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AEC RESEARCH AND DEVELOPMENT REPORT

OPERATIONS DIVISION

MONTHLY REPORT

FOR MONTH ENDING SEPTEMBER 30, 1951

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

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OPERATIONS DIVISION
MONTHLY REPORT
for
Month Ending September 30, 1951

by
M. E. Ramsey

Date Issued

JAN 18 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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10. There were 676 radioisotope shipments compared to 759 last month (Page 11).

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PILE DEPARTMENT

OPERATING DATA

	SEPTEMBER 1951	AUGUST 1951	YEAR TO DATE 1951
Total accumulated kw-hr	2,439,476	2,628,061	22,371,405
Average kw/operating hr	3724.09	3784.47	3781.92
Average kw/24-hr day	3388.15	3532.34	3414.40
Per cent lost time	9.0	6.7	9.7
Excess pile reactivity	50 in-hr	130 in-hr	
Slugs discharged	188	73	3112
Slugs charged	199	73	3227
Product made (gm)	89.03	95.91	816.47
Product discharged	19.03	8.41	380.87

PILE OPERATIONS

Graphite Pile – The average pile power per operating hour for the month was 3724.1 kw, compared with 3784.5 kw for August 1951.

The pile down-time was 9%, compared with 6.7% in August 1951, and 9.7% for the year to date. The increase in down-time can be attributed to additional time required to discharge two ruptures and to remove a large number of special irradiation slugs which had jammed in the discharge chute.

Two ruptured slugs were detected by visual scanning and discharged on September 10, 1951. The data are given in Table 1.

The canning of bonded slugs at Y-12 has been discontinued until a solution has been found to the blistering problem. Approximately 20% of all slugs tested at 400°C for one week have developed blisters. Tests by the Metallurgy Division indicate that this is accompanied by the presence of tin in the small blistered areas on the surface of the uranium slug. These areas penetrate the Al-Si bond, allowing formation of an Al-U compound.

Four test lots have been canned at Y-12 and tested at 400°C for one week. These indicate that either a lower temperature in the bronze bath or longer time in the Al-Si bath eliminated most of the failures due to blisters. Further tests along this general line will be made. Slugs tested at 550°C gave about the same percentage of rejects as the ones tested at 400°C, instead of the much higher reject rate expected. This is not understood yet, and additional tests will be made to compare the 400°C and 550°C tests.

TABLE 1

RUPTURE NO.	CHANNEL NO.	DAYS IN PILE	APPROXIMATE TEMPERATURE
89	1981	2492	100°C
*90	0870	2558	150°C

*This rupture was completely oxidized. All that remained was the aluminum jacket.

[redacted]

It became necessary to shield the canal water decontamination units because of buildup of an activity which is not easily removed during the normal regeneration cycle. This residual activity is believed to be Co^{60}. It was decided to shield the unit with 4 in. of lead. Several piping changes will be made at the same time to improve operation of the unit.

Admission of demineralized water from holes 19 and 51 to the canal was started September 21, 1951. The canal water hardness has dropped from 102 ppm (as $CaCO_3$) to 76 ppm in five days.

A sample of canal water was evaporated 5:1, and a radiochemical analysis of the concentrate is being made. Better information on the specific composition of the contaminants will permit more efficient operation.

The completion of the three new safety rods being built to replace the four presently in the pile is being held up pending receipt of special cables.

A special irradiation of 200 slugs was completed for the Chemical Corps, and the irradiation of a similar amount will be completed early in October. The whole lot will be shipped about October 8, 1951.

Low-Intensity Training Reactor – The following are LITR operating data to date:

	SEPTEMBER 1951	YEAR TO DATE 1951
Total accumulated kw-hr	218,068	457,102
Average kw/operating hr	492.59	
Average kw/24-hr day	302.87	
Per cent lost time	38.5	
Excess reactivity (September 30)	3.67%	

Regular operation of the LITR began on September 9, 1951. The total down-time for the month was 38.5%, since operation prior to September 9 was sporadic. Several experiments are already in the reactor, and a number of isotopes are being irradiated. It is expected that more experiments will be added very soon, as experimental equipment is completed.

