Implementation Action Plan (IAP) Strategy 2 Volume 4 - Licensing and Siting Dose Assessment Codes Presented at RAMP 2020

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U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Agenda

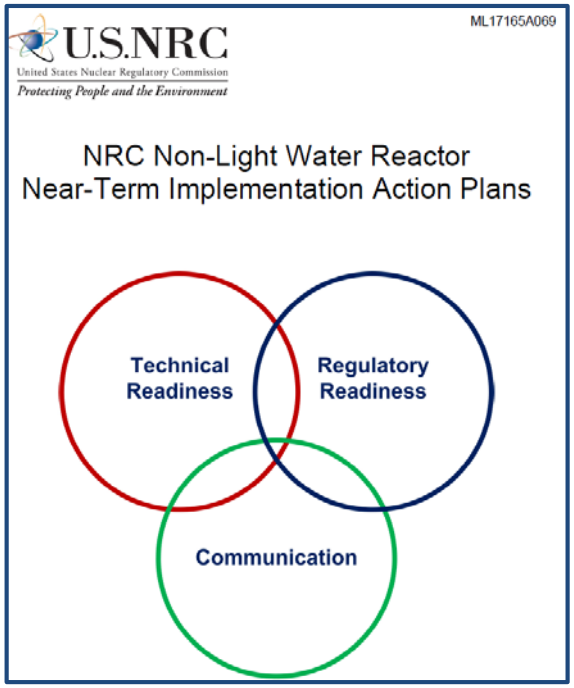
- NRC's "Be Ready" Attitude
- Integrated Action Plan (IAP)
- Strategy 2
- Volume 4, RAMP Codes

NRC's "Be Ready" Attitude

- Improve mission value while enabling safe operations
  - Deliver cost savings
  - Develop regulatory tools
  - Build staff expertise
  - Leverage collaborations

BlueCRAB

NRC's Integrated Action Plan (IAP) for Advanced Reactors



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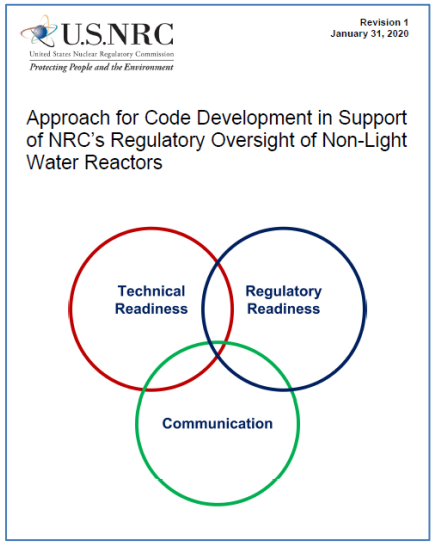
Near-Term Implementation Action Plan

- Strategy 1: Knowledge, Skills, and Capacity
- Strategy 2: Analytical Tools
- Strategy 3: Flexible Review Process
- Strategy 4: Industry Codes and Standards
- Strategy 5: Technology Inclusive Issues
- Strategy 6: Communication

Strategy 2: Computer Code Readiness
Code Development Plans

These Volumes outline the specific analytical tools to enable independent analysis of non-LWRs, "gaps" in code capabilities and data, V&V needs and code development tasks.



Introduction
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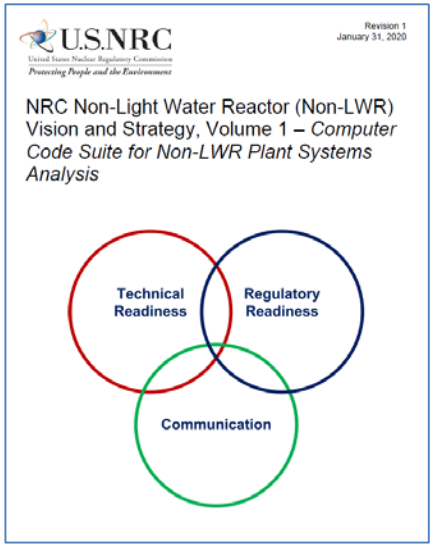

