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# Strategic Programmatic Overview of the Operating Reactor Business Line Commission Meeting

November 14, 2024

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# Mirela Gavrilas

## Executive Director for Operations

# Operating Reactors BL Panel

## Mike Franovich

- Acting Deputy Director for Reactor Safety Programs and Mission Support

## Jamie Pelton

- Deputy Director, Division of Operating Reactor Licensing

## Lauren Gibson

- Branch Chief of the License Renewal Project Branch, Division of New and Renewed Licenses

## Meena Khanna

- Acting Director, Division of Risk Assessment

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# Mike Franovich

**Acting Deputy Director for Reactor Safety Programs and Mission Support**
**Office of Nuclear Reactor Regulation**

# Mission Excellence

Delivering high quality products on schedule and within budget


## Enablers to success

- Graded approach focuses on key safety- and risk-significant areas
- Innovative use of project management tools and data analytics
- Transforming communication approaches with stakeholders
- Implement core/integrated review teams
- Enable timely decision-making
- Adapt to fact-of-life changes
- Prioritize workload

# NRC's Operating Reactor Execution

*"Leveraging data and experience to make the safe use of nuclear technology possible"*

Approved more than **190 industry transitions to risk-informed programs** that decreased dose, increased operational flexibility, and increased timely maintenance.

**Successful transition of Vogtle Units 3 & 4 to commercial operation.**

Completed **95% of licensing action reviews within 125% of budget/schedule estimate,** using mission analytics for greater efficiency.

Revised **more than 40 inspection procedures and Manual Chapters** for Reactor Oversight Process enhancement.

Approved **6 Accident Tolerant Fuel submittals,** safely supporting industry effort to continue rollout of near-term ATF technologies.

Leveraging lessons from **more than 170 power uprate amendments** to optimize regulatory guidance for future submittals.

Averaged more than **450 public outreach activities per year,** promoting knowledge transfer, improving communication and fostering stakeholder confidence.

Enhanced subsequent license renewal reviews, initially resulting in around **4,000 less review hours per application**.

Enhanced resident inspector training to produce **full inspector qualification in approximately 15 months** while maintaining quality.

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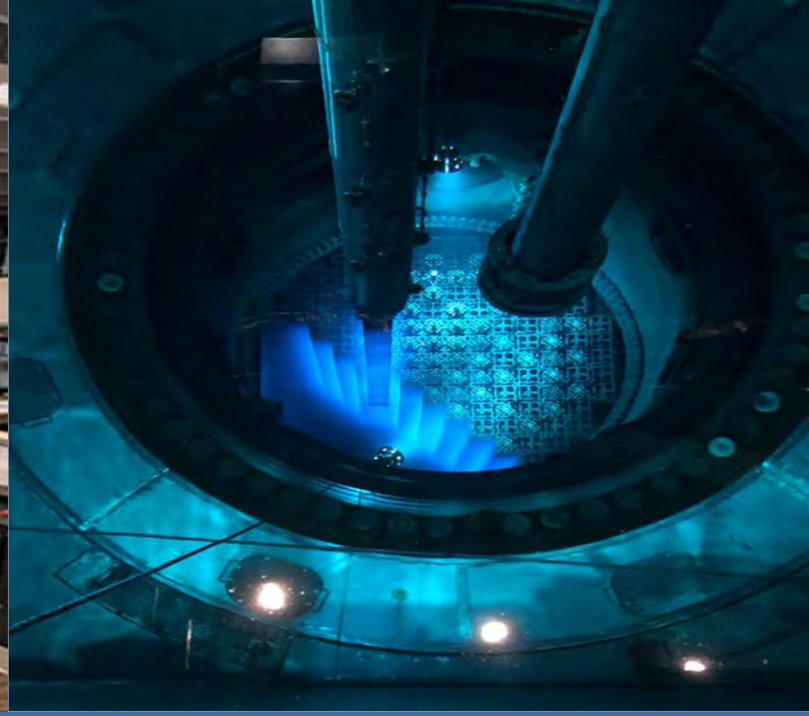

# Research and Operating Experience is Foundational to Reliable Regulation

- **Increased Enrichment (IE) rulemaking**
  - Treatment of large loss of coolant accidents (LOCAs)
  - Main control room dose design criteria
- **Digital Instrumentation & Controls (I&C)**
- **Reactor Accident Analysis Modernization (RAAM)**

# Accelerating Modernization Efforts through ADVANCE Act Initiatives

- The ADVANCE Act is a catalyst that is stimulating creative approaches and accelerating efforts.
- Licensing Efficiencies (ADVANCE Act Section 505):
  - Effective pre-application engagements and data utilization to optimize resource expenditures and efficiently execute established schedules
- Oversight Efficiencies (ADVANCE Act Section 507):
  - Establish new baseline inspection program and assess cross-cutting issues using updated risk-informed, performance-based assessment

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# Jamie Pelton

**Deputy Director**
**Division of Operating Reactor Licensing**
**Office of Nuclear Reactor Regulation**

# Palisades Potential Restart: A Benchmark for the Future

**2023**

- Palisades Restart Panel Charter
- Communications Plan
- Public website enhancements
- Public meetings

