



MITT ROMNEY  
GOVERNOR

KERRY HEALEY  
LIEUTENANT GOVERNOR

RONALD PRESTON  
SECRETARY

HOWARD K. KOH, MD, MPH  
COMMISSIONER

The Commonwealth of Massachusetts  
Executive Office of Health and Human Services  
Department of Public Health  
Radiation Control Program  
174 Portland Street, 5<sup>th</sup> Floor, Boston, MA 02114  
(617) 727-6214 (617) 727-2098 - Fax

March 9, 2004

John Jankovich  
SS&D Team Leader  
Division of Industrial & Medical Nuclear Safety  
Mailstop T-8F5  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555

**Re: Amendment to Sealed Source and Device  
Registration Number: MA-1059-S-358-S**

Dear Mr. Jankovich:

Enclosed please find the most recent amendment to this existing registration. Please review the enclosed document carefully. If there are any errors or questions please do not hesitate to contact this office at the number above.

Sincerely,

A handwritten signature in cursive script that reads "John Sumares".

John Sumares  
Radiation Control Officer  
Radiation Control Program

JES/jes

Enclosure: (1)

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 1 of 7

SOURCE TYPE: Neutron Source

MODEL: AMN.V997, AMN.V340

DISTRIBUTOR:

AEA Technology QSA Incorporated  
40 North Avenue  
Burlington, MA 01803

MANUFACTURERS:

Outer Encapsulations Only:

AEA Technology QSA Incorporated  
40 North Avenue  
Burlington, MA 01803

Outer and Inner Encapsulations:

Reviss  
P. A. Mayak  
31 Lenin Street  
Ozyorsk, Chelyabinsk Region  
456780 Russia

ISOTOPE:

Americium-241/Be

MAXIMUM ACTIVITY:

50 millicuries (1.85 Gbq) for AMN.V997  
350 millicuries (13 Gbq) for AMN.V340

LEAK TEST FREQUENCY:

6 months

PRINCIPAL USE:

(H) General neutron source applications

CUSTOM SOURCE:

☐ YES ☒ NO

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 2 of 7

SOURCE TYPE: Neutron Source

DESCRIPTION:

The models AMN.V997 and AMN.V340 consist of a pressed pellet of Am-241 oxide powder mixed with beryllium metal powder, doubly encapsulated in a stainless steel capsule. The pellet is pressed at a pressure of approximately 10 tons per square inch. This pellet is non-leachable. This is loaded into the inner stainless steel capsule, a lid is press fitted and the capsule hermetically sealed by TIG or laser welding. The capsule is visually examined and tested for leak tightness. The inner stainless steel capsule is then loaded into the outer stainless steel capsule, a lid is press fitted and the capsule is hermetically sealed by TIG or laser welding.

The model AMN.V997 corresponds to the X1 or AX1 capsule. The X1 and AX1 capsules are 10.15 mm. (0.4 in.) long x 7.9 mm. (0.31 in.) diameter. The model AMN.V340 corresponds to the X2105 capsule. The X2105 capsule is 13.2 mm. (0.52 in.) long x 12.8 mm. (0.50 in.) diameter.

**The AX1 designated capsules were manufactured prior to 2004, by a secondary branch of AEA Technology in England. There are no physical differences between the X1 and AX1 designated capsules.**

LABELING:

The products are distributed with handling instructions describing their use. All products are permanently engraved with the following information as a minimum:

- Nuclide - "Am241/Be"
- Nominal activity in mCi
- The manufacturers logo - "AI" or "A". (The "A" is engraved on all newly manufactured sources. The "AI" may be engraved on existing sources.)
- Serial number
- Radioactive trefoil is engraved in the lid recess

The activity assay result, reference date, model number, and **other pertinent information** is stated on the source test report supplied with each source. The sources are distributed with 'Handling Instructions for Radiation Sources' which describe their use.

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 3 of 7

SOURCE TYPE: Neutron Source

DIAGRAM:

See attachment # 1 for the X1 or AX1 capsule.

See attachment # 2 for the X2105 capsule.

CONDITIONS OF NORMAL USE:

The sources are used for general neutron source applications including use in moisture and density gauges and for neutron activation analysis. They will typically be contained within robust housings providing shielding and mechanical protections for the source. The source will not be subject to extremes of temperature, vibration, impact, and pressure in normal use.

The source should not be mounted in or contained in any materials which will degrade or react as a result of exposure to the radiation doses from the source (e.g. PVC). These sources must not be used for oil well logging purposes or reactor start-up.

