



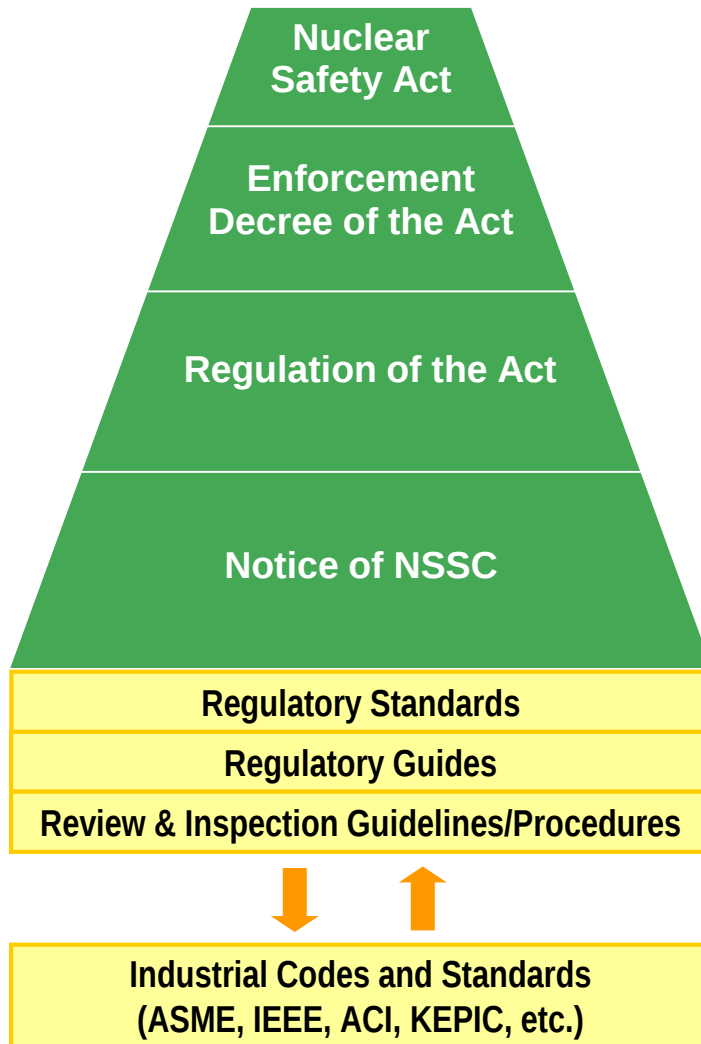
IAEA-KINS WS, 28 May, 2019, KINS

— Documentation for Review and Assessment with Respect to Applicant and Regulator - **Application in Korea** -

