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U.S. Department of Energy

Isotope Program

Reactor-Produced Radioisotopes

DOE Operates Two High Flux Reactors

High Flux Isotope Reactor (HFIR) - ORNL

- Maximum production thermal neutron flux of ~2.6 x 10^{15} neutrons/cm^2/sec
- Hydraulic Tube Facility allows irradiation for short time periods to a full 22 day cycle
- High sample volume positions available
- Thermal/Epithermal ratios of 25 → 40

Advanced Test Reactor (ATR) - INL

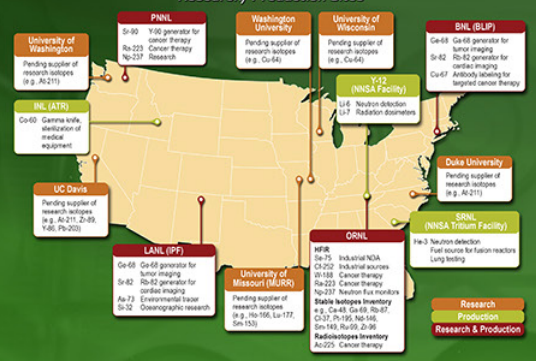
- Hydraulic Tube Shuttle System now available
- Maximum production thermal neutron flux of 2.5 x 10^{14} neutrons/cm^2/sec
- Cobalt-60 is currently produced

Routinely Produced Radioisotopes		
Cf-252	Bk-249	Co-60
Ni-63	Ac-255	Se-75

Special Order or Under Development	
Cd-109	Fe-55
Gd-153	Ho-166m
Lu-177 (HSA)	W-188

Isotope Development and Production for Research and Application Program

Research/Production Sites



Accelerator Produced Radioisotopes

Production and Processing Facilities Available at BNL and LANL

Isotope Production Facility (IPF) - LANL

- 100 MeV proton beam feed to IPF (up to 450 μA)

Brookhaven Linear Isotope Producer (BLIP) - BNL

- Proton beam tunable to 66, 93, 118, 139, 160, 181, 200 MeV (up to 115 μA)

Both IPF and BLIP have multiple target positions available with simultaneous irradiation in low, medium and high energy slots

Routinely Produced Radioisotopes			
Al-26	As-73	Cd-109	Cu-67
Ge-68	Na-22	Rb-83	Si-32
Sr-82	Zn-65		

Special Order or Under Development			
Ac-225	Be-7	Fe-52	Mg-28
Se-72	Tc-95m	Y-86	Y-88

Research and Development

- Therapeutic alpha emitters (At-211, U-233/Th-229/Ac-225/Bi-213, Th-228/Ra-224/Pb-212/Bi-212, U-230/Th-226, Th-227/Ac-227/Ra-223, Ra-225)
- Other therapeutic/theranostic isotopes (Sc-47, Cu-67, Sb-119, Rh-105, Re-186, W-188/Re-188, Pt radioisotopes)
- Isotopes for positron emission tomography (Ti-44/Sc-44, Fe-52, Mn-52, Zn-62/Cu-62, Cu-64, As-76, Y-86, Nb-90)
- Heavy elements (Bk-249, Cm-248, Cf-251)
- New radioisotope/extraction/separations technologies
- Accelerator and reactor isotope production targetry
- Stable isotope enrichment
- Isotope harvesting at rare ion beam facility
- Training in isotope production science and technology

Isotopes Harvested from Long-Lived Stockpiles

In addition to extensive capabilities for the reactor and accelerator production of radioisotopes, a number of isotopes are also available from the decay of long-lived stock materials or as fission products resulting from the processing of nuclear materials including:

Routinely Available			
Ac-225	Am-243	Cm-244	Cm-248
He-3	Pu Isotopes	Ra-223	Th-227
Th-229	U Isotopes		

Available in the Future
Am-241

Recent Accomplishments

- HSA Co-60: Reinstated domestic production for use in medical and industrial applications
- Ra-224/Pb-212 generators: Established production of radium-224/lead-212 generators for medical research
- W-188: Established routine production of bulk solution and W-188/Re-188 generators for medical research
- Cf-249: Supplied for actinide chemistry research
- He-3: Distributed excess inventory through annual auctions for research, medicine, and industry
- Bk-249: Produced for nuclear physics research leading to the discovery of element 117
- Si-32: Produced for environmental researchers investigating climate change
- Np-237: Enabled access to legacy inventory for use in nuclear science research
- Ac-225: Established a tri-lab research collaboration to investigate accelerator production

