SAINT-GOBAIN
CRYSTALS & DETECTORS

November 14, 2001

7099 3400 0017 4255 9627
CERTIFIED MAIL
RETURN RECEIPT REQUESTED

United States Nuclear Regulatory Commission
Materials Safety and Inspection Branch
Division of Industrial and Medical Nuclear Safety
Washington, D.C. 20555-0001
Attn: Dr. John Jankovich

Subject: Amendment to Safety Device Registration NR-339-D-103-S

Dear Dr. Jankovich:

Saint-Gobain Crystals and Detectors requests an amendment to our existing Radioactive Sealed Source and Device Safety Evaluation numbered NR-339-D-103-S.

The original registration lists our TLD Model 6610C Gamma Irradiator as using an Amersham Corporation Model CDC 800 Series source containing 100 millicuries of Cesium 137. This source is no longer manufactured, therefore, we would like to include the Isotope Products Laboratory 100 millicurie Cesium 137 source HEG-137-100 (Capsule type 3015) to the registration. The Isotope Products Laboratory source is identical to the Amersham source and holds the California Sealed Source Safety Evaluation Number CA406S122S.

Enclosed is the Isotope Products Laboratory catalog description of the source and capsule. Also enclosed is a copy of the California Safety Evaluation CA406S122S.

Please let me know if you need additional information to complete this amendment.

Sincerely,
Saint-Gobain Crystals and Detectors

Jeffrey L. Kennedy
Manager, Environmental Safety

Enclosures (2)

NMSS12

12345 Kinsman Road, Newbury, OH 44065
Telephone: 440-564-2251 Fax: 440-542-5906

HIGH INTENSITY GAMMA RAY SOURCES (HEG AND HEGL SERIES)

This group of sources includes gamma emitters with energies greater than 300 keV which are suitable for a variety of field uses including survey instrument calibration and industrial gauging applications. Two basic types are cataloged: the HEG series of point sources and the HEGL series of line sources. All source capsules, with the exception of the Kr-85 capsule, are of doubly encapsulated, welded 304 stainless steel. All sources have been assigned a classification number in accordance with ANSI N242.1977 and meet minimum standards for their application. Most capsules meet D.O.T. Special Form requirements.

The active elements of the HEG point sources are ceramic unless otherwise indicated. Contained activity is normally held to within ±15% of the stated value unless quoted on a different basis. NIST traceability and output calibrations is available on request.

The HEGL line sources contain either ceramic or gold wire elements, depending on the application and activity level. All line sources are produced on a custom basis. Requests for quotations should include contained activity required, active and overall length, diameter limitations and uniformity requirements. Typical activities range up to 10 mCi per cm and lengths to 60 cm. Uniformity is normally held to within ±15%.

Most sources are shipped in non-returnable D.O.T. 7A Type A containers. Certain products labeled with an asterisk require a wooden shipping container and lead insert. This container becomes the customer's property, and is suitable in most cases for permanent storage. There is an additional charge for this container.

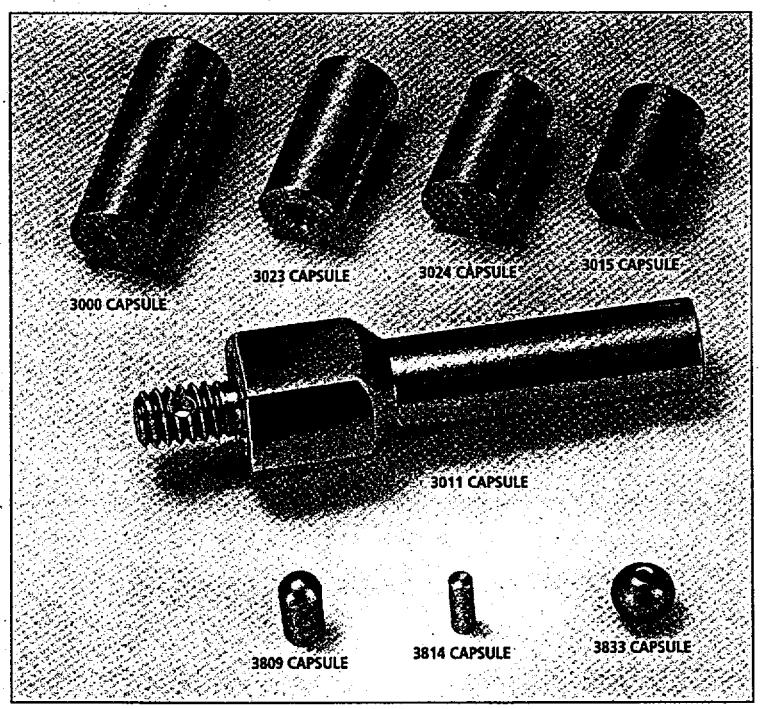

FIGURE 59-A — HIGH INTENSITY GAMMA RAY SOURCES (HEG SERIES)

HIGH INTENSITY GAMMA RAY SOURCES (HEG AND HEGL SERIES)

Source capsules:

Series 225: The model 225 capsule may be configured in several capsule geometries as shown in the following table. The "standard" Model 225 capsule is Catalog #3000.

