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ORNL 982

Series A 7

Progress Report

AEC RESEARCH AND DEVELOPMENT REPORT

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LABORATORY RECORDS 1954

OPERATIONS DIVISION

MONTHLY REPORT FOR MONTH ENDING FEBRUARY 28, 1951

DECLASSIFIED

To.

OAK RIDGE NATIONAL LABORATORY

OPERATED BY

CARBIDE AND CARBON CHEMICALS DIVISION

UNION CARBIDE AND CARBON CORPORATION

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending February 28, 1951

by

M. E. Ramsey

DATE ISSUED

MAR 26 1951

MARTIN MARIETTA ENERGY SYSTEMS LIBRARIES

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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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SUMMARY

1. Lost pile-operating time averaged 9.5%, compared to 10.4% in January and 10.0% for the year-to-date. (Page 4.)

2. A ruptured slug was located and discharged without difficulty. (Page 5.)

3. The Pile Department is expected to assume responsibility for operation of the Low Intensity Training Reactor during the coming month. (Pages 5 and 6.)

4. The C^{14} separations equipment was in operation full time during the month with almost a curie of C^{14} being separated from the Be_3N_2 slugs. The process difficulties are discussed, as well as tentative plans for recovery and re-use of the beryllium for future C^{14} production. (Pages 9, 10, 11, and 12.)

5. Repair work on the fission product equipment in Building 3026 is approximately 85% completed. (Page 13.)

6. Test runs through the Chalk River waste separations equipment are scheduled to start the first of April, 1951. (Pages 14 and 15.)

7. The activity discharged to White Oak Creek was 5.2 curies, compared to 7.9 curies during the previous month. The discharge from the evaporator was 0.05 curie, compared to 0.08 curie for the previous month with decontamination factors being 8,265 and 7,015, respectively. (Pages 19 and 20.)

8. Los Alamos has indicated a need for 30,000-curie batches of RaLa instead of the 10,000-curie batches for which the equipment was designed. (Pages 21 and 22.)

9. The RaLa product-drying equipment appears to be satisfactory, since the installation of the correct heating elements. (Pages 21 and 22.)

10. There were 793 radioisotope shipments, compared to 836 shipments last month. (Page 23.)

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A. PILE DEPARTMENT

I. Operating Data:

	JANUARY 1951	FEBRUARY 1951	YEAR-TO-DATE 1951
Total Accumulated KWH	2,711,088	2,426,390	5,137,478
Average KW/Operating Hour	4066.4	3989.7	4029.8
Average KW/24-Hour Day	3643.9	3610.7	3628.2
Percent Lost Time	10.4	9.5	10.0
Excess Pile Reactivity	~155 inhours	~152 inhours	
Slugs Discharged	104	1696	1800
Slugs Charged	203	1701	1904
Product Made (Grams)	98.94	88.55	187.50
Product Discharged (Grams)	6.33	253.56	259.89

II. Pile Operations:

The average pile power per operating hour for the month was 3,989.7 KW, compared with 4,066.4 KW for January, 1951.

The pile-down time was 9.5%, compared with 10.4% in January, 1951, and 10.0% for the year-to-date.

The large amount of product discharged from the pile during the month was due to the discharge of 1,495 slugs for Purex Process feed. These slugs had been in the central zone of the pile for approximately 900 days.

The No. 2 control rod Selsyn transmitter burned out on February 13, 1951. The transmitter was replaced and used without calibration for several days. During most of this time it was necessary to use the No. 1 control rod for pile power regulation and it was impossible to hold the pile power as constant as is ordinarily done with the No. 2 control rod, since the No. 1 control rod has only a fast speed of travel whereas the No. 2 control rod has both a fast and a slow speed for more sensitive power adjustments.

[redacted]

II. Pile Operations: - (Continued)

A ruptured slug was found during the regular visual inspection in Channel No. 1174 on February 19, 1951. It was previously indicated by a high probe reading. This was the eighty-first rupture detected to date. The slug had been in the pile 2,355 days at a maximum temperature of 175° C. As a check on the reliability of the scanner, readings were taken in the vicinity of the row containing the ruptured slug, but it did not satisfactorily show the presence of the ruptured slug. This failure may have been due to scanning after several hours' shutdown when the pile was cool.

The Y-12 Group preparing the bonded slugs would prefer that metallographic tests be made at Oak Ridge National Laboratory, since they do not have the necessary equipment or personnel for the tests. They plan to test all slugs by visual inspection, steam at about 250 psi, and, possibly, by X-raying some of the slugs. A small percentage will be sectioned, the welds and bonds inspected, and photomicrographs made.

