US NRC INTERNATIONAL REGULATORY DEVELOPMENT PARTNERSHIP (IRDP)

US NUCLEAR REGULATORY COMMISSION LICENSING
(Historical Perspective)

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Regulatory Prerequisites
AGENCY PREREQUISITES

• The following elements had to be in place prior to the Agency commencing licensing activities

  1) National laws, regulations and requirements, guidance and procedures
  2) Organizational structure and internal/external resources
AGENCY PREREQUISITES (cont’d)

3) Communications protocols
4) Document control and management system
5) Planning, scheduling, and work tracking systems
LEGAL FRAMEWORK

• Laws - US Congress
• Regulations - NRC
• Guidance - NRC
• Engineering codes and standards – ASME, IEEE, ETC.
HIERARCHY OF DOCUMENTS

NATIONAL LAWS
• Atomic Energy
• Radiation Protection
• Emergencies
• Etc.

MANDATORY REQUIREMENTS
• Site selection
• Reactor licensing
• Reactor operation
• Decommissioning

GUIDANCE DOCUMENTS
• Technical guidance
• Regulatory processes
• Inspection guides
• Training manuals
LAWS

- Enacted by Congress
- Established authority of regulatory agency (NRC) over safety matters
- Established requirements for conduct of regulatory affairs
- May limit liability of vendors and operating company
REGULATIONS / REQUIREMENTS

- Enacted by regulatory agency (NRC)
- General standards and acceptance criteria
- Govern all aspects of reactor design, construction and operation
- Legally binding on applicant/licensee
- Some regulations apply to the regulator
GUIDANCE

• Developed by regulatory agency (NRC)
• Not legally binding
• Provide guidance to applicants and licensees:
  • Acceptable ways to comply with regulations
  • Form and content of submittals
• Provide guidance to regulatory agency on:
  • Review of licensee submittals
  • Conduct of inspections
  • Regulatory processes
CODES AND STANDARDS

• Developed by engineering / scientific societies
• Technical guidance on design, fabrication, installation, inspection, maintenance and repair of systems, structures and components
• Based on consensus of best technical practices
• Endorsed by NRC for use by operating companies and vendors
Two Step Licensing According to US NRC 10 CFR 50
OPERATING REACTORS

• All NPPs currently operating in US licensed using two step process of 10CFR50
• Extensive experience gained through licensing over 100 power reactors
NRC REGULATORY PROCESS – TWO STEPS

Role of Applicant

ER → DiP → Plant Design → Construction

Role of the Nuclear Regulatory Agency - NRC

Site Review → CP → Operating License

YEAR

1 2 3 4 5 6 7 8 9 10 11 12 13 14
SITE APPROVAL

• Site characteristics suitable to:
  • Support construction
  • Support operation
• Hazards to plant safety
• Seismic
• Suitability for Emergency Planning (EP)
CONSTRUCTION PERMIT

• Fundamentally sound reactor design
• Analysis demonstrates ability to handle accidents and transients
• Safety classification of systems, structures and components (SSC)
• Safety requirements for SSC
• Ability of applicant to safely construct the plant
CONSTRUCTION OVERSIGHT

- Quality Assurance (QA)
- Codes and Standards
- Adherence to CP
- Vendors
USNRC TWO STEP APPROACH (Historical)

- USNRC two step licensing process:
  - At each step, all plants undergo
    - A safety review,
    - An environmental review, and
    - An antitrust review.
  - As part of the process, at each step, an applicant must submit a Safety Analysis Report (SAR) and an Environmental Report (ER)
    - Design information and criteria for proposed reactor
    - Comprehensive data on proposed site
    - Discussion of hypothetical accidents and safety features designed to prevent such accidents or limit their effects
USNRC TWO STEP APPROACH (cont’d.)

• Step 1 - Construction Permit (CP) application includes Preliminary Safety Analysis Report (PSAR) and an Environmental Report (ER).

• Step 2 - Operating License (OL) application includes Final Safety Analysis Report (FSAR), an updated ER and proposed Technical Specifications.
CP REVIEW – STEP 1

• Once application to construct a nuclear plant is received:
  • NRC staff determines whether it contains sufficient information to satisfy requirements for a detailed review.
  • If the application accepted, staff holds a public meeting.
  • Document and correspondence control becomes of critical performance
CP REVIEW – STEP 1 (cont’d.)

