85	0.1
TRE	0.9	0.2	74	0.2
Total	3.5	1.0	71	0.8

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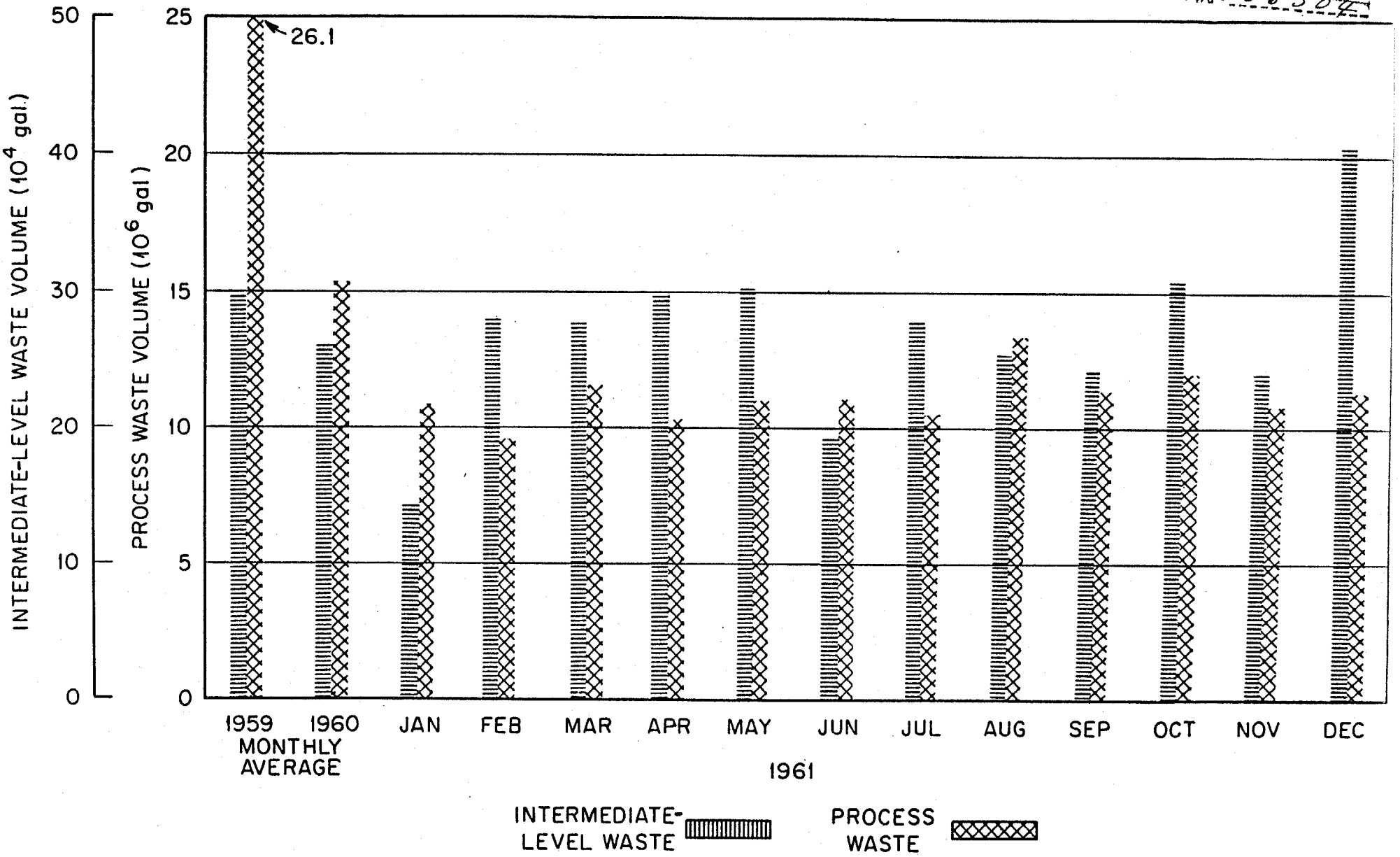

Fig. 2 Liquid Waste Volumes

Heavy rainfall and clean-up activities at the building 3505 storage canal contributed to this surge. Major users of the system were as follows:

1.	Radioisotopes Processing Area	56,300 gals
2.	Building 3019	34,900 gals
3.	Fission Products Development Laboratory	30,100 gals
4.	Reactor Operations	24,500 gals
5.	Segmenting Cells (Bldg. 3026)	20,300 gals
6.	Building 4501	15,000 gals

More complete data on the intermediate level waste activity transfers are given in Table 3.

Creek Monitoring

The total activity and Sr activity discharged to White Oak Creek are shown in Figure 3. Data are presented for each month of 1961; and, for comparison, the average monthly discharges for the last three quarters of 1960 are given. Total activity is arrived at by summation of the activities contributed by five major sources (Monitoring Stations No. 1 - 5) and appears in the Summary (Table 1) as "Total Liquid Waste Discharged to Environment".

There was a marked increase in activity released to White Oak Creek and the dam impoundment during the month of December. The total activity discharged (699 c.) was 75% greater than that reported in November while the Sr release (0.4 c.) increased by 100%. There was evidently much "scouring" of the lake and stream system during December by the heavy rainfall (10 in.) which exceeded the November precipitation by a factor of nearly three. Such a washout generally has a greater effect on the Ru inventory, since Sr usually originates at the Waste Treatment Plant and is not affected by weather.

The total activity discharge to White Oak Dam during 1961 was

TABLE III

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, 3, AND 4, CURIES			
	This Month	Year to Date	Year 1960	Total to Date	This Month	Year to Date	Year 1960	Total to Date
Sr^{89}	1	110			20	92		
Sr^{90}	20	1,116			390	1,565		
Ru^{106}	24	830			150	757		
Cs^{137}	326	13,121			1,905	12,889		
TRE	1	41			4	837		
Total	372	16,181	3,536	19,717	2,469	16,148	21,494	500,360

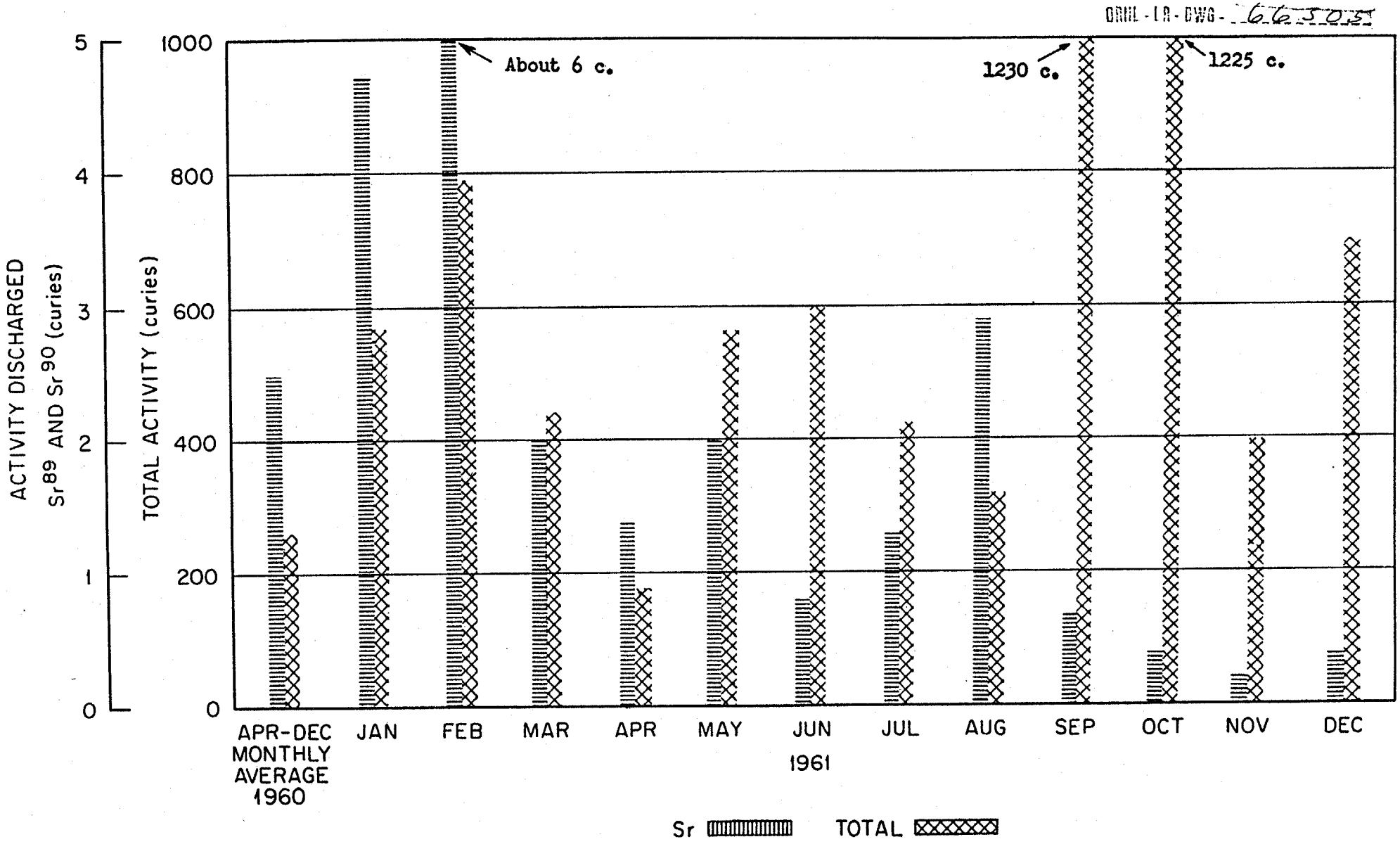

Fig. 3 Liquid Activity Discharge to White Oak Creek

7,407 c. with a monthly average of 617 c. The total Sr release for the year was 22.9 c. or an average of 1.9 c. per month. When compared to these averages, the December releases are not excessive.

Gaseous Waste Monitoring

Figure 4 shows the total monthly discharges of gamma activity from the principal Laboratory stacks 3039, 3018 and 3020. The December discharge (1.54 c.) was the lowest experienced during the entire year 1961. The fact that there were no iodine runs during the month partially explains the decrease; the rerouting of the Isotopes Area cell ventilation air through the recently completed filter system further contributed to the reduction in discharged activity. Except for the iodine isotopes, 131 and 133, emitted primarily from the 3039 Stack, there were no other nuclides of interest detected.

During 1961 an estimated 41.9 c. of gamma activity were released from the Laboratory process stacks. This is an average monthly discharge of 3.5 c. During the last quarter of the year the in-stack sampler was used at the 3039 Stack and accounts for the higher average discharge noted for those months (5.3 c/mo).

Off-Gas System

Off-gas service was normal during the month, with no shut-downs or failures of equipment.

Design of New Gaseous Waste Monitoring Equipment

Injection tests planned to evaluate the three probe sampling system at the 3039 Stack system have been completed. Materials injected included I^{131}, Fe powder (5μ), Al powder (12μ), nickel spheroids (12 to 600μ), styrene beads (12 to 1000μ), $KMnO_4$ (60 to 500μ), and sand. Results from the iodine activity injection were favorable. Assuming an in-stack sampler efficiency of 100%, the efficiency of the probes was found to be

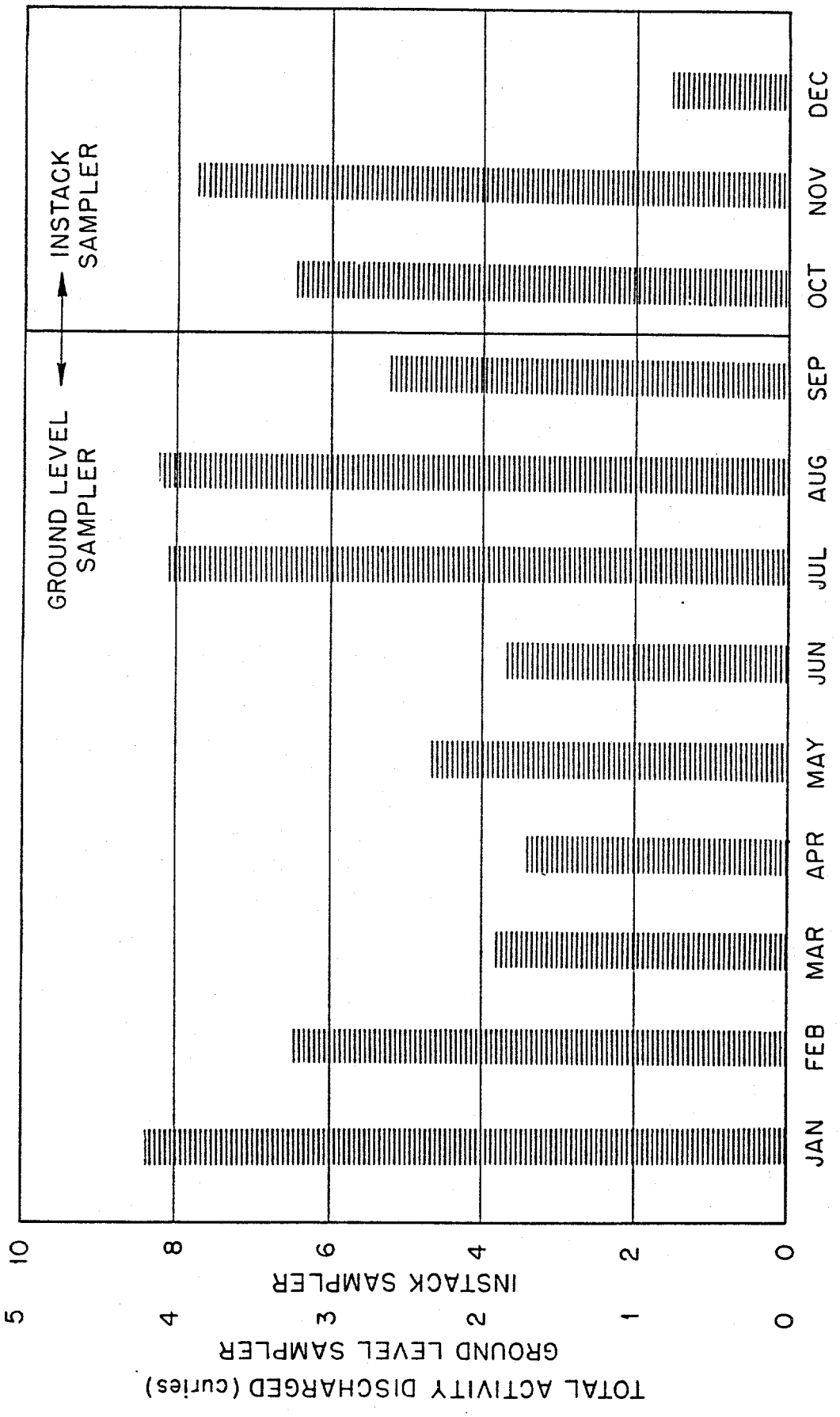

Fig. 4
Gaseous Activity Discharge to Environment

greater than 90%. Particulate injection results were not so encouraging. Optical examination of the filters after each test failed to reveal the presence of any of the injected material; however, the samples are now being analyzed by radioactivation techniques and any hidden or very minute particles will be accounted for. In attempting to establish the presence of large particles on the filter tapes, manipulation of the tape in transferring from the sample collection point to the analytical laboratory presents a serious handicap. Particles which may have been carried through the sampling probe and deposited on the tape probably never reach the point of examination.

Upon completion of the new service balcony for the 3039 Stack, with the necessary electrical services, etc., two probe assemblies will be installed in the stack. Each of these assemblies, which have been fabricated and tested, consists of two sample withdrawal probes and an instack sampler. The probes are of 1 in. tubing and extend 4 ft. into the stack (beyond the wall) and curve 4 ft. down on a 4 ft. radius. The distance of 4 ft. was chosen as a result of the Tracerlab studies. Tests made at that time indicated that sampling characteristics did not appreciably improve at penetrations greater than 3 - 4 ft. within the stack; however, a minimum length is desirable in order to reduce sampling losses within the probe. The instack samplers consist of filter-cartridge holders which slide into the stack through large guide tubes similar in curvature and spacing to the probes. The holders are connected by flexible PVC tubing and quick-disconnect fittings to withdrawal pumps and metering devices. In operation, a holder is disconnected from its pumping system, pulled outside the stack, and the filter and charcoal cartridge changed. The holder is then pushed back in, the tubing is reconnected, and the pump is started. By means of gates and seals the operator is

protected from contaminated air which might otherwise blow out during the sample removal operation.

Of the four available probes, two will be connected to particulate monitors (one beta-gamma and one alpha) and the third will be connected to a monitored charcoal trap for detecting adsorbable gaseous activity. The fourth probe may connect to a rare gas detector (as yet undesigned) or may remain a spare. Either one or both of the in-stack samplers may be used for routine inventory sampling; however, their proximity to the probes makes them ideally suited for calibration purposes.

After the monitors have been installed on the balcony, further injection tests are planned to evaluate the efficiency and sensitivity of the overall system.

Waste Monitoring Control Center

Progress is being made on the Waste Monitoring Control Center, building 3105. Instrument racks to take modular panel units have been installed and terminal boxes to handle 175 telemeter circuits have been installed and connected to a smaller box in the 3039 Stack area. The first 25 telemeter circuits have been provided and wiring is complete to the instrument racks. The circuits, as yet, are not complete at either end. Work will progress, dependent on available manpower; however, it is not anticipated that the Center will be in full operation before June of 1962.

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OAK RIDGE NATIONAL LABORATORY
Operated by
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation
UCC
Post Office Box X
Oak Ridge, Tennessee

COPY NO. 29

DATE: April 18, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for February 1962

TO: Distribution

FROM: J. F. Manneschmidt

NOTICE

Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity generated by the Laboratory and discharged to the environment during the month of February is given in Table 1. Also shown in Table 1, are the released quantities of the three most significant radionuclides - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the Settling Basin - Waste Treatment Plant discharge; the seven process waste monitoring stations and the Diversion Box; the seepage streams in the waste pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of all but the process waste sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

The treatment plant processed nearly 11,000,000 gals. of low level waste during the month of February, which is slightly below the volume treated during the preceding month. (See Figure 2). An abnormally high 5.1 curies of activity were released to White Oak Creek, which included 2.4 curies of Co^{60} from the Radioisotopes Processing Area. The Sr^{90} discharge (0.7 c.) was still quite low, however. The overall plant efficiency continued low, which may be attributed, in part, to a mechanical outage of the No. 2 coagulator. A summary of treatment plant operations is given in Table 2.

TABLE I

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.7	1.0	0.7	5.1
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0	0	0	0
7500 Waste to Melton Branch	3	0.01	0.002	0.005	0.07
East Waste Pit Seepage to White Oak Creek	4	0.0007	363.	0.05	365.
West Waste Pit Seepage to White Oak Creek	5	0.003	230.	0.09	233.
Total Liquid Waste Discharged to White Oak Lake		0.7	594.	0.8	603.
White Oak Dam to Clinch River	6	2.5	194.	1.7	217.
Gaseous Waste[3]					
3039 Stack	7				1.19
3020 Stack	8			Less Than	0.01
3018 Stack	9				0.22
7500 Stack	10				--
Total Gaseous Waste Discharged to Environment					1.42

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

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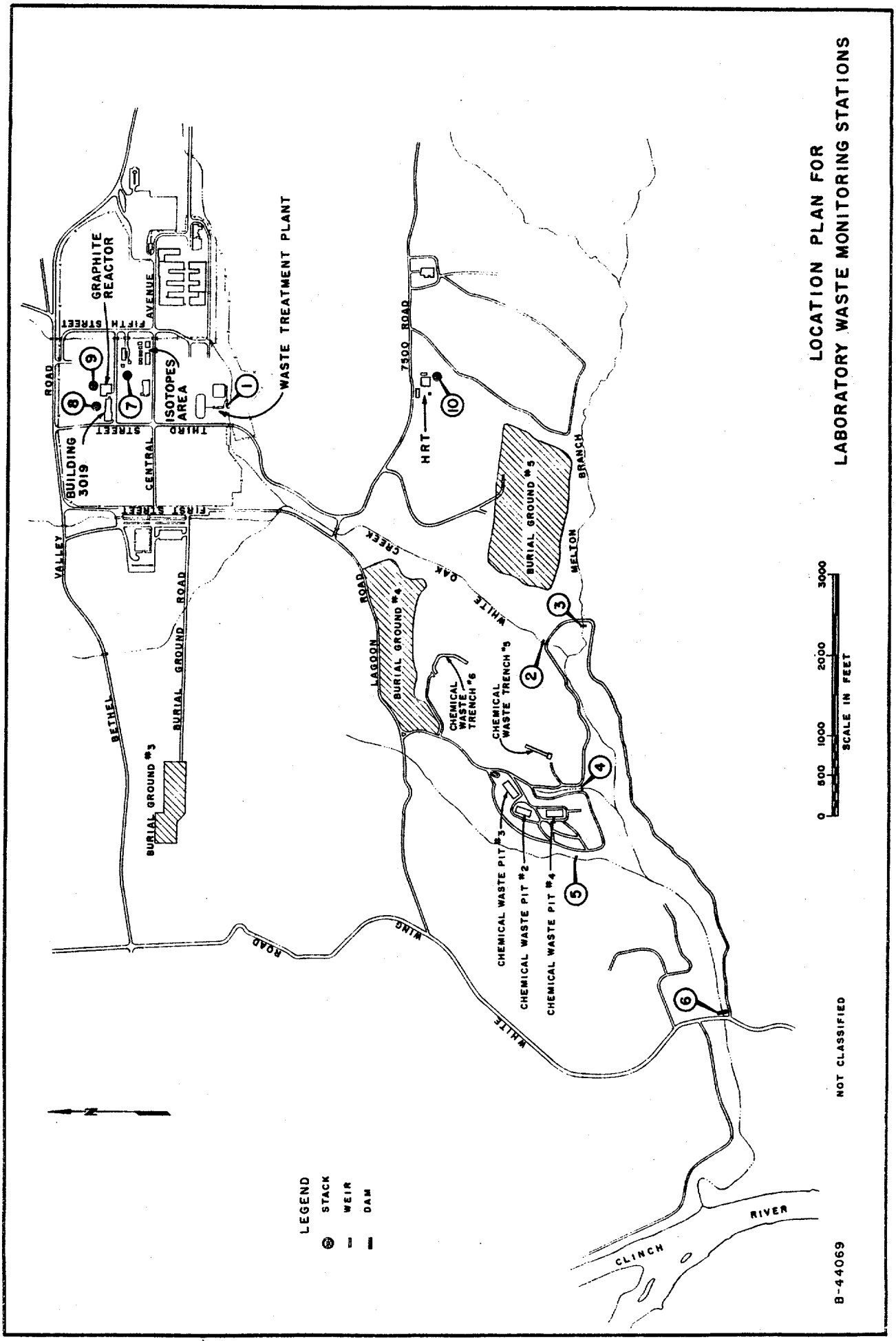
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
NOT CLASSIFIED
B-44069
LEGEND
STACK
WEIR
DAM
SCALE IN FEET
0 500 1000 2000 3000
GRAPHITE REACTOR
FIFTH STREET
AVENUE
ROAD
STREET
ISOTOPES AREA
THIRD
CENTRAL
BUILDING 3019
(FIRST STREET)
VALLEY
WASTE TREATMENT PLANT
7500 ROAD
HRT
BURIAL GROUND #5
MELTON
BRANCH
WHITE OAK CREEK
LAGOON ROAD
BURIAL GROUND #4
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE TRENCH #5
BETHEL
BURIAL GROUND ROAD
BURIAL GROUND #3
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
WHITE WING ROAD
CLINCH RIVER
N

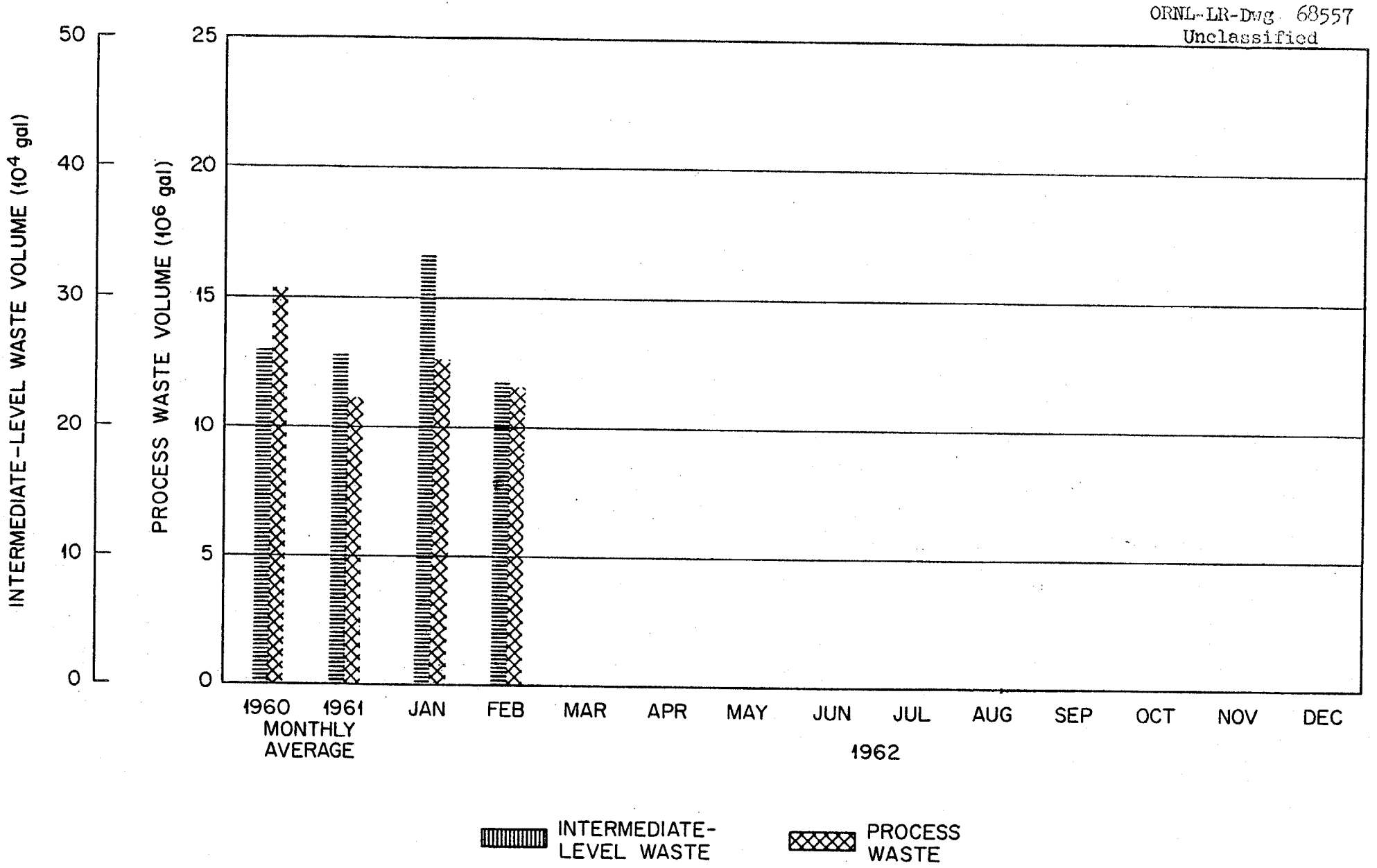

Fig. 2. Liquid Waste Volumes.

TABLE II

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH:

TOTAL WASTE VOLUME DISCHARGED
TO WHITE OAK CREEK THIS MONTH:

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT (Curies)	PER CENT REMOVED	DISCHARGE TO WHITE OAK CREEK (Curies)
Sr^{89}	None Detected	None Detected	- -	None Detected
Sr^{90}	2.7	0.8	70	0.7
$Ru^{103,106}$	0.7	0.7	0	1.0
Co^{60}	3.5	3.3	4	2.4
Cs^{137}	2.2	0.7	70	0.7
TRE	2.4	0.6	76	0.4
Total	11.5	6.1	47	5.2

The emergency catch basin and its auxiliaries were tested during the month and found to be in satisfactory condition.

Intermediate Level Waste

Heavy rainfall and a variety of plant wide clean-up activities continued to load this system to its capacity. Major contributors of intermediate level waste were as follows:

1.	Radioisotopes Processing Area	43,700 gals.
2.	Building 3019	31,100 gals.
3.	Fission Products Development Laboratory	24,900 gals.
4.	Reactor Operations	20,300 gals.
5.	4500 Area	17,300 gals.

Further data on transfers to the Pits and Trench are given in Table 3, volumes are shown in Figure 2.

Creek Monitoring

Total activity and Sr activity discharges to White Oak Creek are shown in Figure 3. Data are presented for each month of 1962 and, for comparison, the average monthly discharges for 1961 are given. Total activity is arrived at by a summation of the activities found at Monitoring Stations Nos. 1 - 5 and appears in the Summary (Table 1) as "Total Liquid Waste Discharged to Environment".

The total activity released during February (603 c.) was well below the January figure and about equalled the monthly average for 1961. There was a corresponding large decrease in rainfall in January as compared with December and it may be that the effect of this is being seen at this time. The only Sr of any consequence found in the creek system was that originating in the process waste, as noted previously, and the

TABLE III

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, AND 4, CURIES			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date
Sr^{89}	24	24	110	147	2	2	92	
Sr^{90}	118	141	1,116	1,650	23	91	1,565	
Ru^{106}	56	87	830	2,498	61	149	757	
Cs^{137}	1,227	1,712	13,121	16,112	1,272	2,551	12,889	
TRE	257	287	41	1,006	30	111	837	
Co^{60}	35	35	-	-	30	30	-	
Total	1,717	2,286	16,181	22,411	1,418	2,934	16,148	503,294

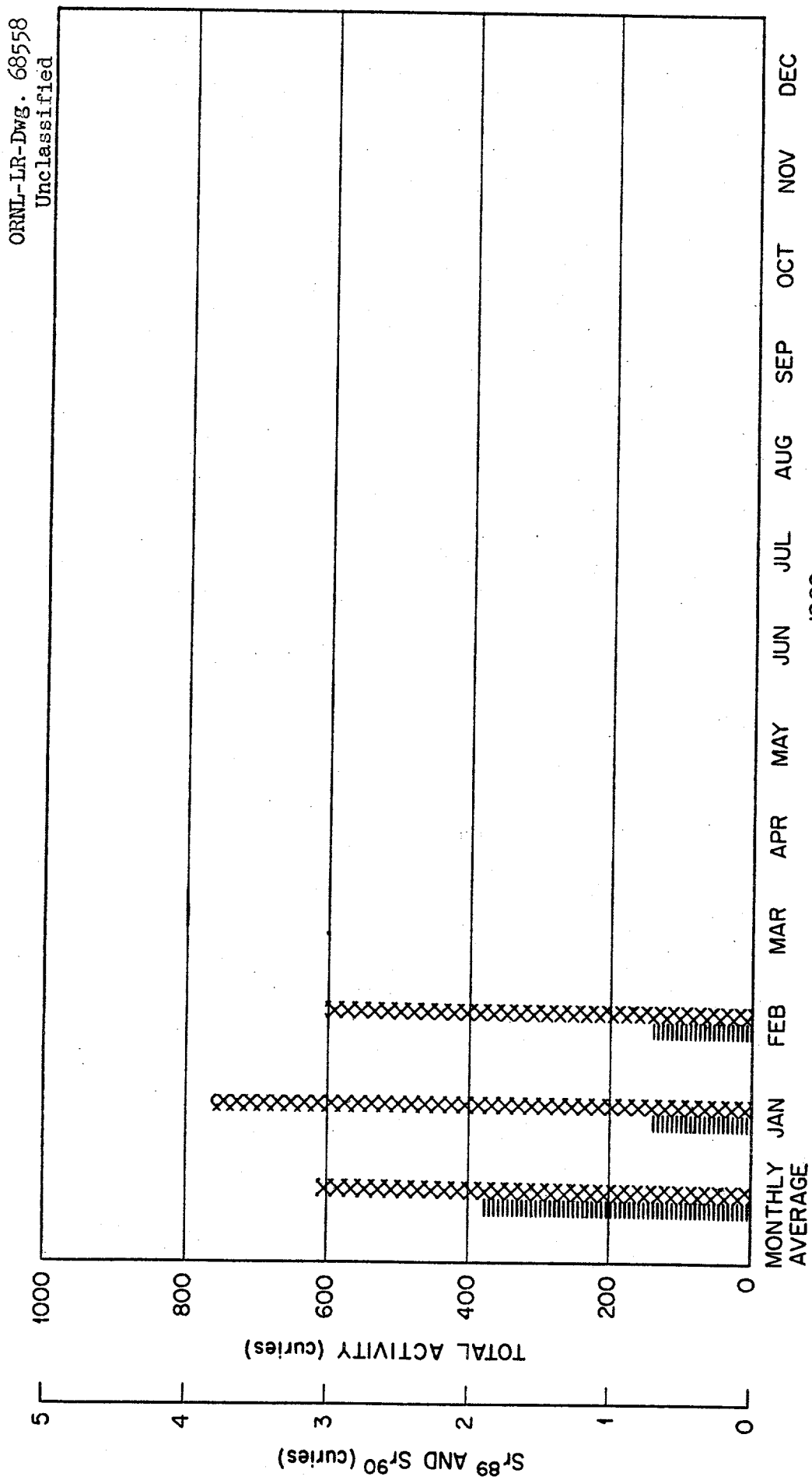

Fig. 3. Liquid Activity Discharge to White Oak Creek.

level there was satisfactorily low.

Gaseous Waste Monitoring

Figure 4 is a plot of gamma activity discharge data for the principal Laboratory stacks - 3039, 3018, and 3020. Shown on the plot are total activity, gaseous and particulate; and filterable activity, which includes particulate or any other type of activity which can be trapped or adsorbed by a filter.

The total activity release for February was only one half of that reported for January and is the lowest monthly release on record. As in the past, activity peaks were noted during periods of radioiodine processing; however, it is to the credit of the isotopes processing group that their continuing effort to reduce emissions is doing much toward eliminating the gaseous waste problem at the Laboratory.

Off-Gas System

The off-gas facility operated normally and without incident during the month. A complete change of the south filtration system was made and all units, including the roughing and metallic media, were replaced. This action was taken as a result of pressure drop increase across the units and there was no loss of service at any time.

Design of New Gaseous Waste Monitoring Equipment

During the month the new service balcony at the 3039 Stack was erected by the Rust Engineering Company. Design is under way on roofing and side drops for the balcony and also for the installation of a power hoist. As soon as electrical services - lights, power, and a

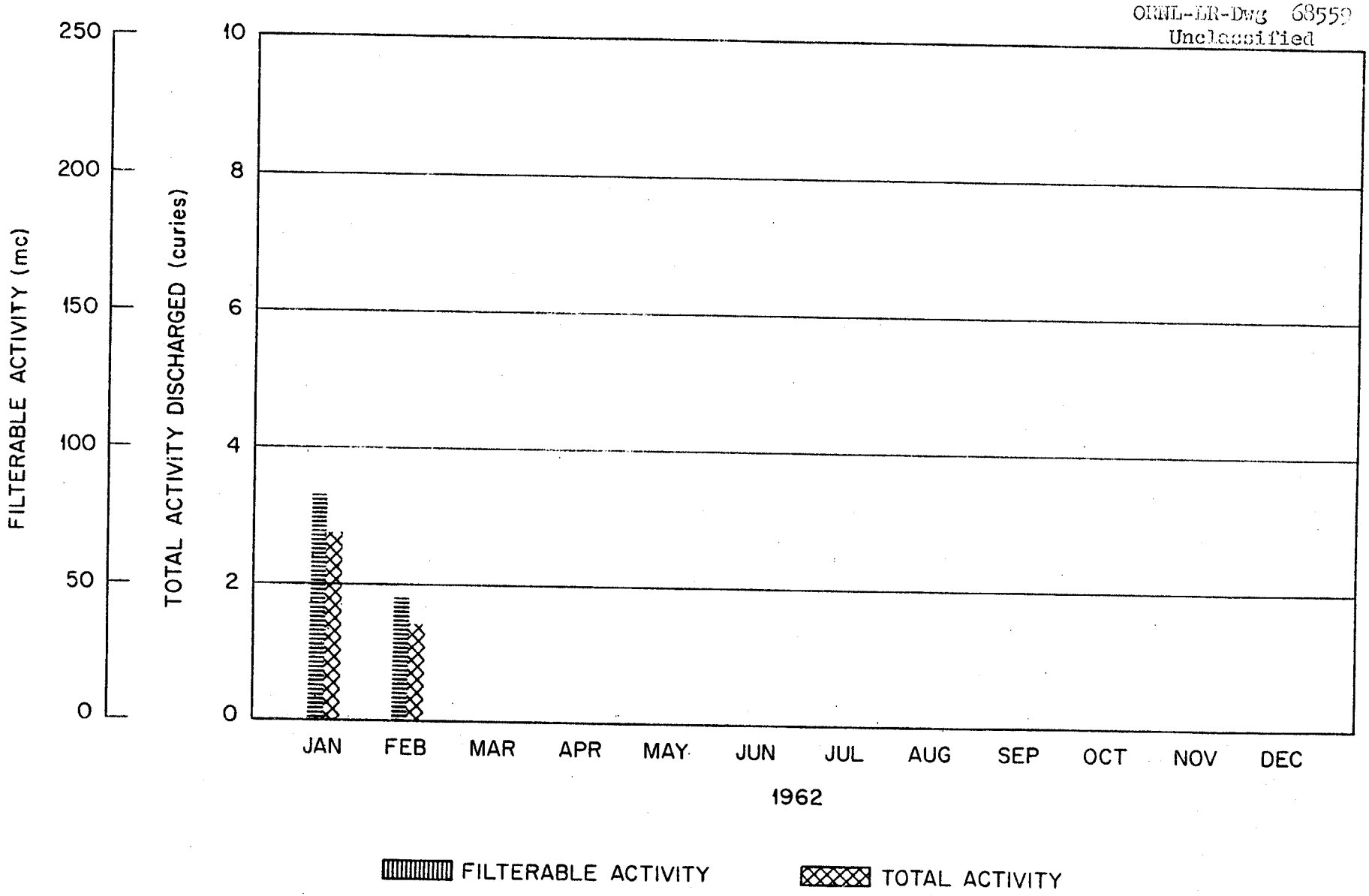

Fig. 4. Gaseous Activity Discharge to Environment.

communications circuit - are provided, the new probe assemblies can be installed in the stack and monitoring resumed at the 50 ft level.

Waste Monitoring Control Center

Good progress was made on the installation of equipment in Building 3105 during the period. Radiation and flow information from seven process waste manholes and the diversion box are now being recorded at that location. Control of the diversion box valve was also transferred to the Control Center. The annunciator system, to which all instruments are being connected, is now tied to signal devices located at the Pagemaster encoder and at Guard Headquarters. In the event of an alarm occurring when the building is unattended, responsible personnel may be notified by either the Pagemaster or by radio. Transfer of monitoring functions to the Control Center is approximately 25% complete at this date.

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Operated by
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation
UCC
Post Office Box X
Oak Ridge, Tennessee

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CENTRAL FILES NUMBER
62-6-10

COPY NO. 29

DATE: June 8, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for April 1962

TO: Distribution

FROM: J. F. Manneschmidt

NOTICE

Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity discharged to the environment from the Laboratory waste disposal system during the month of April is given in Table 1. Also shown in Table 1, are the released quantities of the three most significant radionuclides - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the Settling Basin - Waste Treatment Plant discharge; the seven process waste monitoring stations; the seepage streams in the waste pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of all but the process waste sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

The volume of process waste treated during the month of April was the same as that treated during the month of March, 12.4 million gallons. (See Fig. 2). The rate at which the process waste was generated during these two months was higher than that experienced in any month since December 1960 and the average monthly volume during the first four months of this year was 21% higher than that of last year. At the end of April, there appeared to be no reversal in the upward trend. During peak-load periods, the plant was operated at full capacity.

The increase in volume has had no significant effect, thus far, on the amount of activity released to the creek. Any appreciable volume

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

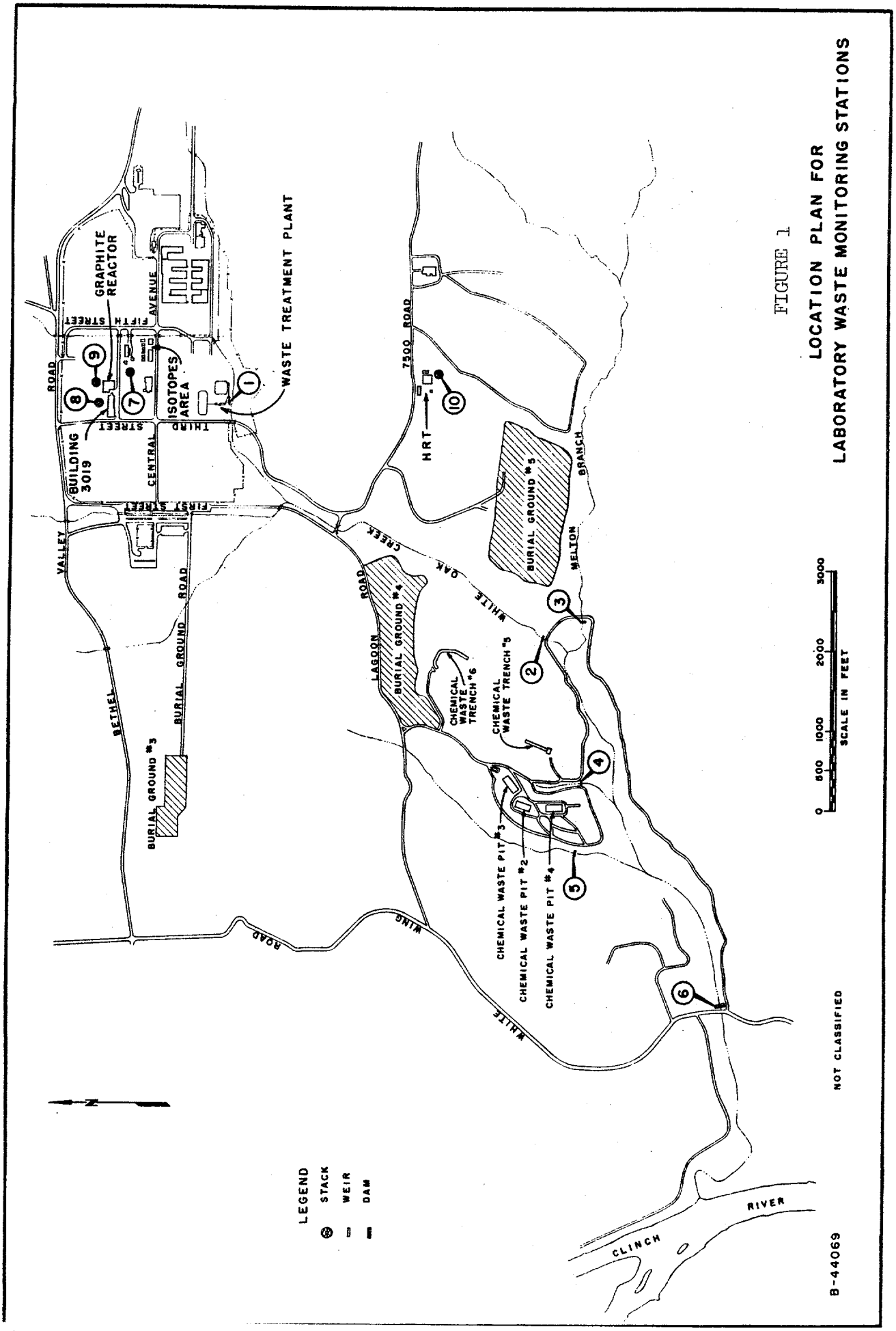
SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	1.4	0.03	0.4	2.0
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0	0	0	0
7500 Waste to Melton Branch	3	0.009	0.03	0.02	0.07
East Waste Pit Seepage to White Oak Creek	4	0.0004	246.	0.08	248.
West Waste Pit Seepage to White Oak Creek	5	0.007	100.	0.07	100.
Total Liquid Waste Discharged to White Oak Lake		1.4	346.	0.6	350.
White Oak Dam to Clinch River	6	1.5	139.	0.4	146.
Gaseous Waste[3]					
3039 Stack	7				4.45
3020 Stack	8			Less than	0.01
3018 Stack	9				0.15
7500 Stack	10				- -
Total Gaseous Waste Discharged to Environment					4.60

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

TX-3142 (11-61)


LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
FIGURE 1
WASTE TREATMENT PLANT
GRAPHITE REACTOR
BUILDING 3019
ISOTOPES AREA
FIFTH STREET
AVENUE
CENTRAL
THIRD
FIRST STREET
VALLEY ROAD
BETHEL VALLEY ROAD
BURIAL GROUND #3
BURIAL GROUND #4
BURIAL GROUND #5
LAGOON
WHITE OAK CREEK
MELTON BRANCH
7500 ROAD
HRT
CHEMICAL WASTE TRENCH #5
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
WHITE OAK ROAD
CLINCH RIVER
LEGEND
STACK
WEIR
DAM
0 800 1000 2000 3000
SCALE IN FEET
NOT CLASSIFIED
B-44069

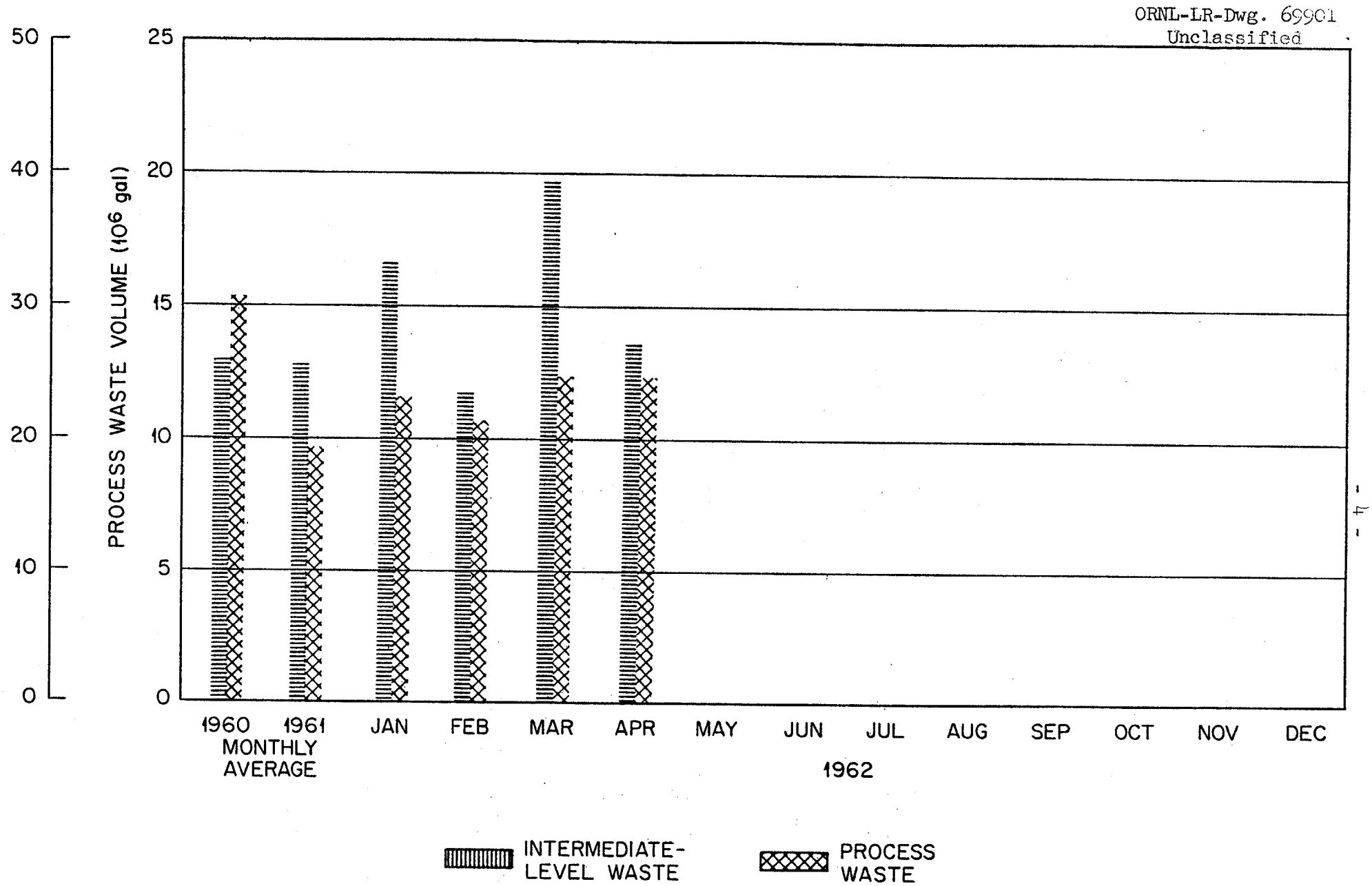


Fig. 2. Liquid Waste Volumes.

increase in the future however, will necessitate either curtailing some of the Laboratory's processing activities or releasing untreated waste into the creek.

The areas contributing the bulk of the volume to the process waste system during the month of April were as follows:

Area	Volume - 10^6 gal	Percent of Total
Reactors and Decontamination Building	3.6	29
4500 Complex	3.1	25
Building 3019	1.8	15
Isotope	1.1	9
Buildings 3503 and 3508	0.9	7
Buildings 3025 and 3026	0.7	6

The combined efficiency of the Process Waste Treatment Plant and settling basin continued to be low at 65%, and the efficiency of the plant itself was only 50%. (See Table 2). The reason for the large difference between the plant efficiency and the combined efficiency was an accumulation of sludge in the plant which prevented the settling of some fine precipitates. A clean-out of the plant has since improved the performance of the plant although it is not likely to have a significant effect on the overall removal of activity by the plant and the settling basin. The continuing poor removal of activity from the waste by the system appears to be caused by the Laboratory's increased use of detergents for decontamination purposes.

Estimates based on measurements of volume and gross beta activity in the process waste system tributaries indicate that approximately 50% of the activity discharged into the system came from the Reactors and the

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 12.4×10^6 gals.

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

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT (Curies)	PER CENT REMOVED	DISCHARGE TO WHITE OAK CREEK (Curies)
Sr^{89}	0.3	0.1	66	0.1
Sr^{90}	3.6	1.9	47	1.4
$Ru^{103,106}$	0.1	0.06	40	0.03
Co^{60}	0.2	0.07	65	0.06
Cs^{137}	1.4	0.6	57	0.4
TRE	0.1	0.04	69	0.04
Total	5.7	2.8	51	2.0

Equipment Decontamination Buildings and that approximately 40% came from the Isotope Area. A check for Sr^{90} however, showed that these areas did not account for the increase in the amount of Sr^{90} handled through the system and released to the creek as shown in Table I and Fig. 3. It is suspected that some large portion of Sr^{90} came from the Metal Recovery Building canal. Releases of activity from the canal were detected by the diversion box monitor but the exact amount could not be determined because the stream from the canal was not monitored. The installation of a monitor could not be justified in view of the temporary nature of the operation.

