AERB SAFETY GUIDE NO. AERB/SG/G-6

CODES, STANDARDS AND GUIDES TO BE PREPARED BY THE REGULATORY BODY FOR NUCLEAR AND RADIATION FACILITIES

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This document is subject to review, after a period of one year from the date of issue, based on the feedback received.

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FOREWORD

The establishment and operation of nuclear and radiation facilities, and the use of radioactive sources, contribute to the economic and social progress of the country. However, while undertaking such activities, the safety of the workers concerned, the general public and the environment at large, is to be ensured, and this is possible through compliance with the relevant provisions of the Atomic Energy Act, 1962.

Since the inception of the atomic energy programme in the country, importance has been given to the adoption and maintenance of high safety standards. In order to enforce safety standards, the Government of India constituted the Atomic Energy Regulatory Board (AERB), in November 1983.

The Board is entrusted with the responsibility of laying down safety standards and framing rules and regulations covering the regulatory and safety functions envisaged under the above Act. AERB has therefore undertaken a programme of developing Safety Standards, Codes, Guides and Manuals for both nuclear and radiation facilities, covering all aspects such as Siting, Design, Construction, Operation, Quality Assurance, Decommissioning and Regulation.

Safety Standards contain internationally accepted safety criteria for design, construction and operation of specific equipment, systems, structures and components of nuclear and radiation facilities. Safety Codes are intended to establish objectives and to set minimum requirements that shall be fulfilled to provide adequate assurance for safety in nuclear and radiation facilities. Safety Guides provide guidelines and make available methods for implementing specific requirements as prescribed in line with the relevant Safety Code(s). Safety Manuals are intended to elaborate specific aspects and may contain detailed technical information and/or procedures.

Consistent with accepted practices, "shall" and "should" are used in these documents to distinguish between firm requirement and a desirable option respectively, for the benefit of the user.

Emphasis in these documents is on protection of site personnel, the public and the environment from unacceptable radiological hazards. For aspects not covered, applicable and acceptable national and international codes and standards shall be followed.

Industrial safety in nuclear and radiation facilities is to be ensured through strict compliance with the applicable provisions of the Factories Act, 1948 and the Atomic Energy (Factories) Rules, 1996.

The Codes, Guides and Manuals will be revised as and when necessary in the light of experience and feedback from users as well as new developments in the field.

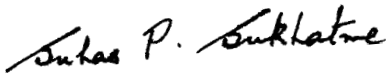
Based on experience, AERB has issued a Safety Code on "Regulation of Nuclear and Radiation Facilities" to spell out the minimum safety related requirements/obligations to be met by a nuclear or radiation facility to qualify for the issue of regulatory consent at every stage leading to eventual operation. It is hoped that this will be of use to the Regulatory Body as well as to the applicant of any nuclear or radiation facility.

This Safety Guide on "Codes, Standards and Guides to be prepared by Regulatory Body" is expected to be useful to the Regulatory Body in identifying and preparing such regulatory documents and also in streamlining their contents.

A Working Group consisting of AERB staff and other professionals has prepared the Guide. In drafting it, extensive use has been made of information contained in relevant documents of the International Atomic Energy Agency (IAEA) under the Nuclear Safety Standards (NUSS) programme, specially the Guide on "Regulations and Guides for Nuclear Power Plants (50-SG-G9)".

Experts have reviewed the Guide and the AERB Advisory Committees have vetted it before issue. The list of persons who have participated in the Committee meetings, along with their affiliations, is appended in the document.

AERB thanks all individuals and organisations who reviewed the draft and helped in its finalisation.



(Suhas P. Sukhatme)
Chairman, AERB

DEFINITIONS

Applicant

Any person who applies to the competent authority for consent to undertake any of the actions for which consent is required.

Approval

A formal consent issued by the Regulatory Body to a proposal.

Atomic Energy Regulatory Board (AERB)

The Regulatory Body that is currently functioning in India (see also 'Regulatory Body)

Authorisation

A type of regulatory consent issued by the Regulatory Body for all sources, practices and uses involving radioactive materials and radiation generating equipment.

It also includes specific stage-wise activities leading to grant of license for a nuclear facility.

(See also 'Consent')

Commissioning

The process during which structures, systems and components of a facility, having been constructed are made operational and verified to be in accordance with design specifications and to have met the performance criteria.

Competent Authority

Any official or authority appointed, approved or recognised by the Government for purposes of Rules promulgated under the Atomic Energy Act, 1962.

Consent

A written permission issued to the applicant by the Regulatory Body to perform specified activities related to nuclear and radiation facilities. The types of such consents are 'lincense', 'Authorisation', 'Registration' and 'Approved', and will apply depending upon the catogery of the nuclear/radition facility, the particular activity and the radiation source involved.

Construction

The process of manufacturing, testing and assembling components of a facility, the erection of civil works and structures, and installation of equipment.

Decommissioning

The process by which a facility is finally taken out of operation in a manner that provides adequate protection to the health and safety of workers, the public and the environment.

Design

The process and results of developing the concept, detailed plans, supporting calculations and specifications for a facility.

Nuclear Facility

All nuclear fuel cycle and associated installations encompassing activities covering from front and to back end of nuclear fuel cycle processes and the associated industrial facilities, such as heavy water plants,beryllium ectraction plants, Zirconium plants etc

Nuclear Power Plant (NPP)

A nuclear reactor or a group of reactors together with all structures, systems and components necessary for safety and for generation of electricity.

Operation

All activities following commissioning and before decommissioning performed to achieve, in a safe manner, the purpose for which an installation was constructed, including maintenance.

Prescribed Substance

Any substance including any mineral which the Central Government may, by notification, prescribe, being a substance which in its opinion is or may be used for the production or use of atomic energy or research into matters connected therewith and includes uranium, plutonium, thorium, beryllium, deuterium or any of their respective derivatives or compounds or any other materials containing any of the aforesaid substances.

Radiation Facility/Installation

Any installation/equipment or a practice involving the use of radition generating units,or the use of radioisotopes in research, industry, medicine and agriculture.

Regulatory Body

An Authority constituted and empowered by the Central Government to carry out the regulatory and Safety functions as enuisaged in the Atornic Energy Act, 1962 and the Rules issued there under.

The term is Synonymous with the term 'Competent Authority', mentioned in the above Rules.

Research Reactor

A critical / sub-critical assembly of nuclear fuel elements, used mainly for research and production of radioisotopes.

Safety (nuclear)

Protection of all persons from undue radiological hazard.

Siting

The process of selecting a suitable site for a facility including appropriate assessment and definition of related design bases.

Source

That which causes radiation exposure, either by emitting ionising radiation or releasing radioactive substance or materials.

Surveillance

All planned activities namely monitoring, verifying, checking including in-service inspection, functional testing, calibration and performance testing performed to ensure compliance with operating specifications established in a facility.

Note: Words and expressions not defined in this document, but defined in the Act, Rules and Surveillance Procedures shall have the meanings respectively assigned to them in the Atomic Energy Act, 1962, Rules and Surveillance Procedure.

Some of the above definitions are modified versions of those appearing in the first two documents of this series, viz. Code No. AERB/SC/G and Guide No. AERB/SG/G-5.