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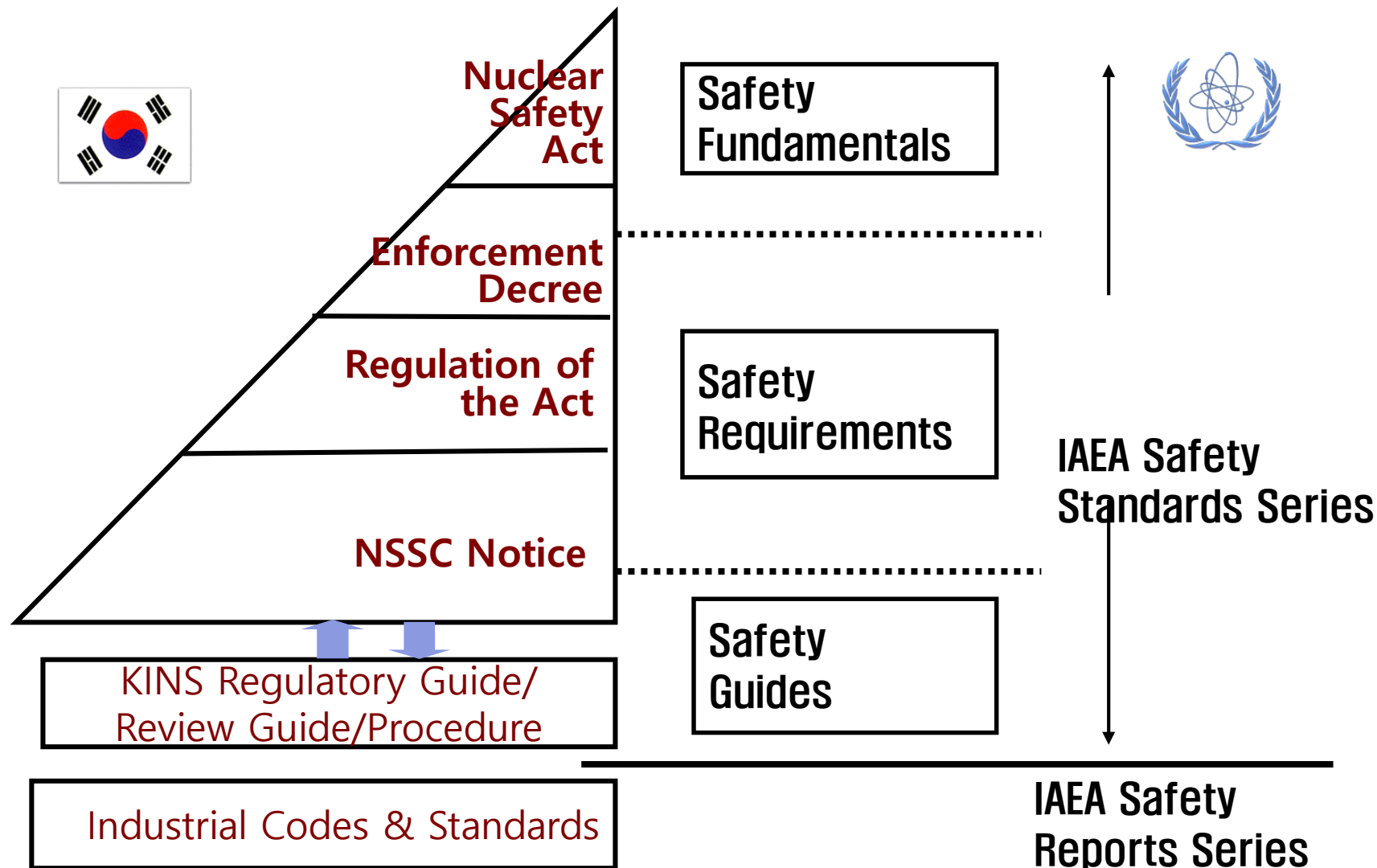
Legal Hierarchy for NPP License in Korea

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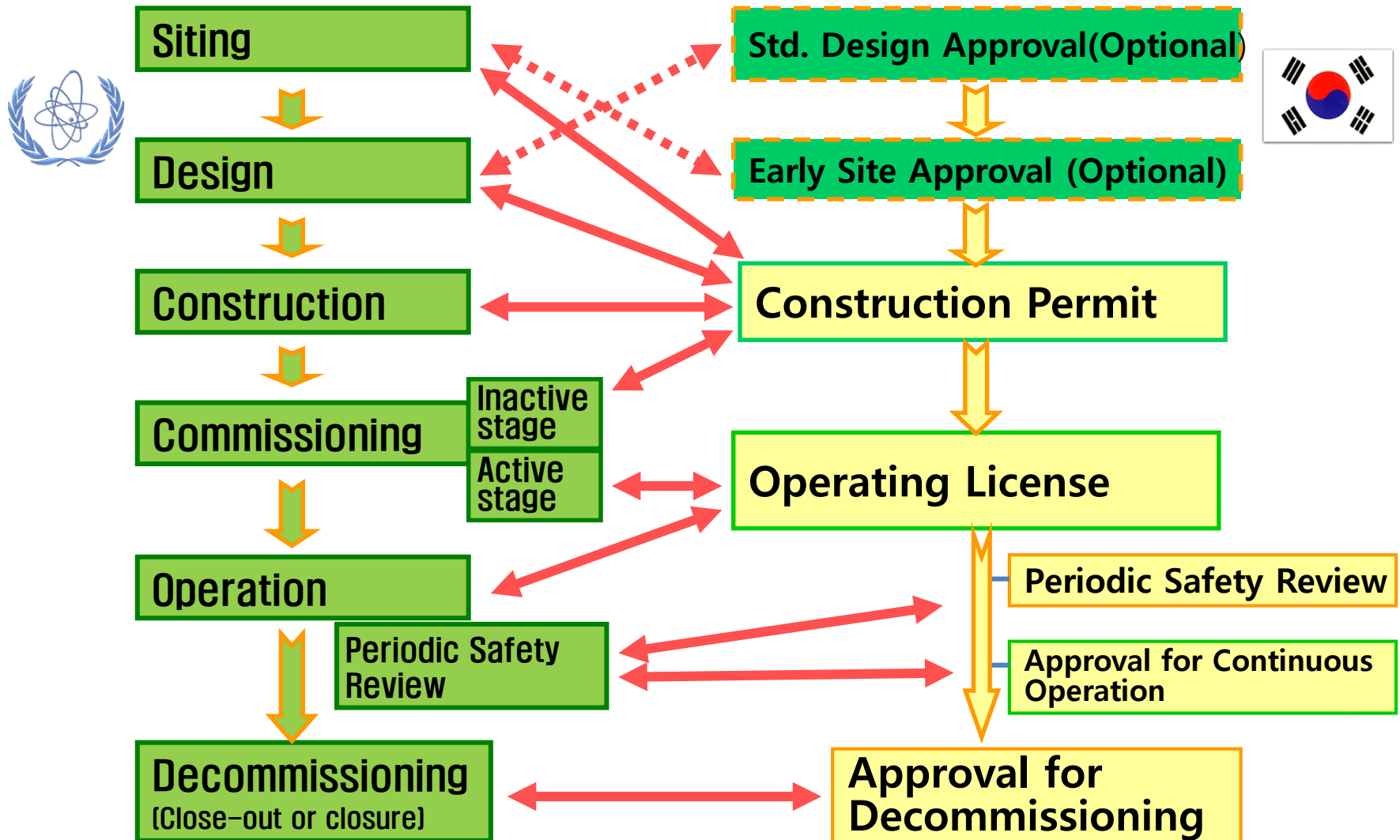
- The Act provides the **bases and fundamental matters** regarding safety regulations
- The Decree provides particulars entrusted by the Act and necessary for **the enforcement of the Act**
- The Regulation provides the **technical standards and particulars** entrusted by the Act and the Decree such as detailed legal procedures and format of documents
- The Notice provides **detailed particulars for the technical standards and general design criteria**
- The Regulatory Standards and Guides provide the **interpretation, detailed criteria, acceptable methods, conditions, and specifications of the technical standards.**
- The Review & Inspection Guidelines/Procedures provide **the staff guidance in carrying out regulatory activities.**
- Codes and Standards for materials, design, test, and inspection of components and equipment

