ORNL 1050
Progress Report

AEC RESEARCH AND DEVELOPMENT REPORT

OPERATIONS DIVISION

MONTHLY REPORT

FOR MONTH ENDING

JUNE 30, 1951

M. E. Ramsey

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

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OPERATIONS DIVISION MONTHLY REPORT for Month Ending June 30, 1951

by
M. E. Ramsey

DATE ISSUED SEP 20 1951

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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CONTENTS

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SUMMARY

1. Lost pile-operating time averaged 8.9 per cent, compared to 8.2 per cent in May and 10.3 per cent for the year to date (Page 2).

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

3. An additional experimental hole will be made available by a rearrangement of safety rods (Page 2).

4. The Low-Intensity Training Reactor has been operated at very low power during the month in order to calibrate the shim rods against poison inserted in the fuel assemblies (Page 2).

5. The I^{131} equipment operation was, in general, satisfactory after the repairs were completed during the first part of the month (Page 2).

6. Design work for the new I^{131} plant is nearing completion (Page 5).

7. Installation and testing of equipment for Chalk River waste separation were completed during the month (Page 7).

8. The source of the high-activity discharge to the Settling Basin reported last month was found to be due to leaks in the valve pit near Building 3026 (Page 9).

9. The activity discharged to White Oak Creek was 12.9 curies, compared to 35.4 curies during the previous month (Page 9).

10. The RaLa resin cubicle (No. 200) has been decontaminated sufficiently for repairs. The valve failure reported last month was due to a linkage failure (Page 10).

11. There were 677 radioisotope shipments compared to 820 last month (Page 12).

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A. PILE DEPARTMENT

I. OPERATING DATA

	June 1951	May 1951	Year to Date 1951
Total accumulated kilowatt-hours	2,436,838	2,402,620	14,864,191
Average kilowatts per operating hour	3713.39	3517.65	3812.82
Average kilowatts per 24-hour day	3384.50	3229.33	3421.78
Per cent lost time	8.9	8.2	10.3
Excess pile reactivity	~90 in-hrs.	~120 in-hrs.	
Slugs discharged	107	40	2697
Slugs charged	106	48	2692
Product made (grams)	88.94	87.69	542.49
Product discharged (grams)	8.24	0.48	344.37

II. PILE OPERATIONS

1. Graphite Pile

The average pile power per operating hour for the month was 3,713.4 kilowatts, compared with 3,517.7 kilowatts for May 1951.

The pile-down time was 8.9 per cent, compared with 8.2 per cent in May 1951, and 10.3 per cent for the year-to date.

There were no ruptured slugs found during the month. The total number detected to date remains at eighty-seven.

Production of aluminum-silicon bonded slugs at Y-12 has started. It is hoped that production will reach one to two thousand per week by the end of July 1951.

Arrangements are being made to install a stainless steel filter in the slug cutter and to dispose of the effluent, so that there will be less canal contamination following slug-cutting operations.

The hot drains from the north and south faces of the pile are overloaded, and it will be necessary to increase their capacity. It is proposed to separate the water which has been irradiated from that which has not been through the reactor. This will help prevent overloading the canal demineralizer.

In order to provide an extra vertical hole on top of the pile, three new safety rods of greater total reactivity effect than the reactivity effect of the four existing safety rods will be installed, replacing the four used at present. This will make one of the four holes now used for safety rods available for research. The scanner will be changed from the east to the west side of the scanner holes so that there will be approximately 8 feet of working space.

2. Low-Intensity Training Reactor

During the past month, operation at the LITR has been limited to a power of approximately 20 watts for the purpose of calibrating shim rods against poison in the form of stainless steel strips inserted in the fuel elements. In addition, personnel of the Phillips Petroleum Company have been trained in operation during these runs. As soon as the calibration experiment now under way is completed, Phillips personnel will be trained in operating at a higher power.

A system of safety trips is being designed for the LITR so that unusual conditions during experiments in the beam holes will actuate the trips and shut down the reactor. Monitrons and other radiation-monitoring devices will also actuate the trips to shut down the reactor as considered necessary.

