NP Isotope Program and Facilities

DOE Nuclear Physics SBIR workshop
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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.
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 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.
The program was re-christened the National Isotope Production and Applications Program.

A clear revision of its focus was adopted:
- Workshop in August 2008
- NSAC subcommittee reports

The program will be run from HQ.

Issues of substance will be conducted “Fed to Fed”

Peer review will be utilized.

Funds to support SBIR are available.
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.
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.
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.
As part of the move, NIDC was set up. NIDC is responsible for five activities:

- Identify and provide expert support for IPA activity
- Manage the Isotope Business Office at ORNL
- Oversee production scheduling
- Oversee shipping and distribution
- Communications
  - Website
  - Newsletter
  - IPA booth
  - Customer interactions
Examples of the engagement of expert resources

- Identify participants for peer review activity
- Accelerator production on new products for the portfolio
- Engage experts on reactor production on new products for the portfolio
- Engage experts on enrichment technology for re-instituted program
- Identify experts to advise on issues related to QC and QA
  - Calibration
  - Assessing production
  - Drug Manufacturing Files
  - Good Manufacturing Practice
  - ISO 9000
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
Historical Isotope Production Sites in the DOE Isotope Program

Idaho – ATR:
Co-60 – Sterilization of surgical equipment and blood
Sr-82 – Rb-82 gen used in cardiac imaging
Cu-67 – Antibody label for targeted cancer therapy

Richland:
Sr-90 – Y-90 gen for cancer therapy

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

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

Oak Ridge – HFIR:
Se-75 – Industrial NDA; Protein studies
Cf-252 – Industrial source
W-188 – Cancer therapy

Stable Isotopes Inventory:
Top 10 stable isotopes sold over the last 5 years:
Ca-48, Ga-69, Rb-87, Cl-37, Pt-195, Nd-146, Sm-149, Ru-99, Zr-96
Inventory:
Ac-225 – Cancer therapy

Savannah River – Tritium Facility:
He-3 – Neutron detection
– Fuel source for fusion reactors
– Lung testing
Additional Production Sites Integrated in the 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

**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

**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

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

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

**Stable Isotopes Inventory:**
Top 10 stable isotopes sold over the last 5 years:
Ca-48, Ga-69, Rb-87, Cl-37, Pt-195, Nd-146, Sm-149, Ru-99, Zr-96

**Inventory:**
Ac-225 – Cancer therapy
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
Communications

- Website will be updated
  - Searchable by isotope or element
  - Linked to IBO to facilitate inquiry on price and schedule
  - Also provide archive of newsletters and other communications

- Re-establish Newsletter

- 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
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
    - 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
Contact information

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Thank you!