Overview of Licensing for Nuclear Reactors & other NRC Licensed Facilities

Wyoming Legislature Joint Committee for Minerals, Business, & Economic Development

October 8, 2024

U.S. Nuclear Regulatory Commission

Kimyata Morgan-Butler, Deputy Director, Division of Fuel Management

Mallecia Sutton, Senior Project Manager, Advanced Reactor Licensing Branch

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United States Nuclear Regulatory Commission
Protecting People and the Environment

NRC Mission Statement – Protecting People and the Environment

The NRC licenses and regulates the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety, to promote the common defense and security, and to protect the environment.

www.nrc.gov/about-nrc.html

Topics

- New Reactor Licensing Overview
- Differences/Similarities in Licensing Fuel Cycle Facilities
- Differences/Similarities in Licensing Spent Fuel Storage Facilities

Overarching Regulatory Authorities

- Atomic Energy Act (AEA) of 1954, as amended, authorizes NRC to license and regulate "production and utilization facilities"
  - Nuclear Reactors (commercial & research/test)
  - Conversion, Enrichment, & Fuel Fabrication Facilities
- AEA authorizes NRC to relinquish oversight and regulation over some forms of radioactive materials and facilities in agreements with Governors (Sect. 274b)
- However, AEA PRECLUDES relinquishing oversight of "production and utilization facilities" to States (Sect. 274c)

New Reactor Licensing Overview

Mallecia Sutton

Senior Project Manager

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

Office of Nuclear Reactor Regulation

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Primary Legislation & Regulations Driving Timely Decisions and Outcomes

Environmental Review

Environmental Impact Statement

- National Environmental Policy Act (1969)
- Impacts **ON** the environment **FROM** licensed activities
- 10 CFR Part 51
- Impact level
- Disclosure document

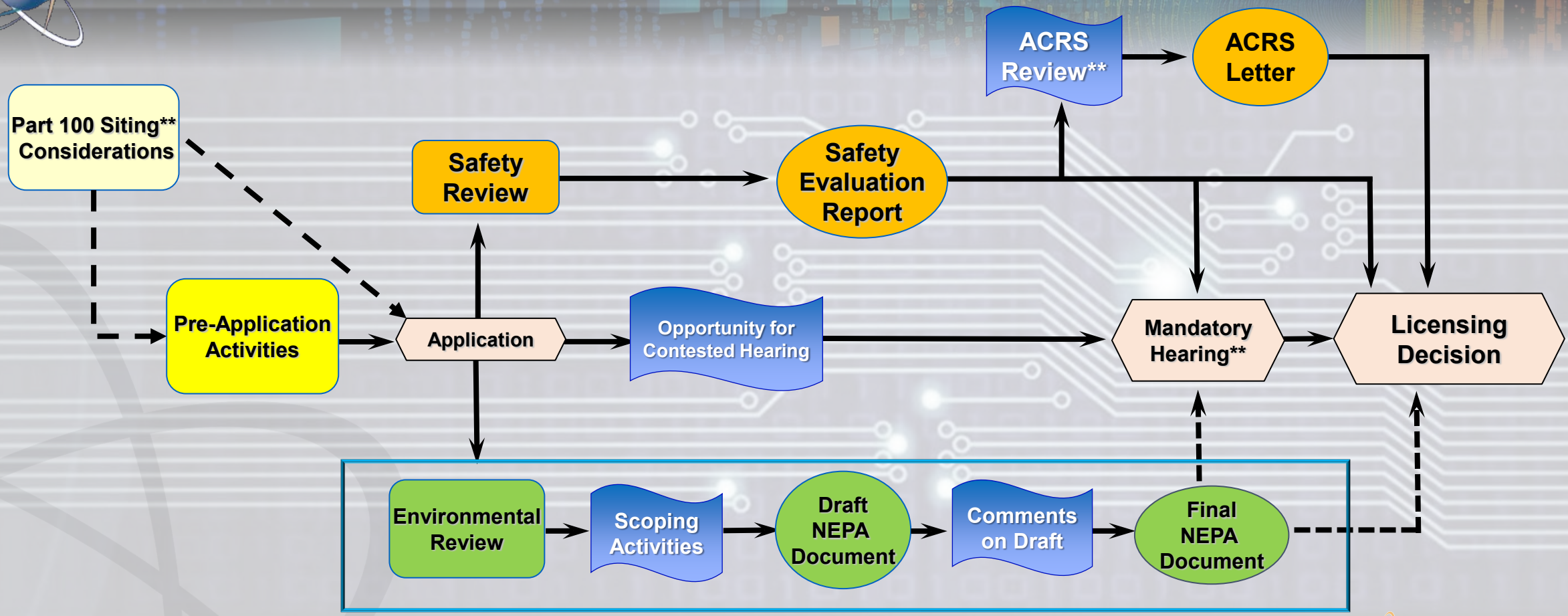
Safety Review

Safety Evaluation

- Atomic Energy Act (1954)
- Energy Reorganization Act (1974)
- Impacts **ON** the facility **FROM** the environment
- 10 CFR Parts 20, 40, 50, 52, 70, 73, 72, 74, & 95
- Risk informed
- Reasonable assurance of adequate protection

www.nrc.gov/about-nrc/governing-laws.html

Two-Part Independent Reviews

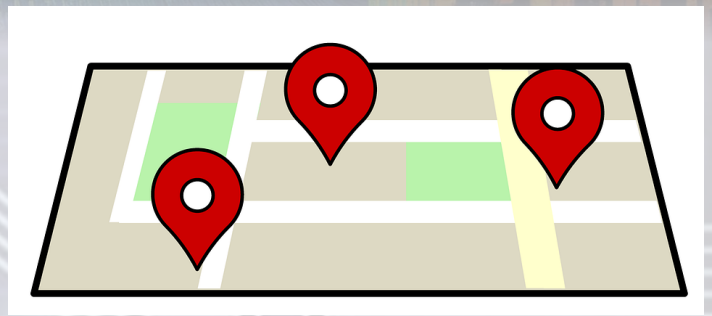


ACRS: Advisory Committee on Reactor Safeguards
NEPA: National Environmental Policy Act

** Mandatory Hearing Required for early site permits, construction permits, or combined licenses

10 CFR 100 – Reactor Site Criteria

- Site suitability criteria when selecting a site:
  - Potential radiological consequences
    - Population density criteria
  - Natural phenomena, potential man-made hazards
  - Other site characteristics



- Different than other criteria that State/Local governments may require for 'industrial facilities' (e.g., access to potable water sources, sewage systems, access roads, etc.)
- Recently updated guidance for meeting population density criteria for Advanced and Small Modular Reactor applications

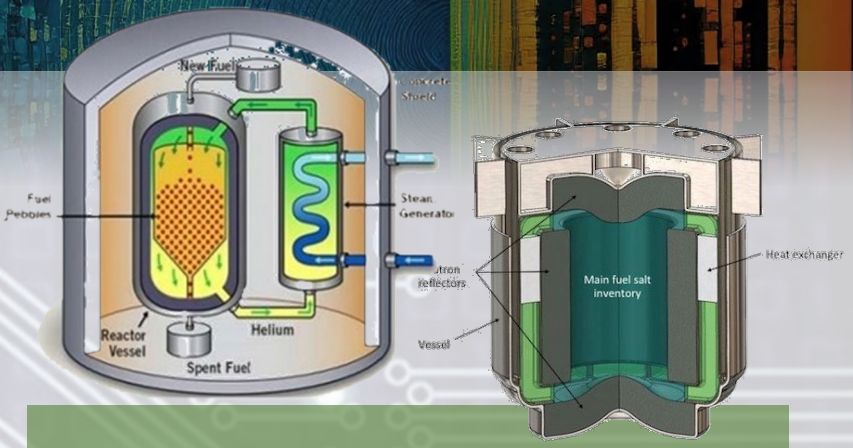
Flexible Reactor Licensing Pathways

10 CFR Part 50

- Large majority of operating power reactor and NPUF fleet
- Construction Permit + Operating License

10 CFR Part 52

- Vogtle AP-1000, NuScale
- Early Site Permit, COL, Design Certification, Manuf. License



