U.S. DEPARTMENT OF ENERGY | Nuclear Energy

Li-7 Supply

Richard Reister

Office of Light Water Reactor Technologies
Office of Nuclear Energy
U.S. Department of Energy

September 19, 2013

Background

- Li-7 (99.99% enriched) is used for pH control in PWRs (65 reactors in the US) to offset Boron addition (for reactivity control).
- Each reactor needs about 2-4 kg of Li-7 per year on average (up to 300kg total per year when including the manufacture of resin beds).
- Current price around $10,000/kg.
- Essentially, all Li-7 was produced using a mercury-based COLEX process as a byproduct of Li-6 enrichment for weapons programs. U.S. enrichment of Lithium stopped in 1963. Russia and China are the only countries that continue to enrich Lithium.

Issue

- It appears China has stopped exporting Li-7 due to domestic needs
  - Large new construction of PWRs
  - Building a salt cooled ($^{7}Li_2BeF_4$) test reactor that needs large quantities of high purity (99.995% enriched) Li-7
- Russia still exporting
  - Quality issues have resulted in supply disruptions with the chemical companies who serve as intermediaries
  - Russia's ability to increase production to meet demands is unknown

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Potential Mitigation

- Stockpile
- Recycle Li-7 from resin beds
- Develop domestic production capability
- Use enriched boric acid
- Increase use of burnable poisons in fuel
- Develop alternative chemistry

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Internal DOE Li-7 Working Group

Li-7 is currently a commercial product. However DOE is working with the U.S. nuclear industry on strategies to mitigate the risks of a potential Li-7 supply disruption

Led by Office of Science Isotope Program

- NNSA (holds current DOE Li-7 inventory at Y-12)
- Office of Nuclear Energy (facilitates interface with nuclear industry)
- Office of Intelligence