ORNL 857
Progress Report
6A

AEC RESEARCH AND DEVELOPMENT REPORT

OPERATIONS DIVISION

MONTHLY REPORT FOR MONTH ENDING SEPTEMBER 30,1950

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

[redacted]

REPORT NUMBER: ORNL-857

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending September 30, 1950

by

M. E. Ramsey

DATE ISSUED

OCT 20 1950

OAK RIDGE NATIONAL LABORATORY
operated by
CARBIDE AND CARBON CHEMICALS DIVISION
Union Carbide and Carbon Corporation
Post Office Box P
Oak Ridge, Tennessee

ORNL-857

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SUMMARY ORNL-857

1. Lost pile-operating time averaged 11.8%, compared to 11.0% for the year-to-date. (Page 4.)
2. The excess pile reactivity is now one hundred and twenty-five to one hundred and thirty-five inhours. (Page 4.)
3. The pile will be operated at approximately one half power for an estimated ten days beginning October 16, 1950, during the replacement of one of the pile-cooling fans. (Page 5.)
4. The P^{32} equipment in Building 906 has passed the testing stage and is now in operation on production runs. (Pages 7 and 8.)
5. Most of the equipment required for separation of C^{14} from irradiated Be_3N_2 has been built and is being installed in Building 905. (Pages 8 and 9.)
6. Very satisfactory separation of Pu from fission products is obtained with the TBP process. (Pages 10 and 11.)
7. The activity discharged to White Oak Creek was 7.7 curies, compared to 13.2 curies during August, 1950. The discharge from the evaporator was 0.30 curie, compared to 0.12 curie last month. (Pages 15 and 16.)
8. The starting date of the next RaLa run has been postponed to November 6, 1950, at the request of Los Alamos. (Pages 17 and 18.)
9. A dummy run through the new RaLa equipment was begun using seventy, four-inch unirradiated slugs. The only difficulty discovered to date has been the plugging of the process filters by materials that have not yet been identified. (Pages 17 and 18.)
10. There were 671 radioisotope shipments during the month, compared with 689 for August, 1950. (Page 19.)
11. Considerable interest is being shown in Iridium 192 as a high specific activity gamma source. The half-life of seventy-five days is expected to limit its usage. (Pages 22 and 23.)

A. PILE DEPARTMENT

I. Operating Data:

	SEPTEMBER 1950	AUGUST 1950	YEAR-TO-DATE 1950
Total Accumulated KWH	2,318,760	2,289,904	20,279,912
Average KW/Operating Hour	3650.26	3432.37	3477.62
Average KW/24-Hour Day	3220.50	3077.83	3095.22
Percent Lost Time	11.8	10.3	11.0
Excess Pile Reactivity	125-135 inhours	100-110 inhours	
Slugs Discharged	191	56	1934
Slugs Charged	191	56	2062
Product Made (Grams)	84.63	83.57	740.12
Product Discharged (Grams)	2.79	0.54	117.92

II. Pile Operation:

The pile-down time was 11.8%, compared to 10.3% for the previous month and 11.0% for the year-to-date. The small increase in pile-down time was due to time required for a large number of shutdowns needed for an experiment being conducted by the Physics Division.

There were no ruptured slugs during the month.

The water tube in Hole 12 developed a leak on September 15, 1950. The water has been removed and the tube will be operated without cooling until a new unit is built.

The excess pile reactivity is now one hundred and twenty-five to one hundred and thirty-five inhours. The twenty-five-inhour increase during the month was due principally to removal of the water from the cooling system of Hole 12.

The permanentization work in the Pile Building is very near completion, although completion will require several more weeks due to the requirement that the pile be down during the final connections of the equipment and control panel to the replacement wiring. These connections will be made during the routine shutdown made each week.

II. Pile Operation: - (Continued)

A few small items, such as completion of a small section of the wall on the first level on the south side of the pile and the installation of the steps to this level, cannot be completed until the replacement wiring is in use and the old contactor cabinets have been removed.

Replacement of one of the pile-cooling fans is scheduled to begin on October 16, 1950. The pile will be operated at approximately one-half power on the other fan during the estimated ten days required for replacement of the fan.