10 CFR Part 53

- New licensing framework under development
- Technology-inclusive, risk-informed, performance-based framework
- Publish by mid-2025

Licensing Process Brochure (NUREG/BR-0298)

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10 CFR Part 50: Two-Step Licensing Process

Construction Permit

Construction Permit Application → Public Hearing → Construction Permit → Construction Begins

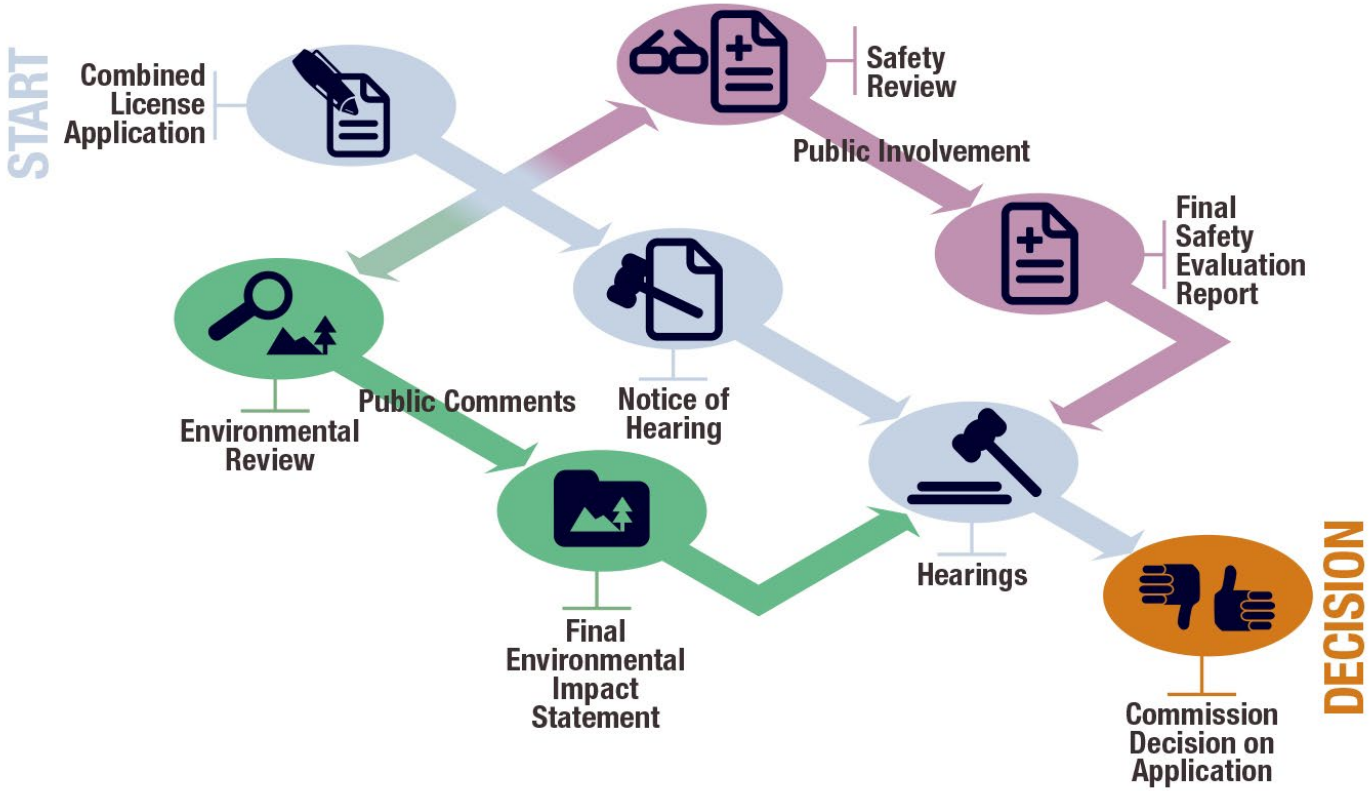
Operating License

Operating License Application → Public Hearing Opportunity → Operating License → Operation Begins

10 CFR Part 52: Single Process with Multiple Components

This process may involve the following:

- Combined License (COL)
- Early Site Permit (ESP)
- Design Certification (DC)
- Standard Design Approval (SDA)
- Manufacturing License



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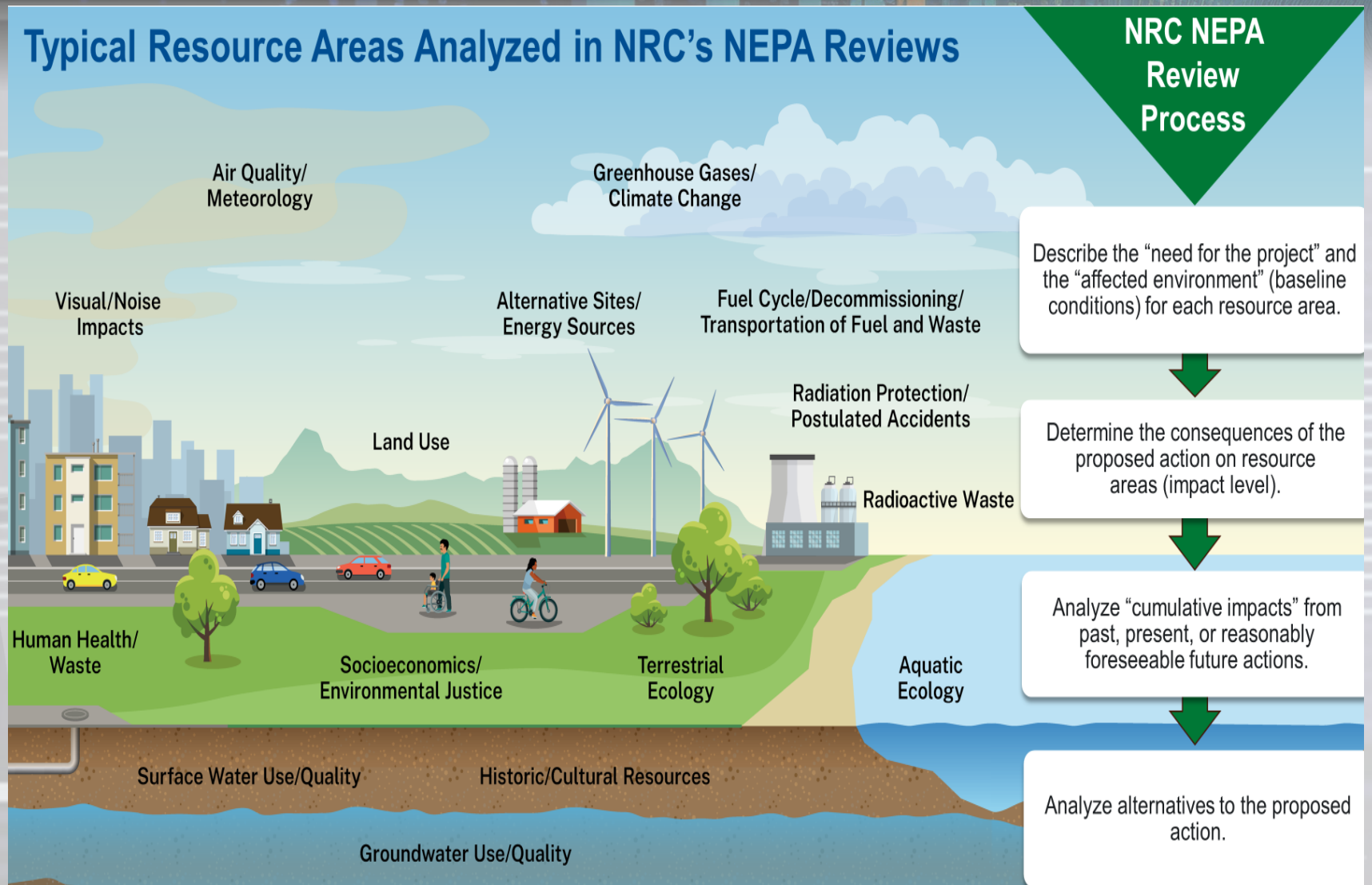
10 CFR Part 53: Transformative Regulatory Framework

