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Two Division Safety System Compliance with Applicable Rules and Regulations



Date: 9/13/23

Presented By: Patrick Essner

SMR, LLC, A Holtec International Company
Krishna P. Singh Technology Campus
One Holtec Boulevard
Camden, NJ 08104, USA

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Agenda

- Purpose and Outcome
- Licensing Strategy
- Licensing Requirements
- Conformance of the design to portions of IEEE 603 related to two division design.

Purpose and Outcome

- The purpose of the meeting is to
 - ✔ Familiarize NRC staff with I&C architecture of the SMR-160, focusing on the two-division design and how it complies with applicable regulation

- The outcome is to obtain feedback from the NRC staff on
 - ✔ The approach for complying with regulations in this area
 - ✔ The specific ways the SMR-160 I&C complies with available guidance and regulations
 - ✔ Future revisions to NRC guidance or regulation in this area

Licensing Strategy for SMR-160 I&C

- Following Part 50 Process
- DNRL-ISG-2022-01, provides guidance for I&C content related to Part 50
 - ✓ Points to guidance in the design-specific review standard (DSRS) for NuScale
 - Generic for I&C focused on Digital I&C systems
 - Incorporated some of the lessons learned from review of large LWR designs.
 - The guidance emphasizes fundamental instrumentation and control (I&C) design principles of independence, redundancy, predictability and repeatability, and diversity and defense in depth.

Licensing Requirements for I&C Design

- 10 CFR 50.55a requires conformance to IEEE 603-1991.
 - ✓ SAR content will demonstrate full compliance to IEEE 603-1991
- Some requirements from IEEE 603 are affected by the design being a two-division safety system.
 - ✓ Single-Failure Criterion
 - ✓ Completion of Protective Action
 - ✓ Between Redundant Portions of a Safety System
 - ✓ Interconnected Equipment
 - ✓ Capability for Test and Calibration
 - ✓ Capability for Testing and Calibration
 - ✓ Operating Bypasses
 - ✓ Maintenance Bypass
- These are the focus of the whitepaper.

Questions for the NRC

- Are there plans to revise Part 50 to remove IEEE 603-1991 and update the Regulatory Guides to endorse newer versions of IEEE 603?
 - ✔ If so is there a timeline?
- Are there any other high priority requirements Related to IEEE 603 or two division design?

Summary of Closed Meeting Materials

- Overview of the Two Division design.
- Detailed description of how the design complies with the highlighted portions of IEEE 603
 - ✓ Single-Failure Criterion
 - ✓ Completion of Protective Action
 - ✓ Between Redundant Portions of a Safety System
 - ✓ Interconnected Equipment
 - ✓ Capability for Test and Calibration
 - ✓ Capability for Testing and Calibration
 - ✓ Operating Bypasses
 - ✓ Maintenance Bypass

*****Transition to CLOSED portion of the meeting at this time*****

Scope

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[REDACTED]



[REDACTED]



[REDACTED]

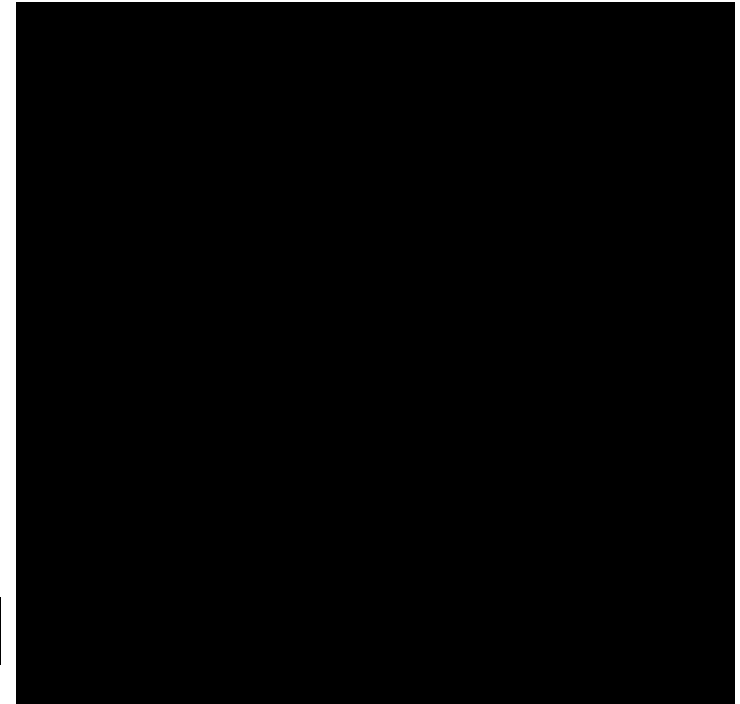


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SMR-160 I&C Architecture

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Single-Failure Criterion

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[REDACTED]



