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ORNL 900
Series A
Progress Report
7a

AEC RESEARCH AND DEVELOPMENT REPORT

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LABORATORY RECORDS
1954

OPERATIONS DIVISION
MONTHLY REPORT FOR MONTH ENDING NOVEMBER 30, 1950

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending November 30, 1950

by

M. E. Ramsey

DATE ISSUED

DEC 18 1950

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SUMMARY ORNL-900

1. Lost pile-operating time averaged 11.6%, compared to 11.2% for the year-to-date. (Page 4.)
2. The seventy-seventh ruptured slug was detected and discharged during the month. (Pages 4 and 5.)
3. The second replacement pile-cooling fan was installed during the month. (Pages 5 and 6.)
4. The I^{131} equipment, which failed the last of October, was repaired early in November and normal operations resumed. (Pages 8 and 9.)
5. Studies were continued on the use of a heated ion exchange column for fission product separations. (Pages 14, 15, and 16.)
6. The equipment is being installed for processing the Chalk River wastes. (Pages 16 and 17.)
7. The activity discharged to White Oak Creek was 6.0 curies, compared to 17.2 curies during October, 1950. The discharge from the evaporator was 0.12 curie, compared to 0.21 curie last month. (Pages 19 and 20.)
8. The Chemical Technology Division is working on the RaLa filtration problem but a satisfactory answer has not been found yet. (Page 22.)
9. Los Alamos postponed the next RaLa run to the last of January, 1951. (Page 22.)
10. There were 661 radioisotope shipments during the month, compared with 760 shipments for October, 1950. (Page 23.)

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A. PILE DEPARTMENT

I. Operating Data:

	NOVEMBER 1950	OCTOBER 1950	YEAR-TO-DATE 1950
Total Accumulated KWH	1,970,603	1,982,849	24,233,364
Average KW/Operating Hour	3096.32	3038.08	3403.25
Average KW/24-Hour Day	2736.95	2665.12	3023.12
Percent Lost Time	11.6	12.3	11.2
Excess Pile Reactivity	Approx. 110 inhours	125-135 inhours	
Slugs Discharged	464	337	2735
Slugs Charged	464	337	2863
Product Made (Grams)	71.92	72.37	884.43
Product Discharged (Grams)	17.94	27.11	162.97

II. Pile Operations:

The pile-down time was 11.6%, compared with 12.3% in October, 1950, and 11.2% for the year-to-date. The pile-down time remained relatively high due to the replacement of the second fan with a new Sturtevant fan and to a number of extra shutdowns for research work. Both of the old pile-cooling fans have now been replaced with the more efficient Sturtevant units.

There was one ruptured slug located during the month. It was located in Channel No. 868 on November 27, 1950, having been previously indicated by a high probe reading on November 24, 1950. Visual inspection of the metal channels on November 24, 1950, however, did not locate the ruptured slug. It was not found until a second visual inspection of the metal channels was made on November 27, 1950, during the regular shutdown. The slug was one which at one time had a thermocouple attached, but the thermocouple had broken off several months ago. The jacket was almost completely off when inspected in the canal immediately after discharge. Metal Channel No. 1475 was discharged due to the suspected presence of a ruptured slug. Inspection of the discharged slugs in the canal revealed a badly swelled jacket but the jacket had not ruptured.

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II. Pile Operations: (Continued)

The rupture in Channel No. 868 was the seventy-seventh detected to date. The slugs in this channel had been in the pile for 399 days at a temperature of approximately 150°C.

Since the installation of the second Sturtevant fan, the air flow through the pile has been increased appreciably over comparable periods a year ago. The total increase is in the neighborhood of 10%. Since both the new fans have been in operation, the pile has been operated at approximately 3,800 KW.

During the past month, one member of the Pile Operations Department has closely followed alterations being made to the MTR Mock-Up, which is to be operated as the Low Level Training Reactor. When operation is begun at an expected power not to exceed 500 KW, it will be possible to irradiate a number of materials for the Radioisotope Program. Appropriate stringers will be designed so that sulfur can be irradiated to produce P^{32} and various other materials irradiated to provide high specific activity radioisotopes from n, γ reactions. These irradiations will be of appreciable value to the Radioisotope Program and will permit development of techniques for insertion and removal of radioactive samples from the MTR.

III. Fan House:

Installation of the second fan began on November 13, 1950, and proceeded according to the following schedule:

1. November 14 - Decontamination of the cell was completed and the old fan and ductwork were removed. The cell was turned over to the J. A. Jones Construction Company at approximately noon.

