LIST OF DOE RADIOISOTOPE CUSTOMERS WITH
SUMMARY OF RADIOISOTOPE SHIPMENTS, FY 1980

Compiled by
J. S. Burlison

DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

- August 1981

Prepared for
Office of Health and Environmental Research
Office of Energy Research
U.S. Department of Energy
Washington, D.C. 20545
Contract DE-AC06-76RLO 1830

Pacific Northwest Laboratory
P.O. Box 999
Richland, Washington 99352

This document is
PUBLICLY RELEASABLE
Larry E. Williams
Authorizing Official
Date: 06/13/2007

EB
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

ACKNOWLEDGMENTS

The compiler thanks to the following laboratories and DOE Area Offices for their annual contributions from which this report is compiled.

Argonne National Laboratory
Brookhaven National Laboratory
Hanford Engineering Development Laboratory
Idaho Operations Office/EG&G Idaho, Inc.
Los Alamos Scientific Laboratory
Mound Facility
Oak Ridge National Laboratory
Pacific Northwest Laboratory
Savannah River Plant/DOE
UNC Nuclear Industries, Inc.

PREVIOUS REPORTS

Previous reports in this series are:

TID-2160 (FY 1964)	ORNL-IIC-32 (FY 1970)	BNWL-1993 (FY 1975)
ORNL-IIC-6 (FY 1965)	ORNL-IIC-38 (FY 1971)	BNWL-2147 (FY 1976)
ORNL-IIC-9 (FY 1966)	BNWL-1774 (FY 1972)	PNL-2572 (FY 1977)
ORNL-IIC-13 (FY 1967)	BNWL-1824 (FY 1973)	PNL-2930 (FY 1978)
ORNL-IIC-17 (FY 1968)	BNWL-1902 (FY 1974)	PNL-3274 (FY 1979)
ORNL-IIC-27 (FY 1969)		

Other reports covering stable isotope sales include:

"Stable Isotope Sales: Mound Facility Customer and Shipment Summary, FY 1979",
MLM-2718.

"Stable Isotope Customer List and Summary of Shipments, FY 1980," ORNL/TM-7764.

"Stable Isotope Customer List and Summary of Shipments, FY 1979," ORNL/TM-7214.

Similar reports covering stable isotope distribution have also been prepared and are available from the National Technical Information Center, U.S. Department of Commerce, 5285 Port Royal Rd, Springfield, VA 22161.

CONTENTS

ACKNOWLEDGMENTS	iii
PREVIOUS REPORTS .	iii
LIST OF DOE RADIOISOTOPE CUSTOMERS WITH SUMMARY OF RADIOISOTOPE SHIPMENTS FY 1980 .	1
1. ISOTOPE SUPPLIER, FACILITY CONTACT AND ISOTOPES OR SERVICE SUPPLIED	3
2. ALPHABETICAL LIST OF CUSTOMERS, SUPPLIERS AND ISOTOPES PURCHASED .	5
3. ALPHABETICAL LIST OF ISOTOPES CROSS-REFERENCED TO CUSTOMER NUMBER .	31
4. GEOGRAPHIC LOCATION OF RADIOISOTOPE CUSTOMERS .	37
5. RADIOISOTOPE SALES AND TRANSFERS--FY1980 .	41

LIST OF DOE RADIOISOTOPE CUSTOMERS WITH
SUMMARY OF RADIOISOTOPE SHIPMENTS FY 1980

The sixteenth edition of the radioisotope customer list was prepared at the request of the Office of Health and Environmental Research, Office of Energy Research, Department of Energy (DOE). This document lists DOE's radioisotope production and distribution activities by its facilities at Argonne National Laboratory; Pacific Northwest Laboratory; Brookhaven National Laboratory; Hanford Engineering Development Laboratory; Idaho Operations Office; Los Alamos Scientific Laboratory; Mound Facility; Oak Ridge National Laboratory; Savannah River Laboratory; and UNC Nuclear Industries, Inc.

The information is divided into five sections:

1. Isotope Suppliers, Facility, Contracts and Isotopes or Services Supplied. Section 1 lists ~~suppliers~~ of isotopes ~~supplied~~, and the contact ~~person~~ for each DOE facility. If a reader needs more specific information that is not supplied in this report about isotope sales or shipments for a particular facility, he or she should contact the person listed for that facility.
2. Alphabetical List of Customers, and Isotopes Purchased. Section 2 is an alphabetical list of domestic and foreign customers and their addresses. Each customer has a customer number. This number is used to cross-reference data in the other sections of the report. Isotope purchases are listed after each customer's addresses, and the laboratory supplying each isotope is indicated by a letter abbreviation set off by parentheses.
3. Alphabetical List of Isotopes Cross-Referenced to Customer Numbers. Section 3 ~~alphabetically~~ lists isotopes and cross-references them to customer numbers. This section provides a quick idea of the number of customers purchasing a particular isotope.
4. Geographical Location of Radioisotope Customers. Section 4 is an alphabetical list of states and foreign countries that is cross-referenced to customer numbers and indicates the geographical concentration of isotope users.
5. Radioisotope Sales and Transfers-FY 1980. Section 5 summarizes the FY-1980 radioisotope shipment activities of the DOE laboratory facilities listed in Section 1. A table alphabetically lists the isotopes and their suppliers. Data on shipments, quantities, and dollar values of each isotope are listed under domestic, foreign, and project (DOE facilities) categories.

1. ISOTOPE SUPPLIER^(a), FACILITY CONTACT, AND ISOTOPE OR SERVICES SUPPLIED

The following abbreviations are used in this listing:

Cyclotron Service Irradiations	CSI	Natural Uranium	NU
Depleted Uranium	DU	Reactor Service Irradiations	RSI
Encapsulation	Cap	Withdrawn radioisotopes prepared under special approval	RW
Enriched Uranium	EU	Special Services	SS
Fission Products	FP	Targets	Tgs
Miscellaneous Compound Preparations	MCP		

<u>Facility</u>	<u>Abbreviation</u>	<u>Facility</u>	<u>Abbreviation</u>
Argonne National Laboratory R. G. Damm Special Materials Division Argonne National Laboratory 9700 S. Cass Ave Argonne, IL 60439 FTS 972-6770 Commercial (312)972-6770 <u>Isotopes or Services:</u> CSI	(A)	Hanford Engineering Development Laboratory D. Engel, Manager Materials Department Richland, WA 99352 FTS 444-3548 Commercial (509)942-3548 <u>Isotopes or Services</u> 110Ag, 241Am, 133Ba, 144CePr, 252Cf, 36Cl, 244Cm, 57Co, 60Co, 134Cs, 137Cs, DU, 59Fe, 152Eu, 3H, 192Ir, 54Mn, 22Na, 92Nb, 237Np, NU, 147Pm, 210Po, 239Pu, RaDEF, 90SrY, 236U, 65Zn, 95Zr	(H)
Brookhaven National Laboratory P. Colsman Isotopes and Special Materials Group Brookhaven National Laboratory Upton, Long Island, NY 11973 FTS 664-4058 Commercial (516)345-3441 Extension 4058 <u>Isotopes or Services:</u> 211At, 109Cd, 18F, 52Fe, 68Ge, 123I, 28Mg, 22Na, 191Os, 109Pd, 81Rb, RSI, 97Ru, 103Ru, 99Tc, 178W, 127Xe	(B)	Idaho Operations Office R. E. Tiller, Director Reactor Operations and Programs Department of Energy 550 Second Street Idaho Falls, ID 83401 FTS 583-1439 Commercial (208)526-1439 <u>Isotopes or Services</u> 198Au, 56Mn, 24Na, 122Sb, 124Sb	(I)

(a) All entries for Argonne, UNC, and Idaho are either reactor service irradiations, cyclotron service irradiations, or both with no processed isotopes being sold; entries for Savannah River represent material for resale and loans.

<u>Facility</u>	<u>Abbreviation</u>	<u>Facility</u>	<u>Abbreviation</u>
Los Alamos Scientific Laboratory	(L)	Pacific Northwest Laboratory	(P)
C. Longmire Los Alamos Scientific Laboratory University of California P.O. Box 1663 Los Alamos, NM 87545		J. V. Filsinger Safety and Materials Management Pacific Northwest Laboratory P.O. Box 999 Richland, WA 99352	
FTS 843-4948 Commercial (505)667-4948		FTS 444-2051 Commercial (509)375-2051	
<u>Isotopes or Services</u>		<u>Isotopes or Services</u>	
⁷⁷ Br, ⁸² Sr, ⁸⁸ Y		²⁴¹ Am, ²⁵² Cf, DU, EU, ²³⁷ Np, NU Pu, Th	
Mound Facility	(M)	Savannah River Plant	(S)
L. P. Thomas Sales/Marketing Manager Stable Isotope Sales Monsanto Research Corporation P.O. Box 32 Miamisburg, OH 45342		C. G. Halsted Technical and Production Division Department of Energy P.O. Box A Aiken, SC 29801	
FTS 774-3896 Commercial (513)865-3896		FTS 239-2217 Commercial (803)725-6211 Extension 2217	
<u>Isotopes or Services</u>		<u>Isotopes or Services</u>	
²⁵² Cf, DU, ³ H, ¹⁹² Ir, ⁸⁵ Kr, NU, ²⁰⁹ Po, ²¹⁰ Po, ²³⁸ Pu, ²³⁹ Pu, ²⁴⁰ Pu, ²⁴² Pu, Th, ²³⁴ U, ²³⁸ U		²⁴¹ Am, ²⁵² Cf, ²³⁸ Pu	
Oak Ridge National Laboratory	(O)	UNC Nuclear Industries, Inc.	(U)
J. E. Ratledge, Supervisor Isotope Sales Oak Ridge National Laboratory P.O. Box X Oak Ridge, TN 37830		J. P. Schmidt, Manager Reactor Technology Richland, WA 99352	
FTS 624-6984 Commercial (615)547-6984 Extension 6661		FTS 444-4909 Commercial (509)373-4909	
<u>Isotopes or Services</u>		<u>Isotopes or Services</u>	
²⁴¹ Am, ²⁴³ Am, ³⁷ Ar, ¹⁴⁰ Ba, ²⁴⁹ Bk, ¹⁴ C, ⁴⁷ Ca, Cap, ²⁴⁹ Cf, ²⁵² Cf, ¹⁴⁴ Ce, ⁶⁰ Co, ¹³⁷ Cs, CSI, ²⁴⁴ Cm, ²⁴⁸ Cm, ²⁵³ Es, ¹⁵² Eu, ²⁵⁷ Fm, ¹⁵³ Gd, ³ H, ¹⁸¹ Hf, ¹²⁹ I, ¹³¹ I, ¹⁹² Ir, ⁴³ K, ⁸⁵ Kr, MCP, ⁹⁵ Nb, ⁶³ Ni, ²³⁷ Np-high purity, ²³⁷ Np-oxide, NU, ³³ P, ²³¹ Pa, ¹⁴⁷ Pm, ²³⁶ Pu, ²³⁷ Pu, ²³⁸ Pu, ²³⁹ Pu, ²⁴⁰ Pu, ²⁴¹ Pu, ²⁴² Pu, ²⁴⁴ Pu, RW, ¹⁰³ Ru, ¹⁰⁶ Ru, ⁷⁵ Se, ¹⁵¹ Sm, SS, ⁸⁹ Sr, ⁹⁰ Sr, Tgs, ⁹⁹ Tc, ²²⁹ Th, ²³⁰ Th, ²³² Th, ²³³ U, ²³⁴ U, ²³⁵ U, ²³⁶ U, ²³⁸ U, ¹³³ Xe, ⁹⁵ Zr/ ⁹⁵ Nb		⁶⁰ Co, ²⁴ Na, ¹⁴⁷ Nd, ¹⁴⁹ Nd, ¹⁸⁸ Re, ¹⁷⁰ Tm All produced from reactor service irradiations	

2. ALPHABETICAL LIST OF CUSTOMERS, SUPPLIERS AND ISOTOPES PURCHASED

The letter following each isotope or service entry is the supplier abbreviation listed in Section 1.

DOMESTIC CUSTOMERS

<p>1 Advanced Micro Devices Incorporated
P.O. Box 453
Sunnyvale, CA 94086</p> <p>$^{85}\text{Kr}(\text{O})$</p>	<p>8 Allen & Bradley Company
136 W. Greenfield Ave.
Milwaukee, WI 53204</p> <p>$^{85}\text{Kr}(\text{O})$</p>
<p>2 Aerojet Heavy Metals Division
3097 E. Ana Street
Compton CA 90221</p> <p>$\text{DU}(\text{P})$</p>	<p>9 American Atomics Corporation
425 South Plumer
Tucson, AZ 85719</p> <p>$^3\text{H}(\text{O})$</p>
<p>3 Aerojet Nuclear Company
550 Second Street
Idaho Falls, ID 83401 $^{140}\text{Ba}(\text{O}), ^{129}\text{I}(\text{O}), ^{240}\text{Pu}(\text{O}),$
$^{133}\text{Xe}(\text{O}), ^{252}\text{Cf}(\text{O}), \text{MIS}(\text{O}),$
$^{236}\text{Pu}(\text{O}), ^{238}\text{Pu}(\text{O}), ^{239}\text{Pu}(\text{O}),$
$\text{Tgh}(\text{O}), ^{235}\text{U}(\text{O})$</p>	<p>10 Pmerisham Corporation
2636 S. Clearbrook Drive
Arlington Heights, IL 60005 $^{109}\text{Cd}(\text{B}), ^{153}\text{Gd}(\text{O}), ^{129}\text{I}(\text{O}),$
$\text{RW}(\text{O})$</p>
<p>4 Aerospace Corporation
Catholic University
Maloney Hall Room 101E
620 Michigan Avenue NE
Washington DC 20017</p> <p>$^{63}\text{Ni}(\text{B})$</p>	<p>11 Analog Devices Semiconductor
829 Woburn Street
Wilmington, MA 01887</p> <p>$^{85}\text{Kr}(\text{O})$</p>
<p>5 AIRCO, Inc.
Central Research Laboratories
Murray Hill, NJ 07974</p> <p>$^{85}\text{Kr}(\text{O})$</p>	<p>12 Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439 $^{249}\text{Bk}(\text{O}), ^{248}\text{Cm}(\text{O}), \text{DU}(\text{M}),$
$^{258}\text{Es}(\text{O}), ^{236}\text{Pu}(\text{O}), ^{239}\text{Pu}(\text{M}),$
$\text{RSI}(\text{B}), ^{106}\text{Ru}(\text{O}), \text{SS}(\text{O}), ^{99}\text{Tc}(\text{O}),$
$^{229}\text{Th}(\text{O}), ^{230}\text{Th}(\text{O}), ^{234}\text{U}(\text{M}),$
$^{238}\text{U}(\text{M}), ^{95}\text{Zr}(\text{O})$</p>
<p>6 Alabama Department of Public Health
State Office Building
Montgomery, AL 36130</p> <p>$^{234}\text{U}(\text{M}), ^{238}\text{U}(\text{M})$</p>	<p>13 Arkansas Department of Health Division
of Public Health Laboratories
4815 W. Markham St.
Little Rock, AR 72201</p> <p>$^{234}(\text{M}), ^{238}\text{U}(\text{M})$</p>
<p>7 Albert Einstein Hospital
Ullman Building, Room 119
Newport & Morris Avenue
Bronx, NY 10461</p> <p>$^{81}\text{Rb}(\text{B})$</p>	<p>14 Army, Department of the
Army Materials & Mechanics
Research Center
Watertown, MA 02172</p> <p>$\text{DU}(\text{P})$</p>