- **Technology-Inclusive**: Can be used for any new light water small modular reactor or non-light water reactor technology
- **Risk-Informed**: Requirements scaled to risk and consequences of the facility
- **Performance-Based:** Establishes clear and objective criteria to assess performance

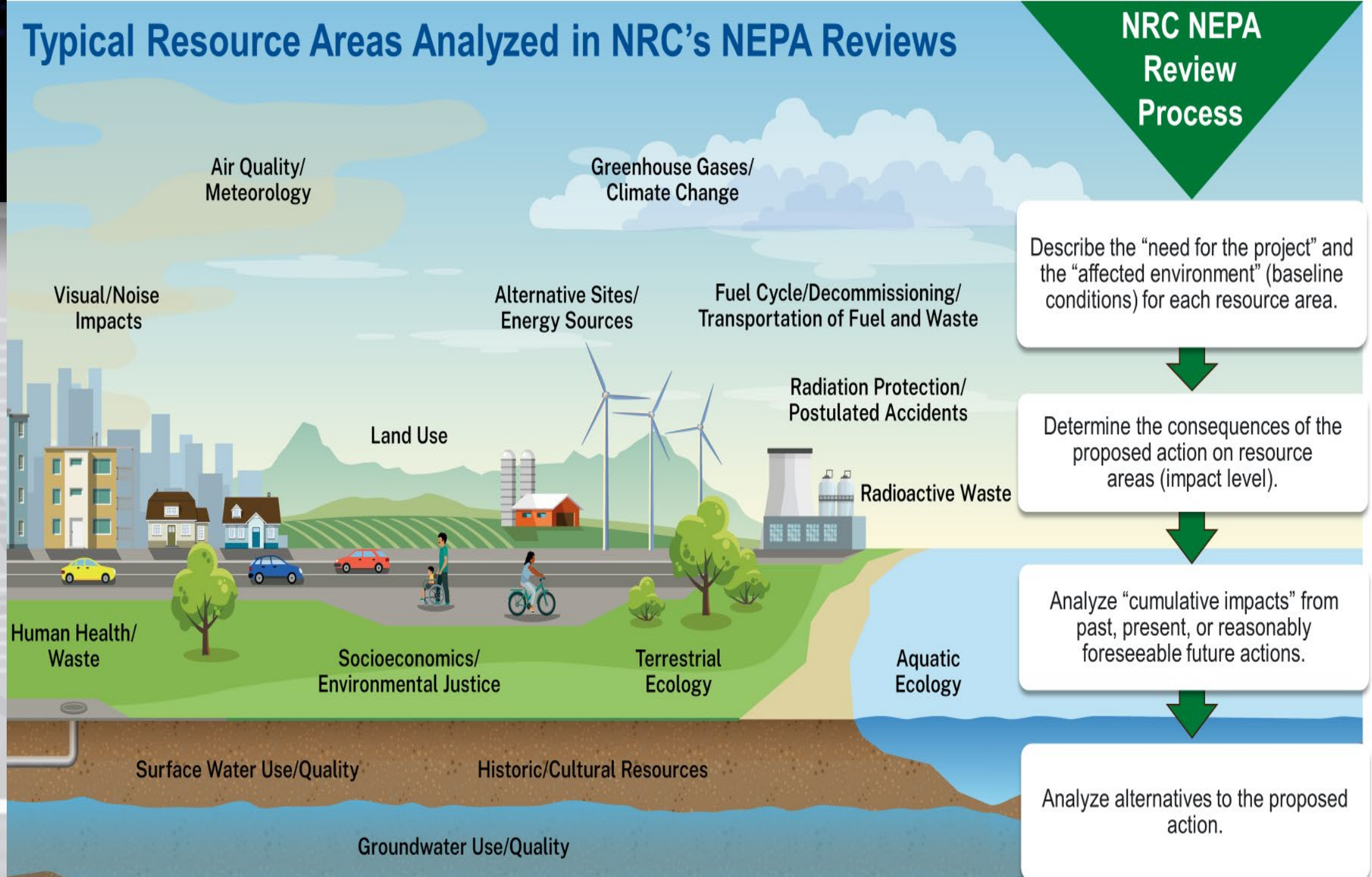
- Final rule expected to be issued in 2025

www.nrc.gov/reactors/new-reactors/advanced/rulemaking-and-guidance/part-53.html

Environmental Review



Typical Resource Areas Analyzed in NRC's NEPA Reviews



NRC NEPA Review Process

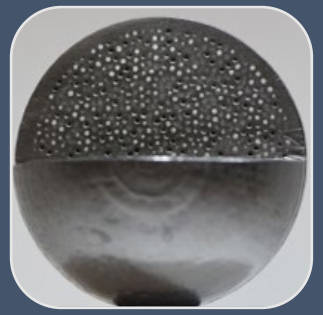
Describe the "need for the project" and the "affected environment" (baseline conditions) for each resource area.

Determine the consequences of the proposed action on resource areas (impact level).

Analyze "cumulative impacts" from past, present, or reasonably foreseeable future actions.

Analyze alternatives to the proposed action.

Reactor Safety Review – Functions & Topics

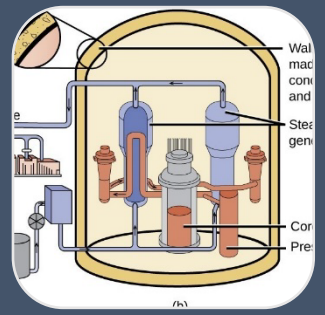


Reactivity & Power Control

- Fuel
- Reactivity control systems

Heat Removal

- Reactor Coolant System
- Backup Cooling Systems



Radionuclide Retention

- Barriers to keep radionuclides within facility

Programmatic Elements

- External Hazards
- Radiation Protection
- Accident Analysis
- Operational Programs

Timeframes for Reactor Licensing

- Current timelines (as driven by NEIMA)
  - Part 50 (CP and OL) – 36 months each
  - Part 52 (COL) – 36 months
  - Environmental review (24 months) in parallel with safety reviews
- ADVANCE Act of 2024
  - https://www.nrc.gov/about-nrc/governing-laws/advance-act.html