The reactor was operated from September 9 to 15 at a power of approximately 150 kw, prior to a "fuel-element heating tests." At the end of the run, the water was drained very quickly from the reactor tank, causing the reactor to shut down. The heating of the fuel elements, owing to fission-product activity, was then followed until the maximum temperature was reached and the temperature began to decrease. These data were required by the Reactor Safeguard Committee, since the maximum power of this reactor must not be high enough to result in melting of the fuel in case the cooling water is suddenly lost. The permissible power will be well above the current power levels. A similar run is expected to be made at a power of 375 kw from October 3-8.

FILTER HOUSE

Table 2 compares the pressure drop in inches of water, gage, across the exit air filters last month with this month and that experienced when all filters were clean.

FAN HOUSE

Both fans operated normally during the month.

[redacted]

OPERATIONS DIVISION MONTHLY REPORT

TABLE 2

DATE	GLASS WOOL (in. wg)	CWS NO. 6 (in. wg)	TOTAL ACROSS HOUSE
9-30-51	2.8	1.4	5.5
8-31-51	3.0	1.4	5.7
Clean filters	1.1	1.0	3.3

RADIOISOTOPES

Table 3 is a comparison of the radioisotopes and research samples charged into the pile during September 1951 with those handled in August 1951.

At the end of September 1951, there were 386 cans of target material in stringers 13, 14, and 16, compared to 395 cans of target material in these stringers at the end of August 1951.

TABLE 3

	SEPTEMBER 1951		AUGUST 1951	
	RESEARCH	RADIOISOTOPES	RESEARCH	RADIOISOTOPES
Stringers 13, 14, and 16	11	113	17	146
Hole 22	41	0	69	1
All other holes	2	20	7	19
Total by groups	54	133	93	166
Total for month	187		259	

WATER DEMINERALIZATION BUILDING

The operation of the building was normal, with 488,940 gal of water being demineralized, of which 32,175 gal was also deaerated (Table 4).

TABLE 4

WATER PRODUCED (gallons)	SEPTEMBER 1951	AUGUST 1951	YEAR TO DATE
Demineralized	488,940	467,820	5,381,150
Deaerated	32,175	53,510	436,845

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FOR MONTH ENDING SEPTEMBER 30, 1951

CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

RADIOISOTOPES

Iodine (I^{131} - 8d) – Forty-two ORNL slugs were processed and 38,111 mc were shipped.

Processing difficulties were encountered in two runs this month. In one of these runs, the product had a very dark color and had to be redistilled, causing some loss of product. During the processing of the other run, pressure was built up in the equipment due to a vessel off-gas failure, and some UNH was blown outside the shielding into the dissolver liquid level traps. To clean up the contaminated areas, it was necessary to eliminate the second sparging step. It was also necessary to reprocess the final product in the glassware because of a high heavy-metal content. These two difficulties caused a high product loss for the run.

Iodine development work – The Instrument Department has prepared a preliminary layout for instrumentation in the new iodine plant, which was approved by this department.

All finished drawings and specifications are being checked for necessary corrections and additions. Approximately six drawings remain to be made on process piping, instrumentation, and process equipment.

A rapid method for the determination of trace amounts of iodide ion and iodate ion was needed to assay the I^{131} product solution. Since concentrations involved are too low for chemical methods, it was decided that paper chromatography offered the best possibility of success. A number of preliminary experiments were performed, using inactive iodine salts on Whatman No. 1 filter-paper strips and developing the strips with various concentrations of methyl, ethyl, *n*-propyl, and *n*-butyl alcohols. The position of the iodide ion on the paper was determined by adding an acidified iodate solution containing starch as an indicator. The position of iodate ions was determined in the reverse manner.

