Power Plant Simulation Conference 2019
Tampa, Florida
January 23, 2019

James B. Florence
ANS–3.5 Working Group
FOLLOW-UP
SIMULATOR TEST OPERATOR WORKSHOP

Utility Simulator Users Group Event
Hosted by D.C. Cook Nuclear Plant

What: Simulator Test Operator Workshop
Where: DC Cook Nuclear Plant
When: June 19–21, 2018

Attended by 31 individuals representing 25 nuclear power plants and five members of the NRR/NRC
ANS–3.5 Topic Overview

- ANS–3.5 Development Statistics
- Introduce ANS–3.5 Working Group
- ANS–3.5–201x Project Status
- ANS–3.5 Standards Transition Status
- Questions
ANS–3.5 Development Statistics

- 16 active members;
- 675 collective years of experience in the nuclear industry;
- 479 years of simulation–related experience;
- 249 years of operator training experience;
- working group continuity was preserved by members with a range of 1 to 29 years of previous working group participation;
- 12 face–to–face meetings since 2010;
- 7,680 man–hours;
- $960,000 labor dollars;
- $288,000 travel costs;
- significant participation from the industry, and;
- 101 comments addressed/resolved
ANS–3.5 Standard Working Group Membership

Officers

- Jim Florence (Cooper) – Chair
- Bob Felker (Western Services Corp.) – Vice Chair
- Keith Welchel – Secretary
- Butch Colby – Editor
- SK Chang – Style Editor
- Bernard Litkett (NRC) – Parliamentarian
ANS–3.5 Standard Working Group Membership

- Bill Fraser (Westinghouse)
- Robert Goldman (Grand Gulf)
- David Goodman (Comanche Peak)
- Jody Lawter (Summer)
- George McCullough (Exitech Corp)
- Michael Petersen (Monticello/Prairie Island)
- Pablo Rey (Tecnatom – Spain)
- James Sale (Independent)
- Frank Tarselli (Independent)
- Larry Vick (Independent)
Approved Scope:

- This standard establishes the functional requirements for full scope nuclear power plant control room simulators that are subject to U.S. Nuclear Regulatory Commission (NRC) regulation for use in operator training and examination. The standard also establishes criteria for the scope of simulation, performance, and functional capabilities of nuclear power plant control room simulators.

- This standard does not establish criteria for the use of simulators in operator training programs.
ANS–3.5–201x Project Status

- ANS–3.5–201x was “balloted” to the ANS Large Light Water Reactor Consensus Committee (LLWRCC) in May 2017

- ANS–3.5–201x was approved by the ANS LLWRCC subsequent to a “reconsideration” ballot on In November 2018

- Second “reconsideration” ballot issued to the ANS LLWRCC on 01/15/19; ballot closes on 01/29/19

- Next steps in process are ANS & ANSI approval

- Expect to be publish in early Summer 2019
ANS–3.5–201x Project Status

What’s Different in the 201x Standard?

- Addresses comments from the original 2009 Standard review effort
- Addresses next generation simulators
- Deleted/modified definitions; introduced “discrepancy” in lieu of noticeable difference, deviation and deficiency
Deleted Malfunction List in Section 3.1.4; a footnote references the "control manipulations/plant evolutions" list in the Code of Federal Regulations, Part 10CFR55.59 "Requalification" § (c)(3)(i) where the malfunction list was originally derived.

Changed Section 3.4/4.4 to from “Simulator Testing” to “Performance Testing”

Moved verification/validation testing to Section 5, Configuration Management

Moved Assessment of Deviations to Section 5
Defined Testing Periodicities
- Limits of Simulation
- Steady-state & Normal Evolutions
- Malfunctions
- Physical Fidelity & Human Factors
- Instructor Station
- Real Time & Repeatability

Defined testing configurations for various performance tests (fully integrated vs. non-integrated)

No changes to scenario-based testing!!!
Section 5:

- initial design vs. change control
- performance benchmark (steady-state & transient testing)
- noticeable differences
- resolution of discrepancies
- verification/validation testing
Appendix B deleted; transient list deleted, steady-state parameters moved to Section 4

Clarified that previously selected transients may be used (for legacy plants); transients tests confirm overall simulator model completeness and integration

Re-lettered Appendices C & D

Readability/clarity
ANS–3.5 Transition Status
(2018 Data – United States Regions 1–4)

• Vogtle 1&2 transitioned from 1985 to 2009 in 2018

• Davis Besse transitioned from 1998 to 2009 in 2018

• 1985 Standard – Hatch, Sequoyah, Watts Bar, Browns Ferry, Comanche Peak, Palo Verde, Fermi

• 1998 Standard – Perry

With the exceptions noted above, all other U.S. simulation facilities currently conduct business to the ANS–3.5–2009 Standard.
The ANS–3.5 Webpages can be accessed via:

- www.ans.org
- https://www.usug.org/

Find:

- Scope Statement
- Membership Contact Information
- Meeting Locations
- Meeting Minutes
- Link to ANS–3.5 Inquiry Process
- How to submit inquiry requests
ANS–3.5 Working Group

Questions???

V. C. Summer
November 2011
ANS–3.5.1 Standard

New Adventure
ANS–3.5.1 Standard

- **Background**
  - Simulators are being used for purposes other than training (ANSI/ANS-3.5)
  - Benefits to this practice, if done appropriately
  - BUT no minimum requirements

- **Solution**
  - ANS-3.5.-20xx – Nuclear Power Plant Simulators for Use in Simulation-Assisted Engineering and Non-Operator Training
Overview

- Provide minimum requirements for use of simulators for other applications including:
  - Plant Engineering Design V&V
  - Mod V&V
  - Design Optimization
  - Plant Performance Optimization
  - Control Loop Tuning
  - Procedure Development
  - etc.
Status

- Working Group established
- Kashmir Singh leading project
- Project Initiation Notification System (PINS) form has been approved and comments resolved
- Registered with ANSI on Dec 14, 2018

Working Group Members

- Kashmir Singh - EDF Energy
- Burkhard Holl - KSG
- Barney Panfil - CORYS
- Alan Cheng - Exelon Generation
- David Goodman, PE - Luminant
- Oussama Ashy - Western Services Corp
- Ian Lowe - Sizewell B Power Station
- Jose Antonio Ruiz - Tecnatom
- Alan Montgomery - Torness Power Station
- Ed Rau - Duke
- Rama Deljournavesh - OPG
- Dennis Spielman - SNS
- Alistair Linsell - Hinkley Point C
- Joseph Yarbrough - Xcel Energy
- Kenneth Leung - Bruce Power
- George McCullough - Exitech
- Evan Lloyd - Exitech
- Jim Florence - NPPD