NRC FORM 567
(1-1999)

U.S. NUCLEAR REGULATORY COMMISSION

REQUEST FOR A SEALED SOURCE OR DEVICE EVALUATION

INSTRUCTIONS: Send this rerquest AND a copy of all related letters/applications and drawings to the Chief, Sealed Source Safety Section, OWFN Mail Stop O-6 H3. Change the License Tracking System milestone to 19 and assign to reviewer code 1-5.
NOTE: Retain a copy of this request with the application and background files.

REQUESTER **International Isotopes, Inc.**	REGION/LOCATION: ☐ I ☐ II ☐ III ☐ IV ☐ HQ ☐ LFARB
TELEPHONE NUMBER **800-699-3108** DATE	TYPE OF ACTION REQUESTED *(Check as appropriate)*
NAME OF APPLICANT **John Miller**	☐ SOURCE REVIEW ☐ DEVICE REVIEW ☐ CUSTOM REVIEW ☐ AMENDMENT OF REGISTRATION SHEET NUMBER(S)
MAIL CONTROL NUMBER(S)	
LETTER/APPLICATION DATE **02/24/2009** LICENSE NUMBER(S)	

COMMENTS:
7944 Convoy Court
San Diego, CA 92111

FOR SSSS USE ONLY

REVIEWER	MODEL NUMBERS	NUMBER ASSIGNED
Stephen Poy	**INIS 022409 - Model BM10 Series**	**09-15**
DATE RECEIVED **02/24/2009**	DATE ASSIGNED **02/24/2009**	DATE TO FEES **02/24/2009**

TYPE OF ACTION *(Indicate the number of each type)*

☐ COMMERCIAL DISTRIBUTION (FORMAL)	☑ USE BY A SINGLE APPLICANT (CUSTOM)

SOURCE (9C)	DEVICE (9A)	SOURCE (9D)	DEVICE (9B)
☐ NEW	☐ NEW	☑ NEW	☐ NEW
☐ AMENDMENT	☐ AMENDMENT	☐ AMENDMENT	☐ AMENDMENT

☐ NO SAFETY EVALUATION REQUIRED NO FEES REQUIRED	☐ LICENSING ACTION REQUIRED (IF KNOWN) ☐ YES ☑ NO

☑ OTHER *(Specify)*
Fee paid in the amount of $2,700.00. Check Number 013361.

	TOTAL NUMBER OF REVIEW HOURS	NOTES **Application for Safety Review INIS 022409-Model BM10 Series.**
	NUMBER OF DEFICIENCY LETTERS	
	NUMBER OF DEFICIENCY CALLS	

FOR FEE USE ONLY

TYPE OF FEE		FEE CATEGORY ☐ 9A ☐ 9B ☐ 9C ☑ 9D	
AMOUNT RECEIVED	CHECK NUMBER	DATE OF CHECK	LOG
APPROVED BY			DATE OF RETURN
COMMENTS			

International Isotopes Inc.

February 24, 2009

John P. Jankovich, Ph.D.
Team Leader
Sealed Source and Device Registrations
Mail Stop T-8E24
Office of Federal and State Materials and Environmental Management Programs
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852

Subject: Application for Safety Review INIS 022409 – Model BM10 Series

Dear Dr. Jankovich,

Enclosed is The Application for Safety Review, INIS 022409 – Model BM10 Series, and documentation of testing, Neurotom Phantom Source – Sealed Source Testing along with a check for $2700 in accordance with §170.31 (9)(C). Note that testing for the source was conducted in August, 2005. Up until now the demand for such as source did not warrant registration.

Please contact me by phone at (208) 524-5300 or by email at jjmiller@intisoid.com should you have any questions regarding this request.

