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OPERATIONS DIVISION MONTHLY REPORT

FOR

MONTH ENDING SEPTEMBER 30, 1952

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OPERATIONS DIVISION MONTHLY REPORT

for

Month Ending September 30, 1952

by

M. E. Ramsey

DATE ISSUED

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OPERATIONS DIVISION MONTHLY REPORT

SUMMARY

The activities of the Operations Division for the month ending September 30, 1952 are summarized and indexed below:

1. A shortage of reactivity limited the ORNL graphite reactor power during the month (p. 3).

2. The ORNL graphite reactor is completely loaded with aluminum-silicon bonded slugs (p. 3).

3. The fuel loading of the LITR has been repositioned (p. 4).

4. Higher-quality demineralized water is being produced from the Water-Demineralization Building since installation of the new resins (p. 5).

5. Arrangements are being made for the construction of a new I^{131} plant (p. 6).

6. Preliminary studies are being made on methods of concentrating zirconium-niobium activity separated from uranium solutions by the silica gel adsorption process (p. 6).

7. The effluent from the heated ion-exchange column contained less than 3% ruthenium activity with a feed of short-lived mixed fission-products solution from which the uranium and plutonium had been removed by a batch TBP process, as contrasted with the usual 20% ruthenium in the effluent encountered when fission-product solutions containing the uranium and plutonium are adsorbed on the column (p. 6).

8. The hot chemistry cell in Building 3029 is essentially complete (p. 7).

9. A total of 43.6 curies of beta activity was discharged to White Oak Creek compared with 103.9 curies last month (p. 9).

10. RaLa run No. 51 was completed on September 30 and 18,500 curies of product was shipped on October 1, 1952 (p. 11).

11. There were 870 radioisotope shipments during September 1952 compared with 796 during the previous month (p. 12).

REACTOR OPERATIONS DEPARTMENT

OPERATING DATA

	SEPTEMBER 1952	AUGUST 1952	YEAR TO DATE 1952
ORNL Graphite Reactor			
Reactor power			
Total accumulated (kwhr)	2,179,073	2,324,013	21,124,748
Average kw/operating hr	3352.93	3476.02	3607.80
Average kw/24-hr day	3026.49	3123.67	3212.40
Lost time (%)	9.74	10.14	10.96
Excess reactivity (inhr)	55	20	
Slugs discharged	4048	10,766	41,789
Slugs charged	4041	11,302	42,465
Product made (g)	79.53	84.82	770.98
Product discharged (g)	256.96	1181.55	6238.99
Low-Intensity Test Reactor			
Reactor power			
Total accumulated (kwhr)	964,316	868,727	6,389,148
Average kw/operating hr	1,493	1,497	1,207
Average kw/24-hr day	1,339	1,168	972
Lost time (%)	10.3	22.0	19.5
Position of No. 2 shim rod (in. out)	26.128*	27.503	

*This corresponds to approximately 0.6% excess reactivity.

REACTOR OPERATIONS

ORNL Graphite Reactor

A shortage of reactivity existed during the month, which limited the reactor power, because the radiation absorbed by research equipment has increased markedly. Also, 30 slugs containing tantalum were loaded in two central holes where they absorbed more than 50 inhours. The discharge of these tantalum slugs on September 29 resulted in a gain of 50 to 60 inhours. It was then possible to raise the power to 4000 kw for constant power runs.

An opportunity to measure the reactivity which was absorbed by an experimental sample in hole 54 occurred when the sample was removed while the reactor was operating. A gain of reactivity of approximately 22 inhr resulted.

The Army Chemical Center requested that the 540 tantalum slugs being irradiated in peripheral channels not be discharged on September 29, as previously planned, but that they be held in the reactor until April 1953. If this is done, it may be necessary to add more uranium to the reactor loading to furnish adequate reactivity.

Seven containers that held approximately 280 tantalum slugs irradiated between April 28 and June 30, 1952 were delivered to the Army Chemical Corps on September 4.

There were no slug ruptures during September.

The loading of aluminum-silicon bonded slugs into the reactor has been completed. The only unbonded slugs now in the reactor are those used for radioiodine production.

