Isotopes for Threat Reduction

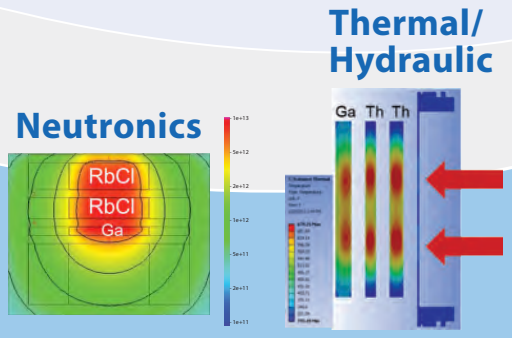
Isotope production at Los Alamos National Laboratory ensures:

- A safe, secure and reliable domestic supply of radionuclides that reduces our dependence on foreign-supplied isotope materials and services.
- A source of surrogate materials and analytical standards for use in testing and validation of procedures.
- A supply of radiotracers for environmental impact studies after radiation dispersal events and for model validation and related applications.
- Radionuclides and technical expertise needed for nuclear forensic applications.

Modeling Capabilities

Extensive application of software systems to model:

- The behavior of targets under extreme thermal, mechanical, and radiation conditions.
- Yields of primary products and impurities in a variety of irradiation environments.



Modeling capability includes mechanical, thermal hydraulic analysis of targets as well as predictions of isotope yields based on proton and secondary neutron interactions.

Isotopes for Environmental Science

Isotopes produced at Los Alamos National Laboratory are used as environmental tracers.

- As-73 is used to investigate environmental contamination and transport of toxic arsenic.
- Na-22 and other environmentally relevant isotopes are needed to understand flowpaths for geochemical and hydrologic modeling.
- Al-26 is utilized to elucidate the impacts of acid rain.
- Si-32 is needed for oceanographic tracing, which contributes to a better understanding of climate change and its aggregate impacts on the environment.

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For more information visit
http://isotopes.lanl.gov/

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Los Alamos National Laboratory Isotope Production and Applications Program

Committed to the safe and reliable production of isotopes for the Nation

Over 40 years of experience providing radioisotope products and services

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Our Capabilities

Los Alamos National Laboratory's Isotope Production and Applications Program is unique.

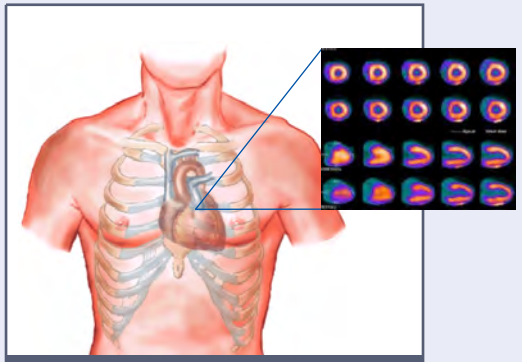
- The Isotope Production Facility (IPF), located at the Los Alamos Neutron Science Center (LANSCE), uses a 100 MeV proton beam at 250 μA to produce isotopes from an 800 MeV-capable accelerator.
- The Radiochemistry Complex, located at TA-48, houses a dedicated processing facility with 13 hot cells able to shield up to 1000 Ci of Co-60. The hot cells are cGMP/FDA compliant for production of active pharmaceutical ingredients.
- The Plutonium facility, located at TA-55, is developing capability for large scale Am-241 processing.
- Expertise in nuclear physics, radiochemistry, radionuclide applications, actinide science and targetry development.

IPF is located at the Los Alamos Neutron Science Center (LANSCE).

The Isotope Program has:

- Expertise in targetry development, radiochemistry, and nuclear physics, with access to Los Alamos National Laboratory's broad talent pool in chemistry, bioscience, materials science, and analysis of radioactive materials.
- Access to LANSCE National User Facilities, including the Lujan Center and Neutron Science Facilities, for materials and nuclear physics research.
- National and international collaborations, including partnership with the University of New Mexico's New Mexico Center for Isotopes in Medicine (NMCIM).

Isotopes for Nuclear Medicine



Isotopes produced at IPF are critical for medical diagnosis. Strontium-82 produced at LANL is used for ~30,000 cardiac perfusion studies each month by positron emission tomography scanning (PET).

We save lives

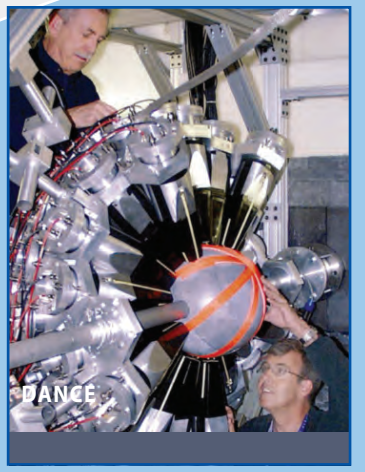
- LANL is a major domestic supplier of the important diagnostic isotopes Sr-82 and Ge-68 and is researching methods to increase supply to meet the needs of the medical community.
- The Isotope Program is actively researching the production of isotopes for therapeutic applications, including promising alpha-emitting radionuclides for targeted radiotherapy such as Ac-225.

LANL is participating in a Tri lab effort with ORNL and BNL to scale up production of Ac-225.

Isotopes for Fundamental Science

Nuclear Physics and Accelerator Science Research

- The IPF and the LANSCE accelerator are the only facilities in North America contributing charged particle nuclear data relevant to radionuclide production in the energy range from 100-800 MeV.
- Our isotopes are used to perform cross-section measurements at a variety of facilities including the Detector for Advanced Neutron Capture Experiment (DANCE) at LANSCE to generate critical nuclear data and provide input for the development of radiation transport codes including MCNPX.
- IPF can also produce off-stability radionuclides for the study of r- and s-processes in stars, which are of great interest for astrophysics.



IPF integrates with researchers to prepare unique targets for facilities including the Los Alamos Neutron Science Center's DANCE detector that is designed to study neutron capture reactions on small quantities (~ 1 mg) of radioactive or rare stable nuclei.

Training, Education, and Outreach Opportunities

- The Isotope Program is always actively seeking talented students, postdocs, and visiting scientists in radiochemistry, nuclear physics, and engineering to learn about and contribute to isotope production.