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PROGRESS

OPERATIONS DIVISION

MONTHLY REPORT

FOR

MONTH ENDING JULY 31, 1951

M. E. Ramsey

OAK RIDGE NATIONAL LABORATORY
U.S. ATOMIC ENERGY COMMISSION

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

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Contract No. W-7405, eng-26

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by

M. E. Ramsey

Date Issued

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

	Page
SUMMARY	1
PILE DEPARTMENT	2-4
Operating Data	2
Pile Operations	2-3
Graphite Pile	2-3
Low-Intensity Training Reactor	3
Filter House	3
Fan House	3
Radioisotopes	3-4
Water Demineralization Buildings	4
CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS	5-11
Radioisotopes	5-9
Iodine (I^{131} - 8d)	5
Phosphorus (P^{32} - 14.3d)	5-6
Carbon (C^{14} - 5,740y)	6
Cadmium (Cd^{115} - 43d)	6
Cobalt ($Co^{56,57,58}$ - 72d, 270d, 72d) (Cyclotron)	6
Indium (In^{114} - 50d)	6
Mercury (Hg^{203} - 43.5d)	6
Prometheum (Pm^{147} - 3.7y)	6
Ruthenium (Ru^{106} - 1.0y)	6
Sodium (Na^{22} - 2.6y)	6-7
Sulfur (S^{35} - 87.1d)	7
Thallium (Tl^{204} - 2.7y)	7
Wolfram (W^{185} - 73.2d)	7
Beryllium (Be^{7} - 57.9d) (Cyclotron)	7
Mixed Fission Products	7
Chalk River Waste Separation	7-8
Rare Gas Separation and Analysis	8
Source Preparations	8
Packaging	8
Services	8
Miscellaneous	8-9
Tank Farm	9-10

[redacted]

TABLE OF CONTENTS (continued)

	Page
General	9
Wastes Discharged to White Oak Creek	9-10
Chemical Waste Evaporator	10
Waste Tank Inventory	10
RaLa (Ba^{140} - 12.5d)	11
RADIOISOTOPE CONTROL DEPARTMENT	12-18
General	12
Hanford Irradiations	12-13
Cyclotron Radioisotopes	13-15
Activation Analyses	15
S-F Material Control	15-18

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SUMMARY

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

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

3. Approximately 4,000 Al-Si bonded slugs were received from Y-12 during the month (Page 2).

4. The project for replacement of the four existing safety rods with three safety rods having a greater combined reactivity effect is proceeding slowly due to lack of materials (Page 2).

5. Experiments on LITR shim-rod calibration and fission-product growth and decay were conducted during the month. Training of Phillips Petroleum Company personnel for MTR operation was continued (Page 3).

6. The LITR is being altered to permit operation up to 1.5 megawatts (Page 3).

7. Very little additional work on the proposed new I^{131} plant will be done until funds are available for the project (Page 5).

8. The processing of Chalk River wastes was started during the month (Page 7).

9. A site beyond the new Burial Ground has been selected to locate a 200,000-gallon "lagoon" for the storage of waste metal supernatant now stored in W-10 (Page 9).

10. The activity discharged to White Oak Creek was 8.9 curies, compared to 12.9 curies during the previous month (Pages 9-10).

11. The cubicle in the RaLa process has been reassembled and is ready for testing (Page 11).

12. The next RaLa run has been scheduled to begin on August 12, 1951 (Page 11).

13. There were 809 radioisotope shipments, compared to 677 last month (Page 12).

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PILE DEPARTMENT

OPERATING DATA

	July 1951	June 1951	Year to date 1951
Total Accumulated Kilowatt-Hours	2,439,677	2,436,838	17,303,868
Average Kilowatts per Operating Hour	3,655.77	3,713.39	3,789.87
Average Kilowatts per 24-Hour Day	3,279.14	3,384.50	3,400.92
Per Cent Lost Time	10.3	8.9	10.3
Excess Pile Reactivity	135 in-hours	90 in-hours	-
Slugs Discharged	154	107	2,851
Slugs Charged	263	106	2,955
Product Made (Grams)	89.04	88.94	631.53
Product Discharged (Grams)	9.06	8.24	353.43

PILE OPERATIONS

Graphite Pile

The average pile power per operating hour for the month was 3,655.8 kilowatts, compared with 3,713.4 kilowatts for June 1951.

The pile down time was 10.3 per cent, compared with 8.9 per cent in June 1951, and 10.3 per cent for the year to date. The increase in down time for the month was due to five regularly scheduled Monday shutdowns.