Fuel Cycle Facility Licensing Overview

Kimyata Morgan-Butler

Deputy Director

Division of Fuel Management

Office of Nuclear Material Safety & Safeguards

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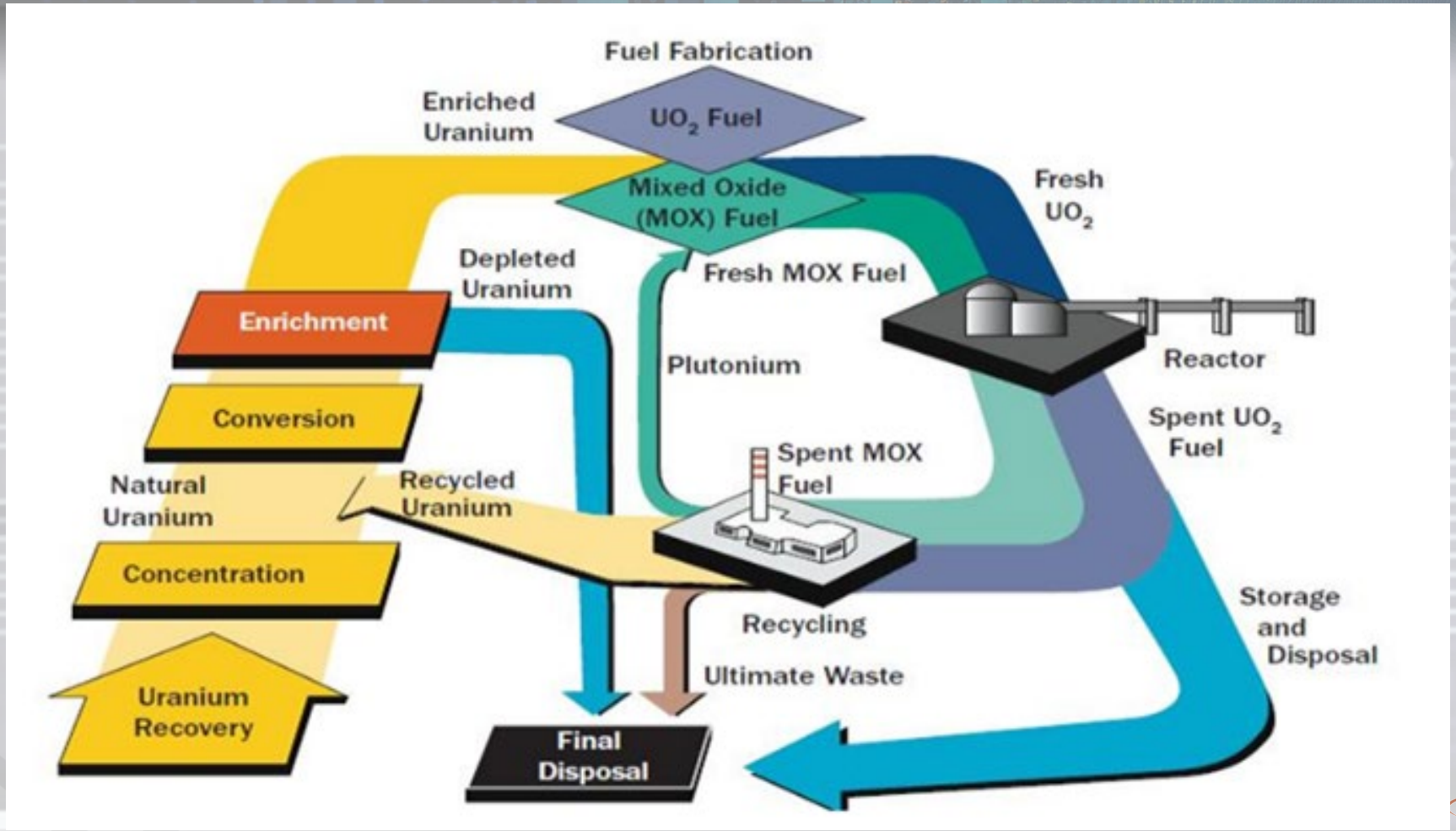
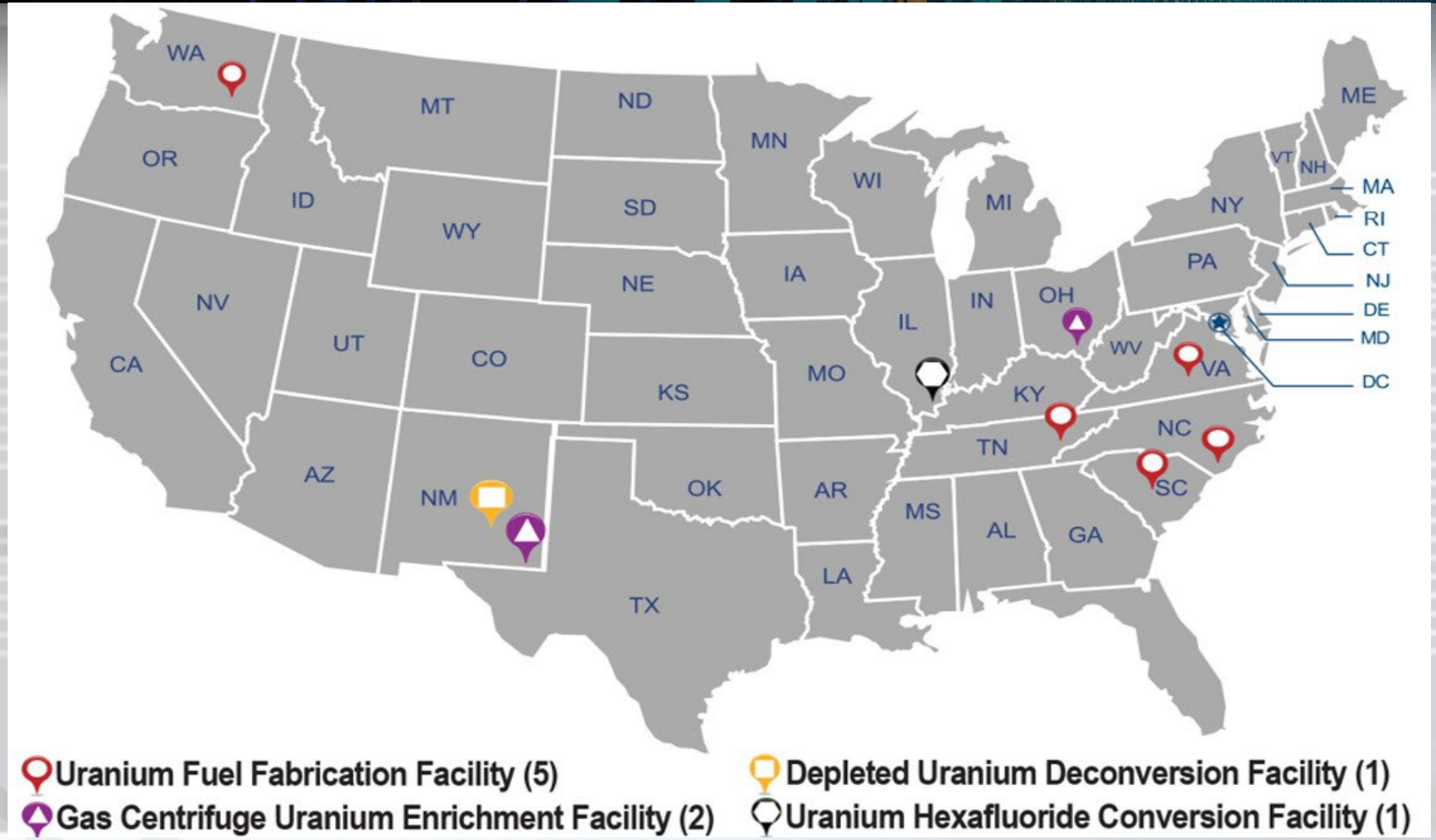
Overview of the Nuclear Fuel Cycle