Sincerely,

John J. Miller, CHP
Radiation Safety Officer

Enclosures:
Application for Safety Review INIS 022309 – BMNT & BMCY
Neurotom Phantom Source –M Sealed Source Testing

cc:
JJM letter file JJM-2009-11

4137 Commerce Circle, Idaho Falls, Idaho 83401
Phone: 208-524-5300, 800-699-3108 Fax: 208-524-1411
Website: www.intisoid.com

Application for Safety Review
INIS 022409- Model BM10 Series

SUMMARY DATA

Date:

Sealed Source Type: Point Source, Photon Emitting

Models: BM10-33
BM10-37
BM10-57
BM10-68

Applicant:

International Isotopes, Inc.
4137 Commerce Circle
Idaho Falls, ID 83401
(Manufacturer/Distributor)

For further information, contact
John J. Miller, CHP
Radiation Safety Officer
(208) 524-5300

Other Company Involved:

RadQual, LLC
30275 Bainbridge Rd A-2
Solon, OH 44139
(Engineering/Design)

For further information, contact
Keith Allberg
President
(603) 513-1221

Isotope and Maximum Activity:

Model Number	Isotope	Maximum Activity
BM10-57	Co-57	1.0 mCi (33.3 MBq)
BM10-68	Ge-68/Ga-68	0.5 mCi (18.5 MBq)
BM10-37	Cs-137	0.20 mCi (7.4 MBq)
BM10-33	Ba-133	0.20 mCi (7.4 MBq)

Leak Test Frequency: 6 Months

Principal Use: W (Medical Reference Source)

Custom Source: No

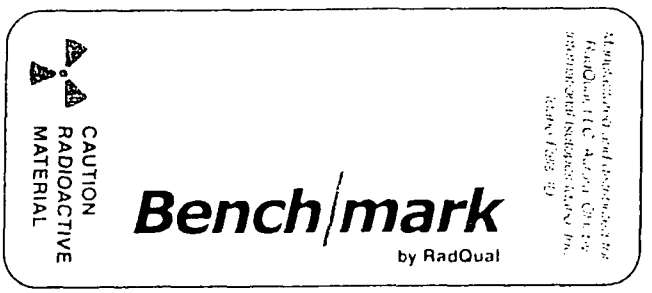
DESCRIPTIVE DATA

Description:

The Model BM10 Series sources consist of machined 300 series stainless steel. The overall length of the BM10 series source is 9.25". The pointer rod consists of machined 300 series stainless steel and is thread on both ends to receive the shield while in use and in storage. The end containing the radioactive tip (extended male component with left hand thread) is secured with Loctite thread sealant or equivalent. The radioisotope is contained within a two-part epoxy (Stycast W-19 Parts A and B or equivalent) enclosed in the tip. The pointer rod has a knurled surface to facilitate a grip area when removing or replacing the shield over the radioactive tip. The shield is machined from 300 series stainless steel and is threaded and can be stored on the non-active end when the source is in use. Shields are provided with all sources.
See attached drawing B1001000.

Labeling:

Each source and storage shield is conspicuously labeled with the isotope, activity, a unique serial number and warning The source data labels contain the radioisotope and radioactivity content, in millicuries or microcuries, the radioactivity reference date (MM/YY), and the source model number. An example of the label, less radioisotope data is provided below. Safe handling instructions are included with the source.



Drawings:

Refer to Attachment 1.

Conditions Of Normal Use:

The sources are used as point of reference marker or anatomical marker, and reference standards to check the response of nuclear imaging systems.

Limitations And/Or Other Considerations Of Use:

1. The sources shall be distributed to persons specifically licensed by the NRC, an Agreement State or a Licensing State.

2. Handling, storage, use, transfer and disposal to be determined by the licensing authority but should be, at a minimum, in accordance with the product information pamphlet provided by the distributor.

3. The sources shall be leak tested at intervals not to exceed 6 months using techniques capable of detecting 0.005 microcuries (185 Bq) of removable contamination.

4. The sources shall not be subjected to conditions that exceed its ANSI/HPS N43.6-1997 classification, 97C22212.

5. The probable effect of severe environmental conditions, such as accidents and fire, would be minimal release of radioactivity since the radioisotope is incorporated into the cured epoxy resin. Although the resin matrix, even as it commenced to melt, would prevent dispersion of radioactivity, temperatures exceeding 200 °C would result in combustion of the resin in which the radioisotope is dispersed. The melting point for 300 series stainless steel is given as 1400 °C, therefore the Model BM10 would be expected to withstand a moderate fire.

6. This registration sheet and the information contained within the references shall not be changed without the written consent of the Nuclear Regulatory Commission.