<p>15 Army, Department of the
Picatinny Arsenal
Dover, NJ 07801

DU(P)</p> <p>16 Automation Industries, Inc.
PO Box 245
Phoenixville, PA 19460

192Ir(H), 192Ir(M), 192Ir(O)</p> <p>17 Babcock & Wilcox Company
Power Generation Group
20 South Van Buren Avenue
Barberton, OH 44203

SS(O)</p> <p>18 Battelle Columbus
Plain City - Georgeville Road
West Jefferson, OH 43201

95Zr(H)</p> <p>19 Battelle, Pacific Northwest
Laboratories
P.O. Box 999
Richland, WA 99352

241Am(H), 244Cm(H), 244Cm(O),
60Co(H), 137Cs(H), 152Eu(H),
152Eu(O), 3H(O), 3H(H),
85Kr(O), 147Nd(U), 149Nd(U),
237Np(H), NU(H), 147Pm(H),
237Pu(O), 239Pu(H), 239Pu(O),
RaDEF(H), 188Re(U), 90SrY(H),
99Tc(O), Tgs(O), 230Th(O),
170Tm(U), 236U(H)</p> <p>20 Bell Telephone Laboratories
Murray Hill, NJ 07971

CSI(O), MCP(O), SS(O)</p> <p>21 Bishop International Trading Inc.
1270 Ave. of the Americas
Suite 415
New York, NY 10020

238U(O)</p> <p>22 Boston College
Chestnut Hill, MA 02167

99Tc(O)</p> | <p>23 Boston University
100 Cunnington Street
Boston, MA 02215

89Sr(O)</p> <p>24 Brookhaven National Laboratory
Upton, Long Island, NY 11973

252Cf(P), CSI(O), 3H(O),
192Ir(O), 237Np(P), Pu(P),
240Pu(O), 99Tc(O),
Tgs(O), 235U(O), 238U(O)</p> <p>25 Brooks Air Force Base
Brooks AFB, TX 78235

242Pu(M)</p> <p>26 Burroughs Corporation
460 Sierra Madre Villa
Pasadena, CA 91109

85Kr(O)</p> <p>27 California Department of Health
Services Sanitation and Radiation
Laboratory
2151 Berkeley Way
Berkeley, CA 94704

234U(M), 238U(M)</p> <p>28 California Institute of Technology
1201 E. California Boulevard
Pasadena, CA 91109

235U(O)</p> <p>29 Campbell Pacific Nuclear
130 South Buchanan Circle
Pareco, CA 94553

241Am(P)</p> <p>30 Case-Western Reserve University
2232 Circle Drive
Cleveland, OH 44106

28Mg(B)*</p> |
|--|--|

* All starred (*) isotopes are Oak Ridge billed.

<p>31 Catholic University of America
104 McCorté Ward Hall
Washington, DC 20017</p> <p>$^{137}\text{Cs}(0)$, $\text{MCP}(0)$, $^{90}\text{Sr}(0)$</p>	<p>39 Conoco, Inc.
Research and Development
Department
P.O. Box 1267
Ponca City, OK 74601</p> <p>$^{85}\text{Kr}(0)$, $^{89}\text{Sr}(0)$</p>
<p>32 Centronic Incorporated
1101 Bristol Road
Mountainside, NJ 07092</p> <p>$^{238}\text{U}(0)$</p>	<p>40 Cornell University
Ithaca, NY 14850</p> <p>$^{47}\text{Ca}(0)$, $^{28}\text{Mg}(B)^*$</p>
<p>33 Chamberlain Manufacturing Company
E. 4th and Esther Streets
Waterloo, IA 50705</p> <p>$\text{DU}(P)$</p>	<p>41 Cornell University Medical College
Department of Neurosurgery
1300 York Avenue
New York, NY 10021</p> <p>$\text{RSI}(B)$</p>
<p>34 Chevron Research Company
Accounting Department
PO Box 1627
San Francisco, CA 94120</p> <p>$^{106}\text{Ru}(0)$</p>	<p>42 Creighton University
2410 California
Omaha, NB 68131</p> <p>$^{47}\text{Ca}(0)$</p>
<p>35 Children's Hospital
Division of Nuclear Medicine
300 Longwood Ave.
Boston, MA 02115 $^{68}\text{Ge}(B)^*$, $^{191}\text{Os}(B)$, $^{81}\text{Rb}(B)$,
$^{178}\text{W}(B)$</p>	<p>43 Cryogenic Rare Gas Laboratories, Inc.
730 S. 13th Street
Newark, NJ 07103</p> <p>$^{85}\text{Kr}(0)$</p>
<p>36 Colorado State Department of Health
4210 E. 11th Ave.
Denver, CO 80224</p> <p>$^{234}\text{U}(M)$, $^{238}\text{U}(M)$, $^{236}\text{Pu}(0)$</p>	<p>44 DCA Reliability Laboratory
975 Benicia Avenue
Sunnyvale, CA 94086</p> <p>$^{85}\text{Kr}(0)$</p>
<p>37 Columbia Presbyterian Hospital
Nuclear Medicine
622 W. 168th Street
New York, NY 10032</p> <p>$^{81}\text{Rb}(B)$</p>	<p>45 Delco Electronics
General Motors Corporation
Kokomo, IN 46901</p> <p>$^{85}\text{Kr}(0)$</p>
<p>38 Columbia University
630 West 168th Street
New York, NY 10032</p> <p>$^{109}\text{Pd}(B)$</p>	<p>46 Downstate Medical Center
Radiation Physics
450 Clarkson Avenue
Brooklyn, NY 11203</p> <p>$^{28}\text{Mg}(B)^*$</p>

- 47 EAD Metallurgical, Inc.
71 Pearce Ave.
Tonawanda, NY 14150
 $^{241}\text{Am}(\text{O})$, $\text{Cap}(\text{O})$
- 48 East Carolina University
Purchasing Department
Greenville, NC 27834
 $^{89}\text{Sr}(\text{O})$
- 49 Eastern Environmental Radiation
Facility
PO Box 3009
Montgomery, AL 36193
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 50 Eberline Instrument Corporation
Post Office Box 279
Santa Fe, NM 87501
 $^{243}\text{Am}(\text{O})$
- 51 EG&G Idaho, Incorporated
TRA, PO Box 1625
Idaho Falls, ID 93415
 $^{198}\text{Au}(\text{I})$, $\text{EU}(\text{P})$, $^{56}\text{Mn}(\text{I})$, $^{24}\text{Na}(\text{I})$
- 52 E. I. Du Pont De Nemours and Company
Savannah River Plant
Aiken, SC 29801
 $^{243}\text{Am}(\text{O})$, $^{252}\text{Cf}(\text{O})$, $^{252}\text{Cf}(\text{M})$,
 $^{244}\text{Cm}(\text{O})$, $^{248}\text{Cm}(\text{O})$, $\text{DU}(\text{P})$, $\text{EU}(\text{P})$,
 $^3\text{H}(\text{M})$, $\text{MCP}(\text{O})$, $\text{Tgs}(\text{O})$, $\text{Th}(\text{P})$,
 $\text{NU}(\text{P})$, $\text{Pu}(\text{P})$, $^{238}\text{Pu}(\text{M})$, $^{233}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{O})$
- 53 EMR Photo Electric
Div of Weston Instruments
P.O. Box 44
Princeton, NJ 08540
 $^3\text{H}(\text{O})$
- 54 Exxon Minerals Co., USA
PO Box 3020
Casper, WY 82637
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 55 Exxon Nuclear Idaho Company
PO Box 2800
Idaho Falls, ID 83401
 $\text{RSI}(\text{I})$
- 56 Fairchild Semiconductor
Post Office Box 790
Mountain View, CA 94040
 $^{85}\text{Kr}(\text{O})$
- 57 Fairchild Semiconductors
333 Western Avenue
South Portland, ME 04106
 $^{85}\text{Kr}(\text{O})$
- 58 Flinchbaugh Products Incorporated
315 Richard Mine Road
Wharton, NJ 07885
 $\text{DU}(\text{P})$
- 59 Florida Department of Health and
Rehabilitation Radiological
Health Services
PO Box 15490
Orlando, FL 32858
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 60 Food & Drug Administration
Radiation Safety Officer
200 C Street SW
Washington, DC 20204
 $^{99}\text{Tc}(\text{B})$
- 61 Food & Drug Administration, WEAG
109 Holton St.
Winchester, MA 01890
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 62 Ford Aerospace & Communication, Corp
Aeronautic Division
Ford Road
Newport Beach, CA 92663
 $^{85}\text{Kr}(\text{O})$

- 63 Ford Aerospace & Communication Corp.
Division of Ford Motor Corporation
3939 Fabian Way
Palo Alto, CA 94303
 $^{85}\text{Kr}(0)$
- 64 Gama Industries Inc.
Post Office Box 2543
Baton Rouge, LA 70821
 $^{192}\text{Ir}(0)$
- 65 General Atomic Company
10955 John Jay Hopkins Drive
San Diego, CA 92121
 $\text{EU}(\text{P})$
- 66 General Electric
PO Box 780
Wilmington, NC 28401
 $\text{U}(\text{B}), \text{O}(\text{B})$
- 67 General Electric Company
Lynchburg, VA 24502
 $^{85}\text{Kr}(0)$
- 68 General Electric Company
P.O. Box 98
Mattydale, NY 13211
 $^{85}\text{Kr}(0)$
- 69 General Electric Company
P.O. Box 254
San Jose, CA 95103
 $^{234}\text{U}(0)$
- 70 General Electric Company
Knolls Atomic Power Laboratory
PO Box 1072
Schenectady, NY 12301
 $^{131}\text{I}(\text{B}), ^{109}\text{Cd}(\text{B}), ^{242}\text{Pu}(0), ^{235}\text{U}(0)$
- 71 General Electric Company
Neutron Devices Department
St. Petersburg, FL 33733
 $^{238}\text{Pu}(\text{M})$
- 72 General Electric
Vallecitos Nuclear Company
Vallecitos Road
Pleasanton, CA 94566
 $^{122}\text{Sb}(\text{I}), ^{124}\text{Sb}(\text{I}), ^{252}\text{Cf}(\text{S})$
- 73 General Electric Company
Valley Forge Space Center
Philadelphia, PA 19101
 $\text{Th}(\text{M})$
- 74 General Electric Company
General Electric Drive
Waynesboro, VA 22980
 $^{85}\text{Kr}(0)$
- 75 General Electric Research & Development
Building K1
Schenectady, NY 12301
 $\text{RSI}(\text{B})$
- 76 General Nucleonics Division
Tyco Laboratories
2811 Metropolitan Place
Pomona, CA 91767
 $^{85}\text{Kr}(0)$
- 77 Georgia Institute of Technology
225 North Avenue NW
Atlanta, GA 30332
 $^{85}\text{Kr}(0), \text{MCP}(0), ^{89}\text{Sr}(0), ^{90}\text{Sr}(0)$
- 78 George Washington University
Washington, DC 20037
 $^{77}\text{Br}(\text{L})$
- 79 Gollob Analytical Service Corporation
47 Industrial Road
Berkeley Heights, NJ 07922
 $^3\text{H}(0), ^{85}\text{Kr}(0)$
- 80 Goodyear Atomic Corporation
PO Box 628
Piketon, OH 45661
 $\text{EU}(\text{P})$

- 81 ~~CSH~~ Radiation Health
Pittsburgh, PA 15261
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
 $^{137}\text{Cs}(0)$, $^{131}\text{I}(0)$, $^3\text{H}(0)$,
 $^{129}\text{I}(0)$, $^{33}\text{P}(0)$, $^{106}\text{Ru}(0)$,
 $^{90}\text{Sr}(0)$
- 82 Gulf Energy and Environmental
Systems
PO Box 608
San Diego, CA 92112
 $^{137}\text{Cs}(0)$, $^{\text{MCP}}(0)$, $^{\text{SS}}(0)$,
 ^{229}Th , $^{234}\text{U}(0)$, $^{95}\text{Zr}(0)$
- 83 Gulf Nuclear Incorporated
202 Medical Center
Webster, TX 77598
 $^{241}\text{Am}(0)$, $^{\text{Cap}}(0)$, $^{137}\text{Cs}(0)$,
 $^{153}\text{Gd}(0)$, $^3\text{H}(0)$,
 $^{192}\text{Ir}(0)$, $^{\text{MCP}}(0)$
- 84 Harvard Medical School
Shields Warren Laboratory
50 Binney Street
Boston, MA 02115
 $^{211}\text{At}(8)$, $^{18}\text{F}(\text{B})$
- 85 Hazen Research, Inc.
4601 Indiana St.
Golden CO 86401
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 86 Henry Ford Hospital
2799 West Grand Boulevard
Detroit, M 48202
 $^{47}\text{Ca}(0)$
- 87 Hughes Aircraft Company
PO Box 92907
Los Angeles, CA 90009
 $^{85}\text{Kr}(0)$
- 88 ICI America Inc.
Atlas Aerospace Division
Valley Forge Industrial Park
Valley Forge, PA 19481
 $^{85}\text{Kr}(0)$
- 89 ICN & NB Company
26201 Miles Road
Cleveland, OH 44128
- 90 Industrial Nuclear Company
1124 Chess Drive
Foster City, CA 94404
 $^{192}\text{Ir}(0)$
- 91 Intel Corporation
3065 Bowers Avenue
Santa Clara, CA 95051
 $^{85}\text{Kr}(0)$
- 92 Intelcom Radiation Technology
PO Box 80817
San Diego, CA 92138
 $^{\text{DU}}(\text{P})$, $^{237}\text{Np}(0)$, $^{235}\text{U}(0)$,
 $^{238}\text{U}(0)$
- 93 Iowa State University
Ames, IA 50010
 $^{241}\text{Am}(0)$, $^{\text{MCP}}(0)$
- 94 Isomedix, Inc.
P.O. Box 177
25 Eastmans Road
Parsippany, NJ 07054
 $^{137}\text{Cs}(0)$, $^{\text{MCP}}(0)$
- 95 Isotope Products Laboratories
404 South Luke Street
Burbank, CA 91502
 $^{241}\text{Am}(0)$, $^{\text{Cap}}(0)$, $^{109}\text{Cd}(\text{B})$,
 $^{144}\text{Ce}(0)$, $^{249}\text{Cf}(0)$,
 $^{252}\text{Cf}(0)$, $^{137}\text{Cs}(0)$, $^{131}\text{I}(0)$,
 $^{153}\text{Gd}(0)$, $^{129}\text{I}(0)$, $^{85}\text{Kr}(0)$,
 $^{\text{MCP}}(0)$, $^{147}\text{Pm}(0)$, $^{106}\text{Ru}(0)$,
 $^{90}\text{Sr}(0)$, $^{235}\text{U}(0)$,
 $^{127}\text{Xe}(\text{B})^*$
- 96 Isovac Engineering Company
6220 San Fernando Road
Glendale, CA 91204
 $^{85}\text{Kr}(0)$
- 97 Jewish Hospital of St. Louis
216 S. Kingshighway Boulevard
St. Louis, MO 63110
 $^{47}\text{Ca}(0)$