• If application is determined to be acceptable for a detailed review by staff:
  • The staff reviews the application to determine whether the plant design meets all applicable regulations

• When review is completed:
  • Staff develops a preliminary safety evaluation report and an EIS

• Independent advisory body involved in process (by law).

• A public hearing is held before a construction permit is issued for a nuclear power plant.
COMPREHENSIVE REVIEW OF PSAR

- Agency’s decision on CP issuance depends on the findings of the PSAR review

- The PSAR is prepared by the applicant and its scope and quality is the responsibility of the applicant

- The major objective of the review is to determine if the proposed plant, as described in the PSAR, meets regulatory requirements, is a fundamentally sound design, can be constructed and operated safely, and presents an acceptable risk to the public
AGENCY GRANTS CP TO APPLICANT

- The necessary findings of the PSER, and positive findings from the environmental and site reviews, form the basis for granting the CP

- The CP may contain certain requirements or conditions (license conditions) that are imposed on the applicant

- Step1 complete
**OL REVIEW – STEP 2**

- Plant constructed with oversight by NRC staff.
- Final Safety Analysis Report and Environmental Report (ER) completed, submitted, and reviewed by NRC staff.
- Final Safety Evaluation Report and Environmental Impact Statement (EIS) issued by NRC staff after review is complete and all open issues resolved.
- Operating license granted by NRC subsequent to another public hearing (Step 2 complete).
LICENSE LIFETIME

SITING

CONSTRUCTION PERMIT

CONSTRUCTION

OPERATING LICENSE

COMMISSIONING

OPERATION

LICENSE EXTENSION

DECOMMISSIONING
Combined Licensing According to US NRC 10 CFR 52
EVOLUTION OF NRC LICENSING REQUIREMENTS

• Extensive experience gained by US industry in the design, construction and operation of NPPs
• Extensive experience gained by NRC in licensing and regulating US NPPs
• Many lessons learned
• Led to development of alternative licensing regulations that sought to optimize the licensing process
PROMULGATION OF 10CFR52 LICENSING REQUIREMENTS

- Three main parts:
  - Early Site Permits (ESP)
  - Design Certification (DC)
  - Combined License (COL)

- Can be applied together or separately
EARLY SITE PERMIT (ESP)

- An ESP is an NRC approved partial CP for a site for one or more reactors
- ESP process allows early resolution of siting issues
- ESP addresses issues related to site safety, environmental protection, and emergency planning (EP) – almost independent of specific reactor design
EARLY SITE PERMIT (ESP) (cont’d)

- Can be used for 10CFR 50 CP or 10CFR 52 COL
- Siting issues resolved during the ESP process need not be addressed again during CP or COL review
- Appropriate standards of pertinent NRC regulations must be met
- 10 to 20 year duration
DESIGN CERTIFICATION (DC)

- Design Certification is an NRC approval of a standard design for an NPP
- Approved through a rulemaking
- Essentially complete design of an NPP except for site specific elements
- COL application may reference a standard design certification
- An application must contain a level of design information sufficient to enable NRC to judge the applicant’s means of assuring that construction conforms to the design and to reach a final conclusion on all safety matters
DESIGN CERTIFICATION (DC)
(cont’d)

- Application must:
  - Meet pertinent NRC requirements
  - Contain FSAR
  - Include inspection, test, analysis and acceptance criteria (ITAAC) that if performed will show that the facility can be constructed and operated within the provisions of the DC and the NRC regulations

- DC is valid for up to 15 years
COMBINED LICENSE (COL)

- A Combined License for an NPP is a license that combines a CP and an OL with conditions
- May or may not reference an ESP and/or a DC
- Application must include all things required in a ESP and DC, plus site specific information
- Must meet relevant parts of NRC regulations that are needed to issue an OL
- Includes inspections, tests, analysis, and acceptance criteria (ITAAC)
- If it references a ESP and/or an DC, all issues are settled that are governed by provisions of ESP/DC
COMBINED LICENSE (COL) (cont’d)

• NRC cannot modify the terms and conditions of a COL
• Issued prior to construction
• Valid for 40 years
IN CONCLUSION

• NRC extensive knowledge led to new process for licensing NPPs
• Either 2 step or combined licensing process can still be used.
• Issuing ESPs, DCs, and COLs prior to beginning construction reduces uncertainty and financial risk to applicant
• May not be prudent for countries that are new entrants to nuclear power
THANK YOU FOR YOUR ATTENTION