

## NRC-NARUC Federal State Information Session on Nuclear Regulation

February 16, 2022 2:00-5:00 p.m. (ET)



#### Agenda

- 1. Welcome
- 2. Introduction to the NRC
- 3. NRC regulation of opening and new reactors
- 4. NRC approaches to optimizing the licensing processes

Break

5. The role of the NRC in safely regulating advanced reactors6. Overview of state program at the NRC

Break

- 7. Roundtable with NARUC members states
- 8. Opportunities for continued engagement between PUCs and the NRC
- 9. Closing remarks



#### Welcome

### Commissioner David Wright U.S. Nuclear Regulatory Commission



Welcome

Commissioner Tim Echols Georgia Public Service Commission Co-Chair of the DOE-NARUC Nuclear Energy Partnership



Welcome

Commissioner Anthony O'Donnell Maryland Public Service Commission Co-Chair of the DOE-NARUC Nuclear Energy Partnership



### Introduction to the U.S. Nuclear Regulatory Commission



### **NRC Regulation of Operating and New Reactors**

# We make SAFE use of nuclear technology POSSIBLE



# NRC REGULATION OF OPERATING AND NEW REACTORS

Victor Hall, U.S. Nuclear Regulatory Commission

OFFICE OF NUCLEAR REACTOR REGULATION





Protecting People and the Environment



















Inside Vogtle unit 3 "nuclear island"













First nuclear concrete placed to create Vogtle Unit 3 basemat









Assembly of large heavy lift derrick (blue) with Vogtle Unit 4 construction to the left and Unit 3 construction to the right.









Vogtle Unit 3 lower ring placement

# CA01 Structural Module (~1,200 Tons)









Lifting over 1,200 tons, the heavy lift derrick places the CA01 module inside the Vogtle Unit 3 containment vessel.

## NRC Vendor Inspection: Following the Global Supply Chain









## NRC Vendor Inspection: Machining of Forged Reactor Shell







### NRC Vendor Inspection: Reactor Vessel at Japan Steel Works







Unit 4 Reactor Vessel







The Vogtle Unit 4 reactor vessel is lifted onto heavy haul crawlers for transportation to storage.






















































## NRC Approaches to Optimizing the Licensing Process



## **Advanced Reactors**

## **Optimizing the Licensing Process**

Mo Shams and Mike Dudak

# Nuclear Energy Innovation and Modernization Act (NEIMA)



Developing regulatory framework to deploy advanced reactors

**Bipartisan Support** 

Remain a leader in technological innovation

### Pathway to New Regulatory Framework

#### "Part 53" Rulemaking by July 2025

- Leveraging a novel approach with significant stakeholder engagement
- Creating a transformative rule that reflects stakeholder feedback
- Reflecting advanced reactors diversity



## Part 53 rulemaking addresses plant lifecycle with appropriate flexibilities and safety focus

#### Establishes a Transformative Regulatory Framework

## Part 53 builds on a strong foundation of Commission policies and decisions

• Evolves use of **risk**  Leverages performance**based** requirements • **Modern**izes licensing basis change process o Includes consequenceoriented scalable requirements Enables operational flexibility • Optimizes balance between flexibility and **predictability** 

FEATURES

- - >

VS

Part 53 evolves existing requirements into a modern, risk-informed, performance-based approach

#### Part 53

////

Frequency & Consequence-Oriented Requirements Technology Inclusive Explicit Consideration of Defense in Depth QHOs in Rule Expanded Use of Graded Equipment Performance Requirements

#### Parts 50/52

Prescriptive Requirements Optimized for Specific Technology Augmented for Operating Experience Conservative Assumptions & Analyses QHOs Support Deterministic Requirements

Quantitative Health Objectives (QHOs) - Risk of:

- Immediate health effects within 1 mile of site < 5E-7/year</li>
- Latent health effects within 10 miles of site <2E-6/year