- 98 John Hopkins Hospital
615 North Wolfe Street
Baltimore, MD 21205
 $^{77}\text{Br}(\text{L})$, $^{123}\text{I}(\text{B})$, $^{82}\text{Sr}(\text{L})$
- 99 Johns Hopkins University
Baltimore, MD 21218
 $^{47}\text{Ca}(\text{O})$
- 100 Kaman Nuclear
1700 Garden of the Gods Road
Colorado Springs, CO 80907
 $^3\text{H}(\text{O})$, $\text{Tgs}(\text{O})$
- 101 KMS Fusion Inc.
3941 S. Research Park Drive
PO Box 1567
Ann Arbor, MI 48106
 $^3\text{H}(\text{O})$
- 102 Lawrence Experiment Station
37 Shattuck Street
Lawrence, MA 01843
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 103 Lee Environmental Lab
2030 Wright Avenue
Richmond, CA 94304
 $^3\text{H}(\text{B})$
- 104 Los Angeles County
USC Medical Center
1200 N. State Street
Box 112 GH
Los Angeles, CA 90033
 $^{47}\text{Ca}(\text{O})$
- 105 Loyola University
Medical Center
2160 S. First Avenue
Maywood, IL 60153
CSI(A)
- 106 Mallinckrodt Chemical Works
3600 N. Second Street
St. Louis MO 63160
 $\text{RW}(\text{O})$, $^{75}\text{Se}(\text{O})$, $^{127}\text{Xe}(\text{B})^*$
- 107 Massachusetts General Hospital
Boston, MA 02114
 $^{47}\text{Ca}(\text{O})$, $^{18}\text{F}(\text{B})$, $\text{MCP}(\text{O})$,
 $^{82}\text{Sr}(\text{L})$
- 108 Mayo Foundation
Rochester, MN 55901
 $^{47}\text{Ca}(\text{O})$
- 109 Measurex Corporation
10475 Imperial Avenue
Cupertino, CA 95014
 $^{85}\text{Kr}(\text{O})$
- 110 Medical College of Virginia
Radiation Safety Vault
Medical Education Building
Richmond, VA 23398
 $^{28}\text{Mg}(\text{B})^*$
- 111 Memorial Hospital
Department of Nuclear Medicine
1400 East Boulder
Colorado Springs, CO 80909
 $^{133}\text{Xe}(\text{O})$
- 112 Merck and Company
Rahway, NJ 07065
 $^{60}\text{Co}(\text{O})$, $^{127}\text{Xe}(\text{B})^*$
- 113 Methodist Hospital
Nuclear Radiology
1633 N. Capitol Avenue
Indianapolis, IN 46207
 $^{127}\text{Xe}(\text{B})^*$
- 114 Michael & Reese Hospital
29th St. & Ellis Ave
Chicago, IL 60616
 $^{47}\text{Ca}(\text{O})$, $^{133}\text{Xe}(\text{O})$
- 115 Michigan Department of Public
Health
3500 N. Logan St.
PO Box 30035
Lansing, MI 48909
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$

- 116 Micro & Rel, Incorporated
2340 West 10 Place
Tempe, AZ 85281
 $^{85}\text{Kr}(0)$
- 117 Microtest Systems Incorporated
~~1188~~ Bordeaux Drive
Sunnyvale, CA 94086
 $^{85}\text{Kr}(0)$
- 118 Midwest Research Institute
425 Volker
Kansas City, MO 64110
 $^{14}\text{C}(0)$
- 119 Minnesota Mining, and
Manufacturing Company
Nuclear Products
Twin Cities Army Ammunition
Plant
New Brighton, MN 55112
 $^{210}\text{Po}(M)$
- 120 Minnesota, Mining, and
Manufacturing Company
Industrial Nuclear Products
Bldg 223-55/3M Center
St Paul, MN 55102
 $^{137}\text{Cs}(0)$, $^{85}\text{Kr}(0)$, $\text{MCP}(0)$,
 $^{95}\text{Nb}(0)$, $^{210}\text{Po}(H)$, $^{127}\text{Xe}(B)^*$
- 121 Monolithic Memories Incorporated
1165 East Arques Avenue
Sunnyvale, CA 94086
 $^{85}\text{Kr}(0)$
- 122 Monsanto Research Corporation
Dayton Laboratory
1515 Nicholas Road
Dayton, OH 45407
 $^{241}\text{Am}(0)$, $\text{Cap}(0)$, $^{238}\text{Pu}(0)$,
 $^{252}\text{Cf}(S)$
- 123 Monsanto Research Corporation
Mound Laboratory
PO Box 32
Miamisburg, OH 45342
 $^{137}\text{Cs}(0)$, $\text{MCP}(0)$, $^{238}\text{Pu}(S)$
- 124 Monsanto Company
P.O. Box 1311
Texas City, TX 77591
 $^{60}\text{Co}(0)$, $^{85}\text{Kr}(0)$
- 125 Moravek Biochemicals
15302 E. Proctor Avenue
City of Industry, CA 91745
 $^3\text{H}(0)$
- 126 Motorola Inc.
5005 East McDowell Road
Phoenix, AZ 85008
 $^{85}\text{Kr}(0)$
- 127 Mount Sinai Medical Center
1 Gustave L. Levy Place
New York, NY 10029
 $^{82}\text{Sr}(L)$
- 128 NASA Space Center
Building 420
Houston, TX 77058
 $\text{RSI}(B)$
- 129 Nassau County Medical Center
Meadowbrook Hospital
2201 Hempstead Turnpike
East Meadow, NY 11554
 $^{47}\text{Ca}(0)$
- 130 National Bureau of Standards
Receiving Room, Building 301
Route 270 & Quince Orchard Road
Gaithersburg, MD 20760
 $^{198}\text{Ag}(B)$, $\text{DU}(P)$, $^3\text{H}(B)$,
 $^{127}\text{Xe}(B)^*$
- 131 National Bureau of Standards
Department of Commerce
Washington, DC 20234
 $^{252}\text{Cf}(P)$, $\text{CSI}(0)$, $^3\text{H}(0)$,
 $\text{Tgs}(0)$, $^{127}\text{Xe}(B)^*$
- 132 National Institute of Health
Bethesda, MD 20205
 $^{82}\text{Sr}(L)$

- 133 National Institute of Health
Bethesda, MD 20014
 $^{18}\text{F}(\text{B})$, $^{127}\text{Xe}(\text{B})^*$
- 134 National Lead of Ohio
PO Box 39158
Cincinnati, OH 45239
 $\text{DU}(\text{P})$, $\text{EU}(\text{P})$ $\text{Th}(\text{P})$,
- 135 National Naval Medical Center
Radiation Safety Service
Building #144
Bethesda, MD 20014
 $^{127}\text{Xe}(\text{B})^*$
- 137 National Semiconductor Corporation
2900 Semiconductor Drive
Santa Clara, CA 95051
 $^{85}\text{Kr}(\text{O})$
- 138 Naval Regional Medical Center
Receiving Officer, Building 505
8750 Mountain Boulevard
Oakland, CA 94627
 $^{127}\text{Xe}(\text{B})^*$
- 139 Naval Research Laboratory
Supply Officer
Washington, DC 20375
 $\text{RSI}(\text{B})$
- 140 Neutron Products Incorporated
Box 68
Oickerson, MD 20573
 $^{60}\text{Co}(\text{O})$
- 141 New England Nuclear Corporation
601 Treble Cove Road
North Billerica, MA 01862
 $^{109}\text{Cd}(\text{B})$, $^{68}\text{Ge}(\text{B})^*$,
 $^{22}\text{Na}(\text{B})^*$, $^{91}\text{Nb}(\text{B})$,
 $^{88}\text{Y}(\text{L})$
- 142 New England Nuclear Corporation
575 Albany Street
Boston, MA 02118
 $^{14}\text{C}(\text{O})$, $\text{CSi}(\text{O})$, $^3\text{H}(\text{O})$,
 $^{129}\text{I}(\text{O})$, $^{192}\text{Ir}(\text{O})$,
 $^{85}\text{Kr}(\text{O})$, $^{33}\text{P}(\text{O})$,
 $^{106}\text{Ru}(\text{O})$, $\text{RW}(\text{O})$, $^{90}\text{Sr}(\text{O})$,
 $^{99}\text{Tc}(\text{O})$, $^{95}\text{Zr}(\text{O})$
- 143 New Hampshire Water Supply and
Pollution Control Commission
Hayen Drive
Concord, NH 03301
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 144 New York Hospital
Nuclear Medicine
525 East 68th Street
New York, NY 10021
 $^{81}\text{Rb}(\text{B})$
- 145 North Carolina Baptist Hospital
300 S. Hawthorne Road
Winston-Salem, NC 27103
 $^{127}\text{Xe}(\text{B})^*$
- 146 North Carolina Memorial Hospital
Division of Nuclear Medicine
Chapel Hill, NC 27514
 $^{127}\text{Xe}(\text{B})^*$
- 147 North Carolina Radiation
Protection Section
PO Box 12200
Raleigh, NC 27605
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 148 North Carolina State University
P.O. Box 5935
Raleigh, NC 27607
 $^{237}\text{Np}(\text{O})$

- 149 Northeastern Ohio Universities
College of Medicine
4209 State Route 44
Rootstown, OH 44272
 $^{28}\text{Mg}(\text{B})^*$
- 150 Northwestern University
619 Clark Street
Evanston, IL 60201
SS(0)
- 151 Nuclear Associates Incorporated
100 Voice Road
Carle Place, NY 11514
 $^{137}\text{Cs}(0)$, MCP(0), SS(0),
- 152 Nuclear Radiation Development
Inc.
2937 Alt Blvd
Grand Island, NY 14072
 $^3\text{H}(0)$
- 153 Nuclear Research Corporation
Southampton, PA 18966
Tgs(0), $^{232}\text{Th}(0)$
- 154 Nuclear Sources and Services
P.O. Box 14023
Houston, TX 77021
 $^{241}\text{Am}(0)$, Cap(0), $^{85}\text{Kr}(0)$
- 155 Oak Ridge Associated
Universities
PO Box 117
Oak Ridge, TN 37830
 $^{252}\text{Cf}(0)$, CSI(0), MCP(0)
- 156 Office of Finance
Assistant Director for Liaison
Washington, DC 20505
SS(0), $^{99}\text{Tc}(0)$
- 157 Ohio State University
Research Foundation
1314 Kinnear Road
Columbus, OH 43212
 $^{89}\text{Sr}(0)$
- 158 Oklahoma Medical Research
Institute
825 NE 13th Street
Oklahoma City, OK 73104
 $^{47}\text{Ca}(0)$
- 159 Oregon State Health Division
Radiation Control
PO Box 231
Portland, OR 97207
 $^{236}\text{Pu}(0)$, $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 160 Oregon State University
Radiation Center
Corvallis, OR 97331
 $^{166}\text{Ho}(\text{B})$, NU(0), NU(P),
 $^{89}\text{Sr}(0)$
- 160 Orlando Laboratories
PO Box 8008
Orlando, FL 32856
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 161 Pathfinder Labs Incorporated
11542 Fort Mims
St. Louis, MO 63141
 $^{14}\text{C}(0)$
- 162 Pechiney Ugne Juhlmann
Development Incorporated
825 3rd Avenue
New York, NY 10022
Tgs(0), $^{238}\text{U}(0)$
- 163 Pennsylvania Hospital
Department of Molecular Biology
8th and Spruce Streets
Philadelphia, PA 19107
 $^{28}\text{Mg}(\text{B})^*$
- 164 Phillips Petroleum Company
Bartlesville, OK 74003
MCP(0)
- 165 Potter and Brumfield
Princeton, IN 47570
 $^{85}\text{Kr}(0)$

- 166 Princeton University
Occupational Health & Safety
Office
James Forrestal Campus
Princeton, NJ 08544

RSI(B)
- 167 Radium Chemical Company
Incorporated
161 East 42nd Street
New York, NY 10036

 $^3\text{H}(0)$
- 168 Raytheon Company
350 Ellis Street
Mountain View, CA 94042

 $^{85}\text{Kr}(0)$
- 169 Raytheon Company
350 Lowell Street
West Andover, MA 01810

 $^{85}\text{Kr}(0)$
- 170 RCA
Raritan, NJ 08869

 $^{85}\text{Kr}(0)$
- 171 Reactor Experiments,
Incorporated
936 Terminal Way
San Carlos, CA 94070

 $^{237}\text{Np}(0)$, $^{238}\text{U}(0)$, $^{232}\text{Th}(0)$, $^{235}\text{U}(0)$
- 172 Reluxtrol
333 Victory Avenue
S. San Francisco, CA 94080

 $\text{DU}(P)$
- 173 Rensselaer Polytechnic Institute
Troy, NY 12181

RSI(B), $^{28}\text{Mg}(B)^*$
- 174 Research Triangle Institute
PO Box 12086
Research Triangle Park,
NC 27709

 $^{85}\text{Kr}(0)$, $^{90}\text{Sr}(0)$, $^{90}\text{Sr}(0)$
- 175 Reuter & Stokes Electronics
Components
18530 S. Miles Parkway
Warrensville Heights
Cleveland, OH 44128

 $^{234}\text{U}(0)$
- 176 Rockwell Hanford Operations
Richland, WA 99352

 $^{238}\text{Pu}(P)$, $^{239}\text{Pu}(P)$, $^{238}\text{Pu}(H)$, $^{238}\text{U}(M)$, $^{238}\text{U}(M)$
- 177 Rockwell International
Rocky Flats Plant
Golden, CO 80401

 $^{238}\text{Pu}(P)$, $^{238}\text{Pu}(P)$, $^{238}\text{Pu}(M)$, $^{238}\text{U}(M)$, $^{238}\text{U}(M)$
- 178 Rockwell Int. Collins Radio
Division
PO Box 10462
Dallas, TX 75207

 $^{85}\text{Kr}(0)$
- 179 Rush & Presbyterian St. Luke's
Medical Center
1753 West Congress Parkway
Chicago, IL 60612

 $^{52}\text{Fe}(B)$, $^{89}\text{Sr}(0)$
- 180 Rutgers State University
Busch Campus
PO Box 939
Piscataway, NJ 08854

