

Regulatory Requirements

(Licencee's Feedback on AERB Regulatory Documents)

Mukesh Singhal
Executive Director (RS&A)
Nuclear Power Corporation of India Limited

Presented in National Conference on Regulatory Interface (NCRI)
Mumbai – November 28, 2017

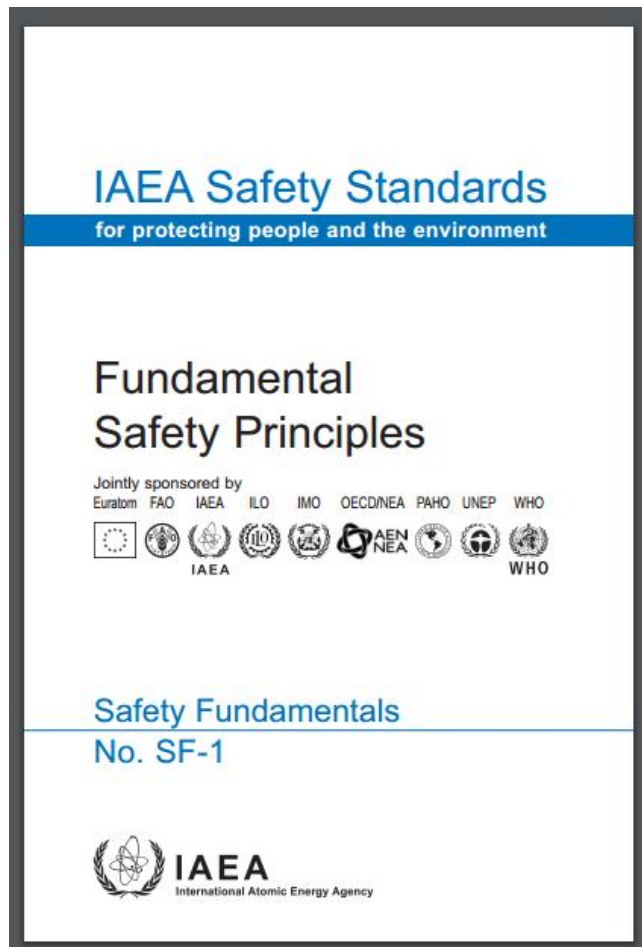
Presentation Contents

Feedback/Comments on

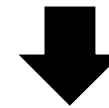
- Regulatory documents development process
- Regulatory documents under preparation/revision.
- Regulatory review process.

In addition, revision in some of the regulatory documents is also suggested.

Regulatory Documents Development Basis



Safety Objective
The fundamental safety objective is to protect people and the environment from harmful effects of ionizing radiation.