Locations of NRC-licensed Fuel Cycle Facilities



https://www.nrc.gov/materials/fuel-cycle-fac.html

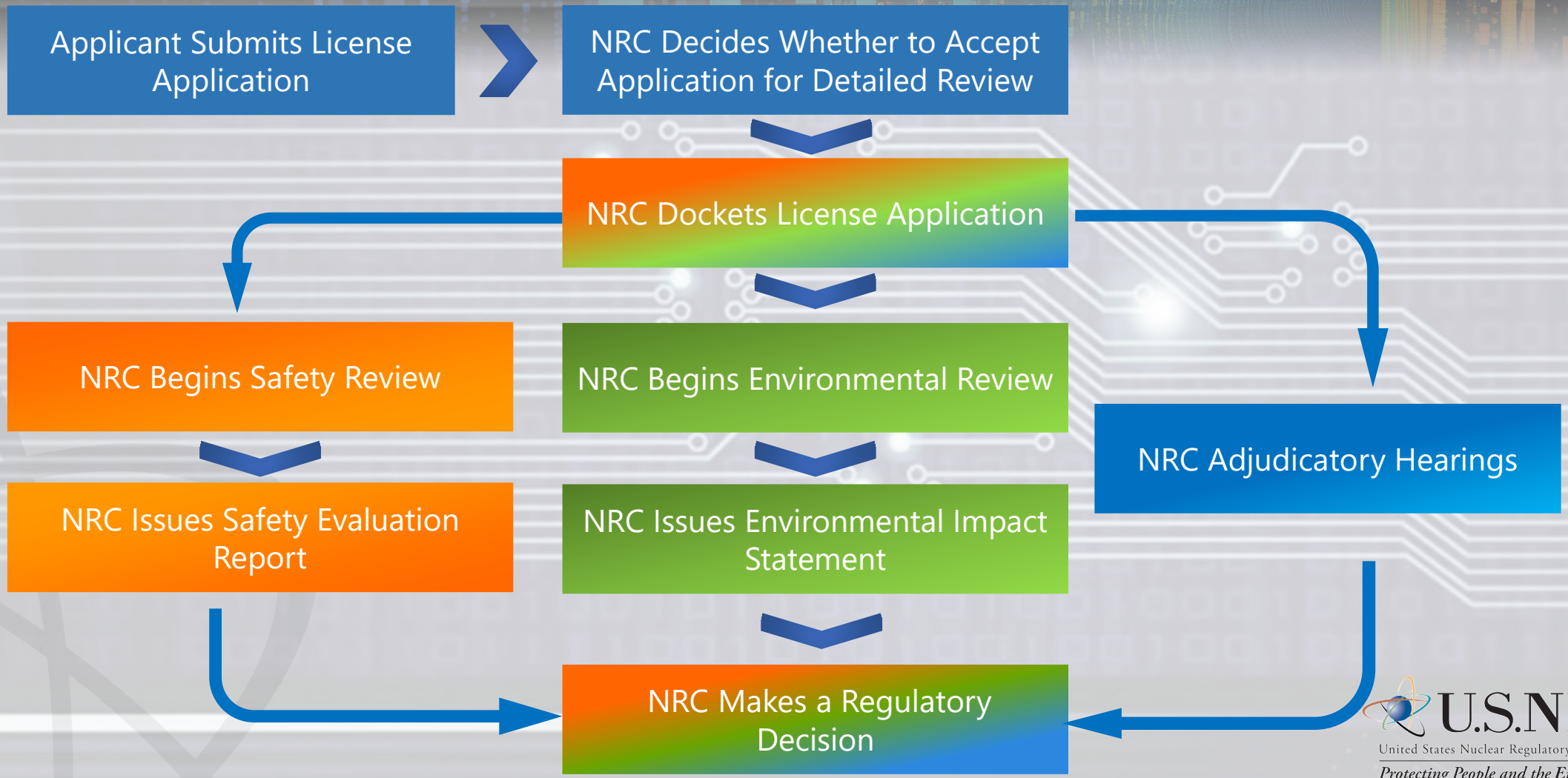
Laws, Regulations, Policies, and Guidance for Fuel Cycle Facilities

- Atomic Energy Act of 1954, as amended (http://www.nrc.gov/about-nrc/governing-laws.html)
- 10 CFR Part 20, "Standards for Protection Against Radiation"
- 10 CFR Part 30, "Rules of General Applicability to Domestic Licensing of Byproduct Material"
- 10 CFR Part 40, "Domestic Licensing of Source Material"
- 10 CFR Part 51, "Environmental Protection"
- 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material"
- 10 CFR Part 73, "Physical Protection of Special Nuclear Material"
- 10 CFR Part 74, "Material Control and Accounting of Special Nuclear Material"
- 10 CFR Part 95, "Protection of Classified Matter"

Laws, Regulations, Policies, and Guidance for Fuel Cycle Facilities (continued)

- NRC's Agreement State Program Policy Statement (82 FR 48535; 10/18/2017) and program guidance (https://scp.nrc.gov/)
- Safety Review Guidance
  - NUREG-1556, Volume 17, Rev. 1, "Program-Specific Guidance About Licenses for Special Nuclear Material of Less than Critical Mass," July 2018 (ML18190A207)
  - NUREG-2212, "Standard Review Plan for Applications for 10 CFR Part 70 Licenses for Possession and Use of Special Nuclear Materials of Critical Mass but Not Subject to the Requirements in 10 CFR Part 70, Subpart H – Draft Report for Comment," December 2022 (ML22335A087)
  - NUREG-1520, Rev. 2, "Standard Review Plan for Fuel Cycle Facilities License Applications," June 2015 (ML15176A258)
  - NUREG-1513, "Integrated Safety Analysis Guidance Document," May 2001 (ML011440260)
- Environmental Review Guidance
  - NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs," July 2003 (ML032450279)

Fuel Cycle Facility Licensing



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Spent Fuel Storage Licensing Overview

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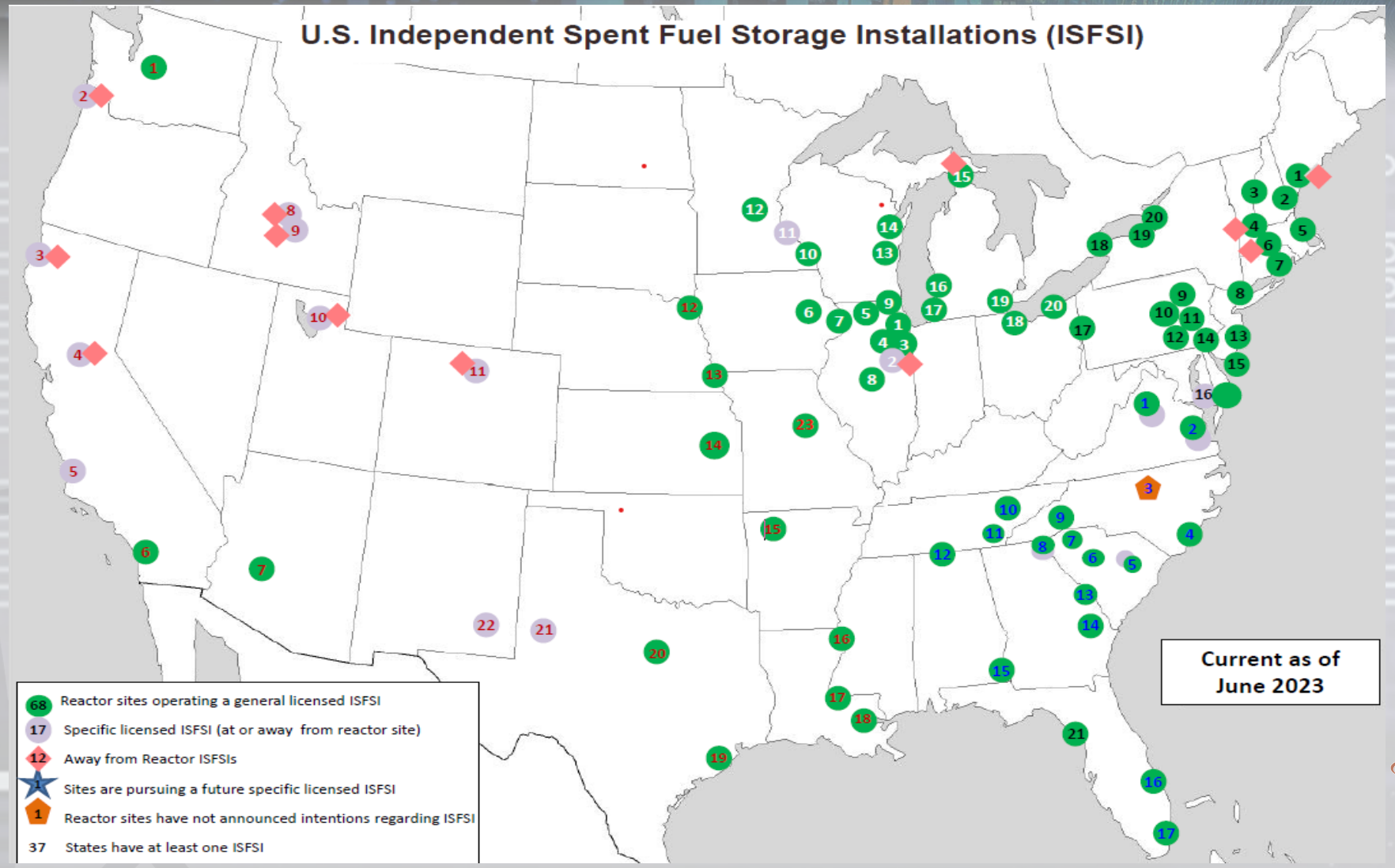
Locations of NRC-Licensed Independent Spent Fuel Storage Installations (ISFSI)



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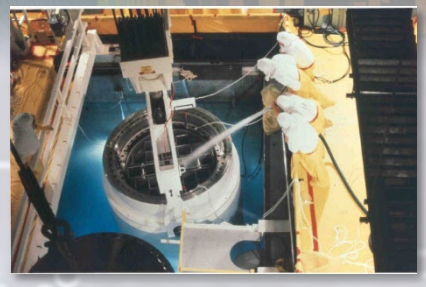
NRC's Spent Fuel Storage Responsibilities

