

BERTHOLD INSTRUMENTS, INC.

136 Bradford Avenue

Pittsburgh, PA 15205

412-922-2635 Telex: 812527

September 28, 1984

U. S. Nuclear Regulatory Commission
 Region I
 631 Park Avenue
 King of Prussia, PA 19406-1498

ATTN: JACK DAVIS

REF: CONTROL #5 - 02478 (POSSESSION)
 - 02479 (DISTRIBUTION)

Attached is further information I forwarded to
 Steve Baggatt on devices to be safety evaluated and
 certified. (Two copies for your file.)

By way of this letter, I request that the following
 information be added to attachments #1, Item #8 on both
 possession and distribution license applications with
 the control #02478 and #02479 respectively.

As follows:

| | | | |
|-----------------------|---------------|----------------------|-------------|
| Cm 244 | Sealed Source | Berthold Inst., Inc. | 4 @ 10 mCi |
| | | 15136.000-000 | |
| Am ²⁴¹ /Be | Sealed Source | Berthold Inst., Inc. | 2 @ 100 mCi |
| | | 21121-002 | |
| Am ²⁴¹ /Be | Sealed Source | Berthold Inst., Inc. | 2 @ 100mCi |
| | | 1555.000-021 | |
| Am ²⁴¹ | Sealed Source | Berthold Inst., Inc. | 2 @ 100 mCi |
| | | 15113.002 | |
| Am ²⁴¹ | Sealed Source | Berthold Inst., Inc. | 2 @ 100 mCi |
| | | 2193.200-000 | |

If you should have any questions concerning this matter,
 please feel free to contact me at (412) 922-2635.

Sincerely,

James A. Welsh
 James A. Welsh

JAW:mls

"OFFICIAL RECORD COPY"

Attachments - #2193.200-000 (2 Copies)
 #15136.000-000 (2 Copies)
 #21121-002 (2 Copies)
 #1555.100-021 (2 Copies)
 #15113.002 (2 Copies)

02478
 MLI
 01 OCT 1984

8512020556 850822
 REG1 LIC30
 PDR

TECHNICAL DOCUMENTS
SUPPORTING AN APPLICATION FOR PERMISSION
TO HANDLE RADIOACTIVE SUBSTANCES

Commission number:

(please quote)

Applicant:

1. Description of the radioactive substance:

- 1.1 Isotope designation: $^{241}_{\text{Am}}$
- 1.2 Chemical composition: Am_2O_3
- 1.3 Physical state: ceramic bond
- 1.4 Enclosed or open: enclosed
- 1.5 Number off and individual activity: off, 100 mCi each
- 1.6 Manufacturer: The Radiochemical Centre,
Amersham/England
- 1.7 Supplier: Labor Prof. Dr. Berthold,
Wildbad/Schwarzwald, Germany

2. Description of the enclosure:

For details regarding the construction of the enclosure see the enclosed drawing P 2642-100. The enclosure is tested by the manufacturer for surface contamination and leaks. A relevant test certificate is handed to the user on delivery.

3. Description of the shield:

The source is permanently fitted in a measuring head to drawing 2193. 100-000 M. The radiation outlet opening can be closed by a Pb shield.

4. Dose rates:

At the measuring head surface -
excepting the radiation outlet
opening: 0.20 mRem/h

At a distance of 1 m from the
open radiation outlet opening: max. 0.75 mRem/h

5. Description of the intended handling process or use:

- 2 -

6. Information regarding the whereabouts of radioactive sources which
are no longer required or decayed:

They will be returned to the relevant state collection point for
radioactive waste or to the supplier.

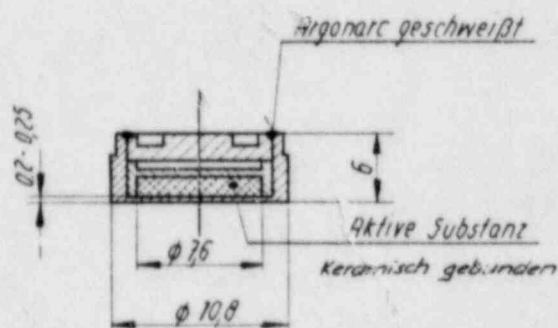
Date:

Enclosures:




