ORNL 776
Progress Report

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AEC RESEARCH AND DEVELOPMENT REPORT

OPERATIONS DIVISION

MONTHLY REPORT

FOR MONTH ENDING JUNE 30, 1950

OAK RIDGE NATIONAL LABORATORY
OPERATED BY
CARBIDE AND CARBON CHEMICALS CORPORATION
FOR THE
ATOMIC ENERGY COMMISSION
OAK RIDGE, TENNESSEE

REPORT NUMBER: ORNL-776

Contract No. W-7405, eng-26

OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending June 30, 1950

by

L. B. Emlet

DATE ISSUED

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

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SUMMARY ORNL-776

1. Lost pile operating time averaged 12.1% as compared to 9.8% for the year-to-date. The increased lost time was largely due to use of Hole 11 for the dual purpose of exposure of uranium solutions and the Argonne National Laboratory's fuel evaluation experiment. (Page 4.)
2. The water tube in Hole 19 was replaced due to a leaking packing gland. (Page 5.)
3. The excess pile reactivity was reduced by about thirty inhours by the loading of 600 pounds of tantalum for the RW Program. (Page 5.)
4. Due to an electrical short in the No. 3 Fan motor, the No. 3 Fan was out of service for one day. (Page 6.)
5. Approximately twenty-three curies of Sr^{90} were purified during the month. (Page 12.)
6. Sixty percent of the personnel of the Radioisotope Development Department were engaged in the high priority Cs^{137} project during the month. Thirty curies were separated and transferred to Bldg. 908 for purification. (Pages 12&13.)
7. The responsibility for operation of the Burial Ground was transferred to the Engineering and Maintenance Division on July 1, 1950. (Pages 15 and 16.)
8. The activity discharged to White Oak Creek was 17% greater than in May, 1950. The source of approximately sixteen curies of the total thirty-two curies discharged has not been determined. The discharge from the evaporator was only 0.35 curie, compared to 0.9 curie for last month. (Pages 16 and 17.)
9. RaLa Run #42 was completed on June 16, 1950. A "skyshine" measurement indicated 4,140 curies present. No unusual difficulties were encountered during the run. (Pages 19, 20, and 21.)
10. The RaLa process is being altered to permit runs of as much as 10,000 curies. (Pages 19,20, and 21.)
11. There were 721 radioisotope shipments during the month, compared to 791 for May, 1950. (Page 22.)

[redacted]

This document contains information affecting the National [redacted]

A. PILE DEPARTMENT

I. Operating Data:

	JUNE 1950	MAY 1950	YEAR-TO-DATE 1950
Total Accumulated KWH	2,042,032	2,267,161	13,639,028
Average KW/operating hour	3224.77	3431.02	3479.15
Average KW/24-hour day	2836.16	3047.26	3139.74
Percent Lost Time	12.1	11.2	9.8
Approx. Excess Pile Reactivity	30-40 inhours	60-70 inhours	
Slugs Discharged	213	339	1285
Slugs Charged	212	339	1292
Product Made (Grams)	74.53	82.74	497.77
Product Discharged (Grams)	4.54	13.04	72.20

II. Pile Operation:

The pile-down time was 12.1% compared to 11.2% for the previous month, and 9.8% for the year-to-date. The increase in pile-down time is largely due to the use of Hole 11 for the dual purpose of exposure of uranium solutions and for the fuel evaluation experiment being made by Argonne National Laboratory. The solution must be hot to cause recombination of gases formed due to neutron bombardment in order to prevent rupture of the container. The present heating facility is inadequate since three hours are required for preheating the system prior to pile operation. Argonne National Laboratory is redesigning the equipment, providing additional heating and adding a spare water circulation pump to the system.

The fuel unit which was dropped during insertion last month has been carefully reinspected, damaged pieces removed, and the remainder was installed in Hole 11 on June 19, 1950. This fuel unit is being evaluated by Argonne National Laboratory and has performed satisfactorily since its insertion.

[redacted]

II. Pile Operation: - (Continued)

A leak developed in the packing gland at the north end of the water tube in Hole 19 during the first part of the month with the water being drawn back into the pile. Attempts at repairing this leak were unsuccessful, so the tube was replaced on June 6, 1950. A similar water leak developed later in the month and was successfully repaired.

No ruptured slugs were detected during the month.

The excess pile reactivity was thirty to forty inhours at the end of the month. The approximately thirty-inhour decrease from last month was due principally to the insertion of two charges of about three hundred pounds of tantalum each for activation for RW work. Each charge is to contain approximately 1,500-2,000 curies.

