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# **Licensee's feedback on AERB regulatory documents**

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**Regulatory safety documents** issued by AERB are classified in the following decreasing order of hierarchy:

- (a) Safety codes
- (b) Safety standards
- (c) Safety guidelines
- (d) Safety guides
- (e) Safety manuals
- (f) Technical documents

The requirements covered in safety codes and safety standards are mandatory in nature. The safety guide is a safety document containing detailed guidance and methodologies that are acceptable to AERB to implement the specific parts of a safety code/safety standard. Safety guides are recommendatory in nature.

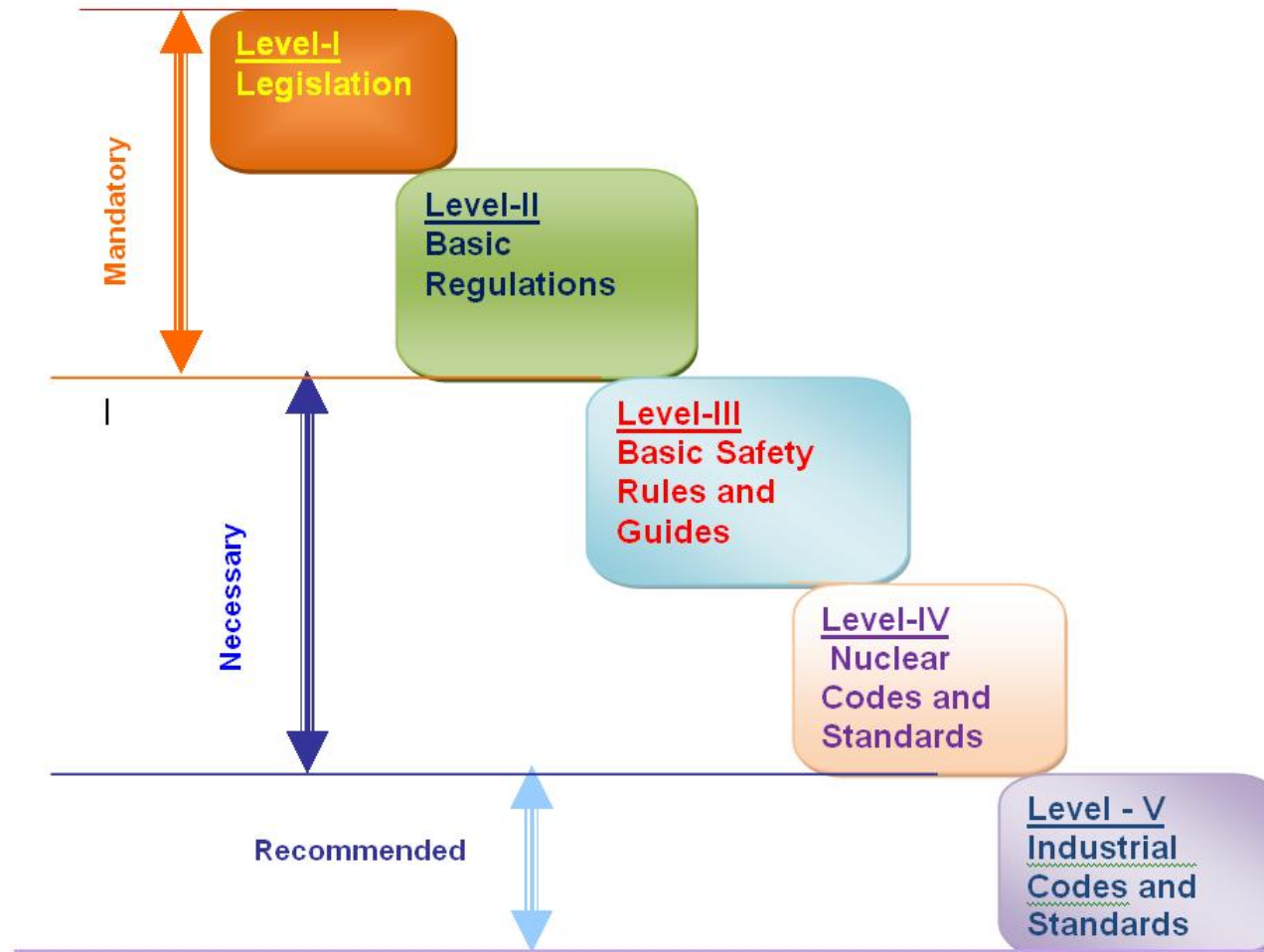


# LEGISLATION, REGULATIONS, CODES AND STANDARDS



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## REGULATION HIERARCHY





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AERB has put in place a well-established process and mechanism for development of regulatory documents as specified in AERB safety guide AERB/NRF/SG/G-6

The framework for document development in AERB involves a multi-tier system of committees of experts.

Feedback and participation from nuclear and radiation facilities is also considered while preparation of new document or for revision of an existing document.

Recent past, AERB started development of new/revision regulatory documents on various topics ranging from 'Accident management' to 'Emergency power supply system' across various technologies( HWR, LWR & FBR).

