

JANE SWIFT
GOVERNOR

ROBERT P. GITTENS
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, 5th Floor, Boston, MA 02114
(617) 727-6214 (617) 727-2098 - Fax

March 14, 2002

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

Dear Mr. Jankovich:

We have completed inactivation actions on the enclosed Sealed Source and Device (SSD) registration certificates for AEA Technology QSA, Inc. The registration numbers for these certificates, along with the associated model numbers, are provided in the attached table.

If you have any questions please contact me at (617) 727-6214.

Sincerely,

A handwritten signature in cursive script, reading "Anthony Carpenito".

Anthony Carpenito
Radiation Control Officer
Radiation Control Program

RJW/acc

Enclosures: (6)

NM5512

INACTIVATED REGISTRATION CERTIFICATES
AEA TECHNOLOGY QSA, INC.

New Certificate Number	Old Certificate Number	AEA Model Number(s)
MA-1059-D-863-S	NR-0628-D-106-S	820
MA-1059-D-864-S	NR-0628-D-112-S	850
MA-1059-S-866-S	NR-0628-S-119-S	866
MA-1059-S-867-S	NR-0628-S-109-S	90003 Source Assembly
MA-1059-S-868-S	NR-0628-S-132-S	A Series (A-1-A and A-2-A)
MA-1059-S-869-S	IL-0136-S-195-S	SIF.P1 (Formerly SIF.31 - SIF.33)

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: **MA-1059-D-863-S**
(Supercedes NR-0628-D-106-S)

DATE: **February 25, 2002**

PAGE 1 OF 4

DEVICE TYPE: Radiographic Source Changer

MODEL: 820

DISTRIBUTOR/MANUFACTURER: AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation
40 North Avenue
Burlington, MA 01803

SEALED SOURCE MODEL DESIGNATION: Amersham A424-1, A424-9, A424-20,
68309, A-2-A, 866, 899XX-Series (89913,
89914, 89916), 848, IN-I-T, IN-I-A, M-I-A,
B-8-T, B-8-A

ISOTOPE:

MAXIMUM ACTIVITY

Iridium-192

1000 Curies (37 TBq)
240 Curies (8.9 TBq) maximum per tube

Depleted Uranium as Shielding

120 lbs (54.5 kg)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (A) Industrial Radiography

CUSTOM DEVICE: YES ____ NO X

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: **MA-1059-D-863-S**
(Supersedes NR-0628-D-106-S)

DATE: **February 25, 2002**

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DEVICE TYPE: Radiographic Source Changer

DESCRIPTION: This device is no longer manufactured. The following description was active at the time of manufacture.

The Model 820 source changer is 19.5 inches (49.53 cm) in diameter and 21.5 inches (54.61 cm) high. The device contains titanium "J" tubes which are welded to an octagonal source stop of titanium. The radioactive source assemblies are housed in the "J" tubes. Shielding for the radioactive sources is provided by 120 lbs (54.5 kg) of depleted uranium. Each of the "J" tubes are provided with a locking mechanism to secure the radioactive source assemblies. The uranium shield is encased in a stainless steel housing. The finished device is about 2/3 the size of a 55 gallon drum, has a similar appearance and weighs approximately 222 lbs (101 kg).

LABELING:

A steel plate is attached to the changer that contains the labeling requirements of 10 CFR Part 20.

In addition the label contains the manufacturer's name, serial number, model number, isotope, capacity, amount of depleted uranium and weight.

DIAGRAM: See Attachment 1.

CONDITIONS OF NORMAL USE:

The Model 820 source is designed to allow field exchange of industrial radiography sources from radiographic exposure devices. It may also be used for transportation and storage of these sources.

Only the source assemblies listed under the "Sealed Source Model Designation" section and/or other source assemblies as specified in a registration certificate issued by the NRC or Agreement State may be used on the model 820 source changer.

PROTOTYPE TESTING:

The Model 820 source changer has been designed for use as a Type B shipping container and has been subjected to the penetration, free drop, puncture and thermal accident tests required by 10 CFR Part 71. The manufacturer's test data shows that these tests had no adverse effect on the integrity of the source changer.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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DEVICE TYPE: Radiographic Source Changer

EXTERNAL RADIATION LEVELS:

The manufacturer (Tech/Ops) measured the external radiation levels from a Model 820 loaded with 860 Ci (31.8 TBq) of Ir-192 and extrapolated the readings to the maximum rated capacity of 1000 Ci (37 TBq). The manufacturer reported that this resulted in a maximum surface reading of 56 mR/hr (350 μ Sv/hr) and a maximum reading at one meter (39.37 in) of 2.0 mR/hr (20 μ Sv/hr) for a device loaded with maximum capacity.

QUALITY ASSURANCE AND CONTROL: The device is no longer manufactured.

The Model 820 was manufactured and tested according to a quality assurance program meeting the requirements of 10 CFR Part 71.

LIMITATIONS AND/OR CONSIDERATION OF USE: The device is no longer manufactured.

- The device 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.
- The device 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 source assemblies listed under the "Sealed Source Model Designation" section can be used with the Model 820 source changer and/or other sources or uses specified in a registration certificate issued by the NRC or Agreement State.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The device is no longer manufactured.

In 1995, based on the information contained in the references below, the NRC concluded that the

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: **MA-1059-D-863-S**

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DEVICE TYPE: Radiographic Source Changer

SAFETY ANALYSIS SUMMARY (Cont'd):

Model 820 source changer design is acceptable for specific licensing purposes. Furthermore, the NRC continued to conclude that the Model 820 would be expected to maintain its integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

In addition, the Model 820 source changer had been reviewed for compliance with the requirements of 10 CFR Part 34. Based on the information contained in the references below, the NRC concluded that the Model 820 source changer meets the requirements of 10 CFR Part 34 for source changers and storage containers.

In 2000, the manufacturer reported that Model 820 source changers were no longer manufactured or distributed, and no design changes have been made since the last registration amendment.

REFERENCES:

The following supporting documents for the Model 820 radiographic source changer are hereby incorporated by reference and are made part of this registry document.

- Technical Operations letters dated December 17, 1979, and November 9, 1979 with enclosures thereto.
- Amersham Corporation letters dated July 6, 1995, and August 5, 1991, and letter dated January 4, 1989, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

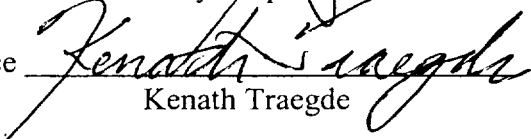
ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES SAFETY EVALUATION OF DEVICE