The major items of permanentization work remaining to be completed in the Pile Area are replacement of the pile control wiring, rebuilding of the inlet filter house, replacement of the wood structure now housing the fan motors with a concrete block structure, and replacement of the pile cooling fans. The duct work for the pile control wiring is almost completed, but the contactor cabinets and wiring have not been installed. A by-pass was installed around the inlet filter house and rebuilding of the inlet filter house started on June 26, 1950. The concrete block structure at the Fan House is nearing completion with current work being principally on rehanging of piping and relocation of building services. The delivery date of the replacement fans has been delayed with the first one being scheduled for delivery the last of August and the other one in September.

II. Pile Operation: - (Continued)

It was necessary to alter the duct work from the central air-conditioning equipment to the third level, south, in an effort to obtain the specified conditions on that level.

III. Filter House:

The following table compares the pressure drop across the exhaust 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	---
5-31-50	2.4	---	2.8	---	6.4	---
6-30-50	2.5	---	3.0	---	6.7	---

The Filter House operation was normal throughout the month.

IV. Fan House:

During an electrical storm on June 2, 1950, a surge blew the fuses to both motors, burned out the timer in the starting circuit of the No. 2 Fan and a solenoid valve in the damper system on the No. 3 Fan. The No. 3 Fan was out of operation for one half hour and the No. 2 Fan for slightly over three hours.

A coil shorted out on the No. 3 Fan motor on June 12, 1950. The fan motor was cleaned, the damaged coil removed from the circuit, and the windings given a coat of Glyptol. The fan was out of service for almost twenty-four hours with the pile being run at only one half power while the No. 3 Fan was out of service. A new set of wiring will be put in the No. 3 motor when the replacement fans are installed later this year.

Except for the above difficulties, Fan House operation has been normal during the month.

V. Radioisotopes:

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

	MAY, 1950		JUNE, 1950	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	35	225	26	137
Hole 22 (Pneumatic Tube)	54	7	91	9
All Other Holes	11	23	5	37
TOTAL BY GROUPS	100	255	122	183
TOTAL FOR MONTH	355		305	

At the end of June, 1950, there were 361 cans of target material in Stringers 13, 14, and 16, compared to 379 cans of target material in these stringers at the end of May, 1950.

VI. Water Demineralization Building:

The operation of the building was normal throughout the month with 558,900 gallons of water being demineralized of which 43,210 gallons were also deaerated.

Produced: (Gallons)	JUNE, 1950	MAY, 1950	YEAR-TO-DATE, 1950
Demineralized	558,900	694,740	3,597,940
Deaerated	43,210	46,640	231,310

B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

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

Thirty-eight ORNL slugs and two Hanford slugs were processed and 26,716.5 millicuries shipped.

During the month, six slugs were processed which yielded no product. The activity appeared to be complexed by mercury which entered the distillation flask from a manometer. All attempts to recover the iodine met with failure. This manometer has been eliminated from the system to prevent similar occurrences in the future.

No difficulties were encountered in processing the Hanford slugs.

A transfer line from the iodine cell to the fission column cell has been installed and shielded with three inches of lead. It will be pressure-tested and put into service in the near future.

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

Twenty-eight, 2,000-gram, ORNL sulfur cans and eight, 120-gram cans from Hanford were processed and 8, 314 millicuries shipped.

Trouble developed in the glassware purification step several times this month, necessitating the processing of extra cans of sulfur. The following is a list of these difficulties:

a. Twice, dissolving of the $La(OH)_3$ precipitate in weak HCl was done with difficulty.

b. One product had to be re-evaporated and the P^{32} taken up again to reduce the HCl content.

[redacted]

I. Radioisotopes: - (Continued)

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

c. One run showed a heavy precipitate at a pH of 7 and had to be reprocessed.

d. A loss in one run occurred when the crude evaporator flask broke during an evaporation.

e. Considerable activity was held up in the final column processing of one run. As a result of this incident, this column was replaced with a resin bed which saves time and apparently does the work of a column satisfactorily.

Phosphorus Development Work

The P^{32} extractor in Building 906 is now complete, except for the installation of the sulfur melting furnace. Testing should be under way within the next two weeks.

Work continued on the study of slight traces of precipitate which sometimes occurs in P^{32} preparations when they are boiled at pH 7.5. Indications are that the precipitate is of a very complex composition.

