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OPERATIONS DIVISION MONTHLY REPORT

FOR

MONTH ENDING NOVEMBER 30, 1952

AEC RESEARCH AND DEVELOPMENT REPORT

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OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS COMPANY
A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending November 30, 1952

by

M. E. Ramsey

DATE ISSUED

[illegible] 1953

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

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OPERATIONS DIVISION MONTHLY REPORT

SUMMARY

The activities of the Operations Division for the month ending November 30, 1952 are summarized and indexed below:

1. One ruptured slug was detected and discharged without difficulty (p. 3).
2. The LITR water-to-air cooler, whose installation was completed during the month, is operating satisfactorily (p. 4).
3. Work is in progress on the structural portion of the new I^{131} plant (p. 6).
4. Use of neodymium hydroxide instead of lanthanum hydroxide for the precipitation step of P^{32} production is being evaluated (p. 6).
5. The use of HI for sulfate removal in the purification of crude Sr^{90} was evaluated (p. 6).
6. The test run for production of Be^7 by the cyclotron at Y-12 was very successful (p. 7).
7. Approximately 16,200 gal of concentrated chemical waste containing about 400 curies of beta activity was transferred to chemical-waste pit No. 2 (p. 9).
8. Major repairs were made to the RaLa equipment (p. 10).
9. The next RaLa run will not be needed before March 1, 1953 (p. 10).
10. There were 835 radioisotope shipments this month compared with 880 last month (p. 11).

REACTOR OPERATIONS DEPARTMENT

OPERATING DATA

	NOVEMBER 1952	OCTOBER 1952	YEAR TO DATE 1952
ORNL Graphite Reactor			
Reactor power			
Total accumulated (kwhr)	2,601,149	2,700,401	26,426,298
Average kw/operating hr	3947.71	3953.55	3671.90
Average kw/24-hr day	3612.71	3629.57	3286.85
Lost time (%)	8.53	8.19	10.49
Excess reactivity (inhr)	60	15	
Slugs discharged	153	106	42,048
Slugs charged	153	106	42,724
Product made (g)	94.93	98.55	964.46
Product discharged (g)	2.87	2.51	6244.37
Low-Intensity Test Reactor			
Reactor power			
Total accumulated (kwhr)	971,353	1,024,205	8,384,892
Average kw/operating hr	1,497	1,488	1,265
Average kw/24-hr day	1,349	1,377	1,043
Lost time (%)	9.9	7.5	17.5
Position of No. 2 shim rod (in. out)	25.337*	26.909	

*This corresponds to approximately 0.8% excess reactivity.

REACTOR OPERATIONS

ORNL Graphite Reactor

A slug rupture (No. 106) was discovered on November 10 in channel 1163 after the slug had been in the reactor for 203 days at a temperature of about 225°C. Channel 1163 contained slugs from lot 130, all of which are believed to have been beta transformed. The ruptured slug was the twentieth from the west end. It was discovered by visual inspection, since probes gave no indication of the rupture. The slug had both ends torn off and in addition was severely blistered on the sides. However, it was not badly oxidized and thus seemed to follow the general pattern established in ruptures of bonded slugs.

Representative slug rows are being measured so that their present length may be established for a comparison with their length at future dates. If any appreciable growth does occur, it should be apparent in the over-all length of the row. Since preliminary cycling tests in the Metallurgy Division showed that alpha slugs grew the most, channels have been selected that contain alpha, beta transformed, and partially transformed slugs. It has been possible to duplicate most measurements within about $\frac{1}{8}$ inch. Since some of the test slugs being cycled have shown jacket growth as much as $\frac{1}{2}$ in. after about 430 cycles between 350 and 50°C, whole row growth is expected to be easily detectable, even if only one slug jacket is growing.

Excess reactivity of the graphite reactor was as low as 30 inhr during the month.

Five liquid hydrogen runs were made, and approximately 13 liters was produced.