Drawing F 2642-100

Drawing 2193.100-000 M

| | | | |
|----|-----|---|---|
| MW | Chb | G | M |
| ZW | EW | P | L |



Kapsel Typ X.91

| | | | | | | |
|---------|----------|--|------|--------|-------------|---|
| | | Werkstoff <i>Edelstahl</i> | | | | |
| | | Sonderbearb. | | | | |
| | | Maße ohne Toleranzangabe | | | | |
| | |  Diese Maße werden besonders geprüft | | Paßmaß | Abmaße | verw. bei |
| | |  Laboratorium Prof. Dr. Berthold Wildbad / Schwarzwald | | Tag | Name | |
| | | | | gez. | 16.6.71 |  |
| | | | | stemp. | | |
| Ausgabe | Änderung | Tag | Name | | | |
| Maßstab | | Hersteller: The Radiochemical Centre, Amersham | | | Zeichn.-Nr. | |
| | | Präparat AMC.16 100 mCi ²⁴¹ Am | | | P2642-100 | |

2193 100-002 (4)

2193 100-004 (5)

2193 100-005 (5)

2193 100-006 (5)

P 2642-100 (4)

P 2639-100 (4)

P 2629-100 (4)

P 2627-100 (4)

2193 100-008 (5)

2193 100-003 (5)

Einspannfläche

Senkschraube M3x10 DIN 963 (2x)

Abus-Sicherheitschloß Nr. 75/11mm

2193 100-001 (4)

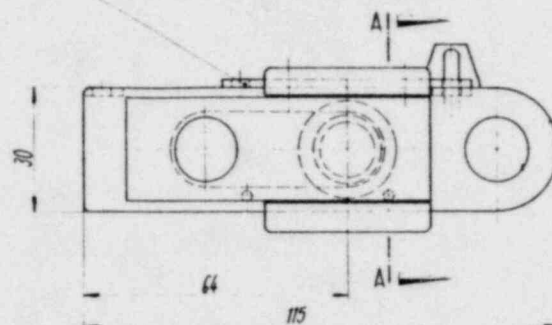
2193 100-007 (5)

Schnitt A-A

40°

Stahlkugel 3#

M 1622 040-017 (4) ①



| | | | | | | | |
|---------------------------|--|--|--|--|--|------------------------|--|
| | | | | Werkstoff | | | |
| | | | | Sonderbearb. | | | |
| | | | | Maße ohne Toleranzangabe | | | |
| | | | | Diese Maße werden besonders geprüft | | | |
| | | | | Fag | | Name | |
| 1. Zeichnung Nr. geändert | | | | gpr | | 16.7.74 | |
| Hauptstab | | | | gpr | | | |
| 1:1 | | | | Präparatgehäuse verriegelbar (neue Ausführung) | | berthold | |
| | | | | | | 7547 Wildbad/Schwarzw. | |
| | | | | | | Zeichen Nr. | |
| | | | | | | 2193 100-000 | |