RSI(B)
- 181 Sandia Corporation
PO Box 5800
Albuquerque, NM 87115

 $^{252}\text{Cf}(0)$, $^{85}\text{Kr}(0)$,
 $\text{MCP}(0)$
- 182 Sandia Laboratories
Livermore Laboratory
Livermore, CA 94550

 $^3\text{H}(M)$

<p>183 Schwarz Bio & Research
Incorporated
Mountain View Avenue
Orangeburg, NY 10962

$^3\text{H}(0)$</p> | <p>192 Solid State Testing
56 Middlesex Turnpike
Burlington, MA 01803

$^{85}\text{Kr}(0)$</p> |
| <p>184 Science Applications, Inc.
3 Chokecherry Road
Rockville, MD 20850

$^{209}\text{Po}(M)$</p> | <p>193 Source Production and Equipment
Co., Inc
625 Oxley Street
Kenner, LA 70062

$^{192}\text{Ir}(0)$</p> |
| <p>185 Science Applications, Inc.
4030 Osrenito Valley Blvd
San Diego, CA 92121

$\text{Tgs}(0), ^{235}\text{U}(0)$</p> | <p>194 Southwest Research Institute
6220 Culbera Road
San Antonio, TX 78284

$\text{DU}(P)$</p> |
| <p>186 Self & Powered Lighting, Ltd.
8 Westchester Plaza
Elmsford, NY 10523

$^3\text{H}(0)$</p> | <p>195 Sperry Univac
P.O. Box 3525
St. Paul, MN 55116

$^{85}\text{Kr}(0)$</p> |
| <p>187 Shepherd and Associates
1614 Victory Blvd
Glendale, CA 91201

$^{137}\text{Cs}(0), \text{MCP}(0)$</p> | <p>196 Spire Corporation
Patriots Park
Bedford, MA 01730

$\text{CSI}(0), \text{RW}(0)$</p> |
| <p>188 Signetics Incorporated
811 East Arques Avenue
Sunnyvale, CA 94086

$^{85}\text{Kr}(0)$</p> | <p>197 Sprague Electric Company
North Adams, MA 01247

$^{85}\text{Kr}(0)$</p> |
| <p>189 Silicon General Incorporated
11651 Monarch Street
Garden Grove, CA 92641

$^{85}\text{Kr}(0)$</p> | <p>198 Squibb and Sons
P.O. Box 70
East Brunswick, NJ 08816

$^{99}\text{Tc}(0)$</p> |
| <p>190 Sloan Kettering Cancer Center
Central Isotope Lab
1275 York Avenue
New York, NY 10013

$^{97}\text{Ru}(B), ^{103}\text{Ru}(B)$</p> | <p>199 Squibb & Sons
New Brunswick, NJ 08903

$^{82}\text{Sr}(L)$</p> |
| <p>191 Sloan Kettering Institute
425 East 68th Street
New York, NY 10021

$^{133}\text{Xe}(0)$</p> | <p>200 St. Luke's-Roosevelt Medical
Center
Department of Nuclear Medicine
113th & Amsterdam Avenue
New York, NY 10025

$^{81}\text{Rb}(B)$</p> |

- 201 **Stanford Microsystems**
International
375 Distel Circle
Los Altos, CA 94022
 $^{85}\text{Kr}(0)$
- 202 Statek Corporation
1200 Alvarez Avenue
Orange, CA 92668
 $^{85}\text{Kr}(0)$
- 203 State University of New York at
Albany
Physics Department
1400 Washington Avenue
Albany, NY 12222
 $^{147}\text{Gd}(B)$
- 204** State University of New York at
Stony Brook
Department of Earth Sciences
Stony Brook, NY 11794
 $\text{RSI}(B)$
- 205 Syntex Corporation
3401 Hillview Avenue
Palo Alto, CA 94304
 $^3\text{H}(0)$
- 206 Technical Operations
South Avenue
Burlington, MA 01803
 $^{192}\text{Ir}(0)$
- 207 Teledyne Energy Systems
110 W. Timonium Rd.
Timonium, MD 21093
 **$\text{MCP}(0)$, $^{238}\text{Pu}(M)$
 $^{90}\text{Sr}(0)$**
- 208 Teledyne Isotopes
123 Woodland Avenue
Westwood, NJ 07675
 $^{89}\text{Sr}(0)$
- 209 **Tempset** Incorporated
1251 Grover Road
St. Louis, MO 63125
 $^{85}\text{Kr}(0)$
- 210 Tennessee Valley Authority
Wilson Dam, AL 35661
 $^{33}\text{P}(0)$
- 211 Texas A & M Research Foundation
PO Box H
College Station, TX 77843
 $^{229}\text{Th}(0)$
- 212 Texas Instruments, Incorporated
Science Services Division
PO Box 5012
Dallas, TX 75222
 $^{85}\text{Kr}(0)$
- 213 Texas Instruments, Inc.
P.O. Box 66027
Mail Stop 5615
Houston, TX 77006
 $^{85}\text{Kr}(0)$
- 214 Trio-Tech, Inc
A Division of Tracer Flo
2435 N. Naomi
Burbank, CA 91504
 $^{85}\text{Kr}(0)$, $\text{MCP}(0)$
- 215 TWR Semiconductors, Inc.
14520 South Aviation Blvd
Lawndale, CA
 $^{85}\text{Kr}(0)$
- 216 TWR Systems Group
One Space Park
Redondo Beach, CA 90277
 $^{85}\text{Kr}(0)$

- 217 UNC Nuclear Industries
PO Box 490
Richland, WA 99352

110Ag(H), 133Ba(H),
144CePr(H), 57Co(H),
60Co(H), 60Co(U),
137Cs(H), DU(P), EU(P),
54Mn(H), RaDEF(H)
- 218 Union Carbide Corporation
Nuclear Division
Analytical Department
Technical Services Division
Paducah, KY 42001

234U(M), 238U(M)
- 219 Union Carbide Corporation
Nuclear Division
Oak Ridge Gaseous Diffusion
Plant
PO Box P
Oak Ridge, TN 37830

85Kr(O), 236Pu(O)
- 220 Union Carbide Corporation
Nuclear Division
Oak Ridge National Laboratory
PO Box X
Oak Ridge, TN 37830

241Am(O), 241Am(S),
243Am(O), 14C(O), 47Ca(O),
Ca(O), 252Cf(O), 248Cm(O),
137Cs(O), 3H(O), 131I(O),
85Kr(O), MCP(O), 95Nb(O),
237Np(O), NU(M), 231Pa(O),
209Po(M), 239Pu(O), 240Pu(O),
SS(O), 82Sr(L), SS(O), 99Tc(O),
Tgs(O), 230Th(O), 232Th(O),
233U(O), 234U(M),
235U(O), 236U(O),
238U(M), 238U(O),
133Xe(O), 95Zr(O)
- 221 Union Carbide Corporation
Nuclear Division
Y-12 Plant
PO Box Y
Oak Ridge, TN 37830

241Am(O), CSI(O), DU(P),
153Gd(O), 192Ir(O), MCP(O),
236Pu(O), 239Pu(O),
242Pu(O), SS(O)
- 222 Unit Process Assemblies, Inc
53 & 15 37th Avenue
Woodside, NY 11377

147Pm(O), 90Sr(O)
- 223 U.S. Department of Agriculture
Research Service
P.O. Box 53326
New Orleans, LA 70150

28Mg(B)*
- 224 U.S. Department of Energy
Richland Operations Office
PO Box 550
Richland, WA 99352

236Pu(O)
- 225 U.S. Department of Energy
9800 South Cass Avenue
Argonne, IL 60439

252Cf(O), DU(P), EU(P),
MCP(O), Pu(P)
- 226 U.S. Environmental Protection
Agency
26 W. St. Clair St.
Cincinnati, OH 45268

234U(M), 238U(M)
- 227 U.S. Environmental Protection
Agency
Accounting Operations Office,
Durham
Research Triangle Park,
NC 27711

CSI(O)
- 228 U.S. Food & Drug Administration
South Agriculture Building
12th and C Streets, SW.
Washington, DC 20204

47Ca(O)
- 229 U.S. Geological Survey
12201 Sunrise Valley Drive
Reston, VA 22092

252Cf(S), 236Pu(O)

- 230 U.S. Geological Survey
WRD
PO Box 25046, MS 407, DFC
Denver, CO 80225
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 231 U.S. National Aeronautics
and Space Administration
Lewis Research Center
21000 Brookpark Road
Cleveland, OH 44135
 $^{151}\text{Sm}(\text{O})$
- 232 U.S. National Aeronautics and
Space Administration
Goddard Space Flight Center
Glendale Road
Greenbelt, MD 20771
 $^{85}\text{Kr}(\text{O})$
- 233 U.S. Navy
Ammunition Depot
Crane, IN 47522
 $^{85}\text{Kr}(\text{O})$
- 234 U.S. Navy
National Naval Medical Center
Bethesda, MD 20014
 $^{127}\text{Xe}(\text{B})^*$
- 235 U.S. Navy
Naval Electronics Lab Center
271 Catalina Blvd
San Diego, CA 92152
 $\text{SS}(\text{O})$
- 236 U.S. Navy
Naval Research Laboratory
Washington, DC 20390
 $^3\text{H}(\text{O})$, $\text{Tgs}(\text{O})$
- 237 U.S. Naval Regional Medical
Center
8750 Mountain Boulevard &
Building 505
Oakland, CA 94627
 $^{127}\text{Xe}(\text{B})^*$
- 238 U.S. Public Health Service
P.O. Box 684
4505 Maryland Parkway
Las Vegas, NV 89101
 $^{229}\text{Th}(\text{O})$
- 239 U.S. Public Health Environmental
Protection
Accounting Operations Office
Durham Research
Triangle Park, NC 27711
 $\text{CSI}(\text{O})$
- 240 U.S. Public Health Service
15th Avenue and Lake Street
San Francisco, CA 94118
 $^{47}\text{Ca}(\text{O})$
- 241 U.S. Public Health Service
National Institutes of Health
Isotope Laboratory
Building 21
Bethesda, MD 20014
 $^{44}\text{Ca}(\text{O})$, $^6\text{S}(\text{O})$, $^{43}\text{K}(\text{O})$,
 $^{127}\text{Xe}(\text{B})^*$
- 242 U.S. Public Health Service
Hospital
15th Avenue and Lake Street
San Francisco, CA 94118
 $^{47}\text{Ca}(\text{O})$
- 243 U.S. Radium Corporation
4150 Old Berwick Road
PO Box 380
Bloomsburg, PA 17815
 $^3\text{H}(\text{O})$
- 244 U.S. Testing Co.
Richland, WA 99352
 $^{252}\text{Cf}(\text{H})$ $^{239}\text{Pu}(\text{H})$,
- 245 United Technologies Corporation
Silver Lane
East Hartford, CT 06108
 $^{233}\text{U}(\text{O})$

- 246 Unirode Corporation
580 Pleasant Street
Watertown, MA 01970
 $^{85}\text{Kr}(0)$
- 247 University of Alabama
Medical Center
1919 Seventh Avenue South
Birmingham, AL 35486
 $^{133}\text{Xe}(0)$
- 248 University of Arizona
Post Office Drawer 4100
Tucson, AZ 85721
 $\text{MCP}(0)$
- 249 University of Arkansas
Fayetteville, AR 72701
 $^{237}\text{Np}(0)$, $^{239}\text{Pu}(0)$,
 $\text{Tgs}(0)$, $^{235}\text{U}(0)$
- 250 University of Arkansas
Fayetteville, AR 72701
 $^{252}\text{Cf}(S)$, $^{237}\text{Np}(0)$,
 $^{239}\text{Pu}(0)$, $\text{Tgs}(0)$, $^{235}\text{U}(0)$,
- 251 University of California
Lawrence Berkeley Laboratory
Berkeley, CA 94701
 $^{249}\text{Bk}(0)$, $^{248}\text{Cm}(0)$,
 $^{242}\text{Pu}(0)$, $^{82}\text{Sr}(L)$
- 252 University of California
Davis, CA 95616
 $^{129}\text{I}(0)$, $^{77}\text{Br}(L)$,
 $^{241}\text{Pu}(0)$, $\text{SS}(0)$
- 253 University of California
La Jolla, CA 92037
 $^{192}\text{Ir}(0)$, $^{233}\text{U}(0)$, $^{236}\text{U}(0)$,
 $^{182}\text{Ta}(B)$, $^{49}\text{V}(B)$
- 254 University of California
Ernest O. Lawrence Laboratories
PO Box 808
Livermore, CA 94551
 $\text{DU}(P)$, $\text{EU}(P)$, $^{93}\text{Nb}(B)$,
 $^{87}\text{Sr}(B)$, $^{230}\text{Th}(B)$,
 $^{252}\text{Cf}(0)$, $^{248}\text{Cm}(0)$, $^3\text{H}(0)$,
 $^{231}\text{Pa}(0)$, $^{238}\text{Pu}(M)$,
 $^{240}\text{Pu}(M)$, $^{240}\text{Pu}(0)$,
 $^{240}\text{Pu}(0)$, $\text{Tgs}(0)$
- 255 University of California
Lawrence Livermore Laboratory
Bldg 151, Room 2146
Livermore, CA 94550
 $^{249}\text{Bk}(0)$, $^{252}\text{Cf}(0)$,
 $^{248}\text{Cm}(0)$, $^{253}\text{Es}(0)$,
 $^{254}\text{Es}(0)$, $^{257}\text{Fm}(0)$,
 $^3\text{H}(0)$, $^{92}\text{Nb}(H)$,
 $^{231}\text{Pa}(0)$, $^{240}\text{Pu}(0)$,
 $^{244}\text{Pu}(0)$, $\text{SS}(0)$, $\text{Tgs}(0)$,
 $^{229}\text{Th}(0)$
- 256 University of California
405 Hilgard Avenue
Los Angeles, CA 90024
 $^{47}\text{Ca}(0)$, $\text{MCP}(0)$
- 257 University of California
Los Alamos Scientific Laboratory
PO Box 1663
Los Alamos, NM 87544
 $^{243}\text{Am}(0)$, $^{211}\text{At}(B)$,
 $^{252}\text{Cf}(0)$, $^{252}\text{Cf}(S)$,
 $^{90}\text{Nb}(B)$, $^{102}\text{Pd}(B)$,
 $^{234}\text{Pu}(M)$, $^{238}\text{Pu}(M)$, $\text{SS}(0)$,
 $^{85}\text{Sr}(B)$, $\text{Th}(M)$, $\text{Tgs}(0)$,
 $^{99}\text{Zr}(0)$,
- 258 University of Chicago
Kobler Building
910 E. 58th Street
Chicago, IL 60637
 $^{127}\text{Xe}(B)^*$