The north mattress plate was changed on November 24, and it is planned to change the south plate on December 1. The north plate was found to be in fair condition, with only one large hole in the neoprene.

Low-Intensity Test Reactor

The LITR operated very satisfactorily during November.

The two shim-rod bearings were delivered; one was installed in the upper grid assembly to replace a graphite bearing and to permit replacement of one of the old shim rods that had a stainless steel end with a new one containing an aluminum end. The third and last bearing will be replaced in about a month.

The LITR water-to-air cooler was completed and tested during the month. It was found necessary to rinse water through the cooler for almost a week in order to clean out most of the oil, metal chips, and other foreign matter. The water initially circulated through the cooler was extremely dirty. Even after a week of cleaning, the water that circulated through the reactor showed a noticeable drop in resistance and an increase in neutron-induced radioactivity.

The cooler appears to operate satisfactorily and gives a temperature differential between exit reactor-water temperature and air temperature of approximately 25°F with both fans running at full speed. The drain valves were found to be too small for draining in cold weather; larger ones will be installed.

One fuel element, one half-element, and one shim rod were added to replace spent elements during the month.

Instruments at the LITR gave a moderate amount of trouble during the month. It was found necessary to replace the Log *N* Amplifier, Servo Amplifier, and several of the magnet amplifiers. Since spare instruments were available in all cases, however, no great difficulty was encountered.

FILTER HOUSE

Table 1 shows a comparison of the pressure drop across the exit air filters last month with the pressure drop this month and that experienced when all filters were clean.

FAN HOUSE

Both fans have operated normally during the month.

RADIOISOTOPES

Stringers 13, 14, and 16 contained 370 cans of target material at the end of November as compared with 380 cans of target material at the end of October.

Table 2 shows a comparison of the radioisotope and research samples charged into the ORNL graphite reactor during November with those handled in October.

WATER-DEMINERALIZATION BUILDING

Table 3 shows water-treatment data for November as compared with those of October.

TABLE 1. PRESSURE-DROP DATA

DATE	PRESSURE DROP (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
11/30/52	3.6	2.3	7.1
10/31/52	3.4	2.1	6.7
Clean filters	1.1	1.3	3.3

TABLE 2. RADIOISOTOPE AND RESEARCH SAMPLES

	NOVEMBER 1952		OCTOBER 1952	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	12	132	24	143
Hole 22	68	1	69	1
All other holes	1	26	3	28
Total by groups	81	159	96	172
Total for month	240		268	

TABLE 3. WATER DEMINERALIZED AND DEGASIFIED

	WATER TREATED (gal)		
	November 1952	October 1952	Year to Date 1952
Demineralized	355,948	330,360	4,344,578
Degasified	0	0	323,120

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} – 8 d)

Sixty-four ORNL slugs were processed and 32,338 mc of iodine was shipped. One run was reprocessed through the glassware because of a heavy precipitate; all other runs were satisfactory.

An attempt was made to increase product yields by making two revisions in the operating procedures: the substitution of nitrogen for air in the dissolver sparging operation in an effort to reduce the oxidation of the product, and the reduction of the volume of nitric acid in the dissolving operation in an attempt to accomplish the same result. The results to date of both these revisions have been inconclusive.

Iodine Development Work

Johnson and Willard, Knoxville contractors, have started work on the structural portion of the new I^{131} plant. Footings have been poured and forms for the filter cell have been built.

All drawings and specifications for equipment and piping installation to be done by ORNL have been completed. Design work was started on a small, fully enclosed, heavily shielded area where both sampling and analysis will be done. This will permit I^{131} control and product analyses to be made with speed and safety.

Three sample recirculating systems were tested. The air jet tested created too much spray to be practical for use in small-volume process vessels. A system using a pyrex syringe and pyrex ball check was found to have too much lag in the check valve. A bellows pump pulsing a remote bellows and check valve unit through a water-filled leg was also tested. A flow rate of 40 ml/min was obtained by using a ½-in.-ID bellows pulsing 30 times a minute; however, it is doubtful if sufficient suction head can be obtained for satisfactory operation of the sampler unit.

