



**nordion**  
SCIENCE ADVANCING HEALTH

# The Path Ahead

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[www.nordion.com](http://www.nordion.com)

# About Nordion



**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**



## 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



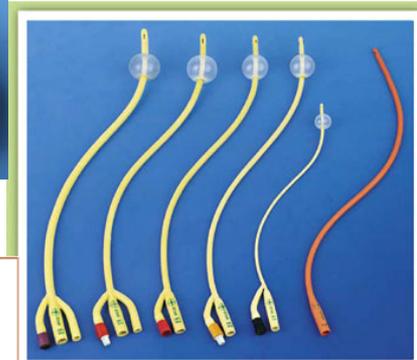
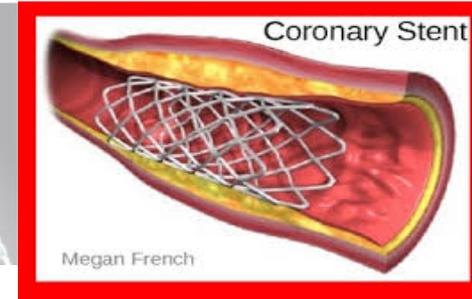
## MEDICAL ISOTOPES

- 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-ft<sup>2</sup> 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



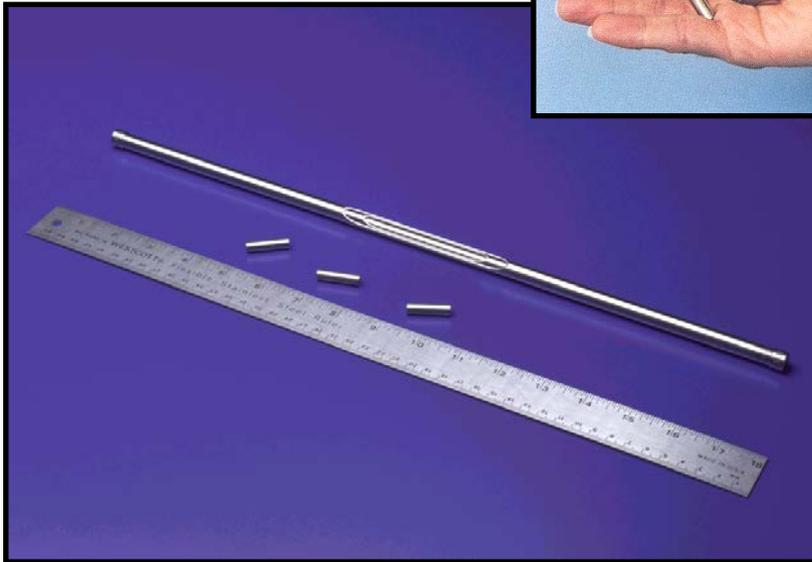
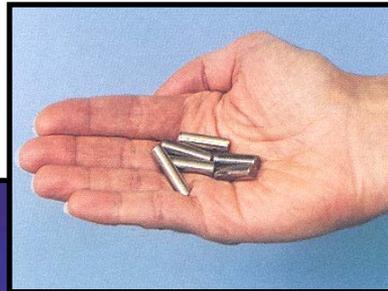
- Global Medical Device market is estimated to have a value in excess of \$200 Billion annually
  - ✓ Medical device demand continues to grow at a 5 to 7% / yr. rate due to aging population and greater access to healthcare globally
- Thousands of Medical Device companies globally
  - ✓ 80% of medical 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:

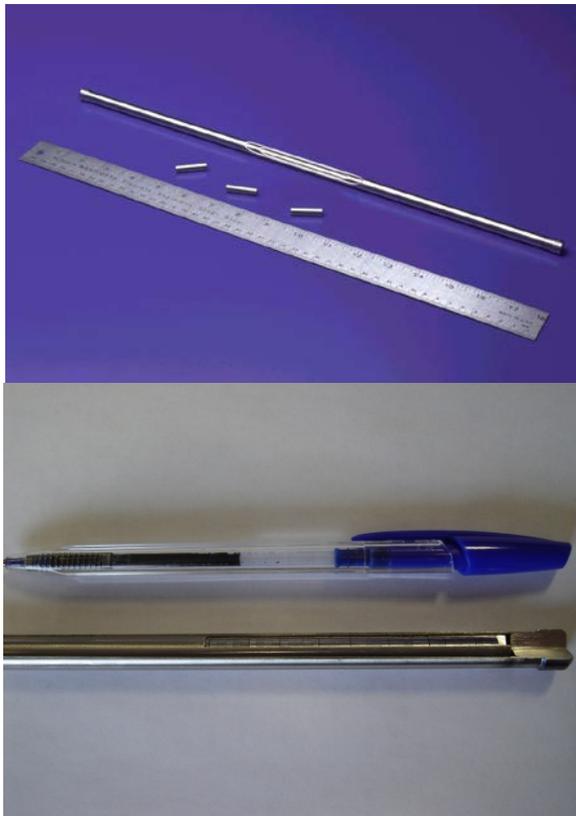
- - A solid metal
- - Non-fissionable
- - Non-soluble
- - Non-dispersible
- - Non-flammable
- - Sources and containers licensed
- - 5.25 year half-life

- Produced in power reactors (Co-59 to Co-60)



