ATOMIC ENERGY COUNCIL

GUIDANCE ON DOCUMENTING A SAFETY ASSESSMENT REPORT

AEC/A/GD 5.1, 2026

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Approved by:

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1.0 Introduction

The use of radiation sources in medicine, industry, agriculture, education, mining, research and other applications provides significant benefits. However, improper management of radiation sources may result in harmful exposure of workers, patients, the public and the environment. This unjustified exposure may result into deterministic effects, stochastic effects from ionizing radiation.

In accordance with the Atomic Energy Act Cap. 154 and the Atomic Energy Regulations, 2012, every applicant and authorized person shall conduct a Safety Assessment prior to authorization, and whenever significant modifications occur to the facility, equipment, or operating conditions. The applicant should demonstrate that all radiation risks have been adequately assessed and appropriate control measures implemented.

A Safety Assessment Report (SAR) is the principal regulatory document used to demonstrate that provides documented evidence that hazards have been identified; radiation risks have been evaluated; adequate protective measures have been established safety measures are adequate and optimized and regulatory requirements are satisfied

This guide provides structured guidance to applicants and authorized persons on the documentation of a Safety Assessment Report (SAR. The guide shall be applied using a graded approach, commensurate with the hazard potential and category and complexity of the radiation source and associated activities.

1.1 Authority

This Guide is issued pursuant to Sections 59 and 73 of the Atomic Energy Act, Cap. 154.

1.2 Citation

This document may be cited as the Atomic Energy Council Guidance on Preparation of Safety Assessment Reports for facilities with radiation sources (AEC/A/GD/ 5.1, 2026)

2.0 Purpose

To provide guidance to applicants and authorized persons on Preparing Safety Assessment Reports (SARs).

3.0 Scope

This guidance applies to facilities possessing or intending to possess radiation sources, including but not limited facilities using sealed and unsealed radioactive sources and facilities operating radiation-generating equipment

4.0 STRUCTURE AND CONTENT OF A SAFETY ASSESSMENT REPORT (SAR)

The SAR shall be hazard-based, graded, facility-specific, and lifecycle-oriented. It shall address normal operations, abnormal events, and credible accident scenarios

The elements of an SAR have been provided as follows

4.1 Cover page

This section should provide the title of the Safety Assessment Report, version and validation date on a headed paper.

4.2 Executive Summary

This section should provide the title of the Safety Assessment Report, version and validation date

Other information should also be provided such as authors, preparation date, reviewer and review date, the responsible manager and the approval dates and signatures

4.3 Purpose

The objective of the safety assessment is to demonstrate that the facility has been designed, equipped and will be operated in a manner that provides adequate protection of workers, patients, members of the public and the environment from unnecessary exposure to ionizing radiation

4.4 Scope

The report should clearly state the scope of the assessment.

The applicant should specify the radiation source covered by the assessment and the services to be provided by the facility.

4.5 Objectives of the Safety Assessment

The SAR should clearly define objectives including but not limited to:

a) Protection of workers, patients, the public, and the environment;
b) Optimization of radiation protection (ALARA principle)
c) Prevention of accidental exposures
d) Control of radioactive sources and security
e) Compliance with regulatory limits
f) Emergency preparedness capability

4.6 Facility description and Site information

4.6.1 General Information/Administrative

This section should provide the following information:

a) Facility name
b) Physical address
c) Details of the legal person including contact

4.6.2 Organizational Structure

This section should provide details of;

a) Legal representative
b) Radiation Protection Officer
c) Qualified Experts
d) Radiation Workers
e) Security Personnel
f) Maintenance/Servicing Personnel

Note: Attach an organizational flow chart

4.7 Description of Radiation Sources

This section should provide details of the radiation source(s) covered by the SAR.

The inventory should include the following information

A: X-ray generating equipment

a) Equipment name/type
b) Installation type (fixed, mobile, or portable)
c) Manufacturer
d) Year of Manufacture
e) Country of Origin
f) Purpose of the equipment
g) Model and Serial Number
h) Maximum tube voltage (kVp)
i) Maximum tube current (mA/mAs)
j) Installation date

B: Radioactive source

a) Radionuclide
b) Radionuclide Activity
c) Activity date
d) Purpose of the radiation source
e) Source location
f) Model and Serial number of the radioactive source
g) Manufacturer
h) Location of use (Onsite or offsite)

Attach: Source certificate and leak test results

4.8 Description of activities

This section should include description of the following where applicable;

A: X-ray Facilities

i. Departments using the X-ray machines

ii. Types of examinations
iii. Expected workload
iv. Patient numbers
v. Equipment specifications

B: Radioactive Source Facilities

i. Source utilization
ii. Source movements
iii. Source storage arrangements
iv. Transportation activities
v. Maintenance activities

4.8.1 Facility layout

Attach scaled floor plans showing:

A: Radiation room:

- Tube location
- Control console
- Patient position

Adjacent Areas

- Offices
- Waiting rooms
- Corridors
- Public access areas

B: Radiation Areas

Identify and indicate the following;

- Controlled Areas
- Supervised Areas
- Public Areas

Note: Please indicate the operating hours for each radiation source.

4.9 SAFETY ASSESMENT METHODOLOGY

4.9.1 Potential Hazard Identification

This section should describe potential hazards associated with the radiation source.

The hazard assessment should address but not limited to:

A: For radiation generating equipment

i. Radiation Hazards resulting from scatter radiation, leakage radiation, repeated exposures or unintended exposures
ii. Electrical Hazards which may result from electric shock or equipment failure
iii. Mechanical Hazards as a result of equipment collapse and table movement injuries
iv. Human Factors E.g. Incorrect patient positioning

B: For radioactive sources

These range from:

i. External Exposure: due to direct gamma radiation or neutron radiation where applicable
ii. Internal Exposure due to Contamination or source leakage
iii. Security Hazards for example Theft, Sabotage or Unauthorized access

Transport Hazards as a result of package damage and Vehicle accidents

Note: Hazards should be documented in a tabular form e.g.