Phosphorus (P^{32} – 14.3 d)

Fourteen 2500-g cans of bombarded sulfur were processed and 8631 mc of P^{32} was shipped.

Neodymium hydroxide in the presence of ammonium chloride was used in the precipitation step this month. Ordinarily, lanthanum hydroxide is used as the precipitate, with no buffer solution being present. It is hoped that by changing to neodymium, the precipitate in the final product may be eliminated. Neodymium hydroxide will precipitate at a pH of 7, but magnesium silicate, which is thought to be the insoluble material in the final product, will not precipitate at this pH.

Carbon (C^{14} – 5740 y)

No C^{14} was produced this month; a run is now in progress.

Further experiments with a Fe_2O_3 bed for oxidation of excess hydrogen in the gas stream indicated that approximately 15% of the hydrogen was burned. It is probable that this performance can be improved by using a longer bed, more uniformly heated than in the experimental unit.

Tritium (H^3 – 12.4 y)

Evaporated films of zirconium on tungsten (for Zr-H^3 targets) have been obtained up to a thickness of 1.5 mg/cm². The results have been checked by chemical methods in addition to the direct gain-in-weight method. By using the present technique, practically no oxide is formed on the metal film. Routine procedures can now be set up to produce targets to supply most demands.

Strontium Purification

A run of about 1 curie of crude Sr^{90} feed from the ion-exchange process was made. This material, together with dead barium, was taken to dryness and treated with 40 ml of 48.8% HI in an attempt to break up the sulfates that may have carried through in the resin. The material was then taken through the fuming nitric and carbonate steps, and, finally, $BaCl_2$ was precipitated from the 12 *N* HCl. The product was satisfactory; however, it was learned from this work that destruction of SO_4^{--} with HI should be done before large amounts of carrier Ba^{++} are added because the relatively large amount of NO_3^- ion, which comes down as $Ba(NO_3)_2$, interferes with the HI treatment and consequently necessitates the disposal of large amounts of iodine vapor.

Dowex-50 resin was taken into solution by boiling with 70 ml of 6 *N* HNO_3 and 10 ml of H_2O_2. A precipitate is formed immediately in this dissolved resin when Ba^{++} is added; when Sr^{++} is added, a precipitate forms after about 30 minutes.

Two test runs are being made on nonradioactive barium and strontium in which the same procedure as that in the Sr^{90} runs is being used; one of the batches contains 10 ml of the dissolved resin. The final HCl product solutions will be checked for total solids.

Another batch containing 2 curies of ion-exchange Sr^{90} crude was processed in the usual manner, except that the starting material was taken to dryness and treated with 15 ml of 48.8% HI (this time without added Ba^{++}). This step worked out well. Of the 35 ml of final product at a concentration of 49 mc/ml, 20 ml was taken to dryness in a shipping bottle and then taken up in 3 ml of H_2O that contained a drop of concentrated HNO_3. Analysis of the product was as follows: concentration, 49 mc/ml; total solids, 9.95 mg/ml; nonvolatile material, 2.2 mg/ml; heavy metals, about 10 ppm. The over-all recovery was 85%.

The following information was obtained from experiments on the solubility of $BaCl_2$ in HCl (using Ba^{133} tracer).

Temperature (°C)	HCl Concentration (*N*)	Dissolved $BaCl_2$ (mg/ml)
22	13	0.046
12.5	13	0.038
6	13	0.03
2.5	13	0.026
22	12	0.048
12.5	12	0.04
6	12	0.031
2.5	12	0.028
22	10	0.07
12.5	10	0.038
6	10	0.032
2.5	10	0.016

The figures for 10 *N* HCl do not appear to be consistent with those obtained at 12 and 13 *N*. Another run is now in progress to check these figures. It was difficult to hold the normality constant, because some gas was lost each time the bottles were opened for sampling.

