

**Success Stories of Radiation Processing  
For Food Irradiation, Gemstone Coloration  
And Medical Product Sterilization in Thailand**

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**Thailand Institute of Nuclear Technology**

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**For Nuclear Energy in Asia. March 19 – 20, 2014 Fukui, JAPAN**

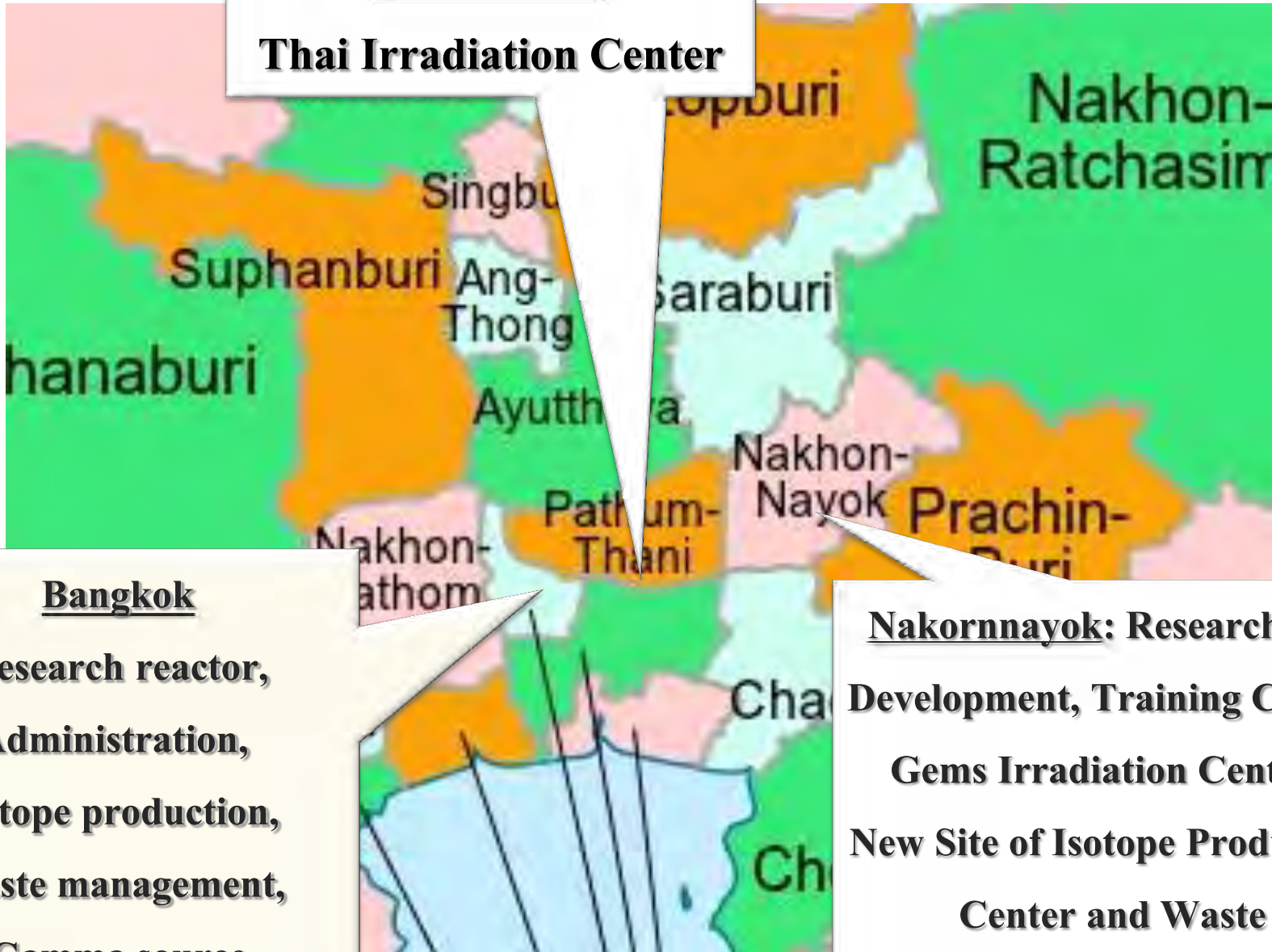
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2. Gems Irradiation Center (GIC)
3. Private Sectors