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

Approximately 4,000 aluminum-silicon bonded slugs have been received from Y-12. It will be possible to begin oven-testing the new slugs shortly.

Bonded slugs rejected during canning operations will be stripped of their jackets and cleaned. Those which do not lose more than 12 grams of uranium will be recanned.

Repairs have been completed on the canal slug-cutter, and outstanding orders for slices of irradiated uranium slugs have been filled. Since the effluent from the slug-cutter is still contaminated, a pump is to be installed which will permit the effluent to be discharged directly into the hot drain. This will help prevent contamination in the canal.

The canal demineralizer is being tested and appears to be removing a considerable quantity of contamination from the canal water. Both the sand filters and the resin columns became quite radioactive after one day's operation. Readings as high as 1.6 roentgens per hour were observed outside the tanks.

The project for replacing the four existing safety rods with three safety rods of greater combined reactivity effects in order to make an additional hole available for experiments is proceeding. Fabrication of the safety rods has been delayed pending receipt of material, but the scanner is being moved from the east to the west side of the scanner holes. This will provide adequate room next to the vacated safety-rod hole for experimental equipment.

A new set of cobalt^{60} standards was calibrated and the calibration curves for the canal electrometer redrawn. It will now be possible to measure cobalt^{60} sources as large as 100 curies. An electrometer for measurement of smaller cobalt^{60} sources is being fabricated and will be in operation shortly. This will permit measurement of sources in the range of 100 millicuries to 1.5 curies without removing the sources from the canal. Formerly, such sources had to be measured in air, with a consequent exposure of personnel.

Approximately twenty tantalum slugs were irradiated for ORINS to give a desired activity of approximately 30 curies per slug. The measured activities of the slugs varied from about 30 to 50 curies per slug.

On July 11, the pneumatic tube was found to have a leaking valve which permitted airborne activity to escape at the pneumatic tube station on the first level south. The valve was easily repaired.

Low-Intensity Training Reactor

Experiments on shim-rod calibration and fission-product growth and decay were carried out during the month. Approximately one week of testing MTR instruments remains, after which it is planned to shut down for maintenance in preparation for steady operation.

The training program to train Phillips Petroleum Company personnel for MTR operation was continued this month. It is expected that approximately four more Phillips Petroleum Company trainees will remain for training in LITR operations for about two months.

The installation of new pumps and heat exchangers, which will permit the LITR power to be increased to above 1.5 megawatts, has been delayed pending receipt of heat exchangers from K-25.

The addition of an extra foot of concrete block shielding around the LITR shield is about 70 per cent complete. The air exhaust system, designed to exhaust radioactive gases which may be given off from experiments at the LITR, is being installed.

FILTER HOUSE

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
7-31-51	2.9	1.4	5.6
6-30-51	2.9	1.3	5.5
Clean filters	1.1	1.0	3.3

The static pressure at the far side of the filter house decreased from 39.8 to 39.5 inches water gauge.

FAN HOUSE

The operation of the fans was normal throughout the month. The practice of stationing an operator in the fan house regularly was discontinued this month, since the performance of the new fans has indicated that such attendance is not justified.

RADIOISOTOPES

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

At the end of July, there were 371 cans of target material in Stringers 13, 14, and 16, compared to 367 cans of target material in these stringers at the end of June 1951.

TABLE 2

	July 1951		June 1951	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	17	144	29	102
Hole 22	59	7	63	10
All other holes	7	30	7	26
Total by Groups	83	181	99	138
Total for Month	264		237	

WATER DEMINERALIZATION BUILDINGS

The operation of the building was normal, with 688,200 gallons of water being demineralized, of which 109,380 gallons were also deaerated. (See Table 3).

TABLE 3

PRODUCED (Gallons)	July 1951	June 1951	Year to Date
Demineralized	688,200	496,410	4,424,390
Deaerated	109,380	24,030	351,160

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CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} - 8d)

Sixty-nine ORNL slugs were processed and 22,662 millicuries shipped.

The total product from an eight-slug run and a portion of the product from a nine-slug run were lost due to the crude material becoming acid just before the final purification step. The acid condition occurred during the scrubber-solution distillation.

To prevent a repetition of the high losses in the last three runs, a close check was made on the normality of the caustic while the run was in progress and the scrubber solutions were processed separately. It was found that the normality was low, and that it was necessary to add more caustic to the scrubber solution to prevent a loss of product in subsequent processing.