A check is being made to determine approximately at what rate graphite in the pile will be oxidized with slug jacket temperatures of 350° C. This will result in a maximum graphite temperature of slightly less than 250° C. in the summer, which is currently considered to be permissible.

Pile Department personnel continued to follow operation at the LITR (Low Intensity Training Reactor), preparatory to assumption of responsibility by the Operations Division for LITR operation. Operation procedures and a check list for operation were prepared during the month.

II. Pile Operations: - (Continued)

The disposal of the purge water from the LITR may constitute a problem if as much as twenty gallons per minute are sent directly to the Settling Basin. This has been contaminated with about 500 c/min/ml of beta activity, and would represent an appreciable fraction of the total waste being discharged into the Settling Basin by the whole Laboratory. It will be impossible to tell exactly how much of a problem this presents until after a period of steady operation.

A sudden pressure rise occurred in the Hole No. 11 equipment being operated by personnel from Argonne National Laboratory on February 5, 1951. Since hydrogen has been used in this system recently, it was suspected that the pressure rise was due to ignition of a small amount of hydrogen by partially submerged strip heaters in one of the tanks. No damage was done since the pressure was released through a pop-off valve. The ANL personnel operating the equipment are to be certain that air is excluded from the system as long as hydrogen is being used.

The slug cutter was removed from the canal for replacement of the steel frame with stainless steel and other repairs. The steel framework had rusted badly in the canal and the rust absorbed large quantities of activity from the water, making the cutter difficult to handle. It is expected that repairs will be completed by March 15, 1951. A request from KAPL to cut a Hanford slug into slices has been received and the cutter is expected to be in operable condition before the slug arrives.

III. Filter House:

The following table compares the pressure drop across the exit air filters last month with this month and that experienced when all filters were clean:

Date	Glass Wool (In. w.g.)	CWS #6 (In. w.g.)	Total Across House
2-28-51	2.4	3.8	7.6
1-31-51	2.4	3.8	7.6
Clean Filters	1.1	1.0	3.3

While the pressure drop across the filters has not changed, it is interesting to note that the static pressure at the exit side of the Filter House has increased from 43.2 to 46.1 inches of water. This is principally due to the warmer weather resulting in a higher pile exit air temperature.

IV. Fan House:

Considerable trouble was experienced with the fan dampers automatically closing on February 6, 1951. Apparently, this was due to ice freezing in the air line supplying the damper controls.

The No. 2 fan leaked approximately twelve gallons of oil from the south hearing on February 9, 1951, without any apparent reason. It is possible that the oil system is very sensitive to pressure of the oil supply. If it happens again, a lower pressure will be tested in the supply line to the bearing to determine whether or not this will eliminate such troubles.

Installation of the new fan motor is still being delayed pending information from Allis-Chalmers concerning alterations to the oil system used on the present motors. This work will be expedited.

V. Radioisotopes:

The following table is a comparison of the radioisotope and research samples charged into the pile during February, 1951, with those handled in January, 1951:

	JANUARY, 1951		FEBRUARY, 1951	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	11	221	6	230
Hole 22 (Pneumatic Tube)	66	5	51	2
All Other Holes	6	22	4	22
TOTAL BY GROUPS	83	248	61	254
TOTAL FOR MONTH	331		315	

At the end of February, 1951, there were 414 cans of target material in Stringers 13, 14, and 16, compared to 386 cans of target material in these stringers at the end of January, 1951.

VI. Water Demineralization Building:

The operation of the building was normal with 641,460 gallons of water being demineralized of which 114,420 gallons were also deaerated.

Produced (Gallons)	January, 1951	February, 1951	Year-to-Date
Demineralized	584,840	641,460	1,226,300
Deaerated	---	114,420	114,420

B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

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

Thirty-eight ORNL slugs were processed and 33,048 millicuries shipped. All products were within specifications.

Iodine Development Work

Several additional, preliminary, construction sketches for the layout of the 3028 Plant were made and checked by various members of the Operations Division. A number of changes have been made in the initial layout, and other preliminary designs are still being considered. A project request for the design of the 3028 Plant was approved, and work will proceed at an accelerated rate during the next three months.

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

Twelve 2,000-gram cans of irradiated sulfur were processed and 7,747 millicuries shipped. All products were within specifications.

