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Radioisotope Distribution Program Progress Report for November 1977

E. Lamb



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ORNL/TM-6243

Contract No. W-7405-eng-26

OPERATIONS DIVISION

RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR NOVEMBER 1977

E. Lamb

Work Sponsored by
DOE Division of Biomedical and
Environmental Research

Date Published - February 1978

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RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR NOVEMBER 1977

E. Lamb

SUMMARY

Information is reported on new production,
inventory status, operational problems, and
radioisotope sales.

RADIOISOTOPE PRODUCTION AND MATERIALS

REACTOR-PRODUCED RADIOISOTOPES

Reactor Products Production (*R. W. Schaich*)
(Production and Inventory Accounts)

<u>Processed Units</u>	
<u>Radioisotope</u>	<u>Amount (mCi)</u>
Calcium-47	19

Iridium-192 Production (*E. Lamb*)

Iridium target capsules provided by customers were inserted in a HFIR VXF position during the scheduled shutdown on October 30 following notification of the GETR shutdown by NRC on October 25. Prior to inserting of GETR-type capsules in the HFIR, a holder for the hollow-cylindrical capsules was prepared and inserted in a VXF position, and capsules were tested in a hydraulic flow mock-up to verify water-flow and heat-removal characteristics. Each target capsule must also pass a stringent pressure and leak test procedure prior to insertion in the HFIR.

A special shutdown of HFIR was made on November 8 to accommodate customers unable to provide capsules for insertion on October 30 and to insert five ORNL-fabricated target capsules in high flux RB positions. One of the targets inserted on October 30 was removed during the November 8 shutdown. Measurements were made of the radiation transmitted through a cylindrical air chamber in the HFIR pool. These measurements, although imprecise, gave valuable information concerning the production rate of ^{192}Ir .

The nominal mid-plane flux in the VXF position is 6×10^{14} n/cm².sec and in the RB positions is 1×10^{15} n/cm².sec. The customers serviced by these irradiations are Technical Operations, Gamma Industries, Gulf Nuclear, Automation Industries, Industrial Nuclear, and Source Production and Equipment Company.

Additional iridium targets and loose iridium wafers and pellets were purchased from GE-Vallecitos for future irradiations. The design of the ORNL RB-type capsule inserts was revised to permit the irradiation of ~50% more iridium wafers (0.107-in.-diam by 0.011-in.-thick) as well as pellets (1/16-in. by 1/32-in. and 1/8-in. by 1/32-in. pellets). The first irradiated capsules were discharged on November 24. A second VXF facility was equipped with a target holder and installed during this shutdown to accommodate the increased number of GETR-type capsules.

Equipment for dissolving the aluminum capsules and processing the irradiated ^{192}Ir wafers was assembled and installed in one of the high-level cells in Building 3029. An ionization chamber, formerly used to calibrate ^{192}Ir and ^{60}Co wafers several years ago and still located in a lead shield attached to the Argonne Cell in Building 3029, was quickly reworked. Calibrated ^{192}Ir wafers were obtained from GE-Vallecitos and will be used in establishing a calibration curve for this equipment. Procedures for processing the ^{192}Ir targets were written and approved, an amendment to the Building 3029 Safety Analysis Report was approved, and cold testing of the procedures and process equipment were conducted. The processing of irradiated targets discharged during the November 24 shutdown was begun on November 28.

ACCELERATOR-PRODUCED ISOTOPES

Cyclotron Service Irradiations (*M. R. Skidmore*) (Production and Inventory Accounts)

November 1977 ORNL 86-Inch Cyclotron runs for ORNL and non-ORNL programs are given in Table 1.