Precipitation Process, Building 3515

Construction and testing of the precipitation process equipment were completed. The first hot run is scheduled for the first week in December.

Source Assembly Station, Building 3013

The following equipment for the source assembly station was received from outside vendors: pipette mechanism, No. 1 solderer, bottle decapper and plug, bottle positioner, and source transfer arm. Delivery on five remaining units is expected by December 15. Installation will not be started until all the equipment has been received.

Y-12 Cyclotron Test Targets

A very successful test run was made for the production of Be^7 by bombardment of lithium with 22-Mev protons in the Y-12 cyclotron. The target received 4780 μa·hr of bombardment. An excellent yield of 870 mc of purified product was obtained.

Processed Radioisotope Production

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

Special Preparations

Three hundred forty-six Co^{60} sources were loaded with a total of 449 curies. A Sr^{90} source was prepared that contained 1 curie. A sample of triphenylstibine was prepared for irradiation. A special batch of Sr^{90} was prepared with a concentration greater than 200 mc/ml.

Miscellaneous Work

The purification of scandium by using TBP extraction from HCl solutions is in progress.

Twelve cans of cobalt prepared for irradiation at Arco are ready for shipment.

The search for a practical method of dissolving iridium metal continues.

New techniques for the opening of quartz ampoules are being explored. A high-speed carborundum wheel will be tried.

Aluminum cans (instead of quartz) for use inside the magnesium LITR rabbits have been fabricated and will be tested during December.

A gear box has been purchased for use with the hoist in the hot chemistry cell and will be installed during December.

The periscope was removed from the fission-product cell in Building 3026-C to be repaired. The lenses have been darkened badly by radiation.

The drainage of the Sr^{90} purification cell in Building 3030 was altered so that it would jet

TABLE 4. RADIOISOTOPES PRODUCED DURING NOVEMBER

PRODUCT SOLUTION	SOURCE	AMOUNT (mc)	SPECIFIC ACTIVITY (mc/g)
Cadmium (Cd^{115} – 43 d)	Hanford reactors	13.1	13.5
Chromium (Cr^{51} – 26 d)	Hanford reactors	163	1160
		87.1	1190
Iron ($Fe^{55,59}$ – 2.9 y, 46.3 d)	Hanford reactors		
Fe^{59}		29	1935*
Fe^{55}		0.1	
Fe^{59}		12.7	8.1+
Fe^{55}		90	59
Mercury (Hg^{203} – 43.5 d)	Hanford reactors	1275	153
Cerium ($Ce^{141,144}$ – 28 d, 275 d)	Fission products, ORNL graphite reactor		
Ce^{141}		138	Carrier-free
Ce^{144}		203	Carrier-free
Strontium (Sr^{90} – 25 y)	Fission products, Hanford reactors	1300	Carrier-free
Beryllium (Be^{7} – 53 d)	Y-12 cyclotron	790	Carrier-free

*Enriched Fe^{58} target + normal Fe target.

to the hot drain and therefore discharge only emergency overflow to the semihot waste system.

A ball-socket tong of a special type was designed.

Design studies of carriers that are a combination of tungsten and lead were begun.

An as-built drawing of the canal tongs was begun.

RADIOACTIVE-WASTE DISPOSAL

The entire gaseous-waste disposal system at the stack area was shut down for 12 hr on November 1 to allow the tie-in of the ventilation duct and the off-gas line from the research area. An orifice and a recording instrument were also installed to measure the flow in the off-gas system. The flow through this system at present is 200 cfm.

The Cottrell precipitator was shut down twice for a total of 14½ hours. The first shutdown of 12 hr was accidental and the result of a blown fuse and dirty switch contacts. The second shutdown of 2½ hr was for cleaning the tubes and switch contacts.

