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Joint NRC-DOE Advanced Reactor Licensing Initiative

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Department of Energy

NRC-DOE Workshop on Advanced Non-Light Water Reactors
1-2 September 2015

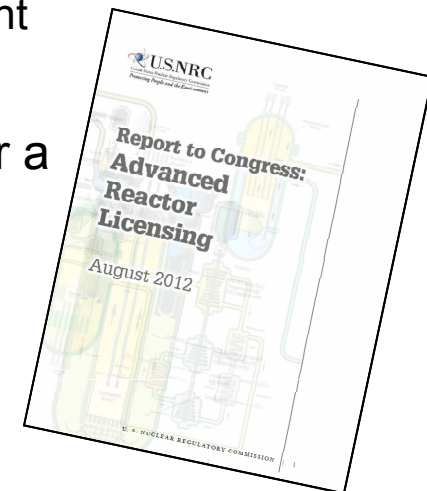


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Need for a Licensing Framework for Advanced Reactors

- During 2012, DOE instituted an Advanced Reactor Concepts Technical Review Panel (TRP) process to evaluate viable reactor concepts from industry and to identify R&D needs
 - TRP members and reactor designers noted the need for a regulatory framework for non-light water advanced reactors
- Also in 2012, in response to Congressional direction, the NRC provided a report to Congress on advanced reactors.
 - The NRC noted the need for regulatory guidance for non-light water reactor designs
- The TRP convened in spring 2014 reiterated the need for a licensing framework for advanced reactors.





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Licensing Framework Initiative

- 10 CFR 50 requires the establishment of principal design criteria derived from the General Design Criteria (GDC) of Appendix A.
- Since the GDC in Appendix A are specific to light water reactors (LWRs), this requirement is especially challenging for potential future licensing applicants pursuing advanced (non-LWR) technologies and designs.
- Overall purpose of this initiative is to establish clear guidance for the development of the principal design criteria (PDC) that advanced non-LWR developers will be required to include in their NRC license applications.
- Completion of this effort and the NRC's future issuance of the associated regulatory guidance are expected to provide the following key benefits:
 - Reduced regulatory uncertainty for advanced non-light water reactor developers
 - Improved guidance for NRC staff reviewing advanced reactor license applications
 - Improved timeliness and efficiency of licensing activities for both applicants and NRC staff



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Phased Approach

■ “Phase 1” – DOE

- Expertise applied to research, analysis, evaluation, documentation
- Deliverables – technical report to NRC with draft Design Criteria for Advanced Reactors
- NRC attended key meetings and observed the development process

■ “Phase 2” – NRC

- Initiate regulatory development process
- Issue regulatory guidance commensurate with an official NRC staff position



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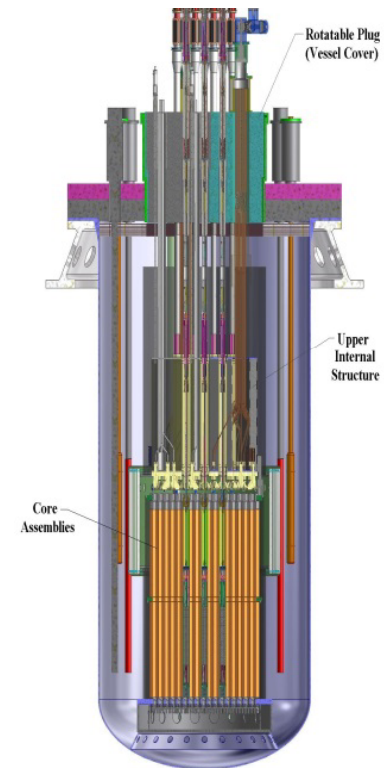
Workshops and Opportunities for Stakeholder Involvement

■ Workshops (April and July 2014)

- Webinar - Planned regulatory framework process discussed
- Workshop 1 - First draft of criteria was presented
- Workshop 2 - Revised criteria that included stakeholder comments were presented
- Attended by Industry, NRC, NEI, EPRI and other stakeholders

■ Industry involvement

- Participated in both workshops
- Provided comments on draft criteria
- Participated through ANS Standards development activities to review advanced reactor design criteria and technology specific design criteria



AFR-100 Advanced Sodium-cooled Fast Reactor



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Licensing Initiative Team

■ Team Members:

- **Department of Energy**
 - DOE Office of Nuclear Energy
 - DOE Office of General Counsel
- **Laboratories**
 - Argonne National Laboratory
 - Idaho National Laboratory
 - Oak Ridge National Laboratory
- **Selected individual licensing consultants**



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Stakeholder Feedback

Stakeholder organizations that submitted comments and inputs on the draft design criteria :

- American Nuclear Society
- AREVA
- Argonne National Laboratory
- Flibe Energy
- CBI Federal Services
- General Atomics
- General Electric
- Gen4 Energy, Inc.
- Hybrid Power Technologies LLC
- Japan Atomic Energy Agency
- Korea Atomic Energy Research Institute
- TerraPower
- Toshiba
- X-energy

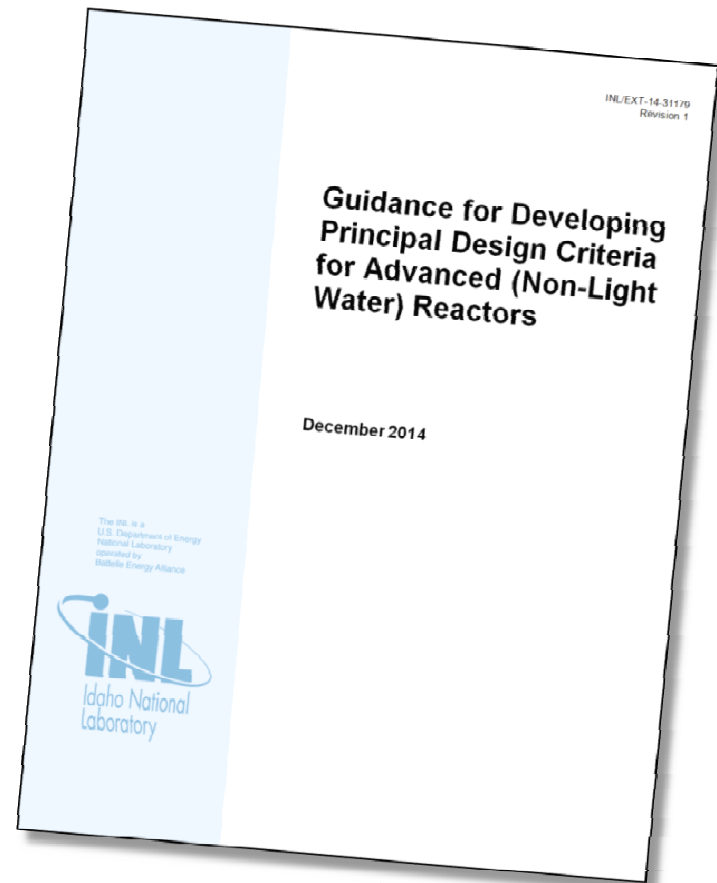


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Phase 1 – DOE Final Report

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- The DOE Team prepared a report titled **Guidance for Developing Principal Design Criteria for Advanced (Non-Light Water) Reactors**
- The report was completed in **December 2014** and transmitted to the NRC
- The NRC held an initial public meeting in **January 2015**.





Content of DOE Final Report

The DOE/national lab final report on advanced reactor design criteria contains:

- A proposed set of ARDC that are generally applicable to:
 - Sodium-cooled Fast Reactors (SFRs)
 - Lead- and LBE-cooled Fast Reactors (LFRs)
 - Gas-cooled Fast Reactors (GFRs)
 - Modular High Temperature Gas-cooled Reactors (modular HTGRs)
 - Fluoride High Temperature Reactors (FHRs)
 - Molten Salt Reactors (MSRs)
- A proposed set of technology-specific criteria adapted from the ARDC for:
 - Sodium-cooled Fast Reactors
 - Modular High Temperature Gas-cooled Reactors
- Technical justification for all proposed design criteria adaptations are provided.



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Next Steps for the DOE Team

■ Remainder of FY15:

- Respond to additional NRC staff questions related to the final report content

■ Actions in FY16:

- Support responses to questions received by the NRC during a public comment period.
- Support responses to questions received by the NRC during a public meeting.
- Provide support to NRC staff to facilitate issuance of regulatory guidance