

VIRTUAL PUBLIC MEETING WITH
THE NUCLEAR REGULATORY COMMISSION
AND THE BOILING WATER REACTOR OWNERS
GROUP (BWROG) EXECUTIVE OVERSIGHT
COMMITTEE (EOC)

October 26, 2023

NUCLEAR
NR
REACTOR
REGULATION
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We Make **SAFE** Use of Nuclear Technology **POSSIBLE**



AGENDA

Time	Topic	Speaker
1:00 p.m.	Public Meeting Start / Introductions	Ngola Otto (NRC), BWROG PM
1:05 p.m.	NRC Opening Remarks	Mike King (NRC) - Deputy Office Director for Reactor Programs
1:10 p.m.	BWROG Opening Remarks, Introduction and Overview	Ho Nieh (Southern Nuclear) – Vice President for Regulatory Affairs
1:20 p.m.	TSTF-576, "Revise Safety/Relief Valve (SRV) Requirements" Update	Phil Lashley (Energy Harbor) - BWROG Licensing Committee Chair
1:35 p.m.	Licensing and TSTF-585, "Revise LCO 3.0.3."	Phil Lashley (Energy Harbor) - BWROG Licensing Committee Chair
1:50 p.m.	Risk [Code Case N-752, PRA Configuration Control Inspections, Software Common Cause]	Bob Rishel (Duke Energy) - BWROG IRIR Committee Chair
2:20 p.m.	Power Upgrades	Denver Atwood (Southern Nuclear) - BWROG Chairman
2:30 p.m.	Break	
2:40 p.m.	Small Modular Reactor [NRC Cooperation with Canadian Nuclear Safety Commission (CNSC) on GE Hitachi's BWRX-300 SMR]	Michelle Hayes (NRC) - NRR/DNRL
3:00 p.m.	Human Factors Engineering – Application to existing plants/digital upgrades	Jesse Seymour (NRC) - NRR/DRO
3:10 p.m.	Subsequent License Renewal	Lauren Gibson (NRC) - NRR/DNRL, John Moses (NRC) - NMSS/REFS
3:30 p.m.	Data-driven Licensing	Doug Broaddus (NRC) - NRR/DORL
3:50 p.m.	NRC Questions/Comments/Wrap-up	NRC/BWROG
3:55 p.m.	Opportunity Public Questions/Comments	Public/NRC
4:00 p.m.	Adjourn	



OPENING REMARKS

Mike King

Deputy Director for Reactor Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission

Ho Nieh

Vice President for Regulatory Affairs
Southern Nuclear
BWROG

**US NUCLEAR REGULATORY
COMMISSION**

NRC Cooperation with Canadian Nuclear Safety Commission (CNSC) on GE Hitachi's BWRX-300 Small Modular Reactor

Michelle Hayes
Office of Nuclear Reactor Regulation

October 26, 2023

U.S. NRC – PUBLIC MEETING WITH BWROG EOC

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Agreements between the US NRC and CNSC

- **Memorandum of Understanding** provides for exchange of technical information and nuclear cooperation (last renewed 2023)
- **2019 Memorandum of Cooperation** to further expand collaboration on the technical reviews of advanced reactor and small modular reactor technologies
- **2022 Charter** established a collaborative information sharing effort on GE Hitachi's BWRX-300 small modular reactor design.



Collaborations under Charter

- Joint Report on GEH BWRX-300 Safety Strategy White Paper, July 2023.
- Joint Report on GEH BWRX-300 Steel-Plate Composite (SC) Containment Vessel (SCCV) and Reactor Building Structural Design White Paper, June 2023.
- Information exchange on fuel verification and validation
- (Pre-charter) Joint Report on Containment Evaluation Method, April 2022.

Charter

Context

- Ontario Power Generation (OPG) and Tennessee Valley Authority (TVA) considering constructing BWRX-300 small modular reactor in Canada and the US, respectively
- CNSC and NRC will adhere to their own national laws and regulations

Objectives

- Share expertise and experience
- Reduce duplication of licensing review efforts
- Jointly utilize third party verification

5-Party Coordination

- NRC, USA, GEH, OPG, and TVA are actively coordinating to support effective and efficient regulatory engagement and ensure timely and beneficial outcomes

Next Steps and Challenges

Next Steps

- The five parties are considering lessons learned on the completed activities and are exploring the next topics for collaboration.