CONTENTS

1. INTRODUCTION

1.1 General

1.1.1 Radiation safety of the public and of occupational workers during development, control and use of Atomic Energy for peaceful purposes is being ensured through the enforcement of safety provisions in the Atomic Energy Act, 1962 and the rules framed thereunder. However, with a view to providing compact and cogent regulatory documents spelling out the obligations of the Consentee and the responsibilities of the Regulatory Body, a comprehensive safety code on "Regulation of Nuclear and Radiation Facilities" (AERB/SC/G) has been prepared. This code details a number of regulatory requirements to be complied with by the Applicant / Consentee as well as by the Regulatory Body itself.

Industrial safety aspects are taken care of through enforcement of safety provisions of Factories Act, 1948 and the Atomic Energy (Factories) Rules 1996.

1.1.2 For carrying out the regulatory and safety functions envisaged in the Atomic Energy Act 1962 and the Rules framed thereunder, the Regulatory Body (Atomic Energy Regulatory Board) was constituted in 1983. The Chairman of the Regulatory Body has been notified as the "Competent Authority" to enforce the Rules.

Apart from discharging the safety functions assigned to it in the above statutes, the Regulatory Body will also have to carry out safety functions that may be assigned to it in other national safety statutes issued from time to time. An overview of Statutes is given in Annexure - I.

1.1.3 Another function of the Regulatory Body is to issue Safety Codes, Standards and Guides for Nuclear and Radiation Facilities and other related activities covered by the Atomic Energy Act, 1962 and as envisaged under the comprehensive Safety Code on "Regulation of Nuclear and Radiation Facilities" (AERB/SC/G). Accordingly, the Safety Guide on " Codes, Standards and Guides to be prepared by the Regulatory Body" has been prepared. As such, this guide will help the Regulatory Body to identify and prepare such documents and streamline their contents.

1.2 Objectives

This Guide indicates various documents like Safety Codes, Standards and Guides to be prepared by the Regulatory Body, along with the format structure to be adopted while preparing these documents.

1.3 Scope

This Guide confines itself only to Safety Codes, Standards and Guides and identifies those to be issued by the Regulatory Body in respect of various activities in each of the following nuclear and radiation facilities and associated activities. Identification of Safety Practices and Manuals is beyond the scope of this guide and therefore, not covered in this document.

1.3.1 Nuclear Facilities:

(i) Facility for mining and processing of radioactive ores and minerals.

(ii) Uranium/thorium processing and fuel fabrication plants.

(iii) Heavy water upgradation plants.

(iv) Research reactors, experimental reactors and critical assemblies.

(v) Nuclear power plants.

(vi) Facility for transport and storage of radioactive material.

(vii) Fuel processing and spent fuel reprocessing plants.

(viii) Radioactive waste management facilities.

(ix) Plants for extraction, processing including isotopic enrichment of special radioactive material.

(x) Facility for handling prescribed substances.

(xi) Rare earth plants.

(xii) Plutonium fuel fabrication plants.

1.3.2 Radiation Facilities:

(i) Medical applications of radiation.

(ii) Industrial applications of radiation.

(iii) Research applications of radiation.

(iv) Agricultural applications of radiation.

(v) Accelerators.

(vi) All other practices involving handling of radioactive sources.

1.3.3 Associated Activities:

(i) Decommissioning of a nuclear or a radiation facility.

(ii) Recycling of contaminated materials.

(iii) Reuse of decommissioned facility.

(iv) Laundry facility for cleaning protective clothes.

1.3.4 This Guide gives a structure to the contents of the safety documents on the above facilities.

1.3.5 Although the Guide is meant for nuclear and radiation facilities which are landbased, the principles and methodologies described for preparation of applicable safety documents may be useful for facilities other than landbased nuclear and radiation facilities.

1.4 Hierarchy of Safety Documents

1.4.1 Safety documents that should be issued by the Regulatory Body will be designated by the following hierarchical titles:

(a) Safety Codes and Standards

(b) Safety Guides and Guidelines

(c) Safety Manuals

1.4.2 Safety requirements for each application (activity) area identified on the basis of international practices, national laws and local requirements, and covered in Safety Codes and Standards are mandatory in nature. These documents specify what is to be done rather than how it could be done. 'Shall' is generally used in Codes and Standards to specify mandatory requirements.

1.4.3 Methods of implementing safety requirements, procedures, provisions and features in a specific application area, which are recommendatory or suggestive in nature are contained in "Safety Guides". The Regulatory Body sometimes provides guidance through "Guidelines" where a Code has not been issued on a particular subject. 'Should' is generally used in Guides to describe the recommendatory or suggestive requirements, unless the requirement is taken from Codes and Standards.

1.4.4 Detailing of recommended/accepted practices, computational methods, data, limits etc. and implementation of specific requirements are covered in "Safety Manuals". However, these documents are beyond the scope of this document.

1.5 Technical Reports, Bulletins and Directives

1.5.1 The Regulatory Body may also publish documents, such as "Technical Reports and Bulletins". These may contain information on wide ranging topics of safety significance in one or more application areas of regulatory concern.

1.5.2 In addition to the above documents, the Regulatory Body may also issue "Directives" in various subjects like radiation limits for occupational workers, frequency for annual medical check-up of radiation workers from time to time bringing out the latest mandatory requirements based on national and international practices.

1.5.3 Technical Reports, Bulletins and Directives are beyond the scope of this document.

2. SAFETY CODES AND STANDARDS

2.1 General

Codes and Standards for nuclear facilities should be specific to various stages or aspects of activities related to nuclear facilities listed under 1.3.1. The various stages may consist of siting, design, construction, commissioning, operation and decommissioning.

Codes and Standards for radiation facilities should cover a wide spectrum of radiation sources, equipment and major installations. Radiation sources may range from small quantities of sealed radioactive materials to large radiation sources like high intensity gamma irradiators, high energy particle accelerators used in radiation processing industry or in research areas. Radiation sources such as teletherapy units, accelerators, brachytherapy units, nuclear medicine sources are widely used in hospitals. Sources such as radiography devices, gauging devices and X-ray and gamma ray sources are used in industry for radiography, process control etc. High intensity gamma irradiators are used for food irradiation, sterilisation of medical products, polymerisation, vulcanisation etc.. In view of the wide variety of sources and their utility as well as the diversity of their applications, the safety requirements have to be specified for each of the sources and equipment separately to meet their specific operational scenarios.

The Bureau of Indian Standards (BIS), the International Electrotechnical Commission (IEC), the International Standards Organisation (ISO), the American National Standards Institute (ANSI), Deutsch Industrie Normen (DIN) etc. issue standards specifying the requirement for design of sources, equipment or devices to ensure their safety during use. The Regulatory Body may adopt either the BIS/IEC/ISO/IAEA standards with/without any change, or may prepare and issue separate documents for use in the country.

2.2 Purpose of Codes and Standards

2.2.1 Codes and Standards for Nuclear Facilities

Codes and Standards are meant to spell out in detail the safety requirements to be complied with by the Applicant/Consentee at all stages of activities of Nuclear Facilities. These have been indicated briefly in the Safety Code on "Regulation of Nuclear and Radiation Facilities" (AERB/SC/G) with a view to ensure the safety of the plant and its operating personnel, the public and the environment. The various activities to be covered are Siting, Design, Construction, Quality

Assurance (QA), Commissioning, Operation and Decommissioning.

Safety assessment for an activity will be based on these documents for granting regulatory consent (license, authorisation) as applicable.

2.2.2 Codes and Standards for Radiation Facilities

Codes and Standards are relevant for designing an equipment or device incorporating a radiation source, either manufactured in the country or imported. The requirements for safety during its transportation use under various operational states and during dismantling, decommissioning or disposals are also to be specified.

