ORNL 1188
Progress

DEVELOPMENT REPORT

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FOR [redacted] 30, 1951

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By [redacted]

9-24-70
4-71

OAK RIDGE NATIONAL LABORATORY

[redacted]ABORATORY

CARBIDE AND [redacted]CALS COMPANY

A DIVISION [redacted] CORPORATION

[redacted]

[redacted]

ORNL 1188

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending November 30, 1951

by

M. E. Ramsey

DATE ISSUED FEB 28 1952

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

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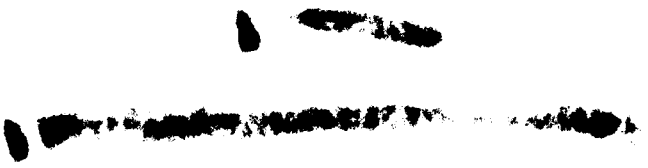

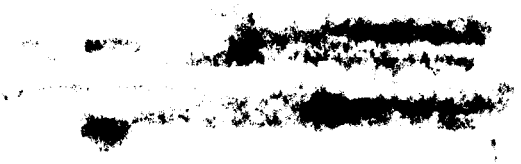

SUMMARY

1. Lost pile-operating time averaged 8.0%, compared to 10.1% in October and 9.6% for the year to date (p. 2).

2. No ruptured slugs were detected during the month (p. 2).

3. Even though somewhat better Al-Si bonded slugs have been made by passing either argon or chlorine through the Al-Si bath, a new method of bonding is to be evaluated (p. 2).

4. The Low Intensity Testing Reactor (LITR) operating time was 82.1% at 767 kw, compared to 56.5% at 613 kw during the previous month (p. 3).

5. A slight unexplained oscillation of the LITR power was noticed during the latter part of the month (p. 3).

6. Some difficulty was encountered with precipitate at a *p*H of 7 in the P^{32} products made early this month (p. 6).

7. Serious radiation damage to the resin has been noted in the separations work on Purex wastes (p. 6).

8. One of the RaLa cubicles has been rebuilt and dummy runs made. The results of two dummy runs indicated higher losses than had been expected (p. 11).

9. The next RaLa run is tentatively scheduled to start on January 6, 1952 (p. 11).

10. The beta activity discharged to White Oak Creek was 22.5 curies, compared to 16.3 curies during the previous month (p. 9).

11. There were 816 radioisotope shipments, compared to 832 last month (p. 12).

PILE DEPARTMENT

OPERATING DATA

(Graphite Pile)

	NOVEMBER 1951	OCTOBER 1951	YEAR TO DATE 1951
Total accumulated kwhr	2,607,479	2,556,832	27,535,716
Average kw per operating hr	3937.11	3842.17	3801.67
Average kw per 24-hr day	3621.50	3436.60	3435.09
Per cent lost time	8.0	10.6	9.6
Excess pile reactivity	135 in-hr	105 in-hr	---
Slugs discharged	95	114	3321
Slugs charged	91	116	3434
Product made (g)	95.16	93.32	1004.95
Product discharged (g)	1.98	2.91	385.76

PILE OPERATIONS

Graphite Pile. The average pile power per operating hour for the month was 3937.1 kw, compared with 3842.2 kw for October 1951, and 3801.7 kw for the year to date.

The pile-down time was 8.0%, compared with 10.6% in October 1951, and 9.6% for the year to date.

There were no ruptured slugs detected during the month. The total number of ruptures detected to date is 91.

No production runs of bonded slugs were made at Y-12 during the month. Two test lots were made in which argon and chlorine, respectively, were bubbled through Al-Si baths to remove dissolved gases. This considerably reduced the number of rejects due to gas formation in the Al-Si layer. The average rate of rejects for both lots due to blistering was about 3% after an oven test at 400°C for one week. Previous rejection rates have averaged almost 20%.