Intermediate Level Waste

275,000 gallons of intermediate level waste were transferred to the disposal area during the month of April. (See Liquid Waste Volumes, Fig. 2). This is a 30% reduction below the volume pumped in March and is attributed to a decrease in rainfall during the month and the completion of repair work on leaking waste lines in the Radioisotopes Processing Area. The volume of waste received into the system invariably goes up during wet weather because of leakage into lines, accumulation of water in pump pits, and for other reasons. Discharges from the Metal Recovery Building canal continue to be abnormally high and will probably remain so until the present temporary operations being carried on at that location are completed. In spite of the reduction in intermediate level waste volume experienced during this month, the volume was still above the monthly average for 1960 and 1961. Transfer data on ILW disposal is given in Table 3.

Major contributors to the system were as follows:

1.	Building 3505 canal	48,000 gals
2.	Building 3019	37,300 gals

TABLE 3

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, AND 4, CURIES			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date
Sr^{89}	0	26	110	149	0	8	92	
Sr^{90}	39	200	1,116	1,709	57	208	1,565	
Ru^{106}	15	116	830	2,529	19	208	757	
Cs^{137}	2,260	6,392	13,121	20,792	2,600	10,751	12,889	
[redacted] Co^{60}	8	--	--	--	10	--	--	
[redacted] TRE	44	363	41	1,082	62	245	837	
Total	2,366	7,140	16,181	27,265	2,748	11,460	16,148	511,820

3.	Reactor Operations	29,400 gals
4.	Fission Products Development Laboratory	24,800 gals
5.	Radioisotopes Processing Area	12,900 gals
6.	4500 Area	12,700 gals

The back filling of waste pit No. 3 was resumed this month and only 300 sq ft of the surface area remains uncovered. The preliminary design work for trench No. 7 was begun.

Creek Monitoring

Activity released to White Oak Creek during the period amounted to 350 curies. There was little change in total activity, most of which was Ru^{106} from the disposal area; however, the Sr^{90} release (1.4 curies) was 40% greater than in March. This release came from the Process Waste system and is discussed more fully in that section. There were no other significant discharges to the creek system. Only 146 curies of activity were detected at White Oak Dam as the dry weather enhanced ruthenium holdup in the lake bed. A plot of liquid activity discharges to White Oak Creek is given in Fig. 3.

Gaseous Waste

The total discharge of activity from the 3039, 3018 and 3020 stacks was the highest experienced in recent months and may have been the highest in more than one year (see Fig. 4). Analyses of samples, taken from the sampling equipment located at ground level, indicated that a total of 4.6 curies were released but past experience has shown that sampling at ground level may be low by a factor of three or four.

The filterable activity shown in Fig. 4 was mainly Cs^{137} that came through the cell ventilation duct from the FPDL. The release was not stopped by filters or detected at the FPDL duct presumably because the cesium oxide, which constituted the activity, was in gaseous form. After

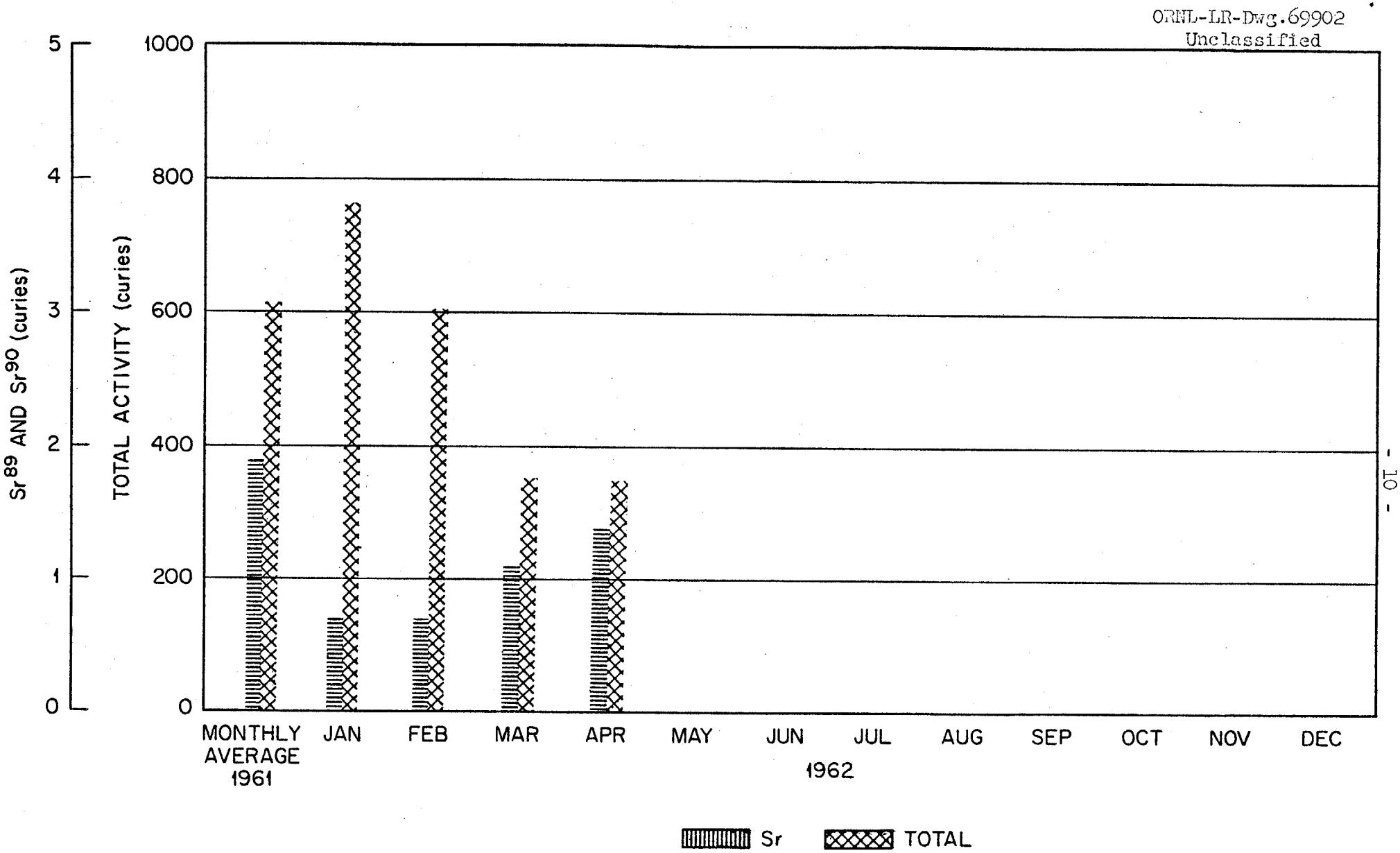


Fig. 3. Liquid Activity Discharge to White Oak Creek.

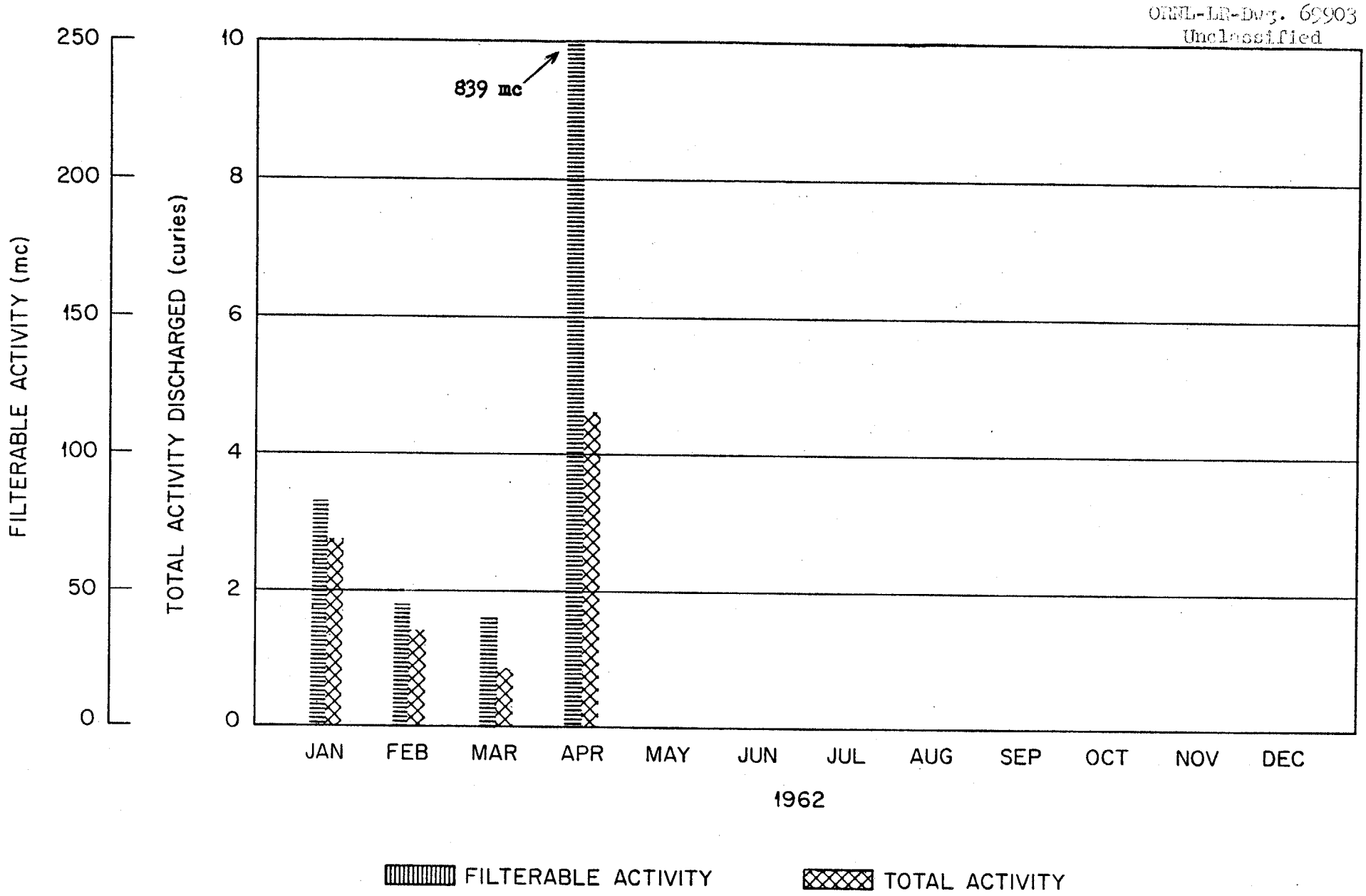


Fig. 4. Gaseous Activity Discharge to Environment.

passing through several hundred yards of dust-filled duct, the oxide condensed sufficiently to assume the characteristics of particulate matter. In that condition it was detected at the Stack Area. The balance of the activity was mainly I^{131} that came through the off-gas system from the Radioisotopes Processing area and was discharged at the 3039 Stack.

The installation of the stack monitoring equipment has been extremely slow because of a lack of craft assistance. Since January, when the scaffold supporting the sampling equipment at the 50 ft elevation was removed for the installation of the permanent platform, all sampling equipment has been operated at ground level. As a result, the reliability is now no better than it was one year ago and far worse than it was before the scaffold was removed. Neither of the two in-stack samplers nor the tape monitors for the cell ventilation ducts have yet been installed.

Off-Gas System

There was one power failure in this area during the month; the stand-by equipment operated satisfactorily at that time.

Waste Monitoring Control Center

The radiation monitors at the Sewage Treatment Plant and on White Oak Creek now record at the Control Center. A new radiation detection monitor was installed at Pumping Station No. 1 which is the point of accumulation of run-off from the gutters around the waste storage tanks in the north and south tank farms. This monitor also has its read-out at the Control Center. The telephone company began installation of telemeter lines for the ILW tank level recording system. When the line work is complete the two recorders, now located at the WasteTreatment Plant, will be moved to the Control Center.

1828

OAK RIDGE NATIONAL LABORATORY
Operated by
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation
Post Office Box X
Oak Ridge, Tennessee

ORNL Dc-1
CENTRAL FILES NUMBER
62-8-7

DATE: August 3, 1962

COPY NO. 33

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for June 1962

TO: Distribution

FROM: J. F. Manneschmidt

NOTICE

Inventory of Total Activity Discharged

A summary of the total radioactivity released to the environment by the Laboratory waste disposal system during the month of June 1962 is given in Table 1. Released amounts of the three nuclides of major importance -- Sr^{90}, Ru^{106}, and Cs^{137} -- are also given. Samples are routinely taken at the process waste manholes and diversion box; the Waste Treatment Plant - Settling Basin discharge; White Oak Creek and Melton Branch; the pit seepage streams in the soil disposal area; and at the principal process stacks. The locations of all but the manhole and diversion box monitoring stations are shown in Figure 1. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek", is arrived at by difference between the activity known to be discharged from the process waste system and that measured in White Oak Creek immediately north of its confluence with Melton Branch. Data on the discharge from White Oak Dam to the Clinch River is gotten from the Health Physics Division.

Process Waste Treatment and Discharge to White Oak Creek

The waste treatment plant processed a total of 13.4 million gallons of waste during the month. This is the highest monthly throughput experienced in 1962 and is approximately 50% higher than the monthly average for 1961. As in recent months, it was necessary to operate the plant at maximum capacity during peak load periods. The discharge of untreated waste to the creek was avoided; however, if the volume of process waste generated by the Laboratory continues to increase, the use of the bypass around the treatment plant must be anticipated (See Liquid Waste Volumes, Figure 2).

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.2	<0.1	0.05	0.25
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0.1	-	-	0.1
7500 Waste to Melton Branch	3	0.03	<0.04	<0.04	0.03
East Waste Pit Seepage to White Oak Creek	4	0.0004	198.	<0.05	201.
West Waste Pit Seepage to White Oak Creek	5	0.001	171.	<0.01	172.
Total Liquid Waste Discharged to White Oak Lake		0.33	369.	0.05	373.
White Oak Dam to Clinch River	6	1.3	96.	1.1	101.
Gaseous Waste[3]					
3039 Stack	7				9.76
3020 Stack	8				<0.01
3018 Stack	9				1.15
7500 Stack	10				-
Total Gaseous Waste Discharged to Environment					10.91

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

TX-3142 (11-61)

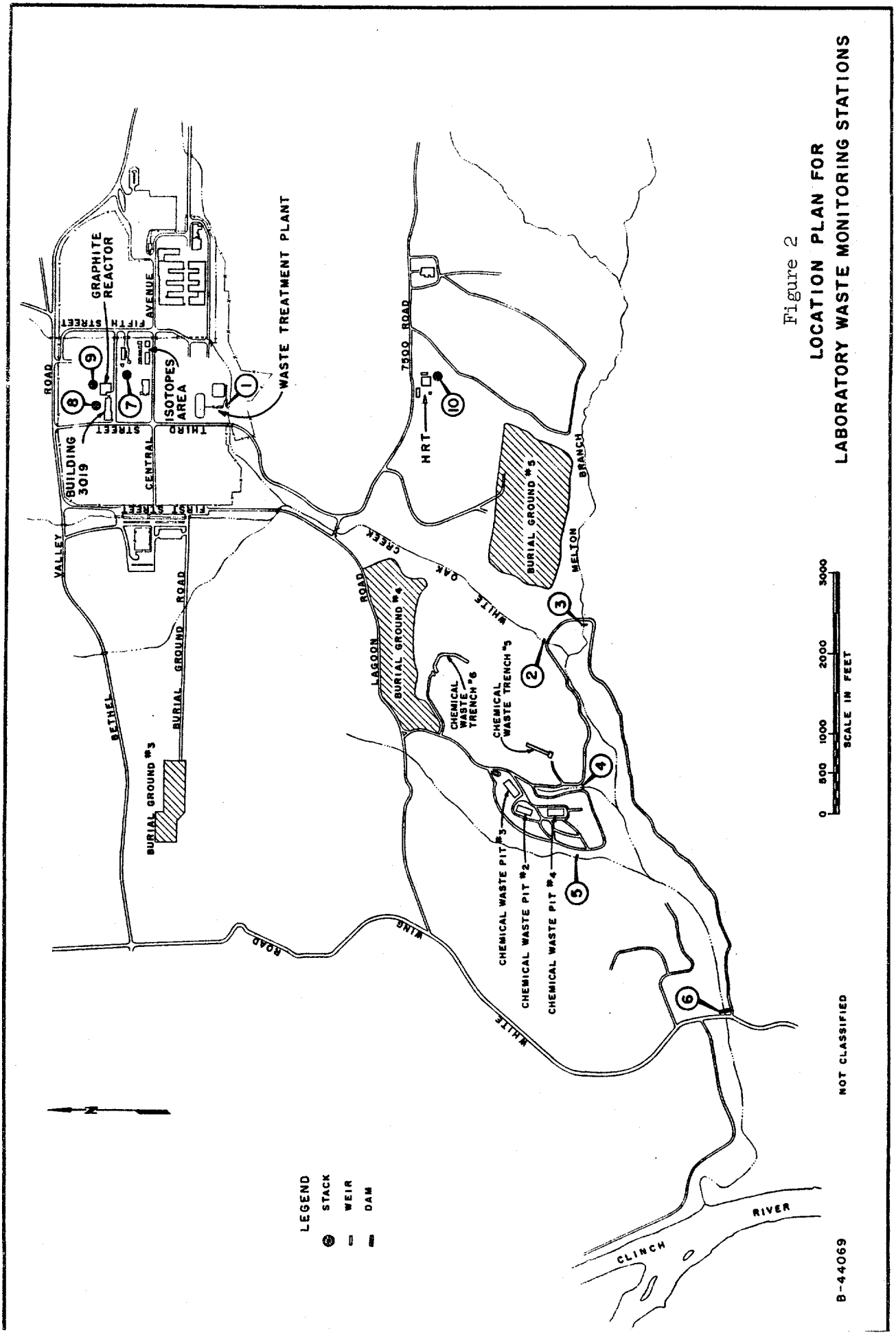


Figure 2
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS

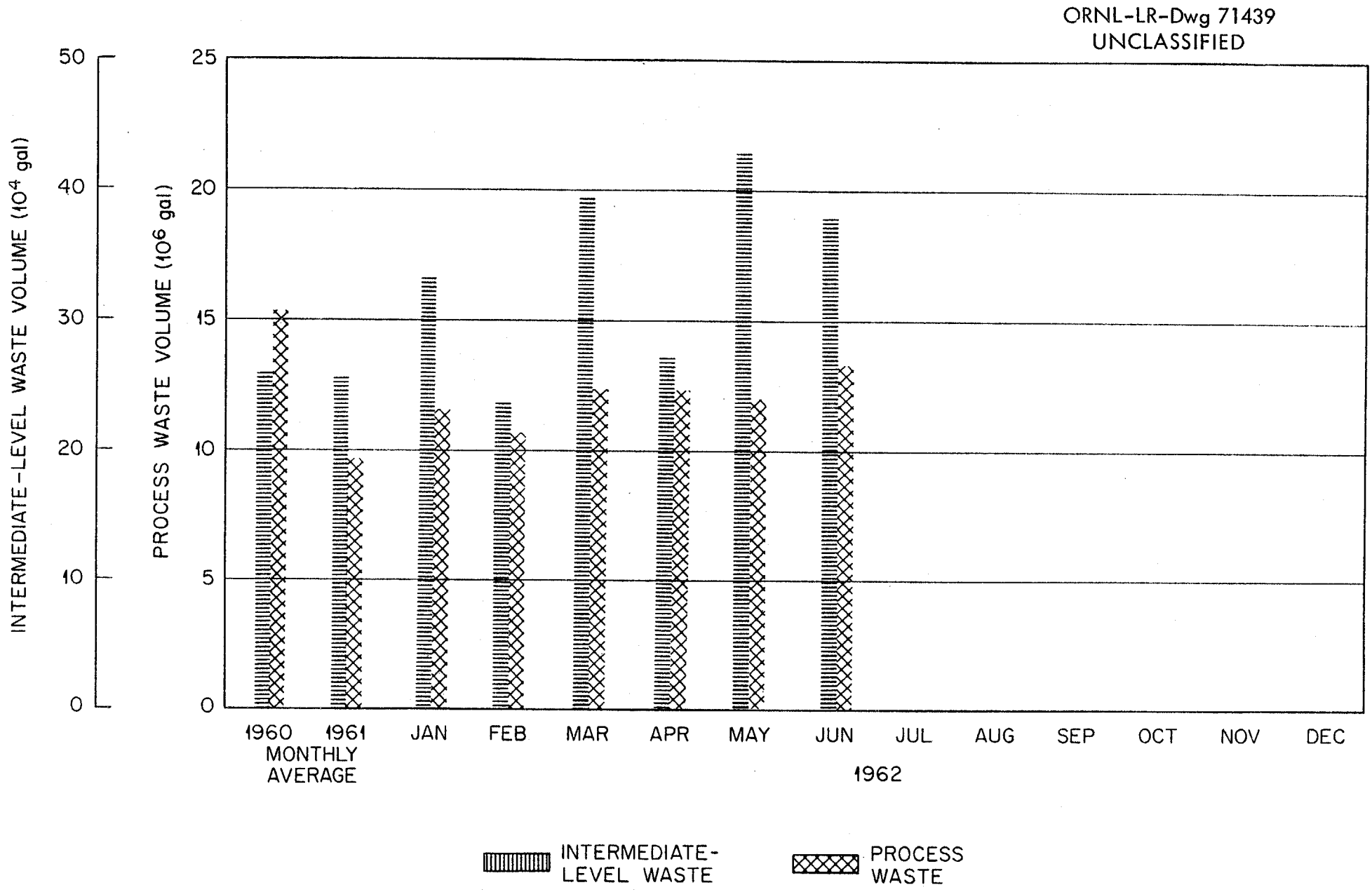


Fig. 2. Liquid Waste Volumes.

While the volume of waste was critically high, the discharge of Sr^{90} from the process waste system dropped to an all time low of 0.2 curies (See Figure 3). This may be attributed, in part, to an increase in the removal efficiencies of the treatment plant and settling basin operations (See Table 2). The Sr^{90} activity and volume of waste discharged into the process waste system from the various areas is shown in Table 3.

Intermediate Level Waste

Transfers of intermediate level waste amounting to 380,000 gallons were made to the disposal area during the month (See Figure 2). While this is below the figure reported for May it is still 50% greater than the monthly averages for 1960 and 1961. Major contributors to this system were, as follows:

1.	Fission Products Development Laboratory	56,700 gallons
2.	Reactor Operations	56,200 gallons
3.	Building 3505 Canal	46,800 gallons
4.	Building 3019	41,000 gallons
5.	4500 Area	22,700 gallons
6.	Radioisotopes Processing Area	19,900 gallons

Additional transfer data is given in Table 4.

Creek Monitoring

The total activity discharge to the creek and stream system from all sources was 373 curies for the month of June (See Figure 3). This is 40% below the quantity reported for May and seems to indicate a downward trend in total discharge since the first of the year. Fifty percent more Sr^{90} was found at the White Oak Creek monitoring station

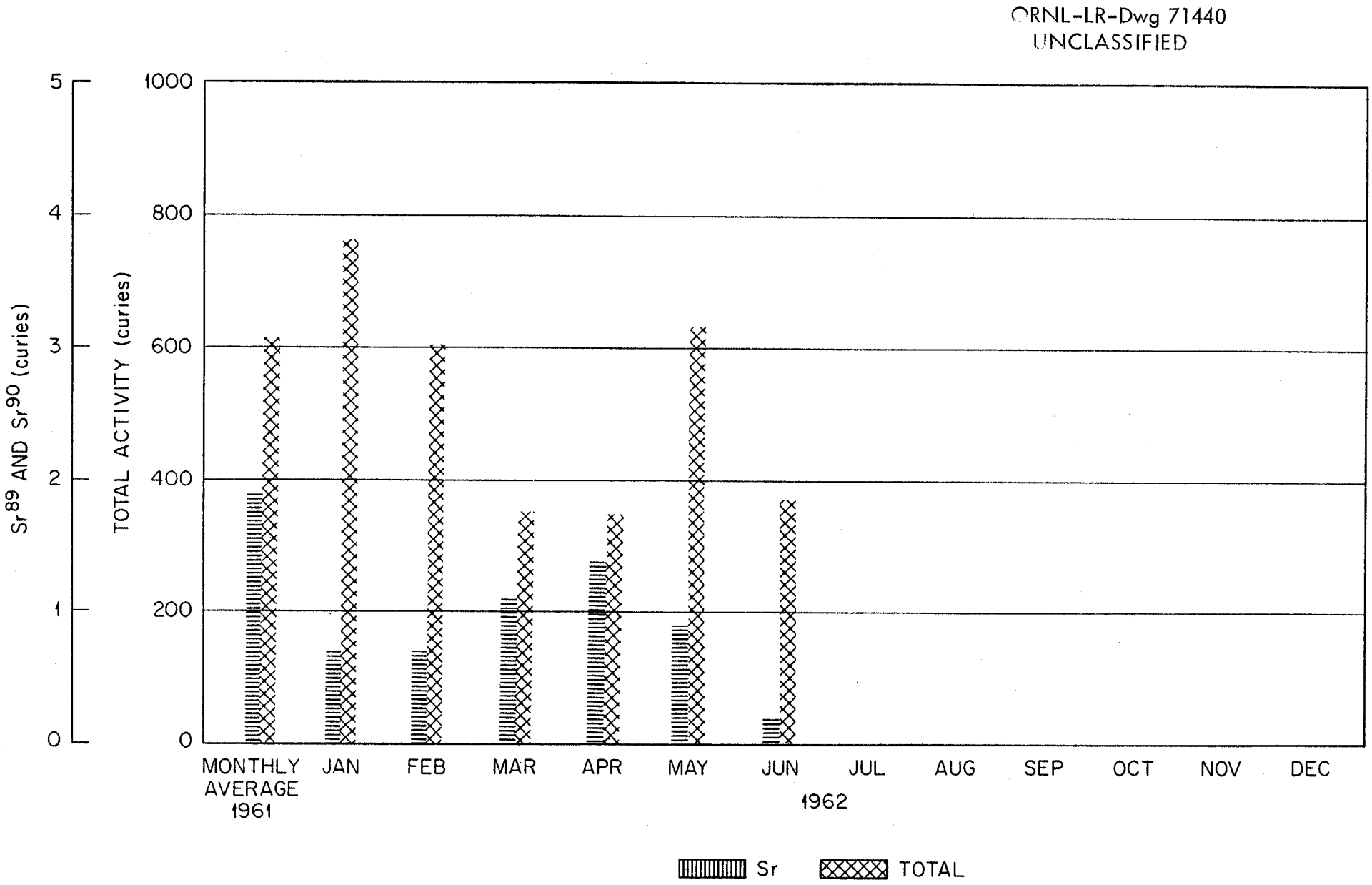


Fig. 3. Liquid Activity Discharge to White Oak Creek.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 13.4×10^6 gal.

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

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT (Curies)	DISCHARGE TO WHITE OAK CREEK (Curies)	PER CENT REMOVED BY PLANT AND SETTLING BASIN
Sr^{90}	1.3	0.5	0.2	85
$Ru^{103,106}$	$<$ 0.1	$<$ 0.1	$<$ 0.1	--
Co^{60}	0.3	$<$ 0.02	$<$ 0.02	93
Cs^{137}	0.9	0.05	0.05	94
Total	2.5	0.55	0.25	90

TABLE 3

PROCESS WASTE DISCHARGES

Source	Gross Beta Activity Average D/M/Ml	Sr^{90}		Volume	
		Millicuries	% of Total	Gal. x 10^6	% of Total
1. Reactor Operations & Decontamination Facility	1,200	1,100	76	4.3	33
2. Radioisotopes Processing Area	1,400	150	10	0.6	5
3. 4500 Area	730	150	10	3.6	28
4. Buildings 3508 and 3503	280	44	3	0.8	6
5. Buildings 3025 and 3026	110	8	< 1	1.3	10
6. Building 3019	2	5	< 1	2.3	18
7. Fission Products Development Laboratory	1	< 1	< 1	0.2	2

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, AND 4, CURIES			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date
Sr^{89}	-	26	110	149	-	8	92	
Sr^{90}	84	412	1,116	1,921	324	1,295	1,565	
Ru^{106}	38	211	830	2,622	54	310	757	
Cs^{137}	754	8,139	13,121	22,539	1,088	12,832	12,889	
TRE	84	547	956	2,181	324	1,125	855	
Co^{60}	8	75	-	-	10	85	-	
Total	968	9,410	16,193	29,139	1,800	15,655	16,148	517,090

than was released by the waste treatment plant. The difference must be attributed to the "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" because it is impossible to relate it to any specific area or operation without the installation of at least one more monitoring station in White Oak Creek. The balance of the activity was Ru^{106} from the seepage streams in the soil disposal area. The reported discharge from White Oak Dam to the Clinch River, while a factor of 3 lower than the total activity contributed by the tributaries, was in much closer agreement than in May when the discrepancy factor was about 29. The combined effects of holdup in the lake bed and washout due to rainfall make an accurate prediction of dam discharge impossible. Likewise, attempts to correlate dam discharge with tributary totals are usually fruitless.

Gaseous Waste

A gaseous activity release of 10.9 curies is reported for June (See Figure 4). Ten curies of this was I^{131} which was released into the 3039 Stack through both the cell ventilation and off-gas systems during an iodine processing run. At about the same time an unusual discharge of approximately 0.9 curies occurred at the 3018 Stack. This was also identified as I^{131} but its source could not be definitely established.

3039 Stack discharge data for June was gotten from samples taken instack. Only one such sampler is presently in use; however, a second is being installed and will produce corroborative data. The use of the more efficient sampler will undoubtedly be reflected in higher reported discharges from the 3039 Stack in future months.

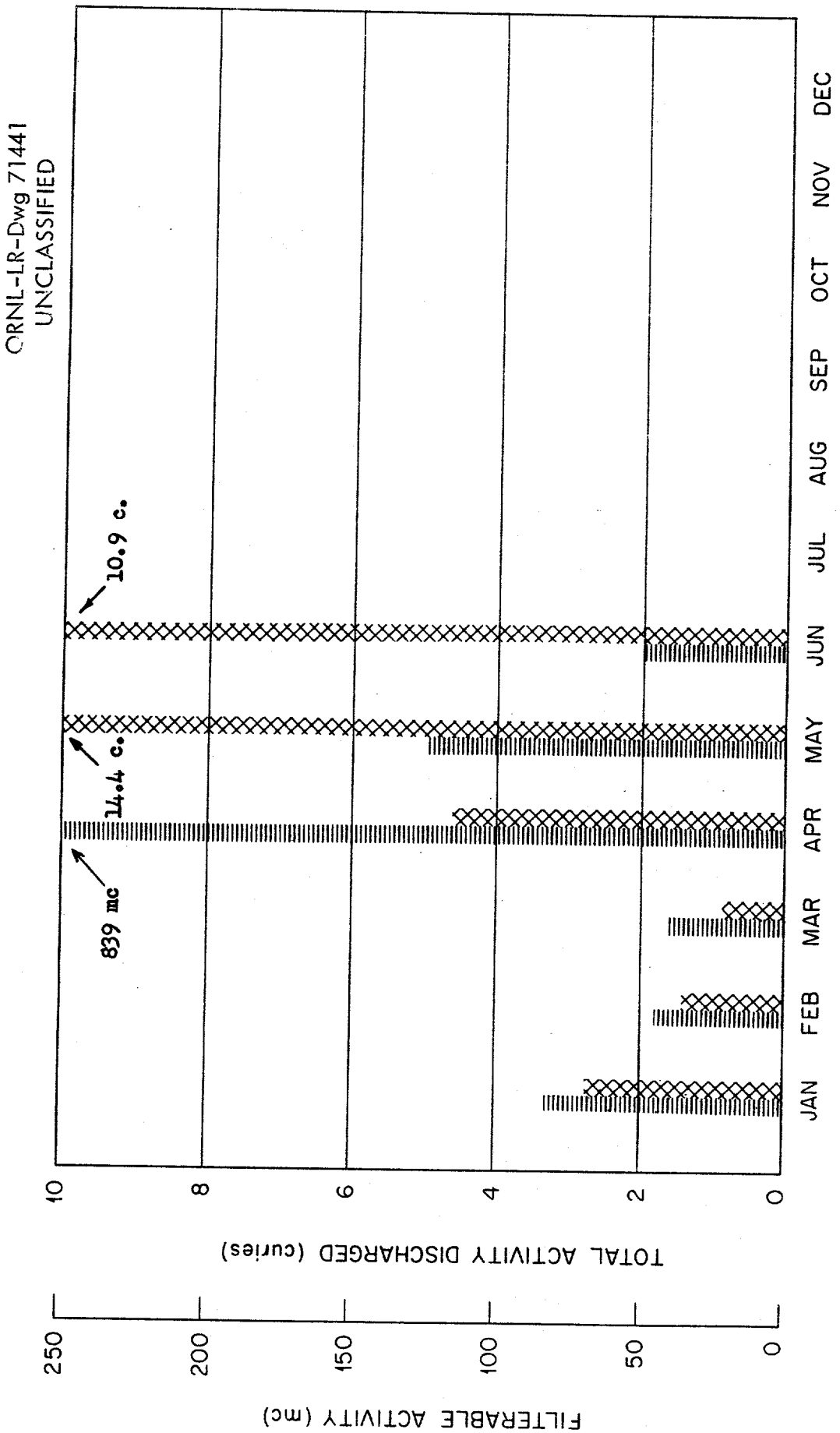


Fig. 4. Gaseous Activity Discharge to Environment.

Modifications to Waste Monitoring Systems

Transfer of the ILW tank level monitoring system to the Waste Monitoring Control Center was completed. The installation of conduit and cable between points in the 3039 Stack area and the Control Center is still underway. On completion of this phase of the work, connections can be made to the various pieces of monitoring equipment located in the stack area. Shop work has been completed on much of this equipment and it is now being field located.

A new anemometer was installed in the Building 3025 - 26 cell ventilation duct to replace one which had been damaged. The anemometers on all the ducts were then recalibrated and flow readings taken; the total stack flow, based on these readings, is estimated at 154,000 cfm. An additional anemometer is being installed directly in the 3039 Stack which will give a continuous indication of the total throughput.

1828

UCN-2363
(3 11-60)

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ORNL
CENTRAL FILES NUMBER
62-8-78

COPY NO. 33

DATE: August 31, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for July 1962

TO: Distribution

FROM: J. F. Manneschmidt

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.6	< 0.1	0.05	1.3-1.4
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0	0	0	0
7500 Waste to Melton Branch	3	0.01	< 0.04	<0.04	0.02-0.1
East Waste Pit Seepage to White Oak Creek	4	0.0005	294.	0.007	299.
West Waste Pit Seepage to White Oak Creek	5	0.002	257.	0.02	258.
Total Liquid Waste Discharged to White Oak Lake		0.61	551.	0.08-0.12	558.
White Oak Dam to Clinch River	6	1.1	95.	1.1	100.
Gaseous Waste[3]					
3039 Stack	7				35.57
3020 Stack	8				< 0.01
3018 Stack	9				0.25
7500 Stack	10				--
Total Gaseous Waste Discharged to Environment					35.82

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

TX-3142 (11-61)

1828

UCN-2383
(3 11-60)

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ORNL
CENTRAL FILES NUMBER
62-10-39

COPY NO. 33

DATE: October 12, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for August 1962

TO: Distribution

FROM: J. F. Manneschmidt

NOTICE

Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity discharged to the environment from the Laboratory waste disposal system during the month of August is given in Table 1. Also shown in Table 1, are the released quantities of the three most significant radionuclides - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the Settling Basin - Waste Treatment Plant discharge; the seven process waste monitoring stations and Diversion Box; the seepage streams in the waste pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of all but the process waste sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

The treatment plant operated at full capacity during the month and treated 15 million gallons of low level waste. (See Figure 2). The activity removal efficiency of the plant was good, averaging above 95%, and only 0.4 curies of activity was discharged to White Oak Creek. Fifty percent of total activity (0.2 curies) was Sr^{90}.

The discharge from the process waste system accounted for less than 30% of the total Sr^{90} released to the creek this month. Other sources, covered elsewhere in this report, contributed the balance of

TABLE 1

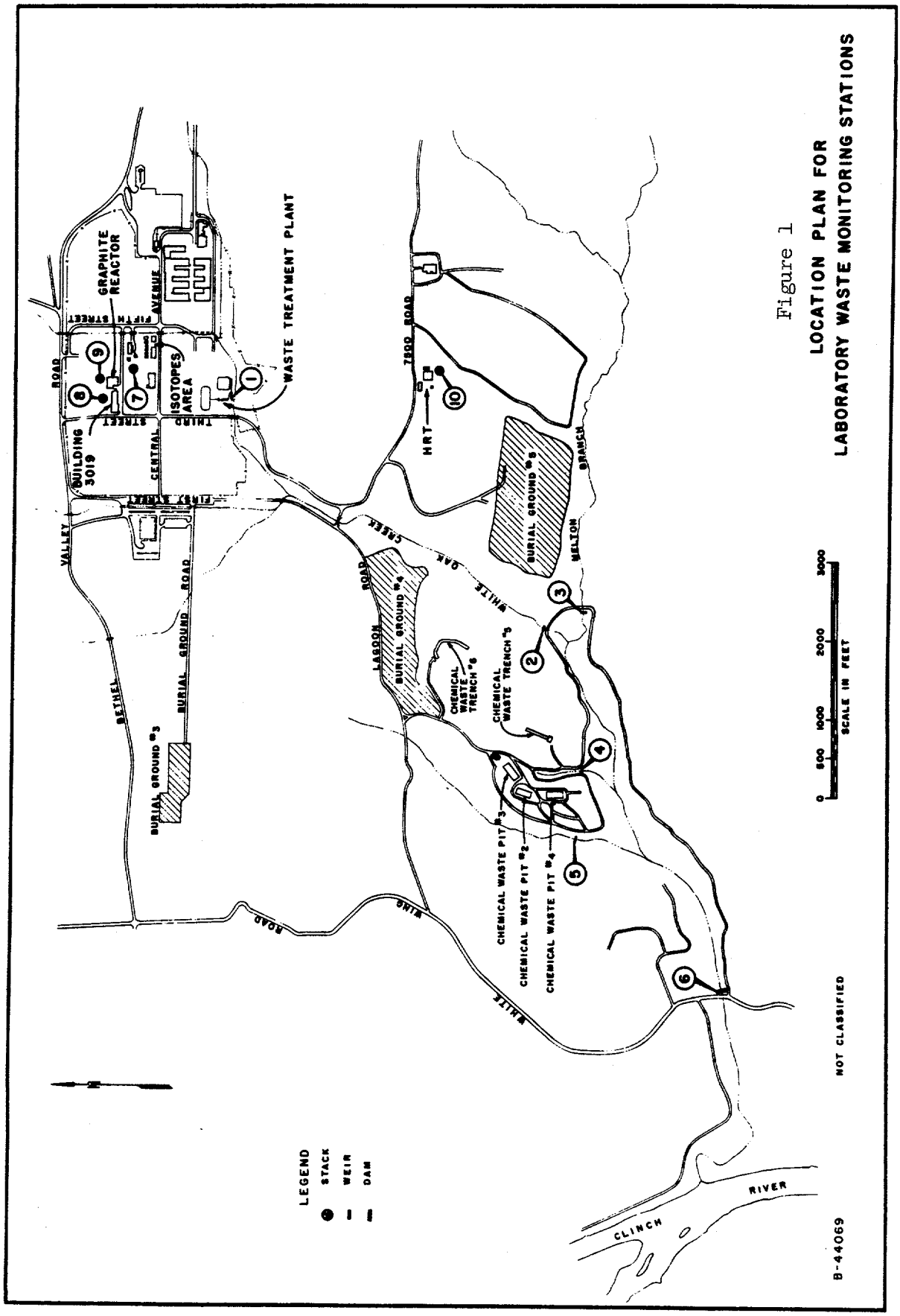
SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.2	0.0	0.1	0.4
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	0.5	1.1	0.3	1.9
7500 Waste to Melton Branch	3	0.005	0.05	0.02	0.08
East Waste Pit Seepage to White Oak Creek	4	0.0003	226.	0.0	230.
West Waste Pit Seepage to White Oak Creek	5	0.0007	181.	0.0	182.
Total Liquid Waste Discharged to White Oak Lake		0.7	408.	0.4	414.
White Oak Dam to Clinch River	6	0.2	16.5	0.4	18.9
Gaseous Waste[3]					
3039 Stack	7				22.38
3020 Stack	8			Less than	0.01
3018 Stack	9				0.14
7500 Stack	10				22.52
Total Gaseous Waste Discharged to Environment					

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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


LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
Figure 1
NOT CLASSIFIED
B-44069
LEGEND
STACK
WEIR
DAM
SCALE IN FEET
0 500 1000 2000 3000
GRAPHITE REACTOR
WASTE TREATMENT PLANT
ISOTOPES AREA
BUILDING 3019
HRT
BURIAL GROUND #3
BURIAL GROUND #4
BURIAL GROUND #5
CHEMICAL WASTE TRENCH #5
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
BETHEL VALLEY ROAD
BURIAL GROUND ROAD
LAGOON ROAD
WHITE OAK CREEK
WHITE OAK LAKE
MELTON BRANCH
7800 ROAD
CLINCH RIVER

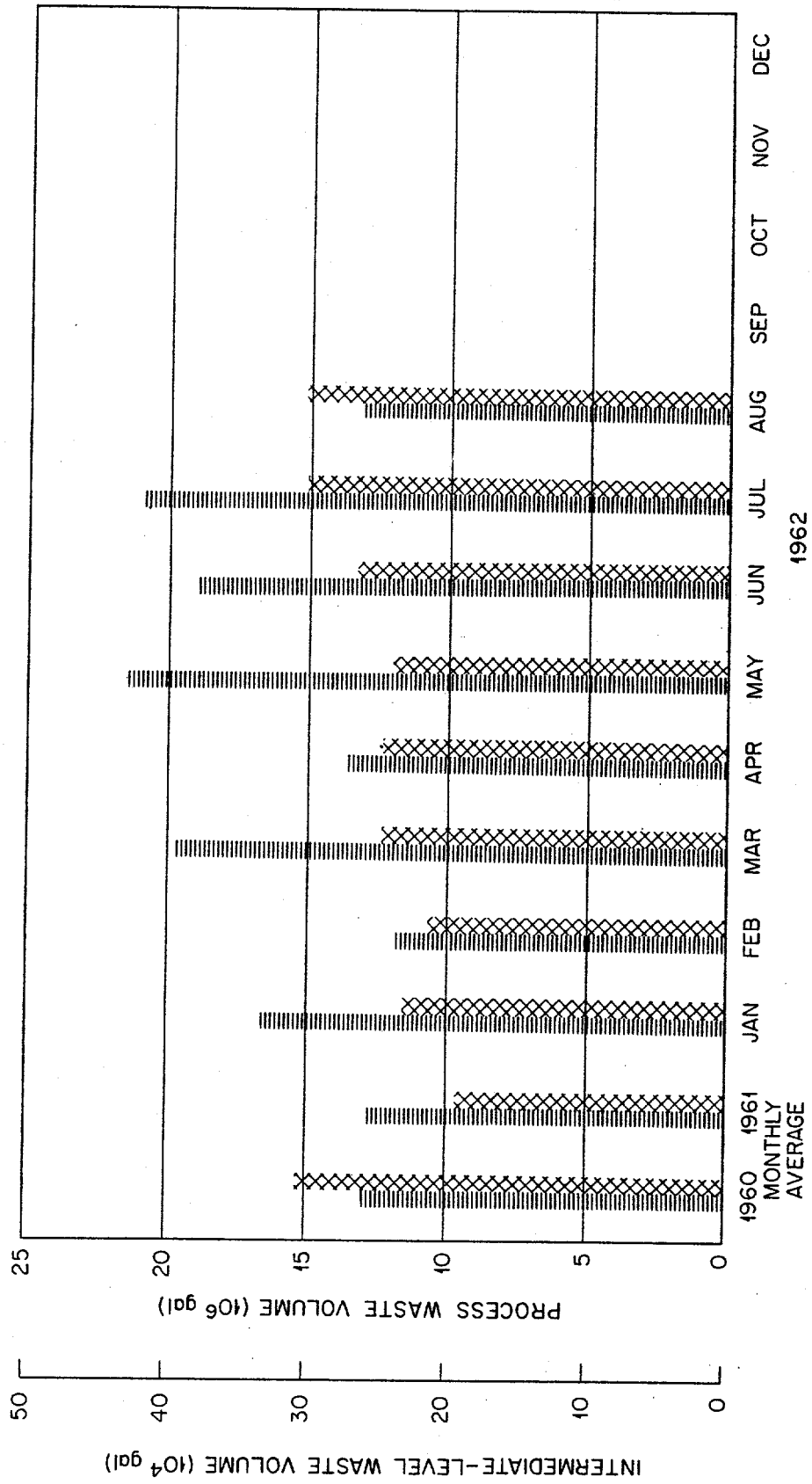


Fig. 2. Liquid Waste Volumes.

the total shown in Figure 3.

There were no abnormal activity releases to the system; however, over a 16 hour period, 400,000 gallons of process waste were inadvertently diverted to the Diversion Box control system failed. The equipment, which had been damaged by lightning, has been repaired.

Operating data for the Waste Treatment Plant is given in Table 2. Table 3 lists the principal sources of process waste activity and gives the volumes of waste and the amounts of Sr^{90} activity contributed by each.

Intermediate Level Waste

A sharp reduction in the volume of intermediate level waste was experienced during the month of August. Transfers totalling 265,000 gallons were made to the soil disposal pits and trench during the month which represents a decrease of nearly 40% below the preceding month. This decrease may be attributed to the curtailment of decontamination activities being carried out at Building 3505. Monthly volumes of waste transferred are shown in Figure 2; transfer data for the ILW system is given in Table 4.

A leak occurring at a valve in monitoring tank WC-10 released an estimated 300 millicuries of Sr^{90} to White Oak Creek. This release accounts for a part of the activity seen at Monitoring Station No. 2. (See Table 1). The necessary repairs were made without delay and normal operation resumed.

The prime contributors to the Intermediate Level Waste system were as follows:

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 15.1×10^6 gals.

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.2×10^6 gals.

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT (Curies)	DISCHARGE TO WHITE OAK CREEK (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Sr^{90}	1.3	0.8	0.2	85
$Ru^{103,106}$	< 0.1	0	0	100
Co^{60}	2.0	< 0.1	0.03	85
Cs^{137}	2.4	< 0.3	< 0.1	> 94
Sn^{113}	1.7	< 0.1	0	100
TRE	0	0	0	-
Total	7.4 - 7.5	0.8 - 1.3	0.2 - 0.4	95 - 97

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, d/m/ml	Sr^{90}		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations & Decontamination Facility	180	576	76	3.1	26
2.	Buildings 3503 and 3508	280	114	15	0.5	4
3.	Radioisotopes Processing Area	330	53	7	0.5	4
4.	Fission Products Development Laboratory	40	8	1	0.3	3
5.	4500 Area	20	5	0.7	5.0	42
6.	Building 3019	20	3	0.4	0.5	4
7.	Buildings 3025 and 3026	50	1	0.1	2.0	17

TABLE - 4

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, AND 4, CURIES			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date
Sr^{89}	-	26	110	149	-	8	92	
Sr^{90}	17	484	1,116	1,993	55	1,427	1,565	
Ru^{106}	64	386	830	2,797	72	507	757	
Cs^{137}	129	9,753	13,121	24,153	77	15,545	12,889	
Co^{60}	11	91	--	--	13	104	--	
TRE	-	547	956	2,181	-	1,125	855	
Total	221	11,287	16,193	31,016	217	18,716	16,148	520,151

1.	Reactor Operations	46,500 gallons
2.	Fission Products Development Laboratory	38,000 gallons
3.	Building 3019	34,500 gallons
4.	Radioisotopes Processing Area	23,900 gallons
5.	Buildings 4501, 4505, and 4507	19,400 gallons
6.	Building 3505	19,200 gallons

Creek Monitoring

The total radioactivity discharge to White Oak Creek for August (414 curies) was 147 curies less than the amount reported for July and is about 20% less than the average for the first eight months of 1962. (See Figure 3). There was little change in the Sr^{90} release (July: 0.6 curies; August: 0.7 curies); however, the bulk of the strontium which was released in August came from sources other than the Waste Treatment Plant. As noted in the preceding section, 0.3 curies originated at a leaky valve in the ILW system; the rest (0.2 curies) is presumed to have come from the storm sewer along Third Street where a leak into the storm sewer system is being investigated.

Gaseous Waste

The release of radioactivity into the gaseous waste system continues to run high. The August release, 22.5 curies, while not as high as that reported in July, still exceeds the average for this year by a factor of two. I^{131} is still the predominant activity and is being released in a gaseous or nonfilterable form as evidenced by the low discharge of filterable activity. A plot of activity discharges to the gaseous waste system is shown in Figure 4.

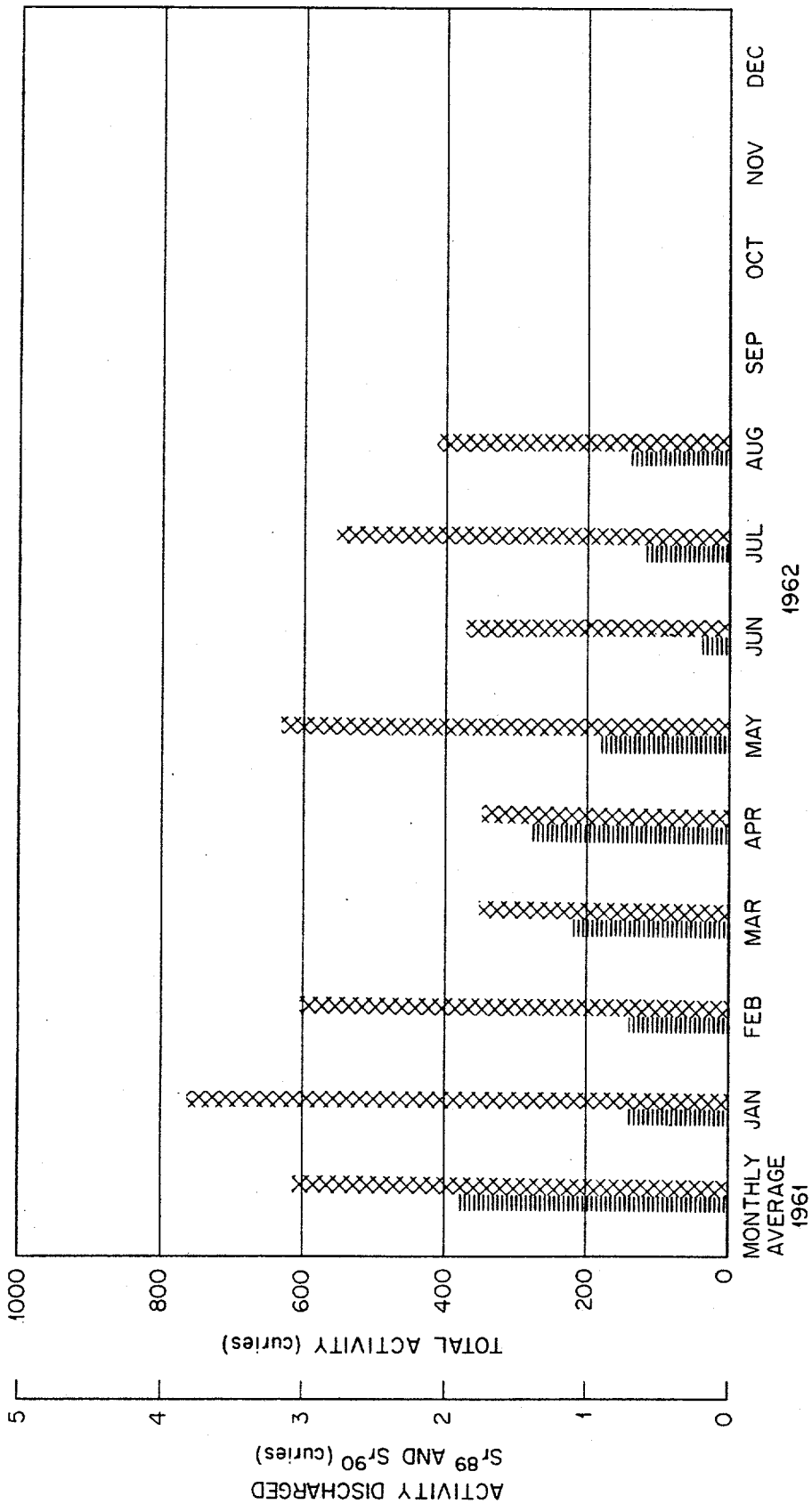


Fig. 3. Liquid Activity Discharge to White Oak Creek.

