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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending July 31, 1952

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

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending July 31, 1952

by

M. E. Ramsey

DATE ISSUED

SEP 8 1952

OAK RIDGE NATIONAL LABORATORY
Operated by
CARBIDE AND CARBON CHEMICALS COMPANY
A Division of Union Carbide and Carbon Corporation
Post Office Box P
Oak Ridge, Tennessee

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OPERATIONS DIVISION MONTHLY REPORT

SUMMARY

The activities of the Operations Division for the month ending July 31, 1952, are summarized below:

1. Lost graphite reactor operating time was 6.4% compared with 12.2% for June and 11.3% for the year to date (p. 3).

2. Charging of aluminum-silicon bonded slugs to the graphite reactor was discontinued temporarily because the uranium in many of the slugs is in the alpha phase rather than in the beta phase (p. 3).

3. The LITR down time was 30.2% compared with 9.9% for June and 20.5% for the year to date. The increase in down time was largely due to a shutdown of one week for fission-product decay and shim rod calibration in preparation for a boiling test (p. 3).

4. Pressure was built up during the peroxide-addition step of two I^{131} runs, which caused loss of products and some difficulty from contamination of service lines to the equipment (p. 5).

5. Delivery of Vycor vessels for separation of fission products by the precipitation process has been delayed until the end of August (p. 6).

6. The hot chemistry cell in Building 3029 is in the final stages of completion. However, delivery of the master-slave manipulator has been delayed until the end of August (p. 7).

7. A total of 23.9 curies of beta activity was discharged to White Oak Creek, compared with 14.4 curies last month (p. 8).

8. A shipment of 23,300 curies of RaLa was made on July 5. It was one of the most difficult runs brought to a successful conclusion (p. 10).

9. RaLa run No. 49 was begun on July 28 (p. 11).

10. There were 839 radioisotope shipments made compared with 922 during the previous month (p. 12).

11. Polonium and polonium-beryllium neutron sources will be available within the next two months (p. 12).

REACTOR OPERATIONS DEPARTMENT

OPERATING DATA

	JULY 1952	JUNE 1952	YEAR TO DATE 1952
ORNL Graphite Reactor			
Total accumulated kwhr	2,472,626	2,277,511	16,621,662
Average kw/operating hr	3,550.49	3,601.19	3,663.72
Average kw/24-hr day	3,323.42	3,163.21	3,251.50
Per cent lost time	6.4	12.2	11.3
Excess reactivity (inhr)	27	120	
Slugs discharged	34	10,132	26,975
Slugs charged	34	10,249	27,122
Product made (g)	90.24	83.12	606.63
Product discharged (g)	0.55	1,654.38	4,800.48
Low-Intensity Test Reactor			
Total accumulated kwhr	742,930	973,419	4,556,105
Average kw/operating hr	1,430	1,500	1,120
Average kw/24-hr day	998	1,352	892
Per cent lost time	30.2	9.9	20.5
Position of No. 2 shim rod (in. out)	27.008 *	25.944	

*This represents approximately 0.3% excess reactivity.

REACTOR OPERATIONS

ORNL Graphite Reactor

The down-time percentage of the ORNL graphite reactor was reduced considerably during July because there was no large-scale recharging of slugs.

No slug ruptures occurred during July. Charging of bonded slugs was discontinued temporarily pending investigation of radiation behavior of alpha uranium in the reactor. It was learned that a considerable number of slugs canned by Y-12 recently had been in the alpha phase rather than in the beta phase. Because of the preferred orientation of the alpha material, it is possible that dimensional changes of sufficient magnitude to cause slug failures may occur after continued irradiation. However, there are indications that the dimensional changes will not be appreciable in the reactor and that such slugs may be used; additional tests are being made to verify this. From time to time, slugs will be discharged from the reactor and measured to determine whether any significant changes in dimensions have occurred.

Three slugs containing tantalum were irradiated from July 21 through July 28 for the Army Chemical Corps and were shipped on July 29. After completion of the loading of the 540 tantalum slugs to be irradiated during July, August, and September, approximately 27 inhr were available for operation during the hottest days. The high air temperature during July has, of course, resulted in somewhat lower excess reactivity than normal.