III. Filter House:

The following table compares the pressure drop across the exit air filters last month and this month with that experienced immediately after replacement of filters:

	GLASS WOOL FILTERS		CWS #6 PAPER		ACROSS HOUSE	
Date	Inches w.g.	% Increase	Inches w.g.	% Increase	Inches w.g.	% Increase
Clean Filters	1.1	---	1.0	---	3.3	---
8-31-50	2.9	164	3.2	220	7.0	112
9-30-50	3.3	14	3.5	9	7.8	11

The Filter House operation was normal throughout the month.

IV. Fan House:

The permanentization of the Fan House is very close to completion with only minor items remaining to be done. However, the replacement fans scheduled for delivery during September were delayed due to difficulties in the vendor's factory and have now passed the required over-speed and performance tests, and will be shipped in the early part of next month. The tentative date for starting the installation of the first replacement fan, as previously mentioned, has been set at October 16, 1950, with the second fan to be installed approximately a month later.

Fan House operation was normal during the month. [redacted]

V. Radioisotopes:

The following is a comparison of the radioisotope and research samples charged into the pile during September, 1950, with those handled in August, 1950:

	SEPTEMBER, 1950		AUGUST, 1950	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	17	182	18	172
Hole 22 (Pneumatic Tube)	69	2	89	17
All Other Holes	8	22	8	26
TOTAL BY GROUPS	94	206	115	215
TOTAL FOR MONTH	300		330	

At the end of September, 1950, there were 381 cans of target material in Stringers 13, 14, and 16, compared to 371 cans of target material in these stringers at the end of August, 1950.

VI. Water Demineralization Building:

The operation of the building was normal throughout the month with 654,860 gallons of water being demineralized of which 34,800 gallons were also deaerated.

GALLONS PRODUCED	SEPTEMBER, 1950	AUGUST, 1950	YEAR-TO-DATE
Demineralized	654,860	689,880	5,540,020
Deaerated	34,800	56,910	370,800

[redacted]

B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

1. Iodine (I^{131} - 8d)

Forty-two ORNL slugs were processed and 26,552 millicuries of I^{131} were shipped.

The product of the last run of the month was cloudy; the cloudiness was removed by redistilling. This is the first time any cloudiness has been noted in the product. A small portion of this product was saved and an attempt is being made to determine the nature of the impurity and its source.

2. Phosphorus (P^{32} -14.3d)

Sixteen 2,000-gram cans of irradiated sulfur were processed and 5,896 millicuries of P^{32} were shipped.

All runs this month showed good yields and all products were within specifications.

Phosphorus Development Work

The P^{32} equipment in Building 906 has passed through the testing stage and is now in operation on production runs. Results on several test extraction runs are listed below. Runs #1 and #2 were made on 2,000 grams of S irradiated only one week.

Run #	Fraction	Extraction Time	P^{32} Found	Percent Recovery
1	1st Extraction	2 hrs.	192.0 mc)	
1	2nd Extraction	1 hr.	43.0 mc) --	93.3
1	Sulfur Waste	---	15.6 mc	6.7
2	1st Extraction	10 min.	9.5 mc)	
2	2nd Extraction	1 hr.	63.8 mc) --	87.1
2	Dilute HNO_3 Wash	5 min.	50.0 mc)	
2	3rd Extraction	2 hrs.	50.0 mc)	
2	Sulfur Waste	---	39.0 mc	12.9
Run #3 was made on a regular production can irradiated ~ forty-five days.				
3	1st Extraction	2 hrs.	872.0 mc)	
3	HNO_3 Wash	10 min.	68.0 mc) --	89.4
3	2nd Extraction	[redacted]45 min.	134.0 mc)	
3	Sulfur Waste	---	128.0 mc	10.6

I. Radioisotopes: - (Continued)

2. Phosphorus Development Work

A fourth test run was made on a production can but complete results are not available; the extraction efficiency was ~95%.

Tracer runs put through the purification glassware indicated no unusual losses. However, some difficulty was experienced in removing traces of iron from the new Dowex 50 resin in the columns. It is expected that some specially-prepared resin can be obtained from the Dow Company which does not contain residual metals and partially decomposed monomers. If extremely pure resin can be obtained, it will have an important bearing on increasing the purity of the products.

