

# “REGULATORY CHALLENGES AND EXPERIENCE IN THE DECOMMISSIONING AND REMEDiation OF COMPLEX NUCLEAR SITES IN THE UNITED STATES”

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Global Implementation of Decommissioning  
and Environmental Remediation Programs  
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# Decommissioning Topics

- Experience with 1997 Regulations “License Termination Rule” and the current U.S. Decommissioning Process
- Actions to Prevent Legacy Sites – “Decommissioning Planning Rule”
- Legacy Site Remediation Experience
- Recent Reactor Shutdowns Impacts and the Transitioning from Operating to Decommissioning
- Present Decommissioning Rulemaking Activities
- International Cooperation

# NRC Mission

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NRC's mission is to ensure safety, is protective of public health and the environment whether the site is operating, or transitioning from operating to decommissioning, and through the entire decommissioning process until the site has been radiologically decommissioned and the license is terminated.

# Decommissioning Regulations Revised in 1997

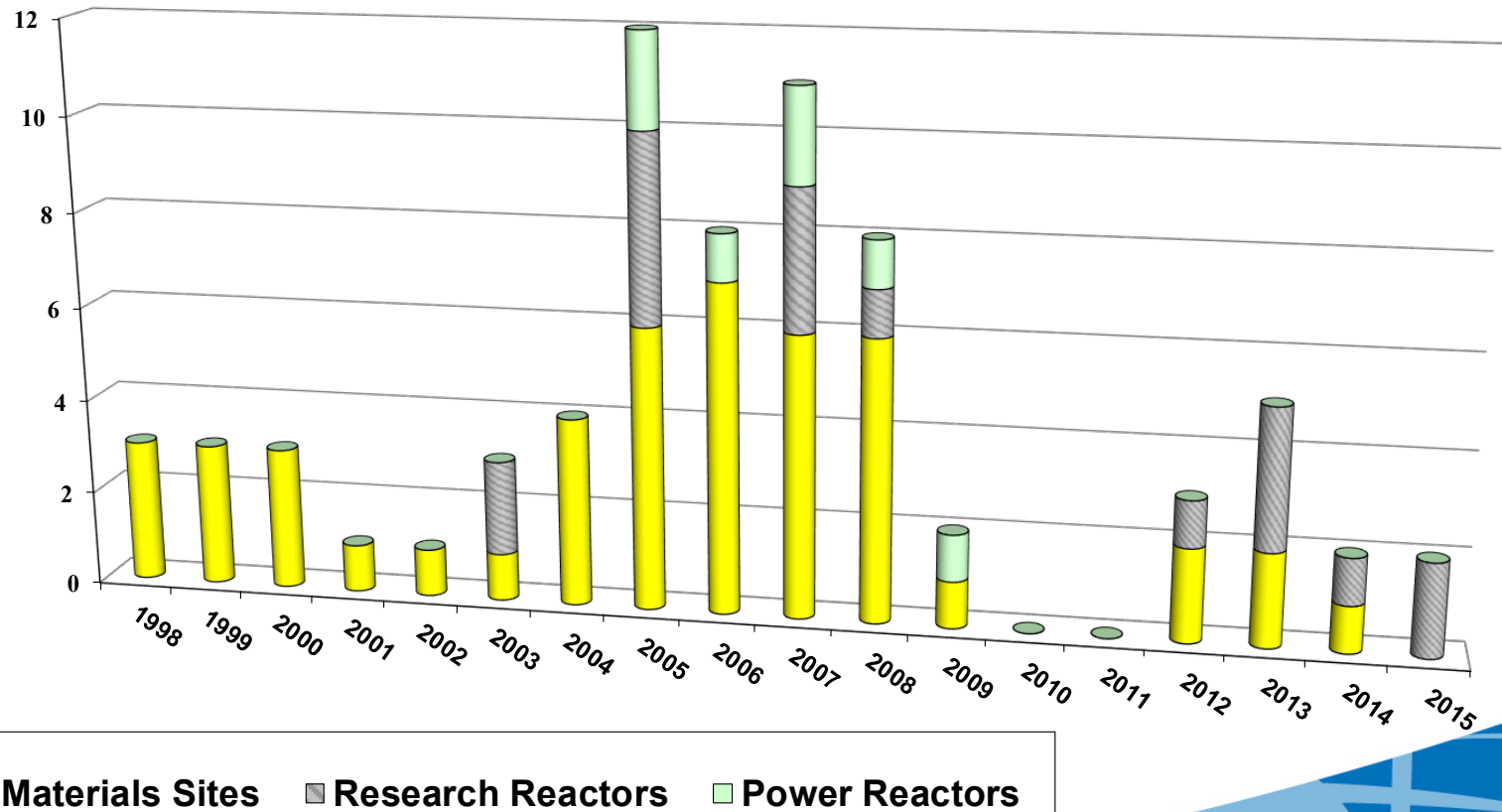
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- Performance-Based and Risk-Informed
- Materials and Uranium Recovery Sites
- For Reactors, based on Lessons Learned from first 3 Power Reactor Decommissionings
- Reactor Decommissioning actions start **5 years** before end of operating license.



