

Isotopes for Life

The U.S. Department of Energy's Office of Nuclear Energy

Diverse applications range from treating cancer to detecting explosives and preventing acid rain.



• Medical and research isotopes are essential to basic research for the Nation's health care system, and to industrial applications that contribute to national economic competitiveness and homeland security.

• The Department of Energy's (DOE) Isotope Program maintains the infrastructure to produce isotopes.

• **Medical Applications**

- Strontium-82 is used in cardio medical imaging to diagnose diseases and injuries.
- Californium-252 is being tested to treat a variety of cancers, including advanced hypoxic tumors of the cervix.
- As a neutron source, californium-252 is used for boron neutron capture therapy for malignant gliomas.
- Tungsten-188/rhenium-188 is used as a monoclonal antibody label and to relieve bone cancer pain.

• **Industrial/Environmental Applications**

- Silicon-32 is used as a radioactive tracer; for example, to measure silicon uptake by oceanic silicons diatoms in global warming studies.
- Californium-252 is used to start up nuclear reactors.
- Californium-252 is also used to analyze the sulfur content of petroleum in order to limit the production of acid rain.

Homeland Security Applications

- Helium-3 is used in neutron detectors for inspections of cargo containers.
- Nickel-63 is used in devices that can detect explosives and drugs.
- Californium-252 is used to detect the presence of nitrogen-based chemical explosives.

DOE provides isotopes only when there is no U.S. private-sector capability or when the available supply is insufficient to meet U.S. needs. The Department encourages private-sector investment in new isotope production ventures and will sell or lease its existing facilities and inventories for commercial purposes.

Funding

Annual appropriations are applied to the maintenance of isotope production facilities at the Brookhaven (BNL), Los Alamos (LANL), and Oak Ridge National Laboratories (ORNL).

All isotopes are priced to recover production costs. In FY 2006, DOE made 510 deliveries to more than 170 customers, generating revenues of about \$13 million.

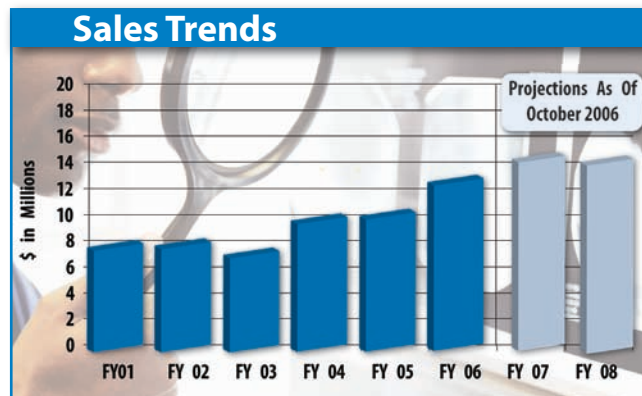
In addition to support for continuing operations at the three production sites, the Isotope Program's requested FY 2007 budget includes:

National Academy of Sciences (NAS) Study

— The NAS study *State of the Science of Nuclear Medicine* is sponsored by DOE and the National Institutes of Health. This jointly sponsored study will be issued in September 2007 and will address future needs for radiopharmaceuticals and medical isotope supply among other important topics.

With the recent approval by the U.S. Food and Drug Administration (FDA) of a therapeutic radio-labeled antibody, the National Cancer Institute and Society of Nuclear Medicine have estimated there will be a dramatic increase in research in uses of medical isotopes. Procedures to meet the FDA's requirements for current Good Manufacturing Practices needed for processing medical isotopes will be revised at BNL, LANL, and ORNL.

Collaborations — The Isotope Program and the Missouri University Research Reactor Center will continue efforts to provide a stable supply of short-lived, reactor-made radioisotopes to the research community.



In addition, DOE has collaborated with a private-sector owner of a linear accelerator and DOE national laboratories in order to develop a stable supply of copper-67, a short-lived isotope that cannot be inventoried and must be routinely made, and is in high demand for targeted cancer therapy.

Planned Program Accomplishments

FY 2007

- Maintain the infrastructures at BNL, LANL, and ORNL in a safe and environmentally compliant condition and state of readiness to provide isotopes for customers.
- Meet customer requests and sales contracts by producing 19 research and commercial isotopes.
- Continue to sell key stable isotopes from existing inventory.
- Develop two new products to accommodate customer needs.

FY 2008

- Maintain the infrastructures at BNL, LANL, and ORNL in a safe and environmentally compliant condition and state of readiness to provide isotopes for customers.
- Manage the marketing, production and sale of isotopes that are not otherwise available to researchers and industry.
- Revise procedures to meet the FDA's requirements for current Good Manufacturing Practices needed for the processing of medical isotopes at BNL, LANL, and ORNL.
- Maintain 95 percent on-time deliveries and ensure more than 98 percent of products and services to meet the terms of the contract/sales orders.