

## Isotopes for Threat Reduction

Isotope production at Los Alamos National Laboratory ensures the following:

- A safe and secure domestic supply of isotopes by limiting our dependence on foreign-supplied isotope shipment and delivery.
- Source and surrogate materials for use in testing, validation, and training.
- Radiotracers needed for environmental impact studies after radiation dispersal events for model validation and other related applications.
- Materials needed for nuclear forensic applications.
- Isotopes needed for membrane permeability studies.

## Isotopes for Defense Programs

Los Alamos National Laboratory isotopes are used for fundamental property studies.

*Isotopes are used to develop better ways to detect concealed nuclear materials in trucks and cargo containers.*

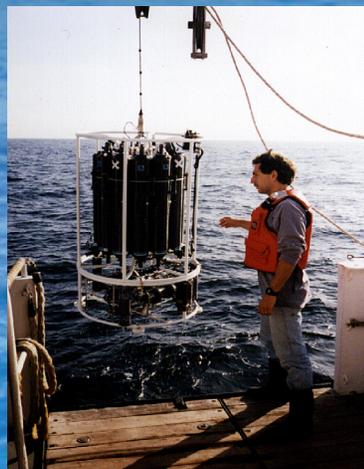


## Isotopes for Environmental Science

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

- As-73 is needed to understand As contamination and transport.
- Na-22, Sr-87, and other solute reactive isotopes are needed to understand flowpaths for geochemical and hydrologic modeling.
- Al-26 is needed to understand the impacts of acid rain.
- Si-32 is needed for oceanographic tracing, which contributes to a better understanding of climate change and its effects.

*Los Alamos National Laboratory can produce Si-32 needed for oceanographic tracing and to study the effects of climate change.*



LA-LP-08-053

For more information visit  
<http://nuclear.lanl.gov/isotopes.shtml>

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# Isotope Science and Production

**35 years of experience in isotope production, processing, and applications.**



**Committed to the safe and reliable production of radioisotopes, products, and services.**

Los Alamos National Laboratory



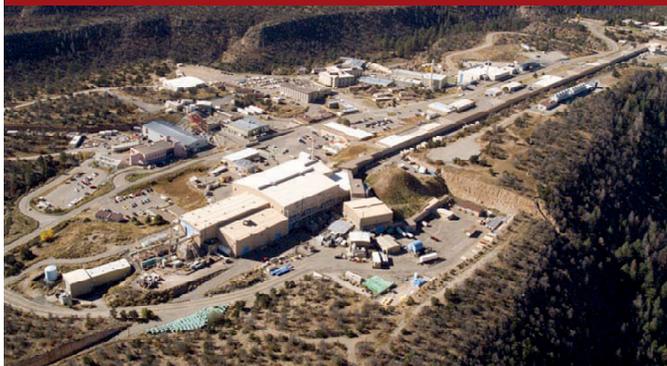
Contact: Kevin John  
LANL Isotope Program Manager  
[kjohn@lanl.gov](mailto:kjohn@lanl.gov)  
505-667-3602

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National Isotope Program  
<http://www.nuclear.energy.gov/isotopes/nelsotopes2a.html>

## Our Capabilities

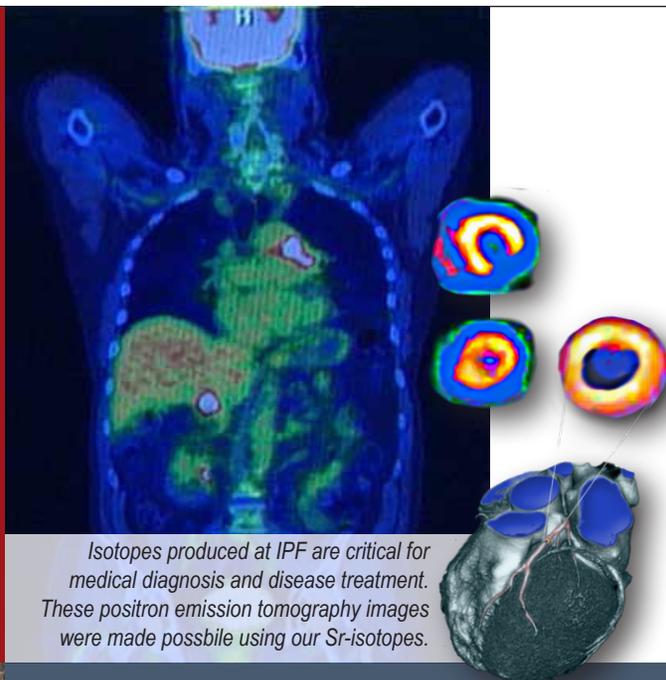
Los Alamos National Laboratory's Isotope Science and Production program is unique. Our capabilities include the following:

- Isotope Production Facility (IPF), located at the Los Alamos Neutron Science Center (LANSCe), uses up to 100 MeV at 250  $\mu$ A to produce isotopes via our 800-MeV accelerator.
- Dedicated processing facility with 13 hot cells.
- cGMP compliant processing.
- Plutonium facilities for Am-241 processing.
- Chemical metallurgy facilities and additional hot cells.
- LANSCe national user facilities, including the Lujan Center and Neutron Science facilities, for materials and isotope research.



IPF is located at the Los Alamos Neutron Science Center

- Los Alamos National Laboratory's many other synthetic, characterization, and counting facilities.
- On-site waste processing facilities.
- Expertise in targetry development, chemistry, bioscience, materials science, and nuclear physics.
- National and international university collaborations, including partnership with the University of New Mexico's New Mexico Center for Isotopes in Medicine (NMCIM).
- Isotope production upon request. Our current portfolio includes Sr-82, Ge-68, Cd-109, As-73/74, Lu-173, Gd-148, Y-88, and Na-22. We have the potential to produce many more.



Isotopes produced at IPF are critical for medical diagnosis and disease treatment. These positron emission tomography images were made possible using our Sr-isotopes.

## Isotopes for Nuclear Medicine

### We save lives

- Our nuclear medicine isotope production, including Sr-82 and Ge-68, are critical to ensuring a safe and reliable domestic supply of isotopes for medical diagnosis and treatment.
- We are developing new generator technologies, like Ge-68/Ge-68 and Se-72/As-72.
- We are conducting targeted radionuclide therapy research using, for example, Bi-213 and Ac-225, in collaboration with NMCIM.
- We are developing chelating agents for optimal radionuclide delivery, like our current capture-polymer studies and nanoparticle delivery-mechanism research.
- We can produce isotopes for dosimetry and toxicology research.

## Isotopes for Fundamental Science

### Space Research

- We're researching alternative power sources for longer-life space missions.
- We produce isotopes for use in irradiation studies that simulate electronic device exposure to cosmic radiation.

### Nuclear Physics

Our isotopes are used, for example, in:

- Cross-section measurements to optimize isotope irradiations, modeling for targetry design, and
- MCNPX code development and application to other types of isotope production.

**The IPF also provides unique opportunities for doing accelerator science research.**

### Astrophysics

- Production of off-stability isotopes for the study of s-processes.

### Training Opportunities

- Radiochemistry training, including on all levels of isotope production and application, for students, postdocs, and visiting scientists.



We're researching the production of a less-hazardous radioisotope power source to replace Pu-238 in spacecrafts, such as the Mars Rover.

Courtesy NASA/JPL-Caltech