**Pathumtani**  
**Thai Irradiation Center**

**Bangkok**  
**Research reactor,**  
**Administration,**  
**Isotope production,**  
**Waste management,**  
**Gamma source**

**Nakornnayok:** **Research and**  
**Development, Training Center,**  
**Gems Irradiation Center,**  
**New Site of Isotope Production**  
**Center and Waste**  
**Management Center**



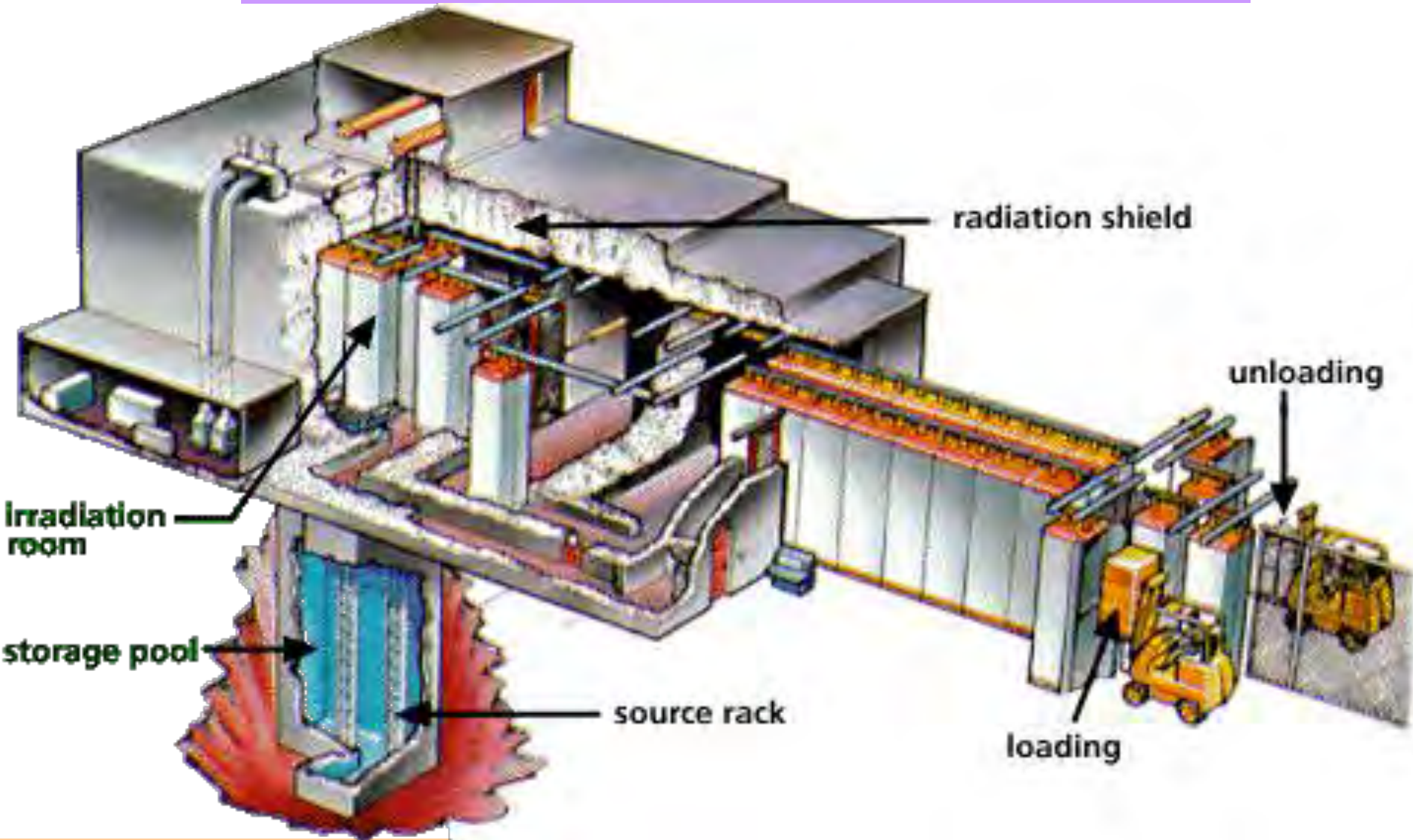
# Thai Irradiation Center



# Thai Irradiation Center

- **Operated on 17 Aug 1989**
- **The first gamma irradiation industrial-scale in Thailand.**
- **The government of Canada assisted for the Gamma- Irradiator of 450,000 Curies.**
- **Thai government was responsible for site preparation, construction of the plant and associated facilities.**

