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OFFICE OF SCIENCE

NP Isotope Program and Facilities

DOE Nuclear Physics SBIR workshop

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Isotope Development and Production for Research and Applications

Office of Nuclear Physics

Office of Science, U.S. Department of Energy

Program Mission

The mission of the DOE Isotope Program is threefold:

- Produce and distribute radioactive and stable isotopes that are in short supply, associated byproducts, surplus materials and related isotope services.
- Maintain the infrastructure required to produce and supply isotope products and related services.
- Conduct R&D on new and improved isotope production and processing techniques.

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History

- The isotope program was created by Congress in the late 1980s to consolidate isotope production activity in DOE
- The program was located in the Office of Nuclear Energy with funding from a revolving fund amounting to one year's sales
- Ironically, most of the production facilities utilized by the program were outside NE
- In FY2009, the program was moved from Office of Nuclear Energy to the Office of Science, Office of Nuclear Physics program.
- Better alignment with production labs was achieved – BNL, ORNL, PNNL are Office of Science labs.
- LANL (NNSA) and INL (NE) maintain participation in the program.
- NP had traditionally supported a mix of lab-based and university-based facilities

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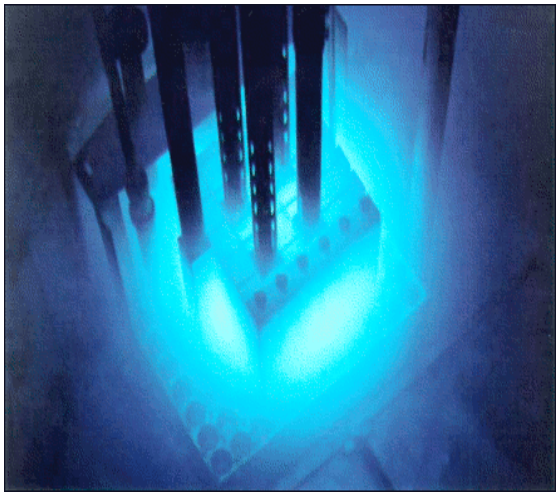
Present



- The program was re-christened the National Isotope Development and Production for Research and Applications Program
- A clear revision of its focus was adopted
  - Workshop in August 2008
  - NSAC subcommittee reports
- The program is managed from HQ
- Issues of substance will be conducted “Fed to Fed”
- Peer review will be utilized
- Funds for STTR & SBIR are available

NSAC Research Isotope Recommendations – Report 1

Compelling Research Opportunities using Isotopes

- Invest in new production approaches of alpha-emitting radionuclides, e.g. Ac-225, At-211.
- Invest in coordination of production capabilities and supporting research.
- Produce isotopes of the heavy elements, e.g. Cf, Ra, TRU.
- Focused study and R&D on new or increased production of He-3.
- Re-establish domestic production and supply of stable isotopes.
- Robust investment into education and training.

NSAC Long Range Plan Recommendations

Isotopes for the Nation's Future - A Long Range Plan

- Maintain a dialogue with all interested federal agencies and commercial isotope customers to forecast and match realistic isotope demand and achievable production capabilities.
- Coordinate production capabilities and supporting research to facilitate networking among existing DOE, commercial, and academic facilities.
- Support a sustained research program in the base budget to enhance the capabilities of the isotope program in the production and supply of isotopes generated from reactors, accelerators, and separators.
- Invest in workforce development in a multipronged approach, reaching out to students, post-doctoral fellows, and faculty through professional training, curriculum development, and meeting/workshop participation.

NSAC Long Range Plan Recommendations

- Devise processes for the isotope program to better communicate with users, researchers, customers, students, and the public and to seek advice from experts:
- Encourage the use of isotopes for research through *reliable availability* at *affordable* prices.
- Increase the robustness and agility of isotope transportation both nationally and internationally.
- Construct and operate an electromagnetic isotope separator facility
- Construct and operate a variable-energy, high-current, multi-particle accelerator and supporting facilities that have the primary mission of isotope production.

