



VIENNA CENTER FOR DISARMAMENT AND NON-PROLIFERATION

VCDNP WORKSHOP ON INDUSTRIAL APPLICATIONS ON 12 MAY

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USING OF GAMMA RADIATION IN INDUSTRIAL APPLICATIONS IN JORDAN



- As medical industry in Jordan grow significantly and became one of the most exporters in the region, a need rose for new safe and reliable sterilization technology without using Ethylene Oxide.
- And that urged to introduce large scale Co-60 gamma irradiator,
- and it was presented by the IAEA support to Jordan through a TC project.
- Hungarian company, Institute of Isotopes supplied the industrial gamma irradiator.
- This was set in operation at the beginning of 2000.
- and that improve the health care level on the national scale and raise the level of competitiveness of exported Jordanian goods all over the world



IRRADIATED PRODUCTS



Product type	Dose (K Gy)
Health care products	
Empty eye droppers <i>ETO residuals will combine with medicine</i>	25
Blood line (Kidney washing) <i>Kidney patients are sensitive to ETO residuals</i>	15
Petri dishes, blood collection tubes	4
Empty gelatin capsules	3.5
Pharmaceutical products	
Herbs (pharmaceuticals)	5-10
Veterinary products (Avinizine, and try-ban injections)	3.5
Food	
Herbs, spices and nuts (raw and finished products	2-10
Cosmetic products	
Dead sea mud	5-15

COVID-19 PANDEMIC



- During covid-19 pandemic it wasn't possible to import health care products due to health closing restrictions, this challenge promote the national companies to fabricate these products and sterilize it in JAEC gamma irradiation center like:
- Surgical gowns
- Cryo tube vials for covid-19 test / RNA separation
- Blood collection tubes all sizes/types
- Viral transport swab and their tubes



EMPTY EYE DROPPERS

- Arab Medical Containers /hikma Company, started producing empty eye droppers in 2006.
- empty eye droppers should be sterile, the best sterilization method is by gamma irradiation .
- hikma company covers 50% of Jordan's market and has plans to expand its export of empty eye droppers.
- hikma has a need to sustain the technology, and JAEC need money to buy Co-60 sources.
- So hikma becomes our Financing partner. In a way :
 - i. The price of the sources is paid by hikma, and the source will be owned by JAEC.
 - ii. hikma will take back the money as Irradiation Services on an economical basis



SECURITY AND SAFETY MEASURES

- **Security** : The gamma irradiator facility adheres to the highest standards of Nuclear Security complying with the national laws of EMRC and international best practices. There is different security measures applied:
 - I. Outside the building: Walls, fence, road blocker, and cameras
 - II. Access into the building is controlled by personal cards and password
 - III. Access into sensitive areas is controlled by Vein imprint, such areas are guarded by cameras, cages, different kinds of locks, motion sensors, and radiation monitors(detect stealing)
- **Safety**: radiation monitoring system to assure safety of workers and workplace. Besides radiation surveillance (TLD = personal dosimeter)

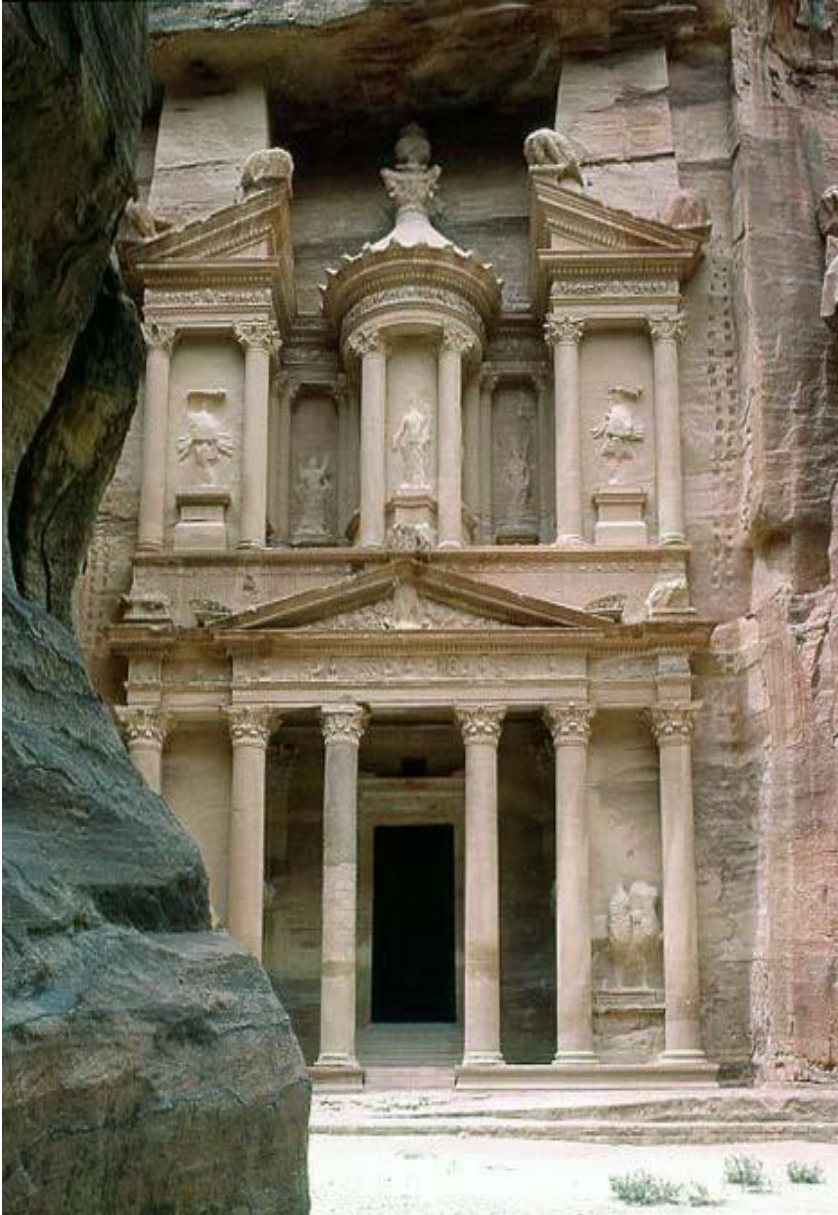


WHAT ARE THE CHALLENGES

- Scarcity of Co-60 sources
- Increasing prices of Co-60 sources
- Transportation complication to the unstable area; the Middle East:
 - No land and sometimes no sea transport only by plane
- High measures safety & security of transporting Co-60 sources. Changeability of international safety and security regulations for environmental reasons.
- Money transfer and LC opening
banks become afraid of such dangerous goods
- Global terrorism



JORDAN



**Thank you
for listening**