The rate of diffusion of the iodide ion and iodate ion on the paper was determined independently for each ion using the developing solutions mentioned above. The most favorable differential rate of movement was obtained with an 80% ethyl alcohol–20% water solution. This solution was tested with a mixture of the two ions and resulted in a complete separation of the pair according to the ion location tests.

Mixtures of carrier-free I^{131} in the iodide and iodate oxidation states were separated by this method. The positions of ions were determined by cutting the filter-paper strip into 1-cm lengths and measuring the activity by means of a scaler counter. The activity was plotted as a function of position along the paper. The position of the activity peaks agreed very closely with the predicted positions extrapolated from the experiments with inactive iodine.

The product I^{131} solution tested showed no evidence of iodate ion. The method could be readily adapted for semi-quantitative analyses on a routine basis.

A systematic study of the distillation of I^{131} from simulated dissolver solutions is in progress. The use of reducing agents, such as sulfur dioxide gas, is being investigated in the latter stages of the process to reduce any iodate formed in the solution to iodine which would result in increased yields of I^{131} from uranium slugs. Preliminary results indicate that about 88% of the active iodine may be recovered. The study will be continued on methods for increasing the yield, and the results will be given in a future report.

Phosphorus (P^{32} - 14.3d) – Nine 2500-gm cans of irradiated sulfur were processed and 8406 mc shipped.

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Out of five runs made, two runs were not within specifications. The first run had a heavy precipitate at a pH of 7 and it was necessary to reprocess it three times before it was acceptable; a high loss was incurred. The second poor run also had a precipitate at a pH of 7. The run was reprocessed once through the glassware, this time with a much smaller loss of product. An investigation is being made to determine the cause of the precipitates at a pH of 7.

Phosphorus - Carrier-free – Eighty-six mc of carrier-free P^{32} were produced in phosphoric acid in weak HCl.

Carbon (C^{14} - 5740y) – During the month, 1260.5 mc of C^{14} were produced.

An analysis is being made to identify the troublesome residual activities in the beryllium waste liquor; preliminary indications are that the most important activity is Co^{60}.

Calcium (Ca^{45} - 180d) – Enriched Ca^{44} was used as target material to produce 260 mc of Ca^{45}. The specific activity was 6500 mc of Ca^{45}/gm Ca.

Iron (Fe^{59} - 47d) – Production of Fe^{59}, of sufficiently high specific activity and low enough (2%) in Fe^{55} for human use, continues to be a major problem. A shortage of Fe^{59} made by irradiation of enriched Fe^{58} exists because of changes which were required in irradiation containers for use in Hanford test-holes; this caused delays in scheduling material out of the Hanford piles. Several samples of enriched Fe^{58} are now being irradiated in the LITR in an effort to produce some satisfactory material as soon as possible. The next shipment from Hanford is not scheduled until late in December of this year.

Work continued on methods for producing acceptable iron by Szilard-Chalmers reactions, although hope for success is dim, as pointed out in our report for August. An experiment is now in progress to determine whether ion-exchange resin saturated with iron is a suitable target material.

Yields of Fe^{59} from cyclotron-irradiated cobalt continue to be unsatisfactory. A CoS target which had been irradiated in a fast neutron zone on the Y-12 cyclotron was processed. The total Fe^{59} extracted was 0.025 mc; the specific activity was 1 mc Fe^{59}/gm Fe.

Fission Products – Fission products were separated and purified as listed below:

La^{140} (40.4 hr)	122 mc
Nb^{95} (35 days)	107 mc
Ru^{106} (1 yr)	700 mc
Ru^{103} (42 days)	25 mc
Sr^{89} (53 days)	810 mc
Sr^{90} (25 yr)	3800 mc
Mixed F.P.'s (young)	8540 mc

Manganese ($Mn^{52,54}$ - 5.8d, 310d) – A cyclotron target (chromium) was processed to produce 0.15 mc Mn^{52} and 0.285 mc Mn^{54}.