These Codes and Standards become the basis for the Regulatory Body to judge satisfactory compliance with regard to the adequacy of built-in safety features and prescribed tests for the equipment or device for type approval. An entire Safety Code may be devoted to nuclear medicine aspects only, elaborating the specific provisions of relevant Rules/Surveillance procedures. The Safety Code for Transport of Radioactive Materials stipulates the transport regulations in general whereas another Safety Code stipulates the procedures for packaging, marking, labeling, forwarding and handling-in-transit of a transport package. Yet another Safety Code may deal entirely with transport of fissile materials and other Codes may include subjects like transport of spent fuels or special arrangement in transport etc.

2.3 General Nature of Contents of Codes and Standards, and their Structure

The following information should be the common features for all Codes and Standards:

2.3.1 Foreword

This will be a preamble to the document, addressed by the Head of the Regulatory Body and will lay emphasis on the importance of the document for regulatory assessment.

2.3.2 Definitions

Terms, which have special significance and appear in the Code or Standard, shall be defined. The definitions shall be consistent with the glossary of terms/ definitions used in other documents.

Definitions specific to the Code or the Standard should be in italics and after the foreword. Definitions should not bear any section number and should be written in alphabetical order. Words defined should appear in the document.

2.3.3 Table of Contents

All sections starting with Arabic numbers e.g., 1,2,3 should be listed. The sub-sections under each section should be numbered using decimals e.g., 1.1, 1.2 for sub-sections and 1.1.1 and 1.2.1 for subsequent paragraph of sub-sections respectively. The corresponding page numbers where sections and sub-sections appear in the document should also be given against each on the right side of the page. Appendix, Annexure, Tables, Figures, List of members of Working Group and Advisory Committee and Provisional list of Codes and Guides should also be listed at the end.

2.3.4 Introduction

"Introduction" should be section-1 of any code and standard and should consist of the following sub-sections:

(a) General

This sub-section should specify the genesis and general requirements, which will be discussed in detail in the subsequent sections and sub-sections.

(b) Objective

The safety objective of the document should be covered in this sub-section and the mandatory requirements to achieve these objectives should be clearly spelt out.

(c) Scope

In this sub-section the document should clearly mention the facilities for

which the Codes or Standards are applicable and what specific aspects are covered.

The order of presentation in various sections should be specified. Various sections, appendices etc. should be highlighted addressing the issues subjectwise, as applicable.

2.3.5 Specific Sections of Codes and Standards

From section-2 onwards the subject matter of the code or standard shall be arranged in a manner that will spell out the mandatory requirements of different aspects. The mandatory requirements, in general, shall be based on international, national and local experiences. The word 'Shall' is generally used in Codes and Standards to specify mandatory requirements.

Additional sections may be identified, prepared and incorporated as required.

2.3.6 Appendices, Annexures, Figures, References/Bibliography, List of Participants, and List of Safety Documents.

All these sections should be included at the end of the main sections of the documents. An Appendix when included is a part of the document, whereas annexure, footnotes and bibliography, where included, are only to provide information that might be helpful to the user. Figures and references depending on their usage with respect to the text of the document may be considered as part of the document. The document should also include, at the end, the list of participants involved in the preparation of the document and a list of other safety documents of the Regulatory Body (completed ones and those under preparation).

2.4 Identification of Codes and Standards for Nuclear Facilities

2.4.1 The list of Codes and Standards to be issued to cover all activities related to nuclear facilities are given in Annexure-II of this Guide.

2.4.2 In addition, other Codes and Standards should be identified through periodical review and issued as and when required.

2.4.3 The Codes and Standards required to be followed during different activities/ stages for any Nuclear Power Plants(NPPs)/Research Reactors (RRs) are listed in Table II-1 as an example.

TABLE II-1: EXAMPLE OF CODES AND STANDARDS ON NUCLEAR FACILITIES

Facility listed in 1.3.1	**Stage Standards**	**Applicable Codes and**
Research reactors, experimental reactors and critical assemblies and NPPs	Siting	AERB/SC/S AERB/SC/G
--Do--	Construction	AERB/SC/D AERB/SC/QA AERB/SC/G AERB/SS/F AERB/SC/CSE
--Do--	Commissioning and Operation	AERB/SC/O AERB/SC/QA AERB/SC/G AERB/S/F
--Do--	Decommissioning	AERB/SC/DC AERB/SC/G AERB/SS/F

The above list is not exhaustive and may include other Codes and Standards. The same document may be common to different activities/stages and also for many facilities.

Details regarding preparation of document, identification of colours to be used for their covers, arrangements of contents, letter quality, numbering of sections, subsections and clauses and abbreviations to be used for reference numbers of various documents, are given in section -4.

2.5 Identification of Codes and Standards for Radiation Facilities

2.5.1 The radiation facilities mentioned in 1.3.2 cover a wide spectrum of radiation sources, equipment and installations. Their uses have been identified in various fields such as in radiation processing industry in research areas, medicine and

agriculture. Since the sources and applications are diverse, requirements of Code and Standards are many.

The provisional list of Codes and Standards for safe handling and safe use of various radiation facilities is given in Annexure-III of this Guide.

2.5.2 The Codes and Standards required to be followed during different activities/ stages for medical applications of radiation are covered in Annexure-III of this Guide and are listed in Table II-2 as an example.

TABLE II-2: EXAMPLE OF CODES AND STANDARDS ON NUCLEAR FACILITIES

Facility listed in 1.3.2	**Stage**	**Applicable Codes and Standards**
Medical applications of radiation	Installation and operation	AERB-SC/Med/1-4 S.No.16 - 25 of Annexure-III of this Guide and AERB-SS-3 & SS-5
	Closure or decommissioning	Applicable AERB Manuals for source removal, decontamination of the facility for future use.

The above list is not exhaustive and may include other Codes and Standards. The same document may be common to different activities/stages and also for many facilities.

Details regarding preparation, identification of colour of document, numbering and details of abbreviation used for various documents reference numbers are given in Section 4.

3. SAFETY GUIDES AND GUIDELINES

3.1 General

Safety requirements mandatory in nature, are contained in the relevant Safety Code and Standard. Details of how these safety requirements and provisions could be met, are contained in the document titled "Safety Guide" for guidance of users. Therefore, Safety Guides are supporting and explanatory documents to the Safety Code and Standard. Safety Guides may contain information on criteria, data, procedure and/or methods of analysis and assessments. The Applicant/Consentee may adopt any other acceptable means to prove that the intents of specific safety requirement contained in the relevant Code and Standard are met.

3.2 Purpose of Guides

Safety Guides are prepared to clarify the safety requirements and provisions contained in the relevant Code or Standard for a particular area. Safety Guide gives necessary guidance about how safety requirements could be complied with by the Applicant/Consentee and enforced by governmental agencies.

The procedures or methodology are only suggestive and the user of the Guide is free to devise his own methods to achieve the same result. The onus of demonstrating or convincing the Regulatory Body that the chosen method meets the intent of the Code requirement lies on Applicant/Consentee.

3.3 General Nature of Contents of Guides

Since the Guide is required to elaborate and explain the provisions of Safety Code and Standard, it is necessary that its content should closely follow the Safety Code or Standard. Each provision in the Code or Standard requiring explanation is to be expanded.

The following information should be the common features for all Guides:

3.3.1 Foreword

This is a preamble to the Guide, addressed by the Head of the Regulatory Body and will lay emphasis on the importance of the Guide for safety assessment.

3.3.2 Definitions

Terms, which have special significance and appear in Safety Guide shall be defined. The definitions shall be consistent with the glossary of terms/definitions used in other documents.