Surplus pumps and heat exchangers have been located which will enable the LITR to be operated above 1 megawatt. The power is now limited by the cooling system to about 750 kilowatts during summer conditions.

An exhaust system, discharging into the graphite

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pile stack, will be built shortly. This is expected to furnish ample capacity to exhaust any radioactive gases which may be given off in the course of experiments or other conditions at the LITR.

III. FILTER HOUSE

One hundred and ten of the new-specification filters are being ordered to give approximately 200 filters of a type suitable for installing in the place of the present CWS No. 6 filters. The old CWS No. 6 filters (there are ninety-four on hand) cost over $70.00 each, whereas the new filters are expected to cost only about one-half as much.

Table 1 compares the pressure drop across the exit air filters last month with this month, and that experienced when all filters were clean.

TABLE 1

Date	Glass Wool (in. w.g.)	CWS No. 6 (in. w.g.)	Total Across House
6-30-51	2.9	1.3	5.5
5-31-51	2.7	1.2	5.3
Clean filters	1.1	1.0	3.3

Static pressure increased from 38.3 to 39.8 inches water gauge.

IV. FAN HOUSE

The oil lines to the south bearing were restricted by orifices to eliminate the difficulty due to flooding. This change makes the No. 3 fan identical with the No. 2 fan. The bearings on the No. 3 fan were inspected on June 25 and found to be in excellent condition.

V. RADIOISOTOPES

Table 2 is a comparison of the radioisotopes and research samples charged into the pile during June 1951 with those handled in May 1951.

At the end of June 1951, there were 367 cans of target material in Stringers 13, 14, and 16, compared to 361 cans of target material in these stringers at the end of May 1951.

VI. WATER DEMINERALIZATION BUILDING

The de-aerator at Building 3004 was opened on June 4 and found to have about 1 square foot of the rubber lining torn loose from the tank wall. This was repaired, and the quality of the de-aerated water has improved markedly. At the same time, a baffle on one of the distributors on the de-aerator was repaired.

The operation of the building was normal, with 496,410 gallons of water being demineralized, of which 24,030 gallons were also de-aerated (Table 3).

TABLE 2

	June 1951		May 1951	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	29	102	10	139
Hole 22	63	10	75	8
All other holes	7	26	4	23
Total by Groups	99	138	89	170
Total for Month	237		259	

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TABLE 3

Produced (gallons)	May 1951	June 1951	Year to Date
Demineralized	689,460	496,410	3,736,190
De-aerated	19,150	24,030	241,780

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B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. RADIOISOTOPES

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

Thirty-four ORNL slugs were processed and 35,998 millicuries shipped.

The repairs on the cell equipment begun last month were completed and the process again put into operation. In addition to the repairs described in last month's report, a leaking still condenser was replaced, several pipe leaks were welded, two thermocouples were replaced, and two activity probes were changed. A dummy run was then made to test the equipment.

Since repairs were made, the yields have improved considerably. The yield of the first run after startup was 855 millicuries per slug, which was, as usual immediately after repairs, lower than that of the following runs. The second run yielded 1050 millicuries, and the third run 1210 millicuries per slug.

Some difficulty was experienced in the chemistry of the process this month. It was found that, wherever the caustic scrubber solution was processed, considerable NO_2 was evolved in the final glassware distillation step. This resulted in some loss of product and increased the content of total solids and nitrates. At the end of the month, some experimental work was being done to try to remedy the situation.

Iodine Development Work. The Engineering and Radioisotope Development Departments have completed eleven architectural drawings, eleven process vessel drawings, eight piping drawings, and two electrical drawings, a total of thirty-two drawings for the proposed I^{131} plant. Approximately eighteen drawings remain to be done.

Design of vessels and equipment by this department continued, with particular attention to the design of the bubble-cap plate scrubber. Mockups of the bubble-cap plate scrubber and the dissolver sparger were designed and are being fabricated.