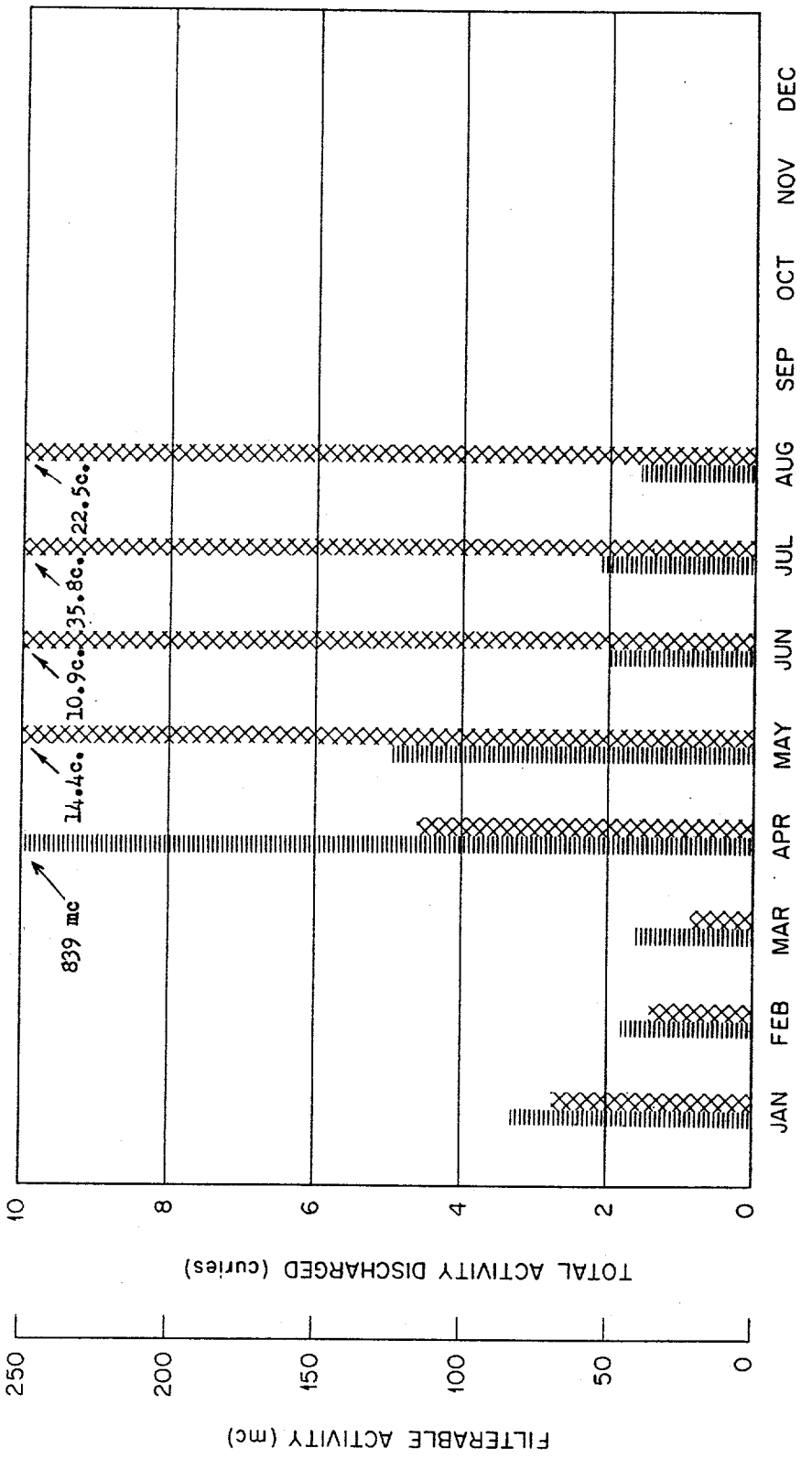


Fig. 4. Gaseous Activity Discharge to Environment.

Modifications to Waste Monitoring Systems

A second instack sampler was installed in the 3039 Stack during this period. The device is a duplicate of the sampler installed in June of this year; however, it is located at a different point within the stack. Analyses of samples taken at the two points will be compared and the average will be used in calculating stack discharges.

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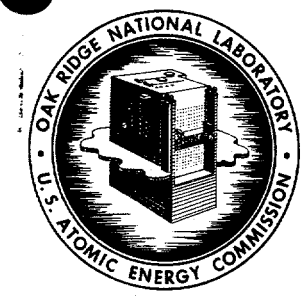
(3 11-60)



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CENTRAL FILES NUMBER
62-11-24

COPY NO. 34

DATE: November 9, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for September 1962

TO: Distribution

FROM: J. F. Manneschmidt

Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity discharged to the environment from the Laboratory waste disposal system during the month of September is given in Table 1. Also included in Table 1 are the released quantities of the three nuclides of greatest significance - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the seven Process Waste monitoring stations and Diversion Box; the Settling Basin - Waste Treatment Plant discharge; the seepage streams in the Waste Pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of the various sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

Operation of the process waste system was normal during the month with levels of volume and activity being about average for the year. The treatment plant, operating at about 90% of capacity, treated 13.5 million gallons of waste (See Figure 2). Total activity discharged to White Oak Creek was about 0.4 curies, half of which was Sr^{90}. The activity removal efficiency of the plant was 90% (See Table 2). This efficiency, which is well above the average for the year, was probably enhanced by the use of coagulant aids which were injected into the process waste at the treatment plant during the last two month.

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.2	< 0.1	< 0.1	0.2-0.5
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1,2	0.4	Trace	Trace	0.4
7500 Waste to Melton Branch	3	0.01	Trace	Trace	0.01
East Waste Pit Seepage to White Oak Creek	4	0.0004	139.	Trace	142.
West Waste Pit Seepage to White Oak Creek	5	0.0008	335.	Trace	342.
Total Liquid Waste Discharged to White Oak Lake		0.6	474.	< 0.1	484.
White Oak Dam to Clinch River	6	0.9	58.4	0.9	63.6
Gaseous Waste[3]					
3039 Stack	7				10.21
3020 Stack	8				< 0.01
3018 Stack	9				0.21
Total Gaseous Waste Discharged to Environment					10.42

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources gotten by difference between the activities measured at Stations 1 and 2.

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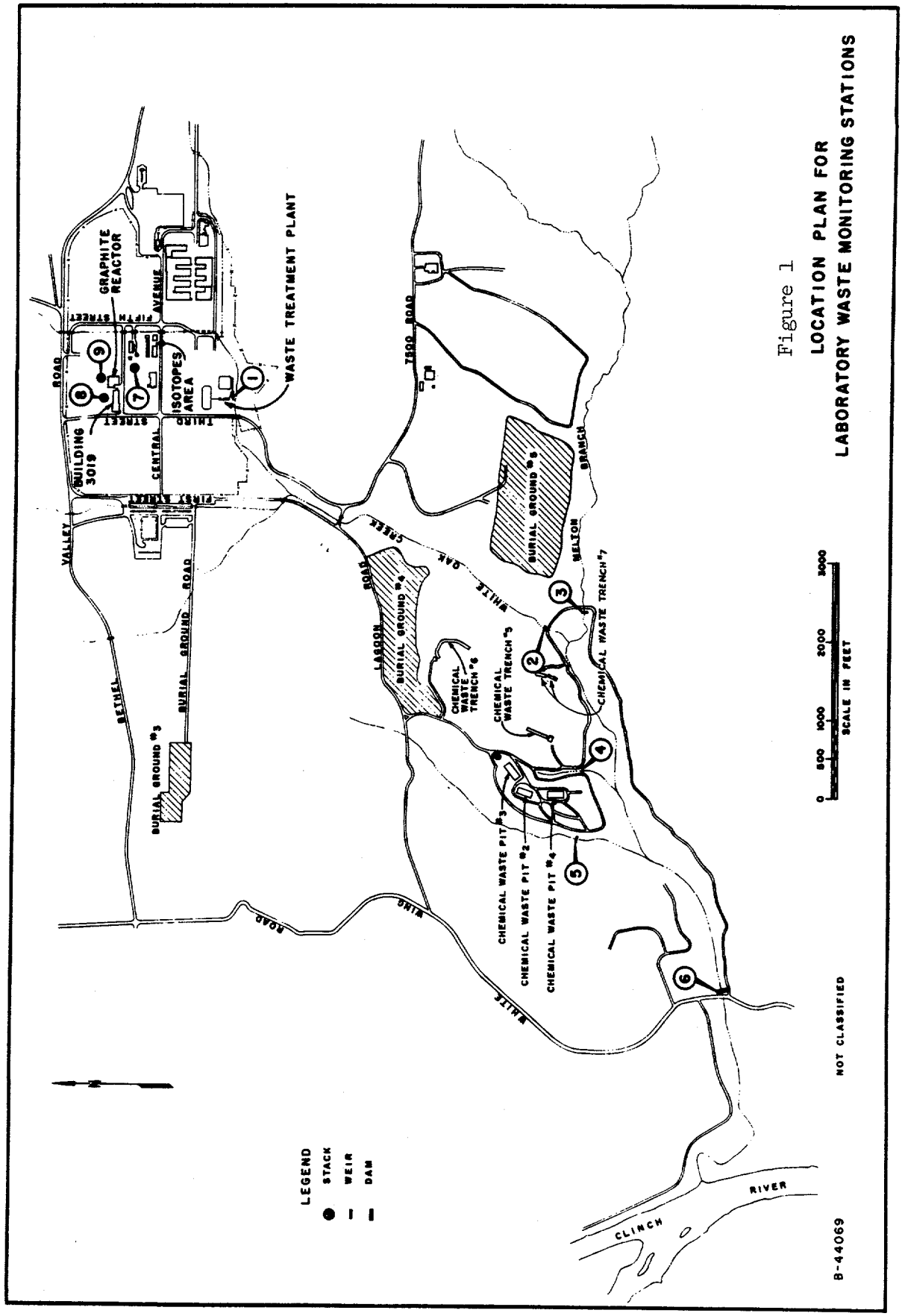

Figure 1
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS

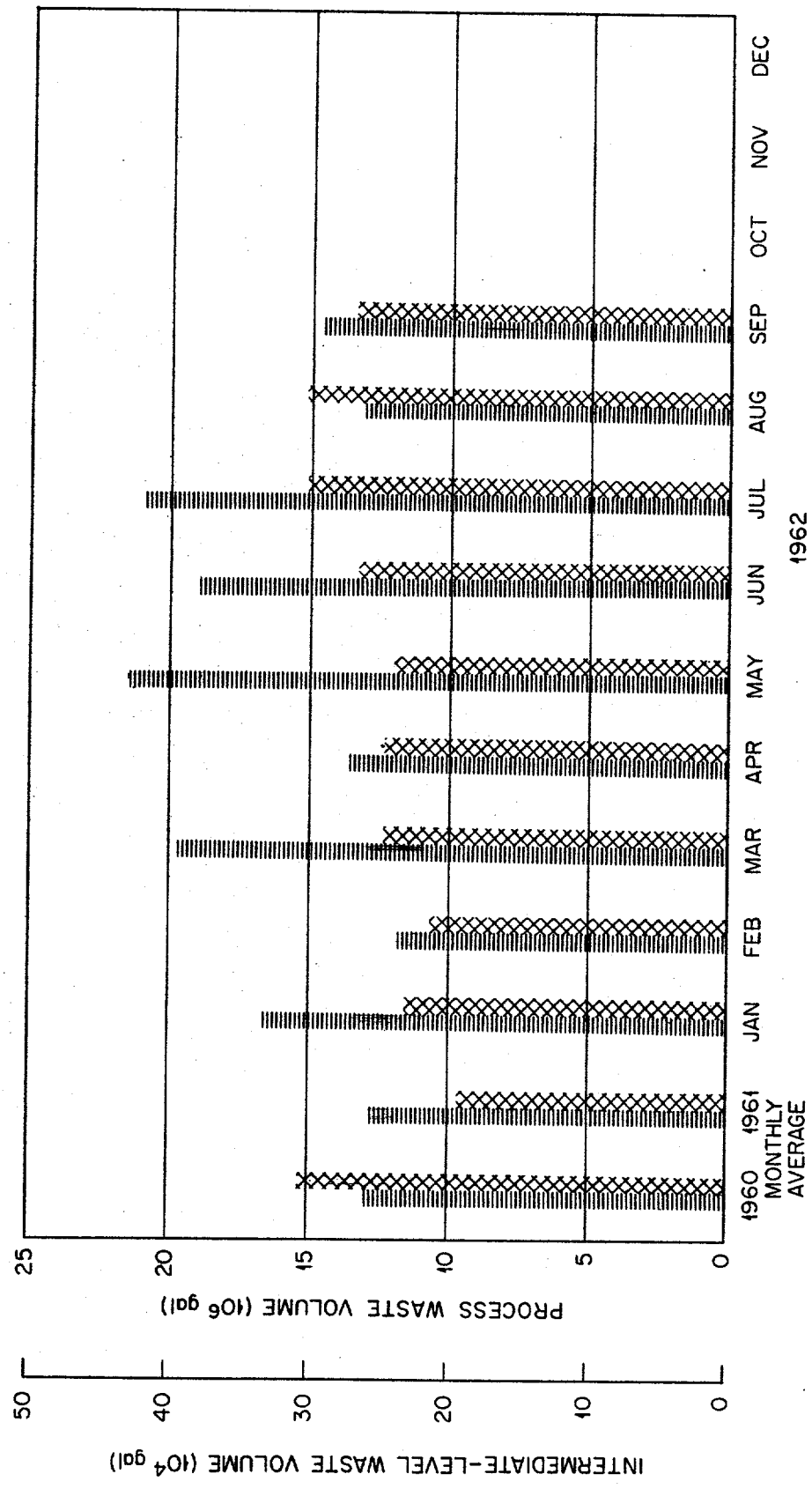

Fig. 2. Liquid Waste Volumes.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.1×10^6 gals

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT TO SETTLING BASIN (Curies)	DISCHARGE TO WHITE OAK CREEK FROM SETTLING BASIN (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.1	0.3	0.2	82
$Ru^{103,106}$	0.1	< 0.1	< 0.1	--
Co^{60}	0.2	0	< 0.02	90-100
Cs^{137}	1.3	< 0.05	< 0.1	92-100
TRE	0.0			
Total	2.7	0.3-0.4	0.2-0.4	85-93

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

Principal users of the process waste system are listed in Table 3, with the volumes of waste and the amounts of Sr^{90} activity contributed by each.

Intermediate Level Waste

The volume of intermediate level waste generated by the Laboratory in September (295,000 gallons) was slightly greater than the amount produced in August (See Figure 2). The resumption of cleanup work at the Building 3505 canal and a leak into the system from a cell in Building 4507 account for this increase.

Disposal Trench No. 7 was completed during the month and the Laboratory assumed beneficial occupancy of the facility. The trench was pretreated by filling with 50,000 gallons of 4% NaOH solution which was allowed to seep out. This operation was accomplished in less than a week which indicated a very rapid seepage rate for the trench. By comparison, seepage of pretreatment solution from Trench No. 5 took over a month.

The first pumping of waste into trench No. 7 is scheduled for the first week in October. Open pits Nos. 3 and 4 are now out of service and the use of pit No. 2 will be discontinued when Trench No. 7 becomes operable. ILW transfer data for September is given in Table 4.

The prime contributors to the Intermediate Level Waste System were, as follows:

1.	Building 3019	54,000 gallons
2.	Buildings 4501, 4504, and 4507	48,900 gallons
3.	Fission Products Development Laboratory	31,700 gallons
4.	Reactor Operations	30,200 gallons
5.	Radioisotopes Processing Area	23,000 gallons
6.	Building 3505	13,200 gallons

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, d/m/ml	Sr^{90}		VOLUME	
		MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations and Decontamination Facility	240	783	83	4.2	36
2. Fission Products Development Laboratory	190	76	8	0.3	3
3. Radioisotopes Processing Area	210	65	7	0.6	5
4. Buildings 3503 and 3508	200	16	2	0.5	4
5. 4500 Area	0	0	0	3.8	33
6. Buildings 3025, 3026 and HRLEL	0	0	0	1.7	15
7. Building 3019	0	0	0	0.5	4

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCH

NUCLIDE	TRENCH NO. 5, CURIES				PITS 2, 3, AND 4,[1] CURIES			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date
Sr^{89}	-	26	110	149	-	8	92	
Sr^{90}	689	1,173	1,116	2,682	54	1,481	1,565	
Ru^{106}	210	596	830	3,007	3	510	757	
Cs^{137}	680	10,433	13,121	24,833	893	16,438	12,889	
Co^{60}	36	127	-	-	3	107	-	
TRE	-	547	956	2,181	-	1,125	855	
Total	1,615	12,902	16,193	32,631	953	19,669	16,148	521,104

[1]Pits 3 and 4 are out of service at this time

Creek Monitoring

The total radioactivity discharged by the Laboratory to the White Oak Creek system totalled 484 curies for the month of September, a 17% increase above the August discharge.

A total of 0.6 curies of Sr^{90} was measured at the White Oak Creek monitoring station (Station No. 2) which is 0.4 curies more than was found in the discharge from the Waste Treatment Plant and Settling Basin (See Figure 3). This difference is thought to have come from a leaking storm sewer, located on Third Street west of the treatment plant. Contaminated drainage from the tank farm areas, leaking into this storm sewer would be discharged directly into White Oak Creek. The condition is being investigated and will be corrected.

Dredging of White Oak Creek, in the area south of the Laboratory, was started in mid September. The resultant upheaval of contaminated creek bottom probably also resulted in the transport of assitional radioactivity downstream.

Gaseous Waste

The release of radioactivity into the gaseous waste system fell off sharply in September. Processing of 1200 curies of iodine was carried out during the month with a loss of only about 10 curies to the stack (See Figure 4). This is less than half of the release reported for August and only one third of the July discharge.

The discharge of filterable activity increased by a factor of four in September due to the release of 95 millicuries of Cs^{137}. This material was emitted during the processing of cesium in the Isotopes Area and came through the cell ventilation duct.

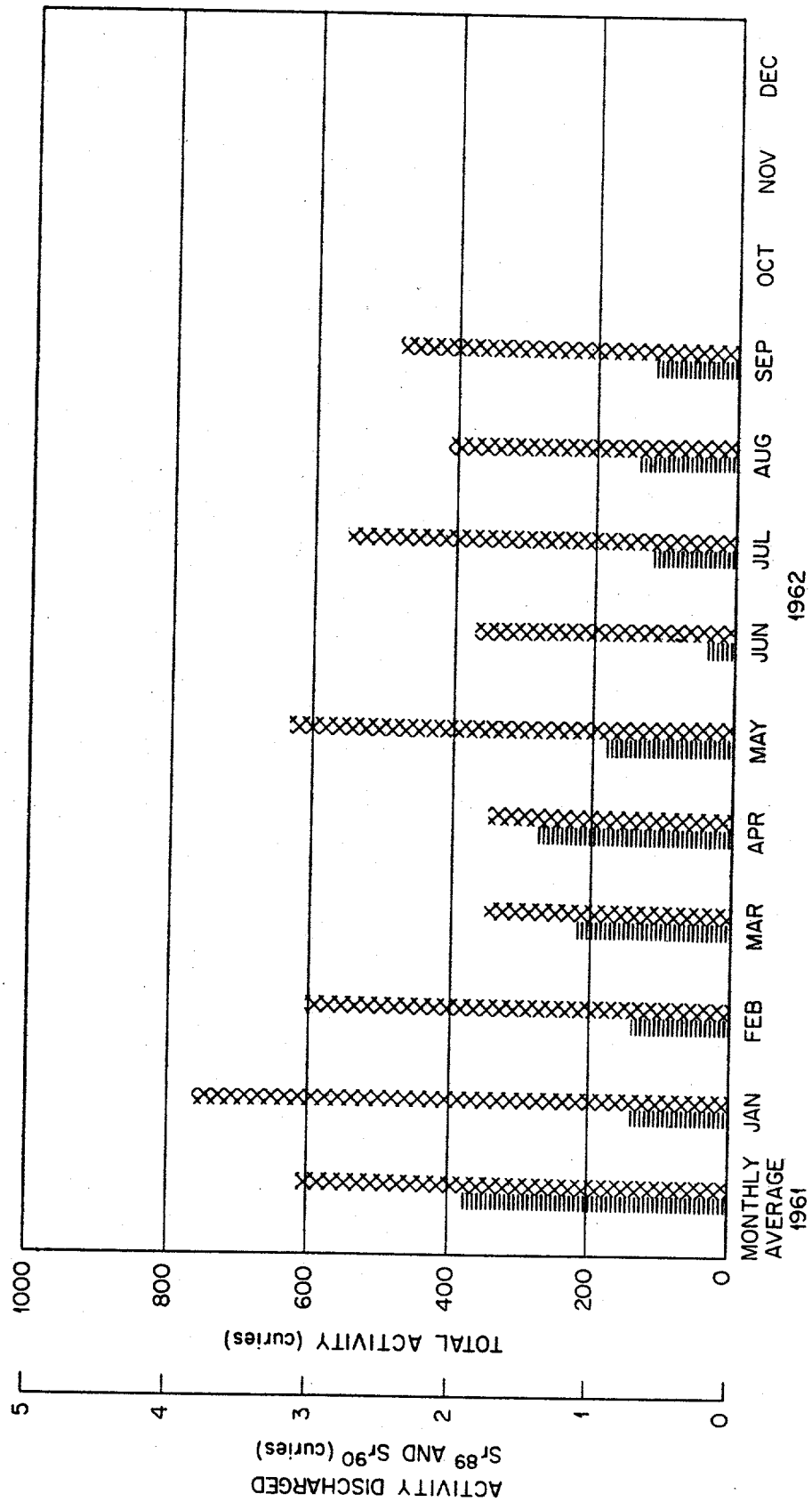

Fig. 3. Liquid Activity Discharge to White Oak Creek.

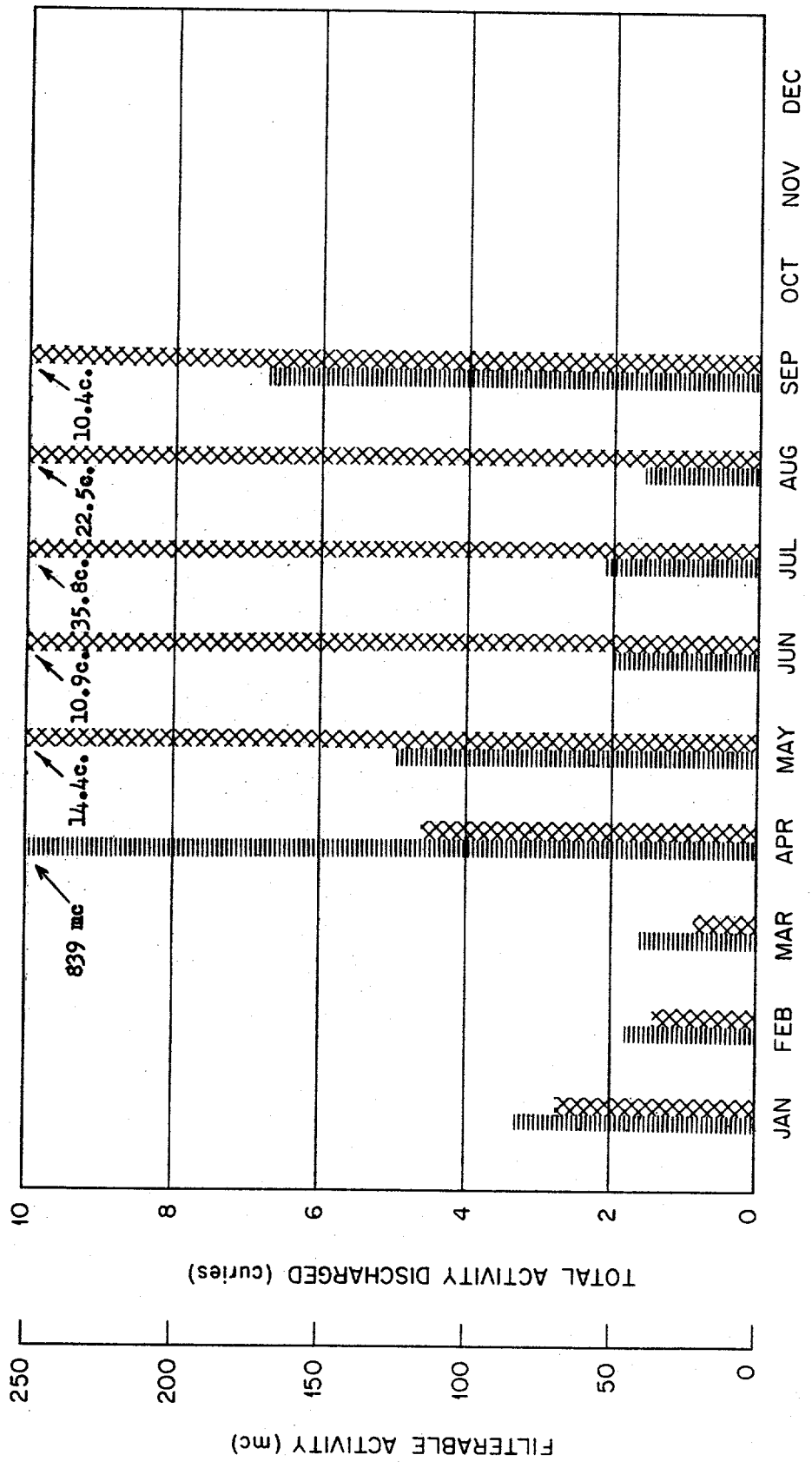

Fig. 4. Gaseous Activity Discharge to Environment.

Modifications to Waste Monitoring Systems

Modifications to the waste monitoring systems are complete except for the installation of the weather instrumentation and the changeover of the 3039 Stack area alarm system to the Waste Monitoring Control Center. This work is now in progress. An intensive checkout of all instrumentation is getting underway with the new equipment being "debugged" and necessary repairs and alterations being made to the old.

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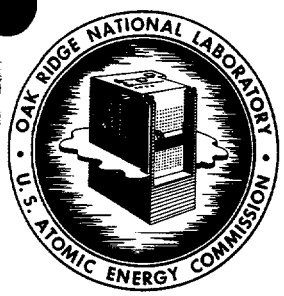

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CENTRAL FILES NUMBER
62-12-2

COPY NO. 36

DATE: December 3, 1962

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for October 1962

TO: Distribution

FROM: J. F. Manneschmidt

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Inventory of Total Activity Discharged

A summary of the total liquid and gaseous activity discharged to the environment from the Laboratory waste disposal system during the month of October is given in Table 1. Also included in Table 1 are the released quantities of the three most significant radionuclides - Sr^{90}, Ru^{106}, and Cs^{137}. Routine samples were taken from the process waste manhole monitoring stations and diversion box; the Settling Basin - Waste Treatment Plant discharge; the seepage streams in the waste pit area; White Oak Creek and Melton Branch; and the three principal process stacks. The locations of the various sampling stations are shown in Figure 1. Data on the White Oak Dam discharge were obtained from the Health Physics Division. The discharge designated "Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek" is arrived at by difference between the radioactivity found in White Oak Creek, just north of its confluence with Melton Branch, and that known to be discharged from the Settling Basin - Waste Treatment Plant.

Process Waste Treatment and Discharge to White Oak Creek

Operation of the low level waste facility was normal during the month and little change was experienced from the preceding month. Approximately 15 million gallons of waste containing 2.7 curies of radioactivity were treated and 0.2 curies were discharged to White Oak Creek (See Figure 2). The plant operated at an overall efficiency of about 90%; however, the Sr removal was not quite as high as in September (See Table 2). The addition of coagulant aid was interrupted during the month due to shortage of supply, but will be resumed as soon as materials are available.

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies) Sr^{90}	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.2	0.1	0.1	0.5
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1,2	0.3	0	0	0.3
7500 Waste to Melton Branch	3	0.009	0	< 0.001	0.01
East Waste Pit Seepage to White Oak Creek	4	0.0004	109.	0	111.
West Waste Pit Seepage to White Oak Creek	5	0.002	303.	0	307.
Total Liquid Waste Discharged to White Oak Lake		0.5	412.	0.1	419.
White Oak Dam to Clinch River	6	0.6	42.7	0.4	45.4
Gaseous Waste[3]					
3039 Stack	7				8.48
3020 Stack	8				0.02
3018 Stack	9				0.26
Total Gaseous Waste Discharged to Environment					8.76

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources gotten by difference between the activities measured at Stations 1 and 2.

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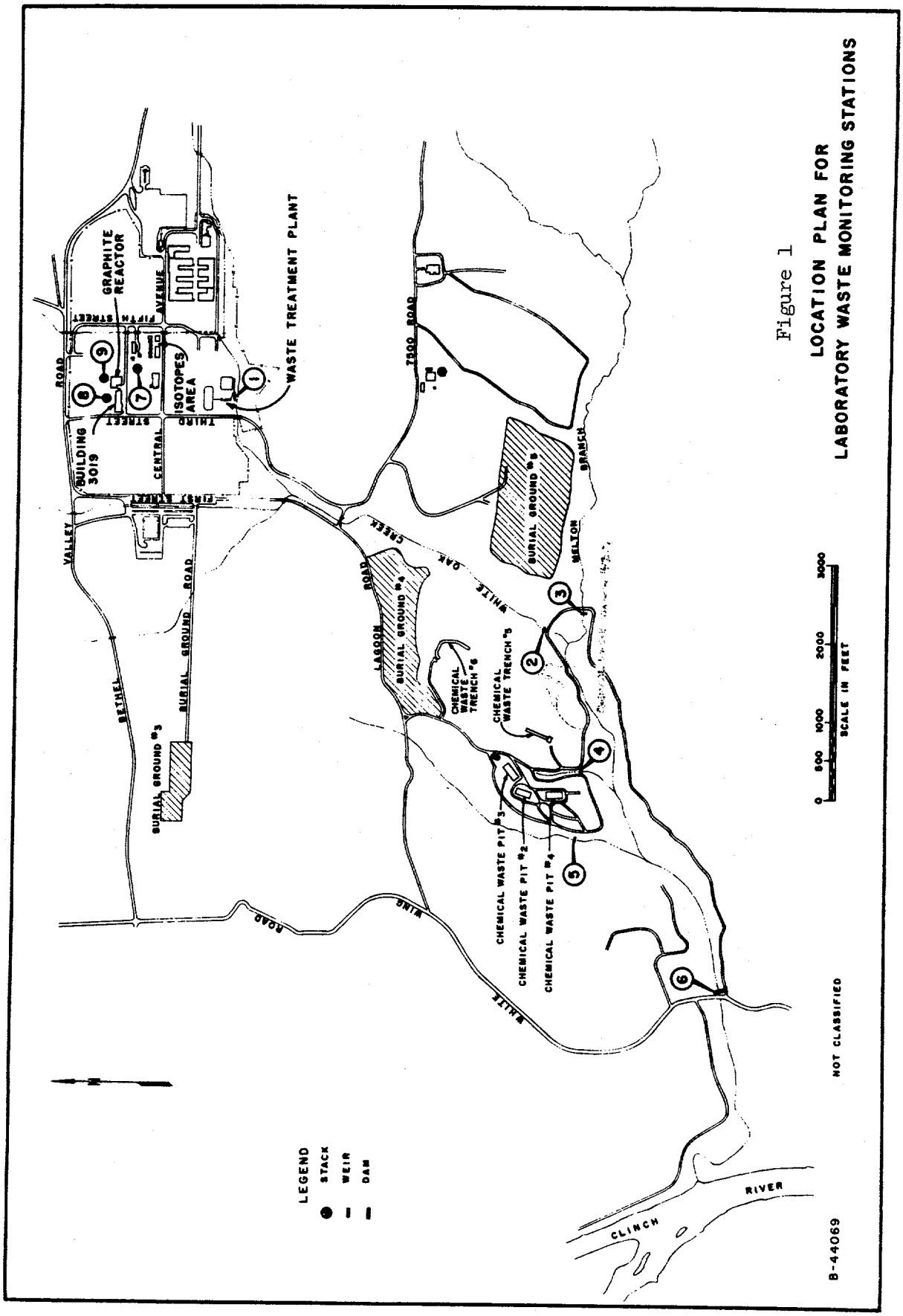
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
GRAPHITE REACTOR
FIFTH STREET
AVENUE
ROAD
BUILDING 3019
CENTRAL
STREET
ISOTOPES AREA
THIRD
WASTE TREATMENT PLANT
7900 ROAD
VALLEY
BETHEL
BURIAL GROUND #3
BURIAL GROUND
ROAD
LAGOON
ROAD
BURIAL GROUND #4
WHITE OAK CREEK
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE TRENCH #5
BURIAL GROUND #5
MELTON BRANCH
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
ROAD
WHITE WING
CLINCH RIVER
LEGEND
STACK
WEIR
DAM
0 500 1000 2000 3000
SCALE IN FEET
NOT CLASSIFIED
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Figure 1

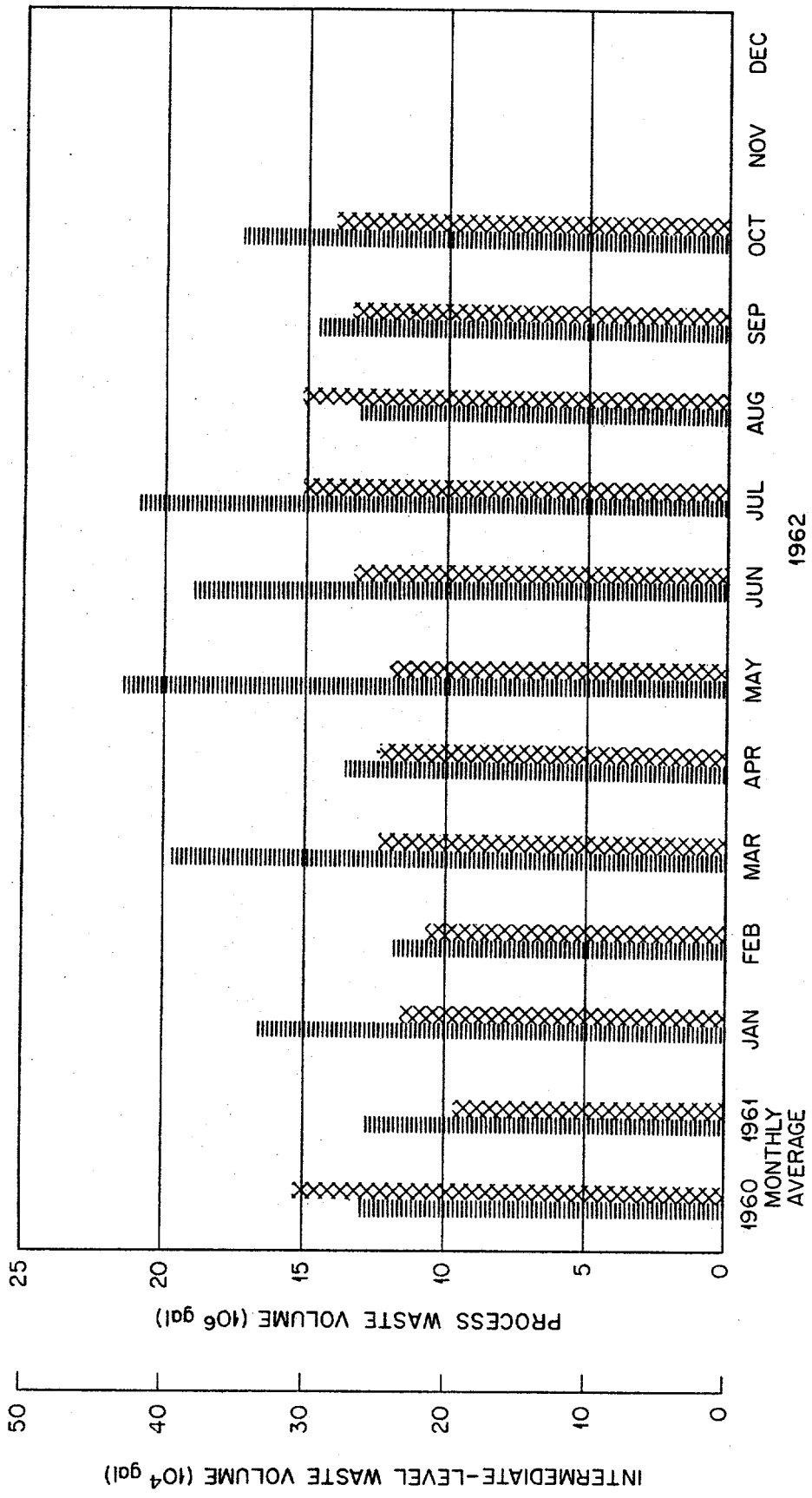

Fig. 2. Liquid Waste Volumes.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 14.1×10^6 gals

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.8×10^6 gals

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT TO SETTLING BASIN (Curies)	SETTLING BASIN DISCHARGE TO WHITE OAK CREEK (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr[1]	0.9	--[2]	0.2	78
$Ru^{103,106}$	0.3	0.1	< 0.1	67-100
Co^{60}	0.9	0	0	100
Cs^{137}	0.6	0.03	< 0.1	83-100
TRE	0	0	0	
Total	2.7	1.0	0.20-0.40	85-93

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

[2]Analytical data not available

Table 3 lists the principal contributors to the process waste system and gives the volumes of waste and amounts of Sr^{90} activity discharged by each.

Intermediate Level Waste

Transfers totalling approximately 350 thousand gallons were made from the ILW collection system to the soil disposal system during the month of October (See Figure 2). The two units of Trench No. 7 were put into operation on October 4 and during the remainder of the month 37% of the total volume of waste was pumped to that facility. Only about 13% of the intermediate level waste was pumped to the open pit system (Pit No. 2) and in the near future that unit will be taken out of service.

The monitoring wells in the vicinity of the disposal trenches and the drainage system for the immediate area are surveyed on a weekly basis. To date, no significant quantities of radioactivity have been found.

Principal contributors to the intermediate level waste system were, as follows:

1.	Building 3505	82,800 gallons
2.	Building 3019	60,800 gallons
3.	Fission Products Development Laboratory	33,400 gallons
4.	Reactor Operations	29,300 gallons
5.	Radioisotopes Processing Area	27,600 gallons
6.	Buildings 4501, 4505, and 4507	22,800 gallons

More complete transfer data on the ILW system may be found in Table 4.

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, d/m/ml	Sr^{90}		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	680	450	76	2.7	19
2.	Buildings 3503 and 3508	680	80	14	0.6	4
3.	Radioisotopes Processing Area	280	48	8	0.6	4
4.	Fission Products Development Laboratory	480	8	1	0.4	3
5.	Buildings 3025, 3026 and HRLEL	150	4	< 1	1.8	13
6.	4500 Area	< 10	- -	- -	7.6	54
7.	Building 3019	20	- -	- -	0.4	3

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclide	Pits 2,3 & 4[1] Curies				Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year 1961	Total to Date	This Month	Year to Date	Year	Total to Date	Month	Year to Date	Year	Total to Date
Total Sr	12	1,501	1,657		85	1,284	1,226	2,916	20	20		20	19	19		19
Ru^{106}	39	549	757		145	741	830	3,152	43	43		43	42	42		42
Cs^{137}	632	17,070	12,889		2,873	13,306	13,121	27,706	845	845		845	874	874		874
Co^{60}	2	109	- -		7	134	- -	- -	2	2		2	2	2		2
Total	685	20,354[2]	16,148[2]	521,789[2]	3,110	16,012[2]	16,193[2]	35,741[2]	910	910		910	937	937		937

[1] Pits 3 and 4 are out of service at this time

[2] Includes other nuclides not listed here

Creek Monitoring

The total discharge to radioactivity to the White Oak Creek system (412 curies) showed a decrease below the quantity reported in September. The strontium release remained about the same (0.5 curies). The usual discrepancy is found between the total discharged from White Oak Dam and that measured in the stream system; however, there continues to be good agreement in the two strontium measurements. The plot of monthly liquid activity discharges (Figure 3) has shown a slight downward trend in total release during 1962 which now seems to be levelling off. Strontium releases, while not following the same pattern, have been holding at about 0.5 curies/month for the past four months and, of this amount, only 50% or less is contributed by the process waste system. As soon as other sources of contamination such as the leaking storm sewer on Third Street (described in the September report) can be eliminated, it is expected that the strontium release will be greatly reduced.

Gaseous Waste

The total discharge of radioactivity to the atmosphere by the gaseous waste disposal system continues to decrease (See Figure 4). Forty percent of the total for the month of October was released during the first week and appeared to be carry-over from an iodine run made during the latter part of September. Weekly emissions decreased during the balance of the month although a xenon run was carried out which involved a small amount of iodine.

Processing of Cs^{137} resulted in the release to the cell ventilation system of approximately 300 millicuries of activity, one third of which was filterable. A similar experience was noted in September with respect

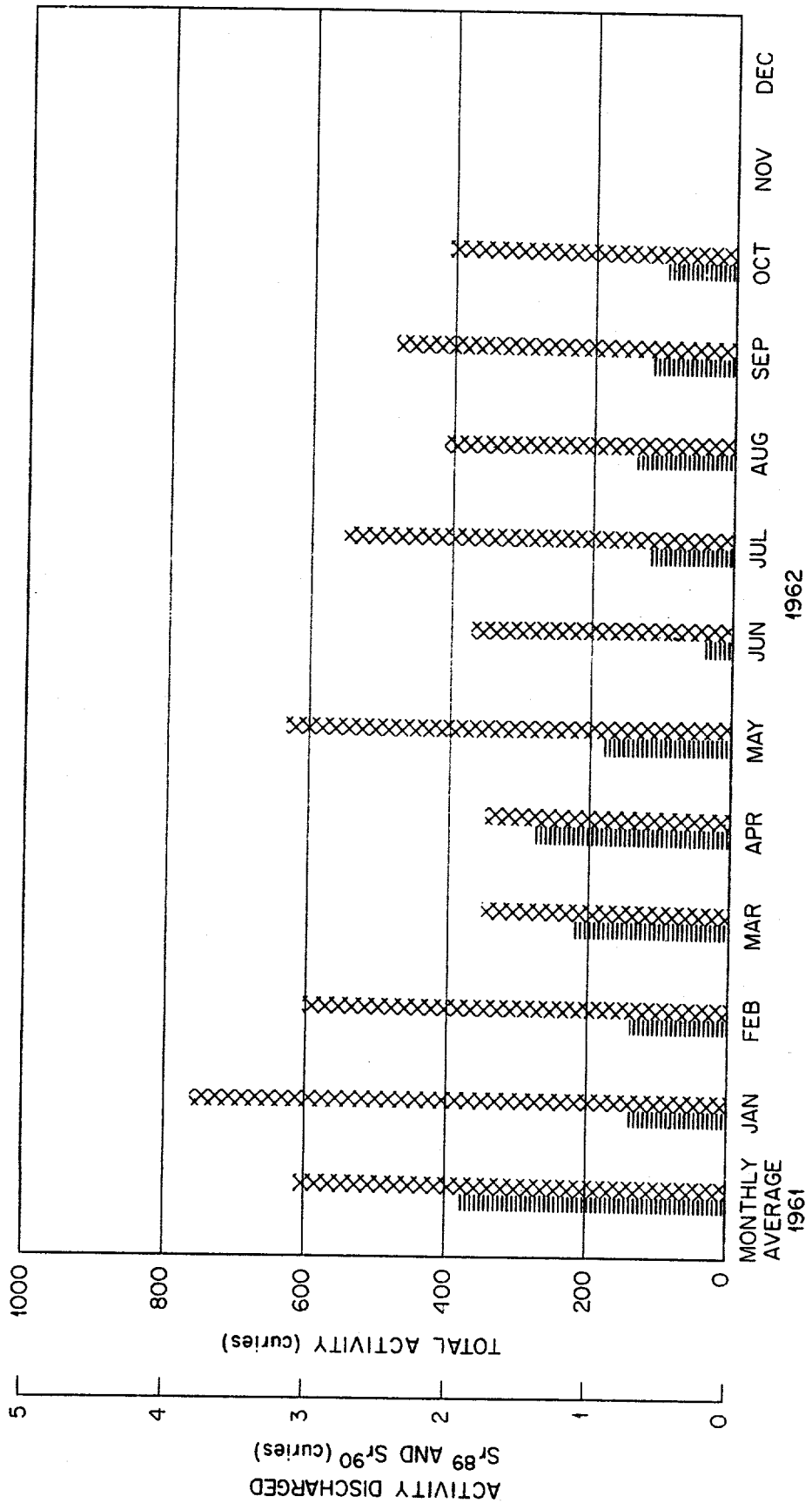

Fig. 3. Liquid Activity Discharge to White Oak Creek.

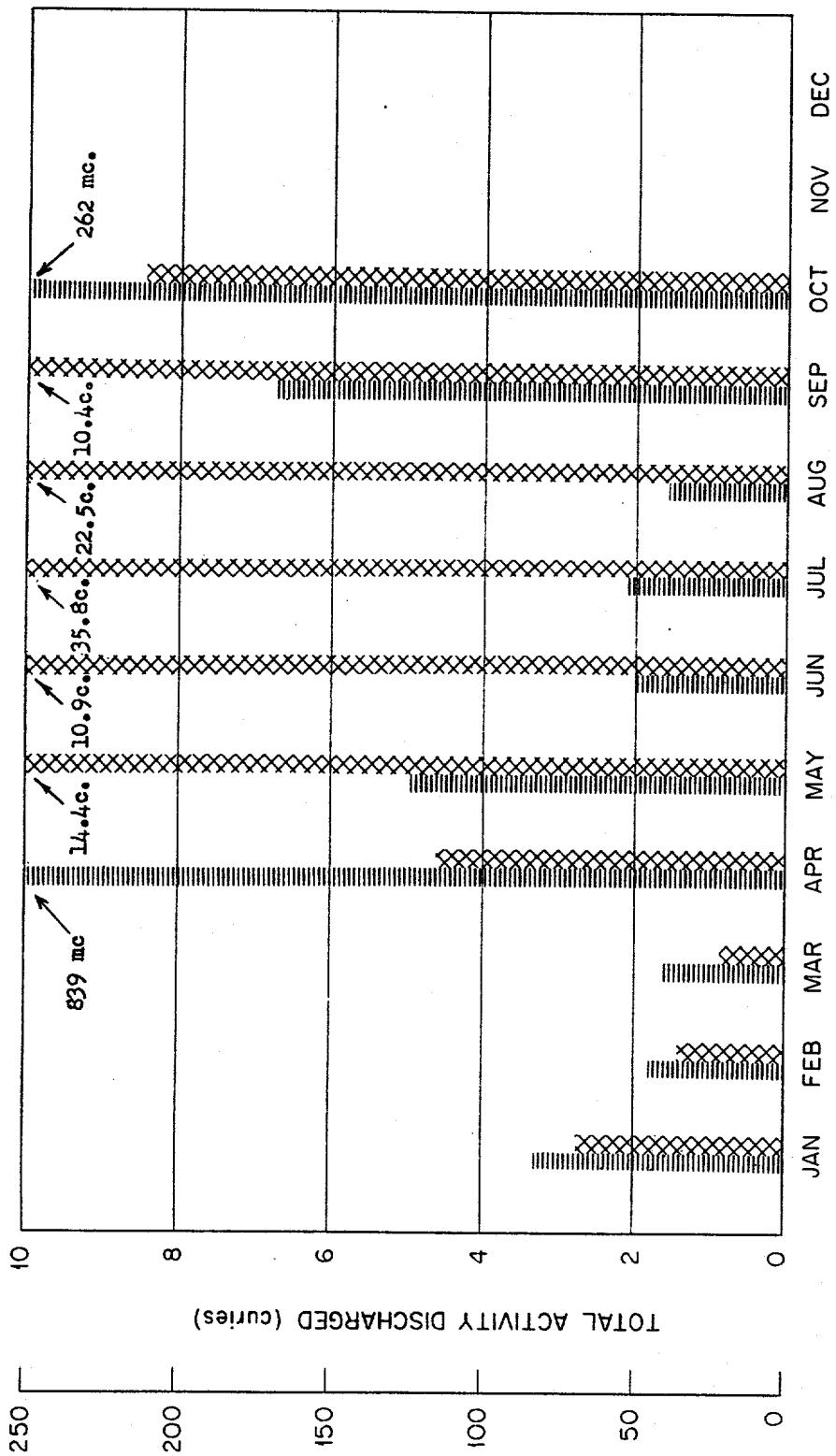

Fig. 4. Gaseous Activity Discharge to Environment.

to cesium.

The major cell ventilation and the off-gas filter systems were inspected and tested by the Inspection Engineering Department. Average filter efficiencies were, as follows:

1.	4500 Area, Cell Ventilation	99.86%
2.	Isotopes Area, Cell Ventilation	99.17%
3.	Off-Gas Facility	99.56%

The original filter units in the Isotopes Area facility were found to be badly deteriorated and were replaced before the tests were made.

Modifications to Waste Monitoring Systems

The last of the modifications to the stack area monitoring System were completed. These included the installation of weather instrumentation and the changeover of the stack area alarm system to the Monitoring Control Center. The source of any alarm in that area is now indicated on a panel in the control building and the building annunciator sounds, in addition to the outside horn being blown.

The process waste manhole activity monitoring system was revised to give speedier print-out of activities measured at each of the manholes. Time pulse transmission was abandoned in favor of direct connection to each count rate meter involved. This change reduced the time between successive printouts of a given station from about 7 minutes to 1 minute, an important consideration when one is interested in detecting short bursts of activity through a particular manhole.