Definitions should follow the Foreword, should not bear any section number and should be listed in alphabetical order. Thereafter, “special definitions”, specifically applicable to a Guide should be listed. Terms defined should appear in the document.

3.3.3 Table of Contents

All sections starting with Arabic numerals e.g., 1,2,3 should be listed. The sub-sections under each section should be numbered using decimals e.g., 1.1, 1.2 for sub-sections and 1.1.1 and 1.2.1 for subsequent paragraphs of sub-sections respectively. Corresponding page numbers where sections and sub-sections appear in the document, should also be given against each on right side of the page. Appendix, Annexure, Tables, Figures, List of members of Working Group and Advisory Committee and Provisional list of Codes and Guides should also be listed at the end.

3.3.4 Introduction

"Introduction" should be section-1 of any Guide and should consist of following sub-sections:

(a) General

This sub-section should specify the genesis and general requirements, which will be discussed in detail in the subsequent sections and sub-sections.

(b) Objective

Safety objective of the document should be covered in this sub-section.

c) Scope

In this sub-section the document should clearly mention the facility and aspects for which the Guide is applicable.

Order of presentation in various sections should be specified. Various sections, appendices, etc. should be highlighted addressing the issues subjectwise as applicable.

3.3.4 Specific Sections of the Guide

From section-2 onwards, the subject matter of the Guide shall be arranged based on international, national and local experiences in a manner that will spell out procedures, provisions and features in specific application areas. These should be recommendatory and suggestive in nature specifying how the safety requirements of AERB Codes and Standards could be met. Every section should start with a general sub-section in which details of the topic of the section should be briefly mentioned.

Additional section may be identified, prepared and incorporated as and when felt necessary.

3.3.5 Appendices, Annexures, Figures, References/Bibliography, List of Participants and List of Safety Documents

All these sections should be included at the end of the main sections of the document. An Appendix when included is a part of the document, whereas an annexure, footnotes, and bibliography where included are only to provide information that might be helpful to the user. References and figures depending on their usage with respect to the text of the document may be considered as part of the document. The documents should also include, at the end, list of participants involved in the preparation of the Guide and a provisional list of other safety documents of the Regulatory Body.

3.4 Identification of Guides on Regulation of Nuclear and Radiation Facilities

Safety Guides on Regulation of Nuclear and Radiation Facilities, may contain information on the organisation, obligations concerning consenting process, enforcement, preparation of documents etc.

A provisional list of Safety Guides on Regulation of Nuclear and Radiation Facilities is given in Annexure-IV of this Guide.

3.5 Identification of Guides for Nuclear Facilities

A provisional list of Safety Guides for various areas/activities of interest to Nuclear Power Plants, is given in Annexure-V of this Guide. Some of them are

already published and the rest are under publication. Those already published are marked '*' in the list.

A similar list of Safety Guides for other Nuclear Fuel Cycle Facilities, which are yet to be prepared, is included in Annexure-VI. Annexure-VII contains the provisional list of Safety Guides for Radiation Facilities. Safety Guides for Nuclear Waste Management, have also been identified for preparation. They are included in Annexure-VIII.

3.5.1 Guides to be followed during different activities/stages, can be chosen out of this list. As an example, the Safety Guides listed in Annexure-V which will be useful for different stages of NPP/RR are illustrated below.

TABLE III-1: EXAMPLE OF GUIDES ON NUCLEAR FACILITIES

Facility listed in 1.3.1	**Stage**	**Applicable Guides**
Research reactors, experimental reactors and critical assemblies and NPPs	Siting	AERB/SG/S-1 to SG/S-11
--Do--	Construction	AERB/SG/QA-1 to SG/QA-4 AERB/SG/D-1 to SG/D-25 AERB/SG/CSE-1 to CSE-8 AERB/SM/D-1
--Do--	Commissioning and Operation	AERB/SG/QA-5 AERB/SG/O-1 to SG/O-11 Guides/Manuals related to Health Physics.
--Do--	Decommissioning	Related Guides

It is to be noted that more guides may need to be added for the different stages. Also, the same guide may be common to many facilities.

Details regarding preparation of documents, identification of colours to be used for their covers, arrangements of conents, letter quality, numbering of sections, subsections and clauses and abbreviations tobe used for reference numbers of various documents, are given in section-4.

3.6 Identification of Guides for Radiation Facilities

A provisional list of Guides for various radiation facilities is given in Annexure-VII of this Guide.

3.6.1 Guides to be followed during different activities, can be chosen out of this list. As an example, the Safety Guides listed in Annexure-VII, which will be useful for different stages in medical application of radiation, are illustrated below.

TABLE III-2: EXAMPLE OF GUIDES FOR RADIATION FACILITIES

Facility listed in 1.3.2	Stage	Applicable Guides
Medical applications of radiation	Installation and operation	AERB/SG/MED-1 to 5 AERB/SM/MED-1 and 16 & 17 of Annexure-IV of this Guide.
	Closure or decommissioning	Applicable AERB Manuals for source removal, decontamination of the facility for future use.

It is to be noted that more guides may need to be added for the different stages. Also, the same guide may be common to many facilities.

Details regarding preparation, identification of the colour of the document, numbering and abbreviations used for various documents' reference numbers, are given in section-4.

3.7 Safety Guidelines

The Regulatory Body, sometimes, provides guidance through "Guidelines" where a Code has not been issued on a particular subject. The structure and contents of Guidelines essentially follow the same pattern as of the Guides. Whenever the Codes have been prepared for such subjects also, these Guidelines should be updated as Guides. One example is the set of AERB Guidelines issued for preparation of On-Site and Off-Site Emergency Preparedness Plans for Nuclear and other Installations.

4. PREPARATION OF DOCUMENTS

4.1 General

The entire process of identification, preparation, issuance, periodic review and updating/revision of safety documents namely Safety Codes and Standards, Safety Guides, Safety Practices and Manuals is the responsibility of the Regulatory Body.

4.2 Size, Colour Coding of the Documents

4.2.1 Proper size, colour coding and letter quality of the documents as mentioned below should be ensured before the document is published. Colour, letter size and quality are normally numbered and the same be used for maintaining uniformity and standard.

4.2.2 Size of the Documents

Codes, Standards, Guides	-	16.5 cm x 24.5 cm
Manuals	-	21 cm x 28 cm (report size)

Centre strip dimensions (on front and back cover pages) for:

Codes, Standards and Guides

Size of the strip	-	3.5 cm
Height above the strip	-	8.0 cm
Height below the strip (including bottom yellow strip)	-	13.0 cm

Manuals

Size of the strip	-	4.5 cm
Height above the strip	-	8.5 cm
Height below the strip (including bottom yellow strip)	-	15.0 cm

Bottom yellow strip dimensions for:

Codes, Standards and Guides	-	3.0 cm
Manuals	-	3.5 cm

4.2.3 Colour coding of documents:

Front cover page background	-	Silver grey
Back cover page background	-	Silver grey
Center strip for Codes	-	Maruti red
Center strip for Standards	-	Maroon red
Center strip for Guides	-	Navy blue
Center strip for Manuals	-	Green
Bottom strip for all	-	Yellow

4.3 Letter Quality and Arrangement of Documents

4.3.1 Letter Quality and Arrangement of Cover page and Back page

Government emblem (three-faced lion) and "Government of India" in black, normal and capital letters (font size 10 pt. for Codes, Standards and Guides and 12 pt. for Manuals respectively) should be printed in the top Silver Grey portion.

