ORNL/TM-11077

OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

# Stable Isotope Customer List and Summary of Shipments – FY 1988

J. G. Tracy

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ORNL/TM-11077

Chemical Technology Division

# STABLE ISOTOPE CUSTOMER LIST AND SUMMARY OF SHIPMENTS - FY 1988

Compiled by

J. G. Tracy

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# STABLE ISOTOPE CUSTOMER LIST AND SUMMARY

# OF SHIPMENTS - FY 1988

## INTRODUCTION

This compilation is published as an aid to those concerned with the separation and sale of stable isotopes. The information is divided into four sections as described below.

| Section | Description |
|---|---|
| I. | Alphabetical lists of domestic and foreign customers, showing the stable isotopes and services purchased during the fiscal year. Isotopes are shown by isotope symbol. Services are shown by the abbreviations SS for special services and TGS for target preparation. |
| II. | Alphabetical lists of isotopes and services, cross-referenced to customer numbers and divided into domestic and foreign categories. |
| III. | Alphabetical lists of states and countries, cross-referenced to customer numbers and indicating geographical concentrations of isotope users. |
| IV. | Tabulation of the shipments, quantities, and dollars for each isotope and dollars for services divided into domestic, foreign, and DOE project categories. |

During FY 1988 sales of stable isotope products and services were made to 230 different customers, of whom 133 were domestic and 97 were foreign, representing 17 different foreign countries. The total revenue was $4,215,727 of which 5.1% was from sales to DOE project customers, 57.0% was from sales to other domestic customers and 37.9% was from sales to foreign customers. This represented sales of 174 different stable isotopes plus associated services and was a 11.4% increase in revenue over FY 1987.

Other reports in this series are:

| | | |
|---|---|---|
| ORNL/TM-1928 | ORNL/TM-5089 | ORNL/TM-8302 |
| ORNL/TM-2038 | ORNL/TM-5853 | ORNL/TM-8704 |
| ORNL/TM-2401 | ORNL/TM-6241 | ORNL/TM-8979 |
| ORNL/TM-2747 | ORNL/TM-6710 | ORNL/TM-9430 |
| ORNL/TM-3146 | ORNL/TM-7214 | ORNL/TM-9866/R1 |

| | | |
|---|---|---|
| ORNL/TM-3543 | ORNL/TM-7764 | ORNL/TM-10324 |
| ORNL/TM-3987 | ORNL/TM-8302 | ORNL/TM-10639 |

We wish to thank J. A. Delker and L. F. Russell of the Business Systems Department of the ORGDP Computing Technology Center for their assistance in developing the tabulations.

## 1. ALPHABETICAL LIST OF CUSTOMERS, WITH CONTACTS AND ISOTOPES PURCHASED

### A. DOMESTIC

1 Aldrich Chemical Company
Accounts Payable
P. O. Box 355
Milwaukee, Wisconsin 53201

$^{6}$Li

2 Allied Signal Companies
Attn: Research Accounting
Engineered Materials Research Center
50 E. Algonquin Road, P.O. Box 5016
Des Plaines, Illinois 60017-5016

$^{194}$Pt

3 Alnor Nuclear Corporation
2585Washington Road
Pittsburgh, Pennsylvania 15241

$^{6}$Li, $^{7}$Li, TGS

4 American Cyanamid Company
1937 W. Main Street
Stamford, Connecticut 06904

SS

5 Argonne National Laboratory
Attn: Chief Accountant - 201
9700 South Cass Avenue
Argonne, Illinois 60439

$^{107}$Ag, $^{41}$Ca, $^{113}$Cd, $^{164}$Er, $^{166}$Er, $^{56}$Fe, $^{76}$Ge, $^{6}$Li, $^{26}$Mg, $^{98}$Mo, $^{144}$Nd, $^{60}$Ni, $^{64}$Ni, $^{148}$Sm, $^{122}$Sn, SS, $^{128}$Te, TGS, $^{92}$Zr

6 Atom Sciences, Incorporated
114 Ridgeway Center
Oak Ridge, Tennessee 37830

$^{53}$Cr, $^{57}$Fe, $^{30}$Si

7 Atomergic Chemetals Corporation
91 Carolyn Boulevard
Farmingdale, New York 11735-1527

SS

8 Auburn University
Dept. of Chemical Engineering
230 Ross Hall
Auburn University, Alabama 36849-3501

$^{54}$Fe, $^{57}$Fe, $^{119}$Sn, SS

9 Ball Corporation/Efratom Division
3 Parker
Irvine, California 92718-1605

$^{87}$Rb

10 Ball State University
Muncie, Indiana 47306

SS

11 Battelle Northwest
Attn: Accounts Payable
P. O. Box 999
Richland, Washington 99352

$^{6}$Li, $^{7}$Li, TGS

12 Brookhaven National Laboratory
Upton, Long Island, New York 11973

$^{134}$Ba, $^{162}$Dy, $^{168}$Er, $^{170}$Er, $^{57}$Fe, $^{6}$Li, $^{95}$Mo, $^{195}$Pt, SS, $^{180}$Ta, TGS

13 California Institute of Technology
Accounts Payable 301-6
Pasadena, California 91125

$^{76}$Se, SS

14 California State University
Long Beach Foundation
P. O. Box 15490
Long Beach, California 90815

$^{63}$Cu, $^{65}$Cu

15 California, University of
405 Hilgard Avenue
Los Angeles, California 90024

$^{25}$Mg, SS

16 California, University of
Santa Barbara, California 93106

$^{138}$La, SS

17 California, University of
Lawrence Livermore Laboratory
Box 808
Livermore, California 94550

$^{40}$Ca, $^{44}$Ca, $^{113}$In, $^{82}$Se, SS, $^{128}$Te, $^{176}$Yb

18 Cambridge Isotope Labs, Inc.
20 Commerce Way
Woburn, Massachusetts 01801

$^{112}$Cd, $^{113}$Cd, $^{6}$Li, $^{7}$Li

19 Carnegie-Mellon University
5000 Forbes
Pittsburgh, Pennsylvania 15213

$^{63}$Cu, $^{65}$Cu

20 Cintichem, Incorporated
Attn: Accounts Payable
P. O. Box 289
Paramus, New Jersey 07653-0289

$^{58}$Fe

21 Combustion Engineering, Inc.
Box 400
Windsor, Connecticut 06095

$^{6}$Li, TGS

22 Consolidation Coal Company
Library, Pennsylvania 15129

$^{6}$Li

23 Cornell University
Purchasing
120 Maple Avenue
Ithica, New York 14850

$^{40}$K, $^{6}$Li, $^{84}$Sr

24 CIBA-GEIGY Corporation
Accounts Payable Dept.
556 Morris Avenue
Summit, New Jersey 07901

$^{170}$Er, SS

25 Denison University
Granville, Ohio 43023

SS

26 Department of Chemistry
Mount Holyoke College
South Hadley, Massachusetts 01075

SS

27 Dow Chemical Company
P. O. Box 191
Midland, Michigan 48640

$^{176}$Lu

28 Dow Chemical USA
Texas Operations
Accounts Payable, APB Building
Freeport, Texas 77541

SS

29 Duke University
Disbursements-Accounting Operations
P.O. Box 40005
Durham, North Carolina 27706

$^{6}$Li, SS

30 E. I. Du Pont De Nemours & Company
NEN Products
Accounts Payable
549 Albany Street
Boston, Massachusetts 02118

$^{107}$Ag, $^{113}$Cd, $^{140}$Ce, $^{59}$Fe, $^{119}$Sn, SS, $^{203}$Tl, $^{65}$Zn

31 E.I. Dupont De Nemours & Company, Inc.
Experimental Station
Accounts Payable Section-E268
Wilmington, Delaware 19898

$^{63}$Cu, $^{65}$Cu

32 Eastman Kodak Company
Kodak Park Division
Rochester, New York 14650

$^{105}$Ag, $^{79}$Br, $^{51}$Cr, $^{65}$Cu, $^{197}$Hg, $^{191}$Ir, $^{206}$Pb, $^{123}$Sb

33 EG&G
35 Congress Street
Salem, Massachusetts 01970-0662

$^{85}$Rb, $^{87}$Rb

34 EG&G Idaho, Incorporated
Accounts Payable
P. O. Box 1625
Idaho Falls, Idaho 83415

$^{143}$Nd, $^{144}$Nd, $^{123}$Te, TGS

35 ETA Industries, Inc.
35 East 21st Street
New York, NY 10010

$^{87}$Rb

36 Field Electron and Ion Technology Compa
19500 N.W. Gibbs Drive
Suite 100
Beaverton, Oregon 97006

SS

37 Florida State University
Tallahassee, Florida 32306

$^{144}$Nd, TGS

38 Georgetown University
Attn: Accounts Payable
37th and "O" Street, NW
Washington, D.C. 20057

$^{70}$Zn

39 Georgia, University of
Athens, Georgia 30601

$^{59}$Ni, $^{63}$Ni, $^{77}$Se

40 GTE Products Corporation
Accounts Payable Department
100 Endicott Street
Danvers, Massachusetts 01923

$^{199}$Hg

41 Harshaw/Filtrol Partnership
6801 Cochran Road
Solon, Ohio 44139

$^{7}$Li

42 Harvard University
Chemical Laboratories
12 Oxford Street
Cambridge, Massachusetts 02138

$^{63}$Cu

43 Hewlett Packard Company
1501 Page Mill Road
Palo Alto, California 94304

$^{85}$Rb

44 Howard Hughes Medical Center
Attn: Accounts Payable
6701 Rockledge Drive
Bethesda, MD 20817

$^{113}$Cd

45 Idaho University
Campus Box 8110
Pocatello, Idaho 83209

$^{6}$Li

46 Imagents, Incorporated
P. O. Box 300486
Houston, Texas 77230-0486

$^{59}$Ni, $^{173}$Yb, $^{65}$Zn

47 Indiana University
Accounts Payable
P. O. Box 4040
Bloomington, Indiana 47402

$^{7}$Li, $^{87}$Rb, $^{87}$Sr, TGS, $^{205}$Tl, $^{176}$Yb

48 Indiana University-
Purdue University at Indianapolis
Purchasing Department
630 W. New York Street
Indianapolis, Indiana 46202

