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List of DOE Radioisotope Customers with Summary of Radioisotope Shipments, FY 1981

Compiled by
J. S. Burlison

September 1982

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 *zero*

Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

PNL-4177

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LIST OF DOE RADIOISOTOPE CUSTOMERS WITH
SUMMARY OF RADIOISOTOPE SHIPMENTS, FY 1981

Compiled by
J. S. Burlison

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September 1982

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Office of Health and Environmental Research
Office of Energy Research
U.S. Department of Energy
Washington, D.C. 20545
Contract DE-AC06-76RL0 1830

Pacific Northwest Laboratory
Richland, Washington 99352

This document is
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Larry E. Williams

Authorizing Official

Date: *06/13/2007*

EB
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Brookhaven National Laboratory
Hanford Engineering Development Laboratory
Idaho Operations Office/EG&G Idaho, Inc.
Los Alamos Scientific Laboratory
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-2147 (FY 1976)
ORNL-IIC-6 (FY 1965)	ORNL-IIC-38 (FY 1971)	PNL-2572 (FY 1977)
ORNL-IIC-9 (FY 1966)	BNWL-1774 (FY 1972)	PNL-2930 (FY 1978)
ORNL-IIC-13 (FY 1967)	BNWL-1824 (FY 1973)	PNL-3274 (FY 1979)
ORNL-IIC-17 (FY 1968)	BNWL-1902 (FY 1974)	PNL-3839 (FY 1980)
ORNL-IIC-27 (FY 1969)	BNWL-1993 (FY 1975)	

Other reports covering stable isotope sales include:

"Stable Isotope Sales: Mound Facility Customer and Shipment Summary, FY 1980", MLM-2843.

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

"Stable Isotope Customer List and Summary of Shipments, FY 1981", ORNL/TM-8302.

"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.

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LIST OF DOE RADIOISOTOPE CUSTOMERS WITH
SUMMARY OF RADIOISOTOPE SHIPMENTS FY 1981

The eighteenth 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; Oak Ridge National Laboratory; Savannah River Laboratory; and UNC Nuclear Industries, Inc.

The information is divided into five sections:

1. Isotope Suppliers, Facility, Contacts 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 address, 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 1981. Section 5 summarizes the FY-1981 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 ISOTOPES 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. Oamm 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 A. W. Oderschman, Manager Safeguards and Materials Management H.E.D.L. P.O. Box 1970 Richland, WA 99352 FTS 444-3548 Commercial (509)942-3548 <u>Isotopes or Services</u> 110mAg, 241Am, 133Ba, 14C, 244Cm, 57Co, 60Co, 134Cs, 137Cs, 152Eu, 3H, 54Mn, NU, 147Pm, 210Po, 238Pu, 239Pu, 90SrY, 99Tc	(H)
Brookhaven National Laboratory P. Colsmann Isotopes and Special Materials Group Brookhaven National Laboratory Upton, Long Island, NY 11973 FTS 666-4058 Commercial (516)282-4058 <u>Isotopes or Services</u> 73As, 211At, 195Au, 128Ba, 109Cd, 244Cm, CSI, 18F, 59Fe, 68Ge, 123I, MCP, 28Mg, 191Os, 109Pd, 208Po, RSI, 103Ru, 99Tc, 178W, 181W, 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> RSI	(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.

Facility Abbreviation

Los Alamos Scientific Laboratory (L)

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

FTS 843-4948
Commercial (505)667-4948

Isotopes or Services

⁷⁷Br, ⁶⁷Cu, ⁵²Fe,
¹⁴⁶La, ¹⁴⁸La, ¹⁵⁰La, ¹⁵¹Gd, ⁶⁸Ge, ¹⁷²Hf,
²²Na, ¹⁴⁵Sm, ¹⁴⁶Sm, ⁸²Sr, ⁴⁸V,
¹²⁷Xe, ⁸⁸Y, ⁸⁸Zr

Oak Ridge National Laboratory (O)

J. E. Ratledge, Supervisor
Isotope Sales
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, TN 37830

FTS 624-6984
Commercial (615)547-6984
Extension 6661

Isotopes or Services

²⁴¹Am, ²⁴³Am, ³⁷Ar, ¹⁴⁰Ba,
²⁴⁹Bk, ¹⁴C, ⁴⁷Ca, ^{Cap}, ¹⁴⁴Ce,
²⁴⁹Cf, ²⁵²Cf, ²⁴⁴Cm, ²⁴⁶Cm,
²⁴⁸Cm, ⁶⁰Co, ¹³⁷Cs, ^{CSI}, ²⁵³Es,
¹⁵²Eu, ⁵⁵Fe, ²⁵⁷Fm, ¹⁵³Gd, ³H,
¹²⁹I, ¹³¹I, ¹¹⁴In, ¹⁹²Ir, ²⁸Mg,
¹⁹²Ir, ⁴³K, ⁸⁵Kr, ^{MCP}, ²³¹Pa,
⁹⁵Nb, ²³⁷Np, ^{NU}, ³³P, ²³⁸Pu,
¹⁴⁷Pm, ²³⁶Pu, ²³⁷Pu, ²³⁸Pu,
²³⁹Pu, ²⁴²Pu, ²⁴⁴Pu, ¹⁰³Ru,
¹⁰⁶Ru, ^{RW}, ⁷⁵Se, ¹⁵¹Sm, ⁸⁹Sr,
⁹⁰Sr, ^{SS}, ⁹⁹Tc, ^{Tgs}, ²²⁹Th,
²³⁰Th, ²³²Th, ²³³U, ²³⁴U, ²³⁵U,
²³⁶U, ²³⁸U, ¹²⁷Xe, ⁹⁵Zr

Facility Abbreviation

Pacific Northwest Laboratory (P)

J. V. Filsinger
Safety and Materials Management
Pacific Northwest Laboratory
P.O. Box 999
Richland, WA 99352

FTS 444-2051
Commercial (509)375-2051

Isotopes or Services

²⁴¹Am, ²⁵²Cf, ^{Cm}, ^{DU}, ^{EU}, ³H, Th

Savannah River Plant (S)

C. G. Halsted
Technical and Production
Division
Department of Energy
P.O. Box A
Aiken, SC 29801

FTS 239-2217
Commercial (803)725-6211
Extension 2217

Isotopes or Services

²⁴¹Am, ²⁵²Cf, ²³⁸Pu

UNC Nuclear Industries, Inc. (U)

G. L. Smith, Manager
P.O. Box 490
Technology Section
Operation Division
Richland, WA 99353

FTS 444-1519
Commercial (509)373-4909

Isotopes or Services

⁹⁷Ru
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 Aerojet Nuclear Company
550 Second Street
P.O. Box 1845
Idaho Falls, Idaho 83401</p> <p>241Am(O), 243Am(O), 140Ba(O),
144Ce(O), 252Cf(O), 244Cm(O),
60Co(O), 153Gd(O), 192Ir(O),
SS(O), 237Np(O), 236Pu(O),
239Pu(O), 242Pu(O), 103Ru(O),
230Th(O), 233U(O), 95Zr(O)</p> <p>2 AIRCO Inc.
Central Research Laboratories
Murray Hill, New Jersey 07974</p> <p>85Kr(O)</p> <p>3 American Hoechst Corporation
P.O. Box 2500
Sumerville, New Jersey 08876</p> <p>85Kr(O)</p> <p>4 Amersham Corporation
Arlington Heights, Illinois 60005</p> <p>153Gd(O), 192Ir(O), 85Kr(O)</p> <p>5 Amtech Incorporated
938 W. Grant Street
Tucson, Arizona 85705</p> <p>85Kr(O), SS(O)</p> <p>6 Analog Devices Semiconductor
829 Woburn Street
Wilmington, Massachusetts 01887</p> <p>85Kr(O)</p> <p>7 Analytics Incorporated
P.O. Box 27565
Atlanta, Georgia 30327</p> <p>127Xe(8*)</p> <p>8 Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439</p> <p>249Bk(O), 249Cf(O), Tgs(O),
Cap(O), 253Es(O), 152Eu(O),
58Fe(B), 237Np(O), 239Pu(O),
106Ru(O), 230Th(O), 232Th(O),
235U(O), 238U(O), 95Zr(O), RSI(B)</p> | <p>9 Argonne National Laboratory
P.O. Box 2528
Idaho Falls, Idaho 83401</p> <p>Tgs(O), 238U(O)</p> <p>10 Automation Industries, Inc.
P.O. Box 245
Phoenixville, Pennsylvania 19460</p> <p>192Ir(O)</p> <p>11 Battelle Pacific Northwest
Laboratories
P.O. Box 999
Richland, Washington 99352</p> <p>241Am(H), 133Ba(H), 244Cm(H),
244Cm(O), 60Co(H), 134Cs(H),
137Cs(H), 3H(H), 59Mn(H),
NU(H), 147Pm(H), 210Po(H),
237Pu(O), 238Pu(H), 239Pu(H),
97Ru(U), 90SrY(H), Tgs(O),</p> <p>12 Bell Telephone Laboratories
600 Mountain Avenue
Murray Hill, New Jersey 07974</p> <p>181W(B), 73As(B)</p> <p>13 Boeing Company
Power Generation Group
P.O. Box 3979
Seattle, Washington 98124</p> <p>236Pu(O), 233U(O), 235U(O)</p> <p>14 Brookhaven National Laboratory
Upton, Long Island, New York 11973</p> <p>147Pm(O), RW(O), SS(O), 241Am(O),
Cap(O), 244Cm(O), 88Ge(L), 3H(O),
SS(O), Tgs(O), 229Th(O), 127Xe(L)</p> <p>15 California Institute of Technology
2101 E. California Boulevard
Pasadena, California 91109</p> <p>77Br(L), 235U(O), 127Xe(B*)</p> <p>16 California State University
Department of Chemistry
Fullerton, California 92624</p> <p>67Cu(L)</p> |
|--|--|

(*) Oak Ridge billed.