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[REDACTED]



[REDACTED]



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Single-Failure Criterion

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Single-Failure Criterion

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[REDACTED]



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Single-Failure Criterion in Section 5.1

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Single-Failure Criterion in Section 5.1

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Single-Failure Criterion in Section 6.7

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[REDACTED]



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Independence between PSS divisions

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Independence between PSS and PCS

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Fail Safe

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[REDACTED]



[REDACTED]



[REDACTED]



[REDACTED]

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Conclusion

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[REDACTED]



[REDACTED]



[REDACTED]



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Licensing Interactions Related to MELCO LTR Revision and SMR-160



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MELCO Topical Report Revision 3



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MELCO Topical Report Revision Approach

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SMR-160 I&C Topical

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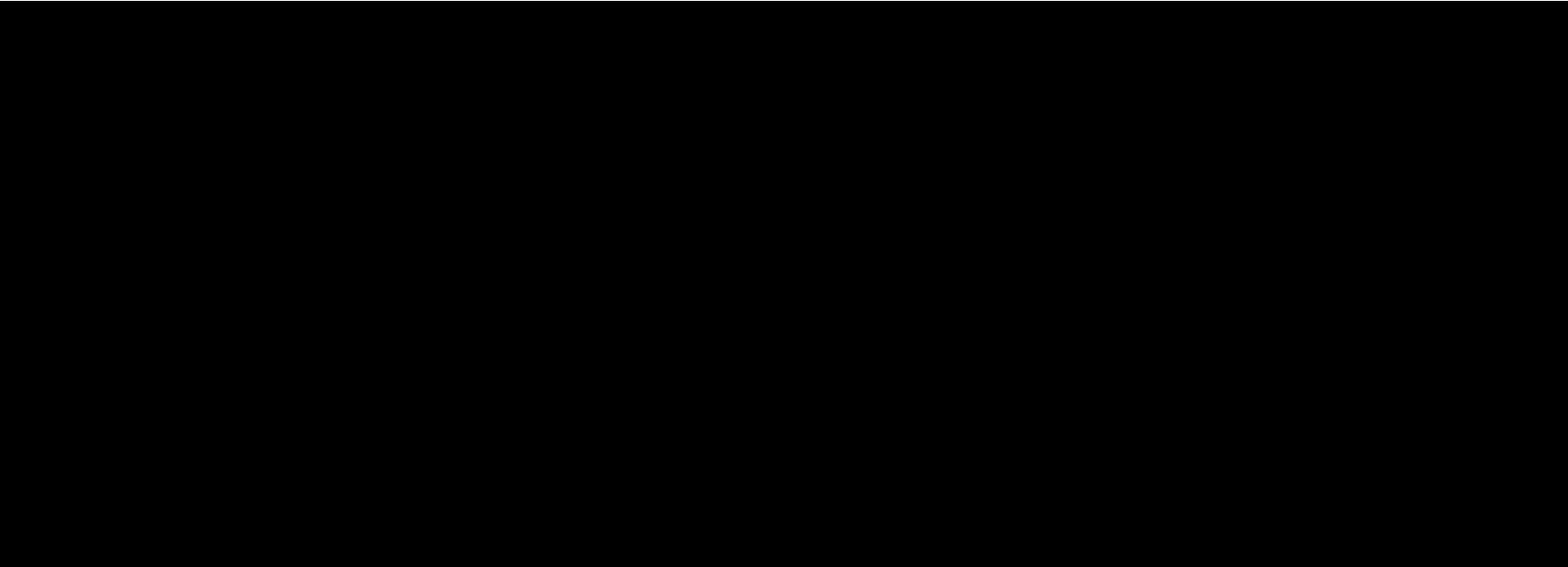


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Overall Schedule



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