Regulatory Body (AERB) Safety Code or Standard or Guide or Manual in white capital letters or reverse printing (font size 12pt. for Codes, Standards and Guides and 14 for Manuals respectively) should be printed in the centre strip of the respective document on the front cover page.

The documents reference number in white capital letters in reverse printing (font 10 pt. for Codes, Standards and Guides and 12 pt. for Manuals) should be printed on the respective document's back cover page centre strip. The document reference number should also be printed on (i) the top right corner of the front cover (in font 10 pt. for Codes, Standards and Guides and 12 pt. for Manuals) and (ii) the left portion of the space of the side stitched documents (in font 8 pt. or less to suit the thickness of the space). See section 4.3.3 of this Guide for further details.

Title of the document should be printed in black bold capital letters (font 16 pt. for Codes, Standards and Guides and 18 pt. for Manuals) in the silver grey space between the centre strip and bottom yellow strip on the front cover page.

Name of the Regulatory Board in capital bold letters in black colour (font 10 pt. for Codes, Standards and Guides and 12 pt. for Manuals) 12 pt. should be printed in the yellow strip on the front cover of the document.

Logo of the Regulatory Board should be in black colour on the left side of the yellow strip of document's front cover page.

Publisher's address in black letters may be printed in the yellow strip on the back cover of the document.

"Times New Roman" font should be used on cover pages.

4.3.2 Letter Quality and Arrangement of Different Sections of the Document

"Times New Roman" font should be used throughout the document.

Font size should be 12 pt. for section titles, 10 pt. for rest of the text in the section and 8 pt. for footnotes and sub/superscripts for Codes, Guides and Standards. Section titles should be in bold and capital letters.

Font size should also be 12 pt. for section titles, 10 pt. for running text in the sections and 8 pt. for footnotes and sub/super scripts for Manuals. Section titles should be in bold and capital letters. Titles of tables, graphs, figures should be in font 10 pt. bold capital letters and footnotes in font size 8 pt. in normal letters.

Equations and symbols should be in italics (e.g., $dN/dT = g$).

Sub-sections and subsequent paragraph of sub-sections should be numbered as in IAEA documents e.g.,

1.1 Bold upper-lower lettering of words of the title,

1.1.1 Upper-lower text not bold (normal),

1.1.1.1 Not many sub-sub-sections should be made and if required Roman numbers, alphabetic letters, bullets and/or dashes may be used.

The area of a page covered by the text should not exceed 12.0 cm x 18.5 cm (excluding the bottom page number) for Codes, Standards and Guides, including the page number the text height should be 20 cm. For manuals,

the text area of the page should be 15.5 cm x 22.5 cm (excluding the page number) and 15.5 cm x 25 cm including the page number. The top margin should be 2.5 cm and the side margin should be so adjusted as to keep them equal on the right and left sides of the text line lengths.

The first inner page should bear the document reference number on top (font size 10 pt.), title of the document in the middle (font size 12 pt.) both in capital letters, the date of issue (in upper/lower) on lower down (font 10 pt.) and name of the Regulatory Body (in upper/lower) at the bottom of the page, (font size 10 pt.) size in bold letters.

The second inner page should bear the price (if applicable) at the centre and the full address (in bold upper/lower) from where the document can be procured at the bottom. Information about availability of documents on electronic media along with access code should be given in the document published for public use.

The third inner page should start with the Foreword and it may go up to fourth page, else the page should be left blank.

List of Definitions should start from fifth inner page onwards. The 'technical terms' should be in upper/lower bold letters and the definitions should be given below the respective terms alphabetically.

Contents should start after definitions, but the starting page should be on the right side (odd page number). Section titles should be in normal capital letters and sub-sections in normal upper/lower, both followed by dotted lines up to page numbers given against each. Appendix, Annexures, References/ Bibliography, Tables, Figures, List of Participants and a Provisional List of respective documents related to the document should also be listed in normal capital letters.

Pages from foreword to end of definitions should be numbered in Roman numerals e.g. (i), (ii)…. (x). The content page should not be numbered.

Section 1, "Introduction" should start from right page (odd page number) and each following section should start from a new page with its title on top. These pages from section-1 onwards should be numbered in Arabic numerals e.g. 1,2,3, etc. till the end of the document. The page number should be at the centre of the bottom of the page.

Appendices should be placed after the main text. Titles of Appendix should be given in bold capital letters in font size 10 pt..

Annexures should be placed after Appendices. Titles of Annexure should be in bold capital letters in font size 10 pt.

References should be placed after the Annexures and the pattern should be as in IAEA documents (i.e., author names in capitals and document details in running upper and lower text, with year of publication at the end of the reference). Only normal letters should be used under the title which should be in font size 12 pt.

Bibliography should come after References and the pattern of text may be as far as possible like IAEA but can deviate within reasonable limits. Only normal letters should be used under title which should be in font size 12 pt.

List of Participants and Committees with dates of meeting etc. should come after References and Bibliography. The title of the committee should be in font size 10 pt., bold capital letters and subtitles about the names of members in the committee in bold, font size 10 pt. in upper/lower case. The rest should be in normal letters of font size size 10 pt.

List of Documents relevant to subjects should come last, after list of participants. This should be in a column box. The first column is to give the reference number of the document and the second column, the complete title of the document.

Documents should be side stitched for which a gutter width of 5 mm is to be provided within the overall width of 16.5 cm and 21 cm of Codes, Standards, Guides and Manuals respectively (as centre stitching is not durable).

4.3.3 Abbreviations used for Various Document Reference Numbers:

The following abbreviations should be used while preparing various documents to maintain uniformity and to identify them easily by their reference numbers.

Name of the Regulatory Body or its abbreviation should be the first reference number. The Atomic Energy Regulatory Board (AERB) should be the first abbreviation in the reference number for Indian documents.

Safety Code (SC), Safety Standard (s), Standard Specifications (SS), Safety Guide (SG) and Safety Manual (SM) etc., should be the second abbreviation in the reference number.

Siting (S), Design (D), Operation (O), Quality Assurance (QA), Decommissioning (DC), Regulation (G), Medical (MED), Industrial (IN), Transport of Radioactive Material (TR), Irradiators (IRRAD), Industrial Radiography (IR), Civil (CSE), Fire (F) etc., should be the third abbreviation in the reference number. Numbers 1,2,3..... etc., should be used after reference number with a dash (-) to identify different documents belonging to the same family.

The above reference numbers should be separated by a slash. AERB/SG/D-11 is typical example giving reference numbers of a AERB Safety Guide on "Design in Electrical Power Supply Systems for Pressurised Heavy Water Reactors." The version of the document may be indicated by 'R-1' or 'R-2' etc., in the brackets after the main reference number.

4.4 Procedure for Preparation of Regulatory Safety Documents

4.4.1 Based on documentation practices of various national regulatory organisations in other countries like USA, Canada etc., as well as international organisations like IAEA, and keeping in view the special national requirements, topics are identified by the Regulatory Body in India for preparation of appropriate regulatory documents bringing out the safety requirements in the fields of nuclear safety, industrial safety and radiological safety. The Indian regulatory body has followed a system consisting of "multi-tier committees" to prepare these documents.

4.4.2 Members of all these committees are so nominated as to ensure that expertly written, unbiased, transparent documents are prepared, which are implementable under Indian conditions. In addition to specialists from the Regulatory Body, suitable experts from various DAE units, Technical Institutions like IIT, National Research Laboratories, Universities, Central/State Government Departments and Public Undertakings etc. are nominated in the above committees.