The Metallurgy Division is building a temperature-cycling oven to test slugs in the alpha phase

under simulated reactor temperatures to determine whether they are more susceptible to rupture than slugs that are in the beta phase. In addition, an apparatus is being constructed to measure the length of slugs discharged from the reactor to see whether any differences are observed between alpha and beta slugs.

Approximately 51,400 bonded slugs have been accepted from Y-12. The 1600 slugs remaining on order will be prepared from unbonded slugs, now on hand, which will be recanned.

Most of the supporting beams around holes 11 and 12 have been installed so that the shield at hole 10 may be placed upon the beams as soon as it is ready. This will give an additional vertical-hole facility.

No liquid hydrogen was made during the month. One of the Dewar flasks on the apparatus was replaced by a cylinder of Styrofoam that has insulating properties almost equal to a Dewar and which is cheaper and less likely to break.

Low-Intensity Test Reactor

The LITR operated very satisfactorily during September. There was 10.3% down time compared with 22% in August, when the reactor was down for a week in preparation for a boiling test.

The two shim-rod bearings are scheduled to be delivered the first week of October 1952. This will permit replacement of two of the shim rods that have been depleted to a very low level.

The fuel loading, which had previously been at the south end of the east side of the lattice, was repositioned to the north end of the east side of the lattice. This resulted in a higher neutron flux in the pneumatic tube and in holes HB-1 and 6. Unfortunately, however, the flux in HB-4 is somewhat reduced.

Sketches of a fuel-element carrier have been sent to Arco for approval. As soon as approval has been obtained, the carrier will be fabricated and shipments of spent LITR fuel elements will be started.

The air cooler is complete except for the connecting pipe, which arrived on September 11; it is hoped that its installation can soon be completed.

An aluminum spray-tank has been fabricated and is ready to be installed. The transfer of the stainless steel tank originally scheduled for this job to the Hot Pilot Plant resulted in a delay of several weeks.

An examination of corrosion data taken over the last 18 months of operation has indicated that the corrosion rate of the steel tanks is not of serious proportions. Corrosion rates of the aluminum and beryllium, while much greater than that of steel, appear to be only a few pounds per year.

On September 9 demineralized water of much higher purity than that previously used became available because of the change of resins in the Water-Demineralization Building. After it had been in the reactor for one week, this water appeared to be very clean, and its pH and resistance remained at much more favorable values throughout the week than in the case of water previously used. It is believed that the corrosion rate will be considerably reduced with the use of this water.

A differential, water-temperature recorder was installed at the LITR to give more accurate readings of the heat power.

FILTER HOUSE

Table 1 shows a comparison of the pressure drop across the exit air filters last month with the pressure drop this month and that experienced when all filters were clean.

FAN HOUSE

The Sturtevant Company was not able to explain the cause of pitting of the journals on the No. 2 fan. It has been decided that if the pitting becomes serious the fan shaft and wheel will be replaced with a spare that is on hand; the defective shaft will then be returned to the manufacturer for repair if this is deemed advantageous. The fan bearings are now being inspected frequently to avoid the possibility of trouble.

RADIOISOTOPES

Stringers 13, 14, and 16 contained 366 cans of target material at the end of September as compared with 367 cans of target material in these stringers at the end of August.

Table 2 shows a comparison of the radioisotope and research samples charged into the ORNL graphite reactor during September with those handled in August.

WATER-DEMINERALIZATION BUILDING

Table 3 shows water-treatment data for September as compared with those of August.

The new resins in the anion unit have eliminated the necessity of degasifying any of the water. The effluent from the units is now carbon dioxide-free and usually has a specific resistance above 5×10^5 ohms. At times this value is as high as 2×10^6, which compares very favorably with the product from the old units that produced water with a specific resistance of only about 1×10^5 ohms.