- 259 University of Chicago
Office of the Comptroller
1525 E. Hyde Park Boulevard
Chicago, IL 60605
 $^{47}\text{Ca}(0)$, $^{244}\text{Cm}(0)$,
 $^{85}\text{Kr}(0)$, $^{89}\text{Sr}(0)$, $\text{Tgs}(0)$,
 $^{127}\text{Xe}(B)^*$
- 260 University of Chicago
Physical Science Department
5641 S. Ingleside Avenue
Chicago, IL 60637

 $\text{CSI}(A)$
- 261 University of Chicago
950 E. 59th Street
Chicago, IL 60637

 $^{252}\text{Cf}(S)$
- 262 University of Cincinnati
Cincinnati, OH 45221

 $^{99}\text{Tc}(0)$
- 263 University of Iowa
Iowa City, IA 52240

 $^{89}\text{Sr}(0)$
- 264 University of Kansas
39th and Rainbow
Kansas City, KS 66103

 $^{77}\text{Br}(L)$
- 265 University of Maryland
College Park, MD 20742

 $^3\text{H}(0)$, $\text{Tgs}(0)$
- 266 University of Massachusetts
Amherst, MA 01003

 $^{77}\text{Br}(L)$
- 267 University of Michigan
Ann Arbor, MI 48104

 $\text{Tgs}(0)$, $^{232}\text{Th}(0)$
- 268 University of Mississippi
Jackson, MS 39205

 $^{43}\text{K}(0)$, $^{85}\text{Kr}(0)$
- 269 University of New York State
3435 Main Street
Buffalo, NY 14214

 $^{89}\text{Sr}(0)$
- 270 University of New York Downstate
Medical Center
450 Clarkson Avenue
Brooklyn, NY 112034

 $^{99}\text{Tc}(0)$
- 271 University of Oklahoma
Health Sciences Center/
Nuclear Pharmacy
Purchasing Department
Service Center Building
Oklahoma City, OK 73190

 $^{47}\text{Ca}(0)$
- 272 University of Oregon Medical
School
3181 SW. Sam Jackson Park Road
Portland, OR 97201

 $^{133}\text{Xe}(0)$
- 273 University of Pennsylvania
Hospital
Radiology Department
3400 Spruce Street
Philadelphia, PA 19104

 $^{18}\text{F}(B)$, $^{123}\text{I}(B)$
- 274 University of Rochester
Rochester, NY 14627

 $^3\text{H}(M)$, $^{244}\text{Pu}(0)$,
 $\text{RSI}(B)$
- 275 University of South Alabama
Purchasing Department
307 University Blvd.
Mobile, AL

 $^{28}\text{Mg}(B)^*$
- 276 University of South Carolina
Columbia, SC 29208

 $^{181}\text{Hf}(0)$

- 277 University of Southern California
University Park
Los Angeles, CA 90007
MCP(0), $^{99}\text{Tc}(0)$
- 278 University of Tennessee
Knoxville, TN 37916
 $^{192}\text{Ir}(0)$
- 279 University of Tennessee - DOE
Agriculture Research Laboratory
1299 Bethel Valley Road
Oak Ridge, TN 37830
 $^{241}\text{Am}(0)$, Cap(0), Tgs(0)
- 280 University of Texas
Nuclear Medicine Service
Galveston, TX 77550
 $^{47}\text{Ca}(0)$, $^{127}\text{Xe}(B)^*$,
 $^{133}\text{Xe}(0)$
- 281 University of Texas
PO Box 30365
Dallas, TX 75230
 $^{47}\text{Ca}(0)$, $^{127}\text{Xe}(B)^*$
- 282 University of Utah
Salt Lake City, UT 84132
 $^{28}\text{Mg}(B)^*$, $^{237}\text{Pu}(0)$,
 $^{242}\text{Pu}(0)$, $^{233}\text{U}(0)$
- 283 University of Utah Medical Center
Radiobiology Department
50 North Medical Drive
Salt Lake City, UT 84132
 $^{28}\text{Mg}(B)^*$
- 284 University of Virginia
Radiation Safety Officer
RWMF, 124 11th Street, S.W.
Charlottesville, VA 22903
 $^{127}\text{Xe}(B)^*$
- 285 University of Washington
Department of Environmental Health & Safety
4725 30th Avenue, N.E.
Seattle, WA 98105
 $^{103}\text{Ru}(B)$
- 286 University of Washington
400 Administration Building
Seattle, WA 98105
 $^{248}\text{Cm}(0)$, $^{153}\text{Gd}(0)$,
 $^{237}\text{Pu}(0)$, $^{241}\text{Pu}(0)$,
 $^{89}\text{Sr}(0)$
- 287 University of Wisconsin
750 University Avenue
Madison, WI 53706
 $^{244}\text{Cm}(0)$, $^3\text{H}(0)$,
MCP(0)
- 288 Veterans Administration Hospital
Chief Supply Service
11201 Benton Street
Loma Linda, CA 92357
 $^{127}\text{Xe}(B)^*$
- 289 Veterans Administration Hospital
5901 East Seventh Street
Long Beach, CA 90804
 $^{133}\text{Xe}(0)$
- 290 Veterans Administration Medical Center
3350 La Jolla Village
San Diego, CA 92161
 $^{192}\text{Ir}(0)$
- 291 Veterans Administration Hospital
Chief Supply Service
Hines, IL 60141
 $^{47}\text{Ca}(0)$, $^{252}\text{Cf}(S)$ CSI(A),
 $^{28}\text{Mg}(B)^*$

- 292 Veterans Administration Hospital
Chief of Supply
1400 V. F. W. Parkway
West Roxbury, MA 02132
 $^{123}\text{I}(\text{B})$, $^{127}\text{Xe}(\text{B})^*$
- 293 Veterans Administration Hospital
Brooklyn, NY 11209
 $^{47}\text{Ca}(\text{O})$, $^{28}\text{Mg}(\text{B})^*$
- 294 Veterans Administration Hospital
Nuclear Medicine
Middleville Road
Northport, NY 11768
 $^{127}\text{Xe}(\text{B})^*$
- 295 Veterans Administration
Calm 361
Data Processing Center
1615 Woodward St. East
Austin, TX 78772
 $^{133}\text{Xe}(\text{O})$
- 296 Veterans Administration Hospital
Nuclear Medicine NM-115
4435 Beacon Avenue South
Seattle, WA 98108
 $^{103}\text{Ru}(\text{B})$
- 297 Veterans Administration Hospital
Madison, WI 53705
 $^{82}\text{Sr}(\text{L})$
- 298 Washington State Department of
Social and Health Services
Radiation and Chemistry
Laboratories
1409 Smith Tower
Seattle, WA 98104
 $^{234}\text{U}(\text{M})$, $^{238}\text{U}(\text{M})$
- 299 Washington University
Lindell and Skinner
St. Louis, MO 63130
 $^{77}\text{Br}(\text{L})$, $^{133}\text{Xe}(\text{O})$
- 300 Wellman Thermal Systems
No. 1 Progress Road
Shelbyville, IN 46176
 $^{85}\text{Kr}(\text{O})$
- 301 Western Electric Company
P.O. Box 241
Reading, PA 19603
 $^{85}\text{Kr}(\text{O})$
- 302 Western Electric Company, Inc.
777 North Blue Parkway
Lee's Summit, MO 64063
 $^{85}\text{Kr}(\text{O})$
- 303 Westinghouse Electric
Corporation
Bettis Atomic Power Laboratory
PO Box 79
West Mifflin, PA 15122
 $^{241}\text{Am}(\text{O})$, $^{243}\text{Am}(\text{O})$,
 $^{137}\text{Cs}(\text{O})$, MCP(O),
 $^{242}\text{Pu}(\text{O})$, Tgs(O),
 $^{235}\text{U}(\text{O})$
- 304 Westinghouse Hanford Co.
Hanford Engineering Development
Laboratory
PO Box 1970
Richland, WA 99352
 $^{110\text{m}}\text{Ag}(\text{H})$, $^{241}\text{Am}(\text{H})$,
 $^{241}\text{Am}(\text{O})$, $^{133}\text{Ba}(\text{H})$,
 $^{252}\text{Cf}(\text{O})$, $^{36}\text{Cl}(\text{H})$,
 $^{57}\text{Co}(\text{H})$, $^{60}\text{Co}(\text{H})$,
 $^{134}\text{Cs}(\text{H})$, $^{137}\text{Cs}(\text{H})$, CSI(O),
DU(H), DU(P), EU(P), $^{59}\text{Fe}(\text{H})$,
MCP(O), $^{54}\text{Mn}(\text{H})$, $^{22}\text{Na}(\text{H})$,
 $^{24}\text{Na}(\text{U})$, $^{237}\text{Np}(\text{O})$, NU(P),
Pu(P), $^{238}\text{Pu}(\text{M})$, $^{239}\text{Pu}(\text{O})$,
 $^{240}\text{Pu}(\text{O})$, $^{241}\text{Pu}(\text{O})$,
 $^{90}\text{SrY}(\text{H})$, Tgs(O), Th(P),
 $^{230}\text{Th}(\text{O})$, $^{233}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$,
 $^{65}\text{Zn}(\text{H})$,

305 Yale-New Haven Hospital
Diagnostic Radiology & Nuclear
Medicine
333 Cedar Street
New Haven, CT 06510

$^{103}\text{Ru}(\text{B})$

306 Yale University
20 Ashmun Street
New Haven, CT 06520

$^{47}\text{Ca}(\text{O})$, $^{248}\text{Cm}(\text{O})$,
 $^{192}\text{Ir}(\text{O})$

307 Yale University Medical School
South Frontage Receiving Station
New Haven, CT 06520

$^{97}\text{Ru}(\text{B})$, $^{103}\text{Ru}(\text{B})$

308 York College
Department of Natural Sciences
Room 232
Jamaica, NY 11451

$\text{RSI}(\text{B})$

309 Zilog Incorporated
10460 Bubb Road
Cupertino, CA 95014

$^{85}\text{Kr}(\text{O})$

FOREIGN COUNTRIES

Australia

- 310 Australian Atomic Energy Commission
Lucas Heights
Sydney, Australia

$^{236}\text{U}(0)$, $^{127}\text{Xe}(B)^*$

- 311 Australian National University
PO Box 4
Canberra, A.C. T. Australia

$^{37}\text{Ar}(0)$

Austria

- 312 International Atomic Energy Agency
Kaerntnerring 11 & 13
A&1010 Vienna, Austria

$^{239}\text{Pu}(0)$, $^{241}\text{Pu}(0)$, $\text{Tgs}(0)$,
 $^{233}\text{U}(0)$, $^{235}\text{U}(0)$, $^{238}\text{U}(0)$

Belgium

- 313 Centre 0-Etude De L-Energie Nucleaire
144 Avenue Plasky
Brussels 4, Belgium

$^{239}\text{Pu}(0)$, $\text{Tgs}(0)$, $^{238}\text{U}(0)$

- 314 European Atomic Energy Commission
Central Bureau for Nuclear Measurements
Geel, Belgium

$^{230}\text{Th}(0)$, $^{233}\text{U}(0)$, $^{234}\text{U}(0)$,
 $^{235}\text{U}(0)$, $^{236}\text{U}(0)$, $^{238}\text{U}(0)$

- 315 IRE Institut National Des
Radioelements
Avenue Eugene Plasky 144
1040 Brussels Belgium

$^{192}\text{Ir}(0)$, $^{85}\text{Kr}(0)$

- 316 SCK and CEN Laboratories
Boeretang 200
Bt 1400
Mol, Belgium

$\text{Tgs}(0)$, $^{235}\text{U}(0)$, $^{238}\text{U}(0)$

Canada

- 317 Atomic Energy of Canada, Limited
PO Box 6300
Postal Station J
Ottawa, Canada

$^{137}\text{Cs}(0)$, $\text{MCP}(0)$, $\text{SS}(0)$

- 318 Atomic Energy of Canada Limited
Chalk River
Ontario, Canada

$^{243}\text{Am}(0)$, $\text{Eu}(P)$ $^3\text{H}(0)$, $\text{Tgs}(0)$

- 319 Health and Welfare Canada
Health Protection Branch
Research Centre
Ross Avenue Tunneys Pasture
Ottawa
Ontario, Canada

$^{229}\text{Th}(0)$

- 320 McMaster University
Hamilton
Ontario, Canada

$^3\text{H}(0)$

- 321 McMaster University Medical Center
Forsythe Avenue
Hamilton
Ontario, Canada

$^{127}\text{Xe}(B)^*$

- 322 Northern Electric Co., Ltd
P.O. Box 3529, Station C
Ottawa
Ontario, Canada

$^{85}\text{Kr}(0)$

- 323 Ontario Hydro
700 University Avenue
Toronto
Ontario, Canada

$^{236}\text{Pu}(0)$

- 324 Queens University
Kingston
Ontario, Canada
 $^{99}\text{Tc}(0)$
- 325 Saint Josephs Hospital
268 Grosevenor Street
London, Ontario N6 A 4 V2
Canada
 $^{127}\text{Xe}(B)^*$
- 326 Scarborough General Hospital
Nuclear Medicine
3050 Lawrence Avenue
E. Scarborough, Ontario
Canada
 $^{127}\text{Xe}(B)^*$
- 327 University of Alberta
Edmonton
Alberta, Canada
 $^{47}\text{Ca}(0)$
- 328 University of British Columbia
Vancouver, British Columbia
Canada
 $^{181}\text{Hf}(0)$
- 329 University Hospital
Nuclear Medicine Department
London, Ontario
Canada N6 G 2 K3
 $^{127}\text{Xe}(B)^*$
- Denmark
- 330 Isotope Pharmacy
378 Frederikssundsvej
Eroenshoej
Denmark
 $^{127}\text{Xe}(B)^*$
- 331 Niels Bohr Institutet
Tandem Accelerator Laboratory
4000 Roskilde, Denmark
 $^3\text{H}(M)$, $^{85}\text{Kr}(M)$

- 332 Rigshospitalet
Psycho Chem Lab
9 Blegdamsvej
Copenhagen
Denmark
 $^{28}\text{Mg}(B)^*$
- 333 University of Copenhagen
Raadmandsgade 71 DK 2200
Copenhagen N
Denmark
 $^{28}\text{Mg}(B)^*$
- Federal Republic of Germany
- 334 American Hoechst Corporation
P.O. Box 2500
Somerville, NJ 08876
 $^{85}\text{Kr}(0)$, $^{113}\text{Sn}(0)$
- 335 Euchler and Company
Frankfurter Str. 294
Braunschweig
Federal Republic of Germany
 $^{37}\text{Ar}(0)$, $^{230}\text{Th}(0)$,
 $^{95}\text{Zr}(0)$
- 336 Euratom Transuranium Institute
P.O. Box 452
75 Karlsruhe
Federal Republic of Germany
 $^{239}\text{Pu}(0)$, $^{242}\text{Pu}(0)$,
 $^{244}\text{Pu}(0)$, $^{233}\text{Pu}(0)$
- 337 Flachglas Aktiengesellschaft
Auf der Reihe 2
4650 Gelsenkirchen
Federal Republic of Germany
 $^{37}\text{Ar}(0)$
- 338 Freie Universitat Berlin
Fachbereich Physik
FB 20, WELA
Boltzmannstrasse 20
1000 Berlin 33
P. West
Federal Republic of Germany
 $^{127}\text{Xe}(B)^*$