CAPSULE NUMBER	OVERALL LENGTH	OVERALL DIAMETER	ACTIVE LENGTH *	ACTIVE DIAMETER
3000 (Standard 225)	0.625" (15.9 mm)	0.250" (6.35 mm)	0.030" - 0.090" (0.762 - 2.29 mm)	0.125" (3.18 mm)
3015	0.315" (8.00 mm)	0.236" (5.99 mm)	0.030" - 0.090" (0.762 - 2.29 mm)	0.125" (3.18 mm)
3023	0.473" (12.0 mm)	0.236" (5.99 mm)	0.030" - 0.090" (0.762 - 2.29 mm)	0.125" (3.18 mm)
3024	0.394" (10.0 mm)	0.236" (5.99 mm)	0.030" - 0.090" (0.762 - 2.29 mm)	0.125" (3.18 mm)

*Typical active length is 0.030" (0.762mm)

Series 193:

CAPSULE NUMBER	OVERALL LENGTH	OVERALL DIAMETER	ACTIVE LENGTH*	ACTIVE DIAMETER
3011 (Standard 193)	1.437" (36.5 mm)	0.250" (0.635 mm) 0.375" hex width (9.53 mm hex width)	0.030" - 0.090" (0.762 - 2.29 mm)	0.125" (3.18 mm)

* Typical active length is 0.030" (0.762 mm)

Additional Point Source Capsules:

CAPSULE NUMBER	OVERALL LENGTH	OVERALL DIAMETER	ACTIVE LENGTH*	ACTIVE DIAMETER
3809	0.410" (10.4 mm)	0.108" (2.74 mm)	N/A	0.012" (0.30 mm)
3814	0.200" (5.08 mm)	0.060" (1.52 mm)	0.110" (2.8 mm)	0.030" (0.76 mm)
3833	N/A	0.156" (3.96 mm)	N/A N/A	0.012" (0.30 mm)

Line Source Capsules:

CAPSULE NUMBER	OVERALL LENGTH	OVERALL DIAMETER	ACTIVE LENGTH	ACTIVE DIAMETER
3402	*	0.120"	1" - 33"	0.060"
		(3.05 mm)	(25.4 mm-838 mm)	(1.52 mm)
3321-1	*	0.187"	0.5 -60"	0.127"
		(4.75 mm)	(12.7 mm - 1.52 m)	(3.23 mm)
3321-2	*	0.187"	0.5 - 60"	0.127"
		(4.75 mm)	(12.7 mm - 1.52 m)	(3.23 mm)

*Overall length per customer's specification. See drawings Page 65.

To place an order:
Phone 818 843-7000 - FAX 818 843-6168
Please include the catalog number, the capsule or configuration number, the nuclide, the activity and any NIST traceability requirements.

High Intensity Gamma Ray Sources (HEG and HEGL Series)

HEG Point Sources

Cesium-137

Half-life:	30.2 y
Principal gamma (keV):	662 (85.2% from Ba-137m), Ba K x-rays: 27-31 (7%)
Radiochemical purity:	>99%
Active element:	CsCl in ceramic matrix
R/h/Ci @ 1 m:	0.32 (0.0032 Gray)

CATALOG NUMBER	mCi	MBq
HEG-137-1	0.1-1	3.7-37
HEG-137-5	5	185
HEG-137-10	10	370
HEG-137-20	20	740
HEG-137-25	25	925
HEG-137-30	30	1110
HEG-137-40	40	1480
HEG-137-50 *	50	1850
HEG-137-100 *	100	3700
HEGL - 137	OR	OR

* Requires a wooden shipping container and lead insert

Cobalt-60

Half-life:	5.27 y
Principal gammas (keV):	1173 (100%), 1333 (100%)
Radiochemical purity:	>99%
Active element:	Cobalt metal or CoCl in ceramic
R/h/Ci @ 1 m:	1.32 (0.0132 Gray)

CATALOG NUMBER	mCi	MBq
HEG-60-1	0.1-1	3.7-37
HEG-60-5 *	5	185
HEG-60-10 *	10	370
HEGL-60	OR	OR

* Requires a wooden container and lead insert.