TABLE 1. PRESSURE-DROP DATA

DATE	PRESSURE DROP (in. water gage)		
	Glass Wool	CWS No. 6	Total Across House
9/30/52	3.0	2.0	6.1
8/31/52	2.9	2.0	6.0
Clean filters	1.1	1.3	3.3

TABLE 2. RADIOISOTOPE AND RESEARCH SAMPLES

	SEPTEMBER 1952		AUGUST 1952	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	19	147	32	119
Hole 22	51	2	72	6
All other holes	4	25	2	16
Total by groups	74	174	106	141
Total for month	248		247	

TABLE 3. WATER DEMINERALIZED AND DEGASIFIED

	WATER TREATED (gal)		
	SEPTEMBER 1952	AUGUST 1952	YEAR TO DATE 1952
Demineralized	363,360	338,850	3,655,370
Degasified	0	34,600	323,120

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} – 8 d)

Thirty-two ORNL slugs were processed and 38,535 mc of iodine was shipped.

Difficulty was encountered in processing one 8-slug run through the glass equipment. A precipitate, which formed in the distillate receiver and which had the appearance of iron, caused a loss of approximately 3 curies of product.

Iodine Development Work

It was decided by the AEC that the structural portion of the new I^{131} plant will be built by a construction contractor. Negotiations are now in progress to obtain the services of a firm for this work.

All changes and corrections of structural drawings were made. Changes and corrections of piping and vessel drawings are in progress and are scheduled to be completed on October 15. Drawings for five auxiliary vessels remain to be made.

The Instrument Department has been unable to begin work on final design and specifications for instrumentation to be used in this project; one engineer is scheduled to begin work on instrumentation by October 7. Completion of this part of the design is scheduled for October 31.

Phosphorus (P^{32} – 14.3 d)

Fifteen 2500-g cans of bombarded sulfur were processed and 9411 mc of P^{32} was shipped.

It was necessary to make pickup runs following the regular processing of three of the runs to remove P^{32} from the walls of the glassware. Operations were normal in all other respects.

Carbon (C^{14} – 5740 y)

One run of 25 slugs of Be_3N_2 was made, but the product assay has not been completed.

A heated iron oxide bed was introduced into the gas train ahead of the CuO bed to reduce the oxidation load on the heated CuO. Experiments are in progress to determine the optimum operating temperature for the iron oxide bed.

Zirconium-Niobium (Zr^{95}, Nb^{95} – 65 d, 35 d)

Preliminary studies are being made on methods of concentrating zirconium-niobium activity that has been separated from uranium solutions by the silica gel adsorption process. The capacity of silica gel for zirconium is of interest, and several quantitative measurements were made by using inactive zirconium with added Zr^{95} tracer. The capacity of silica gel is approximately 180 curies of Zr^{95} per gram of silica gel when calculated on the basis of the average specific activity of zirconium found in fission-product solutions obtained from slugs that have been irradiated 60 days. Only the adsorption of zirconium was considered in this case, since there is a tendency for it to be adsorbed preferentially (over niobium) on the silica gel.

An obviously easy way to make zirconium-niobium sources is to remove the saturated silica gel from the column and, after drying, to press it into a source. However, it may be a more flexible procedure to remove the zirconium-niobium in 5% oxalic acid, as is normally done, and then precipitate it and use the dry precipitated solids for source preparation. There are several methods available for precipitating zirconium – such as the barium fluozirconate process and the oxalate process – that tend to give quantitative results for zirconium, but not for niobium. A third method, precipitation as phosphates, is not so quantitative for zirconium, but does tend to carry down niobium as well. Experiments on this method of precipitation directly from 5% oxalic acid solution indicated that only 25% of the zirconium-niobium was precipitated. The oxalate was destroyed by heating with potassium permanganate, thus releasing the zirconium-niobium from its complex, and subsequent phosphate precipitation was virtually complete. The phosphate precipitate is somewhat objectionable in that it is gelatinous, but it settles out well and can probably be handled if filtration methods of separation are avoided.