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III. Fan House: (Continued)

2. November 16 - Excavation for fan foundation was completed and concrete pouring was begun.

3. November 20 - Installation of the fan was completed. A trial run showed that the fan bearing at the south end leaked badly.

4. November 21 - A number of expedients were tried which failed to correct the leakage in the south bearing of the fan. These included a change from SAE-20 to SAE-10 weight oil and cleaning the oil drain line of the bearing.

5. November 22 - The oil leakage from the south fan bearing was finally corrected by restricting the oil supply. Following this alteration, the fan was put in service and has continued to operate with only very minor difficulties.

The second fan installation was completed in two days less working time than the first one.

IV. Filter House:

It will be necessary to change the CWS #6 filters within the next six months. In the past twenty-four months since their installation, the pressure drop across these filters has increased from 1.0 to 3.70 inches of water.

The following table compares the pressure drop across the exit air filters last month and this month with that experienced immediately after replacement of filters:

Date	Glass Wool (in. w.g.)	CWS #6 (in. w.g.)	Total Across Filter House
Clean Filters	1.1	1.0	3.3
10-31-50	2.0	3.6	6.8
11-30-50	2.1	3.7	7.1

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V. Radioisotopes:

The following is a comparison of the radioisotope and research samples charged into the pile during November, 1950, with those charged during October, 1950:

	NOVEMBER, 1950		OCTOBER, 1950	
	Research	Radioisotopes	Research	Radioisotopes
Stringers 13, 14, and 16	7	117	13	194
Hole 22 (Pneumatic Tube)	77	4	77	2
All Other Holes	11	18	9	25
TOTAL BY GROUPS	95	139	99	221
TOTAL FOR MONTH	234		320	

At the end of November, 1950, there were 341 cans of target material in Stringers 13, 14, and 16, compared with 369 cans of target material in these stringers at the end of October, 1950.

VI. Water Demineralization Building:

The operation of the building was normal throughout the month with 521,000 gallons of water being demineralized. Since the MTR Mock-Up was down for alterations during the month, none of the demineralized water was deaerated.

Produced (Gallons):	November, 1950	October, 1950	Year-to-Date
Demineralized	521,000	580,080	6,641,100
Deaerated	---	---	370,800

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B. CHEMICAL SEPARATIONS AND RADIOISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

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

Thirty-four ORNL slugs and three Hanford slugs were processed and 23,716 millicuries were shipped. The quantity of product made from the Hanford slugs will be adequate to make all shipments during the first two weeks of December, 1950. During the shutdown time available due to the large amount of I^{131} separated from the HEW slugs, several repair jobs will be made on the equipment.

Equipment failure in the 706-C I^{131} plant stopped production shortly before the end of last month. The Development Group was requested to assist in trouble-shooting and making recommendations. The main source of trouble proved to be a hole between the dissolver steam jacket and the tantalum; the resulting pressure partially collapsed the liner. The spare dissolver and liner were installed, using stainless steel dip tubes instead of the tantalum tubes originally furnished. Stainless steel was used because a full set of tantalum tubes was not available and because the fittings for connecting tantalum and stainless steel were unsatisfactory.

During the shutdown, other repairs were made as follows:

a. Catch-tank drain valve was replaced.

b. Leaking still condenser was replaced.

c. Numerous leaks at welds were stopped.

d. Dissolver sampler line was repaired.

e. Dissolver instrument lines were entirely replaced.

f. Distillate receiver probes were repaired.

g. Black-iron reflux condenser was painted.

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I. Radioisotopes: (Continued)

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

Electro-potential studies were made of tantalum-stainless steel systems in concentrated HNO_3, 10% NaOH and KOH. Results indicated that corrosion from these sources is not serious.

After completion of repairs, a test run was made with three "dead" slugs without difficulty. A "hot" run was made only six days after decontamination of the cell and equipment was was started; the product from this run was satisfactory and shipments were resumed only two days behind schedule.

In collaboration with the Engineering Department, a project construction request was made for building the new iodine plant at Building 910 in the Radioisotope Area. The cost was estimated to be approximately $75,000, of which about $60,000 will be expended in Fiscal Year 1951. A 1,000-gallon, metal-waste, holdup tank (underground) and all necessary piping, fittings, instruments, etc., will be installed under Program "H". The piping will extend from a point five feet outside Building 910 to W-9 in the South Tank Farm. The Engineering Department has started work on the waste system.

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

Sixteen, 2,000-gram cans of irradiated sulfur were processed and approximately 7,068 millicuries were shipped. All runs during the month showed good yields and the products were within specifications.