HEALTH AND SAFETY DATA

Safety Analysis Summary:

Based on review of Model BM10 and the information and test data cited below, International Isotopes Inc. concludes that these source models would be expected to maintain its containment integrity for normal conditions of use and accidental conditions, which might occur during uses specified in this application and therefore is acceptable for licensing purposes.

Manufacturer's Safety Analysis of Sealed Source Review:

Two prototypes of a BM10, containing approximately 100 and 250 uCi's of Co-57 respectively, were constructed and subjected to and successfully passed the performance tests as provided in ANSI/HPS N43.6-1997, Table 1 *Classification of sealed-source performance tests*, and achieved a classification of 97C22212 (Calibration Source).

Radiation exposure rates were modeled by the designer using information available to Microshield 7.0®, and are shown below. Calculated dose rates are shown in units of mr/hr and (uGy/hr). Ge-68 source was modeled with Ga-68 in equilibrium.

	BM10-57-1000 (1.0 mCi) Unshielded	BM10-57-1000 (1.0mCi) Shielded	BM10-68-500 (0.50 mCi) Unshielded	BM10-68-500 (0.50 mCi) Shielded
On Contact	680 (68)	2.5 (0.25)	5660 (566)	51 (5.1)
@ 5 cm	27 (2.7)	0.1 (0.01)	225 (22.5)	2.3 (0.23)
@ 30 cm	<0.1 (<0.01)	<0.1 (<0.01)	0.4 (0.04)	<0.1 (<0.01)
@ 100 cm	<0.1 (<0.01)	<0.1 (<0.01)	<0.1 (<0.01)	<0.1 (<0.01)

	BM10-33-200 (0.20 mCi) Unshielded	BM10-33-200 (0.20 mCi) Shielded	BM10-37-200 (0.20 mCi) Unshielded	BM10-37-200 (0.20 mCi) Shielded
On Contact	4900 (490)	6.0 (0.6)	8745 (875)	50 (5)
@ 5 cm	200 (20)	0.3 (0.03)	350 (35)	2.0 (0.2)
@ 30 cm	0.4 (0.04)	<0.1 (<0.01)	0.6 (0.06)	<0.1 (<0.01)
@ 100 cm	<0.1 (<0.01)	<0.1 (<0.01)	<0.1 (<0.01)	<0.1 (<0.01)

A Technical Data Sheet will be included with each source. This sheet will include Leak Test Results, Recommended Use and Storage, and Radiation Safety Recommendations. In addition, a Certificate of Calibration will be included that includes the Source Model and Serial Number, the Radioisotope and its physical properties, i.e. half-life, emission energies and intensities, the physical description of the source, method of calibration and total uncertainty.

Manufacturing and Distribution Controls:

International Isotopes Inc. (INIS) provides for design control, procurement control, process quality control, and final quality assurance.

The INIS Quality Assurance program is a management system established to ensure INIS products are safe and reliable and that those products and INIS services meet or exceed customer requirements.. Quality related activities shall be controlled and conducted using documented procedures including instructions drawings, process diagrams, or other appropriate documents. Quality records are prepared, stored, preserved and kept safe in appropriate facilities so to be retrievable. Periodic audits by INIS Quality Assurance staff will ensure that the program continues to perform as intended.

INIS actively participates in the National Institute of Standards (NIST) Radioactivity Measurement Assurance Program and Technology. Source activity will be determined by assay of the manufacturing batch solution utilizing a dose calibrator that has been calibrated with radioactive standards directly traceable to NIST.