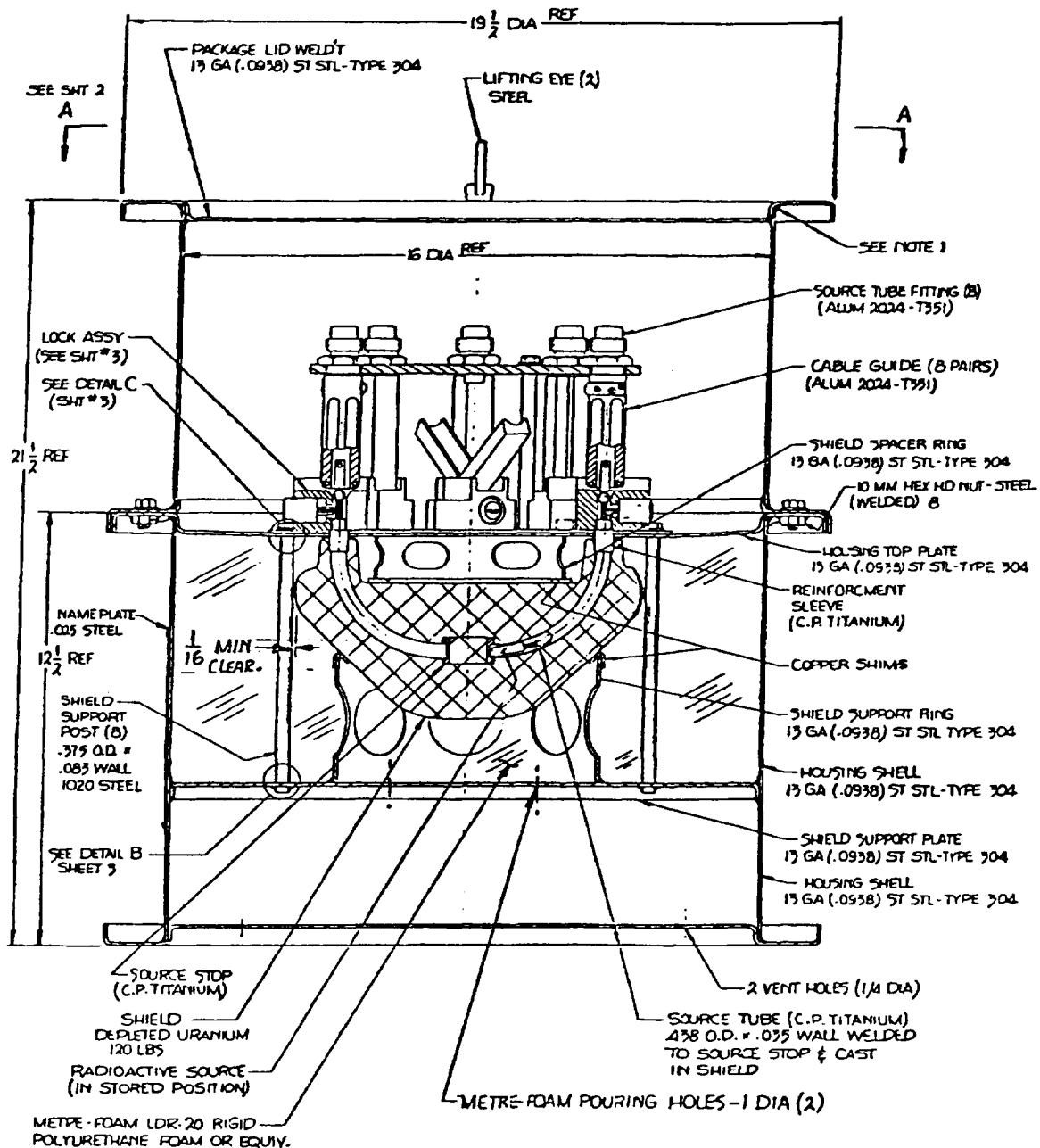
NO.: MA-1059-D-863-S
(Supersedes NR-0628-D-106-S)

DATE: February 25, 2002

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DEVICE TYPE: Radiographic Source Changer

Model 820



REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: MA-1059-D-864-S
(Supercedes NR-0628-D-112-S)

DATE: February 25, 2002

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DEVICE TYPE: Source Changer

MODEL: 850

DISTRIBUTOR/MANUFACTURER: AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation (formerly Tech/Ops)
40 North Avenue
Burlington, MA 01803

SEALED SOURCE MODEL DESIGNATION: Amersham 90003 and 91003

<u>ISOTOPE:</u>	<u>MAXIMUM ACTIVITY</u>
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Iridium-192	240 Curies (8.88 TBq)
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Depleted Uranium as Shielding	22 kg (48.50 lbs)
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LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (A) Industrial Radiography

CUSTOM DEVICE: YES ____ NO X

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

NO.: **MA-1059-D-864-S**
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DEVICE TYPE: Source Changer

DESCRIPTION: This device is no longer manufactured. The following description was active at the time of manufacture.

The Model 850 source changer is 10.4 inches (264 mm) high, 8.5 inches (216 mm) wide and 8.8 inches (224 mm) deep. The gross weight of the device package is 100 pounds (45 kg). Refer to attachment 1.

Within the device are housed the radioactive source assemblies in titanium tubes. Each tube has an outside diameter of 0.056 inches (14.3 mm) and a wall thickness of 0.03 inches (0.8 mm). A source stop is installed in one side of the "U" tube to provide positive positioning of the source assembly at the appropriate storage location.

The source tubes are cast in depleted uranium metal for shielding.

The uranium shield assembly is encased in a stainless steel housing and supported on the bottom by a stainless steel plate attached to the housing. The shield assembly is supported on the top by the lock assemblies. Horizontal movement of the shield assembly is restricted by the studs which mount the support plate to housing. Rotation of the shield assembly is precluded by engagement of the titanium "U" tubes with the lock assemblies.

The lock assemblies on top of the device are used to secure the radioactive source assemblies in position during transport.

Tamper-proof seals are provided for use during shipment. Two holes provide for venting of any gas generated from decomposition of polyurethane foam in event of fire accident involving the device. The smooth outer stainless steel finish of the Model 850 provides for easy decontamination.

A locking arrangement is used to secure the source in the storage position of the source changer.

LABELING:

The Model 850 is labeled in accordance with requirements of Section 20.203, 10 CFR Part 20. In addition, the label contains the following statement: "Radioactive Shielding Uranium 49 LB (22 KG)."

DIAGRAM: See Attachment 1.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES

SAFETY EVALUATION OF DEVICE

NO.: MA-1059-D-864-S
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DEVICE TYPE: Source Changer

CONDITIONS OF NORMAL USE:

The Model 850 source is designed for use as a source changer, storage container or shipping container for Model 90003, and Model 91003 source assemblies.

These changers are used in environments associated with radiography. These environs subject the device and source to extremely harsh environmental use conditions.

PROTOTYPE TESTING:

The manufacturer stated that a prototype model was subjected to, and passed, structural tests for compression, penetration, free drop, and puncture in compliance with the requirements of 10 CFR 71 and IAEA Safety Series No. 6, 1973 for Type B packaging.

EXTERNAL RADIATION LEVELS:

When loaded with 215 curies (7.96 TBq) of Ir-192, the maximum surface reading reported by Amersham was 110 mR/hr (1.1 mSv) and at one meter (39.37") was 1.8 mR/hr (18 μ Sv).

QUALITY ASSURANCE AND CONTROL: The device is no longer manufactured.

The Model 850 was designed, manufactured and serviced in accordance with a quality assurance program meeting the requirements of 10 CFR Part 71.

LIMITATIONS AND/OR CONSIDERATION OF USE: The device is no longer manufactured.

- The device shall be distributed to persons specifically licensed by the NRC or an Agreement State.
- The device shall be leak tested at 6 month intervals using techniques capable of detecting 0.005 microcurie (185 Bq) of removable contamination.
- Handling, storage, use, transfer, and disposal are to be determined by the licensing authority.

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SAFETY EVALUATION OF DEVICE

NO.: **MA-1059-D-864-S**

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DEVICE TYPE: Radiographic Source Changer

LIMITATIONS AND/OR CONSIDERATION OF USE (Cont'd):

- The Model 850 source changer is to be used only in conjunction with the source assemblies listed under the "Sealed Source Model Designation" and/or other source assemblies or uses specified in a registration certificate issued by the NRC or Agreement State.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The device is no longer manufactured.

In 1995, based on review of the information contained in the references below, the NRC concluded that the Model 850 source changer design is acceptable for specific licensing purposes. Furthermore, the NRC continued to conclude that the Model 850 would be expected to maintain its integrity for normal conditions of use and accidental conditions which might occur during uses specified in this certificate.