# TIC FACILITY



**The Multipurpose Irradiator JS 8900**

# Irradiated Product at TIC

- Fresh Fruit



(Mangosteen, Mango, Rambutan, Lychee, Longan and Pineapple)

- Herbs and Spices



- Frozen Product



- Medical devices (Gloves, Pipette, Petri Dish)

- Animal feed

- Food



# **The purpose food and non- food product irradiated at TIC**

**Sprouting inhibition**

**Insect control and disinfestation**

**Pathogenic microorganism control**

**Reduction of pathogenic microorganism**

**Sterilization and reduction of microorganism in  
medical products**





# Operation Process

## 1. Incoming products

will be checked :

- product packaging
- weight and check all amount of products
- labeling



# Operation Process



**2. Put the dosimeters  
on minimum and  
maximum positions**

# Dosimetry system

## Available dosimeters at TIC.

<b>Types of dosimeter</b>	<b>Absorbed dose Range (kGy)</b>	<b><math>\lambda</math> (nm.)</b>	<b>Equipment</b>
RED PERSPEX4034	5-50	640	UV/VIS spectrophotometer
GAMMACHROME YR	0.1-3	530	UV/VIS spectrophotometer
NYLON THIN FILM FWT-60-00	1-50	605	UV/VIS spectrophotometer
OPTI-CHROMIC FWT-70-40 M	0.01-1	600,656	OPTI-CHROMIC Reader
OPTI-CHROMIC FWT-70-83 M	0.1-10	600,656	OPTI-CHROMIC Reader

# Dosimeters



# Achievements of TIC

- ISO 9001:2008  
accredited on  
March 2009 by UKAS



# Achievements of TIC

- USDA Certified for Fresh Fruit Irradiation to USA (Oct 2007)

**USDA**  
United States  
Department of  
Agriculture  
  
Animal and  
Plant Health  
Inspection  
Service  
  
Plant Protection  
and Quarantine

**Certificate of Approval**

for Irradiation  
Type of Facility

This treatment facility and associated equipment have been examined and found acceptable for use in the treatment of articles regulated under the provisions of quarantines and regulations administered by Plant Protection and Quarantine.

Thai Irradiation Center (Treatment Facility Code = 1002) Pravit Keawchoung  
Name of Facility Operator

37 Moo 3 Technopolis, Klong 5, Klong Luang, Pathumthani, Thailand 12120  
Location

Conditions of Approval:

