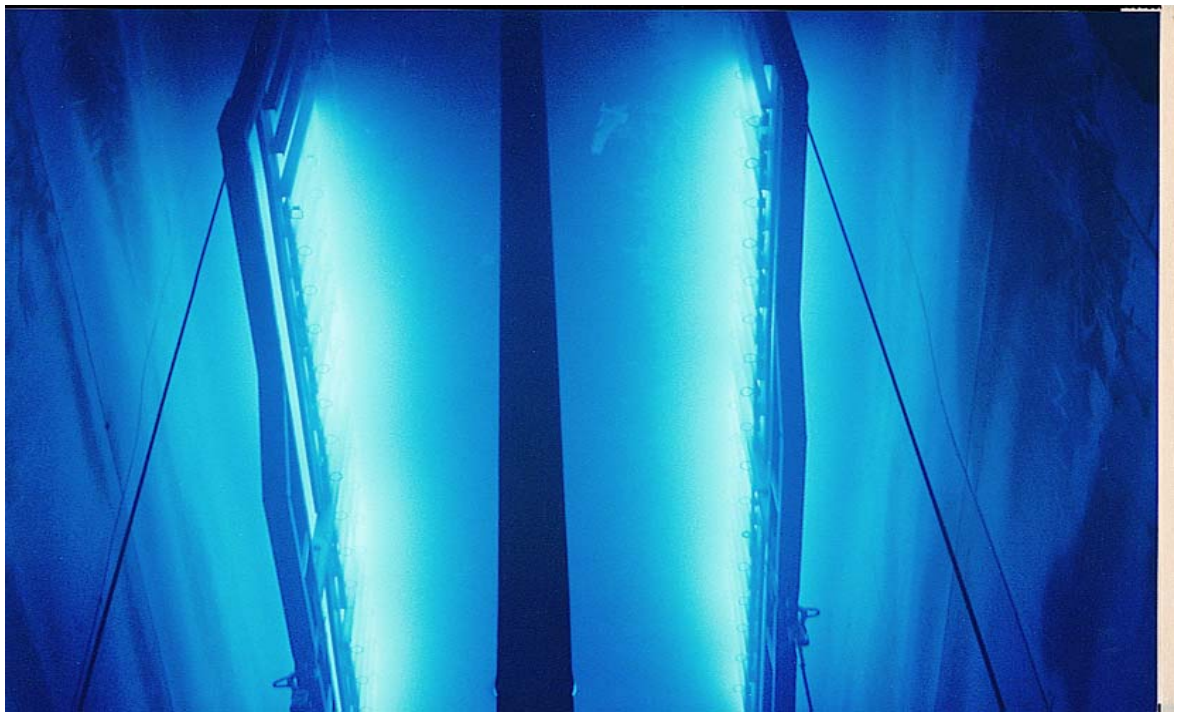
ASTA 2009
Annual Meeting and Trade Show
April 26-29, 2009
Loews Ventana Canyon Resort
Tucson, Arizona

# GAMMA PROCESSING

**Steve Markus, Director of National Accounts Food Safety**

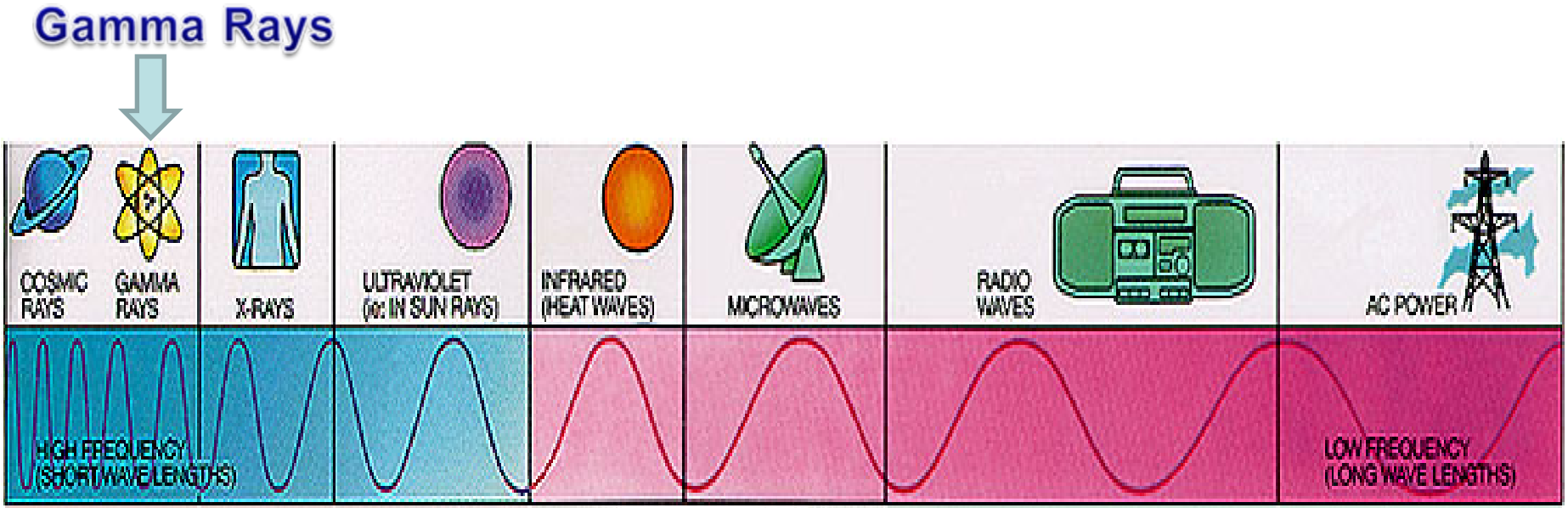


Sterigenics

# Irradiation Overview

- First irradiation of food patent, 1905
- Approved in over 42 countries
- FDA approved for spices in 1983
- Organizations approving food irradiation
  - American Medical Association
  - American Dietetic Association
  - American Council on Diet and Health
  - F.D.A.
  - U.S.D.A.
  - U.S. Public Health Service
  - Mayo Clinic
  - Center for Disease Control and Prevention
  - World Health Organization