National Isotope Development Center

- As part of the move, NIDC was set up. NIDC is a virtual center responsible for five activities:
  - Manage the Isotope Business Office at ORNL
  - Oversee production scheduling
  - Oversee shipping and distribution
  - Communications
    - Website
    - Newsletter
    - IDPRA booth
    - Customer interactions
  - Identify QA/QC support

IDPRA Program staffing

- DOE HQ
  - Jehanne Gillo, Program director
  - Dennis Phillips, Program Manager, R&D
  - Marc Garland, Program Manager, Production
- NIDC
  - Robert Atcher, PhD, MBA – Director
  - Wolfgang Runde, PhD – Associate Director, Production Planning
  - Mitch Ferren, MS – Associate Director, Isotope Business Office
  - Jeff Shelton, BS – Task Leader, Packaging, Shipping, Distribution
  - TBD – QA/QC

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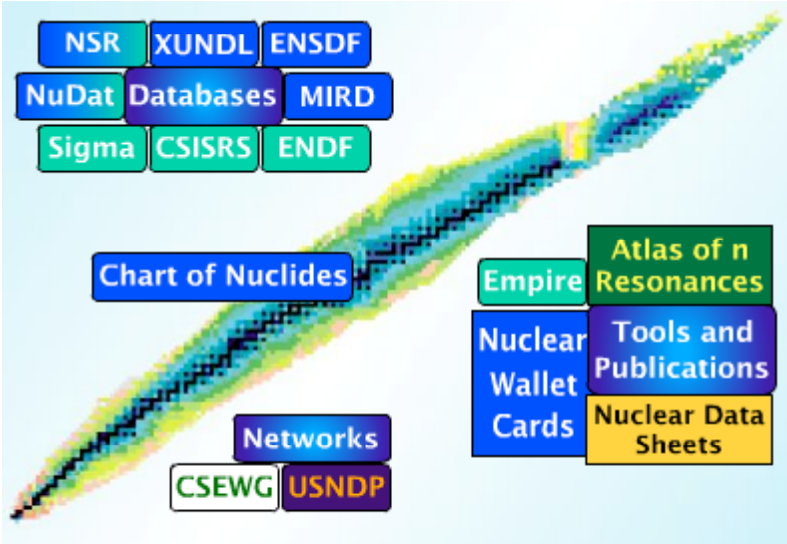
Expert resources

- One example of the engagement of expert resources
  - Identify experts to advise on issues related to QC and QA
    - Calibration
    - Assessing production
    - Drug Manufacturing Files
    - Good Manufacturing Practice
      - ICH Q7A
    - ISO 9000
    - Audit existing activity
    - Train sites for compliance



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Production Planning

- Align production capability and demand
  - Assess capabilities of sites
  - Review operating schedule vs. delivery dates
  - Determine most cost effective option
  - Work with customer to determine specifications for material
  - Monitor operating schedule
  - Revise any production plan if necessary

