

August 13, 2012

U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
One White Flint North  
11555 Rockville Pike  
Rockville, MD 20852-2738

**SUBJECT:** Submittal of slides for presentation during a meeting on August 22, 2012 (NRC Project: 0769)

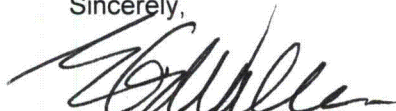
NRC will meet with NuScale Power, LLC at the Corvallis, Oregon offices on August 21 and 22, 2012 for the purpose of meeting with NuScale management to provide design details of the NuScale plant design development. Specifically, NuScale will meet with the NRC Instrumentation and Controls (I&C) staff on August 22, 2012, in Corvallis, Oregon to discuss details of I&C diversity and defense-in-depth.

NuScale requested a closed meeting for the NRC discussion of design details and the I&C presentation scheduled for August 22, 2012 due to the proprietary information that will be presented, as stated in the affidavit in Enclosure 1.

Enclosure 2 is the presentation for titled *Instrumentation and Controls Diversity and Defense-in-Depth*. Enclosure 3 is the nonproprietary version of the presentation. NuScale requests that the proprietary version of the presentation be withheld from public disclosure in accordance with the requirements of 10 CFR § 2.390. The enclosed affidavit (Enclosure 1) supports this request.

Please feel free to contact me at 541-207-3931 or ewallace@nuscalepower.com if you have any questions.

Sincerely,



Edward G. Wallace  
Vice President, Regulatory Affairs

Enclosure 1: Affidavit, NP-AF-0812-1618

Enclosure 2: Final slides: Instrumentation and Controls Diversity and Defense-in-Depth - proprietary

Enclosure 3: Final slides: Instrumentation and Controls Diversity and Defense-in-Depth - nonproprietary

Distribution:

Michael Mayfield, NRC, TWFN-6 E04  
Stuart Magruder, NRC, TWFN-9 F27  
Greg Cranston, NRC, TWFN-9 F27

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NRD

NuScale Power, LLC

AFFIDAVIT of Edward G. Wallace

STATE OF Oregon

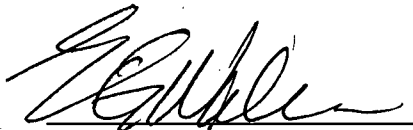
CITY OF Corvallis

I, Edward G. Wallace, state as follows:

- (1) I am the Vice President of Regulatory Affairs of NuScale Power, LLC (NuScale). I have personal knowledge of the facts set forth in this affidavit, and if called and sworn as a witness in a deposition or before any court, I could and would testify competently under oath to these facts. I am authorized to execute this affidavit on behalf of NuScale.
- (2) I have personal knowledge of the criteria and procedures used by NuScale in designating confidential commercial information as proprietary and have been delegated the function of reviewing the information described in this affidavit, which NuScale seeks to have withheld from public inspection. I have been authorized to apply for the withholding of this information on behalf of NuScale.
- (3) The following harm would result if the information sought to be withheld is disclosed to the public:
  - (a) The information discloses information about the methods and processes by which NuScale develops a design approach that includes features and processes to minimize the potential for common-cause failures (CCF) in the reactor protection system (RPS). NuScale has performed significant research and evaluation to develop a basis for methodology and processes and has invested significant human and financial resources in such development.
  - (b) NuScale's unique methodology, schedule, and design performance provides NuScale with a competitive economic advantage over other companies. Public disclosure of the information would cause substantial harm to NuScale's competitive position and would reduce or foreclose opportunities for NuScale to generate a return on its investment in research and development. Although the exact financial value of the information is difficult to quantify, the severe accident analysis approach is a key element of the design basis for a NuScale plant and, therefore, has substantial value to NuScale.
  - (c) If the information were disclosed to the public, NuScale's competitors would have access to the information without having been required to undertake a similar expenditure of resources. Such disclosure would constitute a misappropriation of NuScale's intellectual property, would unfairly provide NuScale's competitors with a windfall, and would deprive NuScale of the opportunity to seek an adequate return on its investment.
- (4) The information sought to be withheld is contained in the slide set scheduled to be presented to the U.S. Nuclear Regulatory Commission (NRC) on August 22, 2012, entitled *Instrumentation and Controls Diversity and Defense-in-Depth*, and bears the designation "NuScale Proprietary Class 2" at the bottom of each page. The information considered by NuScale to be proprietary is identified within double brackets "[[ ]]" in the slides.
- (5) The basis for proposing that the information be withheld is that NuScale treats the information as trade secrets and commercial information that are privileged and confidential. NuScale relies upon the exemption from disclosure set forth in the Freedom of Information Act (FOIA), 5 USC § 552(b)(4), as well as exemptions applicable to the NRC under 10 CFR §§ 2.390(a)(4) and 9.17(a)(4).