4.4.3 As a first step, a "Working Group" (consisting of specialists actively involved in and conversant with the state of the art in the relevant field) is constituted to prepare the initial draft (R-0 Draft) of the proposed document. Technical terms

used in all documents are defined in a consistent manner for which Glossary Committees have been constituted which "normalise" the definitions of these terms.

4.4.4 A broad-based "Advisory Committee" which consists of highly experienced senior specialists in the relevant field(s) reviews this draft. A number of such Advisory Committees have been constituted and are functioning parallely, for well-identified areas, e.g. for siting, design, operation and quality assurance of nuclear installations, for applications of radiation in other fieldsand for Safety regulations. After initial review, the revised draft (R-1 Draft) is circulated among representative specialists in premier institutions.

4.4.5 In the light of comments/suggestions received from them, a further revision of the draft (R-2 Draft) is made by the "Advisory Committee". An apex committee, "This Committee, consisting of specialists of national standing, subsequently reviews this draft. Members of An apex committee are so chosen that, collectively, they provide requisite expertise in all areas to be covered by the regulatory documentation. An apex committee not only reviews the draft from the point of view of technical accuracy and implementability, but also ensures harmonisation of all documents to be issued by the Regulatory Body. It makes appropriate modifications and finally submits the revised draft (R-3 Draft) to the Head of the Regulatory Body. In the Indian context, it is the Chairman, AERB.

4.4.6 The R-3 draft undergoes "Technical Editing" by an independent expert, focussing on flow and clarity of language from the standpoint of unambiguous communication of technical contents. Lastly, this edited draft undergoes professional "copy-editing" primarily to improve the accuracy of English language to an internationally acceptable level.* The final draft is reformatted to conform to Regulatory Body's standard format(s) for codes, guides or manuals, as the case may be.

4.4.7 This final edited and formatted version is printed in the required number and issued for implementation by concerned utilities. For an initial period of one year from the date of issue, the documents are open to comments and suggestions. Based on comments received, the documents may be revised and reissued, if the nature of comments so warrant.

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* Certain documents may also undergo a preliminery technical/copy editing prior to R3 stage.

ANNEXURE - I

OVERVIEW OF STATUTES

1. General

Nuclear and radiation safety in the country is enforced by the Regulatory Body by virtue of provisions of the relevant sections of Atomic Energy Act, 1962 and the Rules and surveillance procedures issued under the enabling provisions of the Act . Industrial safety in the Department of Atomic Energy establishments is ensured through issue of Atomic Energy (Factories) Rules, 1996 based on provisions of the Factories Act, 1948 and its enforcement.

2. Acts

The safety provisions of Atomic Energy Act, 1962, relevant to the applicant intending to set up and operate a nuclear or radiation facility are:

(i) Section 16: This empowers the Central Government to prohibit the handling of radioactive substances without its written Consent.

(ii) Section 17: This empowers the Central Government to frame Rules to prevent radiation injuries at work places, to safely dispose off radioactive wastes, to ensure appointment of qualified persons, to ensure structural safety of buildings, to ensure safety in transportation of radioactive substances, to authorise persons to inspect premises etc..

(iii) Section 23: This empowers the Central Government to administer the provisions of Factories Act, 1948 in the Central Government factories engaged in activities related to Atomic Energy.

3. Rules

Under the enabling provisions of various sections of the Atomic Energy Act, 1962, the following Rules have been issued so that the Regulatory Body (AERB) can carry out its functions and ensure safety in the specific application (activity) areas:

(i)	Radiation Protection Rules, 1971.	(Under Section 30)
(ii)	Atomic Energy (Working of Mines, Minerals and Handling of Prescribed Substances) Rules, 1984.	(Under Sections 14 & 30)
(iii)	Atomic Energy (Safe Disposal of Radioactive Wastes) Rules, 1987.	(Under Sections 17 &30)
(iv)	Atomic Energy (Control of Irradiation of Food) Rules, 1996.	(Under Sections 14,17 & 30)
(v)	Atomic Energy (Factories) Rules, 1996.	(Under Sections 23 & 30)

These Rules stipulate the safety requirements to be complied with by the licensee, and the enforcement measures to be taken by the Regulatory Body, such as safety assessment, issue of regulatory consent, verification of compliance with statutory provisions through inspections, taking of punitive action for violations etc.. The Rules also include formats for application for consent, issue of consent, reporting etc..

4. Surveillance Procedures

Rule 15 of Radiation Protection Rules, 1971 provides for issue of surveillance procedures appropriate to the radiation source and for the Applicant/ Consentee to comply with the same. This Rule also stipulates that these procedures may provide that radiation installation shall be planned, and approved by the Competent Authority. The working conditions shall be approved prior to routine operation such as, personnel monitoring of workers, medical examination of radiation workers, maintenance of records of individual doses, inventory of sources, results of area monitoring and any other data specified by the Competent

Authority. Accordingly, surveillance procedures have been issued in respect of :

(i) Industrial Radiography (1980)

(ii) Medical Application of Radiation Sources (1989) and

(iii) Transport of Radioactive Materials (1987)

Surveillance procedures specify that the competent authority may issue safety codes in which specific details in respect of any particular activity are specified and compliance with the code is mandatory.

ANNEXURE - II

PROVISIONAL LIST OF SAFETY CODES/STANDARDS FOR NUCLEAR FACILITIES

*AERB/SC/G	Safety Code on Regulation of Nuclear and Radiation Facilities
*AERB/SC/S	Code of Practice on Safety in Nuclear Power Plant Siting
*AERB/SC/D	Code Of Practice on Design for Safety in Pressurised Heavy Water Based Nuclear Power Plants
*AERB/SC/O	Code of Practice on Safety in Nuclear Power Plant Operation
*AERB/SC/QA	Code of Practice on Quality Assurance For Safety in Nuclear Power Plants
AERB/SC/DC	Safety Code on Nuclear Power Plant Decommissioning
AERB/SS/F	Safety Standard for Fire Protection Systems of Nuclear Facilities
AERB/SC/RW	Safety Code on Management of Radioactive Waste
*AERB/SS/CSE	Civil Engineering Structures Important to Safety of Nuclear Facilities

* Published

ANNEXURE - III

PROVISIONAL LIST OF SAFETY CODES/STANDARDS FOR RADIATION FACILITIES

*1. Safety Code for Telegamma Therapy Equipment and Installations, AERB/SC/MED-1

*2. Safety Codes for Medical Diagnostic X-ray Equipment and Installations, AERB/SC/MED-2

*3. Safety Code for Brachytherapy Sources, Equipment and Installations, AERB/SC/MED-3

*4. Safety Code for Nuclear Medicine Laboratories, AERB/SC/MED-4

*5. Safety Code for the Transport of Radioactive Materials, AERB/SC/TR-1

*6. Safety Code on Emergency Response Planning and Preparedness for Transport Accidents involving Radioactive Material, AERB/SC/TR-3

*7. Safety Code on Operation and Maintenance of Land-Based Stationary Gamma Irradiators, AERB/SC/IRRAD