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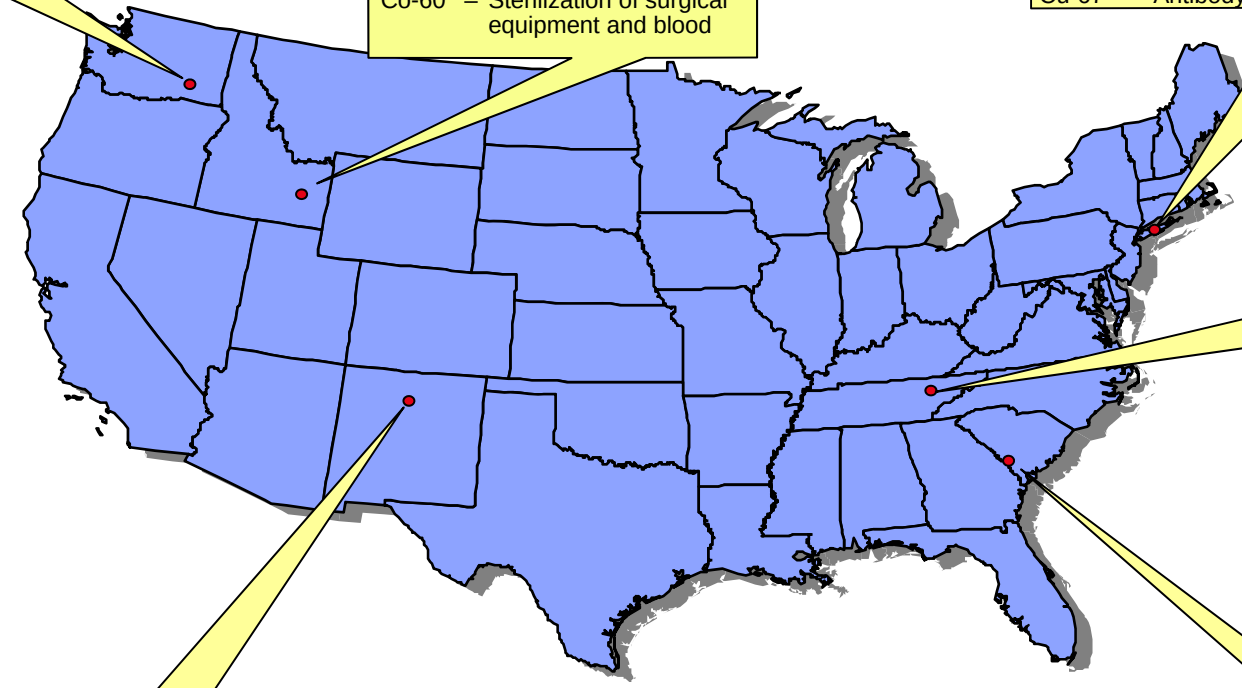
Historical Isotope Production Sites in the DOE Isotope Program



Richland:

Sr-90 – Y-90 gen for cancer therapy

Idaho – ATR:

Co-60 – Sterilization of surgical equipment and blood

Brookhaven – BLIP:

Ge-68 – Calibration sources for PET equipment; Antibody labeling

Sr-82 – Rb-82 gen used in cardiac imaging

Cu-67 – Antibody label for targeted cancer therapy

Oak Ridge – HFIR:

Se-75 - Industrial NDA; Protein studies

Cf-252 - Industrial source

W-188 - Cancer therapy

Stable Isotopes Inventory:

Inventory:

Ac-225 - Cancer therapy

Los Alamos – LANSCE/IPF:

Ge-68 – Calibration sources for PET equipment; Antibody labeling

Sr-82 – Rb-82 gen used in cardiac imaging

As-73 – Radiotracer

Savannah River – Tritium Facility:

