URANIUM SUPPLY PROCESS FOR RESEARCH AND ISOTOPE PRODUCTION REACTORS

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Presentation Outline

- Foreign Research Reactor (FRR) Uranium Supply Program Overview
- LEU Production Process
- LEU Supply Process
- Summary
Y-12 FRR Uranium Supply Program Overview

• The Y-12 National Security Complex (Y-12) supports the Department of Energy (DOE)/National Nuclear Security Administration (NNSA) in supplying LEU metal at 19.75 wt. % $^{235}$U to FRR community.

• LEU is produced by down blending surplus U.S.-origin highly enriched uranium (HEU).

• In 1995, ~174 MTU HEU were declared surplus to national security needs.

• In 2005, an additional 200 MTU HEU were declared excess to national defense purposes.
• ~ 20 MTU of the total surplus HEU are designated for research and test reactor fuel and targets for medical isotope production

• As of the end of February 2013, over 141 MTU of the surplus/excess HEU have been delivered for down blending and ~135 MTU have been down blended.

• >4.5 MTU have been down blended at Y-12 to 19.75 % $^{235}\text{U}$ for research reactor needs.

• ~11 MTU LEU have been produced and ~9 MTU have been delivered to FRR customers.
Nonproliferation Commitment

- LEU for FRR supports the Surplus HEU Disposition Program
  Record of Decision:
  - Non-weapons usable
  - Recover economic value to extent possible

- RERTR – reliable and cost-effective uranium supplier for
  research reactors converting to LEU

- GTRI, FRR Spent Nuclear Fuel Acceptance & RRRFR
  Programs – returned /removed HEU may be exchanged for LEU
  credits under an NNSA supply contract

- American Medical Isotopes Production Act of 2012
NNSA Authorizations

• Atomic Energy Act of 1954, as amended
  – Agreements for Cooperation
  – Project and Supply Agreements

• USEC Privatization Act of 1996
  – Secretary of Energy determination for uranium sales

  – More stringent requirements for HEU exports
  – Medical isotope production
LEU Production Process

- LEU demand forecast for foreign research, test and isotope production reactors \(~1200\text{-}1500\) kgs per year

- Establish LEU production schedule based on this demand and delivery timeframes

- Maintain an on-the-shelf LEU inventory to meet customer orders and for more efficient processing.
LEU Deliveries and Inventory

Available Certified
Inventory

Cumulative Demand

Cumulative Delivery

Inventory of Available LEU

kgU
LEU Production Process

- HEU combined with DU or NU for down blending to LEU
- Metal cast into a right annular cylinder
- Log sampled and analyzed
- Logs broken then sheared
- Broken metal loaded into cans
- Cans loaded into shipping container
- Containers staged for shipment
- Export Control authorization to ship
LEU Production Process
LEU Production Process
LEU Production Process
Enriched Uranium Supply Process

- Customer submits an expression of interest specifying EU requirements
- Y-12 provides cost proposal
- Customer issues a letter of intent to purchase
- Y-12 drafts a supply contract
- Export license application submitted to U.S. Nuclear Regulatory Commission (NRC)
- Transportation logistics arranged
- Contract finalized and export license issued
- EU delivered to customer/fuel /target fabricator
Low Enriched Uranium Lease Program Status

- NNSA developing lease agreement approach, such as
  - Program management
  - LEU charging methodology
  - Contract language
  - Scrap take back provisions

- Request for Information from domestic producers
  - Contact information
  - LEU feedstock physical form and chemical specifications
  - Annual LEU feedstock demand
  - Composition of fresh LEU scrap, recycled LEU, spent fuel/irradiated scrap, etc. to be returned
  - LEU return quantities and frequency
Summary

• In Fiscal Year 2012, Y-12 safely and securely supplied over 1400 kgs EU to 11 different FRR customers in 9 separate deliveries.

• Y-12 continues to support the nonproliferation objectives of HEU Disposition, RERTR, GTRI, FRR SNF Acceptance, RRRFR and Domestic Mo-99 Programs.

• NNSA Production Office Y-12 emphasizes the importance for the domestic Mo-99 producers who plan to use LEU to submit the requested information in order to develop a viable Enriched Uranium Lease/Take Back Program.

• Y-12 production and supply processes help ensure a reliable and cost-effective uranium supply program for the global research reactor community.
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