A cobalt-60 source, reported to contain 1250 curies of cobalt-60 activity, was received from Chalk River and is being loaded into a special shield for the Oak Ridge Institute of Nuclear Studies. This is being done partly in the canal and partly in the Solid State Division cells where manipulators permit operation behind thick shields.

The slug cutter is still out of service; it was necessary to obtain a new motor to replace the old one. Several orders for sliced slugs are outstanding and every effort is being made to get the slug cutter back in operation.

The canal demineralizer has operated satisfactorily. Activity in the clean portion of the canal is generally less than 200 counts/min/ml. Removal of the carbon tetrachloride from the cobalt has reduced the activity in the cobalt portion to about 2000 counts/min/ml.

Four runs were made to produce approximately 10 liters of liquid hydrogen. The storage vessel is being used, and the evaporation losses will be evaluated.

Low-Intensity Test Reactor

The LITR operated satisfactorily during the month. The high percentage of down time was due to a week-long shutdown to calibrate the No. 2 shim rod preparatory to a boiling test. The reactor was shut down on July 25 to allow fission products to decay over the week-end; the No. 2 shim rod was then calibrated by inserting poison strips of stainless steel into the fuel elements until the excess reactivity had been almost completely absorbed. The decay of fission products, together with the removal of hollow beryllium pieces in core positions C-44, C-46, and C-48, resulted in a reactivity gain of approximately 4%.

When the No. 2 shim rod has been calibrated, it is planned to boil the water in the reactor to observe the effect of reactivity changes caused by boiling.

A new research facility with access through the top of the reactor was added and utilizes a third hole in the lattice. This particular facility consists of a flexible metal tube through the southwest diffuser flange extending downward on the west side of the spider into a beryllium piece containing a hole approximately 2 in. in diameter. This beryllium piece is in position C-46 adjacent to the fuel. On July 23, a sample fuel element being irradiated in this facility ruptured, automatically shutting down the graphite reactor because gaseous fission-produce activity expelled through the LITR exhaust system into the graphite reactor exhaust. The efficiency of the LITR exhaust system was demonstrated by the fact that no contamination was found around the top of the reactor following this rupture.

With the experiment described above in position C-46 and similar, smaller experiments in positions C-44 and C-48, it became necessary to replace a spent shim rod on July 15 and a spent fuel element on July 22.

The parts needed for the bypass demineralizer to be installed in the water system at the LITR have been ordered except for the resin baskets. Bids for these are being obtained from vendors but the order has not yet been placed. It is believed that this demineralizer will reduce the corrosion rate inside the LITR tank by reducing the concentration of the troublesome ions in the water.

FILTER HOUSE

In Table 1 the pressure drop across the exit air filters for last month is compared with this month's; a comparison is also given for the pressure drop experienced when all filters are clean.

TABLE 1

PRESSURE-DROP DATA

DATE	PRESSURE DROP (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
7/31/52	3.0	2.1	6.3
6/30/52	3.0	2.1	6.31
Clean filters	1.1	1.3	3.3

FAN HOUSE

The fan house operation was normal throughout the month.

RADIOISOTOPES

Stringers 13, 14, and 16 contained 367 cans of target material at the end of July compared with 357 cans of target material in these stringers at the end of June. Table 2 is a comparison of the radioisotope and research samples charged into the ORNL graphite reactor during June and July.

WATER-DEMINERALIZATION BUILDING

Table 3 gives comparison data for June and July.

TABLE 2

RADIOISOTOPE AND RESEARCH SAMPLES

	JULY 1952		JUNE 1952	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	44	125	11	153
Hole 22	61	8	55	1
All other holes	4	28	6	31
Total by groups	109	161	72	185
Total for month	270		257	

TABLE 3

WATER DEMINERALIZED AND DEAERATED

	GALLONS PRODUCED		
	July 1952	June 1952	Year to Date 1952
Demineralized	375,252	356,220	2,953,160
Degasified	40,620	35,940	298,520

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} – 8 d)

Forty-eight ORNL I^{131} slugs and two Hanford slugs were processed and 34,677 mc was shipped.