| L | M | P | G | EW | Ch B | ZW | MW | Lfd. Nr. | Stückzahl | Benennung | Zeichnungs-Nr. | Teil-Nr. | Blattgröße | Werkstoff | Normteil (Abmessung) | Bemerkung |
|----------|---|----|---|----|------|----|----|----------|-----------|---|----------------|----------|------------|----------------|----------------------|---|
| Aut | 1 | As | | | | | | 1 | 1 | Präparatgehäuse | 2193.100- | 001 | A4 | Ms 58 | DIN 1761 | |
| gelb | | | | | | | | 2 | 1 | Schieber | 2193.100- | 002 | A4 | Ms 58/Pb-Blech | DIN 1765 | |
| Änderung | | | | | | | | 3 | 1 | Leiste | 2193.100- | 003 | A5 | Ms 58 | DIN 1759 | |
| | | | | | | | | 4 | | | | | | | | |
| Tag | | | | | | | | 5 | 1 | Hülse (für Präparat P2627-100) | 2193.100- | 004 | A5 | Ms 58 | DIN 1756 | } wird wahlweise verwendet je nach Auftrag |
| Name | | | | | | | | 6 | 1 | Präparat AMC.17 300mCi ²⁴¹ Am | P2627- | 100 | A4 | | | |
| | | | | | | | | 7 | | | | | | | | |
| | | | | | | | | 8 | 1 | Hülse (für Präparat P2629-100, P2642-100) | 2193.100- | 005 | A5 | Ms 58 | DIN 1756 | |
| | | | | | | | | 9 | 1 | Präparat AMC.5 30mCi ²⁴¹ Am | P2629- | 100 | A4 | | | |
| | | | | | | | | 10 | 1 | Präparat AMC.16 100mCi ²⁴¹ Am | P2642- | 100 | A4 | | | } wird wahlweise verwendet je nach Auftrag |
| | | | | | | | | 11 | | | | | | | | |
| | | | | | | | | 12 | 1 | Hülse (für Präparat 2639-100) | 2193.100- | 006 | A5 | Ms 58 | DIN 1756 | |
| | | | | | | | | 13 | 1 | Präparat Typ X10 10mCi ²⁴¹ Am | P2639- | 100 | A4 | | | |
| | | | | | | | | 14 | | | | | | | | |
| | | | | | | | | 15 | 1 | Halteschraube | 2193.100- | 007 | A5 | Ms 58 | DIN 1756 | |
| | | | | | | | | 16 | 1 | Kontermutter | 2193.100- | 008 | A5 | Ms 58 | DIN 1756 | |
| | | | | | | | | 17 | | | | | | | | |
| | | | | | | | | 18 | 1 | Druckfeder | M 1622.040- | 017 | A4 | | | |
| | | | | | | | | 19 | | | | | | | | |
| | | | | | | | | 20 | 1 | Abus-Sicherheitsschloß | | | | | Typ: Nr. 75/20mm | |
| | | | | | | | | 21 | 1 | Stahlkugel | | | | | 3φ | |
| | | | | | | | | 22 | | | | | | | | |
| | | | | | | | | 23 | 2 | Senkschraube | | | | | M3 x 10 DIN 963 | vernickelt |
| | | | | | | | | 24 | | | | | | | | |
| | | | | | | | | 25 | | | | | | | | |
| | | | | | | | | 26 | | | | | | | | |
| | | | | | | | | 27 | | | | | | | | |

berthold
7547 Wildbad / Schwarzwald

Zeichnung-Nr. **2193.100-000 M**
besteht nur aus Baugruppe 100

Bestell-Nr. **15174**
Gepr. **15174**
Norm. **15174**
Tag **15174**
Name **15174**

Stückliste zu
Präparatgehäuse, verschleißbar

Besteht aus
1 Blatt

Technical documents supporting an application for permission
to handle radioactive substances

Commission number: (please quote in all correspondence)

Applicant:

1. Description of the radioactive substance:

- | | | |
|-------|--|--------------------|
| 1.1 | Radioactive substance | 244Cm |
| 1.1.2 | Chemical composition: | curium oxide |
| 1.1.3 | Physical state: | in ceramic form |
| 1.2 | Enclosed or open: | enclosed |
| 1.3 | Number off and individual activity: | 1 off, 10 mCi each |
| 1.4 | Manufacturer: The Radiochemical Centre, Amersham/England | |
| | ISO Classification: | C 64344 |
| | Capsule type: | X131/4 |
| 1.5 | Supplier: Labor. Prof. Dr. Berthold, 7547 Wildbad/Schwarzwald, Germany | |

2. Description of the enclosure and shielding:

- | | | |
|-----|--------------------------------------|---|
| 2.1 | <u>Description of the enclosure:</u> | For details of the construction of the enclosure see the enclosed drawing no. 2657.000-000. The enclosure is tested by the manufacturer for surface contamination and leaks. An appropriate test certificate is issued covering this. |
| 2.2 | <u>Description of the shielding:</u> | The source is permanently fitted in a special steel capsule to drawing no. 2648.000-000. The dose rate at the capsule surface - excepting the radiation outlet opening - is 0.1 mR/h. On the measuring arrangement to drawing no. 15136.000-000 the radiation outlet opening is covered by the measuring cell opposite. |

- 2 -

3. Description of the intended handling process or use:

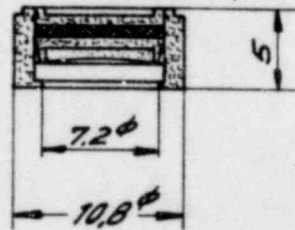
Continuous determination of sulphur in mineral oil

4. Information regarding the whereabouts of radioactive sources which are no longer required or decayed:

To be returned to the state collection point for radioactive waste.