Germanium-68/Gallium-68

(For Use In Pet Scanners)

Half-life:	270.8 d/1.35 d
Principal Gammas (keV:	511 (178%, annilation peak) 1077 (3%)
Radiochemical purity :	99.9% Not Determined
Active element:	ceramic or epoxy
R/h/Ci @ 1 m:	0.52 (gamma only)

CATALOG NUMBER	mCi	MBq
HEG-68	OR	OR
HEGL-68	OR	OR

To place an order:
Phone 818 843-7000 - FAX 818 843-6168
Please include the catalog number, the capsule or configuration number, the nuclide, the activity and any NIST traceability requirements.

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

NO.: CA406S122S DATE: October 9, 1998

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

MODEL: HEG-XXX Series (Formerly 225)

XXX Represents Radionuclide Mass Number

MANUFACTURER/DISTRIBUTOR: Isotope Products Laboratories
1800 North Keystone Street
Burbank, California 91504
(8 18) 843-7000

	ISOTOPE:		MAXIMUM ACTIVITY:
(a)	Cesium-137	(a)	600 mCi
(b)	Cobalt-60	(b)	600 mCi
(c)	Sodium-22	(c)	100 mCi
(d)	Cobalt-57	(d)	300 mCi
(e)	Cobalt-58	(e)	300 mCi
(f)	Germanium-68	(f)	50 mCi
(g)	Barium-133	(g)	100 mCi
(h)	Radium-226	(h)	50 mCi
(i)	Thorium-228, Thorium-229, Actinium, Protactinium	(i)	50 mCi
(j)	Thorium-230, Thorium-232, Uranium	(j)	30 mCi
(k)	Californium-252	(k)	1 mCi (2 μg)
(l)	Europium-152	(l)	20 mCi
(m)	Americium-241	(m)	50 mCi

LEAK TEST FREQUENCY: Six (6) Months

PRINCIPAL USE: Gamma Gauge (D)

CUSTOM SOURCE: _____ YES __X__ NO

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

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

DESCRIPTION:

This series of sources is doubly encapsulated and constructed of Type 304 or Type 304L stainless steel with a minimum wall thickness of 0.040" (combined inner and outer capsule thickness). The A3026 is triply encapsulated. Four sizes are available: (1) 0.625" long by 0.25" diameter, (2) 0.315" to 0.395" long by 0.236" diameter, (3) 0.473" to 0.500" long by 0.236" diameter, and (4) 1.43" long by 0.370" diameter.

The chemical forms of the active elements in the HEG series are Chlorides or Nitrates in Ceramic, Oxides in Gold or Aluminum, or metal plated onto substrate.

These sources are designated as "Special Form" and have been issued Special Form Certificate Number USA/0356/S.

LABELING:

The source is engraved with IPL, the nuclide, nominal activity, and serial number.

DIAGRAM:

Drawing Nos. A3000, A3015, A3023, A3024 & A3026 (see Attachments 1 through 5).

CONDITIONS OF NORMAL USE:

These sources are normally used by trained personnel in a laboratory environment, installed in gauging devices, or installed in well logging tools (See "Prototype Testing" and "Limitations and/or Other Considerations of Use").

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

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

PROTOTYPE TESTING:

Prototype sources have undergone testing per ANSI N542-1977 indicating the following classifications:

Capsule Drawing No.	ANSI N.542-1977 Classification	ANSI N.542-1977 Recommended Usage
A3000	77C66535	Gamma Gauging & Oil well logging*
A3015	77C66535	Gamma Gauging & Oil well logging*
A3023	77C63333	Gamma Gauging
A3024	77C66535	Gamma Gauging & Oil well logging*
A3026	77C66535	Gamma Gauging & Oil well logging* (Note: contains an A3000 capsule)

* These sources may be used in down-hole applications, and are pressure tested to 25,000 PSIG minimum. This requirement does not apply to sources used in gamma gauging applications.

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

NO.: CA406S122S DATE: October 9. 1998 PAGE: 4 of 7

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

EXTERNAL RADIATION LEVELS:

The radiation level of the source will vary with the contained radionuclide and the activity level. Listed below are radiation levels in mr/hr for the model HEG-XXX sources. Data has been taken, where available, from table of gamma factors on page 131 of the "Radiologic Health Handbook." The factor for 100 cm is taken from the table and the 30 cm and 5 cm radiation levels calculated using the inverse square law. For nuclides not listed in the referenced table, measurements were taken at a measured distance with an ion chamber type survey meter and the radiation levels in the following table calculated using the inverse square law.