Fractionation of Mixed Fission Products on the Heated Ion-Exchange Column

A solution containing approximately 10 curies of short-lived mixed fission products that had been separated from uranium and plutonium by the batch TBP process, evaporated to dryness, and taken up in water, was adsorbed on the heated ion-exchange column. Less than 3% of the ruthenium activity was observed in the effluent in contrast

with the usual 20% found when uranium solutions are adsorbed directly on an ion-exchange column. Since the total cationic strength of the solution was low, only a trace of cesium was observed in the effluent, although the effluent acid concentration was 0.2 *N*. Elution was performed with 5% citrate solution at a pH of 3.2. A band of Cs^{137} was removed and was later purified so that it could be checked on the scintillation spectrometer against Cs^{137} that had been made from old slugs. The purity of the various fractions ranging from yttrium to barium was quite satisfactory. No interference was encountered from the ruthenium, zirconium, and niobium that remained on the column.

Tritium and Helium

Five packages of He^3 were prepared this month. The preparation was distributed as two shipments of 95% He^3: one of 2000 ml and one of 9 ml and three shipments of 4% He^3: one of 2000 ml, one of 900 ml, and one of 600 ml.

Preliminary sketches were made of a new system for packaging all He^3 and for providing for extra purification of He^3 from the contaminating tritium.

Five tritium packages were prepared this month; the total activity was 3.01 curies.

Work was continued with the metal evaporator for producing thin zirconium surfaces for target preparation. A vacuum of 2×10^{-6} mm Hg was obtained; this is low enough for all types of evaporation.

Argon (A^{37} – 34.1 d)

A larger charcoal column is being made to complete the purification of the A^{37} now being processed. No reduction in volume was obtained when the gas was exposed to molten lithium. This indicated a need for a larger column for the removal of excess helium (carrier gas).

Fission-Product Equipment

Precipitation Process, Building 3515. Changes that were proved necessary by the test run are being made in the equipment and piping used in the precipitation process.

Two Vycor vessels were delivered and are being installed.

An additional chemical test run will be started as soon as maintenance work in the cells is completed.

Source Assembly Station, Building 3013. The furnace to be used in the source assembly station has been completed and tests are being made. Modification of existing equipment is proceeding.

The waste holdup tank was found to be leaking at one flange; necessary repairs to this unit have been scheduled.

Separation Cell, Building 3028. Installation of column No. 2 of the separation cell was completed. Test runs made in this column were satisfactory and the equipment was released for operation.

Hot Chemistry Cell, Building 3029

The master-slave manipulators for the hot chemistry cell were received and were installed. The viewing window was filled with zinc bromide solution. Installation of a hoist for removing carrier lids is in progress.

Drawings have been made for the following tools to be used in the cell: shield pallets, mirror and light supports, and a handling device for underground storage containers. Tools to be designed are as follows: special screw drivers, an adapter for opening rabbits, a bottle decapper, and a tool-storage rack.

Installation of lead scatter shielding and final testing and adjusting of it have not been completed.

Underground Storage Facility

Fabrication of 40 stainless steel tubes and associated equipment for the underground storage facility is now in progress. Three storage containers were fabricated for testing and were found to be satisfactory after slight modifications were made.

Strontium Purification Equipment

The equipment assembly for strontium purification is complete, and a charge of 30 g of $Ba(NO_3)_2$ (used as strontium carrier) has been carried through the nitrate, carbonate, and chloride steps with no difficulty.

Work continued on the precipitation of $BaCl_2$ in 13 *N* HCl produced by absorption of HCl gas in HCl solution. Indications are that a maximum of 40 μg of $BaCl_2$ per milliliter of HCl will be retained in solution; this amount is considered negligible. Further studies are being made on the inclusion of strontium in $BaCl_2$ crystals under these conditions.

Sulfur Purification Unit, Building 3032

Design criteria for the sulfur-purification equipment were given to the Engineering Department, and preliminary sketches are being made for departmental approval.

Processed Radioisotope Production

Table 4 is a list of radioisotope product solutions that were prepared from reactor-irradiated targets.

Special Preparations

Eighty-four Co^{60} sources were loaded with a total of 89.58 curies.

Five Cs^{137} sources were prepared that contained a total of 352 mc.

Ten cans of cobalt were prepared for irradiation.

Miscellaneous Work

A new source holder was designed to contain moderate amounts of Cs^{137}.

A horizontal-vertical, motion-motorized pipet was assembled for use in Building 3029.