He-3 – Neutron detection
– Fuel source for fusion reactors
– Lung testing

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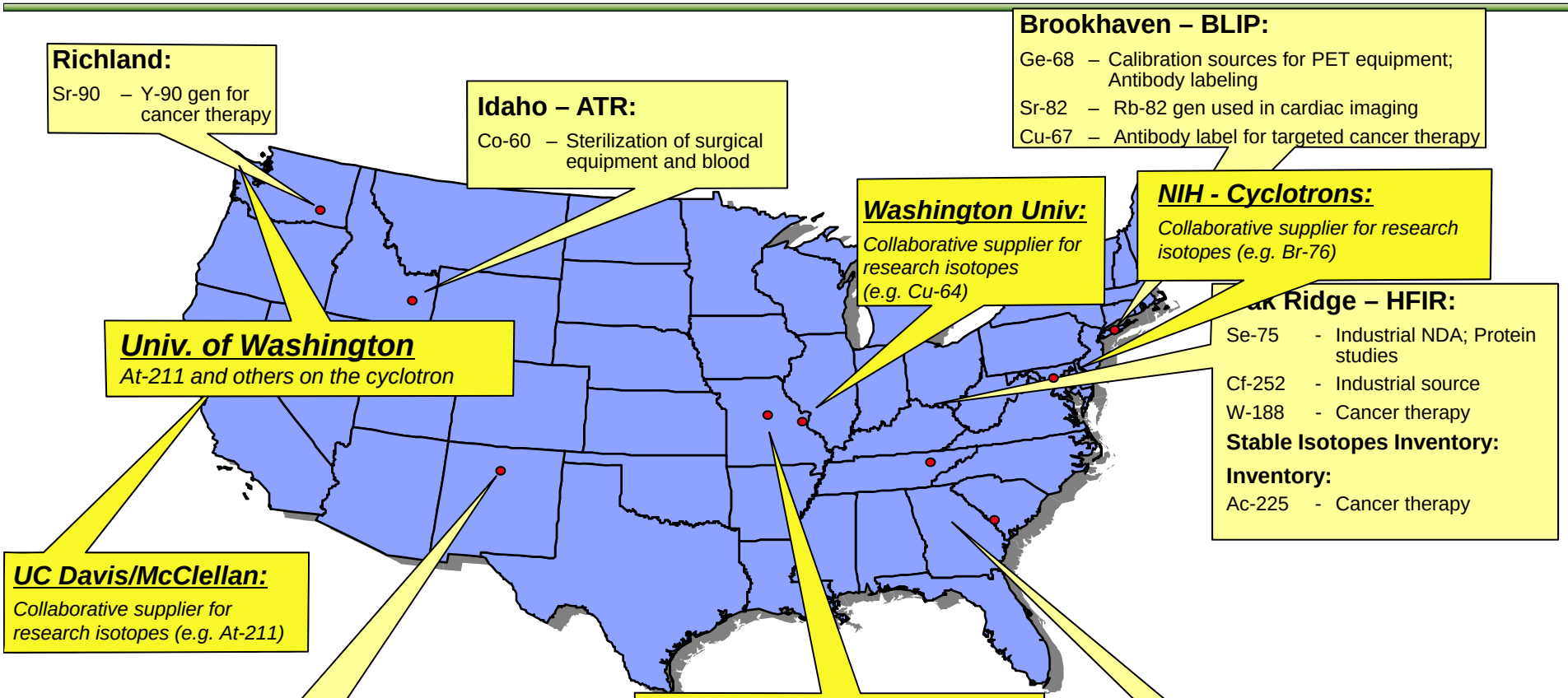
Potential Production Sites To Integrate in the Isotope Program



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Brookhaven – BLIP:
Ge-68 – Calibration sources for PET equipment; Antibody labeling
Sr-82 – Rb-82 gen used in cardiac imaging
Cu-67 – Antibody label for targeted cancer therapy

Washington Univ:
Collaborative supplier for research isotopes (e.g. Cu-64)

NIH - Cyclotrons:
Collaborative supplier for research isotopes (e.g. Br-76)

Univ. of Washington
At-211 and others on the cyclotron

ak Ridge – HFIR:
Se-75 - Industrial NDA; Protein studies
Cf-252 - Industrial source
W-188 - Cancer therapy
Stable Isotopes Inventory:
Inventory:
Ac-225 - Cancer therapy

UC Davis/McClellan:
Collaborative supplier for research isotopes (e.g. At-211)

Columbia – MURR:
Collaborative supplier for research isotopes (e.g. As-72)

Los Alamos – LANSCE/IPF:
Ge-68 – Calibration sources for PET equipment; Antibody labeling
Sr-82 – Rb-82 gen used in cardiac imaging
As-73 – Biomedical tracer

Savannah River – Tritium Facility:
He-3 – Neutron detection
– Fuel source for fusion reactors
– Lung testing

Shipping and Distribution

- Provide oversight for the entire program
- Monitor incoming shipments from external production sites
- Track location and movement of shipping containers
  - Type B
- Monitor shipments from production sites to customers
- Interact with freight companies, customs agents, and others to expedite material movement
- Work with shipping container suppliers for new designs
- Organize task group to provide guidance

