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OPERATIONS DIVISION
 MONTHLY REPORT
 FOR
 MONTH ENDING OCTOBER 31, 1948
 BY
 M. E. RAMSEY
 E. J. WITKOWSKI
 A. F. RUPP
 J. A. COX
 L. B. EMLET

NOV 19 1948



OAK RIDGE NATIONAL LABORATORY

OPERATED BY
 CARBIDE AND CARBON CHEMICALS CORPORATION
 FOR THE
 ATOMIC ENERGY COMMISSION

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OPERATIONS DIVISION

MONTHLY REPORT

for

Month Ending October 31, 1948

by

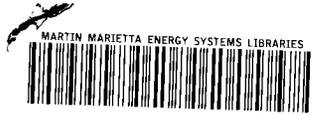
- M. E. Ramsey
- E. J. Witkowski
- A. F. Rupp
- J. A. Cox
- L. B. Emlet

DATE ISSUED

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SUMMARY

1. Excessive lost pile operating time (35.1%) resulted from the daily scanning and a six-day shutdown to enable collection of air contamination data.
2. The new pile exhaust air filter house design has been completed. Construction is progressing rapidly and the air will be routed through the filters during the week of November 8, 1948.
3. No swollen or ruptured slugs were detected during the month.
4. Two new particle detection instruments developed by personnel in the Chemistry and Physics Divisions are being developed for use as monitors in the pile exhaust air stream.
5. Pitot tubes have been installed in the exhaust duct and are being calibrated. These pitot tubes will replace the venturi which will be bypassed when the new filter house is completed.
6. Radioisotope production continued with difficulty because of excessive pile down time and restricted pile discharge conditions.
7. The first test run through the newly designed fission product column was completely successful.
8. Potassium chloride, enriched in the natural radioactive isotope K^{40} as a result of exposure in the Hanford Pile, is being examined to determine if the specific activity is sufficiently great for tracer work.
9. RaLa run #28 is scheduled to start November 17, 1948, using Hanford-irradiated slugs.
10. A total of 287 shipments of radioisotopes was made during October, an increase of ten shipments over the previous month. This brings the number of shipments from August, 1946, to a total of 5,006.



A. PILE DEPARTMENT

I. Operating Data:

	<u>October</u> <u>1948</u>	<u>September</u> <u>1948</u>	<u>1948</u> <u>Year-to-Date</u>
Total Accumulated KWH-----	1,785,217----	1,767,590----	23,533,775
Average KW/operating hour-----	3695.57-----	3638.81-----	3733.65
Average KW/24-hour day-----	2399.49-----	2459.99-----	3215.00
Percent Lost Time-----	35.1%-----	32.5%-----	13.9%
Approx. Excess Pile Reactivity---	130-140 inhours--	180-190 inhours--	
Slugs Charged-----	129-----	464-----	9,081
Slugs Discharged-----	128-----	517-----	6,466
Product Made (grams)-----	65.16-----	64.51-----	858.91
Product Discharged (grams)-----	0.96-----	36.20-----	197.09

II. Pile Operation:

The pile operation, as well as all other major Laboratory activities, were shut down from October 16, 1948, to October 21, 1948, to enable the collection of radiation background data. In general, very little difference in the number of air-borne particles could be detected during the prolonged shutdown.

The daily visual scanning of all metal loaded channels continued, but no swollen nor ruptured slugs were detected. The discharge of slugs from the pile was limited by the prevailing meteorological conditions, as recommended in a memorandum from K. Z. Morgan to C. N. Rucker, dated September 15, 1948, entitled "Remedial Measures Regarding the Particle Problem", C. F. No. 48-9-123.

The lost time for October averaged 35.1% as compared to 32.5% for September. The average lost time from January to August, 1948, inclusive, was 8.9%. The excessive lost operating time and restricted slug discharge conditions limited the usefulness of the pile during the month and resulted in delayed and canceled radioisotope shipments, canceled slug discharges for the Argonne and Knolls Laboratories, and delays in various research programs.



The filter house which will contain both American Air Filters No. F.G. 50 and CWS No. 6 paper will be completed early in November, 1948. It is planned to tie-in this new facility during the week of November 8, 1948. Preliminary data indicates that no serious plugging of the filters should be experienced. Cyclone Separators have been ordered and will be installed between the pile and the new filter house as soon as possible. No decision has been made concerning the utilization of electrostatic precipitators in this system. It appears desirable to first evaluate the filter medium and the Cyclones before spending additional money for a precipitator.