**2024**

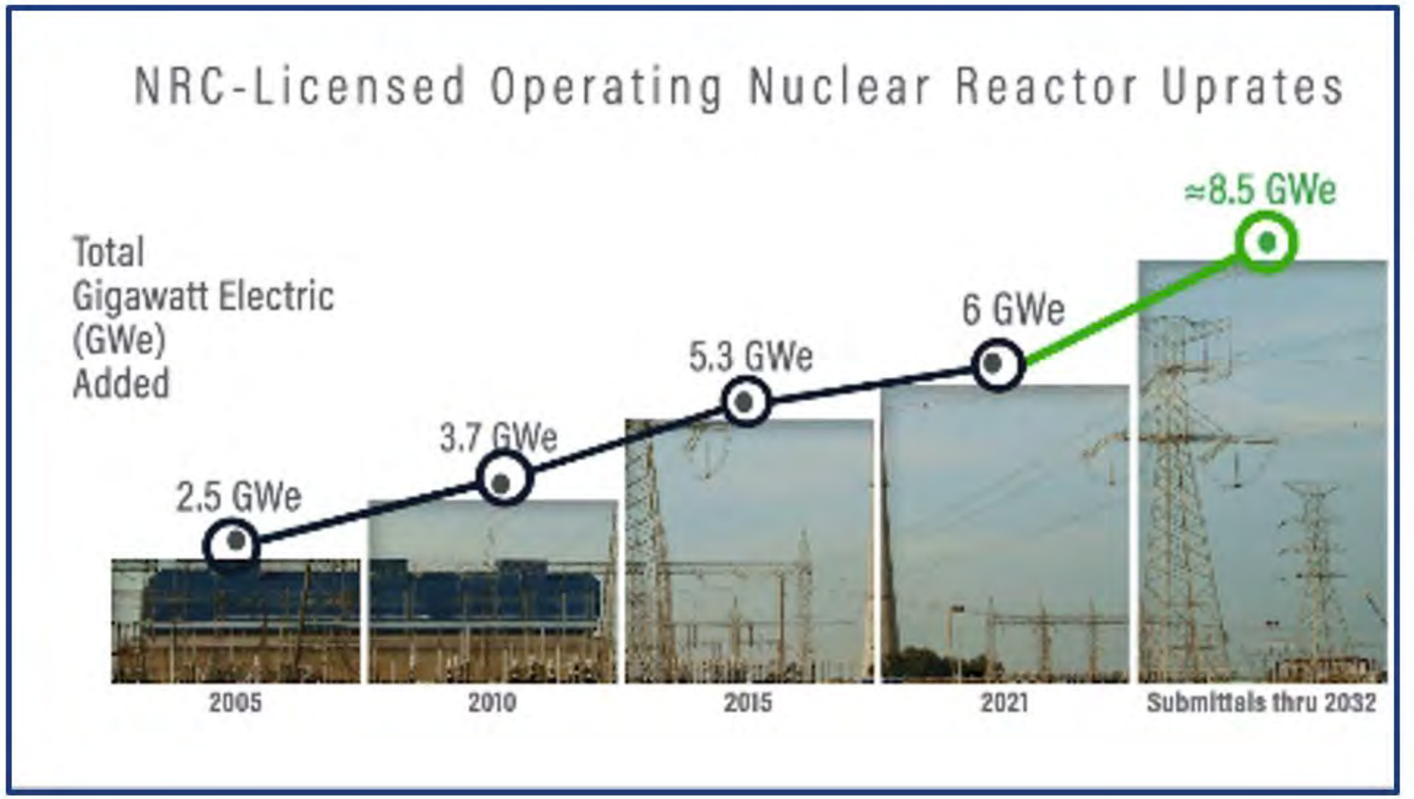
- ACRS and public meetings
- Restart inspection guidance issued
- Six licensing applications
- Environmental review ongoing
- Resident inspectors onsite
- Ongoing NRC inspections
- Two hearing opportunities

**2025**

- Reactor Oversight Process (ROP) implementation
- Completion of licensing actions
- Make final decision for operation

# Power Uprates: A Graded Approach

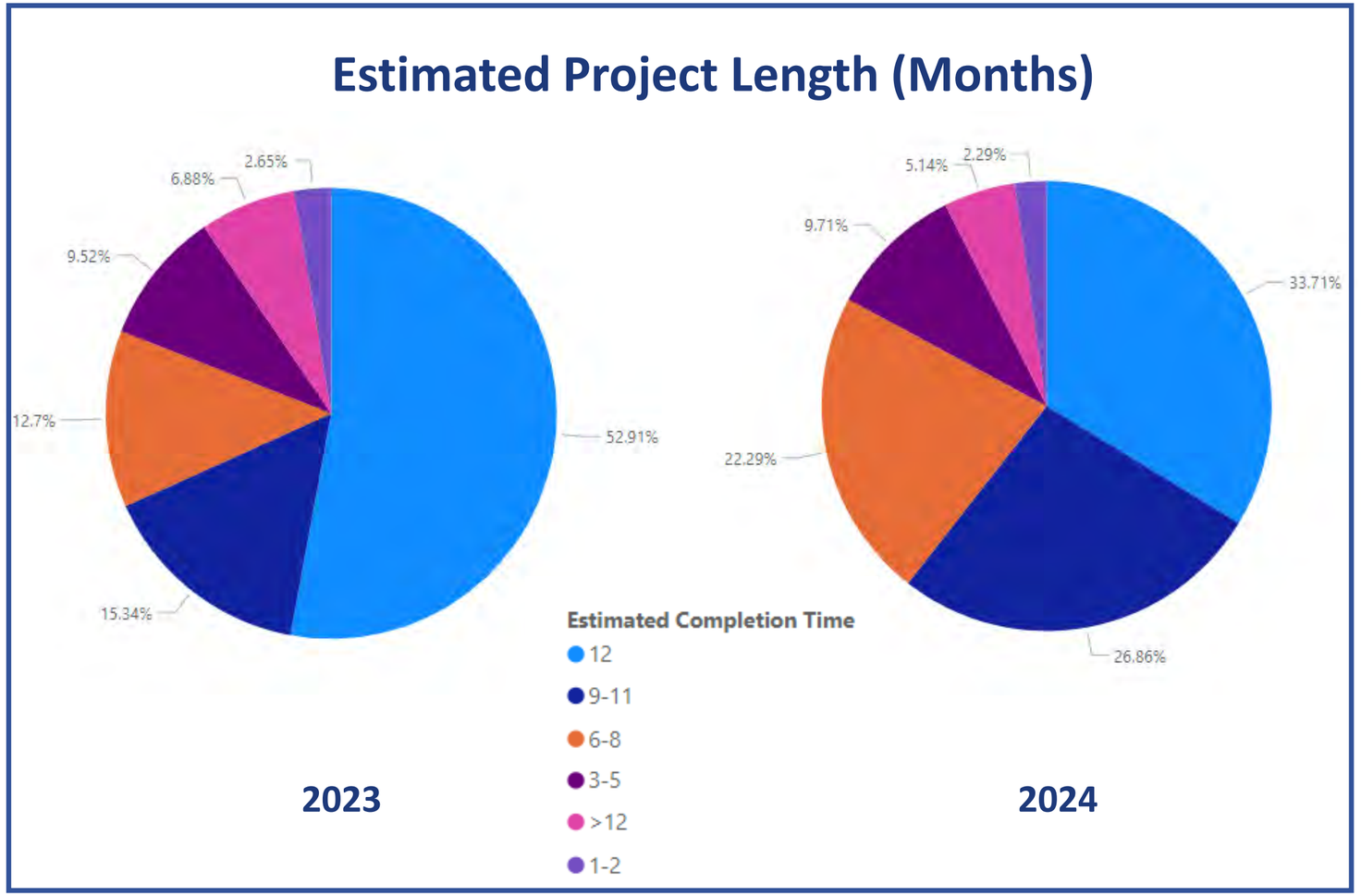
- **Licensing Process Improvements**
  - Data optimized review process
  - Guidance enhancements
- **Dedicated Project and Core Team**
  - Project and Communications plan
  - Core Team Charter
- **Stakeholder Engagements**
  - Workshops and Pre-application
  - Regulatory Issue Summary