The sulfur can-filling station is being fabricated and should be completed within one week. Initial tests will be made during the next report period.

There were 238 millicuries of P^{32} prepared from W-irradiated P_2O_5. Part of this material was shipped to a university scientist for a study of the β-ray spectrum.

Approximately 1,000 millicuries of carrier-free and specially-purified P^{32} were processed for specific customers.

3. Carbon (C^{14} - 5,720y)

Five hundred $Ca(NO_3)_2$ slugs were processed in five runs. The first four runs yielded about 252 millicuries with an average isotopic ratio of 2.60%; results are not yet available on the last run.

[redacted]

I. Radioisotopes: - (Continued)

3. Carbon (C^{14} - 5,720y)

The following is a list of the C^{14} available in the unprocessed Be_3N_2 and $Ca(NO_3)_2$ slugs:

No. of $Ca(NO_3)_2$ Slugs in Pile	520
No. of $Ca(NO_3)_2$ Slugs in Canal	610
Total C^{14} Content in $Ca(NO_3)_2$ (Estimated)	680 mc.
No. of Be_3N_2 Slugs on Hand	851
Total C^{14} Content in Be_3N_2 (Estimated)	38,295 mc.
Total C^{14} Available (Estimated)	38,975 mc.
September 30, 1950, Inventory $BaC^{14}O_3$	13 mc.
Total C^{14} Inventory	38,988 mc.

Carbon Development Work

Practically all melting, crushing, and hood equipment for separation of C^{14} from Be_3N_2 slugs in Building 905 has been completed and installation of equipment should begin within ten days.

There were 17.675 grams of $BaC^{14}O_3$ (273 mc.) re-worked to produce homogeneous material.

4. Sulfur (S^{35} - 87.1d) Development Work

Two carrier-free $H_2S^{35}O_4$ runs were made with products having the following analyses:

	Product A	Product B
Concentration	15.2 mc/ml	21.5 mc/ml
Total S-35	2800 mc	2688 mc
Total Solids	1.0 mg/ml	0.0 mg/ml
NVM	0.0 mg/ml	0.0 mg/ml
SO_4	0.0 mg/ml	0.0 mg/ml
P^{32}	<0.1%	<0.1%

[redacted]

I. Radioisotopes: - (Continued)

5. Argon (A^{37} - 34d) Development Work

Radioargon gas was removed from Hanford-irradiated $CaCO_3$. This material will be shipped without assay.

6. Fission Products Development Work

Both the Building 910 TBP unit and the Building 706-C fission product plant were operated during the month to build up depleted stocks of fission products.

Investigation of CCl_4 as diluent for TBP was continued. Decontamination of the solvent after uranium removal was found to be very difficult. Absolute identification of the activity remaining in the solvent has not been made, but it is believed to be Ru, Ce, or Zr-Nb.

Plutonium and uranium extractions were very satisfactory (99.99%). A shipment of mixed fission products was made from the concentrate in the evaporator and was found to be well within our Pu tolerance (150 counts/min/mc F.P.). This one feature is enough to recommend the TBP process as the method of choice for fission product isolation.

Batch-wise extractions are poor as regards fission product losses, since the aqueous UNH and HNO_3 concentration falls rapidly after a few extractions, allowing fission products to pass into the organic layer. This can be avoided, to a large extent, by column operations.

Sodium bicarbonate solutions were used to scrub traces of uranium out of the organic without the TBP destruction experienced when sodium carbonate is used.

I. Radioisotopes: - (Continued)

6. Fission Products Development Work

A different uranium-removal step was used in 706-C operations. Oxalic acid was used to remove uranium from column #2 instead of 0.25 M H_2SO_4. Tentative results indicate that Sr losses on column #2 are much lower with this procedure. Greater fission product loading of column #2 may also be obtained, since successive batches of UNH may be put through the same column after oxalic acid selective regeneration.

Run #SS-23 was completed this month to supply crude fission product fractions needed for current orders.

The steam-heated coiled column broke during this month's rare earth purification run and all material was lost to the hot drain. Coiled columns made of glass will withstand only a very small influent pressure because of the Bourdon-tube effect. It is hoped that it will be practical to fabricate columns of titanium and tantalum in the near future.