339 Gesellschaft fuer Kernforschung MBH
Institute fuer Angewandte Reaktor
Physik
Weberstrass 5
75 Karlsruhe
Federal Republic of Germany

Cap(0), $^{237}\text{Np}(0)$, $^{238}\text{Pu}(0)$,
 $^{99}\text{Tc}(0)$

340 Gesellschaft fuer Schwerionenforschung
MBH
Finanz Abteilung
Postfach 541
D 6100 Darmstadt
Federal Republic of Germany

$^{248}\text{Cm}(0)$

341 Institute fue Metallforschung &
Metallphysik Technische
Universitat Berlin
15 Joachimstaler Str.
31/32 Berlin
Federal Republic of Germany

MCP(0)

342 Kernforschung Sanlage
Postfach 365
517 Julich
Federal Republic of Germany

$^{242}\text{Pu}(0)$, $^{99}\text{Tc}(0)$

343 Leitz Incorporated
468 Park Avenue S.
New York, NY 10016

$^{113}\text{Sn}(0)$

344 Mainz/Rhein Un iversitat
Mainz Am Rhein
Federal Republic of Germany

$^{244}\text{Cm}(0)$, $^{95}\text{Zr}(0)$

345 Sektion Physik
Der Universitat Muchen
Technologisches Labor
8046 Garching
Coulombwall 1
Federal Republic of Germany

$^{242}\text{Pu}(0)$

346 W. Maier Comm Ges
722 Schwennigen A. N.
Postfach P.O.B. 126
Federal Republic of Germany

$^{147}\text{Pm}(0)$

France

347 CEA Office of Rayonnements Ionisants
c/o Societe Gondraid
Roissy Airport, France

$^{85}\text{Kr}(M)$, $^3\text{H}(M)$

348 CEA
Department Des Radioelements
BPNO 2
91190 GIF Sur Yvette
France

$^{231}\text{Pa}(0)$, $^{230}\text{Th}(0)$, $^{235}\text{U}(0)$,
 $^{236}\text{U}(0)$, $^{95}\text{Zr}(0)$

349 Centre d'Etudes Nucleaires de
Santenay-Aux Roses
92260 Santenay-aux-Roses,
France

$^{252}\text{Cf}(S)$

350 Pechiney Ugne Kuhlmann
Development, Inc.
825 3rd Avenue
New York, NY 10022

Tgs(0), $^{238}\text{U}(0)$

Great Britain

351 Atomic Energy Research Establishment
Harwell Laboratories
Oxfordshire
Great Britain

EU(P)

352 Brandhurst Co Ltd
Wellington Road
High Wycombe Bucks H P12 3 P S
Great Britain

$^3\text{H}(0)$

353 Mallinckrodt, Limited
Building 521 1296
Southampton Road
Middlesex
Great Britain

$^{127}\text{Xe}(\text{B})^*$

354 MRC Cyclotron Unit
Hammersmith Hospital
Ducane Rd.
London, England W12 OHS
Great Britain

$^{82}\text{Sr}(\text{L})$

355 Radiochemical Centre
White Lion Road
Amersham Bucks,
Great Britain

$\text{Cap}(\text{O})$, $^{144}\text{Ce}(\text{O})$, $^{252}\text{Cf}(\text{S})$,
 $^{244}\text{Cm}(\text{O})$, $\text{CSI}(\text{O})$, $^{55}\text{Fe}(\text{O})$,
 $^{153}\text{Gd}(\text{O})$, $^3\text{H}(\text{O})$, $^{129}\text{I}(\text{O})$,
 $^{85}\text{Kr}(\text{O})$, $\text{MCP}(\text{O})$, $^{22}\text{Na}(\text{B})^*$,
 $^{95}\text{Nb}(\text{O})$, $^{237}\text{Np}(\text{O})$, $^{147}\text{Pm}(\text{O})$,
 $^{106}\text{Ru}(\text{O})$, $\text{RW}(\text{O})$, $^{151}\text{Sm}(\text{O})$,
 $^{99}\text{Tc}(\text{O})$, $\text{Tgs}(\text{O})$, $^{95}\text{Zr}(\text{O})$

356 Saunders & Roe Developments Ltd.
North Hyde Road
Hayes Middlesex,
Great Britain

$^3\text{H}(\text{O})$

357 United Kingdom Atomic Energy
Establishment
Harwell, Didcot
Berkshire, Great Britain

$^{248}\text{Cm}(\text{O})$, $^{240}\text{Pu}(\text{O})$,
 $^{242}\text{Pu}(\text{O})$, $^{244}\text{Pu}(\text{O})$,
 $\text{Tgs}(\text{O})$, $^{235}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$

Hong Kong

358 National Cash Register Mfg. Co., Ltd.
55 Wong Chuk Hang Road
Aberdeen, Hong Kong

$^{85}\text{Kr}(\text{O})$

359 Semi & Conductor Devices, Ltd.
59&61 Wong Chuk Hang Road
Aberdeen, Hong Kong

$^{85}\text{Kr}(\text{O})$

India

360 Aligarh Muslim University
Aligarh U.P.
India

$^{252}\text{Cf}(\text{O})$, $\text{Tgs}(\text{O})$

361 Bhabha Atomic Research Centre
Government Of India
3rd Floor Mohatta Building
Bombay, India

$^{241}\text{Am}(\text{O})$, $\text{Cap}(\text{O})$, $^{237}\text{Np}(\text{O})$

Israel

362 Embassy of Israel
1621 22nd Street N.W.
Washington, DC 20008

$^3\text{H}(\text{O})$

363 Weizmann Institute of Science
P.O. Box 26
Rehovot, Israel

$^{252}\text{Cf}(\text{O})$

Italy

364 Laboratoria Chimica Nucleare
C. N. R. Montellobretti
Casella Postale 10
Roma
Italy

$^3\text{H}(\text{B})$

Japan

365 Cancer Institute Hospital
Tokyo, Japan

$^{252}\text{Cf}(\text{S})$

366 Japan Radioisotope Association
28-45 Hon-Komagome 2-Chome
Bunkyo-ku, Tokyo
Japan

$^{85}\text{Kr}(\text{M})$, $^3\text{H}(\text{M})$

367 Toyomenka **America** Incorporated
Suite 4011
One World Trade Center
New York, NY 10048

$^{242}\text{Pu}(0)$, $^{233}\text{U}(0)$

368 University of Tokyo
Solid State Physics
Rappongi, Minato-ku
Tokyo
Japan

$^{60}\text{Ni}(B)$

Netherlands

369 Institute for Atomic Sciences in
Agriculture
Keyenbergseweg 6 Wageningen
Netherlands

$^{236}\text{Pu}(0)$, $^{242}\text{Pu}(0)$

370 Rijksinkoopbureau
Netherlands Government
Purchasing Office
55 A Laan Van Meerdervoort
The Hague, Netherlands

$^{244}\text{Cm}(0)$, $\text{Tgs}(0)$

Norway

371 Institutt for Energiteknikk
P.O. Box 40
Kjeller, Norway

$^{236}\text{Pu}(0)$

Portugal

372 Junta De Energia Nuclear
Laboratorio De Fisica E
Engenharia Nucleares
Estrada Nacional No. 10
Sacavem, Portugal

$^{236}\text{Pu}(0)$, $^{239}\text{Pu}(0)$

Republic of China

373 Central Trust of China
One World Trade Center
Suite 2273
New York, New York 10048

$^{241}\text{Am}(0)$, $\text{Cap}(0)$

374 Institute of Nuclear Energy
Research
P.O. Box 3
Lang Tan
Taiwan, China

^{63}Ni

375 United Pacific Semiconductor Corp.
1 San Chin Street
Su Lin Cheng
Taipei Hsien
Taiwan, China

$^{85}\text{Kr}(0)$

Spain

376 Instituto Nacional De
Investigaciones Agrarias
AVDA Puerta De Hierro S.N.
Madrid 3
Spain

$^{33}\text{P}(0)$, $^{127}\text{Xe}(B)^*$

Sweden

377 University of Lund
Radiation Physics
Lasarattet, S221 8 5
Lund
Sweden

$^{127}\text{Xe}(B)^*$

378 University of Uppsala
Uppsala, Sweden

$^{236}\text{U}(0)$

Switzerland

379 Eidg. Technische Hochschule
8049 Zurich
Switzerland

$^{127}\text{Xe}(B)^*$

380 Eidg. Inst. fur Reactorforschung
5303 Wurenlingen
Switzerland

$^{241}\text{Am}(0)$, $^{127}\text{Xe}(B)^*$,
 $\text{Tgs}(0)$, $^{236}\text{U}(0)$

381 Universite De Geneve
Geneva Switzerland 1211
Switzerland
Radium & Chemie
A. Zeller & Company
9053 Feufen/Ar
Switzerland

MCP(0) , $^{147}\text{Pm}(0)$

Union of South Africa

382 Atomic Energy Board
Jan Smuts Airport
Johannesburg,
Union of South Africa

$^{127}\text{Xe}(\text{B})^*$

383 J. A. Ewing & McDonald, Inc.
51 Madison Avenue
New York, NY 10010

$^{127}\text{Xe}(\text{B})^*$

384 Mayfair Sales Pty Limited
PO Box 61785
Marshalltown 2107
Union of South Africa

$^3\text{H}(0)$

3. ALPHABETICAL LIST OF ISOTOPES
CROSS-REFERENCED TO CUSTOMER NUMBER

Pmericium (Am) 241	Californium (Cf) 249
19, 29, 47, 83, 93, 95, 122, 154, 220, 221, 279, 303, 304, 361, 373, 380	95
Pmericium (Pm) 243	Californium (Cf) 252
50, 52, 220, 257, 303, 318	3, 24, 52, 72, 95, 122, 131, 155, 181, 220, 225, 229, 244, 250, 254, 255, 257, 261, 291, 304, 349, 355, 360, 363, 365
Antimony (Sb) 122, 124	Carbon (C) 14
72	118, 142, 161, 220
Argon (Ar) 37	Cerium (Ce) 144
311, 335, 337	95, 217, 355
Astatine (At) 211	Cerium-144 Praeseodymium (CePr) 144
84, 257	217
Barium (Ba) 133	Cesium (Cs) 134
217, 304	304
Barium (Ba) 140	Cesium (Cs) 137
3	19, 31, 82, 83, 89, 94, 95, 120, 123, 151, 187, 217, 220, 303, 304, 317
Berkelium (Bk) 249	Chlorine (Cl) 36
12, 251, 255	304
Bromine (Br) 77	Cobalt (Co) 57
78, 98, 252, 264, 266, 299	217, 304
Cadmium (Cd) 109	Cobalt (Co) 60
10, 70, 95, 141	19, 112, 124, 140, 217, 304
Calcium (Ca) 47	Curium (Cm) 244
40, 42, 86, 97, 99, 104, 107, 108, 114, 129, 158, 220, 228, 240, 241, 252, 256, 259, 271, 280, 281, 291, 293, 306, 327	19, 52 , 259, 287, 344, 355, 370
	Curium (Cm) 248
	12, 52, 220, 251, 254, 255, 286, 306, 340, 357

Cyclotron Service Irradiations

20, 24, 89, 95, 105, 131, 142,
155, 196, 221, 227, 239, 241,
260, 291, 304, 348, 355

Depleted Uranium

2, 12, 14, 15, 33, 52, 58, 92,
130, 134, 172, 177, 194, 217,
221, 225, 254, 304

Einsteinium (Es) 253

255

Einsteinium (Es) 254

255

Encapsulation

47, 83, 95, 122, 154, 220, 279,
339, 355, 361, 373

Enriched Uranium

51, 52, 65, 80, 134, 217, 225,
254, 304, 351

Europium (Eu) 152

19

Fermium (Fm) 257

255

Fluorine (F) 18

84, 107, 133, 273

Gadolinium (Gd) 153

10, 83, 95, 221, 286, 355

Germanium (Ge) 68

35, 141

Gold (Au) 198

51

Hafnium (Hf) 181

276, 328

Iodine (I) 123

98, 274, 292

Iodine (I) 129

3, 10, 89, 95, 142, 252, 355

Iodine (I) 131

70, 220

Iridium (Ir) 192

16, 24, 64, 83, 90, 142, 193,
206, 221, 253, 278, 290, 306,
315

Iron (Fe) 52

199

Iron (Fe) 55

355

Iron (Fe) 59

304

Krypton (Kr) 85

1, 5, 8, 11, 19, 26, 39, 43,
44, 45, 56, 57, 62, 63, 67, 68,
74, 76, 77, 79, 87, 88, 91, 95,
96, 109, 116, 117, 120, 121,
124, 126, 137, 142, 154, 165,
168, 169, 170, 174, 178, 181,
188, 189, 192, 195, 197, 201,
202, 209, 212, 213, 214, 215,
216, 219, 220, 232, 233, 246,
259, 268, 300, 301, 302, 309,
315, 322, 331, 334, 347, 355,
358, 359, 366, 375

Magnesium (Mg) 28

30, 40, 46, 110, 149, 163, 173,
223, 275, 282, 283, 291, 293,
332, 333

Manganese (Mn) 54

217, 304

Manganese (Mn) 56

51

Miscellaneous Compounds (MCP)

20, 31, 52, 77, 82, 83, 93, 94,
95, 107, 120, 123, 151, 164,
181, 187, 207, 214, 220, 221,
225, 248, 256, 277, 287, 303,
304, 317, 341, 355, 381

Natural Uranium (NU)

19, 52, 160, 171, 220, 304

Neodymium (Nd) 147

19

Neptunium (Np) 237

19, 24, 92, **148,** 171, 220, 249,
250, 304, 339, 355, 361

Nickel (Ni) 63

4, 374

Niobium (Nb) 92

255

Niobium (Nb) 95

120, 220, 355

Osmium (Os) 191

35

Palladium (Pd) 109

38

Phosphorus (P) 33

89, 210, 376

Plutonium (Pu)

24, 52, 176, 177, 225, 304

Plutonium (Pu) 236

3, 12, 36, 159, 219, 221, 224,
229, 323, 369, 371, 372

Plutonium (Pu) 237

19, 282, 286

Plutonium (Pu) 238

3, 52, 71, 122, 123, 177, 207,
254, 257, 304, 339

Plutonium (Pu) 239

3, 12, 19, 176, 220, 221, 244,
249, 250, 304, 312, 313, 336,
372

Plutonium (Pu) 240

3, 24, 220, 254, 255, 304, 357

Plutonium (Pu) 241

252, 386, 304, 312

Plutonium (Pu) 242

25, 70, 221, 251, 282, 303,
336, 342, 345, 357, 367, 369

Plutonium (Pu) 244

255, 274, 336, 357

Polonium (Po) 209

184, 220

Polonium (Po) 210

119, 120

Potassium (K) 43

241, 268

Promethium (Pm) 147
19, 95, 222, 346, 355, 381

Protactinium (Pa) 231
220, 254, 255

RaDEF
19, 176, 217

Rhenium (Re) 188
19

Reactor Service Irradiations (RSI)
12, 41, 55, 75, 128, 139, 166,
173, 180, 204, 274, 308