		Distance from source		
Nuclide	Activity	5 cm	30 cm	100 cm
(a) Cs-137	600 mCi	79200 mR/h	2200 mR/h	198 mR/h
(b) Co-60	600 mCi	316800	8800	198
(c) Na-22	100 mCi	48,000	1333	120
(d) Co-57	300 mCi	8,400	231	21
(e) Co-58	300 mCi	66,000	1833	165
(f) Ge-68	50 mCi	10,000	280	25
(g) Ba-133	100 mCi	7,700	215	20
(h) Ra-226	50 mCi	16,400	456	41
(i) Th-229, Th-228, Ac, Pa	50 mCi	28,000	778	70
(j) Th-230. Th-232, U	50 mCi	400	11	1
(k) Cf-252	1 mCi	73.1 744*	2.03 20.7*	0.183 Gamma 1.86* Neutron
(l) Eu-152	20 mCi	4640	129	11.6
(m) Am-241	**50 mCi**	**6276**	**174**	**16 mSv/hr ****

*mRem/hr
** **Health Physics and Radiological Health Handbook, revised ed., 1992.**

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

NO.: CA406S122S DATE: October 9. 1998 PAGE: 5 of 7

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

QUALITY ASSURANCE AND CONTROL:

Program: The IPL Quality Assurance Manual details the quality control of these sources from raw materials to finished product. The program is designed to satisfy 10 CFR Part 50 (B) and meets the requirements of ISO 9001. The program covers drawing control, purchasing, training, calibration records, source numbering, incoming raw materials, assay quality control, leak testing, document control, confirming orders, and pre-production design review.

Activity: Held to ± 15% of nominal activity.

Assay procedures: A calibrated ionization chamber is used to measure the activity of the source. For actinides, the content is measured by liquid scintillation counting of an aliquot of starting material.

Radiopurity determination: Determined by gamma or alpha spectrometry of the source or the radionuclide batch.

Leak test procedures: Sources are either leak tested according to the "Immersion With Boiling Test" taken from ANSI N542 1977 Appendix A, Section A2.1.3, or the immersion test from Appendix to ANSI N44.2-1973 "American National Standard for Leak Testing Radioactive Brachytherapy Sources." Criteria for acceptance are.

1.0 nCi removable beta/gamma
0.1 nCi removable alpha

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

NO.: CA406S122S DATE: October 9, 1998 PAGE: 6 of 7

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

LIMITATIONS AND/OR OTHER CONSIDERATIONS OF USE:

a. Distribution: These sources shall be distributed to specific licensees of the NRC or Agreement States.

b. Use: These sources are used in a laboratory environment for checking or calibrating nuclear instrumentation, or to be permanently installed in gauging devices. Sources manufactured to Drawing Numbers A3000, A3015, A3024, and A3026 meet the ANSI N542-1977 guidelines for oil well logging sources and are pressure tested to 25,000 PSIG at the time of manufacture prior to use in down-hole applications.

c. Handling: Remote handling tools and localized shielding should be used.

d. Storage: store in a clean, dry area. Shielding should be provided as necessary.

e. Cleaning: Sources may be cleaned with alcohol or water with a mild detergent.

f. Leak Test: Sources containing radioactive material in excess of the exempt quantities listed in 17 CCR 30235 Schedule A, shall be leak tested at intervals not greater than six months. Such tests must be capable of detecting 0.005 μCi of removable radioactivity, and be performed by specific licensees of the NRC or Agreements States.

g. Disposal: Disposal of decayed or otherwise unusable sources must be made via the user's authorized radioactivity disposal method.

h. This registration sheet 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 our review of the information provided we conclude that the calibration and gauging gamma sources model HEG-XXX series are acceptable for licensing purposes.

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

NO.: CA406S122S DATE: October 9. 1998

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

REFERENCES:

a) Isotope Products Laboratories letters with attachments dated March 26, 1985, October 30, 1985, December 15, 1989, January 30, 1990 and October 10, 1993.

b) IPL Quality Assurance Manual.

c) Isotope Products Laboratories letter dated November 30, 1993.

d) Isotope Products Laboratories letter dated April 25, 1995.

e) Isotope Products Laboratories letter dated June 12, 1995, with enclosures thereto.

f) **Isotope Products Laboratories letters dated June 30, 1998 and July 1, 1998, with attachment.**

ISSUING AGENCY: California Department of Health Services

DATE: October 9, 1998 AMENDED BY: Ronald Rogus, Ph.D.

DATE: October 9, 1998 CONCURRED BY: David Wesley, M.S.