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I. Radioisotopes: (Continued)

2. Phosphorus Development Work

Operation of this facility was turned over to the Chemical Separations Department. In general, the plant has been successful except for leaks in the extractor flanges. This condition has not been corrected yet.

Testing of cylindrical sulfur-irradiation cans continued. One can was filled to the neck with sulfur (3,000 grams) and another with 2,800 grams. Both were heated at approximately 140°C. The full can showed deformation within twelve hours. The partly-filled can showed no changes after one week. The deformed can was emptied and refilled with approximately 2,800 grams of sulfur, and a Taylor air gage was attached. The unit was heated to 140°C.; after forty minutes, the pressure reached a maximum of five psig and then dropped off for reasons not yet determined. This test will be repeated.

The new sulfur can-filling station is now in operation with satisfactory results.

Standby P^{32} production equipment in the Tank Farm Area is to be dismantled to make room for the new Chalk River waste process operating gallery. This equipment will be reinstalled in Building 906 inside a hood which can later be used for purifying sulfur. The design of this hood is now complete.

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

One hundred and eighty-seven $Ca(NO_3)_2$ slugs were processed to yield about 108 millicuries with an average isotopic ratio of 2.90%. All irradiated $Ca(NO_3)_2$ slugs have now been processed and all future C^{14} will be separated from beryllium nitride slugs irradiated at Hanford. [redacted]

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I. Radioisotopes: (Continued)

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

The 100-slug run made last month for which results were not available yielded about sixty-nine millicuries with an isotopic ratio of 3.21%.

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	901
Total C^{14} Content in Be_3N_2 (Estimated)	40,545 mc
C^{14} in the Form of $BaCO_3$ on Hand at End of Month	494 mc
TOTAL	41,039 mc

Carbon Development Work

The C^{14} produced during the month from nine Be_3N_2 slugs plus some rework was 56,534.5 milligrams of $BaCO_3$, containing 989.1 millicuries C^{14}.

Installation of the hood equipment was completed and tests were made. The removable ingot tray unit was modified to permit easier sliding. The crusher hammer was rebuilt with Stellite teeth; a further change will provide for simple replacement of teeth. The Be_3N_2 receiver does not seat tightly enough against the crusher. This caused some loss of active dust particles inside the hood. This condition will be corrected.

The Lucite final processing dry box and the cubicle for storing Be_3N_2 slugs were also completed.

Design of glassware is virtually complete and awaiting fabrication. Minor changes on the hood were made.

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I. Radioisotopes: (Continued)

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

Three batches of carrier-free $H_2S^{35}O_4$ were produced with the following analyses:

	#1	#2	#3
Total S^{35}	5225 mc	3888 mc	2300 mc
Concentration	27.5 mc/ml	32.4 mc/ml	18.5 mc/ml
Acidity (HCl)	0.167 N	0.114 N	0.723 N
SO^4	0.0 mg/ml	0.0 mg/ml	0.0 mg/ml
Total Solids	1.2 mg/ml	0.0 mg/ml	0.0 mg/ml
NVM	0.0 mg/ml	0.0 mg/ml	0.0 mg/ml
Impurity	0	0.16%	<0.05%

5. Chlorine (Cl^{36} - 10^6y)

A batch of Cl^{36} was produced with the following analysis:

Total Cl^{36}----------1.14 mc
Concentration--------0.0114 mc/ml
Specific Activity----0.23 mc/g
Acidity----------1.46 N
Total Solids---------0.0 mg/ml

6. Thallium (Tl^{204} - 3.0y)

The thallium products reported last month had the following analyses:

	#1	#2
Total Tl^{204}	343 mc	569 mc
Concentration	2.29 mc/ml	3.25 mc/ml
Specific Activity	47.0 mc/g	36.0 mc/g
Acidity	6.59 N Acid (HNO_3)	8.35 Acid (HNO_3)

7. Iron (Fe^{55-59} - 4y, 44d)

Analyses of the enriched Fe^{58} samples which were processed last month and a normal iron sample had the following analyses:

	Enriched (1)	Enriched (2)	Normal
Total Fe^{55-59}	83 mc	83 mc	30 mc
Concentration Fe^{59}	0.83 mc/ml	0.83 mc/ml	0.206 mc/ml
Concentration Fe^{55}	0.076 mc/ml	0.075 mc/ml	0.342 mc/ml
Specific Activity Fe^{59}	2370 mc/g	2340 mc/g	3.65 mc/g
Acidity	0.52 N Acid (HCl)	0.145 N Acid (HCl)	0.73 N Acid (HCl)
Co^{60}	4.83×10^{-6} mc/ml	4.68×10^{-6} mc/ml	5.6×10^{-6} mc/ml

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I. Radioisotopes: (Continued)

8. Silver (Ag^{110} - 225d)

The silver preparation reported last month had the following analysis:

Total Ag^{110}	1846 mc
Concentration	10.55 mc/ml
Specific Activity	182 mc/g
Purity	99.9%

9. Calcium (Ca^{45} - 180d)

W-irradiated calcium was processed. The analysis is not yet complete.