$^{42}$Ca, $^{43}$Ca, $^{44}$Ca

49 International Business Machines Corpora
Route 52
Hopewell Junction, New York 12533

$^{63}$Cu, $^{94}$Mo, $^{58}$Ni, $^{64}$Zn

50 International Copper Research Associati
825 Third Avenue
New York, New York 10022

$^{63}$Cu

51 Intraspec Incorporated
P. O. Box 847
119 Caldwell Drive
Oak Ridge, Tennessee 37830

$^{6}$Li

52 Iowa State University
Ames Laboratory
Purchasing Department
Room 139, Spedding Hall
Ames, Iowa 50011

SS

53 Isotec, Incorporated
3858 Benner Road
Miamisburg, Ohio 45342

$^{43}$Ca, $^{41}$K, $^{6}$Li, $^{64}$Ni, SS, $^{123}$Te

54 Isotope Products Laboratories
404 South Luka Street
Burbank, California 91502

$^{123}$Te, $^{176}$Yb

55 IBM Corporation
P.O. Box 9452
New Haven, Connecticut 06534-0452

$^{7}$Li

56 ICN Biomedicals, Incorporated
P. O. Box 19536
Irvine, California 92714
Attn: Accounts Payable

$^{48}$Ca, $^{111}$Cd, $^{113}$Cd, $^{35}$Cl, $^{53}$Cr, HC,
$^{6}$Li, $^{7}$Li, SS

57 John Hopkins University
Accounts Payable Department
Charles & 34th Street
Baltimore, Maryland 21218

$^{63}$Cu, $^{65}$Cu, $^{56}$Fe, HC, SS

58 Lamont-Doherty Geological Observatory
Accounts Payable
Palisades, New York 10964

$^{144}$Nd, $^{30}$Si, $^{87}$Sr

59 Lockheed Engineering & Mgmt. Services C
1830 Nasa Road 1
Houston, Texas 77258

SS

60 Mallinckrodt, Inc.
2703 Wagner Place
Maryland Heights, Missouri 63043

$^{112}$Cd

61 Maryland, University of
College Park, Maryland 20742

$^{42}$Ca, $^{44}$Ca, $^{67}$Zn

62 Massachusetts Institute of Technology
Box 69
Cambridge, Massachusetts 02139

$^{43}$Ca, HC, $^{62}$Ni, $^{196}$Pt, $^{87}$Sr, SS, $^{46}$Ti

63 Mayo Foundation
200 1st Street SW
Box 10,000
Rochester, Minnesota 55905

$^{42}$Ca, $^{44}$Ca

64 Medi-Physics, Incorporated
Accounts Payable
P.O. Box 289
Paramus, New Jersey 07653-0289

$^{203}$Tl

65 Medical University of South Carolina
Attn: Accounts Payable
171 Ashley Avenue
Charleston, South Carolina 29425

$^{42}$Ca, $^{44}$Ca

66 Miami University
Purchasing Office
213 Roudebush Hall
Oxford, Ohio 45056

$^{152}$Sm

67 Michigan State University
Attn: Accounts Payable
366 Administration Building
East Lansing, Michigan 48824

$^{54}$Fe

68 Microfoils
P. O. Box 283
Argonne, Illinois 60439

$^{196}$Pt

69 National Bureau of Standards
Accounting Division
Gaithersburg, Maryland 20899

$^{6}$Li, $^{24}$Mg, $^{145}$Nd, $^{148}$Nd, TGS

70 National Institutes of Health
Accounts Payable Section, DFM
Building 31, Room B1839
Bethesda, Maryland 20892

$^{42}$Ca, $^{44}$Ca, $^{112}$Cd, HC, $^{192}$Os, SS, $^{203}$Tl, $^{64}$Zn

71 New York, State University of
Research Foundation
Stony Brook, New York 11790

$^{50}$Cr, $^{7}$Li, $^{208}$Pb, SS

72 North Carolina State University
Accounts Payable
P. O. Box 7204
Raleigh, North Carolina 27695
North Carolina

$^{28}$Si, SS

73 North Carolina, University of
Chapel Hill, North Carolina 27514

SS

74 Northern Illinois University
Box 185
DeKalb, Illinois 60115

$^{57}$Fe, SS

75 Northwestern University
Physics & Astronomy Department
2145 Sheridan Road
Evanston, Illinois 60201

$^{113}$Cd, $^{199}$Hg, SS

76 Notre Dame, University of
Notre Dame, Indiana 46556

$^{37}$Cl, $^{70}$Ge, $^{73}$Ge, $^{24}$Mg, $^{28}$Si

77 Oak Ridge National Laboratory
P.O. Box X
Oak Ridge, Tennessee 37831

$^{109}$Ag, $^{53}$Cr, $^{54}$Fe, $^{155}$Gd, $^{158}$Gd, $^{160}$Gd, $^{70}$Ge, $^{73}$Ge, HC, $^{176}$Hf, $^{177}$Hf, $^{179}$Hf, $^{113}$In, $^{92}$Mo, $^{58}$Ni, $^{190}$Os, $^{192}$Os, $^{208}$Pb, $^{84}$Sr, $^{86}$Sr, SS, $^{122}$Te, $^{123}$Te, $^{124}$Te, $^{125}$Te, $^{126}$Te, TGS, $^{90}$Zr, $^{92}$Zr, $^{94}$Zr, $^{96}$Zr

78 Ohio State University
190 North Oval Drive
Columbus, Ohio 43210

$^{43}$Ca, $^{48}$Ca, HC

79 Ohio State University
Research Foundation
1314 Kinnear Road
Columbus, Ohio 43212

$^{6}$Li, $^{92}$Mo, SS, TGS

80 Ohio University
Accounts Payable
Scott Quad
Athens, Ohio 45701

SS

81 P & P Supplies
1 Sally Kane
Plainview, N.Y. 11803

$^{87}$Rb

82 Polytechnic Institute of Brooklyn
333 Jay Street
Brooklyn, New York 11201

$^{25}$Mg

83 Princeton University
James Forrestal Campus
Princeton, New Jersey 08540

$^{130}$Te

84 QE Technology, Inc.
3912 Northampton Way
Tampa, Florida 33624

HC, $^{200}$Hg, SS

85 Rochester, University of
575 Elmwood Avenue
Rochester, New York 14627

$^{114}$Cd, $^{166}$Er, $^{168}$Er, $^{148}$Nd, $^{192}$Os, $^{208}$Pb, $^{124}$Sn

86 Rutgers-The State University
Disbursement Process Control
P. O. Box 1089
Piscataway, New Jersey 08854

$^{110}$Cd, $^{113}$Cd, HC, $^{24}$Mg, $^{148}$Nd, $^{108}$Pd, SS, TGS, $^{168}$Yb

87 Shriners Burns Institute
51 Blossom Street
Boston, Massachusetts 02114

$^{70}$Zn

88 Teledyne Wah Chang Albany
Division of Teledyne Ind. Inc.
P. O. Box 460
Albany, Oregon 97321

$^{110}$Cd

89 Tennessee, University of
Knoxville, Tennessee 37916

SS

90 Texas Instruments Incorporated
Equipment Group
P.O. Box 660425 M/S3136
Dallas, Texas 75266
Attn: Accounts Payable

$^{198}$Pt

91 Texas, University of
Austin, Texas 78712

$^{163}$Dy, $^{166}$Er, $^{155}$Gd, $^{41}$K, $^{143}$Nd, $^{149}$Sm, $^{173}$Yb

92 The Research Corporation of University
of Hawaii, Room 402 Varsity Bldg.
1110 University Avenue
Honolulu, Hawaii 96826

$^{206}$Pb

93 U.S. Services Incorporated
19 Ox Bos Lane
Summit, New Jersey 97901

$^{177}$Hf, $^{41}$K, $^{87}$Rb, $^{84}$Sr, SS

94 United States Department of Agriculture
Research Service
P. O. Box 53326
New Orleans, Louisiana 70150

$^{54}$Fe, $^{67}$Zn, $^{70}$Zn

95 United States Geological Survey
Financial Management
National Center, Room 1447-A
12201 Sunrise Valley Drive
Reston, Virginia 22092

$^{41}$K, $^{206}$Pb, $^{196}$Pt, $^{87}$Rb, $^{84}$Sr

96 University of Alabama in Huntsville
Attn: Accounts Payable
Huntsville, Alabama 35899

SS

97 University of Arizona
Attention: Accounts Payable
Post Office Box 41030
Tucson, Arizona 85717-1030

$^{7}$Li

98 University of California
Agronomy & Range Science Department
Davis, California 95616

SS

99 University of California
Lawrence Berkeley Laboratory
P. O. Box 528
Berkeley, California 94720

$^{160}$Gd, SS, TGS, $^{44}$Ti

100 University of California
Los Alamos National Laboratory
Accounting Dept.
P. O. Box 1663
Los Alamos, New Mexico 87545

$^{109}$Ag, $^{54}$Fe, $^{58}$Fe, $^{199}$Hg, $^{200}$Hg,
$^{201}$Hg, $^{202}$Hg, $^{6}$Li, $^{24}$Mg, $^{206}$Pb, $^{118}$Sn,
$^{119}$Sn, SS, $^{128}$Te, TGS, $^{173}$Yb

101 University of California San Diego
Accounting Office (Q-027)
La Jolla, California 92093

SS

102 University of Chicago
Account Payable
1525 E. Hyde Park Boulevard
Chicago, Illinois 60615

$^{37}$Cl, $^{166}$Er, HC, $^{41}$K, $^{26}$Mg

103 University of Cincinnati
Purchasing Department
Cincinnati, Ohio 45221

$^{57}$Fe

104 University of Colorado
Health Sciences Center
Accounts Payable A063
4200 E. Ninth Avenue
Denver, Colorado 80262

$^{70}$Zn

105 University of Florida
Geology Department
Attn: Perfit 392-2128
1112 Turlington Hall

$^{87}$Rb

106 University of Illinois
252 Administration Building
Accounting Division
506 South Wright Street
Urbana, Illinois 61801

$^{138}$Ba, $^{63}$Cu, HC, $^{6}$Li, $^{7}$Li, SS, $^{205}$Tl

107 University of Iowa
Purchasing Department
Iowa City, Iowa 52242

$^{58}$Fe, $^{25}$Mg, SS, $^{67}$Zn, $^{70}$Zn

108 University of Kentucky
Chemistry Department
Room 120 Chemistry-Physics Building
Lexington, Kentucky 40506-0055

$^{202}$Hg, SS

109 University of Kentucky
Physics & Astronomy
74 Chemistry-Physics Building
Lexington, Kentucky 40506

SS

110 University of Maryland at Baltimore
Accounts Payable - Schools
737 W. Lombard Street
Baltimore, Maryland 21201

$^{41}$K, $^{24}$Mg

111 University of Massachusetts
Attn: B. Clemons
Food Science & Nutrition
Chenoweth Lab
Amherst, Massachusetts 01003

SS

112 University of Massachusetts
Attn: K.S.R. Sastry
Nuclear Physics, GRC Tower B
Amherst, Massachusetts 01003

$^{192}$Os

113 University of Minnesota
Business Office
1919 University Avenue
St. Paul, Minnesota 55104

HC, TGS, $^{48}$Ti

114 University of Missouri
Purchasing Department
General Services Building
Columbia, Missouri 65211

$^{64}$Ni, $^{67}$Zn

115 University of Missouri
Attn: Mary Seewoster
Research Reactor, Room 261
Columbia, Missouri 65211

$^{7}$Li

116 University of Pennsylvania
Accounts Payable Department
3451 Walnut Street, Room 215
Philadelphia, Pennsylvania 19104-6281

