ANS 3.5 Working Group Meeting Minutes
American Nuclear Society
Westinghouse, Cranberry Twp, PA
2011 June 07-10

1. Visitors

Visitor	Date	Affiliation	Email, Phone Fax
Mr. Tim Dennis Observer	2011jun07	645 Lehigh Gap St. P. O. Box 119 Walnutport, PA 18088-0119	**Email**: a243@yahoo.com **Phone**:610-767-0979 **Fax**: 610-767-7095
Mr. Bill Fraser	2011jun07	Westinghouse Electric Company Nuclear Services I-70 Madison Exit 54, MB #20 Madison, PA 15663, USA	**Email**: fraserwa@westinghouse.com **Cell**: 717-304-6225 **Work**: 724-722-5777 **Work**: 724-722-5665
Mr. Gary Degraw Goldman Proxy	2011jun07	River Bend Station Entergy Operations, Inc. 5485 US Highway 61 St. Francisville, LA 70775	**Email**: degraw@entergy.com **Cell**: 225-378-3527 **Work**: 225-381-4645

2. Membership and Attendance

Present	Member	Address	Notes-Proxy	Email-Phone-Fax
Present	Jim Florence **Chair**	Nebraska Public Power District P. O. Box 98 Brownville, Nebraska 68321		**Email**: jbflore@nppd.com **Phone**: 402-825-5700 **Fax**: 402-825-5584
Present	Robert Felker **Vice Chair**	Western Services Corporation 7340 Executive Way, Suite A Frederick, MD 21704		**Email**: felker@ws-corp.com **Phone**: 301-644-2520 **Fax**: 301-682-8104 **Cell**: 240-344-5889
Present	Keith Welchel **Secretary**	Duke Power Company Oconee Training Center- MC:ON04OT 7800 Rochester Hwy Seneca, SC 29672		**Email**: kwelchel@duke-energy.com **Phone**: 864-885-3349 **Fax**: 864-885-3432
Present	F.J. (Butch) Colby **Editor**	L-3 MAPPS 8565 Cote-de-Liesse Quebec, Canada H4T 1G5		**Email**: butchcolby@comcast.net **Email**: butch.colby@l-3com.com **Phone**: (410) 961-7535 **Fax**: (410) 756-1954
Present	Lawrence (Larry) Vick **Parliamentarian**	US NRC, Office of Nuclear Reactor Regulation 07-G13 Washington, DC 20555		**Email**: lawrence.vick@nrc.gov **Phone**: 301-415-3181 **Fax**: 301-415-3061
Present	George McCullough	GSE Systems, Inc. 2300 St. Marys Road Suite D St. Marys, GA 31558		**Email**: gsmccullough@gses.com **Phone**: 912-576-6730 **Cell**: 410-707-6946
Absent No proxy	Dennis Koutouzis	INPO 700 Galleria Parkway, NW Atlanta, GA 30339-5957		**Email**: koutouzisjd@inpo.org **Phone**: 770-644-8838 **Fax**: 770-644-8120
Present	Frank Tarselli	129 Abbey Rd Sugarloaf, PA 18249		**Email**: frankt64@epix.net **Phone**: 570.542.3717 **Cell**: 570-956-0303 **Fax**: 570.542.3855
Present	SK Chang	Dominion Nuclear Connecticut, Inc. Millstone Power Station L. F. Sillin, Jr. Nuclear Training Ctr. Rope Ferry Road Waterford, CT 06385		**Email**: Shih-Kao.Chang@dom.com **Phone**: 860-437-2521 **Fax**: 860-437-2671
Proxy: Gary Degraw	Robert Goldman	Entergy 1340 Echelon Parkway Jackson, MS 39213-8298		**Email**: rgoldma@entergy.com **Phone**: 601-368-5582 **Fax**:
Present	David Goodman	Luminant PO Box 1003 Glen Rose, TX 76043		**Email**: david.goodman@luminant.com **Phone**: 254-897-5636 **Fax**: 254-897-5714

Present	Jody Lawter	VC Summer Nuclear Station PO Box 88 Jenkinsville, SC 29065		**Email**: jody.lawter@scana.com **Phone**: 803-345-4854 **Fax**: 803-931-5616
Present	Mac McDade	Progress Energy – Harris Nuclear Plant 3932 New Hill–Holleman Rd New Hill, NC 27562		**Email**: mac.mcdade@pgnmail.com **Phone**: 919-362-3319 **Fax**: 919-362-3346
Present	Michael Petersen	Xcel Energy – Prairie island – Monticello 1660 Wakonade Drive West Welch, MN 55089		**Email**: Michael.petersen@xenuclear.com **Phone**: 651-388-1121 x 7253 **Fax**: 651-330-6282
Present	Pablo Rey	Tecnatom, s.a. Avda. Montes de Oca, 1 San Sebastian de los Reyes, 28703 - Madrid		**Email**: prey@tecnatom.es **Phone**: +346-079-99218 **Fax**: +349-165-98677
Present	James Sale	North Anna Power Station 11022 Haley Drive, PO Box 402 Mineral, Virginia 23117-0402		**Email**: jim.sale@dom.com **Phone**: 540-894-2464 **Fax**: 540-894-2931
Host	William Fraser	Westinghouse Electric Company Nuclear Services I-70 Madison Exit 54, MB #20 Madison, PA 15663, USA		**Email**: fraserwa@westinghouse.com **Cell**: 717-304-6225 **Work**: 724-722-5777 **Work**: 724-722-5665

3. Action Items

3.1 Action Item Quick-look Table

Open	Complete	Carried to Next Standard

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40

3.2 Action Items

No.	Status	Date	Assigned To:	Work Assignment
1		2010oct05	**Florence** **Lawter** **Sale**	Appoint new members for officer development (job shadow for position development). Parliamentarian Assist Lawter, Sale
2		2010oct06	**Koutouzis** McCullough	2009 AI-60 Define the Term **Training Needs Assessment** in such a manner that it is clear in intent to both Training and Simulator staff
3		2010oct06	**Vick** Tarselli (BWR) Petersen (BWR) Rey (BWR) Goodman (PWR) McDade (PWR) Sale (PWR)	2009 AI-126 Consider adding Performance Test Program in next standard. New Appendix that gives example Performance Testing Program.
4	2011jun08: Closed items - 1, 3, 4	2010oct06	**Tarselli** Vick Chang Fraser Felker	2009 AI-132 ~~1. Review Malfunction Testing~~. 2011jun08 Closed 2. Are all list required? ~~3. What constitutes Malfunction testing is unclear~~ 2011jun08 Closed ~~4. Better define Malfunction causes~~. 2011jun08 Closed 2011jun08 AI-4 remains open pending review of Section 3.1.4 List. The remaining issue is relevance of the Malfunction list in Section 3.1.4 to the 201x standard. Additional consideration is if the malfunction list in section 3.1.4 should remain, be deleted or moved.

