[redacted]

ORNL-1502
Progress

OPERATIONS DIVISION MONTHLY REPORT

FOR

MONTH ENDING JANUARY 31, 1953

AEC RESEARCH AND DEVELOPMENT REPORT

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION
UCC
POST OFFICE BOX P
OAK RIDGE, TENNESSEE

[redacted]

[redacted]

ORNL-1502

This document consists of 18 pages.

Copy 2 of 52 copies. Series A.

Contract No. W-7405-eng-26

OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending January 31, 1953

by
M. E. Ramsey

DATE ISSUED

MAR 4 1953

OAK RIDGE NATIONAL LABORATORY
Operated by
CARBIDE AND CARBON CHEMICALS COMPANY
A Division of Union Carbide and Carbon Corporation
Post Office Box P
Oak Ridge, Tennessee

[redacted]

[redacted]

[redacted]

ORNL-1502
Progress

INTERNAL DISTRIBUTION

1. C. E. Center
2-3. Chemistry Library
4. Physics Library
5. Biology Library
6-7. Training School Library
8-11. Central Files
12. C. E. Larson
13. P. C. Aebersold
14. E. A. Bagley
15. G. E. Boyd
16. D. W. Cardwell
17. G. H. Clewett
18. D. D. Cowen
19. J. A. Cox
20. J. S. Felton
21. K. A. Fowler
22. J. H. Gillette
23. C. S. Harrill
24. A. Hollaender
25. H. K. Jackson
26. C. P. Keim
27. M. T. Kelley
28. R. B. Briggs
29. R. S. Livingston
30. S. A. Lough
31. K. Z. Morgan
32. E. J. Murphy
33. M. E. Ramsey
34. P. M. Reyling
35. L. P. Riordan
36. A. F. Rupp
37. E. D. Shipley
38. A. H. Snell
39. F. L. Steahly
40. H. F. Stringfield
41. C. D. Susano
42. J. A. Swartout
43. A. M. Weinberg
44. C. E. Winters
45. E. J. Witkowski

EXTERNAL DISTRIBUTION

46-49. AEC, Washington
50. Technical Information Service, Oak Ridge
51-52. Hanford Operations Office

[redacted]

[redacted]

CONTENTS

[redacted]

OPERATIONS DIVISION MONTHLY REPORT

SUMMARY

The activities of the Operations Division for the month ending January 31, 1953 are summarized and indexed below:

1. Lost graphite reactor operating time averaged 8.2%, compared with 9.7% for December 1952 (p. 3).
2. Three ruptured slugs were detected and discharged without difficulty (p. 3).
3. Minor damage was caused by the hydrogen explosion that occurred on January 23 when a carpenter drove a nail through a feed line to the hydrogen liquifier located in the storeroom adjacent to Building 3001 (p. 3).
4. The LITR down time was 21.4%, compared with 9.1% during December 1952. The major portion of the unusually high down time was due to excessive shim-rod travel that resulted in bent shim drive rods. This overtravel was caused by failure of the travel limits (p. 4).
5. The by-pass demineralizer on the LITR water system is maintaining the LITR water at a specific resistance of approximately 10^6 ohm/cm^3 (p. 4).
6. The concrete cell blocks for the new I^{131} plant have been poured (p. 6).
7. A total of 117 curies of beta activity was discharged to White Oak Creek, compared with 89.9 curies last month. Retention-pond discharge accounted for about one-third of the activity, but the method by which the activity reached the retention pond is as yet unknown (p. 8).
8. Cell B decontamination and equipment removal have been started (p. 9).
9. The rebuilt resin cubicle No. 300 was lowered into its cell and tested. The first dummy run gave a poor yield; therefore another run is being made (p. 10).
10. There were 896 radioisotope shipments during January, compared with 925 during December 1952 and 903 during January 1952 (p. 11).