- (6) With respect to the considerations set forth in 10 CFR § 2.390(b)(4),
- (a) the information sought to be withheld has been held in confidence by NuScale.
  - (b) the information is of a sort customarily held in confidence by NuScale and, to the best of my knowledge and belief, consistently has been held in confidence by NuScale. The procedure for approval of external release of such information typically requires review by the staff manager, project manager, chief technology officer or other equivalent authority, or the manager of the cognizant marketing function (or his delegate), for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside NuScale are limited to regulatory bodies, customers and potential customers and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or agreements to maintain confidentiality.
  - (c) the information is being transmitted to and received by the NRC in confidence.
  - (d) no public disclosure of the information has been made, and it is not available from public sources. All disclosures to third parties, including any required transmittals to the NRC, have been made or must be made, pursuant to regulatory provisions or agreements that provide for maintenance of the information in confidence.
  - (e) public disclosure of the information is likely to cause substantial harm to the competitive position of NuScale, taking into account the value of the information to NuScale, the amount of effort and money expended by NuScale in developing the information, and the difficulty others would have in acquiring or duplicating the information. The information sought to be withheld is part of NuScale's technology that provides NuScale with a competitive advantage over other firms in the industry. NuScale has invested significant human and financial capital in developing this technology, and NuScale believes it would be difficult for others to duplicate the technology without access to the information sought to be withheld.

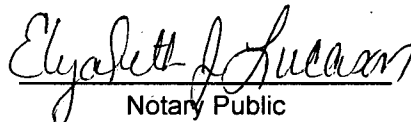
I declare under penalty of perjury that the foregoing affidavit and the matters stated therein are true and correct to the best of my knowledge, information, and belief.



Edward G. Wallace

State of Oregon, County of Benton.

Subscribed and sworn to before me this 14 day of August 2012.



Notary Public



My commission expires:

March 14, 2016

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# **Instrumentation and Controls Diversity and Defense-in-Depth**

**Nonproprietary version**

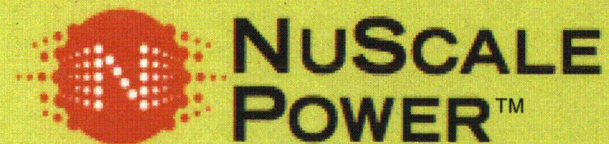


# Instrumentation and Controls Diversity and Defense-in-Depth



Gary Jones and Gregg Clarkson

*August 22, 2012*



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# Agenda

- Purpose
- Background
- NuScale Instrumentation & Controls (I&C) pre-application strategy
- Diversity and Defense-in-Depth (D3) Technical Report summary
- I&C Software Quality Assurance
- Feedback
- Next steps

# Purpose

- Present the NuScale I&C pre-application strategy
- Provide background information with respect to NuScale I&C
- Summarize the D3 Technical Report submitted in July 2012
- Discuss NuScale I&C software quality assurance plan
- Obtain NRC feedback:
  - NuScale pre-application strategy
  - NuScale embodiment of the five key design attributes
  - Status of the NuScale Design-Specific Review Standard (DSRS), Chapter 7