Table 1. Cyclotron Irradiations and Runs for November 1977

Date	Customer	Product	Target	Total Time (hr:min)	Total Charges
<u>ORNL Programs</u>					
	ORAU	Carbon-11	Boron Oxide	6:35	\$ 783
<u>Non-ORNL Programs</u>					
11- 1-77	New England Nuclear	Gallium-67	Zinc-68	45:45	\$ 7,055
11- 2-77	PNL, Richland, Wash.	Technetium-95m	Molybdenum	3:15	650
11- 9-77	New England Nuclear	Gallium-67	Zinc-68	25:15	3,980
11- 9-77	New England Nuclear	Gold-195	Platinum	11:15	1,918
11-15-77	New England Nuclear	Gallium-67	Zinc-68	49:15	7,580
11-17-77	New England Nuclear	Cobalt-57	Nickel-58	51:15	9,105
11-22-77	New England Nuclear	Gallium-67	Zinc-68	37:15	5,780
11-28-77	New England Nuclear	Gallium-67	Zinc-68	25:15	3,980
				248:30	\$40,048

Cyclotron Operations

During the month of November the cyclotron operated a total of 255 hours. We had several runs interrupted and one run terminated due to a shorted ion source. One run was interrupted due to the failure of an electrical breaker outside the building. Another run was interrupted by the failure of the F134 tube in the limiter cubicle of the oscillator system. Two runs were interrupted by shorted capacitors in the oscillator circuit and two runs were interrupted by filament to ground shorts in the ion source.

FISSION PRODUCTS

Krypton-85 Enrichment Facility (*R. W. Schaich*)

One ⁸⁵Kr enrichment column was operative during the month of November and the unit functioned according to design. The three columns in the south bank were shut down to replace the pulse pump diaphragms. The south bank loading station modifications to increase the operating sensitivity and to reduce personnel exposure were completed in November.

Cesium-137 Pilot Production (*R. W. Schaich*)
(Production and Inventory Accounts)

1. Process Status

The ¹³⁷Cs processing equipment has been placed in standby status.

2. Operational Summary

Product Inventory

(Decay calculated through August 31, 1977)

<u>Inventory Material</u>	<u>Amount (Ci)</u>
Cesium-137 chloride powder	29,960
<u>Total Inventory Material</u>	29,960
<u>Non-Inventory Material</u>	<u>Amount (Ci)</u>
Special Form Cans	4,300
Material returned or stored for customer	
Nuclear Research Corporation	0
J. L. Shepherd	50,600
New England Nuclear Corporation	2,500
Puerto Rico Sources	7,900
Lockheed	19,600
AECL powder	71,500
Radiation Resources	19,800
Minn. Mining & Mfg. Company	2,800
Gamma Industries	8,400
<u>Total Non-Inventory Material</u>	187,400
TOTAL INVENTORY AND NON-INVENTORY MATERIAL	217,360

Fabrication Summary

	<u>Nov. 1977</u>		<u>CY 1977</u>		<u>FY 1978</u>	
	<u>No.</u>	<u>Ci</u>	<u>No.</u>	<u>Ci</u>	<u>No.</u>	<u>Ci</u>
Sources						
Fabricated	0	0	14	16,926	0	0
Shipped	0	0	17	35,555	0	0
Special Form Cans						
Fabricated	0	0	2	2,055	1	5
Shipped	3	195	17	7,800	4	200

3. Current Orders

All orders on hand have been completed and the material placed into storage awaiting receipt of release for the material.

Strontium-90 Pilot Production (*R. W. Schaich*)
(Production and Inventory Accounts)

1. Process Status

The ⁹⁰Sr source fabrication equipment has been placed in standby status.

Product Inventory

(Decay calculated through August 31, 1977)

<u>Inventory Material</u>	<u>Amount (Ci)</u>
⁹⁰ Sr titanate powder (±5%)	0
Sources in fabrication	0
Stock powder cans	3,325
Stock solution	200
<u>Total Inventory Material</u>	<u>3,525</u>
<u>Non-Inventory Material</u>	<u>Amount (Ci)</u>
Batch 26Sr-74RE	7,900
Calorimeter Standards	4,800
Weather Bureau source	11,400
SNAP-7B	156,300
SNAP-7C	24,600
SNAP-7D	143,000
SNAP material purchase ^a	248,300
AGN-4 Powder	38,400
<u>Total Non-Inventory Material</u>	<u>634,700</u>
<u>TOTAL INVENTORY AND NON-INVENTORY MATERIAL</u>	<u>638,225</u>

^aStrontium-90 purchased under DRRD program.