# What is irradiation?



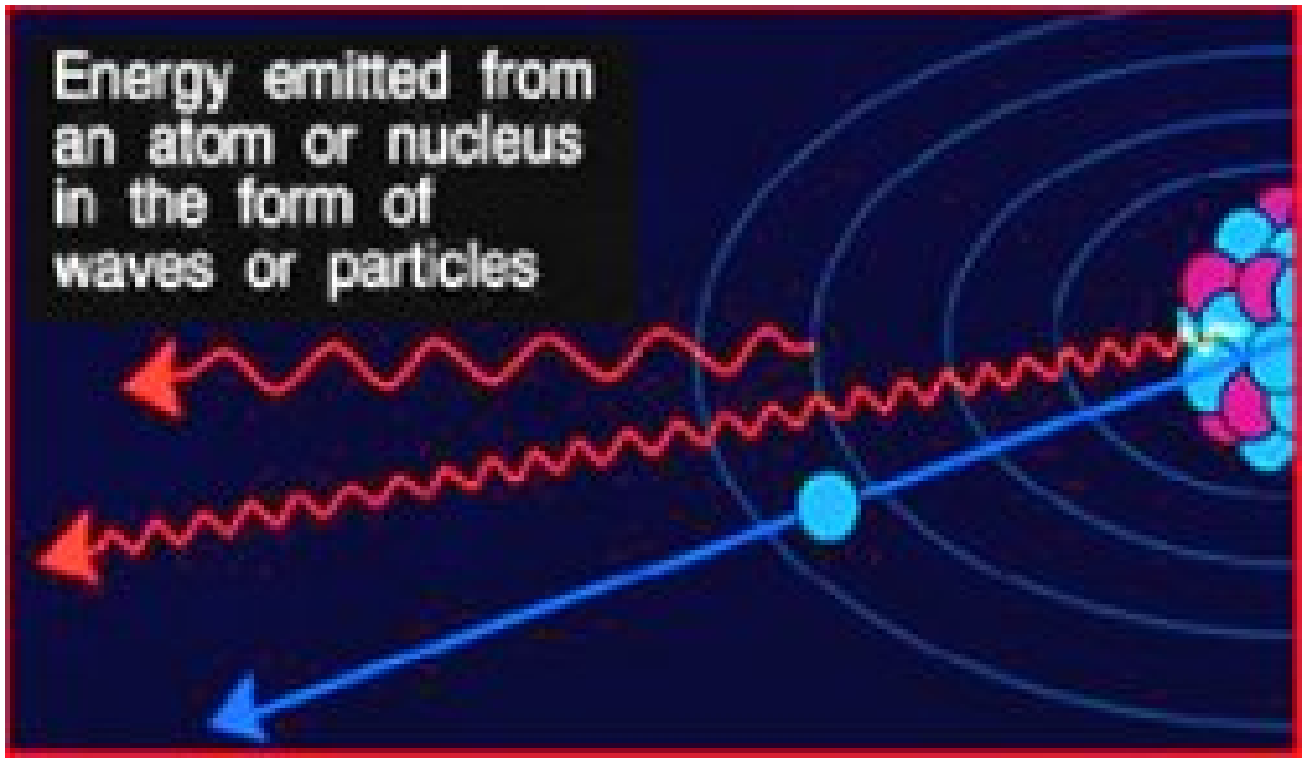

***High Frequency***

***Short Wavelengths***

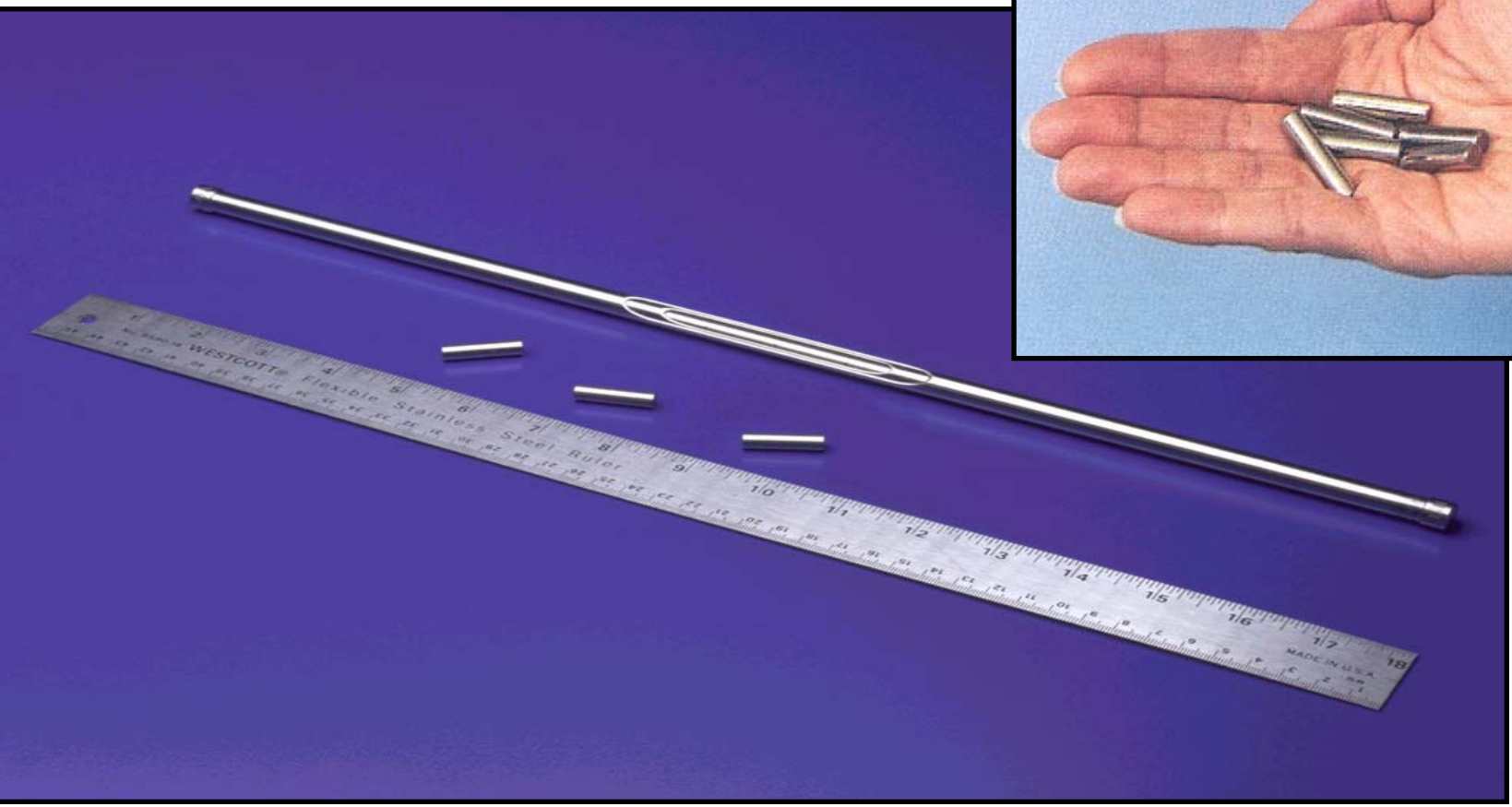