In an effort to determine how well slugs which passed (with a rejection rate of about 20%) the one-week oven test at 400°C would resist blistering after extended tests, approximately 1000 such slugs were tested for three additional weeks at 400°C. After the first week there were approximately 3% blisters and one rupture. After the second week there were approximately 10% blisters and three ruptures; after the third additional week there were approximately 2% additional rejects and three more ruptures.

This appears to indicate that even the slugs which passed the first oven test will not prove to be suitable for use in the pile at high temperatures.

In an effort to compare the severity of the oven test at 400°C with tests at lower temperatures, several batches of slugs will be tested at 400°C and at two lower temperatures. A comparison will also be made between the present unbonded slugs and bonded slugs by testing some of each at the same temperature.

Since it appears that the present method of bonding may not be suitable due to small amounts of tin left on the surface of the slugs which results in blistering, a new method using a lead dip will be evaluated in which tin will be eliminated altogether.

The canal demineralizer tanks have been shielded with lead and as soon as a few leaks are repaired the demineralizer will be put into operation.

The first of the new safety rods will be installed the first week in December in safety-rod hole No. 8.

A Co^{60} source of approximately 300 curies was assembled in a special container for the Medical Division of ORINS.

Low Intensity Testing Reactor. The LITR operating data for November in comparison with that of the previous month are shown in Table 1.

The total down time at the LITR was 17.86%, compared with 43.4% in October 1951. There were 17 unscheduled shutdowns due to failure or emergency maintenance of instruments.

An effort is being made to put instrument maintenance upon a regular schedule. Due to the shortage of personnel this has not been done to date. A weekly check of magnet-drop currents has somewhat reduced accidental scrams.

A number of supplemental instruments have been ordered to improve the safety and efficiency of operation. Among them are a water-radioactivity instrument and a water-flow alarm.

A drop test was made on November 6 after approximately six days' operation at 770 kw. After shutdown the thermocouple between the plates of fuel element No. 25 reached a maximum temperature of approximately 135°C.

A shutdown of approximately three days was occasioned by failure of the Log *N* compensated neutron chamber. Three spare chambers were inserted with some defect being found in each one; a fourth chamber functioned satisfactorily.

A power oscillation was noticed in the LITR on November 22 which required intermittent movement of the regulating rod to hold the power constant. Prior to this time very little movement of the regulating rod has been required. An effort is being made to determine the cause of this; there is some evidence that the oscillations are due

TABLE 1

LITR Operating Data for October and November

	NOVEMBER 1951	OCTOBER 1951
Total accumulated kwhr	453,383	258,514
Average kw per operating hr	766.6	613.41
Average kw per 24-hr day	629.7	347.47
Per cent lost time	17.86	43.4
Position of No. 2 shim rod (in. out, 11-30-51)	25.879	21.901

TABLE 2

Pressure Drop Data

DATE	PRESSURE DROP (inches water gauge)		
	GLASS WOOL	CWS NO. 6	TOTAL ACROSS HOUSE
11-30-51	2.2	1.5	6.00
10-31-51	3.0	1.5	5.8
Clean filters	1.1	1.0	3.3

to bubbles formed within the fuel plates.

Since the water flows at a low rate through the fuel plates, bubbles continually rise to the top. These have been considered to be a result of the dissociation of water. Upon checking the gas accumulated under the top plug it was found that small quantities of fission product gas were present, indicating the possibility of a ruptured fuel plate.

FILTER HOUSE

Table 2 compares the pressure drop across the exit air filters last month with this month and that experienced when all filters were clean.

FAN HOUSE

The operation of the fans was normal throughout the month.

The No. 2 fan motor was replaced with a rebuilt motor on November 12. Approximately 21 hr were required to complete the installation.

RADIOISOTOPES

Table 3 is a comparison of the radioisotopes and research samples charged into the pile during November 1951 with those handled in October 1951.

