Safety Issues for Hg irradiation

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- Experiment siting -
  Activation of air and components

- Activity of Hg –
  unsealed radioactive source

- Radioactive waste
Experiment in TT2a tunnel

- TT2a is an old transfer tunnel. As such, it does not dispose of
  - ventilation
  - waste water retention
- Activation of air by 40 pulses of $2E13 \ p$ corresponds to approx. 1 yr of operation in EHN1.
- Lack of beam dump leads to unnecessary activation of components and aggravates air activation
Hg activation

- “worst case scenario”: Hg spill
  - activity of Hg after 1 month > 22 $L_A$ (50% most active isotopes)
  - TT2a drains go directly in Nant’d’Avril
  - Radioactive pollution of environment

- Handling of unsealed sources
  - Work sector
  - “Sealed” design of experimental apparatus
ISO 2919

- International standard, describing design requirements for sealed radioactive sources
- Graded requirements to respond to environmental conditions
- We require the nearly lowest resistance classes:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Requirement Type/Value</th>
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</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>180 deg for 1 hour</td>
</tr>
<tr>
<td>ext./int. Pressure</td>
<td>25 kPa</td>
</tr>
<tr>
<td>Impact</td>
<td>50 g from 1 m or equivalent energy</td>
</tr>
<tr>
<td>Vibration</td>
<td>no test</td>
</tr>
<tr>
<td>Puncture</td>
<td>1 g from 1 m or equivalent energy</td>
</tr>
</tbody>
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“Certification”? 

- No certification required, but:
  - traceable demonstration, that the (weakest parts of the) apparatus fulfil the mentioned requirements
  - Measurements, FE calculations, use of certain materials …
  - SC/GS shall give its consent to the demonstration.
- “Weakest parts” (my guess):
  - beam windows
  - joints in Hg piping
Radioactive waste

- The magnet will be reused in the US or Japan √
- The irradiated Hg shall be transported to the new destination “for re-use” √
- As much as the magnets in TT2a, the N₂ system will be slightly activated – any re-use envisaged?