Level monitoring instrumentation was put into operation on disposal Trench No. 7 with a record being kept in Building 3105. As in the case of

Trench No. 6, safety devices are incorporated which automatically cut off the transfer pump if a preset level in the trench is exceeded.

The first routine inspection of all waste monitoring facilities was made late in the month. Such inspections, carried out by representatives of the Instrumentation and Controls Division, will continue on a weekly basis and will provide a measure of much needed preventive maintenance.

Monitoring equipment at the 3018 and 3020 stacks was reviewed and an estimate made of the revisions needed to improve these monitoring systems with respect to sampling efficiencies and completeness of coverage. A fund request for $16,000 to cover the costs of the necessary improvements has been submitted.

1828

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(3 11-60)

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ORNL
CENTRAL FILES NUMBER
63-3-39

COPY NO. 38

DATE: March 14, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for January 1963

TO: Distribution

FROM: J. F. Manneschmidt

LABORATORY FACILITIES - WASTE DISPOSAL

INVENTORY OF TOTAL ACTIVITY DISCHARGED

An inventory of the total radioactivity released to the environment by the Laboratory during the month of January is given in Table 1. Also included in this table are the released quantities of the three nuclides of major interest: Sr, Ru^{106}, and Cs^{137}. Data for calculating discharges is derived from samples taken routinely at the process waste monitoring stations and diversion box; from the waste treatment plant - settling basin discharge; from White Oak Creek and Melton Branch; from the seepage streams in the soil disposal area; and from the three principal process stacks. Locations of the monitoring stations are shown in Figure 1. The amount of radioactivity contributed by the source titled "Burial Ground No. 4 and Miscellaneous Laboratory Drainage" is normally gotten by difference between the activity measured in the process waste discharge (Station No. 1) and that found in White Oak Creek just north of its junction with Melton Branch (Station No. 2). However, due to the extreme weather experienced during the month, difficulty was encountered in keeping the White Oak Creek station operable. As a result, the monthly composite sample taken at that location was not considered reliable and no data is reported on discharges past that point. Burial ground and miscellaneous discharges of strontium can be estimated, however, by comparing the release of that isotope from the process waste system with the strontium reported in the White Oak Dam discharge. The contribution of strontium by the seep streams or Melton Branch is negligible. Data on the White Oak Dam release was obtained

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.2	0.2	<0.1	0.4-0.5
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek	2	Sample not Available			
7500 Waste to Melton Branch	3	0.02	0	<0.02	0.02-0.05
East Waste Pit Seepage to White Oak Creek	4	0.0012	147.	<0.003	150.
West Waste Pit Seepage to White Oak Creek	5	0.0017	42.	<0.008	43.
Total Liquid Waste Discharged to White Oak Lake		0.2-0.7	189.	<0.1	194.
White Oak Dam to Clinch River	6	0.7	104.	0.09	107.
Gaseous Waste[3]					
3039 Stack	7				4.48
3020 Stack	8				<0.01
3018 Stack	9				0.22
Total Gaseous Waste Discharged to Environment					4.70

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

TX-3142 (11-61)

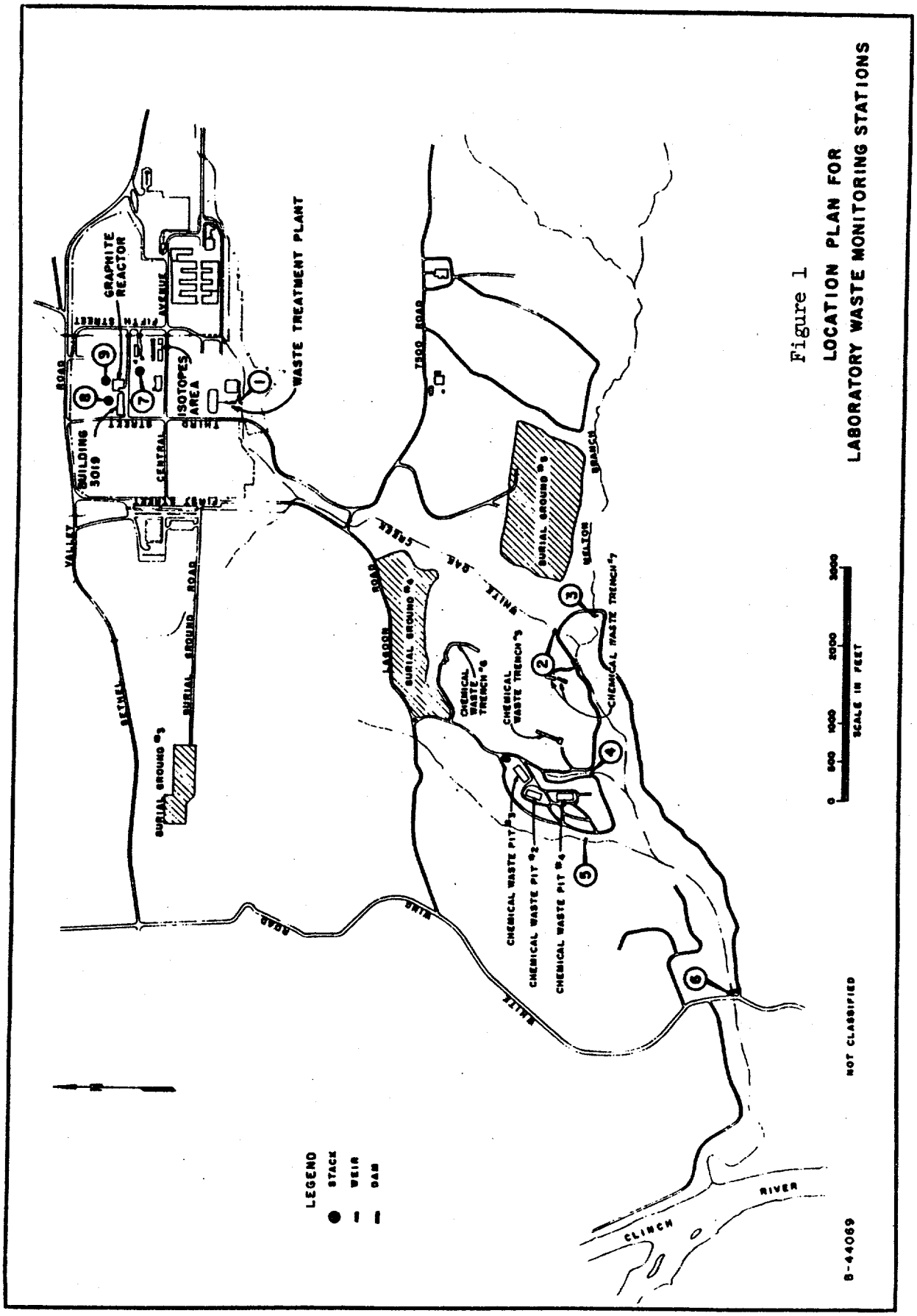

Figure 1
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS

from the Environmental Monitoring Group of the Health Physics Division

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Operation of the process waste treatment plant was normal during the month. Fourteen million gallons of low level waste were treated with a resultant discharge of 0.5 curies of activity. Forty percent of this was strontium (0.2 curies). The overall decontamination efficiency for the plant was 83%. A plot of volumes processed is shown in Figure 2; operational data for the system is given in Table 2. Table 3 gives the volumes of waste generated and the total activity released by the major users of the process waste system.

INTERMEDIATE-LEVEL WASTE

Operation of the intermediate-level waste system was uneventful with 341,000 gallons of waste being transferred to the soil disposal area (see Figure 2). Distribution to the trenches was, as follows:

1.	Trench No. 5	169,200 gallons
2.	Trench No. 7-A	87,000 gallons
3.	Trench No. 7-B	84,900 gallons

Major users of the system were, as follows:

1.	Building 3019	57,600 gallons
2.	Fission Products Development Laboratory	43,600 gallons
3.	Reactor Operations	32,700 gallons
4.	Radioisotopes Processing Area	30,500 gallons
5.	4500 Area	29,200 gallons
6.	Building 3505	15,600 gallons

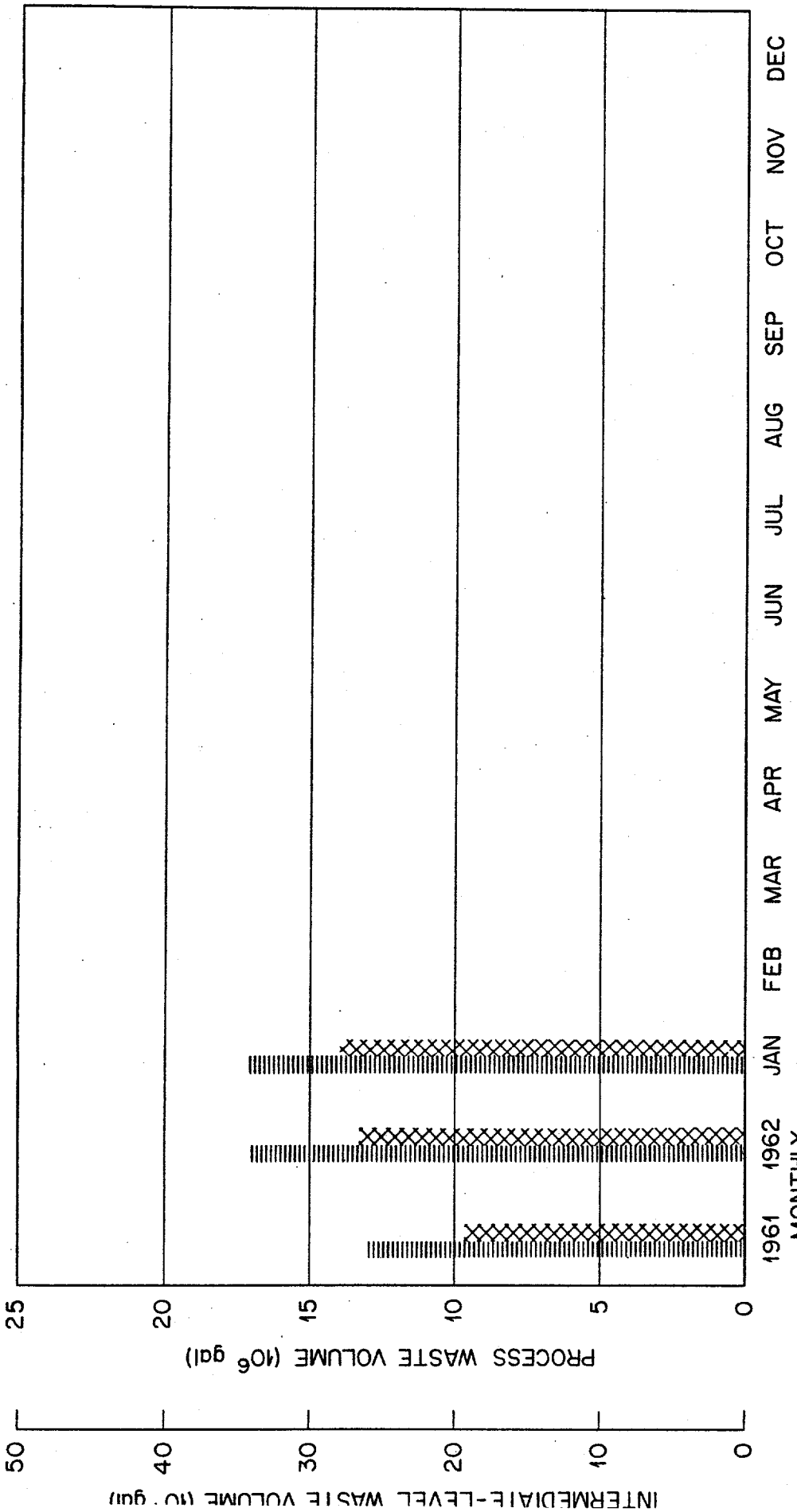

Fig. 2. Liquid Waste Volumes.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 15.9 x 10^6 gals

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.7 x 10^6 gals

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.0	0.2	80
$Ru^{103,106}$	1.5	0.2	87
Co^{60}	0	0	-
Cs^{137}	0.4	0.1	75
TRE	0	0	-
Total	2.9	0.5	83

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS ACTIVITY		VOLUME	
		MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations and Decontamination Facility	5	250	67	3.7	25
2. Buildings 3503 and 3508	4	65	17	1.2	8
3. Radioisotopes Processing Area	8	43	11	0.4	3
4. Buildings 3025 and 3026	1	18	5	1.3	9
5. 4500 Area	0	0		7.2	49
6. Building 3019	0	0		0.7	5
7. Fission Products Development Laboratory	Not Available	-		0.3	2

Pit No. 2 has been completely back-filled and, with Pit No. 3, is now permanently out of service. Pit No. 4 remains open and is used as a disposal facility for sludge from the waste treatment plant.

Complete transfer data on the ILW system is given in Table 4.

CREEK MONITORING

During the month of January a total release of 194 curies to the White Oak Creek system was measured. The strontium release, measured at White Oak Dam, amounted to 0.7 curies (see Figure 3). With 0.2 curies of strontium being released from the process waste system, the remainder is presumed to have come from miscellaneous leakage into the stream along the mile it meanders to the lake bed. It is felt that the half curie in question did not come as a sudden release or else it would have been detected by the radiation monitor at the 7500 Road bridge, which was not the case. Also, the sewer line near the waste treatment plant, which had been responsible for several other releases discussed in previous reports, was plugged in December and is not considered a likely source. Analyses of subsequent samples taken in that vicinity indicate that the repair was successful.

Ordinarily any increase in activity in White Oak Creek occurring below the waste treatment plant discharge is monitored at White Oak Creek Station No. 2. However, during the period of near zero weather experienced this month, freeze-ups were common at all the liquid-waste monitoring stations; and the proportional sampling equipment could not function in several cases. At White Oak Creek the monthly sample was considered

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

NUCLIDE	PITS 2, 3, AND 4[1], curies			TRENCH NO. 5, curies				TRENCH NO. 7-A, curies				TRENCH NO. 7-B, curies			
	Year 1962	Year 1961	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
TOTAL Sr	1513	1657		44	44	1354	1398	33	33	38	71	32	32	32	64
Ru^{106}	741	757		50	50	1274	1324	33	33	358	391	32	32	307	339
Cs^{137}	17561	12889		2091	2091	14749	16840	1554	1554	1588	3142	1523	1523	1668	3191
Co^{60}	111	-		88	88	153	241	43	43	11	54	42	42	9	51
TRE	1141	855		-	-	608	608	-	-	6	6	-	-	5	5
TOTALS[2]	21070	16148	522505	2273	2273	18138	20411	1663	1663	2001	3664	1629	1629	1989	3618

[1] All pits are out of service at this time. [2] Includes other nuclides not listed here.

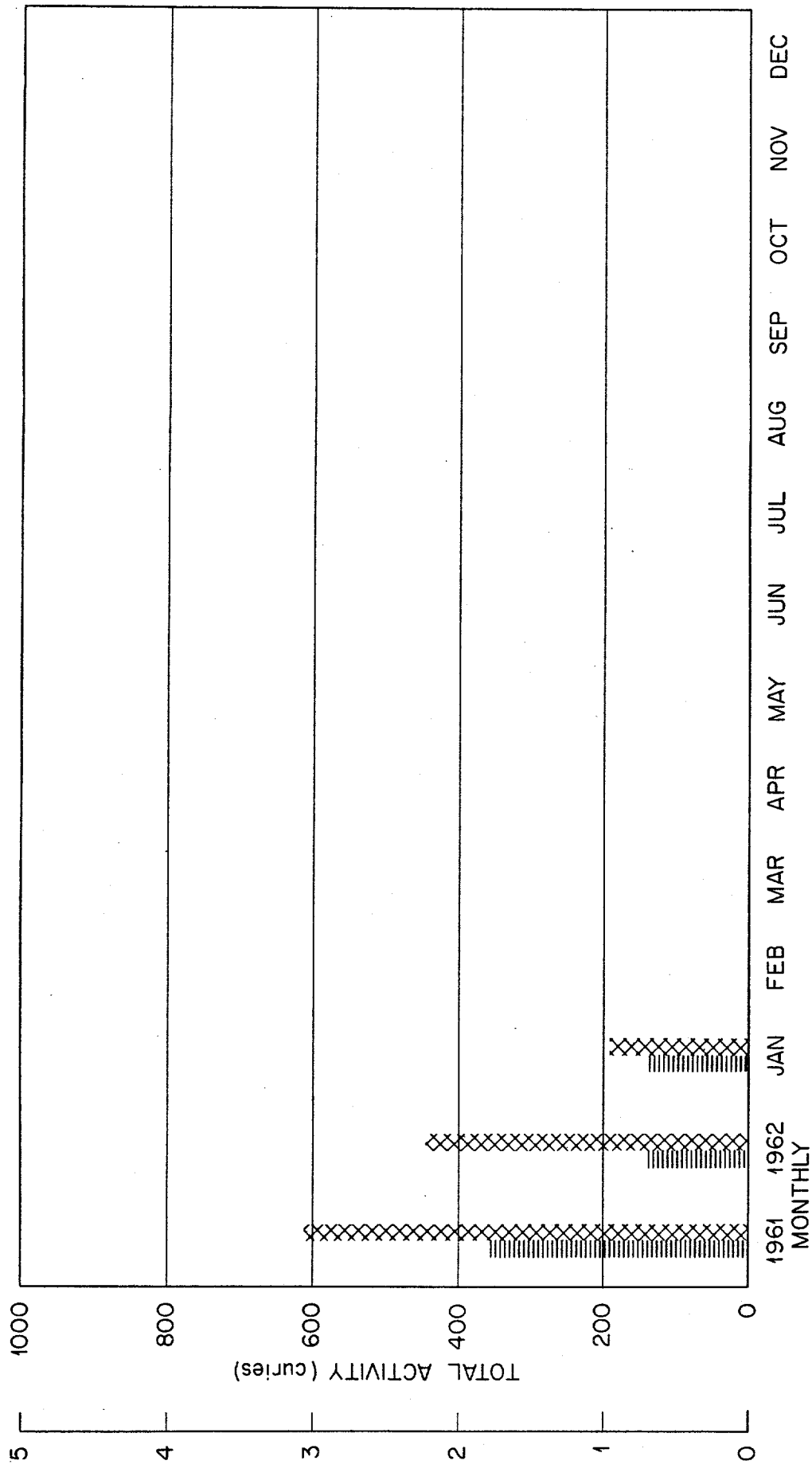

Fig. 3. Liquid Activity Discharge to White Oak Creek.

unreliable as a result of these conditions.

GASEOUS WASTE

The Laboratory discharged 4.48 curies of gaseous activity to the atmosphere during the month. Of this, 34 mc. was filterable. I^{131} and I^{133} were the only nuclides present in significant quantity (see Figure 4).

Operation of the gaseous waste system was normal, with no unusual releases or shutdowns.

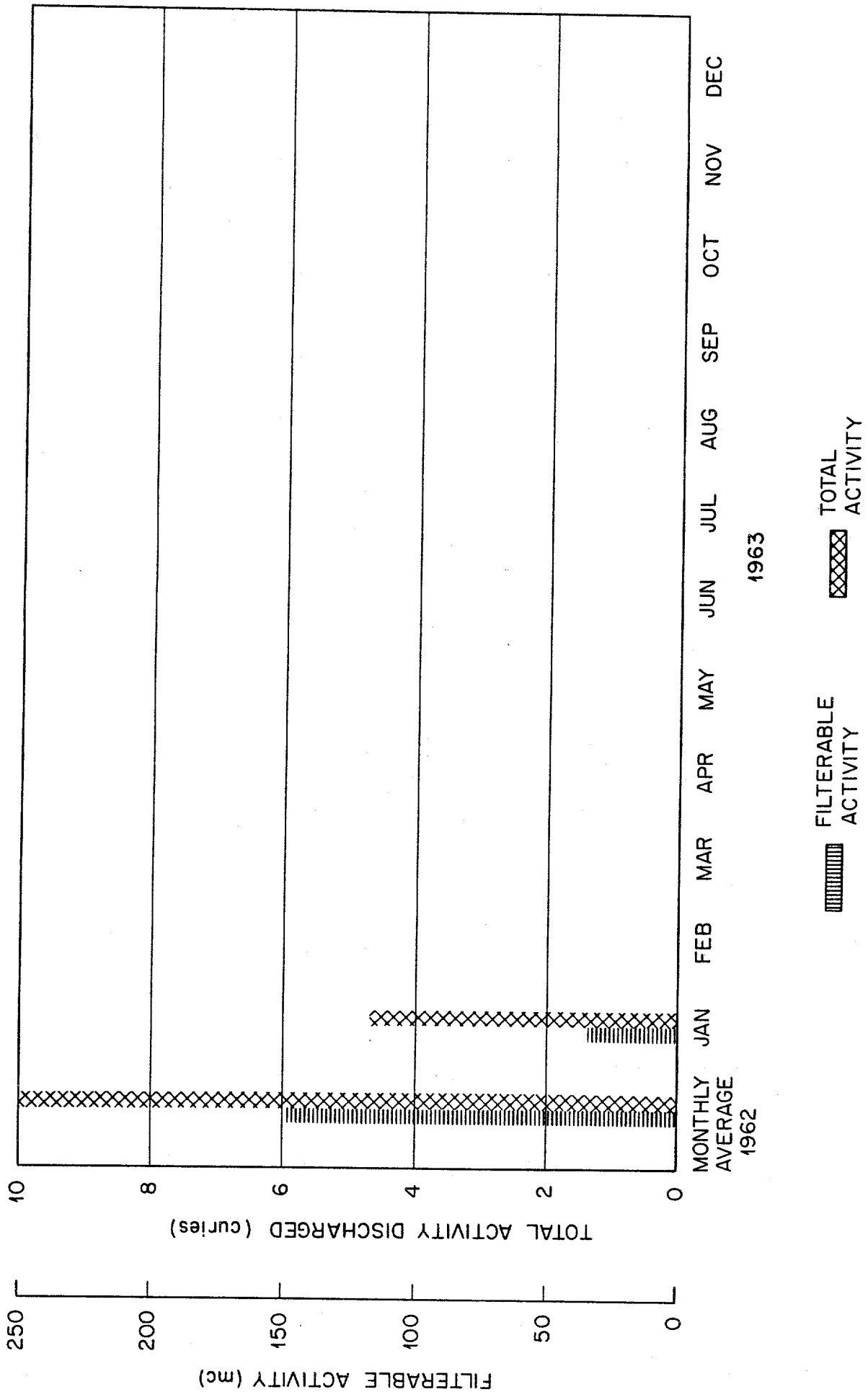

Fig. 4. Gaseous Activity Discharged to Environment.

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CENTRAL FILES NUMBER
63-4-3

COPY NO. 38

DATE: April 1, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for February 1963

TO: Distribution

FROM: J. F. Manneschmidt

NOTICE

INVENTORY OF TOTAL ACTIVITY DISCHARGED

A resume of the total radioactivity discharged to the environment during the month of February by the Laboratory is given in Table 1. Released quantities of Sr, Ru^{106}, and Cs^{137}, nuclides of especial interest, are also included in the table. The data found in this table were derived from routine samples taken at the process waste monitoring stations and diversion box; from the waste treatment plant - settling basin discharge; from White Oak Creek and Melton Branch; from the two seep streams lying east and west of the disposal pit area; and from the three main process stacks. Locations of all but the process waste monitoring stations are shown in Figure 1. The activity contributed by the source titled "Burial Ground No. 4 and Miscellaneous Laboratory Drainage" is arrived at by difference between the radioactivity found in the process waste discharge (Station No. 1) and that measured in White Oak Creek immediately north of its junction with Melton Branch (Station No. 2). Data on releases from White Oak Dam are provided by the Environmental Monitoring Group of the Health Physics Division.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Fourteen million gallons of low level waste were generated by the Laboratory and treated for activity removal (see Figure 2). Early this month an estimated 8 curies of promethium-147 was released from the Isotopes Area into the process waste system. Although only about 30% of this quantity was removed by processing at the waste treatment plant, the remainder, which was discharged to White Oak Creek, increased the concentration in the creek to only 0.2% of MPC_w for that isotope. The

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.3	< 0.1	< 0.1	6.3
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1,2	0.3	0	0.8	1.1
7500 Waste to Melton Branch	3	0.02	0	0	0.02
East Waste Pit Seepage to White Oak Creek	4	0.002	68.	0	69.
West Waste Pit Seepage to White Oak Creek	5	0.0001	21.	0	21.
Total Liquid Waste Discharged to White Oak Lake		0.6	89.	0.8	97.
White Oak Dam to Clinch River	6	1.5	83.	0.2	89.
Gaseous Waste[3]					
3039 Stack	7				1.79
3020 Stack	8				< 0.01
3018 Stack	9				0.17
Total Gaseous Waste Discharged to Environment					1.96

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources gotten by difference between the activities measured at Stations 1 and 2.

TX-3142 (11-61)

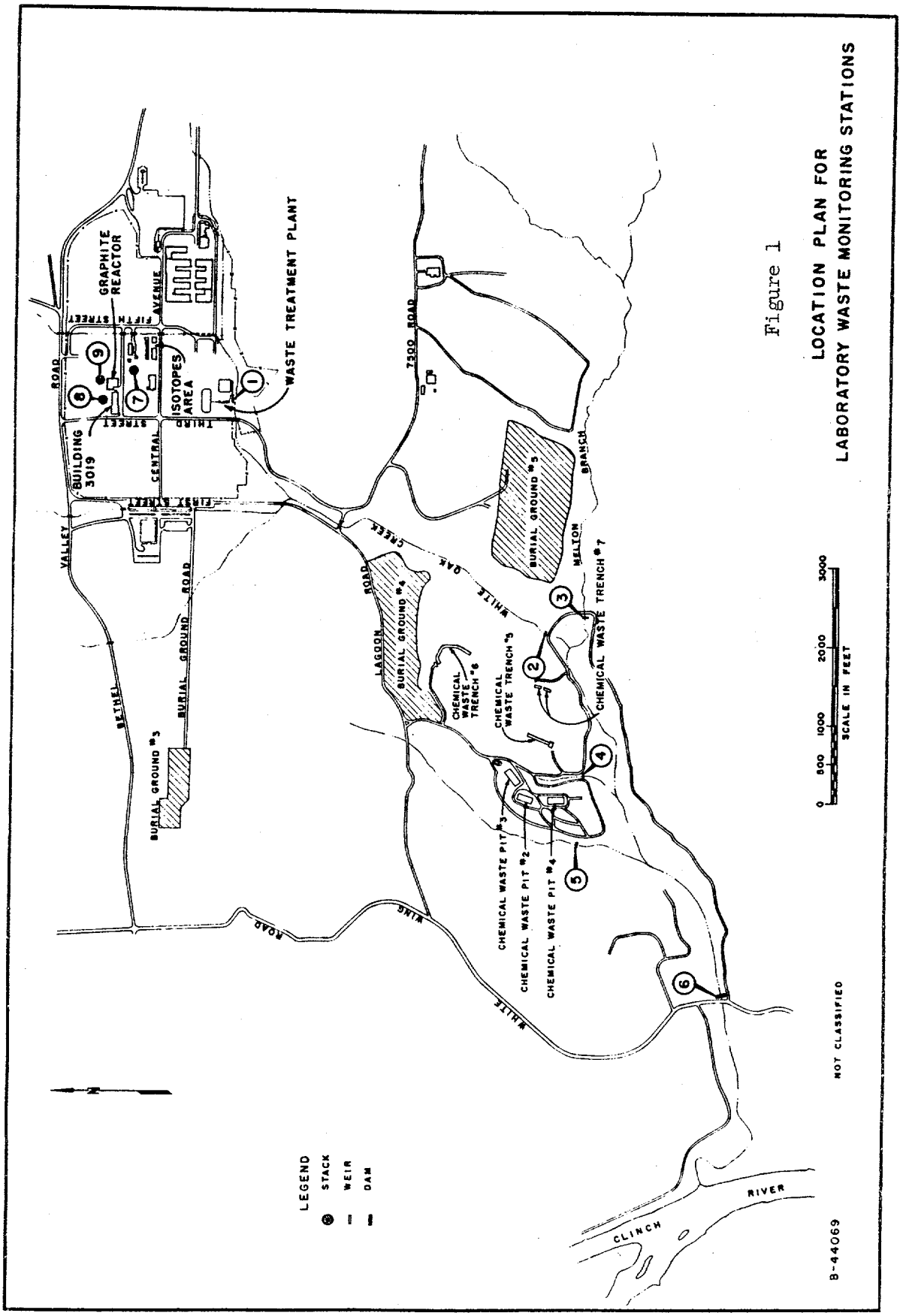
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
WASTE TREATMENT PLANT
GRAPHITE REACTOR
BUILDING 3019
ISOTOPES AREA
FIFTH STREET
CENTRAL AVENUE
THIRD STREET
FIRST STREET
VALLEY ROAD
BETHEL VALLEY ROAD
BURIAL GROUND #3
BURIAL GROUND #4
BURIAL GROUND #5
LAGOON
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE TRENCH #5
CHEMICAL WASTE TRENCH #7
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
7200 ROAD
WHITE OAK CREEK
WHITE OAK BRANCH
MELTON
WHITE KING ROAD
CLINCH RIVER
LEGEND
STACK
WEIR
DAM
0 500 1000 2000 3000
SCALE IN FEET
NOT CLASSIFIED
B-44069

Figure 1

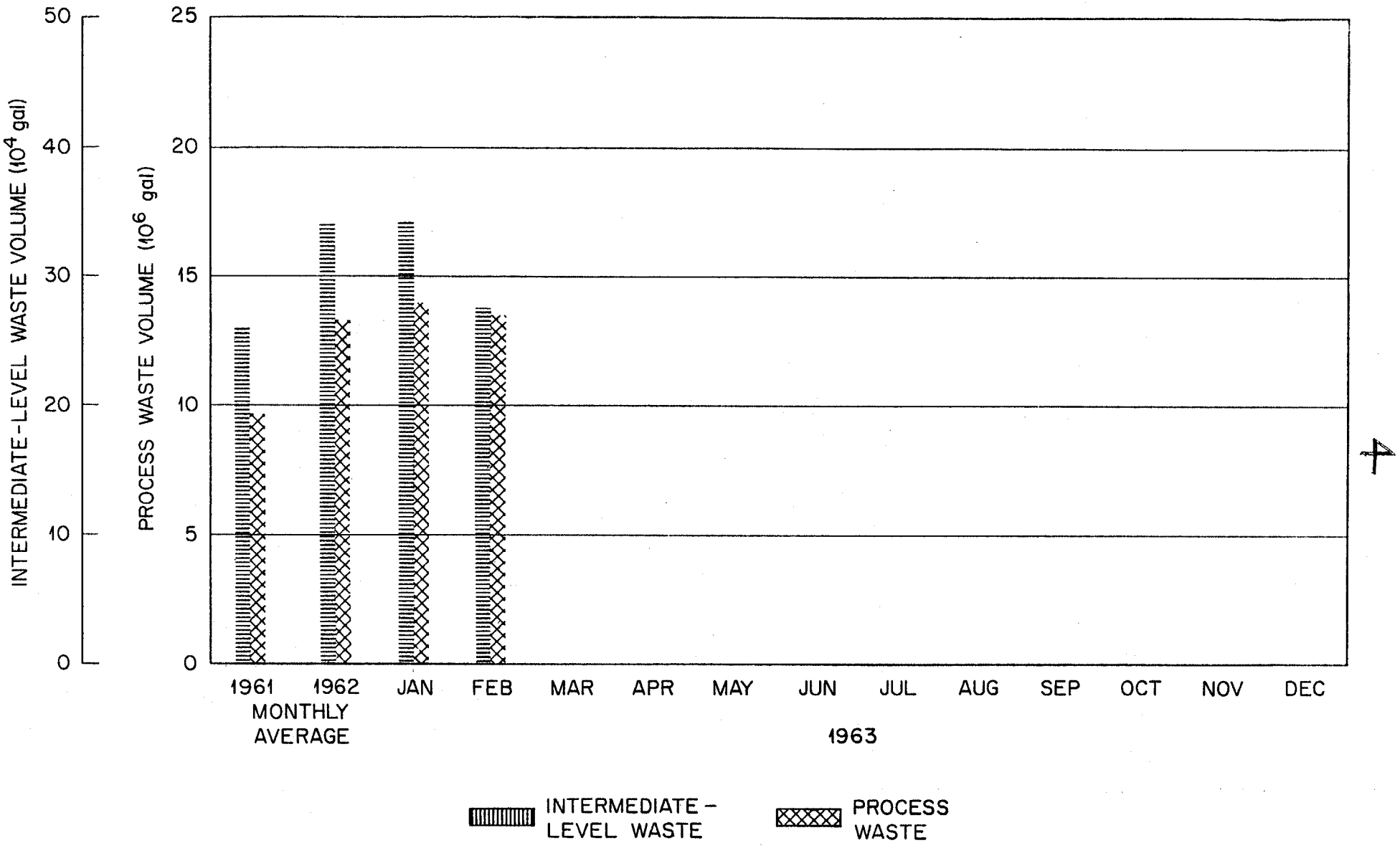

Fig. 2. Liquid Waste Volumes.

decontamination efficiency for other activities in the process-waste stream was essentially the same as in past months (about 80%), with about 0.3 curies of strontium being released (see Figure 3). Operational data for the treatment plant is given in Table 2. Table 3 lists the major users of the system and gives the quantity of activity and the volume of waste generated by each.

INTERMEDIATE-LEVEL WASTE

During the month 276,000 gallons of intermediate level waste was transferred to the disposal trenches (see Figure 2). Distribution was as follows:

1.	Trench No. 5	135,600 gallons
2.	Trench No. 7-A	64,800 gallons
3.	Trench No. 7-B	75,600 gallons

Major contributors to the ILW system were, as follows:

1.	Building 3019	57,200 gallons
2.	Radioisotopes Processing Area	31,400 gallons
3.	Building 3505	28,800 gallons
4.	Reactor Operations	21,900 gallons
5.	4500 Area	16,400 gallons
6.	Fission Products Development Laboratory	10,400 gallons

During the second week of the month, daily samples were taken from two seep streams east and west of the Trench No. 7 area. Analyses of these samples and estimates of the flow rates involved indicate that approximately 30 millicuries/day of Ru^{106} and 4 millicuries/day of Co^{60} are

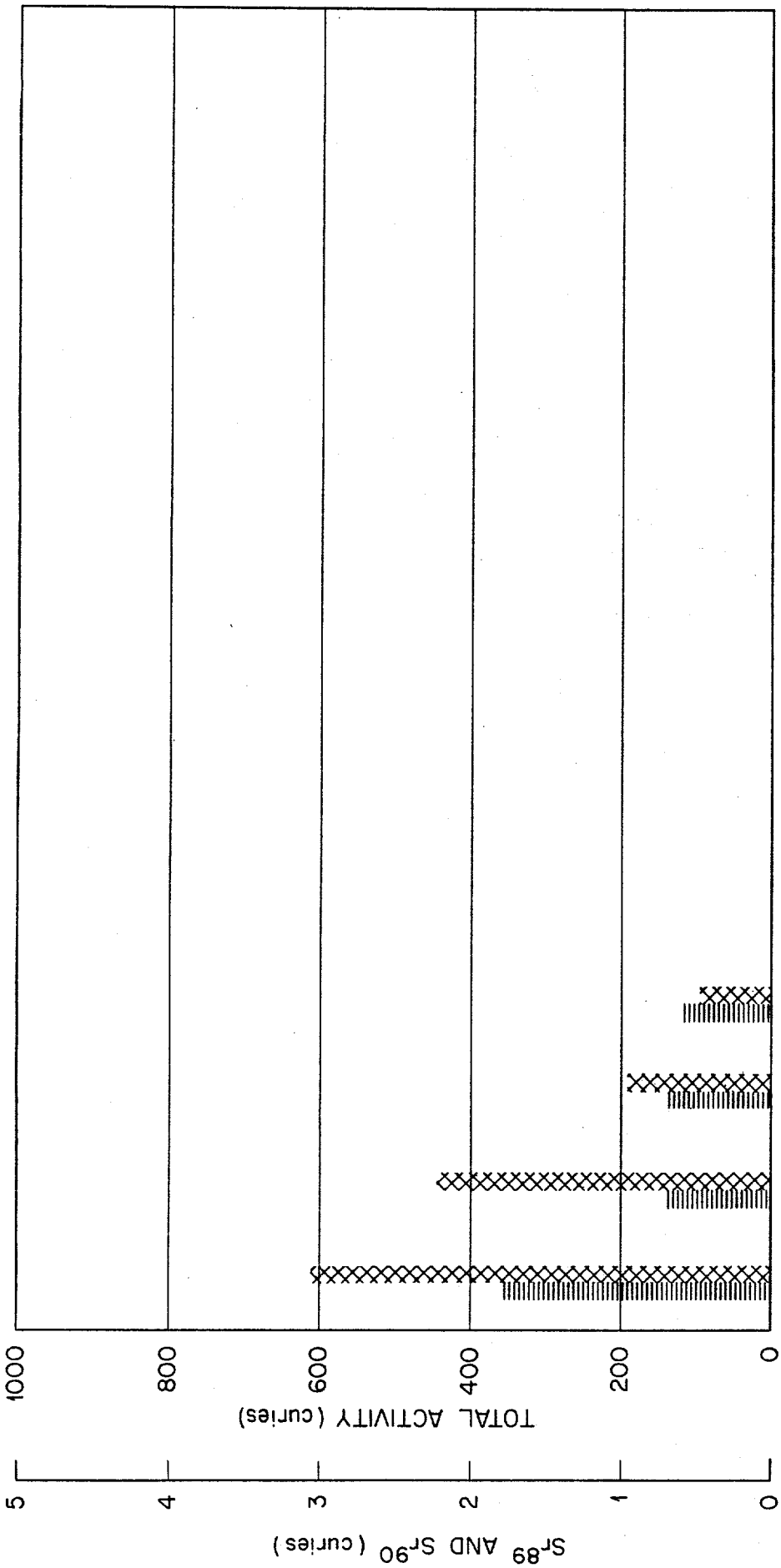

Fig. 3. Liquid Activity Discharge to White Oak Creek.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 14.1×10^6 gals

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.0	0.3	73
$Ru^{103,106}$	0.5	0.1	74
Co^{60}	0.07	0.05	30
Cs^{137}	0.5	0.1	74
TRE	0	0	-
Pm^{147}	8.4	6.0	29
Total	10.5	6.3-6.6	37-40

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS ACTIVITY*		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	25	1,100	62	3.3	25
2.	Radioisotopes Processing Area	97	550	31	0.4	3
3.	Buildings 3503 and 3508	7	100	6	1.2	9
4.	Buildings 3025, 3026 and 3550	1	15	< 1	1.0	7
5.	Building 3019	2	8	< 1	0.3	2
6.	Fission Products Development Laboratory	29	6	1	0.1	1
7.	4500 Area	< 1	0	0	7.1	53

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

being released by the trench to these two streams. Absorption studies failed to show the presence of Sr^{90} or other low-energy beta emitters. Periodic monitoring of the area will be continued.

Complete transfer data for the intermediate-level waste system is given in Table 4.

CREEK MONITORING

The total discharge of radioactivity to White Oak Creek fell below one hundred curies for the month of February (see Figure 3). This is the lowest discharge for a single month on record; however, it is not to be confused with the total White Oak Dam release which is also included in this report and is customarily lower. The strontium release continues at about 0.6 curies, half of which is from unknown sources.

Eight hundred millicuries of Cs^{137} were measured in the creek this month; this was traced to a leak which developed into the sanitary sewer system in the vicinity of the intermediate-level waste monitoring tank, WC-1. Samplings indicate that approximately 1 millicurie/day of strontium, in addition to cesium, is seeping from the area via this leak. An appraisal is being made to determine the most expedient way to correct the situation.

As mentioned earlier, 6 curies of Pr^{147} reached the stream system as the result of an inadvertant discharge. In spite of the magnitude of this release, the hazard involved was slight since the MPC_w for this isotope is quite high (greater than 1000 times the MPC_w for Sr^{90}).

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

NUCLIDE	PITS 2, 3, AND 4[1], curies			TRENCH NO. 5, curies				TRENCH NO. 7-A, curies				TRENCH NO. 7-B, curies			
	Year 1961	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
TOTAL Sr	1657	1513		59	103	1354	1457	7	40	38	78	9	41	32	73
Ru^{106}	757	741		92	142	1274	1416	31	64	358	422	36	68	307	375
Cs^{137}	12889	17561		4227	6318	14749	21067	2011	3565	1588	5153	2346	3869	1668	3227
Co^{60}	-	111		268	356	153	509	91	134	11	145	106	148	9	157
TRE	855	1141		-	-	608	608	-	-	6	6	-	-	5	5
TOTALS[2]	16148	21070	522505	4646	6919	18138	25057	2140	3803	2001	5804	2497	4126	1989	6115

[1] All pits are out of service at this time. [2] Includes other nuclides not listed here.

GASEOUS WASTE

A total discharge of 1.96 curies of radioactivity was emitted from the Laboratory's gaseous waste system during the period. Of this, only 21 millicuries was filterable. This total is the lowest recorded since the in-stack samplers were installed and is part of a steady downward trend extending over the last ten months. (See Figure 4)

In addition to the I^{131} which is always emitted in greatest quantity, millicurie amounts of Eu^{154} were discharged via the cell-ventilation system from the hot-cell area in Building 3025; and Cs^{137} was continually detected in the cell-ventilation exhaust from the 3500 area. The latter isotope was apparently evolved during glass grinding and carbonate dissolution processes which were taking place in Building 3517. The operators involved in both areas were notified and have taken corrective steps.

One bank of absolute filters in the off-gas facility was replaced during the month. There were no equipment changes, failures, or shutdowns elsewhere in the system at any time.

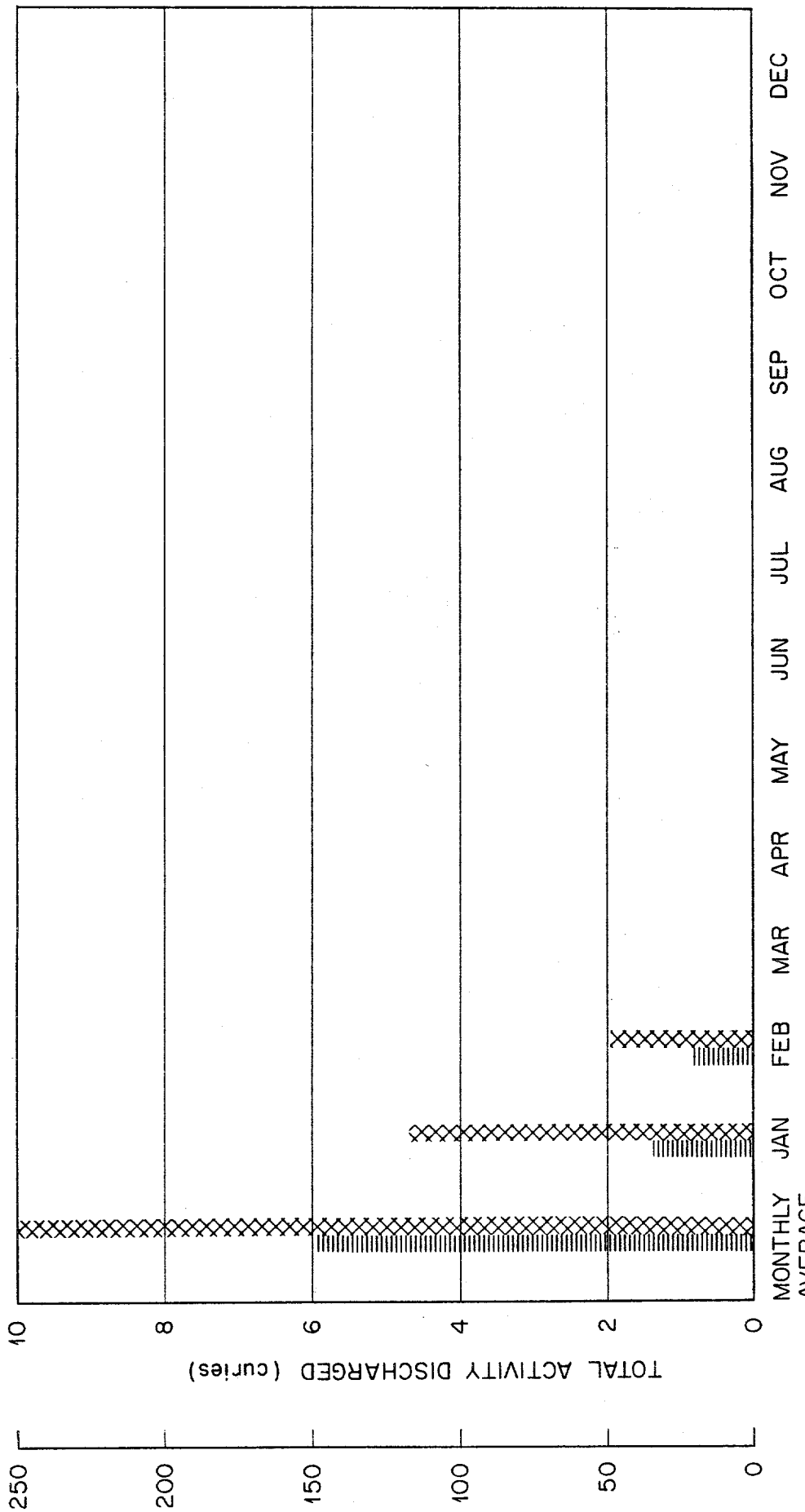

Fig. 4. Gaseous Activity Discharged to Environment.

UCN-2383
(3 11-60)

OAK RIDGE NATIONAL LABORATORY
Operated by
UNION CARBIDE NUCLEAR COMPANY
Division of Union Carbide Corporation
UCC
Post Office Box X
Oak Ridge, Tennessee

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DATE: May 2, 1963

COPY NO. 38

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 gives a summary of data obtained from sampling stations monitoring Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Data pertaining to White Oak Dam releases was provided by the Health Physics Division. Available data cannot account for the abnormally high strontium release attributed to miscellaneous Laboratory drainage. However, several rainstorms, averaging from 2-3 inches of precipitation per day, occurred during the period; and one can speculate that during periods of high flow some of the activity was scoured from the creek bed. It is also probable that the actual strontium release may have been appreciably lower than that shown in Table 1 and Figure 3 since during the heavy rains, when the dilution in the creek was greatest, the creek flow exceeded the capacity of the weir and sampling equipment at station No. 2, and at one time, the station was completely flooded out of service.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Approximately 15 million gallons were processed by the plant during the month. An estimated 1.6 million gallons were discharged to the creek without treatment when the capacity of the plant was exceeded during periods of heavy rainfall. The decontamination efficiency of the plant and settling basin remained acceptable, in spite of the plant bypassing operation. Tables 2 and 3 and Figure 2 summarize operations for the period.

The emergency pond was emptied this month. The pump and pipe-line to

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.5	<0.3	<0.1	<0.9
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1,2	1.5	0	1.9	3.4
7500 Waste to Melton Branch	3	0.2	<0.1	<0.6	<0.9
East Waste Pit Seepage to White Oak Creek	4	0.0007	79	0	81
West Waste Pit Seepage to White Oak Creek	5	0.0014	26	0	26
Total Liquid Waste Discharged to White Oak Lake		2.2	105	2	112
White Oak Dam to Clinch River	6	1.5	86	0.4	93
Gaseous Waste[3]					
3039 Stack	7				6.09
3020 Stack	8				<0.01
3018 Stack	9				0.14
Total Gaseous Waste Discharged to Environment					6.23

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources derived by difference between the activities measured at Stations 1 and 2.