- 17 California State University
Northridge, California 91330
 $^{48}\text{V}(\text{L})$
- 18 Campbell Pacific Nuclear Corporation
130 So. Buchanan Circle
Pacheco, California 94553
 $^{137}\text{Cs}(\text{B})$
- 19 Carnegie Institution of Washington
Washington, D.C. 20008
 $^{144}\text{Ce}(\text{O})$, $^{152}\text{Eu}(\text{O})$, $^{151}\text{Sm}(\text{O})$
- 20 Carnegie & Mellon University
5000 Forbes
Pittsburgh, Pennsylvania 15213
 $\text{Tgs}(\text{O})$, $^{252}\text{Cf}(\text{O})$,
- 21 Case Western Reserve University
2220 Circle Drive
Cleveland, Ohio 44106
 $^3\text{H}(\text{O})$, $^{28}\text{Mg}(\text{B}^*)$
- 22 Chevron Research Company
Richmond, California 94802
 $^{172}\text{Hf}(\text{L})$, $^{172}\text{Lu}(\text{L})$
- 23 Children's Hospital
Division of Nuclear Medicine
300 Longwood Road
Boston, Massachusetts 02115
 $^{191}\text{Os}(\text{B})$
- 24 Children's Hospital Medical Center
Radiation Control
20 Blackfan Street
Boston, Massachusetts 02115
 $^{127}\text{Xe}(\text{B}^*)$
- 25 Colorado State University
Fort Collins, Colorado 80521
 $^{241}\text{Am}(\text{O})$
- 26 Columbia University
Health Physics Office
520 West 120 Street
New York, New York 10027
 $\text{CSI}(\text{O})$
- 27 Columbia University
630 West 168 Street
New York, New York 10032
 $^{109}\text{Pd}(\text{B})$
- 28 Conoco, Incorporated
P.O. Box 1785
Uvalde, Texas 78801
 $^{89}\text{Sr}(\text{O})$
- 29 Conoco, Incorporated
Research & Development Department
P.O. Box 1267
Ponca City, Oklahoma 74601
 $^{85}\text{Kr}(\text{O})$, $^{103}\text{Ru}(\text{O})$, $^{89}\text{Sr}(\text{O})$
- 30 Continental Testing Laboratories
763 U.S. Highway 17 & 92
Fern Park, Florida 32730
 $^{85}\text{Kr}(\text{O})$
- 31 Cornell University
Purchasing
120 Maple Avenue
Ithaca, New York 14850
 $^{47}\text{Ca}(\text{O})$
- 32 Creighton University
2410 California
Omaha, Nebraska 68131
 $^{47}\text{Ca}(\text{O})$
- 33 Cryogenic Rare Gas Laboratories, Inc.
730 South 13th Street
Newark, New Jersey 07103
 $^{85}\text{Kr}(\text{O})$
- 34 Dow Chemical Company
Larkin Laboratory
1691 N. Swede Road
Midland, Michigan 48640
 $^3\text{H}(\text{B})$
- 35 E. I. du Pont de Nemours & Company,
Inc.
Savannah River Plant
Aiken, South Carolina 29801
 $^{252}\text{Cf}(\text{O})$, $^{248}\text{Cm}(\text{O})$, $\text{SS}(\text{O})$
- 36 E. A. D. Metallurgical, Inc.
71 Pearce Avenue
Tonawanda, New York 14150
 $^{241}\text{Am}(\text{O})$, $\text{Cap}(\text{O})$
- 37 East Carolina University
Purchasing Department
Greenville, North Carolina 27834
 $^{89}\text{Sr}(\text{O})$

- 38 Eastman Kodak Company
Kodak Park Works
Rochester, New York 14650
 $^{129}\text{I}(\text{O})$
- 39 East Virginia Medical Authority
Radiation Safety
519 Front Drive
Norfolk, Virginia 23510
 $^{22}\text{Na}(\text{B})$
- 40 EG&G Idaho, Inc.
P.O. Box 1625
Idaho Falls, Idaho 83415
RSI(I)
- 41 E. M. R. Photo Electric
Div. of Weston Instruments
P.O. Box 44
Princeton, New Jersey 08540
 $^3\text{H}(\text{O})$
- 42 Exxon Nuclear Idaho Company
P.O. Box 2800
Idaho Falls, Idaho 83401
RSI(I)
- 43 Fairchild Semiconductor
P.O. Box 790
Mountain View, California 94040
 $^{85}\text{Kr}(\text{O})$
- 44 Fermi National Accelerator Lab
Batavia, Illinois 60510
 $^{60}\text{Co}(\text{B})$
- 45 Florida State University
Tallahassee, Florida 32306
 $^{237}\text{Np}(\text{O})$
- 46 Ford Aerospace & Communication Corp.
Division of Ford Motor Company
3939 Fabian Way
Palo Alto, California 94303
 $^{85}\text{Kr}(\text{O})$
- 47 Gamma Industries, Inc.
P.O. Box 2543
Baton Rouge, Louisiana 70821
 $^{192}\text{Ir}(\text{O})$
- 48 Gamma Industries
9320 Travenor
P.O. Box 34526
Houston, Texas 77034
 $^{241}\text{Am}(\text{O}), \text{Cap}(\text{O})$
- 49 General Electric Company
Lynchburg, Virginia 24502
 $^{85}\text{Kr}(\text{O})$
- 50 General Electric Company
P.O. Box 254
San Jose, California 95103
 $^{144}\text{Ce}(\text{O}), ^{137}\text{Cs}(\text{O}), ^{153}\text{Gd}(\text{O}),$
 $\text{MCP}(\text{O}), \text{SS}(\text{O}), ^{232}\text{Th}(\text{O})$
- 51 General Electric Company
Vallecitos Nuclear Company
Vallecitos Road
Pleasanton, California 94566
RSI(I), $^{252}\text{Cf}(\text{S})$
- 52 General Electric Company
General Electric Drive
Waynesboro, Virginia 22980
 $^{85}\text{Kr}(\text{O})$
- 53 General Electric Research & Development
Bldg. K1
Schenectady, New York 12301
RSI(B)
- 54 General Nucleonics Division,
TYCO Laboratories
2811 Metropolitan Place
Pomona, California 91767
 $^{85}\text{Kr}(\text{O})$
- 55 General Semiconductor, Inc.
2001 West 10th Place
Tempe, Arizona 85281
 $^{85}\text{Kr}(\text{O})$
- 56 George Washington University
23 & I Street N.W.
Washington, D.C. 20037
 $^{77}\text{Br}(\text{L}), ^{123}\text{I}(\text{B})$
- 57 Georgetown University
3800 Reservoir Road, N.W.
Washington, D.C. 20007
 $^{89}\text{Sr}(\text{O})$

- 58 Georgia Institute of Technology
Nuclear Research Center
900 Atlantic Drive N.W.
Atlanta, Georgia 30332
 $^{127}\text{Xe}(\text{B}^*)$
- 59 Gollob Analytical Service Corporation
47 Industrial Road
Berkeley Heights, New Jersey 07922
 $^3\text{H}(\text{O})$, $^{85}\text{Kr}(\text{O})$
- 60 Gulf Energy and Environmental Systems
P.O. Box 608
San Diego, California 92112
 $^{89}\text{Sr}(\text{O})$, $\text{SS}(\text{O})$, $^{95}\text{Zr}(\text{O})$
- 61 Gulf Nuclear Incorporated
202 Medical Center
Webster, Texas 77598
 $^{241}\text{Am}(\text{O})$, $^{137}\text{Cs}(\text{O})$,
 $^{153}\text{Gd}(\text{O})$, $^{192}\text{Ir}(\text{O})$
- 62 Harvard Medical School
Shields Warren Laboratory
Boston, Massachusetts 02115
 $^{211}\text{At}(\text{B})$, $^{18}\text{F}(\text{B})$
- 63 Hughes Aircraft Company
P.O. Box 92907
Los Angeles, California 90009
 $^{85}\text{Kr}(\text{O})$
- 64 I C I America, Inc.
Atlas Aerospace Division
Valley Forge, Pennsylvania 19481
 $^{85}\text{Kr}(\text{O})$
- 65 I C N & N B Co.
26201 Miles Road
Cleveland, Ohio 44128
 $^{137}\text{Cs}(\text{O})$, $\text{CSI}(\text{O})$, $^{153}\text{Gd}(\text{O})$,
 $^3\text{H}(\text{O})$, $^{33}\text{P}(\text{O})$, $^{147}\text{Pm}(\text{O})$,
 $^{106}\text{Ru}(\text{O})$, $^{75}\text{Se}(\text{O})$, $^{89}\text{Sr}(\text{O})$,
 $^{90}\text{Sr}(\text{O})$
- 66 Indiana University
Bloomington, Indiana 47401
 $^{14}\text{C}(\text{O})$, $\text{SS}(\text{O})$
- 67 Indiana University
630 W. New York Street
Indianapolis, Indiana 46202
 $^{47}\text{Ca}(\text{O})$
- 68 Industrial Nuclear Company
1124 Chess Drive
Forest City, California 94404
 $^{192}\text{Ir}(\text{O})$
- 69 INTEL Corporation
3065 Bowers Avenue
Santa Clara, California 95051
 $^{85}\text{Kr}(\text{O})$
- 70 International Antex, Inc.
2630 California Street
Mountain View, California 94040
 $\text{MCP}(\text{O})$, $^{147}\text{Pm}(\text{O})$
- 71 Iowa State University
Ames, Iowa 50010
 $^{129}\text{I}(\text{O})$, $\text{MCP}(\text{O})$, $^{234}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{O})$, $^{236}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$,
 $^{192}\text{Ir}(\text{B})$, $^{182}\text{Ta}(\text{B})$
- 72 Isomedix Inc.
P.O. Box 177
25 Eastmans Road
Parsippany, New Jersey 07054
 $^{137}\text{Cs}(\text{O})$, $\text{MCP}(\text{O})$
- 73 Isotope Products Laboratories
404 South Luke Street
Burbank, California 91502
 $^{243}\text{Am}(\text{O})$, $^{144}\text{Ce}(\text{O})$, $^{252}\text{Cf}(\text{O})$,
 $^{137}\text{Cs}(\text{O})$, $\text{CSI}(\text{O})$, $^{55}\text{Fe}(\text{O})$,
 $^{129}\text{I}(\text{O})$, $^{85}\text{Kr}(\text{O})$, $^{231}\text{Pa}(\text{O})$,
 $^{208}\text{Po}(\text{B})$, $^{236}\text{Pu}(\text{O})$, $^{239}\text{Pu}(\text{O})$,
 $^{106}\text{Ru}(\text{O})$, $^{89}\text{Sr}(\text{O})$, $^{90}\text{Sr}(\text{O})$,
 $^{135}\text{U}(\text{O})$, $^{230}\text{Th}(\text{O})$, $^{235}\text{U}(\text{O})$,
 $^{236}\text{U}(\text{O})$, $^{127}\text{Xe}(\text{B}^*)$, $^{95}\text{Zr}(\text{O})$
- 74 Isotec, Incorporated
7542 McEwen Road
Centerville, Ohio 45459
 $\text{MCP}(\text{O})$
- 75 Isovac Engineering Company
6220 San Fernando Road
Glendale, California 92104
 $^{85}\text{Kr}(\text{O})$
- 76 Jewish Hospital of St. Louis
216 S. Kingshighway Boulevard
St. Louis, Missouri 63110
 $^{47}\text{Ca}(\text{O})$

- 77 John Hopkins University
Baltimore, Maryland 21218
MCP(0)
- 78 John Hopkins Medical Institute
Division of Nuclear Medicine
622 N. Washington Street
Baltimore, Maryland 21205
 $^{77}\text{Br}(\text{L})$, $^{123}\text{I}(\text{B})$
- 79 Kaman Nuclear
1700 Garden of the Gods Roads
Colorado Springs, Colorado 80907
 $^3\text{H}(\text{O})$
- 80 KMS Fusion, Inc.
3941 S. Research Park Drive
P.O. Box 1567
Ann Arbor, Michigan 48106
 $^3\text{H}(\text{O})$
- 81 Land Seas Corporation
1212 Avenue of the Americas
New York, New York 10036
 $^{129}\text{I}(\text{O})$
- 82 Lee Environmental Lab
2030 Wright Avenue
Richmond, California 94304
 $^3\text{H}(\text{B})$
- 83 Los Angeles County USC Med. Center
1200 N. State Street
Box 112 G.H.
Los Angeles, California 90033
 $^{47}\text{Ca}(\text{O})$
- 84 Lovelace Clinic
4800 Gibson Boulevard, S.E.
Albuquerque, New Mexico 87108
 $^{243}\text{Cm}(\text{O})$, SS(0)
- 85 Loyola University Medical Center
2160 So. First Avenue
Maywood, Illinois 60153
CSI(A)
- 86 Mallinckrodt Chemical Works
3600 N. Second Street
St. Louis, Missouri 63160
CSI(0), $^{75}\text{Se}(\text{O})$, SS(0), $^{127}\text{Xe}(\text{B}^*)$
- 87 Mallinckrodt Nuclear
P.O. Box 5840
St. Louis, Missouri 63134
 $^{127}\text{Xe}(\text{B}^*)$
- 88 Marubeni America Corporation
14 Henderson Drive
West Caldwell, New Jersey 07006
 $^{242}\text{Pu}(\text{O})$
- 89 Massachusetts General Hospital
Boston Massachusetts 02114
 $^{47}\text{Ca}(\text{O})$, $^{18}\text{F}(\text{B})$, $^{68}\text{Ge}(\text{L})$
- 90 Massachusetts Institute of Technology
Box 69
Cambridge, Massachusetts 02139
 $^{47}\text{Ca}(\text{O})$, $^3\text{H}(\text{O})$
- 91 Mayo Foundation
Rochester, Minnesota 55901
 $^{47}\text{Ca}(\text{O})$
- 92 Measurex Corporation
10475 Imperial Avenue
Cupertino, California 95014
 $^{85}\text{Kr}(\text{O})$
- 93 Medical College of Wisconsin
8700 W. Wisconsin Avenue
Milwaukee, Wisconsin 53226
 $^{43}\text{K}(\text{O})$
- 94 Medilab
312 N.E. 15th Street
Miami, Florida 33132
 $^{235}\text{U}(\text{O})$
- 95 Merck and Company
Rahway, New Jersey 07065
 $^{60}\text{Co}(\text{O})$
- 96 Methodist Hospital
1604 W. Capitol
Indianapolis, Indiana 46202
 $^{127}\text{Xe}(\text{B}^*)$
- 97 Michael & Reese Hospital
29th Street and Ellis Avenue
Chicago, Illinois 60616
 $^{47}\text{Ca}(\text{O})$

