2636 S. CLEARBROOK DRIVE ARLINGTON HEIGHTS, ILLINOIS 60005 TELEX: 28-2452 TELEPHONE: (312) 593-6300



December 29, 1976

Mr. Francis St. Mary Nuclear Regulatory Commission Radioisotope Licensing Branch Office of Materials Licensing Washington, D.C. 20555



Dear Sir:

Please consider the attached application for specific license to manufacture and distribute the isotope assay calibration check source model number CDR.1185.

Yours sincerely,

Fred Andrews Technical Manager Radiation Sources

jr enclosure

> COPIES SENT TO OFF. OF INSPECTION AND ENFORCEMENT

Rea - 01 manaral,

12-12826-01- - A - Jo he

85349

8411190373 840124 PDR FOIA SAVINI83-587 PDR



Application for Specifice License to Manufact re and Distribute the Isotope Assay Calibration Check Source Model Number CDR.1185.

Information required by CFR 32.74.

- A. 1. General requirements of 30.33 satisfied.
 - 2. a. The by-product material contained is Cesium-137. Cesium chloride and zirconium phosphate are fired at 900°C to give a low solubility compound of the nuclide. The active compound is then sealed between two layers of silver. The total activity is 250µCi ± 10%.
 - b. The active foil inserts as discs are welded into a stainless steel capsule type X.118 (see drawing number ARC 10311/S). This sealed primary source is then placed in a plastic (PVC) holder shaped to resemble a 10 ml multidose vial The Radiochemical Centre type P6 (as shown on data sheet 11173) and is held in position by a cemented plug.
 - c. The following ANSI tests have been carried out on two capsules containing 250µCi Cesium-137. The results of immersion test B2.2 (USASI N5.10-1968) are also quoted.

TEST	TEMP.	EXT. PRESSURE	IMPACT	VIBRATION	PUNCTURE	
ANSI CLASS	5	4	3	4	4	
Source 1 Source 2	0.000012 0.000023	0.00032 0.00012	0.000018 0.000038	0.000505 0.000548	0.000059) Immersion results) in microcuries

Fig.1 (see Apprendix) shows a capsule after temperature class 5. In addition ISO class 5 impact has been carried out on 2 capsules with the following results: 0.000018µCi and 0.000017µCi. Fig. 2 shows two capsules after this test.

In addition temperature and impact testing has been carried out on one complete source assembly. Temperature class 2 (ANSI) did not affect the plastic and a leach of 0.00012µCi was obtained. Temperature class 3 and above would affect the plastic but not the metal capusle. The plastic holder splits when tested to ISO class 5 (see Fig. 3) but the leach obtained was only 0.000894µCi. Impact testing below this class does not damage the holder. Vibration, pressure and puncture testing give results similare to that obtained by the capsule alone.

8534U 5184





Fig. 3 Complete source assembly after ISO class 5 impact.

POCP/76/2

Production Quality Control Procedure

1

 \mathbf{x}^{\dagger}

for the wnufacture of

Isotope Assay Calibration Clocking Source

Catalogue Codes : RAR. 1184 and CDR. 1185

	Component	Quality	Control
1.	Radioactive compound (226Ra, 137Cs)	Purity	Y Spectrum checked using Ge (Li) detector
2.	Active foil inserts (active compound laminated between two layers of noble metal	Content	Activity compared with - laboratory standard using a dose meter (scintillation - type).
	alloys	Integrity	Visual check for scratches, cuts, loose swarth etc.
3.	Stainless steel capsules	Purity	All stainless steel is bonded on UKAEA premises. Specification is : 316 L double vacuum melted.
	Γ	Identification	Visual check of engraving
4.	Sealed Source	Integrity	Bubble test 'D' B.S.3513:1962 (Emanation test 'K' ²²⁶ Ra only Immersion test 'L' (0.005µCf) Wipe test 'A' B.S. 3513 : 1962 (0.005µCi) (See below for description) Prototype capsule tested ISO rating C.64544
		Content	Gamma emission measured in a re-entrant TPA ion chamber. Measurements compared with laboratory standard.
5.	Plastic outer case (empty)	Integrity	Visual inspection. Engraving checked.

-1-

85340

THE RADIOCHEMICAL CENTRE

HI/76/2 (STLM/9)

RADIATION SOURCES DEPARTMENT

Isotope Assay Calibrator Checking Source

Handling Instructions

The Isotope Assay Calibrator Checking Source should be transported, and stored in the lead lined (12 mm thick) wooden case. When not in use the encased source should be stored in an approved storage bay inside the building.