IAEA-SF-1
10 Safety Principles



Safety Codes and Safety Standards

Safety Guides

Safety Manuals

AERB Documents Development

Regulatory Documents Development Basis

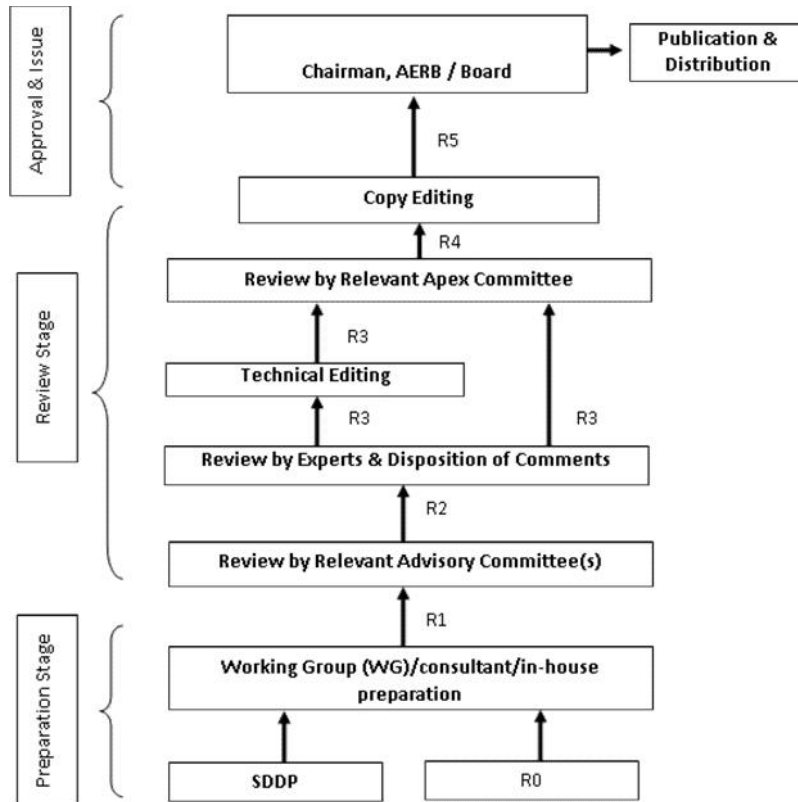
Safety Objective

This fundamental safety objective of protecting people — individually and collectively — and the environment has to be achieved

- without unduly limiting the operation of facilities or
- the conduct of activities that give rise to radiation risks.

| SL NO | Levels | Objective | Essential means | Plant state |
|-------|---------|--|---|--|
| 1 | Level-1 | Prevention of abnormal operation and failures | Conservative design and high quality in construction and operation. | Normal operation |
| 2 | Level-2 | Control of abnormal operation and detection of failures | Control, limiting and protection systems and other surveillance features. | Abnormal Operational Occurrences (AOO) |
| 3 | Level-3 | Control of accidents within design basis | Engineered safety features and accident procedures | Design Basis Accidents (DBA) |
| 4 | Level-4 | Control of severe plant conditions, including prevention of accident progression and mitigation of the consequence of severe accidents | Complimentary measures and accident management. | Design Extension Conditions (DEC-A, DEC-B) |
| 5 | Level-5 | Mitigation of radiological consequences of significant releases of radioactive materials | Offsite emergency response. | Off-site emergency response. |

AERB Documents Development



- Development of the first draft of the document by AERB-IHWG helps in reducing total time of document preparation
- Utility
 - ✓ Representation in WG/TF for documents preparation
 - ✓ Representation in the advisory committee
 - ✓ Involvement in expert review of the document
- As per existing process SDDP can be initiated by one of the divisions of AERB.

In the regulatory process provision may be made for utilities to approach ACNRS with formal request for revision of any document and based on review ACNRS may ask AERB to propose SDDP.

AERB Documents Development

- It is natural to witness differences in regulatory and utility perspectives in preparing and finalizing regulatory documents.
- TF/WG preparing documents **should include utility comments in their Reports/MoMs for discussions in higher committee.**
- We find that ACNRS is the appropriate platform for highlighting any difference of opinion by the utility. It is suggested that *instead of present practice of presentation on disposition of comments by the concerned TF/WG, agenda should include presentation by the utilities to explain their comments.*

AERB Documents Under Preparation/Revision

A number of documents have been taken up by AERB for preparation/revision. We believe that these documents will be in line with international regulatory documents and will bring in much needed clarity in regulatory review process.

- Safety Codes on
 - ✓ Design of PHWR Based NPPs
 - ✓ Design of FBR Based NPPs

- Safety Guides on
 - ✓ Consenting Process of NPPs
 - ✓ Deterministic Safety Analysis of PHWRs
 - ✓ Design Basis Events for NPPs
 - ✓ Emergency Electric Power Supply Systems
 - ✓ Accident Management Programme for Water Cooled NPPs

Safety Codes on Design of NPPs (1/2)

- AERB has issued in 2015, Safety Code on Design of LWR based NPPs
- Presently, two safety codes, one for PHWRs and another for FBRs are under revision/preparation. These Safety Codes are in line with Safety Code on Design of LWR based NPPs.
- First five chapters in all these Safety Codes are 'similar'. Since these chapters are generic in nature and include high level requirements, these chapters should be 'same' in all three codes. This also applies to 'Chapter-7: Reinforcing and Enhancing Safety Further'.