7. Zirconium-Niobium (Zr^{95}-Nb^{95}, 65d-35d) Development Work

A purified preparation of Zr-Nb in oxalic acid was produced for shipments. The analysis is not complete.

8. Cesium (Cs^{137} - 33y) Development Work

A cesium preparation was produced from W-3 waste and put in storage. Analysis was as follows:

Concentration------18 mc/ml
Total Cs^{137}--------5400 mc.
Acidity------------0.016 N
Total Solids-------3.7 mg/ml

[redacted]

I. Radioisotopes: - (Continued)

9. Krypton (K^{85} - 9.4y) Development Work

A portable processing unit for removing rare gases from the 706-C dissolver exhaust is 90% completed. A trial run will be made in October.

10. Strontium (Sr^{90} - 25y)(Sr^{89} - 55d) Development Work

Runs are in progress to produce both Sr^{89} and Sr^{90}. An adequate supply of Sr^{90} is on hand, but Sr^{89} is needed to fill some current orders.

11. Iron (Fe^{55-59} - 4y, 44d) Development Work

Analyses of enriched and normal iron Hanford-irradiated samples are listed below:

	Normal	Enriched Fe^{58}
Concentration Fe^{55}	0.031 mc/ml	0.05 mc/ml
Concentration Fe^{59}	1.121 mc/ml	0.478 mc/ml
Specific Activity Fe^{55}	1.11 mc/g Fe	143 mc/g Fe
Specific Activity Fe^{59}	4.32 mc/g Fe	1360 mc/g Fe
Acidity	2.89 N	0.84 N
Co^{60}	0.6%	0.004%

All iron preparations are now being put through an isopropyl ether extraction purification step to reduce Co^{60} contamination. It is interesting to note that even though we use the highest grade C.P. iron for target material, the cobalt contamination is much too great for our purposes.

12. Thulium (Tm^{170} - 125d) Development Work

The sample reported last month had the following analysis: (Note the high specific activity.)

Concentration----------4.3 mc/ml
Total Tm^{170}----------323 mc.
Specific Activity--------36,800 mc/g Tm
Acidity----------0.59 N (HCl)

[redacted]

I. Radioisotopes: - (Continued)

13. Mercury (Hg^{203} - 43.5d) Development Work

A Hanford unit was processed to give a preparation with the following analysis:

Concentration	1.86 mc/ml
Total Hg^{203}	112 mc
Specific Activity	75.6 mc/g Hg
Acidity	6.59 N (HNO_3)

14. Cesium (Cs^{134} - 2.3y) Development Work

A Hanford unit was processed. The preparation had the following analysis: (Note the high specific activity.)

Concentration	13.4 mc/ml
Total Cs^{134}	13,400 mc.
Specific Activity	3,200 mc/g Cs
Acidity	0.032 N (HCl)

15. Calcium (Ca^{45} - 180d) Development Work

A Hanford $CaCO_3$ unit was processed to produce high specific activity Ca^{45}. A^{37} was also obtained from this unit. Ca^{45} analysis is given below:

Concentration	1.69 mc/ml
Total Ca^{45}	262 mc.
Specific Activity	60.9 mc/g Ca
Acidity	0.47 N (HCl)
Heavy Metals	< 10 ppm

16. Tritium (H^3 - 12.1y) Development Work

Most of the large tritium charge was removed from the high-vac system into a storage bulb for safe-keeping. The amount remaining in the system will be adequate to fill small orders.

17. Miscellaneous Work

The Chemical Technology Division continued testing the electrical precipitator for the hot off-gas system.

Inventorying and classifying of the cobalt needles in the 902 storage barricade were completed.

[redacted]

[redacted]

I. Radioisotopes: - (Continued)

17. Miscellaneous Development Work

a. Cobalt Sources

Cobalt sources were loaded in holders as listed below:

Newport News Shipbuilding and Dry Dock Co.	500 mc.
Newport News Shipbuilding and Dry Dock Co.	500 mc.
Locomotive Finished Material Co.	450 mc.
Reactor Technology School (ORNL)	200 mc.
Grede Foundries, Inc.	200 mc.
Kellex Corporation	1050 mc.
Baldwin Locomotive Works	450 mc.
American Brake Shoe Co.	400 mc.

b. Niobium Source

A special source of Nb^{95} was prepared to a customer's specifications.

c. Hanford Units

Twenty-six channel cans and twenty-four side-hole cans were loaded for W irradiation.

d. Fe^{55} X-Ray Source

Work is in progress on preparation of a pure Fe^{55} X-ray source for a customer.

e. Building 902 Shields

Special lead shields for very hot materials in W side-hole cans and 200-milliliter bottles were designed for Section V. of the 902 Storage Barricade.