Instrumentation problems were discussed, and it was decided that Foxboro instruments would be used and that the instrument console would be designed and built by Foxboro. Instrumentation engineering will be requested after July 1, 1951.

Three experimental I^{131} tracer runs were made in the glassware mockup of the dissolver-catch tank-scrubber system to test the effectiveness of water-scrubbing of I^{131} under varying conditions. Results are shown in Table 4 as per cent of I^{131} captured at various points.

In summary, the results of the foregoing experiment indicate that a four-plate bubble-cap scrubber will scrub 75 per cent to 80 per cent of the I^{131} from the vapor passing the catch tank. There is also an indication that O_2 sparging will decrease the yield during distillation.

It was decided to use a modified version of the Schutte and Koerting air jet designed for the Arco project for I^{131} sampling. Schutte and Koerting was consulted concerning modification of the jet to have only one 1/8-inch pipe tap straight in to the inlet chamber on the inlet side. It was learned that this could be done at no increase in cost, and that a revised drawing of the jet will be sent for our approval.

A recirculating air-jet sampler has been set up to test the reliability of samples of I^{131} taken by this method. Additional tracer runs in the glassware mockup are also planned.

A report has been completed on the I^{131} process and equipment which have been in use during the last four years, and will be issued as an ORNL report.

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

Ten 2000-gram cans and twelve 2500-gram cans of irradiated sulfur were processed and 7490 millicuries shipped this month.

The square-type 2000-gram bombardment can was replaced this month with the stronger, round type, which has a capacity of 2500 grams. It is believed that these cans will decrease the possibility of rupture in the pile. They will also permit a more efficient use of the space in the pile.

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TABLE 4

Vessel	Run 2 (Air Sparge, No Steam) Per Cent of Distilled	Run 3 (O_2 Sparge, Steam) Per Cent of Distilled	Run 3 (O_2 Sparge, Steam) Per Cent Past Catch Tank	Run 4 (N_2 Sparge, Steam) Per Cent of Distilled	Run 4 (N_2 Sparge, Steam) Per Cent Past Catch Tank
Catch tank	87.5 (Sucked back from scrubbers)	81.0		70.8	
1st H_2O scrubber	1.7	7.9	42.6	4.6	17.4
2nd H_2O scrubber	2.4	3.25	17.5	3.7	14.0
3rd H_2O scrubber	1.3	2.2	11.7	2.3	8.7
4th H_2O scrubber	1.6	1.6	8.6	1.5	5.7
1st Caustic scrubber	0.8	1.5	8.0	16.1	60.6
2nd Caustic scrubber	4.3	2.2	11.7	0.9	3.4
Dissolver remainder after distillation	33 of original	48.5 of original		21.1 of original	

During part of the month, lower than normal extraction yields were experienced. A thermowell was installed inside the extractor, and the temperature was found to be too high for optimum extraction. When the temperature was lowered 10 degrees, the extraction yields returned to normal.

A new extraction tube, 6 inches in diameter, has replaced the previously used 4-inch tube. The new tube is tapered 1/4 inch from bottom to top, in order that the solid sulfur may be removed from the tube and the tube reused. Besides saving of the cost of the old tubes, four instead of two cans may now be processed in one batch.

3. Carbon (C^{14} - 5700y)

Twenty Be_3N_2 slugs were processed, but no analysis of the product has been made. About 4.5 grams of $NaC^{14}O_3$ were produced. The specific activity has not been determined.