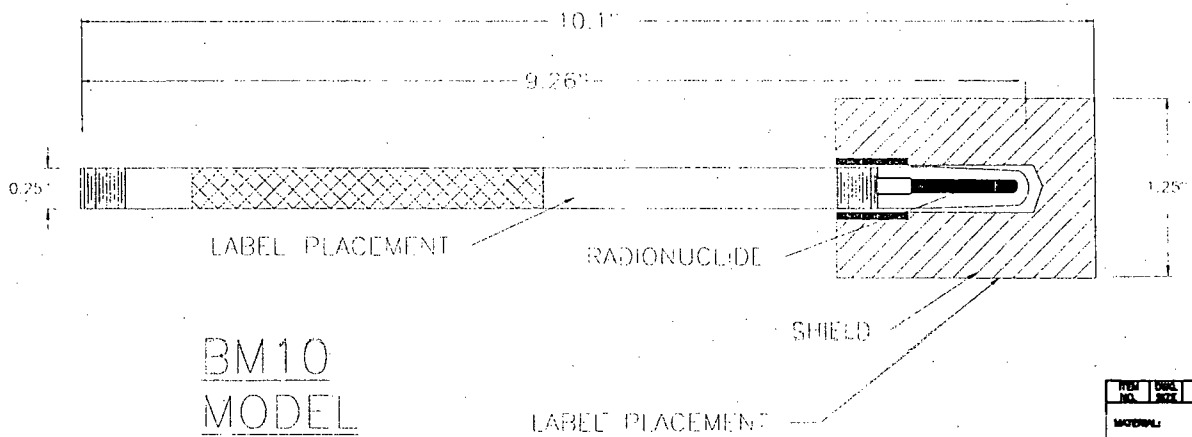
No source will be distributed by INIS if it has not passed leak testing performed in accordance with ANSI/HPS N43.6-1997. Sources will only be transferred to authorized recipients.

Licensees in possession of sources that have decayed below their useful range of activities may contact the distributor for instructions regarding return to the manufacturer. In most cases this will be as limited quantity of radioactive material as specified in 49 CFR 173.42

REVISIONS					
LTR	ECO NO	DESCRIPTION	BY	DATE	APPROVED

NOTES

1. SOURCE ACTIVITY CONSISTS OF RADIONUCLIDE DISPERSED IN A STYCAST OR EQUIVALENT HIGH IMPACT EPOXY RESIN. ALTERNATE METHOD IS TO DEPOSIT ACTIVITY ONTO APPROPRIATE METAL MATRIX AND SEAL WITH EPOXY.
2. PRODUCT NOMINAL ACTIVITY SHALL BE REFERENCED TO LABEL DATE. NOMINAL ACTIVITY TOLERANCE SHALL NOT BE > +20% OR < -10% AT TIME OF SHIPMENT. MAXIMUM ACTIVITY NOT TO EXCEED TABLE A LIMITS
3. NUCLIDE CALIBRATION SHALL BE RADIOACTIVITY CONTENT DETERMINED BY IONIZATION CHAMBER MEASUREMENT OR GRAVAMETRIC TRANSFER OF CALIBRATED MASTER SOLUTION
4. RADIOPURITY TO MEET RADIONUCLIDE SPECIFICATIONS AT TIME OF CALIBRATION.
5. CONTAMINATION/LEAKAGE TESTING OF EACH SOURCE SHALL BE PER PROCEDURE FOR CONTAM./LEAK. TEST OF CAL. SOURCES. LIMIT 5 X 10 $^{-3}$ uCi
6. CERTIFICATES AND LABELING PER PROCEDURE
7. ANS N43.6-1997 PERFORMANCE CLASSIFICATION OF 97C22212 FOR CALIBRATION SOURCES



BM10
MODEL

STANDARD MODEL - TABLE A		
MODEL NO.	NUCLIDE	MAXIMUM ACTIVITY
BM10-57	Co-57	1000 uCi
BM10-68	Ga-68/Ga-68	500 uCi
BM10-133	Ba-133	200 uCi
BM10-137	Cs-137	200 uCi

ITEM NO.	DWG. SIZE	PART OR IDENTIFYING NO.	DESCRIPTION	QTY

MATERIAL: 300 SERIES STAINLESS STEEL

RADQUAL, LLC

TOLERANCE: .XX ± .XXX ± FRACT. ± ANGLES ±

DRAWN: K. ALLBERG DATE: 7/15/08
CHECKED:
APPROVED:
ENG:
SCALE:
Sheet OF

BM10-XXX SERIES PENPOINT MARKER

PRIOR ASSEMBLY
NEXT ASSEMBLY
AUTOCAD DWG. FILE:

DWG. NO. B1001000 REV. 1

This drawing and the information contained within, is proprietary to RadQual, LLC and may not be used or reproduced without written authorization

1.0 Purpose

1.1 To provide a standardized method of leak testing Point Source Markers (BM03 & BM10 Series) and Cobalt -57 Line Sources (BM083 Series) in order to qualify these products as Sealed Sources.