$^{40}$Ca, $^{48}$Ca, SS, TGS

117 University of San Francisco
Golden Gate and Parker Avenues
San Francisco, California 94117

$^{113}$Cd

118 University of South Carolina
Attn: Accounts Payable Department
516 S. Main Street
Columbia, South Carolina 29208

$^{77}$Se, SS

119 University of Southern California
Accounts Payable
P. O. Box 77967
Los Angeles, California 90089-1141

$^{6}$Li

120 University of Texas at Dallas
Attention: Accounts Payable
Post Office Box 830688
Richardson, Texas 75083-0688

$^{85}$Rb, SS

121 UNC Geotech
P. O. Box 14000
Grand Junction, Colorado 81502-5504

$^{135}$Ba, $^{114}$Cd, $^{65}$Cu, $^{100}$Mo, $^{206}$Pb,
$^{117}$Sn, $^{203}$Tl, $^{66}$Zn

122 V. A. Hospital
Allen Park, Michigan
Calm-VA-3 (553)
PO Box 2973
Austin, TX 78769

$^{67}$Zn

123 V. A. Medical Center, Denver
CALM-VA-3-554
P. O. Box 2973
Austin, Texas 78769

$^{6}$Li, $^{7}$Li

124 Vanderbilt University
Accounts Payable
135 Kirkland Hall
P. O. Box 1810
Nashville, Tennessee 37235

$^{57}$Fe, $^{142}$Nd, $^{144}$Nd

125 Washington, University of
400 Administration Building
Seattle, Washington 98105

$^{138}$Ba, $^{111}$Cd, $^{196}$Hg, $^{204}$Hg, $^{85}$Rb,
$^{87}$Rb, $^{147}$Sm, $^{84}$Sr, TGS

126 Wayne State University
Detroit, Michigan 48202

$^{70}$Zn

127 West Valley Nuclear Services Co., Inc.
Attention: Accounts Payable
Post Office Box 191
West Valley, New York 14171-0191

$^{57}$Fe, $^{138}$La, $^{176}$Lu, $^{148}$Nd, SS

128 Westinghouse Electric Corporation
Bettis Atomic Power Laboratory
Post Office Box 79
West Mifflin, Pennsylvinia 15122

SS

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

$^{6}$Li

130 Wisconsin, University of
750 University Avenue
Madison, Wisconsin 53706

$^{178}$Hf, $^{6}$Li, $^{176}$Lu, $^{208}$Pb, TGS

131 Woods Hole Oceanographic Institute
Woods Hole, Massachusetts 02543

$^{168}$Er, $^{155}$Gd, $^{138}$La, $^{176}$Lu, $^{147}$Sm,
$^{171}$Yb

132 Y-12, Martin Marietta Energy Systems, I
P.O. Box Y
Oak Ridge, Tennessee 37831

SS

133 Yale University School of Medicine
Therapeutic Radiology Department
P. O. Box 3333
New Haven, Connecticut 06510

$^{58}$Fe, SS

## B. FOREIGN

AUSTRALIA

134 Australian National University
Research School of Earth Sciences
Attn: Purchasing Officer
GPO Box 4, Canberra 2601
Australia

$^{37}$Cl, $^{50}$Cr, $^{53}$Cr, $^{192}$Os

135 Australian National University
Research School of Physical Sciences
Supply Office, G.P.O. Box 4
Canberra, A.C.T. 2601
Australia

$^{190}$Pt, $^{87}$Sr, $^{88}$Sr

136 Monash University
The Accountant
Wellington Road
Clayton, Victoria
Australia, 3168

$^{128}$Te

137 Western Australia of Technology
Purchasing Department Kent Street
Bentley,
Australia 6102

$^{106}$Cd, $^{108}$Cd, $^{110}$Cd, $^{112}$Cd

BELGIUM

138 Institut National des Radioelements
Service des Achats
Zoning Industrieldu Wainage
B - 6200 Fleurus
Belgium

$^{50}$Cr, $^{58}$Fe, $^{84}$Sr, SS

139 Joint Research Centre
Central Bureau for Nuclear Measurements
Steenweg op Retie
2400 Geel
Belgium

$^{54}$Fe, $^{30}$Si, SS

140 Katolieke Universiteit Leuven
Instituut Voor Kern-En Stralingsfysika
Celestijnenlaan 200 D
3030 Leuven, Belgium

$^{82}$Se, SS, $^{124}$Te, $^{128}$Te, $^{64}$Zn

141 Rijksuniversiteite Gent
Laboratorium voor Kristallografie
en Studie Van DeVastestof
Krijsgslaan 271
B-9000 Gent, Belgium

$^{77}$Se, SS

142 S.C.K. - C.E.N.
Rue Ch. Lemaire 1
1160 Brussels
Belgium

$^{174}$Hf, $^{177}$Hf, $^{99}$Ru

BRAZIL

143 Banco Nacional do Desenvolvimento Econo
Rio de Janeiro, Brazil

SS

144 Instituto Engenharia Nuclear
Cidade Universitaria
Caixa Postal 2186
Brazil

$^{124}$Te

CANADA

145 Agriculture Canada
P. O. Box 3000, Main
Lethbridge, Alberta T1J 4B1
Attn: L. M. Rode

HC, $^{77}$Se

146 Atomic Energy of Canada Limited
Radiochemical Co.
P. O. Box 13500
Kanata, Ontario K2K 1X8
Canada

$^{112}$Cd, $^{50}$Cr, $^{54}$Fe, $^{58}$Fe, $^{62}$Ni, $^{88}$Sr, SS, $^{203}$Tl

147 Atomic Energy of Canada Limited
Chalk River, Ontario, Canada

$^{42}$Ca, $^{106}$Cd, $^{50}$Cr, $^{25}$Mg, $^{92}$Mo, $^{192}$Os, SS, $^{124}$Te, $^{128}$Te, TGS, $^{46}$Ti, $^{94}$Zr

148 Chedoke-McMaster Hospital
1200 Main Street, West
Hamilton, Ontario
Canada L8N 3Z5

$^{44}$Ca

149 Government of Canada
Department of Fisheries and Oceans
Attn: 3161/7-7204
400-555 W Hastings Street
Vancouver, BC V6B 5G3

$^{114}$Cd, $^{65}$Cu, $^{199}$Hg, $^{204}$Pb, $^{208}$Pb

150 Manitoba, University of
Winnepeg, Manitoba, Canada

$^{204}$Pb

151 McGill University
Montreal 2, P.Q., Canada

$^{58}$Fe

152 McMaster University
Hamilton, Ontario, Canada

HC, $^{192}$Os, $^{108}$Pd, $^{32}$S, $^{84}$Sr, SS, $^{64}$Zn, $^{68}$Zn

153 Memorial University of Newfoundland
Attn: Accounts Payable
Comptrollers Office
St. Johns, NFLD
Canada AIC 5S7

$^{67}$Zn

154 Merck Frosst Canada, Incorporated
P. O. Box 1005
Pointe Claire - Dorval Quebec
Canada H9R 4P8

$^{113}$Cd, $^{41}$K, $^{6}$Li

155 Montreal, Universite de
Montreal, Canada

$^{65}$Cu, HC, $^{26}$Mg

156 S.Y.E.P. #1002 xx4
c/o P. O. Box 1000
Agassiz, British Columbia V0M 1A0
Canada

$^{82}$Se, SS

157 Saint Francis Xavier University
Attn: Accounts Payable Office
Antigonish, Nova Scotia
Canada, B2G 1C0

$^{87}$Rb

158 TRIUMF
4004 Wesbrook Mall
Vancouver, British Columbia
Canada V6T 2A3

$^{6}$Li

159 University of Alberta
Edmonton, Alberta, Canada T6G2H1

$^{81}$Br, $^{63}$Cu, $^{41}$K, $^{84}$Sr

160 University of Calgary
2920-24th Avenue Northwest
Calgary, Alberta, Canada T2N 1N4

$^{43}$Ca, $^{37}$Cl, $^{41}$K, $^{77}$Se, $^{67}$Zn

161 University of Saskatchewan
Accounts Payable Department
Administration Building
Saskatoon, Saskatchewan
Canada S7N 0W0

$^{87}$Rb

DENMARK

162 Department of Physics
Royal Veterinary and Agricultural Unive
Thorvaldsensvej 40
DK-1871 Frederiksberg C
Denmark

$^{60}$Ni, $^{108}$Pd

163 Kobenhauns Universitet
Niels Bohr Institutet
Tandem Accelerator Laboratory
Riso, 4000 Roskilde
Denmark

$^{70}$Ge

164 Riso National Laboratory
DK-4000 Roskilde
Denmark

$^{135}$Ba, $^{44}$Ca, $^{111}$Cd, $^{53}$Cr, $^{65}$Cu, $^{26}$Mg, $^{108}$Pd, $^{194}$Pt, $^{77}$Se

ENGLAND

165 Agricultural & Food Research Council
Food Research Institute
Colney Lane
Norwich, NR4 7UA
England

$^{43}$Ca, $^{44}$Ca

166 Amersham International Limited
White Lion Road Amersham
Buckinghamshire England HP7 9LL

$^{50}$Cr, $^{84}$Sr, SS, $^{168}$Yb

167 British Embassy
UKDPO Finance, G2260, Rm. 289
3100 Massachusetts Avenue, N.W.
Washington, D.C. 20008
England

$^{50}$Cr, $^{53}$Cr, $^{54}$Fe, $^{200}$Hg, $^{204}$Hg, $^{6}$Li, $^{174}$Lu, $^{26}$Mg, $^{58}$Ni, $^{61}$Ni, $^{62}$Ni, $^{64}$Ni, $^{74}$Se, $^{76}$Se, SS, $^{46}$Ti, $^{50}$Ti

