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ADVANCED REACTOR SAFEGUARDS

Mitigating Physical Security Licensing Requirement Uncertainties

PRESENTED BY

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Sandia National Laboratories

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U.S. DEPARTMENT OF ENERGY

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Licensing Uncertainties

- Some comments on Part 53 suggest that while the NRC is attempting to establish a more flexible regulatory framework, the current proposed language is extremely complex

- Notable major issues:
  - Offsite Response (Private & LLE)
  - Consequence Analysis
  - Novel technological security solutions
  - Volume of proposed rule language

NuScale DC Application, Attachments: Request for Additional Information No. 219 (eRAI No. 8998).pdf, ML17252B631

Options

- For Pre-Part 53 Applications, use existing SRP and seek exemptions
  - Include technical justifications
- Many unknowns with Part 53
- Either option: Engage in significant pre-application engagement with NRC
  - White papers
  - Topical reports
  - Meetings

Pre-Application Engagement

- NRC encourages pre-application engagement as early as possible in the **design** process to increase predictability
- Review items inclusive of key elements of design are submitted and evaluated
- May be 6 month shorter review timeline

Exs:

- Letter of intent to submit an application
- Regulatory Engagement Plan

Pre-Application Activities

- Meetings, audits, & white papers
  - *Probabilistic Risk Assessment*
  - *Regulatory Gap Analysis*
  - *Policy Issues*
  - *Novel design features or approaches*
  - *Consensus codes and standards and code cases*

Pre-Application Activities

- Topical reports
- Meetings, audits, & white papers
  - *"The applicant should submit a regulatory gap analysis report listing those 10 CFR Part 50 or Part 52 requirements for which the applicant plans to request an exemption or seek a case-specific order or rule of particular applicability"…*
  - *"Examples of potential exemption requests may include emergency planning zone size* ***and number of armed responders for physical security in advance of completion of ongoing rulemakings****"*
  - Explains identification of deficiencies
  - Observations & feedback
  - Acceptability of analysis methods