Difficulty was encountered in processing two ORNL-slug runs and one Hanford-slug run. During the first ORNL-slug run, the first distillation had to be shortened because of the off-gas system failure. During the processing of the second still of the same run, all the product was lost through the off-gas system. During the second ORNL-slug run, a pressure was built up in the whole system when the hydrogen peroxide was added to the still for the first sparging distillation. This pressure blew the UNH from the dissolver through two instrument lines and the sparger line, which made the area highly radioactive. Fortunately, the bulk of the contamination was confined to the inside of the lines.

The trouble incurred in processing the Hanford-slug run was practically the same as that experienced in the second ORNL-slug run. A pressure that built up in the equipment when the peroxide was added to the still blew UNH from the same lines and caused a high radiation field outside the cell. The reason for the pressure is not known.

During the shutdown period after processing the two Hanford slugs, the following repairs were made to the equipment: the steam-air sparger was moved and completely shielded with ½ in. of lead, as the location of the old lines made it practically impossible to shield them; the piping was decontaminated where the sparger valves had leaked; and general repairs were made to the glassware equipment.

In one of the runs, the first distillation procedure was changed so that air alone was used in the sparging instead of the customary air-steam combination. In another run, the procedure was similar except that a slight amount of steam was added to the air. These changes were made to gather data for the proposed new equipment. The yields from these two runs appeared to be slightly less than normal.

Iodine Development Work

At the request of the Analytical Chemistry Division, a study is being made of the possibility of including a portion of the hot analytical facilities directly with the I^{131} sampling equipment so that it will not be necessary to transfer hot samples to the Laboratory.

Recent studies have shown that the hydrogen peroxide requirements may be greatly reduced by introducing oxygen into the water-scrubbing tower after the iodine absorption has been completed. It has also been demonstrated that iodine may be concentrated in a fractionating column so that lengthy alkaline product evaporations may be avoided.

Permission has not yet been received to start construction of the new iodine plant.

Phosphorus (P^{32} – 14.3 d)

Fourteen 2500-g cans of irradiated sulfur were processed and 7444 mc of P^{32} was shipped.

One abnormal run was experienced this month. The extraction solution contained a heavy red precipitate that held practically all of the product. When dissolved in HCl and processed through the equipment, high losses were incurred and the product contained a white precipitate when adjusted to a pH of 7. The entire batch had to be reworked.

Carbon (C^{14} – 5740 y)

Approximately one curie of C^{14} was separated as $BaCO_3$ this month.

An order has been placed for a new supply of Be_3N_2. The Cleveland AEC office is assisting in finding a satisfactory grade of flake beryllium for nitriding.

Tritium (H^3 – 12.4 y)

This month 26 ampules of tritium were packaged that contained a total of 15.13 curies of H^3. All orders for tritium have been filled and work on the preparation of Zr-H^3 targets will be resumed. A new zirconium target heater has been fabricated, in which electrical resistance heating will be used rather than induction heating.

Special shipping containers are being made for several large orders of He^3.

Fission Products

Precipitation Process, Building 3515. Installation of precipitation process equipment has been completed. All lines have been leak-tested and leaking joints have been repaired. Vessels with liquid-level devices are being calibrated.

New micrometallic filters and the periscope shielding glasses were received. Delivery of the Vycor vessels was again delayed until August 29. Pyrex vessels will be substituted during the test runs.

Source Assembly Station, Building 3013. All drawings, totaling 75, were completed and approved. Fabrication of some of the equipment to be made at ORNL has been started. The concrete floor above the cell was painted and 2 in. of lead was laid for additional shielding.

Preparation Cell, Building 3030. A broken air line inside cubicle No. 2 of the preparation cell was repaired and the drip funnels were adjusted. Operations were resumed and the equipment appears to be satisfactory.

Separation Cell, Building 3028. Column No. 1 of the separation cell is back in operation and all equipment inside the cell needed for the second column has been installed. Additional shielding was applied at the top and bottom of each column to reduce radiation levels in the work areas. Progress on the installation of third-level equipment for column No. 2 has been slow because of emphasis on other work.

Strontium-90. Work continued on the remodeling of the old Cs^{137} cell, which is to be used for high-level Sr^{90} purification processing. This work should be completed by August 15.