168 Central Electricity Generating Board
Research Division
Berkeley Nuclear Laboratories
Berkeley, Glos., England

SS, TGS

169 Leicester, University of
Leicester, England

$^{63}$Cu, $^{65}$Cu

170 Manchester University
Manchester 13, England

$^{168}$Er

171 National Physical Laboratory
Contracts Officer
Queens Road
Teddington, Middx, U. K.
London

TGS, $^{172}$Yb

172 Panalpina, Incorporated
UKDPO Representative
1389 2-13894 Redskin Drive
Herndon, Virginia 22071
England

$^{44}$Ca, $^{60}$Ni, $^{62}$Ni

173 Sussex, University of
Brighton, Sussex, England

$^{7}$Li

174 The Laboratory Superintendent
School of Chemical Sciences
University of East Anglia
Norwich, Norfolk, England NR4 7TJ

$^{70}$Ge, $^{74}$Se, SS

FRANCE

175 Commissariat A L'Energie Atomique
Office Des Rayonnements Ionisants
Purchasing Department
B.P. 21
91190 Gif-Sur-Yvette, France

$^{113}$Cd, $^{100}$Mo, SS

176 Hopitap Des Sablons
Service De Biochimie - C
38700 La Tronghe, France
Attn: Miss V. Ducroux

$^{82}$Se

177 Societe National des Petroles d'Aquitai
26 Avenue des Lilas
64 Pau, France

$^{146}$Sm

178 Ste Des Ciments Francais
Les Technodes
B.P. N 1
78931 Buerville Cedex
France

$^{29}$Si

179 Universite De Bretagne Occidentale
6 Avenue Le Gorgev
29287 Brest Cedex
France

$^{29}$Si, $^{30}$Si

GERMANY

180 Alfred Hempel GMBH & Company, KG
Cecilienallee 36
D-4000 Duesseldorf 30
West Germany

TGS, $^{171}$Yb

181 Bundesanstact, Physikalish-Technische
Bundesallee 100
Braunschweig, Germany

SS

182 Der Universitat Gottingen
Zweites Physikalisches Institut
Bunsenstrabe 7-9
D-3400 Gottingen
Germany

$^{50}$V

183 Deutsches Krebsforschungszentrum
Berliner Str. 21
6900 Heidelberg, Germany

$^{194}$Pt

184 Fachbereich Physik
der TU-Munchen
Strahlenschutzabt. Z 62
James-Franck-Weg
D-8046 Garching B. Munchen, West German

$^{58}$Ni, $^{64}$Ni, SS, TGS, $^{90}$Zr

185 Federal Health Office
Ingolstaedter Landstr. 1
D-8042 Neuherberg
West Germany

$^{242}$Pu

186 Freie Universitat Berlin
SFB-161
Arnimallee 14
1 Berlin 33,
W. Germany

$^{109}$Ag, $^{110}$Cd, $^{69}$Ga, $^{74}$Ge, $^{76}$Ge, HC,
SS, $^{130}$Te

187 Gesellschaft fur Schwerionenforschung,
Planckstr. 1
D-6100 Darmstadt 11
Federal Republic of Germany

$^{110}$Pd, $^{198}$Pt, SS

188 Hahn-Meitner-Institut
fur Kernforschung Berlin, Sekton Kernph
Berlin, Germany

$^{48}$Ca, TGS

189 Institut fur Geowissenschaften
UND Lithospharenforschung
Der Justus-Liebig-Unbrasitat
Senckenbergstrabe 3
D-6300 Giessen, West Germany

$^{85}$Rb, $^{87}$Rb, $^{84}$Sr

190 Institut Fur Kernchemie
Johannes Gutenberg-Universitat
Fritz-Strabmann-Weg 2
D-6500 Mainz
West Germany

$^{100}$Ru

191 Johann Wolfgang Goethe University
Frankfurt/Main, Germany

$^{111}$Cd, $^{113}$Cd, SS, TGS

192 Kernforschungsanlage Jullch GmbH
Postfach 1913
D-517 Jullch, FRG
West Germany

$^{6}$Li, $^{7}$Li, TGS

193 Kernforschungszentrum Karlsruhe
Postfach 3640
7500 Karlsruhe
West Germany

$^{57}$Fe, $^{70}$Ge, $^{72}$Ge, $^{73}$Ge, $^{74}$Ge, $^{76}$Ge,
$^{175}$Lu, $^{146}$Nd, TGS

194 Koln, Universitat
Zulpicher Str. 47
5 Koln 1, Germany

SS

195 Marburg/Lahn, Universitat
Marburg/Lahn, Germany

$^{139}$La

196 Max Planck Institut fur Kernphysik
Saupfercheckweg
Heidelberg, Germany

$^{62}$Ni, $^{64}$Ni, SS, TGS, $^{64}$Zn, $^{90}$Zr

197 Max Planck Institute fur Chemie
Saarstrasse 23, Mainz
West Germany

$^{190}$Os

198 Sektion Physik
Der Universitat Munchen
Technologisches Labor
8046 Garching -Am Coulombwall 1,
Germany

$^{204}$Pb, $^{208}$Pb, $^{110}$Pd, SS, TGS, $^{46}$Ti, $^{91}$Zr

199 Universitat Wuppertal
FB 9 - Anorg. Chemie
Gaupstr. 20
D-5600 Wuppertal
West Germany

$^{130}$Te

IRELAND

200 University College
Accounts Office
Belfield, Dublin 4
Ireland

$^{138}$Ba, $^{40}$Ca, $^{136}$Ce, $^{163}$Dy, $^{167}$Er, $^{155}$Gd, $^{40}$K, $^{139}$La, $^{176}$Lu, $^{84}$Sr, SS, $^{171}$Yb

ISRAEL

201 Landseas Corporation
1212 Avenue of the Americas
New York, New York 10036
Israel

SS

ITALY

202 Centro Siciliano di Fisica Nucleare
57 Corso Italia
95129 Cantania, Italy

$^{40}$Ca, $^{6}$Li, $^{7}$Li, $^{24}$Mg, TGS

203 Consiglio Nazionale Delle Ricerche
Instituto Di Geocronologia
Via C. Maffi 36
56100 Pisa, Italy

$^{145}$Nd, SS

204 Instituto Nazionale Fisica Nucleare
Laboratori Nazionali Di Legnard
Via Romea N. 4 - 35020 Legnard
(Padova) Italy

$^{138}$Ba, $^{40}$Ca, $^{110}$Cd, $^{114}$Cd, $^{116}$Cd, $^{63}$Cu, $^{65}$Cu, $^{56}$Fe, $^{70}$Ge, $^{73}$Ge, $^{74}$Ge, $^{76}$Ge, $^{24}$Mg, $^{26}$Mg, $^{92}$Mo, $^{98}$Mo, $^{100}$Mo, $^{58}$Ni, $^{60}$Ni, $^{206}$Pb, $^{116}$Sn, SS, TGS, $^{64}$Zn, $^{66}$Zn, $^{90}$Zr

205 Istituto Nazionale di Fisica Nucleare
Largo E. Fermi 2
50125 Florence, Italy

SS, $^{96}$Zr

206 Italian Economic Corporation, The
25 West 51st Street
New York, New York 10019

$^{208}$Pb, SS

207 Padova, Universita Degli Studi di
Via F. Marzolo 8
Padova, Italy

$^{110}$Cd, $^{114}$Cd, $^{208}$Pb, SS, TGS

JAPAN

208 Japan Atomic Energy Research Institute
2-2, Uchisaiwai-Cho 2-Chome
Chiyoda, Tokyo 100
Japan

$^{148}$Sm, SS

209 Japan Radioisotope Association
Hon-Komagome 2 Chome 28
Bunkyo-Ku
Tokyo, Japan

$^{107}$Ag, $^{109}$Ag, $^{40}$Ca, $^{42}$Ca, $^{44}$Ca, $^{106}$Cd, $^{110}$Cd, $^{111}$Cd, $^{113}$Cd, $^{114}$Cd, $^{50}$Cr, $^{53}$Cr, $^{54}$Cr, $^{63}$Cu, $^{65}$Cu, $^{166}$Er, $^{167}$Er, $^{168}$Er, $^{54}$Fe, $^{56}$Fe, $^{58}$Fe, $^{71}$Ga, $^{155}$Gd, $^{70}$Ge, $^{73}$Ge, $^{74}$Ge, HC, $^{178}$Hf, $^{113}$In, $^{191}$Ir, $^{40}$K, $^{41}$K, $^{138}$La, $^{6}$Li, $^{7}$Li, $^{176}$Lu, $^{24}$Mg, $^{25}$Mg, $^{26}$Mg, $^{92}$Mo, $^{98}$Mo, $^{145}$Nd, $^{146}$Nd, $^{150}$Nd, $^{58}$Ni, $^{60}$Ni, $^{61}$Ni, $^{62}$Ni, $^{64}$Ni, $^{186}$Os, $^{192}$Os, $^{204}$Pb, $^{207}$Pb, $^{208}$Pb, $^{87}$Rb, $^{96}$Ru, $^{28}$Si, $^{30}$Si, $^{148}$Sm, $^{149}$Sm, $^{152}$Sm, $^{116}$Sn, $^{118}$Sn, $^{119}$Sn, SS, $^{130}$Te, TGS, $^{46}$Ti, $^{49}$Ti, $^{50}$Ti, $^{203}$Tl, $^{66}$Zn, $^{90}$Zr, $^{94}$Zr

210 Kansai Electronics Co., Ltd.
8 Toganocho
Kitaku, Osaka, Japan

$^{107}$Ag, $^{109}$Ag, $^{110}$Cd, $^{176}$Lu, $^{24}$Mg, TGS

211 New Metals & Chemicals Corp., Ltd.
Shin Dai-Ichi Building 4-13
3 Chome, Nihonbashi
Chuo-Ku, Tokyo, Japan

$^{114}$Cd, $^{7}$Li, SS

212 Nippon Sanso K.K.
Specialty Gases Development Project
16-7, Nishi-Shinbashi, 1-Chome
Minato, KU, Tokyo, Japan 105

$^{65}$Cu

213 Seishin Trading Co., Ltd.
2-1 Sannomiya-Cho 1 Chome
Chuo-Ku, Kobe
Japan 650

$^{42}$Ca, $^{114}$Cd, $^{52}$Cr, $^{41}$K, $^{26}$Mg, $^{60}$Ni, $^{208}$Pb, $^{102}$Ru, SS, $^{49}$Ti, $^{174}$Yb

214 Shibaya Scientific Co. Ltd.
3 Chome 11-8 Miami-Otsuka
Toshima-Ku, Tokyo Japan

$^{109}$Ag, $^{135}$Ba, $^{138}$Ba, $^{79}$Br, $^{114}$Cd, $^{37}$Cl, $^{53}$Cr, $^{65}$Cu, $^{163}$Dy, $^{166}$Er, $^{54}$Fe, $^{160}$Gd, $^{72}$Ge, $^{178}$Hf, $^{201}$Hg, $^{113}$In, $^{191}$Ir, $^{176}$Lu, $^{24}$Mg, $^{95}$Mo, $^{143}$Nd, $^{60}$Ni, $^{190}$Os, $^{204}$Pb, $^{106}$Pd, $^{194}$Pt, $^{87}$Rb, $^{101}$Ru, $^{34}$S, $^{29}$Si, $^{84}$Sr, SS, $^{125}$Te, $^{47}$Ti, $^{203}$Tl, $^{182}$W, $^{172}$Yb, $^{66}$Zn, $^{91}$Zr