One four-can run yielded about 4,300 millicuries, which is probably the largest single batch ever produced in one run.

The first batch of fifty cans of the new model, round design, was completed and is now being filled with sulfur preparatory to irradiation in the pile.

3. Carbon (C^{14} - 5,700y)

The following is a list of the C^{14} available in the unprocessed Be_3N_2 slugs:

No. of Be_3N_2 Slugs on Hand	845
Total C^{14} Content in Be_3N_2	38,025 mc
C^{14} in the Form of $BaCO_3$ on Hand at End of Month	150 mc
TOTAL	38,175 mc

I. Radioisotopes: - (Continued)

3. Carbon Development Work

The separation equipment has been kept going full time this month; 938 millicuries of C^{14} were delivered to the Radioisotope Separations Department for shipment.

Most of the troubles in the melting hood have been corrected. Trouble with residual metal on the slugs was corrected by heating the slugs to 1000° C. for one-half to three-fourths of an hour. Crusher clogging has been remedied by using a new anvil containing three-eighth-inch holes in place of three-sixteenth-inch holes in the one originally used.

During all the runs, the outlet C^{14} activity has been high. A bubbler with barium hydroxide placed in the outlet shows no precipitate, indicating that the copper oxide furnace has not done its job. To get a check on how much activity was going through, another copper oxide furnace and a scrubber were put into the line just ahead of the output ion chamber. The analysis of this activity has not been completed, but the ion chamber on the outlet remained at about one-tenth of the most sensitive scale.

It should be an easy matter to install a larger furnace on the mounting of the present one. Also, the increase in area should cut down on the fusing of the copper after it has been reduced. This fusing is caused by local heating when hydrogen is being passed through the system at a high rate. As much as one mole of water has been formed on a five-slug run; the heat formation of this much water is 13,500 calories. When the

I. Radioisotopes: - (Continued)

3. Carbon Development Work

hydrogen starts coming over, it makes up a very large part of the gas passing through the furnace. This local heating in one instance was enough to melt a hole in the quartz tube, although the thermocouple indicated only about 650° C.

To recover the cyanide, a solution of sodium hydroxide was placed in the bubbler between the dissolver and the furnace. This was made acid and the cyanide was distilled into a slightly acid solution of silver nitrate. The precipitate was treated with sulfuric acid again, and this time the gas was caught in weak sodium hydroxide. A rough count indicates that there is between one and two millicuries present; this amount was from ten slugs and seems low compared to a sample which was collected some time ago. The small bubbler evidently was inefficient.

A definite outline of the process necessary to prepare nitride to return to the pile has not yet been established, but it appears that the project will proceed as outlined below.

Beryllium is recovered in the form of a basic carbonate. Either this carbonate or the oxide from it will represent the starting point. According to experiments at both the Brush Beryllium Company and the Clifton Products Inc., chlorination is best brought about by mixing about 48% BeO, 28% carbon, and 24% sugar (as binder) into a paste and pelleting it. These pellets are then heated to 1100° C. to 1200° C. in an atmosphere of chlorine. Beryllium chloride, being volatile, sublimes and passes as a gas from the reaction chamber to a condenser.

I. Radioisotopes: - (Continued)

3. Carbon Development Work

Once the chloride is prepared, several procedures are possible. The process of heating beryllium chloride ammoniate to a high temperature may possibly yield the nitride or a compound rich enough in nitrogen and stable enough to serve as target material. Should this prove not to be the case, the next step will be the production of metal.

Metal has been produced in fairly high purity by electrolysis and also by reduction with sodium, magnesium, and in some cases calcium. Electrolysis is carried out in a fused fifty-fifty mixture of beryllium chloride and sodium chloride. When electrolyzed below the melting point of beryllium, the metal is deposited in flakes.

The reduction by sodium gives a fine powder of high purity, which should be very good for nitriding. However, this represents a little more complicated procedure in operation as well as in recovering the product.

During the next month, a chlorinating run will be tried on product recovered from waste to make sure it will chlorinate well, as it is now being handled. In the reports on work being done on chlorination, there have been cases of beryllium oxide from a different source being tried, in a process which had been giving good results, which did not chlorinate well. Chlorinations which have been tried before have been at temperatures far below what is suggested in more recent reports.

From the above test, a quantity of beryllium chloride can be obtained which will allow further investigation on the thermal decomposition of beryllium chloride ammoniate.

