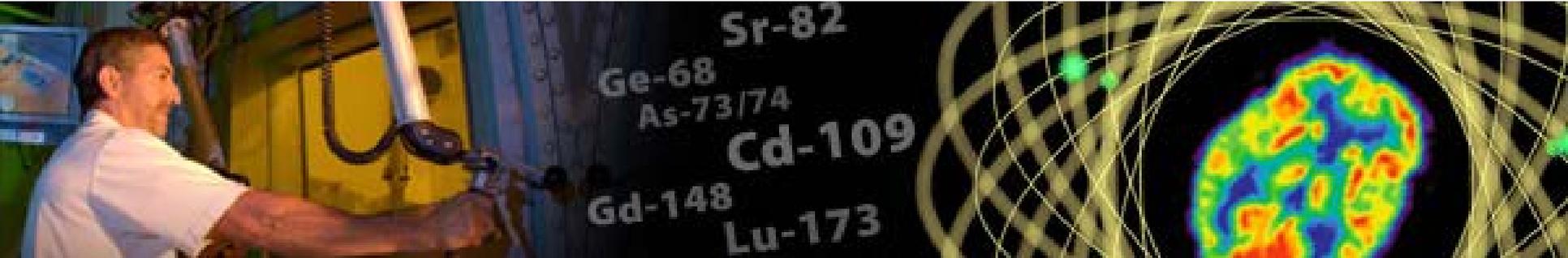




# Stable Isotope Management and Enrichment Activities



**DOE Isotope Program -- Federal Workshop**

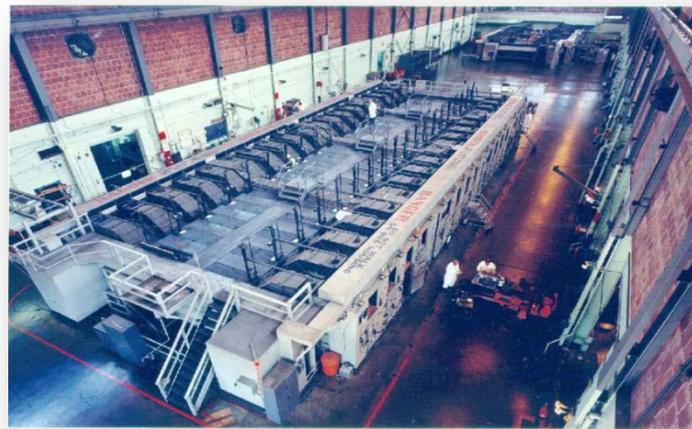
**Joel Grimm, Program Manager  
Stable Isotopes and Accountable Nuclear Materials  
DOE Isotope Program  
Office of Nuclear Physics**