II. Tank Farm:

1. General

a. The J. A. Jones Construction Company continued the construction of the steam line through the Tank Farm. The lines have been installed, a few wooden poles removed, and insulation begun.

[redacted]

II. Tank Farm: - (Continued)

1. General

b. Very little was done on the construction of the outlet Weir box from the Settling Basin. At the end of the month, however, the laying of the concrete pipe was begun.

c. The new concrete pit with revised piping west of 706-C has been poured and the lines shielded. The surrounding earth around the box is contaminated and will be replaced with clean dirt. A lid will be installed.

2. Wastes Discharged to the White Oak Creek

About 7.24 curies of beta activity were discharged from the Settling Basin this month. This is the lowest quantity of activity discharged from the Basin in a one-month period in several years.

ACTIVITY DISCHARGED TO WHITE OAK CREEK

	SEPTEMBER, 1950		AUGUST, 1950	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	22,387	7.24*	26,767,000	11.09*
Retention Pond	500,688	.47	530,175	2.14
TOTAL		7.71*		13.23*
Contributed by Evaporator		0.30		0.12

* Includes contribution of evaporator.

3. Chemical Waste Evaporator

The operation of the evaporator was normal this month. Good evaporation rates and volume reductions were effected. An average decontamination factor of 1,490 was obtained for the month.

[redacted]

II. Tank Farm: - (Continued)

3. Chemical Waste Evaporator

The evaporator was shut down for about six hours this month to repair a leak in the discharge pipe from one of the steam coils.

WASTE EVAPORATOR OPERATION

	Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
SEPT. -	229,072	24,841	8.2:1	446.02	.30
AUGUST-	232,376	25,424	8.1:1	690.10	.12

4. Waste Tank Inventory

HOT PILOT PLANT STORAGE

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged To	Free Space
W3,13,14,15	48,500	240	-0-	-----	9,450

CHEMICAL WASTE STORAGE

W-5	170,000	140,272	229,072	Evaporator	93,600

EVAPORATOR CONCENTRATE STORAGE

W-6, 8	340,000	21,600	1,200	Evaporator	87,600

METAL WASTE STORAGE

W4,7,9,10	543,000	1,792	-0-	-----	173,144

[redacted]

III. RaLa (Ba^{140} - 12.5d):

Los Alamos has again postponed the next run date. It is now tentatively scheduled to start on November 6, 1950.

The following work was accomplished on the RaLa changes in 706-D during the month:

1. The complete testing and repair of Cell A equipment was completed.
2. The monorails and chain falls for removal of the lead plugs from both cubicles were installed.
3. Both process and crud filter cubicles were completed.
4. The loading cubicle was tested and installed.
5. The pipe trough connecting the loading cubicle to the cell wall was completed.
6. All the required insulating and painting were finished.
7. Cell A was completely relamped.
8. Installation has begun on the monorail for the new six-ton-capacity hoist which will handle the product carrier.
9. The second level floor was completely re-covered with linoleum.

A dummy run was begun through the new equipment using seventy, four-inch unirradiated Hanford slugs. A revised procedure for the operation of the new equipment was followed. The only difficulty found to date is that the process filters continue to plug with unknown materials before the filtration can be completed. Complete and thorough washings of Tanks A-8, A-9, and A-17 with 5% $NH_4 \cdot HF_2$, 8M NaOH, H_2O, and 8M HNO_3 have removed much foreign material, which included stainless steel cuttings, from the system. A refiltration of the dummy run extractions following the intense tank cleanout also plugged the filters. Further investigation of the problem is continuing. The crud filters performed very well, as did all condensers and jets.

III. RaLa (Ba^{140} - 12.5d): - (Continued)

The line to B-19 from B-20 glassware was replaced in Cell II of the glassware cubicles. This line was broken following the completion of RaLa Run #42.

