



Princeton University  
Environmental Health and Safety

December 22, 2006

*NMSB2*

Licensing Assistance Team  
U.S. Nuclear Regulatory Commission, Region 1  
475 Allendale Road  
King of Prussia, PA 19406-1415

Re: License Number 29-05185-24      Docket Number 030-00882

2006 DEC 26 PM 2:08

RECEIVED  
REGION 1

Licensing Assistance Team:

I am writing to request amendment of Princeton University's broad byproducts license #29-05185-24 to allow the possession and use of no more than 1mCi of Am-241 in the form of an americium-beryllium (AmBe) source. Princeton University is currently licensed to possess 0.2 mCi of Am-241 in any form (License Item 6L) and 1 mCi of Am-241 in the form of sealed sources (License Item 6M). The AmBe source would be in addition to the current two license authorizations for Am-241.

The source, Catalogue No. AM1N020001M, with an NO-2 capsule, will be purchased from Isotope Products Laboratory, Inc (IPL). Please note that, effective January 1, 2007, IPL will be known as Eckert & Ziegler Isotope Products. The device has been issued Sealed Source and Device Registry Certificate # CA0406S1993 by the Radiologic Health Branch of the California Department of Health Services, and the source registry certificate is attached as Attachment A.

The AmBe sealed neutron source will be used as a calibration source for a Liquid Argon Dark Matter detector developed at Princeton University. The source will be placed outside the Liquid Argon detector, at a distance of 10-20 cm from the detector, and will always be at room temperature. It will be enclosed in a lead shield to shield the detector from the gamma ray flux from the source.

The expected dose rates for an unshielded 1 mCi Am-Be source at 1 meter are 0.315 mrem/hr and 0.0074 mrem/hr for the gamma and neutron components, respectively.

One calibration run may take as long as 24 hours of data acquisition. Several calibrations per month may be necessary. Less than 20 minutes handling time for the source is required for each calibration run as the source is positioned at the start of the calibration and then collected and placed back into storage at the end. During this time, researchers will handle the sealed source with remote handling tools, such as tongs or forceps, so fingers will be no closer than several inches away from the source. Otherwise proximity to the source will be limited as researchers, located no closer than 2 meters from the source, monitor the progress of data acquisition for a few hours per day.

When not in use, the source will be stored in a thick plastic box enclosed in a lead box. The lead box will be equipped with a lock pad to secure the source during the storage period. During calibrations when the source is in use, the room will be locked when no one is present.

*139893*  
NMSC/IRON MATERIALS-002

262 Alexander Street  
Princeton, NJ 08544

Telephone      609-258-5294  
Facsimile      609-258-1804  
E-Mail          ehs@princeton.edu  
Homepage      <http://www.princeton.edu/~ehs>

Princeton University ~~SNM License Termination~~<sup>Wiser</sup>

Princeton University does not have neutron monitoring capability, but in the case of this source, the gamma component is the component of greatest concern. As indicated in our most recent license renewal application dated May 23, 2001, Princeton University does possess adequate gamma monitoring capability and will conduct a gamma radiation survey during initial operations to measure radiation levels. Although we have no reason to anticipate that any person is likely to receive a dose in excess of 10% of the annual dose limits specified in 20.1201(a), those researchers who handle the source directly will initially be required to wear appropriate radiation dosimeters with neutron monitoring capability. After sufficient dose data has been collected, the Radiation Safety Committee will review the dose data and will determine whether the continued use of personal radiation dosimeters is warranted.

As indicated by our current license conditions, Princeton University will conduct semiannual leak tests of this source.

We would appreciate an expedited review of this amendment request. The need for this source developed suddenly, and your expedited review will allow this research to proceed without undue delay.

We appreciate your consideration of our requests. Please direct any questions concerning this correspondence to Sue Dupre, the Princeton University Radiation Safety Officer, at (609) 258-6252.

Sincerely,



Garth Walters  
Director

GGW/SMD/smd

Attachment as per text

- C: Sue M. Dupre, Radiation Safety Officer
- Prof. Elizabeth Gavis, Radiation Safety Committee Chair (w/o attachment)
- Stephen Elwood, Health & Safety Specialist (w/o attachment)
- Prof. Cristiano Galbiati
- Files 9.1, 9.2

**DEPARTMENT OF HEALTH SERVICES****RADIOLOGIC HEALTH BRANCH**

BOX 942732, MS-178  
SACRAMENTO, CA 94234-7320  
(916) 327-6214



November 13, 2000

Michel Gensini, Ph.D.,  
Isotope Products Laboratories  
1800 N Keystone Street  
Burbank, CA 91504

Dear Dr. Gensini:

Enclosed you will find a new (or amended) sealed source and device registry certificate, number CA0406S193S. Please look it over carefully for errors and/or omissions as it will be distributed nationwide to all NRC Regional Offices and Agreement States, and used for determination of licensing requirements.

If you have any questions, please call me at (916) 327-6214.

Sincerely,

A handwritten signature in black ink, appearing to read "Xiaosong Yin", with a stylized flourish at the end.