- 98 Minnesota Mining Manufacturing Co.
P.O. Box 3121
St. Paul, Minnesota 53101
 $^{137}\text{Cs}(0)$, $^{85}\text{Kr}(0)$, $\text{MCP}(0)$,
 $^{95}\text{Nb}(0)$
- 99 Mitsus and Company
c/o USA, Inc.
200 Park Avenue
New York, New York 10017
 $^{234}\text{U}(0)$
- 100 Monolithic Memories Incorporated
1165 East Argus Avenue
Sunnyvale, California 94086
 $^{85}\text{Kr}(0)$
- 101 Monsanto Research Corporation
Dayton Laboratory
151 Nicholas Road
Dayton, Ohio 45407
 $^{241}\text{Am}(0)$, $\text{Cap}(0)$, $^{238}\text{Pu}(0)$,
 $^{252}\text{Cf}(S)$
- 102 Moravek Biochemicals Inc.
577 Mercury Lane
Brea, California 92621
 $^3\text{H}(0)$
- 103 Motorola Inc.
5005 East McDowell Road
Phoenix, Arizona 85008
 $^{85}\text{Kr}(0)$
- 104 Mount Sinai Hospital
Fifth Avenue and 100th Street
New York, New York 10029
 $\text{MCP}(0)$, $^{82}\text{Sr}(L)$
- 105 National Semiconductor
1850 West Grant Road
Suite 114
Tucson, Arizona 85705
 $^{85}\text{Kr}(0)$
- 106 National Semiconductor Corporation
2900 Semiconductor Drive
Santa Clara, California 95051
 $^{85}\text{Kr}(0)$
- 106a Neutron Products, Inc.
P.O. Box 68
Bickerson, Maryland 20573
 $^{60}\text{Co}(0)$
- 107 New England Medical Center
Boston, Massachusetts 02111
 $^{77}\text{Br}(L)$
- 108 New England Nuclear Corporation
575 Albany Street
Boston, Massachusetts 02118
 $^{241}\text{Am}(0)$, $^{14}\text{C}(0)$, $\text{Cap}(0)$,
 $^{144}\text{Ce}(0)$, $^{137}\text{Cs}(0)$, $\text{CSI}(0)$,
 $^{55}\text{Fe}(0)$, $^{153}\text{Gd}(0)$, $^3\text{H}(0)$,
 $^{129}\text{I}(0)$, $^{85}\text{Kr}(0)$, $^{33}\text{P}(0)$,
 $^{75}\text{Se}(0)$, $^{151}\text{Sm}(0)$, $\text{SS}(0)$,
 $^{99}\text{Tc}(0)$, $^{95}\text{Zr}(0)$
- 109 New England Nuclear Corporation
Radiopharmaceutical Div.
601 Treble Cove Road
Billerica, Massachusetts 01862
 $^{195}\text{Au}(B)$, $^{128}\text{Ba}(B)$, $^{109}\text{Cd}(B)$,
 $^{58}\text{Co}(B)$, $^{68}\text{Ge}(B^*)$, $^{68}\text{Ge}(L)$,
 $^{22}\text{Na}(L)$, $^{178}\text{W}(B)$, $^{88}\text{Y}(L)$
- 110 New York Hospital
Nuclear Medicine
525 East 68th Street
New York, New York 10021
RSI(B)
- 111 New York University Medical Center
550 First Avenue
New York, New York 10016
 $^{237}\text{Np}(0)$, $\text{Tgs}(0)$
- 112 New York University Medical Center
A. J. Lanza Lab
Long Meadow Road
Tuxedo, Texas 10987
RSI(B)
- 113 North Carolina Baptist Hospital
Nuclear Medicine
300 S. Hawthorne
Winston-Salem, North Carolina 27103
 $^{127}\text{Xe}(B^*)$
- 114 North Carolina Memorial Hospital
NCNB Plaza, 6th Floor
Chapel Hill, North Carolina 27514
 $^{127}\text{Xe}(B^*)$
- 115 Northeastern Ohio Universities
College of Medicine
4209 State Route 44
Rootstown, Ohio 44272
 $^{28}\text{Mg}(B^*)$

<p>116 Nuclear Radiation Development, Inc.
2937 Alt Blvd
Grand Island, New York 14072
$^{241}\text{Am}(0)$, $\text{Cap}(0)$, $^3\text{H}(0)$</p> <p>117 Nuclear Research Corporation
2 Richwood Place
Oenville, New Jersey 07834
$^{239}\text{Pu}(0)$, $\text{Tgs}(0)$</p> <p>118 Nuclear Sources and Services
P.O. Box 14023
Houston, Texas 77021
$^{241}\text{Am}(0)$, $\text{Cap}(0)$</p> <p>119 Nuclepore Corporation
7035 Commerce Circle
Pleasanton, California 94566
$\text{Tgs}(0)$, $^{235}\text{U}(0)$</p> <p>120 Oak Ridge Associated Universities
P.O. Box 117
Oak Ridge, Tennessee 37830
$^{243}\text{Am}(0)$, $\text{Cap}(0)$, $\text{CSI}(0)$</p> <p>121 Ohio State University
Research Foundation
1314 Kinnear Road
Columbus, Ohio 43212
$^{14}\text{C}(0)$, $^{89}\text{Sr}(0)$</p> <p>122 Ohio University
Athens, Ohio 45701
$^3\text{H}(0)$</p> <p>123 Oregon State University
Corvallis, Oregon 97330
$^{236}\text{U}(0)$</p> <p>124 Potter and Brumfield
Princeton, Indiana 47570
$^{85}\text{Kr}(0)$</p> <p>125 Princeton University
Plasma Physics Laboratory
Accounts Payable Department
P.O. Box 451
Princeton, New Jersey 08544
$^{252}\text{Cf}(0)$, $^{85}\text{Kr}(0)$, $\text{SS}(0)$</p> | <p>126 Princeton University
James Forrestal Campus
Princeton, New Jersey 08544
$^{137}\text{Cs}(B)$, $^{241}\text{Am}(0)$, $\text{Tgs}(0)$</p> <p>127 Proctor and Gamble Company
P.O. Box 175
Groesbecic Station
Cincinnati, Ohio 45239
$^{85}\text{Kr}(0)$</p> <p>128 Purdue University
Pharmacy Annex
Lafayette, Indiana 47907
$^{47}\text{Ca}(0)$, $^{99}\text{Tc}(0)$</p> <p>129 Radiation Management Corporation
Suite 30,
3508 Market Street
Philadelphia, Pennsylvania 19104
$^{85}\text{Kr}(0)$</p> <p>130 Raytheon Company
350 Ellis Street
Mountain View, California 94042
$^{85}\text{Kr}(0)$</p> <p>131 RCA
Raritan, New Jersey 08869
$^{85}\text{Kr}(0)$</p> <p>132 Reactor Experiments, Inc.
963 Terminal Way
San Carlos, California 94070
$^{237}\text{Np}(0)$, $\text{Tgs}(0)$, $^{235}\text{U}(0)$,
$^{238}\text{U}(0)$</p> <p>133 Rensselaer Polytechnic Institute
110 8th Street
Troy, New York 12181
$^{28}\text{Mg}(B^*)$, $\text{RSI}(B)$</p> <p>134 Reuter & Stokes Electronics Components
18530 South Miles Parkway
Warrensville Heights
Cleveland, Ohio 44128
$^{234}\text{U}(0)$</p> <p>135 Reynolds Electric Engineering Company
P.O. Box 14400
Las Vegas, Nevada 89114
$^{243}\text{Am}(0)$, $^{244}\text{Cm}(0)$</p> |
|---|---|

- 136 Rockwell International
Atomic International Division
Rocky Flats Plant
P.O. Box 464
Golden, Colorado 80401
 $^{242}\text{Pu}(0)$, $^{233}\text{U}(0)$
- 137 Rockwell Hanford Operations
Richland, Washington 99352
 $^{90}\text{SrY}(H)$, $^{137}\text{Cs}(H)$, $^{110m}\text{Ag}(H)$,
 $^{99}\text{Tc}(H)$, $^{152}\text{Eu}(H)$, $^{106}\text{Ru}(0)$
- 138 Rush Presbyterian - St. Luke's
Medical Center
Nuclear Medicine
1753 W. Congress Parkway
Chicago, Illinois 60612
 $^{52}\text{Fe}(B)$
- 139 Rutgers State University
Busch Campus
P.O. Box 939
Piscataway, New Jersey 08854
 $\text{RSI}(B)$
- 140 Safety Light Corporation
4150 & A Old Berwick Road
Bloomsburg, Pennsylvania 17815
 $^3\text{H}(0)$
- 141 Sandia Corporation
P.O. Box 5800
Albuquerque, New Mexico 87115
 $^{85}\text{Kr}(0)$
- 142 Schwarz Bio & Research, Inc.
Mountain View Avenue
Orangeburg, New York 10962
 $^3\text{H}(0)$
- 143 Science Applications
3 Choke Cherry Road
Rockville, Maryland 20850
 $^{237}\text{Np}(0)$, $\text{Tgs}(0)$
- 144 Science Applications
1200 Prospect Street
La Jolla, California 92037
 $^{237}\text{Np}(0)$, $\text{Tgs}(0)$
- 145 Self & Powered Lighting, Ltd.
8 Westchester Plaza
Elmsford, New York 10523
 $^3\text{H}(0)$
- 146 Shell Development Company
1410 45th Street
Emeryville, California 94608
 $^{85}\text{Kr}(0)$
- 147 J. L. Shepherd and Associates
1614 Victory Boulevard
Glendale, California 91201
 $^{137}\text{Cs}(0)$, $\text{MCP}(0)$
- 148 Signetics Corporation
1275 South 800 East
Orem, Utah 84057
 $^{85}\text{Kr}(0)$
- 149 Signetics Incorporated
811 East Argue Avenue
Sunnyvale, California 94086
 $^{85}\text{Kr}(0)$
- 150 Silicon General Incorporated
11651 Monarch Street
Garden Grove, California 92641
 $^{85}\text{Kr}(0)$
- 151 Siliconix Incorporated
2201 Laurelwood Road
Santa Clara, California 95054
 $^{85}\text{Kr}(0)$
- 152 Sloan Kettering Cancer Center
Central Isotope Lab
1275 York Ave.
New York, New York 10032
 $^{103}\text{Ru}(B)$, $^{82}\text{Sr}(L)$
- 153 Source Production and Equipment Co.,
Inc.
625 Oxley Street
Kenner, Louisiana 70062
 $^{192}\text{Ir}(0)$
- 154 Southern California University of
University Park
Los Angeles, California 90007
 $\text{MCP}(0)$
- 155 Sprague Electric Company
North Adams, Massachusetts 01247
 $^{85}\text{Kr}(0)$