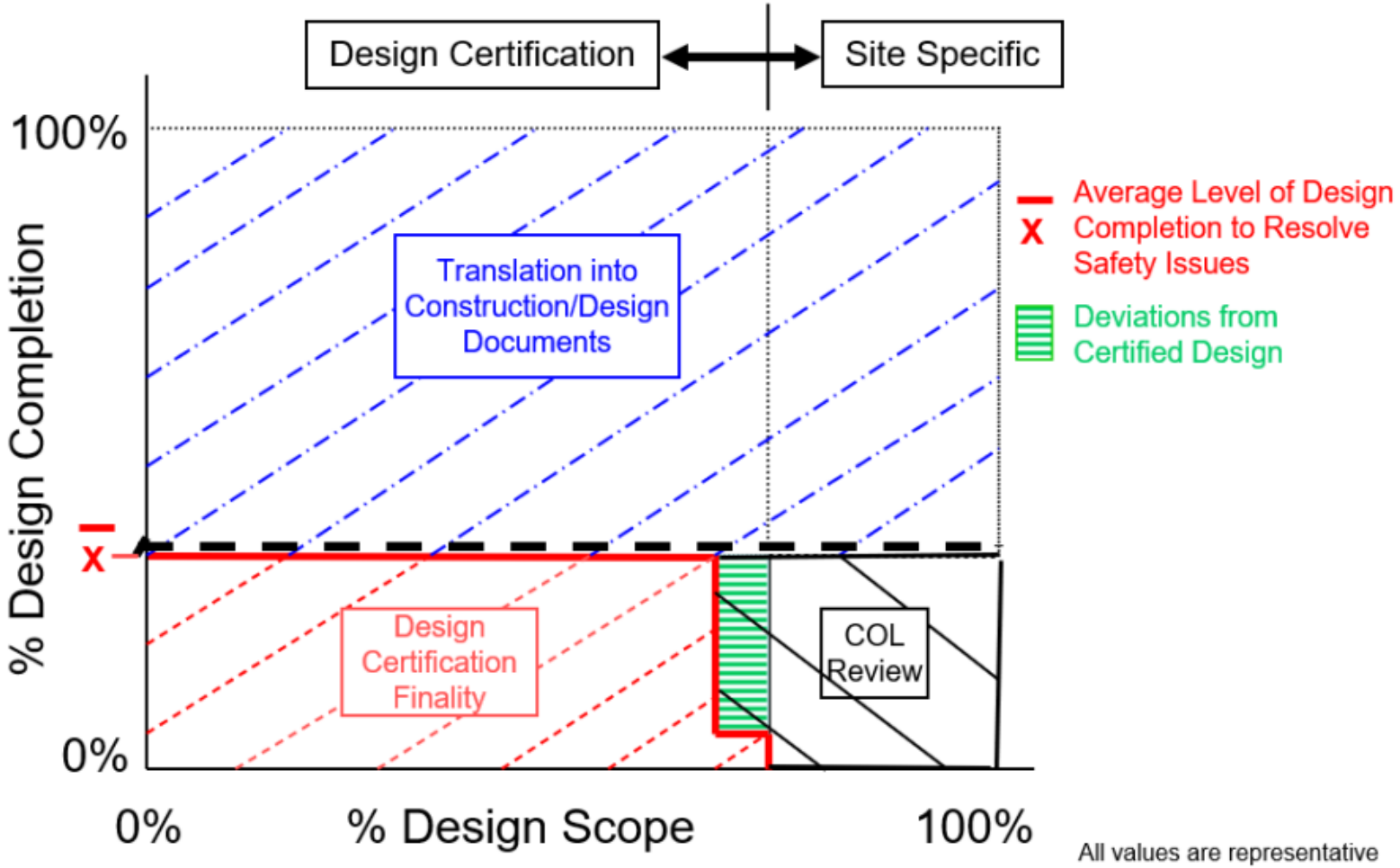
Pre-Application Activities

- Pre-Application Readiness Assessment
  - Identify information gaps between what's submitted and final application
  - Major technical and policy issues
  - Familiarization with application

NRC Policy Issue – Micro-Reactor Licensing

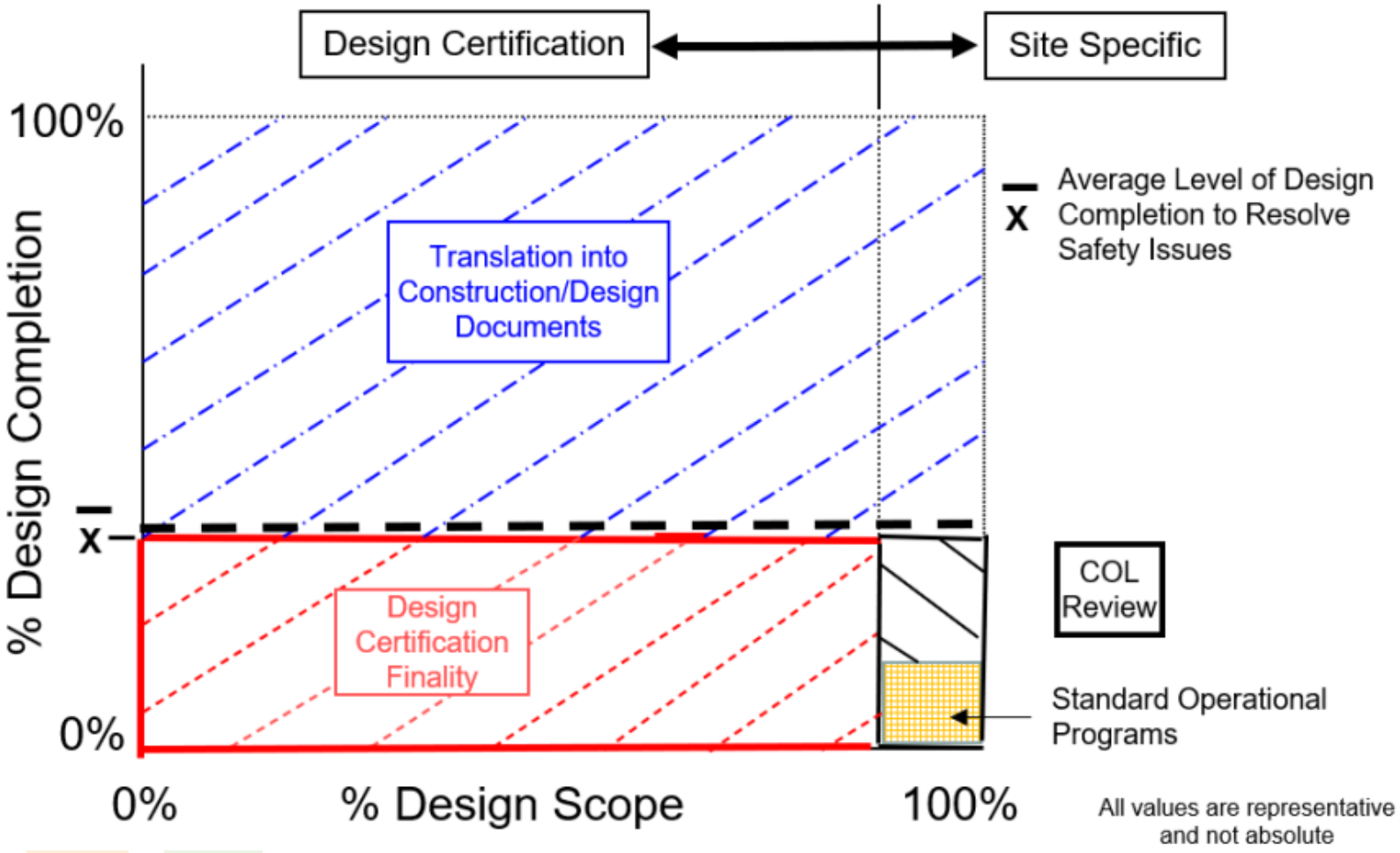
- Existing licensing approaches may need to be re-evaluated for micro-reactor applicability
- NRC is investigating ‘standardization’ through DC phase to resolve site-specific issues in DC or manufacturing license
- Review of operational considerations in design stage
- Optional manufacturing license without fuel load at factory

