Closeout of the Cf-252 Loan/Lease Program

Steven Sherman
Brad D. Patton
Oak Ridge National Laboratory
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Introduction

- **Californium-252**
  - First isolated in 1952 in Ivy-Mike explosion
  - 2.645 y half-life
  - $2.3 \times 10^6$ n/μg/s

- ORNL and RIAR are the only producers

- ORNL provides about 70% of the world’s Cf-252
Introduction

- Packaged in sealed containers
- Used as neutron sources
  - Radiography
  - Well logging
  - Nuclear reactor start-up
  - Instrument calibration
  - Cancer therapy
  - Prompt gamma neutron activation analysis (PGNAA)
  - Education
Cf-252 Loan/Lease Program
- Program to allow low-cost access by government agencies, qualified government contractors, and medical centers to Cf-252 sealed sources
  - Allowed users to borrow or lease Cf-252 sealed sources
  - Loans or leases spanned 1-5 years, and were renewable
  - Customers paid a low fee to cover some shipping and handling costs, but paid nothing for the Cf-252
- Sources were to be returned at the end of the loan or lease
Initiated as a component of DOE’s Cf-252 Market Evaluation Program in late 1960s
  
  - Two purposes
    - Stimulate growth of industry centered on Cf-252 (sales)
    - Stimulate demand for Cf-252 in the marketplace (loans)

- Program administered by Savannah River Site (SRS) from late 1960s through 1987
- ORNL took over the program in 1988
Program funded by AEC, ERDA, and then DOE
  – Sales performed through the DOE Isotope Program
  – Production and loans funded by DOE NNSA

In 2009, regular DOE funding ceased

Industry quickly rallied and organized a private consortium to restart Cf-252 production and sales

No new funding was provided by anyone to continue the loan program
Loan program has been in a suspended state since 2009, awaiting decision on its fate (Resume? Retool? Close?)

- Loaned or leased inventory
  - 59 customers on record (47 sites)
  - 57 customers hold 220 loaned/leased sources
  - 2 customers handed over their sources (1 each) to DOE’s Off-Site Source Recovery Project (University of Maryland, 2009; Edinboro University, 2011)

- Stored inventory
  - 336 sealed sources stored at ORNL in a storage pool (many of these owned by the Cf-252 Loan/Lease Program)

- No new sources manufactured for loan or lease in many years
- No new loan or lease agreements have been executed
- ORNL hasn’t been able to accept source returns from customers since regular program funding ended
In 2012, DOE selected to close out the loan program

Desired End State

- All sources recovered from non-DOE customers
- All sources at DOE sites are recovered or reassigned to other active DOE programs
- Stored sources valuable to other DOE programs are reassigned
- Unneeded sources are disposed to Nevada National Security Site (NNSS) or Waste Isolation Pilot Plant (WIPP)
- No sources remain in the program inventory at end of closeout
- All loan or lease agreements closed
Accomplishments

- New funding received in FY 2013 to begin closeout
  - Funding provided by NNSA through the Heavy Isotopes Lead Materials Management Organization (LMMO)

- NRC certificates of registration for six types of Cf-252 sealed sources were inactivated in August 2012
  - Implications
    - Avoided $95K in yearly renewal fees to NRC in FY2013
    - Prevents us from issuing sources to NRC-regulated customers
    - Does not affect the safety of sources already on loan
Accomplishments

- Responsibility for two DOT special form certificates transferred to the Cf-252 Sales Program
  - Ability to ship Cf-252 sources outside of the U.S. has been maintained
- Customer contact information verified and notification letters sent to program customers
  - 56 letters sent, and awaiting confirmation of contact information for 3 customers
Accomplishments

- Set up an automated customer survey web site to collect information from program customers
  - SurveyMonkey.com
  - So far, 39 customers (2/3 response rate) have filled in the survey
  - Received additional information by email and follow-up phone calls
- Digitizing customer historical records and organizing them into an Access database
  - Loan agreements, shipping records, etc.
- We have begun planning our next steps
- Non-DOE sites
  - We will seek 100% retrieval
  - Source retrievals will be arranged through the National Isotope Development Center – Isotope Business Office at ORNL
  - Retrieved sources will be placed in the ORNL Cf-252 storage pool
  - Customer is expected to pay shipping costs for returns
    - Will work with customer individually to arrange for shipping
  - One return shipment/site for nearly all locations
  - Prioritized return schedule will be developed
  - ORNL has Type A casks that may be used for retrievals
Path Forward

- **DOE sites**
  - We will seek 100% accountability
  - Sites will be given several options
    - Return unwanted sources to ORNL at their own cost
    - Directly dispose of unwanted sources
    - Keep wanted sources
  - Sources not returned to us must be transferred to another DOE program
  - Source transfers would be done on paper, so may be done relatively quickly
  - Physical source returns will be handled in priority order along with returns from non-DOE sites
Path Forward

- Stored Sources
  - Includes sources in the storage pool now and sources that will come back to the storage pool upon retrieval
  - Other DOE programs will be given the opportunity to acquire sources from the pool at their own expense
  - Unwanted sources will be disposed
    - NNSS for low-level waste (LLW)
    - WIPP for trans-uranic (TRU) waste
Path Forward

- **Time Frame**
  - **Assumptions**
    - Only 1 shipment needed from each non-DOE site
    - 35 non-DOE sites must return sources
    - No shipments needed from DOE sites
      - Note: 40% of all loaned/leased sources are at DOE sites
    - ORNL can process 8-10 source returns/year
  - Closeout is possible in four years

- **New Cf-252 sealed sources may be purchased from commercial suppliers**
Future closeout costs will include

- Project management
- Costs to handle returned sources
- Costs to remove sources from the storage pool and package them for disposal
- Disposal costs
- Contingency costs

Costs associated with transfer of sources to other DOE programs are minimal and will be borne by the program office.
Tasks remaining for this fiscal year

- Generate cost estimate and draft recall schedule for non-DOE sites
- Ask each DOE customer about their intentions in regard to their loaned/leased sources
  - If possible, begin programmatic transfers this fiscal year for loaned/leased sources
- Determine fair policy for transfer of desirable sources from the ORNL storage pool to other DOE programs
- Determine funding needs for FY14, assuming we begin source retrievals in that year
Summary

- DOE initiated closeout of the Cf-252 Loan/Lease Program this fiscal year
  - Cancelled or transferred licensing paperwork
  - Informed customers
  - Surveyed our customers to help us plan closeout
- Planning is underway to carry out source retrieval and disposal of unwanted sources
- Investigating transfer of sources to other DOE programs