[redacted]

C. RADIOISOTOPE CONTROL DEPARTMENT

I. General:

During September, 1950, there were 671 radioisotope shipments, compared with 689 during August and 688 during July, 1950. In September, 1949, there were 441.

The breakdown according to separated and unseparated material is as follows:

	September 1950	August 1950	September 1949	August, 1946, to September, 1950, Inc.
Separated Material 706-D Area	493	521	338	13,267
Unseparated Material 100 Area	178	168	103	4,123
TOTAL SHIPMENTS-----	671	689	441	17,390

The following table indicates the breakdown between non-project, project, and foreign orders for September, 1949, and August and September, 1950:

	September 1950	August 1950	September 1949
Non-Project	503	528	347
Project	151	148	68
Foreign	17	13	26
	671	689	441

II. Hanford Irradiations:

The following radioisotope samples were received from Hanford during September, 1950:

Sample No.	Material	Date Discharged	Date Received
ORNL-119	Sulfur	8-15-50	9-6-50
ORNL-28	Iron	8-23-50	9-14-50

II. Hanford Irradiations: - (Continued)

The proposal to irradiate sulfur in a side hole at Hanford has not been favorably received because of the extra work involved in making these irradiations and because available holes are required by other projects with a higher priority. Hanford would prefer to irradiate instead in a process tube. This will mean that sulfur will have to be irradiated in six-inch-long channel slugs holding about 100 grams each. It may be possible to substitute thin-walled slugs for the present ones having one-fourth-inch walls. If this can be done, the amount of sulfur per can will be increased about fifty percent. The cost of handling a large number of these slugs will be considerably greater than that of handling one large side-hole can. Transportation will also be more difficult, since shields will necessarily be larger and heavier for shipping a large number of small slugs.

One channel of beryllium nitride is scheduled to be discharged soon. The cans will be returned here and tested for pressure to determine whether there is any considerable increase of pressure during irradiation.

Purchase Order WCX-A-7013 has been issued to the General Electric Company and will permit charges from Hanford to be made directly to ORNL. The invoices will be sent to the Radioisotope Control Department where letter releases will be prepared. Any incorrect billing can be checked with General Electric and corrections made where necessary. The charges will be distributed directly to the appropriate cost codes instead of to Code 3640 and re-allocated, as is the present procedure.

[redacted]

III. Radioiodine:

The discrepancy in the 4 π counting of Iodine 131 done at the Bureau of Standards and coincidence counting done at ORNL has not as yet been resolved. A letter has been written to the Bureau by the Analytical Chemistry Division explaining this difference, but as yet no reply has been received from the Bureau.

IV. Cyclotron Radioisotopes:

Following is a list of the outstanding orders for cyclotron radioisotopes now on hand:

Material	Amount	Status
Be 7	2 mc	Bombardment has been requested.
Mn 54	3 mc	Bombardment has been requested.
Fe 59	1 mc	Cancelled. Enriched Fe 59 substituted.
As 73	11 mc	Bombardment has been requested.

BOMBARDMENTS RECEIVED

	M. I. T.		U. of CALIF.		U. of PITTSBURGH		WASHINGTON U.	
	Bombardments	Beam Hours	Bombardments	Beam Hours	Bombardments	Beam Hours	Bombardments	Beam Hours
Be 7					6	180.00		
Na 22	1	109.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							2	100.00
Co 57							2	50.00
Fe 59			4	223.10				
Zn 65	1	100.00						
I 125							2	60.00
Molybdenum Metal					1	13.00	2	20.00
TOTAL RECEIVED	2	209.75	4	223.10	14	414.75	12	530.00

REQUESTED BUT NOT RECEIVED

Be 7					1	50.00		
Zn 65			1	40.00				
As 73					1	10.00		
Sr 85	1	60.00						
TOTAL HOURS OUTSTANDING (Not Received or Requested)		480.25		486.90		275.25		220.00

[redacted]

IV. Cyclotron Radioisotopes: - (Continued)

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments September, 1950	No. Millicuries September, 1950	No. Millicuries To Date
Be 7	1	3 mc	127.073
Na 22	2	3 mc	23.347
Mn 52	-0-	-0-	9.991
Co 57	1	1.6 mc	2.0
Fe 59	1	1 S.I.	1.5 mc and 1 S.I.
Zn 65	1	.5 mc	1.5 mc

V. Radiocarbon:

A shortage of approximately fifty millicuries of C^{14} existed at the end of September due to the large demand for this radioisotope. In September, there were 724.9 millicuries of C^{14} shipped.