Approximately 100 millicuries of carrier-free P^{32} were prepared. Total solids on this batch was 0.0 mg/ml.

A special one-curie batch of regular P^{32} solution was reprocessed to remove precipitate for study and yield a solution to meet specifications of a customer.

I. Radioisotopes: - (Continued)

3. Carbon (C^{14} - 5720y)

Seven, 100-$Ca(NO_3)_2$-slug runs were made during the month. Exposure time for these slugs was about twenty-three months.

The following is a listing of the analytical results of these seven runs:

Run	mc Content	Isotopic Ratio
109	Radiochemically contaminated	
110	115.5	3.5%
111	89.0	3.75%
112	89.9	4.2%
113	170.5	3.6%
114	72.8	3.41%
115	No results available	

The remaining traces (less than 1 mc) of C^{14} left in all of the product bottles of the past three years were combined, re-dissolved, and re-precipitated as $BaCO_3$. The laboratory reports this material is contaminated with an unidentified radioisotope.

The following is a listing 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	1,690
No. of $Ca(NO_3)_2$ Slugs in Canal	400
Total C^{14} Content in $Ca(NO_3)_2$ (estimated)	2,632.01 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)	40,927.01 mc
C^{14} in the form of $BaCO_3$ on hand at the end of the month was [redacted]	40 mc

I. Radioisotopes: - (Continued)

3. Carbon Development Work

Experimental equipment for studying the Be_3N_2 production process gases is 90% completed.

All the $BaC^{14}O_3$ now on hand, or being produced from $Ca(NO_3)_2$ in Cell 5 equipment, is being reprocessed in Be_3N_2-process-type equipment to produce a homogeneous product. The $C^{14}O_2$ is generated and absorbed in NaOH and then precipitated with $Ba(OH)_2$.

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

Two curies of elemental S^{35} were produced with a specific activity of 1,560 mc S^{35}/gram S. Two additional sixty-millicurie samples of elemental S^{35}, re-crystallized from benzene, were prepared.

A preparation of S^{35} labeled with sulfanilic acid was made to check a customer's procedure. He had reported poor results, using our carrier-free $H_2S^{35}O_4$, but we had no difficulty in making a pure product.

5. Fission Products

The transfer line for UNH from the I^{131} cell to the fission product cell in 706-C has been completed. The cell has been thoroughly decontaminated and several new line connections will be made before Run #SS-24 starts during the latter part of July.

The experimental TBP pilot unit in Building 910 is approximately 60% completed.

The operation of heated coiled columns is being studied, using Y^{91} activity. A temperature of 70-80°C is sufficiently low to prevent gassing. The most suitable column has a volume of 15-17 ml, with a diameter of 8 m.m., which operates under a

I. Radioisotopes: - (Continued)

5. Fission Products

six-foot head of liquid. Experimental data, and calculations using Sullivan's formula for theoretical column plates, indicate that the heated coiled column has about the same number of plates as the same heated column uncoiled. The number of plates found under the above conditions was 225.

Additional equipment for separating the short-lived rare-earths on a heated coiled column is being installed in Building 908 six-inch lead barricade.

a. Strontium (Sr^{90} - 25y)

Approximately twenty-three curies of Sr^{90} were purified during the month. An adequate supply is now on hand for all anticipated orders.

6. Cesium (Cs^{137} - 33y)

Sixty percent of the personnel of the Radioisotope Development Department were engaged in the high priority cesium source project during the month. The equipment in the Tank Farm (alum crystallization process) operated very smoothly and approximately thirty curies of Cs^{137} were separated in one week. This material was transferred to the Building 908 purification equipment and the final product contained ~ 90 mc/ml; total solids was 6 mg/ml, largely cesium. No radioactive contamination was detected. This material was evaporated down through successive stages until ten curies, in the form of cesium sulfate, were collected in a platinum capsule, 9 m.m. in diameter and 20 m.m. in height. A 1 m.m. platinum cap was soldered onto the top to close the source and the completed

I. Radioisotopes: - (Continued)

6. Cesium (Cs^{137} - 33y)

source was fastened onto a special source holder, as specified by the customer. This source was shipped July 5, 1950, well ahead of schedule. The second ten-curie source should be ready within one week.

7. Cobalt (Co^{60} - 5.3y)

Eighteen 1 cm X 1 cm, ten 1 cm X 4 cm, fifty-three 1/8 cm X 1 inch, and six 1/8 cm X 3-inch pellets were silver-plated this month.