5	2011jun08: Closed	2010oct06	**McCullough** Florence Tarselli Colby	2009 AI-134 Minimum testing Periodicity Build Periodicity into the standard 2011jun09 Closed with Motions Realtime/Repeatability testing periodicity moved to AI-10
6		2010oct06	**Welchel** Lawter Petersen	2009 AI-147 2009 AI-180 Non-fully integrated mode performance testing Where applicable run performance test off-line 2011jun08 Discussion
7		2010oct06	**Vick** Goldman	2009 AI-150 Review the term Power Range for consistency Confusion about the term Power Range.
8	2011jun09: Closed	2010oct06	**Chang** Tarselli Felker	2009 AI-162 Review Appendix B parameters against the standard body MANTG comments App. B parameters and std body are not consistent. 2011jun09 – A parliamentary issue regarding motion results. See AI-26

9		2010oct06	**Felker** Lawter McCullough Fraser Colby Goodman McDade Koutouzis Rey Sale	2009 AI-163 Next generation simulators New builds. Public review comments that the WG did not considered new builds. Examine unique issues with new builds. Review will ask if 3.5-2009 provides sufficient guidance for new builds. 2011jun10 – Info presented. Next meeting will propose the first of several anticipated standard changes.
10		2010oct06	**McCullough** Felker McDade Goldman	2009 AI-179 Real-time and Repeatability testing Periodicity 2009 Public review comments. Methodology to demonstrate real-time. 2011jun10 Carried from AI-5 Realtime/Repeatability -Establish Realtime/Repeatability Periodicity Testing Requirement
11		2010oct06	**Goodman** Vick Petersen Chang	2009 AI-181 Section 5 rewrite 2009 Westrain Comment #60 Configuration Management expectations needs strengthening Performance based. V&V is part of configuration mgt. (Section 4) possible a better fit in Section 5

12	2010oct22: Closed	2010oct06	**Florence**	Invite ANS-21 Chair to WG meeting ANS-21 Chair Gene Carpenter Two White Flint North Washington, DC 20555-0001 **Mobile Ph**: 202-579-5155 **Work Ph**: 301-415-7333 **Email**: gene.carpenter@nrc.gov
13	2011jan28: Closed	2010oct06	**Florence**	Send letters of appointment to new working group members and their respective facility management Letter to new working group member and manager.
14	2011jan28: Closed	2010oct06	**Florence**	Coordinate next ANS-3.5 Meeting at the Crystal River Nuclear Power Plant in January 2011
15	2011jan28: Closed	2010oct06	**Florence**	2009 AI-185 Send a letter to the NEI in an effort to promote NEI participation in the ANS-3.5 Working Group and to develop a more collaborative relationship.
16		2011jan28	**Sale** Rey McCullough Tarselli Chang Koutouzis	Consider the option to include other uses of the simulator in footnote 1 on Page 1 of the Standard (e.g. - technical support). This was a consideration during the development of the scope statement in lieu of explicitly mentioning other uses of the simulator in the scope statement.

17		2011jan28	**McDade** Tarselli Koutouzis Petersen	Consider placing language in Section 1.2 Background to insert "experience requirements": `It is intended that in meeting the criteria of this standard, the simulator will be sufficiently complete and accurate to meet the training needs of the industry as well as the requirements of the NRC, as described in *Code of Federal Regulations*, Title 10, "Energy," Part 55, "Operators' Licenses" (10CFR55) **and station mandated experience requirements** Consider language in Section 1.2 Background to add clarification regarding control manipulations allowed by 10CFR55.46 and how this standard supports it.
18		2011jan28	**Florence** Rey Holl Fraser	1) Contact ANS to determine international opportunities in Standard development. 2) Consider language in Section 1.2 Background to mention use of this standard by the international community. 3) Additional consideration in the Standard body for the international community. Acknowledge international regulatory authorities.

19		2011jan28	**Tarselli** McCullough Goodman Chang Rey	Review the list below for inclusion into ANS 3.5 or other standards and basis for the recommendation: • Engineering Assist • Simulation Assisted Engineering • EP • DCS Logic Control Validation • HFE – Human Factors Engineering • Tech Training – I&C / Mechanical • PR Tours • Process Flow Diagrams • Spec. Operating Parameters • PRA • SAMG
20		2011jan28	**McCullough** Colby Tarselli Lawter Fraser	Identify areas in the standard that can be improved to address DCS
21	2011jun10: Closed	2011jan28	**McCullough** Felker Koutouzis Lawter Goodman	Evaluate the need for inclusion into the standard other simulation devices derived directly from the full scope control room simulator. 2011jun10 – Presentation and discussion. No additional discussion and action will be taken. This AI is closed.
22		2011jan28	**Lawter** Sale Welchel Vick Felker	Review the recent regulatory cyber security guidance and OE to determine if cyber security should be included in the standard.

23		2011jan28	**Vick** Tarselli Rey Sale Florence Chang	Evaluate the need for including into Section 3.3.1 a set of IC criteria for ICs that are to be used when conducting the performance tests required by this standard. 2011jun10 – Proposal made. Additional consideration required.
24	2011feb01: Closed	2011jan28	**Florence**	Submit PINS Form to ANS Administrator 2011feb01 PINS has been submitted.
25		2011jun10	**Chang**	The following Appendix B Steady State parameters were considered in AI-8. BWR - control rod drive hydraulic system flow and temperature - secondary plant heat balance data PWR - containment pressure - boron concentration - pressurizer temperature - control rod positions - secondary plant heat balance These parameters should be reviewed for inclusion into the standard body Steady State parameter list.