4. Wolfram (W^{185} - 73.2d)

Wolfram was produced, with the following analysis:

Total W^{185}	146 mc
Concentration	0.974 mc/ml
Specific Activity	65 mc/gm
Total Solids	44.0 mg/ml
Nonvolatile Material	38.5 mg/ml
Basicity	0.32 N (KOH)
Contamination	0.1 %

5. Sulfur (S^{35} - 87d)

Carrier-free sulfur was produced, with the following analysis:

No. 1

Total S^{35}	15,350 mc
Concentration	102 mc/ml
Total Solids	0.0 mg/ml
Acidity	0.043 N (HCl)
SO_4	0.0 mg/ml
Contamination	0.1 %

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No. 2

Total S^{35}	15,900 mc
Concentration	159 mc/ml
Total solids	2.87 mg/ml
Acidity	0.016 N (HCl)
SO_4	0.0 mg/ml
Contamination	None

A barium sulfide product was made, with the following analysis:

Total S^{35}	2180 mc
Concentration	21.8 mc/ml
Specific activity	6900 mc/gm
Sulfides	3.1 mg/ml
Nonsulfides	0.08 mg/ml
Total sulfide	3.18 mg/ml
$Ba(OH)_2$	2 mg/ml

6. Barium (Ba^{140} - 12.8d)

Total Ba^{140}	69 mc
Concentration	1.38 mc/ml
Specific activity	197 mc/gm
Gross alpha	10 c/m/ml
Pu	10 c/m/ml
Sr	0.01 %
Heavy metals	10 ppm
Total solids	8.5 mg/ml
Nonvolatile material	7.5 mg/ml
Ba	7.0 mg/ml
Acidity	0.111 N (HCl)

7. Fission Products

No further runs for crude fission-product fractions were made during the month. Run No. SS-29 will be started the last week in July.

The experimental TBP solvent-extraction column has been set up in Building 3014-A, but no further tests have been made on this equipment.

Considerable time is being devoted to finishing a report to be issued on the various methods which have been used during the past four years for the separation of pure fission products. The report is being divided into three parts: (1) the VRC or volume reduction column process; (2) the HCl stripping process; and (3) the modified VRC process being used at present. The rough draft has been finished for the first two parts of this report.

Several liters of material from the 3026 garden were processed, but the yield of strontium was only about 1 curie. Much of the volume of the original solution was apparently rain water.

Upon further checking of the brick vault in the garden, about 2 liters of material were found. This will be processed within the next two weeks.

8. Chalk River Waste Separation

Installation and testing of equipment were completed during the month. Shielding has been installed in doors in preparation for the first "hot" run.

The new stainless-steel ruthenium evaporator was completed and installed. Operating capacity of this vessel is 30 liters, and evaporation rate of water is about 20 liters per hour.

Additional shielding was installed on the product-removal station.

A 2-liter glass transfer vessel was added to the alkaline-earth separation equipment so that HCl elutions may be made from the 100-milliliter alkaline-earth column.

The crystallizer for the cesium process was tested and found to be satisfactory, with the exception that a compressed-air line must be added to the decant jet.

Preliminary draft of the operating manual has been completed and is being typed.

An extension of the present gallery has been started, and is expected to be completed within two weeks. This will be used for reagent storage and solution makeup. In addition, guard rails will be installed atop Building 3515.

9. Source Preparations

a) Co^{60} sources were loaded in special holders as follows:

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Hazards
Department, K-25. One source, 150 mc
Texas State Department of Health. . . Eight sources—six 150 mc, one 500 mc, one 1 curie
National Bureau of Standards . . . . Three sources, 3 curies each
V.A., Fort Snelling, Minnesota . . . . . Two sources, 200 mc each
National Bureau of Standards . . . . . One source, 7 curies.

b) A one-millicurie source of Ru^{106} was prepared for the Biology Division.

10. Packaging

a) Twenty cc of He^3 were packaged under the Technical Cooperation Program.

b) The He^3 which was received from Los Alamos was purified and packaged in twenty-two containers of various sizes.

11. Services

a) A 1-gram sample of PCl_3 was prepared for irradiation. This sample was for Kansas State College.

b) Fifty millicuries of Ni^{63} as $NiSO_4 \cdot (NH_4)_2SO_4$ with a specific activity of 5 millicuries per gram were prepared for the National Bureau of Standards.

c) Two millicuries of C^{14} as barium carbonate were diluted with 100 grams of inert barium carbonate. This material was prepared for the University of Michigan.

d) Twenty-four cobalt cylinders were irradiated and then silver plated for Ohio State University.

e) A conference was held on the manufacture of a 1500-curie cesium source. It was decided that W-14 supernate could be used. W-14 has 5000 curies in 1500 gallons. Final purification and source assembly can be done in Building 3013.