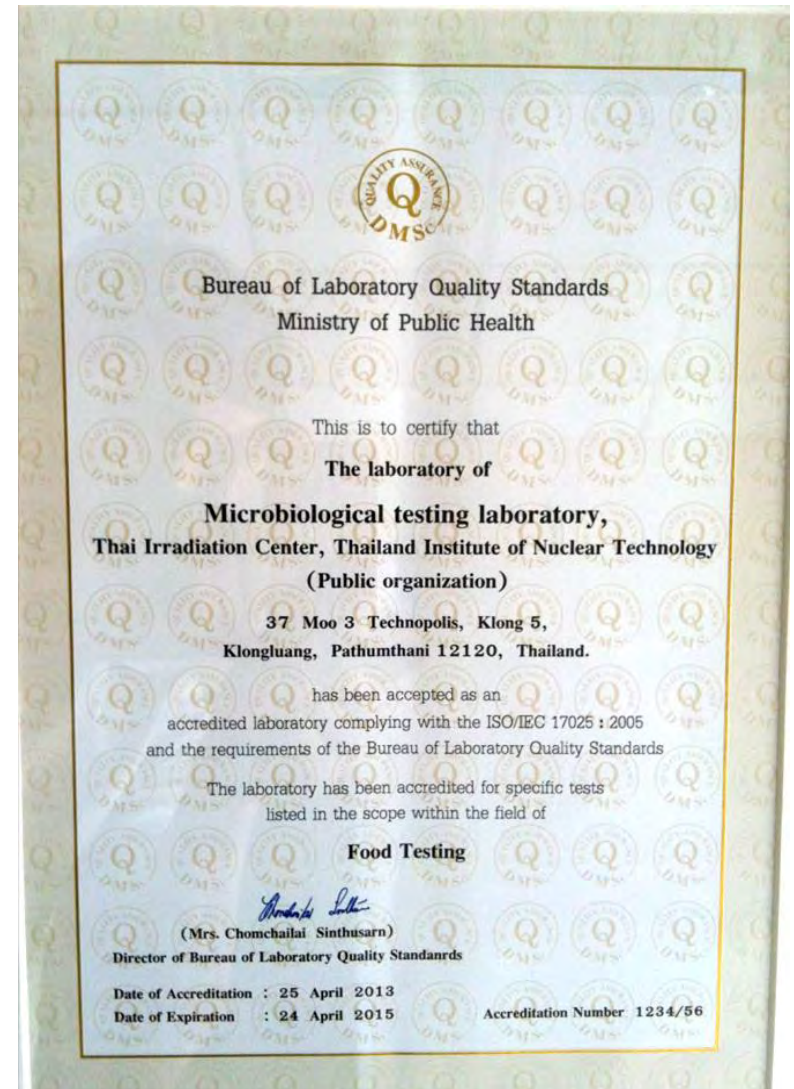
- 1) The facility must operate under the conditions in the Operational Workplan and the Compliance Agreement.
- 2) Treatments must follow approved process configurations.
- 3) See Operational Workplan for conditions under which recertification is required.