The recommended working life of these sources is 15 years, after which it is recommended that the user should arrange for the source to be inspected and assessed by a suitably qualified, and licensed person to extend the working life, or dispose of the source through a suitable licensed person.

The performance requirements for this type of sealed source are defined in ISO 2919:1999 (E) and ANSI/HPS N43.6 - 1997 as 43323, and sources should not be subjected to conditions which exceed their classifications.

PROTOTYPE TESTING:

The source designs have been tested or assessed in accordance with ISO 2919:1999(E) and ANSI/HPS N43.6 - 1997, and have achieved the following ISO/ANSI classifications:

Model No.	Capsule	ANSI/ISO Rating
AMN.V997	X1 and AX1	C66545
AMN.V340	X2105	C65545

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 4 of 7

SOURCE TYPE: Neutron Source

PROTOTYPE TESTING (Cont'd.):

Both capsule types have been tested or assessed for special form for the transport of radioactive materials in accordance with IAEA Safety Series No. 6: 1985 (amended 1990).

The sources have been distributed and used in the working areas described for over 20 years. The manufacturer has not been informed of any incidents causing gross contamination or public risk

associated with design faults of the product during this period. No defects or non-compliance have been recorded as required by 10 CFR Part 21 during this period.

EXTERNAL RADIATION LEVELS:

**Previously, dose rates were reported by the manufacturer for the Model AMN.V997 source containing 40 millicuries (1.5 GBq). To adjust for increasing the maximum activity from 40 to 50 millicuries, the following dose rates for 50 mCi (1.85 GBq) were extrapolated from the measured dose rates:**

<u>DISTANCE</u>	<u>Gamma Dose Rate</u>		<u>Neutron Dose Rate</u>	
	(uSv/h)	(mrem/h)	(uSv/h)	(mrem/h)
At 5 centimeters	312	31.2	55	5.5
At 30 centimeters	11.3	1.1	13.7	1.4
At 100 centimeters	1.3	0.12	3.8	0.38

The following dose rates were reported by the manufacturer for the Model AMN.V340 source containing 350 millicuries (12.95 GBq). The measured exposure rates are provided as follows:

<u>DISTANCE</u>	<u>Gamma Dose Rate</u>		<u>Neutron Dose Rate</u>	
	(uSv/h)	(mrem/h)	(uSv/h)	(mrem/h)
At 5 centimeters	2,188	219	385	38.5
At 30 centimeters	79	7.9	96	9.6
At 100 centimeters	9	0.9	26	2.6

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 5 of 7

SOURCE TYPE: Neutron Source

QUALITY ASSURANCE AND CONTROL:

Sources are manufactured and distributed in accordance with the Quality Assurance program of AEA Technology-QSA Inc. which is in compliance with the requirements of ISO9001:1994. For operations performed by vendors, these actions are controlled to AEA Technology QSA, Inc. specifications through the Quality Assurance program of AEA Technology QSA, Incorporated. A copy of the program is on file with the Agency.

**The following tests are performed on all sources:**

**Leak Test in accordance with ISO9978:1992(E) (or more recent editions).**

**Source neutron output is measured against a standard source using BF<sub>3</sub> detector with a wax moderator (or equivalent sensitive instrument).**

**Sources are visually inspected for defects and/or physical damage after manufacture and prior to acceptance.**

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

- The sources shall be distributed to persons specifically licensed by the NRC or an Agreement State
- 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.
- The sources shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- The sources shall not be exposed to environments which exceed their classifications as specified in the prototype section of this sheet. Even though the sources have qualified for a **higher rating**, the manufacturer recommends that the sources not be subjected to conditions which exceed ANSI/HPS N43.6-1997 classification of 97C43323.

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 6 of 7

SOURCE TYPE: Neutron Source

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE (Cont'd.):

- The sources shall not be used in well-logging operations or reactor start-up.
- The sources should not be stored in direct contact with plastic surfaces as this may cause radiation damage to the plastic, followed by corrosion of the source due to the liberation of ions from the plastic.
- This registration sheet and the information contained within the references shall not be changed without the written consent of the Massachusetts Department of Public Health, Radiation Control Program.

SAFETY ANALYSIS SUMMARY:

Based on review of the Model AMN.V997 and Model AMN.V340, its ISO/ANSI classification, and the information and test data cited below, we continue to conclude that the sources are acceptable for licensing purposes.

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

REFERENCES:

The following supporting documents for the Model AMN.V997 and Model AMN.V340 are hereby incorporated by reference and are made a part of this registry document.