Six Sr^{90} sources were returned from Los Alamos for refabrication into newer type, all-stainless-steel holders.

Purified Fission Products. The following carrier-free fission products were produced:

	Millicuries
Cerium (Ce^{144} – 275 d)	200
Neodymium (Nd^{147} – 11 d)	260
Praseodymium (Pr^{143} – 13.8 d)	1280
Yttrium (Y^{91} – 57 d)	1760
Strontium (Sr^{89} – 56 d)	200

Hot Chemistry Cell, Building 3029

Work on the hot chemistry cell is in the final stages of completion. The delivery of the master-slave manipulators has again been delayed until August 30, after which time the cell will be ready for use.

Processed Radioisotopes

Table 4 lists the radioisotope product solutions that were made from reactor-irradiated targets.

Cyclotron Radioisotopes

The following carrier-free radioisotope product solutions were prepared from cyclotron targets:

	Millicuries
Manganese (Mn^{54} – 310 d)	4.41
Strontium (Sr^{85} – 65 d)	8.1

Special Preparations

Thirty-seven Co^{60} sources were loaded with a total of 42.1 curies.

TABLE 4

RADIOISOTOPES PRODUCED FROM REACTOR-IRRADIATED TARGETS

PRODUCT SOLUTION	AMOUNT (mc)	SPECIFIC ACTIVITY (mc/g)
Calcium (Ca^{45} – 180 d)	68.4	26
Cadmium (Cd^{115} – 43 d)	27.6	22.2
Thallium (Tl^{204} – 2.7 y)	3230	551
	4140	702
Tungsten (W^{185} – 73.2 d)	636	622

Two Cs^{137} sources were prepared – a 100-mc and a 50-mc source.

Two sources of precipitated AgI^{131} were prepared, each contained 2 curies of I^{131}.

Ten microcuries of Cl^{36} in the form of solid lithium chloride was prepared for the University of Michigan.

An ampule containing 3 g of PCl_3 was prepared for irradiation.

Miscellaneous Work

Drip funnels and a faulty pinch clamp were repaired in the ruthenium purification cubicle in Building 3030.

Repeated contamination of the floor in Building 3031 was traced to a leaking hot drain in the semi-hot hood. Both hot drain and hot off-gas lines were plugged and the contaminated area under the hoods was filled with concrete.

The piece of titanium tubing that was exposed to a molten sulfur and HNO_3 corrosion test for two months at 140°C was examined under a microscope. Comparison with a control sample revealed no attack. There was no detectable loss of weight of the test piece.

A fume hood for the cold laboratory muffle furnace was installed.

Radiation damage studies on various cements were continued.

The second quarter section of the decontamination building floor was covered with stainless steel this month.

Work was started on the decontamination building hoist to increase its capacity from 5 to 10 tons; the work is about 75% complete.

RADIOACTIVE WASTE DISPOSAL

The jet line from W-5 tank to the evaporator building has been shielded with an additional ½ in. of lead to lower the radiation background in Building 3506.

The W-7 slurry pump was put into service and removed twice this month. The first failure was the result of shorted motor leads. The second failure was the result of a broken impeller, worn bearings, and scoured shaft. At the end of the month, the pump was awaiting the installation of the new parts.

The Cottrell precipitator was shut down for 8½ hr to perform the semiannual inspection and clean-up of the rectifying tubes and insulators.

One bearing of the electrical off-gas shaft failed and was replaced.

Nineteen waste pots were received from Argonne National Laboratory and their contents emptied into tank W-5.

Wastes Discharged to White Oak Creek

A total of 23.88 curies of beta activity was discharged to White Oak Creek from the settling basin and retention pond (see Table 5). This discharge is 9.53 curies greater than that of last month. The activity discharged was the result of many difficulties encountered in various parts of the plant, including:

1. Decontamination of building and equipment in Building 3026-D.
2. Discharge of dissolved cobalt in the canal water of Building 3001.
3. Discharge of contaminated canal water of Building 3505.
4. Unusual waste-evaporator operation during which a foam-over of concentrated waste occurred directly to the settling basin.