Two cobalt chloride preparations previously reported had the following analyses:

Batch #	6	7
Total Co^{60}	366 mc	170 mc
Specific Activity	506 mc/g. Co	1080 mc/g. Co
Concentration	2.09 mc/ml	1.03 mc/ml

8. Strontium (Sr^{89-90} - 53d, 25y)

The remainder of the UNH from the slugs loaded and dissolved in the 706-D equipment for Sr^{90} recovery was deliver to Unit Operations for separation early in the month. This work is considered complete until very late in the year when the equipment may be available for such use again.

9. Chlorine (Cl^{36} - 10^6y)

During the month, 0.63 millicurie of HCl^{36} was produced.

10. Selenium (Se^{75} - 125d)

The selenium preparation reported last month had the following analysis:

Total Se^{75} - 2050 mc
Concentration - 7.9 mc/ml
Specific Activity- 340 mc/g. Se.

[redacted]

I. Radioisotopes: - (Continued)

11. Titanium (Ti^{51} - 72d)

During the course of examination of the Hanford-irradiated TiO_2 processed last month, a long-held suspicion that there is no Ti^{51} was upheld by investigations made by the Analytical Division. Ti^{51} is listed in Seaborg's Tables as a 72-day activity. It is believed that the activity often observed in Ti samples is due to Ta and W impurities. The investigation is being continued by the Analytical Division and they will report on it when their studies are completed.

12. Cyclotron Targets

a. Zinc (Zn^{65} - 250d)

The analysis of the Zn^{65} preparation reported last month is as follows:

Total Zn^{65}	-	15.6 mc
Specific Activity	-	55,000 mc/ g. Zn
Acidity (HCl)	-	0.09 N
Concentration	-	0.104 mc/ml

b. Sodium (Na^{22} - 2y)

Nine millicuries of Na^{22} were prepared for shipping during the month.

13. Miscellaneous Work

a. Cobalt Sources

The following special sources of Co^{60} were prepared in containers according to customers' specifications:

1 - 10-curie
1 - 1 curie
3 - 0.25 curie

[redacted]

I. Radioisotopes: - (Continued)

13. Miscellaneous Work

b. Hanford Units

Twenty side-hole tubes and three slugs containing Co pellets were prepared for irradiation at Hanford; also, one enriched Sm^{118} sample.

c. Gold

Ten irradiated gold foil slugs were opened and the gold prepared for shipment.

d. Iodine

One special sample of I^{131} was prepared in a sealed capsule.

II. Tank Farm and Burial Ground:

1. General

a. The responsibility for the operation of the Burial Ground has been transferred to the Engineering and Maintenance Division effective July 1, 1950.

b. A new, two-inch stainless line from W-12 to W-9 has been laid but not tied into W-9 due to the high radiation field at W-9. Also laid in the same ditch with the above line are two stainless, three-inch, lines to the new Research Area. Neither of these have been tied into W-9 as yet.

c. A one-inch stainless line has been laid from W-15 to the new cesium equipment in the South Tank Farm.

d. J. A. Jones Construction Company continued work this month on the new Tank Farm and Restricted Area fences.

II. Tank Farm and Burial Ground: - (Continued)

1. General

e. Preliminary work was begun to install a new steam and air header in the South Tank Farm to replace the two old ones so that work could be done with heavy equipment at tanks W-5, W-7, and W-9.

f. It has been suspected for some time that the old W-11 tank was leaking. A solution of dye and water was put into this tank and the dye traced to the dry well system, indicating the tank actually does leak. It is fortunate that W-12 had at one time been installed in the event of such an occurrence and the W-11 is now used only as an overflow tank.

g. A flood light has been installed at the new Retention Pond weir, and the earth backfilled around the box.

2. Wastes Discharged to the White Oak Creek

Approximately 32.07 curies of beta activity were discharged from the Settling Basin this month. Of this, 15.93 curies were discharged during the first ten days of the month and 9.53 curies the last four days of the month. The source of the high activity discharged early in the month is not known. In an attempt to locate the source, constant sampling pumps were placed at strategic locations in the waste streams to the Settling Basin without giving indication of the origin of this activity.

The high activity at the end of the month was caused by the fire hose decontamination of one of the 706-D cells. Toward the end of the cell decontamination, it is always necessary to wash

II. Tank Farm and Burial Ground: - (Continued)

2. Wastes Discharged to the White Oak Creek

down the outside of the equipment with a large volume of water. This water cannot be accommodated in W-5 tank and it becomes necessary to send it directly to the Settling Basin.