2.0 Potential Hazards

2.1 The potential of radiation exposure and/or contamination exists during the performance of this procedure. Dosimetry and appropriate PPE should be worn and caution exercised while performing this procedure. This procedure is to be performed by trained operators who must take appropriate steps to minimize radiation exposure to themselves and surrounding personnel and must follow all radiation and safety procedures.

3.0 Applicability and Limitations

3.1 This procedure is to be used to leak test Point Source Markers (BM03 & BM10 Series) and Cobalt -57 Line Sources (BM083 Series) in order to qualify these products as Sealed Sources

4.0 Definitions

4.1 None

5.0 Responsibilities

5.1 **I4 Quality** – Oversee the performance of this procedure and review the testing results.

5.2 **I4 Technician** – Assist with the performance of this procedure as required.

6.0 Equipment and Materials

6.1 Sealed Source prototype, fabricated per draft procedure or instructions.

6.2 Dry Ice

6.3 Antifreeze Bath

6.4 Oven

6.5 Testing Hammer #1, 50 grams, used for the impact test

6.6 Testing Hammer #2, 1 gram, used for the puncture test

6.7 Steel plate, used as backing for the impact and puncture tests

7.0 Procedure

7.1 Preparation and Staging for Sealed Source Testing

7.1.1 Verify that the prototype sources are complete and ready for testing.

Verification performed by _____ Date 8/9/05

7.1.2 Stage the required materials and equipment in the testing area(s).

Materials staged by _____ Date 8/9/05

7.2 Impact Tests

7.2.1 Place the steel plate on the floor where the impact testing will be performed.

7.2.2 Place the source on the steel plate.

7.2.3 Position the 50 gram testing hammer at least 1 meter above the source.

7.2.4 Drop the testing hammer on the source.

7.2.5 Perform a dry wipe test on the source as follows:

7.2.5.1 Wipe all external surfaces of the source with a piece of dry filter paper.

7.2.5.2 Measure the activity on the filter paper and record on the data page at the end of this procedure.

7.2.6 Repeat Section 7.2 for other source variations to be tested.

7.3 Puncture Tests

7.3.1 Place the steel plate on the floor where the puncture testing will be performed.

7.3.2 Place the source on the steel plate.

7.3.3 Position the 1 gram testing hammer at least 1 meter above the source with the pin down.

7.3.4 Drop the testing hammer on the source.

7.3.5 Perform a dry wipe test on the source as follows:

7.3.5.1 Wipe all external surfaces of the source with a piece of dry filter paper.

7.3.5.2 Measure the activity on the filter paper and record on the data page at the end this procedure.

7.3.6 Repeat Section 7.3 for other source variations to be tested

7.4 External Pressure Test

7.4.1 Place the source in the testing chamber.

7.4.2 Seal the Test Chamber.

7.4.3 Draw a vacuum on the test chamber of at least 3.6 psiv (7.4 in Hg).

7.4.4 Hold the vacuum for five minutes.

7.4.5 Vent the chamber and allow it to return to atmospheric pressure.

7.4.6 Draw a vacuum on the test chamber of at least 3.6 psiv (7.4 in Hg).

7.4.7 Hold the vacuum for five minutes.

7.4.8 Vent the chamber and allow it to return to atmospheric pressure.

7.4.9 Remove the source from the testing chamber and perform a dry wipe test as follows:

7.4.9.1 Wipe all external surfaces of the source with a piece of dry filter paper.

7.4.9.2 Measure the activity on the filter paper and record on the data page at the end of this procedure.

7.4.10 Repeat Section 7.4 for other source variations to be tested

7.5 Low Temperature Test

7.5.1 Prepare a bath of antifreeze solution sufficient to immerse the source completely.

7.5.2 Place the dry ice in the bath.

7.5.3 Monitor the temperature of the bath.

7.5.4 When the temperature of the bath reaches –40°C (–40°F), place the source in the bath and record the start time on the data page at the end of this procedure).