**[Joel.grimm@science.doe.gov](mailto:Joel.grimm@science.doe.gov)**



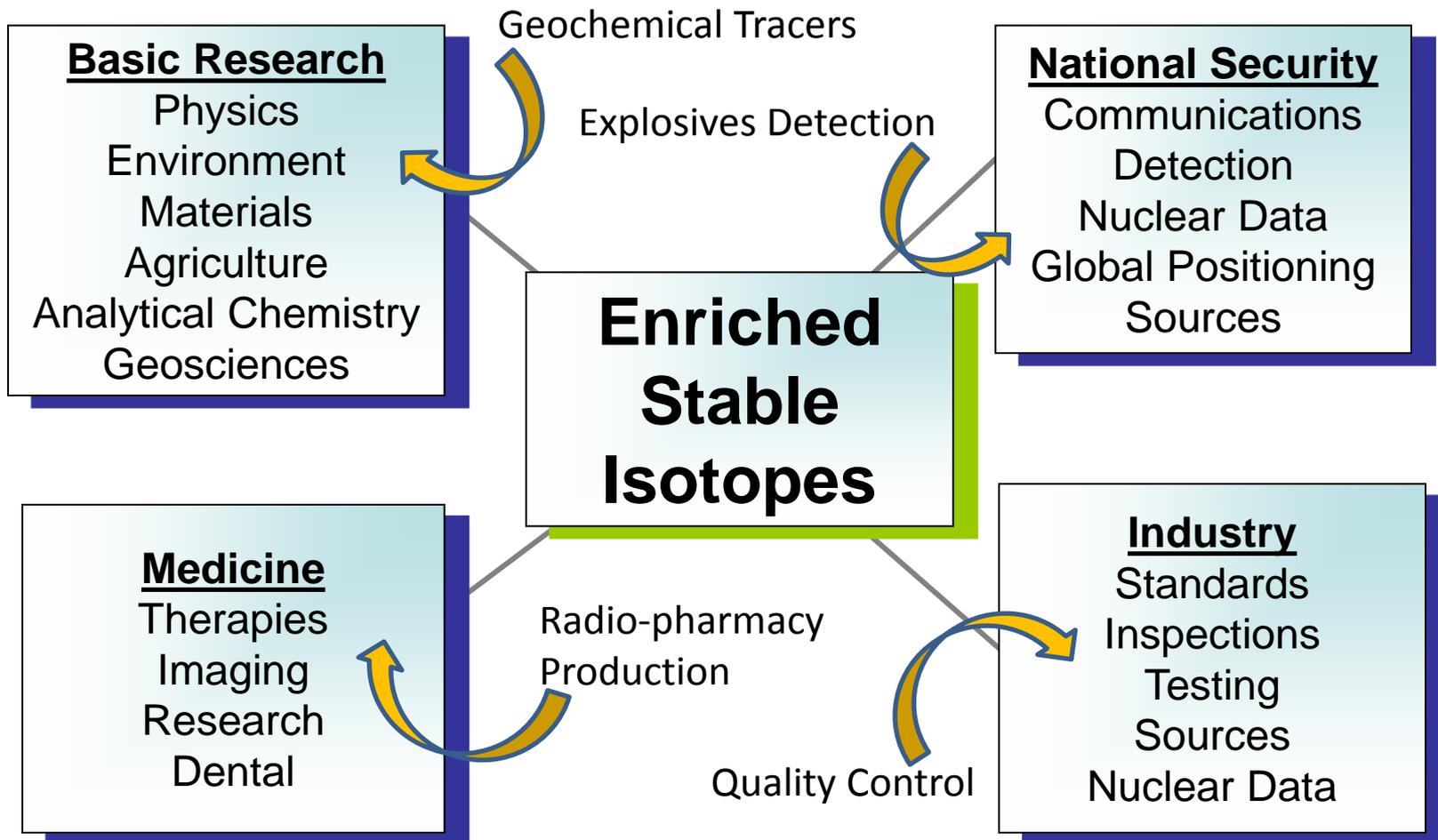
- **Stable Isotopes**
  - Legacy inventory and operations
  - ORNL Inventory and Technical Services
- **Lithium-7**
  - Domestic supply issues
  - Nuclear industry applications
  - DOE position
- **Enriched Stable Isotope Prototype Plant**

- **ORNL Inventory from Y12  
Calutron enrichment 1945 - 1998**
- **Unique materials with few other  
suppliers**
- **No existing domestic broad-scope  
enrichment**
- **244 Stable Isotopes**
- **131 Purchase Orders FY 2015**
- **73 Helium-3 Purchase Orders**
- **Inventory of Approximately a  
Dozen Has Been Exhausted**





# Stable Isotopes Uses

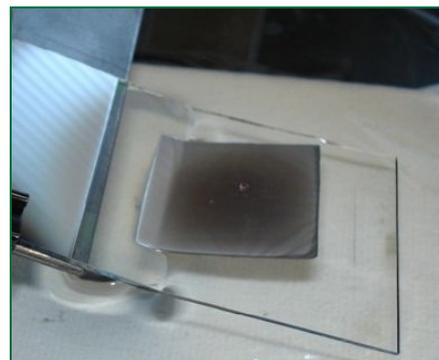


Enriched Pd foils  
 $\varnothing 2$  cm x 1.5 mg/cm<sup>2</sup>



- **Maintain and dispense the US enriched stable isotope inventory**
- **\$360M of stable inventory**
- **Chemical conversion capabilities**
- **Wide range of metallurgical, ceramic and vacuum processing of custom materials**
- **Assay capabilities including: ICP-MS and SEM/XES**
- **ISO 9001:2008 certification**
- **New online catalog at [www.isotopes.gov](http://www.isotopes.gov)**