In addition, the Model 850 source changer had been reviewed for compliance with the requirements of 10 CFR Part 34. Based on the information contained in the references below, the NRC concluded that the Model 850 source changer meets the requirements of 10 CFR Part 34 for source changers and storage containers.

In 2000, the manufacturer reported that Model 850 source changers were no longer manufactured or distributed, and no design changes have been made since the last registration amendment.

REFERENCES:

The following supporting documents for the Model 850 source changer are hereby incorporated by reference and are made part of this registry document.

- Technical Operations letters dated April 10, 1981, February 4, 1981, and October 30, 1980, with enclosures thereto.
- Amersham Corporation letters dated July 6, 1995, and August 5, 1991, and letter dated January 4, 1989, with enclosures thereto.

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SAFETY EVALUATION OF DEVICE

NO.: MA-1059-D-864-S

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DEVICE TYPE: Radiographic Source Changer

REFERENCES (Cont'd):

- AEA Technology letter dated April 13, 2000, with enclosures thereto.

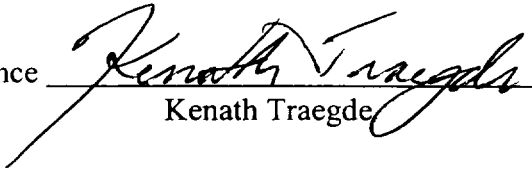
ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
SAFETY EVALUATION OF DEVICE

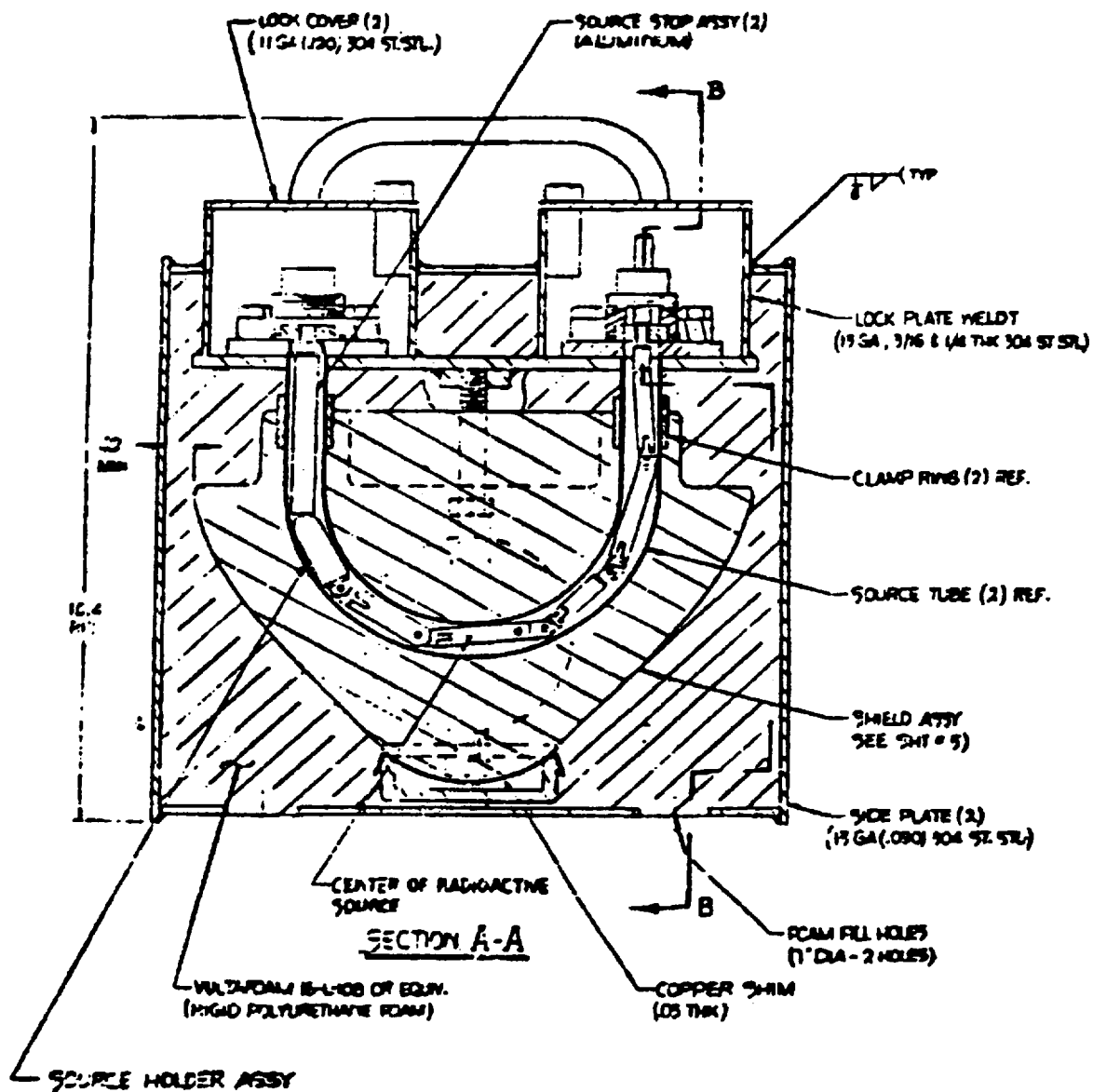
NO.: MA-1059-D-864-S
(Supercedes NR-0628-D-112-S)

DATE: February 25, 2002

Attachment 1 of 1

DEVICE TYPE: Radiographic Source Changer

Model 850



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

NO.: MA-1059-S-866-S

(Supercedes NR-0628-S-119-S)

DATE: February 25, 2002

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SEALED SOURCE TYPE: Radiographic Source Assembly

MODEL: 866

DISTRIBUTOR/MANUFACTURER:

AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation (formerly Tech/Ops)
40 North Avenue
Burlington, MA 01803

ISOTOPE:

MAXIMUM ACTIVITY

Iridium-192
Ytterbium-169
Cesium-137
Thulium-170

240 Curies (8.88 TBq)
200 Curies (7.40 TBq)
30 Curies (1.11 TBq)
50 Curies (1.85 TBq)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (A) Industrial Radiography

CUSTOM SOURCE:

YES ____ NO X

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

NO.: MA-1059-S-866-S

DATE: February 25, 2002

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(Supercedes NR-0628-S-119-S)

SEALED SOURCE TYPE: Radiographic Source Assembly

DESCRIPTION: This source assembly is no longer manufactured. The following description was active at the time of manufacture.

The radioactive isotope is contained in Amersham Model 875XX Series source capsule. These source capsules are fabricated from either type 304 or 304L stainless steel. The source capsule is sealed by welding. Amersham has a previously received approval for source encapsulation procedures. The source capsule is swaged to a drive cable with a Model 861 connector is attached, and a stop ball positioned to allow locking of the device. This forms a complete source assembly.

These source assemblies meet 10 CFR Part 34 requirements.

LABELING:

Each assembly connector is stamped with a unique serial number, isotope identification and manufacturer logo. A label is provided that is to be attached to the storage container or exposure device. This label contains the above information plus the activity of source and date the source was measured.

Additionally, a source certificate is provided with each source assembly indicating the manufacturer's source model number, source serial number, radionuclide, activity of source, date the activity was measured and the leak test results.

Each source capsule is marked with the words "DANGER-RADIOACTIVE".

DIAGRAM: See Attachment 1.

CONDITIONS OF NORMAL USE:

The Model 866 source assembly is designed for use in industrial radiography under field conditions. The source assembly is used in conjunction with Amersham Models 650, C-10, U-110, and 855 Source Changers and Model 520 Radiographic Exposure Device.

These changers are used in environments associated with radiography. These environs subject the device and source to extremely harsh environmental use conditions.

