The Path Ahead
Scientific Forum
IAEA General Conference
Vienna; 2015 Sept. 15 – 16

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Nordion is a health science company that provides market-leading products used for the prevention, diagnosis and treatment of disease.

We’ve been delivering safe, high-quality products to global customers for more than 60 years.

To best serve the diversity of our customers’ requirements, we are organized into two business units – Gamma Technologies and Medical Isotopes.
Nordion’s Global Footprint

APPROXIMATELY 375 EMPLOYEES
AROUND 30 PRODUCTS
SUPPLY OVER 500 CUSTOMERS
ACROSS MORE THAN 40 COUNTRIES
Leading Providers in...

GAMMA TECHNOLOGIES

LEADING PRODUCTS & SERVICES

- Irradiator designs
- Cobalt-60
- Applied research services
- Irradiator maintenance, upgrades and training services

VALUE>

- Extensive cobalt processing expertise, regulatory expertise, worldwide logistics capabilities and distribution network
- Full lifecycle management of Cobalt-60 (cradle-to-grave)
- One stop solution for all gamma processing needs

MEDICAL ISOTOPES

- Isotopes for cardiology, neurology, oncology and research applications
- Applied R&D services
- Contract manufacturing services
- Medical imaging services

- Extensive processing expertise, regulatory expertise, worldwide logistics capabilities and distribution network
- 80,000-ft² state-of-the-art cGMP manufacturing facility
- Proven as a trusted source for a breadth of critical isotopes
Medical Device Sterilization
In addition to Medical Devices:

- Consumer products (cosmetics; bandages, contact lenses and solutions)
- Phytosanitary treatment of wide variety of foods
  
  55 : The # of countries that have approved the use of irradiation
  
  500,000 : The # of metric tons of food products commercially irradiated each year

- Drug Discovery
• Global Medical Device market is estimated to have a value in excess of $200 Billion annually
  ✓ Medical device demand continues to grow at a 5 to 7% / yr. rate due to aging population and greater access to healthcare globally

• Thousands of Medical Device companies globally
  ✓ 80% of medical device companies are smaller companies, in which sterilization switching may be difficult.
  ✓ Many of these companies are also global companies that have manufacturing and distribution sites located throughout the world
  ✓ Many companies are establishing themselves in growing economies and need reliable, simple and safe technology that they can rely upon
Medical Device Industry

- Single use, medical device sterilization is a critical function of this market, using the following technologies:
  - Cobalt-60 Gamma: ~ 40% volume processed
  - Ethylene Oxide (EO): ~ 50% volume processed
  - E-Beam (accelerator based): ~ 10% volume processed
  - X-Ray (accelerator based): ~ 0% volume processed

- Sterilization facilities are comprised of manufacturer’s in-house and outside contract:
  - Most sterilization sites operate 24/365 days per year (1 year = 8760 hours)
  - Gamma PI sites typically operate with 95 – 98% efficiency (8300 – 8600 hrs/yr)
  - Device composition, density, complexity, packaging, kitting, turnaround time, equipment reliability & quality control of process are critical to the device manufacturer
  - Technology validation costs vary widely by technology and product. These costs include such tests as bioburden, product sterility, method suitability testing, accelerated aging, biocompatibility and verification dose
  - As the last step in manufacturing, devices can go immediately to the end-use healthcare facilities and labs after gamma sterilization
Cobalt-60

• Cobalt-60 sources emit gamma radiation - this energy is harnessed to eliminate pathogens and microbes

• Cobalt-60:
  • A solid metal
  • Non-fissionable
  • Non-soluble
  • Non-dispersible
  • Non-flammable
  • Sources and containers licensed
  • 5.25 year half-life

• Produced in power reactors (Co-59 to Co-60)
Cobalt-60 in Irradiators

Cobalt-60 slugs in a source

Source module

Source rack
Gamma: Simple and Reliable Design

- Components are all simple machinery requiring low level maintenance and upkeep (i.e. product handling system conveyors, pneumatic racks)
- Gamma does not require any high power or complex machinery to deliver the radiation to the product in a highly reliable manner
Gamma Irradiator Safety

- Gamma Systems have a long and highly reliable safety and security record.
- All safety components are simple in design and easy to maintain.
- Main safety issue is the source which utilizes gravity for reliable return to safe position.
## Gamma System Design

<table>
<thead>
<tr>
<th>Cobalt Use</th>
<th>Cobalt-60 is a <strong>simple</strong> and <strong>highly reliable</strong> radiation source that does not require high power or complex machinery to operate (<strong>continuous, consistent, uniform</strong>)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dose Delivery</td>
<td>Gamma rays are <strong>highly penetrating</strong>, permitting easy and reliable use on <strong>multiple types of product</strong> and with <strong>simple and accurate dose prediction</strong></td>
</tr>
<tr>
<td>Product Size Flexibility</td>
<td>Gamma has <strong>many different well proven system designs</strong> to handle product in smaller totes all the way up to full pallets giving wide product type flexibility</td>
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<tr>
<td>Labour</td>
<td>Due to simple design, gamma <strong>does not require high level technical operators or maintenance personnel</strong> unlike machine source systems</td>
</tr>
<tr>
<td>Cost</td>
<td>Most capital costs are in the building and conveyor. Many gamma systems have a <strong>long life of over 30 years</strong> with only <strong>few upgrades required during the life for reliability</strong></td>
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### Economic and Experience Summary

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Gamma</th>
<th>E-Beam</th>
<th>X-Ray</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliability</td>
<td>Excellent</td>
<td>&lt; Gamma</td>
<td>&lt; E-Beam</td>
</tr>
<tr>
<td>Maintenance / Spare Parts</td>
<td>Low costs</td>
<td>High Costs</td>
<td>Very High Costs</td>
</tr>
<tr>
<td>Equipment Complexity</td>
<td>Low</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Source Complexity</td>
<td>None</td>
<td>High</td>
<td>Very High</td>
</tr>
<tr>
<td>Penetration-High Density</td>
<td>Effective</td>
<td>Poor</td>
<td>Effective</td>
</tr>
<tr>
<td>Environmental Impact</td>
<td>Source Disposal (no impact) &amp; minimal CO₂ emissions</td>
<td>High Energy Usage &amp; High CO₂ emissions</td>
<td>High Energy Usage &amp; High CO₂ emissions</td>
</tr>
<tr>
<td>Market Share</td>
<td>High</td>
<td>Low</td>
<td>Minimal</td>
</tr>
</tbody>
</table>
Gamma Summary

• Gamma systems have been operating for over 60 years on all continents.

• Over 200 gamma facilities operating globally with more than over 400 MCi in operation.

• Gamma rays are highly penetrating and can process many types of products with very predictable results

• Most products requiring radiation treatment today have been fully qualified already for gamma

• Approximately 45% of all single use medical disposal devices are sterilized with gamma
Gamma Summary

- Gamma technology does not require complex machinery or highly sophisticated power sources to operate.
- Gamma is normally operated by staff with minimal technical training.
- Gamma does not require complex maintenance practices to operate reliably.
- Most gamma systems operate at over 95% reliability.
- Many gamma systems operate for over 30 years with minimal upkeep for safety and support.