At the end of November 1951, there were 355 cans of target material in

TABLE 3

Radioisotope and Research Samples Charged into Pile During October and November

	NOVEMBER 1951		OCTOBER 1951	
	RESEARCH	RADIOISOTOPES	RESEARCH	RADIOISOTOPES
Stringers 13, 14, and 16	16	125	14	129
Hole 22	78	0	52	0
All other holes	6	31	11	33
Total by Groups	100	156	77	162
Total for Month	256		239	

stringers 13, 14, and 16, compared with 384 cans of target material in these stringers at the end of October 1951.

WATER DEMINERALIZATION BUILDING

The operation of the building was normal with 436,680 gal of water being demineralized, of which 8160 gal were also deaerated (Table 4).

TABLE 4

Water Demineralized and Deaerated During October and November

PRODUCED (gallons)	NOVEMBER 1951	OCTOBER 1951	YEAR TO DATE
Demineralized	436,680	469,100	6,286,930
Deaerated	8,160	34,050	479,055

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} - 8d). Fifty-four ORNL slugs were processed and 39,961 mc were shipped.

During the month the crude product from one run became acid and caused the loss of about two curies of product. A second run had a lower than normal yield due to an unknown cause.

Iodine Development Work. No further design or experimental work was done on the new iodine plant this month.

Phosphorus (P^{32} - 14.3d). Twelve 2500-g cans of irradiated sulfur were processed and 8927 mc shipped.

Some difficulty was encountered with precipitates at a *p*H of 7 in the runs made early this month. In an attempt to eliminate these precipitates, some of the glassware in the final purification equipment was modified. A new quartz evaporator was added, to be used for fuming any possible organic matter, and the final resin column was removed and replaced with a very small resin bed. This was done to reduce the possibility of introducing organic matter from the resin. The results from these changes are inconclusive as yet.

Carbon (C^{14} - 5740y). A total of 886 mc of C^{14} as $BaCO_3$ was produced during the month; 103 mc of this amount, which was produced from the hottest Be_3N_2 slugs we have on hand, had an isotopic ratio of 20.2%.

Fission Products. 1. *Separations from Purex Waste.* New Purex waste is not yet available from the pilot plant; however, some Purex waste which was processed by the pilot plant early this year has been made available by the Chemistry Division. This material is now being processed in the ion-exchange equipment previously used for Redox waste, principally to obtain Sr^{90} and to obtain data on the efficiency and reliability of ion-exchange methods for processing high-level wastes. Serious radiation damage to the resin (Nalcite HCR) has been noted on one-liter columns containing less than 50 curies of Sr^{90}. The damage becomes apparent in approximately 72 hr at this level and is evidenced by gassing, change in resin appearance, and dark brown color in the column effluent. It should be noted that the damage cited occurred in the presence of nitric acid in concentrations up to 6 *M*; it is believed that the nitric acid is also a contributing factor in causing the damage. The large amount of organic matter in the Sr^{90} crude product effluent as result of resin degeneration has caused much difficulty in the purification process. Unfortunately, the Sr^{90} obtained from this source is high in Sr^{89} contamination and will have to be stored for four to six months to allow the Sr^{89} to decay out.

2. *Design of Precipitation Process Equipment.* Tentative flow sheets for the precipitation process on Purex waste have been prepared. The transfer jet from W-19 and W-20 to Bldg 3515 was tested to determine the operating characteristics and the volume of heels. Operation was satisfactory, but the heels were too large (~ 120 gal), so it was decided to extend the dip legs.