- AEA Technology QSA-Inc. letter dated October 23, 2000, with enclosures thereto.
- AEA Technology QSA-Inc. letter dated June 25, 2001.
- AEA Technology QSA-Inc. letter dated October 12, 2001.
- AEA Technology QSA Inc. letter dated July 23, 2002.
- AEA Technology QSA Inc. letter dated January 20, 2004.

REGISTRY OF SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

PAGE: 7 of 7

SOURCE TYPE: Neutron Source

ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program.

Date 3-8-04

Reviewer John Sumares  
John Sumares

Date 03/08/04

Concurrence Joshua Daehler  
Joshua Daehler



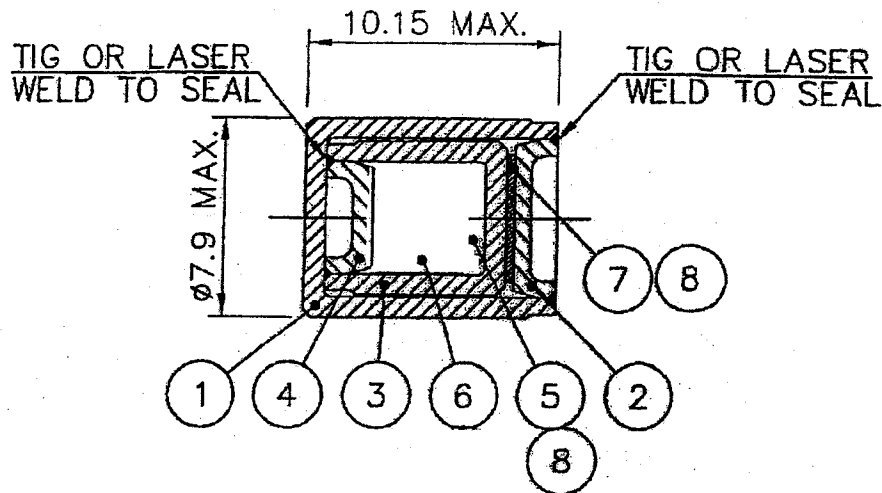
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

Attachment 1 of 2

Model AVN.V997 (X1 or AX1 Capsule)  
(All units in millimeters.)



ITEM No.	DESCRIPTION	QTY.
1	SHEATH BODY STAIN.STL	1
2	SHEATH LID STAIN.STL	1
3	CELL BODY STAIN.STL	1
4	CELL LID STAIN.STL	1
5	ACTIVE MATERIAL	1
6	SPACER (X1 OR AX1) STAINLESS STEEL (OPTIONAL)	AR
7	SPACER (X1 OR AX1) STAINLESS STEEL (OPTIONAL)	AR
8	CERAMIC FIBER PACKING(OPTIONAL)	AR

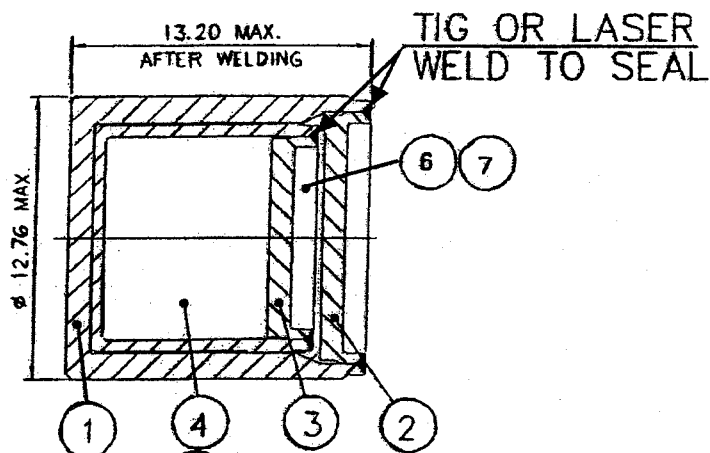
REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES  
SAFETY EVALUATION OF SEALED SOURCE  
(AMENDED IN ITS ENTIRETY)

NO: MA-1059-S-358-S

DATE: March 8, 2004

Attachment 2 of 2

Model AMN.V340 (X2105 capsule)  
All units in millimeters



ITEM No.	DESCRIPTION	No. OFF.
1	SHEATH BODY STAIN.STL.	1
2	SHEATH LID STAIN.STL.	1
3	ASSY CAPSULE X1188.	1
4	ACTIVE MATERIAL	AR
5	SPACER STAINLESS STEEL (OPTIONAL)	AR
6	SPACER STAINLESS STEEL (OPTIONAL)	AR
7	CERAMIC FIBER PACKING(OPTIONAL)	AR