Challenges

- Variation in laws and regulations between countries
- Timing of applications in each country
- Level of countries' experience

Collaborations under MOC

Joint Regulatory Reviews

- Comparison of NRC's Licensing Modernization Project and Canadian practice for technology-inclusive, risk-informed, and performance-based reviews of advanced reactors
- Similarities and differences in the safety classification process
- Common regulatory position on Tristructural Isotropic (TRISO) fuel qualification

Joint Vendor Reviews

- X-energy's Xe-100 white paper on the reactor vessel construction code
- Terrestrial Energy's white paper on Postulated Initiating Events Integral Molten Salt Reactor's

IAEA's Nuclear Harmonization and Standardization Initiative (NHSI)

- NHSI includes a Regulatory Track and an Industry Track.
- The NRC is participating in all three regulatory working groups under IAEA's Nuclear Harmonization & Standardization Initiative
 - WG1: Develop an international framework for pre-licensing/licensing information sharing to facilitate collaborative reviews and multinational reviews.
 - WG2: Develop a process and reference framework for multinational pre-licensing regulatory reviews.
 - WG3: Develop a process to leverage the reviews of other regulators and for regulators to work together during ongoing regulatory reviews.
- NHSI working groups will issue draft technical reports in 2024.

Questions



**US NUCLEAR REGULATORY
COMMISSION**

Human Factors Engineering: Application to Existing Plants / Digital Upgrades

Jesse Seymour
Office of Nuclear Reactor Regulation



HFE Application & Digital Upgrades

- Human Factors Engineering (HFE) supports operator performance and is a key design consideration
 - Digital upgrades can reduce operator workload and reliance upon manual actions
- Plants vary in their HFE-related regulatory bases and commitments
 - Both the NRC staff and the facility licensee need to understand the licensee's HFE commitments and licensing basis
- Timing of integrated system validation (ISV) completion can present challenges (e.g., ISV results not being available in time to support a submittal)
 - Tools such as early pre-application engagement and methods such as multi-stage validation (MSV) can help to navigate this

HFE Application & Digital Upgrades

- Licensees are increasing the scope of digital upgrades to main control room
- It is important to engage the NRC staff early to establish a common understanding of regulatory bases, project scope, and timelines for HFE-related design and validation activities
- NRC staff note that awareness of MSV (including how it can be used as an effective component of broader HFE design and validation processes) can be improved.

Further Information on MSV

- Nuclear Energy Agency (NEA) Report No. 7466, “Multi-Stage Validation of Nuclear Power Plant Control Room Designs and Modifications”.
- Institute of Electrical and Electronics Engineers. (IEEE) Std. 2411-2021, “IEEE Guide for Human Factors Engineering for the Validation of System Designs and Integrated Systems Operations at Nuclear Facilities.”

Questions



Subsequent License Renewal License Renewal & Environmental Reviews

Lauren Gibson, Branch Chief, License
Renewal Projects, NRR

John Moses, Deputy Director of Division of
Rulemaking, Environmental, and Financial
Support, NMSS

Possible Ways to Make Subsequent License Renewals More Efficient

- Things NRC has already implemented
 - Tiger team for acceptance review rather than all reviewers
 - Eliminating the keyword list and report for Operating Experience Reviews
 - Smaller scoping and screening audit
 - One Advisory Committee on Reactor Safeguards (ACRS) meeting
 - Inspections not part of licensing decision

Possible Ways to Make Subsequent License Renewals More Efficient

- Things we are currently working on
 - Streamlining Safety Evaluation
 - Streamlining audit report
 - Modernizing the internal Technical Review Package (TRP) tool
 - Revising generic documents (SRP-SLR, GALL-SLR, GEIS)
- Things we are discussing to improve efficiencies
 - Reconsidering Peer reviews
 - Reconsidering audit execution and time available
- Open to suggestions...