# Background

- Previous NuScale engagement with NRC
  - October 2011 - Digital I&C Diversity and Defense-In-Depth presentation
  - April 2012 - I&C Design Overview meeting
  - July 5, 2012 - D3 Technical Report submitted
  - July 11, 2012 - Phone conference

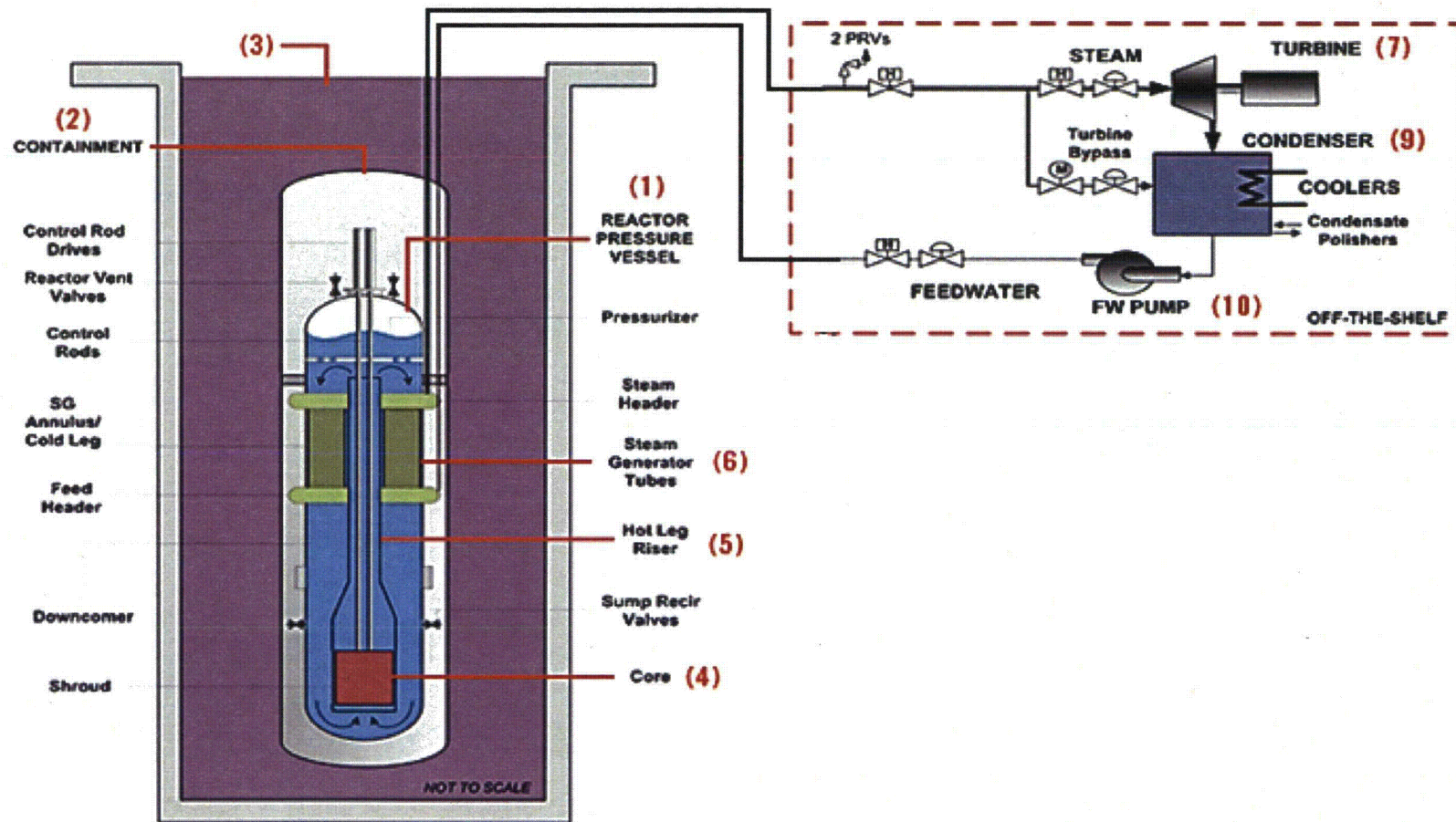


# NuScale I&C Pre-Application Strategy

- Purpose of strategy
  - Provide alignment with the NRC philosophy on DSRS
  - Optimize pre-application time
  - Minimize requests for additional information (RAIs) during design control document (DCD) review