26		2011jun10	**Florence**	Review and recommend modifications to the Rule of the Chair related to quorum in session. Interim Voting (Motions – Substantive Changes) shall be by Consensus (75% [rounded up] of quorum in session); Rule of the Chair for the remainder of the Westinghouse meeting: Interim Voting (Motions – Substantive Changes) shall be by Consensus (75% [rounded up] of voting membership present);
27		2011jun10	**Florence**	Define Substantive Change with regards to Motion "Carried" threshold.
28		2011jun10	**Felker** Chang Sale	Review and report to the WG the usage of the terms: **If available** versus **As applicable**.
29		2011jun10	**Rey** Tarselli	Review Normal Operating procedures Surveillance testing with regards to periodicity testing. It should be clarified what Normal Evolutions defined in 3.1.2.2 shall be tested with the frequency established in 4.1.3.2
30		2011jun10	**Sale**	Review Appendix B Steady State section for deletion.
31		2011jun10	**Petersen** Chang	Review list nomenclature for consistency

4. Working Group Procedural Rules

4.1 Rules of the Chair

- Interim Voting (Motions – Substantive Changes) shall be by Consensus (75% [rounded up] of quorum in session);
- The Chair rules that no Motions will be accepted when not in session;
- Administrative issues by simple majority (quorum in session);
- The Chair shall be informed of absences;
- The absent member is encouraged to send a proxy.
- A Proxy shall have voting privileges
- Members shall attend the full length of the meeting;
- Word 7.0 shall be the document format;
- The Host shall collect and send all handout material for absent members without proxy;
- Robert's Rules of Order shall be used as a general guide;
- Guest Individual Contributors may receive working copy of the draft standard based on need;
- Chair approval shall be required for distribution of working copies of the draft standard;
- Members shall not Vote against their own non-amended Motion;
- The WG will through the course of normal business, generate confidential documentation applicable to the WG charter. As a result of this business, documentation could be released to the public through approved minutes posted on the ANS 3.5 WEB site. Other information may be released to the public as deemed appropriate by the WG Chair or Vice-Chair. In addition, information may be supplied to non-working group members on a need-to-know basis for the purpose of review and comment.

4.2 Rules Enacted by the Working Group

Missing two consecutive meetings in a row without representation could result in loss of membership on the committee.

5. Tuesday 2011 June 7 (0800)

5.1 Introduction (0830) Dave Kwaitkowski

Welcome to the Westinghouse facility.

5.2 Roll Call

Present:
Chang, SK
Colby, Butch
Florence, Jim
McCullough, George
Tarselli, Frank
Vick, Larry
Welchel, Keith
Felker, Bob
Robert Goldman Proxy – Gary Degraw (River Bend) with voting privilege
David Goodman
Jody Lawter
Mac McDade
Michael Petersen
Pablo Rey
James Sale

Absent:
Koutouzis, Dennis

5.3 Consensus Level

16 - Voting members
15 - Voting members Present
8 - Quorum (Majority Total Membership)
12 - Consensus (75% Membership Attendees)
10 – Super Majority (2/3 Membership Attendees)
8 – Majority (> 50% Membership Attendees)

5.4 Motion (Carried): Crystal River Minutes Approve

Name 2011 June 7 **Motion**: Crystal River Minutes Draft rev 11	Motion: **Carried** • 15 – For • 0 – Against • 0 – Abstained

5.5 Motion (Carried): Agenda Review and Approval

Name 2011 June 7 **Motion**: Agenda as discussed	Motion: **Carried** • 15 – For • 0 – Against • 0 – Abstained

5.6 Business Rules

Roberts Rules of Order

5.7 Members reviewed Rules of the Chair (no change)

5.8 Officers reports

Florence
- PINS Accepted with minor comment
- Crystal River Scope accepted without change.

Welchel
- ONS preliminary agreement with the NRC concerning testing and two simulator

Colby
- The two column document that identifies changes in the ANS-3.5-201x Standard as meetings progress will not be posted for public viewing with the published minutes. The ANS-3.5-2009 Standard (as a part of the two column document) is not to be made available to the public via the working group's two column document.

Chang
- No report

Vick
- No report

Koutouzis (INPO)
- No report

USUG (Florence)
- No report

5.9 NRC (Vick)

NRC Report

On April 11, 2011, the NRC published in the Federal Register (Vol. 75, No. 69, page 20052) its Notice of Issuance and Availability of Revision 4 of Regulatory Guide 1.149, "Nuclear Power Plant Simulation Facilities for Use in Operator Training, License Examinations, and Applicant Experience Requirements."

RG 1.149, Revision 4, describes methods acceptable to the NRC's staff for complying with those portions of the Commission's regulations associated with approval or acceptance of a nuclear power plant simulation facility for use in operator and senior operator training, license examination operating tests, and meeting applicant experience requirements

(e.g., 10 CFR 55.46).

Related further information also referenced in the Federal Register included:

- RG 1.149, Rev 4, (ADAMS # ML110420119)
- DG-1248 (ADAMS # ML100770145)
- Regulatory Analysis (ADAMS # ML110420133)
- Public comments and the NRC responses (ADAMS # ML110420139)

RG 1.149, Rev 4, is a means for the Office of Nuclear Reactor Regulation (NRR) to accept and endorse ANSI/ANS-3.5-2009, "Nuclear Power Plant Simulators for Use in Operator Training and Examination."

A copy of Regulatory Guide 1.149 may be located at http://nrc.gov/reading-rm/doc-collections/reg-guides/power-reactors/rg/division-1/division-1-141.html.

NRC prefers a letter from the utility stating movement to ANS 3.5 2009

5.10 Schedule (Felker)

Presentation of a Microsoft Project schedule that outlines the activities and timelines estimates
Key dates:

- 2014sep04 – 5 yr maintenance activity end
- Three meetings per year
- 2013feb01 – Work need to be completed and the approval process starts

5.11 AI-9 (Felker) Next generation simulators and new builds

Specific points:

- Today's standard does not address new builds

- Malfunctions
- DCS
- Appendices
- Specifics to plant type

Standard should remain as generic as possible regarding requirements
Possibly a new ANS 3.5 standard that addresses new builds and the present standard plays the role of a maintenance standard
Limited present day standard guidance for transients that originate in the BOP
The present standard is really two standards, one for PWR and one for BWR. The new builds may be considered two additional types new build PWR and new build BWR.
Tables in the present standard are problematic in that they are specific and do not cover all bases and thus require the user to take exceptions

Items have been identified where the present standard is silent regarding guidance and testing. The AI-9 team will bring a list to the WG for consideration.