# Data Driven Licensing

- **Real-time and Historical Data Analysis Tools**
  - Reactor Program System (RPS) licensing dashboards
  - Request for Additional Information (RAI) App
  - Effort and Schedule Estimator (EASE) tool

- **Metrics & Performance Evaluation**
  - Resource and timeline accountability
  - Optimized performance metrics to maximize efficiency and resource utilization




***Note: Data based on NRR/DORL EPIDs excluding topical reports, COVID related actions, and actions without RPS estimate.***

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## Lauren Gibson

**Branch Chief of the License Renewal Project Branch**
**Division of New and Renewed Licenses**
**Office of Nuclear Reactor Regulation**

# Progress Shown with Comanche Peak License Renewal

Comanche Peak Nuclear Power Plant, Units 1 and 2, renewed licenses were issued on July 30, 2024!

The review was completed 2 months ahead of schedule and 5,932 hours under budget.

**Comanche Peak LRA Receipt**
Est: 23,000 hours, 22 months
**Nov 2022**

**Commission SRM for a Roadmap**
**Dec 2023**

**Staff License Renewal Roadmap + Supplement**
**Mar/Apr 2024**

**Comanche Peak LR Issuance**
17,068 hours, 20 months
**July 2024**

**Commission SRM**
14,000 hours, 18 months
**Aug 2024**

# New Graded Approach Being Applied (Tiered Approach)

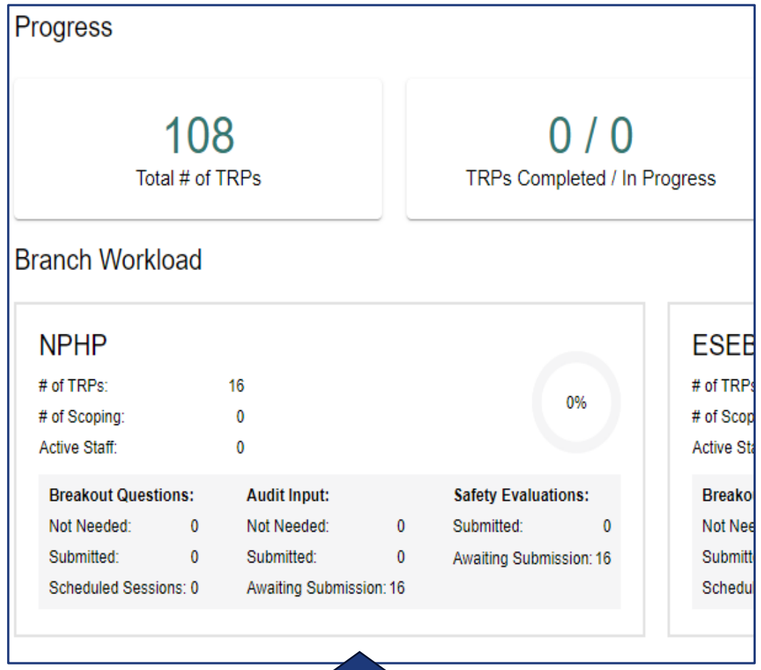
**Depth of Review**

| Standard (High) | Modified (Medium) | Confirmation (Low) |
|---|---|---|
| • Application<br>• Operating experience<br>• AMP basis documents<br>• System health reports<br>• Engineering analyses<br>• Implementing procedures<br>• Inspection and test results<br>• Corrective actions | • Application<br>• Operating experience<br>• AMP basis documents<br>*Discretion to review key details in other plant documents* | • Application<br>• Operating experience<br>• Essential AMP details in AMP basis documents<br>*(e.g., key standards, inspection criteria)* |

**Factors Considered**

| AMP weighing factors | | |
|---|---|---|
| High risk/safety significant SSCs | Medium risk/safety significant SSCs | Low risk/safety significant SSCs |
| Limited or no reference to widely accepted standards | GALL-SLR recommends significant augmentation of industry standards | Mature plant programs with high degree of standardization |
| No or minimal NRC oversight/visibility | Moderate NRC oversight/visibility | Robust NRC oversight/visibility |
| No prior reviews | Relies on some aspects of previous reviews | Fully leverages previous reviews (initial license reviews or fleetwide programs) |
| Plant-specific AMPs or a high number/significance of exceptions to GALL-SLR | Limited GALL-SLR inconsistencies | Full GALL-SLR consistency |
| Recent, novel, or reoccurring operating experience of degradation | Operating experience shows average trends | Absence of unexpected operating experience of degradation; or shows positive trends |