TX-3142 (11-61)

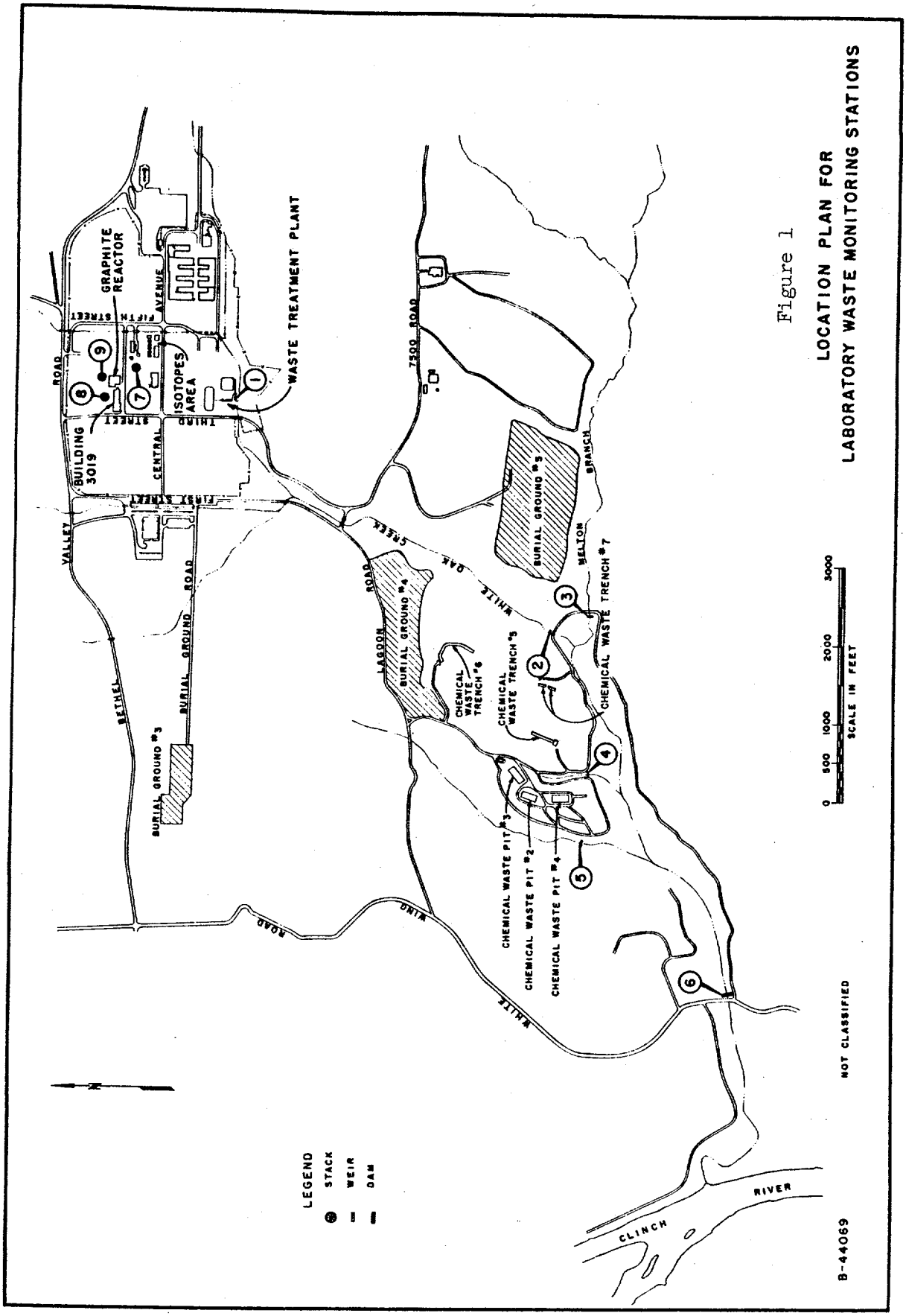
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
WASTE TREATMENT PLANT
GRAPHITE REACTOR
BUILDING 3019
ISOTOPES AREA
FIFTH STREET
CENTRAL AVENUE
THIRD STREET
FIRST STREET
BETHEL VALLEY ROAD
BURIAL GROUND #3
BURIAL GROUND ROAD
7500 ROAD
WHITE OAK CREEK
WHITE OAK LAKE
LAGOON ROAD
BURIAL GROUND #4
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE TRENCH #5
CHEMICAL WASTE TRENCH #7
BURIAL GROUND #5
MELTON BRANCH
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
WHITE OAK ROAD
CLINCH RIVER
LEGEND
STACK
WEIR
DAM
0 500 1000 2000 3000
SCALE IN FEET
NOT CLASSIFIED
B-44069

Figure 1

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 14.7×10^6

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.9×10^6

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.4	0.5	64
$Ru^{103,106}$	1.5	$<$ 0.3	80
Co^{60}	0.2	Not detected	100
Cs^{137}	0.9	$<$ 0.1	89
TRE	-	-	-
Total	4.0	0.5 - 0.9	78 - 88

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS ACTIVITY*		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	22	1,166	43.8	3.9	23.9
2.	Radioisotopes Processing Area	36	288	10.8	0.6	3.7
3.	Buildings 3503 and 3508	9	162	6.1	1.3	8.0
4.	Buildings 3025, 3026 and 3550	9	171	6.4	1.4	8.6
5.	Building 3019	6	66	2.5	0.8	4.9
6.	Fission Products Development Laboratory	52	156	5.8	0.2	1.2
7.	4500 Area	6	654	24.6	8.1	49.7

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

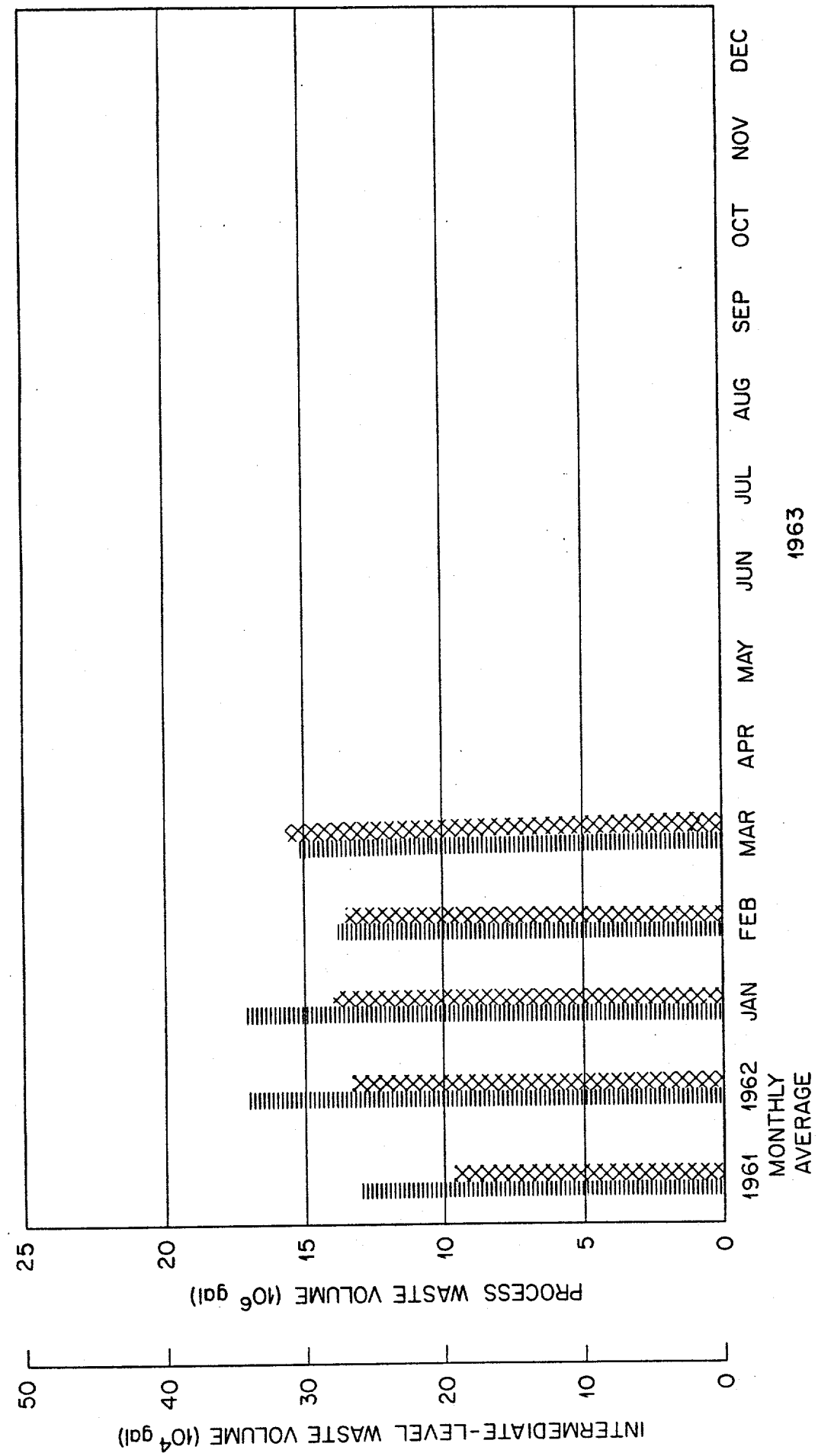

Fig. 2. Liquid Waste Volumes.

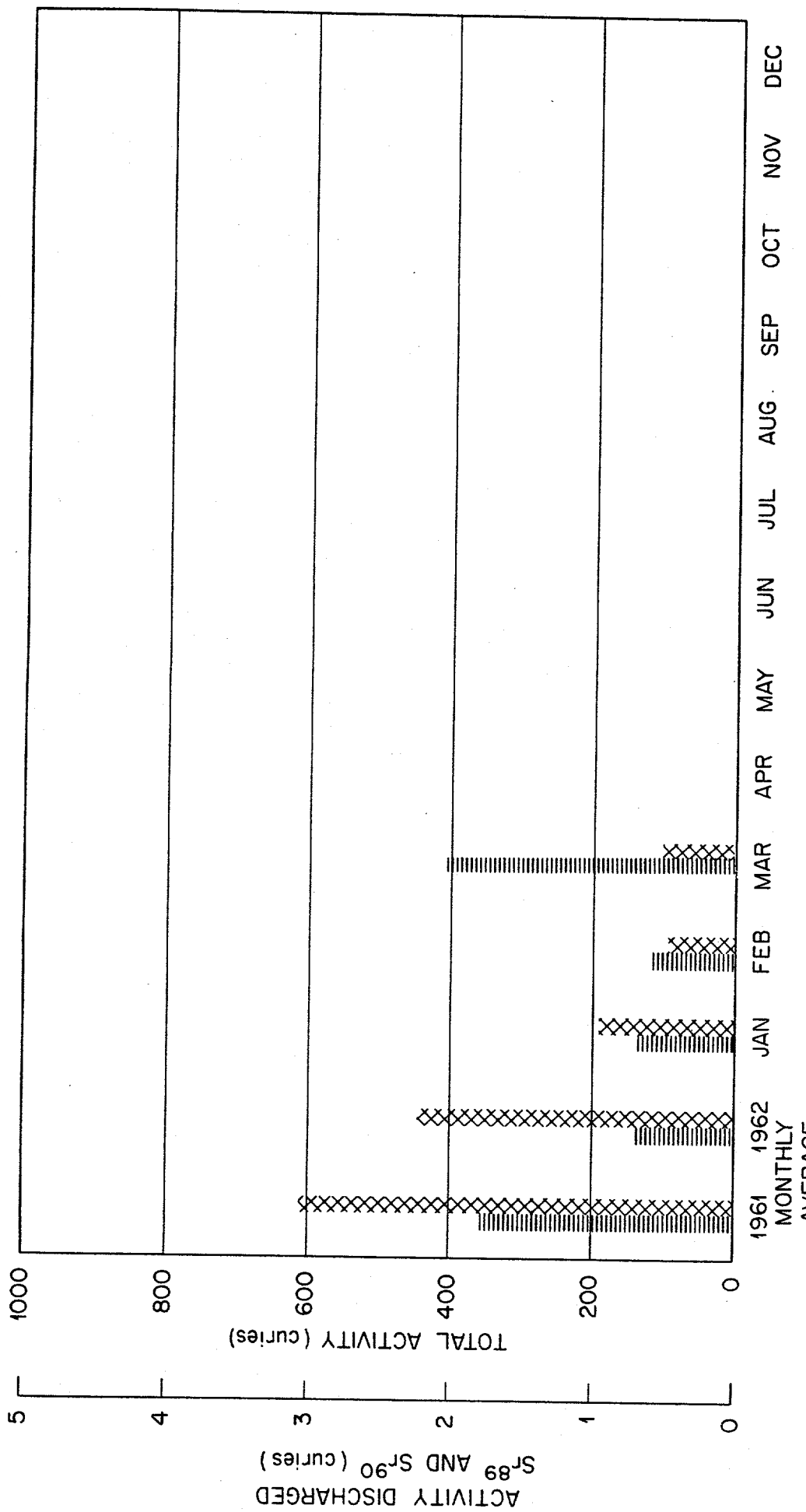

Fig. 3. Liquid Activity Discharge to White Oak Creek.

pond were tested under static conditions and found to be operable.

INTERMEDIATE LEVEL WASTES

During the month, 301,000 gallons of waste were transferred to the soil disposal trenches as shown in Table 4. Distribution between the trenches was as follows:

1.	Trench No. 5	98,400 gallons
2.	Trench No. 7-A	108,000 gallons
3.	Trench No. 7-B	94,800 gallons

Major contributors to the system are listed below:

1.	Building 3019	57,650 gallons
2.	Radioisotopes Processing Area	37,103 gallons
3.	Fission Products Development Laboratory	29,970 gallons
4.	Reactor Operations	23,725 gallons
5.	4500 Complex	14,750 gallons

Analyses of samples taken from the trench 7 drainage area indicate that the approximate rates of release of strontium, ruthenium, and cobalt are as listed below:

$Sr^{89,90}$	< 1.6 μc/day
Ru^{106}	20 mc/day
Co^{60}	6 mc/day

GASEOUS WASTE SYSTEM

An identified 6.2 curies of radioactivity (predominently I^{131}) was released to the atmosphere during the month. A small portion of this total,

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

NUCLIDE	PITS 2, 3, AND 4[1], curies			TRENCH NO. 5, curies				TRENCH NO. 7-A, curies				TRENCH NO. 7-B, curies			
	YEAR 1961	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
TOTAL Sr	1657	1513		2	105	1354	1459	13	53	38	91	11	52	32	84
Ru^{106}	757	741		108	250	1274	1524	106	170	358	528	94	162	307	469
Cs^{137}	12889	17561		1668	7986	14749	22735	1584	5149	1588	6737	1408	5277	1668	6945
Co^{60}	-	111		12	368	153	521	23	157	11	168	20	168	9	177
TRE	855	1141		-	-	608	608	-	-	6	6	-	-	5	5
TOTALS[2]	16158	21067	522505	1790	8709	18138	26847	1726	5529	2001	7530	1533	5659	2021	7680

[1]Pits 3 and 4 are out of service at this time. [2]Includes other nuclides not listed here.

47 millicuries, was particulate. Cesium activity was continually detected by the 3039 stack monitoring system; however, the total release only amounted to 11 millicuries. In addition, microcurie amounts of short-lived alpha activity were detected in the 3039 effluent. Analysis of tape samples indicated the presence of Ra^{224}, Bi^{212}, Po^{212}, and Po^{216}. Figure 4 compares the gaseous waste released by the Laboratory during the first quarter of 1963 and includes the monthly average for 1962.

The 3039 stack equipment operated without incident. A number of minor piping changes, notably steam bypasses to the turbines, were completed. The 2000 cfm off-gas system has been reactivated and is currently used as a second standby for the 4000 cfm system.

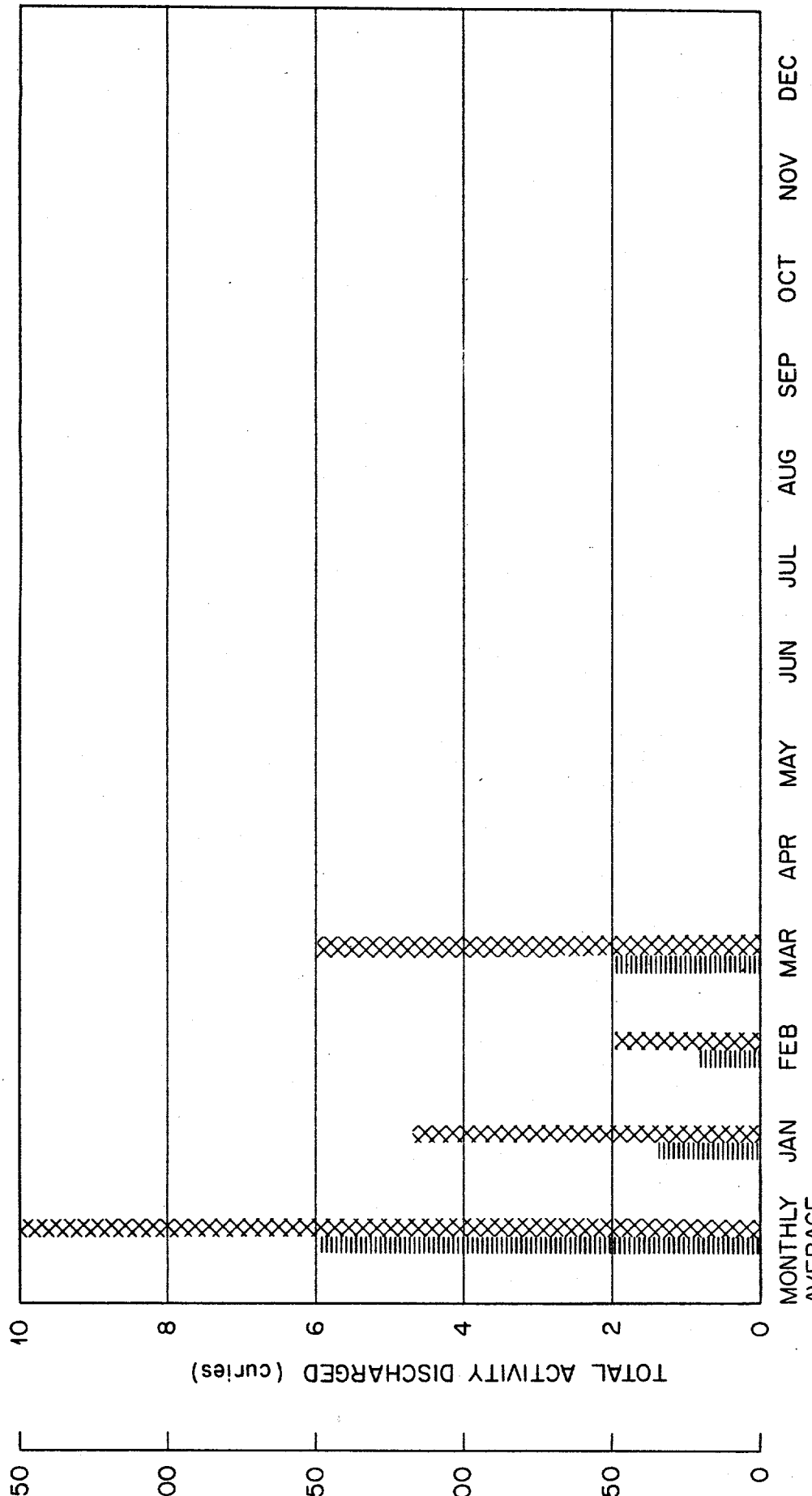

Fig. 4. Gaseous Activity Discharged to Environment.

Distribution:

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2. T. A. Arehart
3. W. A. Arnold
4. Walter Belter, AEC-DRD, Washington, D. C.
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ORNL
CENTRAL FILES NUMBER
63-5-75

COPY NO. 38

DATE: May 29, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of April 1963

TO: Distribution

FROM: L. C. Lasher

NOTICE

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 gives a summary of data obtained from the sampling stations which monitor Laboratory waste effluents. The physical locations of these stations are shown by Figure 1. Data pertaining to the White Oak Dam were provided by the Health Physics Division. The total discharge to White Oak Lake increased slightly during the month, mainly because of the Ruthenium activity seeping from the open pit disposal area (see Table 1 and Figure 3). However, the strontium and cesium effluents declined sharply. The total strontium discharge was 0.4 curies; and, of this total, 0.1 curies was attributed to miscellaneous drainage (1.5 curies detected during March). On the basis of previous experience, the Decontamination Laundry, Sewage Plant, and Burial Grounds probably account for one half of this miscellaneous activity, leaving only 50 millicuries unaccounted for. This is within the limits of sampling and analytical error; the material balance for this month was satisfactory.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Approximately 15 million gallons of low-level waste were processed during April. The plant capacity was exceeded for the second consecutive month; approximately 0.5 million gallons were discharged without treatment into the creek. An upward trend of waste volume, shown in Figure 2, has resulted from additional operations initiated in the 4900 area and at Buildings 3025 and 3525.

A mechanical failure of a chemical feeder probably contributed to the unsatisfactory plant decontamination factors. No abnormal discharge of

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.3	<0.03	<0.1	<0.4
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1, 2	0.1	00	0	0.2
7500 Waste to Melton Branch	3	0.02	0.003	0.002	0.03
East Waste Pit Seepage to White Oak Creek	4	0.001	88	0.003	88
West Waste Pit Seepage to White Oak Creek	5	0.004	38	0.01	39
Total Liquid Waste Discharged to White Oak Lake		0.4	126	<0.1	128
White Oak Dam to Clinch River	6	0.28	11.6	0.06	12.65
Gaseous Waste[3]					
3039 Stack	7				3.2
3020 Stack	8				<0.01
3018 Stack	9				0.1
7500 Stack	10				- -
Total Gaseous Waste Discharged to Environment					3.3

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources derived by difference between the activities measured at Stations 1 and 2

TX-3142 (11-61)

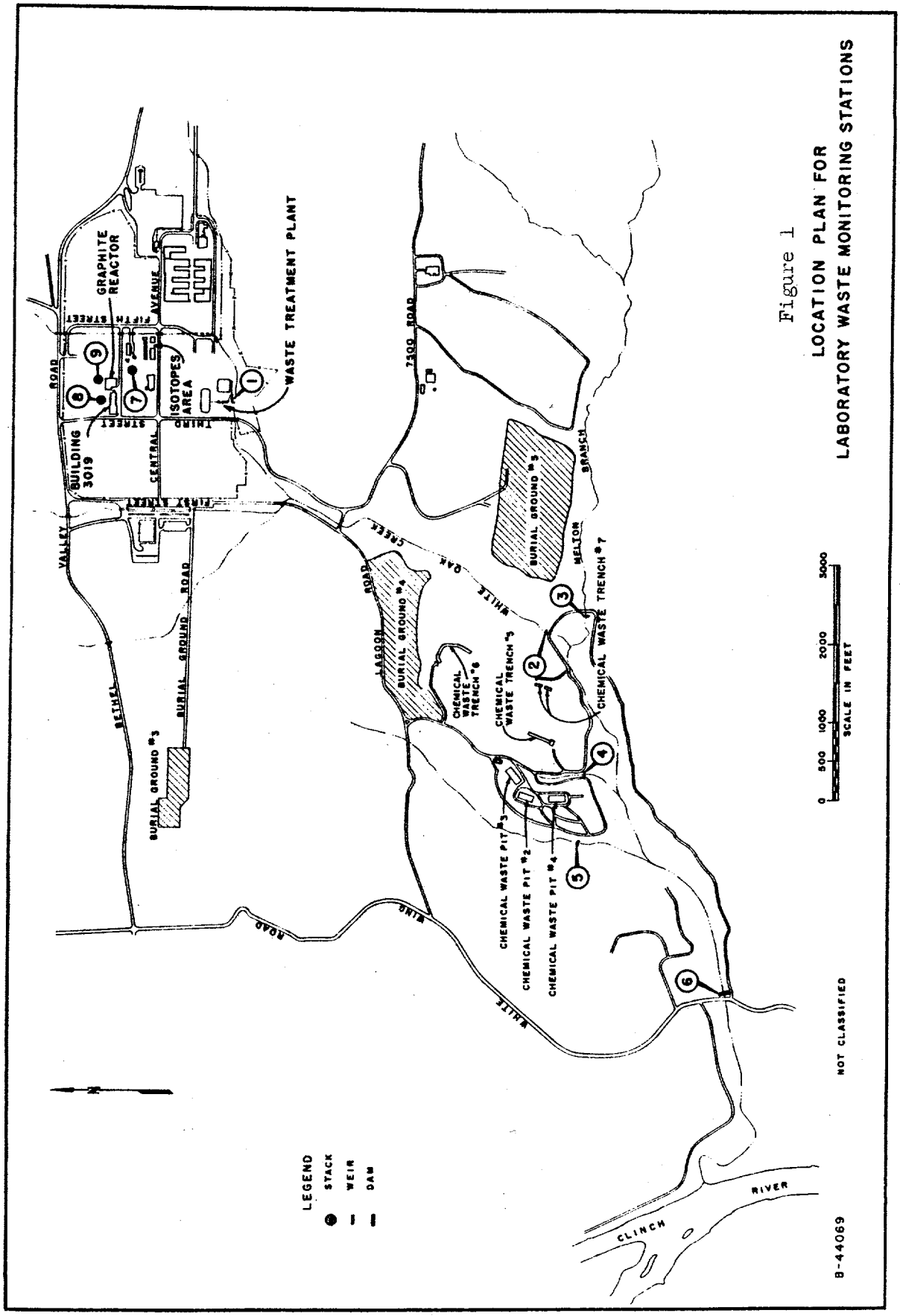
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS
WASTE TREATMENT PLANT
GRAPHITE REACTOR
FIFTH STREET
AVENUE
ISOTOPES AREA
BUILDING 3019
CENTRAL
STREET
TWINING
ROAD
VALLEY
BETHEL
BURIAL GROUND #3
BURIAL GROUND
ROAD
2300 ROAD
WHITE OAK CREEK
LAGOON
BURIAL GROUND #4
CHEMICAL WASTE TRENCH #6
CHEMICAL WASTE TRENCH #5
CHEMICAL WASTE PIT #3
CHEMICAL WASTE PIT #2
CHEMICAL WASTE PIT #4
BURIAL GROUND #5
MELTON BRANCH
CHEMICAL WASTE TRENCH #7
WHITE
ROAD
CLINCH
RIVER
LEGEND
STACK
WEIR
DAM
0 500 1000 2000 3000
SCALE IN FEET
NOT CLASSIFIED
B-44069

Figure 1

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 14.8×10^6

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.5×10^6

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	0.8	0.3	63
$Ru^{103,106}$	0.3	<0.03	>90
Co^{60}	None detected	None detected	--
Cs^{137}	0.3	<0.1	>67
TRE	No analysis	No analysis	--
Total	1.4	<0.4	>72

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS ACTIVITY*		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	16	816	73	3.8	24
2.	Radioisotopes Processing Area	9	72	6	0.6	4
3.	Buildings 3503 and 3508	2	28	3	1.0	6
4.	Buildings 3025, 3026 and 3550	2	40	4	1.5	10
5.	Building 3019	16	112	10	0.5	3
6.	Fission Products Development Laboratory	16	48	4	0.2	1
7.	4500 Area	0	- -	- -	8.2	52

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

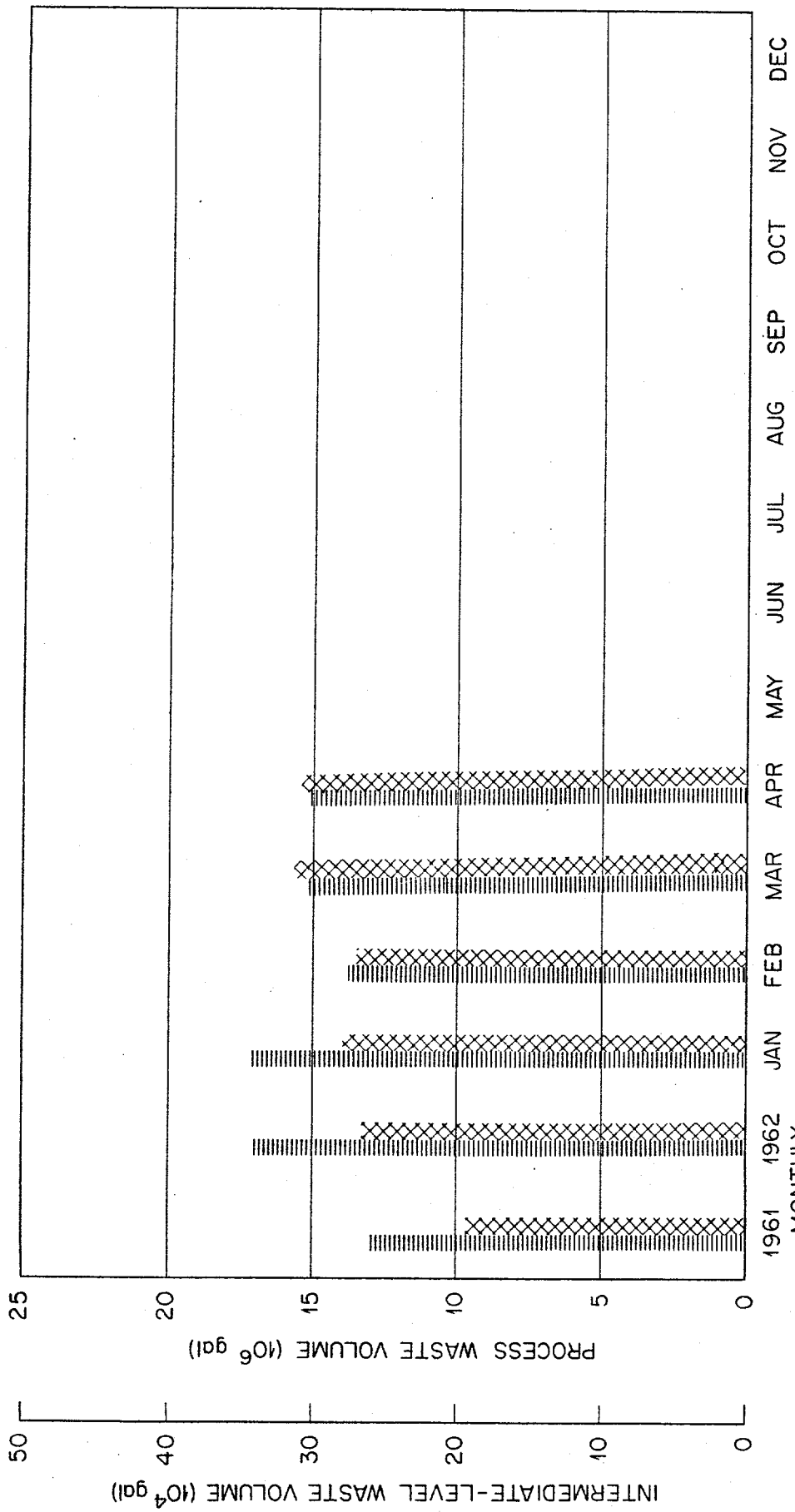

Fig. 2. Liquid Waste Volumes.

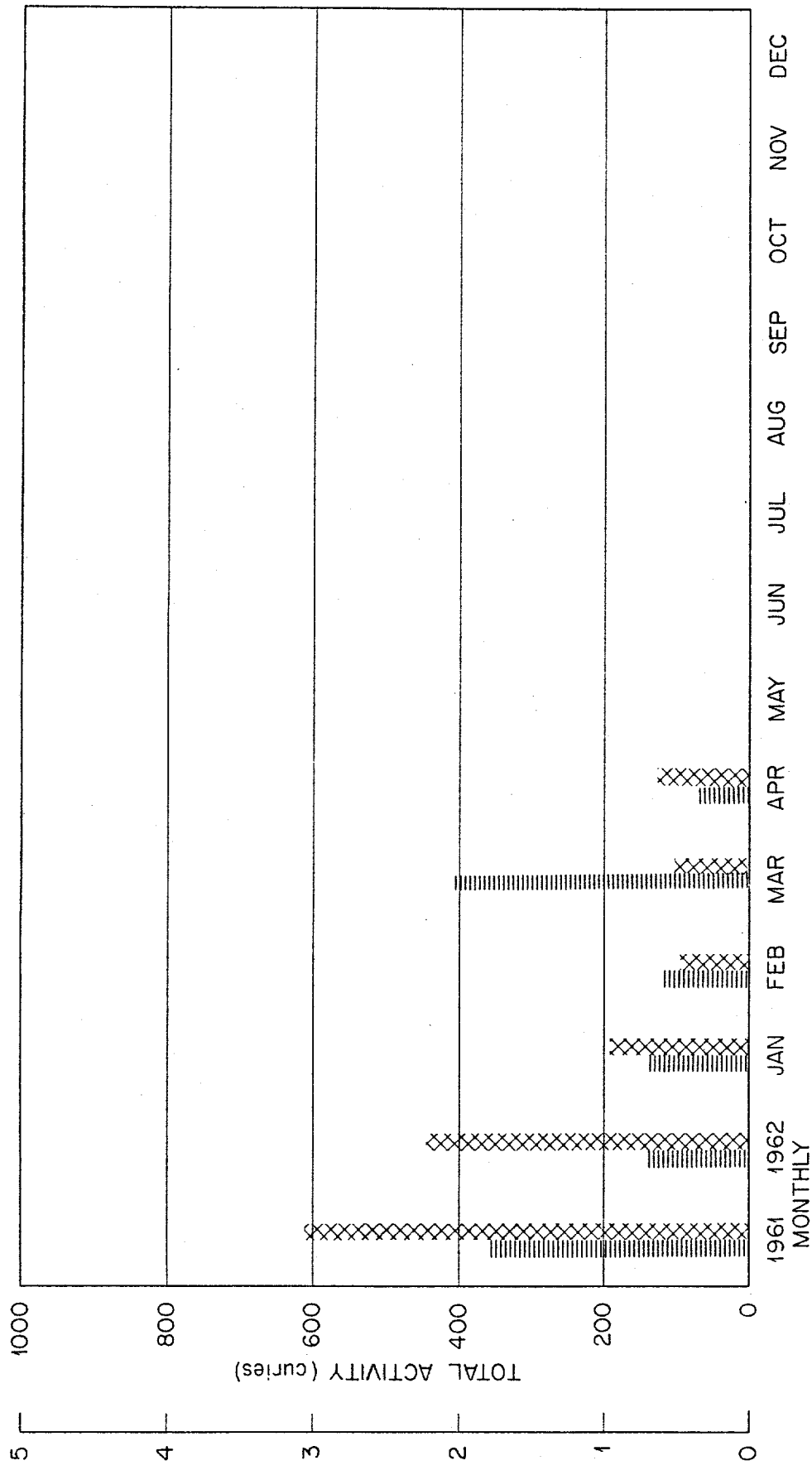

Fig. 3. Liquid Activity Discharge to White Oak Creek.

radioactivity occurred during the month. Tables 2 and 3 present a summary of operations for the period.

INTERMEDIATE-LEVEL WASTES

A total of 301,200 gallons of waste was pumped to the trenches during the month. Distribution between the trenches is indicated below:

1.	Trench No. 5	164,400 gallons
2.	Trench No. 7-A	39,000 gallons
3.	Trench No. 7-B	97,200 gallons

Major contributors to the system are listed below:

1.	Building 3019	77,650 gallons
2.	Radioisotopes Processing Area	40,465 gallons
3.	Fission Products Development Laboratory	30,390 gallons
4.	Canal at Building 3505	24,000 gallons
5.	Reactor Operations	20,760 gallons
6.	4500 Complex	10,550 gallons

Table 4 gives an inventory of the radioactivity transported to the soil disposal areas.

CREEK MONITORING

There was no significant release of radioactivity into White Oak Creek during the period. However, microcurie quantities of Na^{24} were detected by the monitoring system early in the month. This activity was traced to the Research Reactor and subsequently eliminated.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

NUCLIDE	PITS 2, 3, AND 4[1], curies			TRENCH NO. 5, curies				TRENCH NO. 7-A, curies				TRENCH NO. 7-B, curies			
	YEAR 1961	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
TOTAL Sr	1657	1513		54	159	1354	1513	26	79	38	117	62	114	32	146
Ru^{106}	757	741		36	286	1274	1560	20	190	358	548	48	210	307	517
Cs^{137}	12889	17561		1019	9005	14749	23754	457	5606	1588	7194	1116	6393	1668	8061
Co^{60}	- -	111		15	383	153	536	13	170	11	181	32	200	9	209
TRE	855	1141		- -	- -	608	608	--	- -	6	6	--	--	5	5
TOTALS[2]	16158	21067	522505	1124	9833	18138	27971			5529	8046			2021	8938

[1]All Pits are out of service at this time. [2]Includes other nuclides not listed here.

GASEOUS WASTE SYSTEM

A total of 3.3 curies of identifiable activity was discharged from the stack systems serving the Laboratory (see Table 1). Filterable activity remained essentially unchanged at 53 millicuries (see Figure 4); most of it (48 mc) was Cs^{137} from the Fission Products Development Laboratory. The gaseous effluent showed a drop of 2.9 curies below that of last month. Most of this activity was identified as I^{131} which was released from the Radioisotopes Processing Area.

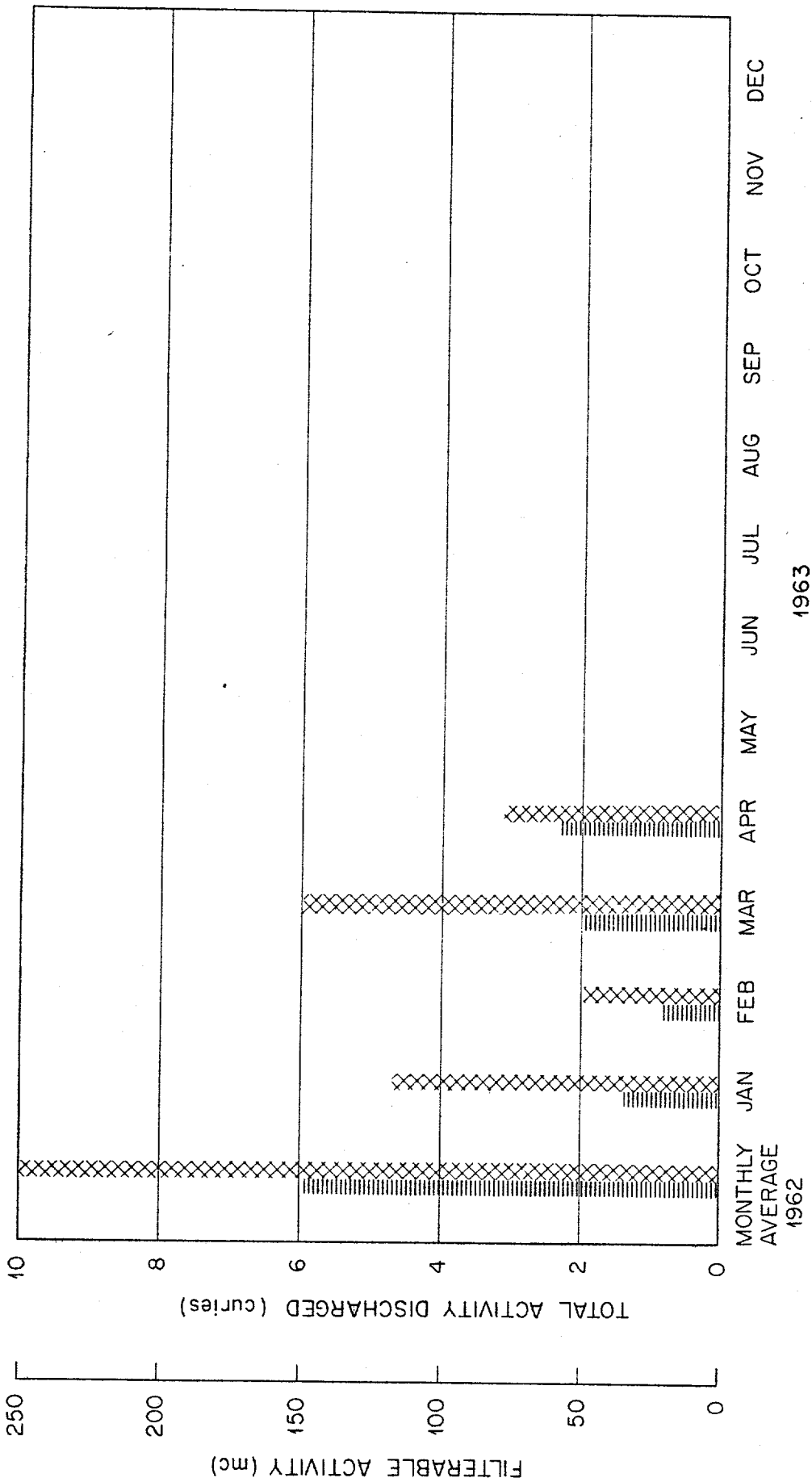

Fig. 4. Gaseous Activity Discharged to Environment.

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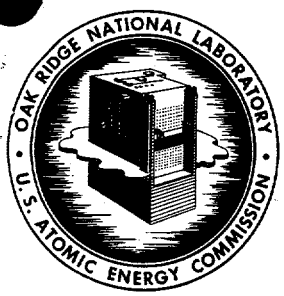

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63-6-44

COPY NO. 38

DATE: June 21, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of May 1963

TO: Distribution

FROM: L. C. Lasher

NOTICE

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 gives a summary of the data obtained from the sampling stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure 1. Data pertaining to the White Oak Dam were provided by the Health Physics Division.

The total discharge of activity to White Oak Lake decreased this month because of the continued reduction of ruthenium activity released from the disposal pit areas. The strontium portion, however, increased 0.2 curie. One half of the increase came from the process waste system and the other half from miscellaneous sources including the Sewage Treatment Plant, Decontamination Laundry, storm sewers, and the burial grounds. The discharges into the creek for each month of this year and the averages for the two previous years are shown in Figure 3.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 14.9 million gallons of process waste was treated this month. The plant capacity was again exceeded, and 0.8 million gallons of waste by-passed the plant and was discharged without chemical treatment into the creek. Tables 2 and 3 summarize operations for the period; figure 2 compares the process volumes on a monthly basis.

INTERMEDIATE-LEVEL WASTES

A total of 390,000 gallons of waste was pumped to the soil disposal area. Approximately 90,000 gallons of this total was supernatant accumulated in the metal waste storage tanks. The volume received from the

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process Waste to White Oak Creek	1	0.4	<0.03	<0.1	0.5
Burial Ground No. 4 and Miscellaneous Laboratory Drainage to White Oak Creek[4]	1, 2	0.2	--	--	0.2
7500 Waste to Melton Branch	3	0.02	0.002	<0.06	<0.08
East Waste Pit Seepage to White Oak Creek	4	0.0003	52.	<0.002	53.
West Waste Pit Seepage to White Oak Creek	5	0.0013	28.	0.007	28.
Total Liquid Waste Discharged to White Oak Lake		0.6	80.	<0.17	82.
White Oak Dam to Clinch River	6	0.73	42.37	0.09	45.2
Gaseous Waste[3]					
3039 Stack	7				4.9
3020 Stack	8				<0.01
3018 Stack	9				0.1
7500 Stack	10				
Total Gaseous Waste Discharged to Environment					5.0

[1] Refers to Fig. 1.

[2] Includes other nuclides not listed here.

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

[4] Activity from these sources derived by difference between the activities measured at Stations 1 and 2

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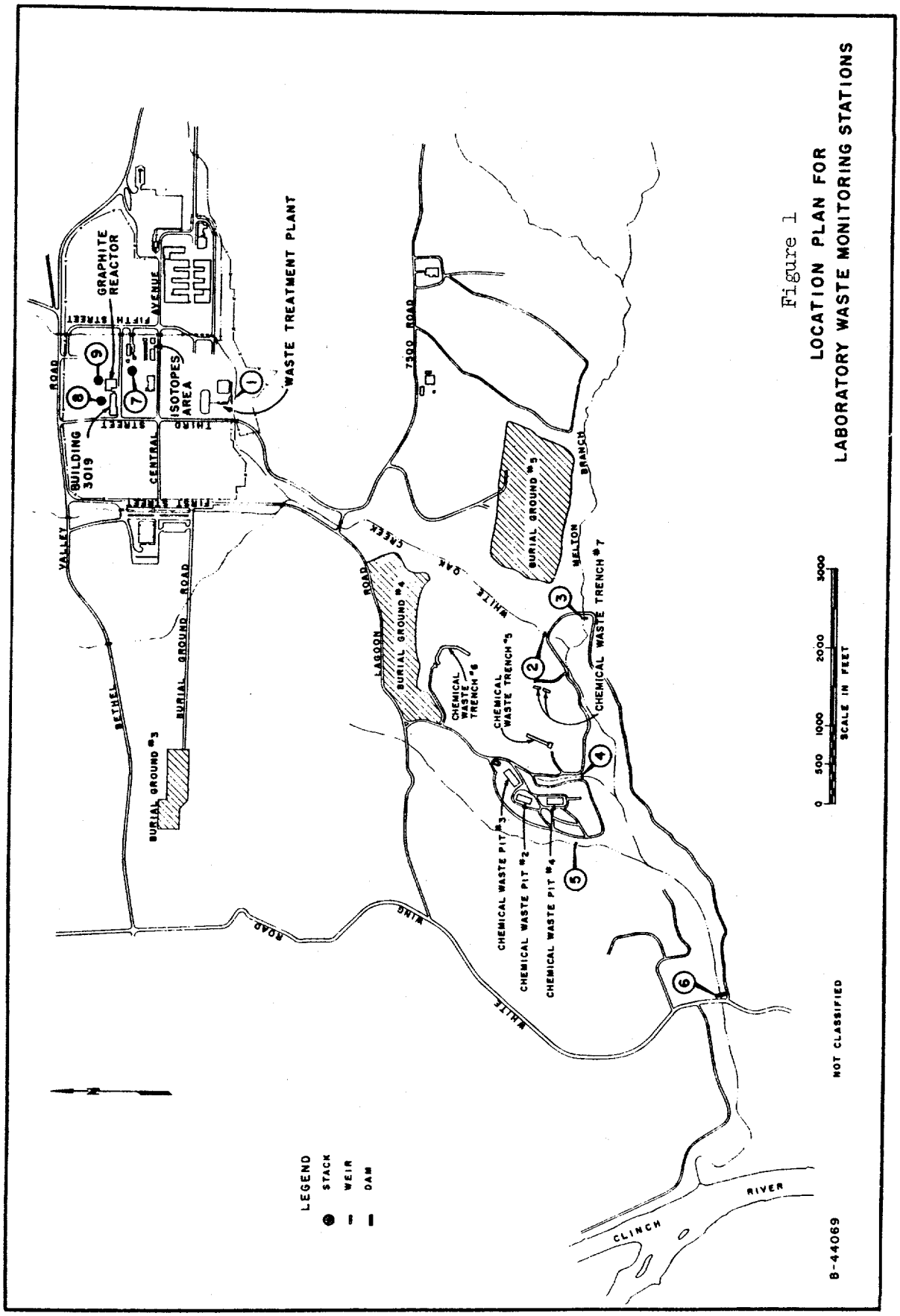

Figure 1
LOCATION PLAN FOR
LABORATORY WASTE MONITORING STATIONS

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 14.9×10^6

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 15.7×10^6

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.6	0.4	75
$Ru^{103,106}$	< 0.3	< 0.03	~ 90
Co^{60}	None detected	None detected	--
Cs^{137}	0.3	< 0.1	> 67
TRE	No analysis	No analysis	--
Total	< 2.2	< 0.5	~ 77

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS ACTIVITY*		VOLUME	
			MILLICURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	13	494	59	2.8	18
2.	Radioisotopes Processing Area	12	84	10	0.5	3
3.	Buildings 3503 and 3508	4	88	10	1.6	10
4.	Buildings 3025, 3026 and 3550	1	24	3	1.8	12
5.	Building 3019	1	8	1	0.6	4
6.	Fission Products Development Laboratory	11	33	4	0.2	1
7.	4500 Area	1	108	13	8.0	52

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

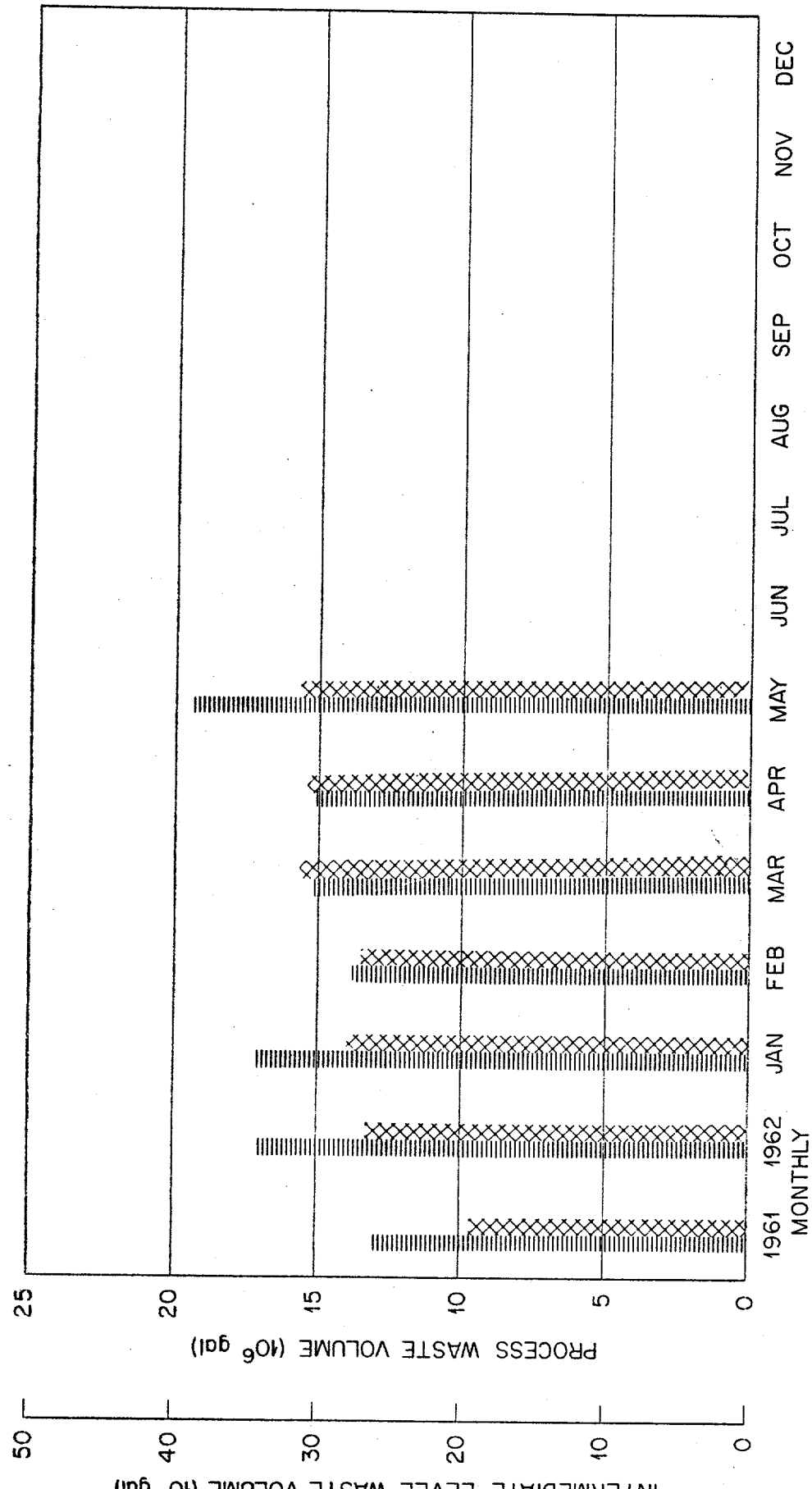

Fig. 2. Liquid Waste Volumes.

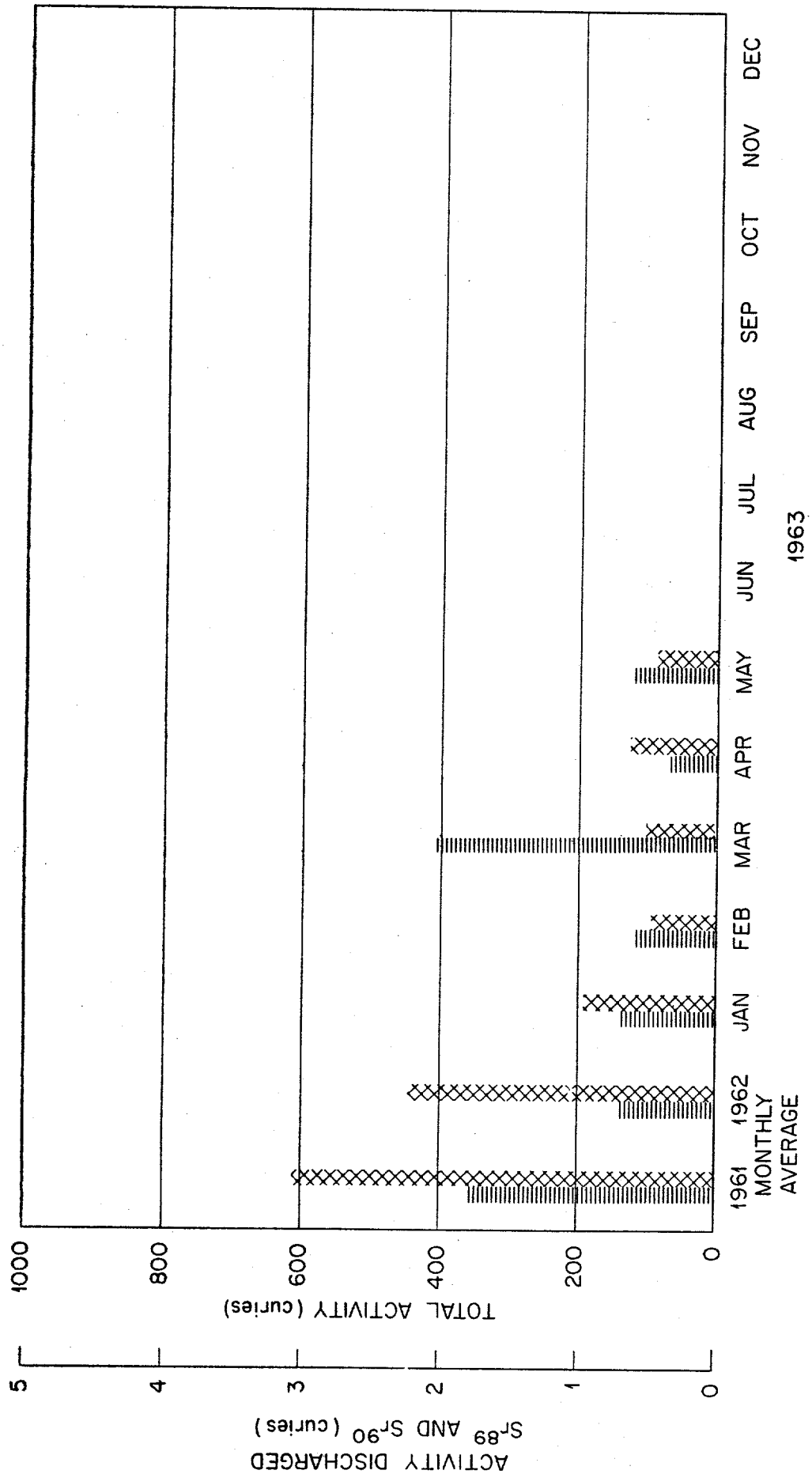

Fig. 3. Liquid Activity Discharge to White Oak Creek.

operating areas was normal. The distribution between the trenches was as follows:

1.	Trench No. 5	180,000 gallons
2.	Trench No. 7	100,800 gallons
3.	Trench No. 7-B	109,200 gallons

Major contributors to the system are listed below:

1.	Building 3019	67,245 gallons
2.	4500 Complex	39,405 gallons
3.	Fission Products Development Laboratory	39,073 gallons
4.	Radioisotopes Processing Area	27,134 gallons
5.	Reactor Operations	23,520 gallons

An inventory of the activity transferred to the disposal areas is recorded in Table 4.