Date:

Enclosures: 1 x drawing no. 2657.000 -000
1 x drawing no. 2648.000-000
1 x drawing no. 15136.000-000
1 x Certificate of Approval of design of capsule X131/4 SFC 144
1 x Certificate of Radioactive Source Integrity QCS 187



Kapsel Typ X 131/4

ISO Classification C 64 344

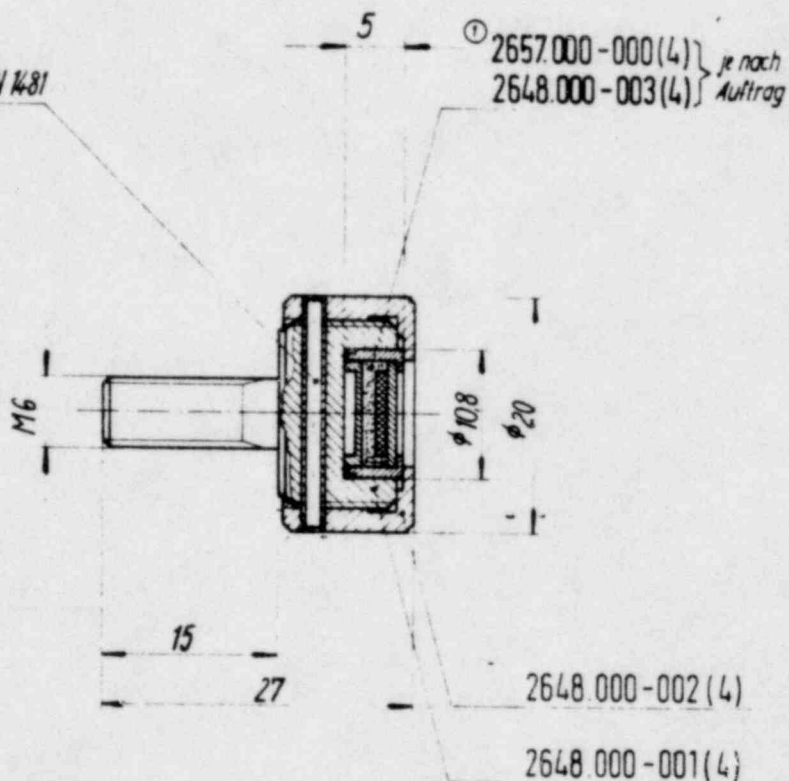
Ref. RSD/CTR/59/1 1.12.1977


Die Zeichnung ist als Entwurf zu verstehen und ist nicht für den Fall der Ausführung oder der Herstellung zu verwenden. Die Zeichnung ist als Entwurf zu verstehen und ist nicht für den Fall der Ausführung oder der Herstellung zu verwenden. Die Zeichnung ist als Entwurf zu verstehen und ist nicht für den Fall der Ausführung oder der Herstellung zu verwenden.