- NRC establishes safety, security, and environmental regulations for:
  - Licensing of interim spent fuel storage installations (ISFSIs)
  - Certification of cask designs for dry storage of spent nuclear fuel
- NRC currently licenses and oversees 79 ISFSIs in 36 States
- NRC has issued certificates of compliance (CoCs) for 15 different dry storage cask designs for use at reactor sites
- NRC inspects and oversees applicants and licensees during
  - Construction, operation, and decommissioning of interim storage facilities
  - Manufacturing of dry storage casks and systems



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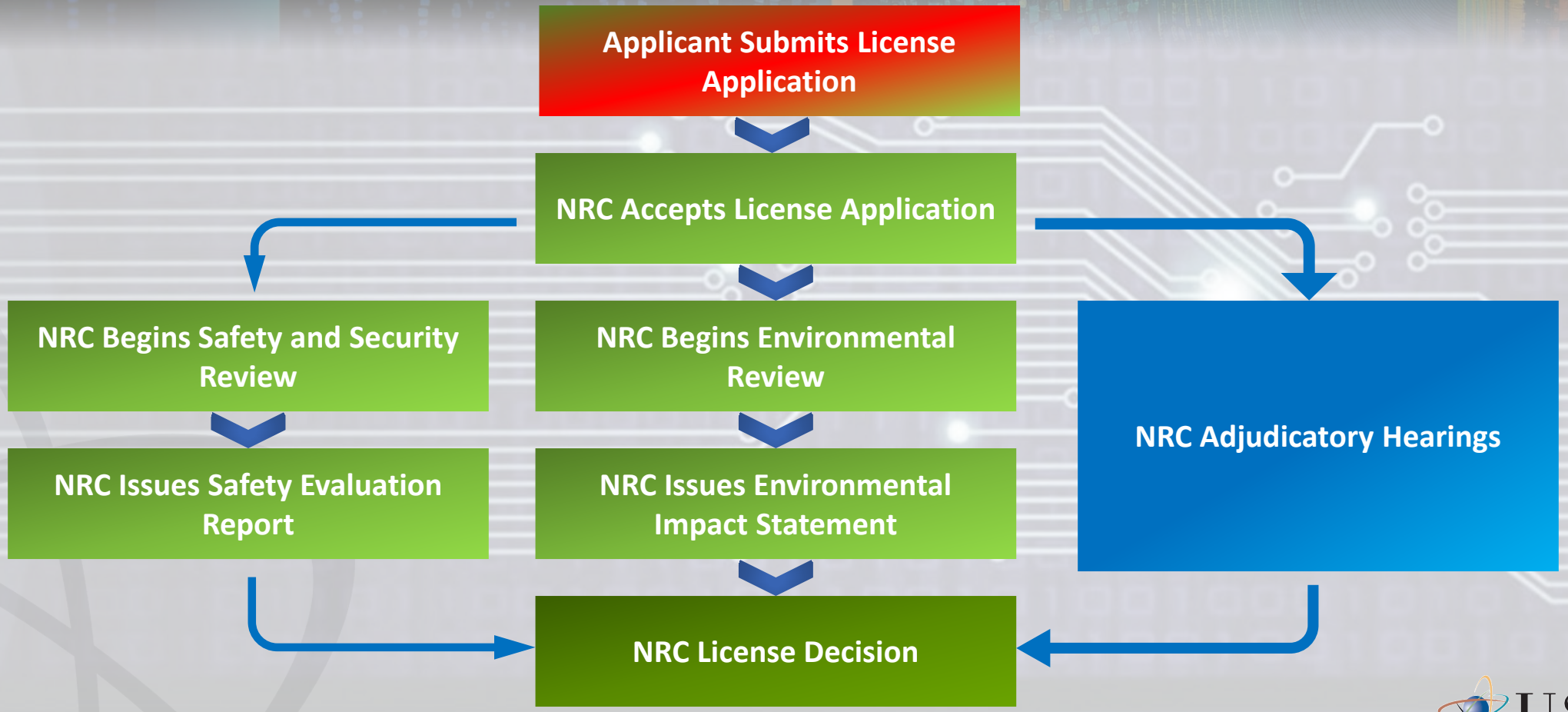
Regulations for ISFSI and CoC Licensing

- Title 10, Part 72, of the Code of Federal Regulations, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste"
  - Subpart B: Site Specific Licensing
  - Subpart K: General Licenses
  - Subpart L: Approval of Spent Fuel Storage Casks (CoCs)
- Consolidated Interim Storage Facilities (CISFs) licensed similarly to ISFSIs

Disposal of Spent Fuel and High-Level Waste

- The U.S. National Program is for disposal in a deep geological repository
- Specific roles for government agencies
- DOE is the developer of the repository
- NRC is the regulator (10 CFR Parts 60 and 63)
- EPA sets health standards (40 CFR parts 191 and 197)
- Spent nuclear fuel continues to be safely stored under NRC regulations and oversight at Part 72
- NRC's Yucca Mountain proceeding is currently suspended

NRC's Decision Process for CISF Reviews



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NRC's CISF Review

- Safety and Security Review includes:
  - Maintaining confinement of radioactive material,
  - Providing adequate radiation shielding for workers and the public,
  - Preventing nuclear criticality, and
  - Maintaining retrievability of spent fuel
- Environmental Review
  - Analyzes environmental impacts of the proposed action consistent with NEPA
- NRC Adjudicatory Hearings
  - Opportunity for the public to request an adjudicatory hearing before NRC's Atomic Safety and Licensing Board Panel (ASLBP)

Current Status of ISP & Holtec CISF Licenses

- In 2024, the U.S. Fifth Circuit Court of Appeals vacated the ISP and Holtec licenses in two separate cases
- Department of Justice (specifically, the Solicitor General) has sought review (certiorari or “cert”) in the U.S. Supreme Court the decision in both cases
- Other circuit courts besides Fifth Circuit have been receptive to NRC’s arguments about jurisdiction and AEA authority

Thank you for the opportunity…

- Opportunity to present before Wyoming Legislative Committee is consistent with NRC Values and Principles of Good Regulation, including
  - Openness
  - Clarity
  - Cooperation
- NRC will continue to engage with Wyoming
  - Kemmerer Power Station Construction Permit Application
  - Any future license applications for NRC-regulated activities in the state
  - With our Co-Regulating Partner (WY DEQ)

Overview of Licensing for Nuclear Reactors & other NRC Licensed Facilities

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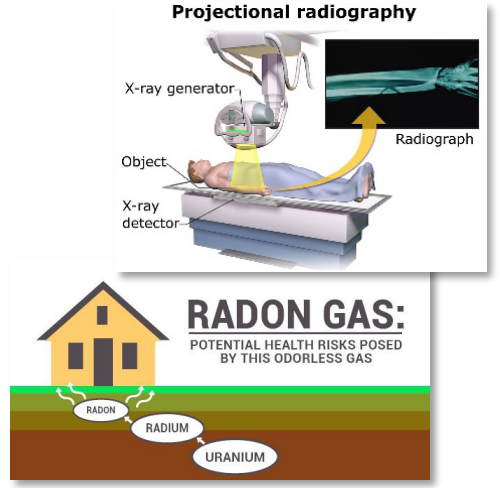
Backup Slides

