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Radioisotope Distribution Program Progress Report for February 1979

E. Lamb



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OPERATIONS DIVISION

RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR FEBRUARY 1979

Date Published - April 1979

E. Lamb

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RADIOISOTOPE DISTRIBUTION PROGRAM
PROGRESS REPORT FOR FEBRUARY, 1979

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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	36

Iridium-192 Production (*R. W. Schaich*)

Ten customer irradiation units and fourteen ORNL HFIR units (RB) containing 174,000 Ci of ^{192}Ir at HFIR discharge date were processed during the month of February, 1979. Eleven shipments containing 61,000 Ci of ^{192}Ir were made during this period.

ACCELERATOR-PRODUCED ISOTOPES

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

During February, 1979, the ORNL 86-Inch Cyclotron operated 7:15 hours for ORNL and Oak Ridge DOE programs for total charges of \$1,083. Non-ORNL program irradiations were for 52:15 hours with total charges of \$10,064.

Most of the month was spent repairing and cleaning the cyclotron vacuum system. On February 1 the oscillator tube which had been replaced January 31 had to be replaced due to the burning of the filament lugs. Apparently the connectors had not been tightened properly during installation on January 31. On February 5 after intolerable RF instabilities, the Cyclotron vacuum tank was opened; two broken carbons on the liner wall and a crack in the liner were found. Repairs were completed and RF bake-out commenced on February 8. During the bake-out a leak detector was removed from the forepump vacuum section of the Cyclotron. The valve to the leak detector had not been

closed, resulting in air sweeping diffusion pump oil back into the Cyclotron vacuum system. The dees and liner were degreased, bake-out started on February 23, and operations resumed on February 26.

FISSION PRODUCTS

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

Process Status

The purification of 12 batches of $^{137}\text{CsCl}$ for J. L. Shepherd Company was completed, and 64,800 Ci of acceptable product was obtained. This product was canned in five Type IV inner capsules. The $^{137}\text{CsCl}$ product inventory is tabulated below.

Product Inventory

(Decay Calculated through August 31, 1978)

<u>Inventory</u>	<u>Amount (Ci)</u>
Cesium-137 chloride powder	<u>7,900</u>
Total Inventory Material	7,900
 <u>Non-Inventory Material</u>	
Reject Pellets and Sources	4,300
Special Form Cans	4,000
Material returned or stored for customer	
J. L. Shepherd	75,800
New England Nuclear Corporation	1,975
Puerto Rico Sources	7,700
Lockheed	19,100
AECL powder	6,800
Radiation Resources	16,800
Gamma Industries	8,200
Minn. Mining & Mfg. Co.	<u>12,000</u>
Total Non-Inventory Material	156,675

A total of 17 $^{137}\text{CsCl}$ sources containing 30,100 Ci were fabricated and shipped to AECL. The fabrication summary follows.

Fabrication Summary

	Feb. 1979		CY 1979		FY 1979	
	No.	Ci	No.	Ci	No.	Ci
Sources						
Fabricated	17	30,100	17	30,100	17	30,100
Shipped	17	30,100	17	30,100	33	45,360
Special Form Cans						
Fabricated	0	0	0	0	0	0
Shipped	0	0	2	200	4	2,200

The elevated temperature test of a WESF $^{137}\text{CsCl}$ storage container was terminated on February 15 after being maintained at 380°C since May 1, 1978. The outer capsule was removed, and three rings approximately one-inch wide were cut from the inner can for metallographic studies.

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

Process Status

The ^{90}Sr processing equipment has been placed in standby status.

Product Inventory

(Decay Calculated through August 31, 1978)

<u>Inventory Material</u>	<u>Amount (Ci)</u>
^{90}Sr titanate powder ($\pm 5\%$)	0
Sources in fabrication	0
Stock powder cans	3,170
Stock solution	<u>180</u>
Total Inventory Material	3,350
<u>Non-Inventory Material</u>	<u>Amount (Ci)</u>
^{90}Sr Fluoride	60,000
New England Nuclear Corporation	4,700
Calorimeter Standards	11,100
Weather Bureau Source	152,500
SNAP-7B	24,000
SNAP-7C	139,500
SNAP-7D	<u>126,700</u>
SNAP material purchase ^a	
Total Non-Inventory Material	518,675
TOTAL INVENTORY AND NON-INVENTORY MATERIAL	552,025

^a Strontium-90 purchased under DRRD program.