I. Radioisotopes: - (Continued)

4. Sulfur (S^{35} - 87.1d)

Elemental sulfur was produced which contained a total of 2,600 millicuries at a specific activity of approximately ten curies/gram.

5. Fission Products

Repair work on the fission product equipment in Building 3026 was continued. After decontamination was completed in this cell, it was found that more extensive repairs than had been anticipated were required. The work on this job is approximately 85% completed.

One purification run was made by adsorbing the gross activities from a 0.2 M citrate solution at a pH of 1.0. Elution of the column was done under the best conditions of flow rate, resin mesh and temperature. The yttrium activity at the peak was at best 94% pure.

Other column separations made yielded only $Ce^{141-144}$ and Y^{91}. These fractions, although within specifications as to gross beta absorption curves, contained alpha contamination and heavy metals. They were stored in the shipping barricade to be purified as needed.

a. Strontium 90

Repairs to the Sr^{90} equipment have been completed and two runs were made, the first about six curies and the second about eight curies.

The usual trouble with sticking stopcocks still persists. There is probably some reaction between the silicone stopcock grease and fuming nitric acid or the

I. Radioisotopes: - (Continued)

5. Fission Products

a. Strontium 90

fumes from the acid. During, and for a short time after the step involving the fuming nitric acid, the stopcocks begin sticking. When this part of the process is past, the tendency to stick disappears. Thus far, the sticking problem has been averted by simply moving the stopcocks frequently during the time fuming nitric acid is being used, and between runs the stopcock plugs are partially withdrawn.

b. Cerium ($Ce^{141-144}$ - 30.6d, 27d)

Cerium 144 was produced with the following analysis:

Total Ce^{144}----------1,130 mc
Total Ce^{141}----------Not detected
Concentration--------4.72 mc/ml
Gross Alpha----------440 cts/min/ml
Heavy Metals---------10 ppm
Acidity----------0.99 N HCl
Total Solids---------1.1 mg/ml
Nonvolatile Matter---0.2 mg/ml

6. Chalk River Waste Separations

All equipment has been received for this job with the exception of the DC motor for the Vanton pump; a substitution has been made for this item with a direct current motor obtained from spare parts and it seems to function satisfactorily. All heavy equipment has been installed, including the main column, and the piping has been finished. Test runs are being made on the Vanton pump to measure the throughput on the main ion exchange column and evaluate the pressure drop in the system. It is necessary yet to install glassware and electronic equipment before chemical test runs can be made. Test runs are

I. Radioisotopes: - (Continued)

6. Chalk River Waste Separations

scheduled to start April 1, 1951, providing all the remaining work can be finished by that time.

7. Fission Product Purification Cell, Building 3028

All work has been completed on this job with the exception of the lead doors and modifications on portable lead shielding.

8. SF Waste Dissolver Unit, 3053 Annex

The installation of this equipment is virtually complete and tests will be made within a few weeks.

9. Cadmium (Cd^{115} - 43d)

A cadmium 115 preparation was made with the following analysis:

Total Cd^{115}	7.08 mc
Concentration	0.0788 mc/ml
Specific Activity	7.95 mc/gm
Acidity	0.291 N (HNO_3)
Purity	99%

10. Iron (Fe^{55} - 4y)

Enriched iron 55 was produced with the following analysis:

Total Fe^{55}	20.7 mc
Total Fe^{59}	0.036 mc
Concentration Fe^{55}	0.345 mc/ml
Concentration Fe^{59}	0.0006 mc/ml
Specific Activity Fe^{55}	187 mc/gm
Specific Activity Fe^{59}	0.0324 mc/gm
Acidity	0.284 N (HCl)
Co^{60}	0.1%

I. Radioisotopes: - (Continued)

11. Arsenic (As^{73} - 90d) (Cyclotron)

The arsenic 73 product reported last month had the following analysis:

Total As^{73}----------0.618 mc
Total As^{74}----------0.595 mc
Concentration As^{73}--------0.00824 mc/ml
Concentration As^{74}--------0.00793 mc/ml
Specific Activity As^{73}----4.1 mc/gm
Specific Activity As^{74}----3.9 mc/gm
Acidity----------5.4 N (HCl)

12. Strontium (Sr^{85} - 66d) (Cyclotron)

The strontium 85 product reported last month has the following analysis:

Total Sr^{85}----------8.19 mc
Concentration----------0.0819 mc/ml
Acidity----------0.051 N (HCl)

13. Products in Preparation

The following products have been prepared; however, the analyses are not complete:

a. Thallium 204.
b. Chromium 51 (2 batches).
c. Manganese 52-54.
d. Sulfur 35 (sulfate).