Appreciable efforts also initiated in formulation of new regulations to accommodate the fleet mode deployment of reactors in the country.





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## **LWR Specific documents**

**Most of the presently issued documents are PHWR specific.**

**There are only two ‘LWR specific’ documents.**

1. Safety Code “ Design of Light Water Reactor Based Nuclear Power Plants, [AERB/NPP-LWR/SC/D](#), January 2015.
2. Safety Guide on “Commissioning of Pressurised Water Reactors Based Nuclear Power Plants”, [AERB/NPP-PWR/SG/O-4 C](#), October 2014





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There are general documents which are applicable to Light Water based Reactors as given below:

1. Safety Code “Site Evaluation of Nuclear Facilities”, [ **AERB/NF/SC/S (REV 1)**, 2014].
2. Safety Guide on “Consenting Process for Nuclear Power Plants and Research Reactors” [ **AERB/NPP&RR/SG/G-1**, 2007]. [**Under Revision** ]
3. Safety Code on “Quality Assurance for Safety in Nuclear Power Plants” [ **AERB/NPP/SC/QA**, 2009].
4. Safety code on “Nuclear Power Plant Operation” [ **AERB/NPP/SC/O (Rev.1)**, 2008].
5. Safety Code on “Radiation Protection for Nuclear Fuel cycle facilities” [ **AERB/NF/SC/RP**, 2013]
6. Safety Standard on “Civil Engineering Structures Important to Safety of Nuclear Facilities” [ **AERB/SS/CSE**, 1998]
7. Safety Guide on “Standard Format and Contents of Safety Analysis Report for NPPs” [ **AERB/NPP/SG/G-9**, 2017].