REACTOR OPERATIONS DEPARTMENT

OPERATING DATA

	JANUARY 1953	DECEMBER 1952
ORNL Graphite Reactor		
Reactor power		
Total accumulated (kwhr)	2,687,049	2,569,688
Average kw/operating hr	3935.92	3823.27
Average kw/24-hr day	3611.63	3453.88
Lost time (%)	8.24	9.66
Excess reactivity (inhr)	40	43
Slugs discharged	95	80
Slugs charged	41	797
Product made (g)	98.07	93.78
Product discharged (g)	1.66	1.43
Low-Intensity Test Reactor		
Reactor power		
Total accumulated (kwhr)	871,303	1,014,646
Average kw/operating hr	1,491	1,500
Average kw/24-hr day	1,171	1,364
Lost time (%)	21.4	9.1
Position of No. 2 shim rod (in. out)	24.918*	24.928

*This corresponds to approximately 0.1% excess reactivity.

REACTOR OPERATIONS

ORNL Graphite Reactor

Operation of the reactor was normal except for two ruptures of unbonded slugs being irradiated for production of radioiodine and one rupture of a bonded slug. The five rows containing unbonded slugs, which are being irradiated for radioiodine, have been shortened from 35 to 24 slugs each in order to keep the slugs at a lower temperature. Table 1 shows pertinent data on the ruptures that occurred this month.

The jackets from the two most recently ruptured bonded slugs have been removed and will be inspected by the Metallurgy Division.

The canal demineralizer functioned very well and maintained the radioactivity of water above the dam at quite a low level (about 500 c/m/ml), whereas the radioactivity below the dam was generally 10,000 to 20,000 c/m/ml.

Reactivity was adequate during most of the month, but installation of a glass-insulated cable in one of the experimental holes took approximately 30 inhr, and the installction of a sodium loop in hole 58 required approximately 15 inhours. The tantalum being irradiated in the peripheral holes remains the major absorber of reactivity.

A hydrogen explosion occurred on January 23 when a carpenter drove a nail through a feed line to a hydrogen liquifier located in the storeroom adjacent to Building 3001. Damage was limited mostly to windows and small electrical equipment in the vicinity of the explosion. Of the four persons in the area nearby, one was burned about the face and arms badly enough to be hospitalized; the others received minor burns.

TABLE 1. SLUG RUPTURES DURING JANUARY

NUMBER	CHANNEL	DATE DISCOVERED	DAYS IN REACTOR	APPROXIMATE TEMPERATURE (°C)	POSITION*	REMARKS
108	1969	1/1/53	80	240	1	Indicated by probe – unbonded slug
109	1163	1/5/53	56	220	21	From lot 6213, all of which were supposedly transformed; unwelded end completely off; not indicated by probe – bonded slug
110	1964	1/19/53	98	240	1	Not indicated by probe – unbonded slug

*Determined by counting from west end of row.

Low-Intensity Test Reactor

Several mechanical failures occurred at the LITR during January and resulted in a rather high down time of 21.4%. The No. 3 magnet drive shaft became separated from an upper shaft carrying the stops for the limit switches and resulted in the lower limit switch failing to operate when the clutch circuit was broken during instrument repairs. Thus the magnet was driven downward beyond its normal travel and bent the drive shaft. A better connection between the drive shaft and the shaft carrying the limit switch stop has been made, and a shear pin has been installed in the motor drive shaft to prevent similar recurrences.

A new radiation stringer is being fabricated for the LITR to facilitate irradiation of isotope samples and similar small samples. The first of these stringers is now almost filled with samples, and a second stringer is needed.

A third experimental tube has been installed in a hollow beryllium piece in lattice position C-46. This completes the four positions available through the four west shim-rod holes in the upper grid assembly. C-44, C-46, and C-48 are occupied by straight tubes extending through the top plug, and C-42 has a flexible metal tube extending out through the southwest diffuser flange in the side of tank A.

A neutron converter is being planned for one of the vertical holes that terminates at the wall of tank D.