8. Safety Code on Industrial Radiography, AERB-SC/IR-1

9. Safety Code for Nucleonic Gauging Devices

10. Safety Code on Use of Radiation Sources in Biomedical Research

11. Safety Code on Use of Radiation Sources in Education and Teaching

12. Safety Code on Radioactive Tracers in Hydrology

13. Safety Code on Particle Accelerators

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* Published

14. Safety Code on Safe Disposal of Radioactive Waste in Non-Nuclear Fuel Cycle Practices

15. Standard Procedures for Dosimetry in Food Processing by Gamma Irradiation - Code of Practice

16. Specification for Diagnostic Medical X-ray Equipment IS-7620 Part-1: General and Safety Requirements

17. Specification for Diagnostic Medical X-ray Equipment IS-7620 Part-2: Performance Requirements

18. Medical Electrical Equipment - Diagnostic X-ray Equipment IS-7620 Part-3: Radiation Safety Requirements

19. Medical Electrical Equipment - Dental X-ray Equipment IS- 13709, Radiation Safety Requirements

20. Medical Electrical Equipment - Computed Tomography Equipment - Radiation Safety Requirements

21. Medical Electrical Equipment - X-ray Simulator Equipment Radiation Safety Requirements

22. Medical Electrical Equipment - Part-1: General Requirements for Safety, IS-13450 (Part-1)/IEC-601-1

23. Safety of Medical Electrical Equipment - Part-2 : Particular Requirements for Medical Electron Accelerators in the range of 1 MeV to 50 MeV Section One: General and Section Two: Radiation Safety for Equipment, IEC-601-2-1

24. Safety of Medical Electrical Equipment - Part-2 Particular Requirements for the Gamma Beam Therapy Equipment, Section One: General and Section Two: Radiation Safety for Equipment , IEC-601-2-11

25. Medical Electrical Equipment Part-2: Particular Requirements for the Safety of Remote Controlled Automatically-driven Gamma-ray after loading Equipment, IEC-601-2-17

*26. Standard Specifications for Radiological Safety for the Design and Construction of Industrial Gamma Radiography Exposure Devices and Source Changers, AERB/SS-1

*27. Standard Specifications for Radiological Safety in the Design, Construction and Use of Industrial Ionizing Radiation Gauging Devices, AERB/SS-2.

*28. Standard Specifications for Classification and Testing of Sealed Radioactive Sources, AERB/SS-3

*29. Standard Specifications for Radiological Safety in the Design, Construction and Manufacture of Consumer Products containing Radioactive Substances, AERB/SS-4

*30. Standard Specifications for Radiological Safety in the Design and Manufacture of X-ray Analysis Equipment, AERB/SS-5

*31. Standard Specifications for Radiological Safety for the Design and Installation of Land-Based Stationary Gamma Irradiators, AERB/SS-6

32. Standard Specifications for Radiological Safety for the Design and Operation of Gamma Irradiators (Category-1)

33. Safety Code for Oil Well Logging Sources

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* Published

ANNEXURE - IV

PROVISIONAL LIST OF SAFETY GUIDES ON REGULATION OF NUCLEAR & RADIATION FACILITIES

AERB/SG/G-1	Consenting Process for Nuclear Power Plants and Research Reactors: Documents Submission, Regulatory Review and Assessment of Consent Applications
AERB/SG/G-2	Consenting Process for Nuclear Fuel Cycle and Related Industrial Facilities: Documents Submission, Regulatory Review and Assessment of Consent Applications
AERB/SG/G-3	Consenting Process for Radiation Facilities: Documents Submission, Regulatory Review and Assessment of Consent Applications
AERB/SG/G-4	Regulatory Inspection and Enforcement Nuclear and Radiation Facilities
*AERB/SG/G-5	Role of Regulatory Body with respect to Emergency Response and Preparedness at Nuclear and Radiation Facilities
AERB/SG/G-6	Codes, Standards and Guides to be Prepared by the Regulatory Body for Nuclear & Radiation Facilities
AERB/SG/G-7	Regulatory Consents for Nuclear & Radiation Facilities Contents, Formats
AERB/SG/G-8	Criteria for Regulation of Health and Safety of Nuclear Power Plant Personnel, the Public and the Environment

* Published

ANNEXURE - V

PROVISIONAL LIST OF SAFETY GUIDES FOR NUCLEAR POWER PLANTS

Siting

AERB/SG/S-1	Meteorological Dispersion Modelling
*AERB/SG/S-2	Hydrological Dispersion of Radioactive Materials in Relation to Nuclear Power Plant
AERB/SG/S-3	Extreme Values of Meteorological Parameters
AERB/SG/S-4	Hydrogeological Aspects of Siting of Nuclear Power Plants
AERB/SG/S-5	Models for Radiation Dose Computation Methodologies from Radioactivity Concentration in Environment
*AERB/SG/S-6A	Design Basis Flood for Nuclear Power Plants on Inland Sites
AERB/SG/S-6B	Design Basis Flood for Nuclear Power Plants at Coastal Sites
AERB/SG/S-7	Man - Induced Events and Establishment of DBFs
AERB/SG/S-8	Influence of Site Parameters on Emergency Preparedness
*AERB/SG/S-9	Population Distribution and Analysis in Relation to Siting of NPPs
AERB/SG/S-10	Quality Assurance in Siting
*AERB/SG/S-11	Seismic Studies and Design Basis Ground Motion for Nuclear Power Plant Sites
AERB/SG/S-12	Guidelines on Evaluation for Safety in Dams

* Published

Quality Assurance

AERB/SG/QA-1	Quality Assurance in the Design of Nuclear Power Plants
*AERB/SG/QA-2	Quality Assurance in the Procurement of Items and Services for Nuclear Power Plants
*AERB/SG/QA-3	Quality Assurance in Manufacture of Items for Nuclear Power Plants
AERB/SG/QA-4	Quality Assuranceduring Site Construction of Nuclear Power Plants
*AERB/SG/QA-5	Quality Assurance during Commissioning and Operation of Nuclear Power Plants
AERB/SG/QA-6	Assessment of the Implementation of the Quality Assurance Programme.

Design

AERB/SG/D-1	Safety Classification and Seismic Categorisation
AERB/SG/D-2	Application of Single Failure Criteria
AERB/SG/D-3	Protection against Internally Generated Missiles and Associated Environmental Conditions
*AERB/SG/D-4	Fire Protection
*AERB/SG/D-5	Design Basis Events
AERB/SG/D-6	Fuel Design
*AERB/SG/D-7	Core Reactivity Control

* Published

AERB/SG/D-8	Primary Heat Transport System
AERB/SG/D-9	Process Design
AERB/SG/D-10	Safety Critical Systems
AERB/SG/D-11	Emergency Electrical Power Supply Systems
AERB/SG/D-12	Radiation Protection in Design
AERB/SG/D-13	Liquid and Solid Radioactive Waste Management
AERB/SG/D-14	Control of Air-borne Radioactive Materials
*AERB/SG/D-15	Ultimate Heat Sink and Associated Systems
AERB/SG/D-16	Materials Selection and Properties
AERB/SG/D-17	Design for In-Service Inspection
AERB/SG/D-18	Loss of Coolant Accident (LOCA) Analysis
AERB/SG/D-19	Hydrogen Release and Mitigation Measures under Accident Condition
AERB/SG/D-20	Safety Related Instrumentation and Control
AERB/SG/D-21	Containment System Design
*AERB/SG/D-22	Vapour Suppression System
AERB/SG/D-23	Seismic Qualification
AERB/SG/D-24	Design of Fuel Handling and Storage Systems
AERB/SG/D-25	Computer Based Safety Systems