9

## Part 50 vs. Part 52 Licensing





## 50/52 Rulemaking Overview

- In response to Commission SRM for SECY-15-0002 to align licensing requirements in parts 50 and 52.
- Amends Parts 50 and 52 requirements to (1) ensure consistency in new reactor licensing reviews, (2) promote an efficient new reactor licensing process, (3) reduce the need for exemptions from existing regulations and license amendment requests, and (4) address other new reactor licensing lessons learned.
- Alignment areas are: Severe Accidents; PRA; TMI; Fire Protection; Operators' Licenses: Physical Security; Fitness for Duty; Emergency Planning; Part 52 Licensing Processes; and Environmental.



## SMR Lessons-Learned

- A rigorous safety basis and understanding is still essential for new reactor designs
- Emphasis on the importance for an applicant to develop and submit a complete, high-quality application
- Sustained focus on the most safety-significant aspects of the design is important
- Complete understanding of the design as a whole assists the applicant and the regulator
- Successful completion of first-of-a-kind reviews will result in streamlined N<sup>th</sup>-of-a-kind reviews
- Early and frequent communication with applicants is crucial, both prior to and during the regulator's review







## **Break**

## We will resume in 10 minutes



## The Role of the NRC in Safely Regulating Advanced Reactors



## **Advanced Reactors**

## **Regulatory Perspectives**

**Mo Shams** 

Director, Division of Advanced Reactors & Non-Power Production and Utilization Facilities

**U.S. Nuclear Regulatory Commission** 

Ensuring Readiness for Licensing and Safe Deployment of Advanced Reactors in the United States







### **Our Vision**

Make SAFE use of nuclear technology POSSIBLE







KP-FHR Fluoride salt-cooled high-temperature reactor KAIROS POWER

eVinci Heat pipe-cooled microreactor WESTINGHOUSE NUCLEAR



BWXT Advanced Nuclear Reactor (BANR) High-temperature gas-cooled microreactor BWX TECHNOLOGIES SMR-160 Advanced light-water small modular reactor HOLTEC INTERNATIONAL



The NRC is strategically transforming and modernizing to prepare for safe deployment of

Transforming Our Workforce

#### Stakeholder Engagement

Strategic Policymaking

Modernizing Our Tools

Supporting Innovation Flexible Review Strategies

#### **Executing the Vision**



## Developing Rule Language and Polices



- Part 53's Risk-Informed, Technology-Inclusive Regulatory Framework for Advanced Reactors
- Alternative Physical Security
- Emergency Preparedness
- Generic Environmental Impact Statement for Advanced Reactors
- Siting
- Fee Structure
- Fusion
- Oversight

### Broad Landscape of Advanced Reactor Designs



## NRC is Preparing for an Increase in Advanced Nuclear Technology Licensing



- **10** Entities actively engaged in pre-application activities
- **7** Topical reports and white paper reviews completed for 7 vendors
- 20 Topical reports and white papers under evaluation from 8 vendors



### Safely Regulating Advanced Reactor Technologies Now and Into the Future



Engaging in licensing reviews



Active in preapplication engagements

Using core teams to perform risk-informed reviews



Creating tools to leverage data, optimize execution and enhance transparency

#### **Adapting our Organization**

Ś

Δ

Analytics

#### Augment

А

Add staff and managers to optimize staffsupervisor ratio Use a drive Develop Develop the next sc generation of leaders/experts

Use analytics to drive efficiency and enable scalability Plan for future scenarios with bias towards agility

P

#### Team

Ŋ

Train staff to work synergistically

#### Is it Safe?

Example Review Areas Severe Accident Source Term Nuclear (Safety/Accident Analysis/Fuels) Probabilistic Risk Assessment Engineering (Materials, Mechanical) Environmental External Hazards Civil & Structural Electrical Instrumentation & Controls Security Emergency Preparedness Quality Assurance Human Factors Engineering

Is it Safe?

#### LICENSING MODERNIZATION

Introduction of an actual frequency-consequence curve as part of the regulatory process, along with cumulative risk metrics, safety classification, and assessment of defense in depth.