Two new instruments are being developed by the Chemistry and Physics Divisions personnel to detect active particles in the exhaust air from the pile. The one utilizes a gummed-tape which holds particles impinging on it and carries them to a radiation detection instrument. If the jacket on a uranium slug ruptures, the active oxide should adhere to this tape and show an increase over the normal background. The second type of instrument is based on its ability to collect and measure the activity of the decay products of gaseous fission products. A sample of the pile exhaust air is passed through a CWS No. 6 filter paper and then into a chamber containing a traveling-charged wire. The particles are removed on the filter which all fission gases pass. The fission gases which decay to a solid radioactive daughter are collected on the traveling-charged wire and carried to a radiation detection instrument. Any increase above background should be indicative of a ruptured slug. Both of these new instruments will be utilized to monitor the pile exhaust air.

The excess pile reactivity has been decreased by approximately 50 inhours to 130-140 inhours. This decrease resulted from the loading of additional sulfur (for P³² production) and a new experimental installation in Hole 12 by the NEPA group.

III. Fan Operation:

The pile cooling fans operated normally throughout the entire month.

IV. Radioisotopes:

The following table is a comparison of the radioisotope and research samples charged in the pile during October with those handled in September, 1948:

	<u>SEPTEMBER, 1948</u>		<u>OCTOBER, 1948</u>	
	<u>Research</u>	<u>Radioisotopes</u>	<u>Research</u>	<u>Radioisotopes</u>
Stringers 13, 14, and 16	20	90	23	86
Hole 22 (Pneumatic Tube)	23	6	25	0
All Other Holes	<u>5</u>	<u>8</u>	<u>3</u>	<u>13</u>
TOTAL BY GROUPS	<u>48</u>	<u>104</u>	<u>51</u>	<u>99</u>
TOTAL FOR MONTH	152		150	

At the end of October, 1948, there were 362 cans of target material in Stringers 13, 14, and 16 compared to 359 cans of material in those stringers at the end of September, 1948.

V. Experimental Work:

The installation of partial removal equipment will make it necessary to by-pass the existing venturi used for measurement of pile exit air. Use of this venturi permits reasonably accurate heat power calculations. These calculations are used to adjust the position of the differential chambers used in conjunction with the galvanometer pile power measurement.

Straightening vanes have been installed in the exit air duct as close to the pile as possible and a bank of five pitot tubes installed in the duct just inside the Pile Building. The pitot installation is being calibrated by use of air flows measured by the venturi. It is recognized that the pitot installation will give a less accurate measurement of air flow than was given by the venturi. This will give a corresponding increase in the error of heat power calculations and will make determination of pile power correspondingly inaccurate.

B. CHEMICAL SEPARATIONS AND ISOTOPE DEVELOPMENT DEPARTMENTS

I. Radioisotopes:

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

Fifteen uranium slugs and twenty-four, sixty-two-gram cans of irradiated tellurium were processed; approximately 4,587 millicuries were shipped. All products were within specifications. Low yields are a result of pile-down time.

The lack of favorable weather conditions now necessary for slug discharges from the pile and the shutdown of all "hot" operations for a period of one week in connection with the particle problem made uranium slugs unavailable during a large part of the month. It was therefore necessary to return to the processing of tellurium for I^{131} .

[REDACTED]

2. Phosphorus (P^{32} - 14,3d)

Eleven, 2000-gram cans of irradiated sulfur were processed and approximately 4,155 millicuries were shipped. All products were within specifications. The lower yields are a result of pile-down time.

Phosphorus Development Work

No further development work was done on phosphorus, since there was an insufficient supply of irradiated sulfur on hand to meet shipping commitments.

3. Carbon (C^{14} - 5100y) (From $Ca(NO_3)_2$)

No runs were made.

Beryllium Nitride Development Work

Cold runs to check air leakage and dead carbonate in beryllium nitride slugs were made during the month. The inactive carbon contributed by reagents, air leakage, or other sources is less than one milligram per run. A beryllium nitride slug which had not been in the pile was processed. Approximately sixty milligrams of inactive carbon was obtained from this slug. It is not known whether this large amount of carbon will be found in all the slugs; if so, some technique will have to be developed to separate low and high specific activity fractions. On the basis that little additional information would be obtained by processing more dead slugs, it has been decided to start testing active slugs November 1, 1948.

4. Sulfur (S^{35} - 87d)

A total of 4,360 millicuries of carrier-free S^{35} (as sulfate) was produced during the month.

5. Fission Products

A small-scale run, using UNH from one-tenth slug, was made during the month. The run was completely successful, indicating that the principles around which the new process is built are correct. The separations from crude UNH solution were the best obtained to date on this apparatus.

The equipment is now ready for full-scale operation as soon as hot material becomes available. The limitations on slug discharges from the pile is delaying further work at this time.

6. Ruthenium (Ru¹⁰⁶ - 1y)

Fifteen concentrates were made during October. The process was shut down for one week during the general shutdown of all "hot" processes in the Restricted Area. The processing will not be resumed until some repairs and alterations are made to the equipment.