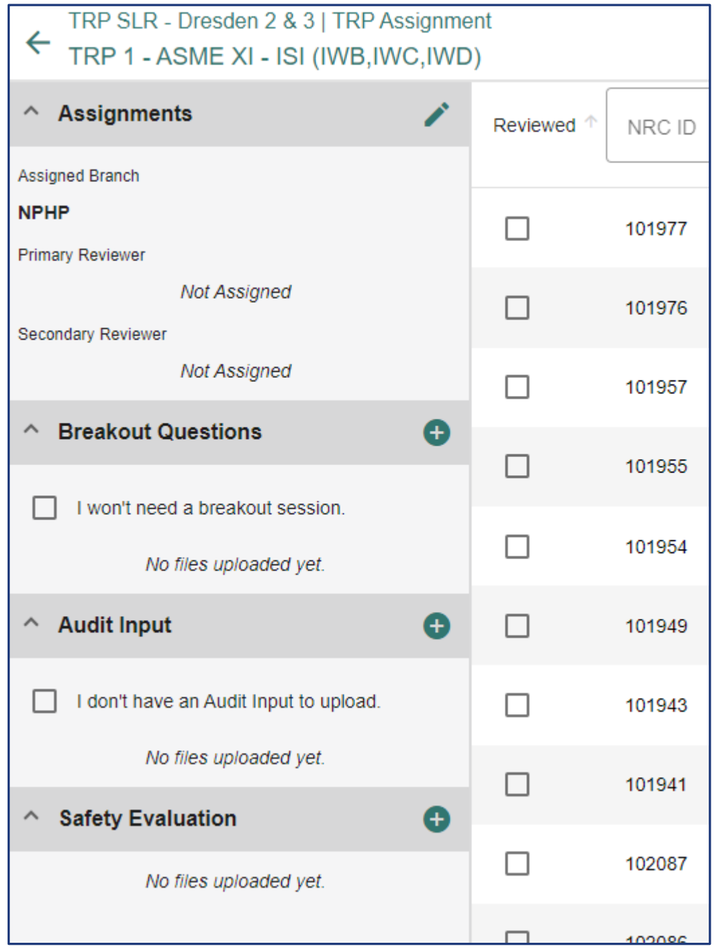
# Developing Tools to Enhance Administrative Efficiencies




Dashboard View

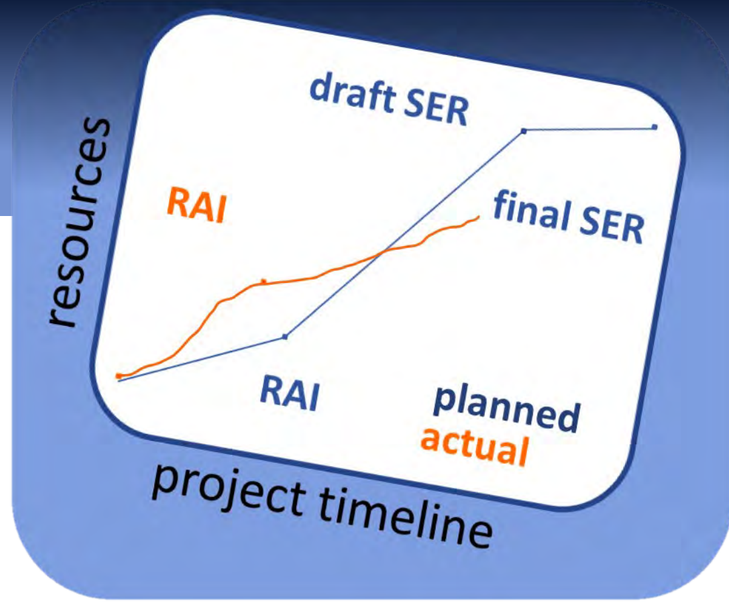
PM/Tech Reviewer Communication

Ability to Upload Files Directly




Checklist for Reviewers

# Strategic Direction to Enhance PM Practices




Enhance Project Management Skills and Application in all NRC Activities

## Assessment

How do we adapt Project Management best practices to a regulatory setting?

Which areas would have the greatest impact?

## Training

Principles of Project Management

Leadership and Communication for Project Managers

## Tools

Improved dashboards for project monitoring, decision-making, and communication

Focus on planned vs. actual resources

… and beyond.

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# Meena Khanna

**Acting Director**
**Division of Risk Assessment**
**Office of Nuclear Reactor Regulation**

# Expanding the Use of RIDM Across the Business Lines

Guidance on alternative radiological source term for evaluating design basis accidents

ASME Code Case N-752- risk-informed categorization and implementing alternative treatment for repair/replacement activities