Safety Codes on Design of NPPs (2/2)

- Once Safety Codes for Design of PHWR and FBR based NPPs are ready for issue, AERB may consider
 - ✓ *Technology neutral requirements in a single safety code on Design of NPPs* (In line with IAEA SSR 2/1).
 - ✓ *Technology specific chapters (Chapter 6 of each code) can be appendices of the single safety code on Design of NPPs or may be issued as separate technology specific documents*, considering unique features of the design (e.g. importance of LOCA and LOCA with ECCS failure)

(This will take care of TF/WG specific changes in technology neutral chapters; and a single Safety Code will have regulatory requirements applicable to all designs)

With Safety Codes and Safety Guides in place

- What is to be reviewed?
- There is a need to have *guidelines for the review, something similar to Standard Review Plan*, in absence of which
 - ✓ reviews are TF/WG specific
 - ✓ reviews are not uniform
 - ✓ issues discussed and resolved in earlier reviews get reopened.

(Though we expect that with issue of AERB/SG/D-5, AERB/SG/D-19, AERB/SG/G-9, AERB/SG/G-1, there may be some uniformity in the review process.)

- What is important for review from regulatory perspective – i.e. meeting acceptance criteria/design criteria or spending time on some numerical oscillations in results/discussing extended design requirements?

For Standard Design of NPPs

When Designs are standardised...

- When design is standard and fleet mode is proposed – then subsequent NPPs will fall under category of ‘repeat design’. For review of such NPPs:
 - ✓ Utility should be permitted to make *Generic Submissions (say PSARs....)*
 - ✓ Such submissions can be reviewed by Standing TFs/WGs and once reviewed and certified by utility to be the same; there may not be any need for NPP-wise detailed review, which would result in significant saving of efforts, both for utilities and regulator
 - ✓ Design certification may be considered for two standard designs (rocky site and soil site) and generic clearance may be given for these two standard designs.
- *AERB may consider this aspect while finalizing AERB/SG/G-1.*

Inputs from international documents

- AERB safety requirements and guides are a ‘mixed blend’ of various international regulatory requirements and documents. In doing so:
 - ✓ some utilities practices get included in regulatory documents, many new terminologies creep in, which are not as per Indian practices
 - ✓ proposals for inclusion of such nomenclature leads to lengthy discussions.
 - e.g. Integrated accident management, On-site emergency response organization, extensive disaster management guidelines, various emergency response facilities.

There is a need to see *if ‘all’ international guidelines are to be included in Indian regulatory documents*. These may be used as reference documents and their applicability needs to be rationally decided.

Clarity in regulatory requirements/context

- Safety Codes contain mandatory requirements. The text should be such that different interpretations are not possible.

To aid this, *TFs/WGs should prepare a 'background document' explaining specific clauses where different interpretation could be possible or where there is a need to give 'basis' for arriving at certain clauses.*

This 'background document' should be available with regulators and utilities, as 'people move, documents don't'.

- Safety Guides contain guidance and methodologies to implement requirements of Safety Codes/Safety Standards. To that extent Safety Guides are 'recommendatory' in nature. This difference between Safety Codes and Safety Guides needs to be 'mandatorily' made clear to different WGs/TFs.