NOTE: **The bath temperature must remain below -40°C (-40°F) for at least Twenty minutes.**

7.5.6 Record the stop time on the data page at the end of this procedure.

7.5.7 Remove the source from the bath and perform a dry wipe test as follows:

7.5.7.1 Wipe all external surfaces of the flood source with a piece of dry filter paper.

7.5.7.2 Measure the activity on the filter paper and record on the data page at the end of this procedure.

7.5.8 Repeat Section 7.5 for other source variations to be tested

7.6 High Temperature Test

7.6.1 Preheat the oven to 80°C (176°F), record the start time on the data page at the end of this procedure.

7.6.2 Monitor the oven temperature for at least sixty minutes.

NOTE: **The oven temperature must remain above 80°C (176° F) for at least sixty minutes.**

7.6.3 Record the stop time on the data page at the end of this procedure.

7.6.4 Remove the source from the oven and perform a dry wipe test as follows:

7.6.4.1 Wipe all external surfaces of the source with a piece of dry filter paper.

7.6.4.2 Measure the activity on the filter paper and record on the data page at the end of this procedure).

7.6.5 Repeat Section 7.6 for other source variations to be tested

7.7 Data Analysis

7.7.1 I4 Quality review the data collected and recorded on the data page.

NOTE: **THE SOURCES SHALL PASS AS LEAK FREE IF THE MEASURED ACTIVITY ON EACH OF THE SWIPES IS LESS THAN 5 NCI.**

7.8 Conclusion

7.8.1

Source	Pass	Fail	Data Analysis Performed By
BM10	X		
BM03- Lucite	X		
BM03 - Aluminum	X		
BM83-10	X		
BM83-20	X		
BM83-30	X		
BM83-40	X		

8.0 References

8.1 ANSI/HPS N43.6-1997

BM03, BM10 AND BM83 Series Source Testing Data

Test	BM10 Source Test Results			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 42 cpm	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 48 cpm	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 40 cpm	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 46 cpm	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 52 cpm	Recorded By

Test	BM03 – Lucite Model Source Test Results			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 46 cpm	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 45 cpm	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 51 cpm	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 55 cpm	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 50 cpm	Recorded By

Test	BM03 – Aluminum Model Source Test Results			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 46 cpm	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 52 cpm	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 60 cpm	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 61 cpm	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 55 cpm	Recorded By

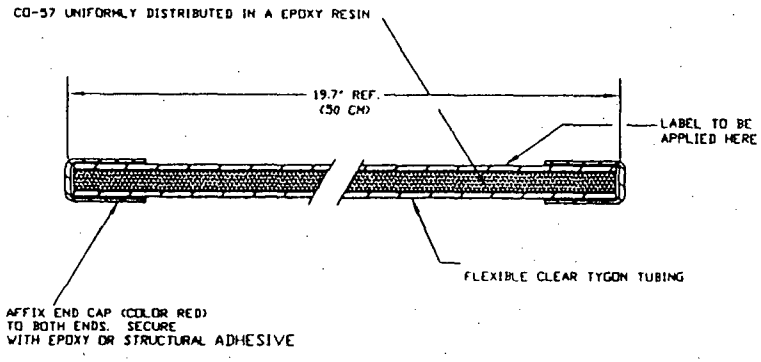
Test	BM83 –10 Co-57 Flexible Line			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 48 cpm	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 56 cpm	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 60 cpm	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 62 cpm	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 56 cpm	Recorded By

Test	BM83 –20 Co-57 Flexible Ruler			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 50 cpm	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 51 cpm	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 61 cpm	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 62 cpm	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 56 cpm	Recorded By

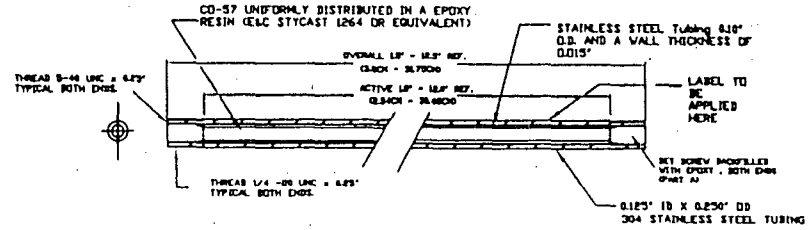
Test	BM83 –30 Co-57 Rigid Ruler			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 50CPM	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 56CPM	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 61CPM	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 60CPM	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 51CPM	Recorded By