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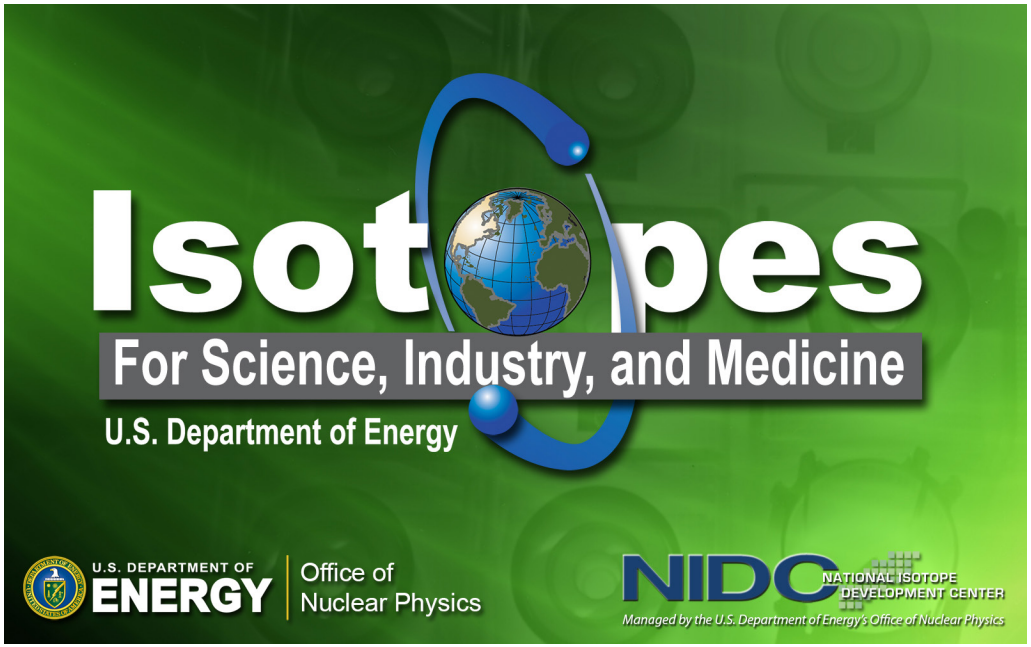
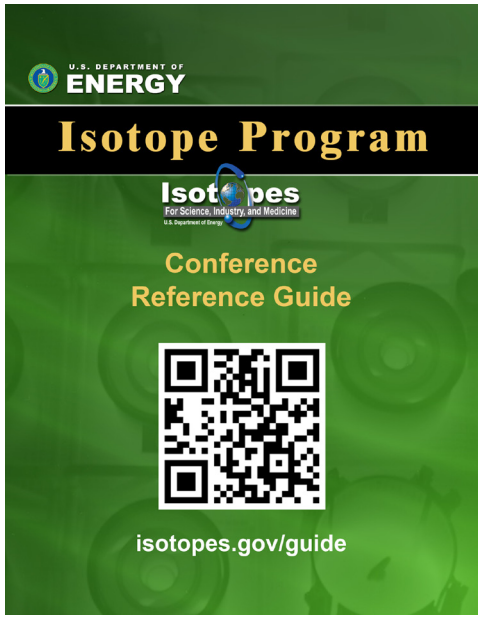
Isotopes For Science, Industry, and Medicine
U.S. Department of Energy

Podium and Table Signs





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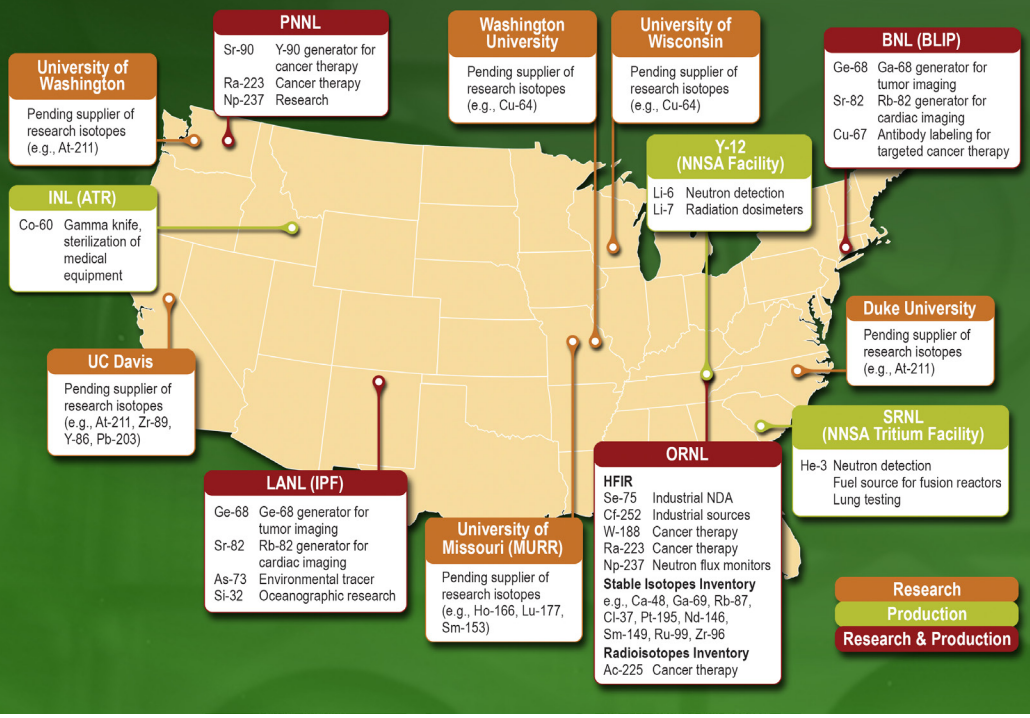

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National Isotope Development Center

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The National Isotope Development Center (NIDC) is managed by the U.S. Department of Energy's (DOE) Office of Nuclear Physics. The NIDC is a virtual service organization which interfaces with the user community and manages the coordination of isotope production across facilities. The NIDC's Isotope Business Office (IBO) manages the business operations involved in the production, sale, and distribution of isotopes.

Information and quotations for products and services can be obtained by contacting:
Isotope Business Office • Oak Ridge National Laboratory • Oak Ridge, TN 37831-6158
Phone: (865) 574-6984 • Fax: (865) 574-6986 • Email: contact@isotopes.gov

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