Comparison with IAEA Safety Std.



Licensing Stages in Comparison with IAEA Standards

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▶ Types of Licensing

- ▶ Standard Design Approval(SDA) : **Optional**
- ▶ Early Site Approval (ESA) : **Optional**
- ▶ **Construction Permit (CP)**
- ▶ **Operating License (OL)**

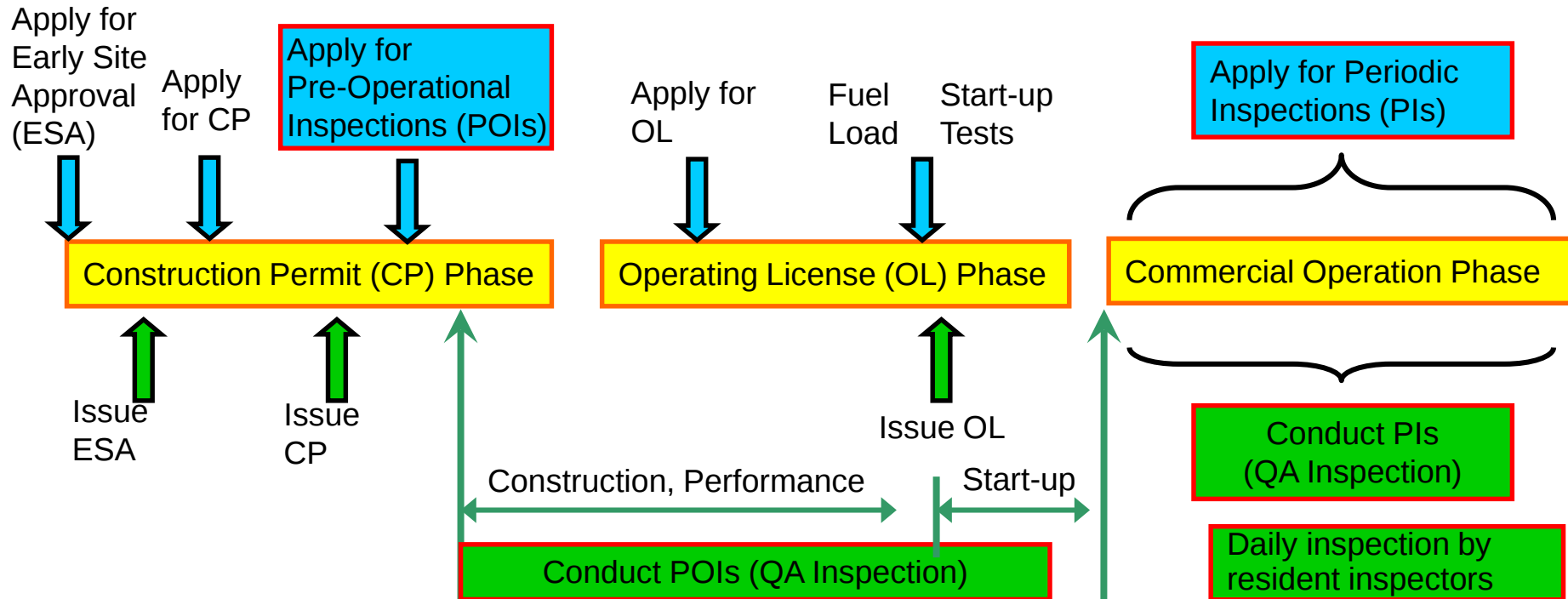
▶ Other Reviews

- ▶ Periodic Safety Review (PSR)
- ▶ Review of Continued Operation over design life time
- ▶ Standard Design Approval (SDA)
- ▶ Amendment of Permit or License
- ▶ Approval of Topical Report (TR)

Licensing Stages of a NPP in Korea

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Operating Organization (KHNP)



Regulatory Body (NSSC/KINS)

▶ **Purpose**

- ▶ to ensure that the technical standards for the location, structure, facility, and performance of NPP are met

▶ **Documents submitted for CP**

- ▶ Radiation Environmental Report
- ▶ **Preliminary Safety Analysis Report (PSAR)**
- ▶ Quality Assurance Plan for construction
- ▶ Description on the technical capability for nuclear plant installation

▶ **Docket Review**

- ▶ to assure that the documents submitted by the applicant contain all necessary details required by Atomic Energy Act and subordinate regulations

▶ Purpose

- ▶ to confirm that the final design of nuclear reactor described in the final safety analysis report meet the applicable standards
- ▶ to ensure that the completed nuclear reactor can be operated as expected throughout the design life

▶ Documents submitted for OL

- ▶ **Final Safety Analysis Report (FSAR)**
- ▶ **Technical Specifications for Operation**
- ▶ Quality Assurance Plan for operation
- ▶ Radiation Environmental Report
- ▶ **Radiation Emergency Plan**
- ▶ Description on the technical capability for the reactor operation
- ▶ Description on nuclear fuel loading plan
- ▶ Description of the technical background and verification method to be for the Emergency Operating Procedure

▶ Docket Review

- Chapter 1 - Introduction and General Description of Plant
- Chapter 2 - Sites Characteristics
- Chapter 3 - Design of Structures, Components, Equipment, and Systems
- Chapter 4 - Reactor
- Chapter 5 - Reactor Coolant System and Connected Systems
- Chapter 6 - Engineered Safety Features
- Chapter 7 - Instrumentation and Controls
- Chapter 8 - Electric Power
- Chapter 9 - Auxiliary Systems
- Chapter 10 - Steam and Power Conversion System
- Chapter 11 - Radioactive Waste Management
- Chapter 12 - Radiation Protection
- Chapter 13 - Conduct of Operations
- Chapter 14 - Initial Test Program
- Chapter 15 - Accident Analysis
- Chapter 16 - Technical Specifications
- Chapter 17 - Quality Assurance
- Chapter 18 - Human Factors Engineering
- Chapter 19 – PSA and Severe Accidents

Safety Analysis Report

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- ▶ All of areas considering **up-to-dated Experiences & other Factors** :
 - ▶ **Based on the SRGs being periodically revised by MS procedure**
 - ▶ Proven provisions or Qualification
 - ▶ EQ, Software Quality of Safety-critical I&C Systems
 - ▶ Consideration of competence and skills and others
 - ▶ Evaluation of Technical Capability for Operation , Human Factor
 - ▶ Incorporating on the latest experience
 - ▶ Cyber Security for Digital I&C Systems
 - ▶ Independent confirmatory audit calculation
 - ▶ Uncertainty and Sensitivity Analysis, Code V & V in Safety Analysis
 - ▶ On-site verification through regulatory inspection
 - ▶ Electric System Design, ECCS Recirculation Sump Strainer, etc.