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

NO.: CA406S122S DATE: October 9, 1998 ATTACHMENT 1

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

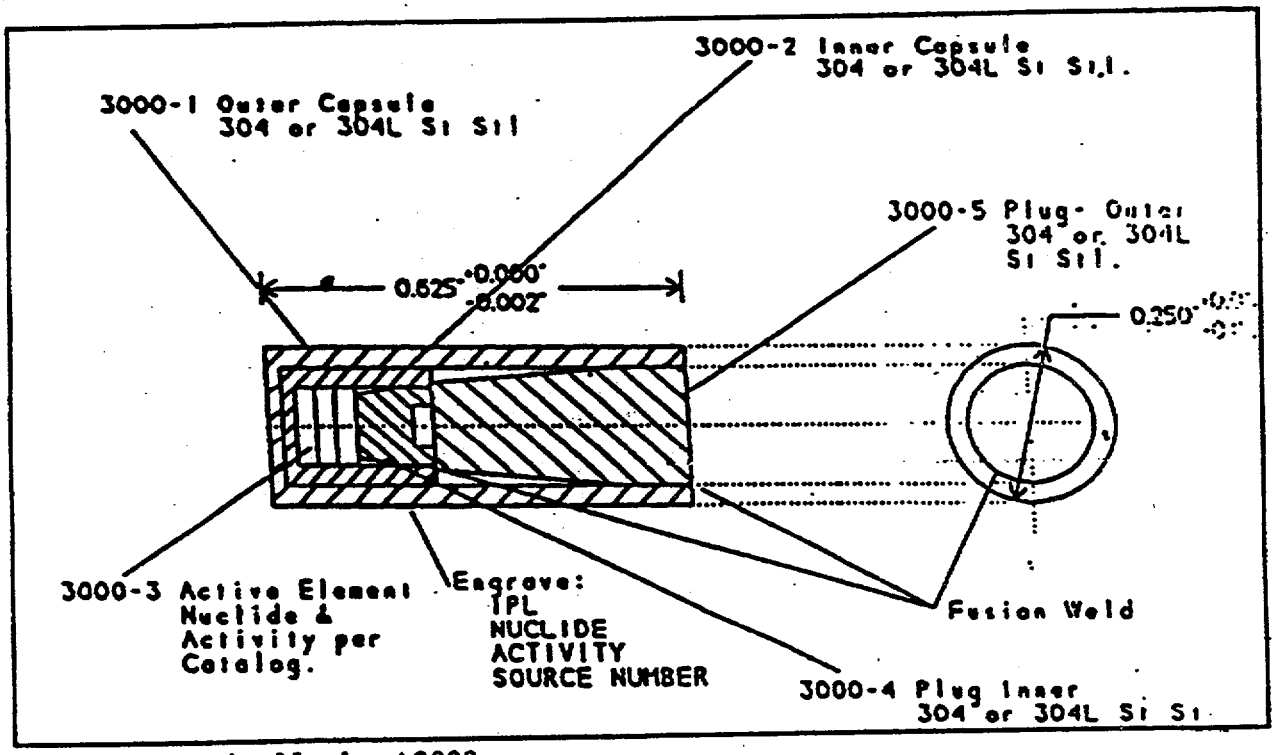

Figure 1: Drawing Number A3000

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