Enriched Sn evaporated to glass  
and floated off to foil





- **Formal Helium-3 allocation process for research, cryogenics, and national security**
- **Commercial auctions 2012, 2013, and 2014**
- **Lithium-6 for homeland security**
- **Lithium-7 for safety dosimetry**





- **Domestic PWR fleet utilizes boric acid for reactivity control, buffering pH with lithium-7 hydroxide**
- **Lithium-7 prevents tritium generation**
- **Industry 100% reliant upon foreign imports – 500 kg annually**
- **Potential supply constraints started to appear in 2011**
  - **Aging production infrastructure**
  - **Growing demand**



# Lithium-7; DOE Actions

- **Coordinate with NNSA, DOE/NE and Industry through NEI and EPRI**
- **Set aside reserve of NNSA inventory**
- **Process the reserve for purification**
- **Isotope Program funds R&D for new lithium-7 enrichment techniques**
- **DOE/NE and Industry fund R&D to develop lithium-7 recovery and recycling methods**





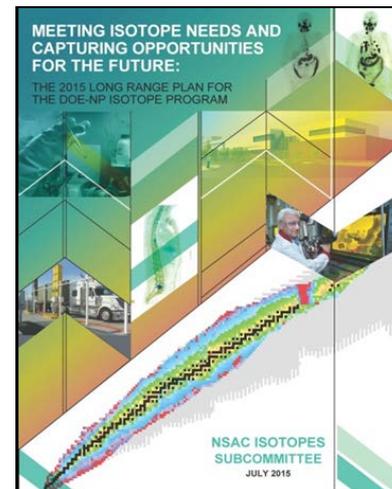
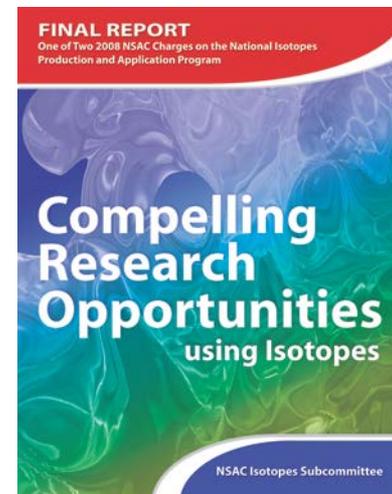
## NSAC 2008 - Compelling Research Opportunities Using Isotopes

- 250 stable isotopes
- The 220 stable non-gaseous isotopes are not currently produced in the United States
- Most require separation and enrichment by either electromagnetic or gas centrifuge separators