At the end of the month, an investigation was being carried on to determine the practicability of introducing air into the dissolver in order to prevent some formation of HNO_3 which neutralizes the caustic. The results of this work will be reported next month.

While attempting to clean out two plugged manometer lines, a pressure was built up in the dissolver and a small amount of UNH was blown into two traps on one of the panelboard instruments. It was necessary to discontinue operations for about four hours for removal and replacement of these traps.

Iodine development work. - The preliminary cost estimate for this project was revised to effect the required division of work between an outside construction contractor and ORNL. Drawings and specifications (building and cell construction) for the outside contractor were prepared. Budget approval is being awaited so that a construction request can be initiated.

Little work was done on I^{131} design by the Engineering Department during the month because of other higher priority jobs. The Radioisotope Development Department completed several drawings of process vessels. Approximately fourteen drawings remain to be made.

The bubble-cap scrubber and dissolver sparger mockups were completed and tested. Based on results of these tests, the bubble-cap column was designed.

Experimental determinations of the attenuation of I^{131} radiation in barytes concrete and lead were made, using an 8-curie I^{131} source. The tenth-thickness value for barytes is 3.3 inches and for leak, 0.7 inch.

The Schutte-Koerting Company submitted a revised drawing of the jet which is being considered for sampling. These jets may be procured at no additional costs over those being procured for Arco installations.

Phosphorus (P^{32} - 14.3d)

Eighteen 2,500-gram cans of irradiated sulfur were processed and 3,354 millicuries shipped. Even though all orders were filled, the amount of product shipped was much lower than in recent months.

A small carrier-free run was made for a 60-millicurie shipment.

Extraction yields were normal, and there was little difficulty in the operation of the equipment.

Carbon (C^{14} - 5,740y)

Five slugs were run in small equipment to test the feasibility of dissolving the pellets without

crushing them. The reaction proceeds very smoothly and with no appreciable increase in time. This will not only eliminate a difficult step, but reduce the dangers of exposure to beryllium nitride dust.

The new furnace for semicontinuous melting of aluminum jackets from the slugs is installed and working well. The furnace does not heat to as high a temperature in the hood as in the experimental runs, but this can be remedied by proper insulation.

A total of 736 millicuries of C^{14} as $BaCo_3$ was produced during the month.

Cadmium (Cd^{115} - 43d)

Cadmium nitrate solution was prepared with the following analysis:

Total Cd^{115}	18.1 mc
Concentration	0.145 mc/ml
Specific Activity	23.77 mc/gm
Acidity	1.8 N (HNO_3)

Cobalt ($Co^{56,57,58}$ - 72d, 270d, 72d) (Cyclotron)

Total Co^{56}	0.49 mc
Total Co^{57}	0.15 mc
Total Co X-ray	1.4 mc
Concentration Co^{56}	0.0049 mc/ml
Concentration Co^{57}	0.0015 mc/ml
Concentration Co X-ray	0.014 mc/ml
Total solids	0.5 mg/ml
Nonvolatile material	0.5 mg/ml
Acidity	0.068 N (HCl)

Indium (In^{114} - 50d)

Indium chloride solution was prepared with the following analysis:

Total In^{114}	127.5 mc
Concentration	2.56 mc/ml
Specific activity	135.0 mc/gm
Acidity	0.511 N (HCl)
Radiochemical purity	>99%

Mercury (Hg^{203} - 43.5d)

Mercuric nitrate solution was prepared with the following analysis:

Total Hg^{203}	2580.0 mc
Concentration	23.5 mc/ml
Specific activity	286.6 mc/gm
Acidity	4.68 N (HNO_3)
Radiochemical purity	>99%

Prometheum (Pm^{147} - 3.7y)

A prometheum product which was processed several months ago has been analyzed as follows:

Total Pm^{147}	38.0 mc
Concentration	0.76 mc/ml
Gross alpha	252,880.0 c/m/ml (~95% Am)
Pu	84.0 c/m/ml
Acidity	0.0426 N (HCl)
Heavy metals	<10.0 ppm
Total solids	0.5 mg/ml
Nonvolatile material	0.0 mg/ml

Ruthenium (Ru^{106} - 1.0y)

Ruthenium was produced with the following analysis:

Total Ru^{106}	612.0 mc
Concentration	4.07 mc/ml
Specific activity	3.88×10^4 mc/gm
Gross alpha	20.0 c/m/ml
Acidity	2.48 N (HCl)