Volume 1
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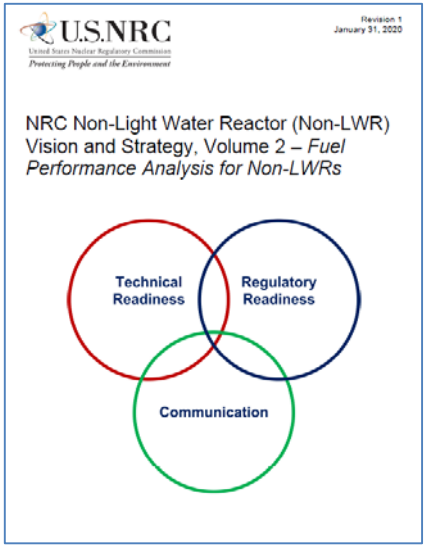

Volume 2
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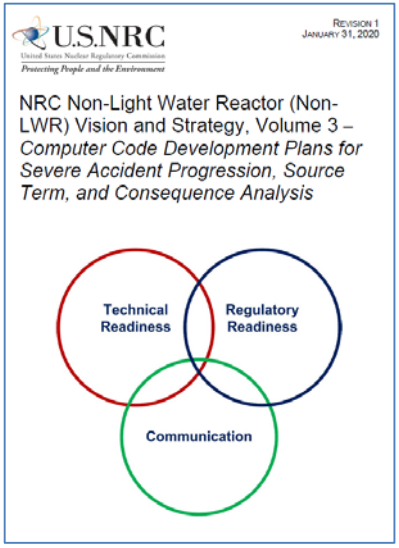

Volume 3
ML20030A178

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NRC's Integrated Action Plan (IAP) Status

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NEW REACTORS

- Small Modular Reactors (LWR designs)
- **Advanced Reactors (non-LWR designs)**
- Combined License Holders
- Combined License Applications
- Design Certification Applications
- Early Site Permits Applications
- Bellefonte Construction Permits
- Regulations, Guidance, and Communications
- Regulatory Oversight

Home > Nuclear Reactors > New Reactors > **Advanced Reactors**

Advanced Reactors (non-LWR designs)

Advanced Reactor Activities

RELATED INFORMATION

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Advanced Reactor - Summary of Integrated Schedule and Regulatory Activities

Summary of Integrated Schedule and Regulatory Activities (updated 08/18/2020)

Advanced Reactor Program - Summary of Integrated Schedule and Regulatory Activities*

Strategy 1	Knowledge, Skills, and Capability
Strategy 2	Computer Codes and Review Tools
Strategy 3	Flexible Review Processes
Strategy 4	Consensus Codes and Standards
Strategy 5	Policy and Key Technical Issues
Strategy 6	Communication

Legend

- Concurrence (Division/Interoffice)
- Federal Register Publication
- Public Comment Period
- Draft Issuance of Deliverable
- Final Issuance of Deliverable
- EDO Concurrence Period
- Commission Review Period**
- ACRS SC/FC (Scheduled or Planned)
- External Stakeholder Interactions
- Public Meeting (Scheduled or Planned)

Version 8/18/20

Present Day

Strategy	Regulatory Activity	Commission Papers	Guidance	Rulemaking	NEIMA	Complete	2020 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2021 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Development of non-Light Water Reactor (LWR) Training for Advanced Reactors (Adv. Rxs) (NEIMA Section 103(a)(5))																													
	FAST Reactor Technology					x	x																							
	High Temperature Gas-cooled Reactor (HTGR) Technology					x	x																							
	Molten Salt Reactor (MSR) Technology					x	x																							
	Competency Modeling to ensure adequate workforce skillset						x																							
	Identification and Assessment of Available Codes						x																							
	Development of Non-LWR Computer Models and Analytical Tools																													
	Code Assessment Reports Volumes 1 (Systems Analysis)						x																							
	Reference plant model for Heat Pipe-Cooled Micro Reactor						x																							

Advanced Reactor Program - Summary of Integrated Schedule and Regulatory Activities*