12. Design Work

a) Two product-transfer shields have been modified to facilitate transfer between Buildings 3030 and 3028.

b) A new tube assembly was designed for the C^{14} jacket-melting furnace, and it is now being fabricated.

c) Design of the revision of Room 204 in Building 3037 has been started by the Engineering Department.

d) A new type plaque for Sr^{90} sources was designed and is being fabricated.

e) Larger solenoid coils were tested with the magnetically operated glass valve, without success. The amount of iron that can be used in the valve is limited, and this limits the size of coil that can be used, because too large a coil will burn up with insufficient iron in the core. A test is planned, using a large coil to jerk the valve loose from the seat and switching immediately to a smaller coil to hold it.

f) Further work was done in the analytical system and the fractionating column for gases. Most of the glass work has been completed, and the system should be in operation next month.

g) The flow sheet for the Ru^{106} purification process, Building 3030, Cubicle 6, has been completed and equipment design has been started.

13. Miscellaneous

a) Delivery is expected shortly on a refrigerator which is being reconditioned for use in the Cold Laboratory. It will be used for storing plastic molding powder and other chemicals which must be kept cold.

b) The 20-foot hot barricade in Building 3030 was painted.

c) Work was begun this month to construct two concrete pads in the vicinity of Building 3036. The smaller of the two pads has been completed,

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with the exception of cleanup work. The other has had sewage facilities installed, but the pouring of the concrete has not begun.

II. TANK FARM:

1. General

Following complete testing of tanks W-16, W-17, and W-18, and completion of the repairs indicated by the tests, the tanks were put into service on June 23, 1951. W-16 is the automatically jetted tank servicing 3026-D, while W-17 and W-18 serve as collection and overflow tanks for 3026-C Building. This system enables the Tank Farm operator to determine the amount of waste contributed by each building, as well as to monitor the waste discharge. W-12 tank, which formerly serviced Buildings 3026 and 3550 now services Building 3550 exclusively. The backfilling at these tanks has not as yet been completed.

In searching for the source of high-activity discharge to the Settling Basin last month, it was found that both the chemical and metal waste lines from Building 3026-C were leaking both inside and outside of the valve pit. The drain from this pit connects directly to a discharge line from 3026 Building to the Settling Basin. These leaks have been repaired. Following the leak repair, additional shielding was placed over these lines to prevent a recurrence of the high radiation shine which existed during the last RaLa run.

The 440-volt service was run to the discharge pump of the metal waste collection tank for the Radioisotope Area.

2. Wastes Discharged to White Oak Creek

A total of 12.88 curies of beta activity was discharged from the Settling Basin this month. This is a great decrease from the discharge of last month, which seemingly came from the leaks found in the metal and chemical waste lines serving Building 3026. However, once again during the month a sharp temporary rise occurred in the activity discharged to the creek. Sampling of the streams in the process lines indicated that the activity came from the direction of Building 3019, and that the activity was strontium^{90}. The exact source of the activity, however, could not be determined. (See Table 5.)

3. Chemical Waste Evaporator

The evaporator was shut down for the installation of a new evaporator tank sampler line and overhaul of the temperature-recorder instrument. A new two-point conductivity recorder also was installed to provide an additional conductivity point for the de-entrainment column when it is installed.

The volume reduction was decreased markedly as a result of reconcentration of already concentrated wastes from W-8 tank. At the end of the month the concentration factors are rising once more. (See Table 6.)