- NuScale approach
  - Provide increasing level of design detail prior to DCD review
  - Jointly develop a pre-application engagement timeline



# NuScale Plant Design

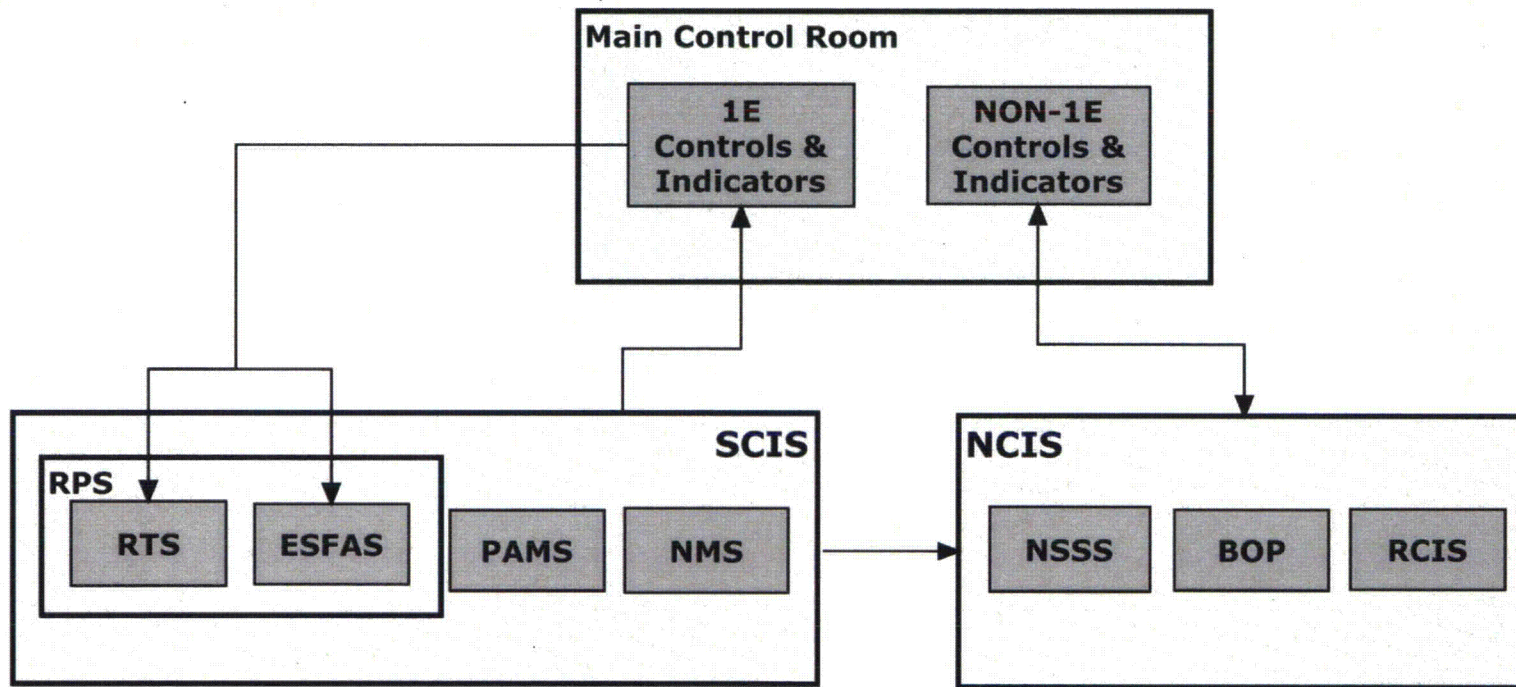


# D3 Technical Report Summary Agenda

- Overall I&C architecture and the echelons of defense
- Description of reactor protection system
  - Sensors and detectors
  - Signal conditioning
  - Trip determination
  - Reactor trip system
  - Engineered safety features actuation system