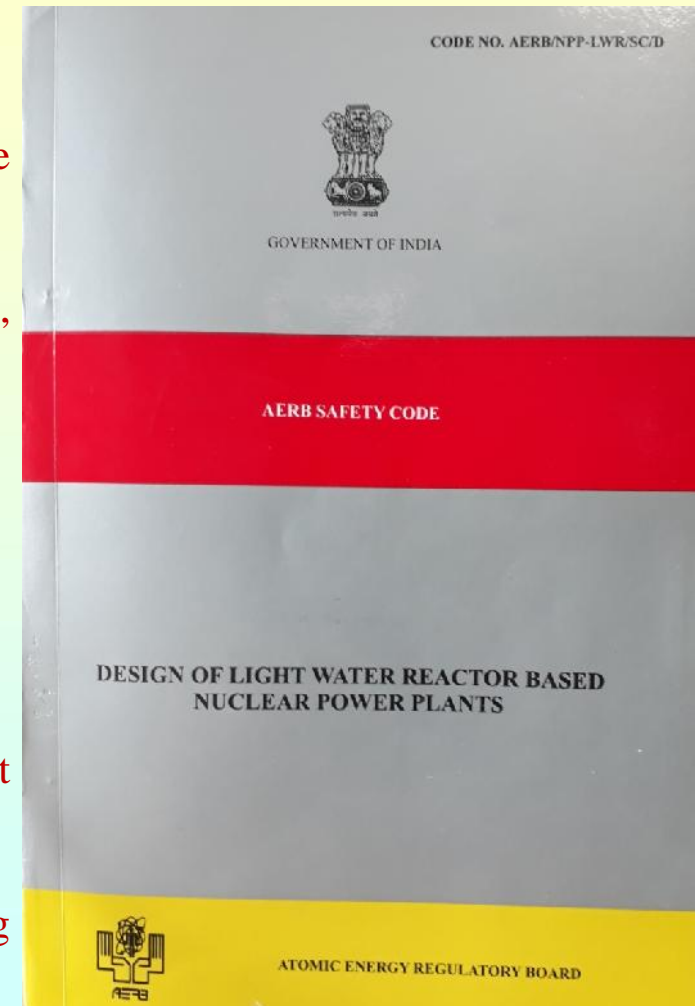




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## Safety Code “ Design of Light Water Reactor Based Nuclear Power Plants”

- Requirements of GEN III+ type Reactors (LWRs)
- The safety requirements in this code reflect the present national and international benchmarks.
- Considered relevant documents of IAEA, CNSC, STUK, USNRC, WENRA
- Specifies Quantitative Safety Targets
- Specifies Post Fukushima Requirements
- Extreme external events Requirements
- Protection of containment under severe accident conditions
- Plant States as per international harmony including DEC and OESC.



# Safety Code “ Design of Light Water Reactor Based Nuclear Power Plants

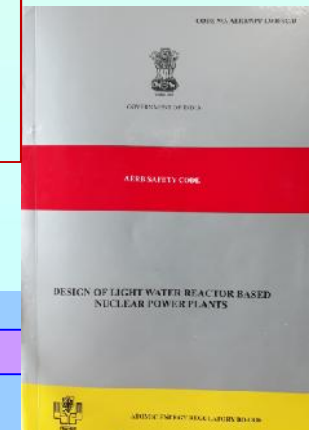


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## Advantages

- A single document specifies the high level AERB requirements for LWR, which is convenient to specify the Indian Regulatory Requirements.
- Reduces Licensing Risk ( Reduces the uncertainties related to Cost & Schedule)
- Transparency in the Regulatory requirements
- Consistency in the requirements rather than ‘subjective’ interpretations
- Reduces the technical negotiations time to a large extent.

LWR code also introduced concept of (**Design authority**) i.e the formal process in NPCIL to maintain (a) the integrity of design and (b) requisite knowledge throughout the plant life for the Imported reactors.







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LICENSEE'S FEEDBACK:

NEED  
FOR DEVELOPMENT OF  
ADDITIONAL REGULATORY DOCUMENTS  
IN THE AREAS  
OF  
LWR TECHNOLOGY





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## Licensee's feedback

### DEVELOPMENT OF STANDARD REVIEW PLAN DOCUMENT (SRPD)

Existence of Standard Review Plan document can provides (i) guidance to regulator in performing safety reviews of documents submitted by the Utility for Consenting applications , and (ii) guidance to the applicant to level of details required to be provided in the licensing submissions.

The principal purpose is to assure that level of details is to the expectation of the regulator and uniformity of the regulatory submissions.

SRPD would also improve communication between the Regulator, Utility and the Vendors/Suppliers, thereby increasing understanding of the review process and requirements.





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## Licensee's feedback

### DEVELOPMENT OF LWR SPECIFIC DOCUMENTS

Presently in AERB, majority of the documents are PHWR specific. PHWR codes are referred during the review process of LWR technology for the applicability or its intent. It always generates additional discussions for their applicability or intent for LWR based Plants.