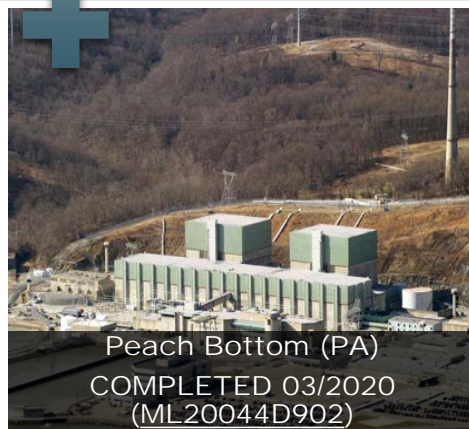
Possible Ways to Make Subsequent License Renewals More Efficient

- Things Industry could do to help make the NRC review more efficient
 - Keep the GALL numbering in your application
 - Review previous Audit Reports and Breakout questions
 - Proactively communicate Late Breaking Operating Experiences
 - Early communication of complex issues
 - Early communication on Annual updates, especially if changes are expected
 - Maintain a master copy of the application with all the changes
 - What would be the implications of submitting this to NRC? (e.g., cost from applicants, NRC efforts to confirm the information, etc.)
 - Could NEI maintain the “clean” copies for future applications benefits

Initial License Renewal Applications Under Review

★ = Site Specific Environmental Report Submitted

✚ = Safety Evaluation Report Completed



SLR Application Status

Comanche Peak (TX)

Submitted: October 2022

Accepted for Review: November 2022



October 26, 2023

Perry (OH)

Submitted: July 2023

Accepted for Review: September 2023



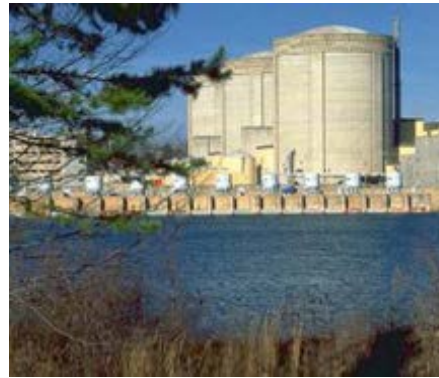
Environmental Reviews Planned Path Forward



Turkey Point



North Anna



Oconee



Monticello



VC Summer

The NRC path forward

- Review all applicable Category 1 (generic) issues listed in the applicable SEIS Table 4-1 for site-specific findings (e.g., SMALL, MODERATE, LARGE) using the methodology in the LR GEIS and document NRC staff's analysis

Environmental Reviews Planned Path Forward (continued)

- NRC path forward
 - Review applicable Category 2 (site-specific) issues listed in the applicable SEIS Table 4-2 for new information since the issuance of the site-specific draft or final SEIS and update site-specific analyses
 - Issue a notice of availability that begins a limited scoping period (comments invited; no public meeting)
 - Complete an (virtual) environmental audit, including issuing RAIs and RCIs, as appropriate

Environmental Reviews Planned Path Forward (continued)

- NRC path forward
 - Issue a site-specific draft SEIS or draft SEIS supplement for public comment, and a notice of opportunity for hearing
 - Issue a site-specific final SEIS or final SEIS supplement to provide NRC staff's recommendation on whether to authorize the licensing action

Estimated Timeline Based on Current Projections

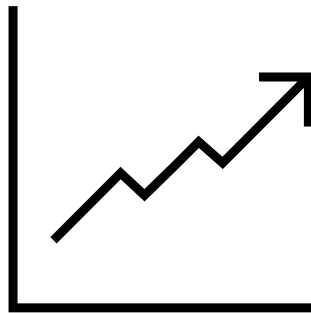
Milestone	Approximate Timing
Site-specific environmental license renewal application supplement received by NRC	-60 days
Acceptance Review Complete	day 0
NRC publishes availability of supplement and intent to prepare an EIS supplement starting the 30-day scoping period, as appropriate, <i>Federal Register</i> notice (FRN)	30 days
Scoping period ends (if one is conducted)	60 days
Conduct environmental audit	5-7 months
NRC issues environmental RAIs/RCIs (if needed)	6-8 months
NRC receives RAI/RCI responses	7-9 months

Estimated Timeline Based on Current Projections (continued)

Milestone	Approximate Timing
NRC publishes draft SEIS supplement or draft SEIS and FRNs to start 45-day comment period and 60-day period to request a hearing	13 months
Draft SEIS supplement or draft SEIS comment period ends	15 months
Develop Comment Responses/Prepare final SEIS	16 months
Publish final SEIS supplement or final SEIS and FRN	21 months
EPA Issues FRN – final SEIS supplement, or final SEIS, notice of availability and beginning of 30-day cooling off period	21 months
NRC issues FRN - renewed license/record of decision (assuming no EPA comments or per Commission direction)	22 months

Outlook

- Based on available information, we are expecting up to nine supplements/applications by the end of 2024.
- Resources are projected to be tight.
- Please continue to send in Notices of Intent so we can plan.