- 156 E. R. Squibb and Sons
P.O. Box 70
East Brunswick, New Jersey 08816
 $^{75}\text{Se}(0)$, $^{99}\text{Tc}(0)$
- 157 E. R. Squibb and Sons
New Brunswick, New Jersey 08903
 $^{82}\text{Sr}(L)$
- 158 State University of New York
3435 Main Street
Buffalo, New York 14214
 $^{89}\text{Sr}(0)$, $^{99}\text{Tc}(0)$
- 159 State University of New York
at Stony Brook
Department of Earth Sciences
Stony Brook, New York 11794
RS 16)
- 160 State University of New York
at Stony Brook
University Hospital
Stony Brook, New York 11794
 $^{127}\text{Xe}(B^*)$
- 161 Statek Corporation
1200 Alvarado Avenue
Orange, California 92668
 $^{85}\text{Kr}(0)$
- 162 Technical Operations
South Avenue
Burlington, Massachusetts 01803
 $^{192}\text{Ir}(0)$, SS(0)
- 163 Teledyne Isotopes
Nuclear Systems Division
110 W. Timonium Road
Timonium, Maryland 21093
MCP(0), $^{90}\text{Sr}(0)$
- 164 Teledyne Isotopes.
123 Woodland Avenue
Westwood, New Jersey 07675
 $^{89}\text{Sr}(0)$
- 165 Texas A & M
College of Agriculture
Box 156
Kingsville, Texas 78363
 $^{147}\text{Ca}(0)$
- 166 Texas A & M University
P.O. Box 44
College Station, Texas 77843
NU(0)
- 167 Texas Instruments, Inc.
Science Services Division
P.O. Box 5012, Mail Stop 6
Dallas, Texas 75222
 $^3\text{H}(0)$, $^{85}\text{Kr}(0)$
- 168 Trio & Tech International
2040 W. Lincoln Street
Burbank, California 91504
 $^{85}\text{Kr}(0)$
- 169 UNC Nuclear Industries
P.O. Box 490
Richland, Washington 99352
 $^{60}\text{Co}(H)$, $^{57}\text{Co}(H)$, $^{110m}\text{Ag}(H)$,
 $^{90}\text{Sr}(H)$, $^{137}\text{Cs}(H)$, $^{133}\text{Ba}(H)$
- 170 Union Carbide Corporation Nuclear
Division
Oak Ridge Gaseous Diffusion Plant
P.O. Box P
Oak Ridge, Tennessee 37830
 $^{85}\text{Kr}(0)$
- 171 Union Carbide Corporation Nuclear
Division
Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee 37830
 $^{241}\text{Am}(0)$, $^{241}\text{Am}(S)$, $^{47}\text{Ca}(0)$,
 $^{144}\text{Ce}(0)$, $^{144}\text{Ce}(P)$, $^{252}\text{Cf}(P)$,
 $^{244}\text{Cm}(B)$, $^{244}\text{Cm}(0)$, $^{137}\text{Cs}(0)$,
 $^{131}\text{I}(0)$, $^{68}\text{Ge}(L)$, $^3\text{H}(0)$,
 $^{122}\text{Hf}(L)$, $^{131}\text{I}(0)$, $^{85}\text{Kr}(0)$,
MCP(0), $^{22}\text{Na}(L)$, $^{237}\text{Np}(0)$, NU(0),
 $^{239}\text{Pu}(0)$, $^{242}\text{Pu}(0)$, RU(0),
 $^{75}\text{Se}(0)$, $^{89}\text{Sr}(0)$, SS(0),
 $^{99}\text{Tc}(0)$, Tgs(0), $^{232}\text{Th}(0)$, Th(P),
 $^{233}\text{U}(0)$, $^{235}\text{U}(0)$, $^{238}\text{U}(0)$,
- 172 Union Carbide Corporation
Nuclear Division
Y & 12 Plant
P.O. Box Y
Oak Ridge, Tennessee 37830
 $^{131}\text{I}(0)$, $^{153}\text{Gd}(0)$, $^{114}\text{In}(0)$,
 $^{192}\text{Ir}(0)$, MCP(0), $^{147}\text{Pm}(0)$, SS(0)

- 173 Union Carbide Corporation
Nuclear Division
Paducah Gaseous Diffusion Plant
Paducah, Kentucky 42002
 $^{233}\text{U}(0)$, $^{236}\text{U}(0)$
- 174 Union Carbide Corporation
Sterling Forest Research Center
P.O. Box 324
Tuxedo, New York 10987
 $^{75}\text{Se}(0)$
- 175 Unit Process Assemblies, Inc.
53 & 15 37th Avenue
Woodside, New York 11377
 $^{147}\text{Pm}(0)$, $^{90}\text{Sr}(0)$
- 176 United States Air Force
McClellan Air Force Base, California
95652
 $^{37}\text{Ar}(0)$
- 177 United States Department of
Agriculture
Research Service
P.O. Box 53326
New Orleans, Louisiana 70150
 $^{241}\text{Am}(0)$
- 178 United State Department of Energy
376 Hudson Street Fifth Floor
New York, New York 10014
 $^{236}\text{Pu}(0)$
- 179 United States Department of Energy
Chicago Operations Office
Finance Division
9800 South Cass Avenue
Argonne, Illinois 60439
 $^{243}\text{Am}(0)$
- 180 United States Department of Energy
New Brunswick Laboratory
9800 South Cass Avenue
Argonne, Illinois 60439
 $\text{Pu}(P)$, $\text{DU}(P)$
- 181 United States Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352
 $\text{Cap}(0)$, $^{236}\text{Pu}(0)$, $^{238}\text{Pu}(0)$
- 182 United States Department of Energy
Denver Federal Center
Denver, Colorado 80225
 $\text{Pu}(P)$
- 183 United States Geological Survey
Bldg. 21
Denver, Colorado 80225
 $^{237}\text{Np}(0)$, $^{239}\text{Pu}(0)$
- 184 United States Geological Survey
12201 Sunrise Valley Drive
Reston, Virginia 22092
 $^{252}\text{Cf}(S)$
- 185 United State Food and Drug
Administration
12th and C Streets, S.W.
Washington, D.C. 20204
 $^{47}\text{Ca}(0)$, $^{99}\text{Tc}(0)$, $^{99}\text{Tc}(B)$
- 186 United States National Aeronautics
and Space Administration
John F. Kennedy Space Center,
Florida 32899
 $^{238}\text{Pu}(S)$
- 187 United States National Aeronautics and
Space Administration
Goddard Space Flight Center
Glendale Road
Greenbelt, Maryland 20771
 $^{85}\text{Kr}(0)$
- 188 United States National Aeronautics and
Space Administration
Manned Spacecraft Center
Houston, Texas 77058
 $^{47}\text{Ca}(0)$, $\text{RSI}(B)$
- 189 United States National Bureau of
Standards
Connecticut Avenue and Van Ness St.
N.W.
Washington, D.C. 20234
 $^{252}\text{Cf}(0)$, $^3\text{H}(0)$, $^{129}\text{I}(0)$,
 $^{85}\text{Sr}(0)$, $^{237}\text{Np}(0)$, $^{236}\text{Pu}(0)$,
 $^{99}\text{Tc}(0)$, $\text{Tgs}(0)$, $\text{EU}(P)$
- 190 United States National Bureau of
Standards
Rec. Room, Bldg. 301
Route 270 & Quince Orchard Road
Gaithersburg, Maryland 20760
 $^{127}\text{Xe}(B^*)$

- 191 United States National Institute of Health
Neurosurgery Branch
Bldg. 10, Room 11N242
Bethesda, Maryland 20014
 $^{18}\text{F}(\text{B})$
- 192 United States National Institute of Health
Bldg. 21
Bethesda, Maryland 20014
 $^{68}\text{Ge}(\text{B}^*)$, $^{82}\text{Sr}(\text{L})$, $^{127}\text{Xe}(\text{B}^*)$,
- 193 United States Navy
Charleston Naval Shipyard
United States Naval Base
Charleston, South Carolina
 $^{127}\text{Xe}(\text{B}^*)$
- 194 United States Navy
National Naval Medical Center
Bethesda, Maryland 20014
 $^{127}\text{Xe}(\text{B}^*)$
- 195 United States Navy
Naval Air Propulsion Center
1440 Parkway Avenue
Trenton, New Jersey 08628
 $^{85}\text{Kr}(\text{O})$
- 196 United States Navy
Naval Regional Medical Center
8750 Mountain Boulevard and
Building 505
Oakland, California 94627
 $^{127}\text{Xe}(\text{B}^*)$
- 197 United States Navy
Naval Research Laboratory
Supply Officer
Washington, D.C. 20375
 $^{49}\text{V}(\text{B})$
- 198 United States Navy
Naval Weapons Center
China Lake, California 93555
 $^{147}\text{Pm}(\text{B})$
- 199 United States Public Health Service
National Institutes of Health
Isotope Laboratory
Building 21
Bethesda, Maryland 20014
 $\text{CS}(\text{O})$, $\text{MCP}(\text{O})$, $^{127}\text{Xe}(\text{B}^*)$
- 200 University of Arizona
P.O. Drawer 4100
Tucson, Arizona 85721
 $^{47}\text{Ca}(\text{O})$
- 201 University of Arkansas
Business Manager's Office
Purchasing Section &
321 Admin. Bldg.
Fayetteville, Arkansas 72701
 $^{252}\text{Cf}(\text{S})$, $^{237}\text{Np}(\text{O})$, $\text{Tgs}(\text{O})$,
 $^{235}\text{U}(\text{O})$
- 202 University of California
Donner Laboratory
Berkeley, California 94720
 $^{82}\text{Sr}(\text{L})$
- 203 University of California
P.O. Box 109
La Jolla, California 92037
 $^{103}\text{Ru}(\text{O})$
- 204 University of California
405 Hilgard Avenue
Los Angeles, California 90024
 $^{47}\text{Ca}(\text{O})$, $\text{MCP}(\text{O})$
- 205 University of California
Lawrence Berkeley Laboratory
Berkeley, California 94701
 $^{249}\text{Bk}(\text{O})$, $^{249}\text{Cf}(\text{O})$, $^{236}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{B})$, $^{90}\text{Sr}(\text{B})$
- 206 University of California
Lawrence Livermore Laboratory
Box 808
Livermore, California 94550
 $^{241}\text{Am}(\text{O})$, $^{249}\text{Bk}(\text{O})$, $\text{Cap}(\text{O})$,
 $^{244}\text{Cm}(\text{O})$, $^{246}\text{Cm}(\text{O})$, $^{257}\text{Fm}(\text{O})$,
 $^{3}\text{H}(\text{O})$, $^{237}\text{Np}(\text{O})$, $^{231}\text{Pa}(\text{O})$,
 $^{239}\text{Pu}(\text{O})$, $^{244}\text{Pu}(\text{O})$, $^{145}\text{Sm}(\text{L})$,
 $^{146}\text{Sm}(\text{L})$, $^{99}\text{Tc}(\text{O})$, $\text{Tgs}(\text{O})$,
 $^{232}\text{Th}(\text{O})$, $^{165}\text{Ho}(\text{B})$, $\text{DU}(\text{P})$
- 207 University of California
Los Alamos Scientific Laboratory
P.O. Box 1663
Los Alamos, New Mexico 87545
 $^{241}\text{Am}(\text{O})$, $^{243}\text{Am}(\text{O})$, $^{77}\text{Br}(\text{L})$,
 $^{14}\text{C}(\text{O})$, $^{252}\text{Cf}(\text{S})$, $^{252}\text{Cf}(\text{O})$,
 $^{253}\text{Es}(\text{O})$,
 $^{146},^{148},^{150},^{151},^{153}\text{Gd}(\text{L})$,
 $^{231}\text{Pa}(\text{O})$, $^{238}\text{Pu}(\text{S})$, $^{239}\text{Pu}(\text{L})$,
 $^{242}\text{Pu}(\text{O})$, $\text{SS}(\text{O})$, $^{182}\text{Ta}(\text{B})$,
 $^{99}\text{Tc}(\text{O})$, $\text{Tgs}(\text{O})$, $^{229}\text{Th}(\text{O})$,
 $^{168}\text{Tm}(\text{L})$, $^{210}\text{Po}(\text{B})$, $^{93}\text{Mo}(\text{B})$