On January 28, power oscillations with a frequency of about one per second were observed at the LITR. The regulating rod was moving a maximum distance of 0.2 to 0.3 in.; most of the movements were about 0.1 inch. The frequency was several times greater than that of the oscillations observed a year ago, which were caused by air in the cooling water. After about a day, the cause of the oscillations was found to be an experiment in C-42 over which cooling air was flowing. The sample was not firmly fastened, and the air caused it to vibrate, which produced small power fluctuations.

A line that permits water to be pumped through the fluid cooler and the heat exchanger in series was added to the water system. This will be useful for shutdowns during cold weather, since steam can be put into the shell of the heat exchanger to warm the water and prevent freezing when the reactor is not operating. In addition, if the fluid cooler does not give sufficient cooling during warm weather, it can be supplemented by circulating water in the heat-exchanger shell.

The by-pass demineralizer was put into operation on January 14 and operated until January 27, when the resin began leaking through because of a weak support in the bottom of the resin basket; this support is being strengthened. Specific resistance of the water increased to approximately 10^6 ohm/cm^3, whereas it had formerly dropped to about 2×10^5 after a week in the reactor. No corrosion data on the water have been collected as yet.

Corrosion of steel and aluminum specimens is being studied to estimate the effect of the by-pass demineralizer and the expected life of reactor components.

The spray tank was completed this month, and a series of water-drop tests are scheduled for February. The first two tests will be at 1250 kw (the power of the last test on May 19, 1952), one with and one without water from the spray tank.

FILTER HOUSE

Table 2 shows a comparison of the pressure drop across the exit air filters last month with the pressure drop this month and that experienced with clean filters.

FAN HOUSE

Both fans functioned normally throughout the month.

The No. 3 fan bearings were rolled out and inspected on January 19. Both bearings showed some evidence of wiping along the high spots of the bearing; they were rescraped and reinstalled.

Thermocouples were installed in the babbit housing of the No. 3 fan bearing. This system of measuring bearing temperature was previously tried on the No. 2 fan and was found to be quite successful.

RADIOISOTOPES

Stringers 13, 14, and 16 contained 388 cans of target material at the end of January, as compared with 381 cans of target material at the end of December 1952.

Table 3 shows a comparison of the radioisotope and research samples charged into the ORNL graphite reactor during January with those handled in December 1952.

WATER-DEMINERALIZATION BUILDING

The following list shows water-treatment data for January, as compared with those of December 1952:

	January 1953	December 1952
Water demineralized (gal)	372,858	403,086

TABLE 2. PRESSURE-DROP DATA

DATE	PRESSURE DROP (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
1/31/53	3.7	2.5	7.4
12/31/52	3.7	2.4	7.3
Clean filters	1.1	1.3	3.3

TABLE 3. RADIOISOTOPE AND RESEARCH SAMPLES

	JANUARY 1953		DECEMBER 1952	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	9	134	15	166
Hole 22	43	8	55	4
All other holes	2	23	13	28
Total by groups	54	165	83	198
Total for month	219		281	

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} – 8 d)

Sixty-four ORNL slugs were processed and 36,933 mc of iodine was shipped. The reason for the low yield of one eight-slug run is unknown; all other runs were satisfactory.

Iodine Development Work (Building 3028)

All cell and cubicle liners were placed, and all piping runs embedded in concrete were completed and welded to the liners. Pouring of concrete for the cell block was completed. Raising of structural steel was begun.

Bids have been received on 12 of the vessels to be fabricated by outside contractors. A firm order for these vessels is to be placed the first week of February. Delivery is promised in four to six weeks after receipt of stainless steel from ORNL.

Bids were not received on three vessels; these will again be placed on bid to those vendors who have received orders for other vessels.

Instrumentation drawings and specifications were sent to three vendors, but no bids have been received.

Phosphorus (P^{32} – 14.3 d)

Fifteen 2500-g cans of bombarded sulfur were processed in five runs and 10,202 mc of P^{32} was shipped.