The main design problems at this stage are choice of materials for

TABLE 5

Radioisotopes Processed During November

PRODUCT	AMOUNT	SPECIFIC ACTIVITY
Calcium (Ca^{45} - 180d)	285 mc	73 mc/g Ca
	10.2 mc	0.82 mc/g Ca
Iron (Fe^{55} - 4y)		
Enriched material from LITR	0.885 mc	5.71 mc/g Fe
	0.49 mc	28.6 mc/g Fe
Iron (Fe^{59} - 46.3d)		
Enriched material from LITR	7.75 mc	500 mc/g Fe
	7.1 mc	403 mc/g Fe
Normal material from W	17.3 mc	4.7 mc/g Fe
Sulfur (S^{35} - 87.1d)		
As carrier-free sulfate	22 curies	
Antimony (Sb^{125} - 2.7y)		
Carrier-free	2.84 mc	

processing vessels and lines, and the type of valves to be used.

3. *Building 3026 Processing.* Since Sr^{90} obtainable from present Purex wastes is too high in Sr^{89} content, it was decided to process old W slugs in the Bldg 3026 equipment, in which uranium and plutonium are removed by ion exchange, in order to obtain Sr^{90} for present needs. The unit is now operating on a three-shift basis. This will delay plans to put a larger TBP extractor in this cell for producing mixed fission products.

4. *Purified Products.* A total of 1728 mc of Sr^{90} was produced during the month. Sufficient semirefined rare-earth fractions are available for producing yttrium and rare earths, but available manpower has been diverted to the more pressing problem of Sr^{90} production.

5. *Fission-Product Purification Equipment, Bldg 3028.* Work continued on the installation of equipment for purification of rare-earth fission-product fractions. The work is now about 25% complete.

Miscellaneous Processed Radioisotopes. Table 5 shows a list of radioisotope products made during the month ending November 30, 1951.

Tritium (H^3 - 12y). Design work continued on the tritium system which will be fabricated largely from metal instead of glass. Several additions have been made to the system so that relatively large quantities of He^3 can also be purified and packaged.

Argon (A^{37} - 34.1d). Argon was removed from $CaCO_3$ irradiated in the X Pile. Only about 0.1 mc was obtained from 50 g, as measured by gas-counting

chambers recently put into operation. A new $CaCO_3$ dissolving system is now being installed which will handle up to 2000 g of $CaCO_3$ per batch so that sufficient production can be obtained.

Cyclotron Target Processing. The following cyclotron products were separated:

Arsenic (As^{73-74} - 90d, 17.5d)	1.53 mc
Beryllium (Be^{7} - 57.9d)	58.8 mc
Sodium (Na^{22} - 2.6y)	1.7 mc

Special Preparations. Co^{60} sources were loaded as follows:

1. A. Gunthard Co., 2 sources, 500 mc each;

2. Air Force Cambridge Research Center, 2 sources, one 1-curie, one 5-curies;

3. Argonne National Laboratory, 2 sources, one 19-curies, one 3.6-curies;

4. Callery Chemical Co., 1 source, 400 mc;

5. Civil Defense, State of Georgia, 6 sources, 100 mc each;

6. Edward R. Sanford, 1 source, 800 mc;

7. Emerson-Schewring Tank & Mfg. Co., Inc., 1 source, 1 curie;

8. Farrar & Trefts, Inc., 1 source, 1 curie;

9. Ford Motor Co., 1 source, 200 mc;

10. Los Alamos Scientific Laboratory, 4 sources, one 800-mc, three 1-curie;

11. Minneapolis-Honeywell Regulator Co., 1 source, 200 mc;

12. Radiological Defense School, Langley Air Force Base, 2 sources, 100 mc each;

13. Robert G. Wood, 2 sources, 800 mc each;

14. Schutte & Koerting Co., 1 source, 800 mc;

15. St. John X-Ray Laboratory, 1 source, 500 mc;

16. Sun Shipbuilding & Dry Dock Co., 2 sources, 800 mc each;

17. The Babcock & Wilcox Co., 1 source, 100 mc;

18. Tracerlab, Inc., 7 sources, 250 mc each;

19. Tracerlab, Inc., 2 sources, 50 mc each;

20. University of California, 10 sources, 1 curie each;

21. University of Chattanooga, 1 source, 100 mc;

22. U. S. Department of Interior, 3 sources, one 150-mc, two 50-mc;

23. Victoreen Instrument Co., 1 source, 30 curies.

A 2-curie source of Cs^{137} was prepared for ORINS.