Chalk River Redox Waste Separations – Operation of the unit on a two-shift basis was resumed after the shutdown for repairs reported last month. Emphasis is being placed on the production of Sr^{90} and Ru^{106}. Material balances for important activities are being made. Preliminary results indicate that ion-exchange methods are not well adapted to processing this highly salted type of waste for the following reasons: (1) low yields, (2) low throughput, (3) high waste-effluent volume, (4) excessive operational requirements, (5) high chemical costs, and (6) radiation damage to resin.

Tritium (H^3 - 12y) – Two Zn-H^3 targets containing a total of 2 curies of H^3 were prepared.

Further work was done on the evaporation of Zr onto tungsten bases for the preparation of very thin Zr-H^3 sources.

The difficulty with the internal gas-counting tube reported last month was found to be caused by overloading the tube with A^{37}. Upon proper dilution of the gas, satisfactory counting could be done. Several batches of A^{37} are now being assayed.

[redacted]

Source Preparations – Co^{60} sources were loaded as follows:

(1) SCAP Foreign Trade, New York Office, 30 needles, total activity of approximately 90 mc;

(2) The Netherlands, 19 sources, 1 curie each;

(3) Transcontinental Gas and Pipeline Corporation, 3 sources, 800 mc each;

(4) Naval Research Laboratory, 2 sources, one 50 mc, one 10 curies;

(5) Newport News Shipbuilding and Drydock Company, 2 sources, 500 mc each;

(6) Standard Steel Works Division, 1 source, 1 curie;

(7) Los Alamos Scientific Laboratory, 2 sources, 8 curies each;

(8) USAF School of Medicine, 6 sources, 10 mc each;

(9) University of Tennessee, 1 source, 250 mc;

(10) University of Tennessee, 1 source, 2 curies.

A 75-mc Cs^{137} special source for a spectrometer was prepared for the California Institute of Technology.

A 4-mc Nb^{95} source was prepared in a thin-window stainless steel container for R.C.A.

Services

Ten gm of Be_3N_2 was prepared for a special irradiation for the University of Illinois.

Five cans of cobalt were prepared for irradiation for Tracerlab.

Enriched U^{235} was decontaminated for an Argonne research group, so that an isotopic analysis to determine burnup could be made.

Miscellaneous

Various methods and equipment were tested for heating glass vessels in high-level cells. The results on those tested were as follows:

Heater	Performance
Steam bath	Very poor
Steam coil nest	Very poor
Steam coil nest, insulated	Very poor
S.S. tube, high current	Good, but high cost
220 v Chromalox flat coil	Good, but high cost
110 v Chromalox nest	Fair
110 v Chromalox, flat coil	Good

The new underground storage garden was completed.

The low-cost bottle "snare," used instead of tongs, was found to be satisfactory.

Clarification of $ZnBr_2$ solution was continued. The Alsop filter, which will expedite this work, has been received.

A bottle of Sr^{90} was spilled on the concrete floor of the Radioisotope Packing and Shipping Building as the bottle was lifted over the top of the concrete barricade. The spill could not be completely decontaminated, and it was necessary to replace the top layer of concrete on about 20 sq ft of floor area.

A radioisotope display was prepared for installation in the Delta Airlines Knoxville office.

The ruthenium equipment on the third level of Building 3026 has been removed, and that corner of the building is being returned to its former condition.

The exterior of Building 3026 is being painted and repaired where necessary.

TANK FARM

General – The transfer of radioactive metal waste supernate from W-10 to the chemical waste

storage pit was resumed on September 24, 1951. The amount transferred from September 24 through September 30 was 43,200 gal, bearing 33.6 curies of beta activity, 17.17 kg of uranium, and 76 mg of plutonium.

The transfer of waste will continue until an adequate amount of free space is made available to transfer the contents of W-7 to W-10.

The installation of the tank farm fence in the vicinity of W-16, W-17, and W-18 tanks was completed.