The source should be handled by authorised persons only. Designated persons in the category need to wear an appropriate personnel film badge.

The table below gives an indication of the dose rates likely to be encountered on, or near the source.

When handling the source use 25 cm long forceps and grip the plastic firmly at the narrow neck immediately below the crown. Always replace the source into the storage case immediately after use.

be of Source	At surface so	of unshielded urce	25 cm fro so	m unshielded urce	Scurce in Case		
	Top	Bottom	Тор	Bottem	Top of Case	Bottom of Case	Side · of Case
CDR 1185 (250 µC1 137 _{Cs})	32	400	< 1	1.3	3	11	9
RAR 1184 226 Ra)	32	400	< 1	1.3	3	19	16

Approximate Dose Levels (m Rad/hour) in Viscinity of Source

-85184 85340



651d4



Isotope assay calibrator check sources codes CDR.1185, RAR.1184

These sources are designed for routine checking of isotope assay calibrators to detect instability. The gamma emitting nuclides used in the sources are long lived so that little, if any, correction for decay is required.

SPECIFICATION

Each source consists of an outer plastic (PVC) holder, shaped to resemble a 10mi multidose vial, TRC type P6, and containing a sealed primary source. The plastic holder is coloured to indicate the nuclide used, which may be either caesium-137 or radium-226.



Data sheet

Nuclide	Caesium-137				
Activity	250µCi ±10%				
Colour of holder	grey				
Code	CDR.1185				
Nuclide half-life	30 years				
Principal y-ray energies	0.662 MeV (from ^{137m} Ba daughter)				

Radium-226

100µCi ±10%

red

RAR.1184

1620 years

0.610 MeV (from ²¹⁴ Bi) also 0.19-2.43 MeV (including other daughters)

Decay of 137 Cs

The activity remaining is calculated by multiplying the initial activity by the appropriate factor below.

Time (years)	1	2	3	4	5	6	7	8	9	10
Factor	0.977	0.955	0.933	0.912	0.891	0.871	0.851	0.831	0.812	0.794

Identification

Each holder is engraved with

TRC nominal activity nuclide serial no.

85340

.....

Primary source

Construction	
Active material:	metal foil discs containing a low solubility compound of the nuclide.
Encapsulation:	welded stainless steel capsule, type X.118.
Testing	
Wipe test:	each source is wiped with a moist swab, and the activity removed is measured. The acceptance limit is 0.005µCi removed.
Bubble test:	each source is immersed in ethanediol and the pressure reduced to 100mm of mercury. No bubbles must be observed.
Immersion test:	each source is immersed in water at 50°C for 4 hours and the activity in the water measured. The acceptance limit is 0.005µCi extracted.

Special testing

The source capsule has been tested according to the requirements of the American National Standards Institute (USASI Report N5.10, 1968) and has been assigned the classification C.54344.

compiete source	그렇게 가지 그는 것 같은 것 같
Wipe test:	each source is wiped with a moist swab and the activity removed is measured. The accuritence limit is 0.005μ Ci removed.
Measurement:	the activity content of each source is determined by comparison with a suitable gamma emitting standard. Only sources within the $\pm 10\%$ tolerance are accepted.

DOCUMENTATION

A test report giving results of the quality control tests and the measurement, accompanies each source.

PACKAGING

Each source is supplied in a wooden case with integral lead shielding, 12mm thick. The case is labelled to indicate the contents.

AVAILABILITY

These sources are available from stock and can be despatched within 3 days of receipt of order.

These sources are intended for checking the reproducibility of radioisotoph usage calibrate the routine operation. An accurate calibration of the radionuclide content of the sources is of limited value because there is appreciable absorption of the gamma radiation within the source, but a calibration can be provided at additional charge if required.

A more accurate check of true calibration of a radioisotope assay calibrator can be obtained by using standardized solutions of the radioisotopes of interest. Suitable solutions for this purpose can be supplied; full details on request.

DS.11173

2636 S. Clearbrook Drive Arlington Heights, Illinois 60005 Telex: 28-2452 Telephone (312) 593-6300 October 1972

In Carlada: 400 Iroquois Silore Road Oakville: Ontario Telex: 519-82216 Telephone: (416) 364-2183