NO.: CA406S122S DATE: October 9, 1998 ATTACHMENT 2

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

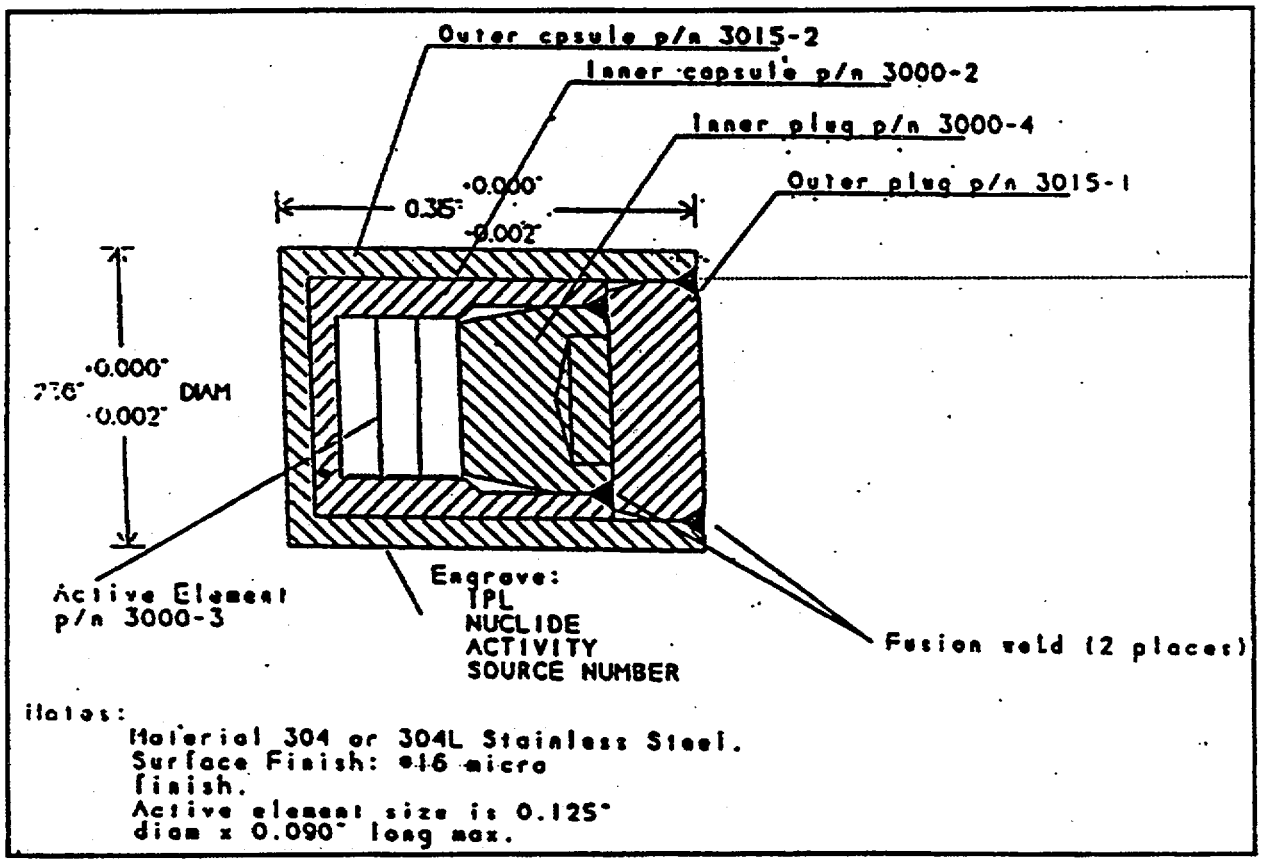

Figure 2: Drawing Number A3015

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

NO.: CA406S122S DATE: October 9, 1998 ATTACHMENT 3