- 208 University of California at Davis
Sacramento, California 95817
 $^{67}\text{Cu}(\text{L})$
- 209 University of California
Parnassus Avenue
San Francisco, California 94143
 $^{47}\text{Ca}(\text{O})$
- 210 University of Chicago
Office of the Comptroller
1525 E. Hyde Park Boulevard
Chicago, Illinois 60615
 $^{247}\text{Ca}(\text{O})$, $^{192}\text{Ir}(\text{O})$, $^{89}\text{Sr}(\text{O})$
- 211 University of Chicago
Physical Science Department
5641 S. Ingleside Avenue
Chicago, Illinois 60637
 $\text{CSI}(\text{A})$, $^{68}\text{Ge}(\text{L})$
- 212 University of Connecticut
U-114
Central Warehouse
Storrs, Connecticut 06268
 $^{28}\text{Mg}(\text{B}^*)$
- 213 University of Delaware
Newark, Delaware 19711
 $\text{SS}(\text{O})$, $^{230}\text{Th}(\text{O})$
- 214 University of Kansas Medical Center
Kansas City, Kansas 66103
 $^{77}\text{Br}(\text{L})$
- 215 University of Kentucky
Lexington, Kentucky 40506
 $\text{CSI}(\text{O})$
- 216 University of Massachusetts
Amherst, Massachusetts 01003
 $^{77}\text{Br}(\text{L})$
- 217 University of Miami
P.O. Box 8066
Coral Gables, Florida 33146
 $^{237}\text{Np}(\text{O})$, $^{230}\text{Th}(\text{O})$, $^{233}\text{U}(\text{O})$
- 218 University of Michigan
Ann Arbor, Michigan 48109
 $\text{CSI}(\text{O})$, $\text{Tgs}(\text{O})$, $^3\text{H}(\text{B})$
- 219 University of New Mexico
Albuquerque, New Mexico 87103
 $\text{SS}(\text{O})$
- 220 University of New Mexico
Medical Department
Albuquerque, New Mexico 87131
 $^{77}\text{Br}(\text{L})$, $^{65}\text{Cu}(\text{L})$
- 221 University of Pennsylvania
3025 Walnut Street
Philadelphia, Pennsylvania 19104
 $^{47}\text{Ca}(\text{O})$, $^{28}\text{Mg}(\text{B}^*)$
- 222 University of Pennsylvania Hospital
Radiology Department
3400 Spruce Street
Philadelphia, Pennsylvania 19104
 $^{18}\text{F}(\text{B})$, $^{52}\text{Fe}(\text{B})$, $^{123}\text{I}(\text{B})$,
 $^{28}\text{Mg}(\text{B}^*)$
- 223 University of Pittsburgh
Pittsburgh, Pennsylvania 15213
 $^{235}\text{U}(\text{O})$
- 224 University of Rochester Medical Center
Health Physics
575 Elwood Avenue
Rochester, New York 14642
 $\text{RSI}(\text{B})$
- 225 University of Tennessee
Knoxville, Tennessee 37916
 $^{192}\text{Ir}(\text{O})$
- 226 University of Tennessee - DOE
Agriculture Research Laboratory
1299 Bethel Valley Road
Oak Ridge, Tennessee 37830
 $^{241}\text{Am}(\text{O})$, $\text{Cap}(\text{O})$
- 227 University of Texas
Nuclear Medicine Division
Galveston, Texas 77550
 $^{47}\text{Ca}(\text{O})$, $^{127}\text{Xe}(\text{B}^*)$
- 228 University of Texas at Dallas
P.O. Box 30365
Dallas, Texas 75230
 $^{47}\text{Ca}(\text{O})$

- 229 University of Utah
Radiobiology Division
Bldg. 522
Salt Lake City, Utah 84112
 $^{241}\text{Am}(\text{P})$, $\text{Pu}(\text{P})$
- 230 University of Virginia
Radiation Safety Officer
RMMF, 124 11th Street, SW.
Charlottesville, Virginia 22903
 $^{127}\text{Xe}(\text{B}^*)$
- 231 University of Washington
400 Administration Building
Seattle, Washington 98105
 $^{229}\text{Th}(\text{O})$, $^{236}\text{U}(\text{O})$
- 232 University of Wisconsin
COR Safety
1410 Johnson Drive
Madison, Wisconsin 53706
 $^{28}\text{Mg}(\text{B}^*)$
- 233 University of Wisconsin
750 University Avenue
Madison, Wisconsin 53706
 $^3\text{H}(\text{O})$
- 234 U.S. Testing Company, Inc.
2800 George Washington Way
Richland, Washington 99352
 $^{241}\text{Am}(\text{O})$
- 235 Unitrode Corporation
580 Pleasant Street
Watertown, Massachusetts 01970
 $^{85}\text{Kr}(\text{O})$
- 236 Varian Instrument Division
Aerograph Operations
2700 Mitchell Drive
Walnut Creek, California
 $^{63}\text{Ni}(\text{B})$
- 237 Veterans Administration
San Diego, California 92161
 $^{172}\text{La}(\text{L})$
- 238 Veterans Administration
Calm 361
Data Processing Center
1615 Woodward Street East
Austin, Texas 78772
 $^{47}\text{Ca}(\text{O})$
- 239 Veterans Administration Hospital
Chief, Supply Service
Bldg. 1, Room 6137
Hines, Illinois 60141
 $^{28}\text{Mg}(\text{B}^*)$, $\text{CSI}(\text{A})$, $^{47}\text{Ca}(\text{O})$
- 240 Veterans Administration Hospital
Chief, Supply Service
11201 Benton Street
Loma Linda, California 92357
 $^{127}\text{Xe}(\text{B}^*)$
- 241 Veterans Administration Hospital
Northport, New York 11768
 $^{127}\text{Xe}(\text{B}^*)$
- 242 Veterans Administration Hospital
Chief of Supply
1440 V.F.W. Parkway
West Roxbury, Massachusetts 02132
 $^{127}\text{Xe}(\text{B}^*)$
- 243 Veterans Administration Hospital
Nuclear Medicine
1400 V.F.W. Parkway
West Roxbury, Massachusetts 02132
 $^{127}\text{Xe}(\text{B}^*)$
- 244 Victoreen Inc.
10101 Woodland Ave.
Cleveland, Ohio 44104
 $\text{DU}(\text{P})$
- 245 Washington University
St. Louis, Missouri 63110
 $^{77}\text{Br}(\text{L})$, $^{68}\text{Ge}(\text{L})$
- 246 Western Electric Company, Inc.
P.O. Box 1409
Lawrence, Massachusetts 01842
 $^{85}\text{Kr}(\text{O})$
- 247 Western Electric Company, Inc.
777 North Blue Parkway
Lee's Summit, Missouri 64063
 $^{85}\text{Kr}(\text{O})$
- 248 Westinghouse Electric Corporation
P.O. Box 284
Elmira, New York 14902
 $^{234}\text{U}(\text{O})$

249 Westinghouse Electric Corporation
 Bettis Atomic Power Laboratory
 P.O. Box 79
 West Mifflin, Pennsylvania 15122

Eu(P), Th(P)

250 Westinghouse Hanford Company
 P.O. Box 1970
 Richland, Washington 99352

$^{252}\text{Cf}(0)$, $^{85}\text{Kr}(0)$, $^{88}\text{Sr}(0)$,
 $^{237}\text{Np}(0)$, $^{90}\text{SrY}(H)$,
 $^3\text{H}(H)$, $^{14}\text{C}(H)$, $^{239}\text{Pu}(H)$

251 William Beaumont Hospital
 Nuclear Medical Department
 3601 West 13 Mile Road
 Royal Oaks, Michigan 48072

$^{127}\text{Xe}(8^*)$

252 Yale University
 20 Ashmun Street
 New Haven, Connecticut 06520

$^{103}\text{Ru}(0)$

253 Zirlog, Incorporated
 10460 Bubb Road
 Cupertino, California 95014

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

FOREIGN COUNTRIES

Australia

254 Australian Atomic Energy Commission
Research Establishment
Lucas Heights, NSW
AUSTRALIA

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

255 Embassy of Australia
1601 Massachusetts Avenue, N.W.
Washington, D.C. 20036

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

Austria

256 International Atomic Energy Agency
Kaerntnerring 11 & 13
A & 1010 Vienna, AUSTRIA

$^{237}\text{Np}(\text{O})$, $^{238}\text{U}(\text{O})$, $^{235}\text{U}(\text{O})$,
 $^{236}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$

Belgium

257 Central Bureau for Nuclear
Measurements
of the European Communities
B & 2440 Geel, Steenweg Maar Retie
BELGIUM

$^{243}\text{Am}(\text{O})$, $^{238}\text{U}(\text{O})$, $^{235}\text{U}(\text{O})$,
 $^{236}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$

258 Centre D'etude de L'energie Nucleaire
144 Avenue Plasky
Brussels 4, BELGIUM

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

Canada

259 Atomic Energy of Canada Limited
Chalk River, Ontario, CANADA

$^3\text{H}(\text{O})$, $^{230}\text{Th}(\text{O})$

260 Atomic Energy of Canada, Ltd.
Chalk River Nuclear Laboratories
Chalk River, Ontario, CANADA

CSI(A)

261 Atomic Energy of Canada, Ltd.
Whiteshell Nuclear Research
Establishment
Pinawa, Manitoba, CANADA

$^{231}\text{Pa}(\text{O})$, $^{234}\text{U}(\text{O})$,
 $^{235}\text{U}(\text{O})$, $^{238}\text{U}(\text{O})$

262 Atomic Energy of Canada, Ltd.
P.O. Box 6300
Postal Station J
Ottawa, CANADA

$^{33}\text{P}(\text{O})$

263 Carleton University
Accounts Payable Department
Business Office
301 Administration Bldg.
Ottawa, Ontario
K1 S 5 B6
CANADA