Analysis of composite samples taken at the trench 7 drainage areas indicate that the approximate rates of release of strontium, ruthenium, cesium and cobalt are as listed below:

1.	Strontium	3 microcuries per day
2.	Cesium	66 microcuries per day
3.	Ruthenium	61 millicuries per day
4.	Cobalt	24 millicuries per day

GASEOUS WASTE SYSTEM

A total of 5.0 curies of identified activity was discharged from the three stack systems serving the Laboratory. The 3039 system discharged 4.9 curies (Table No. 1). Most of this activity was gaseous I^{131} from

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

NUCLIDE	PITS 2, 3, AND 4[1], curies			TRENCH NO. 5, curies				TRENCH NO. 7-A, curies				TRENCH NO. 7-B, curies			
	YEAR 1961	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
TOTAL Sr	1657	1513		147	306	1354	1660	238	317	38	355	266	380	32	412
Ru^{106}	757	741		38	324	1274	1598	27	217	358	575	30	240	307	547
Cs^{137}	12889	17561		5177	14182	14749	28931	2941	8547	1588	10135	3287	9680	1668	11348
Co^{60}	--	111		14	397	153	550	15	185	11	196	17	217	9	226
TRE	855	1141		-	-	608	608	-	-	6	6	-	-	5	5
TOTALS[2]	10158	21067	522505	5376	15209	18138	33347	3221	9266	5529	11267	3600	10517	2021	12538

[1] Pits 3 and 4 are out of service at this time. [2] Includes other nuclides not listed here.

the Isotope Processing Area. Cesium 137, discharged from the Fission Products Development Laboratory, accounted for 32 millicuries of the particulate activity (See Figure No. 4). Only 19 millicureis of particulate I^{131} was detected during the period.

Two banks of absolute filters were replaced in the off-gas system. Poor demisting through the primary scrubber may have caused the excessive plugging. Both the wet and demisting stages of the primary scrubber were repacked.

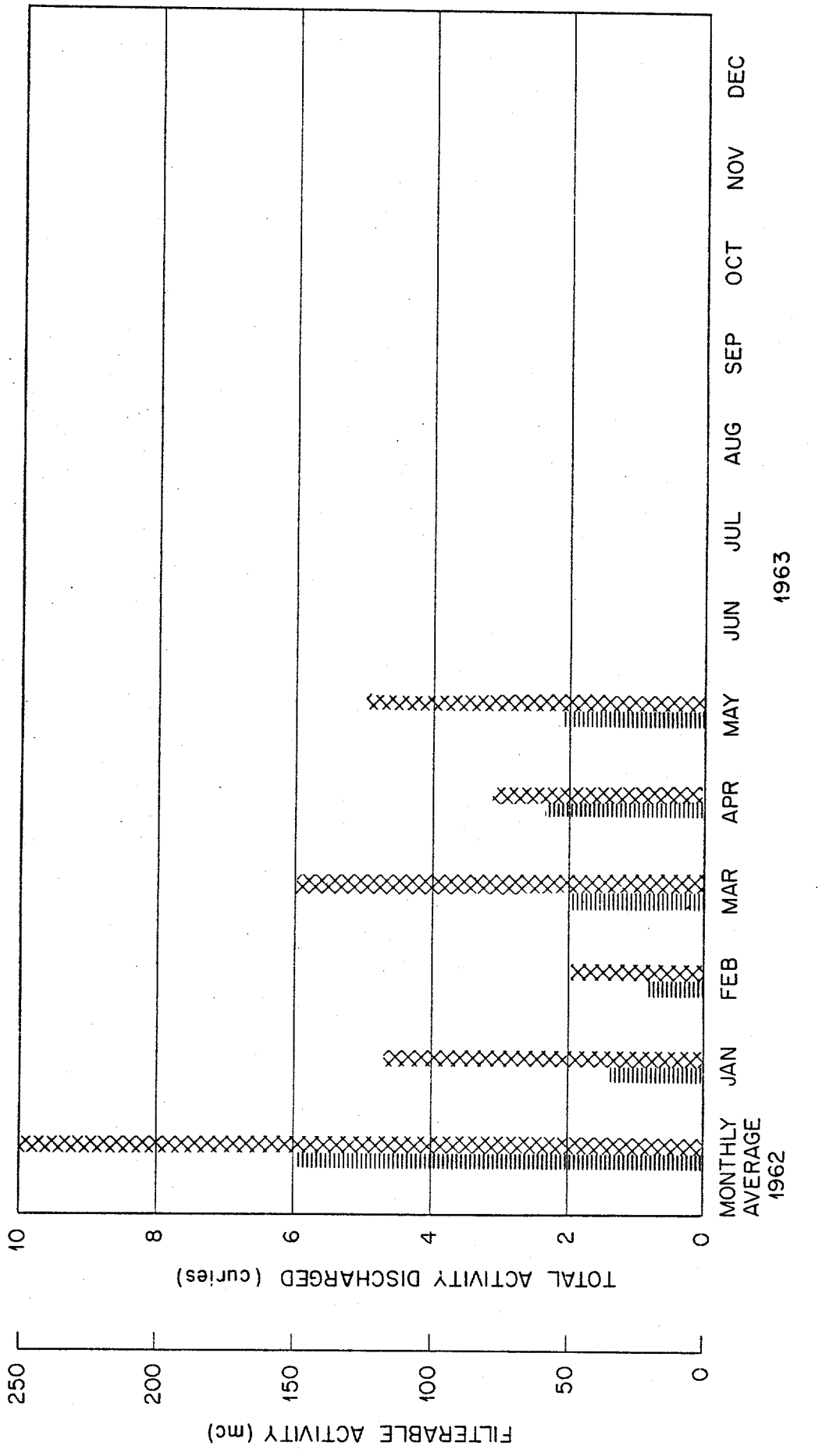

Fig. 4. Gaseous Activity Discharged to Environment.

1828

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ORNL
CENTRAL FILES NUMBER
63-8-64

COPY NO. 38

DATE: August 30, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of July 1963

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 gives a summary of the data collected from the sampling stations which monitor Laboratory waste effluents. Figure No. 1 shows the physical locations of these stations and Figures No. 2 and 4 compare the discharged activity on a monthly basis. The data pertaining to White Oak Dam was provided by the Health Physics Division.

The total discharge of activity to White Oak Lake remained essentially the same as that reported for last month (Figure No. 2). Ruthenium, discharged from the drainage area of Pits 2, 3, and 4, continues to account for the major portion of the discharge. The release of 1.3 curies of strontium activity is an increase of 0.8 curies above that reported for June. Of the increase, 0.4 curie was contributed by the process waste system where the discharge rose from 0.3 to 0.7 curie. The remaining 0.4 curie was discharged through a storm sewer system draining into White Oak Creek west of monitoring station No. 1, shown in Figure No. 1.

The bulk of the increase in the strontium release, through both the storm sewer and process waste system, resulted from a leak out of tank WC-14, one of three small stainless steel tanks located south of Building 3019. The tank was used for storage of special waste materials awaiting further processing; it was filled to capacity. During a period of heavy rainfall, some of the liquid leaked out through the top flange after the ground water filled the tank to the flange level. The exact course followed by the activity into the storm sewer is not known and is being investigated.

TABLE 1
SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies) Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.7	$<$0.03	$<$0.2	$<$0.9
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.03	Insignificant amount		
Total discharge from Bethel Valley area to White Oak Lake	3	1.3	0.1	0.03	1.4
Total discharge from Melton Valley area to White Oak Lake	4	0.01	0.002	0.011	0.02
East waste pit seepage to White Oak Lake	5	0.0004	38.	$<$0.003	39.
West waste pit seepage to White Oak Lake	6	0.006	31.	$<$0.011	32.
Total discharge to White Oak Lake	3,4,5,6	1.3	69.	0.04	73.
White Oak Dam to Clinch River	7	1.4	44.6	0.40	49.6
Gaseous Waste[3]					
3039 Stack	8				2.8
3020 Stack	9				$<$0.001
3018 Stack	10				0.03
Total gaseous waste discharged to environment					2.8

[1] Refers to Fig. 1

[2] Includes other nuclides not listed here

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

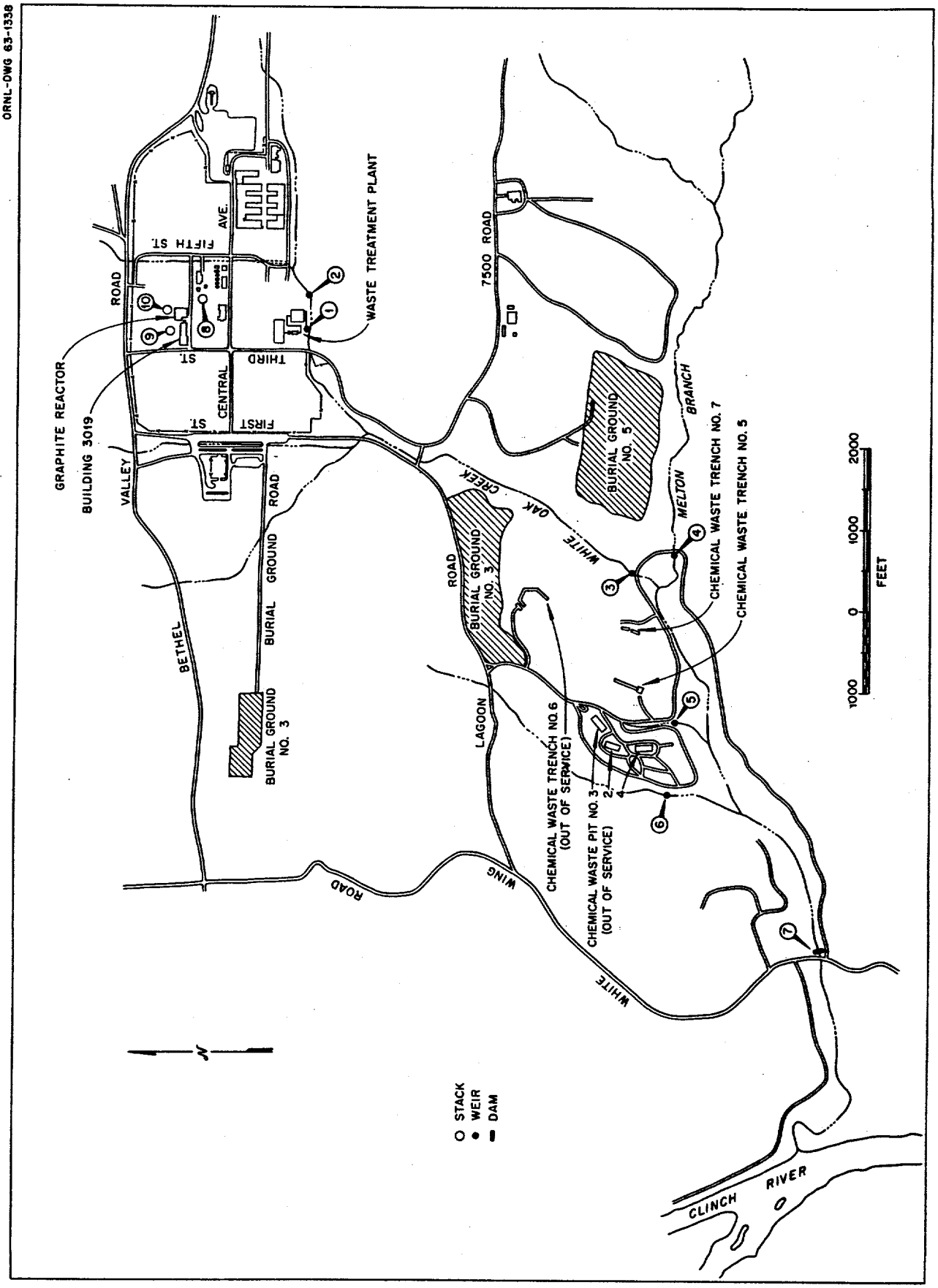

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

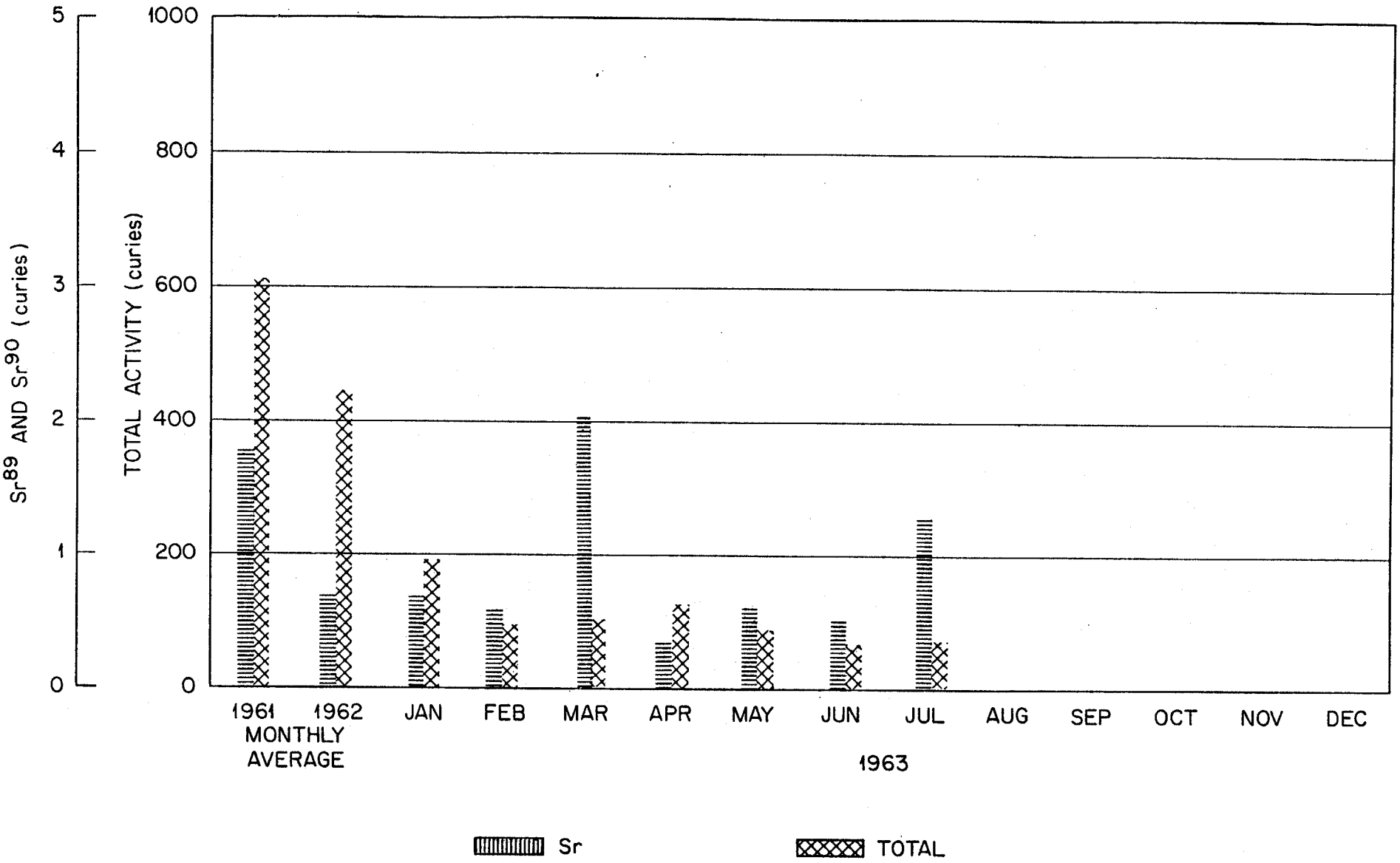

Fig. 2. Liquid Activity Discharge to White Oak Creek.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 16.3 million gallons of waste was processed through the Process Waste Treatment Plant. The upward trend of waste generated by the Laboratory continued (Figure No. 3), and the capacity of the treatment plant was again exceeded. It was necessary to bypass the plant, and 0.9 million gallons of waste were discharged directly to the creek without the benefit of chemical treatment.

Approximately six curies of strontium activity was discharged into the process system this month (Table No. 2). Normally the system receive 1.0 - 2.0 curies per month. The excess came from the tank leak previously mentioned. Although decontamination factors were normal, the discharge of strontium from the process waste system was high at 0.7 curie.

Table No. 2 summarizes plant operation during the period and Table No. 3 lists the main sources of discharges into the system.

INTERMEDIATE-LEVEL WASTES

An abnormally high total of 545,600 gallons of waste was pumped to the disposal area. Primarily, the excess resulted from accelerated processing activities and a faulty pipe connection to the system in Building 3019 . Increased volumes were also received from the Radioisotopes Processing Area and the Reactor Area. A transfer of 49,000 gallons of supernatant from the metal waste system to the intermediate-level waste system also contributed to the excessive volume. The distribution between trenches was as follows:

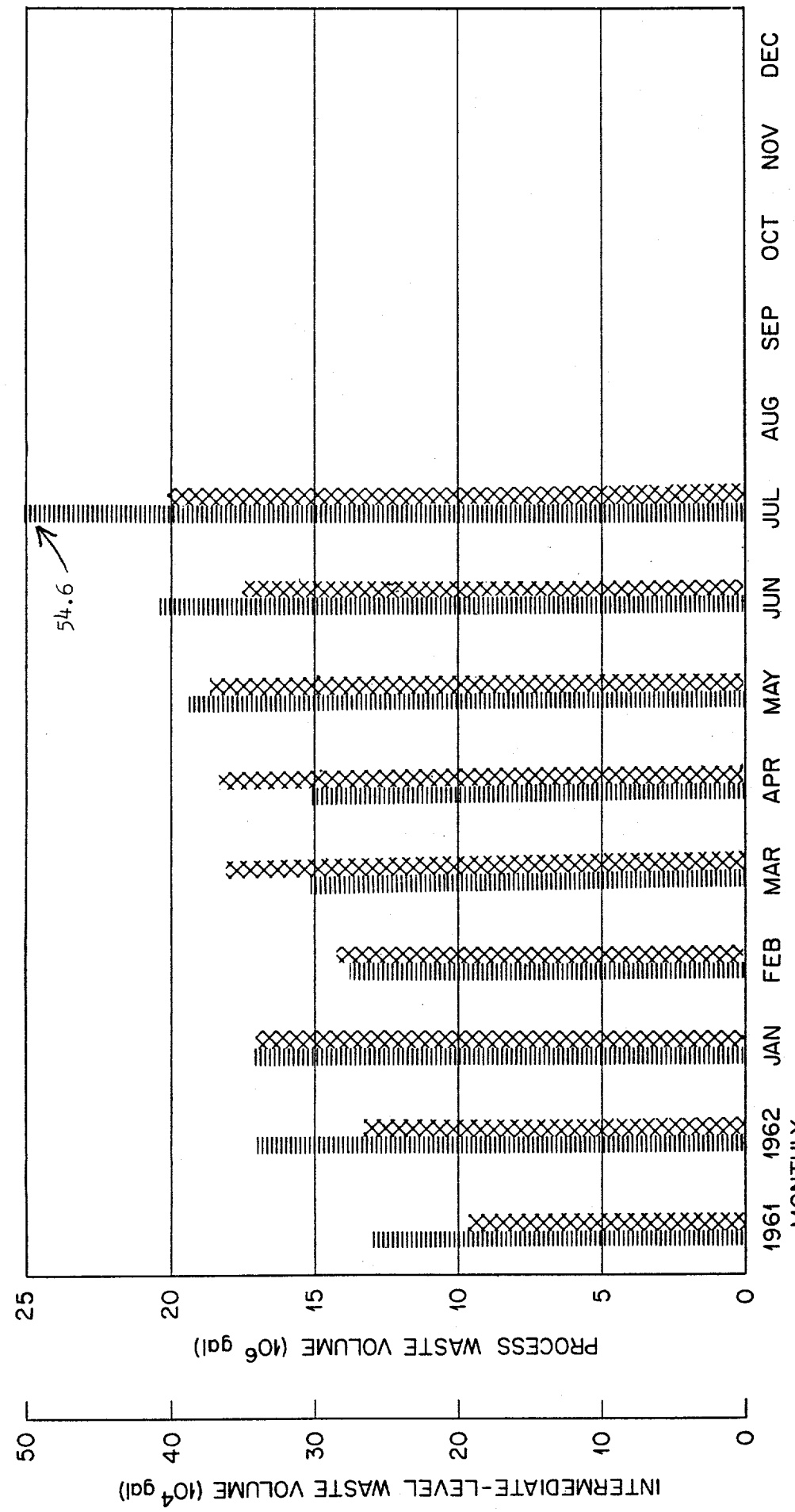

Fig. 3. Liquid Waste Volumes.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 16.3×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 17.9×10^6 gal

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	5.6 curies	0.7 curies	88
$Ru^{103,106}$	$<$ 0.3 curies	$<$ 0.03 curies	--
Co^{60}	None detected	None detected	--
Cs^{137}	0.4 curies	$<$ 0.2	--
TRE	Insignificant amount	--	--
Gross Beta Activity	135 c/m	16. c/m	88

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	10	0.53	72.6	3.9	23.1
2.	Radioisotopes Processing Area	9	0.10	13.7	0.8	4.8
3.	Buildings 3503 and 3508	4	0.08	11.0	1.4	8.3
4.	Buildings 3025, 3026 and 3550	0	--	--	1.6	9.5
5.	Building 3019	0	--	--	0.6	3.6
6.	Fission Products Development Laboratory	4	0.02	2.7	0.3	1.8
7.	4500 Area	0	--	--	7.8	46.4
8.	Building 3525	0	--	--	0.4	2.4

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

1.	Trench 5	189,800 gallons
2.	Trench 7-A	230,400 gallons
3.	Trench 7-B	125,400 gallons

Major contributors to the system were as follows:

1.	Building 3019	140,385 gallons
2.	Radioisotopes Processing Area	59,748 gallons
3.	Reactor Complex	46,275 gallons
4.	4500 Complex	38,295 gallons
5.	Fission Products Development Laboratory	32,509 gallons

Figure No. 3 compares the volumes of waste transferred on a month-to-month basis. Table No. 4 gives the inventory of the more important nuclides transferred to the operating trenches.

GASEOUS WASTE SYSTEM

Only 2.8 curies of identified radioactivity was discharged from the Laboratory's stack systems this month (Figure No. 4). As usual, gaseous I^{131} was the predominant activity, The particulate activity was also low at 11 millicuries; 0.2 millicuries of this activity was identified as strontium (discharged from the Fission Products Development Laboratory), the remaining activity was I^{131}.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclide	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	309	975	1,354	2,329	182	896	38	934	91	889	32	921
Ru^{106}	257	605	1,274	1,879	544	778	358	1,136	272	530	307	837
Cs^{137}	4,140	20,452	14,749	35,201	7,680	17,918	1,588	19,506	3,840	15,300	1,668	16,968
Co^{60}	53	486	153	639	78	300	11	311	39	295	9	304
TRE	--	--	608	608	--	--	6	6	--	--	5	5
Totals	4,759	22,518	18,138	40,656	8,484	19,892	2,001	21,893	4,242	17,014	2,021	19,035

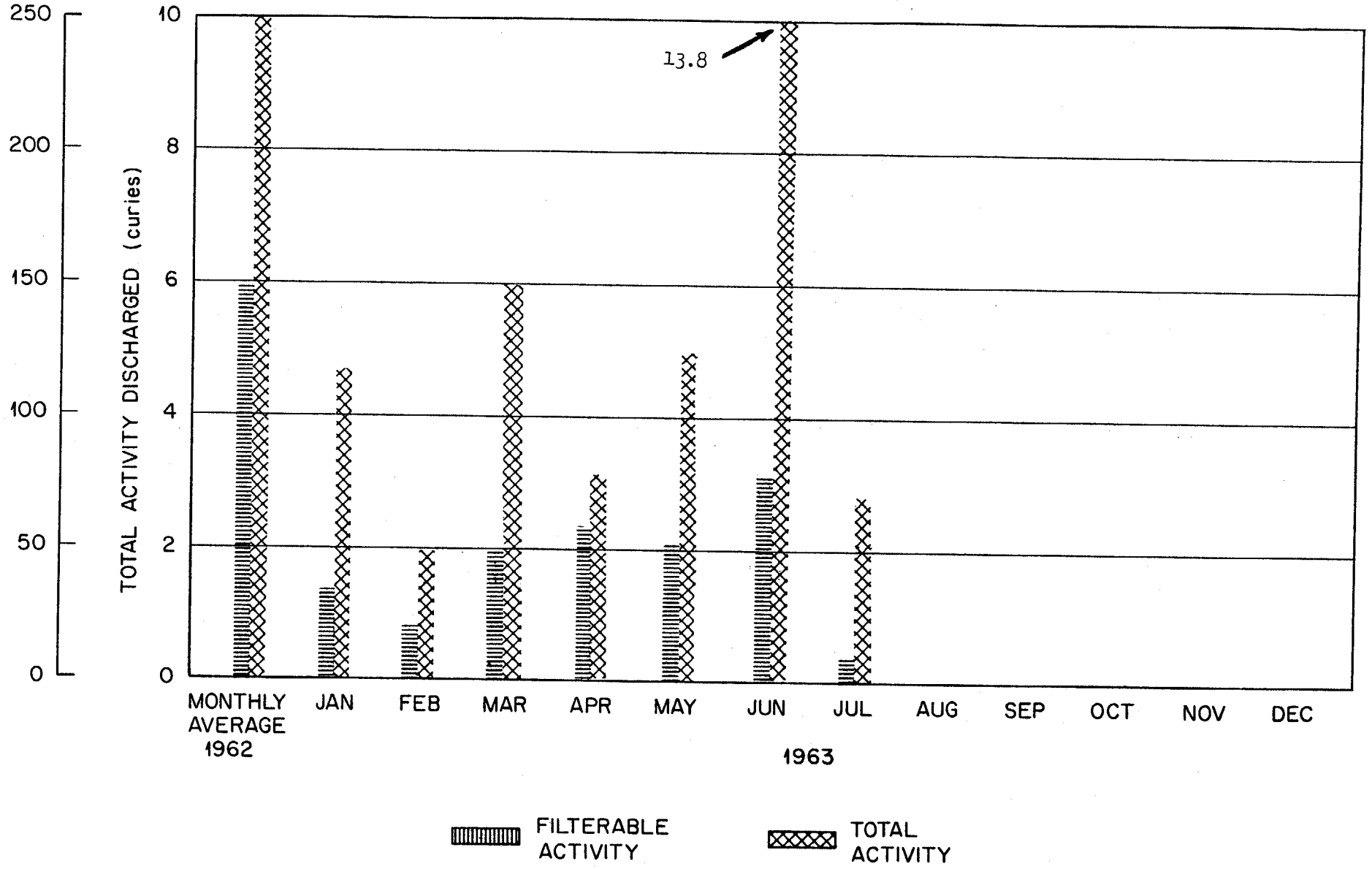

Fig. 4. Gaseous Activity Discharged to Environment.

1825

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ORNL
CENTRAL FILES NUMBER
63-10-5

COPY NO. 38

DATE: October 2, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of August 1963

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 gives a summary of the data collected from sampling stations which monitor Laboratory waste effluents. Figure No. 1 shows the physical locations of these stations and Figures No. 2 and 4 compare the discharged activity from month to month. The data pertaining to White Oak Dam was provided by the Health Physics Division.

A total of 48 curies of radioactivity was released into White Oak Creek this month; ruthenium, discharged from the disposal pit areas, comprised the bulk of this activity. This discharge was slightly lower than that reported for the previous month (Figure No. 2), and the total release at White Oak Dam was low at 8.94 curies. The release of strontium activity into the creek was 0.7 curie. Of this amount, approximately 0.3 curie cannot be accounted for. An investigation to determine the source is continuing.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A total of 17.1 million gallons of waste was processed through the Process Waste Treatment Plant. Although a slight decrease in the volume of process waste was noted (Figure No. 3), the total exceeded the capacity of the plant; and 1.2 million gallons were discharged directly to the creek without chemical treatment. The decontamination efficiency for the plant was normal; there were no unusual occurrences.

Table No. 2 summarizes plant operation during the period, and Table No. 3 lists the main sources of discharge into the system.

TABLE 1
SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.3	<0.03	<0.15	<0.5
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.013	Insignificant amount		
Total discharge from Bethel Valley area to White Oak Lake	3	0.7	0.3	0.07	1.1
Total discharge from Melton Valley area to White Oak Lake	4	0.009	<0.002	<0.001	<0.012
East waste pit seepage to White Oak Lake	5	0.0003	33.	<0.0001	33.9
West waste pit seepage to White Oak Lake	6	0.0003	13.	<0.001	13.3
Total discharge to White Oak Lake	3,4,5,6	0.7	46.		48.3
White Oak Dam to Clinch River	7	0.043	6.65	0.22	8.94
Gaseous Waste[3]					
3039 Stack	8				5.02
3020 Stack	9				0.0003
3018 Stack	10				0.03
Total gaseous waste discharged to environment					5.1

[1] Refers to Fig. 1

[2] Includes other nuclides not listed here

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

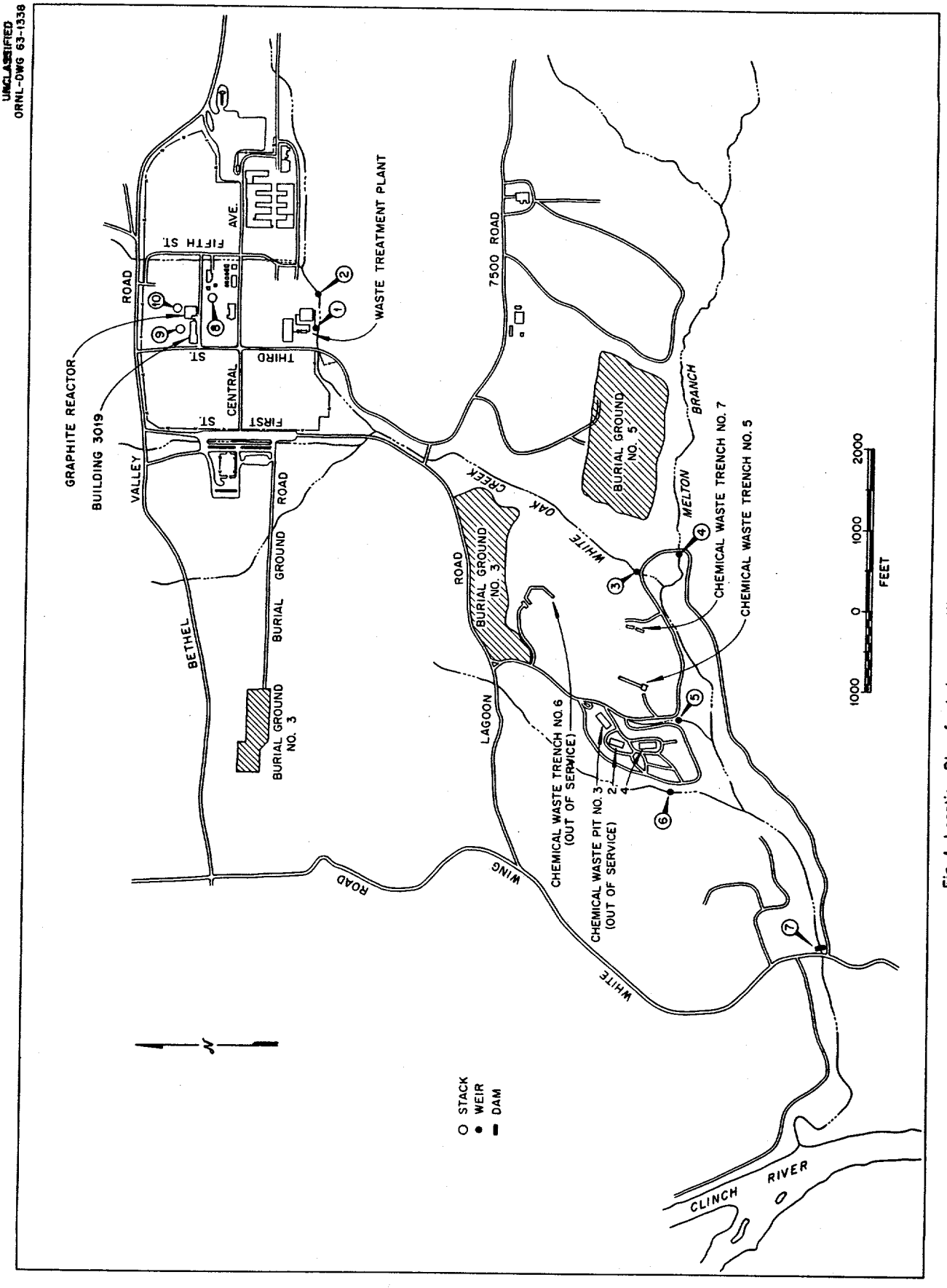

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

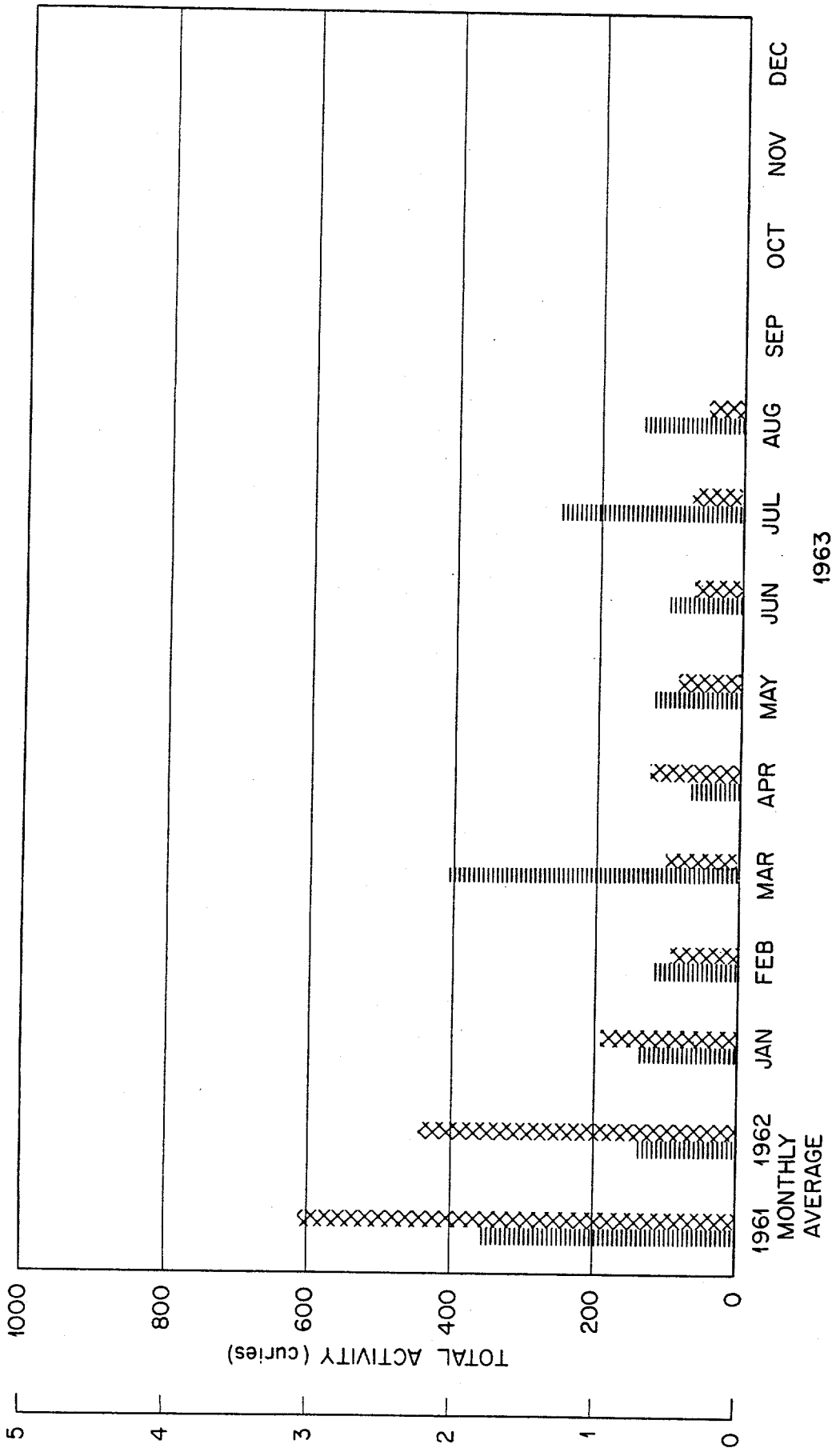

Fig. 2. Liquid Activity Discharge to White Oak Creek.

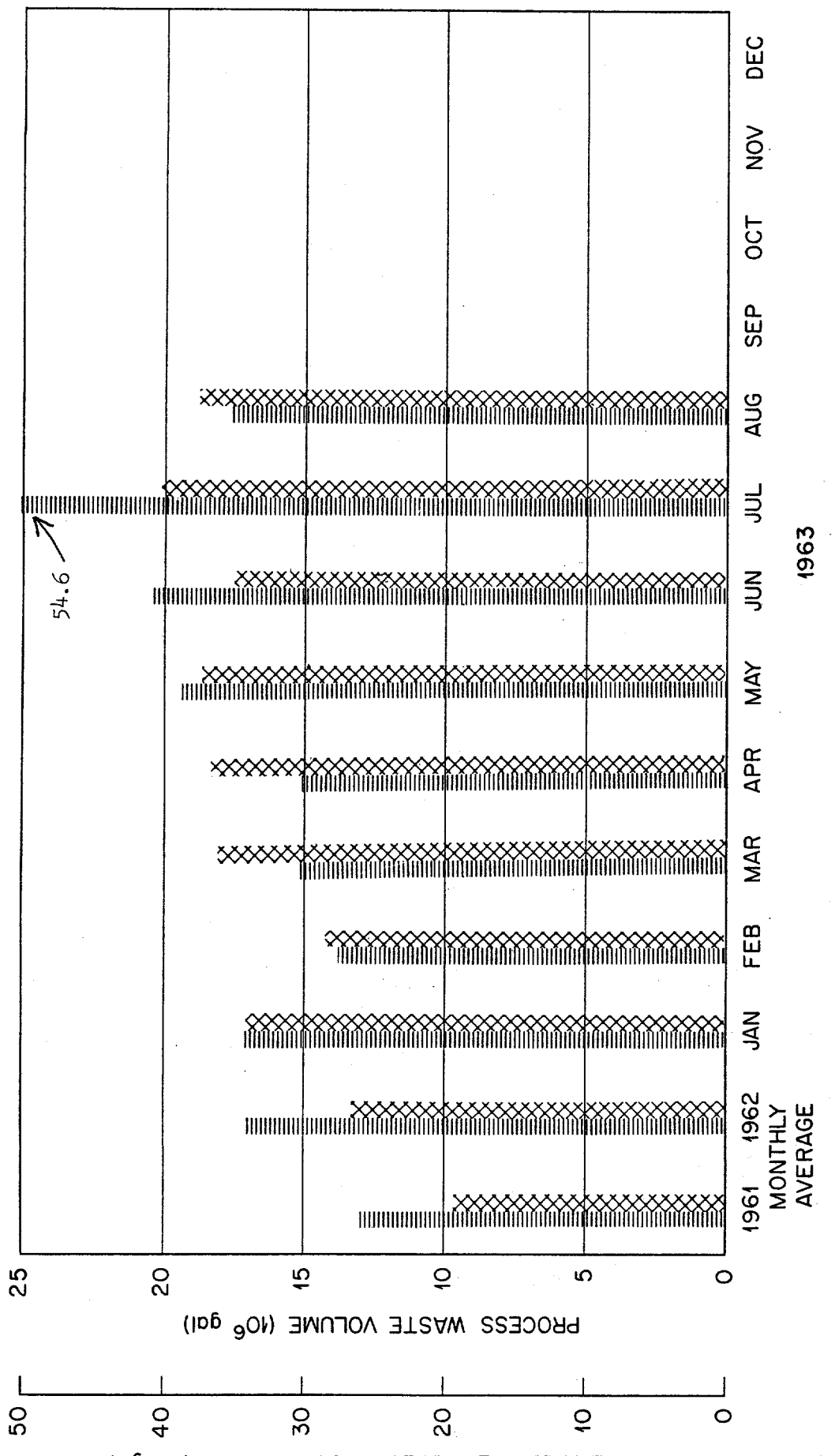

Fig. 3. Liquid Waste Volumes.

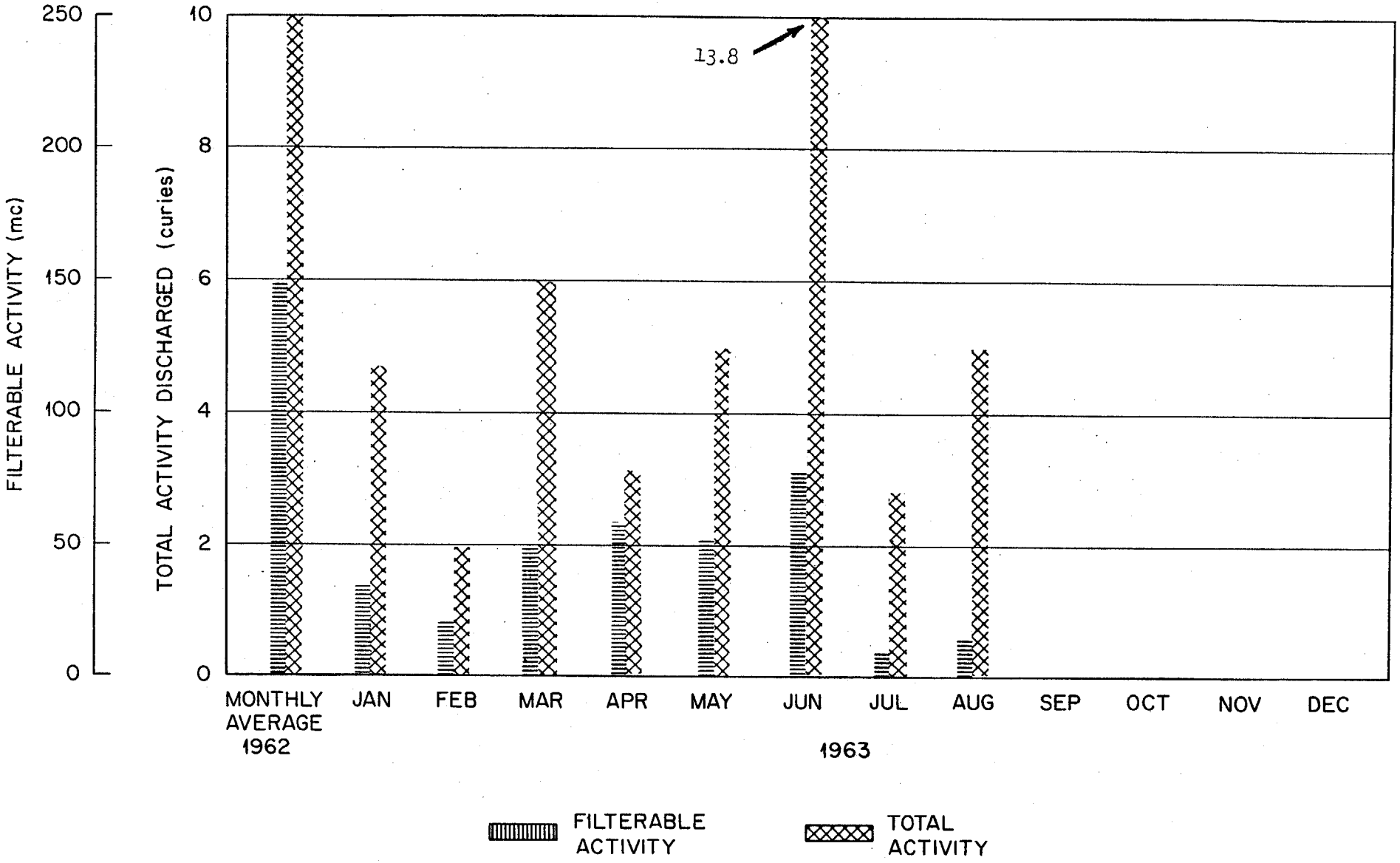

Fig. 4. Gaseous Activity Discharged to Environment.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 17.1×10^6 gal

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 18×10^6 gal

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.81 curies	0.34 curies	81
$Ru^{103,106}$	< 0.292	< 0.031	
Co^{60}	None detected	None detected	
Cs^{137}	~ 0.58	< 0.15	
TRE	Insignificant amount	--	
Gross Beta Activity	53 c/m	10 c/m	81

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	10	0.43	41.8	3.2	19.7
2.	Radioisotopes Processing Area	8	0.09	8.7	0.8	4.9
3.	Buildings 3503 and 3508	11	0.17	16.5	1.1	6.8
4.	Buildings 3025, 3026 and 3550	1	0.02	1.9	1.4	8.6
5.	Building 3019	6	0.06	5.8	0.9	5.6
6.	Fission Products Development Laboratory	12	0.05	4.9	0.3	1.9
7.	4500 Area	2	0.21	20.4	7.9	48.8
8.	Building 3525	--	--		0.6	3.7

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

INTERMEDIATE-LEVEL WASTE

A total of 353,400 gallons of waste was pumped to the waste trenches this month. Of this total, 50,000 gallons was supernatant liquor from the metal waste system which was transferred to the intermediate-level waste system. The distribution between the trenches was as follows:

1.	Trench 5	180,200 gallons
2.	Trench 7-A	77,600 gallons
3.	Trench 7-B	95,600 gallons

Major contributors to the system are listed below:

1.	Building 3019	51,035 gallons
2.	Fission Products Development Laboratory	39,327 gallons
3.	Reactor Complex	34,400 gallons
4.	Radioisotopes Processing Area	31,558 gallons
5.	4500 Complex	27,150 gallons

Figure No. 3 gives a monthly comparison of waste volumes transferred to the disposal area. Table No. 4 is an inventory of the more important nuclides deposited at the disposal sites.

GASEOUS WASTE SYSTEM

A total of 5.1 curies of identified activity was discharged from the three stack systems serving the Laboratory. The 3039 stack discharged 5.0 curies of gaseous I^{131}; the bulk of this discharge came from the Radioisotopes Processing Area. Only 14 millicuries of particulate activity, also identified as I^{131}, were discharged during the period.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclide	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	1,389	2,364	1,354	5,350	2,652	3,548	38	3,586	3,264	4,153	32	4,185
Ru^{106}	195	800	1,274	4,485	174	952	358	1,310	214	744	307	1,051
Cs^{137}	10,416	30,868	14,749	60,017	1,264	19,182	1,588	20,770	1,555	16,855	1,668	18,523
Co^{60}	259	745	153	898	15	315	11	326	18	313	9	322
TRE	--	--	608	2,242	--	--	6	6	--	--	5	5
Totals	12,259	34,777	18,138	72,992	4,105	23,997	2,001	25,998	5,051	22,065	2,021	24,086

1825

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Post Office Box X
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ORNL
CENTRAL FILES NUMBER
63-11-10

DATE: November 8, 1963

COPY NO. 38

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of September 1963

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 summarizes the data collected from sampling stations which monitor Laboratory waste effluents. Figure No. 1 shows the physical locations of these stations and Figures No. 2 and 4 compare the discharged activity from month to month. The data pertaining to White Oak Dam were provided by the Health Physics Division.

A total of 35 curies of radioactivity was discharged into White Oak Creek. Ruthenium, seeping from the disposal pit areas, accounted for the major portion of the activity although the total ruthenium release was lower than it had been in any month during the last several years (Figure No. 2). The strontium activity released into the creek was low at 0.3 curie. Of this total, 0.2 curie was discharged by the process waste system, and 0.1 curie came from miscellaneous sources such as the Decontamination Laundry, Sewage Treatment Plant and Burial Grounds.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

A downward trend of low-level liquid waste volume continued during the period (Figure No. 3). However, 15.7 million gallons of waste were processed through the Waste Treatment Plant, and the capacity of the plant was exceeded for a brief period. Approximately 0.1 million gallons of waste were discharged to White Oak Creek without chemical treatment. The decontamination efficiency for the plant was normal. There were no unusual occurrences during the period.

Table No. 2 summarizes plant operations and Table No. 3 lists the main sources of activity discharged into the system.