5.12 Presentation (Jack Cross): DCS Stimulation/Simulation/Emulation

A presentation (Attachment 2) and discussion concerning DCS and Stimulation/Simulation/Emulation

- Stimulation – Exact HW based equipment driven by the simulation
  - Lacking simulator specific functionality (Freeze, Run…)
  - Runs the actual SW/Firmware
  - High degree of accuracy
- Simulation – A SW equivalent
  - Includes simulation specific functionality
  - Developed from functional drawings/specs
  - Less detail
  - Requires significant level of validation
- Emulation – A SW equivalent but with significantly high level of detail and exactness
  - Includes simulation specific functionality
  - Less detail than Stimulation but more detail than Simulation
  - Requires significant level of validation

Due to the deployment of simulators within an organization, stimulated components will need to be addressed.

DCS technology exposes more data to the operator. Legacy simulations may need to be upgraded to support accurate data to the operator.

5.13 Recessed: 1630

6. **Wednesday 2011 June 08 (0800)**

6.1 Roll Call

Present:
Chang, SK
Colby, Butch
Florence, Jim
McCullough, George
Tarselli, Frank
Vick, Larry
Welchel, Keith
Felker, Bob
Robert Goldman Proxy – Gary Degraw (River Bend)
David Goodman
Jody Lawter
Mac McDade
Michael Petersen
Pablo Rey
James Sale

Absent:
Koutouzis, Dennis

6.2 Consensus Level

16 - Voting members
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8 – Majority (> 50% Membership Attendees)

6.3 Industry Standard Adoption (Dennis)

A presentation was given detaining the US Utility Industry's ANS-3.5 standard adoption history

Tim: Need USUG URL for the Standards Adoption Excel file

6.4 Presentation: (Tarseli) AI-4 Malfunctions

The presentation below was given:

ACTION ITEM #4 PRESENTATION (TEAM TARSELLI)

TEAM: Tarselli, Vick, Chang, Fraser, and Felker

ACTION: [2009. AI-132] Review Malfunction Testing. Are all list required? What constitutes Malfunction testing is unclear. Better define Malfunction causes.

DISCUSSION: The standard defines the term "malfunctions" as "A simulator feature or capability that provides for instructor-controlled degradation of performance of simulated plant components, equipment, or systems. Override capability is not considered a malfunction."

Section 3.1.4, "Malfunctions," is silent on what constitutes a malfunction from a technical perspective. The section goes on to say that "the response of the simulator shall be compared to actual reference unit response or best estimate unit response, as required by Sec. 4, "Testing Requirements" etc.

Today's full scope nuclear power plant simulators have many preprogrammed malfunctions installed and readily available for use via the instructor's console/station. However, a malfunction's specific cause [as programmed and or modeled] is not often apparent in that a solid technical basis may not exist at all. Instead a simulation model kluged is used to obtain the desired end results for which the expected plant response cannot be substantiated and validated. Hence a reduction in scope and fidelity is intentionally programmed into the simulator creating a potential for "negative training." The standard defines the term "negative training" as "Training on a simulator whose configuration or performance leads the operator to an incorrect response to or understanding of the reference unit."

The purpose of this action item is to consider enhancing the next standard to eliminate the use of kluges when programming reference unit malfunctions into the capability of the simulator. The use of malfunctions based on a sound technical approach and cause will enhance the scope and fidelity of the simulated plant without contributing to negative training.

PROPOSAL: The following is proposed for consideration for the next standard.

Add to Section 3.1.4 a new subsection 3.1.4.1, "Malfunction Causes" to read as follows"

Each malfunction listed in Section 3.1.4 that ~~is programmed and or modeled~~ shall have a valid cause based upon a sound technical basis. A malfunction's technical basis shall ~~may~~ be derived from actual known causes and or specific causes as identified in an electrical wiring diagram, piping and instrumentation diagram, or vendor technical manual or specification data. Malfunctions associated with piping degradation that are variable over the diameter of the pipe do not need a specific cause other than pipe failure (failure location must be specified). All electrical ~~and component~~ malfunctions must have a valid cause. For purposes of scope and fidelity, if another specific cause is used to obtain the same end point it is considered a different malfunction. In cases where malfunctions are more or less global in nature (such as reactor trip, turbine trip, failure of an automatic reactor trip system) specific malfunctions shall be "chained" either in series or in parallel to obtain the desired end point.

Malfunctions that have no technical cause shall be identified and flagged at the instructor's console/station as having the potential for negative training.

Add to Section 4.1.4 a new subsection 4.1.4.1, "Malfunction Causes" to read as follows"

Each malfunction listed in Section 3.1.4 that is programmed and or modeled shall have a valid "cause.

malfunctions: A simulator feature or capability that provides for instructor-controlled degradation of performance of simulated plant components, equipment, or systems. Override capability is not considered a malfunction.

Each malfunction listed in Section 3.1.4 shall have a valid cause based upon a sound technical basis. A malfunction's technical basis shall be derived from actual known causes and or specific causes as identified in an electrical wiring

diagram, piping and instrumentation diagram, or vendor technical manual or specification data. Malfunctions associated with piping degradation that are variable over the diameter of the pipe do not need a specific cause other than pipe failure (failure location must be specified). All electrical malfunctions must have a valid cause. For purposes of scope and fidelity, if another specific cause is used to obtain the same end point it is considered a different malfunction. In cases where malfunctions are more or less global in nature (such as reactor trip, turbine trip, failure of an automatic reactor trip system) specific malfunctions shall be "chained" either in series or in parallel to obtain the desire end point.

Malfunctions that have no technical cause shall be identified and flagged at the instructor's console/station as having the potential for negative training.

Add to Section 4.1.4 a new subsection 4.1.4.1, "Malfunction Causes" to read as follows"

Each malfunction listed in Section 3.1.4 that is programmed and or modeled shall have a valid cause. Malfunction: A simulator feature or capability that provides for instructor-controlled degradation of performance of simulated plant components, equipment, or systems. Override capability is not considered a malfunction.