What the NRC Does **NOT** Do…

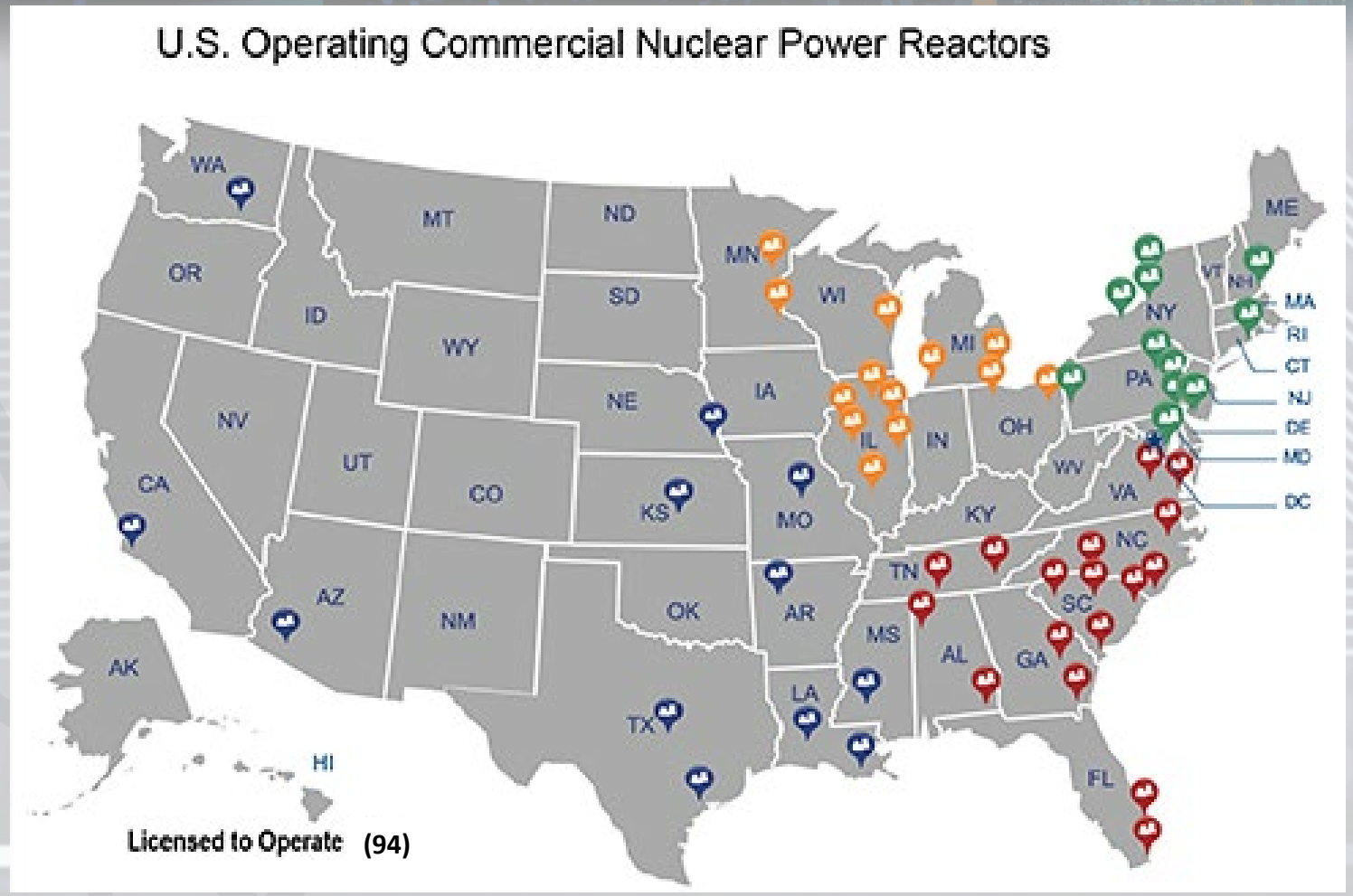
Own or operate nuclear power plants; nor lobby for/promote nuclear power

Regulate nuclear weapons, military or DOE reactors, or space vehicle reactors



Regulate naturally occurring radon gas, or X-ray or other radiation producing machines

Locations of Commercial Nuclear Power Plants



As of today, 94 units licensed to operate, including Vogtle Unit 3 & Unit 4 (GA) that went into operations in late 2023 & early 2024

https://www.nrc.gov/reactors/operating/list-power-reactor-units.html

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NRC and NEPA

- The National Environmental Policy Act (NEPA) requires Federal agencies to evaluate the impacts of proposed federal actions on the human environment.
- The NRC complies with NEPA through its regulations in 10 CFR Part 51.
- The NRC staff will summarize its findings in an Environmental Impact Statement (EIS)
- Public Comments are collected during a scoping period and after the Draft EIS is published

Kemmerer Unit 1 – Construction Permit Application

Safety Review:

- March 2024 - USO submitted its Kemmerer Unit 1 Construction Permit (CP) Application
  - May 2024 - NRC accepted the application for review and began its detailed review of the application
- August 2026 (anticipated) - NRC staff currently expects to complete its Safety Evaluation Report for the CP

Environmental Review:

- July 2024 - Staff conducted an environmental scoping public meeting in Kemmerer for the CP Application
- June 2025 (anticipated) - Staff publishes Draft Environmental Impact Statement (EIS) for public comment
- June 2026 (anticipated) - Staff issues Final EIS

https://www.nrc.gov/reactors/new-reactors/advanced/who-were-working-with/applicant-projects/terrapower.html

Kemmerer Unit 1 – Construction Permit

- An NRC document that authorizes an applicant to proceed with construction of a nuclear facility
- An additional application and NRC review of a final design is needed for an Operating License that approves operation of the facility
  - Review of Operating License application (if submitted) will include:
    - Safety Evaluation for proposed operation of constructed facility
    - Environmental review for proposed operation of constructed facility

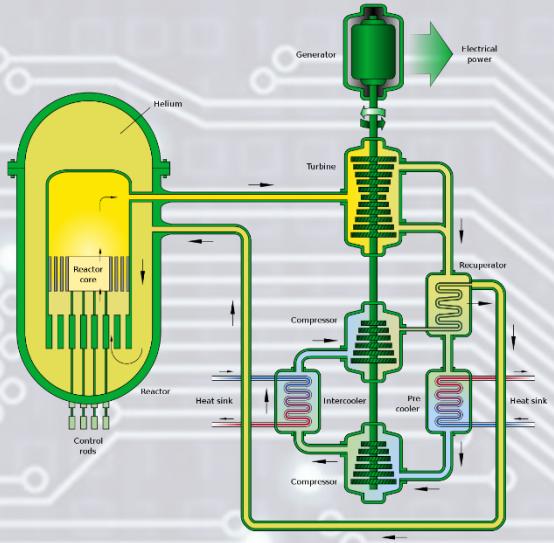
Kemmerer Unit 1 – Construction Permit Hearing

- A mandatory uncontested hearing on the construction permit application will be held at a time and place to be set in the future
  - Staff will present and support its conclusions before either the Commission or the Atomic Safety and Licensing Board (ASLB)
- Interested persons were offered an opportunity to file a petition for leave to intervene (i.e., contested hearing) with respect to the application
  - The petition period was open June 4 through August 5, 2024
  - No petitions were received for a contested hearing by the closure date

Reactor Concepts

Light Water Small Modular Reactors (SMR)