10/26/2007 Ian Winborne None  
Date Approved Certifying Official Expiration Date

Ian Winborne  
Pest Exclusion Specialist  
Title

# Achievements of TIC

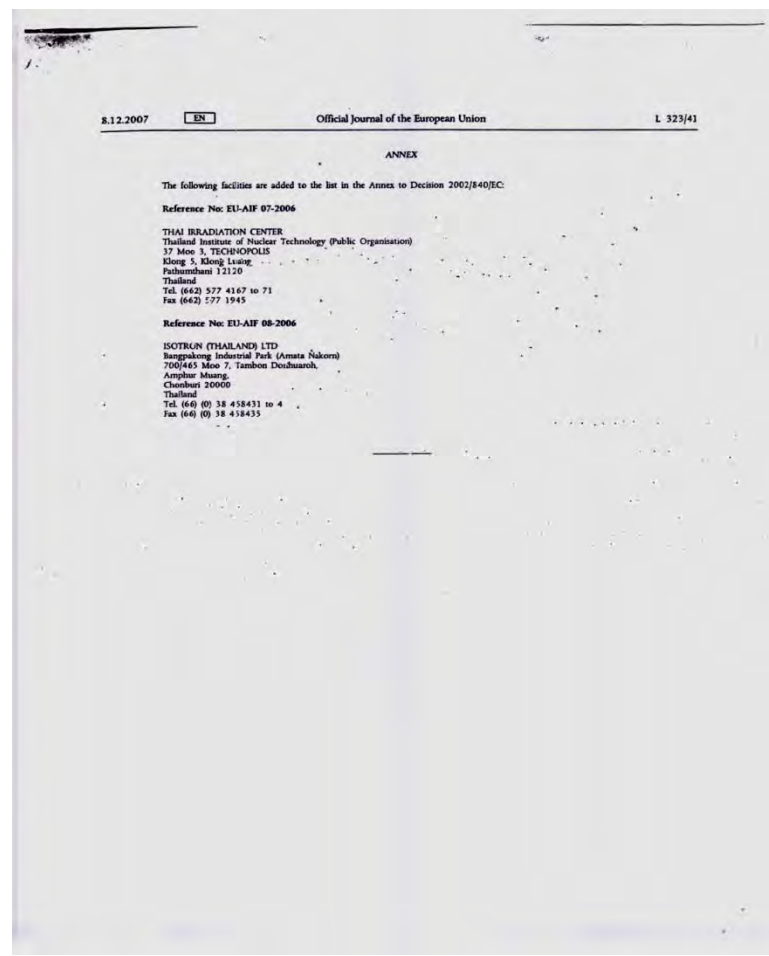
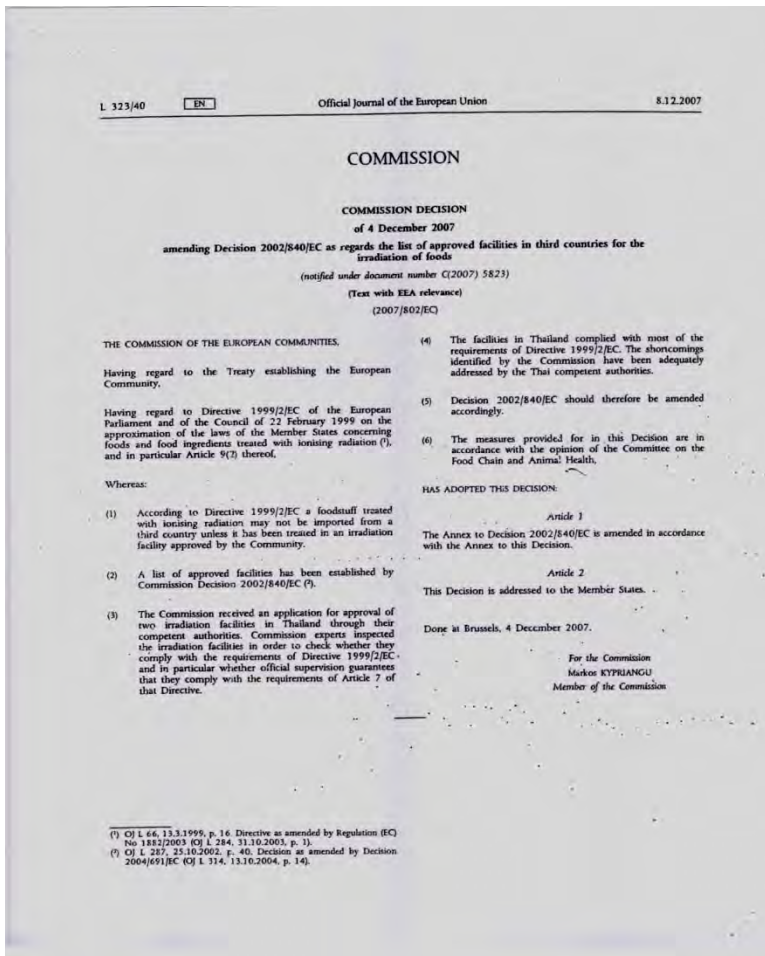
- ISO/IEC 17025:2005  
Microbiological testing laboratory  
accredited on April 2013 by  
Bureau of Laboratory Quality  
Standards Ministry of Public Health





# Achievements of TIC

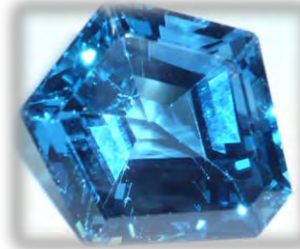
- EU Certified for Spices Irradiation on December 2007