14. Miscellaneous Work

a. Source Preparations

(1) Cobalt 60 sources were loaded in special holders as follows:

Industrial X-Ray Laboratory----------1 source, 500 mc
Ericson Research Laboratories----------1 source, 200 mc
Newport News Shipbuilding & Drydock Co.-----2 sources, 500 mc ea
Fluor Corporation----------1 source, 500 mc
American Brake Shoe Company----------1 source, 500 mc
Ross Meehan Foundries----------1 source, 500 mc
National Bureau of Standards----------3 sources, 2-7 C ea & 1-4 C
Los Alamos----------3 sources, 1-100mc,1-200mc, & 1-500mc
Los Alamos----------4 sources, 60-70 mc ea
Federal Telecommunications Laboratory-------1 source, 1 curie
University of California, Los Alamos--------2 sources, 1 curie ea
Farrell-Cheek Steel Company----------1 source, 500 mc [redacted]

I. Radioisotopes: - (Continued)

14. Miscellaneous Work

a. Source Preparations

(2) Cobalt 60

Five standard sources were made for the Omart Corporation: three 10-microcurie, one 50-microcurie, and one 100-microcurie.

(3) Niobium 95

A standard source mount (4 mc) was prepared for the Radio Corporation of America.

(4) Calcium 45

A standard source mount (1 mc) was prepared for Anton Electronic Laboratories.

(5) Cesium 137

A standard source mount (75 mc) was prepared for California Institute of Technology.

(6) Strontium 90

A special source mount (1 curie) was prepared for Los Alamos.

b. Special Preparations

(1) P_2O_3 (4 ampoules) was prepared for irradiation for the U. S. Department of Agriculture.

(2) Special tantalum wire was prepared for irradiation for Harvard University.

c. Tritium Packaging

New England Medical Center, 100 millicuries.

II. Tank Farm:

1. General

a. The proportional sampler on the outler weir at the Settling Basin has been tested by the Health Physics Division, but has not been put into service yet.

b. The work to raise the thirty-six-inch manhole at W-10 to the surface of the ground has been completed. Several lines to and from the Metal Recovery Building were installed into the manhole manifold.

c. The thirty-six-inch manhole on W-5 tank was replaced this month with a new one through which ten pipes, two to three inches in diameter, have been cast. Connections have been made to four of these pipes.

d. An underground leak into the twelve-inch manhole on W-4 tank has been located. The broken terra-cotta pipe has been replaced with stainless steel tubing and the excavation back-filled.

e. The electrical supply to the evaporator building was rerouted from overhead to underground conduit so that cranes could be used to pull the blocks on top of the evaporator with less difficulty.

f. Excavation has begun in the South Tank Farm for the installation of the 3026 Building monitoring waste tanks.

g. Two two-inch stainless steel lines were tied in from the W-6 tank to the Metal Recovery Building. One line will serve as an outlet from the tank and one an inlet.

[redacted]

II. Tank Farm: - (Continued)

1. General

h. The electric pump purchased to transfer metal slurry from W-7 to W-10 did not perform as was expected. An air-driven sump pump was installed instead. After some difficulty, pumping of the precipitated sludge was begun. Over 30,000 gallons of solution and precipitate were transferred to W-10 before the pump failed. It is difficult to find a pump with parts which will stand up under the corrosive action of the solution in the tank. The pump will be repaired and pumping efforts continued until a minimum of precipitate remains.

i. The outside of the evaporator building was painted.

2. Wastes Discharged to White Oak Creek

Approximately 5.07 curies of beta activity were discharged from the Settling Basin this month.

ACTIVITY DISCHARGED TO WHITE OAK CREEK

	FEBRUARY, 1951		JANUARY, 1951	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	17,954,000	5.07*	21,790,000	7.82*
Retention Pond	542,881	0.14	491,743	0.06
TOTAL		5.21		7.88
* Contributed by Evaporator		0.05		0.08

3. Chemical Waste Evaporator

Operation of the evaporator was normal this month. Good evaporation rates and volume reductions were obtained. An average decontamination factor of 8,265 was obtained.