$^{230}\text{Th}(\text{O})$

264 Hospital Saints & Lac Achats
1058 St. & Denis
Montreal, P.O.
H2 X 3 J4
CANADA

$^{47}\text{Ca}(\text{O})$

265 McGill University
Montreal 2, P.G.
CANADA

$^{235}\text{U}(\text{O})$

266 McMaster University Medical Center
Forsyth Avenue Receiving
Hamilton, Ontario
CANADA

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

267 University Hospital
Nuclear Medicine Department
339 Windermere Road
London, Ontario
CANADA

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

268 University of Alberta
Edmonton, Alberta
CANADA

$^{47}\text{Ca}(\text{O})$

269 University of British Columbia
Vancouver 8, British Columbia
CANADA

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

270 University of Toronto
Toronto, Ontario
CANADA

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

Denmark

- 271 Isotope Pharmacy
378 Frederikssundsvej
Broenshoej
DENMARK

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

Federal Republic of Germany

- 272 Bonn Universitat
Nussallee 12 & 14
55 Bonn,
FEDERAL REPUBLIC OF GERMANY

$^{230}\text{Th}(0)$

- 273 Buchler and Company
Frankfurter Str. 294
Braunschweig,
FEDERAL REPUBLIC OF GERMANY

$^{37}\text{Ar}(0)$, $^{129}\text{I}(0)$, $^{95}\text{Zr}(0)$

- 274 Darmstadt, Technischen Hochschule
61 Darmstadt,
FEDERAL REPUBLIC OF GERMANY

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

- 275 EURATOM Transuranium Institute
P.O. Box 452
75 Karlsruhe,
FEDERAL REPUBLIC OF GERMANY

$^{239}\text{Pu}(0)$, $^{244}\text{Pu}(0)$, $^{252}\text{Cf}(S)$

- 276 Freie Universitat Berlin
Fachbereich Physik
FB20, WE1A
Boltzmannstrasse 20
1000 Berlin 33
P. West
FEDERAL REPUBLIC OF GERMANY

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

- 277 Gesellschaft Fur Kernforschung
Mbh
Institute Fuer Angewandte
Reaktor Physik
Weverstrasse 5
75 Karlsruhe
FEDERAL REPUBLIC OF GERMANY

$^{241}\text{Am}(0)$, $^{243}\text{Am}(0)$, $\text{Cap}(0)$,
 $^{238}\text{Pu}(0)$

- 278 Geissen Universitat
6300 Giessen
FEDERAL REPUBLIC OF GERMANY

$^{244}\text{Pu}(0)$

- 279 Kernkraftwerk Obrigheim MBH
6951 Obrigheimam Neckar
Frankfurt
FEDERAL REPUBLIC OF GERMANY

$^{234}\text{U}(0)$

- 280 Kommission Der Europaischen
Gemeinschaften
Gemeinsame Forschungsstelle
Reaktorgelände D7514
Lepoldshafen
FEDERAL REPUBLIC OF GERMANY

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

- 281 Universitat Dortmund
Postfach D 0 & Hombrach 500
4600 Dortmund & Eichlinghofen
FEDERAL REPUBLIC OF GERMANY

$^{99}\text{Tc}(0)$

- 282 University of Eremen
Zentraler Einkauf
280 Bremen
FEDERAL REPUBLIC OF GERMANY

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

France

- 283 CEA
Department Des Radioelements
B.P. No. 2
91190 Gif Sur Yvette
FRANCE

$^{95}\text{Nb}(0)$, $^{147}\text{Pm}(0)$, $^{240}\text{Pu}(0)$,
 $^{241}\text{Pu}(0)$, $\text{SS}(0)$, $^{230}\text{Th}(0)$,
 $^{236}\text{U}(0)$

- 284 Centre d' Etudes Nucleaires
de Sontenay-Aux-Roses
92260 Sontenay-Aux-Roses
FRANCE

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

Great Britain

- 285 Amersham Bucks
Radiochemical Center, Ltd.
Bldg. 250, Cargo Terminal
London, Heathrow Airport
GREAT BRITAIN

$^{127}\text{Xe}(\text{B}^*)$, $^{252}\text{Cf}(S)$

286 Amersham International Limited
White Lion Road Amersham
Buckinghamshire England
H P7 9 LL
GREAT BRITAIN

$^{144}\text{Ce}(0)$, $^{244}\text{Cm}(0)$, $^{137}\text{Cs}(0)$,
 $^{55}\text{Fe}(0)$, $^3\text{H}(0)$, $^{129}\text{I}(0)$,
 $^{85}\text{Kr}(0)$, $\text{MCP}(0)$, $^{147}\text{Pm}(0)$, $\text{RW}(0)$,
 $^{99}\text{Tc}(0)$, $\text{Tgs}(0)$, $^{127}\text{Xe}(\text{B}^*)$,
 $^{95}\text{Zr}(0)$

287 Brandhust Co. Ltd.
Wellington Road
High Wycombe, Bucks
H P 12 3 P S England
GREAT BRITAIN

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

288 Hammersmith Hospital
Ducane Road
London, W. 12, England
GREAT BRITAIN

$^{82}\text{Sr}(\text{L})$, $^{242}\text{Pu}(0)$

289 Mallinckrodt, Ltd.
81dg. 521 129 G
Southampton Road
Middlesex
GREAT BRITAIN

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

290 Saunders & Roe Developments, Ltd.
North Hyde Road
Hayes, Middlesex, England
GREAT BRITAIN

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

291 United Kingdom Atomic Energy
Establishment
Harwell, Didcot, Berkshire
England
GREAT BRITAIN

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

292 University of Leeds
Leeds 2, England
GREAT BRITAIN

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

Hong Kong

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

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

Japan

294 Cancer Institute Hospital
Tokyo,
JAPAN

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

295 Gakushuin University
Faculty of Science
1-5-1 Mejiro, Toshima - Ku
Tokyo, 171
JAPAN

$^{11}\text{B}(\text{B})$

296 Japan Atomic Energy Research Institute
Tokai Research Establishment
Tokai & Mura, Naka & Gun
Ibaraki & Ken
JAPAN

$^{241}\text{Am}(0)$, $^{243}\text{Am}(0)$, $\text{Cap}(0)$,
 $^{237}\text{Np}(0)$, $^{238}\text{Pu}(0)$, $^{240}\text{Pu}(0)$

297 Japan Radioisotope Association
Hon & Komagome 2 Chome 28
Bunkyo & Kie
Tokyo
JAPAN

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

298 Power Reactor and Nuclear Fuel
Development Corpor 9 & 13
1 & Chome, Akasaka, Minator & Ku
Tokyo
JAPAN

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

299 University of Tokyo
Solid State Physics
Roppongi, Minato-ku
Tokyo
JAPAN

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

The Netherlands

300 N. V. Philips & Duphar
P.O. Box 2
Weesp
THE NETHERLANDS

$^{103}\text{Ru}(0)$, $\text{SS}(0)$, $^{99}\text{Tc}(0)$

New Zealand

301 New Zealand Embassy
1145 & 19th Street
Washington, D.C. 20036

$\text{CSI}(0)$

Norway

302 Institute for Atomic Energy
Isotope Laboratories
N-2007
Kjeller
NORWAY

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

People's Republic of China

303 China National Institute
Import & Export Corporation
Beijing
PEOPLE'S REPUBLIC OF CHINA

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

Portugal

304 Junta de Energia Nuclear
Laboratorio de Fisica e Engenharia
Nucleares
Estrada Nacional No. 10
Sacavem
PORTUGAL

$^{233}\text{U}(\text{O}), ^{235}\text{U}(\text{O})$

Republic of China

305 Coordination Council for North
American
Affairs
133 PO & AI Road
Taipei, Taiwan
REPUBLIC OF CHINA

$^{242}\text{Pu}(\text{O}), ^{238}\text{Pu}(\text{O}), ^{233}\text{U}(\text{O})$

Republic of Ireland

306 Electramed - Ireland, Ltd.
c/o Aer Lingus Import Cargo
143 Phibsboro Road
Dublin
REPUBLIC OF IRELAND

$^{28}\text{Mg}(\text{B}^*)$

Switzerland

307 Eidg. Institut für Reaktorforschung
Würenlingen
SWITZERLAND

$^3\text{H}(\text{O}), \text{MCP } ^{147}\text{Pm}(\text{O}), ^{99}\text{Tc}(\text{O})$

308 Geneva Research Centres
7, route de Drize
1227 Carouge
Geneva
SWITZERLAND

$^{14}\text{C}(\text{B})$

309 Schweizerisches Institut für
Nuklearforschung
Neunbrunnenstrasse 85,
8050 Zurich, Switzerland
MB & Microtec, Incorporated
Friedburgstrasse 624
CH & 3172 Niederwangen/Berne
SWITZERLAND

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

Union of South Africa

310 Chemlab
Johannesburg
UNION OF SOUTH AFRICA

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

311 Tygerberg Hospital
Nuclear Medicine Department
Pretoria
Cape Province
UNION OF SOUTH AFRICA

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

312 Well Organization c/o P. Ty Limited
P.O. Box 31315
Braamfontein 2017
Johannesburg
UNION OF SOUTH AFRICA

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

3.0 ALPHABETICAL LIST OF ISOTOPES CROSS-REFERENCED TO CUSTOMER NUMBER

Americium (Am) 241	Calcium (Ca) 247
1, 11, 14, 25, 36, 48, 61 101, 108, 116, 118, 126, 171, 177, 206, 207, 226, 229, 234, 277, 296	210
Americium (Am) 243	Californium (Cf) 249
1, 73, 120, 135, 179, 207, 257, 277, 296	8, 205
Argon (Ar) 37	Californium (Cf) 252
176, 273	1, 20, 35, 51, 73, 101, 125, 171, 184, 189, 201, 207, 250, 279, 275, 280, 284, 285, 294
Arsenic (As) 73	Carbon (C) 14
12	66, 108, 121, 207, 250, 308
Astatine (At) 211	Cerium (Ce) 144
62	1, 19, 50, 73, 108, 171, 286
Barium (8a) 128	Cesium (Cs) 134
109	11
Barium (Ba) 133	Cesium (Cs) 137
11, 169	11, 18, 50, 61, 65, 72, 73, 98, 108, 126, 137, 147, 169, 171, 286
Barium (Ba) 140	Cobalt (Co) 57
1	169
Berkelium (8k) 249	Cobalt (Co) 58
8, 205, 206	109
Boron (8) 11	Cobalt (Co) 60
295	1, 11, 44, 95, 106a, 169
Bromine (Br) 77	Copper (Cu) 65
15, 56, 78, 107, 207, 214, 216, 220, 245	220
Cadium (Cd) 109	Copper (Cu) 67
109	16, 208
Calcium (Ca) 47	Curium (Cm) 243
31, 32, 67, 76, 83, 89, 90, 91, 97, 128, 171, 185, 188, 200, 204, 209, 221, 227, 228, 238, 239, 264, 268	84
Calcium (Ca) 147	Curium (Cm) 244
165	1, 11, 14, 135, 171, 206, 286
	Curium (Cm) 246
	206

Curium (Cm) 248

35

Cyclotron Service Irradiations (CSI)

26, 65, 73, 85, 86, 108, 120, 171,
172, 199, 211, 215, 218, 239, 260, 301

Depleted Uranium (DU)

180, 206, 244

Einsteium (Es) 253

8, 207

Encapsulation (Cap)

8, 14, 36, 48, 61, 101, 108, 116, 118,
120, 171, 181, 206, 226, 261, 277, 296

Enriched Uranium (EU)