Processing difficulties were experienced in two of the runs. One run yielded only 500 mc and had to be reworked in a subsequent run because of a precipitate that was found when the product was adjusted to a pH of 7; the second run also contained the same type of precipitate.

Carbon (C^{14} – 5740 y)

Analysis of the batch of C^{14} reported last month was completed; there was a total of 660 mc, with an isotopic ratio of 18.6%.

Tritium (H^3 – 12.4 y)

Work was continued on the determination of the best conditions for absorbing H^3 in thin zirconium films.

Precipitation Process, Building 3515

Processing of Purex waste from tank 19 was continued until approximately 75 curies of crude Sr^{90} was separated. Operations were then shifted to tank 14, which contains only Cs^{137} in Redox tailings. Approximately 300 curies of Cs^{137} is in process at the present time. Part of this Cs^{137} will be withdrawn and purified for current use, and the remainder will be allowed to accumulate for production of the experimental kilocurie Cs^{137} source.

Three 2-in. NPS steam jets were tested for capacity and suction head; the objective was to use one as an off-gas booster. A vacuum of 25 in. Hg was achieved by using a contact water condenser, but it was concluded that the capacity of the jets was insufficient for use as an off-gas booster. One of the jets installed in Building 3515 to replace a defective vacuum pump is operating satisfactorily and with a much greater capacity than that of the original pump.

A ½-hp Kenny vacuum pump has been ordered from the excess list at Y-12 and is to be installed permanently in Building 3515.

Source Assembly Station, Building 3013

The installation of equipment in the source assembly station was started; this work will continue over the period of the next three months.

Special Preparations

One hundred five Co^{60} sources were loaded with a total of 592 curies. Four Sr^{90} sources were fabricated: 20 mc, 40 mc, 46 mc, and 70 mc. Two ampoules of tritium were prepared and assayed; they contained a total of 6.9 μc of tritium. Ten ampoules were prepared that contained 0.3 ml/ampoule of gas assaying 90% in A^{38}.

Processed Radioisotope Production

Table 4 is a list of radioisotope product solutions that were prepared during January.

Miscellaneous Work

The as-built drawings of the canal tongs were completed and given to the Reactor Operations Department.

TABLE 4. RADIOISOTOPES PRODUCED DURING JANUARY

PRODUCT SOLUTION	SOURCE	AMOUNT (mc)	SPECIFIC ACTIVITY (mc/g)
Iron ($Fe^{55,59}$ – 2.9 y, 46.3 d)	Hanford		
Fe^{59}		115	9.4
Fe^{55}		298	24.0
Iron (enriched Fe^{58} target)	LITR	29.35	1,730
Iridium (Ir^{192} – 70 d)	LITR	279	143,000
Potassium (K^{42} – 12.4 h)	LITR	320	192
Sulfur (S^{35} – 87.1 d)	ORNL graphite reactor	1000	Carrier-free
Selenium (Se^{75} – 127 d)	Hanford	8544	1,330
		3474	511
Tantalum (Ta^{182} – 117 d)	Hanford	407	2,440
Tin (Sn^{113} – 112 d)	Hanford	42	15.9
Calcium (Ca^{45} – 152 d)	Hanford	135	27
Neodymium (Nd^{147} – 11 d)	Fission products, ORNL graphite reactor	13	Carrier-free
Strontium (Sr^{90} – 25 y)	Fission products, Hanford reactors	4171	Carrier-free
Strontium (Sr^{89} – 53 d)	Fission products, ORNL graphite reactor	800	Carrier-free
Yttrium (Y^{91} – 57 d)	Fission products, ORNL graphite reactor	1050	Carrier-free
Barium (Ba^{140} – 12.8 d)	Fission products, ORNL graphite reactor	88	Carrier-free
Sodium (Na^{22} – 2.6 y)	Pittsburgh cyclotron	38.5	400
Argon (A^{37} – 34.1 d)	ORNL graphite reactor	1	Carrier-free

A drawing was made for a mold to be used for pressing Eu_2O_3 pellets.

An experimental source container for pressed Eu_2O_3 pellets was made.