[redacted]

II. Tank Farm: - (Continued)

3. Chemical Waste Evaporator

WASTE EVAPORATOR OPERATION

Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
FEB. - 175,463	18,903	8.3:1	3,980.98	0.05
JAN. - 164,348	39,086	3.2:1	540.50	0.08

4. Waste Tank Inventory

HOT PILOT PLANT STORAGE

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged To	Free Space
W-3,13,14,15	48,500	0	360	Evaporator	9,458
CHEMICAL WASTE STORAGE					
W-5	170,000	131,063	175,463	Evaporator	69,600
EVAPORATOR CONCENTRATE STORAGE					
W-6, 8	340,000	30,000	6,000	Evaporator	92,400
METAL WASTE STORAGE					
W-4,7,9,10	543,000	7,184	0	----	249,448

III. RaLa (Ba^{140} - 12.5d):

Los Alamos has indicated through the USAEC that 30,000-curie batches may be desired by May 15, 1951. A formal request has been received to determine the feasibility and additional cost of such large-scale runs in the equipment now under construction. This equipment has been designed for only 10,000 curies.

While the request is being considered, design work has been started on a large water-cooled slug carrier which would permit shipment of a greater number of slugs for the production of these large-sized batches. Fabrication of the carriers will be held up, however, until more definite decisions are made.

Work continued on the construction of the resin column cubicles throughout the month. Work on one cubicle is now essentially complete but is being held up by delivery of some tantalum fittings which are due March 12, 1951. The other cubicle is about 30% complete; its completion date is estimated to be no earlier than April 1, 1951, and is contingent upon the accuracy of the estimated delivery date of the tantalum evaporator.

Several drying tests were conducted with the new product-drying equipment. After the first two tests, the heater element scaled off and had to be replaced. It was determined that the manufacturer has not supplied the heating element specified in the purchase order. The proper element was procured and more drying tests were conducted. These tests indicated that 500 milliliters of an aqueous solution containing 3.8 grams of $Ba(NO_3)_2$ could be dried in eight hours using an outlet air temperature of 415° C. and an airflow of approximately five CFM. The product distribution was fairly good, being principally in the bottom of the cone with evidence of very little spattering on the cone sides or charging head.

[redacted]

III. RaLa (Ba^{140} - 12.5d): - (Continued)

The decontamination room floor was replaced with a new acid brick floor.

New flat plate filters of 347 stainless steel sintered filter media are being constructed.

Rubber mat insulating guards are being placed over the formerly exposed electrical buss bars on the building crane monorails.

A new Aerofin heater was installed in the building heating system replacing the original unit which was operating unsatisfactorily.

Phoenix carrier No. 4 is being fabricated. The stainless steel shell is almost completed.

[redacted]

C. RADIOISOTOPE CONTROL DEPARTMENT

I. General:

During February, 1951, there were 793 radioisotope shipments, compared with 836 during January, 1951, and 616 during December, 1950. In February, 1950, there were 548.

The breakdown according to separated and unseparated material is as follows:

	February 1951	January 1951	February 1950	August, 1946, to February, 1951, Inclusive
Separated Material 706-D Area	598	652	428	16,111
Unseparated Material 100 Area	195	184	120	4,945
TOTAL SHIPMENTS	793	836	548	21,056

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

	February 1951	January 1951	February 1950
Non-Project	621	680	436
Project	155	146	94
Foreign	17	10	18
	793	836	548

II. Hanford Irradiations:

On February 19, 1951, we received the two samples which were shipped in error from Hanford to Argonne National Laboratory during the month of January. This shipment consisted of one piece of ORNL-127 (iridium 192) and one piece of ORNL-60 (KCl).

Representatives of the Radioisotope Control Department visited Hanford to discuss scheduling of irradiations. It is felt that this visit was well worthwhile, since the Hanford people handling these

II. Hanford Irradiations: - (Continued)

irradiations were not aware that considerable latitude in scheduling is permissible. During the month of January, the number of inhours consumed at Hanford was 104; this is considerably higher than was used during the last few months.

III. Cobalt 60:

A supply of 1/8" x 5/8"-long cylinders of cobalt 60 were received from Hanford. This material is being chopped up to provide one half and one curie sources. This material, as well as the previous material from Hanford, will be completely inventoried and segregated according to sizes within the next few weeks.

IV. Activation Analyses:

It is expected that a representative from the Reynolds Metal Company, Sheffield, Alabama, will visit the Laboratory in the near future bringing about six samples for analysis. As mentioned in previous reports, this may lead to a considerable number of analyses being made for Reynolds Metal Company.