TABLE 5

Activity Discharged to White Oak Creek

	June 1951		May 1951	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	27,218,892	12.88*	23,688,000	35.26*
Retention Pond	393,264	0.05	350,928	0.15
Total		12.93		35.41

* Contributed by the evaporator

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TABLE 6

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-212,762	23,646	8.0:1	6274	0.58
May-202,362	19,766	9.2:1	6592	0.57

4. Waste Tank Inventory

TABLE 7

Waste Storage

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged to	Free Space
HOT-PILOT-PLANT STORAGE					
W-3,13,14,15	48,500	740	200	706-C	7307
CHEMICAL-WASTE STORAGE					
W-5	170,000	235,342	212,762	Evaporator	23,944
EVAPORATION-CONCENTRATION STORAGE					
W-6,8	340,000	23,646	41,378	W-5	95,283
METAL-WASTE STORAGE					
W-4,7,9,10	543,000	4354	0	---	167,198

III. RaLa (Ba^{140} – 12.5d)

Decontamination of the No. 200 resin cubicle was continued in its shroud in Building 3026 until further attempts at decontamination gave no beneficial results. The equipment was then moved to Burial Ground No. 3, where the parts could be made more accessible for decontamination and removal without increasing the radiation background in the operating areas.

At the burial ground, several highly contaminated parts were removed and further decontamination accomplished by steaming and washing with various reagents. When the decontamination at the burial ground ceased to progress because of the inadequacy of the temporary equipment, the unit was moved to the Decontamination Building (3036).

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Many parts were again removed to lower the radiation background and to remove broken parts. Among these were the flexible shafts and the Tygon shaft coverings, the electric cables, flowrator, monitoring chamber, and glass column. Further decontamination was accomplished by using the electrolytic method now under investigation by the Chemical Technology Division. This process enables gross contamination to be removed at safe distances, and appeared to work well.

It is noteworthy that satisfactory decontamination of the plastic valves was impossible while the valves remained assembled. Decontamination was accomplished with ease, however, after the component parts were allowed intimate contact with the decontamination agents.

It was found that the valve which failed during the last run contained no broken parts, but failed because of the characteristics of the construction material. The plastic from which the valve plugs were made has a tendency to flow, and this, in addition to inadequate reserve linkage, permitted the connecting drive link to become disengaged.

Work was begun on the repair of the plastic valves. The fluorothene diaphragm in the throttling valve to the column, which ruptured, will be replaced with a polyethylene diaphragm which is believed to be more suitable for this purpose. The fluorothene valve block in this same valve, damaged by radiation, will also be replaced.

All the plastic plug valves except the one which failed during the last run were inspected, repaired, and tested under 10 pounds per square inch pressure for leakage. All the plastic valve parts were gauged to be sure that the flow of plastic did not alter their size. The connecting linkages were measured and replaced in all cases, in order to give maximum connecting surface. The valve gears and bearings were replaced wherever necessary, and new flexible shafts were prepared for installation.

Attempts at repairing the plastic valve which failed during the last run have failed thus far. A heavier spring will be used to try to stop the leak around the plug. If this fails, it may be necessary to fabricate a new valve.

It has been decided that no extensive alterations will be made in the present resin cubicle at this time, other than to install a valve in the feed tank air sparger line to prevent another back-up of activity. This decision was made in spite of the knowledge gained during the last month which points out certain undesirable features in the equipment. It is believed that expensive alterations, if any appear desirable, should be postponed until the chemistry of the resin column process is proven to be satisfactory for full-scale levels of activity.

Two more sample carriers were obtained for the column cubicles. They are now being filtered for use.

Construction above the "hot" laboratories has begun to provide the analytical group with better sample-handling facilities.

The latest estimates from Los Alamos are that they will not require another shipment until early in August or possibly later.

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C. RADIOISOTOPE CONTROL DEPARTMENT

I. GENERAL

During June 1951, there were 677 radioisotope shipments, compared with 820 during May 1951, and 721 during June 1950. The decrease is principally due to a seasonal fluctuation.

The breakdown according to separated and unseparated material is shown in Table 8.