A leak of radioactive material from a metal-waste line of Building 3026-D into a valve pit that drains to the settling basin occurred on July 31, but the total discharge from this source is not included in this month's calculated discharge.

Chemical-Waste Evaporator

Evaporator operation gave considerable difficulty during the month as the result of variable feed and the pH of tank W-5. Operations and inventory are given in Tables 6 and 7.

TABLE 5

ACTIVITY DISCHARGED TO WHITE OAK CREEK

DISCHARGED FROM	JULY 1952		JUNE 1952	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	24,885,650	23.71*	25,249,100	14.25
Retention pond	365,600	0.17	362,600	0.10
Total	25,251,250	23.88	25,611,700	14.35

*Less than 1.27 curies contributed by normal evaporator operation. This does not include the foam-over to the settling basin. It is estimated that the foam-over contributed approximately 5 curies of activity discharged to the settling basin.

TABLE 6

WASTE-EVAPORATOR OPERATION

MONTH	SOLUTION FED TO EVAPORATOR (gal)	CONCENTRATE TO W-6 (gal)	VOLUME REDUCTION	BETA CURIES TO EVAPORATOR	BETA CURIES TO SETTLING BASIN
July 1952	177,960	11,890	15:1	39,179	1.27
June 1952	182,657	11,989	15.2:1	25,671	4.87

TABLE 7

WASTE-TANK INVENTORY

TANKS	CAPACITY (gal)	FREE SPACE (gal)	
		July	June
Hot-Pilot-Plant Storage			
W-3, 13, 14, 15	48,500	31,560	31,600
Chemical-Waste Storage			
W-5	170,000	64,800	73,000
Evaporator-Concentrate Storage			
W-6, 8	340,000	57,500	59,000
Metal-Waste Storage			
W-4, 7, 9, 10	543,000	261,500	250,000

A foam-over occurred (previously mentioned under "Wastes Discharged to White Oak Creek") directly to the settling basin, but the analytical results of the offending run do not show this since no sample of the discharge was available when the trouble was discovered.

RaLa (Ba^{140} – 12.5 d)

RaLa run No. 48, begun on June 28, was completed and shipped on July 5. The shipment contained 23,300 curies of product in the form of a nitrate with last separation time being 1415 on July 4. It was one of the most difficult runs processed to a successful conclusion.

Besides several operating-procedure changes made necessary by equipment failures, two process changes were incorporated into this run. The first metathesis solution volume was increased by a factor of 10 in an attempt to eliminate the excess sulfate ions from the equipment following the sulfate extraction step. The purpose of this change was to improve the dissolution of product in the acetate feed and to lower the product content of the Versene feed to the column. An excessive amount of product in the Versene feed in previous runs made control of the pH of the Versene feed extremely difficult and hazardous.

The other process change was the addition of a second fuming nitric precipitation step and the boiling of the product in fuming nitric prior to the transfer of the product to the shipping cone. This change was made in an attempt to destroy organic material which the customer suspects is causing difficulty in his processing.

The main difficulties encountered during this run resulted from the failure of a valve extension handle on a process filter-valve prior to the transfer of the product to the resin column cubicle. The extension handle has become highly contaminated by a leaking valve within the filter cubicle, and when pulled out of the shield contaminated the operating area equipment, air, and personnel. It was necessary to suspend operations for 6 hr while decontamination and emergency repairs were made.

The resin cubicle waste tank jet also failed to operate during the fuming nitric precipitation steps. It was impossible for the tank to accommodate the extra large volumes of wastes resulting from the added fuming nitric step, so that the tank was allowed to overflow into the shroud in order to continue operation.

The filtration of the sixth sulfate extraction and the large carbonate metathesis required 8 and 9 hr, respectively, because of plugged process filters. Both filters had to be used for the metathesis filtration and the procedure revised to combine the precipitate on one filter for the product cake-solution step.

Other equipment failures included a thermocouple in the product evaporator tank and the fission counting chamber in the loading cubicle. Temperature measurements could not be made in the evaporator and only the ionization chamber could be used to verify the quantity of product shipped according to chemical analysis.