Sketches were made of small utility extraction equipment to be located in Building 3030, cubicle No. 3.

Preliminary design of tongs and equipment for utility cubicles in Buildings 3029 and 3030 was begun.

Preliminary design information on a shielding window for a 10,000-curie Co^{60} loading cell was accumulated. A cerium glass having a specific gravity of 3.27 is made by Corning Glass Works and is priced at $2.25 per pound; a proposed cell window will be made of this heavy glass.

Tests were continued on the corrosion of titanium metal by molten sulfur. A sample of ½-in.-OD titanium tubing was placed in a beaker of molten sulfur in an oven at 130°C. Corrosion effects will be determined by examination of the tube under a microscope. No corrosion is visible to the eye after a period of three weeks.

RADIOACTIVE-WASTE DISPOSAL

The discharge of activity into White Oak Creek from an unknown source through the retention pond continued at a high rate this month. By extensive excavation of the pipe lines connected to the retention-pond system in the north tank farm and by repeated measurements of flow and activity entering the main line from the various tributaries, it was determined that the major portion of the total activity was entering the system in the vicinity of tanks W-3 and W-4. Efforts to determine the exact source of this discharge will be continued.

Tanks WC-5, WC-6, WC-7, WC-8, and WC-9 were tied into the telemetering system. Only the operation of tank WC-7, which services Building 3504, has been officially accepted as the responsibility of the Chemical Separations Department. The other tanks, which service Buildings 3503 and 3508, are temporarily being operated by the Chemical Technology Division, since this division is using the area where the tanks are located for processing waste contained in one of the tanks. The responsibility for operation of these tanks will be transferred to the Chemical Separations Department as soon as Chemical Technology vacates the area.

Eleven pots containing waste were received from Argonne National Laboratory. Six of these pots were emptied into the chemical-waste system, tank W-5, and the remaining five pots were emptied into the metal-waste system, tank W-7.

Twenty-one hundred gallons of radioactive liquid waste was received from K-25; 900 gal was emptied into the metal-waste system, tank W-7, and the remaining 1200 gal was emptied into the chemical-waste system, tank W-5.

The recovery of uranium waste in tank W-10 was begun by the Chemical Technology Division on January 15.

A leak was located in the discharge line in the jet pit of tanks W-19 and W-20. The decontamination liquids from this pit were jetted to the chemical-waste system until the activity level of the liquids reached 15,000 c/m/ml, at which point the flow was diverted to the settling basin.

The Cottrell precipitator was shut down for 16 hr this month to repaint the iron superstructure, to replace a burned-out rectifier tube, and to wire in lights over the 4500 Area blower motors.

The hot off-gas system from the Radioisotope Area was shut down for 2 hr to permit a tie-in of the fission I^{131} equipment now being constructed.

The Cyclone link fence surrounding the stack area has been reassembled.

Waste Discharged to White Oak Creek

A total of 117 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond (see Table 5). The sources of high activity were (1) the automatic discharge of flange leakage to the settling basin from the pump pit south of Building 3503; this discharge has since been rerouted to the chemical-waste system; (2) the discharge from Building 3019, where some decontaminating solutions were released down a floor drain directly to the settling basin during decontamination of processing equipment; and (3) the retention-pond discharge of about 33% of the activity, the source of which has not yet been found, but which was about 50% lower than that of last month.

Chemical-Waste Evaporator

The waste evaporator was shut down for 4 hr this month to repair a leaking coil return line. An unexplained high entrainment that complicated evaporator operation was encountered early in the month, but has since disappeared. Evaporator operation is shown in Table 6; waste-tank inventory is shown in Table 7.

TABLE 5. ACTIVITY DISCHARGED TO WHITE OAK CREEK

DISCHARGED FROM	JANUARY 1953		DECEMBER 1952	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	18,767,400	78.10*	15,953,000	15.51
Retention pond	685,000	38.94	468,000	74.42
Total	19,452,400	117.04	16,421,000	89.93

*Less than 2.93 curies contributed by the evaporator.