NuScale Standard Design Approval Application

# Advancing the Use of the Risk Informed Process for Evaluations (RIPE)

**Shearon Harris Nuclear Power Plant:** Turbine Control System and Reactor Protection System Circuitry

**Palo Verde Nuclear Generating Station:** Safety Injection Tank

# Balanced Approach to PRA Configuration Control

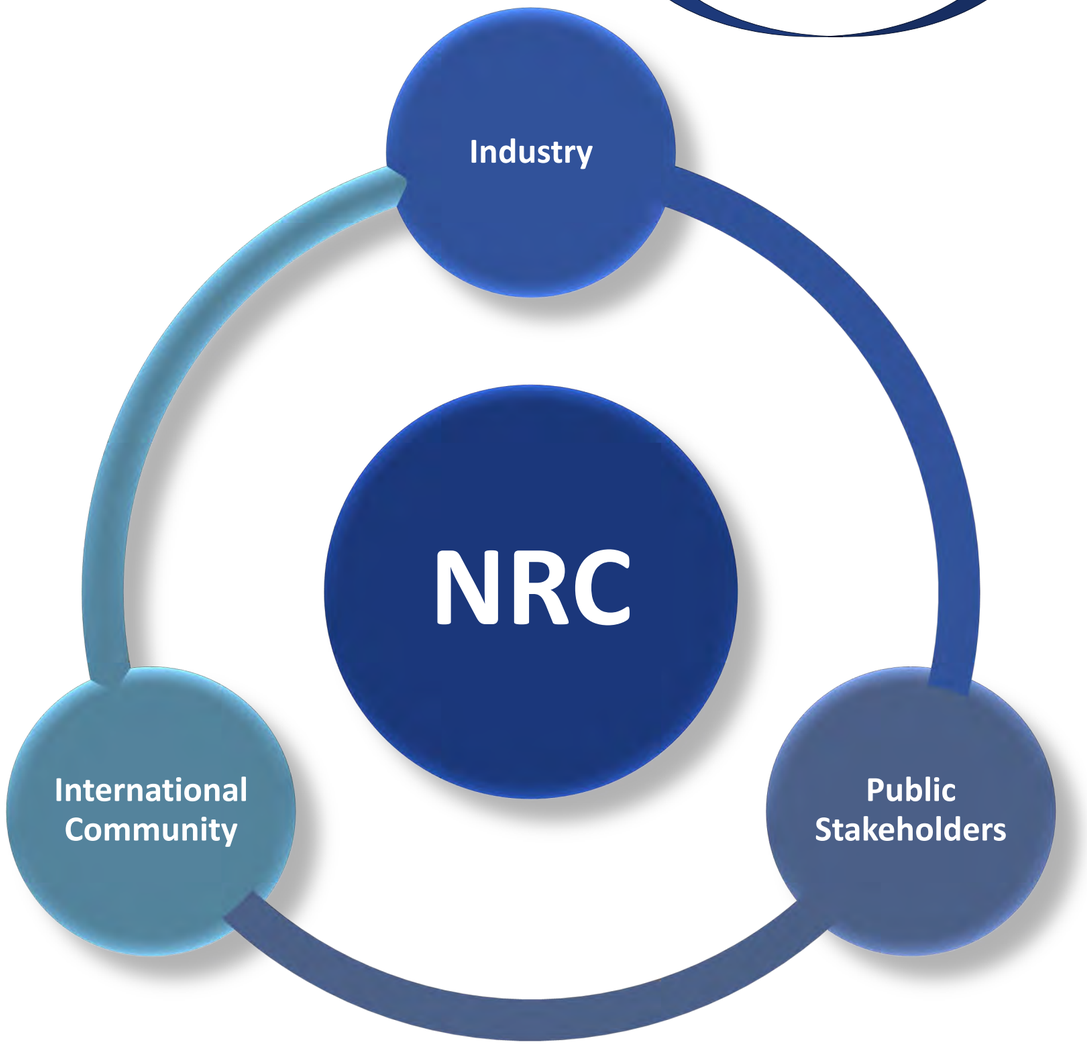
## Completed

- Conducted tabletops
- Held public workshops and meetings
- Developed balanced approach for oversight of PRA configuration control
- Implemented OpE Smart Samples at five nuclear power plants

## Path Forward

- Conduct annual assessment of smart samples and adjust, accordingly
- Develop long-term PRA configuration control oversight plan

# *Becoming riskSMARTer*






## KEY PRINCIPLES OF RISK-INFORMED DECISIONMAKING

**Be riskSMART**

**The five key principles risk-informed decisionmaking are found in RG 1.174. These include:**

1. **Adherence to Agency Regulations**
2. **Upholds Defense-in-Depth**
3. **Maintenance of Sufficient Safety Margins**
4. **Minimal Risk Increases**
5. **Robust Performance Monitoring**


## HOW TO USE RISK

### REINVIGORATING BE RISKSMART!

Be riskSMART is a framework that facilitates the effective **management** and **use** of risk for various agency processes. More information can be found on an additional brochure.

See SRM-SECY-19-0036 for Commission direction on using RIDM

### REGULATION AND OVERSIGHT

A variety of other processes also require risk-informed approaches, including, but not limited to:

- **LIC-206** for licensing reviews
- The **RIPE** process for license evaluations and amendments
- **LIC-504** for emergent issues
- **Management Directive 8.3 (MD 8.3)** for incident investigations
- The **Significance Determination Process (SDP)** for inspection finding safety significance
- **The Notice of Enforcement Discretion (NOED)** for license condition exceptions

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# Mirela Gavrilas

## Executive Director for Operations

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# New Reactors BL Panel

## Greg Bowman

- Deputy Office Director for New Reactors

## Jeremy Bowen

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

## Michelle Rome

- Branch Chief, Environmental Technical Review Branch 1, Division of Rulemaking, Environmental, and Financial Support

## Christian Araguas

- Director, Division of Engineering

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# Greg Bowman

**Deputy Office Director for New Reactors**
**Office of Nuclear Reactor Regulation**

# Accomplishments

Addressing more than **35 policy** issues & created more than **60 guidance** documents

Completed more than **10** advanced reactor design computer **models**

Reviewed more than **90 topical report/white paper** **33% faster** than the generic schedule

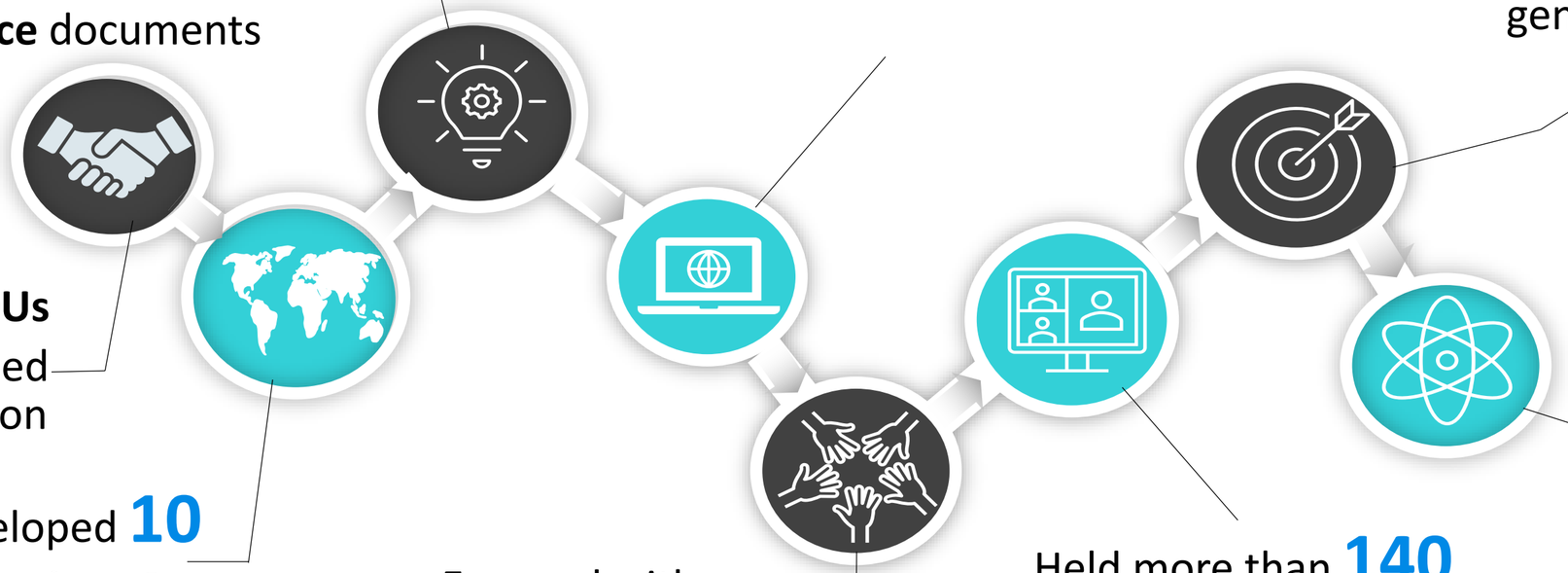
**10 NRC/DOE MOUs** focused on advanced reactor collaboration

Developed **10 work plans** & issued **8 joint reports** with Canada

Engaged with **20+ vendors** in licensing/ preapplication activities

Held more than **140 public engagements** a year on advanced reactor topics

Completed Kairos Hermes 1 and ACU construction permit safety review **faster** than the generic schedule goal.