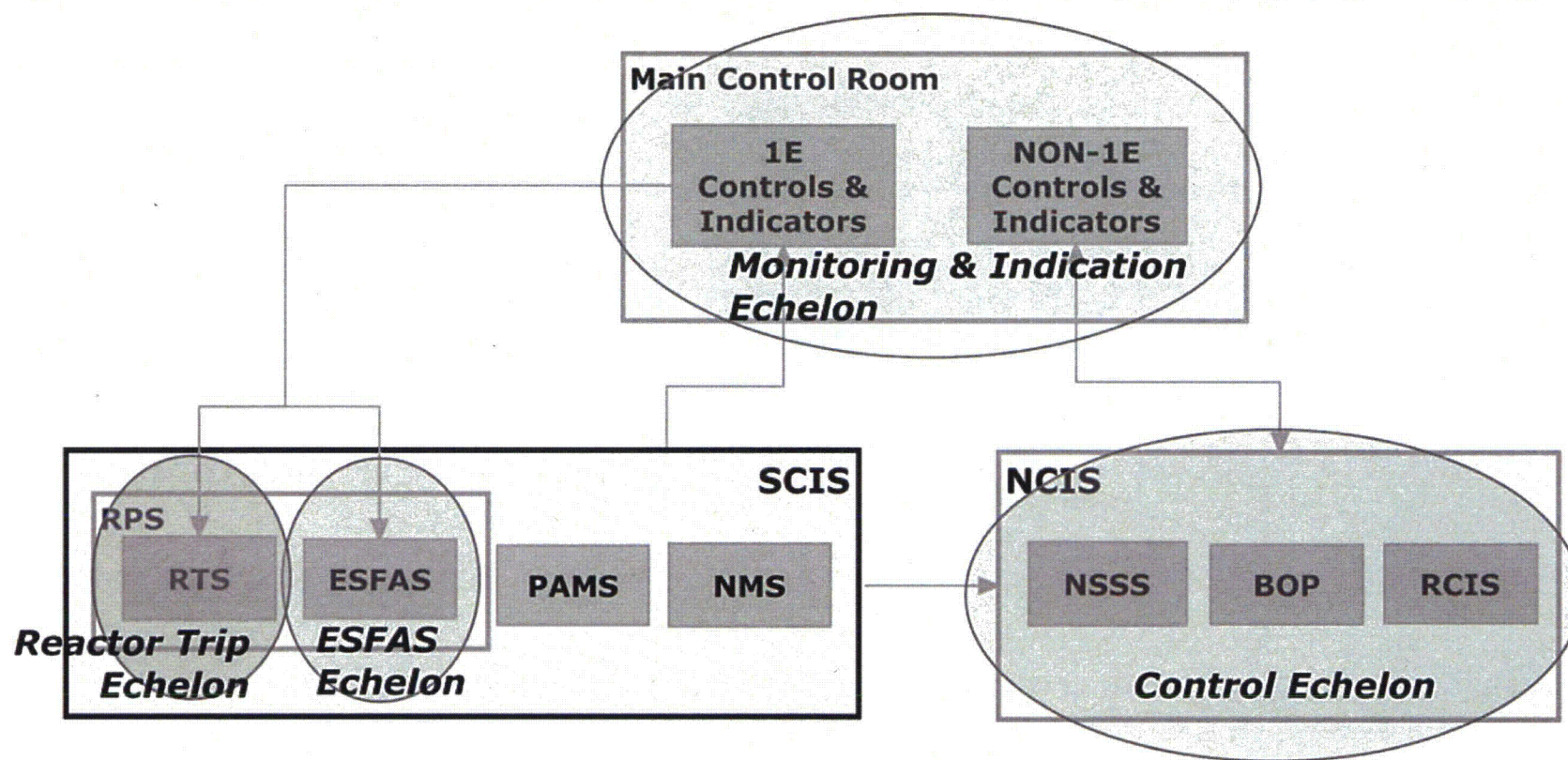


# Overall I&C Architecture





# Echelons of Defense



- *Monitoring and Indication Echelon*
- *Reactor Trip Echelon*
- *ESFAS Echelon*
- *Control Echelon*

# Reactor Protection System Overview

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## Fundamental design aspects

- Safe
- Simple
- Highly reliable

]]<sup>3(a)-(c)</sup>



# Sensors and Detectors

[[

]]<sup>3(a)-(c)</sup>

- Process sensors measure pressure, temperature and level.
- Process parameters are
  - measured using different types of sensors.

[[

]]<sup>3(a)-(c)</sup>

- Neutron flux detectors measure leakage of neutrons.
  - Different types of detectors will measure source range, intermediate range, and power range.

# Signal Conditioning

[[

]]<sup>3(a)-(c)</sup>

- Sensors and detectors are the inputs to the signal conditioning block (SCB).

[[

]]<sup>3(a)-(c)</sup>



# Trip Determination

[[

]]<sup>3(a)-(c)</sup>

# Trip Determination

[[

]]<sup>3(a)-(c)</sup>



# Reactor Trip System

[[

]]<sup>3(a)-(c)</sup>

- 2-out-of-4 voting scheme is employed to trip the reactor.

# Engineered Safety Features Actuation System

[[

]]<sup>3(a)-(c)</sup>

- A TDB will send an actuate signal when the sensed parameter exceeds a setpoint.
- No single failure can prevent a safeguards actuation when required.
- No single failure can generate an unnecessary safeguards actuation.
- 2-out-of-4 voting scheme is employed to actuate the engineered safety features (ESF) equipment.



# Implementation of Five Key Design Characteristics

- Independence
- Redundancy
- Determinism
- Multi-layered diversity
- Simplicity