KOREA

215 Yonzei University
Department of Physics
Seoul, KOREA 120-00

SS

NETHERLANDS

216 Interuniversity Reactor Institute
Mekelweg 15
2929 JB Delft, Netherlands

$^{6}$Li, TGS

217 Kernfysisch Versneller Instituut
Stichting Fom
Zernikelaan 25
NL 9747 AA Groningen
Netherlands

$^{198}$Hg, $^{200}$Hg, $^{204}$Hg

218 P.O.B. 1
1755 ZG Petten
The Netherlands
The Netherlands

SS

NEW ZEALAND

219 Massey University
The Registrar
Palmerston North, New Zealand
New Zealand

$^{40}$K

SWEDEN

220 Ab Hassle
S-431 83 Molndal
Sweden

SS

221 Tandem Accelerator Laboratory
Box 533
S-751 21 Uppsala, Sweden

$^{56}$Fe, $^{7}$Li, TGS

222 University of Goteborg
Department of Histology
P. O. Box 33031
S-400 33 Goteborg
Sweden

$^{44}$Ca

223 University of Gothenburg
Dept. of Analytical Chemistry
Attn: Conny Haraldsson
S-412 96 Gothenburg

$^{196}$Hg, $^{206}$Pb

224 University of Lund
Department of Solid State Physics
P. O. Box 118
S-221 00 Lund
Sweden

SS

225 Uppsala Universitet
Department of Radiation Sciences
Box 535
S-751 21 Uppsala
Sweden

$^{109}$Ag, $^{65}$Cu, $^{198}$Hg, $^{77}$Se, $^{82}$Se

SWITZERLAND

226 Bern Universitat
3000 Bern, Switzerland

$^{143}$Nd, $^{150}$Sm

227 Fribourg, University of
1700 Fribourg, Switzerland

HC, $^{152}$Sm, TGS, $^{174}$Yb

228 Eth-Zentrum
Lab. Physikalische Chemie
Ch-8092 Zurich, Switzerland

$^{63}$Cu

229 ETH Zurich
Institut fur Kristallographie Und Petro
ETH-Zentrum
Ch-8092 Zurich
Switzerland

$^{155}$Gd, $^{139}$La, $^{176}$Lu

230 Paul Scherrer Institute (PSI)
Accounting Office
CH-5234 Villigen
Switzerland

SS, TGS, $^{168}$Yb, $^{176}$Yb

## II. ALPHABETICAL LIST OF ISOTOPES, CROSS-REFERENCED TO CUSTOMER NUMBERS

### A. DOMESTIC

Antimony 123
32
Barium 134
12
Barium 135
106, 121
Barium 138
125
Bromine 79
32
Cadmium 110
86, 88
Cadmium 111
56, 125
Cadmium 112
18, 30, 60, 70
Cadmium 113
5, 18, 44, 56, 75, 86, 117
Cadmium 116
85, 121
Calcium 40
17, 116
Calcium 41
5
Calcium 42
48, 61, 63, 65, 70
Calcium 43
48, 53, 62, 78
Calcium 44
17, 48, 61, 63, 65, 70
Calcium 48
56, 78, 116
Cerium 140
30
Chlorine 35
56
Chlorine 37
76, 102
Chromium 50
71
Chromium 52
77
Chromium 53
6, 32, 56
Copper 63
14, 19, 31, 42, 57, 106
Copper 65
14, 19, 31, 32, 49, 50, 57, 121
Dysprosium 162
12
Dysprosium 163
91
Erbium 164
5
Erbium 166
5, 85, 91, 102
Erbium 168
12, 85, 131
Erbium 170
12, 24
Gadolinium 155
91
Gadolinium 156
77
Gadolinium 158
77
Gadolinium 160
99
Gadolinium High Purity 155
131
Gadolinium High Purity 160
77
Germanium 70
76, 77
Germanium 72
77
Germanium 73
76
Germanium 76
5
Hafnium 176
77

Hafnium 177

77, 93

Hafnium 178

130

Hafnium 179

77

Handling Charges

56, 57, 62, 70, 77, 78, 84, 86, 102, 106, 113

Indium 113

17, 77

Iridium 191

32

Iron 54

67, 77, 94, 100

Iron 56

5, 8, 57

Iron 57

6, 8, 12, 74, 103, 124, 127

Iron 58

20, 30, 100, 107, 133

Lanthanum 138

16, 127, 131

Lead 206

32, 92, 121

Lead 208

71, 77, 85, 95, 100, 130

Lithium 6

1, 3, 5, 11, 12, 18, 21, 22, 23, 29, 45, 51, 53, 56, 69, 79, 100, 106, 119, 123, 129, 130

Lithium 7

3, 11, 18, 41, 47, 55, 56, 71, 97, 106, 115, 123

Lutetium 176

27, 127, 130, 131

Magnesium 24

5, 69, 86

Magnesium 25

15, 82, 102, 107

Magnesium 26

76, 100, 110

Mercury 196

32, 40

Mercury 198

100

Mercury 199

75, 125

Mercury 200

84, 100

Mercury 201

100

Mercury 202

100, 108

Mercury 204

125

Molybdenum 92

77, 79

Molybdenum 95

12

Molybdenum 96

49

Molybdenum 98

5

Molybdenum 100

121

Neodymium 142

34, 124

Neodymium 143

91

Neodymium 144

5, 34, 37, 58, 124

Neodymium 145

69

Neodymium 148

69, 85, 86, 127

Nickel 58

39, 46, 77

Nickel 60

5, 39, 49

Nickel 62

62

Nickel 64

5, 53, 114

Osmium 190

77

Osmium 192

70, 77, 85, 112

Palladium 106

86

Platinum 192

68

Platinum 194

2

Platinum 195

12

Platinum 198

62, 90, 95

Potassium 40

23

Potassium 41

53, 91, 93, 95, 102, 110

Rubidium 85

33, 43, 120, 125

Rubidium 87

9, 33, 35, 47, 81, 93, 95, 105, 125

Samarium 147

125, 131

Samarium 148

5

Samarium 149

91

Samarium 152

66

Selenium 76

13

Selenium 77

39, 118

Selenium 82

17

Silicon 28

76

Silicon 29

72

Silicon 30

6, 58

Silver 107

5, 30

Silver 109

32, 77, 100

Special Services

4, 5, 7, 8, 10, 12, 13, 15, 16, 17, 24, 25, 26, 28, 29, 30, 36, 52, 53, 56, 57, 59, 62, 70, 71, 72, 73, 74, 75, 77, 79, 80, 84, 86, 89, 93, 96, 98, 99, 100, 101, 106, 107, 108, 109, 111, 116, 118, 120, 127, 128, 132, 133

Strontium 84

23, 77, 93, 95, 125

Strontium 86

77

Strontium 87

47, 58, 62

Tantalum 180

12

Target Preparation Stable

3, 5, 11, 12, 21, 34, 37, 47, 69, 77, 79, 86, 99, 100, 113, 116, 125, 130

Tellurium 122

34, 54, 77

Tellurium 123

77

Tellurium 124

77

Tellurium 125

5, 53, 77

Tellurium 126

77

Tellurium 128

17, 100

Tellurium 130

83

Thallium 203

30, 64, 70, 121

Thallium 205

47, 106

Tin 117

121

Tin 118

8, 30, 100

Tin 119

100

Tin 122
5
Tin 124
85
Titanium 46
99
Titanium 48
113
Titanium 49
62
Ytterbium 168
54, 86
Ytterbium 171
131
Ytterbium 172
46
Ytterbium 173
91, 100
Ytterbium 176
17, 47
Zinc 64
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Zinc 66
49, 121
Zinc 67
61, 94, 107, 114, 122
Zinc 68
30, 46
Zinc 70
38, 87, 94, 104, 107, 126
Zirconium 90
77
Zirconium 92
5, 77
Zirconium 94
77
Zirconium 96
77

B. FOREIGN

Barium 135
164, 200, 214
Barium 138
204, 214
Bromine 79
214
Bromine 81
159
Cadmium 106
137, 147, 209
Cadmium 108
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Cadmium 110
137, 186, 204, 207, 209, 210
Cadmium 111
164, 191, 209
Cadmium 112
137, 146, 175
Cadmium 113
154, 191, 209
Cadmium 114
149, 204, 209, 211, 213, 214
Cadmium 116
204, 207
Calcium 40
202, 204, 209
Calcium 42
147, 165, 209, 213
Calcium 43
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Calcium 44
148, 164, 165, 172, 209, 222
Calcium 48
188, 200
Cerium 136
200
Chlorine 37
134, 160, 214
Chromium 50
134, 138, 146, 147, 166, 167, 209
Chromium 52
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Chromium 53
134, 164, 167, 209, 214

Chromium 54
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Copper 63
159, 169, 204, 209, 228
Copper 65
149, 155, 164, 169, 204, 209, 212, 214, 225
Dysprosium 163
200, 214
Erbium 166
209, 214
Erbium 167
200, 209
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Gadolinium 155
200, 209, 229
Gadolinium High Purity 160
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Gallium 69
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174, 193, 204, 209
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193, 204, 214
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193, 209
Germanium 74
186, 193, 204, 209
Germanium 76
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Hafnium 177
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Indium 113
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Iridium 191
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Iron 54
146, 167, 209, 214
Iron 56
139, 151, 204, 209, 221
Iron 57
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138, 146, 209
Lanthanum 138
195, 200, 209, 229
Lead 204
150, 214
Lead 206
149, 198, 209, 213, 223
Lead 207
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Lead 208
149, 198, 204, 206, 207, 209
Lithium 6
154, 158, 167, 192, 202, 209, 216
Lithium 7
173, 192, 202, 209, 211, 221
Lutetium 175
193
Lutetium 176
167, 200, 210, 214, 229
Lutetium High Purity 176
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Magnesium 24
202, 204, 209, 210
Magnesium 25
147, 167, 209
Magnesium 26
155, 164, 204, 209, 213, 214
Mercury 198
217, 225
Mercury 199
149, 223
Mercury 200
167, 217