The hazards involved in removing the loaded product-carrier were considerably decreased by changing the product-loading procedure, by covering the operating personnel from head to toe with protective clothing, and by using air masks. Although air activity occurred during this operation, there was no serious hazard to personnel.

The shipping truck was loaded at 0100 and left the plant at 0900 on July 5, 1952.

The analytical results of the following have all values corrected to an LST of 1415 on July 4, 1952:

Slugs loaded	214 Hanford slugs
Slugs dissolved	213 (by analysis)

	Curies	Per Cent
Product dissolved	35,878	100.00
Cell A losses	2,763	7.70
Resin cubicle losses	4,719	13.15
Total losses accounted for	7,482	20.85
Losses unaccounted for		14.15
Product shipped	23,322	65.00
Materiol balance		85.85

Following shipment of the run, the building and equipment were decontaminated to as low a background as practical. The process filter-valve extension handles were replaced with stronger handles. The tubing connections at the cubicle edge were tightened to eliminate the source of leakage of radioactive solutions that occurred during the run. A regeneration was made of the resin and the product content of the elution was found to be 66 curies. Following this test, a resin capacity titration was performed before discarding the resin.

RaLa run No. 49 was begun on July 28 with the loading of 226 4-in. Hanford slugs to the dissolver. These slugs are to be dissolved and extracted in 6 batches. At the end of the month, 6 dissolvings and 5 extractions had been completed.

The process will vary slightly from that of run No. 48 by the addition of fuming HNO_3 to the shipping cone following the product drying. This HNO_3 will then be evaporated and the product shipped.

The run has proceeded normally with relatively minor difficulties involving solution back-ups in service lines, plugging filters, and failure of extension handles to remotely-placed valves.

RADIOISOTOPE SALES DEPARTMENT

Table 8 shows a breakdown of the radioisotope shipments.

On August 2, the AEC is to publicly announce the availability of polonium and polonium-beryllium neutron sources that are expected to become available for distribution within the next two months from ORNL. The policy details for handling these sources have been worked out between ORNL and the AEC.

HANFORD IRRADIATIONS

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

CYCLOTRON RADIOISOTOPES

Table 10 is a list of the orders now on hand for cyclotron radioisotopes.

Table 11 lists the number of radioisotope bombardments received and requested during July.

Table 12 lists the number of radioisotope cyclotron-processed during July.

ACTIVATION ANALYSES

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

TABLE 8

RADIOISOTOPE SHIPMENTS

	JULY 1952	JUNE 1952	JULY 1951	AUGUST 1946 TO JULY 1952, INCLUSIVE
Separated material	671	754	678	27,616
Unseparated material	168	168	131	7,687
Total	839	922	809	35,303
Nonproject	732	799	664	
Project	97	98	132	
Foreign	10	25	13	
Total	839	922	809	

TABLE 9

RADIOISOTOPES RECEIVED FROM HANFORD

SAMPLE NO.	MATERIAL	NO. OF PIECES	DATE DISCHARGED	DATE RECEIVED
ORNL-85	Selenium	1	July 1952	7/15/52
ORNL-156	Cadmium	1	July 1952	7/15/52
ORNL-118	Tantalum Foil	1	July 1952	7/24/52
ORNL-144	Chromium Metal	1	July 1952	7/24/52
ORNL-145	Enriched Fe^{58}	1	July 1952	7/24/52
ORNL-13	Be Nitride	64	July 1952	7/28/52

TABLE 10

CYCLOTRON RADIOISOTOPE ORDERS

MATERIAL	AMOUNT (mc)	AMOUNT (S.I.)	STATUS
Na^{22}	4		Material has been requested
Mg^{28}		1	Material has been requested
Cr^{48}		1	Material has been requested
Mn^{53}		1	Material has been requested
Mn^{54}	1		Material has been requested
Fe^{59}	300 μc		Material to be requested
As^{73}	1.5		Material in process
Sr^{85}	5.0		Material in process