# Independence

- The RPS incorporates independence between
  - four separation groups of sensors and detectors.
  - four separation groups of trip determination.
  - four separation groups of RTS.
  - two divisions of ESFAS circuitry.
  - two divisions of ESF equipment.

[[

]]<sup>3(a)-(c)</sup>



# Redundancy

- Redundancy is incorporated by including
  - four separation groups of
    - sensors and detectors.
    - trip determination.
    - reactor trip system.
  - two divisions of ESFAS circuitry.
- A 2-out-of-4 voting scheme

# Determinism

[[

]]<sup>3(a)-(c)</sup>



# Multi-Layered Diversity

[[

]]<sup>3(a)-(c)</sup>

# Multi-Layered Diversity

[[

]]<sup>3(a)-(c)</sup>



# Multi-Layered Diversity

[[

]]3(a)-(c)

# Simplicity

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]]<sup>3(a)-(c)</sup>



# NuScale I&C Software QA Plan

- NuScale Quality Management Plan
  - NQA-1 2008 (with 2009 addenda)
  - I&C software is governed by NQA-1 subpart 2.7, requirements 3 and 11
- NuScale I&C software plans based upon
  - BTP 7-14, Rev 5 Section B.2.1, “Software Life Cycle Process Planning”
- Closely monitoring DSRS materials to incorporate applicable information into I&C software program

# Feedback

- D3 Technical Report submittal
- Software Quality Assurance Plan
- NuScale-specific DSRS
- Pre-application engagement strategy
- Joint development of pre-application timeline



# Next Steps

- Propose regular meetings to provide increasing detail regarding NuScale I&C architecture
- Prepare pre-application timeline based on NRC feedback
- Provide any additional information regarding D3 Technical Report

# Questions