**Recommendation -- Establish domestic production and supply of stable isotopes.**

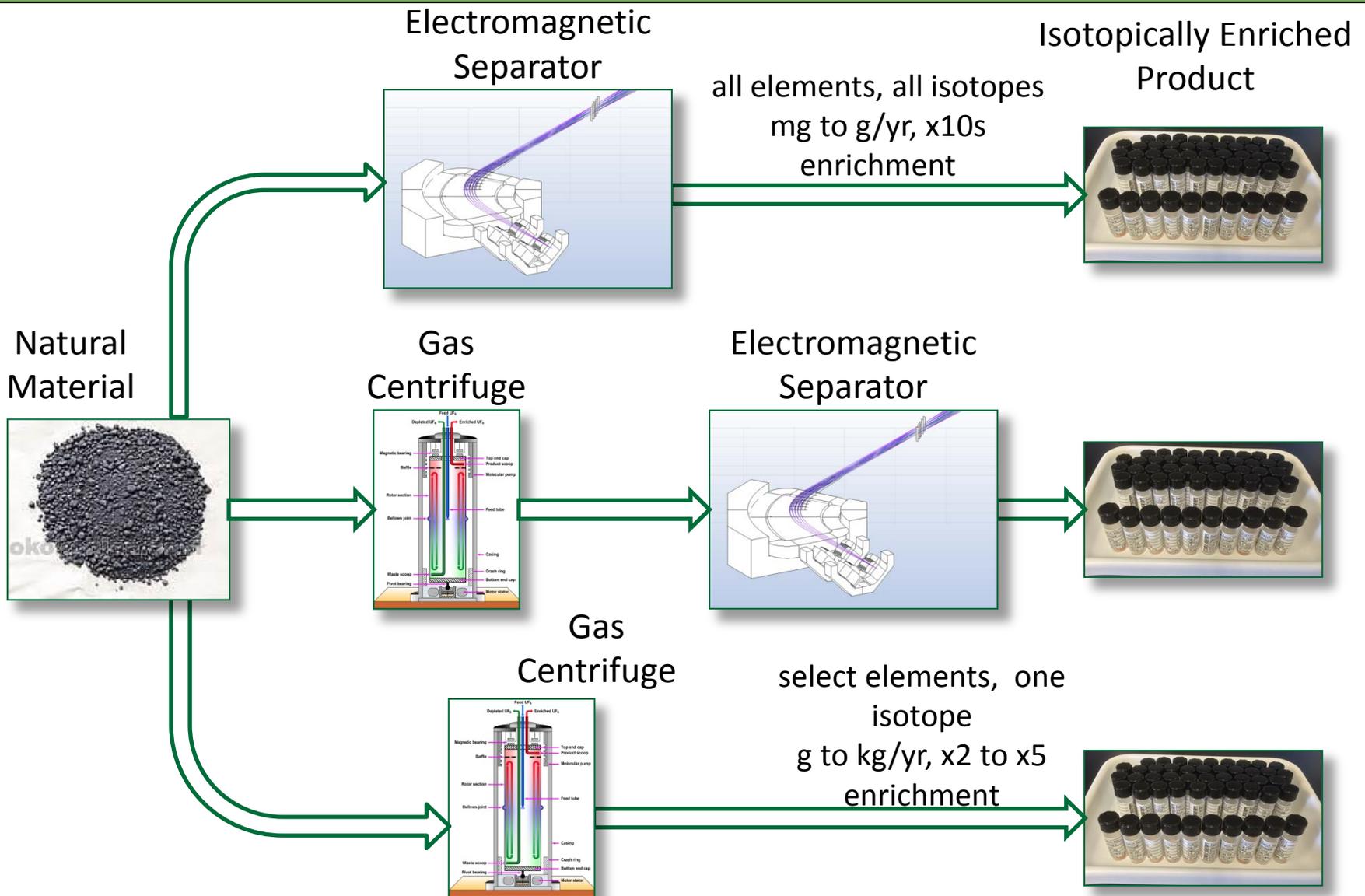
## NSACi – The 2015 Long Range Plan for the DOE/NP Isotope Program