Mercury 201
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Mercury 204
167, 217
Molybdenum 92
147, 204, 209
Molybdenum 96
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Molybdenum 98
204, 209
Molybdenum 100
175, 204
Neodymium 143
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Neodymium 145
203, 209, 226
Neodymium 146
193
Neodymium 148
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Neodymium 150
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Nickel 58
167, 184, 204, 209
Nickel 60
162, 172, 204, 209, 213, 214
Nickel 61
167, 209
Nickel 62
146, 167, 172, 196, 209
Nickel 64
167, 184, 196, 209
Osmium 188
209
Osmium 190
197, 214
Osmium 192
134, 147, 152, 209
Palladium 105
164
Palladium 106
214
Palladium 108
152, 162
Palladium 110
187, 198
Platinum 190
135
Platinum 194
164, 183, 214
Platinum 198
187
Plutonium 242
185
Potassium 40
200, 209, 219
Potassium 41
154, 159, 160, 209, 213
Rubidium 85
189
Rubidium 87
157, 161, 189, 209, 214
Ruthenium 99
142, 209
Ruthenium 100
190
Ruthenium 101
214
Ruthenium 102
213
Samarium 148
208, 209
Samarium 149
177, 209
Samarium 152
209, 227
Samarium High Purity 150
226
Selenium 74
167
Selenium 76
167, 174
Selenium 77
141, 145, 160, 164, 225

Selenium 82

140, 156, 176, 225

Silicon 28

209

Silicon 29

178, 179, 214

Silicon 30

139, 179, 209

Silver 107

209, 210

Silver 109

186, 209, 210, 214, 225

Special Services

138, 139, 140, 141, 143, 146, 147, 152, 156, 166, 167, 168, 174, 175, 181, 184, 186, 187, 191, 194, 196, 198, 200, 201, 203, 204, 205, 206, 207, 208, 209, 211, 213, 214, 215, 218, 220, 224, 230

Strontium 84

138, 152, 159, 166, 189, 200

Strontium 86

214

Strontium 87

135

Strontium 88

135, 146

Sulfur 32

152

Sulfur 34

214

Target Preparation Stable

147, 168, 171, 180, 184, 188, 191, 192, 193, 196, 198, 202, 204, 207, 209, 210, 216, 221, 227, 230

Tellurium 124

140, 144, 147

Tellurium 125

214

Tellurium 128

136, 140, 147

Tellurium 130

186, 199, 209

Thallium 203

146, 209, 214

Tin 116

209

Tin 118

204, 209

Tin 119

209

Titanium 46

147, 167, 198

Titanium 47

214

Titanium 48

209

Titanium 49

209, 213

Titanium 50

167, 209

Tungsten 182

214

Vanadium 50

182

Ytterbium 168

166, 230

Ytterbium 171

180, 200

Ytterbium 172

171, 214

Ytterbium 174

213, 227

Ytterbium 176

230

Zinc 64

152, 196, 204

Zinc 66

140, 204, 214

Zinc 67

153, 160

Zinc 68

152, 209

Zirconium 90

184, 204, 209

Zirconium 91

198, 214

Zirconium 94
147, 209
Zirconium 96
196, 205

## III. ALPHABETICAL LIST OF STATES AND COUNTRIES, CROSS-REFERENCED TO CUSTOMER NUMBERS

### A. DOMESTIC

**Alabama**

8, 96

**Arizona**

97

**California**

9, 13, 14, 15, 16, 17, 43, 54, 56, 98, 99, 101, 117, 119

**Colorado**

104, 121

**Connecticut**

4, 21, 55, 133

**Delaware**

31

**District of Columbia**

38

**Florida**

37, 84

**Gainesville, Florida 32611**

105

**Georgia**

39

**Hawaii**

92

**Idaho**

34, 45

**Illinois**

2, 5, 68, 74, 75, 102, 106

**Indiana**

10, 47, 48, 76

**Iowa**

52, 107

**Kentucky**

108, 109

**Louisiana**

94

**Maryland**

44, 57, 61, 69, 70, 110

**Massachusetts**

18, 26, 30, 33, 40, 42, 62, 87, 111, 112, 131

**Michigan**

27, 67, 126

**Minnesota**

63, 113

**Missouri**

60, 114, 115

**New Jersey**

20, 24, 64, 83, 86, 93

**New Mexico**

100

**New York**

7, 12, 23, 32, 35, 49, 50, 58, 71, 81, 82, 85, 127

**North Carolina**

29, 72, 73

**Ohio**

25, 41, 53, 66, 78, 79, 80, 103

**Oregon**

36, 88

**Pennsylvania**

3, 19, 22, 116, 128

**South Carolina**

65, 118

**Tennessee**

6, 51, 77, 89, 124, 132

**Texas**

28, 46, 59, 90, 91, 120, 122, 123

**Virginia**

95

**Washington**

11, 125, 129

**Wisconsin**

1, 130

### B. FOREIGN

**Australia**

134, 135, 136, 137

**Belgium**

138, 139, 140, 141, 142

**Brazil**

143, 144

**Canada**

145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161

Denmark

162, 163, 164

England

165, 166, 167, 168, 169, 170, 171,
172, 173, 174

France

175, 176, 177, 178, 179

Germany

181, 182, 183, 186, 188, 190, 191,
193, 194, 195, 196, 197, 198

Ireland

200

Israel

201

Italy

202, 203, 204, 205, 206, 207

Japan

208, 209, 210, 211, 212, 213, 214

Korea

215

Netherlands

216, 217, 218

New Zealand

219

Sweden

220, 221, 222, 223, 224, 225

Switzerland

226, 227, 228, 229, 230

West Germany

180, 184, 185, 187, 189, 192, 199

## IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988

### EM Stable Isotopes Sales

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| BARIUM-134 | | | | | | | 1 | 22.0 | 119 | 1 | 22.0 | 119 |
| BARIUM-135 | 1 | 500.0 | 375 | 3 | 250.0 | 460 | 1 | 87.0 | 168 | 5 | 837.0 | 1003 |
| BARIUM-138 | 1 | 135.0 | 127 | 2 | 900.0 | 380 | | | | 3 | 1035.0 | 507 |
| BROMINE-79 | 1 | 100.0 | 1780 | 1 | 10.0 | 268 | | | | 2 | 110.0 | 2048 |
| BROMINE-81 | | | | 1 | 15.0 | 370 | | | | 1 | 15.0 | 370 |
| CADMIUM-106 | | | | 3 | 135.0 | 3701 | | | | 3 | 135.0 | 3701 |
| CADMIUM-108 | | | | 1 | 10.0 | 415 | | | | 1 | 10.0 | 415 |
| CADMIUM-110 | 2 | 150.0 | 807 | 6 | 1500.0 | 6675 | | | | 8 | 1650.0 | 7482 |
| CADMIUM-111 | 2 | 60.0 | 467 | 3 | 132.0 | 903 | | | | 5 | 192.0 | 1370 |
| CADMIUM-112 | 5 | 45010.0 | 126326 | 3 | 20050.0 | 53332 | 1 | 5000.0 | 10650 | 9 | 70060.0 | 190309 |
| CADMIUM-113 | 8 | 274.0 | 2128 | 4 | 670.0 | 3649 | 1 | 100.0 | 486 | 13 | 1044.0 | 6264 |
| CADMIUM-114 | | | | 6 | 20760.0 | 37986 | | | | 6 | 20760.0 | 37986 |
| CADMIUM-116 | 1 | 100.0 | 380 | 2 | 1200.0 | 3560 | 1 | 100.0 | 322 | 4 | 1400.0 | 4262 |
| CALCIUM 41 | | | | | | | 1 | 650.0 | 408 | 1 | 650.0 | 408 |
| CALCIUM-40 | 1 | 1000.0 | 850 | 4 | 1330.0 | 1297 | 1 | 186.0 | 210 | 6 | 2516.0 | 2357 |
| CALCIUM-42 | 6 | 730.0 | 23105 | 5 | 360.0 | 11618 | 1 | 500.0 | 12336 | 12 | 1590.0 | 47059 |
| CALCIUM-43 | 5 | 7.0 | 3387 | 1 | 5.0 | 2035 | | | | 6 | 12.0 | 5422 |
| CALCIUM-44 | 6 | 2459.0 | 18673 | 7 | 2325.0 | 17788 | 2 | 504.0 | 3085 | 15 | 5288.0 | 39547 |
| CALCIUM-48 | 5 | 31.0 | 9243 | 2 | 51.0 | 14559 | | | | 7 | 82.0 | 23802 |
| CERIUM-136 | | | | 1 | 1.0 | 138 | | | | 1 | 1.0 | 138 |
| CERIUM-140 | 2 | 1015.0 | 150 | | | | | | | 2 | 1015.0 | 150 |
| CHLORINE-35 | 1 | 1000.0 | 550 | | | | | | | 1 | 1000.0 | 550 |
| CHLORINE-37 | 2 | 250.0 | 2312 | 3 | 57.0 | 781 | | | | 5 | 307.0 | 3094 |
| CHROMIUM-50 | 1 | 150.0 | 1847 | 9 | 1545.0 | 18974 | | | | 10 | 1695.0 | 20821 |
| CHROMIUM-52 | | | | 1 | 150.0 | 227 | 1 | 20.0 | 107 | 2 | 170.0 | 334 |
| CHROMIUM-53 | 3 | 190.0 | 1454 | 5 | 469.0 | 3022 | | | | 8 | 659.0 | 4477 |
| CHROMIUM-54 | | | | 1 | 30.0 | 1421 | | | | 1 | 30.0 | 1421 |
| COPPER-63 | 6 | 2035.0 | 2228 | 6 | 4425.0 | 4152 | | | | 12 | 6460.0 | 6380 |
| COPPER-65 | 6 | 2300.0 | 4970 | 12 | 7098.0 | 14686 | 1 | 100.0 | 249 | 19 | 9498.0 | 19905 |
| DYSPROSIUM-162 | | | | | | | 1 | 208.0 | 136 | 1 | 208.0 | 136 |
| DYSPROSIUM-163 | 1 | 100.0 | 125 | 2 | 440.0 | 310 | | | | 3 | 540.0 | 435 |
| ERBIUM-164 | | | | | | | 1 | 200.0 | 564 | 1 | 200.0 | 564 |
| ERBIUM-166 | 3 | 1338.0 | 567 | 2 | 2000.0 | 600 | 1 | 284.0 | 145 | 6 | 3622.0 | 1312 |
| ERBIUM-167 | | | | 2 | 1540.0 | 585 | | | | 2 | 1540.0 | 585 |
| ERBIUM-168 | 3 | 2010.0 | 702 | 2 | 3000.0 | 800 | 1 | 41.0 | 105 | 6 | 5051.0 | 1607 |
| ERBIUM-170 | 1 | 1925.0 | 773 | | | | 1 | 38.0 | 108 | 2 | 1963.0 | 881 |
| GADOLINIUM-155 | 2 | 99.0 | 358 | 4 | 104.0 | 569 | | | | 6 | 203.0 | 927 |
| GADOLINIUM-156 | | | | | | | 2 | 1010.0 | 710 | 2 | 1010.0 | 710 |

IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988 (Contd.)