Strategy 1	Knowledge, Skills, and Capability
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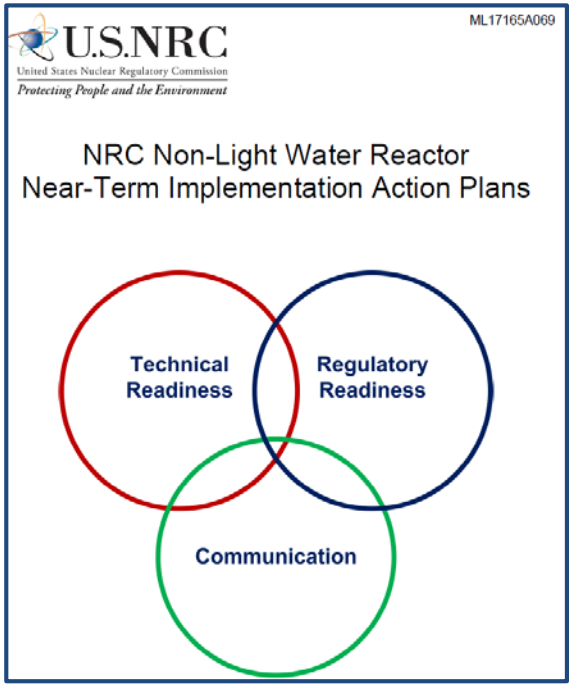
Version 9/30/20

Present Day

Strategy	Regulatory Activity	Commission Papers	Guidance	Rulemaking	NEIMA	Complete	2020 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2021 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2	Identification and Assessment of Available Codes					x																								
	Development of Non-LWR Computer Models and Analytical Tools																													
	Code Assessment Reports Volumes 1 (Systems Analysis)					x																								
	Reference plant model for Heat Pipe-Cooled Micro Reactor					x																								
	Reference plant model for Sodium-Cooled Fast Reactor					x																								
	Reference plant model for Fluoride-Salt-Cooled High-Temperature Reactor																													
	Reference plant model for Gas-Cooled Pebble Bed Reactor																													
	Reference plant model for Molten Salt Fueled Reactor																													
	Code Assessment Reports Volumes 2 (Fuel Perf. Anaylsis)					x																								
	FAST code assessment for metallic fuel																													
	FAST code assessment for TRISO fuel																													
	Code Assessment Reports Volumes 3 (Source Term Analysis)					x																								
	Non-LWR MELCOR (Source Term) Demonstration Project																													
	Reference SCALE/MELCOR plant model for Heat Pipe-Cooled Micro Reactor																													
	Reference SCALE/MELCOR plant model for High-Temperature Gas-Cooled Reactor																													
	Reference SCALE/MELCOR plant model for Molten Salt Cooled Pebble Bed Reactor																													
	Reference SCALE/MELCOR plant model for Molten Salt Fueled Reactor (schedule TBD)																													
	MACCS radionuclide screening analysis																													
	MACCS near-field atmospheric transport and dispersion model assessment					x																								
	MACCS near-field atmospheric transport and dispersion model improvement																													
	Code Assessment Reports Volumes 4 (Dose Analysis)														▼					▼										
	Code Assessment Reports Volumes 5 (Fuel Cycle Analysis)																	▼		▼										
	Non-LWR MELCOR (Source Term) Demonstration Project																													
	Research on Innovative Methods to Enhance Seismic Safety for Design and Construction of Adv. Rxs														↓															
	Develop Regulatory Roadmap for Adv. Rxs (NEIMA Section 103(a)(1))				x	x																								
	Develop prototype guidance for Adv. Rxs					x																								
	Develop non-LWR Design Crtieria for Adv. Rxs					x																								
	EPRI Topical Report on Tri-structural Isotropic (TRISO) Fuel		x								▼		▼																	

Strategy 2 – Volumes 4 & 5

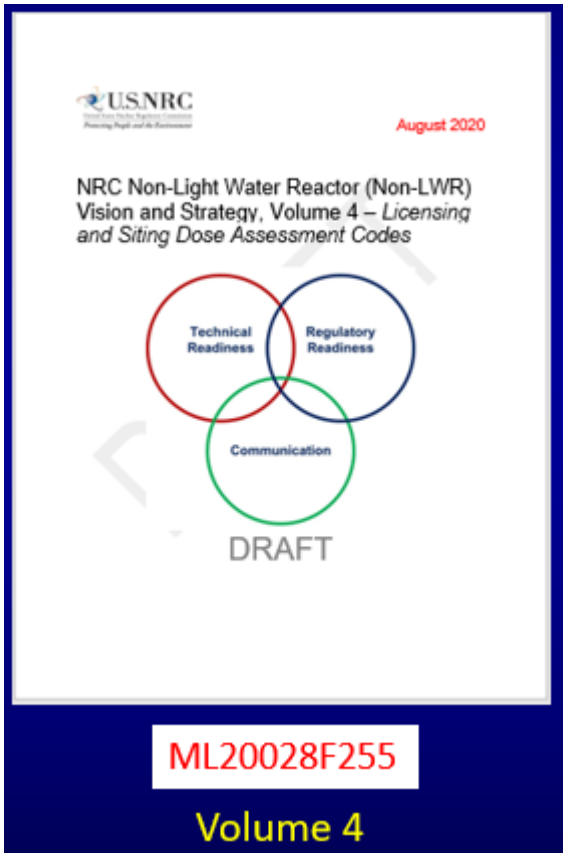
- **Volume 4 — Licensing and Siting Dose Assessment Codes (ML20028F255)**