The discussion initially centered on the new recommendation "Malfunction cause." The Malfunction cause will ensure there is a technical basis for the malfunction. There are cases where malfunctions have no technical basis. This requirement is an effort to remedy.

Malfunctions with no technical basis have the potential for negative-training.

"Malfunction cause" is an enhancement to the standard.

EOPs are symptom based procedures.

A review of the initial AI was discussed. The initial action item was created 2004nov08 Salem Hope Creek. Malfunction testing with regards to SBT was an initial driver for this AI.

Several members recommended closing AI-4.

The chair recommends tabling this AI and additional considerations with respect to the initial AI as defined in the 2004nov08 Salem Hope Creek.

Recommendation to look at AI-132 (e.g. AI-4) and determine if it can be closed and develop a new AI for any enhancements "Malfunction cause"

A straw vote was taken to continue the "Malfunction cause" discussion

6.5 AI-6 (Welchel) Integrated/Non-Integrated Mode testing

Presentation below was given:

AI-6
2009 AI-147
2009 AI-180
Non-fully integrated mode performance testing
Where applicable run performance test off-line

2009 Testing Categories

Test	Integrated Testing Requirements
Verification	No
Validation	No
Operability	Yes
Realtime	Ambiguous
Repeatability	Ambiguous
SBT	Yes
PEST	Yes
Core	Yes

Define: Integrated Mode of Operation:
Does integrated mode require the Instructor Console?

For each test, define what is actually to be gained from the test and does integrated or non-integrated necessarily alter the test results.
Example: Core Performance Testing is made up of two test: 1) Core Physics testing to determine replication and 2) SBT for the Scenario. Question is can CPT Part 1 be completed in a non-integrated-mode and SBT is completed in an integrated mode.

IMO – Integrated Mode Operation NIMO – Non-Integrated Mode Operation Define IMO in general terms: NIMO allowance such that an additional test is required to verify no NIMO significant deviations are present.

To Do…

Develop NIMO language that gives guidance and is not prescriptive
Define IMO and NIMO repeatability requirement or guidance
IMO and NIMO acceptance criteria
Baseline IMO test results for NIMO comparisons

Define simulator scope required for IMO testing:
•Instructor Console
•All panels
•Some panels
•Stimulated Devices
•Output devices
•DCS-Data Highway
•DCS-All Display devices
•DCS-All Panels(I/O)
•DCS-Stimulated Devices

Two acronyms were coined:

- IMO – Integrated Mode Operations
- NIMO – Non-Integrated Mode Operation

Question: How often does one repeat IMO (how long is it good for - if you use NIMO testing methods)

NIMO loses hardware indications picked up in IMO

NIMO may not work with require stimulated controllers

Without panels one may not know that a problem exists.

PEST may be better completed NIMO

Core testing may be better completed NIMO

Efficiency is not necessarily the driver for NIMO testing

6.6 AI-23 (Vick) Initial Conditions

The presentation

ACTION ITEM #23 PRESENTATION (TEAM VICK)

TEAM: Vick, Tarselli, Rey, Sale, Florence, and Chang

ACTION: Evaluate the need for including into Section 3.3.1 a set of IC criteria for ICs that are to be used when conducting the performance testing.

DISCUSSION: The standard defines the term "initial condition" as "A set of data that represents the status of the reference unit from which real time simulation can begin."

Section 3.3.1, "Initial Conditions," is silent on the nature of and type of initial conditions that should be established and used for conducting performance tests required by Section 3.4.3.

The following initial condition sets should be considered for use for all full scope nuclear power plant simulators that meet the scope and fidelity requirements of the standard. The use of a standard set of initial conditions for conducting ANS-3.5 simulator performance testing would enhance the reliability and validity of tests results.

PROPOSAL: The following is proposed for consideration for the next standard.

1. Simulator Initial Conditions

a. *Baseline Initial Condition* (IC-001) – this is an ambient cold shutdown baseline reactor and plant status from which all subsequent initial conditions are derived from. Attributes associated with IC-001 are:

1) Simulated nuclear power plant ready for startup with all support systems operating in normal system configurations based on plant procedure(s) line-up.
2) Ambient temperature(s) established for all atmospheric, oil, gas, and water mediums including river, ponds,

tanks, buildings, heat exchangers, reactor coolant, etc.

3) Ambient wind speed and direction established
4) Plant systems, components, trains, logics, equipment, and valve alignments established including all manual remote controls, valves, electrical buses and breakers, etc.
5) No programmed malfunctions are active nor are there any software overrides active.
6) All alarms and plant process computer points confirmed and validated for plant condition.
7) Reactor is subcritical with all control rods fully inserted with reactor pressure at 0 psig and reactor water level at normal operating band (~~between >low alarm and <high alarm~~); secondary plant ready for systems startup.

b. *Protected Initial Conditions* (IC-001 through IC-0XX) - these are ICs for use in performance testing. All protected ICs have been derived from IC-001 as a result of actual real time operation of the simulated power plant using normal plant operating procedures. The following minimum cut set of protected initial conditions should be strictly controlled in accordance with the simulator's configuration management protocols [simulation load control]:

1) IC-001, Baseline IC is described above with the reactor subcritical with all control rods fully inserted. Core life is beginning of cycle (BOC) and may be initial core loading and or subsequent core loading following a specific refueling outage.
2) IC-002, Identical to IC-001 except that core life is middle of cycle (MOC).
3) IC-003, Identical to IC-001 except that core life is end of cycle (EOC).
4) IC-004, derived from IC-001 (or IC-002 or IC-003) ending with ready-to-withdraw reactor control rods.
5) IC-005, derived from IC-004 ending in approach-to-critical [slightly subcritical].
6) IC-006, derived from IC-005 ending with reactor critical and at the point-of-adding-heat (POAH) [moderator temperature increasing from ambient due to nuclear heating].
7) IC-007, derived from IC-006 ending in ready-to-synchronize main-generator to the grid.
8) IC-008, derived from IC-007 ending at 25 percent reactor thermal power, power ascension in progress (xenon and samarium building in).
9) IC-009, derived from IC-008 ending at 50 percent reactor thermal power, power ascension in progress

(xenon and samarium building in).
10) IC-010, derived from IC-009 ending at 75 percent reactor thermal power, power ascension in progress (xenon and samarium building in).
11) IC-011, derived from IC-010 ending at 100 percent reactor thermal power, steady state with xenon and samarium at equilibrium, no abnormal alarms and or conditions, all systems are operable with no technical specifications limiting conditions for operation.