# NRC Decommissioning Experience

## License Terminations



# The Decommissioning Processes

## Materials/Uranium Recovery Facilities

### ***Before Cleanup***

Licensee ceases operations and notifies NRC.  
Licensee submits decommissioning plan (DP) or reclamation plan (RP) to NRC for review. (1 year)  
NRC performs technical and environmental reviews of licensee plan and documents the reviews in NRC safety and environmental reports.  
NRC approves DP/RP if acceptable.



### ***During Cleanup***

Licensee conducts cleanup activities, as described in the DP/RP.  
NRC conducts periodic inspections.  
Licensee completes cleanup activities.

## Power Reactor Facilities

### ***Before Cleanup***

Licensee ceases operations and notifies NRC.  
**Licensee submits post-shutdown decommissioning activities report (PSDAR) for NRC's information.**  
Licensee waits 90 days before starting any major decommissioning activities.



### ***During Cleanup***

Licensee initiates cleanup activities, as described in the PSDAR.  
**60 years to complete the decommissioning**  
Licensee submits license termination plan (LTP) for review 2 years before license termination. The plan outlines remaining decommissioning activities.  
NRC performs technical and environmental reviews of the licensee plan and documents the reviews in NRC safety and environmental reports. NRC approves LTP if it is acceptable.  
NRC conducts periodic inspections.  
Licensee completes cleanup activities.

### ***After Cleanup***

Licensee conducts final status survey and submits report.  
NRC conducts confirmatory surveys and reviews licensee's report. NRC approves final status survey report and terminates license.

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*Uranium Recovery Sites: Custodial agency submits Long Term Surveillance Plan (LTSP) for NRC review. Upon NRC's acceptance of LTSP, the existing license is terminated and the title to the site is transferred to the custodian under general license.*

# Commercial LLW Sites in U.S.



# Staff Initiatives from 1990's Reactor Decommissionings

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## 2000 - SECY-00-145 Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning

- September 11, 2001 Attacks
- License Renewal
- Commission direction to prevent future Legacy Sites

# Legacy Sites

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- Complex Materials Legacy Site – The licensee/owner cannot complete decommissioning work for technical or financial reasons.
- Cold War Legacy Site – former uranium mill site used for the Defense Complex

# DECOMMISSIONING PLANNING RULE (DPR)

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- 2004 Decommissioning Meeting with Industry
- The Decommissioning Planning Rule
  - Published June 2011 (76 *FR* 35512)
  - Effective Date December 2012
- Applicable to **OPERATING** Facilities
  - ALL LICENSE TYPES
  - Nuclear Power Plants, NEI-07-07 Voluntary Initiative meets the DPR

# Decommissioning Planning Rule (DPR)

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- 10CFR20 Radiation Protection Standards
  - §20.1406(c) “MINIMIZATION OF CONTAMINATION” - Conduct **Operations** to minimize introduction of Radiological Contamination into the environment
  - §20.1501(a) “GENERAL” - Conduct reasonable surveys **INCLUDING the SUBSURFACE**
  - §20.1501(b) “GENERAL” - Record Subsurface Contamination
  - Regulatory Guide 4.22, “Decommissioning Planning During Operations”



