

# Power Plant Simulators – NRC Perspectives

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# Agenda

- **Simulator Regulations**
- **ANSI/ANS-3.5-201x**
- **Regional Perspectives**
- **Changes in Inspection Manual Chapter 0609 Appendix I**
- **Simulator Modification and Testing**
- **Update on NuScale**
- **INPO is changing the accreditation process**



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# Simulator Regulations

- **10 CFR Part 55.4 “Definitions”**
  - Plant-referenced simulator – simulator modeling the systems of the reference plant with which the operator interfaces in the control room, including operating consoles, and which permits use of the reference plant’s procedures
- **10 CFR Part 55.31(a)(5) “How to Apply”**
  - Control manipulations required for licensing may be performed on a plant-referenced simulator meeting 10 CFR 55.46(c).

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# Simulator Regulations

- **10 CFR Part 55.45(a) “Operating Tests”**
  - Operating test performed in plant and on plant-referenced or commission-approved simulator
- **10 CFR Part 55.46 “Simulation Facilities”**
  - Plant-referenced simulators must demonstrate expected response
  - Sufficient in scope and fidelity to conduct evolutions listed in 55.45(a)(1)-(13) AND 55.59(c)(3)(i)(A)-(AA)

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# Simulator Regulations

## **10 CFR Part 55.45(a) (1) –(13) “Operating Tests”**

- (1) Perform pre-startup procedures for the facility, including operating of those controls associated with plant equipment that could affect reactivity.**
  - (2) Manipulate the console controls as required to operate the facility between shutdown and designated power levels.**
  - (3) Identify annunciators and condition-indicating signals and perform appropriate remedial actions where appropriate.**
  - (4) Identify the instrumentation systems and the significance of facility instrument reading.**
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# Simulator Regulations

## **10 CFR Part 55.45(a) (1) –(13)“Operating Tests”**

**(5) Observe and safely control the operating behavior characteristics of the facility.**

**(6) Perform control manipulations required to obtain desired operating results during normal, abnormal, and emergency situations.**

**(7) Safely operate the facility's heat removal systems, including primary coolant, emergency coolant, and decay heat removal systems, and identify the relations of the proper operation of these systems to the operation of the facility**

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# Simulator Regulations

## **10 CFR Part 55.45(a) (1) –(13)“Operating Tests”**

**(8) Safely operate the facility's auxiliary and emergency systems, including operation of those controls associated with plant equipment that could affect reactivity or the release of radioactive materials to the environment.**

**(9) Demonstrate or describe the use and function of the facility's radiation monitoring systems, including fixed radiation monitors and alarms, portable survey instruments, and personnel monitoring equipment.**

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# Simulator Regulations

## 10 CFR Part 55.45(a) (1) –(13)“Operating Tests”

**(10) Demonstrate knowledge of significant radiation hazards, including permissible levels in excess of those authorized, and ability to perform other procedures to reduce excessive levels of radiation and to guard against personnel exposure.**

**(11) Demonstrate knowledge of the emergency plan for the facility, including, as appropriate, the operator's or senior operator's responsibility to decide whether the plan should be executed and the duties under the plan assigned.**



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# Simulator Regulations

## 10 CFR Part 55.45(a) (1) –(13)“Operating Tests”

**(12) Demonstrate the knowledge and ability as appropriate to the assigned position to assume the responsibilities associated with the safe operation of the facility.**

**(13) Demonstrate the applicant's ability to function within the control room team as appropriate to the assigned position, in such a way that the facility licensee's procedures are adhered to and that the limitations in its license and amendments are not violated.**

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# Simulator Regulations

- **10 CFR Part 55.46 “Simulation Facilities”**
  - **Allow for completion of control manipulations**
  - **If used for the control manipulation requirement in 55.31(a)(5)**
    - **Most recent core load**
    - **Without procedure/simulator exceptions or training scenario deviation**
  - **Conduct testing, correct discrepancies, and have uncorrected performance test failures available for NRC review before initial or requalification test**

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# Simulator Regulations

- **10 CFR Part 55.49 “Integrity of Examinations and Tests”**
  - **Ensure that simulator set-up does not compromise test integrity**

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# Simulator Regulations

## 10 CFR Part 55.59 (c)(3)(i) “Requalification”

- ***Requalification program requirements.*** A facility licensee shall have a requalification program reviewed and approved by the Commission and shall, upon request consistent with the Commission's inspection program needs, submit to the Commission a copy of its comprehensive requalification written examinations or annual operating tests. The requalification program must meet the requirements of paragraphs (c) (1) through (7) of this section. In lieu of paragraphs (c) (2), (3), and (4) of this section, the Commission may approve a program developed by using a systematic approach to training.

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# **ANSI/ANS-3.5-201X “Nuclear Power Plant Simulators for Use in Operator Training and Examinations”**

- **ANS initiated a second recirculation ballot**
- **Second ballot closes on January 29,2019**
- **The malfunction list was removed**
- **NRC Technical Position: ML18312A128**
- **Once approved send to NRC for our review and future revision to Regulatory Guide 1.149, Rev 4, “Nuclear Power Plant Simulation Facilities for Use in Operator Training and License Examinations**

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# Regional Perspectives

- **Software modification testing and documentation**
- **Decreasing experience levels of simulator staff**
- **Plant modifications**

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# Changes in Inspection Manual Chapter 0609 Appendix I “Licensed Operator Requalification Significance Determination Process

- **New revision effective on January 1, 2019**
- **ML113270313**

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# Positive Performance Example

- **Two unit site**
- **Modification installed on Unit 2, but not yet on Unit 1**
- **Unit 1 is reference unit**
- **Installed modification in simulator**
- **Training needs assessment performed**
- **Glass Table Top Simulators.**



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# NuScale Update

- **The creation of NuScale K&A catalog is to align with a new section of NUREG-1021 for Small Modular Reactors**
- **Public meeting on February 23, 2019 with Advisory Committee on Reactor Safeguards Subcommittee presentation on NuScale Design Certification Application Chapters 13 and 18 Safety Evaluation**

# NuScale Overview



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# INPO “DaVinci”

- **New initiative**
  - **Simplify and improve efficiency of INPO oversight of nuclear training**
  - **Continue to meet requirements and MOA**
- **NRC staff is observing these activities**
- **Completion of this initiative expected by the end of 2019**

# Questions??



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