SMR Security Licensing Considerations

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NRC Rulemaking

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- Staff paper to Commission (SECY-18-0076, "Options and Recommendation for Physical Security for Advanced Reactors")
- Commission direction
  - Approved initiation of a limited-scope revision of regulations and guidance
  - Reminded staff that "high assurance" = "reasonable assurance" for level of regulation
  - Use exemptions until final rule

NRC Rulemaking

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- Rulemaking underway for Security of Advanced Reactors
- Desire to reduce the number of exemptions that might need to be processed to license SMRs and advanced reactors

NRC Rulemaking

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- Two prescriptive requirements are the initial focus of the rulemaking
  - Requirement for minimum of 10 armed responders
  - Requirement for onsite secondary alarm station
- Additional requirements will be considered

Security Benefits

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- Engineered safety features and smaller design reduce risks as compared to large LWRs
- Design features (e.g., underground) can assist in reducing risk
- Improved engineered safety features likely to slow accident progression from an event, provide additional time for mitigation of effects

NRC Material Categorization

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Material	Form	Category		
		I	II	III[e]
1. Plutonium[a]	Unirradiated[b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less
2. Uranium -235[c]	Unirradiated[b] Uranium enriched to 20 pct U^{235} or more	5 kg or more	Less than 5 kg but more than 1 kg	1 kg or less
	Uranium enriched to 10 pct U^{235} but less than 20 pct.		10 kg or more	Less than 10 kg
	Uranium enriched above natural, but less than 10 pct U^{235}			10 kg or more
3. Uranium-233	Unirradiated[b]	2 kg or more	Less than 2 kg but more than 500 g	500 g or less

NRC Material Categorization/ Physical Security

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- NRC categorization structure largely similar to INFCIRC/225/Rev. 5
- A few U.S. non-power reactors use HEU, but not subject to DBT for theft/diversion
  - Unattractive to adversary (cladding, radiation level, bulk)
  - Just-in-time fresh fuel loading and fresh fuel limits less than Cat I
  - Physical security < Cat I

NRC Material Categorization/ Physical Security

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- Some SMR designs may use material with LEU enrichments above 10%, so Cat II protection would apply to the fuel prior to the reactor going critical
  - Current Commission policy – DBT only applies to operating power reactors and Cat I fuel cycle facilities

Security Considerations

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- Many designs employ large quantities of high assay LEU
- Some designs in the international arena employ plutonium
- Increases the concerns for theft during fuel fabrication and assembly

Cyber Security Considerations

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- Some SMR developers are considering autonomous operations with **remote control capabilities**
- Potential technical/regulatory challenges re: cyber security
- Early interaction between developers and NRC staff would be prudent to discuss technical and regulatory feasibility
- SMR developers would need to meet the requirements of 10 CFR 73.54, "Protection of digital computer and communication systems and networks"
  - Submit a cyber security plan (CSP) along with license application
  - Regulatory guidance available for developing a CSP (e.g., RG 5.71, "Cyber Security Programs for Nuclear Facilities")

Next Steps

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- Proposed Rulemaking and Draft Guidance
  - Provide to the Commission in January 2021
  - Issue for public comments in 2021
- Final Rule and final guidance to the Commission – May 2022

NSIR

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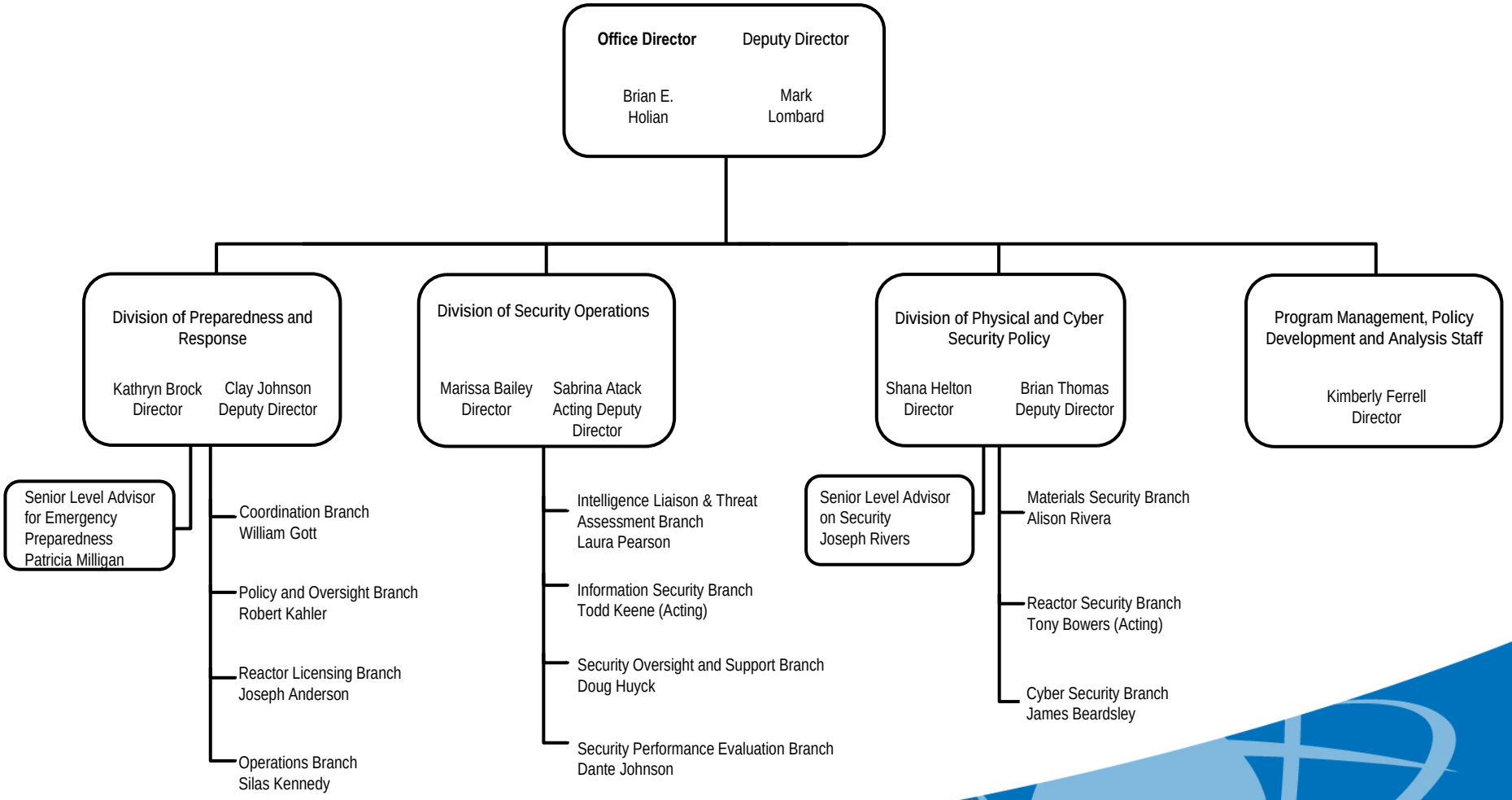