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

NO.: MA-1059-S-866-S

DATE: February 25, 2002

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(Supercedes NR-0628-S-119-S)

SEALED SOURCE TYPE: Radiographic Source Assembly

PROTOTYPE TESTING:

The manufacturer stated that the source assembly was designed and tested to the requirements of ANSI N542 and N432. The source capsules achieved an ANSI N542 classification of 77C43515. The source assembly withstood the tensile load test as prescribed by ANSI N432.

The manufacturer stated that the source capsules were also tested to demonstrate compliance with the requirements for special form radioactive material as described in 10 CFR 71.77.

EXTERNAL RADIATION LEVELS:

Calculated radiation dose rates in R/hr at varying distance for the different isotopes are as follows:

	Ir-192	Yb-169	Cs-137	Tm-170
	240 Ci (8.88 TBq)	200 Ci (7.40 TBq)	30 Ci (1.11 TBq)	50 Ci (1.85 TBq)
5 cm (1.97 in)	46,080	3,200	3,960	50
30 cm (11.81 in)	1,280	89	110	1.5
100 cm (39.37 in)	115	8	10	0.2

QUALITY ASSURANCE AND CONTROL:

The source assembly is no longer manufactured.

The manufacturer stated that it employed a quality control program to insure that each component was manufactured to the specifications furnished to the NRC. This program complied with the terms and conditions of Subpart H, 10 CFR Part 71 and conformed to the American National Standard's recommendations for quality assurance and control programs.

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

NO.: MA-1059-S-866-S

DATE: February 25, 2002

PAGE 4 OF 5

(Supercedes NR-0628-S-119-S)

SEALED SOURCE TYPE: Radiographic Source Assembly

LIMITATIONS AND/OR CONSIDERATION OF USE: The source assembly is no longer manufactured.

- The device shall be distributed to persons specifically licensed by the NRC or an Agreement State.
- The device shall be leak tested at 6 month intervals using techniques capable of detecting 0.005 microcuries (185 Bq) of removable contamination.
- Handling, storage, use, transfer, and disposal are to be determined by the licensing authority. In view that these sources exhibit high surface dose rates when unshielded, these sources should be handled only by experienced licensed personnel using adequate remote handling equipment and procedures.
- The Model 866 source assembly shall not be subjected to environments or conditions of use which exceed ANSI Classification 77C43515.
- The Model 866 source assembly is used in conjunction with the Model AI 520 exposure device and Models 650, 414, C-10, U-no, or 855 source changers and/or other devices or uses as specified in a registration certificate issued by the NRC or Agreement State.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The source assembly is no longer manufactured.

In 1992, based on review of the information contained in the references below, the NRC concluded that the Amersham Model 866 source assembly design is acceptable for specific licensing purposes. Furthermore, Amersham has demonstrated that use of the Model 875XX Series source capsule will have no significant change in the operational safety of the source assembly. The NRC continued to conclude that these source assemblies would be expected to maintain containment integrity for normal research, development, and industrial uses in accidental conditions which might occur during normal operation radiographic use conditions.

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

NO.: MA-1059-S-866-S
(Supercedes NR-0628-S-119-S)

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SEALED SOURCE TYPE: Radiographic Source Assembly

SAFETY ANALYSIS SUMMARY (Cont'd):

In 2000, the manufacturer reported that Model 866 source assemblies were no longer manufactured or distributed, and no design changes have been made since the last registration amendment.

REFERENCES:


The following supporting documents for the Model 8 source are hereby incorporated by reference and are made part of this registry document.

- Tech/Ops letters dated August 19, 1982, and June 7, 1984, with enclosures thereto.
- Amersham Corporation letters dated February 20, 1992, and August 5, 1981, and letter received January 4, 1989, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

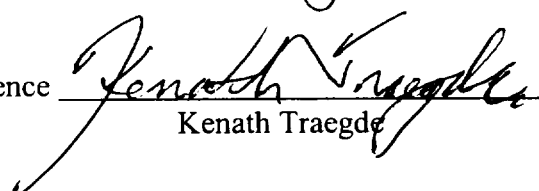
ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

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

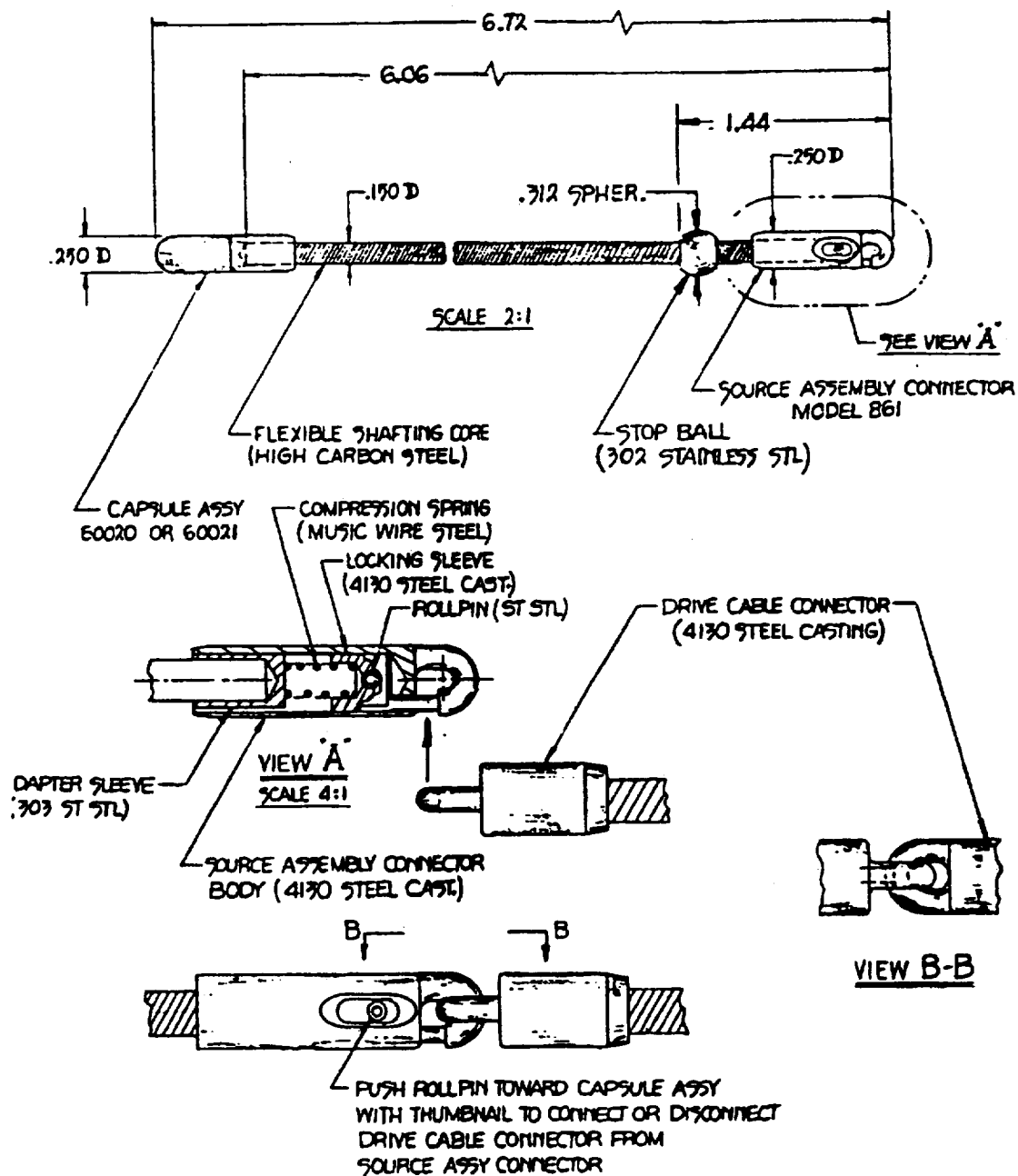
NO.: MA-1059-S-866-S
(Supercedes NR-0628-S-119-S)