# Complex Materials Legacy Site





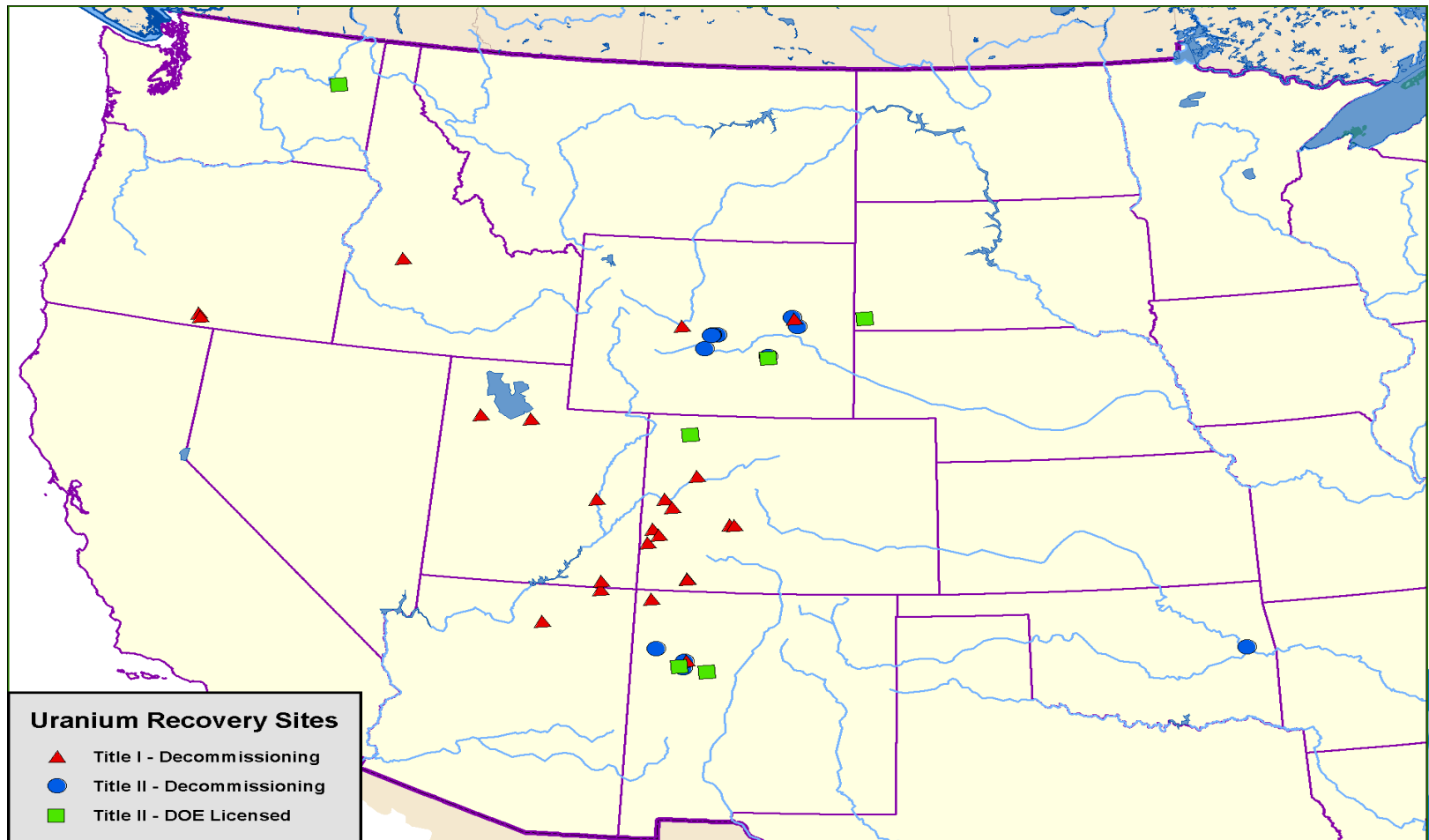
# Complex Materials Legacy Sites

- Legacy Site – The licensee/owner cannot complete decommissioning work for technical or financial reasons.
- License Terminations by the Atomic Energy Commission
- 1990 – 40 Original Legacy Sites
- 1991-1996 – more identified  
Total of 60 Legacy Sites
- 2009 – 17 Sites transferred to Agreement States
- 2016 – 5 NRC Legacy Sites remain
- 2016 - 11 Sites in Agreement States remain
- 2016 – Total of 16 Complex Legacy Sites

# Summary of Uranium Recovery Statutes Regulations and Sites

- Uranium Mill Tailings Radiation Control Act of 1978 (Amended AEA)
  - Title I – inactive uranium mill sites before 1978
  - Title II – sites licensed by NRC in or after 1978
- Regulations
  - 10 CFR Part 40.27: General license (GL) for Title I sites
  - 10 CFR Part 40.28: General license for Title II sites
  - Appendix A: Technical criteria for licensing
- Sites
  - 22 Title I sites transferred to the DOE (4 on the Navajo Nation) and under a general license
  - 11 Title II sites undergoing decommissioning
  - 6 Title II sites transferred to the DOE and under a GL