Questions



Data-driven Licensing

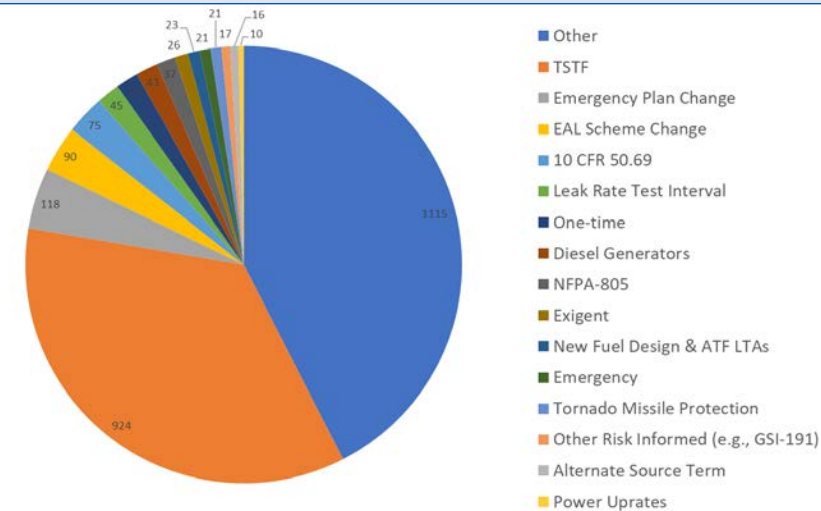
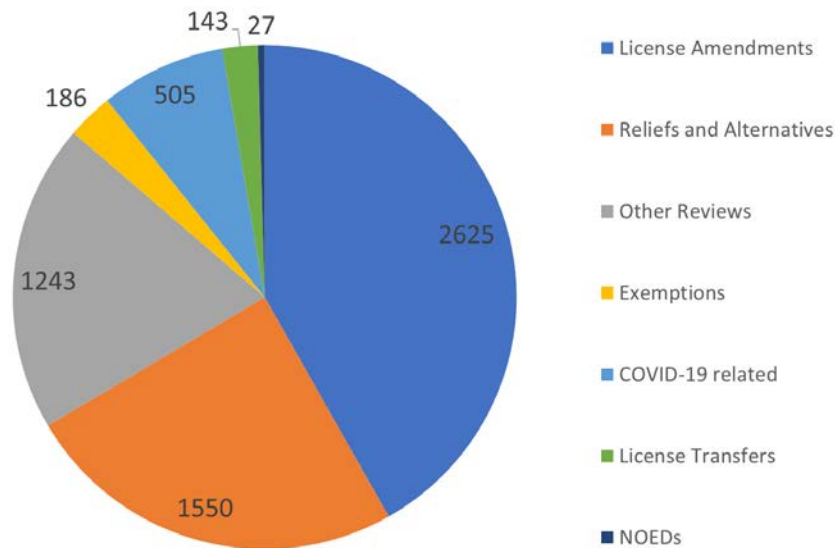
Doug Broaddus

Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

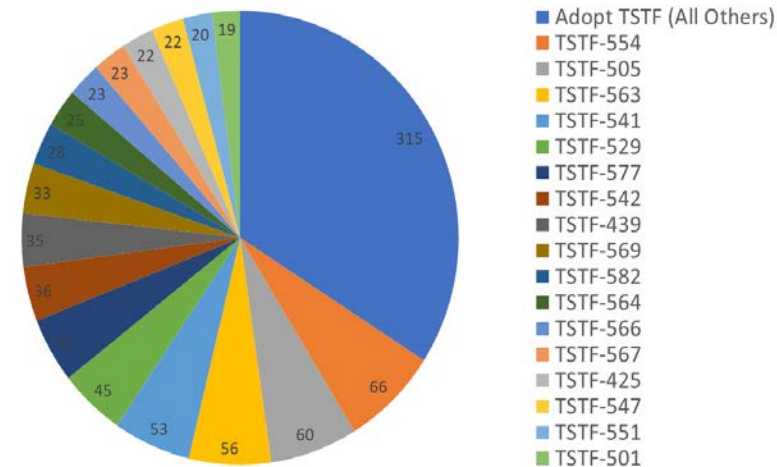
Managing the Licensing Workload

- Historically, managing and tracking the status of ~1000 licensing reviews each year has been a time-consuming manual process that was more reactive than proactive.
- NRC has increased access to licensing data, and using modern data visualization tools has established a more effective and consistent processes for managing our licensing work.
- NRC is using an integrated workload management process to inform changes to our licensing processes and performance goals.