DATE: February 25, 2002

Attachment 1 of 1

SEALED SOURCE TYPE: Radiographic Source Assembly

Model 866



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

NO.: MA-1059-S-867-S
(Supercedes NR-0628-S-109-S)

DATE: February 25, 2002

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SEALED SOURCE TYPE: Radiography Source Assembly

MODEL: 90003 Source Assembly

DISTRIBUTOR/MANUFACTURER: AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation (formerly Tech/Ops)
Radiation Products Division
40 North Avenue
Burlington, MA 01803

<u>ISOTOPE:</u>	<u>MAXIMUM ACTIVITY</u>
Iridium-192	240 Curies (8.88 TBq)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (A) Industrial Radiography

CUSTOM SOURCE: YES ____ NO X__

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

NO.: MA-1059-S-867-S

DATE: February 25, 2002

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(Supercedes NR-0628-S-109-S)

SEALED SOURCE TYPE: Radiography Source Assembly

DESCRIPTION: This source assembly is no longer manufactured. The following description was active at the time of manufacture.

The radioactive Iridium-192 is contained in Amersham Model 90004 or 90005 source capsule. This source capsule is fabricated from either Type 304 or Type 304L stainless steel. The source capsule is seal welded by Amersham in accordance with Amersham standard source encapsulation procedure.

The source capsule is installed in the source capsule holder which is fabricated from either Type 303 or Type 304 stainless steel. The capsule holder is threaded together and pinned at assembly using a 3/32 inch (2.38 mm) diameter roll pin.

Attached to the front of the source capsule holder are two source shields fabricated from tungsten. Attached to the rear of the source capsule holder are three source shields fabricated from tungsten and the female source connector. These source shields and connector are joined by means of couplings fabricated from either Type 303 or Type 304 stainless steel and 3/32 inch (2.38 mm) diameter roll pins. This makes up the Model 90003 source assembly. See Attachment 1 for sealed source dimensions.

This source assembly meets 10 CFR Part 34 equipment requirements.

LABELING:

Each source assembly is engraved with a unique serial number, the isotope and manufacturer's logo. A source identification label is provided with each source assembly for attachment to the device.

The female connector of the source assembly, in accordance with 10 CFR 34.20(C)(4), is labeled with "DANGER-RADIOACTIVE".

DIAGRAM: See Attachment 1.

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

NO.: MA-1059-S-867-S
(Supercedes NR-0628-S-109-S)

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SEALED SOURCE TYPE: Radiography Source Assembly

CONDITIONS OF NORMAL USE:

This component will typically be used in environments associated with industrial radiography. These environs subject the component to extremely harsh environmental use conditions and accidental condition.

PROTOTYPE TESTING:

Prototypes of Model 90003 source assembly were tested by Amersham and classified as ANSI 77C43515. In addition, the source capsules passed special form tests as described in 10 CFR 71 and IAEA Safety Series No. 6, 1973.

EXTERNAL RADIATION LEVELS:

Amersham specifies that the source emits 0.48 R/hr/curie (1.3 mSv/hr/GBq) at 1 meter. Thus, the maximum calculated radiation levels for a 240 curie (8.88 TBq) source are:

Distance		Maximum Radiation Level	
(cm)	(inches)	(R/hr)	(Sv/hr)
5	1.97	46,080	460.08
30	11.81	1,280	12.80
100	39.37	115	1.15

QUALITY ASSURANCE AND CONTROL:

The source assembly is no longer manufactured.

The manufacturer stated that all source capsule and source assembly components were inspected on a 100 percent basis for conformance to design specifications in accordance with Amersham's NRC-approved Part 71 Quality Control Program. Failure of any of these tests or inspections would prevent distribution of the source assembly. A copy of Amersham's quality assurance and control program was on file with the Source Containment and Devices Branch.

REGISTRY OF RADIOACTIVE SEALED SOURCES AND DEVICES
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DATE: February 25, 2002

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SEALED SOURCE TYPE: Radiography Source Assembly

LIMITATIONS AND/OR CONSIDERATION OF USE: The source assembly is no longer manufactured.

- The source assembly shall be distributed only to persons specifically licensed by the NRC or an Agreement State.
- This source should not be subjected to environmental or other factors which exceed the ANSI Classification 77C43515.
- The source assembly shall be leak tested at six month intervals using techniques capable of detecting 0.005 microcuries (185 Bq) of removable contamination.
- Leak tests using Vacuum Bubble Tests techniques shall not employ the use of water unless the inner capsule void space is greater than 30 mm³.
- Handling, storage, use, transfer, and disposal are to be determined by the licensing authority. In view of these sealed sources exhibit high surface dose rates when unshielded, these sealed sources should be handled only by experienced licensed personnel using adequate remote handling equipment and procedures.
- The Model 90003 source assembly can be used in conjunction with Model 900, and 920 exposure devices, and Model 850 source changer.
- This source assembly shall only be used in the devices listed above and/or devices or other uses in a registration certificate issued by the NRC or Agreement State.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

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

NO.: MA-1059-S-867-S

(Supercedes NR-0628-S-109-S)

DATE: February 25, 2002

PAGE 5 OF 5

SEALED SOURCE TYPE: Radiography Source Assembly

SAFETY ANALYSIS SUMMARY: The source assembly is no longer manufactured.

In 1994, based on review of the information contained in the references below, the NRC concluded that the Amersham Model 90003 source assembly is acceptable for specific licensing purposes. This source assembly is designed for use in either Amersham Model 900 or 920 radiography device and is intended for use only by qualified radiographers who are licensed by NRC or Agreement States. Prototype test data provided by Amersham confirmed that Model 90003 source assembly meets ANSI Classification 77C43515 requirements and that it also meets 10 CFR 71 requirements for special form classification. These tests confirm that when used in either the Model 900 or 920 radiography exposure device in accordance with Amersham's instructions they will properly contain the Iridium-192 under conditions of use and accidental conditions which might occur during uses specified in this certificate.

REFERENCES:


The following supporting documents for the Model 90003 source assembly are hereby incorporated by reference and are made part of this registry document.

- Tech/Ops letters dated August 11, 1980, October 28, 1980, February 1980, and March 6, 1980, with enclosures thereto.
- Amersham Corporation letters dated June 11, 1993, August 5, 1991, and letter received January 4, 1989, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

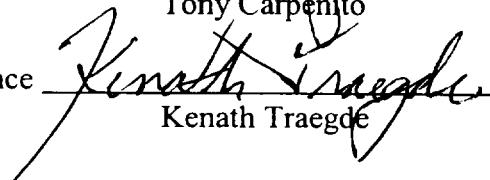
ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