V. Cyclotron Radioisotopes:

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

Material	Amount	Status
Mn 54	1.5 mc	Material in process.

V. Cyclotron Radioisotopes: - (Continued)

BOMBARDMENTS RECEIVED

	M. I. T.		U. of CALIF.		U. of PITTSBURGH		WASHINGTON U.	
	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours	Bombard-ments	Beam Hours
Be 7					8	235.00		
Na 22	1	109.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							3	150.00
Co 57							2	50.00
Fe 59			5	255.60				
Zn 65	1	100.00						
Sr 85	1	51.75			1	10.00		
As 73					1	10.00		
I 125							2	60.00
Molybdenum Metal					1	13.00	2	20.00
Sulfur					1	2.00		
TOTAL RECEIVED	3	261.50	5	255.60	19	491.75	13	580.00
REQUESTED BUT NOT RECEIVED								
Zn 65			1	40.00				
Co 56-57							1	40.00
Sr 85	1	50.00						
TOTAL HOURS OUTSTANDING (Not Received or Requested)		438.50		454.40		258.25		130.00

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments February, 1951	No. Millicuries February, 1951	No. Millicuries To Date
Be 7			164.073
Na 22	4	4.256	35.353
Mn 52			9.991
Co 57			2.0
Fe 59			1.5 mc and 1 S.I.
Zn 65			6.5
Mn 54			0.92
Fe 55-59			1.0
As 73	3	0.650	0.650
Sr 85	2	6.0	6.0

M. E. Ramsey

M. E. Ramsey, Superintendent
Operations Division

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VI. S-F Material Control:

1. During the month, an additional 10.8 kilograms of 90-95% enriched uranium metal were received from Y-12 for ANP disc fabrication work.

   An additional 1,296 discs, representing 7.327 kilograms of 93.3% enriched uranium, were fabricated and returned to Y-12 during February, thus raising the total number of discs shipped to date to 2,687 containing 33.66 kilograms of enriched uranium. Also, 13.5 kilograms of scrap were returned to production channels for reprocessing.

2. On February 8, 1951, an enriched uranium MTR fuel assembly was received from Chalk River, Canada. This assembly had been fabricated at the Laboratory and was sent to Chalk River for irradiation. The return of this assembly has presented somewhat of a problem accountability-wise, since the quantity of SF material transferred back corresponded with the original amount shipped even though the assembly had been irradiated. In this connection, the U. S. liaison officer stationed at Chalk River has been contacted and it has been requested that he furnish necessary pile data for computing the quantity of U-235 consumed by "burn-up" in order that a more realistic material balance on this item can be obtained. Following receipt of these data, the SF Office will effect, by computation, a material balance adjustment on the assembly.

VI. S-F Material Control: - (Continued)

3. The SF survey referred to in Item 4 of last month's report was completed on February 15, 1951. This survey was conducted by personnel of the USAEC ORO SF Accountability Office. The survey consisted of spot-checking material balance areas, a review of SF procedures, audit of receiving and shipping documents, and audit of inventory reports for the last half of Calendar Year 1950. An official report covering their findings and proposed recommendations has not as yet been received.

4. During the month, 236 irradiated slugs were shipped to KAPL for use in connection with their SPRU Program.

5. On February 27, 1951, 301.67 grams of Chalk River (NRX) plutonium were shipped to Los Alamos. Shipment consisted of Batch Nos. 2RC, 3RC, 4RC, and 6RC-3. This raises the total amount shipped to date (of NRX Pu) to 432.70 grams. Two additional batches are being held for shipment pending return of shipping containers.

6. The SF Office continued its program of surveying material balance areas within the Laboratory. During the month, five persons possessing SF material were visited and their material inspected and weighed where feasible. No apparent discrepancies were encountered. This action concluded the annual cycle of visiting all persons possessing SF material for the purpose of checking material balances, observing storage facilities, and making recommendations pertinent to SF accounting. Such surveys will continue to be made on a monthly basis and the findings will be included in the appropriate monthly report.

VI. S-F Material Control: - (Continued)

7. Records of three analytical laboratories were audited during the month. Results of the audits disclosed that all records were in good order and samples had been properly accounted for.

8. During February, there were twenty-two shipments received and twenty-four shipments made, compared with nineteen receipts and forty shipments last month.