10. Argon (A^{37} - 34.1d)

Argon from W-irradiated calcium was removed and was packaged without analysis.

11. Tellurium (Te^{125} - 58d)

Te^{125} was separated from a tin sample. The analysis has not been completed, and it is anticipated that this analysis will take some time.

12. Strontium (Sr^{90} - 30y)

The preparation reported last month had the following analysis:

Total Sr^{90}	554 mc
Concentration	5.83 mc/ml
Gross Alpha	10 c/min/ml
Sr^{89}	$<1\%$
Total Solids	0.6 mg/ml
NVM	0.0 mg/ml
Acidity	2.65 (HCl)

13. Beryllium (Be^{7} - 52.9d) (Cyclotron)

A cyclotron target was processed. The analysis is not yet complete.

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I. Radioisotopes: (Continued)

14. Fission Products Development Work

Two runs were made this month on the separations system in the 706-C Building. One run was made with UNH from the normal iodine dissolvings and one was made from "W" metal. The crude fractions obtained are being used for building up the stockpile of fission products.

Studies were continued on the heated ion exchange column. A column separation was made by using Dowex-50 of mesh 80-100 to increase the flow rate without using pressure at the top of the column. The steam-heated column had to be degassed two or three times during the run. Particles of resin would rise in the bowl of the column because of the bubbles of gas formed on the resin particles. This decreased the effective amount of resin in the column and increased the flow through the column. A decrease in the separation efficiency was noted after the peak of Y^{91}.

As the run progressed, the number of theoretical plates decreased from 196 to approximately 140. This is the lower limit for separation of the adjacent rare earths. One can predict from the first activity peak whether later activities can be separated.

Pure products of the elements from Y^{91} to $Ce^{141-144}$ were produced in approximately sixty-eight hours as compared to a previous run of 435 hours on an unheated column.

By following the presence of the gamma radiation in the fractions before the peak of Nd^{147} and by absorption curves, the greatest amount of Nd was calculated to be fifty-eight millicuries at the

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I. Radioisotopes: (Continued)

14. Fission Products Development Work

time of separation. The amount of Pr^{143} was approximately 372 millicuries. The ratio $\frac{Nd}{Pr}$ is 0.16. This conclusion presupposes that there has been no preferential separation of the rare earths up to the final column purification.

The comparison of the ion chamber readings to the gross beta analysis indicates similar peaks of activity with the exception of praseodymium, which, on the ion chamber, showed two peaks. The second peak was probably the seventeen-minute praseodymium from Ce^{144}.

Summary of Run R.E. - VIII

Ion Exchange Resin, Dowex 50 - 80-100 mesh
Temperature - 90°C.
Column Volume - 18 ml
Eluting Solution - 0.2 m citrate at pH 3.3
Starting Solution Analysis:
Gross Beta - 1995 mc
Ce - 778 mc
TRE-Ce - 837 mc
Ba - 0.003 mc
Sr - 3.3 mc

Fraction	Activity (mc)	Remarks
1	100.0	Citrate cuts, Y^{91}
2	25.0	Y^{91}
3	8.0	Mixture Y^{91} and activity $X_{\frac{1}{2}}$, 4 mg
4	1.4	Y^{91} and 4 mg
5	11.0	Pure Nd
6	26.0	Pure Nd
7	9.0	Pure Nd
8	34.0	30% Nd
9	98.0	Pure Pr
10	113.0	Pure Pr
11	139.0	Pure Pr
12	92.2	Ce and Pr
13	40.0	Pure $Ce^{141-144}$
14	36.2	Pure $Ce^{141-144}$
15	21.0	Pure $Ce^{141-144}$
16	3.2	Pure $Ce^{141-144}$
17	31.2	Pure $Ce^{141-144}$
18	49.2	Pure $Ce^{141-144}$
19	92.0	Pure $Ce^{141-144}$

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I. Radioisotopes: (Continued)