The breakdown of shipments according to non-project, project, and foreign shipments is as follows:

	June 1951	May 1951	June 1950
Non-Project	512	618	549
Project	150	180	154
Foreign	15	22	18
Total	677	820	721

II. HANFORD IRRADIATIONS

The following radioisotope samples were received from Hanford during June 1951:

Sample No.	Material	Date Discharged	Date Received
ORNL-80	Mercury	5-23-51	6-16-51
ORNL-87	Wolfram	6-5-51	6-16-51
ORNL-89	Cadmium	6-5-51	6-16-51
ORNL-101	Antimony	6-5-51	6-16-51

III. CYCLOTRON RADIOISOTOPES

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

Material	Amount	Status
Be 7	30.0 mc	Material in process
Na 22	6.3 mc	Material in process
Mn 54	6.0 mc	Material in process
Co 57	0.1 mc	Material in process
Fe 59	19.75 mc	Material has been requested
Zn 65	1.0 mc	Material has been requested

See also Tables 9 and 10, following pages.

IV. ACTIVATION ANALYSES

Seven rock samples have been received from California Research Corporation for activation analyses. These analyses are in the process of being made.

Of the samples received from the Reynolds Metal Company, the activation-analysis results check very closely with the spectrographic analysis made by Reynolds Metal Company. All that remains is to complete the qualitative analysis on these samples.

V. S-F MATERIAL CONTROL

1. During the month, ten enriched uranium-aluminum alloy "J" slugs, encased in an 11-foot aluminum sheath, were shipped to Chalk River. This assembly

TABLE 8

	June 1951	May 1951	June 1950	August 1946 to June 1951, Inclusive
Separated Material 706-D Area	554	657	554	18,629
Unseparated Material 100 Area	123	163	167	5,648
Total Shipments	677	820	721	24,277

[redacted]

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TABLE 9

BOMBARDMENTS RECEIVED

Material	MIT		University of California		University of Pittsburgh		Washington University	
	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours
Be 7			1	50.00	9	285.00		
Na 22	2	209.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							4	200.00
Co 57	1	10.00					3	100.00
Fe 59			5	255.60				
Zn 65	1	100.00						
Sr 85	2	59.75			1	10.00		
As 73					1	10.00		
I 125							2	60.00
Molybdenum metal					1	13.00	3	30.00
Sulfur					1	2.00		
Ga 67					1	4.00		
Total Received	6	379.50	6	305.60	21	545.75	16	690.00
	REQUESTED BUT NOT RECEIVED							
Zn 65			1	40.00				
Fe 59	1	40.00	1	40.00	1	40.00	1	40.00
Total Hours Outstanding (Not Received or Requested)		330.50		364.40		164.25		20.00

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TABLE 10

Shipments of Cyclotron-Processed Radioisotopes

Material	No. Shipments June 1951	No. Millicuries June 1951	No. Millicuries to Date
Be 7	2	1.220 mc	202.293
Na 22			46.363
Mn 52			9.991
Co 57	1	1 mc	3.
Fe 59			2.1 mc and 2 units
Zn 65			32 mc and 3 units
Mn 54			2.72
Fe 55-59			61.
As 73			0.650
Sr 85			6.0

will replace a similar one now in the Chalk River pile. The shipment was effected on June 7, 1951. The SF content amounted to 407.36 grams, 93.3 per cent enriched uranium.

2. On June 25, 1951, 74.45 grams of Purex Process plutonium were shipped to Los Alamos. The batches shipped were numbered HP 8-A, HP 8-B, HP 8-C, and HP 8-D. This was the first shipment of plutonium product isolated by the Purex Process.

3. The first aluminum-silicon bonded slugs for use in reloading the 3001 pile were received from Y-12 during June. The number received amounted to 294 slugs.

4. On June 16, 1951, an express car was received from Hanford. The contents consisted of 140 slugs for Purex Process separations, 41 slugs for Sr^{90} extraction, and miscellaneous containers loaded with irradiated units for radioisotope separation. Delivery of the 41 slugs for Sr^{90} extraction completed our order IC-225.

5. One trailer-load of SF waste solutions was received from Argonne for disposal into the waste storage tanks. Four of the drums contained solvents and were therefore buried. The SF content buried amounted to 160 grams of depleted uranium and 2 milligrams of plutonium.