# Uranium Mill Tailings Sites



# NRC Regulated Uranium Recovery Activities

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- Milling – Any activity that produces byproduct material
  - Byproduct material is the tailings or wastes produced by the extraction of uranium or thorium for its source material (i.e., uranium or thorium) content
- Wastes produced by milling
- NRC does not regulate uranium mining

# Sweet Water Uranium Mill





# Lakeview – Rock Cover Durability Issues

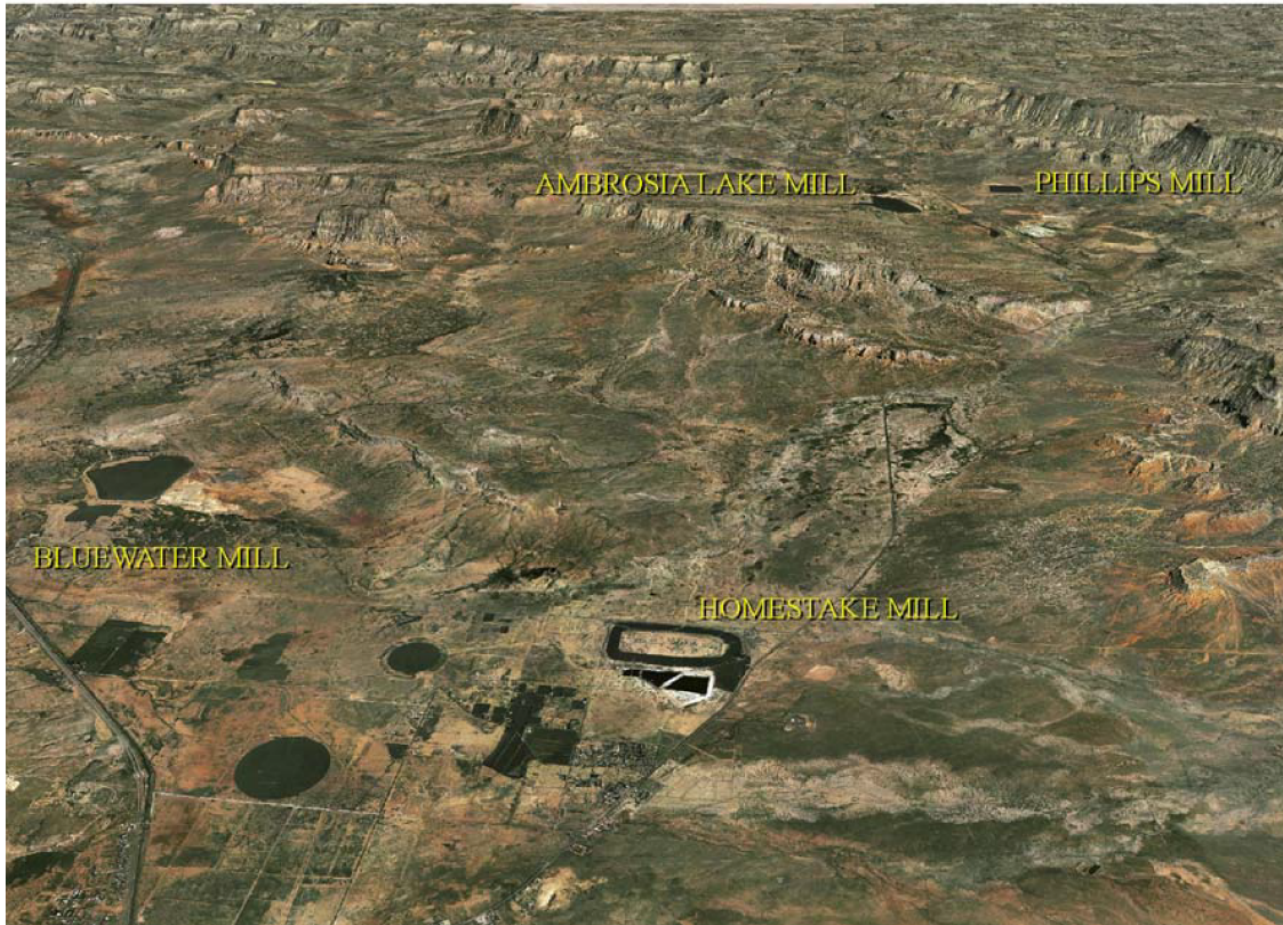
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# Bluewater Valley District Multiple Site Issues