14. Fission Products Development Work

Fraction	Activity (mc)	Remarks
20	63.0	Pure $Ce^{141-144}$
21	77.7	Pure $Ce^{141-144}$
22	80.0	Pure $Ce^{141-144}$
TOTAL	1,057	52.9% of starting activity
Corrected for Decay of Nd and Pr		63.0% of starting activity
Loss on Resin, Decay Other Than Above Pr and Nd, and Left in Boiler		37.0% of starting activity

15. Chalk River Waste Separation Development Work

In order to start construction earlier, engineering drawings were omitted on this job. All necessary information was given to the area engineer, who immediately started work on Building 3515 in the South Tank Farm. To date both cells have new poured-concrete roofs. Cell 2 has a new east wall to afford extra shielding at the operating gallery. The conrete pad in the gallery has been extended, and erection of framing for the new shelter was begun. A glassware rack for Cell 2 was fabricated but not installed. At present various services are being installed.

A number of changes in process equipment were made and a revised flowsheet was drawn up. Major changes include the following:

a. Use of glass-lined pipe instead of Saran-lined for the column.

b. Added three sixty-gallon glass-lined vessels as transfer and head tanks.

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I. Radioisotopes: (Continued)

15. Chalk River Waste Separation Development Work

The following glass-lined equipment was obtained from Y-12 salvage:

a. Three sixty-gallon vessels.

b. One one-hundred-gallon vessel.

c. Two four-foot lengths of six-inch IPS pipe with side nozzels.

The pipe was found defective and was sent to Glascote Products, Inc., for repairs.

Nearly all necessary equipment has been ordered.

Development work continued on the chemical processes. Tracer runs have been made on all the remaining fission products not reported in last month's report. The elution cycles were found to be very much as predicted except for cesium, which was found to come out at several varying points in the elution cycle. The two most significant points in this month's work were the use of ammonium sulfate to change the resin from the acid form to the ammonium form, and the elution of Ba and Sr at high pH (8 to 9) before elution of the rare earths at pH 3 to 4. Y^{91} was removed only slowly from Dowex-50 resin with pH 8.0 citrate, probably due to hydroxide formation. It may be feasible to remove Sr with high pH citrate, thus leaving most of the rare earths on the column.

16. Miscellaneous Work

a. Co^{60} Sources

Cobalt 60 sources were loaded in special holders as follows:

[redacted]

[redacted]

I. Radioisotopes: (Continued)

16. Miscellaneous Work

a. Co^{60} Sources

C. F. Braun and Co.----------500 mc
X-Ray Engineering Co.----------6 sources, 1 curie each
San Francisco Naval Shipyard-------500 mc
Canadian Radium & Uranium Corp.----2 sources, 500 mc each
Pipeline Maintenance Corp.---------4 sources, 1 curie each
Americal Steel Foundries----------500 mc
Brush Development Company----------3 sources, 200, 300, & 500 mc
University of Chicago----------4 sources, 155mc, 1C, 2C, & 10C
National Bureau of Standards-------1 curie
Evans Signal Lab----------4 curies
American Steel Foundries----------400 mc
ORNL - Metallurgy Division---------1 curie

Two Co^{60} sources were returned from the National Bureau of Standards for cleaning.

b. C^{14} Sources

Four C^{14} planchets were produced for Anton Electronic Laboratories.

c. Cesium Source

A one-millicurie source of Cs^{137} was prepared for Cornell University.

d. Na^{22} Source

Two samples of Na^{22} were packaged (special handling) for Carnegie Tech.

e. Iodine 131

A special distillation of I^{131} into KI was made for the National Naval Medical Center.

A special I^{131} preparation (hydrazine) was made for use in ORNL research work.

[redacted]

[redacted]

I. Radioisotopes: (Continued)

16. Miscellaneous Work

f. Ru^{106} Plaques

Two Ru^{106} plaques containing one millicurie and 0.1 millicurie, respectively, were prepared for the Naval Radiological Defense Laboratory.

g. Sr^{90} Sources

Three Sr^{90} sources were prepared containing 1 μc, 5 μc, and 10 μc, respectively.

II. Tank Farm:

1. General:

a. Little or no work was done on the weir box on the discharge side of the Settling Basin.

b. The leak at W-2 tank was located and repaired this month. It was found to be where the vitreous pipe from W-1 - W-2 diversion box ties into the tank itself.

2. Wastes Discharged to the White Oak Creek

About 5.47 curies of beta activity were discharged from the Settling Basin this month.