A 0.5-mc source of Ag^{110} was plated on a 1-in. by 3-in. block of copper for ORINS.

A tritium-zirconium source was prepared for C. D. Moak of the Physics Division, and several tritium-zirconium sources were prepared for Brookhaven National Laboratory.

Packaging. Three ampoules of tritium, 100 mc each, were prepared for Tracerlab, Inc.

Services. An isotonic solution of Be^7SO_4 was prepared for the University of North Carolina.

A 3-g sample of PCl_3 was prepared for irradiation for Kansas State College.

Six samples of hafnium oxide were prepared for irradiation for ORINS.

Cobalt wire was prepared for irradiation for the Medical College of Georgia.

Miscellaneous. Two sirens have been located in the radioisotope area as evacuation alarms. One is located on Bldg 3028 and the other on Bldg 3032. The switch to activate these alarms is on the front of Bldg 3032.

Both bearings on the hot off-gas blower failed this month due to an unknown cause. These bearings were replaced and the blower was put back into service.

TANK FARM

General. The jet pit at W-12 tank was rearranged to conform with the design of the other jet pits in the area.

The pump pit for WC-2 tank was found to be completely full of water which, of course, covered both the tank-pump and sump-pump motors. This was caused by a failure of the power supply. These motors were removed, and the large motor, after being dried, was in good condition; the sump-pump motor had to be rewound. Both have been reinstalled and are now operating satisfactorily.

The WC-4 tank was wired into the telemetering system following the completion of the float gauge installation at the tank.

A sight glass was installed in the main tank-farm transfer line. As a result, the transfer of metal waste slurry to W-10 by pump from W-7, and the decantation of the W-10 supernatant liquor back to W-7 has been speeded up, since by visual examination it is possible to ascertain when the supernatant liquor is free of slurry.

Construction has started on the installation of an off-gas line which will connect equipment in Bldg 3505 to the off-gas manifold in the ground at W-16, W-17, and W-18 tanks.

Wastes Discharged to White Oak Creek. A total of 22.46 curies of beta activity was discharged from the settling basin this month (see Table

TABLE 6

Activity Discharged to White Oak Creek

DISCHARGED FROM	NOVEMBER 1951		OCTOBER 1951	
	GALLONS	BETA CURIES	GALLONS	BETA CURIES
Settling Basin	24,580,000	22.25*	25,500,000	16.22
Retention Pond	492,500	0.21	314,600	0.13
Total	25,072,500	22.46	25,814,600	16.35

*Less than 0.35 curie contributed by the evaporator.

6). This discharge is about 30% higher than that of last month and is due principally to operation difficulties at the canal in Bldg 3001.

The amount of waste received into tanks W-1 and W-2 from Bldg 3019 has again increased due to the resumption of building operations.

Chemical Waste Evaporator (see Table 7). The evaporator was shut down for 8 hr this month to repair a faulty valve. The interior of the evaporator building was repainted.

TABLE 7

Waste Evaporator Operation

GALLONS FED TO EVAPORATOR	GALLONS OF CONCENTRATE TO W-6	VOLUME REDUCTION	BETA CURIES TO EVAPORATOR	BETA CURIES TO SETTLING BASIN
November				
199,000	30,200	6.6:1	6,160	0.35
October				
204,200	26,400	7.1:1	12,220	0.63

Waste Tank Inventory

TABLE 8

Waste Storage

TANKS	GALLONS CAPACITY	NOVEMBER FREE SPACE	OCTOBER FREE SPACE
HOT-PILOT-PLANT STORAGE			
W-3, 13, 14, 15	48,500	22,800	15,700
CHEMICAL-WASTE STORAGE			
W-5	170,000	95,000	98,000
EVAPORATOR-CONCENTRATE STORAGE			
W-6, 8	340,000	100,000	103,500
METAL-WASTE STORAGE			
W-4, 7, 9, 10	543,000	217,000	270,500

RaLa (Ba^{140} - 12.5d)

The rebuilding of the cubicle was completed early in the month and a dummy run started. Several small leaks were found and repaired.