TABLE 11

BOMBARDMENTS RECEIVED AND REQUESTED

MATERIAL	MASS. INSTITUTE OF TECHNOLOGY		UNIVERSITY OF CALIFORNIA		UNIVERSITY OF PITTSBURGH		WASHINGTON UNIVERSITY	
	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours
Bombardments Received								
Be^7			1	47.20	15	342.00		
Na^{22}	2	190.00			9	400.25	4	300.00
Mn^{52}					2	20.00		
Mn^{54}	1	50.00	1	95.00			7	400.00
Fe^{54}			1	18.70				
Co^{57}	1	10.00					4	140.00
Fe^{59}			7	332.80	2	80.60	1	34.00
Zn^{65}	1	100.00	1	47.80				
Ga^{67}					11	77.75		
As^{73}			1	10.50	3	30.50		
As^{74}	1	5.00						
Sr^{85}	3	89.75			1	10.00		
Y^{88}	1	10.00						
I^{125}							2	60.00
Molybdenum metal			1	10.00	2	15.70	5	50.40
KCl	1	1.00						
Sulfur					1	2.00		
Total Received	11	455.75	13	562.00	46	978.80	23	984.40

MATERIAL	MASS. INSTITUTE OF TECHNOLOGY		UNIVERSITY OF CALIFORNIA		UNIVERSITY OF PITTSBURGH		WASHINGTON UNIVERSITY	
	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours
Requested but not Received								
Na^{22}					1	100.00		
Mg^{28}			1	10.00				
Cr^{48}			1	10.00				
Mn^{53}			1	7.00				
Mn^{54}			1	100.00				
Total hours outstanding (not received or requested)		1,044.25		811.00		421.20		515.60

TABLE 12

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

MATERIAL	NO. SHIPMENTS JULY 1952	TOTAL MILLICURIES AND SERVICE IRRADIATIONS			
		July 1952		To Date	
		mc	S.I.	mc	S.I.
Be^{7}				368.743	4
Na^{22}	3	3.35		84.154	
Mn^{52}				10.991	
Mn^{54}	5	8.2		15.72	
$Fe^{55,59}$				63.64	4
Co^{57}				4.144	
Zn^{65}				42	4
Ga^{67}					20
As^{73}	1	0.002		4.760	
Sr^{85}				6	
Sr^{88}	2	25		25	
Sr^{90}					1
Mo^{95}					7

SF MATERIAL CONTROL

Two carload-lot shipments were received from Hanford during the month. The first car, received July 15, contained 140 irradiated slugs for the Purex process pilot-plant. The second car, received July 28, contained 228 irradiated slugs for the RaLa process.

A carload-lot shipment that consisted of 66 irradiated slugs for the SCRUP program was received from Chalk River on July 10.

An additional 4843 silicon-bonded aluminum-jacketed, normal uranium slugs were received from Y-12 during July for use in reloading the graphite reactor.

Sixteen CP-5 uranium-aluminum alloy fuel assemblies, consisting of 1579.40 g of 90.1 to 95% enriched uranium, were shipped to Argonne National Laboratory on July 22.

On July 2, 2475.88 g of 90.1 to 95% enriched uranium were received from Y-12 in the form of

60, uranium-aluminum alloy slugs for fabricating six assemblies for irradiation in the Chalk River reactor. The completed assemblies were shipped to Westinghouse Electric Company, Pittsburgh, Pa., on July 22.

During the month the following fissionable element material was shipped to Los Alamos: 287.17 g of plutonium (SCRUP material) and 133.21 g of plutonium (Purex material).

Five MTR shim rods were shipped to Phillips Petroleum Company, Scoville, Idaho, during July. This increases the total number of assemblies and control rods shipped to date to 114 and 23, respectively.

SF surveys during the month consisted of visiting one person possessing SF material. The material possessed was inspected and weighed when feasible; no apparent discrepancies were encountered. In addition, the records of three analytical laboratories were audited with results disclosing that all records were in good order and proper accounting had been made for all samples.

During July there were 20 receipts and 43 outgoing shipments, compared with 25 receipts and 49 outgoing shipments last month.

Tables 13 and 14 are summaries of receipts and shipments during the month of July.