Xiaosong Yin  
Associate Health Physicist  
Radiologic Health Branch

**REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE**

**NO:** CA0406S193S      **DATE:** November 13, 2000

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**SOURCE TYPE:** Am-Be neutron Source

**DESCRIPTION:**

The Am1.N02 sealed source consists of five component parts: the outer source body, outer plug insert, inner capsule, inner capsule plug, and an Am-241:Be core (see attachment 2). The total length of the cylindrical radiation source is 10 mm (0.39") and its diameter is 7.8 mm (0.31"). The capsule body wall thickness is 1.6 mm (0.06").

Americium-241 oxide and beryllium powder are proportionally mixed and compacted to form a pellet with a dimension of 4.6 mm (0.18") in its length and 4.3 mm (0.17") in its diameter. The pellet is securely placed into the inner capsule by mechanically pressing the plug and subsequently tungsten-inert gas (TIG) welded. The completed inner capsule is then secured into the outer source body by the mechanical pressing and TIG welding of the outer plug.

The plugs and capsule bodies are made of high-grade stainless steel.

**LABELING:**

The source is laser engraved with the isotope, activity, model number, serial number and year of manufacture, code of the manufacturer, and word "RADIOACTIVE". The text is 1.5 mm (0.06") high and is on the side of the source capsule.

**DIAGRAM:**

Attachment 2:            The Source Drawing

Attachment 3:            Laser engraved Label on Am1.N02

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE

NO: CA0406S193S      DATE: November 13, 2000

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SOURCE TYPE: Am-Be neutron Source

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

1. The source shall be distributed to persons specifically licensed by the U.S. Nuclear Regulatory Commission or an Agreement State.
2. Handling, storage, use, transfer, and disposal: To be determined by the licensing authority. In view that these sources exhibit high dose rates, the sources should be handled by experienced licensed personnel using adequate handling equipment and procedures.
3. The source shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
4. The source shall not be subjected to conditions that exceed its ANSI N542-1977/ISO 2919 classification, 77C66545.
5. This registration certificate and the information contained within the references shall not be changed without the written consent of the California Department of Health Services.

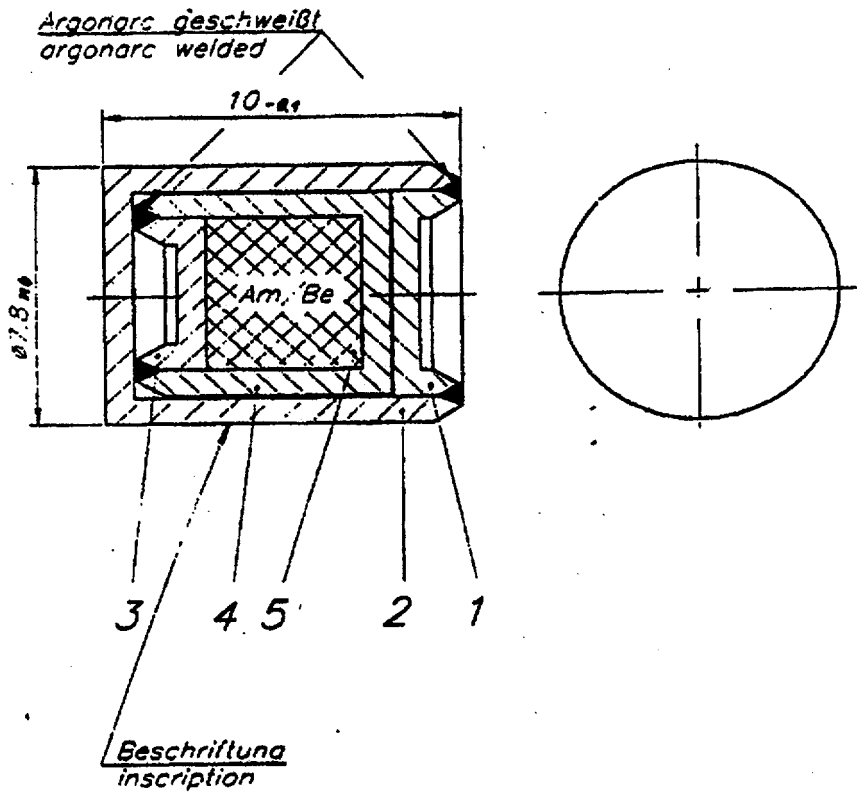
SAFETY ANALYSIS SUMMARY:

Based on review of the Model Am1.N02 sealed source, its ANSI/ISO classification, and the information and test data cited below, we conclude that the source is acceptable for licensing purposes.

Furthermore, we conclude that the source would be expected to maintain its containment integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE

NO: CA0406S193S      DATE: November 13, 2000      ATTACHMENT 1



1. Outer Plug
2. Outer Corpus
3. Inside Plug
4. Inside Corpus
5. Radioactive Element

Drawing of the Am1.N02

This is to acknowledge the receipt of your letter/application dated

12/22/2006, and to inform you that the initial processing which includes an administrative review has been performed.

APR 29-05125-24 There were no administrative omissions. Your application was assigned to a technical reviewer. Please note that the technical review may identify additional omissions or require additional information.

Please provide to this office within 30 days of your receipt of this card

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A copy of your action has been forwarded to our License Fee & Accounts Receivable Branch, who will contact you separately if there is a fee issue involved.

Your action has been assigned **Mail Control Number** 139893.  
When calling to inquire about this action, please refer to this control number.  
You may call us on (610) 337-5398, or 337-5260.

NRC FORM 532 (RI)  
(8-98)

Sincerely,  
Licensing Assistance Team Leader