Licensing Actions Managed FY2018 to FY2023



Amendments by Type

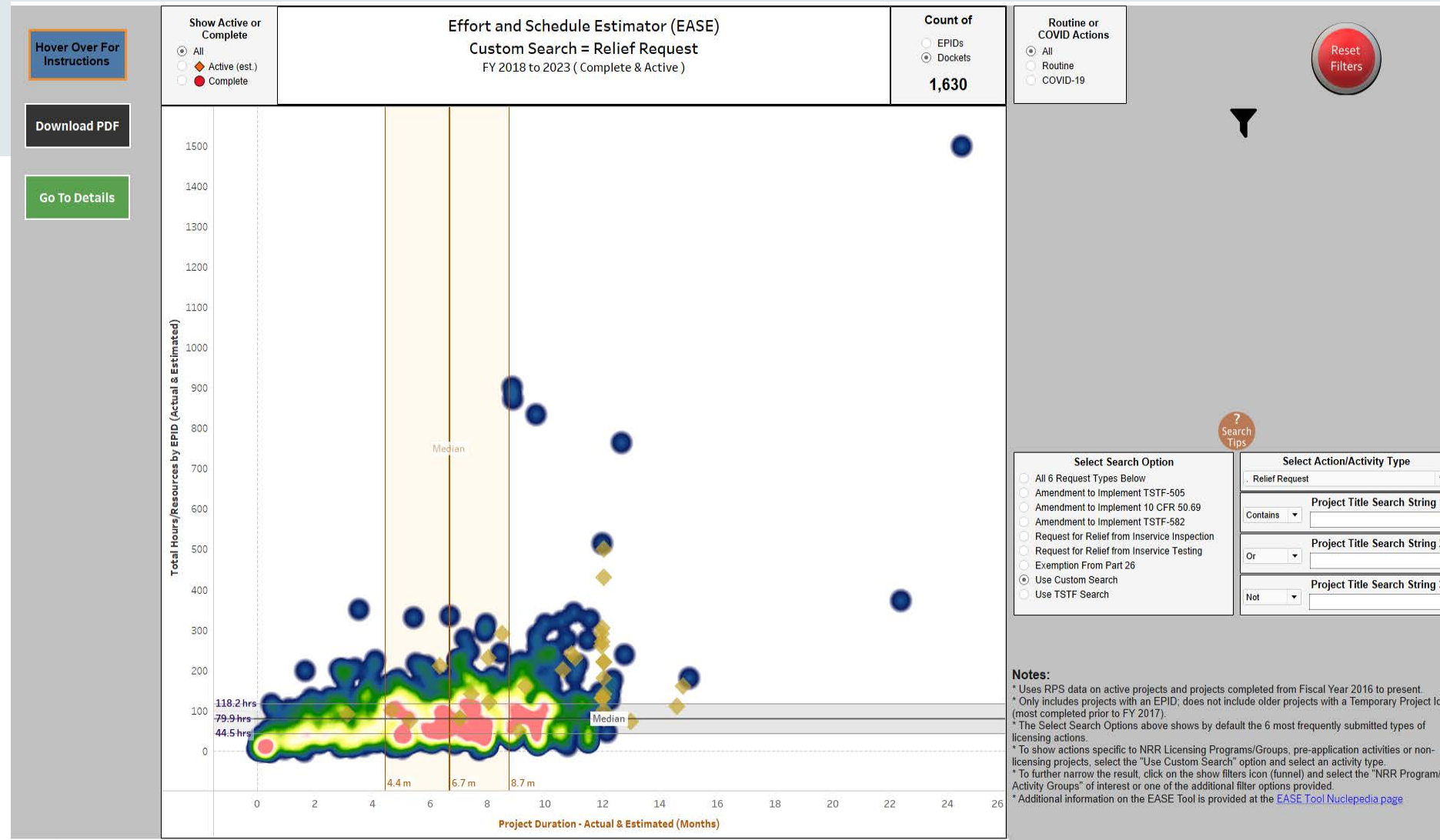


Amendments by TSTF

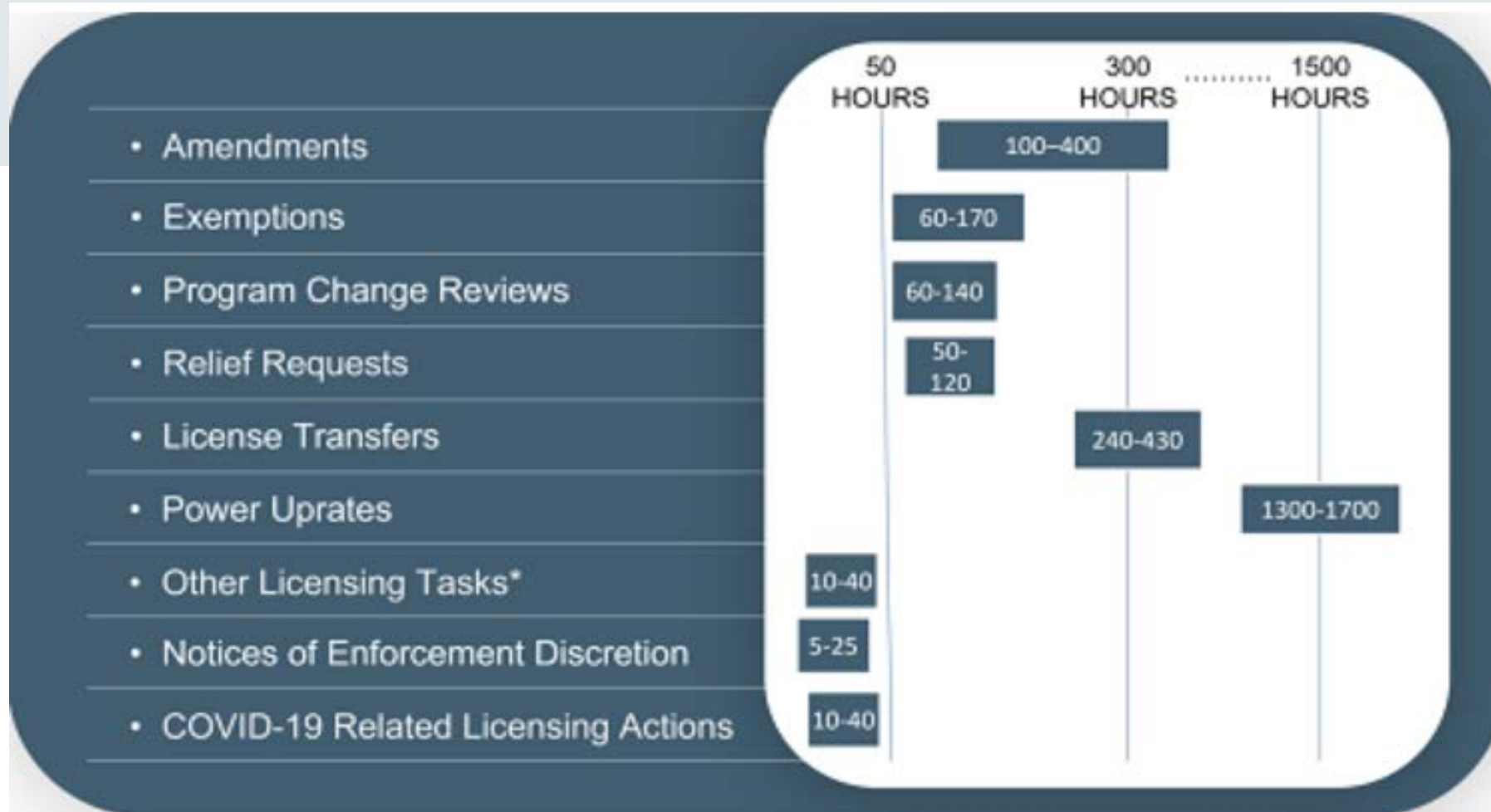
Performance Drivers

- Historically, NRR's performance metric has been to complete 90% of the reviews within 1-year.
- NRR has shifted its focus to developing resource and schedule estimates that reflect the historical performance of the various types of completed reviews.
- NRR is utilizing its licensing data to:
 - inform the development of estimates communicated to applicants
 - track in real-time our performance against those estimates, and
 - complete our reviews within 75% - 115% of the estimated schedule and less than 125% of the estimated resources