Hazard	Cause	Potential Consequence
Scatter Radiation	Normal operation	Worker exposure
Leakage Radiation	Tube housing defect	Excess worker dose
Repeated Examinations	Poor image quality	Additional patient dose
Unauthorized Entry	Door left open	Public exposure
Equipment Failure	Generator malfunction	Unintended exposure

4.9.2 Exposure Analysis

The assessment shall identify all persons who may be exposed.

4.9.2.1Occupationally Exposed Workers

In this section, please state all the categories of radiation workers.

These may include radiographers, radiologists, Medical physicists or Service engineers

4.9.2.2 Members of the Public

These may include visitors, reception staff, adjacent office workers and general public

4.9.2.3 Patients

In this section, please state all the categories of patients

These may include adults, children and pregnant patients as well as comforters and caretakers.

4.9.3 Assessment of Normal Exposures

The section should include evaluation of doses expected during normal operation.

4.9.3.1 Survey measurements

This section should provide results of survey measurements conducted at various measurement locations including the control cubicle and behind barriers like doors. E.g entrance doors.

4.9.3.1 Occupational Exposure Assessment

This section should provide the exposure pathways e.g. Scatter radiation, Leakage radiation Quality control testing or during Maintenance

Indicate the dose assessment by providing the annual doses for each radiation worker. For example

Worker Category	Estimated Annual Dose
Radiographer	0.5 mSv
Radiologist	1.2 mSv
Medical Physicist	0.3 mSv

Explain the methodology used to arrive at the values and any assumptions made.

4.9.3.2 Patient Exposure Assessment

Patient protection is a central component of medical exposure assessment.

This section should include the examination protocols, exposure parameters and dose monitoring arrangements.

Provide evidence that doses are optimized.

This section is not applicable if the likely exposures do not involve patients

4.9.3.3 Public Exposure Assessment

Calculate annual doses and demonstrate compliance with 1mSv/year for members of the public.

Please consider these occupancy factors for adjacent areas to rooms housing radiation source as indicated in Table 3 below.

Area	Occupancy Factor
Office	1
Corridor	0.2
Waiting Room	1

4.9.4 Optimization of Protection and Safety

Protection and safety should be optimized using the ALARA principle.

This section should describe the various means employed to optimize safety. Some of them may include.

4.9.4.1 Engineering Controls

This section should describe the various engineering controls employed to optimize safety.

These may either be employed by the structural shielding i.e Walls, Doors and Viewing windows or by use of Safety Devices such as radiation Warning lights, safety interlocks etc.

4.9.4.2 Administrative Controls

This section should describe the administrative measures employed to optimize safety. These may be realized by having strict access control and documented and implemented Local Rules or work instructions

4.9.4.3 Minimizing Human Factors

This section should provide how human factors will be minimized. These could be through Staff training, Competency assessments and refresher training conducted.

Indicate the training to be offered including its frequency.

4.9.4.4 Design Shielding Assessment Exposures

The facility should provide technical basis of the safety assessment. The applicant should demonstrate that the structural shielding design is adequate demonstrate compliance with dose constraints and dose limits.

The assessment should include:

a) workload assumptions;
b) use factors;
c) occupancy factors;
d) distances;
e) design dose constraints;
f) primary barriers;
g) secondary barriers;
h) leakage radiation;
i) scattered radiation;
j) shielding material specifications;
k) transmission calculations;
l) shielding calculations;
m) verification measurements, where available.

Floor plans identifying controlled and supervised areas should be included

5.0 Quality Assurance and Quality Control

This section should provide assurance that the equipment performance is maintained.

This may be realized through having various tests conducted and results maintained at the facility. These include acceptance testing, commissioning, routine quality control, preventive maintenance and calibration tests.

Note: Attach schedules and records.

6.0 Conclusion

The conclusion should explicitly state all significant hazards that have been identified, reasonably foreseen abnormal events have been assessed and that adequate protection and safety measures are adequate and optimized in order to be compliant with the regulatory requirements.

7.0 References/Applicable Code and Standards, Tables and Annexure

All reference documents, codes and standards, used for preparation of the report along with the tables and annexes (if any) shall be listed and appropriately cited.

7.1 Definitions and Abbreviations

A dedicated section shall define all technical terms and abbreviations used in the SAR.

8.0 Facility Declaration

8.1 Declaration by the Authorized Person / Facility Management

This section shall include commitment by the representative of the facility to implement the documented procedures therein. This may take the form as below;

I hereby declare that this Safety Assessment Report has been prepared in accordance with the Atomic Energy Act Cap. 154, the regulations made there under. The facility undertakes to implement, maintain, and periodically review the SAR arrangements described herein and to ensure that all personnel are trained and equipped to respond execute their roles effectively and in a safe manner.

Name of Facility .....
Name of Authorized Person .....
Designation: .....
Signature: .....
Date: .....

8.2 Regulatory Review and Approval (For Official Use)

Reviewed by:	
Designation:	
Regulatory Authority	Atomic Energy Council (AEC)
Decision	☐ Approved
	☐ Approved with conditions
	☐ Not Approved
Reference No.:	
Date of Decision:	
Authorized Signature and Seal	

9.0 REFERENCES

a) Atomic Energy Regulations, 2012
b) Atomic Energy Act Cap. 154
c) International Atomic Energy Agency. Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, General Safety Requirements Part 3 (GSR Part 3), Vienna.
d) International Atomic Energy Agency. Safety Assessment for Facilities and Activities, General Safety Guide GSG-3, Vienna