***Low Frequency***

***Long Wavelengths***

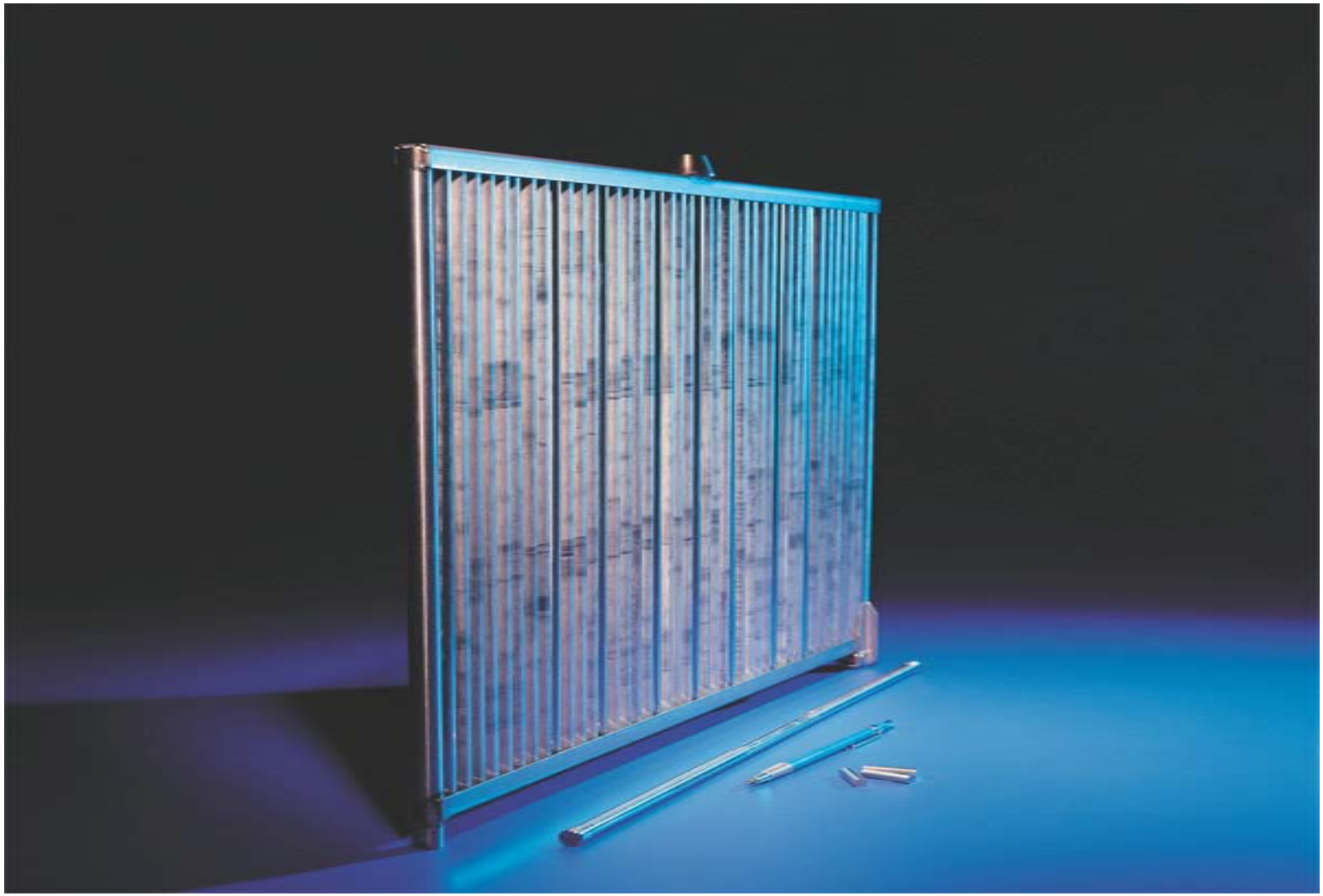
# Gamma rays=weightless packets of energy called "photons"