TABLE 6. WASTE-EVAPORATOR OPERATION

MONTH	SOLUTION FED TO EVAPORATOR (gal)	CONCENTRATE TO W-6 (gal)	VOLUME REDUCTION	BETA CURIES TO EVAPORATOR	BETA CURIES TO SETTLING BASIN
January 1953	153,804	12,442	12.4:1	68,265	2.93
December 1952	143,431	10,147	14.1:1	37,000	0.63

Waste-Tank Inventory

TABLE 7. WASTE-TANK INVENTORY

TANKS	CAPACITY (gal)	FREE SPACE (gal)	
		January 1953	December 1952
Hot-Pilot-Plant Storage			
W-3, 13, 14, 15	48,500	30,780	30,500
Chemical-Waste Storage			
W-5	170,000	69,800	103,000
Evaporator-Concentrate Storage			
W-6, 8	340,000	55,600	60,500
Metal-Waste Storage			
W-4, 7, 9, 10	543,000	208,500	209,500

RaLa (Ba^{140} – 12.5 d)

The lead cubicle, which housed the old glass purification equipment, was completely dismantled. The contaminated lead was cleaned in preparation for recasting along with the odd-sized bricks and large lead doors. The uncontaminated bricks were stored for future use.

Some of the cubicle equipment was salvaged for possible future use by the Radioisotope Development Department. The remainder was sent to the burial ground for salvage.

The concrete pedestal under the lead cubicle was chipped down to floor level. The concrete floor under the pedestal was found to be contaminated, but its removal has been postponed until the decontamination of cell B is accomplished, since there would be contaminated-solution leakage into this area through the cell B wall while decontamination is in progress.

Cell B decontamination was begun and continued as a spare-time effort as the availability of man power and exposure time permitted. The radiation levels have been sufficiently lowered to permit removal of equipment by the maintenance forces.

Some of the equipment, including pipes and instrument probes, has been removed from the inside of the cell and the outside top of the cell. The platinum electrodes were removed from the probes and salvaged for other use.

The rebuilding of the process filter cubicle was completed and the two filters were installed. One of the filters is of a new type that has a filter area increased from 1 to 3 ft^2 and will be used in an attempt to speed up the extraction filtrations in future runs.

The new filter was found to be leaking prior to its installation; this necessitated rewelding of the entire housing, which also has to be revised to fit into the cubicle. After the repairs were completed, the filter was tested for leakage through both the outer shell and the filter area by filtration of a sulfate slurry containing the equivalent of 100 g of lead and 5 g of barium; the results of the test were favorable.

The rebuilt resin cubicle No. 300 was lowered into its cell and tested. Successful transfers were made from cell A, the tanks were recalibrated, and all equipment with the exception of the charging heads was found to be in operating condition. The cone would not fit under the charging head, and it will be necessary to completely realign the cone manipulator with reference to the product carrier and both charging heads; this work is now in progress.

A complete chemical dummy run was made through the equipment from the extraction tank in cell A to the product cone. The results of this run indicated a yield of 55% of the inactive barium used in the feed solution; however, only the product solution and a product tank rinse were sampled. Because the dummy-run product results were unfavorable, the lead-shot shielding will not be replaced as yet. Instead, another dummy run will be made in which all wastes will be analyzed to determine if product loss is the result of an equipment or process inadequacy. The equipment appeared to have operated well during the unsuccessful dummy run.

RADIOISOTOPE SALES DEPARTMENT

Radioisotope shipments made during January 1953 are compared with those made during December 1952 and January 1952 in Table 8. A breakdown according to separated and unseparated material (including totals for August 1946 through January 1953), and for project, nonproject, and foreign shipments is also shown.

HANFORD IRRADIATIONS

Table 9 is a list of radioisotope samples that were received from Hanford during the month.

CYCLOTRON RADIOISOTOPES

Table 10 is a list of the orders now on hand for cyclotron radioisotopes.