| | | | | Werkstoff Edelstahl | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|---------------------------|---|------|---|------|---------------|-------|-------|------|-------|------|------|-----|------|------|------|------|------|------|--|---|--------|----------|------|-------|----|---|-------|--------|-------|--|---------------------------|
| | | | | Sonderbearb. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | Zulässige Abweichungen f. Maße u. Toleranzangabe n. DIN 7160 | | verwendet bei | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <tr> <th>Abw.</th> <th>0,5</th> <th>3</th> <th>6</th> <th>30</th> <th>120</th> <th>215</th> </tr> <tr> <th>Art</th> <th>3</th> <th>6</th> <th>30</th> <th>120</th> <th>215</th> <th>1000</th> </tr> </table> | | Abw. | 0,5 | 3 | 6 | 30 | 120 | 215 | Art | 3 | 6 | 30 | 120 | 215 | 1000 | <table border="1"> <tr> <th>Bearb.</th> <td>15.11.79</td> <td></td> </tr> <tr> <th>Gepr.</th> <td></td> <td></td> </tr> <tr> <th>Norm.</th> <td></td> <td></td> </tr> </table> | | Bearb. | 15.11.79 | | Gepr. | | | Norm. | | | | |
| Abw. | 0,5 | 3 | 6 | 30 | 120 | 215 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Art | 3 | 6 | 30 | 120 | 215 | 1000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bearb. | 15.11.79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gepr. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Norm. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | <table border="1"> <tr> <th>Maß</th> <th>±0,05</th> <th>±0,08</th> <th>±0,1</th> <th>±0,15</th> <th>±0,2</th> <th>±0,3</th> </tr> <tr> <th>mit</th> <td>±0,1</td> <td>±0,1</td> <td>±0,2</td> <td>±0,3</td> <td>±0,5</td> <td>±0,8</td> </tr> <tr> <th>grö</th> <td>-</td> <td>±0,2</td> <td>±0,5</td> <td>±0,8</td> <td>±1,2</td> <td>±2</td> </tr> </table> | | Maß | ±0,05 | ±0,08 | ±0,1 | ±0,15 | ±0,2 | ±0,3 | mit | ±0,1 | ±0,1 | ±0,2 | ±0,3 | ±0,5 | ±0,8 | grö | - | ±0,2 | ±0,5 | ±0,8 | ±1,2 | ±2 | <table border="1"> <tr> <th>Paßmaß</th> <th>Abmaß</th> </tr> <tr> <td></td> <td>7547 Wilzbach / Schwarzl.</td> </tr> </table> | | Paßmaß | Abmaß | | 7547 Wilzbach / Schwarzl. |
| Maß | ±0,05 | ±0,08 | ±0,1 | ±0,15 | ±0,2 | ±0,3 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| mit | ±0,1 | ±0,1 | ±0,2 | ±0,3 | ±0,5 | ±0,8 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| grö | - | ±0,2 | ±0,5 | ±0,8 | ±1,2 | ±2 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Paßmaß | Abmaß | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 7547 Wilzbach / Schwarzl. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div style="border: 1px solid black; width: 20px; height: 10px; display: inline-block;"></div> Diese Maße wurden besonders geprüft | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maßstab | | Hersteller: The Radiochemical Centre Amersham | | | | Zeichn.-Nr. | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Strahler C64344 10-200 mCi ²⁴⁴ -Curium | | | | 2657.000-000 | | | | | | | | | | | | | | | | | | | | | | | | | | |

| | | | | |
|--|----|-----|---|---|
| | MW | CAB | G | M |
| | ZW | EW | P | L |

Sparrinstift $\varnothing 2 \times 20$ DIN 1481



| | | | | | | | |
|--|--|--|--|--|------|--------------------------|--------|
| | | | | Werkstoff | | | |
| | | | | Sonderbearb. | | | |
| | | | | Maße ohne Toleranzangabe | | 15136 000-000 | |
| | | | |  Diese Maße werden besonders geprüft | | 1572 000-000 | |
| | | | | | | Paßmaß | Abmaße |
| | | | | | | verw bei | |
| | | | | Tag | Name | | |
| 1 Strahler 1537 100-000 zusätzlich M 2 2 | | | | gez. | 2275 | Lub | |
| Ausgabe | | | | Änderung | Tag | Name | |
| Maßstab | | | | 10 mCi ²⁴⁴ Cm-Strahler | | berthold | |
| 2:1 | | | | Präparatkapsel mit 10 mCi ²³⁸ Pu-Strahler | | 7547 Wildbad / Schwarz w | |
| | | | | | | Zeichn.-Nr. | |
| | | | | | | 2648 000-000 | |

Design No. SFC 144Issue 1

**CERTIFICATE OF APPROVAL OF DESIGN OF CAPSULE
FOR RADIOACTIVE MATERIAL**

| | |
|--------------------------------------|--|
| TITLE | Low Energy Gamma Source Capsule Type XL31/4 |
| Drawing Nos. and/or Specification | BRC 10318/S Issue A |
| Radioactive Material | Americium 241 Plutonium 238 Curium 244 |
| Maximum Activity | 100mCi |

This is to certify that the Secretary of State for the Environment being, for the purposes of the Regulations of the International Atomic Energy Agency, the competent authority of Great Britain in respect of inland surface transport and the Secretary of State for Trade and Industry being the competent authority of the United Kingdom of Great Britain and Northern Ireland in respect of sea and air transport, have approved the above-mentioned Capsule Design. Radioactive material sealed in capsules manufactured to the above-mentioned design qualifies as special form radioactive material and as such will meet the requirements of the regulations overleaf.

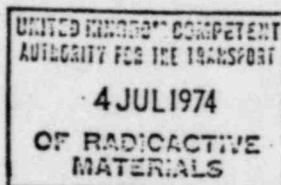
This Certificate of Approval applies only to the design of the capsule as set out in the above-named drawings and/or specifications RSD/CTR/59 dated June 1974 submitted by The Radiochemical Centre, Amersham.