Fabrication Summary

	Feb. 1979		Cy 1979		FY 1979	
	No.	Ci	No.	Ci	No.	Ci
Sources						
Fabricated	0	0	0	0	4	153,000
Shipped	0	0	0	0	4	153,000
Special Form Cans						
Fabricated	0	0	0	0	0	0
Shipped	0	0	0	0	0	0

Short-Lived Fission Production (*H. Bailey*)
(Production and Inventory Accounts)

Three irradiated 2.5-gram ^{235}U targets were processed to yield the products tabulated below. Of the 1460 Ci of ^{133}Xe obtained, 104 Ci were loaded into 73 ampules for shipment to customers.

<u>Isotopes</u>	<u>Number of Batches</u>	<u>Amount (Ci)</u>
Iodine-131	1	50
Molybdenum-99	3	100
Ruthenium-103	1	1
Xenon-133	3	1460
Zirconium/Niobium-95	1	7

Three experimental runs were made to test the procedure used to recover ^{99}Mo from fission product mixtures. The procedure tested is essentially the one used at ORNL about twelve years ago prior to being withdrawn from the sale of ^{99}Mo . Yields ranging from 35 to 75 Ci per 2.5-gram ^{235}U target (seven days decay) were obtained with purities consistent with present-day standards. Samples were provided to interested companies which use fission-product ^{99}Mo .

Krypton Enrichment Facility (*J. R. DeVore*)

During February, 1979, the south bank was emptied, purged with helium, and the cell was opened. The column valves were leak tested and it was determined that seven valves were leaking through the seat. These have been replaced by maintenance personnel.

The column inventory (south bank) balanced to within 78 Ci. A total of 732 Ci of >23% ^{85}Kr was obtained along with 182 Ci of 17.71% ^{85}Kr and 583 Ci of >9% ^{85}Kr . A total of 577 Ci was lost during this enrichment cycle through normal operations (loading, unloading, purging) or disposal of tails. One hundred seventy-five Ci of 23.57% and 182 Ci of 17.71% ^{85}Kr were transferred to Sales. The remainder will be reloaded onto the columns for a 40% enrichment run beginning in late March, 1979.

Packing and Shipping (*R. D. Johnston*)

A total of 225 packages was processed and shipped as tabulated below. The total weight shipped was 53,900 pounds.

<u>Radioactive Solid Shipments</u>	<u>Radioactive Gas Shipments</u>	<u>Radioactive Liquid Shipments</u>	<u>Empty Containers</u>	<u>Total</u>
55	109	56	5	225

Fifty empty returnable containers were received and decontaminated.

Alpha Handling Facility (*R. D. Johnston*)

A total of 21 packages of ^{241}Am and ^{237}Np was prepared for shipment, including 500 grams of ^{241}Am .

FPDL Operations (*F. V. Williams*)

The decontamination of Cell 10W, combined with shielding of high radiation spots, reduced the general background in the cell to 200 to 300 mrem/hr. Smears from the cell walls and floor averaged 20 mrem/hr. Maintenance personnel began work on removing the shielding window and frame. The decontamination of Cell 10E was continued by pressure spraying and removing contaminated materials. This effort is a part of the FPDL Decommissioning Program but will be essential to the utilization of these cells for fission ^{99}Mo production if ORNL is assigned a backup role for United States supply of this essential radioisotope.

Maintenance work included removal and storage of the Cell 10W manipulator and changing boots on two manipulators.

The review of FPDL Operating Procedures was completed.

Miscellaneous (*R. W. Schaich*)

The design for a new ^{133}Xe loadout system was completed and installation is to start in the first quarter of 1979.

