Small Modular Reactor Licensing

Design Specific Review Standards

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Protecting People and the Environment

Background

Why Are We Planning To Do SMR Licensing Reviews Differently?

- Commission direction to risk informed iPWR review
  - SECY 11-0024, "Use of Risk Insights to Enhance the Safety Focus of Small Modular Reactor Reviews"
    - ✓Staff performs "Risk-Informed and Integrated" review
    - ✓Considers both safety category and risk significance
    - ✓Graded review approach
    - ✓Near-term focus on iPWR licensing reviews
- Solution: Design Specific Review Standard (DSRS)
  - Similar to the Standard Review Plan (SRP), but is adapted for a specific design
  - Engage designers, potential licensees, and stakeholders in meaningful pre-application interactions
  - Identify and resolve key technical and policy issues
  - Incorporate lessons learned from Large Light Water Reactors licensing reviews

Background

What Will Not Change?

The "foundations" of our licensing process work remain unchanged:

- Safety focus
- Confidence in the quality of our technical reviews and findings
- Maintaining regulatory independence and public trust
- Current regulatory licensing framework (10CFR50 and 10CFR52)

Guidance Documents

Standard Review Plan (NUREG-0800)

- Guidance for staff to perform safety reviews of applications for Construction Permit, Operating License, Early Site Permit, Design Certification and Combined License

New Reactor Guidance for Large Light Water Reactors

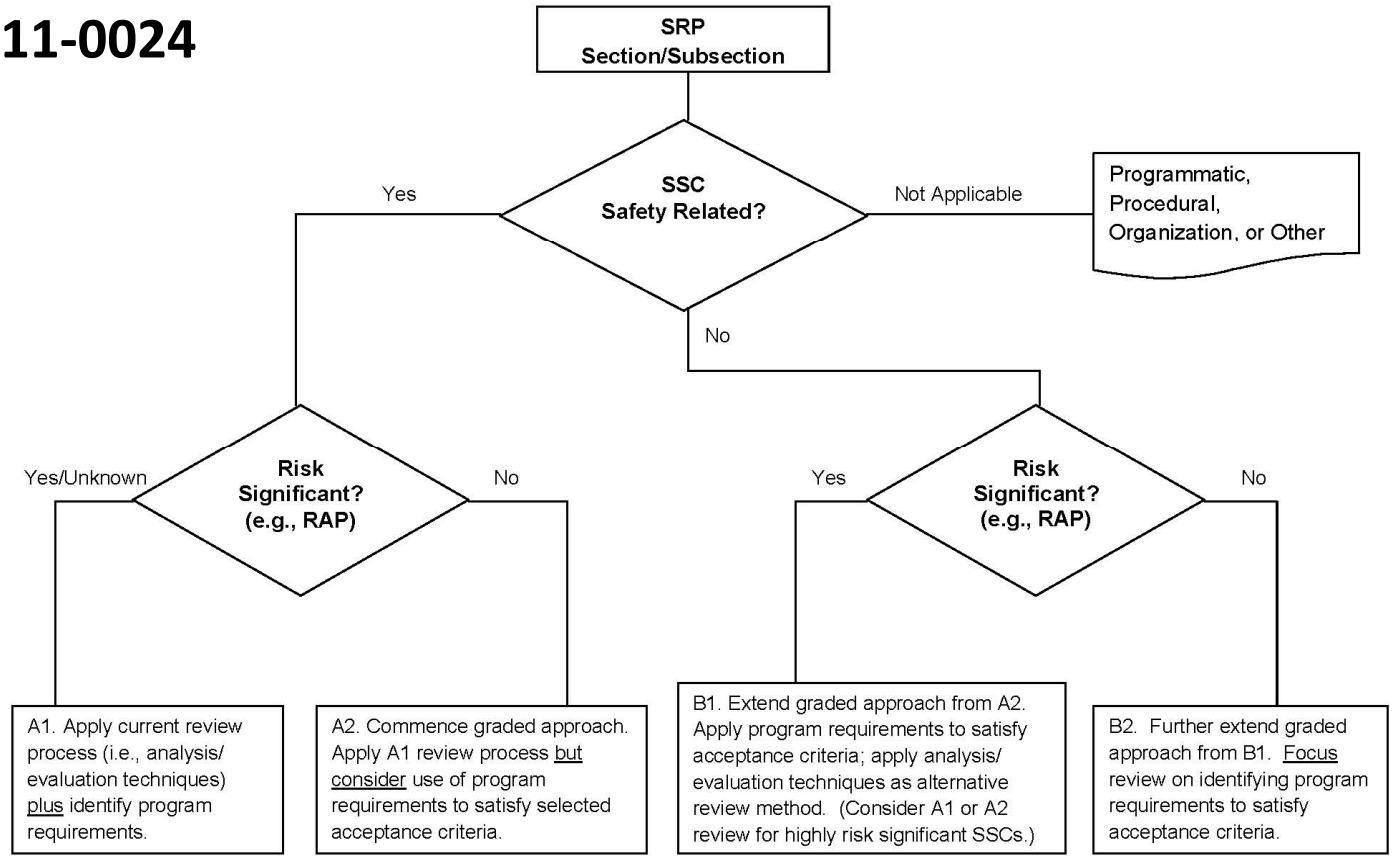
- Regulatory Guide 1.206 (Guidance for applicants)

iPWR Guidance

- Early engagement in pre-application
  - DSRS
  - Requires design information
- No early engagement
  - SRP/RG 1.206