The Trion precipitator and accessory equipment at the stack area were dismantled and removed to the burial ground for storage.

The Chemical Warfare Service filters in the cell ventilation system of Building 3026-D were replaced on November 21.

A 12-in. wall of concrete block was erected on the east side of the Cottrell precipitator to lower the radiation background in the radioisotope area.

An integrating flowmeter recorder and a sampling pump unit were placed in service in manhole 14, which serves the former Semi-Works and the two eastern wings of Building 3550. To date, the average flow through this manhole has been about 800 gph and bears very little activity.

A new gasket was placed in the connecting flange to the outlet valve from tank W-1, and the connecting flanges to the outlet valve from tank W-2 were tightened. Leaks had been found at these places, which were undoubtedly contributing to the high activity discharged from the retention pond.

Work has begun on the repair of the walks across the settling basin.

About 31,200 gal of supernatant was decanted from tank W-10 to W-7 to provide a higher uranium concentration in the W-10 tank slurry for recovery purposes.

Approximately 16,200 gal of concentrated chemical waste from tank W-8, which contained 400 curies of beta activity, was moved to chemical-waste storage pit No. 2. The total transferred to date is 33,000 gal bearing 718 curies of beta activity.

Waste Discharged to White Oak Creek

A total of 38.1 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond (see Table 5). The high discharge through the settling basin came from the process waste system, but the exact source was never definitely established. At the end of the month, the discharge from the settling basin was back to normal.

Twenty-two per cent of the total output to White Oak Creek came through the retention pond. The main source of this discharge has not yet been located, although leaks into this system were located and repaired in the valve pit at tanks W-1 and W-2.

Chemical-Waste Evaporator

The chemical-waste evaporator was shut down twice this month for a total of 88 hr; each shutdown was for the repair of a sheared pin in the discharge valve from the evaporator tank to the concentrate storage tank W-6. The first time, the pin was replaced; the second time, this troublesome condition was remedied by changing the coupled pin connection to a wheel-type handle that is now bolted to the valve extension handle. The situation seems to be under control at present.

The operation of the waste evaporator had to be reduced during the month to a level as low as 150 gph because the activity entrained in the vapor was higher than that desired for good performance. Some of this activity carry-over can be attributed to the highly active feed of about 1×10^7 c/m/ml. 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	NOVEMBER 1952		OCTOBER 1952	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	15,719,000	29.83*	16,555,000	31.50
Retention pond	364,000	8.25	304,000	2.52
Total	16,083,000	38.08	16,869,000	34.02

*Less than 2.7 curies contributed by the evaporator operation.

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
November 1952	159,826	12,641	12.6:1	46,348.0	2.61
October 1952	201,485	12,317	16.4:1	7,507	1.73

Waste-Tank Inventory

TABLE 7. WASTE-TANK INVENTORY

TANKS	CAPACITY (gal)	FREE SPACE (gal)	
		November 1952	October 1952
Hot-Pilot-Plant Storage			
W-3, 13, 14, 15	48,500	30,500	31,000
Chemical-Waste Storage			
W-5	170,000	90,000	90,800
Evaporator-Concentrate Storage			
W-6, 8	340,000	58,000	40,600
Metal-Waste Storage			
W-4, 7, 9, 10	543,000	212,500	219,000

RaLa (Ba^{140} – 12.5 d)

The process filter cubicle manifold valves, filter valves, and filter disconnects of the RaLa apparatus were either repacked or gaskets were replaced as required, and the equipment was reassembled for testing. Jam nuts were installed under the packing gland nuts of all valves to prevent them from becoming loose during operation.

It was impossible to decontaminate the process filter cubicle to working-time tolerance by chemical means. Some of the highly contaminated removable parts of the equipment were removed and discarded, and the remainder was shielded to provide the required working-time levels.