THIS CERTIFICATE CANCELS ALL PREVIOUS ISSUES

COMPETENT AUTHORITY

IDENTIFICATION MARK :

GB: SFC 144



Date of Approval

E. J. Wilson (Dr.)
for E. J. Wilson (Dr.)
Transport Radiological Adviser on behalf of the
Secretary of State for the Environment and the
Secretary of State for Trade and Industry.

Note: Any questions relating to this Certificate should be made to the Radiological Adviser at the following address:-

Department of the Environment,
~~2 Marsham Street~~ 2 Marsham Street,
~~London SW1 3EH~~ SW1 3EH

~~2 Marsham Street~~ MARSHAM
Telex: ~~22801~~ Answer back DOE ~~STERN~~ LONDON

Telephone: - ~~01-212-7247~~ ~~01-212-7247~~
01 - 212 - 7247

REGULATIONS GOVERNING THE TRANSPORT OF RADIOACTIVE MATERIALS

1. **INTERNATIONAL.**— International Atomic Energy Agency (I.A.E.A.) Safety Series No.6. Regulations for the Safe Transport of Radioactive Materials, 1967 Edition.
Intergovernmental Maritime Consultative Organisation (I.M.C.O.) International Maritime Dangerous Goods Code—Class 7. Radioactive Substances.
International Air Transport Association (I.A.T.A.) I.A.T.A. Regulations relating to the carriage of restricted articles by air.
2. **ROAD.**— Great Britain only. Radioactive Substances Act 1948 [Section 5(2)]—The Radioactive Substances (Carriage by Road) (Great Britain) Regulations 1970. S.I. 1826. Code of Practice for the Carriage of Radioactive Materials by Road.
Europe only. European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR). Class IVb
3. **RAIL.**— Great Britain only. British Rail List of Dangerous Goods and Conditions of Acceptance for carriage by Freight Train and by Passenger Train [BR22426 (Revised) November 1966] Class 7.
Europe only. International Convention concerning the carriage of Goods by Rail (CIM).
Annex 1. Regulations concerning the substances and articles not to be accepted for carriage or to be accepted subject to certain conditions (RID). Class IVb.
4. **SEA.**— Merchant Shipping (Safety Convention) Act 1949 (Section 23) and Merchant Shipping (Dangerous Goods) Rules 1965 as amended by S.I. 1968: No. 322. The Report of the Standing Advisory Committee on the Carriage of Dangerous Goods in Ships 1966 (the "Blue Book") Class 7.



The Radiochemical Centre Amersham

CERTIFICATE OF RADIOACTIVE SOURCE INTEGRITY

QCS 187
Issue 2

SPECIFICATION :- Capsule Type X131/4

DWNG NO. :- BRC10318/5

NUCLIDE, RADIO TOXICITY GP. :- Americium-241 Plutonium-238 Curium-244
Group A

MAXIMUM ACTIVITY :- 200mCi

CLASSIFICATION DESIGNATION :- C64344

TEST SOURCES :- 2 x 40 mCi Plutonium-238

| TEST | TEMPERATURE | PRESSURE | IMPACT | VIBRATION | PUNCTURE |
|------|--------------------------|------------------------|------------------------|----------------------|----------------------|
| 1 | | | | | |
| 2 | | | | | |
| 3 | | | PASS < 0.01 0.01 | | |
| 4 | | PASS < 0.01 0.03 | | PASS 0.02 0.02 | PASS 0.03 0.03 |
| 5 | | | | | |
| 6 | PASS < 0.01 < 0.01 | | | | |
| | | | | | |

TEST CARRIED OUT IN ACCORDANCE WITH RECOMMENDATION OF:- British Standard 528
and draft International Standard ISO 29

LEAK TEST:- Immersion and Wipe

ADDITIONAL INFORMATION:- Figures in Table denote activity (nCi) measured in
liquid after immersion

Pat Hoxby
Quality Control Dept.

Date 28 February 1978

E. G. Hall
Radiation Sources Department

The Radiochemical
Centre Ltd

registered England
1000010

registered office: telephone:
White Lion Road Little Chalfont
Amersham (024 04)
Buckinghamshire 4444

cables: telex:
Activity 83141
Amersham

OVERSIZE DOCUMENT PAGE PULLED

SEE APERTURE CARDS

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