NRIC National Reactor Innovation Center

Overview of best practices and processes for effective engagement with NRC on technical issues, testing and data collection, application development and licensing reviews [reactor design and plant siting/operation approvals]

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June 23, 2025

NRC's Prospective Applicant Landing Page

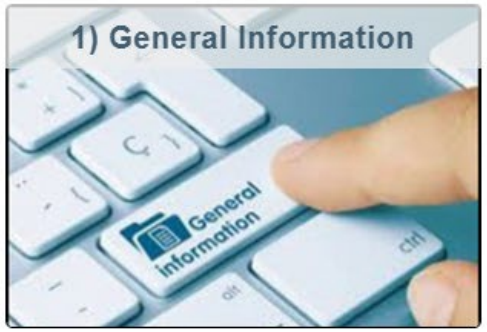
https://www.nrc.gov/reactors/new-reactors/advanced/new-app.html

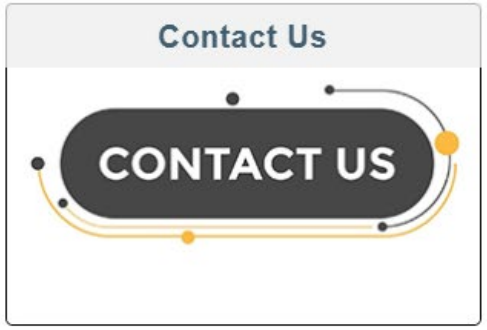
Comprehensive source of information, guidance, and support for applicants who are currently in the development process of a nuclear reactor design or reactor-related project that have not yet contacted the NRC

- General Information
- General Guidance
- Project Information
- Contact Information

NRC's Prospective Applicant Landing Page

Read each the sets of webpages in the order shown below before approaching NRC





Effective Engagement with NRC

Pre-application engagement with NRC is important and useful for applicants as part of preparing a high-quality application for agency review

Recommended pre-application plans and activities

- Regulatory Engagement Plans (may be updated)
- Readiness Assessment activities of preliminary design information and/or applications (written NRC staff observations help applicants refine and improve their applications for more efficient technical reviews)
- Regular communication with NRC staff and management helps facilitate resolution of regulatory and technical issues prior to application submittal and during the application review

Design, Testing and Data Collection

NRC Report to Congress on Section 401 of the ADVANCE Act, ML24292A171

Advanced manufacturing processes (use or one or more innovative manufacturing technologies (AMTs)

- NRC regulatory framework: two pathways for AMTs for LWRs:
  1) NRC's incorporation by reference of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code Rules of Construction into 10 CFR 50.55a.
  2) Section 50.55a(z) allows NRC applicants and licensees to obtain NRC approval for alternatives to the standards incorporated by reference

Design, Testing and Data Collection (cont'd)

Requirements for nuclear-grade components in manufacturing and construction for nuclear energy projects

- For fission reactors, 10 CFR 50.55a provides the regulations for codes and standards relative to the design, construction, operation, inspection, and testing of all relevant systems and components in a nuclear power plant.
- For nuclear-grade components, ASME BPV Code provisions are incorporated by reference in 10 CFR 50.55a. In addition, Institute of Electrical and Electronics Engineers (IEEE) standards are incorporated by reference in 10 CFR 50.55a for electrical and instrumentation and controls.
- 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," identifies requirements for quality assurance programs for structures, systems, and components with safety-related functions. The requirements of Appendix B are generally met by following ASME NQA-1

Design, Testing and Data Collection (cont'd)

For non-LWR designs, 10 CFR 50.55a has limited applicability

The most efficient way to determine acceptable nuclear-grade components is through the NRC endorsement of non-LWR codes and standards via regulatory guides (RGs). For example:

- NRC endorsed ASME BPV Code, Section III, Division 5, "High Temperature Reactors," in RG 1.87, Revision 2, "Acceptability of ASME Code, Section III, Division 5, 'High Temperature Reactors,'" January 2023 (RG 1.87, Revision 2, "Acceptability of ASME Code, Section III, Division 5, 'High Temperature Reactors,'" January 2023 (ML22101A263)), with exceptions and limitations.
- ASME BPV Code, Section III, Division 5 covers material, fabrication, design, testing, and installation requirements for both metals and nonmetals at elevated temperatures
- Primary NRC regulatory requirements related to quality assurance for manufacturing and construction of mechanical components for non-LWRs are in Appendix B to 10 CFR Part 50 and the principal design criteria, which are customized based on the reactor design.

Testing and Data Collection

Testing and data collection need to be done in a manner that is repeatable and reproducible if it is to be relied on to support an application or design review

The testing equipment or facility does not necessarily require the use of 10 CFR Part 50, Appendix B components, but the collection of data needs to done in accordance with 10 CFR Part 50, Appendix B, “Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants” if it will be applied to the development of safety related information

Questions?

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June 23, 2025

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