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

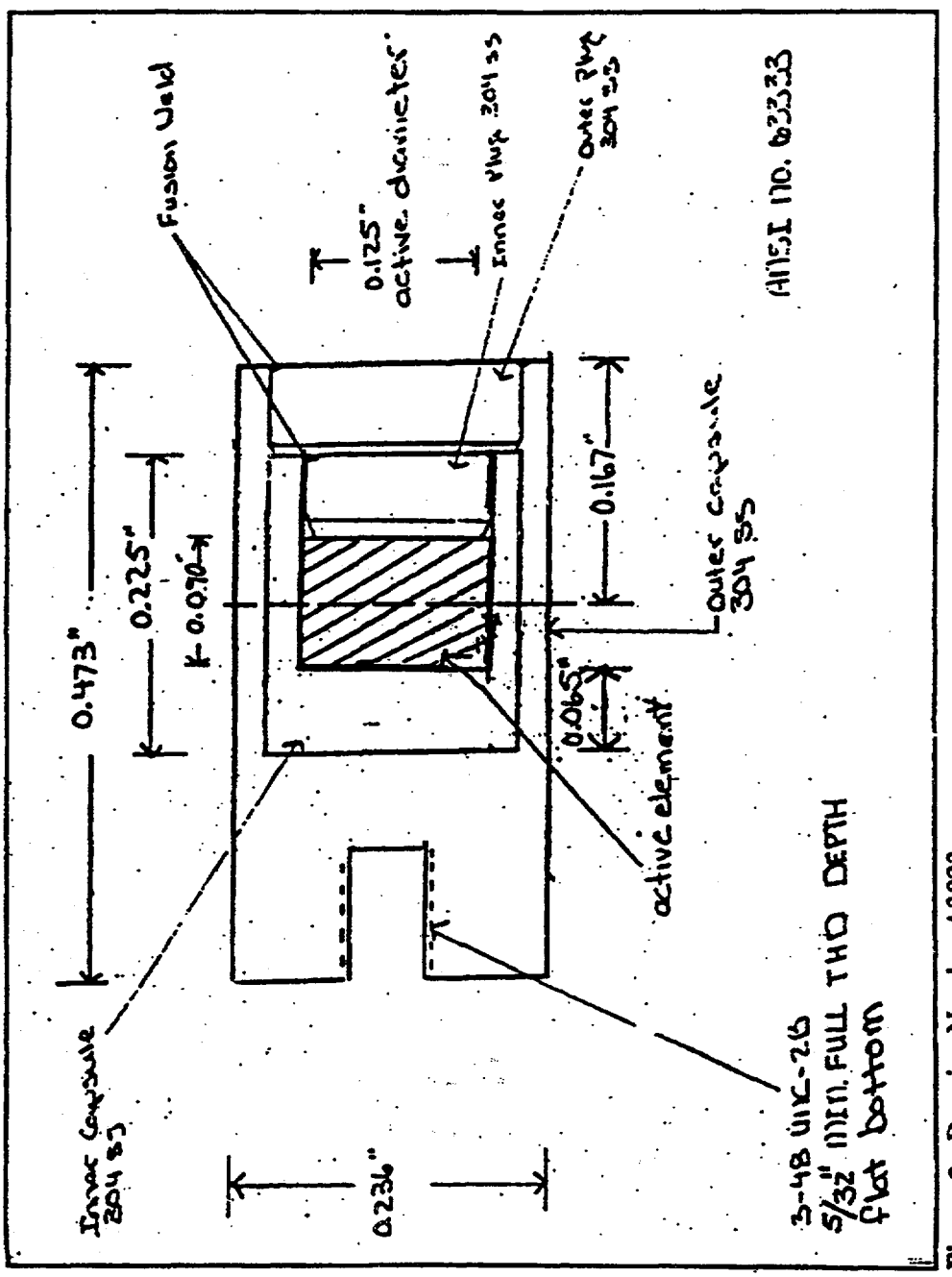

Figure 3: Drawing Number A3023

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

NO.: CA406S122S DATE: October 9. 1998 ATTACHMENT 4

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