TABLE 8. RADIOISOTOPE SHIPMENTS

	JANUARY 1953	DECEMBER 1952	JANUARY 1952	AUGUST 1946 TO JANUARY 1953, INCLUSIVE
Separated material	753	749	752	31,870
Unseparated material	143	176	151	8,635
Total	896	925	903	40,505
Nonproject	796	824	773	
Project	77	89	115	
Foreign	23	12	15	
Total	896	925	903	

TABLE 9. RADIOISOTOPES RECEIVED FROM HANFORD

SAMPLE NUMBER	MATERIAL	NUMBER OF PIECES	DATE DISCHARGED	DATE RECEIVED
ORNL-144	Chromium metal	1	12/23/52	1/5/53
		1	January 1953	1/30/53
ORNL-164	Hafnium oxide	1	12/23/52	1/5/53
		1	January 1953	1/30/53
ORNL-165	Calcium carbonate	2	12/23/52	1/5/53
		2	January 1953	1/30/53
ORNL-147	Iron oxide	1	12/23/52	1/5/53

TABLE 10. CYCLOTRON-RADIOISOTOPE ORDERS

MATERIAL	AMOUNT (mc)	SERVICE IRRADIATIONS	STATUS
Na^{22}	1.5		Material has been requested
Ti^{44}		1	Material has been requested
Co^{57}	1.0		Material has been requested
I^{125}	1.1		Material has been requested
V^{53}		1	Material has been requested

Table 11 is a list of the number of radioisotope bombardments received and requested through January 1953.

Table 12 lists the quantity of radioisotopes that was cyclotron-processed and the number of shipments of radioisotopes that were made during January. Also shown are totals to date as divided into millicurie and service-irradiation amounts.

ACTIVATION ANALYSES

A total of 91 requests has been received for information concerning the activation analyses. Twenty-seven of these have developed into requests for analyses, 18 of which have been completed.

TABLE 11. BOMBARDMENTS RECEIVED AND REQUESTED

MATERIAL	MASS. INSTITUTE OF TECHNOLOGY		UNIVERSITY OF CALIFORNIA		UNIVERSITY OF PITTSBURGH		WASHINGTON UNIVERSITY	
	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours
Bombardments Received								
Be^7			1	47.20	15	342.00		
Na^{22}	2	190.00			14	705.25	4	300.00
Mg^{28}			2	19.80				
Mn^{52}					2	20.00		
Mn^{53}			1	8.00				
Mn^{54}	1	50.00	2	182.40			7	400.00
Fe^{54}			1	18.70				
Co^{57}	1	10.00					4	140.00
Fe^{59}			7	332.80	2	80.60	1	34.00
Zn^{65}	1	100.00	1	47.80				
Ga^{67}					11	77.75		
As^{73}			1	10.50	4	40.50		
As^{74}	1	5.00						
Sr^{85}	3	89.75			1	10.00		
Y^{88}	1	10.00						
I^{125}							2	60.00
Iridium							1	8.00
Molybdenum metal			1	10.00	2	15.70	5	50.40
Potassium chloride	1	1.00						
Sulfur					1	2.00		
Total received	11	455.75	17	677.20	52	1293.80	24	992.40
Bombardments Requested but not Received								
Na^{22}					5	250.00		
Ti^{44}			1	10.00				
V^{53}							1	6.00
Sb^{125}			1	100.00				
Total hours outstanding (not received or requested)		1044.25		712.80		−43.80*		501.60

*An extension has been requested for an additional 700 beam hours.