6. An additional 169.65 kilograms of thorium metal in the form of billets were received from Ames Laboratories during June for use by the Metallurgy Division.

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

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

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9. Special attention was given to acquiring and compiling data relative to submitting SF material accounting cost for ORNL in line with a request from the USAEC. This information will be submitted by July 11, 1951.

10. The formal report covering the USAEC, Oak Ridge Operations SF accountability survey, which was conducted last February, was received in June. A reply to the recommendations tendered will be prepared and submitted during July.

11. During the month, there were twenty-eight receipts and eighteen outgoing shipments, compared with twenty-nine receipts and seventeen shipments last month.

12. Tables 11 and 12 are summaries of receipts and shipments of SF material for the month of June 1951.

TABLE 11

Receipts

From	Material	Amount
Argonne National Laboratory	Depleted uranium (waste)	790.00 gm
Argonne National Laboratory	Normal uranium (waste)	3,700.00 gm
Argonne National Laboratory	Pu (waste)	14.39 gm
C&CCC, K-25 Area	Enriched uranium (discs)	0.002 gm
C&CCC, K-25 Area	Normal uranium (UO_3)	377.00 gm
C&CCC, K-25 Area	Normal uranium (UO_3)	84,129.00 gm
C&CCC, Y-12 Area	Enriched uranium (U_3O_8)	0.50 gm
C&CCC, Y-12 Area	Enriched uranium (U_3O_8)	0.50 gm
C&CCC, Y-12 Area	Enriched uranium (discs)	0.0124 gm
C&CCC, Y-12 Area	Enriched uranium (disc)	11.4 mg
C&CCC, Y-12 Area	Enriched uranium (UF_4)	9.68 gm
C&CCC, Y-12 Area	Depleted uranium (discs)	4.79 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	25,332.00 gm
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	574.60 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	25,311.00 gm
C&CCC, Y-12 Area	Normal uranium (UO_2F_2)	57.70 gm
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	172.60 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	152,906.50 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	3.90 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	5.00 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	10.80 gm
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	2,058.00 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	277,785.00 gm
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	258.60 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	158,659.60 gm
General Electric Co., HGE.	Depleted uranium (slugs)	393,802.00 gm
General Electric Co., HGE.	Pu (slugs)	175.00 gm
Iowa State College	Thorium billets (metal)	43,060.00 gm
Iowa State College	Thorium billets (metal)	42,540.00 gm
Iowa State College	Thorium billets (metal)	84,050.00 gm
Mallinckrodt Chemical Works	Normal uranium (pitchblende)	125,644.00 gm

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TABLE 12

Shipments

To	Material	Amount
Battelle Memorial Institute	Thorium (rods)	26,905.00 gm
C&CCC, Y-12 Area	Normal uranium (rods)	1,300.00 gm
C&CCC, Y-12 Area	Thorium carbonate	23,913.26 gm
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	845.70 gm
C&CCC, Y-12 Area	Enriched uranium (solution)	0.079 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	4,408.00 gm
C&CCC, Y-12 Area	Enriched uranium (U_3O_8)	0.50 gm
C&CCC, Y-12 Area	U-234 (U_3O_8)	92.80 mg
C&CCC, Y-12 Area	Normal uranium (solution)	40,900.00 gm
C&CCC, Y-12 Area	Normal uranium (U-alloy)	43,687.40 gm
C&CCC, Y-12 Area	Normal uranium (U-alloy)	25,882.42 gm
C&CCC, Y-12 Area	Normal uranium (U-alloy)	2,019.92 gm
C&CCC, Y-12 Area	Normal uranium (solution)	29,875.00 gm
E. I. duPont de Nemours and Co.	Pu (discs)	0.000001 gm
Monsanto Chemical Co.	Depleted uranium (waste)	0.08 gm
National Research Council (NRX)	Enriched uranium (U-al)	380.04 gm
Los Alamos Scientific Lab.	Pu (Purex)	74.45 gm

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