Rubidium (Rb) 81
7, 35, 37, 144, 200

Ruthenium (Ru) 97
190, 307

Ruthenium (Ru) 103
190, 285, 296, 305, 307

Ruthenium (Ru) 106
12, 34, 89, 95, 142, 355

Samarium (Sm) 151
231, 355

Selenium (Se) 75
106

Silver (Ag) 110
217

Sodium (Na) 22
141, 304, 355

Sodium (Na) 24
51, 304

Special Services (SS)
12, 17, 20, 82, 150, 151, 156,
174, 220, 221, 235, 255, 257,
317

Strontium (Sr) 82
98, 107, 127, 132, 199, 220,
251, 297, 354

Strontium (Sr) 89
23, 39, 48, 77, 157, 160, 179,
208, 259, 263, 269, 286

Strontium (Sr) 90
31, 77, 89, 95, 142, 174, 207,
222

Strontium (Sr) 90-Yttrium (Y)
19, 304

Target Preparations (Tgs)
19, 24, 52, 100, 131, 153, 162,
171, 185, 220, 236, 250, 254,
255, 257, 259, 265, 267, 279,
303, 304, 312, 313, 318, 350,
355, 357, 360, 370, 380

Technetium (Tc) 99
12, 19, 22, 24, 60, 156, 198,
220, 262, 270, 277, 324, 339,
342, 355

Thorium (Th)
52, 73, 134, 257, 304

Thorium (Th) 229
12, 82, 211, 238, 255, 319

Thorium (Th) 230
12, 19, 220, 254, 304, 314,
335, 348

Thorium (Th) 232

153, 171, 220, 267

Thulium (Tm) 170

19

Tritium (H) 3

9, 19, 24, 52, 53, 79, 83, 89,
100, 101, 103, 125, 130, 131,
142, 152, 167, 182, 183, 186,
205, 220, 236, 243, 254, 255,
265, 274, 287, 318, 320, 331,
347, 352, 355, 356, 362, 364,
366, 384

Tungsten (W) 178

35

Uranium (U) 233

52, 220, 245, 253, 383, 304,
312, 314, 367

Uranium (U) 234

6, 12, 27, 36, 49, 54, 49, 61,
69, 81, 82, 85, 102, 115, 143,
174, 159, 160, 175, 176, 177,
218, 220, 226, 230, 298, 314

Uranium (U) 235

3, 24, 28, 52, 70, 92, 95, 185,
220, 249, 250, 303, 304, 312,
314, 348, 357

Uranium (U) 236

19, 220, 253, 310, 314, 348,
378, 380

Uranium (U) 238

6, 12, 13, 21, 24, 27, 32, 36,
49, 54, 59, 61, 81, 85, 92,
102, 115, 143, 147, 159, 160,
162, 171, 176, 177, 218, 220,
226, 230, 298, 304, 312, 313,
314, 350, 359

Withdrawn Isotopes (RW)

10, 106, 142, 196, 355

Xenon (Xe) 127

95, 106, 112, 113, 120, 130,
131, 133, 135, 138, 145, 146,
234, 237, 241, 258, 259, 280,
281, 284, 288, 292, 294, 310,
321, 325, 326, 239, 330, 338,
353, 376, 377, 379, 380, 382,
383

Xenon (Xe) 133

3, 111, 114, 191, 220, 247,
272, 280, 289, 295, 299

Yttrium (Y) 88

141

Zinc (Zn) 65

304

Zirconium (Zr) 95

12, 18, 82, 142, 220, 257, 335,
344, 348, 355

4. GEOGRAPHICAL LOCATION OF RADIOISOTOPE CUSTOMERS
(identified by customer numbers)

STATES

Alabama (AL)

6, 49, 210, 247, 275

Arizona (AZ)

9, 116, 126, 248

Arkansas (AR)

13, 249, 250

California (CA)

1, 2, 26, 27, 28, 29, 34, 44,
56, 62, 63, 65, 69, 72, 76, 82,
87, 90, 91, 92, 95, 96, 103,
104, 109, 117, 121, 125, 137,
138, 168, 171, 172, 182, 185,
187, 188, 189, 201, 202, 205,
214, 215, 216, 235, 237, 240,
242, 251, 252, 253, 254, 255,
256, 277, 288, 289, 290, 309

Colorado (CO)

36, 85, 100, 111, 177, 230

Connecticut (CT)

245, 305, 306, 307

District of Columbia (DC)

4, 31, 60, 78, 131, 139, 156,
228, 236, 364

Florida (FL)

59, 71, 160

Georgia (GA)

77

Idaho (ID)

3, 51, 55

Illinois (IL)

10, 12, 105, 114, 150, 179,
225, 258, 259, 260, 261, 291

Indiana (IN)

45, 113, 165, 233, 300

Iowa (IA)

33, 93, 263

Kansas (KS)

264

Kentucky (KY)

218

Louisiana (LA)

64, 193, 223

Maine (ME)

57

Maryland (MD)

98, 99, 130, 132, 133, 135,
140, 184, 207, 232, 234, 241,
265

Massachusetts (MA)

11, 14, 22, 23, 35, 61, 84,
102, 107, 141, 142, 169, 192,
196, 197, 206, 246, 266, 292

Michigan (MI)

86, 101, 115, 267

Minnesota (MN)

108, 119, 120, 195

Mississippi (MS)

268

Missouri (MO)

97, 106, 118, 161, 209, 299, 302

Nebraska (NB)

42

New Hampshire (NH)

143

New Jersey (NJ)

5, 15, 20, 32, 43, 53, 58, 79,
94, 112, 166, 170, 180, 198,
199, 208, 334

New Mexico (NM)

50, 181, 257

New York (NY)

7, 21, 24, 37, 38, 40, 41, 46,
47, 68, 70, 75, 127, 129, 144,
151, 152, 162, 167, 173, 183,
186, 190, 191, 200, 203, 204,
222, 269, 270, 274, 293, 294,
308, 343, 350, 354, 369, 385

North Carolina (NC)

48, 66, 145, 146, 147, 148,
174, 227, 239

Ohio (OH)

17, 18, 30, 89, 89, 122, 123,
134, 149, 157, 175, 226, 231,
262

Oklahoma (OK)

39, 158, 164, 271

Oregon (OR)

159, 160, 272

Pennsylvania (PA)

16, 73, 81, 88, 153, 163, 243,
273, 301, 303

South Carolina (SC)

52, 276

Tennessee (TN)

155, 219, 220, 221, 278, 279

Texas (TX)

25, 83, 124, 128, 154, 178,
194, 211, 212, 213, 280, 281,
295

Utah (UT)

282, 283

Virginia (VA)

67, 74, 10, 229, 284

Washington (WA)

19, 176, 217, 224, 244, 285,
286, 296, 298, 304

Wisconsin (WI)

8, 287, 297

Wyoming (WY)

54

FOREIGN

Australia

310, 311.

Austria

312

Belgium

313, 314, 315, 316

Canada

317, 318, 319, 320, 321, 322,
323, 324, 325, 326, 327, 328,
329

Denmark	Republic of China
330, 331, 332, 333	373, 374, 375
Federal Republic of Germany	Spain
335, 336, 337, 338, 339, 340, 341, 342, 344, 345, 346	376
France	Sweden
347, 348, 349	377, 378
Great Britain	Switzerland
351, 352, 353, 355, 356, 357	379, 380, 381
Hong Kong	Union of South Africa
358, 359	382, 383, 384
India	
360, 361	
Israel	
362, 363	
Italy	
364	
Japan	
365, 366, 367, 368	
The Netherlands	
369, 370	
Norway	
371	
Portugal	
372	

5. RADIOISOTOPE SALES AND TRANSFERS--FY1980

	shpts	Domestic Amount mCi	Dollars	Shpts	Foreign Amount mCi	Dollars	shpts	Project Amount mCi	Dollars	Shpts	Total Amount mCi	Dollars
Americium-241 (H)							6	9.72 µCi		6	9.72 µCi	
Americium-241 (O)	77	2,650,600 mg	2,129,475	3	5.300 mg	4.840	69	222 mg	4,695	149	2,656,022	2,139,010
Americium-241 (P)	1	50								1	50	
Americium-241 (S)							2	1.77 kg		2	1.77 kg	
Americium-243 (O)	2	1.0 mg	330	1		165	4	1.2 mg	415	7	2.2	910
Antimony-122 (I)	2	339.700 Ci	173,000							2	339.700 Ci	173,000
Antimony-124 (I)(a)	2	44.700 Ci								2	44.700 Ci	0
Argon-37 (O)				12	37.8	2,110				12	37.8	2,110
Astatine-211 (8)	4	8.7								4	8.7	
Barium-133 (H)							2	4.55		2	4.55	
Barium-140 (O)							1	1.0	40	1	1.0	40
Berkelium-249 (O)							3	25.1	195	3	25.1	195
Bromine-77 (L)	29	2,233								29	2,233	
Cadmium-109 (8*)(b)	4	1.240	12.085							4	1.240	12.085
Calcium-47 (O)	174	55.9	15.112	3	0.1	250	34	19.1	5,750	211	75.1	21.112
Californium-249 (O)	1		165							1		165
Californium-252 (H)							1	4.5 nCi		1	4.5 nCi	
Californium-252 (M)							1	23.233 µg		1	23.233 µg	
Californium-252 (O)	1		150	2	0.3	150	19	179.6	1,980	22	179.9	2,280
Californium-252 (P)	1						1			2		
Californium-252 (S)	8	8.66 mg	104,425	5	22.89 mg	271.090				13	31.55 mg	375.515
Carbon-14 (O)	21	2,262,300	531.300				3	1,935,000	7,335	24	4,197,300	538.635
Cerium-144							1	0.73 µCi		1	0.73 µCi	
Praeseodymium (H)							1			1		
Cesium-134 (H)							2	38.8		38.8	38.8	
Cesium-137 (H)							5	37.5		5	37.5	
Cesium-137 (O)	33	2.406 Ci	1.893	6	117.282 Ci	11,972	6	6 Ci	250	45	119.588 Ci	14.115
Chlorine-36 (H)							1	17.4 nCi		1		
Cobalt-57 (H)							2	30.4		2	30.4	
Cobalt-60 (H)							6	41.3		6	41.3	
Cobalt-60 Metal (O)		492,424 Ci	115,385								492,424 Ci	115,385
Cobalt-60 Solution (O)	4	58.0	232							4	58.0	232
Cobalt-60 (U)							2	2,400		2	2,400	
Curium-244 (H)							1	0.41 µCi		1	0.41 µCi	
Curium-244 (O)	2	6 mg	785	5	251 mg	25.685	3	10,001 mg	305	10	10.258	26.775
Curium-248 (O)	2	0.4 mg	230	2		230	6	63.4	390	10	63.8	850
Cyclotron Service Irradiations (O)(c)	84	78.0	562,604	5	2.0	2,000	13	94.0	27,479	102	174.0	592,083
Depleted Uranium (H)							1	0.134 g		1	0.134 g	
Depleted Uranium (P)	53	1.703 kg	12,000				36	4.716 kg	14,000	89	6.419 kg	26,000

	shpts	<u>Domestic</u> <u>hunt</u> <u>mCi</u>	<u>Dollars</u>	Shpts	<u>Foreign</u> <u>Amount</u> <u>mCi</u>	<u>Dollars</u>	Shpts	<u>Project</u> <u>Amount</u> <u>mCi</u>	<u>Dollars</u>	Shpts	<u>Total</u> <u>Amount</u> <u>mCi</u>	<u>Dollars</u>
Einsteinium-253	7		331.583			174,000	2	0.5 mg	130	2	0.5 mg	130
Encapsulation (O)							60		43,998	67		549,581
Enriched Uranium (P)	3	1,219,186 g	1,971,400	2	53,994 g	594,300	49	72.519 g	797,000	54	1,345,698 g	3,362,700
Europium-152 (H)							1	1.45 μ Ci		1	1.45 μ Ci	
Europium-152 (O)							1	4.0	80	1	4.0	80
Fermium-257 (O)							1		65	1		65
Fluorine-18 (B)	29	553								29	553	
Gadolinium-153 (O)	15	8010	11,750	1	500	750	3	25.000	37,500	19	33,510	50,000
Germanium-68 (B*)	8	1,333	8,729							8	1,333	8,729
Gold-198 (I)								0.8	60		0.8	60
Hafnium-181 (O)	1	1.0	25	1	5.0	25				2	6.0	50
Iodine-123 (B)	3	150								3	150	
Iodine-129 (O)	11	8,218 mg	7,622	3	3,000 mg	2,250	1	501 mg	375	15	11,719	10,247
Iodine-131 (O)							33	444.7	11,064	33	444.7	11,064
Iridium-192 (H)	5	183 Ci								5	183 Ci	
Iridium-192 (M)							2	46.5		2	46.5	
Iridium-192 (O)	224	1,244,794 Ci	1,740,303	29	92,238 Ci	135,094	6	855 Ci	1,440	259	1,337,887 Ci	1,876,837
Iron-52 (B)	1	18								1	18	
Iron-55 (O)				8	1,008,900	37,125				8	1,008,900	37,125
Iron-59 (H)							1	0.38		1	0.38	
Krypton-85 (M)				3	0.015 μ Ci					3	0.015 μ Ci	
Krypton-85 (O)	226	8,000 Ci	176,445	19	1,231 Ci	28,982	38	570 Ci	9,205	283	9,801 Ci	214,632
Krypton-85 Enriched (O)	8	1,045 Ci	147,750	2	100 Ci	6,000				10	1,145 Ci	153,750
Magnesium-28 (B*)	25	6.91	3,481	1	0.11	43				26	7.02	3,524
Manganese-54 (H)							2	3.3		2	3.3	
Manganese-56 (I)								112	150		112	150
Miscellaneous Compounds (O)	10	4.0	484	1	2.0	269	3		3,210	14	6	3,963
Natural Thorium (M)							1	4.0 kg		1	4.0 kg	
Natural Uranium (H)							1	0.61 μ g		1	0.61 μ g	
Natural Uranium (H)							3	146.6 g		3	146.6 g	
Natural Uranium (P)	1						2	1 kg	25	3	1 kg	25
Natural Uranium (O)	3	9,000 mg	330							3	9,000 mg	330
Neodymium-147 (U)							1	0.6		1	0.6	
Neodymium-149 (U)							1	1.1	250	1	1.1	250
Neptunium-237 (H)							1	0.44 μ Ci		1	0.44 μ Ci	
Neptunium-237 (P)							1			1		
Neptunium-237 High Purity (O)	2	1.044 mg	443	2	14,435 mg	4,472	5	5.546 mg	1,876	9	21,036	6,791
Neptunium-237 Oxide (O)	2	1.443 mg	454	3	19,000 mg	4,635				5	20,443	5,089
Nickel-63 (O)				1	1,000	3,000				1	1,000	3,000