NRR

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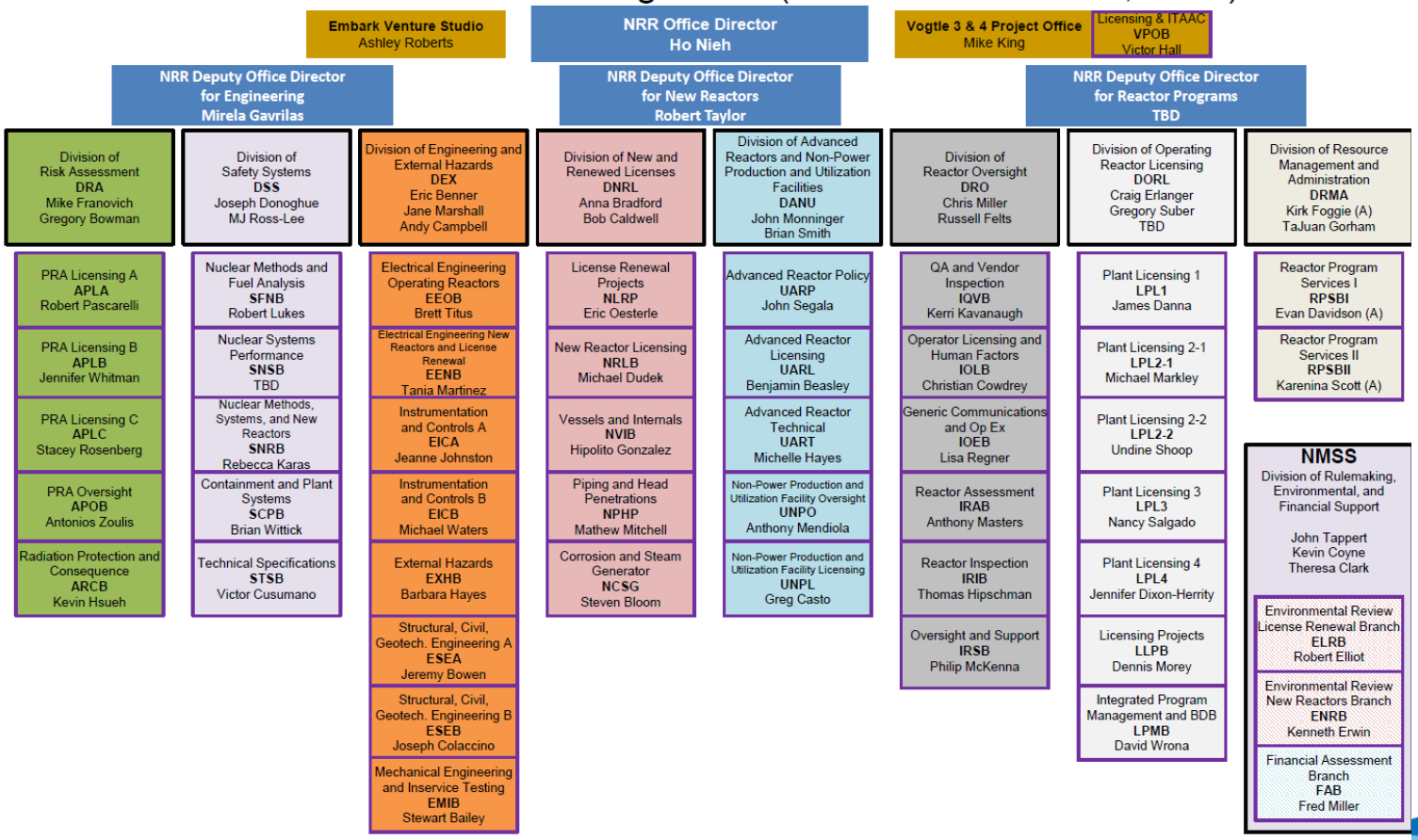
Office of Nuclear Reactor Regulation (effective October 13, 2019)



Questions

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