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

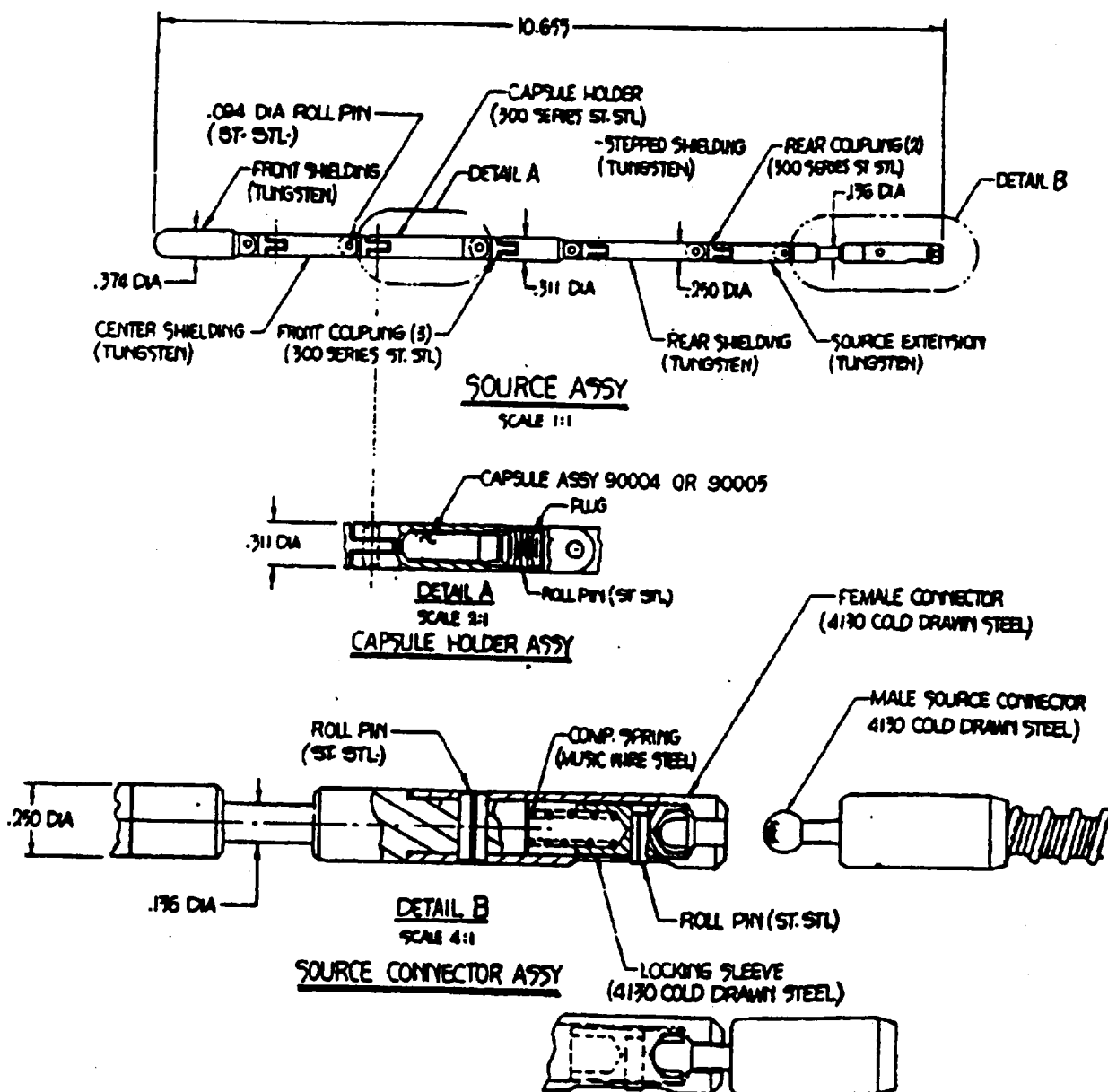
NO.: MA-1059-S-867-S
(Supercedes NR-0628-S-109-S)

DATE: February 25, 2002

Attachment 1 of 1

SEALED SOURCE TYPE: Radiography Source Assembly

Model 90003



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

NO.: **MA-1059-S-868-S**
(Supercedes NR-0628-S-132-S)

DATE: **February 25, 2002**

PAGE 1 OF 6

SEALED SOURCE TYPE: Radiography Source Assembly

MODEL: A Series (A-1-A, A-2-A)

DISTRIBUTOR/MANUFACTURER:

AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation (formerly Tech/Ops)
40 North Avenue
Burlington, MA 01803

ISOTOPE:

MAXIMUM ACTIVITY

Iridium-192

240 Curies (8.88 TBq)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: (A) Industrial Radiography

CUSTOM SOURCE:

YES ____ NO X

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

NO.: MA-1059-S-868-S

DATE: February 25, 2002

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(Supersedes NR-0628-S-132-S)

SEALED SOURCE TYPE: Radiography Source Assembly

DESCRIPTION: This source assembly is no longer manufactured. The following description was active at the time of manufacture.

The A Series source assemblies are designed for use in the radiography exposure devices and source changers shown in Attachment 1. The assemblies consist of a stainless steel connector, a 304 stainless steel stopball, and a stainless steel capsule attached to the cable.

The stainless steel capsule consists of an inner and outer capsule. This inner capsule is made of stainless steel and contains all the active material. It has a fixed outer dimension but may have different inner diameters to accommodate different diameter material. This inner capsule is then inserted into a model 88702 outer source capsule. All welds are tungsten inert gas (TIG) welded according to Amersham's source encapsulation procedures.

The double encapsulated source is then swaged onto a stainless steel adaptor which is swaged onto the end of the source cable. The source cable is 1/8 inch (0.32) diameter, 7x19 stainless steel. The 304 stainless steel Saf-T-Key style connector and the stop ball are also swaged to the source cable. The connector, stopball, and adaptor are all swaged onto the source cable prior to swaging the source capsule onto the adaptor. Overall dimensions of the source assemblies are shown in Attachment 1.

The A-1-A and A-2-A are the only approved models of the A Series. They are identical except for overall length and positioning of the stopball relative to the source capsule.

LABELING:

Each assembly connector is etched with a unique serial number, isotope identification and manufacturer's logo. A label is provided that is to be attached to the storage container or exposure device. This label contains the above information plus the activity of source, the date the source was measured, and the source assembly model number. Each source capsule has the words "DANGER-RADIOACTIVE" etched on the capsule.

DIAGRAM: See Attachment 1.

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

NO.: **MA-1059-S-868-S**

DATE: **February 25, 2002**

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(Supercedes NR-0628-S-132-S)

SEALED SOURCE TYPE: Radiography Source Assembly

CONDITIONS OF NORMAL USE:

The radioactive pigtail assemblies are used in the radiography equipment listed in Attachment 1 and will be typically used in environments associated with industrial radiography. These environs subject the source to extremely harsh environmental use conditions. Therefore caution should be taken when using these cable assemblies so that the assemblies are not subjected to conditions greater than those stated for an ANSI 77C43515 classification.

PROTOTYPE TESTING:

The manufacturer stated that the model 88702 outer source capsule design is similar enough to the models 87501 and 87503 capsule designs which were subjected to the testing requirements of ANSI N542 77C43515 that it can be assumed that the model 88702 will meet the same specification.

The manufacturer also stated that an A Series assembly was cycle tested for greater than 20,000 cycles through a stainless steel "S" tube. The assembly was examined after the test and no mechanical failures or significant wear were observed.

EXTERNAL RADIATION LEVELS:

The external radiation levels from an unshielded 240 curie (8.88 TBq) Ir-192 source as follows:

Distance		Maximum Radiation Level	
(cm)	(inches)	(R/hr)	(mSv/hr)
5	1.97	46,377	463,770
30	11.81	1,288	12,880
100	39.37	166	1,660

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

NO.: **MA-1059-S-868-S**
(Supercedes NR-0628-S-132-S)

DATE: **February 25, 2002**

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SEALED SOURCE TYPE: Radiography Source Assembly

QUALITY ASSURANCE AND CONTROL: The source assembly is no longer
manufactured.

The manufacturer stated that all components of the source assemblies were subjected to a quality control program which meets the requirements of Subpart H, 10 CFR Part 71 to assure conformity to design specifications.

The manufacturer also stated that if any cable assembly failed to meet any of the quality control tests, the cable assembly is rejected.