COL Application Referencing a Certified Design



Micro-reactors Licensing Strategies, Draft Staff White Paper, September 3, 2021, Adams Accession Number ML21235A418, https://adamswebsearch2.nrc.gov/webSearch2/main.jsp?AccessionNumber=ML21235A418.

COL Application Referencing a Certified Design with Enhanced Standardization



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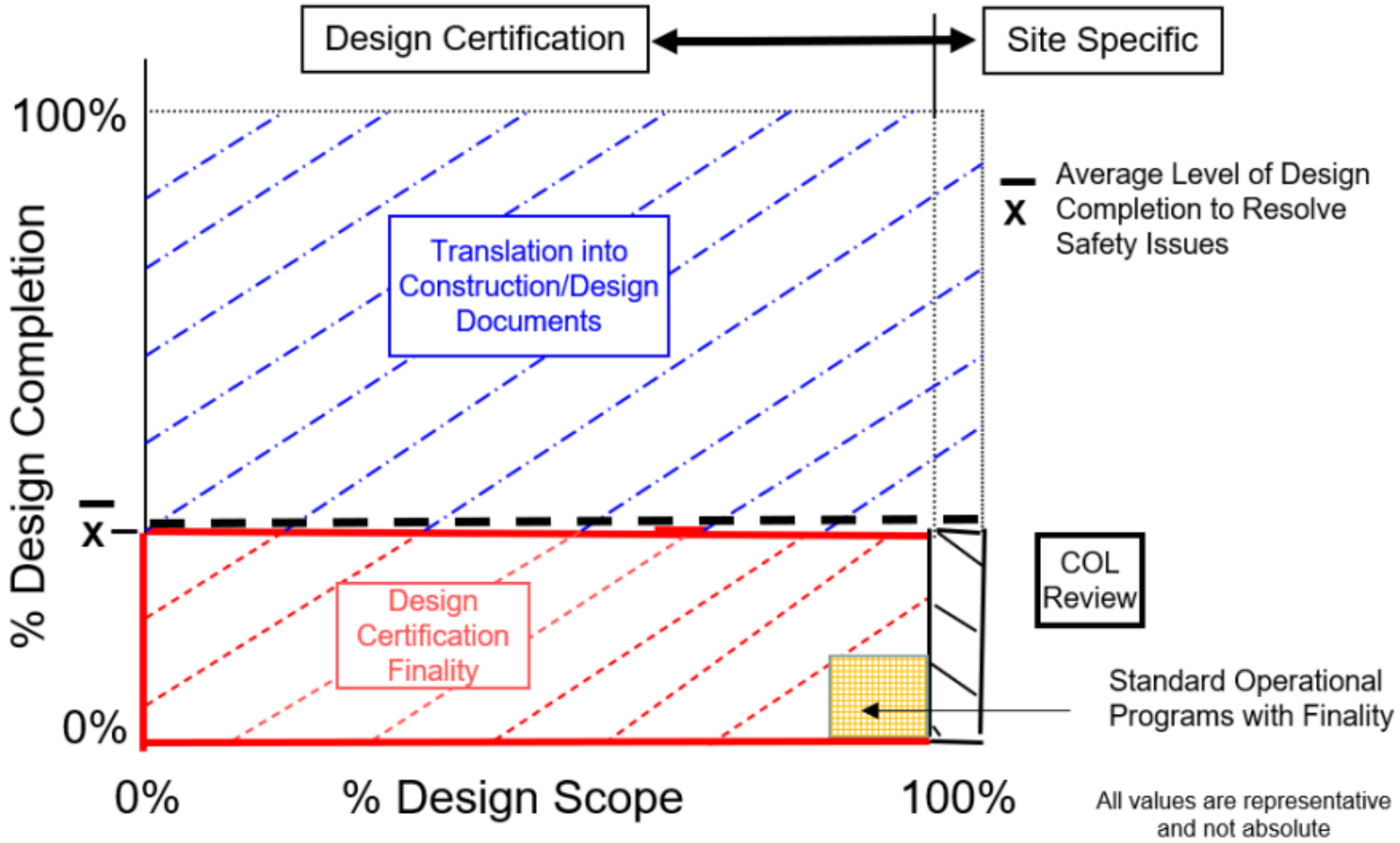
COL Application Referencing a Certified Design with Enhanced Standardization and Finality for Operational Programs