TABLE 1
SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.2	$<$0.03	$<$0.1	$<$0.3
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.01			
Total discharge from Bethel Valley area to White Oak Lake	3	0.3	0.03	0.01	0.3
Total discharge from Melton Valley area to White Oak Lake	4	0.005	0.0001	0.0005	0.006
East waste pit seepage to White Oak Lake	5	0.0003	28.	$<$0.001	28.8
West waste pit seepage to White Oak Lake	6	0.0001	6.	$<$0.0002	6.1
Total discharge to White Oak Lake	3,4,5,6	0.31	34.	0.01	35.2
White Oak Dam to Clinch River	7	0.33	3.3	0.19	4.48
Gaseous Waste[3]					
3039 Stack	8				3.33
3020 Stack	9				0.11
3018 Stack	10				0.07
Total gaseous waste discharged to environment					3.51

[1] Refers to Fig. 1

[2] Includes other nuclides not listed here

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

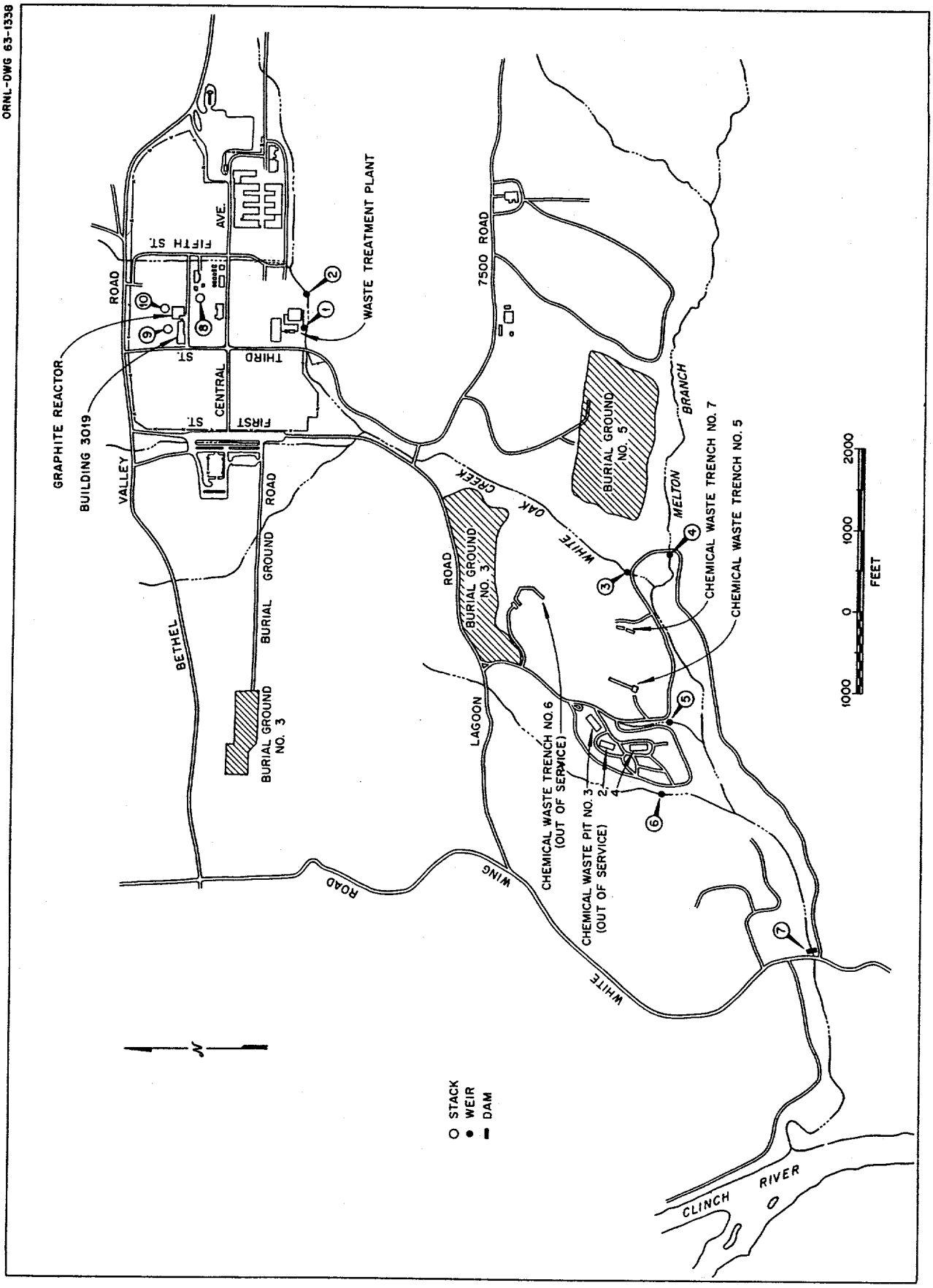

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

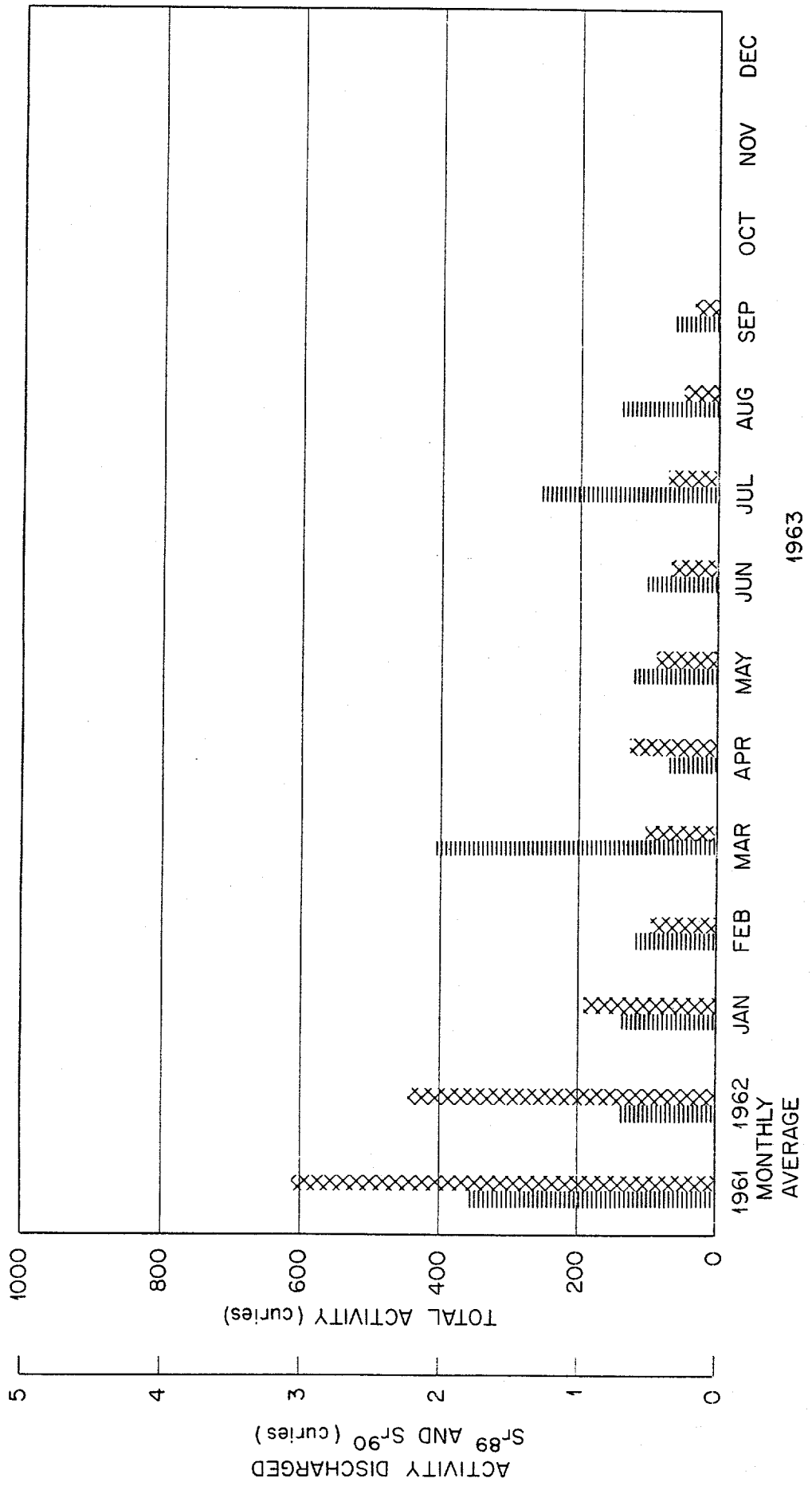

Fig. 2. Liquid Activity Discharge to White Oak Creek.

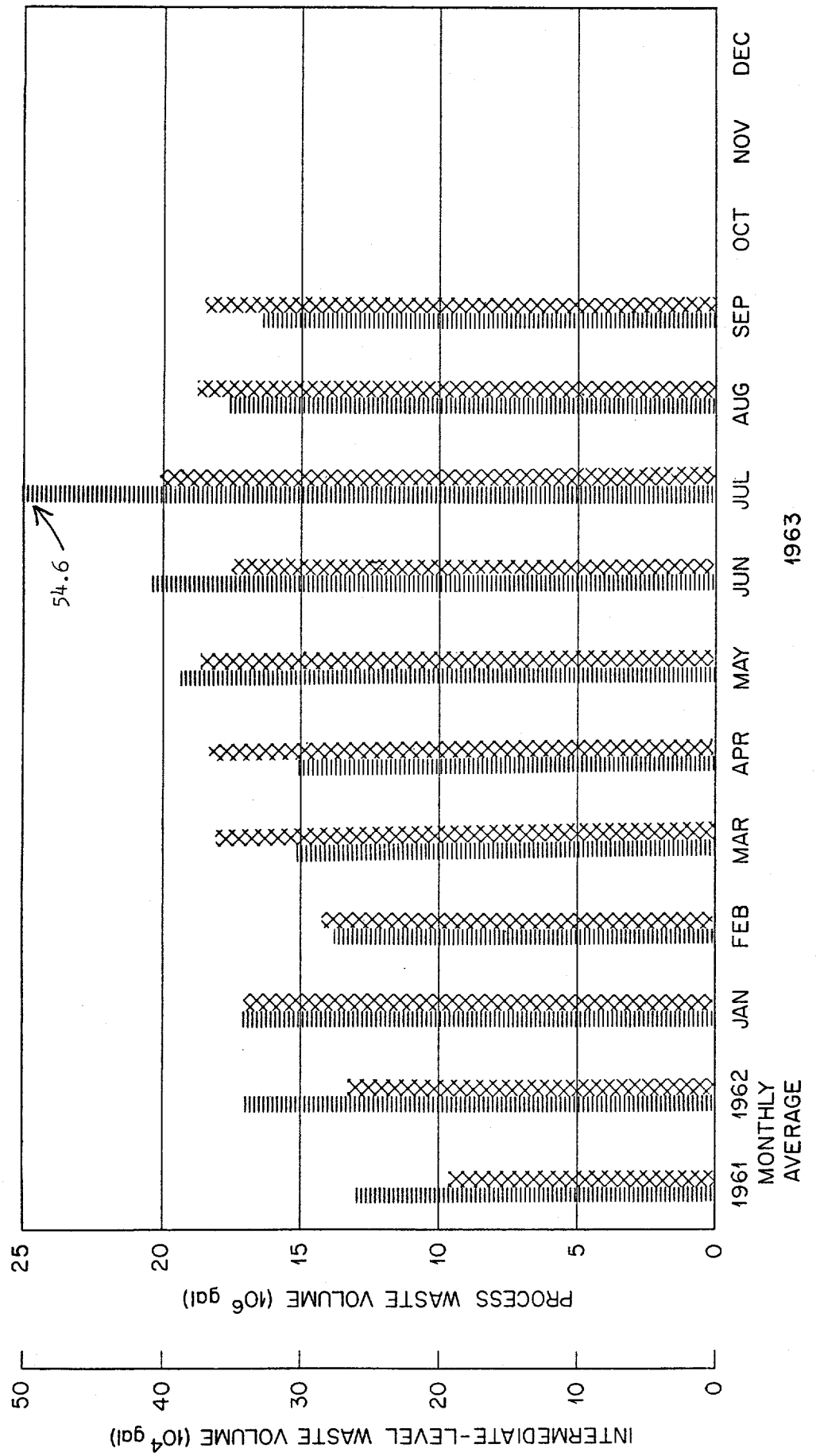

Fig. 3. Liquid Waste Volumes.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 15.7×10^6

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.6×10^6

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	1.2 curies	0.2 curie	83
$Ru^{103,106}$	$<$ 0.1 curie	$<$ 0.1 curie	
Co^{60}	None detected	--	
Cs^{137}	1.0 curie	$<$ 0.1 curie	
TRE	--	--	
Gross Beta Activity	54 c/m/ml	9 c/m/ml	83

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	29	1.22	79.2	3.1	21.8
2.	Radioisotopes Processing Area	3	0.03	1.9	0.8	5.6
3.	Buildings 3503 and 3508	14	0.22	14.3	1.2	8.5
4.	Buildings 3025, 3026 and 3550	0	--	--	1.1	7.7
5.	Building 3019	0	--	--	1.0	7.0
6.	Fission Products Development Laboratory	18	0.07	4.5	0.3	2.1
7.	4500 Area	0	--	--	6.2	43.7
8.	Building 3525	0	--	--	0.5	3.5

*Approximation - The method of analysis used in determining gross beta activity is not sensitive to energies below that of Sr^{90}. In addition, the pH of the sample collections was not controlled and the actual gross activity is expected to be considerably higher than indicated above.

INTERMEDIATE-LEVEL WASTE

A total of 327,400 gallons of waste was pumped to the waste trenches this month. Of this total, 75,600 gallons were supernatant liquor transferred from the metal waste system. The distribution between the trenches was as follows:

1.	Trench 5	173,200 gallons
2.	Trench 7-A	63,800 gallons
3.	Trench 7-B	90,400 gallons

Major contributors to the system are listed below:

1.	Building 3019	42,600 gallons
2.	Radioisotopes Processing Area	37,710 gallons
3.	Reactor Complex	33,300 gallons
4.	Fission Products Development Laboratory	32,490 gallons
5.	4500 Complex	30,035 gallons

Figure No. 3 gives a monthly comparison of waste volumes transferred to the disposal areas. Table No. 4 is an inventory of the more important nuclides deposited at the disposal sites.

GASEOUS WASTE SYSTEM

The gaseous waste systems discharged 3.5 curies of radioactivity this month (Table No. 1 and Figure No. 4). Virtually all of the activity (3.28 curies) was released from the 3039 stack as gaseous I^{131}. The 3039 system also discharged 50 millicuries of particulate I^{131}. The total release from the 3018 and 3020 systems amounted to 180 mc.

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	1,952	4,316	1,354	7,302	1,470	5,018	38	5,056	2,205	6,358	32	6,390
Ru^{106}	220	1,020	1,274	4,705	126	1,078	358	1,436	189	933	307	1,240
Cs^{137}	7,975	38,843	14,749	67,992	2,770	21,952	1,588	23,540	4,155	21,010	1,668	22,678
Co^{60}	62	807	153	960	37	352	11	363	55	368	9	377
TRE	--	--	608	2,242	--	--	6	6	--	--	5	5
TOTALS	10,209	44,986	18,138	83,201	4,403	28,400	2,001	30,401	6,604	28,669	2,021	30,690

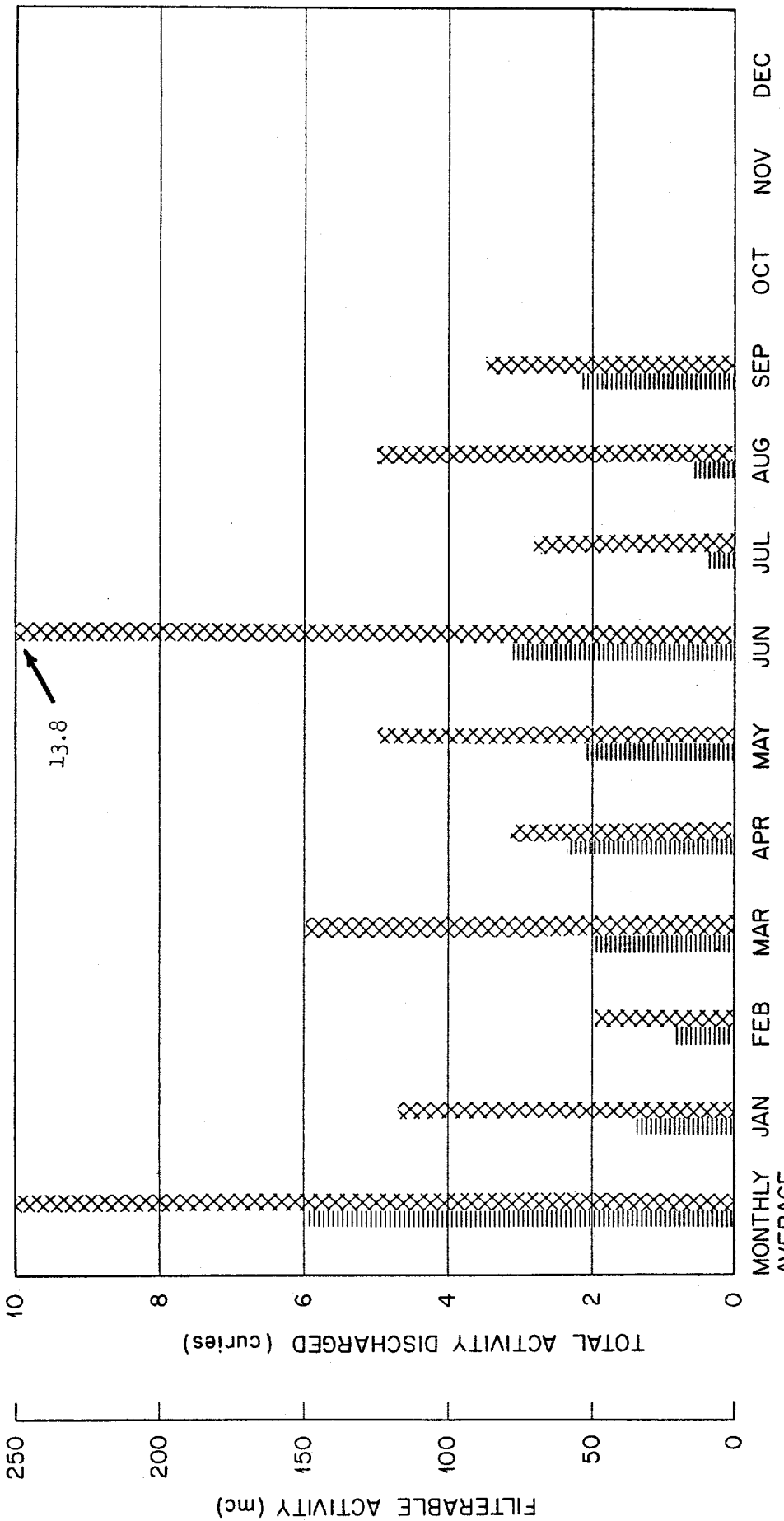

Fig. 4. Gaseous Activity Discharged to Environment.

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CENTRAL FILES NUMBER
63-12-11

COPY NO. 39

DATE: December 4, 1963

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of October 1963

TO: Distribution

FROM: L. C. Lasher

NOTICE

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INVENTORY OF TOTAL ACTIVITY DISCHARGED

A summary of data, accumulated from a network of stations which monitor Laboratory waste discharges, is recorded in Table No. 1. Figure No. 1 shows the physical locations of these stations. A monthly comparison of the discharged activity is illustrated by Figures No. 2 and No. 4. All of the data pertaining to White Oak Dam was provided by the Health Physics Division.

A total of 46 curies of radioactivity was released into White Oak Creek this month. Of this total 45 curies, mostly ruthenium (Table No. 1), was discharged from the disposal pit areas. The Laboratory area (Bethel Valley) discharged 0.9 curie; 0.6 curie of this total was strontium, released primarily from the process waste system (0.5 curie). The total release through White Oak Dam remained low at 4.92 curies.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

As a result of a labor strike, continuous operation of the Waste Treatment Plant was terminated on the 15th of the month. The diversion box was operated automatically; and, for the remainder of the period, the Waste Treatment Plant was operated for short intervals dependent upon the inventory in the Equalization Basin. Only 7.6 million gallons were processed; the remainder of the volume (9.1 million gallons) was discharged, without chemical treatment, to the creek through the Settling Basin. Elimination of the chemical treatment resulted in an increase in the strontium release from 0.2, reported for the previous month, to 0.5 curie.

TABLE 1
SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies) Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.5	$<$0.03	$<$0.1	$<$0.6
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.012	--	--	--
Total discharge from Bethel Valley area to White Oak Lake	3	0.6	0.03	0.3	0.9
Total discharge from Melton Valley area to White Oak Lake	4	0.0095	0.0006	0.0016	0.01
East waste pit seepage to White Oak Lake	5	0.0003	39.	$<$.001	41.
West waste pit seepage to White Oak Lake	6	0.0001	4.	$<$.001	4.
Total discharge to White Oak Lake	3,4,5,6	0.6	43.	0.3	46.
White Oak Dam to Clinch River	7	0.48	3.58	0.07	4.92
Gaseous Waste[3]					
3039 Stack	8				4.21
3020 Stack	9				$<$0.001
3018 Stack	10				0.03
Total gaseous waste discharged to environment					4.24

[1] Refers to Fig. 1

[2] Includes other nuclides not listed here

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

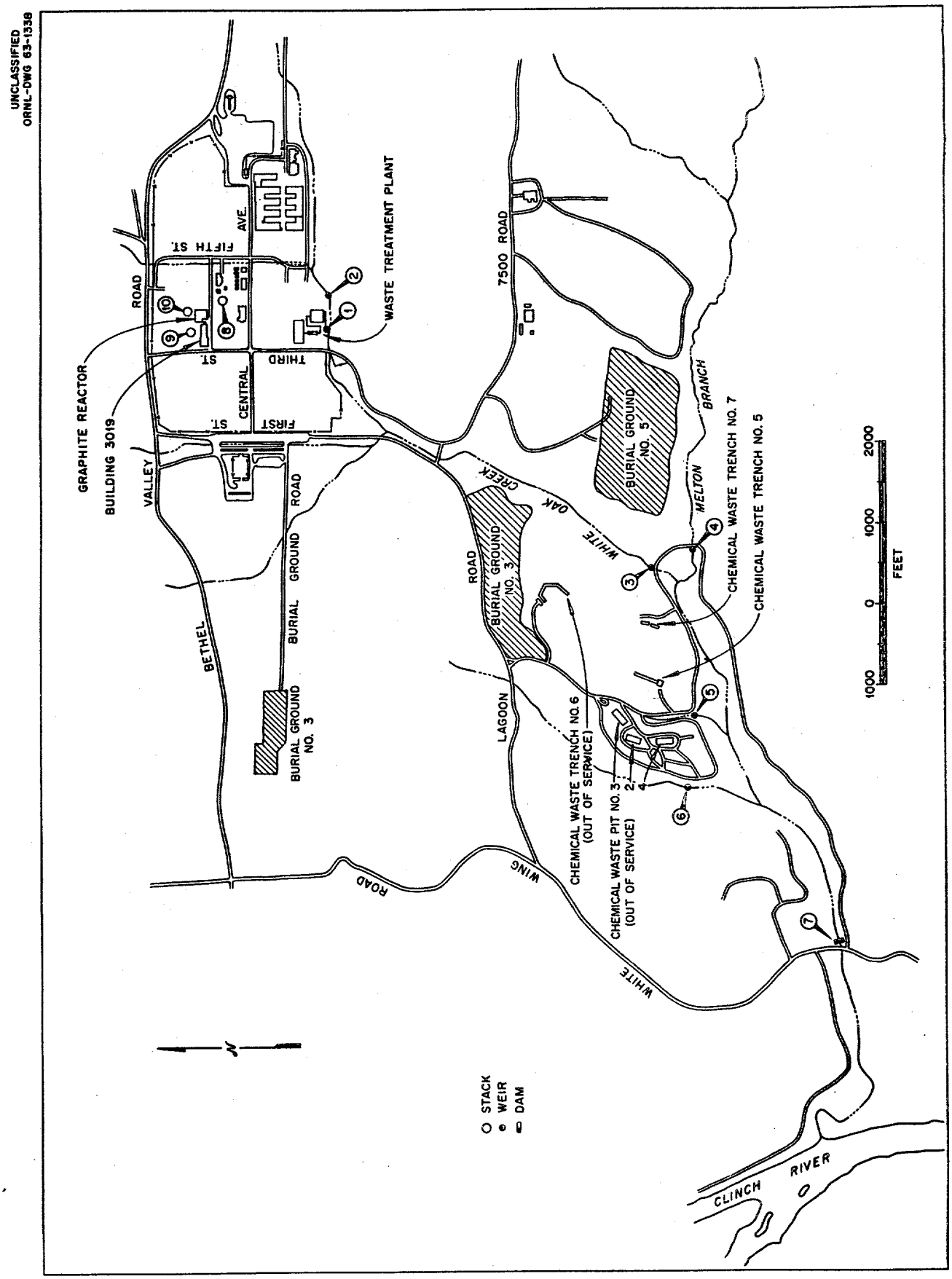

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

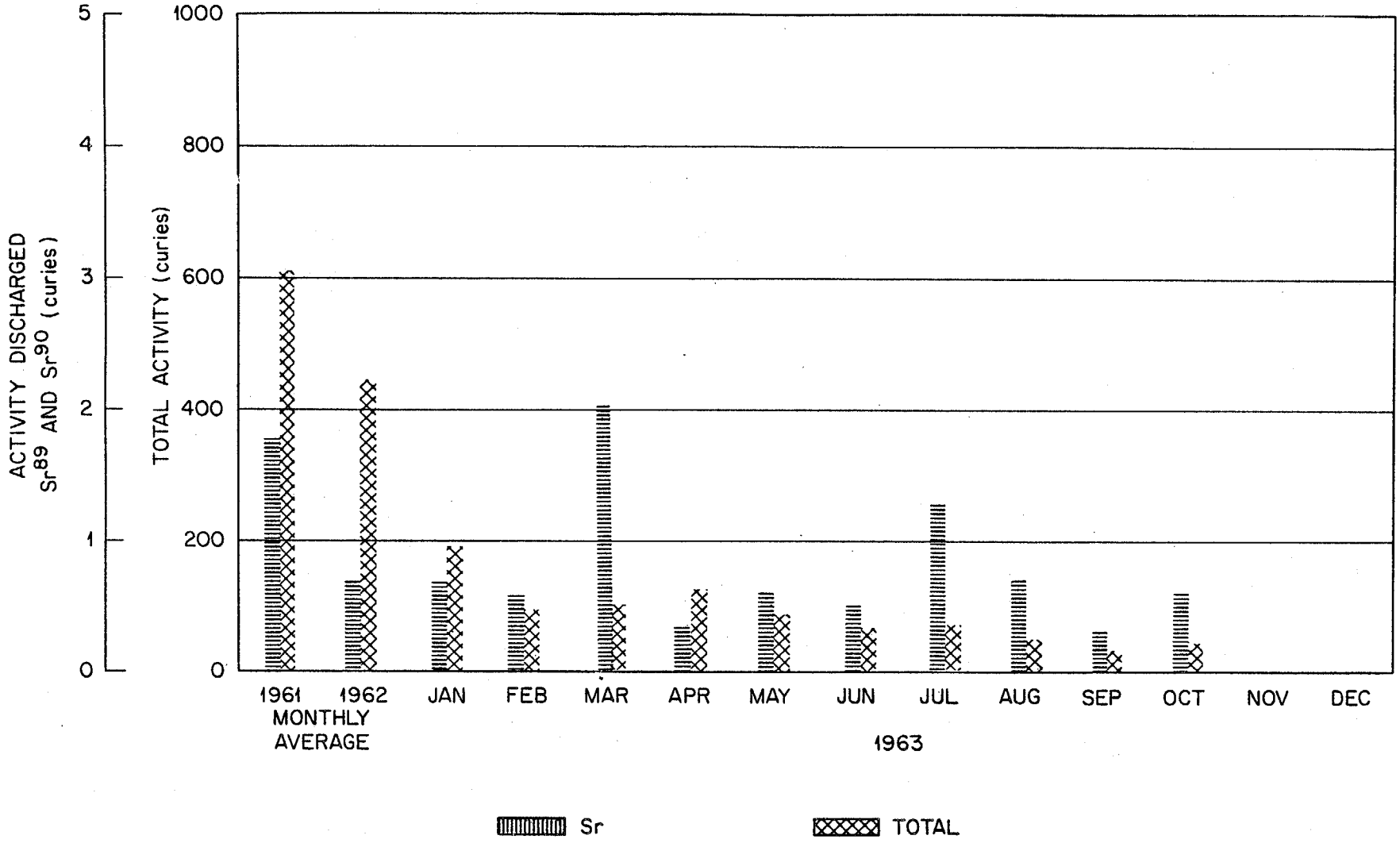

Fig. 2. Liquid Activity Discharge to White Oak Creek.

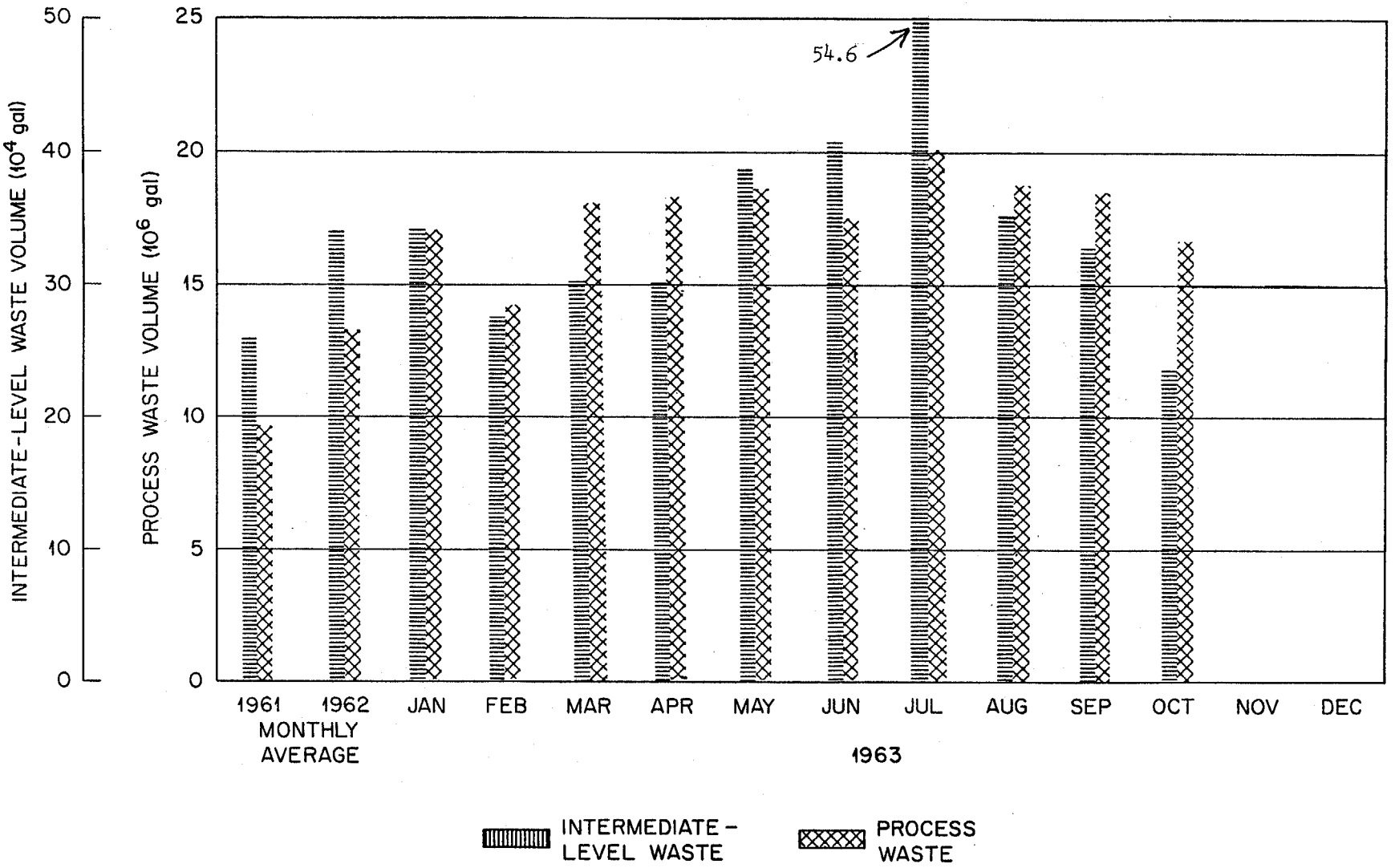

Fig. 3. Liquid Waste Volumes.

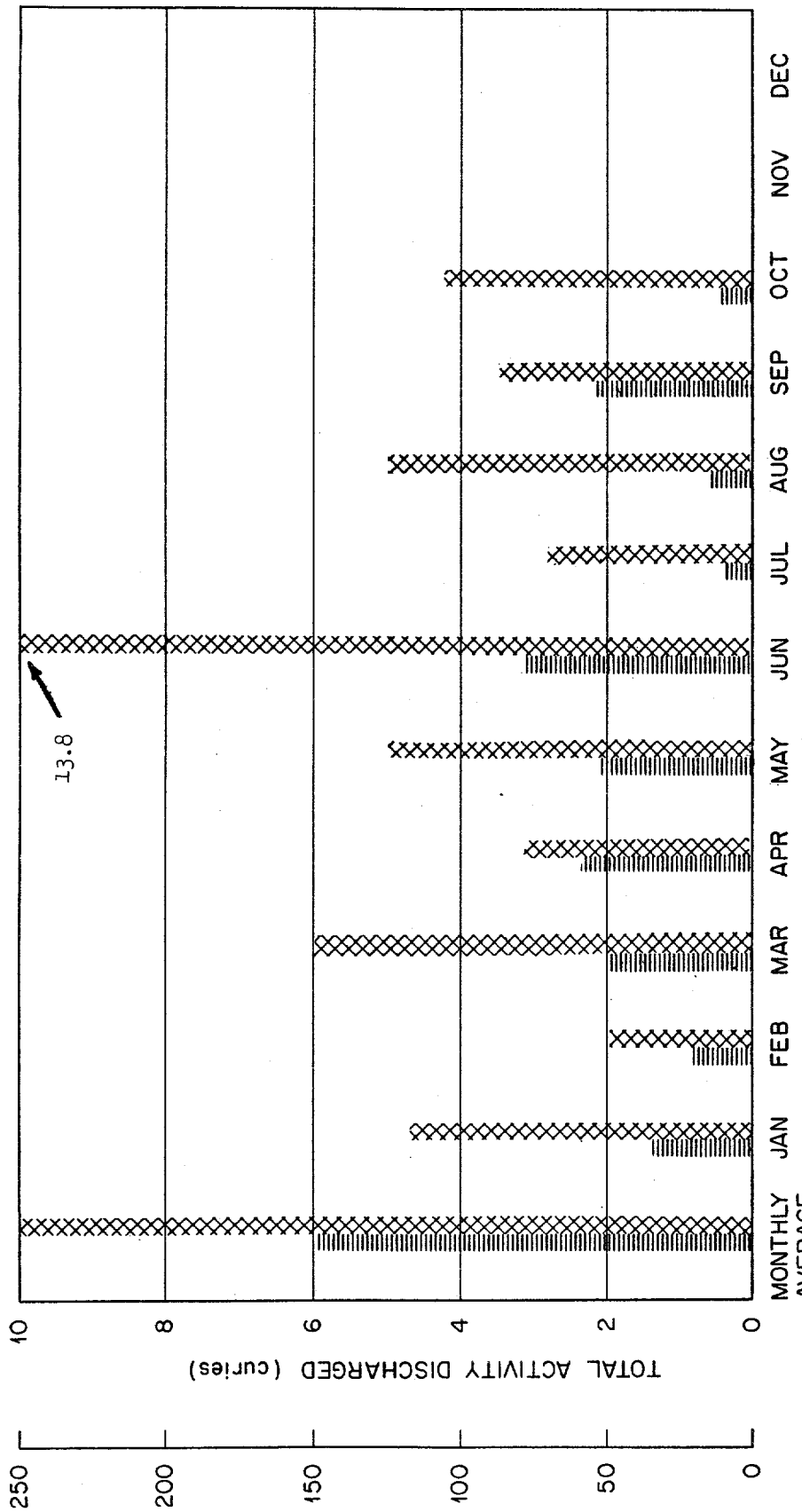

Fig. 4. Gaseous Activity Discharged to Environment.

A summary of plant operations is given in Table No. 2; Table No. 3 lists the main sources of activity discharged into the system.

INTERMEDIATE-LEVEL WASTE

The total volume of waste pumped to trenches amounted to 236,400 gallons. Distribution between the trenches was as follows:

1.	Trench 5	102,000 gallons
2.	Trench 7-A	46,800 gallons
3.	Trench 7-B	87,000 gallons

Principal contributors to this system were as follows:

1.	Reactor Complex	39,960 gallons
2.	Building 3019	37,425 gallons
3.	4500 Complex	32,890 gallons
4.	Radioisotopes Processing Area	31,313 gallons
5.	Building 3517	6,930 gallons

Figure No. 3 is a monthly comparison of waste volumes pumped to the trenches, and Table No. 4 is an inventory of nuclides transferred to the same disposal sites.

GASEOUS WASTE SYSTEM

The Laboratory released 4.24 curies of radioactive gaseous waste this month (Table No. 1). Essentially all of this activity was gaseous I^{131}, discharged primarily from the 3039 stack. Only 11 millicuries of particulate activity were detected: 7 millicuries identified as I^{131} and the remainder as Cs^{137} (Figure No. 4). The total discharge from the 3020 and 3018 stacks was 30 millicuries.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 7.6×10^6

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.7×10^6

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{1}	0.6 curie	0.5 curie	
$Ru^{103,106}$	$\angle$ 0.07 curie	$\angle$ 0.03 curie	
Co^{60}	None detected	--	
Cs^{137}	0.2 curie	0.1 curie	
TRE	No analyses	--	
Gross Bets Activity	42 c/m/ml	22 c/m/ml	

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

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
			CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1.	Reactor Operations and Decontamination Facility	88	3.70	61.0	3.7	20.8
2.	Radioisotopes Processing Area	17	0.24	4.0	1.0	6.7
3.	Buildings 3503 and 3508	87	1.57	25.9	1.3	8.7
4.	Buildings 3025, 3026 and 3550	16	0.29	4.8	1.3	8.7
5.	Building 3019	8	0.15	2.5	1.4	9.4
6.	Fission Products Development Laboratory	7	0.03	0.5	0.3	2.0
7.	4500 Area	1	0.09	1.5	6.3	42.3
8.	Building 3525	0	--	--	0.2	1.3

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

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	92	4,408	1,354	7,394	62	5,080	38	5,118	116	6,474	32	6,506
Ru^{106}	2	1,022	1,274	4,707	7	1,085	358	1,443	12	945	307	1,252
Cs^{137}	7,225	46,068	14,749	75,217	1,160	23,112	1,588	24,700	2,175	23,185	1,668	24,853
Co^{60}	6	813	153	966	4	356	11	367	8	376	9	385
TRE	--	--	608	2,242	--	--	6	6	--	--	5	5
TOTALS	7,325	52,311	18,158	90,526	1,233	29,633	2,001	31,634	2,311	30,980	2,021	33,001

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CENTRAL FILES NUMBER
64-1-28

COPY NO. 39

DATE: January 16, 1964

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of November 1963

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

The data obtained from a network of stations which monitor Laboratory waste effluents are summarized in Table No. 1. The physical locations of these stations are shown in Figure No. 1. Figures No. 2 and 4 compare the discharge of radioactive waste on a monthly basis. Data pertaining to White Oak Dam were provided by the Health Physics Division.

The total release of radioactivity into White Oak Creek remained low at 45 curies (Figure No. 2). Of this total, 41 curies was ruthenium which was discharged from the disposal pit areas. Strontium contamination in White Oak Creek amounted to 0.6 curie; virtually all of the activity was released from the process waste system (Table No. 1).

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Because of the labor strike, the Process Waste Treatment Plant was not operated during the first eleven days of this month. Normal operation of the plant was resumed on November 12. While the plant was idle, the automatic diversion system was utilized and six million gallons of waste, containing only a small amount of activity, was discharged to the creek without treatment while the remainder, containing a significant amount of activity, was stored in the equalization basin for later processing. The elimination of the processing did not appreciably increase the total discharge of activity for the month over that in previous months (Figure No. 2).

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies)			
		Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.56	0.1	0.2	1.0
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.02	Not Analyzed		
Total discharge from Bethel Valley area to White Oak Lake	3	0.56	0.1	0.1	1.0
Total discharge from Melton Valley area to White Oak Lake	4	0.04	Not Analyzed		
East waste pit seepage to White Oak Lake	5	0.0004	24	None	26
West waste pit seepage to White Oak Lake	6	0.0006	17	None	18
Total discharge to White Oak Lake	3,4,5,6	0.60	41	0.1	45
White Oak Dam to Clinch River	7	0.48	11.65	0.43	14.76
Gaseous Waste[3]					
3039 Stack	8				1.37
3020 Stack	9				0.003
3018 Stack	10				0.03
Total gaseous waste discharged to environment					1.4

[1] Refers to Figure 1.

[2] Includes other nuclides not listed here.

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

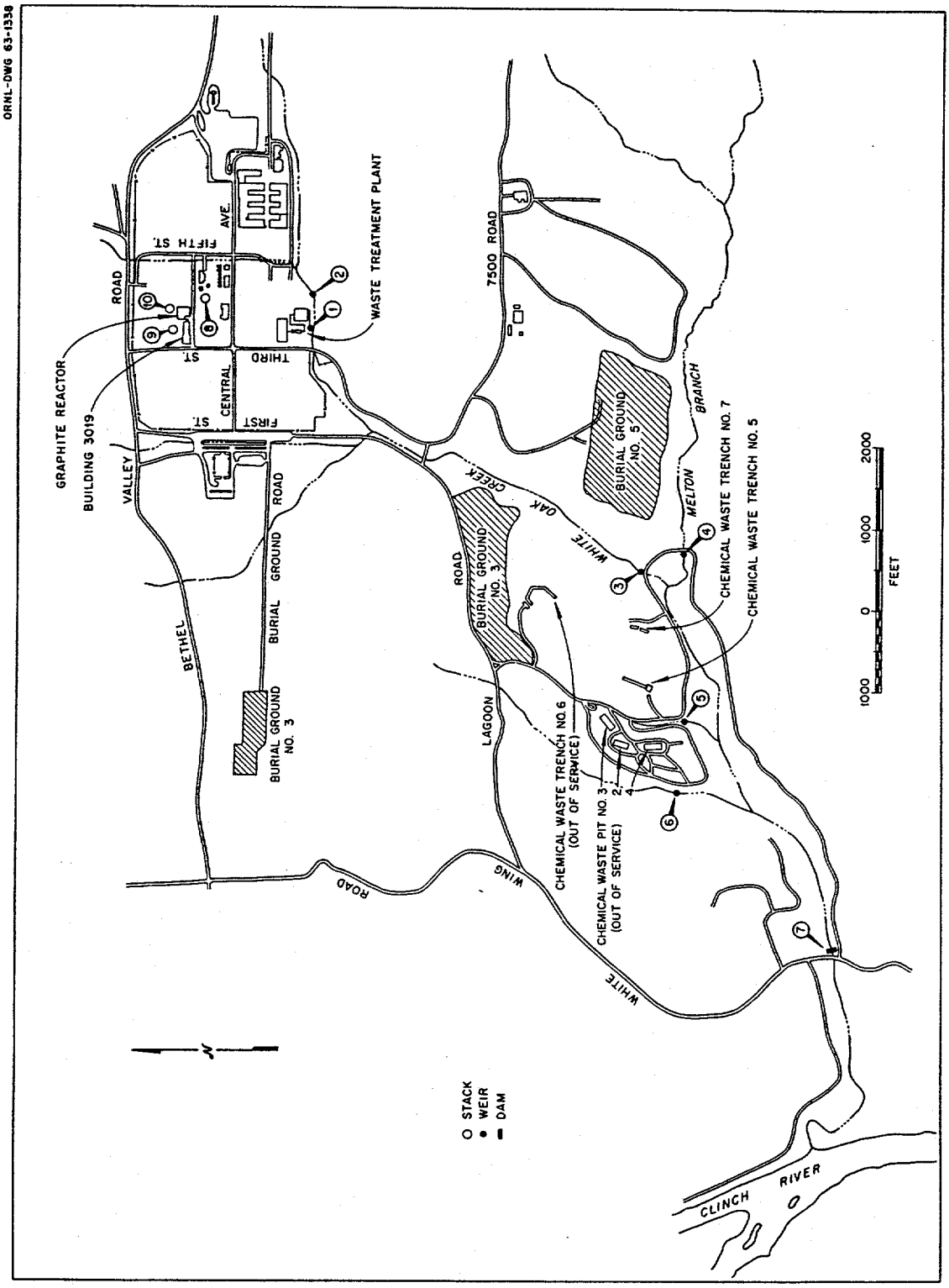

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

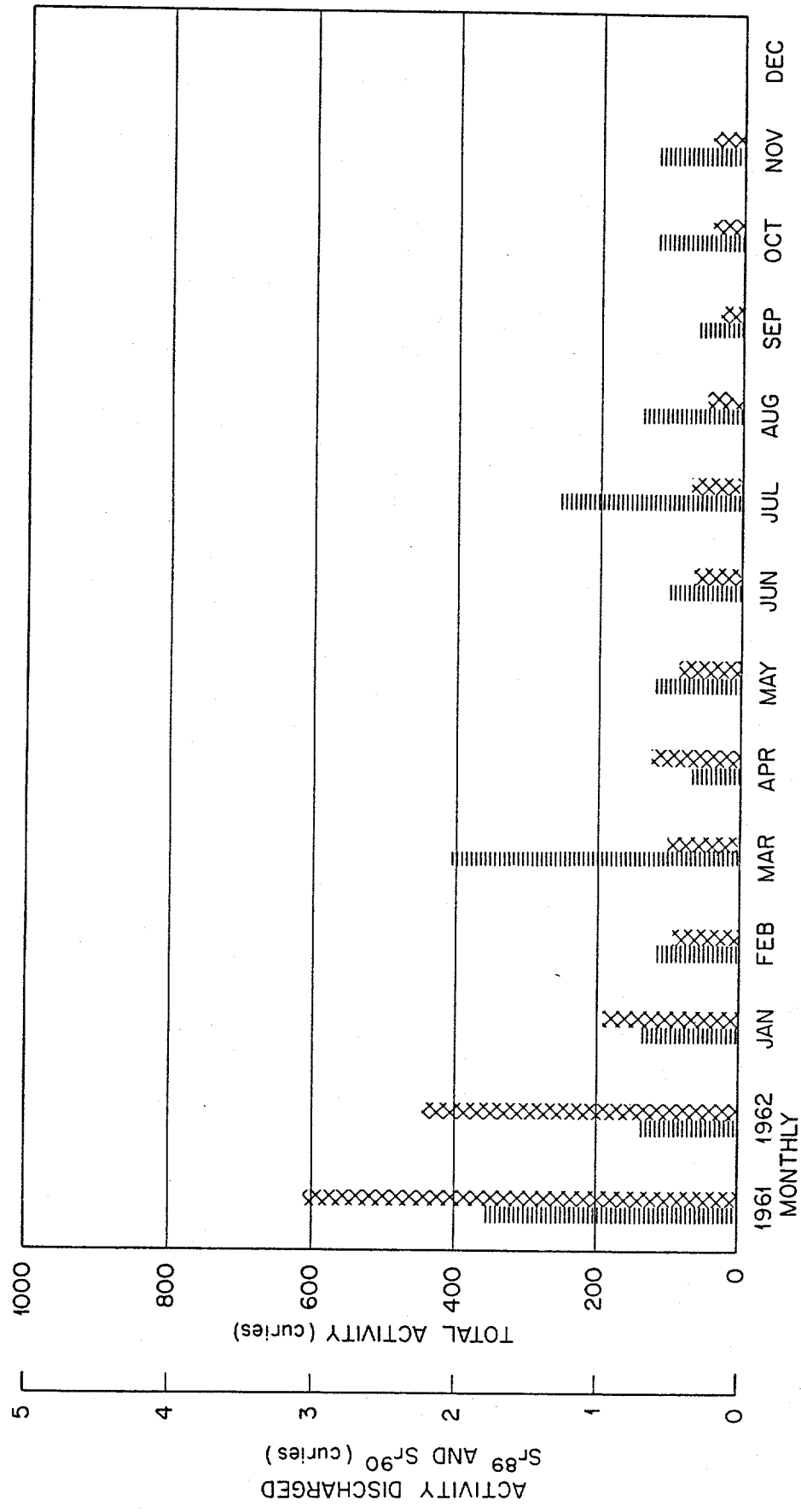

Fig. 2. Liquid Activity Discharge to White Oak Creek.

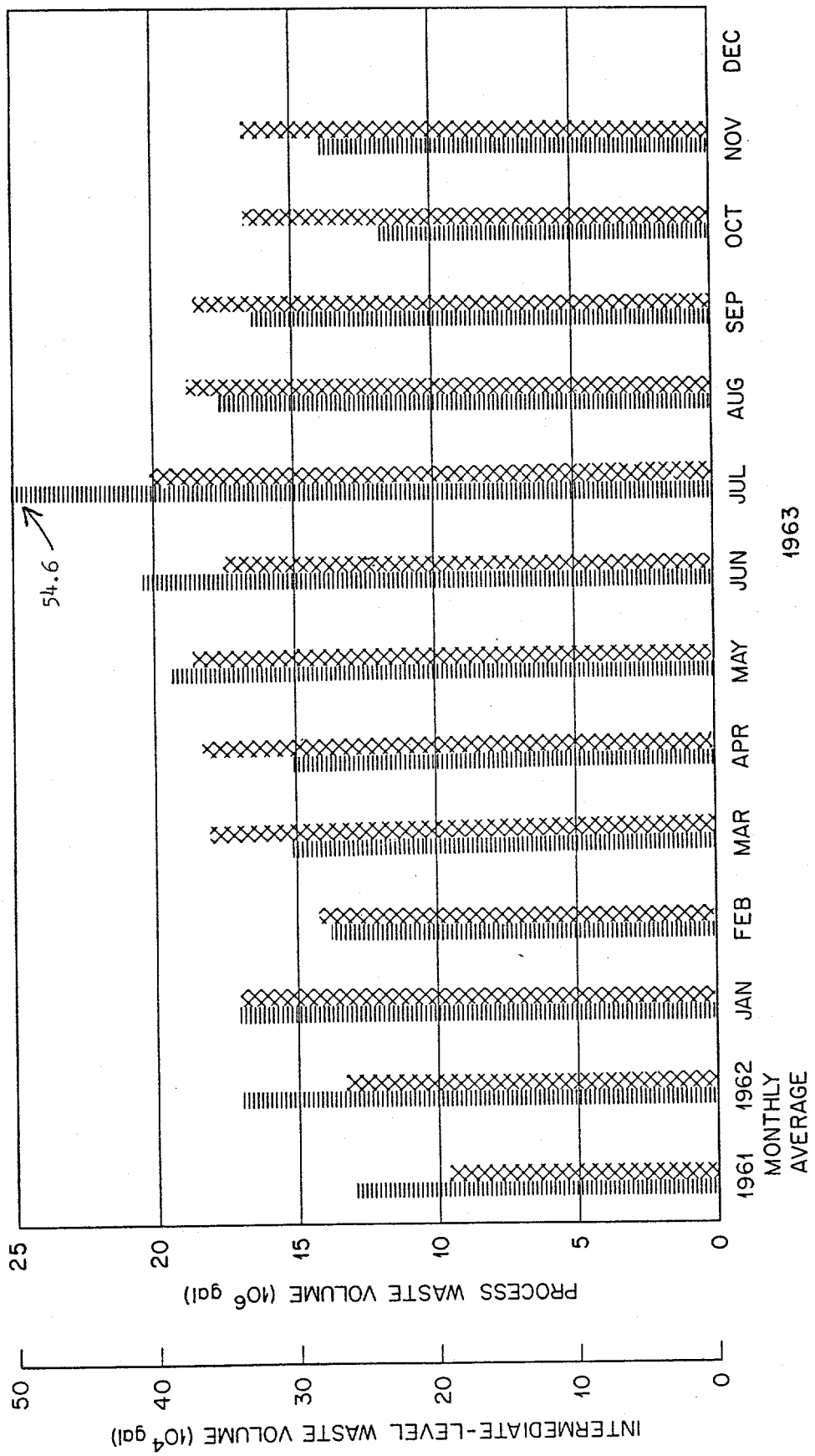

Fig. 3. Liquid Waste Volumes.