LIMITATIONS AND/OR CONSIDERATION OF USE: The source assembly is no longer
manufactured.

- The device shall only be distributed prior to January 10, 1996, to those persons specifically licensed by an Agreement State which has not adopted regulations equivalent to 10 CFR Part 34.
- The source assemblies shall not be used by specific licensees of the NRC or by persons working under the general license provisions of 10 CFR 150.20.
- The source assemblies shall not be subjected to environmental or other conditions of use which exceed the ANSI N542 Classification 77C43515.
- The Model A Series source assemblies listed in Attachment 1 are approved for distribution and use in the devices listed in Attachment 1, and/or other devices or uses as specified in a registration certificate issued by the NRC or Agreement State. Any additional Model A Series source assemblies must be first approved in writing by the Commonwealth of Massachusetts, Radiation Control Program before distribution or use.
- The source assemblies shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcuries (185 Bq) of Iridium-192.
- REVIEWER NOTE: In 1993, the NRC stated that sufficient information had not been supplied to show that the source meets the requirements of 10 CFR 34.20. Specifically, it had not been shown that the connector will ensure that the source assembly will not become disconnected if cranked outside the guide tube.

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

NO.: **MA-1059-S-868-S**
 (Supersedes NR-0628-S-132-S)

DATE: **February 25, 2002**

PAGE 5 OF 6

SEALED SOURCE TYPE: Radiography Source Assembly

LIMITATIONS AND/OR CONSIDERATION OF USE (Continued):

- Handling, storage, use, transfer, and disposal are to be determined by the licensing authority. In view that these cable assemblies exhibit high dose rates, the sources should be handled only by experienced licensed personnel using adequate remote handling equipment and procedures.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The source assembly is no longer manufactured.

Model A Series assemblies are used in approved radiography equipment. The radioactive source is contained in an NRC approved capsule.

In 1993, based on review of the information contained in the references below, the NRC concluded that Model A Series source assemblies were acceptable for specific licensing purposes.

Furthermore, the NRC concluded that these source assemblies would be expected to maintain their containment for normal conditions of use which might occur during the uses specified in the registration sheet.

In 2000, the manufacturer reported that Model A Series source assemblies were no longer manufactured or distributed, and no design changes have been made since the last registration amendment.

REFERENCES:

The following supporting documents for the Model A Series source assemblies are hereby incorporated by reference and are made part of this registry document.

- Amersham Corporation letters dated March 19, 1993, and June 11, 1993, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

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

NO.: MA-1059-S-868-S

DATE: February 25, 2002

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(Supercedes NR-0628-S-132-S)

SEALED SOURCE TYPE: Radiography Source Assembly

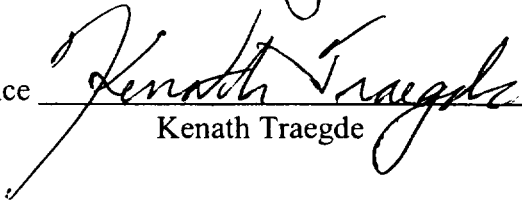
ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

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

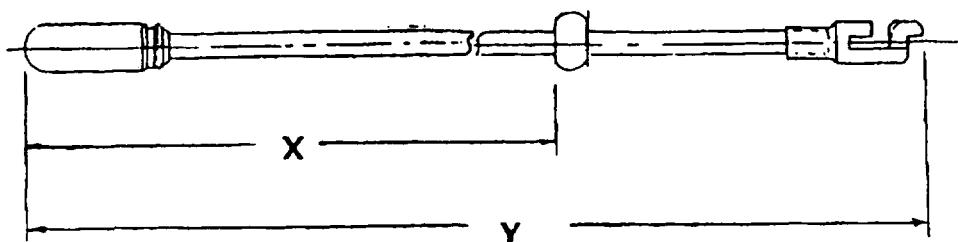
NO.: MA-1059-S-868-S
(Supercedes NR-0628-S-132-S)

DATE: February 25, 2002

Attachment 1 of 1

SEALED SOURCE TYPE: Radiography Source Assembly

Model A Series



SOURCE	"X"	"Y"	CAMERA	CHANGER
A-1-A	5-1/4" (13.34 cm)	7-1/8" (18.10 cm)	GI: 35, 35S, 35S UNIVERSAL, CENTURY, CENTURY S, CENTURY S UNIVERSAL, 20V, 20VS, 40V, 40VS SPEC: 2T	GI: C-10 GN: U-110 AMERSHAM: 500SU, 855, 820
A-2-A	5-1/8" (13.02 cm)	7-11/16" (19.53 cm)	GI: <u>35, 35S,</u> <u>35S UNIVERSAL,</u> 35SA, 35SA UNIVERSAL, <u>CENTURY, CENTURY S,</u> <u>CENTURY S UNIVERSAL,</u> CENTURY SA, CENTURY SA UNIVERSAL, 20V, 20VS, 40V, 40VS SPEC: 2T	GI: <u>C-10</u> GN: <u>U-110</u> AMERSHAM: 500SU, 855, 820

NOTE: The devices which are underlined must be equipped with a shipping cap which has a clearance of at least 1 1/4" to allow the cap to fully thread and not compress the source assembly.

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

NO.: MA-1059-S-869-S
(Supercedes IL-0136-S-195-S)

DATE: February 25, 2002

PAGE 1 OF 6

SEALED SOURCE TYPE: Industrial Gauge Source

MODEL: SIF.P1 (Formerly SIF.31 - SIF.33)

DISTRIBUTOR: AEA Technology QSA Incorporated
40 North Avenue
Burlington, MA 01803

Formerly

Amersham Corporation
2636 South Clearbrook Drive
Arlington Heights, IL 60005-4692

MANUFACTURER: Amex-sham Buckler
Gieselweg 1
Postfach 1149
D-38110 Braunschweig, Germany

Amex-sham International, PLC
White Lion Road Amersham
Buckinghamshire, England HQ79LL

ISOTOPE: MAXIMUM ACTIVITY: $\pm 15\%$

Strontium-90

Capsule Codes:

X.111	320 MBq (10 mCi)
VZ-411	400 MBq (11 mCi)
VZ-411A	400 MBq (11 mCi)

LEAK TEST FREQUENCY: 6 months

PRINCIPAL USE: Beta Gauges

CUSTOM SOURCE: YES ☐ NO ☒

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

NO.: MA-1059-S-869-S
(Supercedes IL-0136-S-195-S)

DATE: February 25, 2002

PAGE 2 OF 6

SEALED SOURCE TYPE: Industrial Gauge Source

DESCRIPTION: This source assembly is no longer manufactured. The following description was active at the time of manufacture.

Capsule Code X.111

The Strontium-90 compound is incorporated into a glass frit which is fired at high temperature into a 1 mm deep recess, which is then placed inside a stainless steel capsule. The capsule is composed of a sheath produced by machining a solid stainless steel rod resulting in the capsule sheath and having a 50 micron window. The glass bead is inserted inside this sheath and is backed by a stainless steel plug inserted behind the bead. The outer capsule is sealed by TIG welding.

Capsule Codes VZ-411 (formerly I411) and VZ-411A

The Strontium-90 compound is incorporated into a glass frit which is fired at high temperature into a 1 mm deep recess at the top end of a stainless steel plug. The active plug is then loaded into a stainless steel sheath. The sheath is a tube onto one end of which a 50 micron thick stainless steel window has been previously silver soldered (VZ-411) or laser welded (VZ-411A). A spring is placed on top of the active plug and a second inactive plug is loaded into the sheath with one end contacting the back end of the spring and the other end measuring flush with the end of the sheath. The second stainless steel plug is then TIG welded to the sheath to effect source capsule closure.