The apparatus for standardizing the sodium carbonate C^{14} samples distributed by the Bureau of Standards is almost completed and it is expected that the Analytical Division will complete this standardization soon. This will permit ORNL C^{14} analyses to be put on the same basis as analyses by the Bureau.

VI. Gamma Ray Sources:

In addition to Cobalt 60 which has been the favorite gamma ray source to date, there appears to be a good chance that Iridium 192 will have some advantage for such applications. This radioisotope can be prepared with a specific activity several times that of Cobalt 60 (in a reasonable irradiation time) and because of the much higher density, the physical size of the sources will be quite small. In order to have a small number of these sources available, 100 pieces - 1/8" in diameter and 1/8" long - have been obtained and some of these will be irradiated at Hanford already encapsulated in small aluminum containers. This will permit them to be shipped with a minimum of

VI. Gamma Ray Sources: - (Continued)

handling after irradiation. It is believed that the number of such sources required will be small because of the short half-life (seventy-five days) compared with Cobalt 60. However, for applications where a high specific activity is required, a few of these can probably be used to good advantage.

VII. Activation Analyses:

1. Vinylite Resins were submitted for analysis by Carbide and Carbon Chemicals Division, UCC, on November 25, 1949. One set of these samples was submitted for analysis of cadmium and other trace metals, and one set for iron and other trace metals.

   Present Status: The resins submitted for Fe analysis were found to contain from 30 to 168 parts per million of Fe.

2. Stainless Steel, Ni-Cr-Mo-W-Alloy, and Ferrous Material were submitted for analysis by Carbide and Carbon Chemicals Division, UCC, Niagara Falls, New York, on February 13, 1950.

   Present Status:

   a. Stainless Steel - these samples were found to vary from 0.04 to 0.21% tantalum.

   b. Ni-Cr-Mo-W-Alloy - this analysis is being held up for calcium determination.

   c. Ferrous Material - this analysis is being held up for calcium determination.

[redacted]

VII. Activation Analyses: - (Continued)

3. Magnesium Metal Alloys were submitted by the Dow Chemical Company on December 22, 1949, for analysis for trace elements.

Present Status:

	Na	K	Ba,Ca,Sr
63644	.00017	.00014	.0001%
6646	.0001	.00018	.0001%
61877	.00015	.00013	.0001%

4. Germanium Samples were submitted by Bell Telephone Laboratories, Inc., Murray Hill, New Jersey, for analysis for trace elements.

Present Status: Analysis is still in progress.

M. E. Ramsey

M. E. Ramsey, Director
Operations Division

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[redacted]

VIII. S-F Material Control:

1. An additional eleven kilograms of material were received from Y-12 for the KAPL disc fabrication work. This shipment raised the total amount received for the disc work to slightly over forty-one kilograms.

The first shipment of discs was made to Knolls on September 15, 1950. A second shipment was made on September 22, 1950. These shipments consisted of 1,687 discs containing 4,106.85 grams of uranium with an enrichment range of 90 to 95%. Approximately 9,000 discs will be shipped during the first week of October, 1950.

2. Ten highly enhanced uranium J-slugs were received from Hanford on September 25, 1950. These slugs are to be encased in an aluminum sheath and forwarded to Chalk River as a replacement for a like assembly that is being irradiated there at present.

3. Seventy unirradiated four-inch Hanford slugs were received for a test run on the recently modified RaLa process.

4. The SF Office has begun a survey among the research divisions for the purpose of determining fissionable material requirements for the Calendar Year 1951. Following the accrual of these data, the SF Office will compile the overall requirements for the Laboratory for submission to the Atomic Energy Commission. Each year, it is necessary for the Laboratory to renew or re-establish fissionable material quotas with the Atomic Energy Commission.