Sodium (Na^{22} - 2.6y)

Two sodium chloride preparations were made with the following analyses:

	No. 1	No. 2
Total Na^{22}	3.96 mc	5.8 mc
Concentration	0.036	0.116 mc/ml
Specific activity	40.4 mc/gm	-
Heavy metals	<10.0 ppm	-
Total solids	3.53 mg/ml	8.65 mg/ml
Nonvolatile material	1.88 mg/ml	-

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Na	0.89 mg/ml
Acidity	0.270N (HNO_3)

Sulfur (S^{35} - 87.1d)

Carrier-free sulfur^{35} as sulfuric acid was prepared with the following analysis:

Total S^{35}	12,050.0 mc
Concentration	97.0 mc/ml
Acidity	0.034N (HCl)
Total solids	0.0 mg/ml
SO_4	0.0 mg/ml

Thallium (Tl^{204} - 2.7y)

Thallium nitrate solution was prepared with the following analysis:

Total Tl^{204}	2580 mc
Concentration	17.8 mc/ml
Specific activity	362 mc/gm
Acidity	1.9 N (HNO_3)

Wolfram (W^{185} - 73.2d)

Potassium wolframate solution was prepared with the following analysis:

Total W^{185}	718.0 mc
Concentration	4.78 mc/ml
Specific activity	468.0 mc/gm
Total solids	43.0 mg/ml
Nonvolatile material	42.0 mg/ml
Basicity	0.191 N (KOH)
Radiochemical purity	>99.5%

Beryllium (Be^7 - 57.9d) (Cyclotron)

Beryllium chloride solution was prepared with the following analysis:

Total Be^7	53.0 mc
Concentration	0.53 mc/ml
Acidity	0.064 N (HCl)
Total solids	0.5 mg/ml

Mixed Fission Products

	No. 1	No. 2
Gross Beta (mc/ml)	3.11	3.23
Total Beta (mc)	700.0	485.0
Gross Alpha (c/m/ml)	335.0	465.0
Pu (c/m/ml)	-	390.0
Acidity, N (HNO_3)	6.96	5.49

	No. 3	No. 4
Gross Beta (mc/ml)	3.30	3.16
Total Beta (mc)	495.0	568.0
Gross Alpha (c/m/ml)	160.0	95.0
Pu (c/m/ml)	147.0	90.0
Acidity, N (HNO_3)	5.47	5.40

	No. 5	No. 6
Gross Beta (cm/cl)	6.88	7.08
Total Beta (cm)	1300.0	1600.0
Gross Alpha (c/m/ml)	1.46×10^4	1.07×10^4
Pu (c/m/ml)	366.0	363.0
Acidity, N (HNO_3)	3.29	3.43

Two batches of strontium^{90} were run, one from the remainder of the old material in garden and one from Chalk River waste processing. Both samples showed too much heavy metals. The first, which contains more than 4 curies, was given a H_2S precipitation to remove the heavy metals.

Chalk River Waste Separation

Construction of the gallery extension in Building 3515 is very nearly complete. Installation of a 1-inch stainless steel transfer line from the two underground metal-recovery plant waste tanks east of Building 3505 was started. The drain from the vessel trays is being connected to the W-12 line. The manifold piping for column backwash was installed.

One hundred fifty gallons of Chalk River Redox waste from W-15 have been processed. Complete processing of this material is expected to require an additional two months. According to the present schedule, the cesium waste from Building 3026 Chalk River processing will be used as raw ma-

terial for the separation of several thousand curies of Cs^{137}.

Rare Gas Separation and Analysis

The gas-analysis system has been leak-tested, and the auxiliary equipment for operating the carbon-fractionating column is completed.

An internal gas-counting tube will be used as a standard for the calibration of the geometry of a scintillation counter. The geometry of the internal gas tube will be assumed to be 100 per cent plus or minus the error in counting.

Upon completion of this equipment, we will be in a position to fractionate and purify the rare gases, argon, krypton, and xenon. The accurately standardized scintillation counter will permit assay in the same equipment.

Source Preparations

$Cobalt^{60}$ sources were loaded in special holders as follows:

X-Ray Engineering Company	6 sources, 1 curie each
Cushing V. A. Hospital	1 source, 1 curie
New Jersey State Civil Defense Agency	3 sources, 1 curie each
Southern Pacific Company	1 source, 600 mc
Schlumberger Well Surveying Corporation	1 source, 600 mc
Midwest Piping and Supply Company	1 source, 300 mc
University of Maine, Office of Civil Defense and Public Safety	1 source, 1 curie
Argonne National Laboratory	18 sources, 3 curies each
ORNL Biology Division	1 source, 40 pieces for a total of 10 curies.