One Hi-Density glass window, 4 by 4 by 8 in., and one stainless steel holder for the glass were loaned to the Chemical Technology Division.

Irradiation tests on various materials were continued as follows:

1. An 80% $ZnBr_2$ solution, with and without added zinc metal, was used. It was noted that the breakdown to produce free bromine was much less in the sample containing the zinc.
2. White refrigerator enamel with red coloring added was irradiated; the red color disappeared under intense radiation, but the paint remained in good condition.
3. A sample of Boltaron plastic is being exposed.

The testing of various cements for sealing radioactive sources continues. Heavy Bakelite varnish appears to be a good sealing agent.

A new lead shield, 4 to 6 in. thick, with a capacity of 400 to 500 bottles, was installed in the radioisotope packing barricade. This installation was made to reduce the radiation background in the operating area.

RADIOACTIVE WASTE DISPOSAL

The wooden east wall of the Evaporator Building, 3506, was replaced with a 12-in. concrete-block wall to provide protection against the high radiation coming from the tank-farm transfer lines. The general background in the Evaporator Building operating gallery was lowered from 12 to 1 mr/hr. An additional section of the tank-farm transfer line to the Evaporator Building was also shielded to lower the radiation background in the operating gallery.

The lead-covered cable of inferior material, which was connected to the telemetering system that services the waste tanks on the north side of the plant, has been replaced with a better cable.

The diversion box to tanks W-1 and W-2 was cleaned out.

The movement of concentrated chemical waste from tank W-8 to chemical-waste pit No. 2 was resumed. There was 4200 gal of waste containing 103 curies of beta activity transferred, which brings the total amount transferred to date to 16,200 gal bearing 290 curies of beta activity.

The W-7 slurry pump, which was reassembled with Micarta bearings, was put back into service. In an attempt to reduce the possibility of future bearing troubles, the operating procedure has been changed to prevent the bearings from going dry while the pump is running.

The transfer of uranium slurry from tank W-7 to W-10 is progressing very slowly. New, faster methods of transfer are being investigated.

TABLE 4. RADIOISOTOPES PRODUCED FROM REACTOR-IRRADIATED TARGETS

PRODUCT SOLUTION	AMOUNT (mc)	SPECIFIC ACTIVITY (mc/g)
Antimony (Sb^{124} – 60 d)	1720	1847
Calcium (Ca^{45} – 180 d)	62.2	22.9
	53.3	3.4
Sulfur (S^{35} – 87.1 d)	345	Carrier-free

An integrating recording flowmeter and sampling pump were installed in manhole No. 149, which services the process waste system from the Solid State and the Chemical Separations Buildings, Nos. 3025 and 3026, respectively.

The normal flow through manhole No. 149, as measured for a period of 30 days, is about 42,000 gal per day and bears about 4 mc of beta activity. When Building 3026-D is operating, the flow increases to a high of 82,000 gal daily as a result of an increase in the use of tank-jacket cooling water. The cooling water from the water-still condenser in Building 3026-D is being rerouted from this system to the storm sewer to reduce the unnecessary load on the settling basin.

Wastes Discharged to White Oak Creek

A total of 43.6 curies of beta activity was discharged to White Oak Creek from the settling basin and the retention pond; this is 60 curies less than that discharged last month (see Table 5). Most of the activity came from the Thorium Processing Building, 3503, which experienced some operating difficulties, and the decontamination of the Waste Evaporator Building, 3506, which was shut down for repairs. The leak, which started last month, in the chemical-waste line from Building 3026 was repaired early in this month.

Chemical-Waste Evaporator

The chemical-waste evaporator was decontaminated and was shut down for 46 hr this month for the repair of a sheared pin in the discharge valve that leads from the evaporator to the concentrate storage tank W-6 and from the steam lines to the coils. The sump jet was unplugged, and the automatic, liquid-level, control valve was repaired. Evaporator operation and waste-tank inventory are shown in Tables 6 and 7.