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# Bluewater – Mill Tailings Site Ponding and Cover Slumping





# Homestake Mill Tailings Site – Temporary Cover and Groundwater Remediation



# Homestake

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# InSitu Uranium Recovery



# Decommissioning Uranium Recovery Issues

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- Long-term care fees
- Post termination GW monitoring
  - Acceptable post license termination monitoring
  - Exceedances
  - Off-site plume responsibility
- General license oversight
- Disposal cell stability

# Decommissioning Uranium Recovery Activities

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- Specifically licensed sites (11)
  - Decommissioning plan/reclamation plan reviews
  - Coordinate with DOE/State/licensee to transfer site to DOE
  - Site specific technical/policy issues
- Generally licensed sites (28)
  - Routine groundwater and performance report reviews
  - Non-routine reviews – Long Term Surveillance Plans, Groundwater Corrective Action Plans, restoration performance reports, geological studies



# In 2013 and 2014, Premature Power Reactor Shutdowns



# 2013 Decommissioning Transition Working Group

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- Ensure Office-wide Staff Coordination and Communications
- Focal point to address immediate and emergent issues and recommend the long term solutions
- NRR Focus on Licensing Activities
- NMSS Focus on Public Meetings, Media and Congressional Inquiries
- Point of Contact for Nuclear Energy Institute
- Issue Final Report to Management

# Regulatory Impacts on Reactor Decommissioning Transition Issues

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2000 - SECY-00-145 Integrated Rulemaking Plan for Nuclear Power Plant Decommissioning

- September 11, 2001 Attacks
- License Renewal

2008 – SECY-08-0024 Delegation of Commission Authority to Staff to Approve or Deny Emergency Plan Changes that Represent a Decrease in Effectiveness

- Requires Commission Approval

2011 - Fukushima Daiichi

- New Orders



# Managing Premature Reactor Permanent Shutdowns

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- Regulatory Approach - Established Precedent
- Licensing Basis is Unchanged after Shutdown
- Lessons Learned and Experience from Plant Shutdowns in 1990s
- Significant Events since 2000
  - September 11, 2001 Attacks, Security and Emergency Response - Orders
  - March 11, 2011 Tōhoku Earthquake and Tsunami – Post Fukushima Orders

# Transition Licensing Actions

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To date, ~ 23 Licensing Actions PER SITE have been identified from the premature shutdowns

- 8 License Amendments
- 8 Exemptions
- 7 Site Specific Requests; amendments, exemptions, and rescinding Orders



# Commission Direction in SECY 14-0118

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- In response to Duke Energy's emergency plan exemption request, the Commission directed the staff December 30, 2014 to:
- Proceed with reactor decommissioning rulemaking
- Completion goal of 2019
- Continue to process amendments and exemptions until complete

# Reactor Decommissioning Proposed Rulemaking

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- New Regulations by 2019 to improve efficiency of the transition from operations to decommissioning, including:
  - license amendments
  - emergency plan exemptions
  - security plans
- Re-evaluate the present regulations including the States Role and 60 years to complete decommissioning

# Opportunities for Public Participation in Rulemaking

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- The NRC is interested in feedback from State partners, the nuclear industry, and all members of the public:
  - Comment opportunities (Advanced Notice for Proposed Rulemaking, Draft Regulatory Basis, Proposed Rule)
    - ANPR public comment period closed on March 18, 2016
  - Planned public meetings throughout the Rulemaking Process

# International Decommissioning Activities - IAEA

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- Safety Guides Contributors
- IRRS Missions / Artemis Project
- Technical Consultancies and Projects
  - Remediation of Legacy Sites
  - Entombment
  - DAROD
- Mission Expert Teams
- Research Reactors

# International Decommissioning Activities

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- NEA Working Party on Decommissioning and other projects
- Bilateral Country Specific Decommissioning Agreements
- Cooperation with UK, Germany
- Dose Modeling Workshop

# NRC's Decommissioning Program

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- 19 Power Reactors, 3 more Power Reactors as early as 2017
- 6 Research Reactors, 2 more expected
- 5 Complex Materials Legacy Sites
- 11 Uranium Sites in Decommissioning/Remediation
- 28 Mill Tailing Sites in Long Term Monitoring
- 5 Operating ISLs, 18 Applications



# Questions?