The valve pit west of Building 3026 was shielded with 2 in. of lead to prevent a recurrence of a high radiation background during RaLa runs.

The installation of the W-12 float and automatic jet controls has begun. Following the backfilling of the original excavation at W-12, a large leak into the tank was detected. A re-excavation was made and a broken terra cotta sampler line was replaced with stainless steel pipe, and the hole again backfilled.

Excavation was started at tank WC-4, west of Building 3026-C, to replace the present troublesome manometer liquid-level device with the float and gage board-type of device used on tanks W-16, W-17, and W-18.

Waste Discharged to White Oak Creek – A total of 13.0 curies of beta activity was discharged from the settling basin this month. During the early part of the month, much of the activity was traced to operational difficulties with an ion-exchange unit located in the Building 3001 canal. Several other times during the month, high activities occurred at the settling basin; the source of these high activities could not be located.

High activity at the retention pond occurred again due to a leaking jet at the W-9 jet pit. The leak has been repaired.

Chemical Waste Evaporator – An auxiliary tie-in was made from the main 125 lb steam line to the chemical waste evaporator. This tie-in will enable the evaporator to keep operating despite a 250 lb steam line shutdown. The only time an evaporator shutdown should occur now is when the whole plant steam system is shut down.

An investigation was made, with the cooperation of Building 3019 supervision, to determine the source of the high waste volumes into tanks W-1 and W-2. All water service was cut off and water turned back on the equipment at intervals with the volume of waste in W-1 and W-2 being measured frequently. The large source of water has not been located as yet, but it was noted on these shutdowns that the flows were stopped and sometimes

TABLE 5

Activity Discharged to White Oak Creek

DISCHARGED FROM	SEPTEMBER 1951		AUGUST 1951	
	GALLONS	BETA CURIES	GALLONS	BETA CURIES
Settling basin	26,800,000	13.60*	28,600,000	17.45
Retention pond	405,000	0.26	363,000	0.46
Total		13.86		17.91

*Less than 0.35 curies contributed by the evaporator.

did not recur for several hours after the startup. Only one minor source of unnecessary discharge to the waste tanks was found, and the equipment was repiped to the cold drain system. This, however, did not account for all the excessive volume being received.

TABLE 6

Waste Evaporator Operation

GALLONS FED TO EVAPORATOR	GALLONS OF CONCENTRATE TO W-6	VOLUME REDUCTION	BETA CURIES TO EVAPORATOR	BETA CURIES TO SETTLING BASIN
September				
340,700	19,800	12.2:1	10,140	0.34
August				
204,500	12,000	17.0:1	6,619	2.79

Waste Tank Inventory

TABLE 7

Waste Storage

TANKS	GALLONS CAPACITY	SEPTEMBER FREE SPACE	AUGUST FREE SPACE
HOT-PILOT-PLANT STORAGE			
W-3, 13, 14, 15	48,500	6,800	8,600
CHEMICAL-WASTE STORAGE			
W-5	170,000	74,000	49,000
EVAPORATION-CONCENTRATION STORAGE			
W-6, 8	340,000	103,500	101,000
METAL-WASTE STORAGE			
W-4, 7, 9, 10	543,000	217,000	180,000

RaLa (Ba^{140} - 12.5d) – Resin cubicle No. 200 was removed to burial ground No. 3, and was dismantled by using extensions on welding rods as cutting rods. Because of the high radiation, the working time was limited to one minute at 10 ft from the equipment. Following removal of the "hottest" sections, the working time was increased so that the remaining equipment was removed in a

more orderly fashion and sent to the decontamination building 3036 for cleanup and salvage.

The lead shot, shroud, fittings (particularly the tantalum tubing and tantalum-lined fittings), the cubicle top, sampler chest, and waste tanks were all salvaged.

A new cubicle frame was fabricated and the waste tanks revised to accommodate the changes in the procedure and flowsheet. A new and larger feed tank and a stainless steel column have been fabricated and installed.