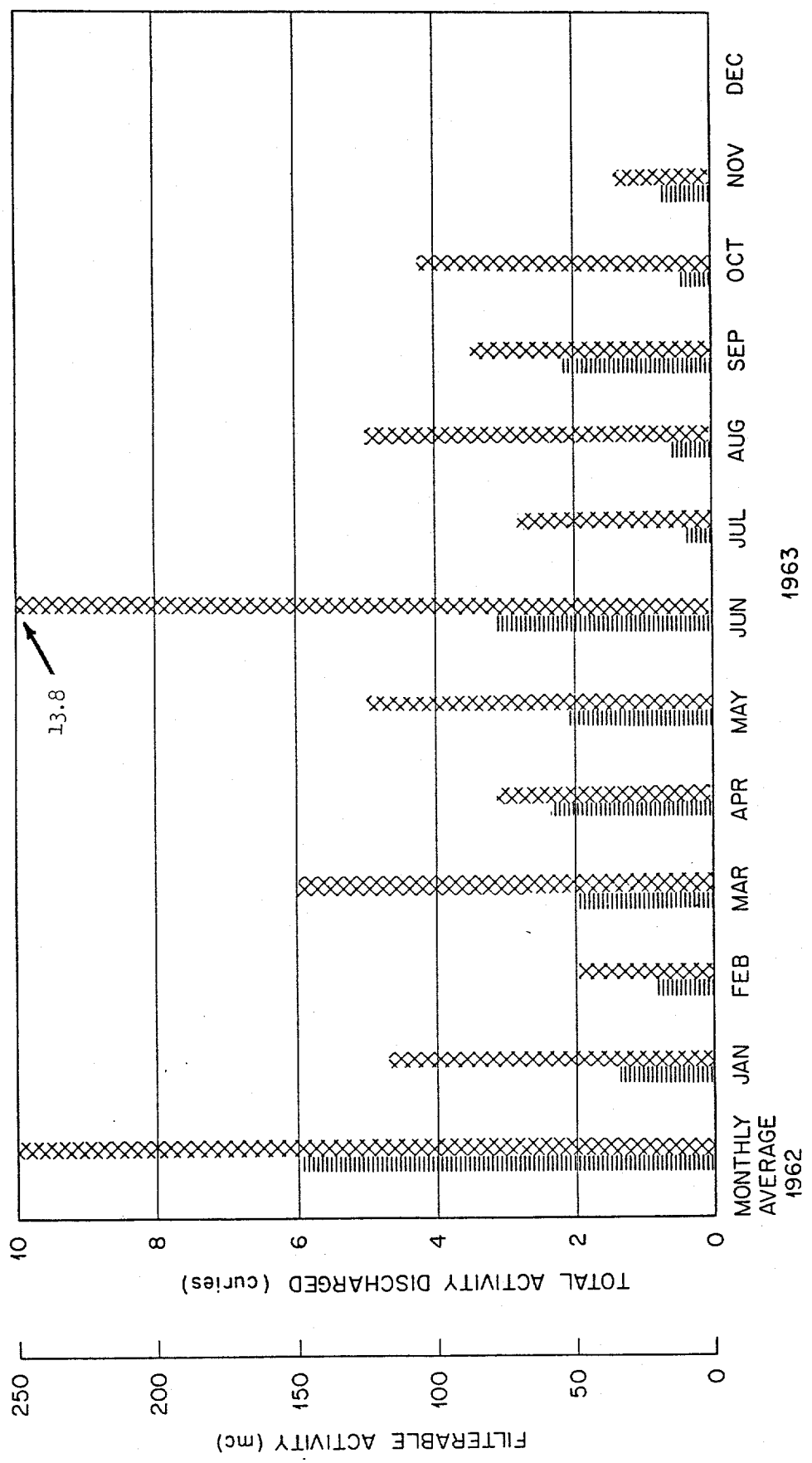

Fig. 4. Gaseous Activity Discharged to Environment.

A summary of the Process Waste Treatment Plant operating data is given in Table 1. The poor overall decontamination is attributed to the bypassing of the plant during the strike period. The bypassing, however, does not completely explain the exceptionally poor strontium removal and it is suspected that the figures shown may be in error.

Table No. 3 lists the main sources of activity discharges into the process waste system.

INTERMEDIATE-LEVEL WASTE

A total of 278,600 gallons of waste was pumped to the trenches this month. Distribution between the trenches is indicated below:

1.	Trench 5	117,600 gallons
2.	Trench 7-A	95,000 gallons
3.	Trench 7-B	66,000 gallons

Major contributions to the system were as follows:

1.	Reactor Complex	57,275 gallons
2.	Building 3019	36,900 gallons
3.	4500 Complex	34,780 gallons
4.	Radioisotopes Processing Area	18,867 gallons
5.	Fission Products Development Laboratory	16,738 gallons

Figure No. 3 gives a monthly comparison of waste volumes pumped to the trenches, and Table No. 4 is an inventory of nuclides transferred to the disposal sites.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.6×10^6 gallons

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE
Total Sr^{1}	0.63 curie	0.56 curie
$Ru^{103, 106}$	None	0.06 curie
Co^{60}	0.06 curie	0.03 curie
Cs^{137}	1.04 curies	0.18 curie
TRE	No analyses	---
Gross Beta Activity	17.7 c/m/ml	7.3 c/m/ml

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
		CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations and Decontamination Facility	43.5	1.9	74.9	3.2	20.8
2. Radioisotopes Processing Area	7	0.1	3.8	1.0	6.5
3. Buildings 3503 and 3508	32	0.5	18.8	1.1	7.1
4. Buildings 3025, 3026, and 3550	2.3	0.03	1.1	0.9	5.8
5. Building 3019	0.3	0.01	0.3	1.9	12.3
6. Fission Products Development Laboratory	4.1	0.02	0.6	0.3	2.0
7. 4500 Area	0.1	0.008	0.3	6.0	39.0
8. Building 3525	0.3	0.004	0.2	1.0	6.5

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

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	51	4,459	1,354	7,445	24	5,104	38	5,142	17	6,491	32	6,523
Ru^{106}	52	1,074	1,274	5,781	25	1,110	358	1,468	17	962	307	1,269
Cs^{137}	792	46,860	14,749	76,009	899	24,011	1,588	25,599	618	23,803	1,668	25,471
Co^{60}	5	818	153	971	2	358	11	369	2	378	9	387
TRE	---	---	608	2,242	---	---	6	6	---	---	5	5
TOTALS	900	53,211	18,158	92,448	950	30,583	2,001	32,584	654	31,634	2,021	33,655

GASEOUS WASTE SYSTEM

Only 1.4 curies of radioactive gaseous waste was released by the Laboratory this month (Table No. 1). Almost all of this activity was gaseous I^{131} which was discharged from the 3039 stack system. The total particulate activity remained low at 17 millicuries (Figure No. 4).

Distribution:

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

35-36. Central Research Library

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CENTRAL FILES NUMBER
64-1-28

DATE: January 16, 1964

COPY NO. 39

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of November 1963

TO: Distribution

FROM: L. C. Lasher

#108

INVENTORY OF TOTAL ACTIVITY DISCHARGED

The data obtained from a network of stations which monitor Laboratory waste effluents are summarized in Table No. 1. The physical locations of these stations are shown in Figure No. 1. Figures No. 2 and 4 compare the discharge of radioactive waste on a monthly basis. Data pertaining to White Oak Dam were provided by the Health Physics Division.

The total release of radioactivity into White Oak Creek remained low at 45 curies (Figure No. 2). Of this total, 41 curies was ruthenium which was discharged from the disposal pit areas. Strontium contamination in White Oak Creek amounted to 0.6 curie; virtually all of the activity was released from the process waste system (Table No. 1).

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

Because of the labor strike, the Process Waste Treatment Plant was not operated during the first eleven days of this month. Normal operation of the plant was resumed on November 12. While the plant was idle, the automatic diversion system was utilized and six million gallons of waste, containing only a small amount of activity, was discharged to the creek without treatment while the remainder, containing a significant amount of activity, was stored in the equalization basin for later processing. The elimination of the processing did not appreciably increase the total discharge of activity for the month over that in previous months (Figure No. 2).

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies) Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.56	0.1	0.2	1.0
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.02	Not Analyzed		
Total discharge from Bethel Valley area to White Oak Lake	3	0.56	0.1	0.1	1.0
Total discharge from Melton Valley area to White Oak Lake	4	0.04	Not Analyzed		
East waste pit seepage to White Oak Lake	5	0.0004	24	None	26
West waste pit seepage to White Oak Lake	6	0.0006	17	None	18
Total discharge to White Oak Lake	3,4,5,6	0.60	41	0.1	45
White Oak Dam to Clinch River	7	0.48	11.65	0.43	14.76
Gaseous Waste[3]					
3039 Stack	8				1.37
3020 Stack	9				0.003
3018 Stack	10				0.03
Total gaseous waste discharged to environment					1.4

[1] Refers to Figure 1.

[2] Includes other nuclides not listed here.

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

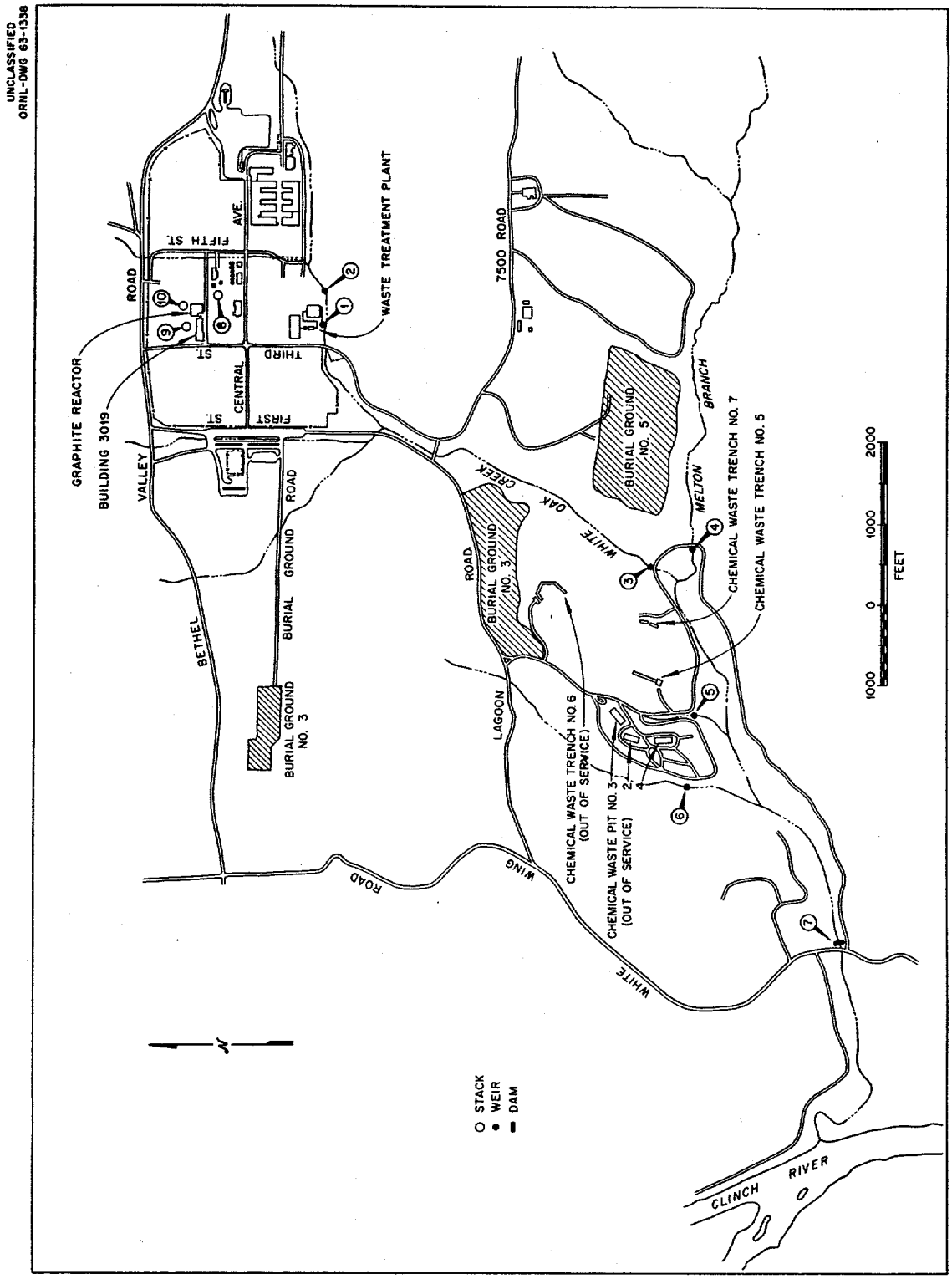

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

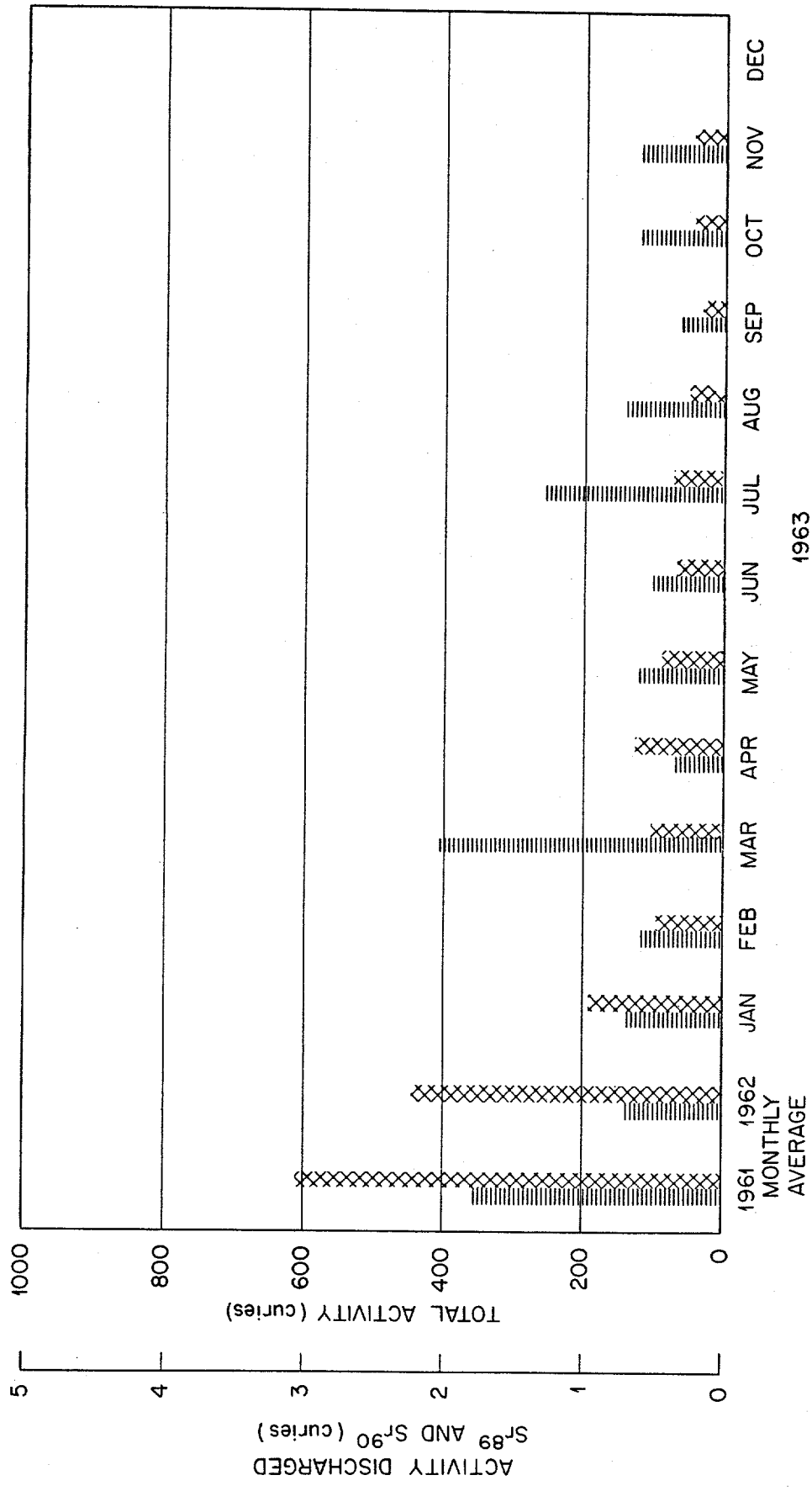

Fig. 2. Liquid Activity Discharge to White Oak Creek.

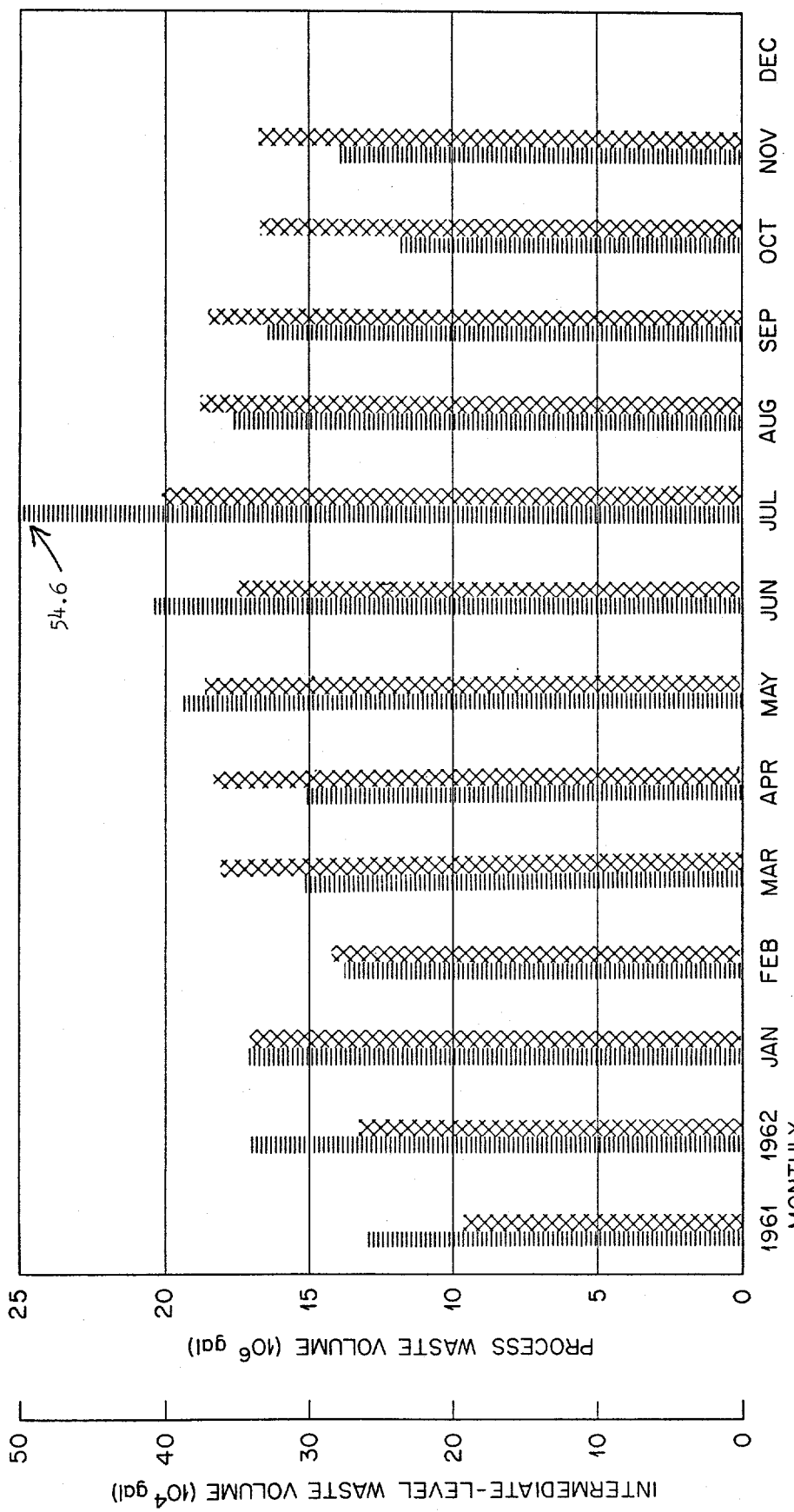

Fig. 3. Liquid Waste Volumes.

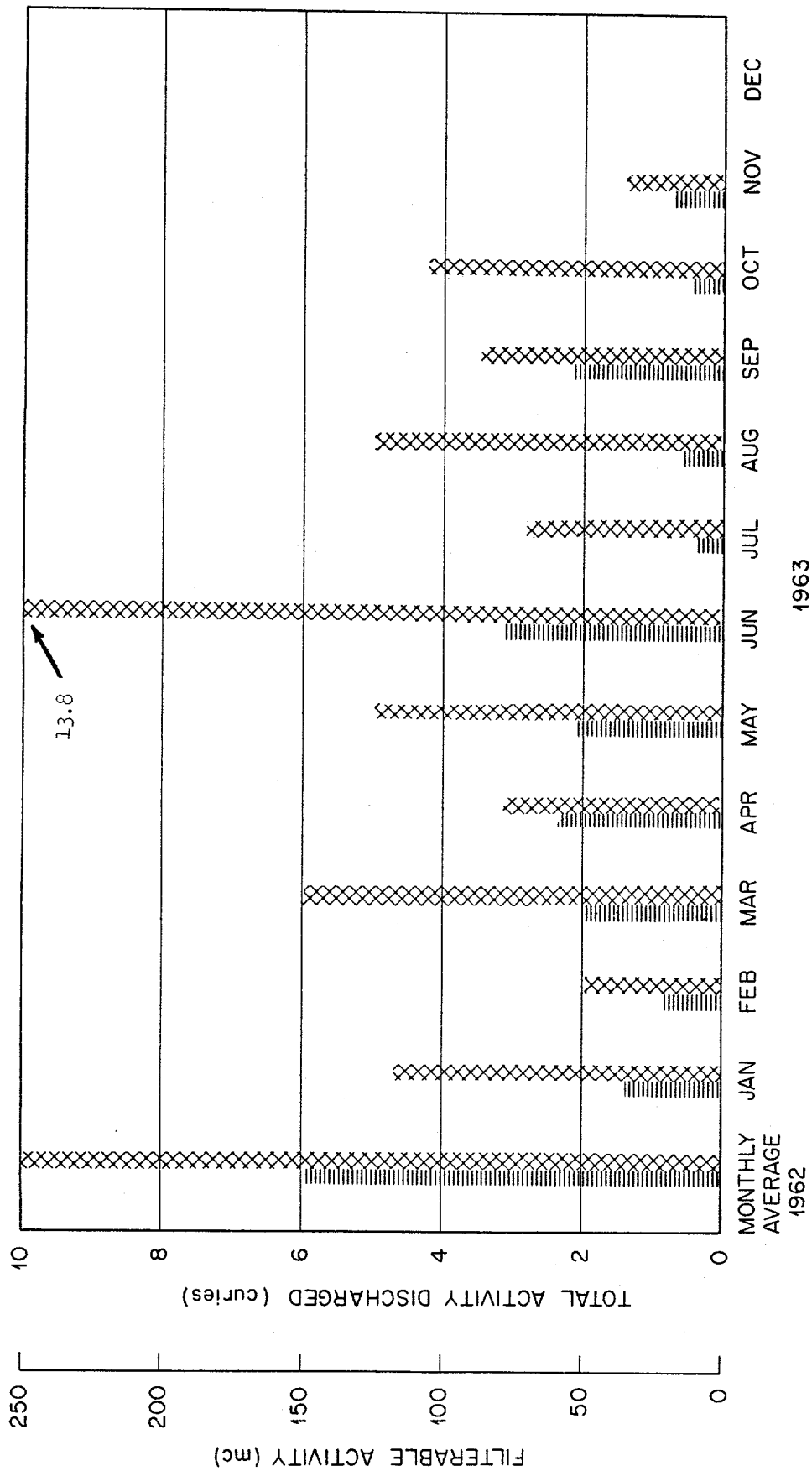

Fig. 4. Gaseous Activity Discharged to Environment.

A summary of the Process Waste Treatment Plant operating data is given in Table 1. The poor overall decontamination is attributed to the bypassing of the plant during the strike period. The bypassing, however, does not completely explain the exceptionally poor strontium removal and it is suspected that the figures shown may be in error.

Table No. 3 lists the main sources of activity discharges into the process waste system.

INTERMEDIATE-LEVEL WASTE

A total of 278,600 gallons of waste was pumped to the trenches this month. Distribution between the trenches is indicated below:

1.	Trench 5	117,600 gallons
2.	Trench 7-A	95,000 gallons
3.	Trench 7-B	66,000 gallons

Major contributions to the system were as follows:

1.	Reactor Complex	57,275 gallons
2.	Building 3019	36,900 gallons
3.	4500 Complex	34,780 gallons
4.	Radioisotopes Processing Area	18,867 gallons
5.	Fission Products Development Laboratory	16,738 gallons

Figure No. 3 gives a monthly comparison of waste volumes pumped to the trenches, and Table No. 4 is an inventory of nuclides transferred to the disposal sites.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

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

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 16.6×10^6 gallons

NUCLIDES	PLANT INFLUENT	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE
Total Sr^{1}	0.63 curie	0.56 curie
$Ru^{103, 106}$	None	0.06 curie
Co^{60}	0.06 curie	0.03 curie
Cs^{137}	1.04 curies	0.18 curie
TRE	No analyses	---
Gross Beta Activity	17.7 c/m/ml	7.3 c/m/ml

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

TABLE 3

PROCESS WASTE DISCHARGES

SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY*		VOLUME	
		CURIES	% OF TOTAL	GAL x 10^6	% OF TOTAL
1. Reactor Operations and Decontamination Facility	43.5	1.9	74.9	3.2	20.8
2. Radioisotopes Processing Area	7	0.1	3.8	1.0	6.5
3. Buildings 3503 and 3508	32	0.5	18.8	1.1	7.1
4. Buildings 3025, 3026, and 3550	2.3	0.03	1.1	0.9	5.8
5. Building 3019	0.3	0.01	0.3	1.9	12.3
6. Fission Products Development Laboratory	4.1	0.02	0.6	0.3	2.0
7. 4500 Area	0.1	0.008	0.3	6.0	39.0
8. Building 3525	0.3	0.004	0.2	1.0	6.5

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

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	51	4,459	1,354	7,445	24	5,104	38	5,142	17	6,491	32	6,523
Ru^{106}	52	1,074	1,274	5,781	25	1,110	358	1,468	17	962	307	1,269
Cs^{137}	792	46,860	14,749	76,009	899	24,011	1,588	25,599	618	23,803	1,668	25,471
Co^{60}	5	818	153	971	2	358	11	369	2	378	9	387
TRE	---	---	608	2,242	---	---	6	6	---	---	5	5
TOTALS	900	53,211	18,158	92,448	950	30,583	2,001	32,584	654	31,634	2,021	33,655

GASEOUS WASTE SYSTEM

Only 1.4 curies of radioactive gaseous waste was released by the Laboratory this month (Table No. 1). Almost all of this activity was gaseous I^{131} which was discharged from the 3039 stack system. The total particulate activity remained low at 17 millicuries (Figure No. 4).

Distribution:

1. H. H. Abee
2. T. A. Arehart
3. W. A. Arnold
4. Walter Belter, AEC-DRD, Washington, D. C.
5. F. N. Browder
6. K. B. Brown
7. F. R. Bruce
8. T. J. Burnett
9. G. C. Cain
10. K. E. Cowser
11. J. A. Cox
12. D. M. Davis
13. Wallace de Laguna
14. J. H. Gillette
15. Howard V. Heacker, AEC-RDD-ORO
16. J. M. Holmes
17. D. G. Jacobs
18. F. Kertesz
19. D. J. Knowles
20. L. C. Lasher
21. T. F. Lomenick
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23. J. F. Manneschmidt
24. F. L. Parker
25. M. E. Ramsey
26. S. J. Rimshaw
27. A. F. Rupp
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CENTRAL FILES NUMBER
64-2-30

DATE: February 14, 1964

COPY NO. 39

SUBJECT: LABORATORY FACILITIES - WASTE DISPOSAL
Report for the month of December 1963

TO: Distribution

FROM: L. C. Lasher

INVENTORY OF TOTAL ACTIVITY DISCHARGED

Table No. 1 is a summary of data obtained from a network of stations which monitor Laboratory waste effluents. The physical locations of these stations are shown in Figure No. 1. Figures No. 2 and 4 compare the discharge of radioactive waste on a monthly basis. The data pertaining to White Oak Dam were provided by the Health Physics Division.

The discharge of 45 curies of radioactivity into White Oak Creek was the same as that reported for November (Figure No. 2). Ruthenium from the ground disposal areas continued to be the major source of contamination (Table No. 1). The discharge to the creek, measured at monitoring station No. 3, was high this month because of a break in the intermediate-level waste transfer line several hundred feet west of monitor station No. 1 (Figure No. 1). The bulk of the resultant contamination was cesium, as indicated in Table No. 1. Strontium contamination (0.7 curie), also measured at station No. 3, remained high because of trouble with equipment at the waste treatment plant and the discharge resulting from the line failure. The strontium discharge from Melton Valley (0.1 curie) was also higher than normal. Most of this activity came from the 7500 area retention pond.

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

The significant data for the Process Waste Treatment Plant operation are given in Table 2. The poor decontamination experienced this month was caused by several malfunctions of the clay and soda ash feeders. Approximately one million gallons of waste was released to the creek without

TABLE 1

SUMMARY OF TOTAL LIQUID AND GASEOUS ACTIVITY DISCHARGED

SOURCE	MONITORING STATION NUMBER[1]	ACTIVITY (Curies) Total Sr	Ru^{106}	Cs^{137}	TOTAL[2]
Liquid Waste					
Process waste to White Oak Creek	1	0.6	$<$0.04	$<$0.2	$<$0.8
Miscellaneous discharges into White Oak Creek from east end of plant	2	0.01	None detected		
Total discharge from Bethel Valley area to White Oak Lake	3	0.7	0.1	6.0	7.4
Total discharge from Melton Valley area to White Oak Lake	4	0.1	0.01	0.2	0.3
East waste pit seepage to White Oak Lake	5	0.0003	33	$<$0.02	34
West waste pit seepage to White Oak Lake	6	0.001	3	$<$0.002	3
Total discharge to White Oak Lake	3,4,4,6	0.8	36	6	45
White Oak Dam to Clinch River	7	0.48	19.53	1.19	23.48
Gaseous Waste[3]					
3039 Stack	8				1.7
3020 Stack	9				$< 10^{-5}$
3018 Stack	10				$<10^{-5}$
Total gaseous waste discharged to environment					1.7

[1] Refers to Figure 1.

[2] Includes other nuclides not listed here.

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

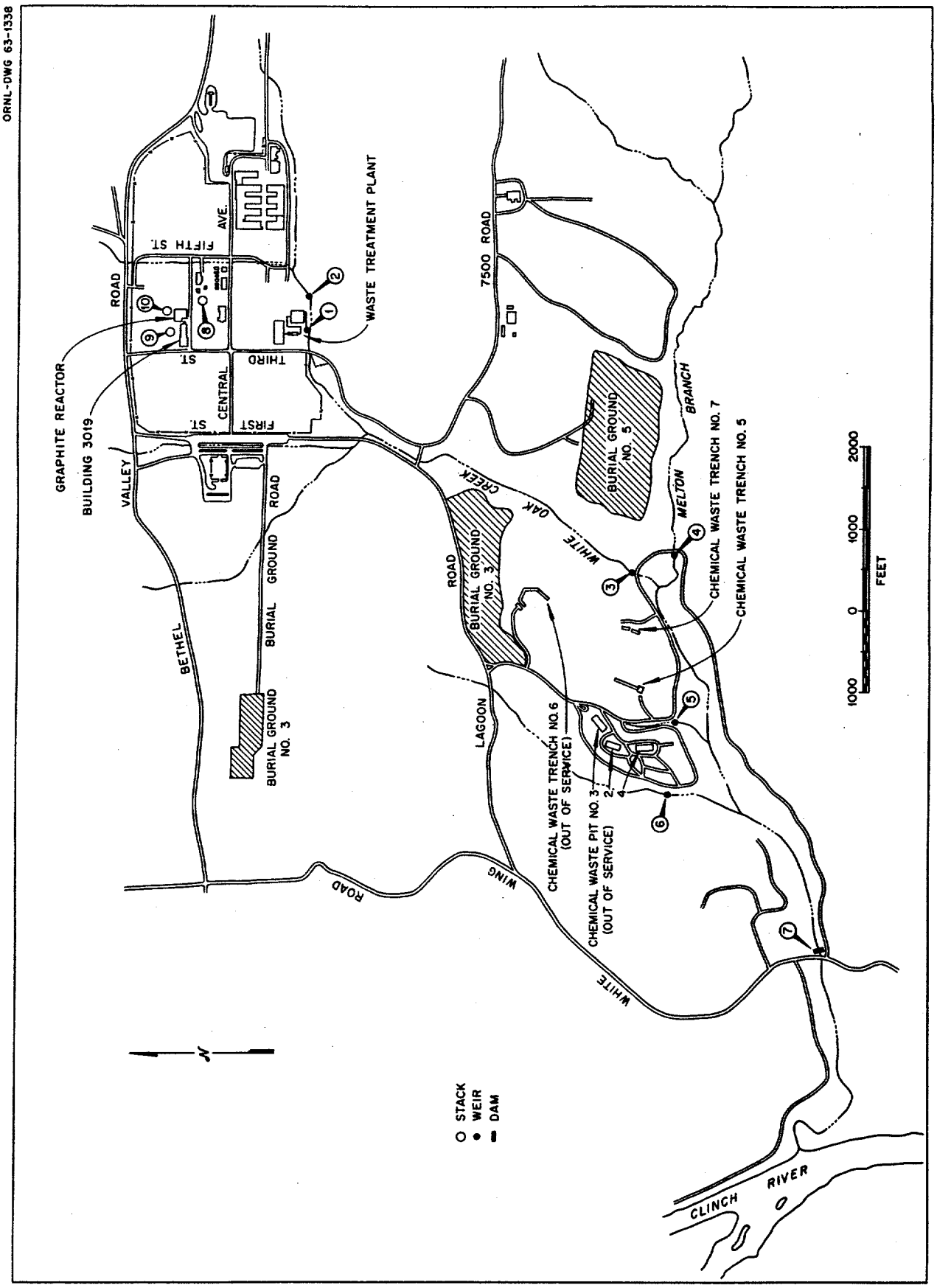

Fig. 1. Location Plan for Laboratory Waste Monitoring Stations

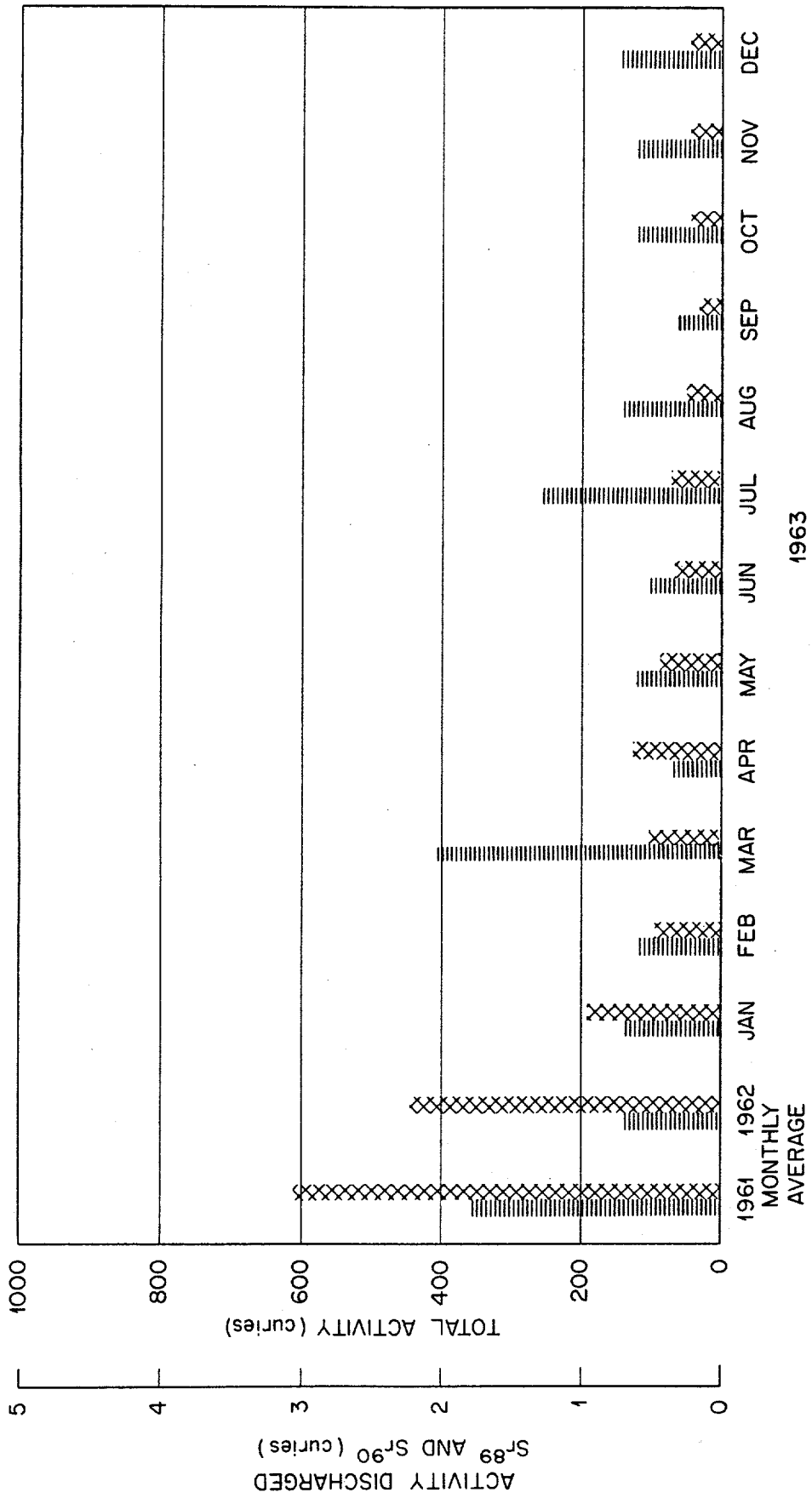

Fig. 2. Liquid Activity Discharge to White Oak Creek.

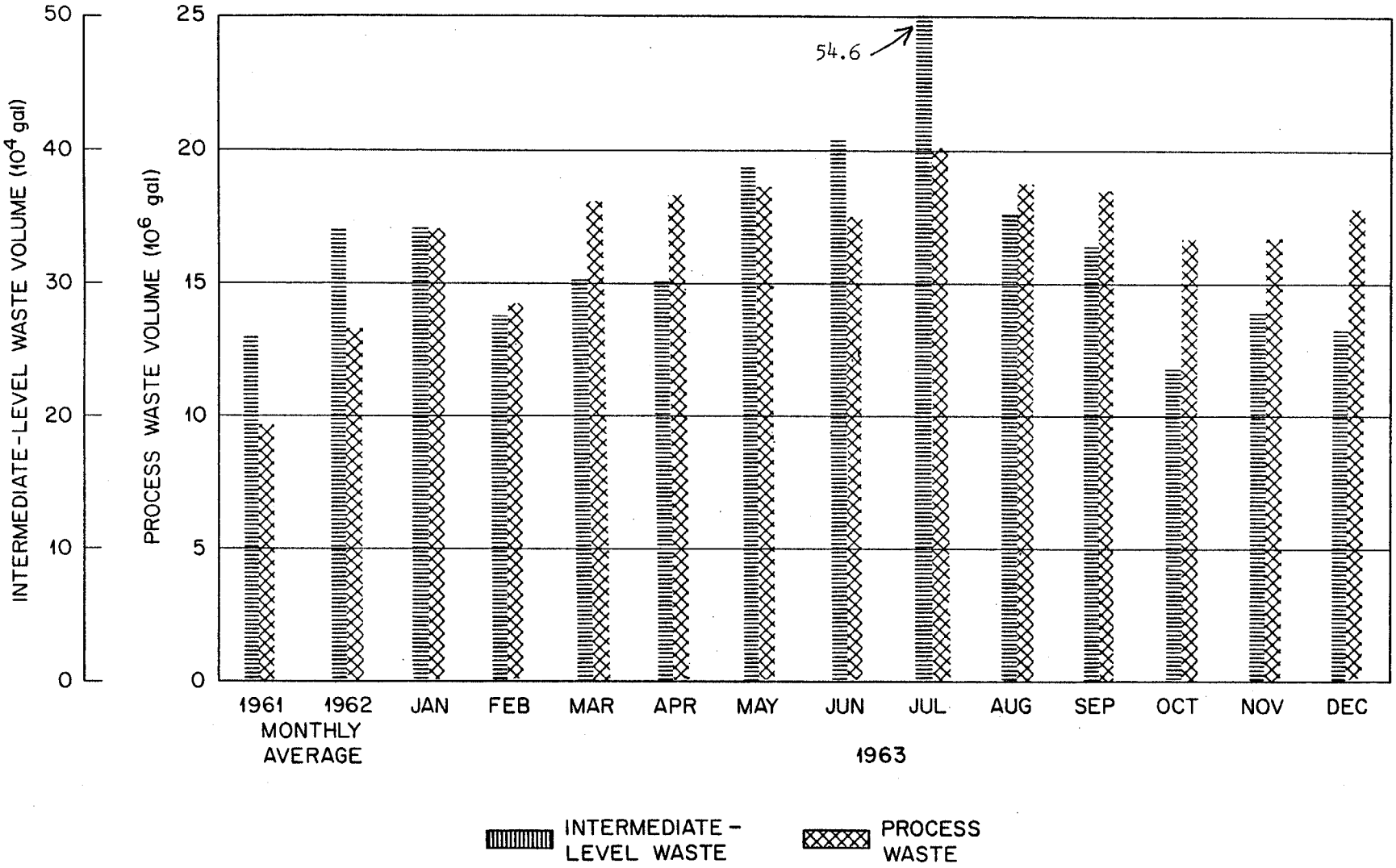

Fig. 3. Liquid Waste Volumes.

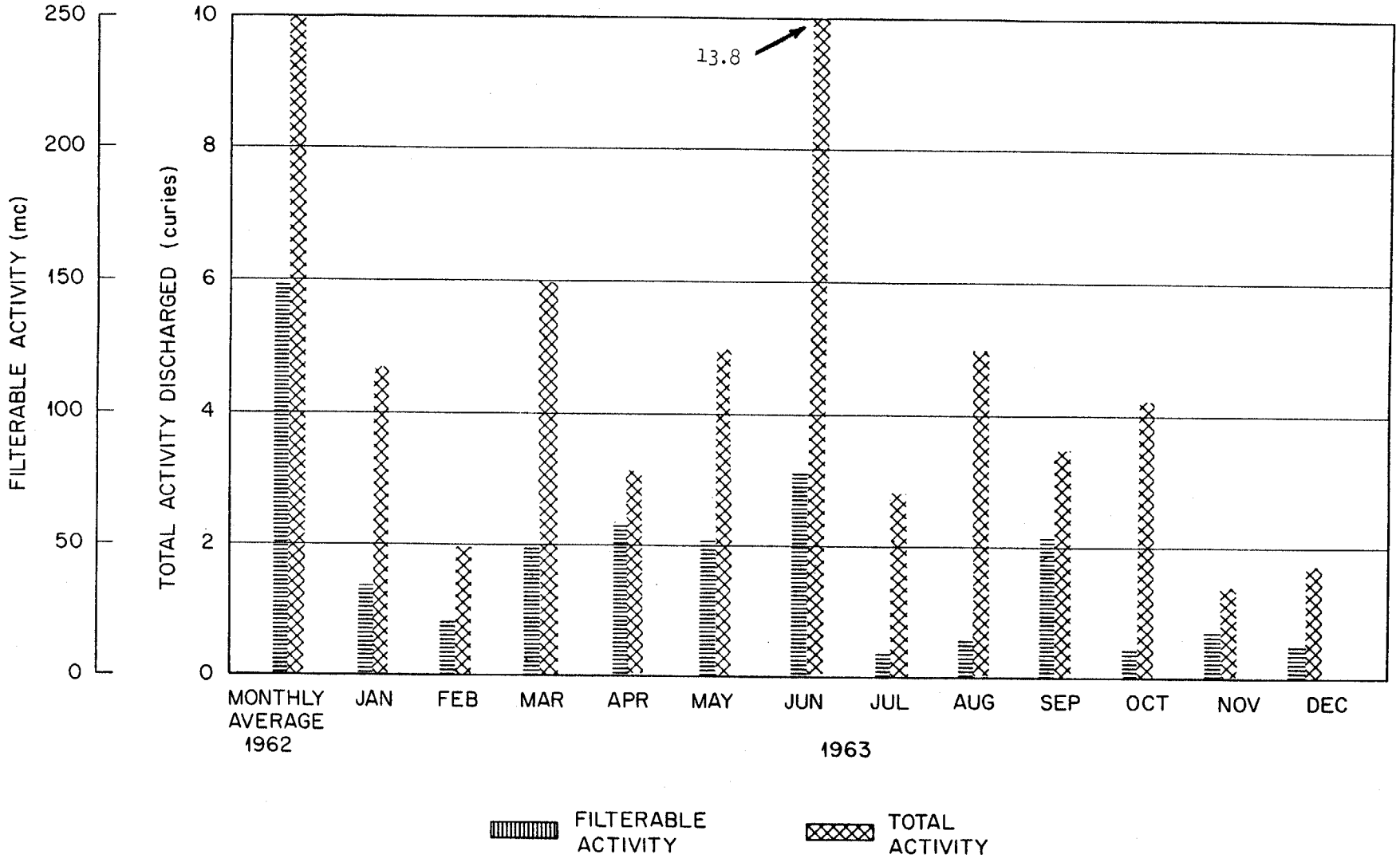

Fig. 4. Gaseous Activity Discharged to Environment.

TABLE 2

PROCESS WASTE TREATMENT AND DISCHARGE TO WHITE OAK CREEK

WASTE VOLUME TREATED THIS MONTH: 17.7×10^6 gallons

TOTAL WASTE VOLUME DISCHARGED TO WHITE OAK CREEK THIS MONTH: 20.8×10^6 gallons

NUCLIDES	PLANT INFLUENT (Curies)	PLANT EFFLUENT AND SETTLING BASIN DISCHARGE (Curies)[1]	PERCENT REMOVED BY TREATMENT PLANT AND SETTLING BASIN
Total Sr^{2}	1.1	0.6	46
$Ru^{103,106}$	0.2	< 0.04	> 80
Co^{60}	None detected	--	--
Cs^{137}	0.5	< 0.2	> 60
Gross Beta	57 c/m/ml	22 c/m/ml	61%

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

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

treatment while the plant was down for repairs. Table No. 3 lists the sources of waste discharged into the system.

INTERMEDIATE-LEVEL WASTE

A total of 265,200 gallons of waste was pumped to the disposal trenches during the month. The waste was distributed between the trenches as follows:

1.	Trench 5	72,000 gallons
2.	Trench 7A	99,600 gallons
3.	Trench 7B	93,600 gallons

Major contributors to the system are listed below:

1.	Radioisotopes Processing Area	52,461 gallons
2.	4500 Complex	46,825 gallons
3.	Building 3019	32,713 gallons
4.	Reactor Complex	32,120 gallons
5.	Fission Products Development Laboratory	24,368 gallons

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

GASEOUS WASTE SYSTEM

A total of 1.7 curies of radioactive waste was discharged from the 3039 stack system. All of this activity was identified as I^{131}, and it was predominantly of a gaseous nature--only 11 millicuries of filterable activity was discharged this month. The total discharge from the 3020 and 3018 stack systems was insignificant (Table No. 1).

TABLE 3

PROCESS WASTE DISCHARGES

	SOURCE	GROSS BETA ACTIVITY AVERAGE, c/m/ml	GROSS BETA ACTIVITY[1] CURIES	GROSS BETA ACTIVITY[1] % OF TOTAL	VOLUME GAL x 10^6	VOLUME % OF TOTAL
1.	Reactor Operations and Decontamination Facility	20	0.92	54.4	3.4	22.7
2.	Radioisotopes Processing Area	10	0.11	6.5	0.8	5.3
3.	Buildings 3503 and 3508	3	0.02	1.2	0.4	2.7
4.	Buildings 3025, 3026, and 3550	4	0.06	3.6	1.0	6.7
5.	Building 3019	1	0.02	1.2	1.8	12.0
6.	Fission Products Development Laboratory	2	0.01	0.6	0.4	2.7
7.	4500 Area	6	0.49	29.0	6.1	40.7
8.	Building 3525	2	0.06	3.6	1.1	7.3

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

TABLE 4

ACTIVITY TRANSFERRED TO PITS AND TRENCHES

Nuclides	Trench No. 5, Curies				Trench No. 7-A, Curies				Trench No. 7-B, Curies			
	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date	This Month	Year to Date	Year 1962	Total to Date
Total Sr	392	4,851	1,354	7,837	146	5,250	38	5,288	137	6,628	32	6,660
Ru^{106}	22	1,096	1,274	5,803	20	1,130	358	1,488	19	981	307	1,288
Cs^{137}	1,248	48,108	14,749	77,257	2,285	26,296	1,588	27,884	2,144	25,947	1,668	27,615
Co^{60}	19	837	153	990	7	365	11	376	7	385	9	394
TRE	--	--	608	2,242	--	--	6	6	--	--	5	5
TOTALS	1,681	54,892	18,138	94,129	2,458	33,041	2,001	35,042	2,307	33,941	2,021	35,962

The 3039 stack cell ventilation and off-gas systems were shut down for twelve hours to provide connections for the future installation of new ORR ventilation fans. During the shutdown, the electrically driven off-gas blower was replaced for a major overhaul.

SUMMARY OF RELEASES DURING 1963

A considerable reduction in routine releases of radioactive materials into the environment was accomplished during the year 1963. The average monthly release of Ru^{106}, one of the two main contaminants released into the White Oak Creek drainage basin, was 77 curies as compared to an average of 447 curies during the year 1962. There was a small increase in the average strontium release (approximately 90% Sr^{90})-0.7 curie per month in 1962 to 0.8 curie in 1963.

The average discharge from the four stacks was 4.5 curies per month in 1963 and 10.1 curies per month in 1962. The bulk of the activity in both years was I^{131}. The filterable activity released from the same stacks was 35 mc per month in 1963 and 149 mc per month in 1962 with the active materials being predominantly I^{131} and Cs^{137}.