ACTIVITY DISCHARGED TO WHITE OAK CREEK

	MAY, 1950		JUNE, 1950	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	21,752,000	27.48*	18,715,000	32.07*
Retention Pond	Normal operation suspended; installing outlet weir		590,904	.42
TOTAL		27.48*		32.49*
*Contributed by Evaporator		.91		.35

3. Chemical Waste Evaporator

Operation of the evaporator was normal this month. An average decontamination factor of 8,992 was obtained.

WASTE EVAPORATOR OPERATION

Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
JUNE - 179,515	10,036	16.9:1	3111.73	.35
MAY - 180,659	19,966	8.0:1	6884.00	.91

[redacted]

II. Tank Farm and Burial Ground: - (Continued)

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	890	584	Cesium Plant	10,100

CHEMICAL WASTE STORAGE

W-5	170,000	198,715	179,515	Evaporator	32,400

EVAPORATOR CONCENTRATE STORAGE

W-6, 8	340,000	7,200	4,800	Evaporator	96,000

METAL WASTE STORAGE

W4,7,9,10	543,000	8,976	-0-	----	197,804

5. Special Wastes

a. Three Dayton shipments were buried.

b. Eleven pots and six drums of liquid waste were received from Chicago.

c. A total of 762,501.38 grams of uranium were transferred to the Metal System this week. Of this, the Chemical Technology Division transferred 669,310.38 grams; the Operations Division, 64,130 grams; and Argonne National Laboratory, 29,061 grams.

[redacted]

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

The removal of the experimental resin column in 706-D Building was completed early in the month, as was the removal of the former off-gas lines from 706-D Building at their junction at the 205 Building. This old equipment was buried.

The removal of the 706-DA Building and equipment was started and 99% completed during the month. The former A-16 off-gas fans were stored at the Burial Ground, while the building was demolished and buried.

The RaLa equipment was used for Sr recovery work until Run #42 was begun.

Run #42 was begun on June 11, 1950, with the loading of seventy-four, four-inch Hanford slugs to the dissolver. The run was delayed twenty-four hours in starting due to transportation delays in receipt of the slugs. It was necessary to perform three dissolvings and extractions because of the dilution of the dissolver solution by the large number of uranium slug heels left behind from the strontium recovery runs.

No difficulties were encountered during this run although the waste losses were slightly higher than those encountered in RaLa Run #41. This was the first run made utilizing the new off-gas systems to the 900 Area fans and stack. No air activity was detected during any of the processing.

B-1 tank was used in the place of B-6 tank for product sampling and fuming.

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

The glassware procedure lasted ten hours and L.S.T. was reached at 0630 on June 16, 1950. The product was in the form of a nitrate containing 4,140 curies (determined by a nine-hour skyshine reading of 36.7 R/hr) was shipped at 5:10 p.m. on June 16, 1950.

The analytical summary of the run follows:

Cell A

Slugs loaded: 74 Hanford slugs

Slugs dissolved: 96.3 Hanford slugs by analysis

(Includes heels of X slugs used for strontium recovery.)

	Curies	Percent
Total Curies Dissolved	5,812	100.00
Cell A Losses	1,544	26.57
Cell B Losses	223	3.84
Total Losses Accounted For	1,767	30.41
Product		
Product in B-1 (Radiochemical)	4,033	69.4
Material Balance through B-1		96.4
Losses Unaccounted for through B-1		3.6
Product Shipped (Skyshine)	4,140	71.2

The fuming nitric waste and the HCl-ether waste of this run were not sampled in order to reduce the radiation exposure of both the laboratory and Operations personnel. No further sampling of these wastes in subsequent runs is contemplated unless difficulties are encountered in run operations.

[redacted]

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

While the run was in progress, alterations were started on the 706-D Building structure to accommodate the expected changes in process. The process and equipment changes are designed for a maximum of 10,000 curies per run. The former isotope packing room, personnel decontamination room, janitor's storage cabinet, and instrument shop were removed and the superstructure revised insofar as possible before the steel work is put up for the six-ton crane.

Excavation was begun for the rerouting of the building floor and process drains, as well as for the new cubicles. During the excavation it was found that the building fire water supply lines were corroded and would have to be replaced.

The first complete pour for the new cubicles has been completed and the forms and reinforcing rods are now being placed for the second floor pour and the walls.