# Cobalt-60 in Irradiators

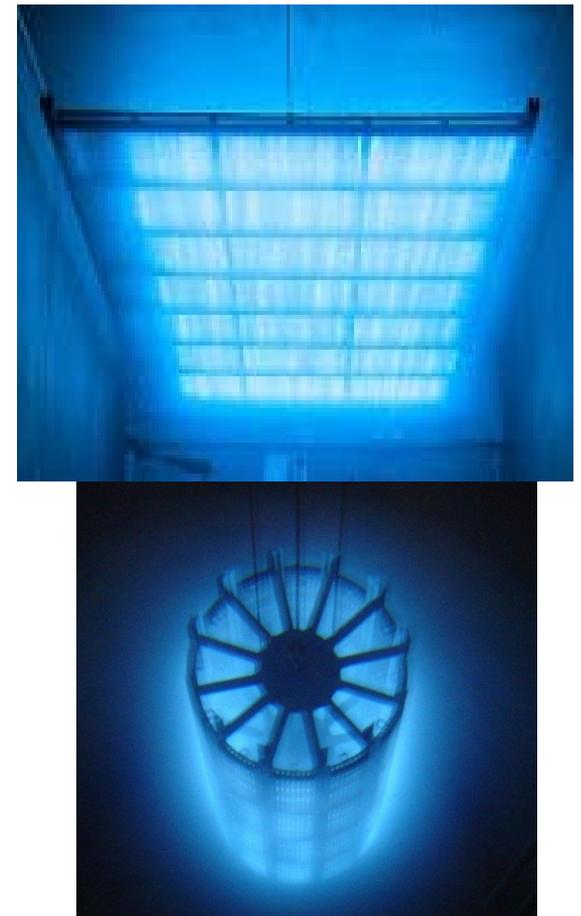
## Cobalt-60 slugs in a source



## Source module

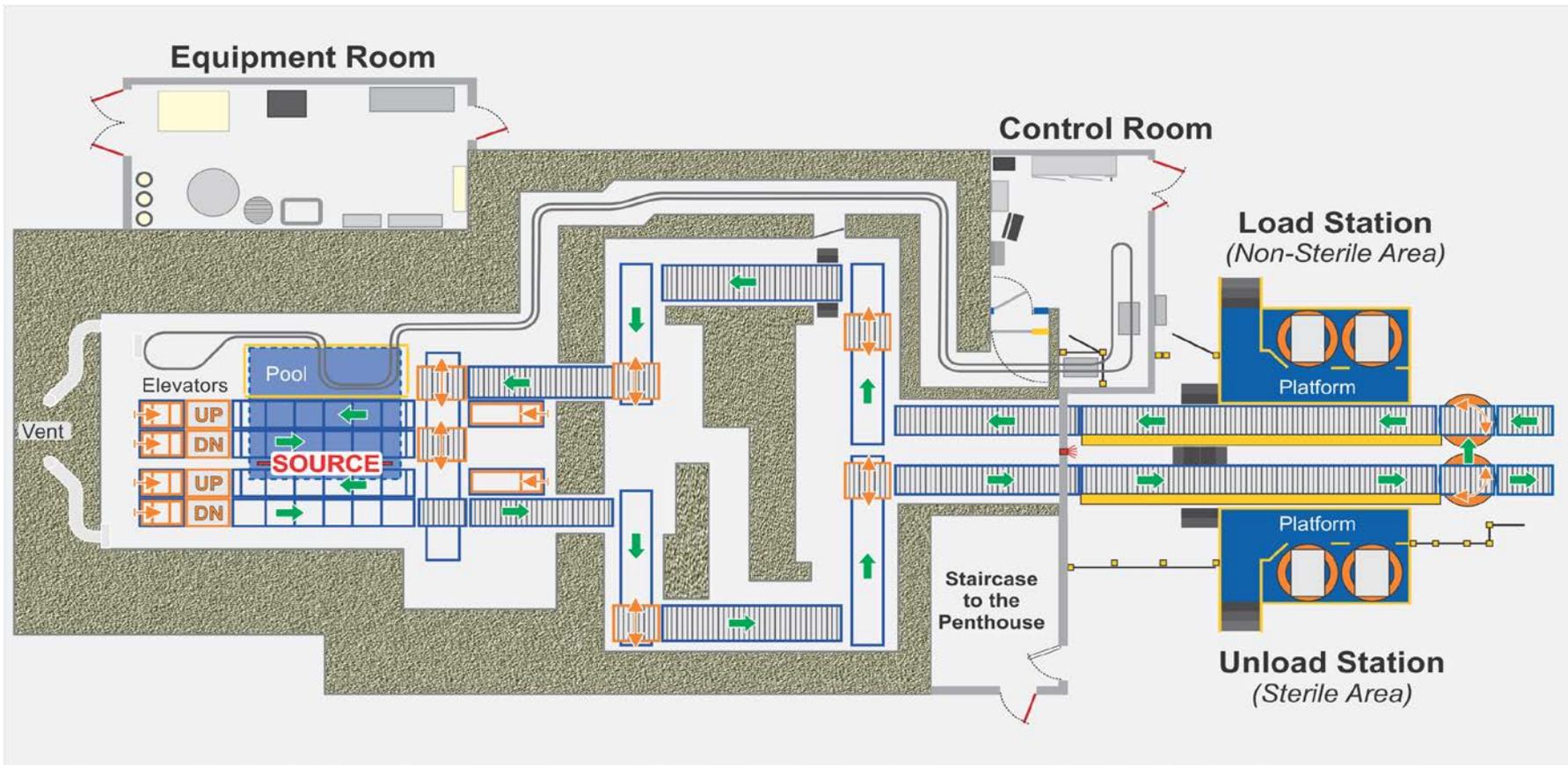


## Source rack

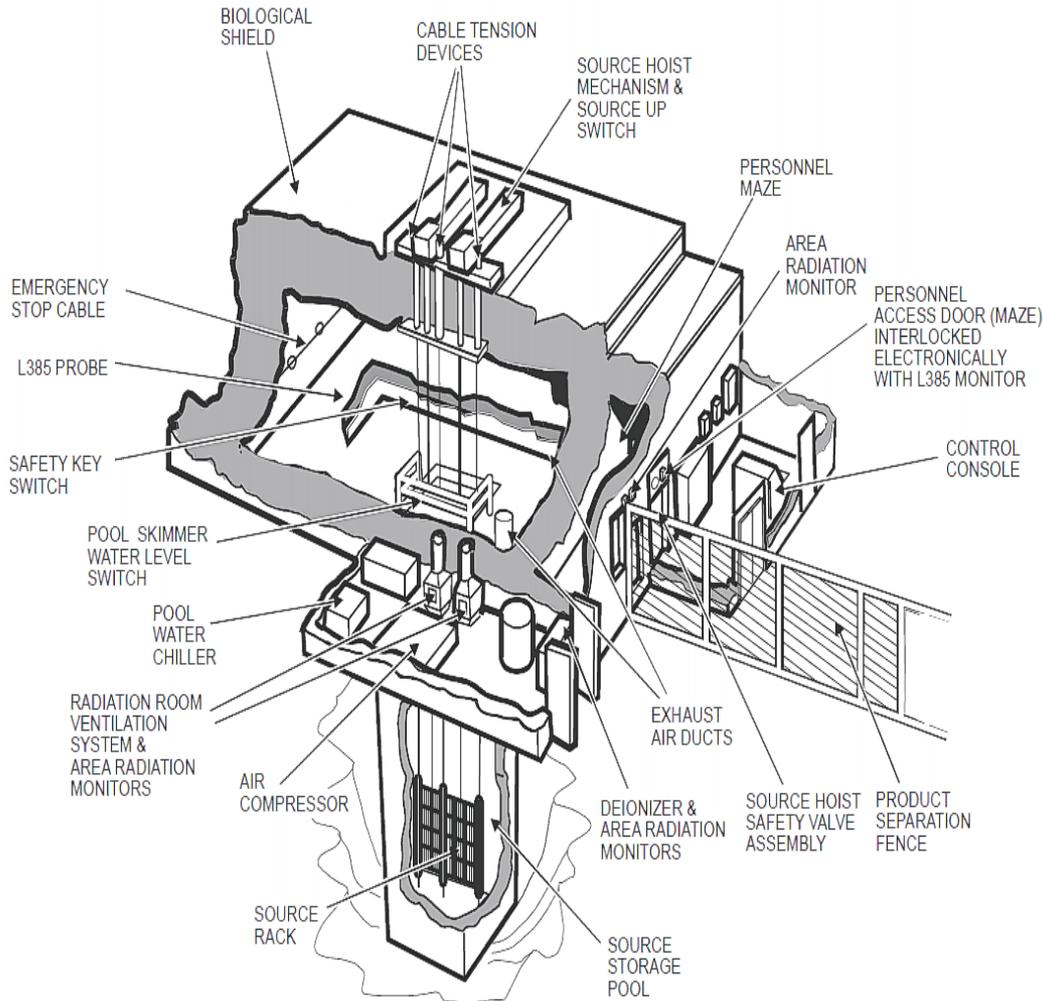


# Gamma: Simple and Reliable Design

- 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.

## Cobalt Use

- Cobalt-60 is a **simple** and **highly reliable** radiation source that does not require high power or complex machinery to operate (**continuous, consistent, uniform**)

## Dose Delivery

- Gamma rays are **highly penetrating**, permitting easy and reliable use on **multiple types of product** and with **simple and accurate dose prediction**

## Product Size Flexibility

- Gamma has **many different well proven system designs** to handle product in smaller totes all the way up to full pallets giving wide product type flexibility

## Labour

- Due to simple design, gamma **does not require high level technical operators or maintenance personnel** unlike machine source systems

## Cost

- Most capital costs are in the building and conveyor. Many gamma systems have a **long life of over 30 years** with only **few upgrades required during the life for reliability**

# Economic and Experience Summary



<b>Attribute</b>	<b>Gamma</b>	<b>E-Beam</b>	<b>X-Ray</b>
Reliability	Excellent	< Gamma	< E-Beam
Maintenance / Spare Parts	Low costs	High Costs	Very High Costs
Equipment Complexity	Low	Moderate	High
Source Complexity	None	High	Very High
Penetration-High Density	Effective	Poor	Effective
Environmental Impact	Source Disposal (no impact) & minimal CO <sub>2</sub> emissions	High Energy Usage & High CO <sub>2</sub> emissions	High Energy Usage & High CO <sub>2</sub> emissions
Market Share	High	Low	Minimal

# 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 predicable 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 up keep for safety and support