- ▶ R & A is performed to **confirm the compliance** with regulatory requirements and associated acceptance criteria
- ▶ **Safety Review Guideline/Procedure** are used (KINS Internal Guidelines)
 - ▶ necessary for **effective review and assessment** of the application documents submitted by applicant
 - ▶ NSSC **approves the KINS Rules** for Entrusted Regulatory Activities developed in accordance with Article 311 (Approval of Activities) of Enforcement Decree
 - ▶ Administrative procedures(**MS**) for conducting the technical activities

- ▶ **KINS has developed and used the Guidelines/ Procedures**
 - ▶ **Review and Assessment Guidelines**
 - ▶ Safety Review Guidelines for PWR
 - ▶ Safety Review Guidelines for Periodic Safety Review of PWR
 - ▶ Safety Review Guidelines for Periodic Safety Review of PHWR
 - ▶ Safety Review Guidelines for Continued Operation of PWR
 - ▶ Safety Review Guidelines for Continued Operation of PHWR
 - ▶ **R & A Procedures [Nuclear Power Reactor and Related Facilities] : MS document**
 - ▶ Licensing Review Procedure
 - ▶ License Amendment Review Procedure
 - ▶ Periodic Safety Review Procedure
 - ▶ Topical Report Review Procedure

- ▶ KINS Safety Review Guidelines (SRGs) for safety analysis report of NPPs
 - ▶ KINS SRGs are almost identical with Standard Review Plan (US **SRP** in NUREG-0800, ...) of US NRC.
 - ▶ KINS SRGs **provide the staff guidance and review procedures** in view of the related technical areas.
 - ▶ KINS SRGs are **not requirements**, but the operator is expected to evaluate the facility as recommended by the SRGs.
 - ▶ This evaluation must include an ‘identification and description of all differences in design features, analytical techniques and procedural measures’ proposed for the facility and those corresponding features in the SRGs.

► Chapters of SRG

- KINS SRG chapters are identical with the corresponding chapters in SAR

- Ch.1, Introduction and Interfaces
- Ch.2, Sites Characteristics and Site Parameters
- Ch.3, Design of Structures, Components, Equipment, and Systems
- Ch.4, Reactor
- Ch.5, Reactor Coolant System and Connected Systems
- Ch.6, Engineered Safety Features
- Ch.7, Instrumentation and Controls
- Ch.8, Electric Power
- Ch.9, Auxiliary Systems
- Ch.10, Steam and Power Conversion System

- Ch.11, Radioactive Waste Management
- Ch.12, Radiation Protection
- Ch.13, Conduct of Operations
- Ch.14, Initial Test Program
- Ch.15, Accident Analysis
- Ch.16, Technical Specifications
- Ch.17, Quality Assurance
- Ch.18, Human Factors Engineering
- Ch.19, PSA and Severe Accidents

▶ Contents of SRG(SRP)

- ▶ Responsibilities of staff reviewers (Review responsibility)
- ▶ Matters that are reviewed (**Area of review**)
- ▶ Regulations and acceptance criteria necessary for the review (**Acceptance Criteria**)
- ▶ How the review is accomplished (**Review Procedure**)
- ▶ Conclusions that are appropriate (**Evaluation Findings**)
- ▶ Implementation requirements (Implementation)
- ▶ Information about regulatory matters (References)

Licensing Review Procedure for Nuclear Power Reactors and related facilities Contents

1. Objective
2. Scope of Application
3. Applicable References
4. General Aspects
 - 4.1 Glossary (definitions)
 - 4.2 Responsibilities
 - 4.3 Documents to be reviewed
 - 4.4 Review standards
5. Implementation Procedures
 - 5.1 Receipt of application and establishment of review plan
 - 5.2 Performance of safety review
 - 5.3 Submission of safety review results
 - 5.4 Preparation and distribution of final safety review report
 - 5.5 Management of follow-up actions
 - 5.6 Record keeping and technical support, etc.
6. Attachments
 - 6.1 Flowchart of review process for licensing NPP
 - 6.2 Ulchin Units 5 & 6 operating license review report(example)

- Licensing Documents in Korea
 - CP: PSAR, QAP,..
 - OL: FSAR, QAP, T/S
- Documents for Regulatory Review & Assessment
 - Safety Review Guideline (Technical)
 - Review Procedure (Process)