This is an enhancement to ensure there is a universal set of ICs to complete simulator testing.

Core reload IC are not problematic and are sufficient to show continued assurance

A straw poll was taken asking if new IC language would enhance the standard. About half the members voted to continue this AI.

A question was raised asking what section 3.3.1 Paragraph 2 "A set of initial conditions that support the operator training and examination program shall be identified and administratively controlled" does not cover.

Additional discussions on AI-23 will be continued at a later date.

6.7 AI-4 (Continued) Malfunctions

A history of AI-4 was given:

AI-132 (Wyatt)
Opened discussion on the background of the item and previewed a proposed change to section 4.1.4. Basically, calls for invoking V&V testing of malfunctions specifically when new malfunctions are generated, and subsequently test them via SBT when used for training. Working group to review proposed wording change tonight and be ready for detailed discussion tomorrow.

AI-132(Wyatt) Continued
Continued the discussion on the background of the item and previewed a proposed change to section 4.1.4.
The same criteria multiple times in the standard.
Koutouzis – Modifications and new malfunctions are tested independently, and then tested with SBT before being used in training.
Existing malfunctions are tested via SBT and are not under some sort of continuing testing program.
Proposed new language for 4.1.4. Deletes the criteria list in 4.1.4 and reference instead the criteria in 4.4.3.2, SBT criteria.
Shelly – The language seems to imply that new malfunction must be V&V'd, than SBT'd before being used in training.
Concerns centered around whether or not the new language is new criteria that malfunctions have to be SBT'd before being used in training.
More debate centered on whether or not the draft standard requires that all scenarios must be tested before using used in training. Some members are unsure whether the draft requires (implies) ALL scenarios be tested. The draft standard does not explicitly require that all scenarios be tested prior to use.
Havens – Section 4.4.3.2 implies that SBT be conducted for scenarios before use.
Vick – The new language expands the testing and scope of malfunctions.
Florence – new malfunctions are V&V'd and then put on the shelf. No periodic testing required. Malfunction testing will be covered in SBT.
Dennis – Malfunctions may be required to be tested based on ramifications of other changes and mods.
McCullough – Leave a lone for now. The new language does not cover when and where and opens it up for more ambiguities.
Florence – The next standard revision should address new simulators and simulator maintenance separately.
Wyatt – Summary Not achievable in the current standard. Should be taken up during the next session. No further discussion.
AI-132 will be deferred to the next standard.

The original AI-132 was mainly directed at removing the Malfunction list. The "Malfunction cause" presented is new.

The AI-4 team recommends:

- Keeping the section 3.1.4 malfunction list
- Adding a "Malfunction cause" section

6.8 Motion (Amended in Section 6.9): AI-4 Section 3.1.4 Adding cause requirement

Motion: Append the following language in Section 3.1.4	Motion: **Amended below**
Each malfunction listed in Section 3.1.4 shall have a valid cause based upon a sound technical basis. A malfunction's technical basis shall be derived from actual known causes and or specific causes as identified in an electrical wiring diagram, piping and instrumentation diagram, or vendor technical manual or specification data. Malfunctions associated with piping degradation that are variable over the diameter of the pipe do not need a specific cause other than pipe failure (failure location must be specified). All electrical malfunctions must have a valid cause. For purposes of scope and fidelity, if another specific cause is used to obtain the same end point it is considered a different malfunction. In cases where malfunctions are more or less global in nature (such as reactor trip, turbine trip, failure of an automatic reactor trip system) specific malfunctions shall be "chained" either in series or in parallel to obtain the desire end point.	

Malfunctions that have no technical cause shall be identified and flagged at the instructor's console/station as having the potential for negative training. **Reason:** The Standard is silent on Malfunction causes.	

Several versions adding a malfunction cause requirement for the malfunction list of 25 Section 3.1.4 were crafted.

Discussions centered on making sure the new Malfunction Cause requirement is only for the list of 25 in section 3.1.4 and does intend to add burden for malfunction cause documentation.

6.9 Motion (Carried): AI-4 Section 3.1.4 Adding cause requirement

Amended Motion: Replace the following sentence in Section 3.1.4 The simulator shall include the malfunctions listed as follows: *With* The simulator shall include the malfunctions listed as follows; each malfunction shall have a valid cause based upon a sound technical basis:	Motion: **Carried** • 14 – For • 1 – Against • 0 – Abstained

Reason: • The Standard is silent on Malfunction causes. • Adding a "**cause"** for each listed malfunction enhances the technical aspects of the standard and therefore increases simulator fidelity performance.	

Reasons Against: Present language is adequate.

AI-4 Review

1. Review Malfunction Testing. (Complete)
   In 2004 there was confusion between SBT and crediting malfunction testing. This confusion was resolved by the resolution of the SBT issue.
2. Are all list required?
3. What constitutes Malfunction testing is unclear (Complete)
   In 2004 there was confusion between SBT and crediting malfunction testing. This confusion was resolved by the resolution of the SBT issue.
4. Better define Malfunction causes (Complete)
   The Motion (approved) above to replace the sentence in section 3.1.4 completes this item.

AI-4 remains open pending review of Section 3.1.4 List. The remaining issue is relevance of the Malfunction list in Section 3.1.4 to the 201x standard. Additional consideration is if the malfunction list in section 3.1.4 should remain, be deleted or moved.