TABLE 5. ACTIVITY DISCHARGED TO WHITE OAK CREEK

DISCHARGED FROM	SEPTEMBER 1952		AUGUST 1952	
	Gallons	Beta Curies	Gallons	Beta Curies
Settling basin	19,997,200	42.74*	23,170,000	103.68
Retention pond	312,000	0.84	368,500	0.21
Total	20,309,200	43.58	23,538,500	103.89

*Less than 0.94 curie contributed by normal evaporator operation.

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
September 1952	186,736	9626	19.4:1	12,030	0.93
August 1952	147,360	7800	18.9:1	13,698	3.71

Waste-Tank Inventory

TABLE 7. WASTE-TANK INVENTORY

TANKS	CAPACITY (gal)	FREE SPACE (gal)	
		September	August
Hot-Pilot-Plant Storage			
W-3, 13, 14, 15	48,500	31,000	31,000
Chemical-Waste Storage			
W-5	170,000	27,500	39,500
Evaporator-Concentrate Storage			
W-6, 8	340,000	50,500	52,500
Metal-Waste Storage			
W-4, 7, 9, 10	543,000	229,000	243,000

RaLa (Ba^{140} – 12.5 d)

The following work was done in preparation for RaLa run No. 51:

1. The iron, which contaminated the product of run No. 50, was cleaned out of the product-evaporator tank.
2. The north hot laboratory, which was contaminated as a result of a waste-line backup, was decontaminated.
3. The loading-cubicle equipment was put into good working condition by lubricating the cone manipulator, repairing the viewing lights, replacing the mirrors, and by making other minor repairs and adjustments.

RaLa run No. 51 was begun on September 23, with the loading of 107 eight-in. Hanford slugs. Eighteen hours of operating time was lost when the slugs jammed in the loading chute after 58 slugs had been successfully charged into the dissolver. The chute was unplugged by dissolving some of the slug jackets with caustic solution and by the use of tongs.

The slugs were dissolved and extracted in six batches. It became necessary to change process filters during the third-batch extraction when the filter that was first used became plugged; the run then proceeded normally through the extraction filtrations. After each filtration, a backwash was made of the first filter used to permit accumulation of all the product on one filter.

The first metathesis filtration, however, required an unusually long time and resulted in a known waste loss of about 10%. This loss was caused by changes in operating procedures that became necessary to complete the filtration; both filters were used with much backwashing and blowing-back with air.

The second and third metathesis filtrations were also very slow and required the same procedure changes as did the first metathesis filtration. The known loss of product in these wastes was about 4%.

The transfer of product from the extractor to the resin cubicle by means of acetate feed solution required the unusually long time of 5 hours. The transfer of the remainder of the product in the Versene feed was also very slow, and the water-wash used after the transfer was never completed. Fortunately, only 4% of the product was left behind in the extractor and the filters.

The operation of the resin-column cubicle proceeded satisfactorily except for the failure of the product-evaporator sampler and a backup of activity into the operating area through the feed-tank sampler. To lower the exposure of operating personnel to radiation, the taking of three samples of the resin-column effluents was eliminated by combining and sampling four of the wastes as one.

Approximately 18,500 curies of product, as measured at the last separation time, 1550 on September 30, was shipped on October 1. The product shipped was measured by direct radiation only because of difficulties experienced with the product evaporator sampler.

The analytical summary for run No. 51 will be reported next month because the sampling of wastes has not been completed. It is already obvious, however, that the yield was low and that the unaccounted-for losses were high. The high losses probably resulted from the excessive blowbacks of the filtering equipment, which undoubtedly contains some leaks.

After shipment of the product, an effort made to determine the amount of product holdup on the resin resulted in a backup of activity into the operating area. At the end of the month, work was under way to lower the radiation background sufficiently for completion of the job.

RADIOISOTOPE SALES DEPARTMENT

Radioisotope shipments made during September 1952 are compared with those made during August 1952 and September 1951 in Table 8. A breakdown according to separated and unseparated material (including totals for August 1946 through September 1952), and for project, nonproject, and foreign shipments is also shown.

HANFORD IRRADIATIONS

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

CYCLOTRON RADIOISOTOPES

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

Table 11 is a list of the number of radioisotope bombardments received and requested during September.