The operating gallery has been enclosed and painted in order to make this outdoor operation more comfortable during the winter months

Approximately 120 millicuries of purified Ru¹⁰⁶ were processed.

7. Calcium (Ca⁴⁵ - 180d)

No calcium was processed during the month.

8. Strontium (Sr⁸⁹⁻⁹⁰ - 55d, 30y)

No runs were made.

9. Iron (Fe⁵⁵⁻⁵⁹ - 44d, 4y)

One Hanford slug was processed to produce ninety millicuries of Fe⁵⁵⁻⁵⁹. The specific activity was 5.6 mc Fe⁵⁹ per gram of iron.

[REDACTED]

10.

10. Zinc (Zn^{65} - 250d)

A sample of zinc irradiated at Hanford was processed. The analysis is not yet completed.

11. Potassium (K^{40} - 4×10^8 y)

By-product KCl enriched in K^{40} has been obtained during the processing of Hanford-irradiated KCl for S^{35} and Cl^{36} . After further purification, the specific activity will be determined to learn whether this material will be useful for tracer work.

II. Tank Farm and Burial Ground:

1. Special Wastes

Other than routine disposal of plant wastes, the following wastes were handled:

- a. Four shipments were received from Dayton for burial.
 - b. Ten pots and twelve drums were received from Chicago. The pots contained fission products only. Six drums contained hexone, four chemical waste and two uranium.
 - c. The Hot Pilot Plant transferred 232.0 kg of uranium to W-4.
 - d. The Semi-Works transferred 189.6 kg of uranium to W-4.
 - e. K-25 transferred contaminated trash to the Burial Ground.
 - f. The Ruthenium Process consumed 14,000 gallons of precipitated metal supernatant which contained an average of .0043% uranium.
 - g. K-25 transferred 600 gallons of waste to the Chemical Waste System.
 - h. The Technical Division, Section IV, transferred .1 kg of uranium to W-3.
- [REDACTED]

11.

2. Wastes Discharged to the White Oak Creek

a. From the Settling Basin

<u>Gallons Discharged</u>	<u>To</u>	<u>Curies</u>
11,814,000	White Oak Creek	68.72

b. From the Retention Pond

260,800	White Oak Creek	.18
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3. Waste Tank Inventory

CHEMICAL WASTE

<u>Tanks</u>	<u>Gallons Capacity</u>	<u>Gallons In</u>	<u>Gallons Out</u>	<u>Discharged To</u>	<u>Free Space</u>
W1,2,5,6	348,800	294,230	355,970	White Oak Creek	193,600

METAL WASTE

W3,4,7,8,9,10	754,300	2,974	9,600	Ru Process	197,300
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4. Maintenance

- a. A small amount of clean-up work remains to be done before the Settling Basin project can be closed out.
- b. Two of three concrete jet pits have been poured in the Tank Farm.
- c. One, 2300-gallon stainless steel tank was transferred from the Burial Ground to the new filter house near Building 115.
- d. New catwalks have been built for the East and West Ponds. The old ones are to be removed and the new walks set in place.
- e. The fences at the Settling Basin have been rebuilt.

5. General

- a. The Settling Basin was hosed down frequently this month to settle floating algae. The cold weather is now slowing down the formation of algae.

- b. A stainless steel tank has been set up south of the W-4 truck pad. All Chicago wastes, except solvents, will be stored in this tank. Radiation readings will be taken in an attempt to determine the feasibility of shipping wastes by tank truck.
 - c. All of the contaminated lead brick and some lead sheets at the Burial Ground have been cleaned up in preparation for reuse in the new Radioisotope Area.
 - d. Oil is now being sprayed on all trash dumped into the Burial Ground trenches in an attempt to reduce the possibility of spreading radioactive particles.
- [REDACTED]

III. RaLa (Ba¹⁴⁰ - 12.5d):

Following the recommendations of the Radioactivity Hazards Committee, temporary glass wool filters will be installed in both off-gas lines before Run #28 is started. The design and installation of the filters are now in progress and completion is anticipated in the middle of November, 1948. Run #28, using Hanford slugs, will start November 17, 1948.

Plans are now being made to sample the off-gases and cell ventilation air during the next run in order to determine the particle removal efficiency of the temporary filters and to gather design data for permanent gas decontamination facilities which will be built at the new stack. The sampling equipment installation is essentially complete.

The cell ventilation air flow has been reduced from 15,000 cfm to approximately 2,000 cfm in an effort to reduce the number of particles coming from this source.

A batch of slugs has been shipped from Hanford to the Hot Pilot Plant in the carrier which will be used for transporting slugs for the RaLa process. The carrier operated satisfactorily.

