

TITLE:		Number:	Effective Date:
Cs-137 CDC.800/CDC.700 OVER ENCAPSULATION		I4-OP-60	TBD
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PRI Signature and Date:	Document Control Signature and Date:	Quality Assurance Signature and Date:	
DRAFT			

Procedure User Signature and Initial Log

print name	signature	initials

1.0 PURPOSE

To outline the procedure for over encapsulation of CDC.800 and CDC.700 cesium-137 source capsules and to document source measurement, leak test, and other information required on each sealed source certificate.

2.0 POTENTIAL HAZARDS

The hazards associated with the implementation of this procedure include:

- Potential exposure to radioactive material.
- Industrial hazards associated with the inspection and handling of transportation packages such as rigging, crane operations, forklift operations, pinch points, manual lifting, strains, trips, slips and falls.

3.0 APPLICABILITY AND LIMITATIONS

This procedure addresses over encapsulation of the Models CDC.800 and CDC.700 Cs-137 sealed sources in the INIS-SF-CS-1J and INIS-SF-CS-2J capsules. Only sealed sources meeting the criteria established in Section 7.4 are eligible for over encapsulation.

4.0 DEFINITIONS

Sealed Source – Any source that is of a design which has been successfully tested against the criteria of ANSI/HPS N43.6 or ISO 2919-1999 and is listed in the National Sealed Source and Device Registry.

Special Form – A solid form or capsule design which has been successfully tested against the criteria established in 49 CFR § 173.469 or equivalent foreign regulations.



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5.0 RESPONSIBILITIES

5.1 I³ Quality

- 5.1.1 Verify this procedure is the most current revision.
- 5.1.2 Ensures INIS source capsules and caps are within specification.
- 5.1.3 Reviews completed procedure and releases sources for shipment.

5.2 I³ Radiation Safety Officer

- 5.2.1 Authorizes distribution of completed sources.

5.3 I³ Technician

- 5.3.1 Performs steps outlined in this procedure to include filling of capsules, assaying capsules, welding of capsules and decontaminating as required.

6.0 Equipment and Materials

- 6.1 Qualified Model CDC.800 and CDC.700 Cs-137 sealed source(s).
- 6.2 INIS-SF-CS-1J and or INIS-SF-CS-2J components per I³ drawing, DWG.
- 6.3 Q-tip smears
- 6.4 Leak testing apparatus
- 6.5 Certificate of Analysis Template

7.0 PROCEDURE

- 7.1 Operation Supervisor (OP) verify that technicians performing the welding and N.D.T. (Leak Testing) of Sealed Sources are qualified and certifications are current.

OP Signature: _____ Date _____

Name of Welder: _____

Name of N.D.T. Inspector: _____

7.2 Acquire customer loading request information and record in space below.

Customer Name: _____ P.O. Number: _____

Number of INIS-SF-CS-1J: _____ Activity per source: _____

Number of INIS-SF-CS-2J: _____ Activity per source: _____

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7.3 List CDC.800/CDC.700 Cs-137 source(s) to be re-encapsulated

Item	Manufacturer	Model/Serial Number	SS&D Number	Current Activity (Ci)
1				
2				
3				
4				
5				

Use additional sheets as necessary

7.4 Verify the CDC.800 and CDC.700 Cs-137 source(s) comply with the following:

- 7.4.1** The source is constructed from a Series 300 Stainless Steel to ensure material compatibility with the INIS Type 304 (304L, 316, 316L) S.S. outer capsule. – This information should be included in the Sealed Source Safety Evaluation and/or Special Form CoC document
- 7.4.2** The source successfully passes either the wipe (smear) test or dry wipe test in accordance with ANSI/HPS N43.6-1997 Annex A Paragraphs A.2.1.1 or A.2.1.2 respectively. – Attach survey records to this procedure. (Wipe test must be accomplished within 6 months of over encapsulation).
- 7.4.3** The source successfully passes either a vacuum bubble test, hot liquid bubble test or the helium pressurization bubble test in accordance with ANSI/HPS N43.6-1997 Annex A Paragraph A.2.2.1, A.2.2.2 or A.2.2.3 respectively. – Attach completed leak test sheets. (Leak check must be accomplished within 6 months of over encapsulation).
- 7.4.4** The source passes a visual inspection indicating it is free of defects. (A magnification device may be used to perform this check.)
- 7.4.5** The source’s outside dimensions are compatible the International Isotopes Inc. INIS-SF-CS-1J and or INIS-SF-CS-2J, verified via go-no-go fit test.
- 7.4.6** Initial the appropriate columns in the table below. Note Item numbers correspond to the Item numbers from Section 7.3.

Item	7.4.1		7.4.2		7.4.3		7.4.4		7.4.5	
	PASS	FAIL	PASS	FAIL	PASS	FAIL	PASS	FAIL	PASS	FAIL
1										
2										
3										
4										
5										

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7.5 Determine INIS Source model number(s) and serial number(s). Record item from Step 7.4 that will be over encapsulated in each INIS source. NOTE, serial number is in the format of MMY-## where -## is the next sequential number of source model number built for the current month.