- **Establish effective full intensity operations of stable isotope separation**





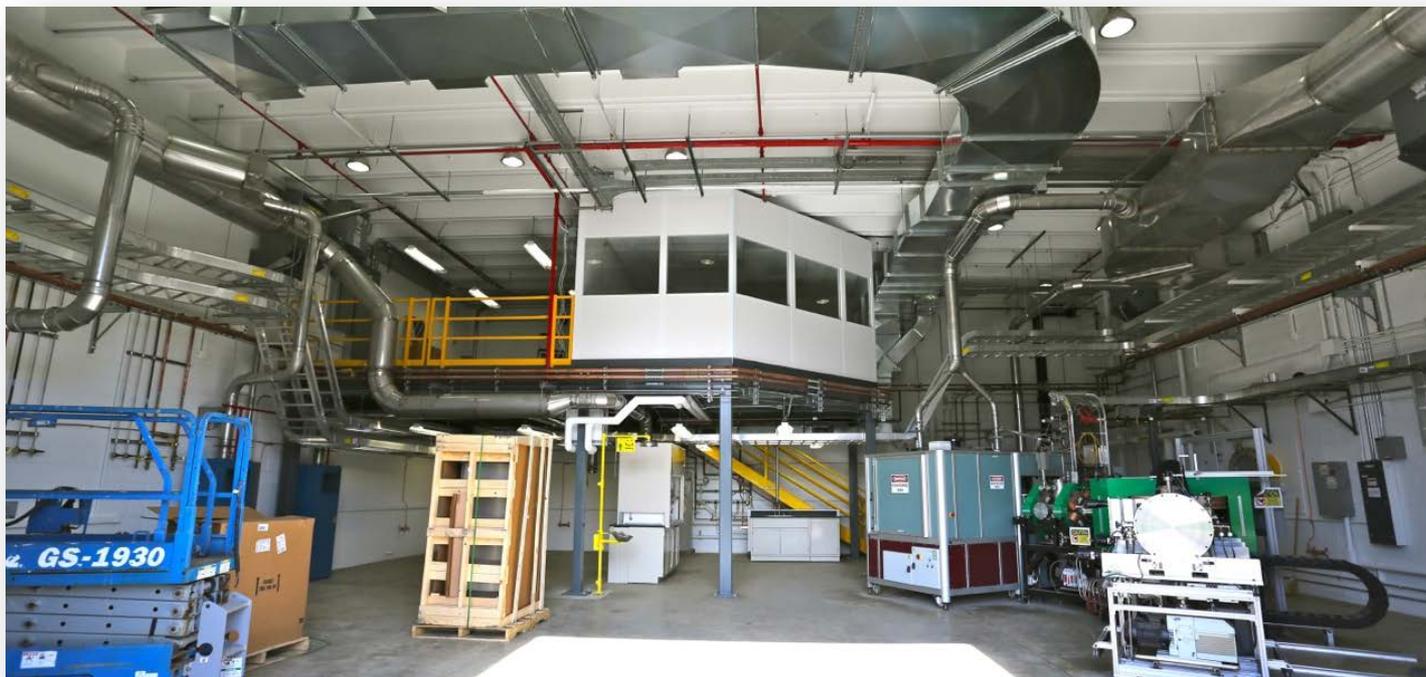
# Enrichment Paths





- Developing new stable isotope separation technology with \$11M investment
- Transition from R&D to Prototype Plant
- Construction Complete FY 2016
- Improved EMIS and Small Centrifuge Cascade





- **DOE Planning for Future Expansion**
- **Stable Isotope Production Facility – “SIPF”**
- **CD-O Mission Need approved - expand over the next 5 years**
- **Objective - reach 1-kg annual capacity for selected isotopes**

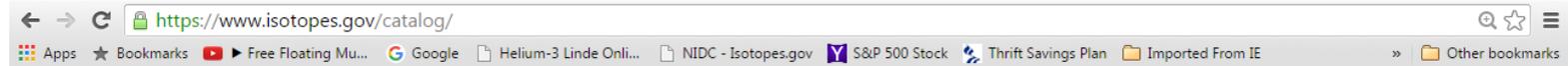


# Selected Stable Isotopes of Interest

Isotope	Method	Application	ESIPP	SIPF
Xenon-129	GCIS	Commercial/Medical		Kilograms
Molybdenum-98 Molybdenum-100	GCIS	Gov't/Commercial Medical		Kilograms
Germanium-76 Tellurium-130	GCIS	Government Research		Kilograms
Gadolinium-157	EMIS	Research Commercial Industrial	Grams	Kilograms
Calcium-48	EMIS	Research	Grams	
Lutetium-176	EMIS	Commercial Medical	Grams	
Pb-204 and -207	EMIS	Research/Environmental	Grams	
Numerous Others	EMIS	Targets for Radioisotope Production	Grams	



[www.isotopes.gov/catalog](http://www.isotopes.gov/catalog)



## PRODUCT CATALOG

### Online Catalog of Isotope Products

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