Fabrication Summary

	<u>Nov. 1977</u>		<u>CY 1977</u>		<u>FY 1978</u>	
	<u>No.</u>	<u>Ci</u>	<u>No.</u>	<u>Ci</u>	<u>No.</u>	<u>Ci</u>
Sources						
Fabricated	0	0	3	157,000	0	0
Shipped	0	0	4	177,000	0	0
Special Form Cans						
Fabricated	0	0	0	0	0	0
Shipped	0	0	2	20	0	0

Short-Lived Fission Product Production (*R. W. Schleich*)
(Production and Inventory Accounts)

Short-lived fission product production is given in the table below.

<u>Isotope</u>	<u>Number of Batches</u>	<u>Amount (Ci)</u>
Ruthenium-103	1	30
Xenon-133	3	2500
Zirconium/Niobium-95	1	35
Iodine-131	1	75
Strontium-89	1	52

Xenon-133 Production (*E. Lamb*)

The production of ^{133}Xe was increased to serve customers who formerly obtained ^{133}Xe from GE and are unable to obtain sufficient material from other sources. In order to provide a 600-Ci weekly capability, scheduling of ORR irradiations were changed to provide three five-day irradiations of ^{235}U targets each month with shutdown for target discharge on Thursday. The scheduled HFIR shutdown provides irradiated targets for the fourth week. Processing is scheduled weekly to provide ^{133}Xe for shipment on Tuesday of each week.

Design is underway on improved ^{133}Xe processing equipment which will be installed in an existing concrete-shielded manipulator cell in Building 3028. The main objective of this equipment is remote operation of all processing and dispensing equipment in order to reduce exposure to operating personnel. A system will be designed to permit the removal of irradiated targets without a shutdown of the ORR being required. It will be necessary to use such equipment after the ORR resumes full time operation early in CY 1978.

RADIOISOTOPE SALES

J. E. Ratledge

Shipments made during the month that may be of interest are listed below:

<u>Customer</u>	<u>Isotope</u>	<u>Amount</u>
<u>Large Quantities</u>		
New England Nuclear Corporation	Tritium	12,000 Ci
Radiochemical Centre, England	Tritium	15,000 Ci
Schwarz/Mann	Tritium	1,000 Ci
Self-Powered Lighting, Ltd.	Tritium	2,000 Ci
Radium-Chemie, Ltd., Switzerland	Tritium	15,000 Ci
Merz and Benteli Nuclear, Switzerland	Tritium	11,000 Ci
American Atomics Corporation	Tritium	65,000 Ci
Saunders-Roe Developments, England	Tritium	15,000 Ci
<u>Withdrawn Items</u>		
Mine Safety and Appliance Company	Iodine-131	150 mCi
<u>Items Used in Cooperative Programs</u>		
University of Kentucky	Platinum-195m	20 mCi
University of Southern California	Platinum-195m	20 mCi

The radioisotope sales and shipments for the first two months of fiscal year 1977 and fiscal year 1978 are given in Table 2.

Table 2. Radioisotope Sales and Shipments

<u>Item</u>	<u>10-1-76 thru 11-30-76</u>	<u>10-1-77 thru 11-30-77</u>
Inventory items	\$ 46,644	\$ 190,142
Major products	16,089	29,603
Radioisotope services	41,286	45,956
Cyclotron irradiations	75,532	60,902
Miscellaneous processed materials	14,789	20,214
Packing and shipping	<u>30,179</u>	<u>33,025</u>
Total	\$ 224,519	\$ 379,842
Number of shipments	385	393

PUBLICATIONS

REPORTS

E. Lamb, *Radioisotope Distribution Program Progress Report for October 1977*, ORNL/TM-6155, Oak Ridge National Laboratory (November 1977).

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