NRRC Stakeholders Guidelines

Kingdom of Saudi Arabia

Application for Authorization of Human Non-Medical Radiation Imaging

NRRC-SG-013

2023

هيئة الرقابة النووية والإشعاعية
Nuclear and Radiological Regulatory Commission

Stakeholder Guideline

Application for Authorization of Human Non-Medical Radiation Imaging

2023

NRRC-SG-013

Preamble

In accordance with the provisions of the NRRC's approved Regulations, this stakeholder guideline describes criteria and/or techniques that are considered appropriate for satisfying the requirements stipulated in the NRRC's regulations.

This stakeholder guideline has been prepared on the basis of International Atomic Energy Agency (IAEA) standards, as well as the and the international best practices and the experiences of similar international regulatory bodies, and in accordance with the Kingdom's international commitments, and it has been approved by the NRRC's CEO resolution No. 1412, dated 23/07/2023.

Contents

1. Purpose

Nuclear and Radiological Regulatory Commission (NRRC) has developed an effective regulatory framework for the safe and secure authorization of X-ray Systems for Human Imaging for Security Purpose practice throughout its life cycle. Under the regulatory framework, the prime responsibility for safety and security within the practice lies with the authorized person.

The purpose of this guideline document is to give the applicant and/or the authorized person clear and specific guidance on the submission of the authorization application for human non-medical radiation imaging practice.

2. Scope

This guideline is addressed to Human non-medical radiation imaging. In addition, it includes the required information relating to radiation safety and security in order to verify the adequacy of the safety and security measures as part of the authorization process.

This guideline includes the required information relating to authorization of new license, renewal as well as amendment of license.

3. Definitions

Annual dose

The dose from external exposure in a year plus the committed dose from intakes of radionuclides in that year.

Assessment

The process, and the result, of analyzing systematically and evaluating

the hazards associated with sources and practices, and associated protection and safety measures.

Applicant

Any person applying to the NRRC for authorization to undertake specified activities and facilities including practices. Strictly, an applicant would be such from the time at which an application is submitted until the requested authorization is either granted or refused.

Controlled area

A defined area in which specific protection measures and safety provisions are or could be required for controlling exposures or preventing the spread of contamination in normal working conditions and preventing or limiting the extent of potential exposures.

Dose limit

The value of a quantity used in certain specified activities or circumstances that must not be exceeded.

Emergency plan

A description of the objectives, policy, and concept of operations for the response to an emergency and of the structure, authorities and responsibilities for a systematic, coordinated and effective response. The emergency plan serves as the basis for the development of other plans, procedures, and checklists.

Emergency preparedness

The capability to take actions that will effectively mitigate the consequences of an emergency for human health and safety, quality of life, property and the environment.

Exposure

The state or condition of being subject to irradiation.

Management system

A set of interrelated or interacting elements (system) for establishing policies and objectives and enabling the objectives to be achieved in an efficient and effective manner.

Occupational exposure

Exposure of workers incurred in the course of their work.

Quality Assurance (QA)

The function of a management system that provides confidence that specified requirements will be fulfilled.

Radiation protection program (RPP)

Systematic arrangements that are aimed at providing adequate consideration of radiation protection measures.

Safety assessment

Assessment of all aspects of an activity that are relevant to protection and safety; for an authorized facility. This includes siting, design, and operation of the facility.

Security

Prevention and detection of any theft, sabotage, unauthorized access, illegal transfer (or any other criminal act) involving nuclear, nuclear-related, or radioactive materials and associated facilities.

Supervised area

A defined area not designated as a controlled area but for which occupational exposure conditions are kept under review, even though specific protection measures or safety provisions are not normally needed.

4. Abbreviations

Abbreviation	Definition
NRRC	Nuclear and Radiological Regulatory Commission
RPP	Radiation Protection Program
RSO	Radiation Safety Officer
QA	Quality Assurance
QC	Quality Control.
TLD	Thermoluminescent Dosimeter
OSL	Optically Simulated Luminescence
DRD	Direct Reading Dosimeter

5. Format and content of the use of X-ray Systems for Human Imaging for Security Aspects Application

The following sections and subsections describe the content and level of detail that should be included within the application for authorization.