A program of Cell A decontamination was begun immediately following the run shipment and was completed by the end of the month. Alterations inside of the cell will being early in July.

The maintenance program will include necessary cell repair such as painting, repair of the A-5 tank agitator motor which burned out during cell decontamination and replacement of electric lights besides the design changes for the process revision.

C. RADIOISOTOPE CONTROL DEPARTMENT

I. General:

During June, 1950, there were 721 radioisotope shipments, compared with 791 during May and 635 during April. In June, 1949, there were 447.

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

	June 1949	May 1950	June 1950	August, 1946, to June, 1950, Incl.
Separated Material 706-D Area	332	561	554	11,745
Unseparated Material 100 Area	115	230	167	3,597
	447	791	721	15,342

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

	June 1949	May 1950	June 1950
Non-Project	367	596	549
Project	54	171	154
Foreign	26	24	18

II. Hanford Irradiations:

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

Sample No.	Material	Date Discharged	Date Received
ORNL-88	Tin (1 pc)	5-10-50	6-10-50
ORNL-119	Sulfur (8 pcs)	June, 1950	6-22-50
ORNL-119	Sulfur (8 pcs)	June, 1950	6-26-50

II. Hanford Irradiations: - (Continued)

Three slugs containing cobalt which Hanford found to be badly bowed were returned and inspected. It is impossible to determine whether the bowing was caused by pressing the end-plugs into the slugs or by faulty machining.

III. Radioactive Strontium:

During the past months approximately twenty-five curies of Strontium 90, low in Strontium 89, were prepared and enough is now on hand to satisfy all outstanding orders.

IV. Special Preparations:

Requests for special work received during June, 1950, included the following:

Material	Requester
Be^7 in the form of sulfate	University of North Carolina
155-curie Cobalt 60 source	Brookhaven National Laboratory
50-curie Cobalt 60 source	Chemical Corps
10-curie Cobalt 60 source	Geo-Physical Service, Inc. Dallas, Texas
50 mc Rh^{106} plated on plastic holder	O.R.I.N.S.
Irradiation of 5300 zinc discs	A. C. Gilbert Company
4, 1½-curie Cobalt 60 sources	X-Ray Engineering Company
60-curie Cobalt 60 source	Chemical Corps
61 Cobalt sources, 40-60 mc each	Air Corps

V. Phosphorus 32:

During most of the month there was a shortage of P^{32}, partly caused by the high rate of shipment which almost equaled the amount produced in the X-10 pile. In order to overcome the shortage, sixteen sulfur slugs containing about 130 grams of sulfur each were

V. Phosphorus 32: - (Continued)

obtained from Hanford and these, together with the production from the X-10 pile, furnished enough P^{32} to fill all outstanding orders.

A complaint was received from the University of California regarding the purity of P^{32} and a special product was prepared for this customer. Extra charges have been made for this special material.

VI. Cyclotron Radioisotopes:

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

Material	Amount	Status
Na 22	.040 mc	Special source being prepared.
Mn 54	3.00 mc	Source of Mn^{52}-Mn^{54} being held until Mn^{52} decays.
Fe 59	2.00 mc	Customers will be encouraged to take material prepared from enriched Fe^{58}.
As 73	11.00 mc	Univ. of Pittsburgh attempting to prepare.

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					5	170.00		
Na 22	1	109.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							1	50.00
Co 57							2	50.00
Fe 59			3	184.30				
Zn 65	1	100.00						
I 125							2	60.00
Molybdenum metal					1	13.00	1	10.00
TOTAL RECEIVED	2	209.75	3	184.30	13	404.75	10	470.00
REQUESTED BUT NOT RECEIVED								
Zn 65			1	40.00				
As 73					1	10.00		
Mo Metal Plate							1	10.00
TOTAL HOURS OUTSTANDING (Not Received or Requested)		540.25		525.70	[redacted]	335.25		270.00

[redacted]ET

VI. Cyclotron Radioisotopes: - (Continued)

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments June, 1950	No. Millicuries June, 1950	No. Millicuries To Date
Be 7	3	33.000 mc	119.073 mc
Na 22	1	.177 mc	13.147 mc
Mn 52			9.991 mc
Fe 59	2	1.500 mc	1.500 mc
Zn 65	1	1.000 mc	1.000 mc

VII. Activation Analyses:

1. Vinylite Resins submitted by Carbide and Carbon Chemicals Division, UCC, 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: These analyses are about 95% complete. A report will be issued soon.