*Statistics since 2018*

# Priorities for Sustaining Success in the New Reactor Business Line


- Building on past success to enhance future efficiency
- Establishing a graded approach to focus on key safety- and risk-significant areas
- Innovating our use of project management tools and data analytics
- Transforming communication approaches with stakeholders
- Leveraging effective pre-application engagement
- Effectively implementing core/integrated review teams
- Adapting to fact-of-life changes

# Implementation of the ADVANCE Act

Develop and Implement Clear, Technology-inclusive Regulations and Guidance for New and Advanced Nuclear Reactors

Assess any Potential Modifications on the Regulatory Framework to Expedite and Streamline Licensing Reviews of Brownfield Sites

Ensure We Have the Adequate Resources and the Technical Capacity We Need to Fulfill Our Role and Conduct the Review of Applications in an Efficient Manner

Revamp Engagement with Other Federal Agencies

Efficient and Effective Licensing Review Programs

Reduced Burden for New and Advanced Reactor Applicants

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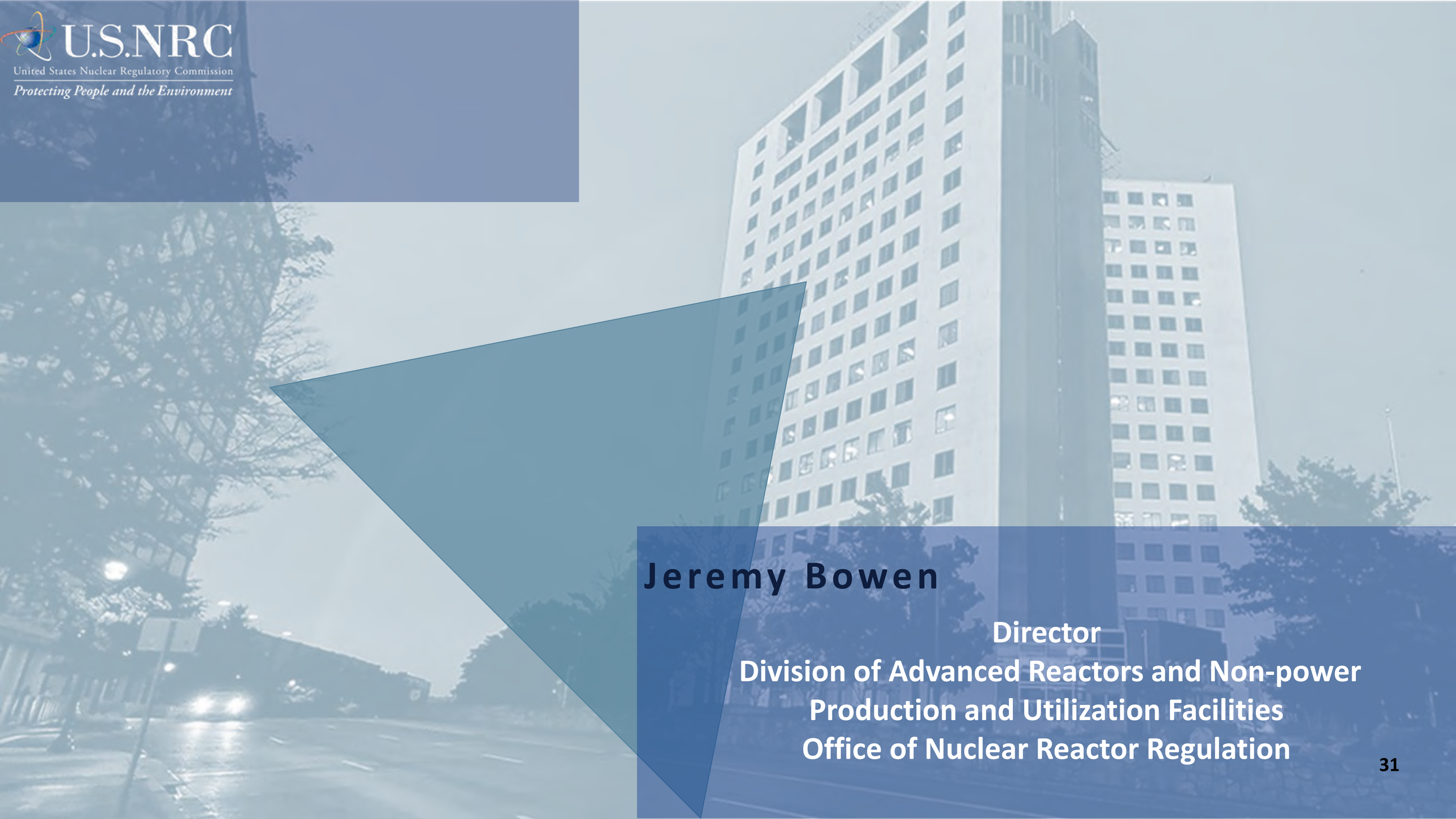


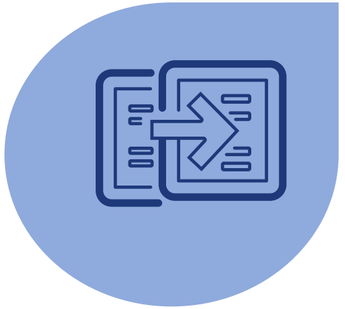
## Jeremy Bowen

**Director**
**Division of Advanced Reactors and Non-power Production and Utilization Facilities**
**Office of Nuclear Reactor Regulation**