	shpts	Domestic hunt mCi	Dollars	shpts	Foreign Amount mCi	Dollars	Shpts	Project Amount mCi	Dollars	Shpts	Total Amount mCi	Dollars
Niobium-92 (H)	2	4.1								2	4.1	
Niobium-95 (O)	35	560	17,750	3	12	330	2	6	240	40	578	18.320
Osmium-191 (B)	15	22,050								15	22.050	
Palladium-109 (B)	1	8								1	8	
Phosphorus-33 (O)	22	1,990	22.150	1	100	1,000	1	15	525	24	2,105.0	23.675
Plutonium (P)	2						16	103 g	4,500	18	103 g	4,500
Plutonium-236 (O)	2		257	4		1.312	6		7,950	12		9.519
Plutonium-237 (O)	4		4,360				3		9,706	7		14.066
Plutonium-238 (M)							28	26,744 g		28	26.744 g	
Plutonium-238 (O)	2	19,160 mg	21.316	1	2,000 mg	26.120	1		165	4	21.160 mg	47,601
Plutonium-238 (S)							5	2.82 kg		5	2.82 kg	
Plutonium-239 (H)							14	2.36 µCi		14	2.36 µCi	
Plutonium-239							3	800 g		3	800 g	
Plutonium-239 (O)	1	2,875 mg	580	2	5.442 mg	4,268	10	762 mg	805	13	9,079.0 mg	5.653
Plutonium-240 (M)							1	3 g		1	3 g	
Plutonium-240 (O)				1	1.000 mg	3.110	7	865 mg	735	8	1.865 mg	3.845
Plutonium-241 (O)	2	0.1 mg	230	2	1,075.0 mg	8.818	1	100.4 mg	180	5	1,175.5 mg	9.228
Plutonium-242 (M)							1	0.05 µCi		1	0.05 µCi	
Plutonium-242 (O)	4	3 mg	1,160	14	1.951 mg	46.897	4	6.000 mg	510	22	6,954 mg	48.567
Plutonium-244 (O)	1	0.1 mg	66	2	30.0 mg	655	2	922.5 mg	185	5	952.6 mg	906
Polonium-209 (M)							4	23 µCi		4	23 µCi	
Polonium-210 (H)	1	10.0								1	10.0	
Polonium-210 (M)							3	226		3	226	
Potassium-43 (O)	10	30.0	3.000				6	6.0	600	16	36.0	3,600
Promethium-147 (H)							2	39.0 pCi		2	39.0 pCi	
Promethium-147 (O)	6	1.040 Ci	540	13	7.006 Ci	7,306				19	7.016 Ci	7,846
Protactinium-231 (O)							3	166.0 mg	6,533	3	166.0 mg	6.533
RaDEF							4	49.7 nCi		4	49.7 nCi	
Rhenium-188 (U)							1	0.14	250	1	0.14	250
RSI (B)	28		16.870							28		16.870
Rubidium-81 (B)	34	1,420								34	1.420	
Ruthenium-97 (B)	2	1.60								2	1.60	
Ruthenium-103 (B)	17	1.23								17	1.23	
Ruthenium-103 (O)	3	11.0	425				4	20.0	575	7	31.0	1.000
Ruthenium-106 (O)	9	101.0	3.275	4	250.0	3.125	1	1.0	25	14	352.0	6.425
Samarium-151' (O)				2	1.333 mg	3.076	1	1,000 mg	100	3	2.333 mg	3.176
Selenium-75 (O)	10	40.815	42,440							10	40.815	42.440
Silver-110 Meta (H)							2	40.2		2	40.2	
Sodium-22 (B*)	1	335	5.343							1	335	5.343
Sodium-22 (H)							1	3.3		1	3.3	
Sodium-24 (I)								0.6	60		0.6	60
Sodium-24 (U)							2	5.000	1,800	2	5,000	1,800

	Shpts	Domestic Amount mCi	Dollars	Shpts	Foreign Amount mCi	Dollars	Shpts	Project Amount mCi	Dollars	Shpts	Total Amount mCi	Dollars
Special Services and Processing (e)	15	2	54.831			5.100	18	10.000.0	86.530	33	10.002	146.461
Strontium-82 (L)							12	3.159		12	3.159	
Strontium-89 (O)	34	233.0	4.833				1	30.0	405	35	263.0	5.238
Strontium-90 (O)	28	387.275 Ci	38.854							28	387.275 Ci	38.854
Strontium-90, Yttrium (H)							12	70		12	70	
Target Preparations (O)			61,799			11.750	5	2.0	237.818	5	2.0	311,367
Technetium-99 (E)	1	0.20					1			1	0.20	
Technetium-99 (O)	23	55.000 mg	3,025	9	283.600 mg	15,598	14	31.310 mg	1,811	46	369.910 mg	20,434
Thorium (P)	1	533 kg	10.700				12	10 kg	200	13	543	10,900
Thorium-229 (O)	2		150	3		1.695	3		295	8		2,140
Thorium-230 (O)				1	100.0 mg	2,427	2	12.6 mg	185	3	112.6	2,612
Thorium-230 > 95 (O)	1	1.0 mg	65	3	207.0 mg	19,973	4	4.0 mg	287	8	212.0 mg	20,325
Thorium-230 80-9 (O)					300.7 mg	6.937	1	1.0 mg	67	1	301.7 mg	7,004
Thorium-232 (O)	4	9,367,100 mg	2.611				4	172.446 mg	130	8	9,539,546 mg	2,741
Thulium-170 (U)							3	45.000	750	3	45,000	750
Tritium (H)							1	1.7		1	1.7	
Tritium (M)				3	0.001 µCi		7	61 Ci		10	61 Ci	
Tritium (O)	206	419,230 Ci	352,831	29	535.000 Ci	407.010	25	1.003 Ci	2.179	260	955.233 Ci	762.020
Tungsten-178 (8)	1	20								1	20	
Uranium-233 (O)	3	155 mg	530	3	16,900 mg	43.862	3	1,000,202 mg	255	9	1,017,256 mg	44,647
Uranium-234 (M)							23	1.15		23	1.15	
Uranium-234 (O)	3	2,205 mg	18.499	1	4,000 mg	33.345	1	1.663 mg	65	5	7.858 mg	51,909
Uranium-235 (O)	5	17.650 mg	1,236	2	20.955 mg	3.310	13	757,300 mg	1.065	20	795.985 mg	5,611
Uranium-236 (H)							1	1 mg		1	1.0 mg	
Uranium-236 (O)	1	30 mg	77	6	1.655 mg	1,128	1	1.0 mg	65	8	1.686 mg	1,270
Uranium-238 (H)							23	1.15		23	1.15	
Uranium-238 (O)	5	55,300 mg	1.954	6	242.400 mg	23.482	9	3,003,569	520	20	3,301,269 mg	25.956
Withdrawn Radioisotopes	11	4,962	19.485	2	350	10.500				13	6.312	29.985
Xenon-127 (B*)	104	15.669	26.498	47	15.867	27.289				151	31,536	53.787
Xenon-133 (O)	44	49.000	3.600				10	7.400	675	54	56,400	4.275
Yttrium-88 (L)	1	2	55							1	2	55

	<i>Shpts</i>	<u>Domestic Amount mCi</u>	<u>Dollars</u>	<i>Shpts</i>	<u>Foreign Amount mCi</u>	<u>Dollars</u>	<i>Shpts</i>	<u>Project Amount mCi</u>	<u>Dollars</u>	<i>Shpts</i>	<u>Total Amount mCi</u>	<u>Dollars</u>
Zinc-65 (H)							1	0.58		1	0.58	
Zirconium-95 (H)	1	37.0 Ci								1	37.0 Ci	
Zirconium-95/ Niobium-95 (O)	<u>9</u>	1,230.0	<u>7,655</u>	<u>5</u>	34.0	<u>231</u>	<u>4</u>	17.5	<u>152</u>	<u>18</u>	1,281.5	<u>8,038</u>
Total	1806		8,809,020	289		2,029,091	802		1,337,159	2,897		12,176,171

(a) Dollar totals included with antimony - 122(1).

(b) Oak Ridge billed.

(c) Radioisotopes produced by cyclotron service irradiations:

133mBa, 205,206,207Bi, 11C, 129,134Cs, 56,57,61Co, 64Cu, 149,150,153Eu, 18F, 67,69,70Ga, 67,68Ge, 197Au, 172Hf, 111In, 123I,
173Lu, 132pm, 189Re, 95Rh, 83,84Rb, 95m,99Tc, 168Tm.

(d) 210Po → 210Bi → 210Pb

(e) Special services include such items as target fabrication, source encapsulation, and preparation of special chemical forms.

DISTRIBUTION

<u>No. of Copies</u>	<u>No. of Copies</u>
<u>OFFSITE</u>	
R. F. Barker U.S. Nuclear Regulatory Commission Washington, DC 20555	B. Davis U.S. Nuclear Regulatory Commission 799 Roosevelt Road Glen Ellyn, IL 60137
W. K. Benson DOE Division of International Security Affairs (MS-E171) Washington, DC 20545	R. E. Devine U.S. Nuclear Regulatory Commission Library Washington, DC 20555
H. Book U.S. Nuclear Regulatory Commission Suite 202 Walnut Creek, CA 94596	W. Ellgen DOE Office of the Assistant Secretary for International Affairs (MS-7220C) Washington, DC 20545
P. B. Brimhall DOE Idaho Operations Office 550 Second Street Idaho Falls, ID 83401	E. D. Flack U.S. Nuclear Regulatory Commission Office of Inspection and Enforcement E/W 359 Washington, DC 20555
G. Brown U.S. Nuclear Regulatory Commission 611 Ryan Plaza Drive Suite 1000 Arlington, TX 76012	G. R. Gartrell DOE Dayton Area Office P.O. Box 66 Miamisburg, OH 45342
W. T. Cave Mound Facility Monsanto Research Corporation P.O. Box 32 Miamisburg, OH 45342	2 V. P. Gede Lawrence Livermore Laboratory University of California Special Materials Office, L-128 P.O. Box 808 Livermore, CA 94550
P. Colsmann Brookhaven National Laboratory Associated Universities, Inc. Upton, NY 11973	D. C. Graves DOE Albuquerque Operations Office P.O. Box 5400 Albuquerque, NM 87115
DOE Office of the Assistant Secretary for International Affairs (MS-7220C) Washington, DC 20545	A. F. Grella U.S. Department of Transportation Washington, DC 20555
DOE Savannah River Operations Office P.D. Box A Aiken, SC 29801	H. R. Gwinn Oak Ridge National Laboratory Union Carbide Corporation P.O. Box X Oak Ridge, TN 37830
27 DOE Technical Information Center P.O. Box 62 Oak Ridge, TN 37830	

No. of
Copies

D. Hamilton
Department of Health Education
and Welfare
Food and Drug Administration
1901 Chapman Avenue
Mailstop HFX-70
Rockville, MD 20857

R. A. Hasse
Idaho National Engineering Co.
EG&G Idaho Inc.
P.O. Box 1625
Idaho Falls, ID 83401

J. C. Haugen
Argonne National Laboratory
9700 South Cass Avenue
Argonne, IL 60439

D. R. Hopkins
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

E. H. Kobisk
Oak Ridge National Laboratory
Union Carbide Corporation
P.O. Box X
Oak Ridge, TN 37830

R. F. Kott
DP-531
U.S. Department of Energy
Washington, DC 20585

E. E. Lamb
Oak Ridge National Laboratory
Union Carbide Corporation
P.O. Box X
Oak Ridge, TN 37830

O. E. Large
DOE Oak Ridge Operations Office
P.O. Box E
Oak Ridge, TN 37830

C. Longmire
Los Alamos Scientific Laboratory
University of California
P.O. Box 1663
Los Alamos, NM 87545

K. W. MacMurdo
Savannah River Laboratory
E. du Pont de Nemours & Co.
Aiken, SC 29801

No. of
Copies

10 J. N. Maddox
Office of Energy Research
ER-70 GTN
Office of Environment
U.S. Department of Energy
Washington, DC 20545

N. A. Matwiyoff
Los Alamos Scientific Laboratory
University of California
P.O. Box 1663
Los Alamos, NM 87544

J. A. Morley
DOE Albuquerque Operations
Office
P.O. Box 5400
Albuquerque, NM 87115

J. W. Nehls
DOE Oak Ridge Operations Office
P.O. Box E
Oak Ridge, TN 37830

E. Newman
Oak Ridge National Laboratory
Union Carbide Corporation
P.O. Box X
Oak Ridge, TN 37830

J. E. Ratledge
Oak Ridge National Laboratory
Union Carbide Corporation
P.O. Box X
Oak Ridge, TN 37830

J. E. Reid
DOE Office of Controller
(MS-C217)
Washington, DC 20545

E. P. Resner
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

P. Richards
Brookhaven National Laboratory
Associated Universities, Inc.
Upton, NY 11973

E. L. Sillcox
DOE/DBP
Forrestal Bldg. (MS-8F031)
Washington, DC 20545

B. Singer
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

No. of
Copies

G. Smith
U.S. Nuclear Regulatory
Commission
631 Park Avenue
King of Prussia, PA 19406

L. G. Stang, Jr.
Brookhaven National Laboratory
Associated Universities, Inc.
Upton, NY 11973

J. Sutherland
U.S. Nuclear Regulatory
Commission
101 Marietta Street
Suite 3100
Atlanta, GA 30303

L. P. Thomas
Mound Facility
Monsanto Research Corporation
P.O. Box 32
Miamisburg, OH 45342

A. N. Tse
U.S. Nuclear Regulatory
Commission
Washington, DC 20555

D. H. Turno
Savannah River Laboratory
E. I. du Pont de Nemours & Co.
Aiken, SC 29801

R. E. Vallee
Mound Facility
Monsanto Research Corporation
P.O. Box 32
Miamisburg, OH 45342

E. Vejvoda
Rockwell International
Atomics International Division
Rocky Flats Plant
P.O. Box 464
Golden, CO 80401

No. of
Copies

E. W. Yeats
Lawrence Berkeley Laboratory
University of California
Berkeley, CA 94720

ONSITE

2 DOE Richland Operations Office

W. R. Pohlod
H. E. Ransom

Hanford Engineering Development
Laboratory

D. Engel

UNC Nuclear Industries

P. A. Carlson

31 Pacific Northwest Laboratory

W. J. Bair
J. B. Brown
J. S. Burlison (15)
J. V. Filsinger
J. J. Fuquay
W. A. Glass
J. H. Jarrett
R. W. McKee
R. W. Perkins
E. J. Wheelwright
Technical Information (5)
Publishing Coordination ch (2)