INIS Model Number	Serial Number	CDC.800/CDC.700 from Step 7.4	Total Activity (Ci)
Use additional sheets as necessary			

7.6 Coordinate with I³ Quality Assurance Manager to procure necessary INIS source capsules and lids.

7.7 Coordinate with I³ Quality Assurance Manager to laser mark each source capsule with the isotope, Cs-137, INIS Model and Serial Number.

NOTE: All work with Cs-137 sources is to be performed in the clean hot cell

7.8 Clean the Cs-137 source capsule(s) to be over encapsulated by dipping in a 50% - 50% isopropyl alcohol – de-mineralized water bath and pat dry.

7.9 Prepare INIS capsules for welding and transfer into the Cs-137 source welding hot cell.

7.10 Prepare INIS Cs-137 sources in accordance with the table from Step 7.5

7.11 Set up welder in accordance with the weld log.

7.12 Weld INIS Cs-137 sources in accordance with the table from Step 7.5.

INIS Model Number	Serial Number	Qualified Welder Signature	Weld Date
Use additional sheets as necessary			



International Isotopes Inc.

(Including International Isotopes Idaho Inc. subsidiary)

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7.13 Perform a leak check on the completed INIS Cs-137 source in accordance with Paragraph A.2.2.1, A.2.2.2 of A.2.2.3 from ANSI/HPS N43.6-1997. Document leak test results on Source Certificate for each source.

INIS Model / Serial No.	Test Performed	Results (Pass/Fail)	NDT Signature	Leak Test Date

Use additional sheets as necessary

7.14 Perform a wet Q-Tip smear of outer sealed source. Count the smear. When source smear is less than 1000 dpm, place in clean container (quart can). Document survey results in space provided below, and complete Sealed Source Certificate.

Contamination Survey Instrument Data							
Instrument	Serial No.	Cal. Due	Efficiency	Background Count Rate R _b (cpm)	Background Count Time t _s (min)	Sample Count time t _b (cpm)	MDA (dpm)

$$MDA = \{3 + 3.29[R_b t_s (1 + (t_s/t_b))^{1/2}]\} / \{Efficiency \times t_s\}$$

INIS Model and Serial No.	Gross Count Rate (cpm)	Net Count Rate (cpm)	Wipe Results (dpm)	Technician initial	Date

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7.15 If sealed source is not to be removed from hot cell following smear test, then identify outside of clean container and log on Isotope Storage board all pertinent information.

7.16 Forward this procedure and any accompanying paperwork or certificates to Q.A. for approval.

8.0 REFERENCES

8.1 ANSI/HPS N43.6-1997, *Sealed Radioactive Sources-Classifications*

8.2 ISO 9978 *Radiation protection Sealed radioactive sources -Leakage test methods.*

8.3 INIS Drawing, DWG No. INIS-SF-CS-040606

8.4 Weld Standard

8.5 N.D.T. Examiner Standard

9.0 ATTACHMENTS

9.1 Sealed Source Certificate

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Attachment 9.1

**SEALED SOURCE CALIBRATION
 CONTAMINATION AND LEAK TEST CERTIFICATE
 OF CS-137 SOURCE FOR**

CUSTOMER: _____

ACTIVITY

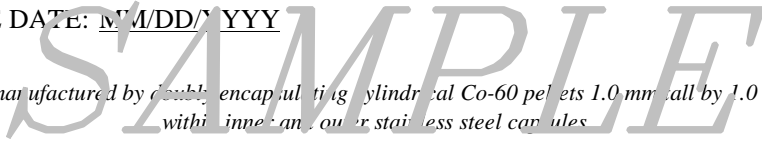
I³ MODEL NUMBER: INIS-SF-CS-

**Ci
TBq**

SERIAL NUMBER: MMYY-##

REFERENCE DATE: MM/DD/YYYY

Each source is manufactured by doubly encapsulating cylindrical Co-60 pellets 1.0 mm tall by 1.0 mm in diameter with inner and outer stainless steel canules.



Physical Data

Isotope: Cs-137
 Half-life: 11018.3 days
 λ : 6.29E-05 d⁻¹

Energy (MeV) Yield
 γ_1 661.65 85.10%
 From Ba-137m

Type	Method	Results
Removable Contamination	Wet Swab	< 1000 dpm
Leakage Test	Vacuum Bubble	No Leakage Observed

NDT Class II Technician: _____
Signature

Date

NDT Class II Verifier: _____
Signature

Date

Quality Assurance: _____
Signature

Date

Leak Test Gauge Description

Manufacturer: ASHCROFT
 Model/Serial Number:: 251009AWL02L/1671 S

Calibration Date: 4-Mar-06
 Calibration Due Date: Sep-06