Test	BM83 –40 Co-57 Rigid Line			
Low Temp	Start Time 0810	Stop Time 0845	Swipe Results 60CPM	Recorded By
High Temp	Start Time 0900	Stop Time 1015	Swipe Results 46CPM	Recorded By
External Pressure	Start Time 1030	Stop Time 1100	Swipe Results 60CPM	Recorded By
Impact	Start Time 1115	Stop Time 1130	Swipe Results 61CPM	Recorded By
Puncture	Start Time 1145	Stop Time 1200	Swipe Results 51CPM	Recorded By

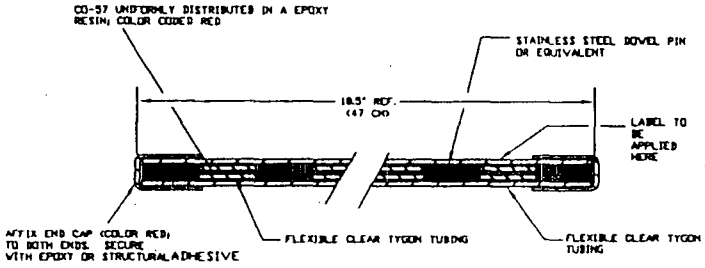
REVISIONS					
LTR.	ECO NO.	DESCRIPTION	BY	DATE	APPROVED



BM83-10
FLEXIBLE LINE



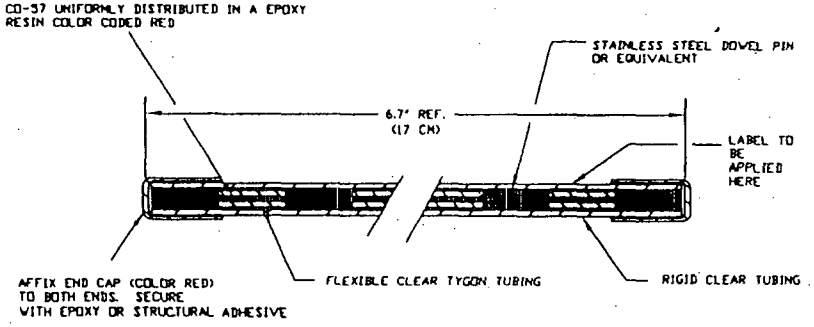
BM83-40
RIGID LINE



BM83-20
FLEXIBLE RULER

All configurations of sources have been tested to meet a minimum classification of ANSIN43.6-1997 performance classification of 97C22212 for Calibration source greater than 30 microcuries.

STANDARD MODEL TABLE			
MODEL NO.	NUCLIDE	MAXIMUM ACTIVITY	COLOR CODE
BM83-10	CO-57	1.2 mCi	RED
BM83-20	CO-57	1.2 mCi	RED
BM83-30	CO-57	1.2 mCi	RED
BM83-40	CO-57	25.0 mCi	RED



BM83-30
RIGID RULER

ITEM NO.	DWG. SIZE	PART OR IDENTIFYING NO.	DESCRIPTION	QTY

MATERIAL: PER DWG. SPECS.

AUTOCAD DWG. FILE:

PRIOR ASSEMBLY

NEXT ASSEMBLY

RADQUAL, LLC

TOLERANCE: .XX ±, .XXX ±, FRACT. ±, ANGLES ±

DRAWN: K. ALLBERG DATE: 11/11/03

CHECKED:

APPROVED

ENG:

SCALE: Sheet OF

CO-57 LINE SOURCE COMPOSITE

BM83-10, BM83-20, BM83-30 AND BM83-40 MODELS

DWG. NO. B009001 REV.

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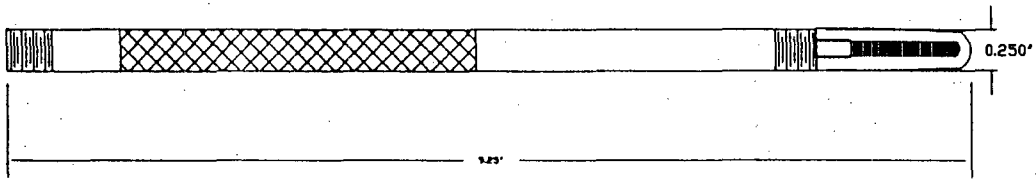
REVISIONS					
LTR.	ECO NO.	DESCRIPTION	BY	DATE	APPROVED