- **Volume 5 — Computer Code Development Plans for Criticality, Shielding, and Accident Analysis in the Nuclear Fuel Cycle (in development)**

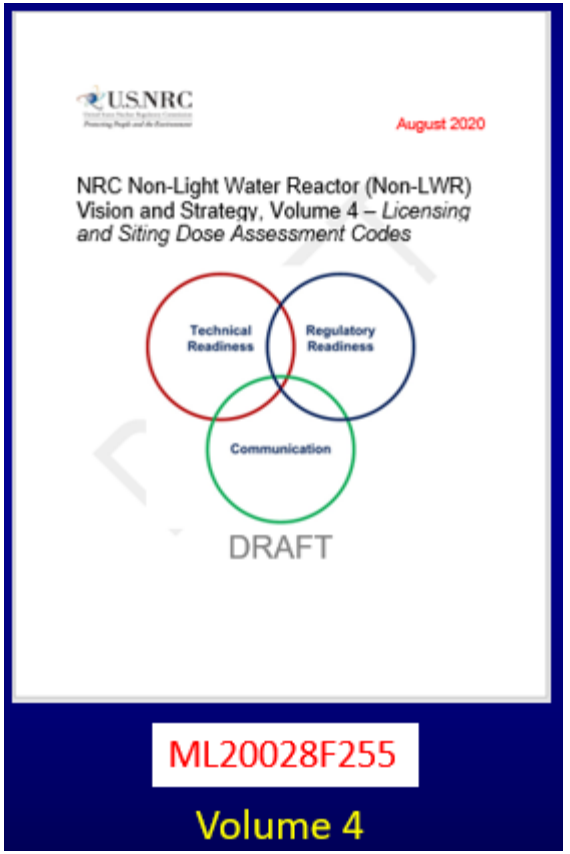
Volume 4: Licensing and Siting Dose Assessment Codes

- Landscape
  - Potential for a spectrum of Non-LWR and fuel designs
  - Over 10 licensing and siting dose assessment codes
  - Inconsistent code development practices, by various contractors, over decades
  - Overlap in code capabilities and need to use resources pragmatically
- Approach (Tasks)
  1. Consolidate/Modernize Dose Assessment Codes
  2. Improve characterization of Source Terms
  3. Improve Atmospheric Transport & Dispersion Models
  4. Update Dose Coefficient values
  5. Develop Environmental Pathway Models



Volume 4: Licensing and Siting Dose Assessment Codes

- This report describes the licensing and siting dose assessment computer codes and how they would be applied and consolidated for the non-LWR design types.
  - Section 1 — Introduces the regulatory requirements.
  - Section 2 — Describes each code and uses.
  - Section 3 — Tasks related to non-LWR designs including code consolidation.
  - Section 4 — Discusses code readiness.
  - Section 5 — Conclusions.



Up Next:.....

9:30 – 9:35 AM	**Welcome & Logistics**	**Bruce McDowell**
9:35 – 9:50 AM	Code Consolidation and Non-LWR Overview	Dr. Stephanie Bush-Goddard
9:50 – 10:30 AM	**Background** **a. RAMP Codes Overview** **b. Advanced Reactor Challenges and Legacy Issues and Inefficiencies**	**Dr. Caitlin Condon** **Bruce McDowell**
10:30 – 10:40 AM	Break	All
10:40 – 11:35 AM	Code Consolidation and Modernization a. Consolidation and Modernization Approach b. Source Term c. Atmospheric Engine Prototype	Bruce McDowell, Dr. Caitlin Condon Dr. Nicole LaHaye, Pavlo Ivanusa Jeremy Rishel, Dr. Saikat Ghosh
11:35 – 11:45 AM	Summary and Path Forward	Dr. Stephanie Bush-Goddard
11:45 – 12:00 PM	Questions and Discussion	All