Since the LWR fleets are presently based imported reactors, it is required to develop the LWR specific documents for the effective communication with the Foreign Vendors by providing 'Licensing requirements' and 'AERB review time' for Consenting. It will also address the Licensing related uncertainties.





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## Licensee's feedback

### DEVELOPMENT OF LWR SPECIFIC DOCUMENTS

- **Development of Safety Guide on Safety Systems of LWR**

Guidelines for the design of various Safety Systems viz. Additional Safety systems and Complementary Safety features for the mitigation of Design Extension Conditions.

### **DEVELOPMENT OF SAFETY CLASSIFICATION GUIDE :**

There are differences in the Systems and Components important to safety between PHWRs and LWRs. So it is required to have a LWR specific Safety Classification guidelines. Generic approach can be adopted considering different technologies (Active System ,Passive systems based NPPs) .

- **Development of Guidelines for the preparation and revision of Technical Specifications for LWRs**

- **Development of Safety Guide on Fire Protection For LWRs.**





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## Licensee's feedback

Development of PWR specific **Safety Evaluation Methodologies** are also desirable e.g. in the following areas:

- LWR Specific Criterion (like Fuel failure Criteria etc)
- Acceptance Criteria for different plant states in Analysis
- Margin assessment Criteria

**Methodologies should exist to comply with specified requirements. For compliance with the requirements methodologies are not known (Multi unit Risk estimation in Probabilistic manner)**

Extreme external events definition and criteria need to be established





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### Design Codes followed by the Technology Provider

#### **DESIGN CODES OF INTERNATIONAL ORIGIN AND THEIR ACCEPTANCE :**

- PNAEG (Russia), ASME(US and India) & RCC-M (France) or IEC vs. IEEE
- *No mandatory requirements for code comparison*

Each design code specifies specific requirements for material selection based on its application. Flexibility to accept the particular design code and recommended materials by the Codes is important.

It is required to establish a list of International documents which are acceptable to AERB wherever LWR specific documents are not existing presently.





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## Licensee's feedback

### General

-Operating Basis Earthquake is not considered in the design by most of the international Vendors. Safety significance OBE in the Licensing domain need a rethinking.

-It is observed that some provisions of Atomic Energy Factory Rule (AEFR) need to be revisited (e.g crane testing requirement, minimum distance for the exit door etc.)





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## Licensee's feedback

### Guidelines on Radiological Impact Assessment of Postulated Accidents in Nuclear Power Plants

- Revised Dose Criteria [Latest issued Safety Code on “Site evaluation of nuclear facilities”, 2014]
  1. Effective dose calculated using realistic methodology shall be less than 20.0 mSv/year following a DBA.
  2. Design extension condition (DEC) without core melt, target for effective dose, with limited interventions considered, remains same as for DBA.
  3. In case of severe accident, the release of radioactive materials should cause no permanent relocation of population.
- We know that task force for the preparation of guidelines started **July 14, 2014** to meet the newly introduced stringent dose targets.
- *NPCIL expects an early completion & issue of document(s) with clearly defined guidelines (From Source term to Public dose) with sample calculations for a typical PWR for meeting the above targets.*







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## Licensee's feedback

Proactive initiation by AERB for the Revision of Safety guide on "CONSENTING OF NUCLEAR POWERPLANTS", **AERB/NPP/SG/G-1 (Rev.1)-Draft**

The draft guide

- Is applicable to all types of reactors
- Has the provisions for 'Early Design Review' much before the official submissions of Consenting application.
- Considers the fleet mode deployment of NPPs.
- Talks about 'Graded Approach' in determining the scope, extent and level of detail for review
- Distinguishes between 'New Design' and 'Repeat Design'.

*Following may be further considered :*

- More clarity on type of Licensing submission documents w.r.t reference and supporting documents.
- Clarity on type of additional information for a FOAK system, Topical Reports, Special Reports etc.





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**THANK YOU**

