

G RADIATION SAFETY AND SECURITY PRECAUTIONS AND MEASURES AT FACILITIES

- ✓ Use approved equipment
- ✓ Follow approved operating procedures
- ✓ Use radiation monitoring devices
- ✓ Conduct risk assessments
- ✓ Establish controlled areas
- ✓ Display warning signs
- ✓ Maintain emergency arrangements
- ✓ Report incidents involving radiation sources

H ADVICE TO THE GENERAL PUBLIC

- ◆ Avoid entering marked industrial radiography areas
- ◆ Follow instructions from radiography teams
- ◆ Report suspicious radioactive sources or activities
- ◆ Never handle unknown radiation equipment



Fig 5: An AEC inspector conducting an Industrial radiography Inspection at a facility.



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ATOMIC ENERGY COUNCIL



INDUSTRIAL RADIOGRAPHY PRACTICES

Providing for the safety and security of society and environment from the dangers of ionizing radiation

A: INDUSTRIAL RADIOGRAPHY

Industrial radiography is a non-destructive testing technique that uses ionizing radiation to examine the internal structure and integrity of materials. It is a method of inspecting materials to see hidden flaws by using the ability of X-rays, gamma rays and neutrons to penetrate various materials.

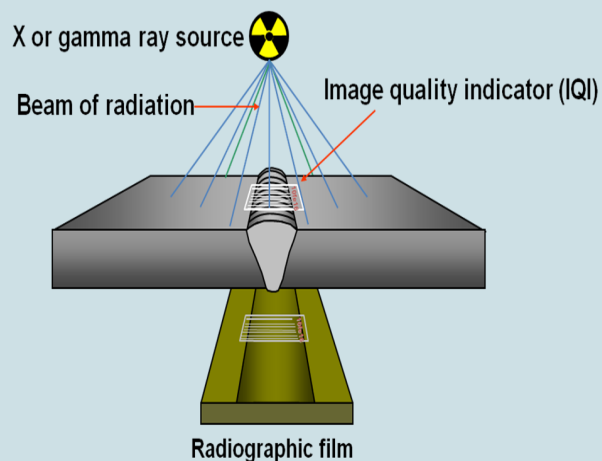


Fig 1: Illustration of the operation of industrial Radiography device

B. TYPES OF EXPOSURE DEVICES

There are different radiation methods of applying Industrial Radiography. These include;

- the use of Radioactive sources (Iridium 192, Selenium 75) or
- X-ray equipment (panoramic, directional) and
- other non destructive testing methods that include visual, ultra-sonic, penetrant and acoustic emissions.

The devices/equipment of regulatory concern are those that emit ionizing radiation which may be harmful to the people and the environment if not well managed.

Some of the exposure devices are shown in figures 2, 3 and 4



Fig 2: Industrial Radiographic X-ray Flaw detector



Fig 3: Industrial Radiographic X-ray Crawler machines



Fig 4: Iridium-192 Gamma Camera Industrial Radiographic Device

C. BENEFITS OF INDUSTRIAL RADIOGRAPHY

The benefits of Industrial Radiography technique include;

- Being used as a tool for quality control and safety reliability.
- Allows for inspection of material and components without causing any damage.
- It can be used when it is difficult or impossible to access the material.
- Versatility of techniques such as X-ray and gamma radiography to suite various inspection needs and materials.
- Some industrial Radiography techniques provide real time imaging for faster analysis and decision making.

D. POSSIBLE HEALTH EFFECTS OF RADIATION EXPOSURE

While industrial radiography provides important benefits, improper handling of radiation sources and failure to follow safety procedures can result in harmful health effects. Therefore, radiation exposure to workers and the public must always be kept as low as reasonably achievable.

High radiation doses can cause immediate health effects, known as deterministic effects, such as tissue damage, when exposure exceeds a certain threshold. Since industrial radiography sources can deliver high doses, strict adherence to approved procedures is essential.

Lower levels of radiation exposure may still carry a risk of long-term effects, known as stochastic effects, such as radiation-induced cancer. The likelihood of these effects increases with the amount of radiation received, making dose reduction and effective radiation protection measures critical.

Due to the potential for high radiation doses and the history of radiation-related incidents in industrial radiography, the practice requires strong regulatory oversight, proper training, and strict safety controls.

E. REGULATORY FRAMEWORK

Atomic Energy Council (AEC) is a corporate body empowered through an Act of Parliament, the Atomic Energy Act Cap. 154 (AEA) to ensure peaceful use of ionizing radiation in Uganda for the protection and safety of the public and the environment from the dangers resulting from ionizing radiation.

Additionally, the Atomic Energy Regulations, 2012 were developed to ensure safety of the Industrial Radiography practices in Uganda. AEC also developed the Atomic Energy (Security of Radioactive Materials), 2021 to ensure that such IR devices are not accessed and used for malicious acts by adversaries.

F. REQUIREMENTS FOR ESTABLISHING INDUSTRIAL RADIOGRAPHY PRACTICES

- Notification of practice (fill form 1A)
- Apply for import (form 4), transport (form 8) and authorization to possess and use (form 2A)

Note: Transport permits are issued for radioactive sources only

- Document and implement a radiation safety programme
- Adequate security arrangements where radioactive sources are to be stored and used.

Attachments to applications

- Safety assessment report
- Source certificate (radioactive sources only)
- Letter of return agreement (for radioactive sources only)
- Transport security plan for category 1 and 2 radioactive sources
- Design and layout of the storage bunker
- Consent agreements signed by both the importing state and