



Californium-252 Newsletter

“To promote the exchange of information among ²⁵²Cf users”

April 2000

Volume 4, No. 2

Proposed Regulatory Changes Complicate Transport of Multi-milligram ²⁵²Cf Sources

New transportation rules have been proposed to reduce the “A1” value for ²⁵²Cf (i.e., threshold for the more restrictive Type B shipments) to 2.5 mg rather than the current level of 5.0 mg. **In practice, a 3-mg source currently shipped in a 4800-pound container would require an exclusive-use-shipment 9500-pound container. In a few years, Type B shipments will require a 27,000-pound shipping package** (see article on following page). This change is being implemented internationally in response to IAEA Report ST-1, *Regulations for the Safe Transport of Radioactive Material*, 1996. Transportation of many isotopes other than ²⁵²Cf will also be affected. Interested parties who support an exception for domestic shipments to maintain the current shipping requirements should officially comment on these proposed rules as soon as possible to the U.S. Department of Transportation. Relevant issues include the cost impact in handling and transporting Type B rather than Type A containers and the fact that 2.5- to 5-mg quantities HAVE been shipped safely in Type A packages.

Regarding the proposed changes, the *Federal Register* (Vol. 64, No. 248/Tuesday, December 28, 1999) indicates the following:

DATES: *Submit comments by March 29, 2000. To the extent practicable, we will consider comments received after this date.*

ADDRESSES: *Submit written comments to the Dockets Management System, U.S. Department of Transportation, 400 Seventh Street, SW, Washington, D.C. 20590-0001. Comments should refer to Docket Number RSPA-99-6283 and be submitted in two copies Comments may also be submitted to the docket electronically by logging into the Dockets Management System website at <http://dms.dot.gov>. Click on “Help & Information” to obtain instructions for filing the comments electronically. In every case, the comment should refer to the Docket number “RSPA-99-6283.”*

A draft version of IAEA’s ST-2, the proposed revision to ST-1, can be viewed at <http://hazmat.dot.gov/st2.pdf>. The IAEA is soliciting comments on this latest draft.

More ²⁵²Cf Technical Sessions

The ²⁵²Cf technical session agenda at the American Nuclear Society (ANS) Annual Meeting in San Diego in June is listed on the reverse page. We are also planning for the ANS/European Nuclear Society International Meeting, November 12–17, 2000, in Washington, D.C. The call for papers lists “Production and Industrial Applications of ²⁵²Cf,” although we expect additional presentations on prompt gamma activation analysis and the medical applications of ²⁵²Cf. If you are interested in presenting your work, please contact the newsletter editor as soon as possible to discuss the possibility of presenting an invited talk (which may affect conference registration fees).

Spectrum 2000 Conference in September

This International Conference on Nuclear and Hazardous Waste Management, September 24–28, 2000, in Chattanooga, Tennessee, will focus on technologies related to waste management, D&D, and environmental restoration. The deadline for summary submission is April 30, with over 130 summaries submitted to date ranging from the technical to the programmatic. For more information, see <http://www.engr.utk.edu/spectrum>.

Isotope News from ORNL

- Heavy-element campaign 72 is tentatively scheduled to begin in August 2000 with dissolution of the irradiated curium oxide target rods. The ²⁵²Cf mass at campaign time is estimated at ~300 mg. Smaller masses of Bk, Es, and Fm isotopes will be available for approved research.
- The High Flux Isotope Reactor (HFIR) is currently scheduled for a 6-month outage to replace the beryllium reflector, beginning in October 2000. We are currently fabricating a new batch of curium oxide target rods, with irradiation to be completed after the HFIR outage, to ensure continuity of ²⁵²Cf supply.

San Diego ANS Sessions on ²⁵²Cf Applications

“Industrial Applications of Californium-252 Neutron Sources” will consist of three technical sessions and a panel discussion on June 6–7, 2000, at the annual meeting of the American Nuclear Society, San Diego, California. More information is available at <http://www.ans.org/meetings>.