5.1. Integrated Management System (Administrative Level):

5.1.1. Provide management structure and responsibilities including the following:

- Description of the management structure.

- Description and clear definition of responsibilities and duties related to radiation safety for RSO and all radiation workers.

5.2. Safety Assessment:

Provide safety assessment documents that shall include a basis for decision making in relation to the following:

- The engineered control measures that are required for safety;
- The development of local rules and procedures to be followed by workers operating inspection devices.
- Investigation levels
- Requirements and procedures for designating controlled areas and supervised areas.
- Any requirements for protection of persons inside the cargo container or vehicles
- Any requirements for protection of workers and the public
- The measures required to minimize the likelihood of incidents occurring.

For inspection devices, the safety assessment should include not only considerations of occupational and public exposure, but also the exposure of persons who may be inadvertently exposed

and the possibility of accidental exposures. In the case of vehicle or cargo scanners, the safety assessment should consider the possible exposure of drivers, passengers, and concealed individuals, as appropriate.

5.3. Technical Information:

Provide detailed description of the following:

5.4. Design of the Facility:

- Layout of the imaging rooms and adjacent areas.
- Boundaries of controlled and supervised areas
- Shielding calculation that should include dose rates and doses per scan, workload, system orientation (i.e., beam direction).
- The flow of people and if relevant, vehicles.
- Signs and warning lights.
- Access control

5.5. Information on Inspection Imaging Devices:

- Type of security screening systems Manufacturer
- Model
- Serial number
- Maximum kVp and mA/mAs.

5.6. Radiation Protection Program (RPP)

Provide detailed description of the following:

5.6.1. Protection of Workers:

- Education and training of workers
- Designation of controlled and supervised areas
- Assignment of responsibilities
- Local rules and procedures
- Protection of Workers Driving Vehicles Undergoing Inspection
- Individual monitoring
- Workplace monitoring
- Health surveillance
- Personal protective equipment
- Recording and reporting

5.6.2. Protection of Person Undergoing human non-medical radiation imaging:

- A system of protection and safety to protect the public person undergoing human non-medical radiation imaging.

- Training of personnel on functions relevant to protecting public safety.
- Establishment of dose constrain per scan.
- Establishment of collective dose per unit.
- Assessment, control, and surveillance of external public exposure.
- Monitoring program and records management.
- Optimization of the dose per scan based on DRL for the chosen type of scan.
- Optimization based on the size of the body of the person being scanned.
- Confirmation on non-pregnancy exists.

5.6.3. Protection Of Public:

- A system of protection and safety to protect the public.
- Procedures for routine periodic measurements of exposure rates in areas adjacent to imaging rooms.
- Assessment, control, and surveillance of external public exposure.

5.6.4. Records:

- Occupational exposure.

- Training.
- Area survey.
- Inventory of imaging inspection devices and accountability.
- Quality control report.
- Maintenance and repair work.
- Incident and accident investigation reports.

5.7. Quality Assurance (QA)

A quality assurance program for the use of inspection devices should include the following:

- Quality control tests.
- Documentation and records.
- A preventive maintenance program.
- A review of local rules and procedures.

5.8. Emergency Preparedness and Response Plan

Provide an emergency preparedness and response plan including the following:

- All reasonably foreseeable scenarios, including those of very low probability.

- Possible scenarios for inspection devices for potential exposure include flaws in the design of the device, failures of engineered controls on inspection devices while in operation, failures and errors in the software that control or influence the emission of radiation from the inspection device, and human error.

6. Related documents and files

Document Name	Document Type	Document Number	Relation to the guideline
Radiation Safety	Technical Regulation	NRRC-R-01	This Regulation set out the general safety requirements in ensuring protection of people and the environment against the harmful effects of ionizing radiation and for the safety of radiation sources.in addition, this regulation harmonize the requirements applicable in the Kingdom with the international best practices in order to achieve the highest standards of safety in activities and facilities that give rise to radiation risks
Notification on and Authorization of Facilities and Activities with Radiation Sources	Technical Regulation	NRRC-R-02	Prescribes the general requirements for notification on and authorization of activities, facilities and practices with radiation source, nuclear material and/or ore containing uranium and thorium in the Kingdom

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