9. Following is a summary of receipts and shipments of SF material for the month of February, 1951:

RECEIPTS

From	Material	Content	
Argonne National Lab.	Depleted uranium (slug)	676.00	gm
Argonne National Lab.	Plutonium (slug)	0.01	gm
Argonne National Lab.	Depleted uranium (wastes)	23,720.00	gm
Argonne National Lab.	Plutonium (wastes)	0.15	gm
Argonne National Lab.	Normal uranium (wastes)	350.00	gm
Batelle Memorial Institute	Thorium metal (rod)	210.00	gm
Batelle Memorial Institute	Thorium metal (rod)	250.00	gm
C&CCC, K-25 Area	Normal uranium (UO_2)	4,404.00	gm
C&CCC, Y-12 Area	Enriched uranium (ANP)	3,618.57	gm
C&CCC, Y-12 Area	Enriched uranium (UO_3)	0.09	gm
C&CCC, Y-12 Area	Enriched uranium (ANP)	6,470.57	gm
C&CCC, Y-12 Area	Normal uranium (UNH)	68,416.90	gm
C&CCC, Y-12 Area	Depleted uranium (UNH)	65,267.50	gm
C&CCC, Y-12 Area	Normal uranium (UNH)	73,885.20	gm
C&CCC, Y-12 Area	Normal uranium (UNH)	91,687.50	gm
C&CCC, Y-12 Area	Normal uranium (UNH)	64,141.00	gm
C&CCC, Y-12 Area	Normal uranium (UNH)	222,451.60	gm
General Electric Co. (KAPL)	Depleted uranium (slugs)	79,288.00	gm
General Electric Co. (KAPL)	Plutonium (slugs)	1.00	gm
Iowa State College	Thorium metal (billets)	11,950.00	gm
Iowa State College	Thorium metal (billets)	34,650.00	gm
Iowa State College	Thorium metal (billets)	36,310.00	gm
Iowa State College	Thorium metal (billets)	32,380.00	gm
Iowa State College	Thorium fluoride	5,100.00	gm
Iowa State College	Thorium metal (billets)	35,490.00	gm
Iowa State College	Thorium metal (billets)	36,610.00	gm

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VI. S-F Material Control: - (Continued)

9. Summary of receipts and shipments for February, 1951.

SHIPMENTS

To	Material	Content
Argonne National Lab.	Depleted uranium	2.00 gm
Argonne National Lab.	Normal uranium	2.00 gm
Argonne National Lab.	Depleted uranium (slug)	619.00 gm
Argonne National Lab.	Plutonium (slug)	0.01 gm
Brookhaven National Lab.	Normal uranium (foil)	0.11 gm
Brookhaven National Lab.	Depleted uranium (slugs)	6,996.00 gm
Brookhaven National Lab.	Plutonium (slugs)	0.90 gm
Brookhaven National Lab.	Normal uranium (foil)	0.11 gm
Brookhaven National Lab.	Normal uranium (foil)	0.11 gm
Brookhaven National Lab.	Normal uranium (foil)	0.11 gm
C&CCC, K-25 Area	Plutonium	0.0001 gm
C&CCC, Y-12 Area	Normal uranium (tubes)	2,470.00 gm
C&CCC, Y-12 Area	Thorium (tubes)	1,200.00 gm
C&CCC, Y-12 Area	Enriched U metal (scrap)	111.99 gm
C&CCC, Y-12 Area	Enriched U metal (discs)	3,327.53 gm
C&CCC, Y-12 Area	Enriched U metal (discs)	3,389.94 gm
C&CCC, Y-12 Area	Enriched U metal (scrap)	6,446.17 gm
C&CCC, Y-12 Area	Enriched U metal (discs)	3,511.55 gm
C&CCC, Y-12 Area	Enriched U metal (scrap)	79.51 gm
C&CCC, Y-12 Area	Normal U (UO_3 slurry)	34.70 gm
C&CCC, Y-12 Area	Enriched U metal (scrap)	5,968.01 gm
General Electric Co. (KAPL)	Depleted uranium (slug)	359.00 gm
General Electric Co. (KAPL)	Depleted uranium (slugs)	275,176.00 gm
General Electric Co. (KAPL)	Plutonium (slugs)	3.49 gm
Kellex Corporation	Depleted uranium	0.009 gm
Los Alamos Scientific Lab.	Plutonium (NRX)	301.67 gm
Tracerlab, Inc.	Normal uranium (U_3O_8)	0.42 gm
Tracerlab, Inc.	Normal uranium (U_3O_8)	0.41 gm
Tracerlab, Inc.	Normal uranium (U_3O_8)	0.41 gm

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