Risk Informed Categorization

SECY 11-0024



* For programmatic, procedural, organization, or other non-SSC topics (e.g., quality assurance, training, human factors engineering, health physics programs, operating procedures), the current review process is applied as provided in the SRP.

Risk Informed Categorization

Balance of Plant (Implementation Example)

- Different approach
- Instead of design specific, options depending on risk significance of structures, systems, and components
- Output of applicants reliability assurance program

Risk Informed Categorization

Implementation Example – Station Service Water System

Acceptance criterion	Current Review	Risk-Informed Review
GDC 2 – protection against natural phenomena	Technical analysis and evaluation	Technical analysis and evaluation
GDC 4 – environmental and dynamic effects	Technical analysis and evaluation	Technical analysis and evaluation
GDC 45 - inspection	Technical analysis and evaluation	Programmatic requirements (initial plant testing, ITAAC)
GDC 46 - testing	Technical analysis and evaluation	Programmatic requirements (reliability assurance program, ITAAC)

Challenges

Level of design information available in pre-application

- Ideal
  - Design complete enough to inform all review sections
- Reality
  - Varying levels of design completion for each review section

Pre-application Coordination

- Potential efficiency gains in review process by working activities in pre-application phase
- Review process aided by improved documentation in applications (e.g., fewer RAIs)
  - More knowledge about the design
- Earlier engagement of public stakeholders in the review process
- Vendor participation required for success

Codes and Standards

Sample list of updated codes and standards been referenced

- DSRS Section 4.5.1, “Control Rod Drive Structural Materials Review” updated ASTM A-262-1970, “Standard Practices for Detecting Susceptibility to Intergranular Attack on Austenitic Stainless Steels” to ASTM A-262-10 in its review of the qualification of the welding process for Austenitic Stainless Steel Components under “Review Procedures”.
- DSRS Section 6.6, “Inservice Inspection and Testing of Class 2 and 3 Components” added ASME Section XI Article IWF-2000 to its list of required examinations, inspections, and tests in “Acceptance Criteria”.
- DSRS Section 9.4.2, “Spent Fuel Pool Area Ventilation System” removed ANSI/ANS 59.2-1985 from its applicable industry standards, updated standard ANSI/ASME AG-1-1985, “Code on Nuclear Air and Gas Treatment to the ANSI/ASME AG-1-2009 version. DSRS Section 9.4.2 also added standards ASHRAE 62.1-2010, ASME N509-2002, and ASME N510-2007 to its list of applicable industry standards in “Review Procedures”.

mPower DSRS Status

- A matrix will describe the applicability of SRP chapters/sections to the design-specific review.
  - The SRP section is to be used “as-is”
  - The SRP section is not used in the DSRS (not applicable)
  - The SRP section is to be modified into an “SRP-like” section in the DSRS
  - A new “SRP-like” section is to be developed for the DSRS

- mPower DSRS Scope (Preliminary determination)
  - 91 Sections classified as use “as-is”
  - 81 Sections classified non-applicable
  - 149 Sections classified as modified
  - 13 Sections classified as section is to be developed

mPower DSRS Status

Public Participation

- DSRS Information available on the public website
  http://www.nrc.gov/reactors/advanced/mpower/dsrs.html
- Draft DSRS sections are publicly available for comment (not part of Federal Register Notice)
- Opportunity to provide comment during Federal Register Notice period

mPower DSRS Status

What Still Needs To Be Done?

- Issue Draft mPower DSRS – (one year prior to anticipated application receipt).
  - Public comment/resolution period and concurrence by NRO/NSIR/OGC obtained prior to issuance.
- Brief ACRS with their level of interest in specific topics/areas.
- Develop and issue final DSRS for use concurrent with application receipt. Concurrence by NRO/NSIR/OGC obtained prior to issuance. Updates to final DSRS will be made using Interim Staff Guidance process.

Summary

- The iPWR licensing process approach is being revised in accordance with Commission direction.
- NRO management's goal is to "bring forward" as much review infrastructure development as possible into the pre-application phase and to incorporate lessons learned from LLWR reviews.
- Early engagement of vendors is crucial to make these process successful.