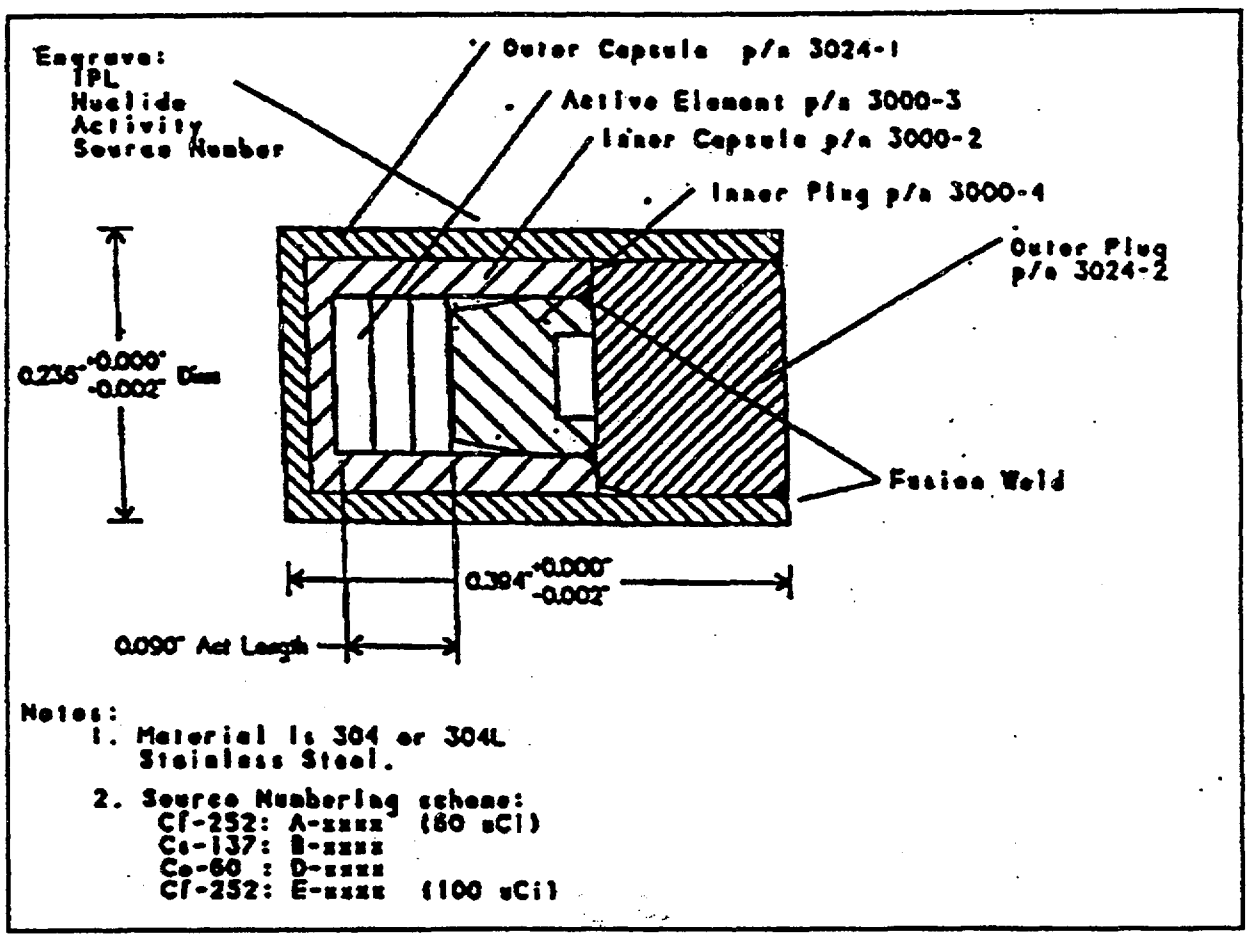

Figure 4: Drawing Number A3024

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

NO.: CA406S122S DATE: October 9, 1998 ATTACHMENT 5

SEALED SOURCE TYPE: Calibration and Gauging Gamma Source

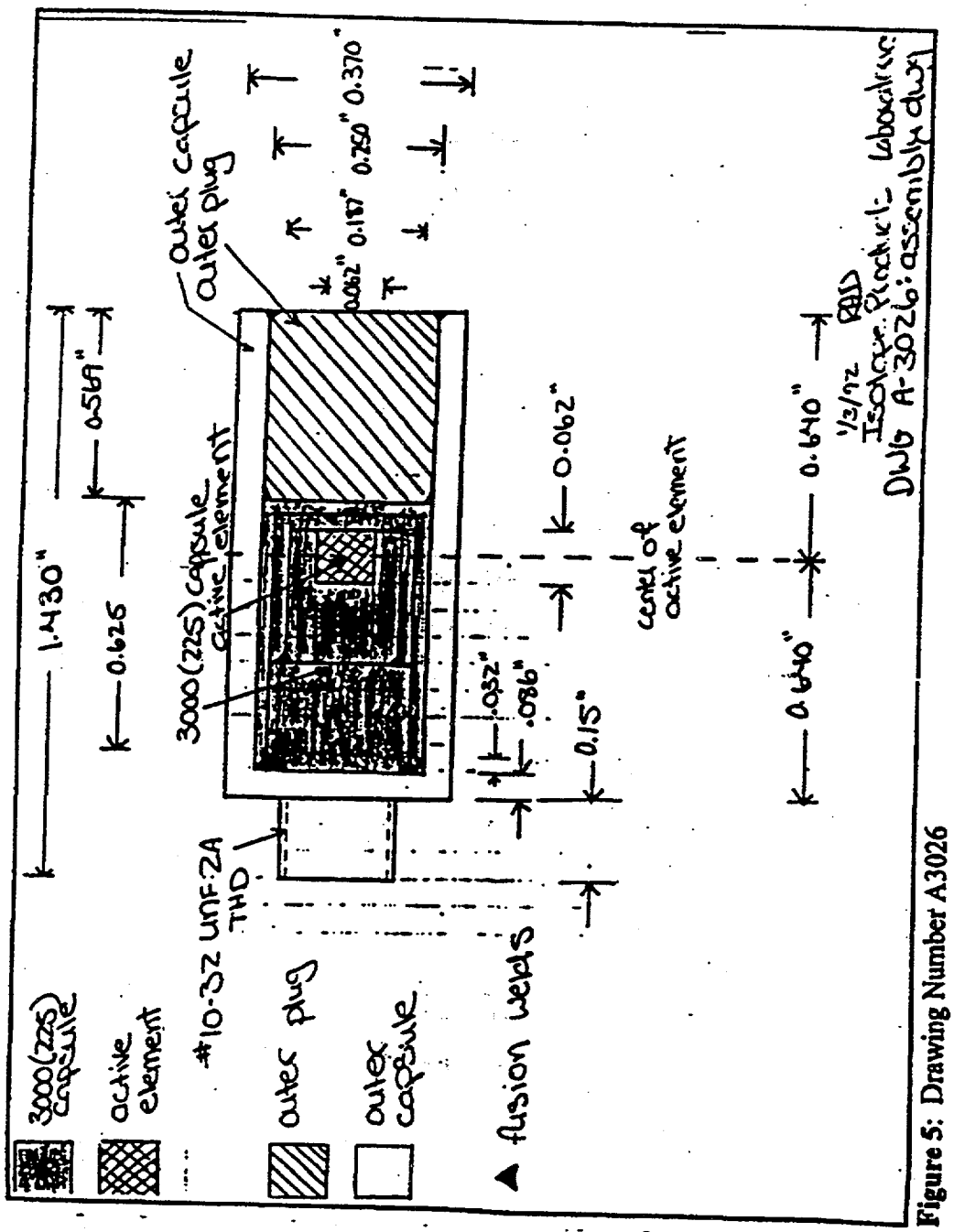

Figure 5: Drawing Number A3026