$Strontium^{90}$ sources were prepared as follows:

Kearfott Company, Inc.	1 source, 50 mc.
Radiation Research Corporation	1 source, 250 mc.

Packaging

Tritium was packaged as follows:

Tracerlab, Inc.	5 ampoules, 50 mc each 5 ampoules, 20 mc each 5 ampoules, 10 mc each 5 ampoules, 1 mc each.

Services

A sample of partially decayed carrier-free P^{32} was reseparated for Dr. Jensen of Iowa State College as part of a series of experiments in which ORNL is collaborating.

Five cans of cobalt pellets were prepared for irradiation for a customer in Switzerland.

Isotonic solution of Be^{7} was prepared for Dr. Van Cleve of the University of North Carolina.

Miscellaneous

Barytes concrete cubicle dividers for the hot barricade in Building 3030 were installed.

Six design sketches were made for equipment to be used for routine production of carrier-free P^{32}.

An air-cylinder-operated pinch clamp was fabricated and tested.

A pair of master-slave manipulators (Modified ANL No. 4) was ordered. Plans to proceed with design and construction of an ANL-type radiochemistry cell for these tongs were delayed because the wrong drawings were sent from Argonne.

It appears that the $ZnBr_2$ problems are not completely solved. J. Miser reported the receipt of thirteen carboys of material with very dark color. Several carboys of our own were found to be discolored. A study of various problems is being

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made, including an evaluation of methods for decolorizing $ZnBr_2$.

The 3001 Building canal water decontamination unit, designed by the Radioisotope Development Department, was put into operation. A decontamination factor of 60 was achieved during the first day's run.

Material and equipment are being moved from the corral and wooden storage platform to the new concrete storage pad.

A column shield was placed in the Building 3028 fission-product cell, and various plates for supporting shielding were designed and ordered.

New bearings were installed on the north vacuum pump in Building 3034.

The first layer of concrete was poured for the large pad near Building 3036. A finishing layer of high-density concrete will be poured when the first layer has sufficiently cured.

The emergency off-gas steam turbine bearing failed while being operated on a regular test run. It will be repaired as soon as a new bearing can be obtained.

TANK FARM

General

The areas around the valve pit west of Building 3026-C and at W-16, W-17, and W-18 tanks have been completely backfilled and landscaped.

A concrete retaining wall was built at the new settling basin exit weir box, and the area was backfilled and landscaped. This provides a safer operating area.

The settling basin weir boxes, diversion box, and exit weir box were cleaned of accumulated sludge and considerable plant growth.

An electric sump pump was installed in the pump pit to the metal waste catch tank of the Radioisotope Area. This tank will be designated as WC-2.

The float, remote-control jet, and gauge-board assemblies at W-12 tank have been removed. As a consequence, the tank is being operated manually. The controls will be replaced with the newly designed gauge boards and electric circuit to be used with the telemetering system.

In cooperation with the Health Physics Division, a site beyond the new burial ground has been chosen to locate a 200,000-gallon lagoon for the storage of metal-waste supernatant now stored in tank W-10. This location provides a shale which will allow very little seepage over geologically long periods of time. This is expected to be a much safer and cheaper way of permanently disposing of liquid wastes. This project is considered to be an experiment at the present time. Approximately 100,000 gallons containing about 100 curies of activity will be stored there until this method of disposal is proven to be safe and economically practical.

Wastes Discharged to White Oak Creek (See Table 4)

A total of 7.85 curies of beta activity was discharged from the settling basin this month. This is a sharp reduction from the activity discharged last month. The source of last month's high-activity discharge stopped as suddenly as it started, and could not be definitely determined.

Approximately 1 curie of activity was discharged from the retention pond. The main source of this activity was Building 3515, which is now being used for radioisotope separation. The floor drains and tank overflows in this building are now connected to the retention-pond collection system. To eliminate high-activity discharge in the future, it is planned to relocate the drainage to the W-12 tank for eventual processing through the waste evaporator.

TABLE 4
ACTIVITY DISCHARGED TO WHITE OAK CREEK

Discharged From	July 1951		June 1951	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	28,805,000	7.85*	27,219,000	12.88*
Retention Pond	430,000	1.05	393,000	0.05
Total		8.90		12.93

* Less than 0.37 curie contributed by the evaporator.