In order to obtain sufficient capacity to evaporate the supernate from the precipitated metal in W-7 tank, all water coming into W-1 and W-2 with activity less than 2,000 c/min/ml was diverted directly to the Settling Basin rather than to W-5 and then to the evaporator, as has been recent practice. This change in procedure permitted over seventy-five percent of the water entering W-1 and W-2 to be diverted directly to the Settling Basin.

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II. Tank Farm: (Continued)

2. Wastes Discharged to the White Oak Creek

ACTIVITY DISCHARGED TO WHITE OAK CREEK

	OCTOBER, 1950		NOVEMBER, 1950	
Discharged From	Gallons	Beta Curies	Gallons	Beta Curies
Settling Basin	21,704,000	16.40	22,906,000	5.47
Retention Pond	375,147	0.83	391,537	0.51
TOTAL		17.23		5.98
Contributed by Evaporator		0.21		0.12

3. Chemical Waste Evaporator

Operation was normal for most of the month. An average decontamination factor of 2,484 was obtained.

The evaporator was shut down for a period of ten hours this month. While down, the equipment was decontaminated and electrical probes and wiring installed. The purpose of the probes was to attempt to measure the level of the foam in the evaporator during operation. The first attempt at operation showed a short circuit in the probes. One of the probes was removed and it was found that the insulating material had failed. Also, five of the probe rods had fallen out of the flange containing the multiple probes. More work will be done to determine whether or not this method of foam detection is feasible.

WASTE EVAPORATOR OPERATION

Gallons Fed to Evaporator	Gallons of Concentrate to W-6	Volume Reduction	Beta Curies to Evaporator	Beta Curies to Settling Basin
NOV. - 244,246	22,828	9.7:1	294.13	0.12
OCT. - 188,475	31,313	5.0:1	2488.91	0.21

[redacted]

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II. Tank Farm: (Continued)

4. Waste Tank Inventory

Tanks	Gallons Capacity	Gallons In	Gallons Out	Discharged To	Free Space
		HOT PILOT PLANT STORAGE			
W3,13,14,15	48,500	-0-	-0-	---	9,670
		CHEMICAL WASTE STORAGE			
W-5	170,000	173,446	244,246	Evaporator	75,600
		EVAPORATOR CONCENTRATE STORAGE			
W-6, 8	340,000	16,800	-0-	---	93,600
		METAL WASTE STORAGE			
W-4,7,9,10	543,000	592	40,800	Evaporator	208,552

[redacted]

[redacted]

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

No further process work has been done in Building 706-D on the RaLa process. The Chemical Technology Division is undertaking further study of the filtration problem and to date has arrived at no definite information other than the fact that the process filters and the crud filters are not of the same porosity as originally designed. The hole size is the same in both filters but the number of holes per square inch is lower in the process filter than in the crud filter. Investigation of the commercial filter aid has revealed that some silica is soluble but apparently not enough to cause the process difficulties. At present a new process filter of greater area is being designed.

The following work was done on the new RaLa equipment.

1. The new loading cubicle was shielded with lead.
2. The new six-ton crane was received and installed.
3. The ion exchange cubicles are being fabricated.
4. The manipulator casting is being machined.
5. The stainless steel shield for the tantalum evaporator was sent out for lining.
6. The A-17 liquid level gauge was replaced with one of greater range. The east vacuum pump in Building 706-D was completely reworked. The woodwork in Building 706-D is being repainted.

Los Alamos again postponed the next run date. It is now tentatively scheduled to start late in January, 1951.

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C. RADIOISOTOPE CONTROL DEPARTMENT

I. General:

During November, 1950, there were 661 radioisotope shipments, compared with 760 during October and 671 during September, 1950. In November, 1949, there were 542.

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

	November 1950	October 1950	November 1949	August, 1946, to November, 1950, Inc.
Separated Material				
706-D Area	504	592	441	14,363
Unseparated Material				
100 Area	157	168	101	4,448
TOTAL SHIPMENTS	661	760	542	18,811

The following table indicates the breakdown between non-project, project, and foreign orders for November and October, 1950, and November, 1949:

	November 1950	October 1950	November 1949
Non-Project	518	579	404
Project	119	160	118
Foreign	24	21	20
	661	760	542

II. Hanford Irradiations:

The following radioisotope samples were received from Hanford during November, 1950:

Sample No.	Material	Date Discharged	Date Received
ORNL-109	Chromium (2 pcs.)	10-24-50	11-20-50
ORNL-118	Tantalum Foil	8-21-50	11-28-50

[redacted]

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II. Hanford Irradiations: (Continued)

A recent letter from Hanford indicated that several irradiation requests will have to be revised to bring the requested exposure time wanted in line with the time specified on the original request. These particular irradiations have been scheduled for a longer period than was originally specified. Hanford has also asked that no requests be made for exposure time on test hole samples to exceed eighteen months except in very special cases.