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DC Approval: NuScale

NuScale Example

- NuScale application process provides insight into potential issues and pathway to successful DC
  - NuScale DCA was evaluated using SRP and existing regulatory framework in Part 52
  - Physical Security requirements applicable in Part 73 relevant to DC level design phase
  - Significant information is publicly available
    - Specific withheld as SGI
  - Physical security-related application information in Chapter 13.6

NuScale Example

- Technical Report TR-0416-48929, “NuScale Design of Physical Security Systems, Revision 1.”
- Application includes sufficient information on physical security features to support DC approval
  - Designs, figures, configurations, and specifications of SSCs, including vital areas, ceilings, floors, walls
  - PRA analysis for VAI
  - Protective measures for vital areas
  - Preventing entry of persons through penetrations (HVAC)
  - Bullet resistant barriers
  - Acceptable codes for blast analysis of VBS standoff distances
  - Identifies additional responsibilities for COL applicant (site-specific)

NuScale Example

- COL applicant may incorporate NuScale DC as reference but must address additional requirements, including, for example:
  - Location & design of SAS
  - Barriers outside nuclear island
  - Isolation zone
  - Insider mitigation program
  - Access authorization program for protected and vital area access
  - Intrusion detection & assessment performance testing

Areas of Consideration for Industry Capability Development – DC

- Modeling/Simulation
- Security by design
- Delay analysis for tools & blast
- Vulnerability assessment
- Path analysis
- Timeline analysis
- Prohibited item detection
- System effectiveness calculations & verification modeling
- Tabletop exercises
- Vital area identification
- Protective measures for vital areas
- Alarm communication & display design and capabilities
- CAS & SAS Design
- Security infrastructure (power, wiring, cabling, distribution boxes)
- Advanced delay technologies
- Advanced sensing and assessment technologies
- Response & ROWS techniques & methods
- Insider mitigation tools and analysis
- Material Security: NMAC (Domestic Safeguards) Analysis
- Domestic Safeguards by Design
- Training & education on PPS analysis and development
- Cyber

Areas of Consideration for Industry Capability Development – COL & OL

- In addition to the capabilities for SRP 13.6.2:
- Security plan requirements & procedures development
- Staffing size analysis
- Training & qualification plan development

Questions/Discussion?