6.10 Motion (Withdrawn): Remove Section 3.1.4 Malfunction list and text

2011 June 08 **Motion**: Remove the follow text from Section 3.1.4 (1) loss of coolant: significant pressurized water reactor (PWR) steam generator tube leaks, inside and outside primary containment, large and small loss of coolant accidents (LOCA) demonstrating multiphase flow, and failure of safety and relief valves; (2) loss of instrument air to the extent that the whole system or isolable portions can lose pressure and affect the reference unit's static or dynamic performance; (3) degraded electrical power to the station, including loss of offsite power, loss of emergency power, loss of emergency generators, loss of power to the unit's electrical distribution buses, and loss of power to the individual instrumentation buses (including AC as well as DC) that provide power to control room instrumentation or unit control functions affecting the unit's response; (4) loss of forced core coolant flow due to single or multiple pump failure; (5) loss of condenser vacuum, including loss of condenser level control; (6) loss of service water or cooling to individual components; (7) loss of shutdown cooling; (8) loss of component cooling system or cooling to individual	Motion: **Withdrawn**

components;

(9) loss of normal feedwater or normal feedwater system failure;

(10) loss of all feedwater, both normal and emergency;

(11) loss of a protective system channel;

(12) control rod failure, including stuck rods, uncoupled rods, drifting rods, rod drops, and misaligned rods;

(13) inability to drive control rods;

(14) fuel cladding failure resulting in high activity in reactor coolant or off-gas and the associated high radiation alarms;

(15) turbine trip;

(16) generator trip;

(17) failure in automatic control systems that affect reactivity and core heat removal;

(18) failure of reactor coolant pressure and volume control systems for PWRs;

(19) reactor trip;

(20) main steam line break, as well as main feed line break, both inside and outside containment;

(21) nuclear instrumentation failures;

(22) process instrumentation, alarms, and control system failures;

(23) passive failures of components in systems, such as engineered safety features or emergency feedwater systems; (24) failure of the automatic reactor trip system; (25) reactor pressure control system failure, including turbine bypass failure for boiling water reactors (BWRs). **Reason:**	

Motion withdrawn. The lead in sentence to the section changed by this Motion, was previously considered in an approved Motion earlier in the day's session. This Motion requires modification to the lead in sentence, therefore this Motion was withdrawn.

6.11 Recessed: 1700

7. **Thursday 2011 June 09 (0800)**

7.1 Roll Call

Present:
Chang, SK
Colby, Butch
Florence, Jim
McCullough, George
Tarselli, Frank
Vick, Larry
Welchel, Keith
Felker, Bob
Robert Goldman Proxy – Gary Degraw (River Bend)
David Goodman
Jody Lawter
Mac McDade
Michael Petersen
Pablo Rey
James Sale

Absent:
Koutouzis, Dennis

7.2 Consensus Level

16 - Voting members
15 - Voting members Present
8 - Quorum (Majority Total Membership)
12 - Consensus (75% Membership Attendees)
10 – Super Majority (2/3 Membership Attendees)
8 – Majority (> 50% Membership Attendees)

7.3 AI-8

Presentation was given:

AI #8 Appendix B Steady State Parameters 6/07/2011
Team: Chang, Tarselli, and Felker
Reasons for Action:

1. Sets of steady state parameters in Appendix B and those in the standard body are inconsistent.

2. Some parameters and three transients are not applicable to ESBWR's.

These are Comments made by MANTG, WESTRAN and Mr. Daniel Meekhoff on the 2009 draft Standard. The WG did not accept their comments but made a commitment to create an action item to review with due diligence the list in the body and appendix.

Fact 1:

Regarding the steady state parameters, the sets in the Standard body are subsets in Appendix B (Tables 1 and 2). Two BWR and five PWR parameters are listed in the Appendix but not in the Standard body. ***Control rod drive hydraulic system flow and temperature*** **and** ***secondary plant heat balance data*** are included in Appendix B.2.1 (BWR), but not in Section 4.1.3.1.3 or 4.1.3.1.4 of the Standard body. ***Containment pressure, boron concentration, pressurizer temperature, control rod positions, and secondary plant heat balance data*** are included in Appendix B.3.1 (PWR) but not in Section 4.1.3.1.1 or 4.1.3.1.2 of the Standard body. The Standard body has specific accuracy requirements (1% or 2%) but the Appendix does not.

	B.2 BWR simulator operability test requirements			
	B.2.1 Steady-state test parameters	**Standard Body**	**Section**	
1	core MWt	core MWt	4.1.3.1.3	1% parameter
2	reactor narrow range pressure	reactor narrow range pressure	4.1.3.1.3	1% parameter
3	MWe	MWe	4.1.3.1.4	2%

				parameter
4	reactor wide range pressure	reactor wide range pressure	4.1.3.1.3	1% parameter
5	total core flow	total core flow	4.1.3.1.3	1% parameter
6	average power range monitor readings	average power range monitor readings	4.1.3.1.4	2% parameter
7	feedwater temperature (after last feedwater heating stage)	feedwater temperature (after last feedwater heating stage)	4.1.3.1.4	2% parameter
8	total steam flow	total steam flow	4.1.3.1.4	2% parameter
9	individual recirculation loop flows	individual recirculation loop flows	4.1.3.1.4	2% parameter
10	total feedwater flow	total feedwater flow	4.1.3.1.4	2% parameter
11	turbine steam flow	turbine steam flow	4.1.3.1.4	2% parameter
12	condenser vacuum	condenser vacuum	4.1.3.1.4	2% parameter
13	individual calibrated jet pump flow	individual calibrated jet pump flow	4.1.3.1.4	2% parameter
14	narrow range reactor water level	narrow range reactor water level	4.1.3.1.4	2% parameter

15	control rod drive hydraulic system flow and temperature	N/A			
16	secondary plant heat balance data	N/A			

Table 1 BWR Steady State Parameters Comparison

	B.3 PWR simulator operability test requirements				
	B.3.1 Steady-state test parameters	**Standard Body**	**Section**		**Notes or suggestion**
1	T-average	temperature (T)-average	4.1.3.1.1	1% parameter	
2	T-hot	T-hot	4.1.3.1.1	1% parameter	
3	T-cold	T-cold	4.1.3.1.1	1% parameter	
4	MWe	MWe	4.1.3.1.2	2% parameter	
5	core MWt	core MWt	4.1.3.1.1	1% parameter	
6	power range	power range	4.1.3.	1%	

	instrumentation readings	nuclear instrumentation readings	1.1	parameter		
7	reactor coolant system pressure	reactor coolant system pressure	4.1.3.1.1	1% parameter		
8	steam generator pressure	steam generator pressure	4.1.3.1.1	1% parameter		
9	pressurizer level	pressurizer level	4.1.3.1.1	1% parameter		
10	steam generator feed flow	steam generator feed flow	4.1.3.1.2	2% parameter		
11	reactor coolant system flow	reactor coolant system flow	4.1.3.1.2	2% parameter		
12	containment pressure	N/A				
13	steam generator level	steam generator level	4.1.3.1.2	2% parameter		
14	letdown flow	letdown flow	4.1.3.1.2	2% parameter		
15	charging flow	charging flow	4.1.3.1.2	2% parameter		
16	steam flow	steam flow	4.1.3.1.2	2% parameter		
17	turbine first stage	turbine first stage	4.1.3.1.2	2% paramet		

	pressure	pressure		er	
18	boron concentration	N/A			
19	pressurizer temperature	N/A			
20	control rod positions	N/A			
21	secondary plant heat balance data	N/A			