# IRRADIATED FOODS





**HTG**  
GEMS IRRADIATION CENTER



**Thailand Institute of Nuclear Technology**

# A high energy electron accelerator 20 MeV 10 kW

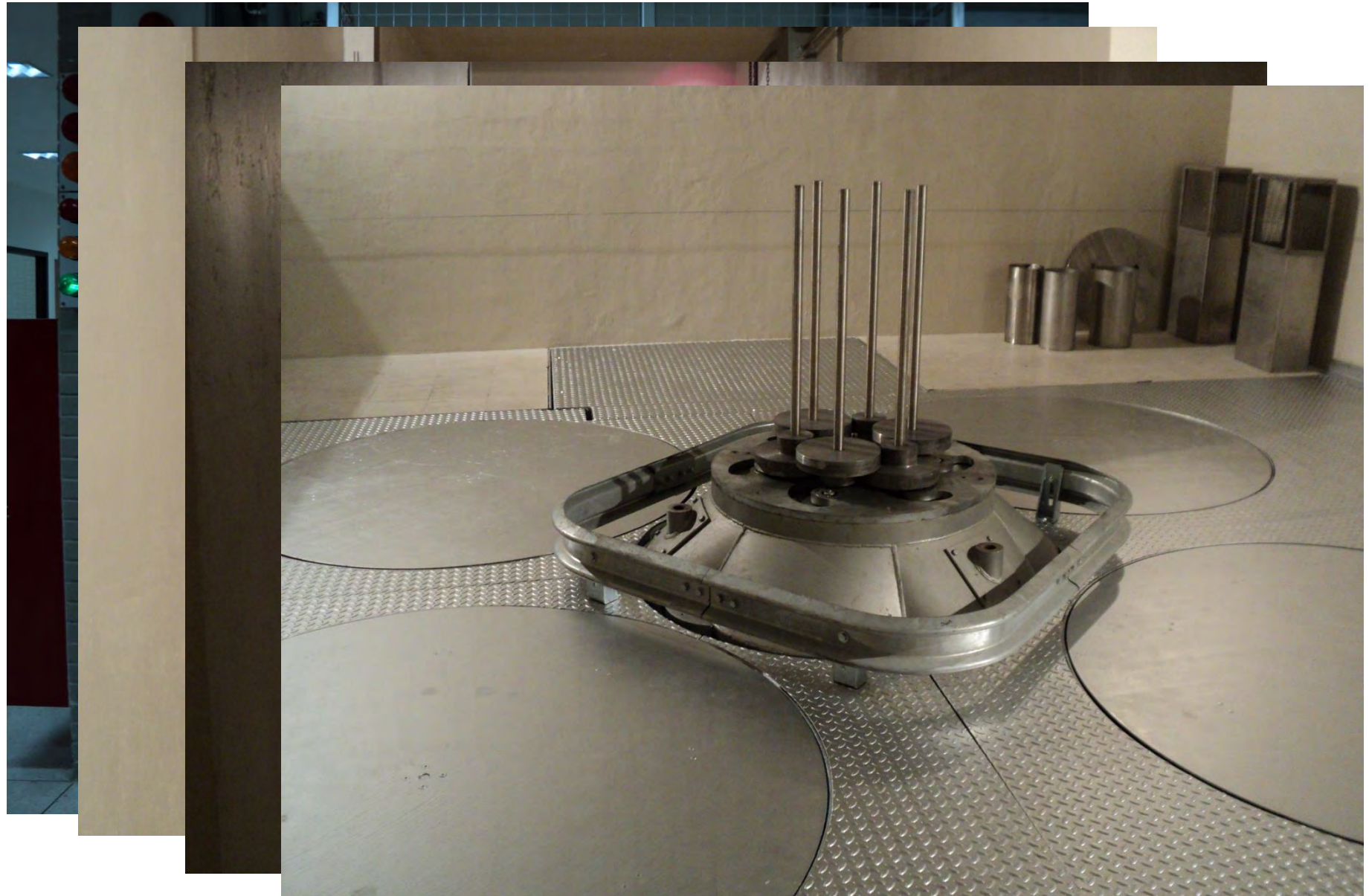


# Gamma Irradiator Properties

## PROPERTIES OF GAMMA IRRADIATOR

Isotope	Cobalt-60
Activity	70 kCi
Category	Type II (ANS N43.10.) Panoramic, dry source storage
Biological Shielding	1.88 m thick concrete
Control	Full computer & PLC controlled
Maximum Gamma Dose Rate	20 kGy/h
Maximum Gems Carrier capacity	0.25 m <sup>3</sup>
Maker	Power Plus System Ltd., UK.