5. In connection with Item 6 in the August 1950 report pertaining to the quarterly SF survey conducted by the Atomic Energy Commission, Oak Ridge Operations, SF Survey Group, a report of their findings

VIII. S-F Material Control: - (Continued)

5. was received during the month. The report stated that they had reviewed the system of internal control, examined or tested material measurement methods and data pertaining to the accuracy and precision of the measurements and accounting records and supporting data, and had made physical tests of inventories. In addition, a material balance statement was attached which reflected the computed balance; accordingly, the report stated, "In our opinion, the accompanying material balance statement for the Oak Ridge National, Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corporation, presents fairly its inventory position as of July 31, 1950, and the results of its SF material operations for the seven months period then ended, in conformity with the requirements of AEC Bulletin GM-95".

It is noted that the Atomic Energy Commission material balance statement has been compared with X-10 SF report statements for the same period with the results that the two statements are in perfect agreement.

6. The SF Office continued its survey program of material balance areas. During the month, seven persons possessing SF material were visited and their material was inspected and weighed where feasible. No apparent discrepancy was encountered.

7. The records of three analytical laboratories were audited during the month. Records were found to be in good order with proper accounting having been made for all samples.

VIII. S-F Material Control: - (Continued)

8. During the month, there were thirteen shipments received and twenty-three shipments made, compared with twenty-two receipts and eighteen shipments last month. In addition, there were fourteen new material requests received and processed during September, 1950.

9. Following is a summary of receipts and shipments of SF materials for the month of September, 1950:

RECEIPTS

From	Material	Content	
C&CCD, K-25 Area	Normal Uranium	85.00	gm.
C&CCD, Y-12 Area	Nickel Foil Plated with Uranium	.20	gm.
" " "	Uranyl Sulfate (Normal)	527.2	gm.
" " "	Normal Uranium Metal	126.00	gm.
General Electric Co.	Normal Uranium Slugs	124,465.10	gm.
" " "	Receptacle Slugs (Depleted)	7,122.29	gm.
		3.72	gm. Pu
Mallinckrodt Chemical Co.	UNH (Normal)	4,309.10	gm.
Westinghouse Electric Co.	Thorium Rods	681.271	gm.
A. D. MacKay, Inc.	Thorium Tetrafluoride	1.00	lb.

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VIII. S-F Material Control: - (Continued)

9. Receipts and shipments for September, 1950.

SHIPMENTS

To	Material	Content	
Argonne National Lab.	Irradiated U_3O_8	3.40	gm.
" " "	Enriched Uranium as U_3O_8	.003	gm.
" " "	Depleted Uranium as U_3O_8	.170	gm.
" " "	Depleted Uranium and Plutonium	729.00	gm.
		0.01	gm. Pu
Brookhaven National Lab.	Irradiated Normal Uranium Foil	.050	gm.
" " "	Irradiated X-Slugs	2,332.00	gm.
		.03	gm. Pu
" " "	Irradiated Normal Uranium Foil	.058	gm.
" " "	Irradiated Normal Uranium Foil	.070	gm.
" " "	Irradiated Normal Uranium Foil	.062	gm.
Univ. of Calif. Rad. Lab.	Normal Uranium-Mo-Alloy	12,611.25	gm.
C&CCD, K-25 Area	Normal Uranium Buttons	85.00	gm.
" " "	Irradiated Normal Uranium Buttons	43.00	gm.
C&CCD, Y-12 Area	Enriched Uranium	54.220	gm.
" " "	Normal Uranium	170.00	gm.
" " "	Enriched Uranium-Aluminum Alloy	41.7980	gm.
" " "	Enriched U_3O_8	3.05	gm.
" " "	Enriched Uranium-Aluminum Alloy	11.896	gm.
" " "	Enriched Uranium	14.96	gm.
Fairchild Engine & Airplane Corporation	Normal Uranium Foil	4,017.00	gm.
General Electric Co.	Enriched Uranium-Aluminum Alloy Washers	909.071	gm.
" " "	Enriched Uranium-Aluminum Alloy Washers	3,197.78	gm.
" " "	Irradiated X-Slugs	275,176.00	gm.
		2.67	gm. Pu
Tracerlab, Inc.	Irradiated Normal U_3O_8	.4113	gm.
" "	Irradiated Normal U_3O_8	.4159	gm.

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