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

   Present Status: These analyses are about 75% completed. The calcium analysis remains to be done.

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

   Present Status: Dr. Wm. Beamer from Dow visited ORNL last week of June to study the methods of activation analysis being used here. He also brought a number of other samples in addition to the metal alloy samples previously submitted. These were studied at a considerable length by the activation analysis group.

VII. Activation Analyses: - (Continued)

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

Present Status: Preliminary analyses have been done on these samples. It is estimated that the analyses are about 30% completed.

VIII. Shipping Regulations:

In response to letters written to various airlines regarding acceptance of CAR Part 49 Regulations, a reply has been received from two of the major airlines. One of these indicated that it was not considered feasible to accept these regulations because of safety considerations. The other airlines indicated that their representative would be willing to try to get acceptance at the next Industry Advisory Board of Air Cargo, Incorporated, in San Francisco, July 11, 1950. At the airline's request, information regarding the effect of radiation on film prepared by a Sub-Committee of the National Research Council is being forwarded.

IX. Price Reductions:

Effective July 1, 1950, prices of S^{35} and Ca^{45} will be reduced and a new product, elemental S^{35}, will be added to the list of available radioisotopes.

Logan B. Emlet by
Logan B. Emlet, Director
Operations Division
W. E. Ramsey

wp

[redacted]

X. S-F Material Control:

1. During the month two notable shipments were made: one shipment consisted of an eleven-foot aluminum sheath containing ten U/Al alloy slugs highly enhanced, and the other was an MTR fuel assembly. The eleven-foot tube was sent to Chalk River, Canada, for irradiation and the MTR assembly forwarded to Argonne. Following experiments at Argonne, the assembly also will be sent to Chalk River for irradiation.

2. One Hanford car was received during the month, arriving on June 10, 1950. Its contents consisted of seventy-six uranium slugs for the RaLa process and seventy-two slugs for Sr^{90} and fission product extraction.

3. On June 8, 1950, 1,453.42 pounds of scrap beryllium were shipped to Brush Beryllium Company, Cleveland, Ohio. Thus far in the Calendar Year, the Laboratory has shipped 2,087 pounds of beryllium for recovery. Preparation is being made for the return of an additional 258 pounds of this material. Following this shipment, we will have returned 2,345 pounds.

4. During the month a report was submitted covering the estimated cost of accounting for SF materials at the Laboratory. The issuance of this report resulted from a request received from the Atomic Energy Commission.

5. A quarterly survey of SF material balance areas was conducted by members of the SF Office. Of seventy-nine individual accounts, outstanding and active at present, twenty were checked. The survey consisted of visual inspection of material, spot-checking weights and requesting sample analysis where feasible. No apparent discrepancy was encountered and all personnel visited

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

5. were exceptionally cooperative, reflecting awareness of their individual responsibility for safe-guarding and accounting for SF material.

6. The records of three analytical laboratories were checked during the month. The audit disclosed that records were in good order and sample material had been properly accounted for.

7. Approximately 500 grams of plutonium, which had been extracted from Chalk River fuel rods, were transferred to the SF Accountability Representative for storage. This material is being held in Cell 7 of the 205 Building. Security facilities at this location are entirely inadequate since the room cannot be locked. In order to provide sufficient safe-guard there, it has been necessary for the Security Division to establish and maintain a guard post at the cell.

8. Storing material such as this has become an acute problem and is expected to be more pressing in the coming months. During the past six months, the 103 Vault has been used to store 300 grams of U-233, 140 grams of plutonium, 1,240 grams of U-235 in the form of MTR fuel plates, and eleven tons of uranium bars. This is in addition to the storage of feed slugs for the 105 Pile, stable isotopes, various energy emitting sources and hundreds of small items such as uranium compounds, thorium compounds, and scrap material.

By early 1951, it is expected that the 205 Pilot Plant will be recovering plutonium and uranium sludge from the Tank Farm. This operation is expected to yield between 800-1000 grams

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

8. of plutonium and 150-160 tons of uranium, thus presenting a tremendous storage problem.

Storage problems arise between completion of Pilot Plant runs and final purification processing.

In order to alleviate this situation, another vault will have to be provided.

9. There were nineteen SF shipments received and thirty-one shipments made during the month, compared with sixteen shipments received and thirty-six shipments made last month.

In addition, there were twenty-five new material requests received and processed during June, 1950.