TABLE 13

SF MATERIALS RECEIVED

FROM	MATERIAL	AMOUNT (g)
Battelle Memorial Institute	Thorium (bar)	3,216.00
Carbide and Carbon Chemicals Co., K-25 Area	Normal uranium (UO_3)	8.40
Carbide and Carbon Chemicals Co., Y-12 Area	Enriched uranium (slugs)	2,310.11
	Enriched uranium (UF_4)	0.42
	Normal uranium (UF_4)	2.00
	Normal uranium (fluoride)	171.00
	Normal uranium (slugs) net	54,758.00
	Normal uranium (slugs) net	1,615,348.00
	Depleted uranium (foil)	10.75
	Normal uranium (fluoride)	334.00
	Normal uranium (slugs) net	7,161.00
	Normal uranium (slugs) net	4,209,907.00
General Electric Co. AGT	Enriched uranium (UO_2)	0.23
General Electric Co. HGE	Plutonium (blue nose)	0.01
	Depleted uranium (slugs)	405,400.00
	Plutonium (slugs)	119.00
	Depleted uranium (slugs)	248,931.00
	Plutonium (slugs)	133.00
Harshaw Chemical Corporation	Normal uranium (UNH)	17.03
Iowa State College	Thorium (metal)	800.00
National Research Council, Chalk River	Depleted uranium (slugs)	341,007.00
	Plutonium (slugs)	123.66
University of California Radiation Laboratory	Depleted uranium (metal)	21.00

TABLE 14

SF MATERIALS SHIPPED

TO	MATERIAL	AMOUNT (g)
Argonne National Laboratory	Enriched uranium (CP-5)	1,472.61
	Depleted uranium (blue nose)	34.75
	Plutonium (blue nose)	0.01
Brookhaven National Laboratory	Depleted uranium (blue nose)	34.75
	Plutonium (blue nose)	0.01
California Research and Development Co.	Normal uranium (Zr clad)	508.00
	Normal uranium (Zr clad)	1,100.00
Carbide and Carbon Chemicals Co., K-25 Area	Normal uranium (UO_3)	8.40
Carbide and Carbon Chemicals Co., Y-12 Area	Enriched uranium (HRE)	19.74
	U^{233} [$UO_2(NO_3)_2$]	0.06
	Normal uranium (slugs)	37,480.32
	Normal uranium (U-Zr)	237.20
	Enriched uranium (MTR)	14.82
	U^{233} [$UO_2(NO_3)_2$]	0.32
	Normal uranium (slugs)	271,732.32
	Normal uranium (slugs)	5,627,014.40
	Enriched uranium (MTR)	2.99
	Enriched uranium (UF_4)	4.77
	Enriched uranium (MTR)	3.33
	Plutonium (SCRUP)	0.02
	Normal uranium (slugs)	8,026,450.95
	Depleted uranium (Purex)	1,070.00
	Thorium (foil)	65.00
	Enriched uranium (U_3O_8)	0.47
	Enriched uranium [$UO_2(NO_3)_2$]	0.08
	Normal uranium (foil)	2.24
	Enriched uranium (MTR)	4.73
	Enriched uranium (MTR)	1.90
	Enriched uranium (MTR)	150.62
	Enriched uranium (MTR)	187.88
	Enriched uranium (MTR)	0.38
	Enriched uranium (MTR)	0.25
General Electric Co. AGT	Normal uranium (U_3O_8)	39.40
	Enriched uranium (UO_2)	0.23
General Electric Co. HGE	Depleted uranium (blue nose)	69.50
	Plutonium (blue nose)	0.01
General Electric Co. SGE	Normal uranium (billet)	209.80
Harshaw Chemical Corporation	Depleted uranium (Purex)	1,093,001.00
Los Alamos Scientific Laboratory	Plutonium (SCRUP)	287.17
	Plutonium (Purex)	72.03
	Plutonium (Purex)	61.18

[redacted]

FOR MONTH ENDING JULY 31, 1952

TO	MATERIAL	AMOUNT (g)
Mallinckrodt Chemical Works	Normal uranium (alloys)	82,156.00
	Thorium (alloys)	9,016.00
	Normal uranium (alloys)	9,751.87
North American Aviation, Inc.	Normal uranium (alloy)	306.60
Phillips Petroleum Co.	Enriched uranium (MTR)	545.08
Westinghouse Electric Corporation	Enriched uranium (U-Al)	2,310.11

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