Chemical Waste Evaporator (See Table 5)

The waste evaporator was shut down for six hours for the replacement of a steam-condensate line which failed during the month.

TABLE 5
WASTE EVAPORATOR OPERATION

Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
July - 256,760	20,480	11.5:1	3,841	0.37
June - 212,760	23,650	8.0:1	6,274	0.58

Waste Tank Inventory

TABLE 6
WASTE STORAGE

Tanks	Gallons Capacity	Free Space (July)	Free Space (June)
HOT-PILOT-PLANT STORAGE			
W-3, 13, 14, 15	48,500	7,310	7,130
CHEMICAL-WASTE STORAGE			
W-5	170,000	75,000	24,000
EVAPORATOR-CONCENTRATE STORAGE			
W-6, 8	340,000	97,500	95,500
METAL-WASTE STORAGE			
W-4, 7, 9, 10	543,000	160,000	167,000

RaLa (Ba^{140} - 12.5d)

In order to repair the valve which failed during the last run, it was necessary to machine-down the body which had become oval-shaped and to fabricate a new Teflon valve plug. This valve, when fitted to the glass column assembly, leaked at the junction of the deaerator and the valve. To eliminate this difficulty, the tension spring and backup washer were replaced with fluorothene packing and a packing nut. This change allowed the deaerator to be brought down more tightly against the valve body, which was beveled at the connecting point for more intimate contact.

The cubicle was then reassembled with the new column, flowrator, and monitoring chamber.

During testing of the assembled cubicle, two flexible shafts, used to drive the valves, broke. As a result, it was necessary to disassemble all valves and lubricate the plugs with fluorethene wax. The geared-drive mechanisms were re-examined and found to be badly corroded, although they had never been in actual service. It was evident that the liquid molybdenum lubricant failed to protect the equipment from corrosion. This lubricant was replaced with Vaseline in the hope of preventing corrosion in the future. At the end of the month, the valves were being reassembled and the cubicle again being readied for testing.

A valve was installed on the air sparger line to the feed tank under the lead shielding to prevent backup of activity into the operating area.

The two new spare sample carriers were fitted for use in each cubicle.

C-clamp rotameters, calibrated for a flow of air in cubic centimeters per minute, were installed in place of the original C-clamp rotameters calibrated in cubic feet per hour. The smaller flow of air should eliminate the problem of fluctuating manometer readings caused by variable air pressures.

The linear-scale electrometer used with the cubicle monitoring chamber was replaced with one having a logarithmic scale. This change eliminates the need for changing of instrument range as the product is stripped from the column.

Additional lead shielding was placed between the No. 300 cubicle wall and the side of the cubicle hole. This should eliminate considerable scattered radiation which came from the process tanks during the last run.

Construction of a high-level barricade for use in RaLa analyses is still in progress.

The next run has been scheduled to begin on August 12, 1951.

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RADIOISOTOPE CONTROL DEPARTMENT

GENERAL

During July 1951, there were 809 radioisotope shipments, compared with 677 during June 1951, and 688 during July 1950.

The breakdown according to separated and unseparated material is shown in Table 7.

TABLE 7

	July 1951	June 1951	July 1950	August 1946 to July 1951, Inclusive
Separated Material 706-D Area	678	554	508	19,307
Unseparated Material 100 Area	131	123	180	5,779
Total	809	677	688	25,086

The breakdown of shipments according to nonproject, project, and foreign shipment is shown in Table 8.

TABLE 8

	July 1951	June 1951	July 1950
Nonproject	664	512	531
Project	132	150	140
Foreign	13	15	17
Total	809	677	688

HANFORD IRRADIATIONS

The radioisotope samples received from Hanford during July 1951 are listed in Table 9.

TABLE 9

Sample No.	Material	Date Discharged	Date Received
ORNL-130	Enriched Fe^{54} (1 pc)	6-12-51	7-13-51
ORNL-118	Tantalum foil (1 pc)	6-12-51	7-13-51
ORNL-60	KCl (2 pcs)	6-12-51	7-13-51
ORNL-111	Metallic cobalt (12 pcs)	6-5-51 (11 pcs) 5-23-51 (1 pc)	7-13-51
ORNL-139	Indium metal (1 pc)	July 1951	7-31-51
ORNL-101	Antimony (2 pcs)	July 1951	7-31-51

CYCLOTRON RADIOISOTOPES

Table 10 lists the outstanding orders for cyclotron radioisotopes now on hand.