Tests of the reassembled equipment revealed a total of five leaks in the piping to and from the filter disconnects. These leaks were repaired, but the job turned out to be a major effort because it was necessary to dismantle the entire west wall of the cubicle and cut away the stainless steel liner in order to provide access to the equipment. One small piece of pipe had to be replaced because it had become weakened by past unsuccessful attempts to repair it.

The equipment is now being tested with strong acids in an effort to dissolve any faulty welds before it is reassembled and reshielded.

During the decontamination of the process filter cubicle, some of the contaminated solutions escaped and contaminated the west wall of cell A below the cubicle. The wall was decontaminated as much as possible, and lead shielding was hung to provide adequate working time in this area.

The samplers and sampling equipment of resin cubicle 200 were completely realigned. However, no samples can be obtained from the product evaporator tank under any conditions. It appears that the sampler on this tank is completely inoperable.

The rebuilding of cubicle 300 is approximately 75% complete. The cubicle equipment is being tied in to the panel board services to permit testing before it is lowered into its shield.

A newly designed, larger, tantalum-lined product evaporator was received from the fabricators.

Los Alamos has reported that no product will be needed before March 1, 1953.

RADIOISOTOPE SALES DEPARTMENT

Radioisotope shipments made during November 1952 are compared with those made during October 1952 and November 1951 in Table 8. A breakdown according to separated and unseparated material (including totals for August 1946 through November 1952), and for project, nonproject, and foreign shipments is also shown.

HANFORD IRRADIATIONS

The following radioisotope sample was received from Hanford during the month.

Sample number	ORNL-146
Material	Cobalt
Number of pieces	4
Date discharged	November 1952.
Date received	November 14, 1952

CYCLOTRON RADIOISOTOPES

Table 9 is a list of the orders now on hand for cyclotron radioisotopes.

Table 10 is a list of the number of radioisotope bombardments received and requested through November 1952.

Table 11 lists the quantity of radioisotopes that was cyclotron-processed and the number of shipments of radioisotopes that were made during November. Also shown are totals to date as divided into millicurie and service-irradiation amounts.

ACTIVATION ANALYSES

A total of 70 requests has been received for information concerning the activation analyses. Twenty-four of these have developed into requests for analyses, 13 of which have been completed.

TABLE 8. RADIOISOTOPE SHIPMENTS

	NOVEMBER 1952	OCTOBER 1952	NOVEMBER 1951	AUGUST 1946 TO NOVEMBER 1952, INCLUSIVE
Separated material	670	715	674	30,368
Unseparated material	165	165	142	8,316
Total	835	880	816	38,684
Nonproject	745	769	698	
Project	19	93	111	
Foreign	71	18	7	
Total	835	880	816	

TABLE 9. CYCLOTRON-RADIOISOTOPE ORDERS

MATERIAL	AMOUNT (mc)	SERVICE IRRADIATIONS	STATUS
Na^{22}	21.10		Material in process
Mg^{28}		1	Material has been requested
Ti^{44}		1	Material has been requested
Co^{57}	1.00		Material to be requested
As^{73}	2.02		Material in process
I^{125}	1.10		Material has been requested

TABLE 10. 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}			1	9.80				
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
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	16	667.20	52	1293.80	23	984.40
Bombardments Requested but not Received								
Iridium							1	8.00
Ti^{44}			1	10.00				
Mg^{28}			1	10.00				
Total hours outstanding (not received or requested)		1044.25		812.80		206.20		507.60

TABLE 11. PRODUCTION AND SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

MATERIAL	NUMBER OF SHIPMENTS NOVEMBER 1952	TOTAL PRODUCT (mc)		NO. OF SERVICE IRRADIATIONS	
		November 1952	To Date	November 1952	To Date
Be^7	4	8	376.743		4
Be^9	2			2	6
Na^{22}			87.557		
Mn^{52}			10.991		
Mn^{53}					1
Mn^{54}	3	3	22.22		
$Fe^{55,59}$			63.64		4
Co^{57}			4.144		
Zn^{65}	1	1	43.5		4
Ga^{67}	3			3	39
As^{73}			4.760		
As^{74}					1
Sr^{85}			6		
Sr^{88}			25		
Sr^{90}					1
Mo^{95}					9
KCl					1

SF MATERIAL CONTROL

Two carload-lot shipments of SF material were received from Hanford during November; these shipments consisted of 280 irradiated uranium slugs for the Purex process and one lead pot containing miscellaneous radioisotopes.