Results from the run were unsatisfactory because a leak through the feed-tank valve permitted a backup of of the NaOH eluting solution into the Versene feed, thus changing the *p*H of the Versene feed solution. The rise in *p*H resulted in a high loss of product.

The feed-tank valve was replaced with a right-angle valve, and the resin addition procedure was revised in an attempt to eliminate the possibility of resin preventing proper valve closure. Following these alterations, a second dummy run was made.

The results from the second run were again unsatisfactory because of an extremely high loss in the Versene feed effluent. It is believed that the NaOH from the elution preceding the Versene feed had backed up in the lines above the column and was not completely flushed out, thus changing the *p*H of the initial feed solution. The rise in *p*H again resulted in a high loss.

Water wash lines have been added to the two solution addition lines to correct this condition. These two lines will be well flushed following the NaOH elution. This flush will be followed by the normal water rinse through the column, and then routine operations will be resumed. Dummy runs will be made as soon as the equipment is reinstalled in its shield.

It became necessary to replace the Thermohm temperature indicator and recorder for the product evaporator with a thermocouple and thermocouple recording device. This change was necessary after the failure of a fourth Thermohm. These instruments are costly and difficult to obtain.

The next product run is tentatively scheduled to start on January 6, 1952.

RADIOISOTOPE CONTROL DEPARTMENT

GENERAL

During November 1951, there were 816 radioisotope shipments, compared with 832 during October 1951, and 661 during November 1950.

The breakdown according to separated, unseparated, project, nonproject, and foreign shipments is shown in Table 9.

TABLE 9

Radioisotope Shipments

	NOVEMBER 1951	OCTOBER 1951	NOVEMBER 1950	AUGUST 1946 TO NOVEMBER 1951, INCLUSIVE
Separated Material	674	685	504	21,828
Unseparated Material	142	147	157	6,341
Total Shipments	816	832	661	28,169
Non-Project	698	710	518	
Project	111	117	119	
Foreign	7	5	24	
Total Shipments	816	832	661	

HANFORD IRRADIATIONS

The radioisotope samples listed in Table 10 were received from Hanford during November 1951.

TABLE 10

Radioisotope Samples Received from Hanford

SAMPLE NO.	MATERIAL		DATE DISCHARGED	DATE RECEIVED
ORNL-82	Nickel	(1)*	10-24-51	11-7-51
ORNL-100	Calcium carbonate	(1)	10-24-51	11-7-51
ORNL-118	Tantalum foil	(1)	10-18-51	11-7-51
ORNL-29	Phosphorus	(2)	10-18-51	11-7-51
ORNL-60	KCl	(6)	10-18-51	11-7-51
ORNL-130	Enriched Fe^{54}	(3)	10-18-51	11-7-51

*Number of pieces

CYCLOTRON RADIOISOTOPES

Table 11 is a list of the outstanding orders for cyclotron radioisotopes now on hand. See also Tables 12 and 13.