High Temperature, Gas-Cooled Pebble Bed Reactor Licensing Modernization Project Demonstration



**Advanced Nuclear Reactor Generic Environmental Impact Statement** 

# Advanced nuclear reactors provide opportunities for:

Safety Improvements

#### **Enhanced Operational Flexibilities**

- - >

- - >

- Lower risk
- $\odot$  Lower source term
- **o** Increased safety margins
- $\odot$  Simplified designs
- **O** Passive features
- **○** Inherent safety
  - characteristics
- **Operations**
- $\circ$  Maintenance
- Longer fuel cycles
- $\circ \ \textbf{Security}$
- **o** Emergency preparedness

# Advanced nuclear reactors present challenges



**O Demonstration of safety** 

features

- - >

 $\odot$  Fuel qualification

- $\odot$  Material qualification
- $\,\circ\,$  Fuel fabrication and supply
- Qualified vendors and work
  force

## THANK YOU



## **Overview of State Programs at the NRC**



## NRC's State Agreement and Liaison Programs

Kevin Williams, Director Office of Nuclear Materials Safety and Safeguards Division of Materials Safety, Security, State and Tribal Programs

#### What is an Agreement State?



- A State that has assumed regulatory authority over certain categories of radioactive materials through a cooperative Agreement with the NRC
- State becomes responsible for:
  - licensing, inspection, and enforcement of medical, academic, and industrial uses of certain radioactive materials
  - responding to certain types of incidents and allegations within their borders

*Discontinuation* of federal authority and assumption of state authority – not a delegated program

# NRC's Interaction with the States



- Keep States informed on topics of mutual interest.
- Give States opportunities to participate in the NRC's regulatory processes.
- Assist State activities when appropriate.
- Maintain oversight when States assume regulatory authority from the NRC for specific radioactive materials and activities

#### **NRC and Agreement States**



#### NRC and Agreement State Licenses



- 39 Agreement States regulate ~16,000 specific radioactive material licenses (88%)
- NRC regulate ~2,200 specific licenses (22%)


### NRC Outreach with Agreement State Programs

- National Materials Program
- Regional State Agreements Officers
- Monthly Teleconference with States
- NRC & Agreement State Working Groups
- State Communication Portal (<u>https://scp.nrc.gov/</u>)
- Integrated Materials Performance Evaluation Program and Periodic Meetings with State Radiation Control Program Management
- Organization of Agreement States (OAS) and Conference of Radiation Control Program Directors (CRCPD)





### **State Liaison Officer Program**



- Established in 1976 to improve communication between the States and the NRC
- State Liaison Officers (SLOs)
  Governor-appointed, single point-of-contact between the State and the NRC
- Regional State Liaison Officers (RSLOs)
- Permits observation of/participation in NRC meetings and inspections, attendance at pre-decisional enforcement and regulatory conferences involving reactor licensees



#### **Regional State Liaison Officers**



- Primary NRC contact with SLOs, State, Tribes and local governments and regularly communicates on reactor and emergency preparedness issues
- Customize their approach based on each State's interests and needs; regional and State variations
- Participate in emergency preparedness and incident response
- Coordinate and support *regional* communication with other Federal agencies (e.g., FEMA, EPA, OSHA, DOT)
- Negotiate MOUs and protocols for State and Tribal observation of NRC inspections





Protecting People and the Environment

-6

# •Questions?



### State PUC Roundtable

- Hon. Michael Carrigan, Illinois Commerce Commission
- Hon. Mary-Anna Holden, New Jersey Board of Public Utilities
- Hon. Rebecca Valcq, Public Service Commission of Wisconsin



# Opportunities for Continued Engagement Between PUCs and NRC



# **Thank You**

Please reach out to Kiera Zitelman (<u>kzitelman@naruc.org</u>) and Jasmine McAdams (<u>jmcadams@naruc.org</u>) if you have any questions.