189, 249

Europium (Eu) 152

8, 19, 137

Fermium (Fm) 257

206

Fluorine (F) 18

62, 89, 191, 222

Gadolinium (Gd) 146, 148, 150, 151

207

Gadolinium (Gd) 153

1, 4, 50, 61, 65, 108, 172, 207

Germanium (Ge) 68

14, 89, 109, 171, 192, 211, 245

Gold (Au) 195

109

Hafnium (Hf) 122

171

Hafnium (Hf) 172

22

Holmium (Ho) 165

206

Indium (In) 114

172

Iodine (I) 123

56, 78, 222

Iodine (I) 129

38, 71, 73, 81, 108, 189, 273, 286

Iodine (I) 131

171

Iridium (Ir) 192

1, 4, 10, 47, 61, 68, 71, 153, 162,
172, 210, 225

Iron (Fe) 52

138, 222

Iron (Fe) 55

73, 108, 286

Iron (Fe) 59

8

Krypton (Kr) 85

2, 3, 4, 5, 6, 29, 30, 33, 43, 46, 49,
52, 54, 55, 59, 63, 64, 69, 73, 75,
92, 98, 100, 103, 105, 106, 108, 124,
125, 127, 129, 130, 131, 141, 146,
148, 149, 150, 151, 155, 161, 167,
168, 170, 171, 187, 195, 235, 246,
247, 250, 233, 286, 293

Lanthanum (La) 172

237

Lutetium (Lu) 172

22

Magnesium (Mg) 28

21, 115, 133, 212, 221, 222, 232, 239,
306

Manganese (Mn) 59

11

Miscellaneous Compounds (MCP)

50, 70, 71, 74, 77, 98, 104, 147,
154, 163, 171, 172, 199, 204, 257,
286, 291, 307

Molybdenum (Mo) 93

207

Natural Uranium (NU)

11, 166, 171

Neptunium (Np) 237

1, 8, 45, 111, 132, 143, 144, 171,
183, 189, 201, 206, 217, 250, 256, 296

Nickel (Ni) 60

299

Nickel (Ni) 63

236

Niobium (Nb) 95

98, 283

Osmium (Os) 191

23

Palladium (Pd) 109

27

Phosphorus (P) 33

65, 108, 262

Plutonium (Pu)

180, 182, 229

Plutonium (Pu) 236

1, 13, 73, 178, 181, 189

Plutonium (Pu) 237

11

Plutonium (Pu) 238

11, 101, 181, 186, 207, 277, 296

Plutonium (Pu) 239

1, 8, 11, 73, 117, 171, 183, 206, 207,
250, 275

Plutonium (Pu) 240

283, 296

Plutonium (Pu) 241

283

Plutonium (Pu) 242

1, 88, 136, 171, 207, 358, 274, 288,
291, 292, 298, 305

Plutonium (Pu) 244

206, 275, 278

Polonium (Po) 208

73

Polonium (Po) 210

11, 207

Potassium (K) 43

93

Promethium (Pm) 147

11, 14, 65, 70, 172, 175, 198, 283,
286, 307

Protactinium (Pa) 231

73, 206, 207, 261

Reactor Services Irradiations (RSI)

8, 40, 42, 51, 53, 110, 112, 133, 139,
159, 188, 224

Ruthenium (Ru) 97

11, 171

Ruthenium (Ru) 103

1, 29, 152, 203, 252, 300

Ruthenium (Ru) 106

8, 65, 73, 137

Samarium (Sm) 145

206

Samarium (Sm) 146

206

Samarium (Sm) 151

19, 108

Selenium (Se) 75

65, 86, 108, 156, 171, 174

Silver (Ag) 110

137, 169

Sodium (Na) 22

39, 109, 171

Special Services (SS)

1, 5, 14, 35, 50, 60, 66, 84, 86, 108,
125, 162, 171, 172, 189, 207, 213,
219, 250, 283, 300, 305

Strontium (Sr) 82

104, 152, 157, 192, 202, 288

Strontium (Sr) 89

28, 29, 37, 57, 60, 65, 73, 121, 158,
164, 171, 210

Strontium (Sr) 90

11, 65, 73, 137, 163, 169, 175, 205,
250

Strontium (Sr) 90 - Yttrium (Y)

11, 137, 169, 250

Tantalum (Ta) 182

71, 207

Target Preparations (Tgs)

8, 9, 11, 14, 20, 73, 111, 117, 119,
126, 132, 143, 144, 171, 189, 201,
206, 207, 218, 250, 256, 257, 286

Technetium (Tc) 99

108, 128, 137, 156, 158, 171, 185,
189, 206, 207, 281, 286, 300, 307

Thorium (Th)

171, 249

Thorium (Th) 229

14, 207, 231

Thorium (Th) 230

1, a, 73, 213, 217, 255, 257, 259,
263, 272, 283

Thorium (Th) 232

a, 50, 171, 206, 256

Thulium (Tm) 168

207

Tritium (H) 3

11, 14, 21, 34, 41, 59, 65, 79, 80,
82, 90, 102, 108, 116, 122, 140, 142,
145, 167, 171, 189, 206, 218, 233,
250, 259, 269, 286, 287, 290, 297,
303, 307, 309

Tungsten (W) 178

109

Tungsten (W) 181

12

Uranium (U) 233

1, 13, 136, 171, 173, 217, 298, 304,
305

Uranium (U) 234

71, 99, 134, 248, 255, 261, 279

Uranium (U) 235

8, 13, 15, 71, 73, 94, 119, 132, 171,
201, 205, 223, 255, 256, 257, 265, 304

Uranium (U) 236

71, 73, 123, 173, 205, 231, 255, 283

Uranium (U) 238

8, 9, 71, 132, 171, 255, 256

Vanadium (V) 48

17

Vanadium (V) 49

197

Withdrawn Isotopes (RW)

14, 286

Xenon (**Xe**) 127

7, 14, 15, 24, 58, 73, 86, 87, 96,
113, 114, 160, 190, 192, 193, 194,
196, 199, 227, 230, 240, 241, 242,
243, 151, 254, 266, 267, 271, 276,
282, 285, 286, 289, 302, 310, 311, 312

Yttrium (Y) 88

109

Zirconium (Zr) 95

1, 8, 60, 73, 108, 273, 286

28

~~28~~

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

STATES

Arizona (AZ)

5, 55, 103, 105, 200

Arkansas (AR)

201

California (CA)

15, 16, 17, 18, 22, 43, 46, 50, 51,
54, 60, 63, 68, 69, 70, 73, 75, 82,
83, 92, 100, 102, 106, 119, 130, 132,
144, 146, 147, 149, 150, 151, 154,
161, 168, 176, 196, 198, 202, 203,
204, 205, 206, 208, 209, 236, 237,
240, 253

Colorado (CO)

25, 79, 136, 182, 183

Connecticut (CT)

212, 252

Delaware

213

District of Columbia (DC)

19, 56, 57, 185, 189, 197, 255, 301

Florida (FL)

30, 45, 94, 186, 217

Georgia (GA)

7, 58

Idaho (ID)

1, 9, 40, 42

Illinois (IL)

4, 8, 44, 85, 97, 138, 179, 180, 210,
211, 239

Indiana (IN)

66, 67, 96, 124, 128

Iowa (IA)

71

Kansas

214

Kentucky (KY)

173, 215

Louisiana (LA)

47, 153, 177

Maryland (MD)

77, 78, 106a, 143, 163, 187, 190, 191,
192, 194, 199

Massachusetts (MA)

6, 23, 24, 62, 89, 90, 107, 108, 109,
155, 162, 216, 235, 242, 243, 246

Michigan (MI)

34, 80, 218, 251

Minnesota (MN)

91, 98

Missouri (MO)

76, 86, 87, 245, 247

Nebraska (NB)

32

Nevada (NV)

135

New Jersey (NJ)

2, 3, 12, 33, 41, 59, 72, 88, 95, 117,
125, 126, 131, 139, 156, 157, 164, 195

New Mexico (NM)

84, 141, 207, 219, 220

New York (NY)

14, 26, 27, 31, 36, 38, 53, 81, 99,
104, 110, 111, 116, 133, 142, 145,
152, 158, 159, 160, 174, 175, 178,
224, 241, 248

North Carolina (NC)

37, 113, 114

,Ohio (OH)

21, 65, 74, 101, 115, 121, 122, 127,
134, 244

Oklahoma (OK)

29

Oregon (OR)

123

Pennsylvania (PA)

10, 20, 64, 129, 140, 221, 222, 223,
249

South Carolina (SC)

35, 193

Tennessee (TN)

120, 170, 171, 172, 225, 226

Texas (TX)

28, 48, 61, 112, 118, 165, 166, 167,
188, 227, 228, 238

Utah (UT)

148, 229

Virginia (VA)

39, 49, 52, 184, 230

Washington (WA)

11, 13, 137, 169, 181, 231, 234, 250

Wisconsin (WI)

93, 232, 233

FOREIGN

Australia

254, 255

Austria

256

Belgium

257, 258

Canada

259, 260, 261, 262, 263, 264, 265,
266, 267, 268, 269, 270

Denmark

271

Federal Republic of Germany

272, 273, 274, 275, 276, 277, 278,
279, 280, 281, 282

France

283, 204

Great Britain

285, 286, 287, 288, 289, 290, 291, 292

Hong Kong

293

Japan

294, 295, 296, 297, 298, 299

The Netherlands

300

New Zealand

301

Norway

302

People's Republic of China

303

Portugal

304

Republic of China

305

Republic of Ireland

306

Switzerland

307, 308, 309

Union of South Africa

311, 311, 312

5. RADIOISOTOPE SALES AND TRANSFERS--FY1981

	Domestic			Foreign			Project			Total		
	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars
Americium-241 (H)							8	4.7 µCi		8	4.7 µCi	
Americium-241 (O)	50	1.616 g	1,962,245	2	40 g	32.240	12	3.4	3.810	64	1.659 g	1,998,295
Americium-241 (P)	2						1	1 g		3	1 g	
Americium-241 (S)							1	0.23 kg		1	0.23 kg	
Americium-243 (O)	1		165	2	200 mg	20.285	4	1.133 mg	460	7	1.333 mg	20,910
Argon-37 (O)				1	--	240	1	1.0	60	2	--	300
Arsenic-73 (B)	2	100	673							2	100	673
Astatine-211 (B)	2	0.75								2	0.75	
Barium-128 (B)	2	1.500	1,595							2	1.500	1,595
Barium-133 (H)							2	0.71 µCi		2	0.71 µCi	
Barium-140 (O)							1	2.0	80	1	2.0	80
Berkelium-249 (O)							6	42.6 mg	500	6	42.6 mg	500
Bromine-73 (L)	62	4.389					1	211		63	4600	
Cadmium-109 (B*)(a)	4	2.700	30.414							4	2.700	30,414
Calcium-47 (O)	178	83	21.740	11	1	250	19	6	1.887	208	90	23.877
Californium-249 (O)							2	3.6 mg	135	2	3.6 mg	135
Californium-252 (O)	6		545	2		150	6	31 mg	670	14	31 mg	1,365
Californium-252 (P)							2	34 mg		2	34 mg	
Californium-252 (S)	7	17 mg	189.039	5	20 mg	232.919				12	36 mg	421,958
Carbon-14 (H)							2	8.7 nCi		2	8.7 nCi	
Carbon-14 (O)	9	2.187	4,685				5	1.852	4,630	14	4.039	9,315
Cerium-144 (O)	8	528	1,705	1	200	600	3	5	1,240	12	1.228	3,545
Cesium-134 (H)							1	0.36		1	0.36	
Cesium-137 (H)							7	0.17 µCi		7	0.17 µCi	
Cesium-137 (O)	30	114.413 Ci	11,890		120.700 Ci	12,070	2	10	500	32	235.113 Ci	24,460
Cobalt-57 (H)							1	0.27 µCi		1	0.27 µCi	
Cobalt-60 (H)							3	0.48 nCi		3	0.48 nCi	
Cobalt-60 (O)	1	1,317,745 Ci	206.995				1		25	2	1.31 7.745	207.020
Copper-67 (L)	2	110								2	110	
Curium (P)				1			2			3		
Curium-243 (O)							1	10 mg	65	1	10 mg	65
Curium-244 (B)	1	0.08								1	0.08	
Curium-244 (H)							2	1.3 pCi		2	1.3 pCi	
Curium-244 (O)				4	400 mg	40.480	9	325 mg	1,215	13	725 mg	41,695
Curium-246 (O)							1	137 mg	120	1	137 mg	120
Curium-248 (O)							1		65	1		65
Cyclotron Service Irradiations												
BNL (O)		3 nCi	32,017								3 nCi	31.01 7
Cyclotron Service Irradiations												
LASL (O)		103 nCi	10,609		20 nCi	465		1 nCi	264		124 nCi	11.338
Cyclotron Service Irradiations (A)	17		4.913	2						19		4,193
Cyclotron Service Irradiations (B)	1		410							1		410
Cyclotron (O) Service Irradiations	223	83 mg	529.930	1	0.001 g	1.335	7	20 mg	19,358	231	104 mg	550.623
Depleted Uranium (P)	54	7.094 kg	22.900				51	6,873 kg	24.000	105	13,967 kg	46,900