# #AdvancedReactorReady 2024

## Policy & Rulemaking

- Part 53
- New reactors Generic Environmental Impact Statement
- Performance based emergency planning for SMRs



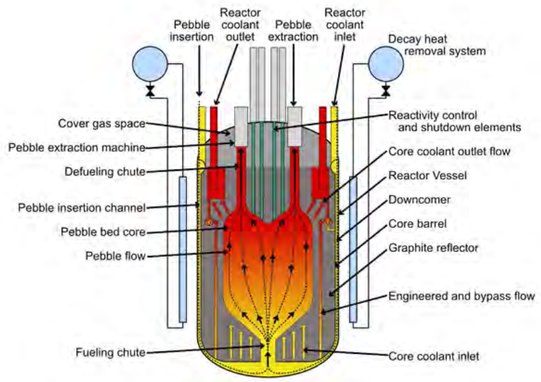
## Regulatory Guidance

- Advanced reactor content of application project
- RG 4.7, “General Site Suitability Criteria for Nuclear Power Stations”
- Microreactor licensing and deployment

## International Cooperation

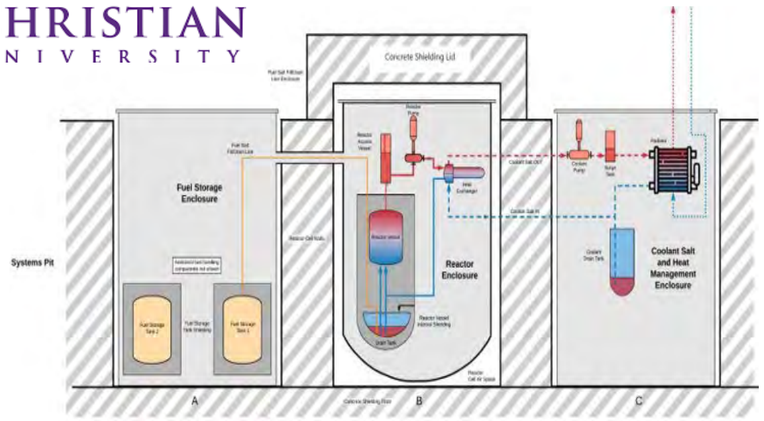
- ONR joined agreement with CNSC
- Regulatory exchange on BWRX-300
- 3 new work plans initiated

# Ensuring Safety
# Ahead of Schedule & Under Budget




Kairos Power


ABILENE CHRISTIAN UNIVERSITY

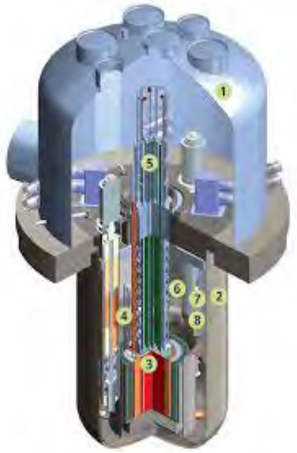



| Regulatory Review Project | Planned Review Schedule | Executed Safety Review Schedule | % Under Resource Estimate |
|---|---|---|---|
| Kairos Hermes 1 | 21 months | 18 months | 6% |
| Kairos Hermes 2* | 14 months | 10 months | 43% |
| ACU Molten Salt Research Reactor | 22 months | 21 months | 13% |
| COLUMBIA Class Propulsion Plant | 14 months | 10 months | 29% |

*additional efficiencies gained by leveraging prior Hermes 1 review

# Recent Experience Informing Current Execution

TerraPower™




NUSCALE

| Regulatory Review Project | Generic NEIMA Milestone | Planned Review |
|---|---|---|
| TerraPower Kemmerer Unit 1 Construction Permit | 36 months | 27 Months |
| NuScale US460 Standard Design Approval | 42 months | 24 months |
| 20+ vendors engaged in pre-application activities with the NRC | | |

# Evolving to Meet Future Demand

**Ensure Sufficient Staff Capacity**

**Establish Appropriate Regulatory Landscape**

**Communicate Effectively with Stakeholders**

**Effective Process Implementation**

**Strive for Continual Improvement**

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## Michelle Rome

**Branch Chief, Environmental Technical Review Branch 1**
**Division of Rulemaking, Environmental,**
**and Financial Support**
**Office of Nuclear Material Safety and Safeguards**

# Fundamental Change

**Matrix staffing**

Environmental center of expertise: five realigned branches

**Congressionally mandated time and page limits**

Environmental impact statements: 24 months, 150-300 pages
Environmental assessments: 12 months, 75 pages

*"Meeting our regulatory requirements with improved efficiency, timeliness, and predictability"*

**New, risk-informed approaches**

Hermes 2 environmental assessment vs. Hermes 1 environmental impact statement: 60% fewer pages, 40% fewer resources, completed in approximately half the time


**Commission direction**

License renewal initial environmental impact statement resource model set to 5,500 hours and 18 months

# Expanding our Efficiency and Capacity Toolboxes

License Renewal Generic Environmental Impact Statement: **74% of issues generically dispositioned**

Potential rulemaking from 2023 NEPA Amendments: **6 new efficiency recommendations**

Expanded Categorical Exclusions Rule: **1,000 staff hours savings per year**

New Reactor Generic Environmental Impact Statement: **up to 80% of issues generically dispositioned**


Incorporation by reference: **up to 10-50 % fewer pages depending on available studies**

Risk-informed technical scope: **potentially up to 20% resource savings**

Non-Federal representatives for Endangered Species Act consultations: **50-80% resource savings per consultation**


Fully staffed to FY25 levels (20 hires over 2 years): **86% of environmental staff are qualified**

Matrixed staffing to share lessons learned: **70% staff on Palisades Restart worked on Hermes 2**