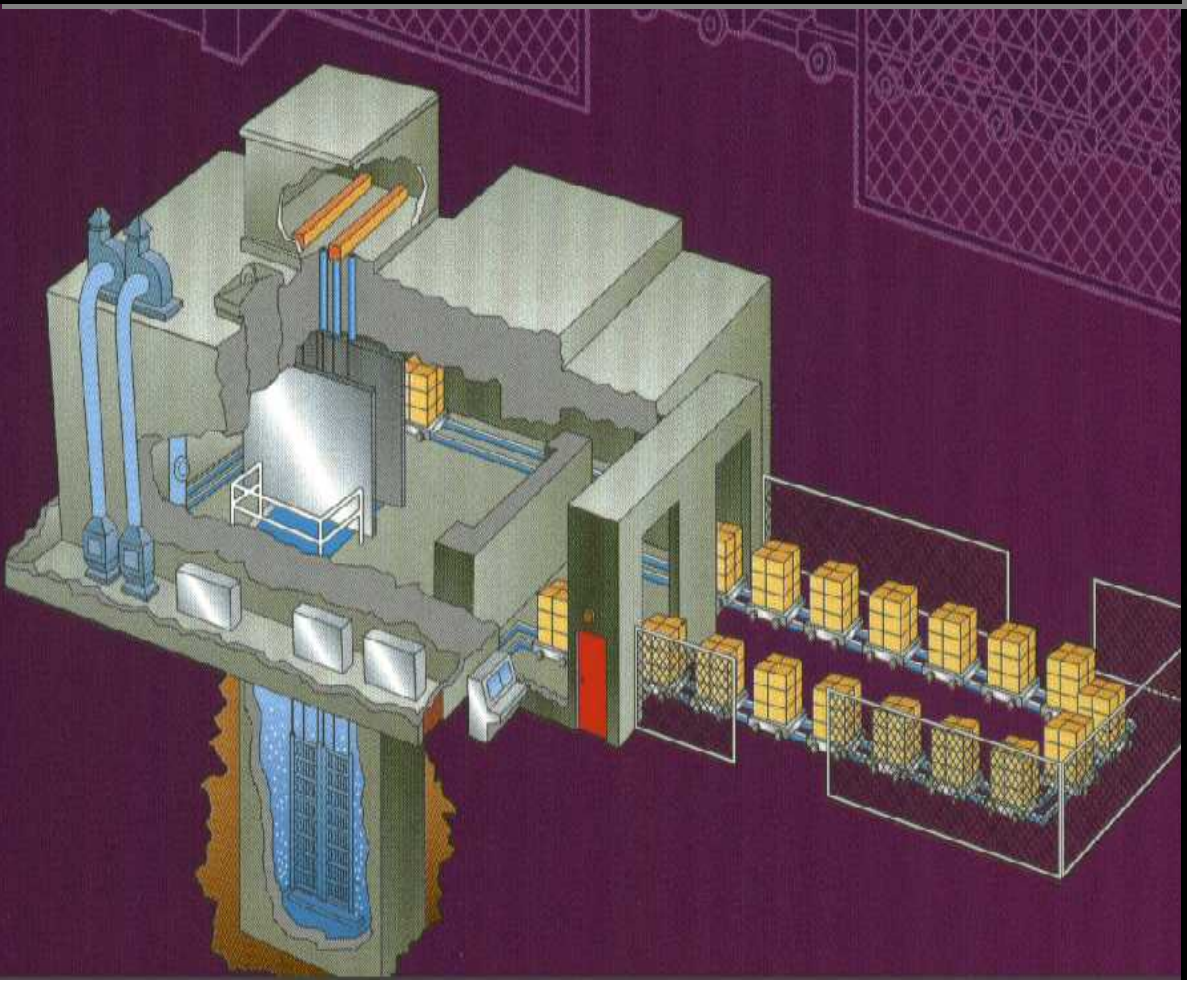
# Source of Co-60 GAMMA RAYS

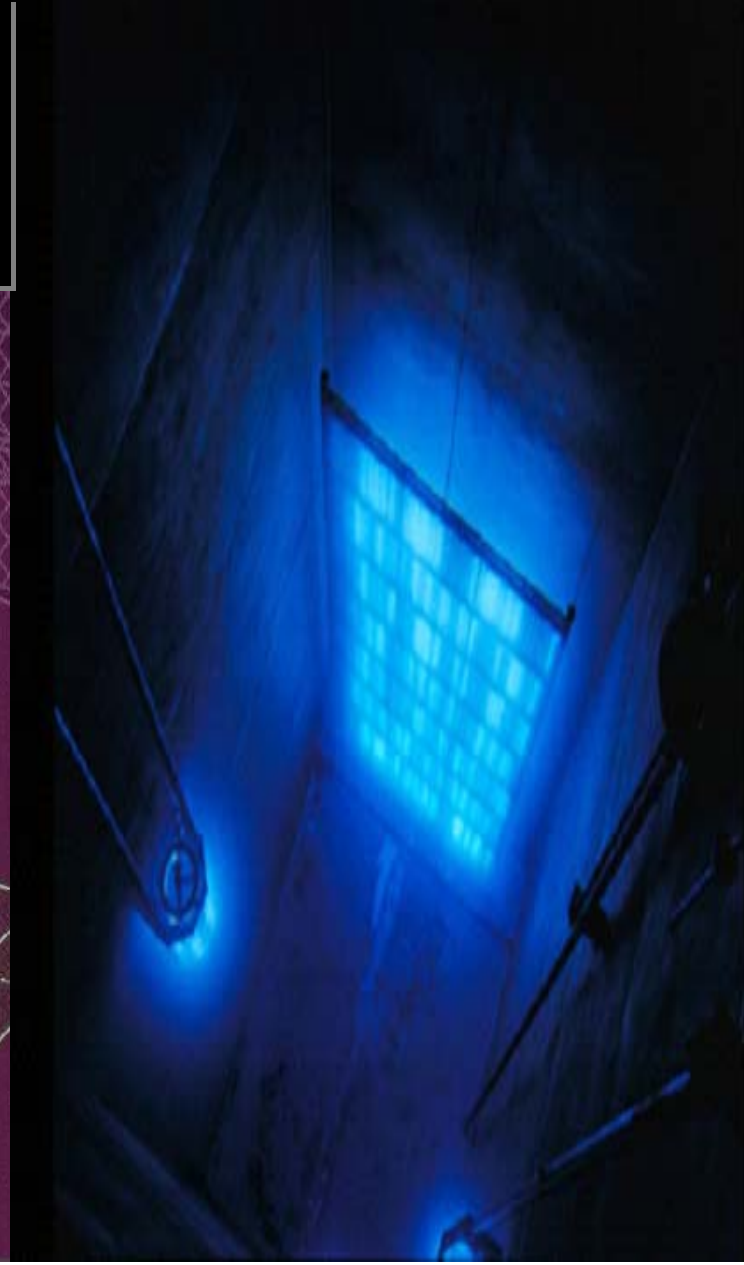


# Co-60 SOURCE RACK UNDER WATER



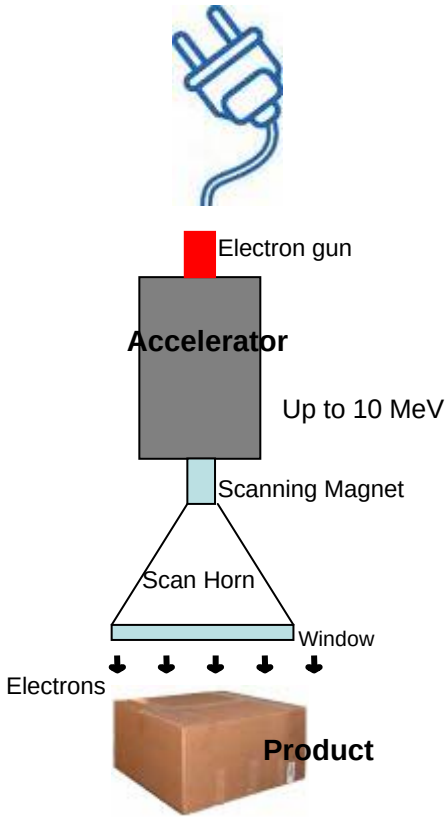
# Gamma Irradiation



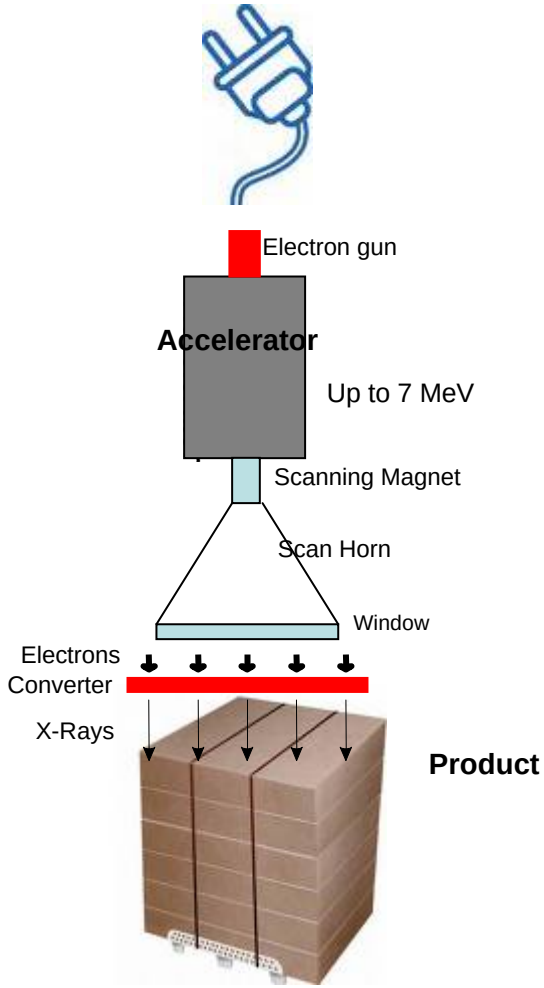


# E-Beam, X-Ray Irradiators

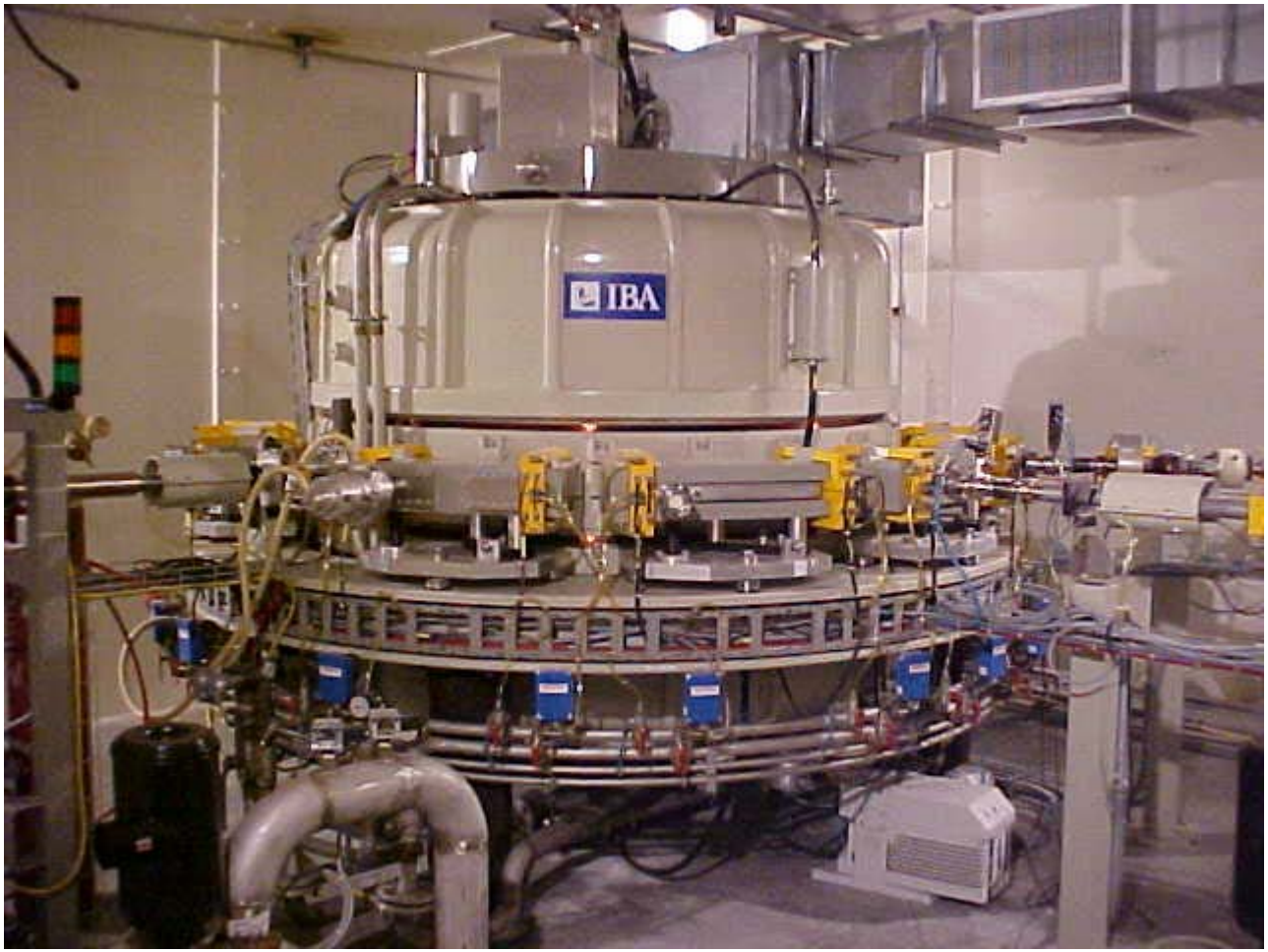