LABELING:

The X.111 source will be permanently engraved with the following:

- "AI"
- "Radioactive"
- Unique Serial Number
- Model Number
- Radionuclide

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

NO.: MA-1059-S-869-S

DATE: February 25, 2002

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(Supercedes IL-0136-S-195-S)

SEALED SOURCE TYPE: Industrial Gauge Source

LABELING (Cont'd):

The VZ-411 and VZ-411A sources will be permanently engraved with the following:

- "AI" or Flying A
- Radiation Trefoil or "Caution - Radioactive"
- Unique Serial Number
- Model Number
- Radionuclide

Sources should be licensed by source model SIF.P1, not capsule codes. The activity and activity assay data will be attached to the shipping container.

DIAGRAM: See Attachment 1.

CONDITIONS OF NORMAL USE:

These sources are designed for use in beta gauges, laboratories and research applications. Sources are used at normal temperatures and pressures and have an expected useful life of ten (10) years.

PROTOTYPE TESTING:

Prototype tests were performed in accordance with ANSI N542, 1977. The Amersham test data verifies an ANSI Classification of 77C54343 for Capsule Codes X.111 and VZ-411 and 77C64344 for Capsule Code VZ-411A.

EXTERNAL RADIATION LEVELS:

Estimated external dose rates for a 10.0 millicurie (370 MBq) source for capsule Code X.111 using an Eberline RO-2W for rates up to 5 rem/hr (50 mSv/hr) and an Eberline RO-7 for rates > 5 rem/hr (50 mSv/hr).

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

NO.: MA-1059-S-869-S

DATE: February 25, 2002

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(Supersedes IL-0136-S-195-S)

SEALED SOURCE TYPE: Industrial Gauge Source

EXTERNAL RADIATION LEVELS (Cont'd):

Distance		Front		Back		Side	
cm	inches	rem/hr	mSv/hr	rem/hr	mSv/hr	rem/hr	mSv/hr
5	2	168.0	1680	3.36	33.6	22.8	228
30	11.8	4.8	48	0.14	1.4	1.4	14
100	39.4	0.25	2.5	0.014	0.14	0.056	0.56

QUALITY ASSURANCE AND CONTROL:

The source assembly is no longer manufactured.

The manufacturer stated that the sources were designed, manufactured and tested according to Amersham International's QA Program described in their Radiation Sources Quality Assurance manual IPD QAM, Issue 9, dated 12 July 1994, or Amersham Buchler's Quality Manual, Revision 3, dated October, 1995.

Each welded window was subject to a pressure test to ensure that the window is leak tight. Each X.111 source was leak tested by a wipe and immersion test. Each VZ-411 and VZ-411A source, following visual inspection, was leak tested by wipe, immersion and bubble test.

LIMITATIONS AND/OR CONSIDERATION OF USE:

The source assembly is no longer manufactured.

- The Model SIF.P1 source shall be distributed only to persons specifically licensed by the NRC or an Agreement State.
- The sources shall be leak tested at six month intervals using techniques approved by the licensing authority and capable of detecting 0.005 microcuries (185 Bq) of removable contamination.

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

NO.: MA-1059-S-869-S
(Supercedes IL-0136-S-195-S)

DATE: February 25, 2002

PAGE 5 OF 6

SEALED SOURCE TYPE: Industrial Gauge Source

LIMITATIONS AND/OR CONSIDERATION OF USE (Cont'd):

- These sources shall not be subjected to environmental or other conditions of use which exceed the ANSI Classification 77C54343 for Capsule Codes X.111 and VZ-411 or 77C64344 for Capsule Code VZ-411A.
- These sources should not be subjected to corrosive environments or extreme cyclic thermal and mechanical conditions.
- At the time of distribution "Handling Instructions for Sources" and "Sealed Radioactive Source Test Report" accompanied each shipment.
- Handling, storage, use, transfer, and disposal are to be determined by the licensing authority. These services should be provided by persons specifically authorized by the NRC or an Agreement State.
- This registration certificate and the information contained within the references shall not be changed or transferred without the written consent of the Commonwealth of Massachusetts, Radiation Control Program.

SAFETY ANALYSIS SUMMARY: The source assembly is no longer manufactured.

In 1997, based on review of the information contained in the references below, the Illinois Department of Nuclear Safety concluded that the Amersham Corporation Model SIF.P1 sealed source designs are acceptable for specific licensing purposes.

Tests of prototype sources show that they meet ANSI requirements for classification as 77C54343 for Capsule Codes X.111 and VZ-411 and 77C64344 for capsule Code VZ-411A.

Thus these sources would be expected to retain their containment capability for normal industrial gauging use and accident conditions which might occur during normal use or transportation.

Since these sources exhibit high surface dose rates when unshielded, they should be handled by experienced, licensed personnel using adequate remote handling equipment and procedures.

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

NO.: MA-1059-S-869-S
(Supercedes IL-0136-S-195-S)

DATE: February 25, 2002

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SEALED SOURCE TYPE: Industrial Gauge Source

REFERENCES:


The following supporting documents for the Amersham Corporation Model SIF.P1 are hereby incorporated by reference and are made part of this registry document.

- Amersham Corporation letters dated July 29, 1971, October 29, 1980, December 3, 1980, February 27, 1997, March 6, 1997, May 16, 1997 and June 3, 1997, with enclosures thereto.
- AEA Technology letter dated April 13, 2000, with enclosures thereto.

ISSUING AGENCY:

Massachusetts Department of Public Health, Radiation Control Program

Date 2/25/02

Reviewer 
Tony Carpenito

Date 3/6/02

Concurrence 
Kenath Traegde

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

NO.: MA-1059-S-869-S
(Supercedes IL-0136-S-195-S)

DATE: February 25, 2002

Attachment 1 of 1

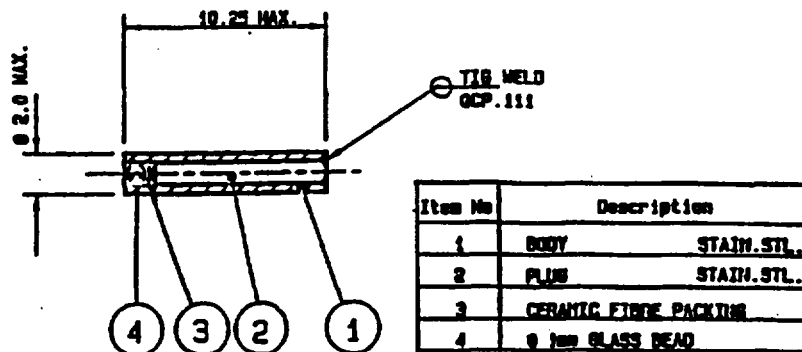
SEALED SOURCE TYPE: Industrial Gauge Source

Model SIF.P1

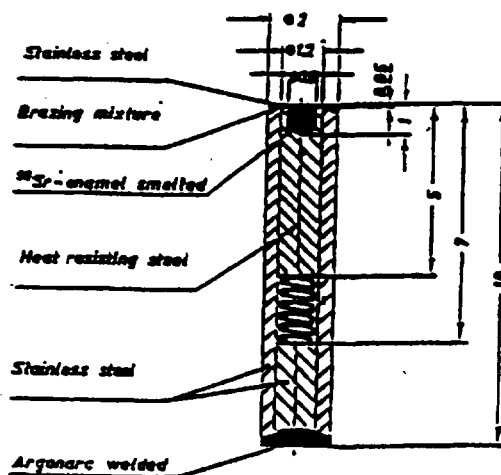
(Formerly SIF.31 - SIF.33)

Dimensions are in units of mm.

X111



VZ-411



VZ-411a