TABLE 10

Material	Amount	Status
Be^{7}	30 mc	Material in process.
Na^{22}	9.2 mc	Material has been requested.
Mn^{54}	6.0 mc	Material has been requested.
Co^{57}	5.1 mc	Material in process.
Fe^{59}	37.75 mc	Material has been requested.
Zn^{65}	6.0 mc	Material in process.

[redacted]

TABLE 11

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	47.2	9	285.00		
Na^{22}	2	190.00			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}			6	295.60				
Zn^{65}	1	100.00	1	47.80				
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	359.75	8	390.60	21	545.75	16	690.00

REQUESTED BUT NOT RECEIVED

Na^{22}					1	10.00		
Mn^{54}	1	50.00						
Fe^{59}			1	40.00	2	80.00	1	40.00
Total Hours Outstanding (Not Received or Requested)		1,090.25		1,069.40		864.25		770.00

[redacted]

TABLE 12

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments July 1951	No. Millicuries July 1951	No. Millicuries to Date
Be^{7}	2	35.0	237.293
Na^{22}	3	3.3	49.663
Mn^{52}			9.991
Co^{57}			3.0
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}			.650
Sr^{85}			6.0

ACTIVATION ANALYSES

The laboratory continues to receive a few requests for activation analyses. It is hoped that a pricing schedule will be worked up for some compounds within the next month.

S-F MATERIAL CONTROL

1. On July 23, 1951, an express car was received from Chalk River. The contents consisted of two containers loaded with two hundred 12-inch sections of Chalk River fuel rods. This was the first shipment received on the large purchase being made from Chalk River.

2. On July 13, 1951, an express car was received from Hanford. The car consisted of 140 slugs for the Purex Process Program.

3. An additional 42.46 kilograms of thorium metal in the form of billets were received from Ames Laboratory during July for use by the Metallurgy Division.

4. During the month, a total of 7,169.43 grams of enriched uranium^{235} was received from Y-12 in the form of uranium-metal buttons. This is to be applied against the MTR Idaho quota.

5. On July 17, 1951, 67.35 grams of uranium^{233} were shipped to Los Alamos. The batches shipped were numbered L-3 and L-4.

6. On July 20, 1951, 71.50 grams of Purex-process plutonium were shipped to Los Alamos. The batches shipped were numbered HP 9-1 and HP 9-2.

7. On July 23, 1951, 77.36 grams of NRX plutonium were shipped to Los Alamos. The batches shipped were numbered 3 RC-2, 4 RC-2, 5 RC-2, and 6 RC-4.

8. On July 23, 1951, 24.28 grams of HEW 7 RC plutonium were shipped to Los Alamos. The batch was numbered 7 RC-2.

9. An additional 3,528 Al-Si bonded slugs for use in reloading the 3001 pile were received during the month of July.

10. SF surveys during the month consisted of visiting three persons possessing SF material. Material in their possession was inspected and

weighed where feasible. No apparent discrepancies were encountered.

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

12. During the month, there were thirty-eight receipts and twenty-four outgoing shipments, compared with twenty-eight receipts and eighteen shipments last month.

13. During July, a report was submitted to the USAEC covering the estimated cost of SF material accounting at ORNL for the period January 1, 1951, through June 30, 1951. This information was furnished in accordance with a request from the Atomic Energy Commission.

14. Reference is made to item 10 of the June report wherein it was indicated that a reply would be issued to the USAEC, ORO SF Accountability Survey Report which was received in June. Further study of USAEC recommendations indicated the necessity of meeting with Commission personnel to further discuss the points raised. This meeting was held on August 2, 1951, and, accordingly, the SF Office was not in a position to submit a reply in July as previously indicated.