Table 12 shows the quantity of radioisotopes that were cyclotron-processed and the number of shipments of radioisotopes that were made during September. Also shown are totals to date as divided into millicurie and service-irradiation amounts.

TABLE 8. RADIOISOTOPE SHIPMENTS

	SEPTEMBER 1952	AUGUST 1952	SEPTEMBER 1951	AUGUST 1946 TO SEPTEMBER 1952, INCLUSIVE
Separated material	703	664	546	28,983
Unseparated material	167	132	130	7,986
Total	870	796	676	36,969
Nonproject	767	698	555	
Project	88	82	111	
Foreign	15	16	10	
Total	870	796	676	

TABLE 9. RADIOISOTOPES RECEIVED FROM HANFORD ON SEPTEMBER 15

SAMPLE NUMBER	MATERIAL	NUMBER OF PIECES	DATE DISCHARGED
ORNL-146	Cobalt	4	8/27/52
ORNL-163	Cobalt	1	8/27/52
ORNL-85	Selenium	1	September 1952
ORNL-82	Nickel	1	September 1952
ORNL-152	Silver nitrate	1	September 1952
ORNL-86	Thallium	1	September 1952
ORNL-88	Tin	1	September 1952
ORNL-164	Hafnium oxide	1	September 1952
ORNL-144	Chromium	1	September 1952
ORNL-147	Iron	1	September 1952
ORNL-165	Calcium	2	September 1952

ACTIVATION ANALYSES

A total of 49 requests has been received for information concerning activation analysis. Twenty-one of these have been developed into requests for analysis, eight of which have been completed.

TABLE 10. CYCLOTRON-RADIOISOTOPE ORDERS

MATERIAL	AMOUNT (mc)	SERVICE IRRADIATIONS	STATUS
Be^{7}	8		Material to be requested
Na^{22}	18.703		Material in process
Mg^{28}		1	Material has been requested
Ti^{44}		1	Material has been requested
Cr^{48}		1	Material has been requested
Mn^{54}	2		Material in process
As^{73}	2		Material to be requested

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			10	500.25	4	300.00
Mn^{52}					2	20.00		
Mn^{53}			1	8.00				
Mn^{54}	1	50.00	2	182.40			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
Potassium chloride	1	1.00						
Sulfur					1	2.00		
Total Received	11	455.75	15	657.40	47	1078.80	23	984.40

TABLE 11 (continued)

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 Requested but not Received								
Ti^{44}			1	10.00				
Mg^{28}			1	10.00				
Cr^{48}			1	10.00				
Total hours outstanding (not received or requested)		1044.25		812.60		421.20		515.60

TABLE 12. PRODUCTION AND SHIPMENT OF CYCLOTRON-PROCESSED RADIOISOTOPES

MATERIAL	NUMBER OF SHIPMENTS SEPTEMBER 1952	TOTAL PRODUCT (mc)		NO. OF SERVICE IRRADIATIONS	
		September 1952	To Date	September 1952	To Date
Be^{7}			368.743		4
Na^{22}			84.154		
Mn^{52}			10.991		
Mn^{54}			19.22		
$Fe^{55,59}$			63.64		4
Co^{57}			4.144		
Zn^{65}			42		4
Ga^{67}	8			8	28
As^{73}			4.760		
As^{74}					1
Sr^{85}			6		
Sr^{88}			25		
Sr^{90}					1
Mo^{95}					9
KCl					1

SF MATERIAL CONTROL

Two carload-lot shipments of SF material were received from Hanford, one containing irradiated uranium slugs for operation "Bluenose" and the other containing irradiated uranium slugs for the RaLa process.

An additional 650 silicon-bonded, aluminum-jacketed, normal uranium slugs were received from Y-12 during September for use in reloading the ORNL graphite reactor.

During September 7.003 kg of 93%-enriched uranium was received for use in fabricating fuel elements for the Idaho materials-testing reactor.

Thirty-three MTR fuel assemblies and four control rods were shipped to Phillips Petroleum Company, Scoville, Idaho, which makes a total of 184 fuel assemblies and 31 control rods shipped to date.