A design for a new tritium handling system was initiated in 1978 and is approximately 95% complete. Installation of the new system is scheduled for the second quarter of 1979.

The design of an electropolisher system for FPDL decontamination operations was 99% complete at the end of February. Installation of this equipment is tentatively set for the end of FY 1979.

A purchase order was issued to fabricate 23 new containers for use in the ^{85}Kr and tritium operations and shipments.

A revised Safety Analysis report has been issued to allow the shipment of 50 W_T in the ORNL Tungsten Carrier. Approval of this revision has been received from ORO-DOE.

An ORNL Radioactive Shipping Container catalog will be published when ORO-DOE issues new Certificates of Compliance for Chemical Technology casks.

The design of a ¹³³Xe processing system for Cell 10 (FPDL) is approximately 95% complete at the end of February and shop fabrication has been initiated.

Five hundred non-returnable tritium gas cylinders were received for shipment of tritium gas in quantities of less than 1,000 Ci. These units have been placed in service.

The preliminary design of a charcoal off-gas system for supplying ventilation to the SLFP cells is complete. Installation of this system is estimated to cost \$150,000.

An ORR Radioisotope Production Facility (A1-A2) was designed by the Reactor Operations personnel for the removal of ¹³³Xe rings during ORR operating periods. This unit should be ready for installation and testing in the second quarter of 1979.

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>		
McMaster University	Tritium	500 Ci
New England Nuclear	Tritium	8,000 Ci
American Atomics Corporation	Tritium	50,000 Ci
Becton Dickinson Immunodiagnostics	Tritium	500 Ci
Saunders-Roe Development, Inc.	Tritium	30,000 Ci
Merz & Bentel Nuclear, Inc.	Tritium	30,000 Ci
Brandhurst Company, Ltd.	Tritium	60,000 Ci
United States Radium Corporation	Tritium	15,000 Ci
Self-Powered Lighting	Tritium	50,000 Ci
Trio Tech International	Krypton-85	300 Ci
Institut Nat'l des Radioelements	Krypton-85	100 Ci
Airco Cryoplants	Krypton-85	100 Ci
Atomics Energy of Canada	Cesium-137	30,100 Ci
The Radiochemical Centre Ltd.	Promethium-147	2,002 Ci

<u>Customer</u>	<u>Isotope</u>	<u>Amount</u>
<u>Withdrawn Items</u>		
ORNL, Chemical Technology	Iodine-131	2 mCi
Univ. of California (Los Alamos)	Iodine-131	36 mCi
ORNL, Inspection Engineering	Iodine-131	5 mCi
<u>Items Used in Cooperative Programs</u>		
Medical Research Council	Platinum-195m	4 mCi
Childrens Hospital Medical Center	Potassium-43	5 mCi
University of Kentucky	Platinum-195m	20 mCi
University of MS Medical Center	Potassium-43	6 mCi
University of Southern California School of Medicine	Platinum-195m	7 mCi
Veterans Administration	Potassium-43	5 mCi
University of Connecticut	Potassium-43	4.5 mCi

The radioisotope sales and shipments for the first five months of fiscal year 1978 and fiscal year 1979 are given in Table 1.

Table 1. Radioisotope Sales and Shipments

<u>Item</u>	<u>10-1-77 thru 2-28-78</u>	<u>10-1-78 thru 2-28-79</u>
Inventory Items	\$ 60,369	\$ 137,164
Tritium	374,483	894,864
Major Products	272,615	170,556
Iridium-192	51,297	477,069
Radioisotope Services	124,975	187,185
Cyclotron Irradiations	140,872	155,167
Miscellaneous Processed Materials	3,100	6,267
Packing and Shipping	79,245	82,645
 Total	 \$1,106,956	 \$2,110,917
 Number of Shipments	 963	 989

PUBLICATIONS

REPORTS

E. Lamb, *Radioisotope Distribution Program Progress Report for January, 1979*, ORNL/TM-6838, Oak Ridge National Laboratory (March, 1979).

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