Knowledge management: **100% new staff with assigned mentors**

# Risk-informed Approach to Streamline Consultations and Strengthening Tribal Engagement

FY24 Consultations

200 Tribes

27 Tribal meetings

486 letters

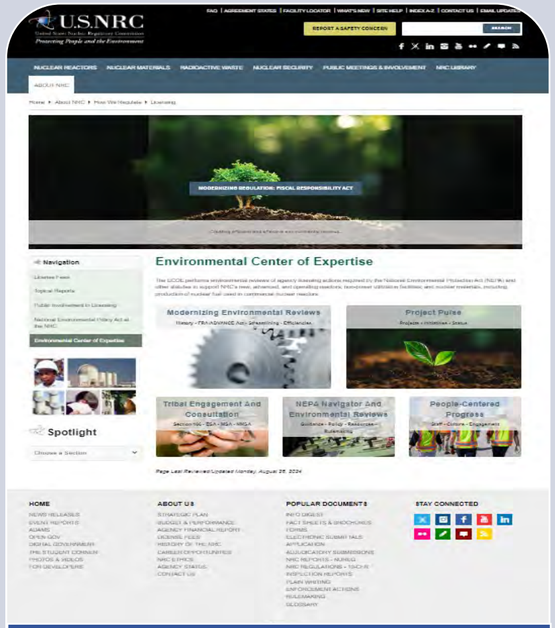
Facilitate site visits and ensure Tribal monitors during ground disturbing activities

Ensure licensees update procedures to protect cultural resources and traditional ecological resources

Tell their story in our environmental documents

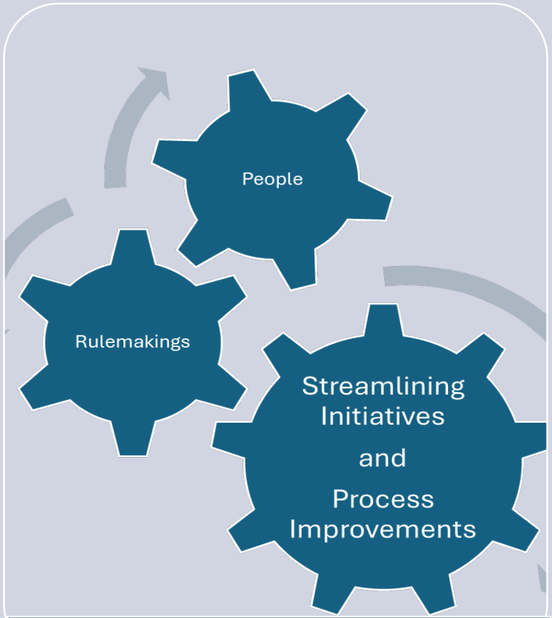
**Earlier and more meaningful resolution of tribal concerns**

# Using Technology to Prioritize and Expand Stakeholder Engagement




**New!**

**One-stop shop external website**




**New!**

**Online environmental review program blueprint**

**Streamlined comment aggregation processes for approximately 3,000 comments per year**


**Tailored in-person outreach and virtual meetings to reach broader and more remote audiences**

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## Christian Araguas

**NRC Standards Executive &**
**Director, Division of Engineering**
**Office of Nuclear Regulatory Research**

# Consensus Codes & Standards are Essential to the NRC Licensing Process

## Proven Value to NRC Licensing

- Firm foundation for regulatory stability
- Enable efficiencies from first-of-a-kind to large-scale, high-volume licensing

## Robust Codes and Standards Program

- Staff from all Program Offices and most Regions participate in standards development organizations activities
- Coordination with 36 gov’t agencies, 12 SDOs, and industry organizations

## Recent Accomplishments

- Expedited review of ASME BPV, Section III, “Rules for Construction of Nuclear Facility Components,” Division 5, “High Temperature Reactors”
- 5 endorsements of codes and standards supporting advanced reactors


Annual NRC Fall Standards Forum

# Identifying Need for Program Enhancement

## Past

- Focus on large LWR designs
- Standards development and NRC endorsement worked sequentially
- Focus on deterministic approaches
- Resourced adequately for past needs

## Present

- Growing focus on codes and standards for advanced reactors
- Endorsing codes and standards via rulemaking may not be timely for advanced reactors
- Desire for more technology inclusive codes and standards
- Need a resources strategy that addresses today's evolving codes and standards program.

## Future

- Efficient engagement in standards development
- Innovative solutions to endorse advanced reactor codes and standards
- Incorporation of graded approaches using risk and performance-based insights
- Resources applied to highest priority standards informed by external stakeholder needs

# Key Codes & Standards Action Plan Components


- Based on input from a broad range of stakeholders, identifying key areas for enhancement and expanded focus
- Plan consists of 17 actions falling within 3 program areas for improvement
- Focus is on increasing timeliness, efficiency, and promoting risk and performance-based insights
- Three timeframes: Swift Actions (1-yr), Intermediate Activities (2-4 yrs), and Program Enhancements

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# Mirela Gavrilas

## Executive Director for Operations

# Acronyms

- **ACRS** -Advisory Committee On Reactor Safeguards
- **ADVANCE Act**- Accelerating Deployment of Versatile, Advanced Nuclear for Clean Energy Act
- **AMP**- Aging Management Program
- **ASME-** American Society of Mechanical Engineers
- **BL**- Business Line
- **CSNC**- Canadian Nuclear Safety Commission
- **EASE-** Effort and Schedule Estimator
- **GALL-** Generic Aging Lessons Learned
- **LMP**- Licensing Modernization Plan
- **LR-** License Renewal
- **LRA-** License Renewal Amendment
- **LWR**- Light Water Reactors
- **NMSS**- Nuclear Material Safety and Safeguards
- **NRBL**- New Reactor Business Line
- **NSIR**- Office of Nuclear Security and Incident Response
- **ONR**- Office of Nuclear Regulation in the United Kingdom
- **OGC-** Office of General Counsel
- **OPA**- Office of Public Affairs
- ORBL- Operating Reactor Business Line

# Acronyms (cont.)

- **PIRT**- Phenomena Identification and Ranking Tables
- **PRA**-Probabilistic Risk Assessment
- **PRP**- Palisades Restart Panel
- **PUR**- Power Uprate
- **RAAM**- Reactor Accident Analysis Modernization
- **RAI**- Request for Additional Information
- **RIDM 2.0**-Risk Insight Decision Making
- **RIPE** – Risk Informed Process for Evaluations
- **ROP**- Reactor Oversight Program
- **RPS**-Reactor Program System
- **RG-** Regulatory Guide
- **SDAA**- Standard Design Approval Application
- **SDP**- Significant Determination Process
- **SLR**- Subsequent License Renewal
- **SRM**- Staff Requirements Memoranda
- **SSC**- Structures, Systems, and Components