TABLE 12. SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

MATERIAL	NUMBER OF SHIPMENTS JANUARY 1953	TOTAL PRODUCT (mc)		NUMBER OF SERVICE IRRADIATIONS	
		January 1953	To Date	January 1953	To Date
Bi_2O_7					1
Be^7			376.743		4
Be^9	2			2	12
Na^{22}	17	35.25	122.807		
Mn^{52}			10.991		
Mn^{53}					1
Mn^{54}	1	1.00	23.22		
$Fe^{55,59}$			63.64		4
Co^{57}			4.144		
Zn^{65}			43.5		4
Ga^{67}	3			3	46
As^{73}			6.780		
As^{74}					1
Sr^{85}			6		
Sr^{88}			25		
Sr^{90}					1
Mo^{95}					9
Pm^{146}					1
KCl					1
Iridium foil					1

SF MATERIAL CONTROL

Two carload-lot shipments of SF material were received from Hanford during January; these shipments consisted of 566 irradiated thorium slugs for the Thorex program and eight lead pots containing miscellaneous radioisotopes.

Twenty-three MTR fuel assemblies were shipped to Phillips Petroleum Co., Scoville, Idaho, during January. This brings the number shipped to date to 302 fuel assemblies and 46 control rods.

On January 27, three drums containing UNH solution (depleted uranium) were shipped to Mallinckrodt Chemical Works, St. Louis, Missouri. This was the first shipment of uranium recovered under the Metal Recovery Program and it contained 250 kg of uranium.

An over-all material balance was completed on the Scrup process during January. Based on analyses, the ORNL balance totaled 7735.9 kg of uranium and 3.165 kg of plutonium. Since Chalk River had estimated the content at 8262.3 kg of uranium and 3.331 kg of plutonium, an adjustment of 526 kg of uranium and 165.34 g of plutonium was necessary. ORNL technical personnel visited Chalk River and discussed these differences. It was determined that a considerable amount of material (roughly estimated at 300 to 400 kg of uranium) was in the Chalk River canal in the form of oxide and scrap that resulted from shearing the rods into 12-in. sections. Presumably a major portion of the plutonium difference is contained in the uranium.

SF surveys during the month consisted of visiting eight persons possessing SF material. The material in their possession was inspected and weighed where feasible, and no apparent discrepancies were encountered. In addition, the records of four analytical laboratories were audited; this disclosed that all records were in good order and that proper accounting had been made for all samples.

There were 30 receipts and 31 outgoing shipments of SF material during January, compared with 25 receipts and 30 outgoing shipments during December 1952. Tables 13 and 14 are summaries of receipts and shipments for January.

TABLE 13. SF MATERIALS RECEIVED

FROM	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Argonne National Laboratory, ANL	Depleted uranium	2	51,500.00
	Plutonium		2.38
Brookhaven National Laboratory, BNL	Depleted uranium	1	17.83
Carbide and Carbon Chemicals Co., K-25, CCC	Enriched uranium	1	1.72
	Depleted uranium	7	43,241.00
	Plutonium		1.27
Carbide and Carbon Chemicals Co., Y-12, CYT	Enriched uranium	5	4,744.69
	Normal uranium	8	8,315.00
	U^{233}	3	1,260.26
General Electric Co., HGE	Thorium	1	1,174,340.00
	Thorium	1	934,648.66
	U^{233}		722.00
Tracerlab, Inc.	Normal uranium	1	1.26

TABLE 14. SF MATERIALS SHIPPED

TO	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Argonne National Laboratory, ANL	Enriched uranium	1	0.91
Carbide and Carbon Chemicals Co., Y-12, CYT	Normal uranium	2	2,791.38
	Depleted uranium	1	16.40
	Enriched uranium	6	43.57
	Plutonium	1	Negligible
	U^{233}	8	1,072.20
General Electric Co., HGE	Depleted uranium	1	2,547.00
	Plutonium		8.38
Iowa State College, ISC	Depleted uranium	1	4,673.30
	Plutonium		0.27
Mallinckrodt Chemical Works, MCW	Depleted uranium	1	250,021.50
Phillips Petroleum Co., MTI	Uranium-thorium alloy	1	1.75
	Uranium-thorium alloy		152.51
	Enriched uranium	6	3,872.03
Sylvania Electric Products, SYL	Normal uranium	1	11,960.00
USAEC, New York Operations Office, COL	Normal uranium	1	0.43