* Published

Civil

AERB/SS/CSE-1	Design of Concrete Structures Important to Safety in Nuclear Facility
AERB/SS/CSE-2	Design, Fabrication and Erection of Steel Structures Important to Safety in Nuclear Facility
AERB/SS/CSE-3	Design and Construction of NPP Containment Structures
AERB/SS/CSE-4	Design, Fabrication and Erection of Embedded Parts, Penetrations Important to Safety in Nuclear Facility
AERB/SG/CSE-1	Seismic Analysis and Qualification of Structures, Systems, Equipment and Components Important to Safety in Nuclear Facility
AERB/SG/CSE-2	Geo-Technical Aspects for Buildings and Structures Important to Safety in Nuclear Facility
AERB/SG/CSE-3	Quality Assurance Aspects in Civil Engineering Structures Important to Safety in Nuclear Facility
AERB/SG/CSE-4	Materials of Construction for Civil Engineering Structures Important to Safety in Nuclear Facility

Operations

*AERB/SG/O-1	Staffing, Recruitment, Training, Qualification and Certification of Operating Personnel of NPPs
AERB/SG/O-2	In-service Inspection of NPPs
*AERB/SG/O-3	Operational Limits and Conditions for NPPs

* Published

*AERB/SG/O-4	Commissioning Procedures for Pressurised Heavy Water Based NPPs
*AERB/SG/O-5	Radiation Protection during Operation of NPP
*AERB/SG/O-6	Preparedness of the Operating Organisation for Handling Emergencies at NPPs
*AERB/SG/O-7	Maintenance of NPPs
*AERB/SG/O-8	Surveillance of Items Important to Safety in NPPs
*AERB/SG/O-9	Management of NPPs for Safe Operation
*AERB/SG/O-10A	Core Management and Fuel Handling in Operation of PHWRs
*AERB/SG/O-10B	Core Management and Fuel Handling in Operation of BWRs
AERB/SG/O-11	Operational Management of Radioactive Effluents and Wastes Arising in NPPs
*AERB/SG/O-12	Renewal of Authorisation for Operation of NPPs
AERB/SG/O-13	Operational Experience Feedback for NPPs

Emergency Response Preparedness Guidelines for NPPs

*AERB/SG/EP-1	Preparation of Site Emergency Preparedness Plans for Nuclear Installations
*AERB/SG/EP-2	Preparation of Off-Site Emergency Preparedness Plans for Nuclear Installations

* Published

ANNEXURE - VI

PROVISIONAL LIST OF SAFETY GUIDES FOR NUCLEAR FUEL CYCLE FACILITIES OTHER THAN NUCLEAR POWER PLANTS

1. Safety Guide on Safety of Uranium/Thorium Mining, Milling and Processing

2. Safety Guide on Safety of Uranium Fuel Fabrication Facilities

3. Safety Guide on Safety of Plutonium Fuel Fabrication Facilities

4. Safety Guide on Safety of Spent Fuel, Reprocessing Facilities

ANNEXURE - VII

PROVISIONAL LIST OF SAFETY GUIDES FOR RADIATION FACILITIES

*1. Safety Guide on Medical Management of Persons Exposed in Radiation Accidents, AERB/SG/MED-1

2. Safety Guides for Medical Diagnostic X-ray Equipment and Installations, AERB/SG/MED-2

3. Safety Guide for Brachytherapy Sources, Equipment and Installations, AERB/SG/MED-3

4. Safety Guide for Nuclear Medicine Facilities, AERB/SG/MED-4

5. Safety Guide on Medical Management of Persons Exposed in Radiation Accidents, AERB/SG/MED-5

6. Safety Guide on Manufacture of Consumer Products Containing Radioactive Materials

7. Guide on Safe Disposal of Radioactive Waste in Non-Nuclear Fuel Cycle Practices

8. Safety Guide on Enclosed Radiography Installations, AERB/SG/IR-1

9. Safety Guide on Open Field Radiography Installations, AERB/SG/IR-2. convicted

10 Safety Guide for Handling of Radiation Emergencies in Industrial Radiography, AERB/SG/IR-3

*11. Safety Guide on Compliance Assurance Program for the Safe Transport of Radioactive Material, AERB/SG/TR-1

*12. Safety Guide on Standards of Safety in Transport of Radioactive Material, AERB/SG/TR-2

*13. Safety Guide on Procedure for Forwarding, Transport, Handling and Storage of Radioactive Consignments, AERB/SG/TR-3

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* Published

14. Glossary of Terms used in Radiation Safety Documents, AERB/Glossary-1

*15. Safety Manual on Atlas of Reference Plans for Medical Diagnostic X-ray Installations, AERB/SM/MED-1

*16. Safety Manual-HandBook for Medical Management of Persons Exposed in Radiation Accidents, AERB/SM/MED-2

17. Safety Guide on Ionising Radiation Measurements

*18. Preparation of Site Emergency Preparedness Plans for Non-Nuclear Installations, AERB/SG/EP-3

*19. Preparation of Off-Site Emergency Preparedness Plans for Non-Nuclear Installations, AERB/SG/EP-4

*20. Safety Guide on Radiological Safety in Enclosed Radiography Installations, AERB/SG/IN-1

*21. Safety Guide on Open Field Industrial Radiography, AERB/SG/IN-2

*22. Safety Guide for Handling of Radiation Emergencies in Industrial Radiography, AERB/SG/IN-3

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* Published

ANNEXURE - VIII

PROVISIONAL LIST OF SAFETY GUIDES FOR RADIOACTIVE WASTE MANAGEMENT

1. Safety Guide on Classification of Radioactive Waste

2. Safety Guide on Collection and Treatment of Low and Intermediate Level Radioactive Waste

3. Safety Guide on Siting of Near-Surface Disposal Facilities

4. Safety Guide on Near-Surface Disposal of Radioactive Waste

LIST OF PARTICIPANTS

WORKING GROUP

Dates of Meeting :	July 07, 1995	February 05, 1996
	August 09, 1995	April 23, 1996
	January 03, 1996	March 20, 1997
	January 17, 1996	June 04, 1997
	January 24, 1996	

Members and invitees participating in the meeting

Shri R.S. Singh (Chairman)	:	AERB
Dr. I.S. Sundara Rao	:	AERB (Formerly)
Shri P. Hajra	:	AERB
Dr. P.C. Basu	:	AERB
Dr. A.K. Ghosh (partly)	:	BARC
Shri P.K. Agarwal	:	NPC
Shri K.D. Pushpangadan (co-opted)	:	AERB
Shri S.N. Rao (Member- Secretary)	:	AERB

ADVISORY COMMITTEE ON PREPARATION OF CODE AND GUIDES ON GOVERNMENTAL ORGANISATION FOR REGULATION OF NUCLEAR AND RADIATION FACILITIES (ACCGORN)

Dates of meeting :	August 15, 1996 November 11, 1997 August 10, 1998

Members and invitees participated in the meeting:

Dr. S.S. Ramaswamy (Chairman)	:	DG, FASLI (Formerly)
Shri G.V. Nadkarny	:	NPC (Formerly)
Shri A.K. Asrani	:	AERB
Shri T.N. Krishnamurthy	:	AERB (Formerly)
Shri N.K. Jhamb	:	AERB
Dr. K.S. Parthasarathy	:	AERB
Dr. I.S. Sundara Rao	:	AERB (Formerly)
Shri A.S. Bhattacharya	:	NPC
Shri P.K. Ghosh	:	AERB
Shri R.S. Singh	:	AERB
Shri G.K. De (Member-Secretary	:	AERB
Shri Y.K. Shah (invitee)	:	AERB
Shri S.T. Swamy (invitee)	:	AERB
Shri K. Srivasista (invitee)	:	AERB