Thirty MTR fuel assemblies and four shim rods were shipped to Phillips Petroleum Co., Scoville, Idaho during November. This brings the number shipped to date to 244 fuel assemblies and 39 shim rods.

On November 28, 81.30 kg of normal uranium and 27.05 kg of thorium sawing waste were shipped to Mallinckrodt Chemical Works, St. Louis, Missouri for recovery.

Phase two of the U^{233} Separations program was completed during November. An over-all material balance was completed by the SF office personnel working in conjunction with personnel of the extraction process and purification laboratory. The U^{233} content calculated at Hanford totaled 1235 grams. Recovery results amounted to 1226.86 g or 99.34% of the calculated content.

Work was started on the determination of an over-all material balance on the Scrup process. This effort will be continued in December in an attempt to include adjusted quantities, based on analytical results, from the November SF monthly report; however, the work may not be completed until the latter part of December.

Consideration has been given to the problem of consolidating ORNL Y-12 SF accountability with ORNL X-10 accountability. A meeting will be held early in December with personnel of the Y-12 SF office to discuss the ramifications involved.

In connection with verification of the MTR fuel assembly fabrication inventory and determination of recognized limits of uncertainty on finished plates and assemblies, work was continued on the gamma-scanning results referred to in the October report, ORNL-1440. One plate that was used as a standard in the gamma scanning was dissolved and analyzed for total uranium content. By analysis, the plate contained 10.01 g of uranium compared with 10.016 g based on dip-sample analytical results applied to fabrication data. This information, along with the scanning results, has been forwarded to A. de la Garza, K-25, for further statistical study.

SF surveys during the month consisted of visiting 11 persons possessing SF material, and no apparent discrepancies were encountered. In addition, the records of three 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 27 receipts and 26 outgoing shipments of SF material during November compared with 28 receipts and 30 shipments during October. Tables 12 and 13 are summaries of receipts and shipments for November.

TABLE 12. SF MATERIALS RECEIVED

FROM	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Brookhaven National Laboratory, BNL	Normal uranium	1	12.00
Carbide and Carbon Chemicals Co., K-25, CCC	Normal uranium	2	2,057.00
	Depleted uranium	3	1,788.00
Carbide and Carbon Chemicals Co., Y-12, CYT	Normal uranium	5	1,895,176.40
	Depleted uranium	1	30.00
	Plutonium	2	0.13
	Enriched uranium	6	13.98
	Thorium	1	0.32
	U^{233}	2	587.06
General Electric Co., HGE	Depleted uranium	2	497,860.00
	Plutonium in depleted uranium		270.00
	Thorium	1	827,800.00
Phillips Petroleum Co., MTI	Enriched uranium	1	0.10

TABLE 13. SF MATERIALS SHIPPED

TO	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
California Research and Development Co., CRD	Normal uranium	1	2,014.00
Carbide and Carbon Chemicals Co., Y-12, CYT	Normal uranium	1	20.00
	Depleted uranium	2	549.70
	Plutonium	1	0.07
	Enriched uranium	10	558.84
	U^{233}	1	0.21
Mallinckrodt Chemical Works, MCW	Normal uranium	1	81,299.00
	Thorium	1	27,048.00
Phillips Petroleum Co., MTI	Enriched uranium	7	5,974.25
University of California Radiation Laboratory, BUC	Enriched uranium	1	55.57