E-beam



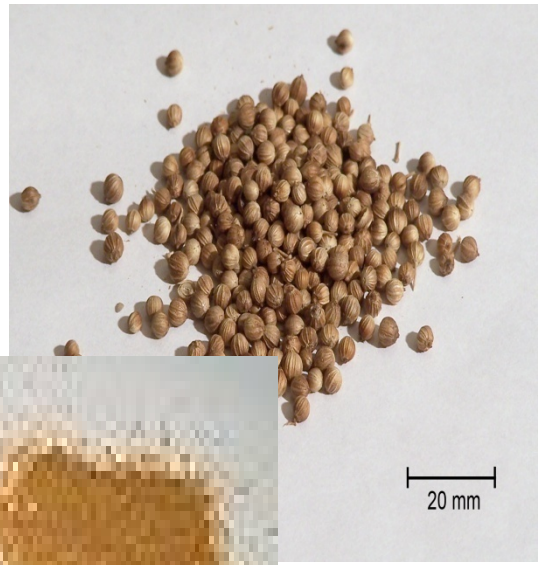

X-ray




# E-Beam/X-Ray

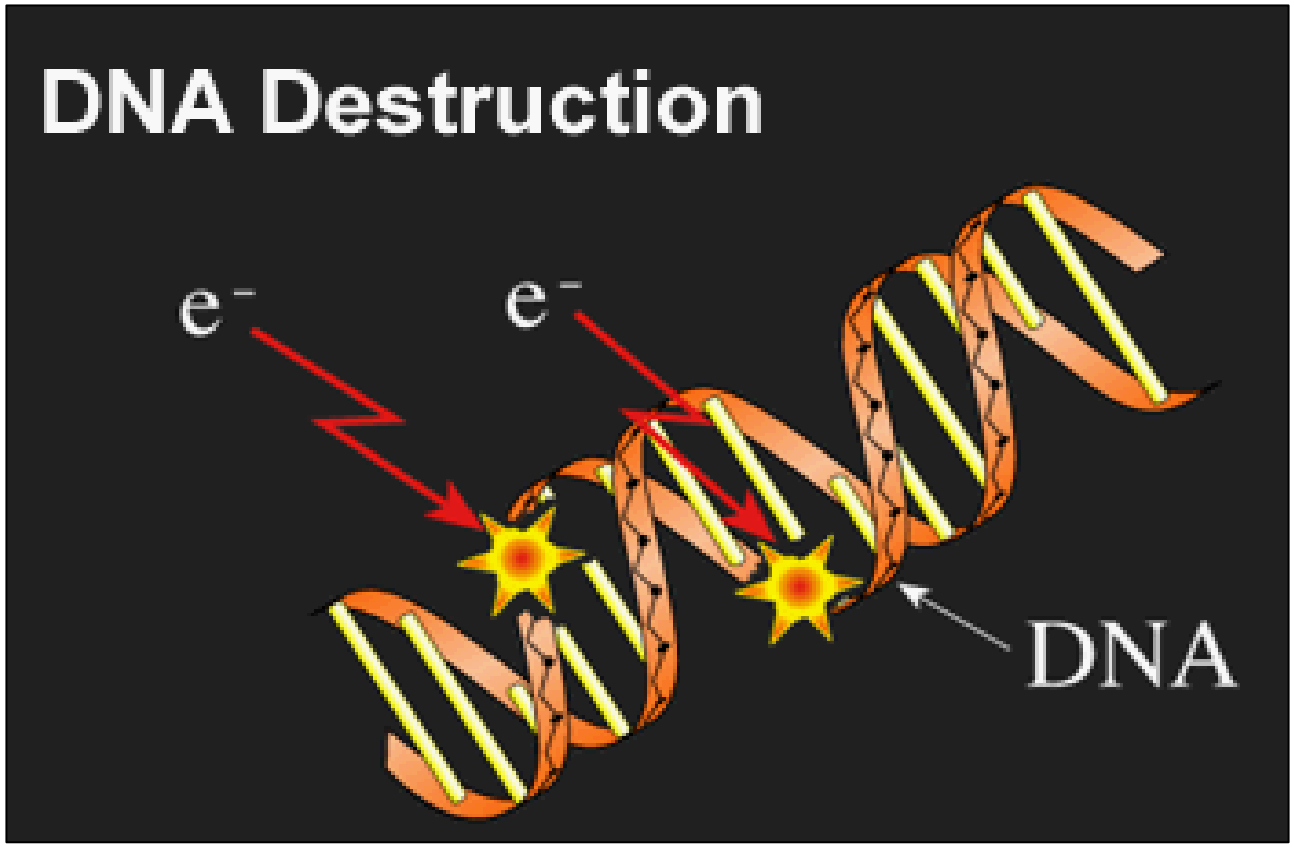


# Products Processed



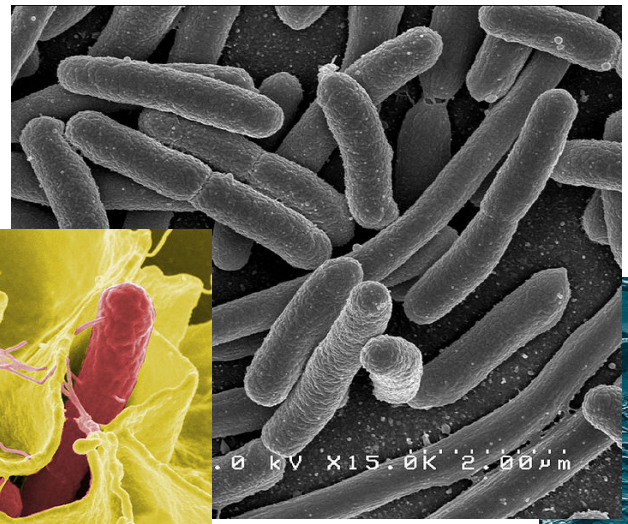

Irradiated food is not radioactive

# How Irradiation Works



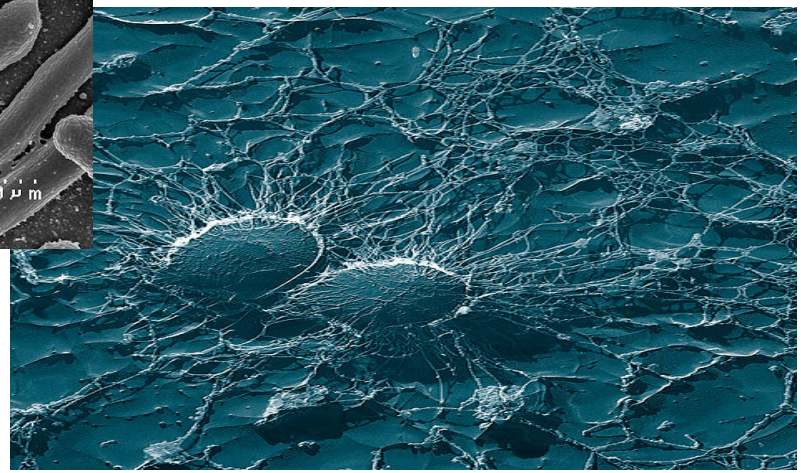
# Target Organisms

E. coli




Salmonella

Staphylococcus



# Gamma Microbial Effectiveness

- **D10 value**
  - **D10 = the amount of irradiation required to generate a 1-log reduction (measured in kGy)**
  - **Typical pathogens**
- **Expected microbial reduction**
  - **Typical spice dose range is 5 to 30 kGy**
  - **Typical microbial reduction target = 5-log or greater**
- **No residues**

# Effectiveness of Gamma

- Typical D10 values (Irradiation exposure for 1-log reduction
  - E. Coli .2 to .44 kGy
  - Salmonella .25 to .50 kGy
  - Staphylococcus .25 to .60 kGy
- Typical dose range achieves 5-log reduction
  - 5.0 to 30.0 kGy