EM Stable Isotopes Sales (Contd.)

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| GADOLINIUM-158 | | | | | | | 1 | 10.0 | 104 | 1 | 10.0 | 104 |
| GADOLINIUM-160 | | | | | | | 1 | 10.0 | 102 | 1 | 10.0 | 102 |
| GADOLINIUM-160 H.P. | | | | 1 | 5.0 | 210 | 1 | 10.0 | 274 | 2 | 15.0 | 484 |
| GALLIUM-69 | | | | 2 | 1577.0 | 1146 | | | | 2 | 1577.0 | 1146 |
| GALLIUM-71 | | | | 1 | 10.0 | 110 | | | | 1 | 10.0 | 110 |
| GERMANIUM-70 | 1 | 50.0 | 255 | 4 | 1400.0 | 4470 | 1 | 400.0 | 1094 | 6 | 1850.0 | 5819 |
| GERMANIUM-72 | | | | 3 | 360.0 | 1200 | 1 | 400.0 | 653 | 4 | 760.0 | 1853 |
| GERMANIUM-73 | 1 | 50.0 | 470 | 2 | 110.0 | 1014 | | | | 3 | 160.0 | 1484 |
| GERMANIUM-74 | | | | 4 | 700.0 | 2045 | | | | 4 | 700.0 | 2045 |
| GERMANIUM-76 | | | | 4 | 400.0 | 3920 | 1 | 100.0 | 794 | 5 | 500.0 | 4714 |
| HAFNIUM-174 | | | | 1 | 1.0 | 848 | | | | 1 | 1.0 | 848 |
| HAFNIUM-176 | | | | | | | 2 | 75.0 | 250 | 2 | 75.0 | 250 |
| HAFNIUM-177 | 1 | 150.0 | 365 | 1 | 100.0 | 275 | 1 | 50.0 | 169 | 3 | 300.0 | 809 |
| HAFNIUM-178 | 1 | 100.0 | 240 | 2 | 322.0 | 650 | | | | 3 | 422.0 | 890 |
| HAFNIUM-179 | | | | | | | 1 | 52.0 | 219 | 1 | 52.0 | 219 |
| INDIUM-113 | | | | 2 | 3.0 | 434 | 2 | 74.0 | 5068 | 4 | 77.0 | 5502 |
| IRIDIUM-191 | 1 | 50.0 | 287 | 2 | 115.0 | 696 | | | | 3 | 165.0 | 984 |
| IRON-54 | 1 | 50.0 | 397 | 6 | 1661.0 | 10482 | 3 | 1160.0 | 5930 | 10 | 2871.0 | 16810 |
| IRON-56 | 3 | 4000.0 | 1900 | 7 | 23300.0 | 10020 | 1 | 4000.0 | 1361 | 11 | 31300.0 | 13281 |
| IRON-57 | 6 | 1564.0 | 12721 | 1 | 257.0 | 2091 | 1 | 1068.0 | 2295 | 8 | 2889.0 | 17107 |
| IRON-58 | 5 | 440.0 | 50880 | 4 | 405.0 | 46772 | 1 | 3.0 | 372 | 10 | 848.0 | 98024 |
| LANTHANUM-138 | 3 | 9.0 | 715 | 4 | 121.0 | 5990 | | | | 7 | 130.0 | 6706 |
| LEAD-204 | | | | 2 | 116.0 | 942 | | | | 2 | 116.0 | 942 |
| LEAD-206 | 2 | 170.0 | 446 | 7 | 1260.0 | 2527 | 1 | 100.0 | 211 | 10 | 1530.0 | 3184 |
| LEAD-207 | | | | 1 | 200.0 | 310 | | | | 1 | 200.0 | 310 |
| LEAD-208 | 4 | 1500.0 | 1300 | 7 | 19170.0 | 12727 | 3 | 367834.0 | 300 | 14 | 388504.0 | 14327 |
| LUTETIUM-175 | | | | 1 | 500.0 | 300 | | | | 1 | 500.0 | 300 |
| LUTETIUM-176 | 4 | 27.0 | 1909 | 5 | 33.0 | 4722 | | | | 9 | 60.0 | 6631 |
| LUTETIUM-176 H.P. | | | | 1 | 5.0 | 6603 | | | | 1 | 5.0 | 6603 |
| MAGNESIUM-24 | 1 | 2450.0 | 1373 | 4 | 1740.0 | 1705 | 2 | 604.0 | 604 | 7 | 4794.0 | 3682 |
| MAGNESIUM-25 | 5 | 829.0 | 7580 | 4 | 235.0 | 2409 | | | | 9 | 1064.0 | 9990 |
| MAGNESIUM-26 | 3 | 310.0 | 3694 | 6 | 190.0 | 2680 | 2 | 495.0 | 4497 | 11 | 995.0 | 10872 |
| MERCURY-196 | 2 | 61.0 | 19149 | | | | | | | 2 | 61.0 | 19149 |
| MERCURY-198 | | | | 2 | 51.0 | 1240 | 1 | 10.0 | 238 | 3 | 61.0 | 1478 |
| MERCURY-199 | 2 | 30.0 | 897 | 2 | 30.0 | 897 | | | | 4 | 60.0 | 1795 |
| MERCURY-200 | 1 | 30.0 | 887 | 2 | 70.0 | 2137 | 1 | 35.0 | 844 | 4 | 135.0 | 3869 |
| MERCURY-201 | | | | 1 | 5.0 | 216 | 1 | 11.0 | 307 | 2 | 16.0 | 523 |

IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988 (Contd.)

EM Stable Isotopes Sales (Contd.)

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| MERCURY-202 | 1 | 15.0 | 294 | | | | 1 | 7.0 | 188 | 2 | 22.0 | 482 |
| MERCURY-204 | 1 | 5.0 | 217 | 2 | 70.0 | 1731 | | | | 3 | 75.0 | 1949 |
| MOLYBDENUM-100 | | | | 2 | 16200.0 | 8300 | 1 | 100.0 | 136 | 3 | 16300.0 | 8436 |
| MOLYBDENUM-92 | 1 | 1000.0 | 350 | 4 | 1250.0 | 712 | 2 | 100.0 | 220 | 7 | 2350.0 | 1282 |
| MOLYBDENUM-95 | | | | | | | -1 | -1056.0 | -210 | -1 | -1056.0 | -210 |
| MOLYBDENUM-96 | 1 | 100.0 | 130 | 1 | 350.0 | 205 | | | | 2 | 450.0 | 335 |
| MOLYBDENUM-98 | | | | 2 | 210.0 | 525 | 1 | 300.0 | 442 | 3 | 510.0 | 967 |
| NEODYMIUM-142 | 1 | 200.0 | 480 | | | | 1 | 150.0 | 302 | 2 | 350.0 | 782 |
| NEODYMIUM-143 | 1 | 84.0 | 175 | 1 | 120.0 | 208 | | | | 2 | 204.0 | 383 |
| NEODYMIUM-144 | 3 | 320.0 | 412 | | | | 2 | 3150.0 | 976 | 5 | 3470.0 | 1388 |
| NEODYMIUM-145 | | | | 3 | 955.0 | 976 | 1 | 2000.0 | 1174 | 4 | 2955.0 | 2150 |
| NEODYMIUM-146 | | | | 1 | 1000.0 | 550 | | | | 1 | 1000.0 | 550 |
| NEODYMIUM-148 | 3 | 410.0 | 669 | 2 | 250.0 | 437 | 1 | 2000.0 | 1385 | 6 | 2660.0 | 2491 |
| NEODYMIUM-150 | | | | 2 | 270.0 | 618 | | | | 2 | 270.0 | 618 |
| NICKEL-58 | 3 | 7200.0 | 4260 | 5 | 1800.0 | 1490 | 1 | 400.0 | 267 | 9 | 9400.0 | 6017 |
| NICKEL-60 | 2 | 300.0 | 335 | 8 | 6130.0 | 3558 | 1 | 4000.0 | 1495 | 11 | 10430.0 | 5388 |
| NICKEL-61 | | | | 3 | 125.0 | 2261 | | | | 3 | 125.0 | 2261 |
| NICKEL-62 | 1 | 25.0 | 388 | 6 | 5585.0 | 65106 | | | | 7 | 5610.0 | 65495 |
| NICKEL-64 | 2 | 55.0 | 1283 | 4 | 785.0 | 15864 | 1 | 100.0 | 1668 | 7 | 940.0 | 18816 |
| OSMIUM-188 | | | | 2 | 200.0 | 5460 | | | | 2 | 200.0 | 5460 |
| OSMIUM-190 | | | | 2 | 39.0 | 492 | 1 | 3000.0 | 18032 | 3 | 3039.0 | 18524 |
| OSMIUM-192 | 2 | 112.0 | 659 | 4 | 380.0 | 1958 | 2 | 235.0 | 974 | 8 | 727.0 | 3591 |
| PALLADIUM-105 | | | | 1 | 45.0 | 201 | | | | 1 | 45.0 | 201 |
| PALLADIUM-106 | 1 | 52.0 | 201 | 1 | 54.0 | 205 | | | | 2 | 106.0 | 406 |
| PALLADIUM-108 | | | | 2 | 1000.0 | 2100 | | | | 2 | 1000.0 | 2100 |
| PALLADIUM-110 | | | | 2 | 1177.0 | 4260 | | | | 2 | 1177.0 | 4260 |
| PLATINUM-190 | | | | 1 | 10.0 | 1863 | | | | 1 | 10.0 | 1863 |
| PLATINUM-192 | 1 | 92.0 | 1981 | | | | | | | 1 | 92.0 | 1981 |
| PLATINUM-194 | 1 | 100.0 | 525 | 3 | 241.0 | 1324 | | | | 4 | 341.0 | 1849 |
| PLATINUM-195 | | | | | | | 1 | 24.0 | 110 | 1 | 24.0 | 110 |
| PLATINUM-198 | 2 | 45.0 | 548 | 1 | 400.0 | 3200 | 1 | 15.0 | 192 | 4 | 460.0 | 3940 |
| PLUTONIUM-242 H.P. | | | | 1 | 10.0 | 250 | | | | 1 | 10.0 | 250 |
| POTASSIUM-40 | 1 | 6.0 | 618 | 4 | 57.0 | 3473 | | | | 5 | 63.0 | 4092 |
| POTASSIUM-41 | 5 | 214.0 | 4796 | 6 | 270.0 | 6015 | 1 | 480.0 | 7744 | 12 | 964.0 | 18556 |
| RUBIDIUM-85 | 4 | 460.0 | 2059 | 1 | 120.0 | 532 | | | | 5 | 580.0 | 2591 |
| RUBIDIUM-87 | 11 | 1761.0 | 15983 | 8 | 2966.0 | 25512 | 1 | 10.0 | 167 | 20 | 4737.0 | 41663 |
| RUTHENIUM-100 | | | | 1 | 100.0 | 650 | | | | 1 | 100.0 | 650 |

IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988 (Contd.)