Oak Ridge National Laboratory will no longer be responsible for charges incurred by NEPA irradiations at Hanford. NEPA now has a type of contract whereby Hanford will be able to charge NEPA directly for these irradiations.

Hanford has stated that the two test hole samples containing irradiated cobalt are still too hot for shipment and have indicated they would like to bury these samples. An attempt is being made to have Hanford box the casks containing the samples, thereby cutting down the radiation to a point where the samples can be shipped.

The U. S. Atomic Energy Commission has informally informed the Laboratory that Hanford will not be able to increase the ORNL inhour consumption from 100 to 125 inhours, as requested.

III. Radioiodine:

The radioiodine equipment has been repaired and all outstanding requests have been filled as of November 8, 1950.

IV. Radiocarbon:

The apparatus for standardizing the sodium carbonate C^{14} samples has been installed and some experimenting has been done with it.

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V. Cyclotron Radioisotopes:

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

Material	Amount	Status
Be 7	22 mc	Material in process.
Mn 54	3 mc	Material in process.
As 73	12 mc	Bombardment has been requested.

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					7	230.00		
Na 22	1	109.75			5	201.75	4	300.00
Mn 52					2	20.00		
Mn 54							2	100.00
Co 57							2	50.00
Fe 59			4	223.10				
Zn 65	1	100.00						
Sr 85					1	10.00		
I 125							2	60.00
Molybdenum Metal					1	13.00	2	20.00
TOTAL RECEIVED	2	209.75	4	223.10	16	474.75	12	530.00

REQUESTED BUT NOT RECEIVED

Be 7					1	5.00		
Zn 65			1	40.00				
As 73					1	10.00		
Sr 85	1	50.00						
TOTAL HOURS OUTSTANDING (Not Received or Requested)		490.25		486.90		260.25		220.00

SHIPMENTS OF CYCLOTRON-PROCESSED RADIOISOTOPES

Material	No. Shipments November, 1950	No. Millicuries November, 1950	No. Millicuries To Date
Be 7	-0-	-0-	127.073
Na 22	3	3.1	27.647
Mn 52	-0-	-0-	9.991
Co 57	-0-	-0-	2.0
Fe 59	-0-	-0-	1.5 mc and 1 S.I.
Zn 65	-0-	-0-	1.5

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VI. Activation Analyses:

The status of the activation analyses work remains the same as shown in the October, 1950, report. The Reynolds Metal Company of Sheffield, Alabama, has inquired as to the possibility of having one hundred aluminum samples analyzed for potassium, sodium, rubidium, and cesium.

M. E. Ramsey
M. E. Ramsey, Director
Operations Division

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VII. S-F Material Control:

1. Knolls Atomic Power Laboratory renewed its request for irradiated slugs for use in connection with the SPRU Program. Accordingly, 185 highly-irradiated slugs were shipped to KAPL on November 10, 1950.

2. An additional 0.5 kilogram of enriched uranium was received from Y-12 for KAPL disc work. This receipt filled the allocated special quota allowed for this work.

   The original request for discs amounting to approximately 17,000 was completed in October, 1950. However, this request was supplemented by another increasing the request by 25%. At the end of November, fabrication of the additional 25% was completed and shipment will be made early in December, 1950.

3. Final purification and shipment of two additional batches of Chalk River plutonium were effected during the month. Material was shipped to Los Alamos. The shipment consisted of Batch #IRC amounting to 28.71 grams of plutonium and Batch #VI RC #2, consisting of 61.01 grams of plutonium.

4. On November 20, 1950, a Hanford express car was received. Contents of the car (that portion assigned to ORNL) consisted of three irradiated uranium slugs for use in the radioiodine separation process, two containers carrying non-SF material for radioisotope separation and one contaminated empty monster container for decontamination.

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VII. S-F Material Control: (Continued)

4. The empty monster container had originally been shipped to Hanford containing an eight-inch section of a Chalk River fuel rod. Apparently, a small piece or pieces of the fuel rod disengaged from the ends and remained in the container causing inside contamination.

5. During the month a procedure for radium inventory control, AEC Bulletin GM-173, was received. This procedure establishes a definite manner and time for reporting an inventory balance on all radium and radium compounds wherein title therefor rests with the U. S. Atomic Energy Commission.