# Yeast/Mold Doses

- Yeasts
  - ›10 kGy
- Molds
  - ›6 kGy

# Physical Impact

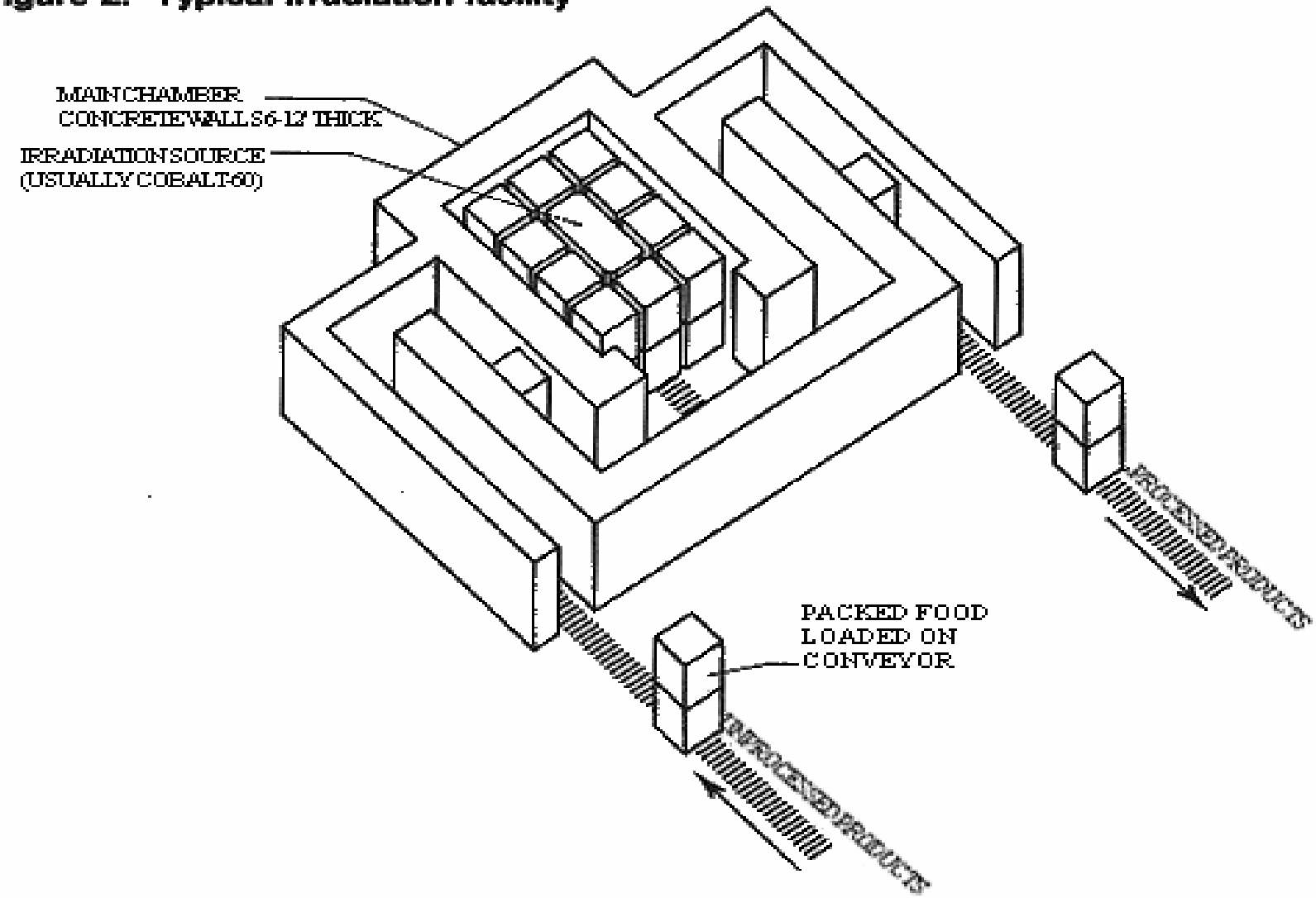
- Surface color
  - High dose exposure may have color implications to:
    - Garlic

    - Onion

# Operational Issues

- Energy Source
  - Constant
- Density
  - Cycle Times
- Dose Range
  - Log Reduction
- Dose mapping
  - Dose Range
- Min. Runs
  - Efficiencies

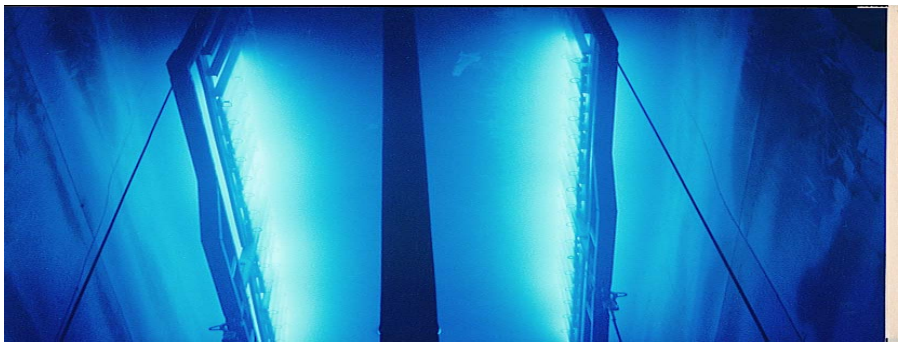
**Figure 2. Typical irradiation facility**




**Source: Radiation Technology, Inc., Rockaway, NJ. Adapted FDA Consumer, July/August 1986, p. 14-15.**

# Costs

- Cobalt-60/Sole Sourced



- Canadian Currency

# Summary

- Irradiation has been thoroughly tested
- Approved by several agencies and countries
- The process is clean, non-evasive, & no residues
- Tested dose ranges provide predictable microbial reductions