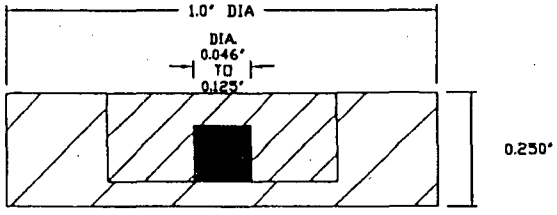


BM10
304 OR 306 SS
DWG B1001001
DWG B1001002

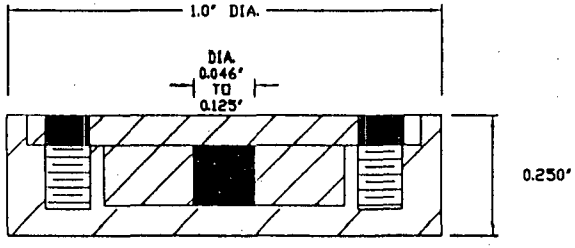
STANDARD MODEL TABLE					
MODEL NO.	NUCLIDE	MAXIMUM ACTIVITY FOR LUCITE	COLOR CODE FOR LUCITE	MAXIMUM ACTIVITY AL-6061-T6	MAXIMUM ACTIVITY 304SS or 306SS
BM03-22	NA-22	0.12 mCi	YELLOW	0.60 mCi	NA
BM03-60	CO-60	0.06 mCi	BLUE	0.30 mCi	NA
BM03-57	CO-57	1.20 mCi	RED	12.0 mCi	NA
BM03-68	GE-68/GA-68	0.12 mCi	WHITE	0.60 mCi	NA
BM03-133	Ba-133	0.12 mCi	BLACK	1.20 mCi	NA
BM03-137	Cs-137	0.12 mCi	GREEN	0.60 mCi	NA
BM10-57	CO-57	NA	NA	NA	1.2 mCi

1. SOURCE ACTIVITY CONSISTS OF RADIONUCLIDE DISPERSED IN A HIGH IMPACT EPOXY RESIN. RESIN MAYBE COLOR CODED PER TABLE USING COLORING APPROPRIATE FOR STYCAST EPOXY (OR EQUIV). ALTERNATE METHOD IS TO DEPOSIT ACTIVITY ONTO APPROPRIATE METAL MATRIX AND SEAL WITH EPOXY.
2. PRODUCT NOMINAL ACTIVITY SHALL BE REFERENCED TO LABEL DATE. NOMINAL ACTIVITY TOLERANCE SHALL NOT BE > +20% OR < -10% AT TIME OF SHIPMENT. MAXIMUM ACTIVITY CAN NOT BE EXCEEDED AT TIME OF SHIPMENT.
3. NUCLIDE CALIBRATION SHALL BE RADIOACTIVITY CONTENT DETERMINED BY IONIZATION CHAMBER MEASUREMENT OR GRAVAMETRIC TRANSFER OF CALIBRATED MASTER SOLUTION.
4. RADIOPURITY TO MEET RADIONUCLIDE SPECIFICATIONS AT TIME OF CALIBRATION.
5. CONTAMINATION/LEAKAGE TESTING OF EACH SOURCE SHALL BE PER PROCEDURE FOR CONTAM./LEAK. TEST OF REF. SOURCES'. LIMIT 5 X 10^{-3} uCi.
6. CERTIFICATES AND LABELING PER PROCEDURE
7. ANSI N43.6-1997 PERFORMANCE CLASSIFICATION OF 97C22212 FOR CALIBRATION SOURCES

BM03
LUCITE
DWG B003001
DWG B003002



BM03
Al 6061-T6
DWG B003003
DWG B003004



ITEM NO.	DWG. SIZE	PART OR IDENTIFYING NO.	DESCRIPTION	QTY

MATERIAL: PER DRAWING SPECS

RADQUAL, LLC

TOLERANCE: .XX ±; .XXX ±; FRACT. ±; ANGLES ±

DRAWN: K. ALLBERG DATE: 1/15/05
CHECKED:
APPROVED:
ENG:

POINT SOURCE MARKER ASSEMBLY DRAWING

PRIOR ASSEMBLY

NEXT ASSEMBLY

AUTOCAD DWG. FILE

SCALE: NTS Sheet 1 of 1

DWG. NO. B003005 REV.

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