15. Table 13 and 14 are summaries of receipts and shipments of SF material for the month of July 1951.

TABLE 13

RECEIPTS

From	Material	Amount
C&CCC, K-25 Area	Normal uranium (discs)	0.04 gm
C&CCC, K-25 Area	Normal uranium (UO_2)	200.00 gm
C&CCC, K-25 Area	Depleted uranium (waste)	3,603.00 gm
C&CCC, Y-12 Area	Enriched uranium (U_3O_8)	46.61 gm
C&CCC, Y-12 Area	Enriched uranium (buttons)	6,068.16 gm
C&CCC, Y-12 Area	Enriched uranium (UF_4)	1.11 gm
C&CCC, Y-12 Area	Enriched uranium (metal)	0.92 gm
C&CCC, Y-12 Area	Enriched uranium (buttons)	1,101.27 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	295,533.50 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	185,478.50 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	295,533.50 gm
C&CCC, Y-12 Area	Normal uranium (metal)	1,232.75 gm
C&CCC, Y-12 Area	Depleted uranium (U_3O_8)	5.00 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	4.90 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	164,355.80 gm
C&CCC, Y-12 Area	Normal uranium (slugs)	394,044.70 gm
C&CCC, Y-12 Area	Normal uranium (slugs) Net	809,250.00 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	2.16 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	8.00 gm
C&CCC, Y-12 Area	Uranium^{234} (U_3O_8)	0.091 gm
C&CCC, Y-12 Area	Normal uranium (slugs) Net	981,560.00 gm
C&CCC, Y-12 Area	Normal uranium ($UO_2(NO_3)_2$)	1.41 gm
C&CCC, Y-12 Area	Normal uranium (UNH)	87.40 gm
C&CCC, Y-12 Area	Uranium^{234} (disc)	0.001 gm
C&CCC, Y-12 Area	Normal uranium (UF_4)	40.60 gm
C&CCC, Y-12 Area	Normal uranium (slugs) Net	1,446,050.00 gm
General Electric Co. (AGT)	Normal uranium (UO_2)	0.40 gm
General Electric Co. (AGT)	Enriched uranium (U_3O_8)	0.38 gm
General Electric Co. (AGT)	Enriched uranium (U_3O_8)	0.39 gm
General Electric Co. (HGE)	Depleted uranium (slugs)	248,930.00 gm
General Electric Co. (HGE)	Plutonium (slugs)	101.00 gm
General Electric Co. (HGE)	Enriched uranium (Zr-U alloy)	0.32 gm
Iowa State College	Thorium metal (billets)	42,460.00 gm
Iowa State College	Thorium oxide (ThO_2)	3,990.00 gm
Los Alamos Scientific Laboratory	Plutonium (crucibles)	234.05 gm
E. I. du Pont de Nemours & Co.	Normal uranium (slugs)	19,005.42 gm
E. I. du Pont de Nemours & Co.	Plutonium (solution)	0.37 gm
Lindsay Light & Chemical Co.	Thorium oxide (ThO_2)	3,986.14 gm

[redacted]

TABLE 14

SHIPMENTS

To	Material	Amount
Argonne National Laboratory	Depleted uranium (slug)	729.00 gm
Argonne National Laboratory	Plutonium (slug)	0.01 gm
Argonne National Laboratory	Depleted uranium (slug)	10,050.00 gm
Argonne National Laboratory	Plutonium (slug)	4.56 gm
C&CCC, K-25 Area	Depleted uranium (Purex)	2,575.70 gm
C&CCC, K-25 Area	Normal uranium (discs)	4,460.00 gm
C&CCC, Y-12 Area	Normal uranium (solution)	29,470.00 gm
C&CCC, Y-12 Area	Uranium^{233} (solution)	0.096 gm
C&CCC, Y-12 Area	Depleted uranium (Purex)	1,287.70 gm
C&CCC, Y-12 Area	Enriched uranium (Al-alloy)	0.22 gm
C&CCC, Y-12 Area	Normal uranium (metal)	5.66 gm
C&CCC, Y-12 Area	Enriched uranium (Al-alloy)	3.92 gm
General Electric Co. (AGT)	Enriched uranium (U_3O_8)	46.61 gm
General Electric Co. (AGT)	Normal uranium (compounds)	2.70 gm
General Electric Co. (AGT)	Normal uranium (UO_2)	0.40 gm
General Electric Co. (AGT)	Enriched uranium (U_3O_8)	0.38 gm
General Electric Co. (SGE)	Depleted uranium (slugs)	216,876.00 gm
General Electric Co. (SGE)	Plutonium (slugs)	2.63 gm
Los Alamos Scientific Laboratory	Uranium^{233} (solutions)	67.35 gm
Los Alamos Scientific Laboratory	Plutonium (Purex)	71.50 gm
Los Alamos Scientific Laboratory	Plutonium (NRX)	77.36 gm
Los Alamos Scientific Laboratory	Plutonium (HEW)	24.28 gm
Mallinckrodt Chemical Works	Normal uranium (solutions)	70,898.00 gm
US AEC, New Brunswick Laboratory	Normal uranium (solutions)	272.96 gm

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