Integrated Requirements

- AERB Safety Codes include 'Plant States' which are in line with international Safety Standards
 - ✓ AERB/SG/D-19 defines analysis methodology and acceptance criteria as per these plant states.
 - ✓ AERB/SG/D-5 includes methodology to classify Postulated Events into these plant states.
 - ✓ AERB/SG/G-9 requires reporting of safety analysis in accordance with these plant states.
- There is a *need to align AERB/SG/D-1 – Safety Classification of SSCs also in line with these documents*
 - ✓ Useful guidance is available in IAEA SSG-30 and TECDOC-1787
 - ✓ With revision of AERB/SG/D-1, guidance will be available for designing additional safety systems/features and complementary safety systems/features for design extension conditions, as well as FOAKs.
- For this integration and uniform evaluation of safety, *TF-RIA report needs to be issued expeditiously and formalized as a regulatory document.*

Suggesting Revisions in Safety Guides

- **AERB/SG/D-1: Safety Classification of SSCs**

Safety Classification needs to be in line with current international practices. In current Guide, there is inconsistency in safety classification of Mechanical/Electrical/Instrumentation Components and Systems.

- **AERB/SG/D-12: Radiation Protection Aspects in NPPs Design**

In view of operational experience at TAPS-3&4, design/construction of KAPP-3&4/RAPP-7&8, severe accident scenario and design improvements post accidents at Fukushima.

- **AERB/SG/D-8: PHT System**

700MWe PHWR PHT system including FOAK features like partial boiling in coolant channel exit, higher feeder size, two trains in ECCS, PDHRS etc to be incorporated; hook up provision to PHT system, SG, ECCS & PDHRS to be added etc.

- **AERB/SG/D-4: Fire Protection and Standard on Fire Protection**

To include latest design features related to cables fire protection (FRLS and LHLS) and DG room fire protection (aerosol) etc.

Suggesting Revisions in Safety Guides

- **AERB/SG/D-10: Safety Systems**

Post-Fukushima improvements like auto reactor trip on seismic event and its instrumentation, new reactor trip parameters like ROPPS, steam line pressure low and its instrumentation and other 700MWe features etc.

- **AERB/SG/D-20: Safety Related I&C**

Automatic reactor trip on seismic event and its instrumentations, new I&C features in 700MWe, qualification of instruments under DBA and under DEC conditions, SAPMS concept, MCR & OESC communication for plant critical parameters monitoring etc.

- **AERB/SG/D-13: Radioactive Waste**

Treatment and discharge of liquid rad waste generated during handling of BDBA scenario (a post-fukushima concept), qualification of dyke walls for site specific SSE etc.

More clarity needed

- Post-accidents at Fukushima units, some terms/issues are included in regulatory documents. **There is a need to have a clarity about these in relevant regulatory documents.**
 - ✓ Practically Eliminated Events
 - ✓ Station Black Out duration (for what purpose) (8h, 24h, 72h, 7days,
 - ✓ Beyond Design Basis External Events/Extreme External Events
 - ✓ Multi-unit PSA

- Guidelines are also **needed to determine the process and extent of applying current requirements to the NPPs built earlier**

In conclusion

AERB regulatory documents development process has evolved over years and this process involves utilities participation. Following suggestions are made in the presentation

- Utilities should be permitted to put up document revision proposal to ACNRS and after review ACNRS may ask AERB to prepare SDDP.
- ACNRS agenda should include in agenda presentation by the utilities, in case utilities wish to highlight certain points on the submitted draft.
- AERB may consider preparing a single Safety Code on design of different types of NPPs with design specific requirements in appendices
- Guidelines for safety review may be formalized in the form of standard review plan
- AERB may consider certification of standard design and permit submission of generic documents with consideration of site specific differences.

In conclusion

- Inputs from various international documents are not necessarily required to be included in AERB documents. These may be used as reference and their applicability should be rationally decided.
- AERB documents should have a background document giving basis for different clauses. This can be used when there is difference of opinion in interpretation of clauses.
- A mechanism may be considered which ensures that across AERB, there is uniform understanding of regulatory requirements.
- Newly introduced terms should be clearly defined
- Clarity should be brought in determining extent of applying current requirements to NPPs built earlier.
- Revision in few AERB documents is also suggested

Thanks for your attention

comments and feedback
singhalm@npcil.co.in