At the end of the month, piping of the cubicle was progressing as rapidly as availability of equipment and manpower permitted. The back plate of the sampler chest was removed to allow inspection of the sampler jets.

No RaLa run is scheduled as yet, and it is hoped that the new equipment will be available for the run when scheduled.

[redacted]

FOR MONTH ENDING SEPTEMBER 30, 1951

RADIOISOTOPE CONTROL DEPARTMENT

GENERAL

During September 1951, there were 676 radioisotope shipments, compared with 759 during August 1951, and 671 during September 1950.

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

TABLE 8

	SEPTEMBER 1951	AUGUST 1951	SEPTEMBER 1950	AUGUST 1946 TO SEPTEMBER 1951, INCLUSIVE
Separated material	546	616	493	20,469
Unseparated material	130	143	178	6,052
Total shipments	676	759	671	26,521

The breakdown of shipments according to nonproject, project, and foreign shipments is shown in Table 9.

TABLE 9

	SEPTEMBER 1951	AUGUST 1951	SEPTEMBER 1950
Non-project	555	633	503
Project	111	114	151
Foreign	10	12	17
Total shipments	676	759	671

HANFORD IRRADIATIONS

No samples were received during the month of September.

CYCLOTRON RADIOISOTOPES

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

Material	Amount	Status
Na 22	11.2 mc	Material has been requested
Mn 54	8.0 mc	Material in process
Co 57	5.0 mc	Material in process
Fe 59	71.75 mc	Material has been requested

[redacted]

[redacted]

OPERATIONS DIVISION MONTHLY REPORT

TABLE 10

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	47.20	9	285.00		
Na 22	2	190.00			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54	1	50.00					4	200.00
Co 57	1	10.00					3	100.00
Fe 59			7	332.80	1	40.00	1	34.00
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	7	409.75	9	427.80	22	585.75	17	724.00

Requested But Not Received

Ga 67					2	68.00		
Na 22					1	10.00		
Molybdenum					1	10.00		
As 73					1	10.00		
Total hours		1,090.25		1,072.20		816.25		776.00
Outstanding (Not received or requested)								

[redacted]

TABLE 11

Shipments of Cyclotron-Processed Radioisotopes

MATERIAL	NO. SHIPMENTS SEPTEMBER 1951	NO. MILLICURIES SEPTEMBER 1951	NO. MILLICURIES TO DATE
Be 7	-	-	237.293
Na 22	-	-	49.763
Mn 52	-	-	9.991
Co 57	1	0.1 mc	3.1
Fe 59	4	0.54 mc	2.64 mc and 2 units
Zn 65	-	-	35 mc and 3 units
Mn 54	-	-	2.72
Fe 55-59	-	-	61.0
As 73	-	-	0.650
Sr 85	-	-	6.0

ACTIVATION ANALYSES

Experimental work continues on samples received from California Research and Reynolds Metal Company.

S-F MATERIAL CONTROL

During September, an additional 369 Al-Si bonded slugs were received from Y-12 for testing and subsequent loading into the 3001 pile.

On September 24, 1951, an express car was received from Chalk River, Canada. The car contained three containers with a total of 210 irradiated slugs for the SCRUP Program.

During September, three uranium metal buttons containing 6934.20 gm of 90.1 to 95% enriched uranium were received for fabrication of Idaho MTR fuel elements. This material is being held in storage pending final material balance determination on material now undergoing fabrication.

On September 17, 100.10 gm of 90.1 to 95% enriched uranium metal was received for preparation of foils for KAPL requests, SR-SNY-361 and SR-SNY-365.

On September 11, 27 thorium metal billets were received from Ames Laboratory, Iowa State College, Ames, Iowa. This material is for use by the Metallurgy Division and is to serve as partial replacement for approximately one ton of thorium billets and scrap shipped to Tonawanda Area and Ames Laboratory at the request of the USAEC during August of this year.