# GAMMA IRRADIATOR

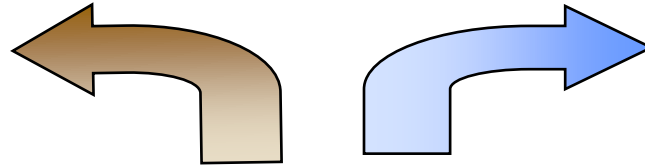


# Gems Enhancement by Radiation Treatment



**BROWN TOPAZ**  
40 THB/Carat

Gamma Radiation    Electron Radiation



**SKY BLUE TOPAZ**  
50-80 THB/Carat

Neutron Radiation



**White Topaz**  
20 THB/Carat



**SWISS BLUE TOPAZ**  
150 – 200 THB/Carat



**LONDON BLUE TOPAZ**  
100 THB/Carat

Electron Radiation



## Tourmaline Change by Gamma Radiation



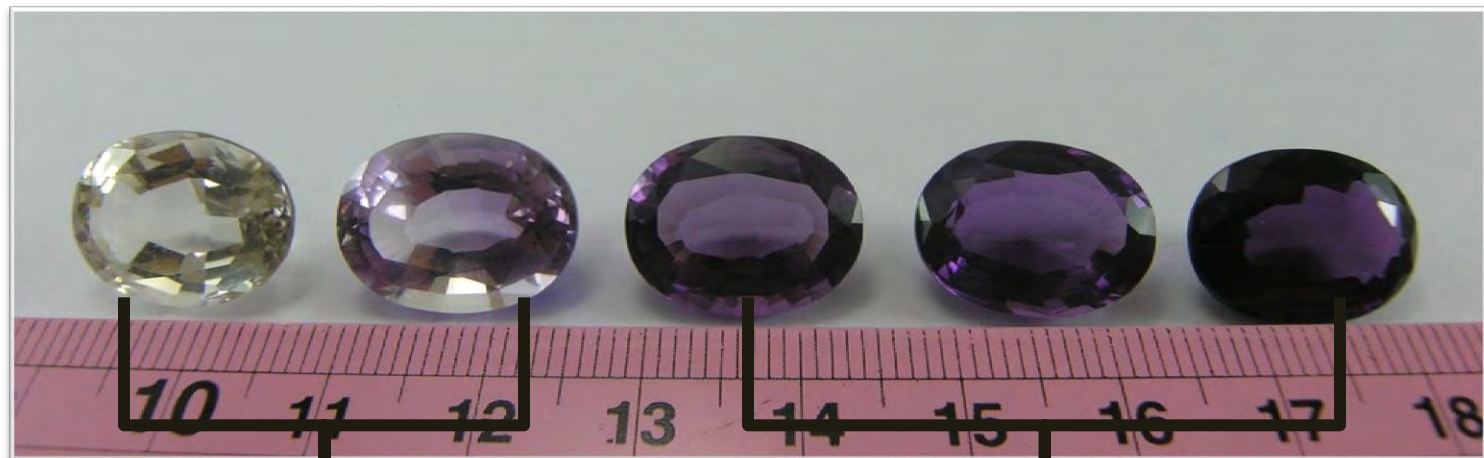
**Before**



**After**



## Quartz enhancement by Gamma Radiation



**Before**

**After**

## Topaz enhancement by Gamma Radiation



**Before**



**After**

## Kunzite enhancement by Gamma Radiation



**Before**



**After**

## Pearl enhancement by Gamma Radiation



**Before**



**After**

## Phenite enhancement by Gamma Radiation



**Before**



**After**

## *Topaz Enhancement by Neutron and Electron Radiation*



## Kunzite Enhancement by Electron Radiation



**Before**



**After**

# Private Sectors

Company Name	Radiation	Product
Steriginics	Gamma, EB	Gems, Medical Products
Synergy Health	Gamma	Medical Products, Food, Fresh Fruit, Others
Kendall Gammatron	Ethylene Dioxide	Medical
Siam Steri Service (Japan)	Gamma, Ethylene Dioxide	Medical
Nippo (Japan)	Gamma	Medical (Specific Brand)
Thai Irradiation Center	Gamma	Food, Fresh Fruit, Agricultural, Medical, Others
Gems Irradiation Center	Gamma, EB	Gems, Others







**THANK YOU**

**[www.tint.or.th](http://www.tint.or.th)**