1. J. Broadhurst et al., “Neutron Hardness Testing of Electronic Components for the LHC”
2. E. M. A. Hussein et al., “Two-Phase Flow Measurements with ²⁵²Cf: Design Aspects and Considerations”
3. J. K. Mattingly et al., “Correlation Measurements with ²⁵²Cf to Characterize Fissile Material”
4. T. O. Tümer et al., “A Sensitive, Selective, and Portable Detector for Contraband: The Compact Integrated Narcotics Detection Instrument”
5. D. P. DiPrete et al., “Neutron Activation Analysis Detection Limits Using ²⁵²Cf Sources”
6. G. L. Troyer et al., “Cf-252 Neutron Activation Analysis of High-Level Processed Nuclear Tank Waste”
7. R. P. Gardner et al., “Software Progress in the PGNAA of Bulk Materials”
8. E. Clifford et al., “Second-Generation Thermal Neutron Activation Sensor for Confirmatory Land Mine Detection”
9. A. J. Caffrey et al., “A Comparison of ²⁵²Cf and 14-MeV Neutron Excitation to Identify Chemical Warfare Agents by PGNAA”
10. R. J. Proctor et al., “On-Line Prompt Gamma Neutron Activation Analyzers”
11. Panel discussion: “Californium-252 or Accelerators for Industrial Neutron Sources?”
12. R. C. Martin, “The U.S. Department of Energy ²⁵²Cf Program”
13. E. F. Janzow et al., “Commercial and Industrial Use of ²⁵²Cf; The First Thirty Years”
14. J. M. Adams, “The Neutron Source Calibration Program at the National Institute of Standards and Technology”
15. W. J. Richards et al., “Review of ²⁵²Cf Neutron Radiography at McClellan Air Force Base”
16. E. A. Lepel, “Eulogy for a Neutron Activation Analysis Facility”
17. R. O. Rushton, “Delivery Systems for ²⁵²Cf Used in Industrial Applications”
18. C. M. Simmons, “A New Type-B Cask Design for Transporting ²⁵²Cf”

²⁵²Cf Shipping Containers, Old and New

The following table, listing the standard shielded containers used by ORNL to ship ²⁵²Cf sources, can be useful in estimating shielding requirements for a given source intensity. Containers are typically cylindrical except for the large semispherical Type B containers. A project has been initiated to build a replacement Type B container to hold up to 60 mg of ²⁵²Cf, with pneumatic source transfer capability and licensed for all modes of domestic and international transport (ground, sea, and air). Container delivery from the vendor to ORNL is currently estimated in late 2001, after which time the “Snowball” container may be redesignated as a Type A container.

Container	Weight (lb)	Height × width (in.)	Nominal ²⁵² Cf content ^a
10-gal. 6M drum ^b	160	17 × 14	6 μg
55-gal. drum	650	36 × 24	100 μg
Type A, #263	300	20 × 18	15 μg
Type A, #262	680	28 × 24	50 μg
Type A, #261	1,220	34 × 30	200 μg
Type A, #122	2,100	38 × 30	500 μg
Type A, #257	3,180	46 × 42	1.5 mg
Type A, #241	3,800	48 × 44	2.2 mg
Type A ^c	4,600	50 × 50	3.7 mg
Type A ^c	7,400	60.5 × 58	5.0 mg
“Snowball” ^b	9,550	75 × 62	80 mg
“Cannonball” ^b	23,500	80 × 68	60 mg
Future Type B design	15,400, 27,600 ^d	68 × 62, 102 × 96 ^d	60 mg

^aCf-252 contents that generate maximum permissible external dose-equivalent rates for routine transportation; that is, 200 mrem/h (neutron plus gamma) at the container surface and 10 mrem/h at 1 m from the surface.

^bType B container.

^cVendor-owned container.

^dThe larger weight and dimensions include complete transport system (cask plus overpack and transport skid).

For Further Information

Californium-252 Newsletter Editor: Rodger C. Martin (865) 576-2280 e-mail: martinrc@ornl.gov
 Californium Sales/Loan Liaison: Paul A. Balo (865) 574-1948 e-mail: balopa@ornl.gov
²⁵²Cf applications and the ORNL Californium User Facility for Neutron Science: <http://www.ornl.gov/divisions/ctd/cuf.htm>