[redacted]

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

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

RECEIPTS

From	Material	Content
Argonne National Lab.	Miscellaneous Waste Solution Containing Uranium and Plutonium	440.00 gm. 331.00 mg. Pu
" " "	ThF_4 and $ThCl_4$	Negligible
" " "	ZR/U-235 Fuel Plates and Wire Fuel Elements	13.0573 gm.
" " "	Miscellaneous Waste Solution Containing Uranium and Plutonium	8,450.00 gm. .08 gm. Pu
" " "	Miscellaneous Waste Solution Containing Uranium and Plutonium	20,171.00 gm. .19 gm. Pu
" " "	Irradiated Metal Punchings from Zr/U-235 Fuel Plates	0.303 gm.
Brookhaven National Lab.	Thorium Fluoride Pellets	25.94 gm.
" " "	U_3O_8 (depleted)	2.941 gm.
" " "	Uranium Foil (normal)	.10 gm.
C&CCD, K-25 Area	Depleted Uranium	2,086.00 gm. 3.00 mg. Pu
" " "	Normal Uranium Buttons in Quartz	23.00 gm.
" " "	Normal Uranium	23.00 gm.
" " "	Normal Uranium	258.00 gm.
C&CCD, Y-12 Area	Solution Containing U-233	0.6 gm.
" " "	Depleted Metal	69.41 gm.
Hanford General Electric	Irradiated Uranium Slugs	131,586.47 gm. 93.93 gm. Pu
" " "	Irradiated Uranium Slugs	135,133.54 gm. 22.32 gm. Pu
Kellex Corporation	Depleted Uranium and Plutonium	0.73 gm. 0.186 mg. Pu
Fairchild Engine and Airplane Corporation	Be_2C Impregnated with UC_2 (normal)	2.70 gm.
Westinghouse Electric Co.	Thorium Powder	4,000.00 gm.

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

10. Receipts and shipment for June, 1950.

SHIPMENTS

To	Material	Content
Argonne National Lab.	Irradiated X-slugs (depleted)	13,992.00 gm. 0.15 gm. Pu
" " "	UNH Solution (depleted)	10.50 gm. 0.013 gm. Pu
" " "	Enriched Uranium	146.99 gm.
" " "	Pieces of Irradiated X-Slugs	1,639.00 gm. 0.02 gm. Pu
" " "	ThF_4 and $ThCl_4$ (irradiated)	Negligible
Battelle Memorial Inst.	Thorium Metal	4,105.00 gm.
Brookhaven National Lab.	Irradiated Thorium Fluoride Pellets	25.94 gm.
Univ. of California	UNH Solution (depleted)	2.625 gm. 0.003 gm. Pu
C&CCD, K-25 Area	Normal Uranium	4,830.00 gm.
" " "	Depleted Uranium	6,560.00 gm.
" " "	Plutonium	0.109 mg.
" " "	Normal Uranium	9.30 gm.
" " "	Irradiated Normal Uranium	66.00 gm.
" " "	Irradiated Normal Uranium	23.00 gm.
C&CCD, Y-12 Area	U/Al Alloy (enriched)	1.485 gm.
" " "	$UO_2(NO_3)_2$ (enriched)	16.00 gm.
" " "	Normal Uranium Plates	1,220.00 gm.
" " "	Scrap from U/Al Alloying (enriched)	279.1762 gm.
" " "	U/Al Alloy (enriched)	0.432 gm.
" " "	U/Al Alloy (enriched)	6.5208 gm.
" " "	U/Al Alloy Rod (normal)	297.90 gm.
" " "	Uranium Metal (normal)	1,815.5 gm.
Monsanto Chemical Co.	Plutonium - 239	16.00micrograms
" " "	Normal Uranium	6.52 gm.
" " "	Depleted Uranium	8.88 gm.
" " "	Plutonium	3.15 mg.
National Research Council	U/Al Alloy Slugs (enriched)	407.53 gm.
Hanford General Electric	U/Al Alloy Slugs (enriched)	407.32 gm.
Iowa State College	Mixed Rare Earths Containing Plutonium	0.75 microgram
Kellex Corporation	Purex Waste Sample	0.15 gm.normal 0.01 mg. Pu
Schenectady General Elec.	Irradiated X-Slugs	398,772.00 gm. 5.51 gm. Pu
" " "	Normal U/Al Alloy	10.79 gm.
Tracerlab, Inc.	Irradiated U_3O_8	0.4315 gm.
" "	Irradiated U_3O_8	0.5568 gm.