TABLE 11

Cyclotron Radioisotope Orders

MATERIAL	AMOUNT (millicuries)	STATUS
Mn^{54}	9.0	Material has been requested
Co^{57}	5.0	Material in process
Fe^{59}	71.75	Material has been requested
As^{73}	1	Material has been requested

TABLE 12

Bombardments Received and Requested

	MASS. INSTITUTE OF TECHNOLOGY		UNIVERSITY OF CALIFORNIA		UNIVERSITY OF PITTSBURGH		WASHINGTON UNIVERSITY	
MATERIAL	BOMBARD-MENTS	BEAM HOURS	BOMBARD-MENTS	BEAM HOURS	BOMBARD-MENTS	BEAM HOURS	BOMBARD-MENTS	BEAM HOURS
Bombardments Received								
Be^{7}			1	47.20	11	297.5		
Na^{22}	2	190.00			7	250.25	4	300.00
Mn^{52}					2	20.00		
Mn^{54}	1	50.00					4	200.00
Fe^{54}			1	20.00				
Co^{57}	1	10.00					3	100.00
Fe^{59}			7	332.80	2	80.60	1	34.00
Zn^{65}	1	100.00	1	47.80				
Ga^{67}					8	55.75		
Sr^{85}	2	59.75			1	10.00		
As^{73}					2	20.50		
I^{125}							2	60.00
Mo					2	15.70	3	30.00
S					1	2.00		
Total Received	7	409.75	10	447.80	36	752.30	17	724.00

TABLE 12 (cont'd)

	Requested but not Received							
As^{73-74}			1	10.00				
Be^{7}					1	10.00		
Ti^{46}			1	3.00				
Ti^{48}			1	3.00				
Mn^{54}							1	50.00
Fe^{57}			1	3.00				
Ga^{67}					2	16.00		
Y^{88}	1	10.00						
Total Hours		1,080.25		1,033.20		721.70		726.00
Outstanding (Not received or requested)								

TABLE 13

Shipments of Cyclotron-Processed Radioisotopes

MATERIAL	NO. SHIPMENTS NOVEMBER 1951	NO. MILLICURIES NOVEMBER 1951	NO. MILLICURIES TO DATE
Be^{7}	2	1 S.I.* and 10.95 mc	248.243 mc and 2 S.I.
Na^{22}			49.763 mc
Mn^{52}			9.991 mc
Mn^{54}			2.72 mc
$Fe^{55, 59}$			61 mc
Co^{57}			3.1 mc
Fe^{59}			2.64 mc and 4 S.I.
Zn^{65}			35 mc and 4 S.I.
Ga^{67}	7	7 S.I.	7 S.I.
As^{73}			0.650 mc
Sr^{85}			6 mc
Mo^{95}	3	3 S.I.	4 S.I.

*Service irradiation.

ACTIVATION ANALYSES

The status of the activation work remains the same as recorded last month.

SF MATERIAL CONTROL

1. During the month an additional 1595 Al-Si bonded slugs were received from Y-12 for testing and subsequent loading into the 3001 pile.

2. On November 1, 1951, 4.5860 g of uranium foil, 90.1 to 95% enriched, were shipped to KAPL on their requests SR-SNY-365 and SR-SNY-595.

3. On November 5, 1951, an express car was received from Chalk River, Canada. The car consisted of three containers carrying 240 irradiated slugs for the SCRUP program.

4. During the month two express cars were received from Hanford. The content of the cars consisted of four Phoenix and two "monster" containers carrying 280 slugs for the Purex process, two casks containing four slugs to be sliced for K-25, and one cask containing a thorium slug for the Chemistry Division.

5. SF surveys during the month consisted of visiting 14 persons possessing SF material. Material in their possession was inspected and weighed where feasible. No apparent discrepancies were encountered.

6. Records of three analytical laboratories were audited. Results of the audit disclosed that all records were in good order and proper accounting had been made for all samples.

7. During the month there were 25 receipts and 20 outgoing shipments, compared with 24 receipts and 20 shipments last month.

