Since 1963, Boeing Radiation Effects Laboratory (BREL) has helped companies protect their people and products around the world and into space. Contact us for more information about contracting opportunities, capabilities, and pricing.

**BOEING RADIATION EFFECTS LABORATORY**

The ultimate proving ground for more than 50 years.

---

**BREL Services**

- Radiation effects testing of electronics and materials: total dose, dose rate, displacement damage, single-event effects
- Radiation modeling
- Combined radiation-effects testing
- Space simulation: solar, Van Allen, cosmic rays, UV
- Man-made effects simulation
- Flight altitude
- Program hardness assurance
- Survivability and vulnerability analysis
BOEING RADIATION EFFECTS LABORATORY

Cutting-edge technology. World-class people.

BREL is the largest private radiation test lab in aerospace, leading the industry in radiation simulation, testing, and qualification of materials and electronics.

In addition to state-of-the-art equipment, BREL has a team of world-class physicists, engineers, and technicians with decades of experience and knowledge in radiation effects environments. And by having comprehensive access to some of the world’s best irradiators, accelerators, and other test capabilities in a single location, the laboratory is able to conduct cutting-edge simulations of both natural and man-made radiation environments at a competitive cost.

### Program Support

<table>
<thead>
<tr>
<th>Type</th>
<th>Linac</th>
<th>FX-75</th>
<th>Dynamitron</th>
<th>CRETC</th>
<th>Kaman Sciences A-711</th>
<th>Gamma Source R</th>
<th>Gamma Source E</th>
<th>Gamma Source F</th>
<th>Open-Field Gamma Irradiator</th>
</tr>
</thead>
<tbody>
<tr>
<td>e^+</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>p^+</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Γ^-</td>
<td>✓</td>
<td>✓</td>
<td>UV</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Neutron</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mode**

- Pulse
- Pulse
- DC
- DC
- DC
- Continuous

**Maximum dose rate (rad[Si]/s)**

<table>
<thead>
<tr>
<th>Energy (MeV)</th>
<th>Linac</th>
<th>FX-75</th>
<th>Dynamitron</th>
<th>CRETC</th>
<th>Kaman Sciences A-711</th>
<th>Gamma Source R</th>
<th>Gamma Source E</th>
<th>Gamma Source F</th>
<th>Open-Field Gamma Irradiator</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1e11</td>
<td>1e14</td>
<td>6</td>
<td>2.5</td>
<td>e^+ : 100keV p^+ : 75keV</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Minimum energy (MeV)**

- 3
- .010
- e^- : 3e11 p^+ : 1e10
- 100x space rates

**Maximum target size**

- 4" x 4"
- 48" x 48"
- 12" x 12"
- 6" x 6"
- 12" x 12"
- 5.5" x 7"
- 5.5" x 7"
- 6" x 9"

†End point energy. Bremsstrahlung peak energy is approximately 280 keV.

‡Dependent on uniformity and dose rate.

---

**Contact Us**

For more information about the Boeing Radiation Effects Laboratory and related services:

206.544.9988
brel@boeing.com

The Boeing Company
MC: 2T-50
P.O. Box 3707
Seattle, WA 98124

Copyright © 2016 Boeing.
All rights reserved. 296623 6/16