5. RADIOISOTOPE SALES AND TRANSFERS--FY1981

	Domestic			Foreign			Project			Total		
	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars
Einsteinium253 (O)							3	2 mg	250	3	2 mg	250
Encapsulation (O)			263.041	8		51,095	67		49,550	75		363,686
Enriched Uranium (P)	3			3	94.666 g	85,000	41	7,377 g	1,600	47	102.063 g	66,600
Europium152 (H)							1	1		1	1	
Europium152 (O)	1	2	40				1	10	200	2	12	240
Fermium-257 (O)							2		130	2		130
Fluorine-18 (B)	45	662								45	662	
Gadolinium (L)							1	1500		1	1500	
Gadolinium153 (O)	14	15 Ci	22,750				5	6 Ci	9,500	19	21 Ci	32,250
Germanium68 (L)							6	172		6	172	
Germanium68 (B*)(a)	3	645	8,417							3	645	8,417
Gold-195 (G)	1	100								1	100	
Hafnium-172 (L)	1	1								1	1	
Indium-114 (O)							1	250	2500	1	250	2500
Iodine-123 (B)	3	104								3	104	
Iodine-129 (O)	7	4,1004	6,225	4	1.551	3,102	2	0.450	900	13	6.1014	12,227
Iridium-192 (O)	1	1	25				1	1	25	2	2	50
Iridium-192 Meta (O)	211	1,303,382 Ci	1,878,568				10	1.365 Ci	2,730	221	1,304,747 Ci	1,881,298
Iron-52 (L)	1	20								1	20	
Iron-55 (O)	2	630	2,362	8	16.600	62,250				10	17,230	64,612
Iron-59 (B)	1	0.005								1	0.005	
Krypton-85 (O)	199	4,922 Ci	164,490	7	286 Ci	6,292	19	534 Ci	10,361	225	5,742 Ci	181,143
Krypton-85 Enriched (O)	9	1.296 Ci	190,040	1	50 Ci	3,000	1			11	1.346 Ci	193,040
Magnesium-28 (B*)(a)	18	6.2	3,127	4	0.64	306				22	7.03	3,435
Manganese54 (H)							2	0.28 nCi		2	0.28 nCi	
Miscellaneous Compounds (B*)	1		7,742							1		7,742
Miscellaneous Compounds (B)	23		720	4		120				27		840
Miscellaneous Compounds (O)	18	6 Ci	2,142	1	2 nCi	110	6	1 nCi	269	25	207 nCi	2,521
Natural Uranium (H)							4	0.33 mg		4	0.33 mg	
Natural Uranium (O)	1	50 g	65				1		65	2	50 g	130
Neptunium237												
High-Purity (O)	3	1,133 mg	531	4	25.500 mg	7,944	4	6.064 mg	2,046	11	32,697 mg	10,521
Neptunium237												
Metal (O)	1	500 mg	65							1	500 mg	65
Neptunium237												
Oxide (O)	3	6,743	1,765	20		4,500	4	16.075	2,673	7	42,818	9,138
Niobium95 (O)	12	200	8,000	1	1	40				13	201	8,040
Osmium191 (B)	7	10,650								7	10,650	
Palladium-109 (B)	16	6,832								16	6,832	
Phosphorus-33 (O)	20	1,839	23,325	1	1	35				21	1,840	23,360
Plutonium (P)	2						33	610 g	26,300	35	610 g	26,300
Plutonium236 (O)	3		2,065				5	1	3,489	8	1	5,554
Plutonium237 (O)									2,975			2,975

5. RADIOISOTOPE SALES AND TRANSFERS--FY1981

	Domestic			Foreign			Project			Total		
	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars
Plutonium-238 (H)							1	6.2 µCi		1	6.2 µCi	
Plutonium-238 (S)							3	2.72 kg		3	2.72 kg	
Plutonium-238 (O)							1	18,520	120	1	18,520	120
Plutonium-238 S) (O)	2	19,000 mg	21.140	1	23.390 mg	34,669				3	42,390 mg	55.809
Plutonium-239 (H)							10	0.22 µCi		10	0.22 µCi	
Plutonium-239 (O)	1	450 mg	510	1	50 mg	241	10	10.495 mg	815	13	10.995 mg	1.566
Plutonium-240 (O)				3	15.400 mg	45,356				3	15.400 mg	45,356
Plutonium-241 (O)				1	200 mg	1,716				1	200 mg	1,716
Plutonium-242 (O)				14	2,030 mg	34,546	5	507 mg	780	19	2,537 mg	35,326
Plutonium-244 (O)				3	27 mg	679	1	86 mg	65	4	0.114 mg	744
Polonium-208 (H)	1	0.10	179							1	0.10	179
Polonium-210 (H)							2	0.24 pCi		2	0.24 pCi	
Potassium-43 (O)	4	12	1,200							4	12	1,200
Promethium-147 (H)							2	0.25 nCi		2	0.25 nCi	
Promethium-147 (O)	4	0.550 Ci	400	7	17,211 Ci	17,211	1	0.350 Ci	850	12	17,212 Ci	18,461
Protactinium-231 (O)	1	22.5 mg	531	1	7 mg	263	2	50 mg	2,140	4	79.5 mg	2,934
Radio Isotopes Withdrawn (O)				3	470	14,100	1	10	25	4	480	14,125
Reactor Services Irradiations (H)	30		33.185							30		33.185
Reactor Services Irradiations (I)	1						46			47		
Ruthenium-97 (U)							1	>0.001	250	1	>0.001	250
Ruthenium-103 (B)	2	0.11					2			2	0.11	
Ruthenium-103 (O)	3	31	1,240	1	5	200	4	16	640	8	52	2,080
Ruthenium-106 (O)	8	65	2,600				2	7	320	10	72	2,920
Samarium-145, 146 (L)							1	240		1	240	
Samarium-151 (O)	2	22	792				2			2	22	792
Selenium-75 (O)	14	44.2 Ci	36,394				1	0.05 Ci	100	15	44.2 Ci	36,494
Silver-110 Heta (H)							2	12 µCi		2	12 µCi	
Sodium-22 (L)	1	683					1			2	683	
Special Services (O)	24	272	296,786			21,400	10		60,540	34	272	378,726
Strontium-82 (L)	26	3900		2	300					28	4200	
Strontium-89 (O)	17	87	3,505				2	15	600	19	102	4,105
Strontium-90/ Yttrium (H)							11	1.4 µCi		11	1.4 µCi	
Strontium-90 (O)	5	40.197 Ci	4,244	2	25 Ci	12				6	40.332	4,256
Target Preparations			70,939			52,875	2		147,324	2		271,138
Technetium-99 (H)	4	0.8								4	0.8	
Technetium-99 (H)							1	0.12 µCi		1	0.12 µCi	
Technetium-99 (O)	16	49 g	2,695	8	88.8 g	4,934	9	70.5 g	3,998	33	208.3 g	11,627
Thorium (P)	1	1 kg	20				1			2	1 kg	20
Thorium-229 (O)	1		215				2		230	3		445
Thorium-230 (O)	1	1 mg	88	1	10 mg	295	1	30 mg	641	3	41 mg	1,024
Thorium-230 > 95 (O)	3	5 mg	680	4	5252 mg	5,533	1	1 mg	72	7	61 mg	6,285
Thorium-230 80-9 (O)	1	1 mg	93	3		29,133				4	1,253 mg	29,226
Thorium-232 (O)			405	1	1.0 g	75	3	12.4 g	195	4	13.4 g	675

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5. RADIOISOTOPE SALES AND TRANSFERS--FY1981

	Domestic			Foreign			Project			Total		
	Shpts	Amount mCi	Dollars		Amount mCi	Dollars	Shpts	Amount mCi	Dollars	Shpts	Amount mCi	Dollars
Tritium (H)												
Tritium (O)	219	426,790 Ci	351,411	28	470,435 Ci	364,949	5	64 nCi		5	64 nCi	
Tritium (P)							19	10,990 Ci	5,404	266	908,214	721,764
Tungsten-178 (B)	3	1,800	9,614				1			1		
Tungsten-181 (B)	2	300	2,454							3	1,800	9,614
										2	300	2,454
Uranium233 (O)	3	300 mg	969	4	10,081 mg	26,268	7	1.811	457	14	12,192 mg	27,694
Uranium234 (O)	4	903 mg	11,713	4	6,120 mg	51,178			65	8	7,023 mg	62,956
Uranium235 (O)	11	321 g	15,412	8	54 g	7,918	9	20 g	638	28	396 g	23,968
Uranium236 (O)	3	36 mg	216	4	340 mg	415	4	10,250 mg	260	11	10,626 mg	891
Uranium-238 (O)	2	145 g	2,297	5	9 g	1,206	8	30 g	1,389	15	184 g	4,892
Vandium-48 (L)	2	2								2	2	
Xenon-127 (B*)	105	14,736	24,127	51	12,953	21,825				156	27,689	45,952
Xenon-127 (L)							4	3,200		4	3,200	
Yttrium88 (L)	1	8								1	8	
Zirconium88 (L)	1	150								1	150	
Zirconium-95/ Niobium95 (O)	9	1,014	8,150	2	8	80	4	35	350	15	1,057	8,580
TOTAL	1,830		6,524,179	240		1,301,097	585		403,115	1,655		8,229,201

(a) Oak Ridge billed.

(b) Radioisotopes produced by cyclotron service irradiations: ¹³³mg, ²⁰⁵, ²⁰⁶, ²⁰⁷Bi, ¹¹C, ¹²⁹, ¹³⁴Cs, ⁵⁶, ⁵⁷, ⁶¹Co, ⁶⁴Cu, ¹⁴⁹, ¹⁵⁰, ¹⁵³Eu, ¹⁸F, ⁶⁷, ⁶⁹, ⁷⁰Ga, ⁶⁷, ⁶⁸Ge, ¹⁹An, ¹⁷²Hf, ¹¹¹In, ¹²³I, ¹⁷³Lu, ¹³²Pm, ¹⁸⁹Re, ⁹⁵Rh, ⁸³, ⁸⁴Rb, ⁹⁵m, ⁹⁹Tc, ¹⁶⁸Tm.

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

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