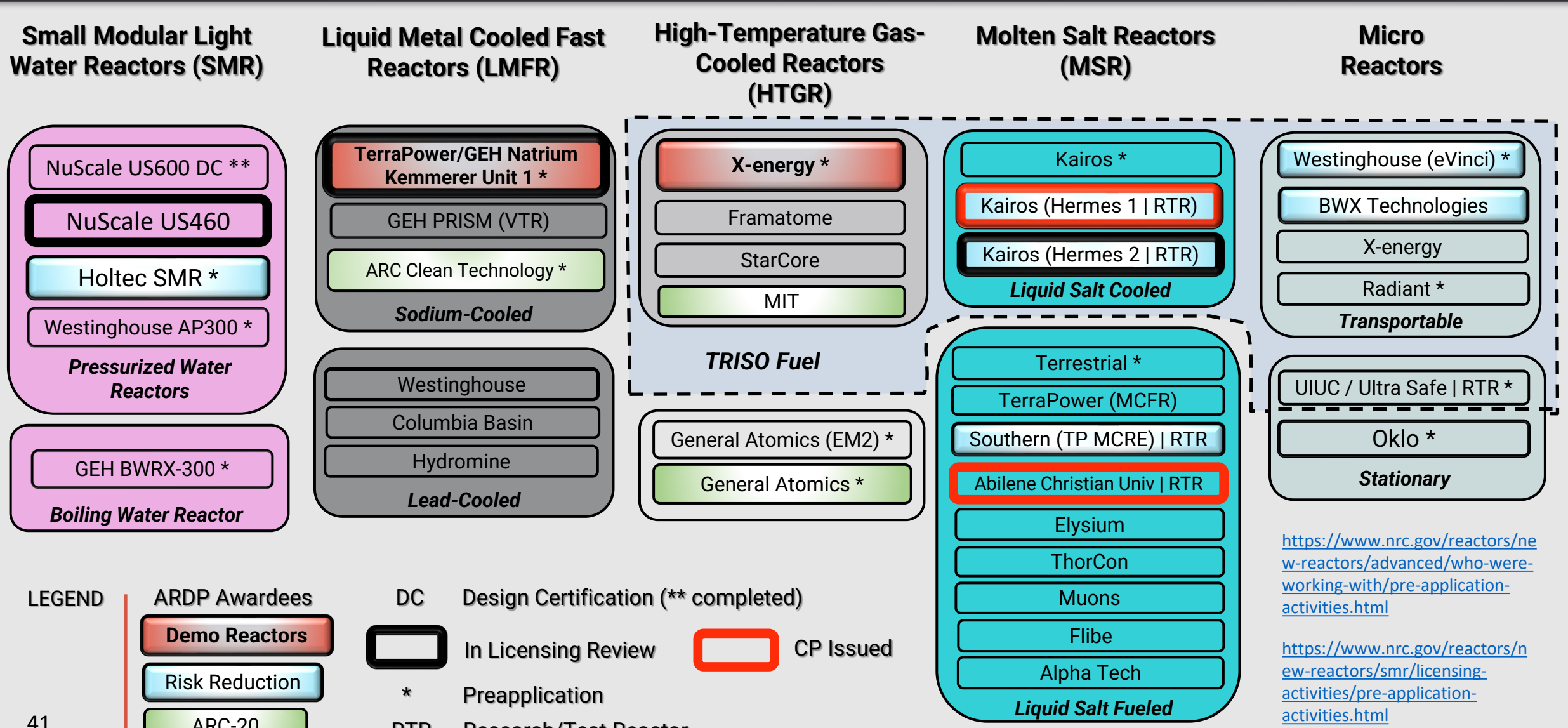
Compact Light Water Reactor (LWR) designs generating 300 MWe or less



Non-Light Water Advanced Reactors (non-LWR)

Non-LWR designs ranging from 1 MWe microreactors to several hundred MWe power stations

SMR & Advanced Reactor Landscape



https://www.nrc.gov/reactors/new-reactors/advanced/who-were-working-with/pre-application-activities.html

https://www.nrc.gov/reactors/new-reactors/smr/licensing-activities/pre-application-activities.html

NRC's Advanced Reactor Readiness By the Numbers

ADVANCED REACTOR READY U.S.NRC

Work on more than **35 policy issues** created more than **60 guidance documents**.

Completed more than **10 advanced reactor design** reference models to make future assessments more efficient.

Completed more than **90 topical report/ white paper reviews 33% faster** than the generic schedule goal.

10 NRC/DOE MOUs focused on advanced reactor collaboration.

Canada collaboration generated more than **10 work plans, 8 NRC/CNSC joint reports.**

Focusing on core review teams of **8-10 technical staff** per application, based on recent new reactor review experience.

More than **140 public engagements** per year on advanced reactor-related topics

Completed Kairos construction permit safety review **50% faster** than the generic schedule goal.

As of October 2023

NRC's Spent Fuel Transportation Responsibilities

- NRC and U.S. Department of Transportation co-regulate transportation of commercial spent fuel
- NRC establishes regulations for:
  - Package design standards for transportation of spent fuel
  - Physical security requirements for transportation of spent fuel
- The NRC also:
  - Evaluates, approves, and authorizes for use transportation package designs; issues certificates
  - Approves routes and security plans for shipment of commercial spent fuel
  - Requires licensees to notify and coordinate with States, Tribes, and local law enforcement prior to shipments
  - Inspects and oversees certificate holders, package fabricators, and licensee shippers
- NRC regularly meets with Federal, State, and Tribal government partners to discuss radioactive material transportation

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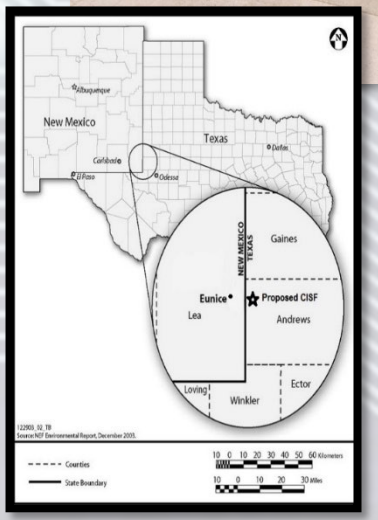
Interim Storage Partners, LLC (ISP) WCS CISF – Andrews County, Texas

- ISP requested to resume the review in July 2018
- ISP, as applicant; joint venture between Waste Control Specialists and Orano CIS LLC (a subsidiary of Orano USA)
- Proposed site located near the existing WCS low-level waste disposal site in Andrews County, TX
- Initial application for 40-year license to store 5,000 metric tons of commercial spent fuel, including MOX, and 231 tons of GTCC waste; future plans to expand to 40,000 metric tons
- Above-grade design using 11 previously certified storage and transportation systems
- License issued in September 2021



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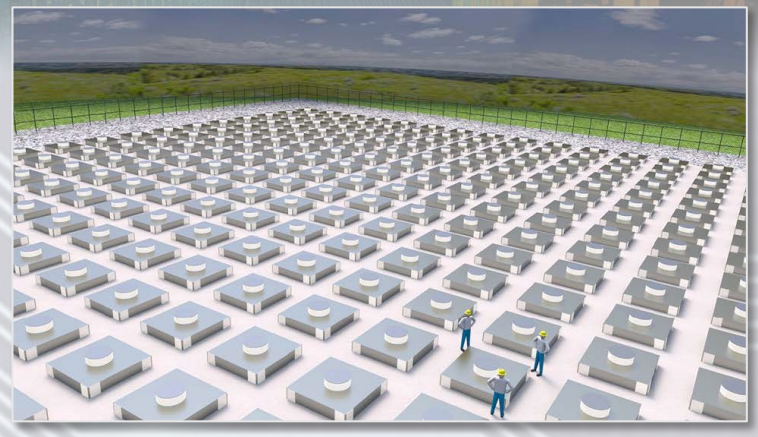
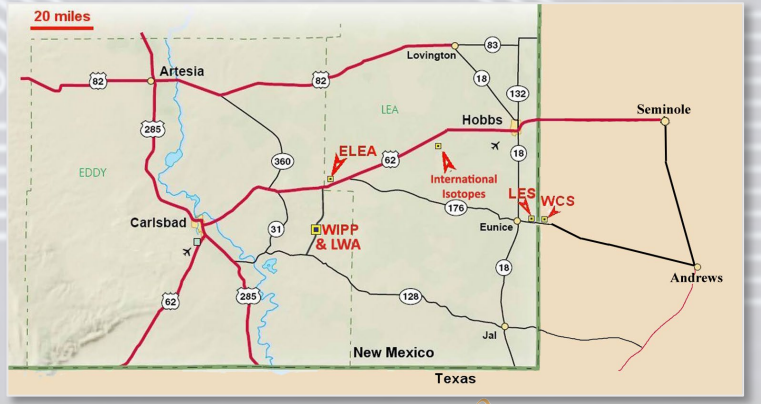
Holtec HI-STORE CISF - Lea County, New Mexico

- License application submitted to NRC on March 30, 2017
- Holtec International is the licensee; proposed site, in Lea County, NM, owned by Eddy-Lea Energy Alliance, LLC (ELEA)
- Initial application for 40-year license to store 8,680 MTU (500 canisters) of commercial spent fuel; future plans to expand up to 100,000 MTU
- Proposed facility to use the previously certified HI-STORM UMAX Canister Storage System (72-1040)
- License issued in May 2023





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