A revised glass reactor for handling 10,000-curie runs was fabricated and tested. These tests proved the reactor to be unsatisfactory. Another modified reactor has been designed.

C. ISOTOPE CONTROL DEPARTMENT

I. General:

During the month of October there were 287 isotope shipments, an increase of ten compared with September. This increase was in spite of excessive lost operation time of the pile which caused cancellation and delay of a number of shipments.

	<u>SEPTEMBER</u> 1948	<u>OCTOBER</u> 1948	<u>TOTAL</u> August, 1946, to October, 1948, Inc.
Separated Material 706-D Area	245	254	3,799
Unseparated Material 100 Area	<u>32</u>	<u>33</u>	<u>1,207</u>
	277	287	5,006

There have been almost constant shortages of iodine and phosphorus during October due to the pile shutdowns; also there have been delays in a number of irradiated-unit shipments.

The breakdown according to non-project, project, and foreign shipments for September and October is as follows:

	<u>SEPTEMBER</u>	<u>OCTOBER</u>
Non-Project	198	207
Project	50	49
Foreign	29	31

II. Radioiodine:

Routine distribution of fission iodine was begun the week of October 3, 1948. A number of customers in New York City and one other locality have noted that the fission iodine did not assay as high as shipments of tellurium iodine. One hospital in New York found approximately a 40% shortage. Work is under way to determine the reason for this discrepancy.

[REDACTED]

III. Radiophosphorus:

The demand for radiophosphorus has been so high that we have not been able to keep up with the orders. At the end of October there were approximately 400 millicuries outstanding which had either been delayed or being held until material becomes available.

Samples of P_2O_5 have been kept at Hanford and when the shutdown of the pile began, Hanford was requested to charge these samples. There was several weeks' delay before samples were finally put into the pile and they will probably not be ready for shipment before the middle of November. Hanford has not agreed to make shipments by common carrier, but only by A.E.C. courier. Since courier shipments do not leave Hanford very often there may be two to four weeks' delay in obtaining shipments after they are ready.

IV. Cobalt:

The order from the National Naval Medical Center at Bethesda, Maryland, for 500 curies of radiocobalt is being processed and most of the material has been canned.

Cobalt rods, one centimeter in diameter and one, two, and four centimeters long, have been obtained from Callite-Tungsten Corporation for irradiation at Hanford. It is hoped that approximately 10,000 curies may be produced at Hanford within the next year for distribution to hospitals where it will be used in cancer treatment.

V. Shipping Regulations:

Arrangements have been completed for having representatives of airlines visit Oak Ridge National Laboratory to discuss the new regulations proposed by the Air Transport Association. It is expected this visit will take place on November 16, 1948.

VI. Antimony-Beryllium Neutron Sources:

Work is continuing on developing Sb-Be neutron sources for distribution on the Isotope Program.

VII. Isotope Production Area:

Construction work on the 250-foot stack was started during the month and scheduled for completion on March 1, 1949. Foundation work on the various buildings is proceeding slowly.

The hood ventilation requirements are being reexamined and design data collected to provide decontamination facilities at the base of the new stack.

L. B. Emlet

L. B. Emlet
General Superintendent
Operations Division
November 9, 1948

LBE:wp

VIII. Source and Fissionable Material Accountability:

Following is a summary of shipments and receipts of S. F. Materials
for the month of October, 1948:

RECEIPTS

<u>Received From</u>	<u>Material</u>	<u>S. F. Content</u>
Argonne National Laboratory	Normal Uranium	13.53 kg.
" " "	" "	27.98 kg.
" " "	ThO ₂	Negligible
" " "	U.N.H.	17.70 kg.
Carbide and Carbon, Y-12 Area	Uranium Chloride	.50 gm.
" " " " "	Uranium Pentachloride	241.8 gm.
Carbide and Carbon, K-25 Area	Hanford Waste U.	21.0 gm.
General Electric - Hanford	Hanford Slugs	194.34 kg.
Iowa State College	Thorium Dicarbide	181.00 gm.
" " "	Uranium Monocarbide	327.49 gm.
Mallinckrodt Chemical Co.	U.N.H.	Approx. 849.12 kg.
" " " "	U.N.H.	850.00 kg.

SHIPMENTS

<u>Shipped To</u>	<u>Material</u>	<u>S. F. Content</u>
Argonne National Laboratory	Normal Uranium	34.97 kg.
" " "	Normal Uranium	27.98 kg.
Brookhaven National Laboratory	Plutonium Sources	Negligible
Carbide and Carbon, Y-12 Area	Enriched Uranium	17,237.00 mg.
" " " " "	Enriched Uranium	6,022.00 mg.
Carbide and Carbon, K-25 Area	Normal Uranium	294.00 gm.

[REDACTED]