EM Stable Isotopes Sales (Contd.)

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| RUTHENIUM-101 | | | | 1 | 25.0 | 197 | | | | 1 | 25.0 | 197 |
| RUTHENIUM-102 | | | | 1 | 150.0 | 317 | | | | 1 | 150.0 | 317 |
| RUTHENIUM-99 | | | | 3 | 900.0 | 4755 | | | | 3 | 900.0 | 4755 |
| SAMARIUM-147 | 2 | 7.0 | 228 | | | | | | | 2 | 7.0 | 228 |
| SAMARIUM-148 | | | | 2 | 1813.0 | 1428 | 1 | 3000.0 | 1702 | 3 | 4813.0 | 3130 |
| SAMARIUM-149 | 1 | 86.0 | 125 | 2 | 2000.0 | 800 | | | | 3 | 2086.0 | 925 |
| SAMARIUM-150 H.P. | | | | 1 | 36.0 | 343 | | | | 1 | 36.0 | 343 |
| SAMARIUM-152 | 1 | 202.0 | 281 | 3 | 288.0 | 559 | | | | 4 | 490.0 | 841 |
| SELENIUM-74 | | | | 1 | 50.0 | 5180 | | | | 1 | 50.0 | 5180 |
| SELENIUM-76 | 1 | 45.0 | 354 | 2 | 1847.0 | 10543 | | | | 3 | 1892.0 | 10897 |
| SELENIUM-77 | 2 | 429.0 | 6377 | 4 | 105.0 | 1939 | | | | 6 | 534.0 | 8316 |
| SELENIUM-82 | | | | 4 | 70.0 | 2822 | 2 | 80.0 | 2228 | 6 | 150.0 | 5050 |
| SILICON-28 | 1 | 682.0 | 782 | 1 | 200.0 | 300 | | | | 2 | 882.0 | 1082 |
| SILICON-29 | 1 | 500.0 | 13375 | 4 | 384.0 | 10520 | | | | 5 | 884.0 | 23895 |
| SILICON-30 | 1 | 25.0 | 1357 | 3 | 820.0 | 38266 | | | | 4 | 845.0 | 39623 |
| SILVER-107 | 1 | 3000.0 | 4150 | 3 | 1110.0 | 1798 | 1 | 4000.0 | 4223 | 5 | 8110.0 | 10171 |
| SILVER-109 | 1 | 100.0 | 260 | 6 | 2015.0 | 3824 | 3 | 401.0 | 797 | 10 | 2516.0 | 4881 |
| STRONTIUM-84 | 3 | 30.0 | 4969 | 6 | 431.0 | 68042 | 2 | 11.0 | 1590 | 11 | 472.0 | 74602 |
| STRONTIUM-86 | | | | 1 | 11.0 | 203 | 1 | 3680.0 | 1368 | 2 | 3691.0 | 1571 |
| STRONTIUM-87 | 3 | 111.0 | 1983 | 1 | 150.0 | 150 | | | | 4 | 261.0 | 2133 |
| STRONTIUM-88 | | | | | 350.0 | 600 | | | | | 350.0 | 600 |
| SULFUR-32 | | | | 1 | 1000.0 | 600 | | | | 1 | 1000.0 | 600 |
| SULFUR-34 | | | | 1 | 13.0 | 124 | | | | 1 | 13.0 | 124 |
| TANTALUM-180 | | | | | | | 1 | 2.0 | 1847 | 1 | 2.0 | 1847 |
| TELLURIUM-122 | 1 | 10.0 | 302 | | | | 2 | 141.0 | 2501 | 3 | 151.0 | 2803 |
| TELLURIUM-123 | | | | | | | 1 | 140.0 | 2046 | 1 | 140.0 | 2046 |
| TELLURIUM-124 | | | | 3 | 2220.0 | 25386 | 1 | 94.0 | 887 | 4 | 2314.0 | 26273 |
| TELLURIUM-125 | 1 | 10.0 | 187 | 1 | 12.0 | 205 | 2 | 298.0 | 2231 | 4 | 320.0 | 2623 |
| TELLURIUM-126 | | | | | | | 1 | 38.0 | 152 | 1 | 38.0 | 152 |
| TELLURIUM-128 | | | | 4 | 1210.0 | 1994 | 2 | 300.0 | 551 | 6 | 1510.0 | 2545 |
| TELLURIUM-130 | 2 | 600.0 | 830 | 3 | 4200.0 | 4710 | | | | 5 | 4800.0 | 5540 |
| THALLIUM-203 | 6 | 862000.0 | 1674000 | 4 | 30170.0 | 53115 | 2 | 5100.0 | 7318 | 12 | 897270.0 | 1734433 |
| THALLIUM-205 | 2 | 1000.0 | 700 | | | | | | | 2 | 1000.0 | 700 |
| TIN-116 | | | | 1 | 126.0 | 156 | | | | 1 | 126.0 | 156 |
| TIN-117 | | | | | | | 1 | 100.0 | 133 | 1 | 100.0 | 133 |
| TIN-118 | 3 | 1635.0 | 2080 | 2 | 210.0 | 441 | 1 | 200.0 | 277 | 6 | 2045.0 | 2798 |
| TIN-119 | | | | 1 | 59.0 | 120 | 1 | 200.0 | 146 | 2 | 259.0 | 266 |

IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988 (Contd.)

EM Stable Isotopes Sales (Contd.)

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| TIN-122 | | | | | | | 1 | 152.0 | 204 | 1 | 152.0 | 204 |
| TIN-124 | 1 | 120.0 | 160 | | | | | | | 1 | 120.0 | 160 |
| TITANIUM-46 | | | | 3 | 525.0 | 4001 | 2 | 2005.0 | 11201 | 5 | 2530.0 | 15202 |
| TITANIUM-47 | | | | 1 | 14.0 | 206 | | | | 1 | 14.0 | 206 |
| TITANIUM-48 | 1 | 425.0 | 397 | 1 | 100.0 | 170 | | | | 2 | 525.0 | 567 |
| TITANIUM-49 | 1 | 2.0 | 121 | 3 | 45.0 | 790 | | | | 4 | 47.0 | 912 |
| TITANIUM-50 | | | | 2 | 260.0 | 3307 | | | | 2 | 260.0 | 3307 |
| TUNGSTEN-182 | | | | 1 | 350.0 | 205 | | | | 1 | 350.0 | 205 |
| VANADIUM-50 | | | | 1 | 10.0 | 1895 | | | | 1 | 10.0 | 1895 |
| YTTERBIUM-168 | 3 | 34.0 | 4211 | 6 | 1530.0 | 488571 | | | | 9 | 1564.0 | 492783 |
| YTTERBIUM-171 | 1 | 10.0 | 110 | 2 | 2210.0 | 2189 | | | | 3 | 2220.0 | 2299 |
| YTTERBIUM-172 | 1 | 425.0 | 482 | 2 | 312.0 | 480 | | | | 3 | 737.0 | 963 |
| YTTERBIUM-173 | 1 | 94.0 | 179 | | | | 2 | 400.0 | 422 | 3 | 494.0 | 601 |
| YTTERBIUM-174 | | | | 2 | 90.0 | 483 | | | | 2 | 90.0 | 483 |
| YTTERBIUM-176 | 1 | 225.0 | 1720 | 1 | 30.0 | 311 | 1 | 50.0 | 382 | 3 | 305.0 | 2413 |
| ZINC-64 | | | | 3 | 730.0 | 1103 | 1 | 100.0 | 210 | 4 | 830.0 | 1313 |
| ZINC-66 | 1 | 75.0 | 235 | 3 | 360.0 | 951 | 1 | 100.0 | 242 | 5 | 535.0 | 1428 |
| ZINC-67 | 3 | 95.0 | 1810 | 2 | 37.0 | 727 | 2 | 440.0 | 5899 | 7 | 572.0 | 8436 |
| ZINC-68 | 3 | 44721.0 | 204496 | 3 | 170.0 | 1124 | | | | 6 | 44891.0 | 205621 |
| ZINC-70 | 7 | 190.0 | 13701 | | | | 1 | 50.0 | 3040 | 8 | 240.0 | 16741 |
| ZIRCONIUM-90 | | | | 3 | 1922.0 | 2413 | 1 | 20.0 | 102 | 4 | 1942.0 | 2515 |
| ZIRCONIUM-91 | | | | 3 | 506.0 | 8170 | | | | 3 | 506.0 | 8170 |
| ZIRCONIUM-92 | | | | | | | 2 | 655.0 | 1217 | 2 | 655.0 | 1217 |
| ZIRCONIUM-94 | | | | 2 | 300.0 | 1265 | 1 | 20.0 | 154 | 3 | 320.0 | 1419 |
| ZIRCONIUM-96 | | | | 2 | 100.0 | 8697 | 1 | 20.0 | 1152 | 3 | 120.0 | 9849 |
| TOTAL | 227 | 1004282.0 | 2285504 | 402 | 228759.0 | 1263615 | 108 | 422363.0 | 145078 | 737 | 1655404.0 | 3694198 |

Non EM Stable Isotopes Sales

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LITHIUM-6 | 19 | 8939.0 | 14574 | 10 | 7750.0 | 10754 | 7 | 24802.0 | 7967 | 36 | 41491.0 | 33295 |
| LITHIUM-7 | 11 | 20497.0 | 77722 | 6 | 1144.0 | 1652 | 2 | 510.0 | 1832 | 19 | 22151.0 | 81206 |

IV. STABLE ISOTOPE SALES AND SERVICES - FY 1988 (Contd.)

EM Stable Isotopes Sales (Contd.)

| ISOTOPE | DOMESTIC | | | FOREIGN | | | PROJECT | | | TOTAL | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS | SHIP | MILLIGRAMS | DOLLARS |
| Special Services | | | | | | | | | | | | |
| | | | 61658 | | | 238550 | | | 26724 | | | 326932 |
| Targets | | | | | | | | | | | | |
| | | | 12605 | | | 37828 | | | 29663 | | | 80096 |

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