Internal Level of Effort And Schedule Estimator

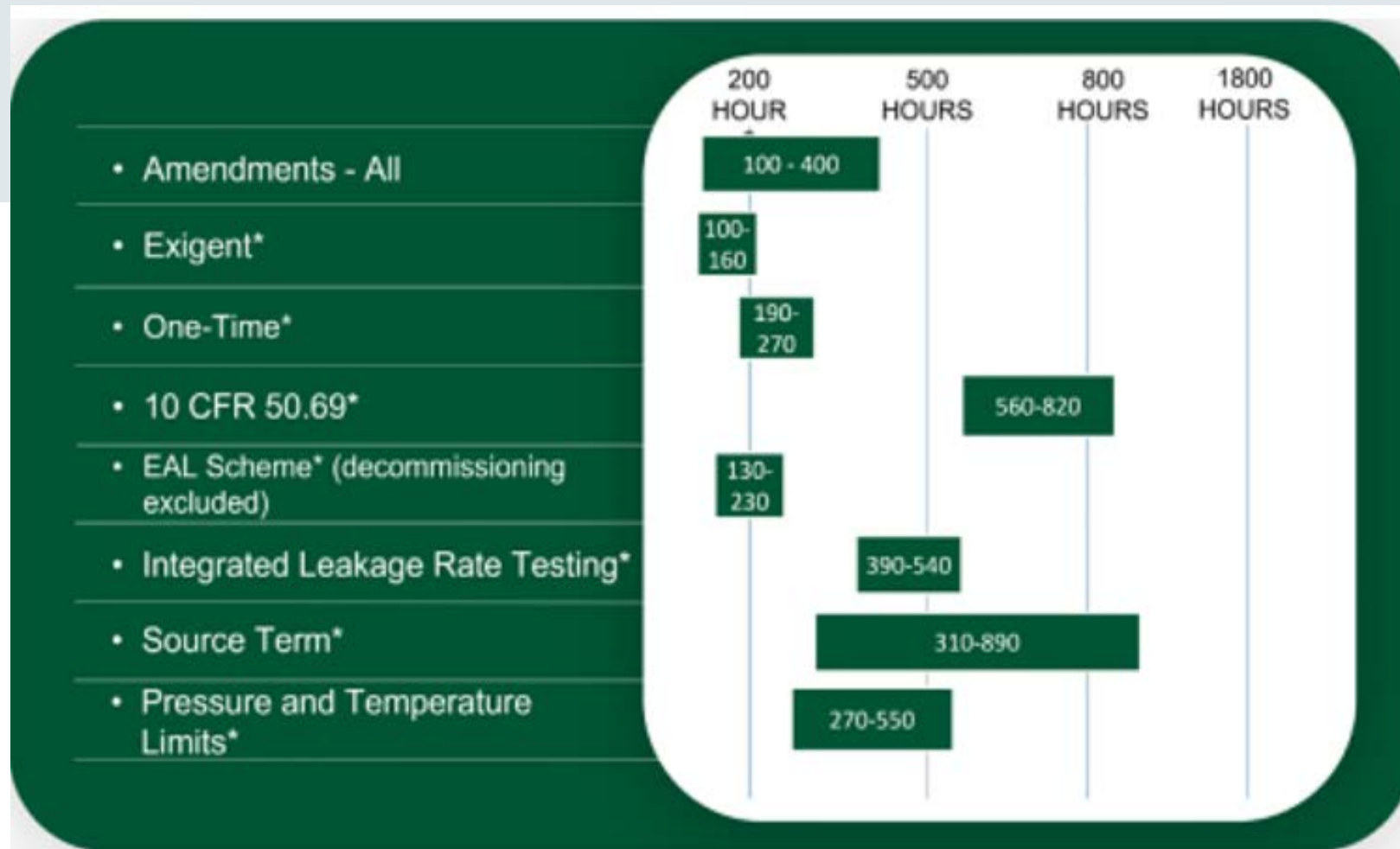


Resource Estimate by Type of Licensing Action



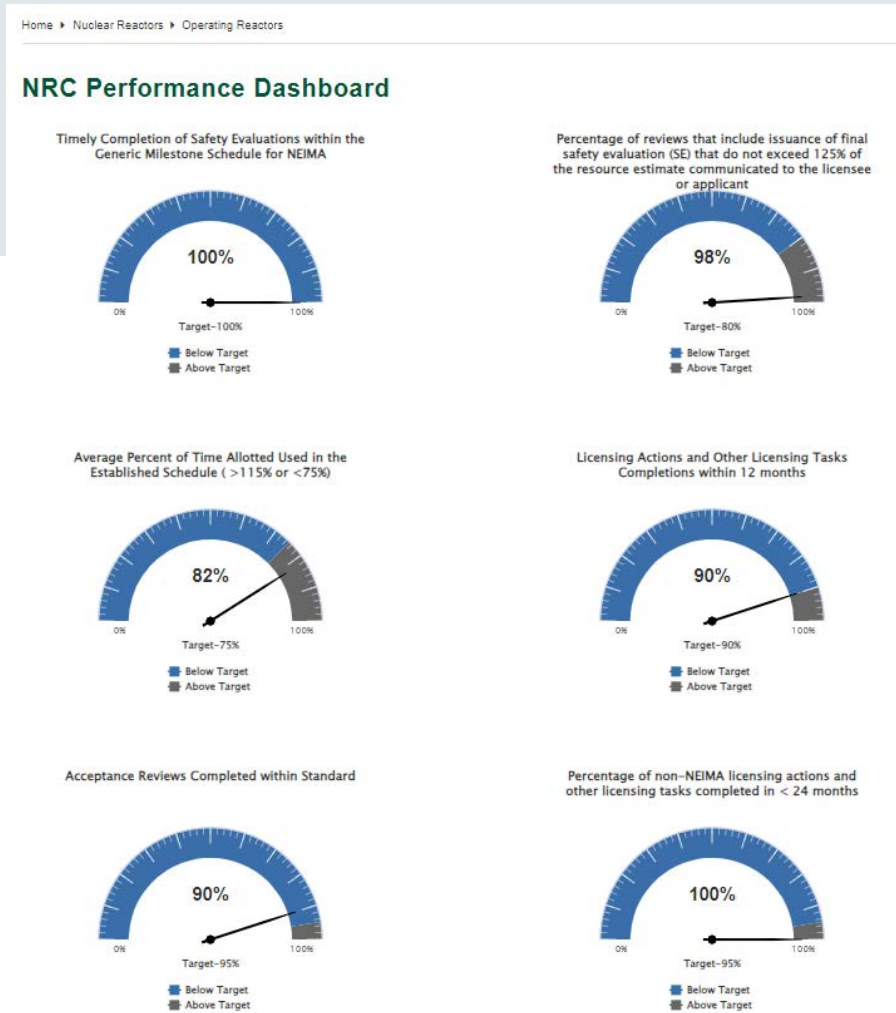
Source: <https://www.nrc.gov/reactors/operating/licensing/resource-estimator.html>

Resource Estimate by Type of LARs



Source: <https://www.nrc.gov/reactors/operating/licensing/resource-estimator/estimates-for-types-of-license-amendment-requests.html>

Tracking Performance



Source: <https://www.nrc.gov/reactors/operating/nrc-performance-dashboard.html>

Using Data to Drive Improvements

- The NRC staff is using historical performance data to inform the schedule and resource estimates for licensing reviews and identifying specific types of reviews that have taken significantly more or less than 1 year.
- NRR's is using real time data to gauge performance against its estimated completion schedules (ECS) to drive schedule accuracy to $75\% < ECS < 115\%$ and identify areas for improvement.
- NRR is utilizing its data to identify and proactively mitigate potential future challenges.

QUESTIONS AND/OR COMMENTS



OPPORTUNITY FOR PUBLIC QUESTIONS AND/OR COMMENTS



CLOSING REMARKS





Acronyms

GALL	Generic Aging Lessons Learned
GALL-SLR	Generic Aging Lessons Learned for Subsequent License Renewal
GEH	GE Hitachi Nuclear Energy
GEIS	Generic Environmental Impact Statement
IAEA	International Atomic Energy Agency
LR	License Renewal
MOC	Memorandum of Cooperation
NEI	Nuclear Energy Institute
RAI	Request for Additional Information
RCI	Request for Confirmation of Information
SEIS	Supplemental Environmental Impact Statement
SLR	Subsequent License Renewal
SRP-SLR	Standard Review Plan for Subsequent License Renewal