   Since records for such special materials are maintained by the SF Control Office, responsibility for compiling the required report has been assigned to this office.

   The initial report will be submitted during the first week of December, 1950.

6. The SF Office continued its program of surveying material balance areas. During the month, three persons possessing SF materials were visited and their material inspected and weighed where feasible. No apparent discrepancies were encountered.

7. The records of three analytical laboratories were audited during November, 1950. Records were found to be in good order and proper accounting had been made for all samples.

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VII. S-F Material Control: (Continued)

8. During the month there were sixteen shipments received and twenty-one shipments made, compared with nineteen receipts and twenty-five shipments last month. Twenty-four new material requests were received and processed in November, 1950.

9. Following is a summary of receipts and shipments of SF materials for the month of November, 1950:

RECEIPTS

From	Material	Content	
Argonne National Lab.	Depleted Uranium	-0-	
Brookhaven National Lab.	Thorium (Pellet)	2.00	gm.
C&CCD, K-25 Area	Depleted Uranium (Supernate)	4,907.00	gm.
C&CCD, K-25 Area	Plutonium	.02	gm.
C&CCD, Y-12 Area	Enriched Uranium (Metal)	469.16	gm.
C&CCD, Y-12 Area	Enriched Uranium (Metal)	.37	gm.
C&CCD, Y-12 Area	Enriched Uranium (Metal)	9.25	gm.
C&CCD, Y-12 Area	Normal Uranium (Plates)	265.00	gm.
C&CCD, Y-12 Area	Normal Uranium (UNH)	233,439.60	gm.
C&CCD, Y-12 Area	Normal Uranium (UO_2SO_4)	262.50	gm.
C&CCD, Y-12 Area	Normal Uranium (Tubes)	570.00	gm.
C&CCD, Y-12 Area	Normal U (Carbide and Nitride)	1,642.20	gm.
General Electric Co., Hanford	Depleted Uranium (Slugs)	5,334.22	gm.
General Electric Co., Hanford	Plutonium	0.93	gm.
A. D. MacKay	Thorium (Oxide)	2,790.00	gm.
Westinghouse Electric Corp.	Thorium (Rods)	615.00	gm.

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VII. S-F Material Control: (Continued)

9. Receipts and shipments for November, 1950.

SHIPMENTS

To	Material	Content	
Argonne National Lab.	Thorium (Slug)	131.80	gm.
Brookhaven National Lab.	Thorium (Pellet)	1.94	gm.
Brookhaven National Lab.	Normal Uranium Foil	0.10	gm.
Brookhaven National Lab.	Normal Uranium Foil	0.10	gm.
C&CCD, Y-12 Area	Depleted Uranium (U_3O_8)	18.66	gm.
C&CCD, Y-12 Area	Depleted Uranium (U_3O_8)	11.34	gm.
C&CCD, Y-12 Area	Enriched Uranium (Solution)	1.12	gm.
C&CCD, Y-12 Area	Enriched Uranium (Solution)	1.94	gm.
C&CCD, Y-12 Area	Enriched Uranium (Solution)	5.09	gm.
C&CCD, Y-12 Area	Enriched Uranium (Solution)	39.93	gm.
C&CCD, Y-12 Area	Enriched Uranium (U/Al Alloy)	21.89	gm.
C&CCD, Y-12 Area	Normal Uranium (Tubes)	570.00	gm.
C&CCD, Y-12 Area	Normal Uranium (Tubes)	550.00	gm.
General Electric Co., Hanford	Depleted Uranium (Slugs)	7,112.29	gm.
General Electric Co., Hanford	Normal Uranium (Slugs)	408,956.74	gm.
General Electric Co., Hanford	Normal Uranium (Slugs)	124,465.10	gm.
General Electric Co., Hanford	Plutonium	3.72	gm.
General Electric, Schenectady	Depleted Uranium (Slugs)	215,710.00	gm.
General Electric, Schenectady	Depleted Uranium (Slug Discs)	300.00	gm.
General Electric, Schenectady	Plutonium	2.54	gm.
General Electric, Schenectady	Plutonium	0.06	gm.
Los Alamos	Depleted Uranium (NRX)	2.10	gm.
Los Alamos	Plutonium (NRX)	89.72	gm.
Tracerlab, Inc.	Normal Uranium (U_3O_8)	0.42	gm.
Tracerlab, Inc.	Normal Uranium (U_3O_8)	0.42	gm.

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