DOE Isotope Program
Stable and Radioactive Materials

NIMSSS Users Training Meeting
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Mr. Joel Grimm
DOE Isotope Program
Office of Nuclear Physics, Office of Science, U.S. Department of Energy
The mission of the DOE Isotope Program is threefold:

- Produce radioactive and stable isotopes that are in short supply
- Maintain infrastructure
- Conduct R&D on new and improved isotope production

Produce isotopes that are in short supply only – we do not compete with industry

FY2013:
>470 shipments supporting
>225 customer orders
- Public Law 101-101 creates Isotope Production Fund
- Allows prices based on cost recovery, market value, U.S. research needs, and other factors.

Resources

- Appropriations
- Production
- Services
- R&D
- Mission Readiness
- Funds From Sales (Production)

Products for Medicine, Manufacturing, Research and National Security

Users
Integrated Production Sites

PNNL
Sr-90  Y-90 generator for cancer therapy
Ra-223  Cancer therapy
Np-237  Research

INL (ATR)
Co-60  Gamma knife, sterilization of medical equipment
Sr-82  Rb-82 generator for cardiac imaging
Cu-67  Antibody labeling for targeted cancer therapy

Washington Univ.
Pending supplier of research isotopes (e.g., At-211)

UC Davis
Pending supplier of research isotopes (e.g., At-211, Zr-89, Y-86, Pb-203)

LANL (IPF)
Ge-68  Ga-68 generator for tumor imaging
Sr-82  Rb-82 generator for cardiac imaging
As-73  Environmental tracer

BNL (BLIP)
Ge-68  Ga-68 generator for tumor imaging
Sr-82  Rb-82 generator for cardiac imaging
Cu-67  Antibody labeling for targeted cancer therapy

Washington Univ.
Pending supplier of research isotopes (e.g., Cu-64)

ORNL
HFIR:
Se-75  Industrial NDA, protein studies
Cf-252  Industrial sources
W-188  Cancer therapy
Ra-223  Cancer therapy
Np-237  Neutron flux monitors

Stable Isotopes:

Radioisotopes Inventory:
Ac-225  Cancer therapy
Pu-238, Pu-239, Am-243  Curium

Y-12 (NNSA Facility)
Li-6  Neutron detection
Li-7  Thermoluminescent dosimeters

SRNL (NNSA Tritium Facility)
He-3  Neutron detection
Fuel source for fusion reactors
Cryogenic Research
Accelerator Production

**100-MeV IPF**

**IPF at LANSCE**

- Diversion of 100 MeV proton beam to target station
- Irradiates targets while LANSCE operates for NNSA/BES
Reactor Production

**/ORNL High Flux Isotope Reactor:/**
- High neutron flux
- Several hot cell facilities
- Cf-252, W-188, Ni-63, Se-75

**/INL Advanced Test Reactor/**
- Moderately high neutron
- Hot cell facilities
- Key Isotope: Co-60
NNSA Surplus Materials

- NNSA Byproducts
- Stable and Radioactive
- Decay and Activation Products from Stockpile Stewardship
- Accountable and non-Accountable
The NIDC and Isotope Business Office
- Coordinates all DOE distribution of isotope products and services
- Sales contract Management
- www.isotopes.gov
- isotopes@ornl.gov
Enriched Stable Isotopes

- Isotope Program manages inventory sales from Y12 Calutrons
- Developing new stable isotope separation technology
- Transition from R&D to prototype production facility – Start of fabrication in December 2013
Targeted Radiotherapy

- Revolutionary Cancer Treatment
- Engineered Antibodies Take Alpha Emitters Directly into Tumor Cells
- Focus is on Using Th-232
  - Target for Ac-225 production
  - Production Research Under Way at Los Alamos and Brookhaven
- Supporting Clinical Trials and other Research
Cobalt-60

- Co-60 used for Gamma Knife surgery and gamma radiography
- 2012 Target failure at INL impacted production
- Isotope Program conducting multi-lab re-design of targets
- Priority in program to re-establish production
Global Supplier

Cryogenics, Research and Neutron Detector Manufacturing

Savannah River Tritium Recovery Operations

2008 Shortages Addressed by High-Level Interagency Policy Group

Demand now Stands at Less than 10,000 Liters Annually

7,000 Liters allocated to Federal Research Users Annually

Periodic Auctions Provide Another 4,000 Liters to Commerce
Lithium-6
- Key Replacement Material for He-3 Neutron Detectors
- Y12 Produces and Distributes Metal

Lithium-7
- Limited NNSA Reserve at Y12
- Thermo-luminescent Dosimeters
- Power Reactors -- Coolant Chemistry
- Foreign Producers
- Growing Global Demand
- Reserve for Isotope Sales
- Well Logging Industry Completely Reliant upon Foreign Imports
- Extracted Plutonium Processing Residues at LANL
- 3.5 Kilograms
- Sealed Source Manufacturers
Californium-252

- Produced by Curium Irradiation at ORNL
- Provide Cf-252 through dedicated sales contracts with sealed source manufacturers
- Neutron sources for industrial, research, medical, homeland security and defense applications.
Other Accountable Actinides

- Mixed Oxides and Metals in Inventory
- Pu-240, -241, -243, -244
- Am-243, Curium, Np-237
- From Weapons Development and Testing
- Unique Materials
- Many Unprocessed Targets
- Needed for CRMs and Other Uses