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Communications

- Website has been updated
  - Searchable by isotope or element
  - Linked to IBO to facilitate inquiry on price and schedule
  - Also provide archive of newsletters and other communications
- Newsletter re-established
- Point of Contact for customers
- Staff booth at SNM, ACS and other meetings
- Act to inform both the stakeholders and DOE mgmt. on developments related to isotope use

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www.isotopes.gov

NIDC NATIONAL ISOTOPE DEVELOPMENT CENTER

the government source of isotopes for science, medicine, security, & applications

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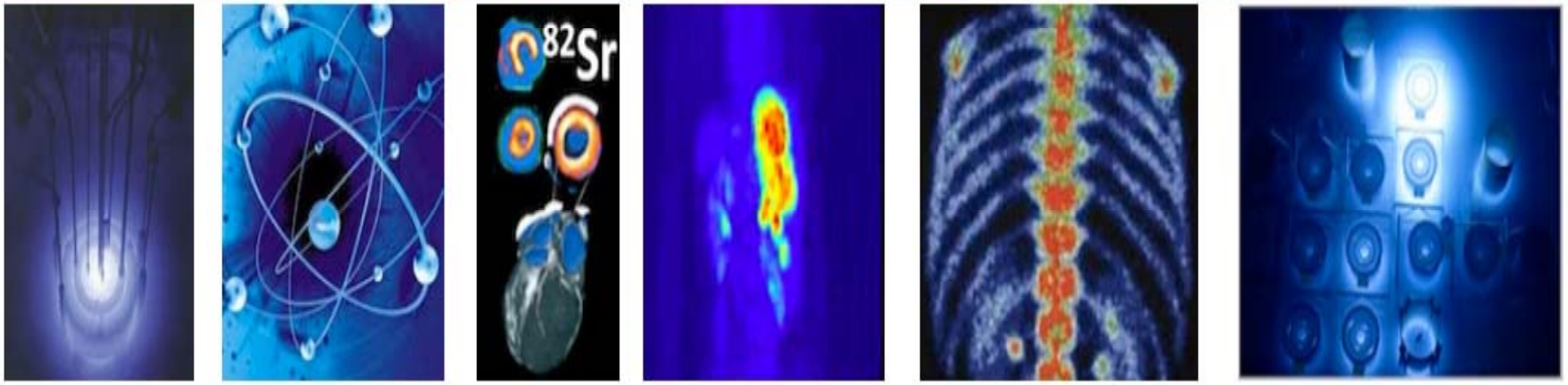

Half of European Demand for Mo-99 to be met by FRM II Neutron Source in Germany -- for details see Breaking News

Opportunities for Small Business

- The Isotope program has substantial interactions with industry as a supplier of stable enriched and radioactive isotopes
- Small business can provide support for the program in a variety of areas
  - Stable isotope enrichment
    - Improved electromagnetic enrichment capability
    - Improved centrifugal enrichment capability
    - New technology for isotope enrichment
  - Accelerator production of radioisotopes
    - New accelerator technology
      - Cyclotron
      - LINAC
      - Injector technology

Opportunities for Small Business

- Small business can provide support for the program in these areas:
  - Reactor isotope production
    - New isotopes for industrial and other applications
      - Radiation and Power sources
      - In-core neutron irradiations
    - New target materials
    - Alternative neutron sources
  - Radioisotope production
    - Novel target materials and target transport systems
    - Separation chemistry
      - Ion exchange materials
      - Automation
    - Radioisotope Generators

Opportunities for Small Business

- Small business can provide support for the program in these areas:
  - Software to support isotope production
    - Automation
    - Modeling and theory
    - Other applications
  - Isotope Program
    - Shipping and distribution
    - Business office operations
    - Public private partnerships

National Isotope Development Center

- Contact information
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Thank you!