Shipments of normal uranium to the California Research and Development Company, San Francisco, California, amounted to 4398 grams.

On September 5, 12 samples of depleted uranium and plutonium contained in UNH solutions from the Scrup process were shipped to Chalk River, Canada, for check analyses in accordance with the agreement negotiated between the USAEC and the National Research Council of Canada relative to the purchase of Chalk River fuel rods.

Shipments of separated plutonium to Los Alamos consisted of 1652.62 g of Scrup and 208.9 g of Purex materials. It is to be noted that some controversy has arisen with Los Alamos relative to acceptance of further shipments of plutonium because of concentrations that were lower than desired and because of reported contamination by other materials. The Research and Medicine Division, Oak Ridge Operations Office, is attempting to clear the matter through the Washington Office. Shipments to Los Alamos have been suspended until further notice. The ORNL SF Office is holding eight containers of plutonium (approximately 600 g) in storage, and unless the difficulty is resolved soon, it may become necessary to store plutonium in the vault of Building 2068.

The adoption of the USAEC SF Accountability Manual, GM-PRO-2, resulted in delay of preparation and submittal of the August SF Accountability Report by 11 calendar days. Even then, quota information, as required by the new manual, was omitted from the report; however, the quota information was furnished as a separate item.

Other major activities during September consisted of preparing and submitting ORNL's special materials requirements and a listing of outstanding-material requests. In addition, the quarterly radium report was completed except for typing. Early in the month, a survey was started among the various research divisions to determine the over-all Laboratory requirements for fissionable material during calendar year 1953; the results of the survey are to be submitted early in October.

SF surveys during the month consisted in visiting five persons possessing SF material. The material in their possession was inspected and weighed when feasible; no apparent discrepancies were encountered. In addition, the records of three analytical laboratories were audited; this disclosed that all records were in good order and that proper accounting had been made for all samples.

During September there were 18 receipts and 45 outgoing shipments of SF materials compared with 29 receipts and 56 shipments last month. Tables 13 and 14 are summaries of receipts and shipments for the month.

TABLE 13. SF MATERIALS RECEIVED

FROM	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Battelle Memorial Institute	Thorium crystal bar	1	2.13
Brookhaven National Laboratory	Depleted uranium	1	17.83
	Plutonium in depleted uranium		0.01
Carbide and Carbon Chemicals Co., K-25	Normal uranium	2	3,813.00
Carbide and Carbon Chemicals Co., Y-12	Enriched uranium	4	7,850.54
	Normal uranium	5	761,240.00
	Zirconium-uranium alloy	1	1,175.00
	Plutonium nitrate	1	21.50
General Electric Co. AGT	Enriched uranium	1	0.25
General Electric Co. HGE	Depleted uranium in slugs	2	491,600.00
	Plutonium in depleted uranium		123.00

TABLE 14. SF MATERIALS SHIPPED

TO	MATERIAL	NUMBER OF SHIPMENTS	AMOUNT (g)
Argonne National Laboratory	Depleted uranium	2	22,776.00
	Plutonium in depleted uranium		0.43
Brookhaven National Laboratory	Enriched uranium	1	21.84
	Enriched uranium	1	10.24
California Research and Development Co.	Normal uranium	4	4,398.00
	Thorium		179.00
Carbide and Carbon Chemicals Co., Paducah	Plutonium	1	Negligible
Carbide and Carbon Chemicals Co., Y-12	Enriched uranium	7	760.75
	U^{233} in $UO_2(NO_3)_2$	9	2,124.96
	Plutonium	1	0.02
	Depleted uranium	1	30.03
Los Alamos Scientific Laboratory	Plutonium	5	1,861.52
	Depleted uranium	1	16.81
Phillips Petroleum Co.	Enriched uranium	8	5,774.01
USAEC, Chicago Operations Office	Normal uranium	1	53.00
USAEC Liaison Office, Chalk River, Canada	Depleted uranium	1	43.00
	Plutonium		0.25
USAEC, New York Operations Office	Normal uranium	1	0.37
USAEC, Oak Ridge Operations Office	Depleted uranium	1	10.35