8. Tables 14 and 15 show a summary of receipts and shipments for the month of November 1951.

TABLE 14

RECEIPTS

FROM	MATERIAL	AMOUNT (grams)
Argonne National Laboratory	Thorium (bars)	51,070.00
Battelle Memorial Institute	Normal uranium (fuel elements)	11.29
Battelle Memorial Institute	Thorium (crystal bar)	345.00
Battelle Memorial Institute	Thorium (crystal bar)	277.00
C&CCC, K-25 Area	Normal uranium (Purex)	140.00
C&CCC, Y-12 Area	Normal uranium (slugs)	746,032.30
C&CCC, Y-12 Area	Normal uranium (slugs)	14,124.90
C&CCC, Y-12 Area	Normal uranium (rod)	500.00
C&CCC, Y-12 Area	Normal uranium (UF_4)	1,291.30
C&CCC, Y-12 Area	Normal uranium (UNH)	116,709.90
C&CCC, Y-12 Area	Normal uranium (U-sulfate)	7,682.10
C&CCC, Y-12 Area	Normal uranium (slugs)	1,127,859.80
C&CCC, Y-12 Area	Thorium metal (tubes)	685.70
C&CCC, Y-12 Area	Normal uranium (UF_4)	11.40
General Electric Co.-AGT	Enriched uranium (UO_2)	0.2547
General Electric Co.-AGT	Normal uranium (UO_2)	108.80
General Electric Co.-AGT	Enriched uranium (UO_2)	0.6092
General Electric Co.-AGT	Normal uranium (UO_2)	108.80
General Electric Co.-HGE	Depleted uranium (slugs)	3,556.00
General Electric Co.-HGE	Pu (slugs)	2.00
General Electric Co.-HGE	Depleted uranium (slugs)	248,931.00
General Electric Co.-HGE	Pu (slugs)	136.00
General Electric Co.-HGE	Thorium metal (slug)	1,646.53
General Electric Co.-HGE	Depleted uranium (slugs)	3,556.00
General Electric Co.-HGE	Pu (slugs)	2.00
General Electric Co.-HGE	Depleted uranium (slugs)	248,931.00
General Electric Co.-HGE	Pu (slugs)	92.00
Mallinckrodt Chemical Works	Normal uranium (slurry)	120,000.00
National Research Council-EVG	Depleted uranium (slugs)	1,312,923.00
National Research Council-EVG	Pu (slugs)	591.60
University of Calif. Rad. Lab.	Normal uranium (bars)	161,500.00

TABLE 15

Shipments

TO	MATERIAL	AMOUNT (grams)
C&CCC, K-25 Area	Depleted uranium (slugs)	3,470.66
C&CCC, K-25 Area	Pu (slugs)	1.95
C&CCC, Y-12 Area	Thorium (ThF_4)	1,307.00
C&CCC, Y-12 Area	Depleted uranium (purex)	193.20
C&CCC, Y-12 Area	Thorium metal (tubes)	685.70
C&CCC, Y-12 Area	Normal uranium (UNH)	38,870.99
C&CCC, Y-12 Area	Normal uranium (rods)	3,483.60
C&CCC, Y-12 Area	Thorium metal	239.00
C&CCC, Y-12 Area	Enriched uranium (MTR)	140.263
C&CCC, Y-12 Area	Enriched uranium (MTR)	133.686
C&CCC, Y-12 Area	Normal uranium (UNH)	30,863.00
C&CCC, Y-12 Area	Normal uranium (UNH)	41,681.60
C&CCC, Y-12 Area	Enriched uranium	0.282
C&CCC, Y-12 Area	Normal uranium (rods)	3,493.05
C&CCC, Y-12 Area	Thorium metal (rods)	418.45
C&CCC, Y-12 Area	Normal uranium (UO_2F_2)	20.159
C&CCC, Y-12 Area	Thorium metal (plate)	152.00
General Electric Co.-AGT	Enriched uranium (UO_2)	0.2547
General Electric Co.-HGE	Enriched uranium (U/Zr)	0.323
General Electric Co.-SGE	Enriched uranium (foil)	4.2773
University of Calif. Rad. Lab.	Thorium metal (plates)	5,390.00
University of Calif. Rad. Lab.	Thorium metal (plates)	639.00