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

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

[redacted]

OPERATIONS DIVISION MONTHLY REPORT

During the month, there were 21 receipts and 14 outgoing shipments, compared with 23 receipts and 28 shipments last month.

On September 17, personnel from the USAEC, ORO SF Accountability Branch began an audit of SF accountability records and a review of procedures at ORNL. It is expected that the audit will be completed during the first week of October 1951.

The following special reports were prepared and submitted by the SF Office during September:

ORNL, X-10 Area, Basic and Special Fissionable Material Requirements for Calendar Year 1952.

ORNL Special Reactor Material Requirements for the Three-Year Period Beginning January 1, 1952.

ORNL Polonium Source Requirements for the Balance of Calendar Year 1951 and the First Six Months of Calendar Year 1952.

Radium and Radium Compound Inventory Report for the Quarter Ending September 30, 1951

Special Report Covering Analysis of Heavy Water, by Drum Number in Storage, and in Use at ORNL.

Tables 12 and 13 give a summary of receipts and shipments of SF materials for the month of September 1951.

TABLE 12

Receipts

FROM	MATERIAL	AMOUNT (gm)
Argonne National Laboratory	Depleted uranium (alloy)	6.79
Battelle Memorial Institute	Enriched uranium (graphite-uranium)	16.46
Battelle Memorial Institute	Thorium metal	50.00
C&CCC, Y-12 Area	Enriched uranium (metal)	6,463.28
C&CCC, Y-12 Area	Enriched uranium (metal)	93.37
C&CCC, Y-12 Area	Enriched uranium (UF_4)	2.25
C&CCC, Y-12 Area	Enriched uranium (Al-foil)	0.014
C&CCC, Y-12 Area	Normal uranium (UF_4)	3.45
C&CCC, Y-12 Area	Normal uranium (slugs) net	100,100.00
C&CCC, Y-12 Area	Normal uranium (slugs) net	142,330.00
C&CCC, Y-12 Area	U-233 (plated disc)	0.014
C&CCC, Y-12 Area	Normal uranium (U-Zr)	114.00
C&CCC, Y-12 Area	Normal uranium (slugs) net	202,550.00
C&CCC, Y-12 Area	Depleted uranium (metal)	100.975
General Electric Company (AGT)	Enriched uranium (UO_2)	0.2774
General Electric Company (AGT)	Enriched uranium (UO_2)	0.1447
Iowa State College	Thorium metal (billets)	531,670.00
Los Alamos Scientific Laboratory	Pu wire	0.0572
Mallinckrodt Chemical Works	Normal uranium (Purex samples)	2,563.00
U. S. AEC., OROO	Depleted uranium (UO_3)	204.60

[redacted]

TABLE 13

Shipments

TO	MATERIAL	AMOUNT (gm)
Argonne National Laboratory	Depleted uranium (slugs)	20,988.00
Argonne National Laboratory	Pu (slugs)	0.36
Argonne National Laboratory	Depleted uranium (slugs)	758.00
Argonne National Laboratory	Pu (slugs)	0.01
Battelle Memorial Institute	Thorium $[Th(NO_3)_4]$	895.30
C&CCC, Y-12 Area	Depleted uranium (metal)	13.356
C&CCC, Y-12 Area	Normal uranium (UO_3)	3,667.00
C&CCC, Y-12 Area	Normal uranium (slugs)	7,036.50
C&CCC, Y-12 Area	Pu $(SO_4)_2$	0.0015
C&CCC, Y-12 Area	Normal uranium (rods)	4,150.00
C&CCC, Y-12 Area	Normal uranium (plate)	63.00
C&CCC, Y-12 Area	Normal uranium (slugs)	7,046.88
C&CCC, Y-12 Area	Normal uranium (plate)	53.40
C&CCC, Y-12 Area	Normal uranium (slugs)	7,046.88
C&CCC, Y-12 Area	Normal uranium (plate)	61.00
C&CCC, Y-12 Area	Normal uranium (UO_2SO_4)	14.85

[redacted]