Radioactive Material Safety Data Sheet

This data sheet presents information on radioisotopes only. This document is not subject to WHMIS requirements. For information on chemical compounds incorporating this radionuclide, see the relevant Material Safety Data Sheet.

Americium-241/Beryllium

### Part 1 – Radioactive Material Identification

<table>
<thead>
<tr>
<th>Common Names:</th>
<th>Americium-241/Beryllium</th>
<th>Chemical Symbol:</th>
<th>Am-241/Be or $^{241}$Am/Be</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atomic Number:</td>
<td>95</td>
<td>Mass Number:</td>
<td>241(146 neutrons)</td>
</tr>
<tr>
<td>Chemical Form:</td>
<td>Americium oxide with beryllium metal</td>
<td>Physical Form:</td>
<td>Compacted mixture of americium oxide with beryllium metal.</td>
</tr>
</tbody>
</table>

### Part 2 – Radiation Characteristics

**Physical half-life:** 432.2 years  
**Specific Activity (GBq/g):** 127

<table>
<thead>
<tr>
<th>Principle Emissions</th>
<th>$E_{\text{Max}}$ (keV)</th>
<th>$E_{\text{eff}}$ (keV)</th>
<th>Dose Rate ($\mu$Sv/h/GBq at 1m)</th>
<th>Shielding Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta* ($\beta$)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gamma ($\gamma$) / X-Rays</td>
<td>13.9 (42.7%)</td>
<td>-</td>
<td>$85^a$</td>
<td>HVL Lead: 0.01 cm</td>
</tr>
<tr>
<td>Alpha ($\alpha$)</td>
<td>5,443 (12.8%)</td>
<td>5,486 (85.2%)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Neutron (n)</td>
<td>-</td>
<td>4,500</td>
<td>$2^a$</td>
<td>HVL Paraffin Wax: 6.6 cm</td>
</tr>
</tbody>
</table>

* Where Beta radiation is present, Bremsstrahlung radiation will be produced. Shielding may be required.  
Note: Only emissions with abundance greater than 10% are shown.  

**Progeny:** Neptunium-237(Np-237)

### Part 3 – Detection and Measurement

**Methods of detection (in order of preference)**

1. A radiation survey meter equipped with an energy-compensated Geiger Mueller detector. This only measures the gamma component of the total dose.

2. A BF$_3$ proportional detector – only measures the neutron component of the total dose.
### Dosimetry

<table>
<thead>
<tr>
<th>Whole Body</th>
<th>Skin</th>
<th>Extremity</th>
<th>Neutron</th>
</tr>
</thead>
<tbody>
<tr>
<td>✔</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Internal:** Sealed sources pose no internal radiation hazard. However, in the event of loss of containment by the sealed source, all precautions should be taken to prevent inhalation or ingestion of the material.

**Critical Organ(s):** Bone surface

**Annual dose limits:**
- *Non-nuclear energy workers:* 1 mSv per year
- *Nuclear energy workers:*  
  - a) 50 mSv in one year
  - b) 100 mSv total over five years
- *Pregnant nuclear energy workers:* 4 mSv over the balance of the pregnancy

### Part 4 – Preventive Measures

*Always use the principles of time, distance and shielding to minimize dose*

**Engineering Controls:** Sealed radioactive sources used in industrial applications should always be within a protective source housing to minimize radiation dose and to protect the source capsule from damage.

**Personal Protective Equipment** *(for normal handling of unsealed sources only. Always wear disposable gloves, safety glasses, personal protective equipment and clothing as appropriate to the material handled).*

No special PPE required.

**Special Storage Requirements:** None

### Part 5 – Control Levels

<table>
<thead>
<tr>
<th>Oral Ingestion</th>
<th>Inhalation</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALI (kBq)</td>
<td>ALI (kBq)</td>
</tr>
<tr>
<td>29.6</td>
<td>0.222</td>
</tr>
</tbody>
</table>

**Exemption Quantity (EQ):** 1,000 Bq

### Part 6 – Non-Radiological Hazards

Currently no information available for americium. Beryllium is a suspected carcinogen and is known to produce cumulative lung damage (Berylliosis).

**OSHA Permissible Exposure Limit (PEL):**
No limits currently set for americium

2 ug/m3 TWA for beryllium
### Part 7 - Emergency Procedures

The following is a guide for first responders. The following actions, including remediation, should be carried out by qualified individuals. In cases where life-threatening injury has resulted, **first** treat the injury, **second** deal with personal decontamination.

#### Personal Decontamination Techniques
- Wash well with soap and water and monitor skin
- Do not abrade skin, only blot dry
- Decontamination of clothing and surfaces are covered under operating and emergency procedures

#### Spill and Leak Control
- Alert everyone in the area
- Confine the problem or emergency (includes the use of absorbent material)
- Clear area
- Summon Aid

#### Damage to Sealed Radioactive Source Holder
- Evacuate the immediate vicinity around the source holder
- Place a barrier at a safe distance from the source holder (min. 5 meters)
- Identify area as a radiation hazard
- Contact emergency number posted on local warning sign

#### Suggested Emergency Protective Equipment
- Gloves
- Footwear Covers
- Safety Glasses
- Outer layer or easily removed protective clothing (as situation requires)

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