Table 2 PWR Steady State Parameters Comparison

Discussion 1:
Appendices are not part of the Standard. They are included in the publication for information purposes only. No change is required. However, the users often use both the standard body and the appendices to conduct simulator testing and documentation. For the purpose of clarity and consistency it may be better to unify the list and put the list in the standard body only.

Possible Resolution 1:

a. In Appendix B.2.1 replace the list of parameters with "Refer to Sections 4.1.3.1.3 and 4.1.3.1.4 for the set of parameters."

b. In Appendix B.3.1 replace the list of parameters with "Refer to Sections 4.1.3.1.1 and 4.1.3.1.2 for the set of parameters."

c. In Appendix B.1.1 replace the 2nd last sentence "The set of parameters to be monitored is identified in Secs B.2 and B.3." with ""The set of parameters to be monitored is identified in Sections 4.1.3.1.3 and 4.1.3.1.4 for BWR's and 4.1.3.1.1 and 4.1.3.1.2 for PWR's."

Or

a. Delete Sections B.2.1 and B.3.1; renumber B.2.x and B.3.x.
b. Same as item c above.

Or

No change

Fact 2:
There are two minor inconsistencies in naming parameters between the Appendix and the standard body (Table 2). "Power range instrumentation readings" is used in Appendix B.3.1 (PWR) whereas "power range nuclear instrumentation readings" is used in Section 4.1.3.1.1. "T-average" is listed in Appendix B.3.1 (PWR) whereas "temperature (T)-average" is listed in Section 4.1.3.1.1.
Discussion 2:
These minor differences are unlikely to cause any misunderstandings, though some people may interpret instrumentation as any instrumentation. For purpose of clarity, the WG should specify "power range nuclear instrumentation readings". Mute issue if B.3.1 is deleted or the set of parameters in B.3.1 is delisted.
Possible resolution 2:
Adopt "power range nuclear instrumentation readings" to specifically identify NI instrumentation; and adopt "T-average", consistent with other RCS temperature terminologies such as T-hot.

Fact 3:
BWR parameters ***individual recirculation loop flows*** (Section 4.1.3.1.4, B.2.1), ***individual calibrated jet pump flow*** (Section 4.1.3.1.4, B.2.1), and ***total low pressure core spray flow*** (B.2.2.4 BWR transient, see Table 3) are not applicable to ESBWR's.
Discussion 3:
There are no recirculation pumps, jet pumps or core spray pumps in ESBWR's.
Possible resolution 3:
In Section 4.1.3.1.3 replace the 1st sentence "It shall be demonstrated that the following BWR parameters match reference unit data within 1% of the reference unit instrument loop range:" with "It shall be demonstrated that the following BWR parameters, if applicable to the design of the reference unit, match reference unit data within 1% of the reference unit instrument loop range:"
In Section 4.1.3.1.4 replace the 1st sentence "It shall be demonstrated that the following BWR parameters match reference unit data within 2% of the reference unit instrument loop range:" with "It shall be demonstrated that the following BWR parameters, if applicable to the design of the reference unit, match reference unit data within 2% of the reference unit instrument loop range:"
In B.2.2.4, 2nd last bullet: replace "total low pressure core spray flow" with "total low pressure core spray flow, if applicable to the design of the reference unit".
Fact 4:
Three BWR transients involving recirculation pumps are not applicable to ESBWR's (Table 3):

(4) simultaneous trip of all recirculation pumps; (B.2.2.1)

(5) single recirculation pump trip; (B.2.2.1)

(7) maximum rate power ramp (master recirculation flow controller in "manual") down to ~75% and back up to 100%;(B.2.2.1)

	B.2.2.1 (BWR transient performance test)		**Notes**
	(4) simultaneous trip of all recirculation pumps;		No recirculation pumps in ESBWR's
	(5) single recirculation pump trip		ditto
	(7) maximum rate power ramp (master recirculation flow controller in "manual") down to ~75% and back up to 100%;		ditto
	B.2.2.4 (BWR transient performance test parameters)		
	total low pressure core spray flow		Not applicable to ESBWR's

Table 3 BWR Transients and Parameters

Discussion 4:
There are no recirculation pumps in ESBWR's. These transients do not apply. There are no core spray pumps and therefore no core spray flows.

Possible resolution 4:

1. Append ", if applicable" to each of the above three transients and parameter "total low pressure core spray flow". OR
2. Modify B2.2.1 and B.3.2.1 to read

   Run the following set of transients, if applicable to the design of the reference unit, from an initial condition of ~100% power, steady-state xenon and decay heat, with no operator follow-up action unless otherwise noted:

Side notes:

There are other types of new reactors that may enter the U. S. commercial market in the near future. NuScale is an integral pressurized-water reactor (iPWR). mPower by B&W is also an iPWR. NGNP (Next Generation Nuclear Plant) is a gas-cooled reactor. These types of reactors may derail the set of parameters defined in the Standard.

During the 1993 standard development, an EPRI survey was conducted across the US utility simulator industry requesting their list of critical parameters. Additionally, tests were conducted to determine operator tolerance to determine when the operator considered the parameter changed enough that action should be taken.

The main influence of 1993 EPRI study data was to determine the tolerance list.

There was a lengthy discussion whether to add motherhood requirement statements or to add individual requirements that acknowledge the possible differences with new design reactors.

7.4 Motion (Carried): Section 4.1.3.1.1 T-average Editorial change

2011 June 09 **Motion**: In section 4.1.3.1.1 change “temperature (T)-average” to “T-average” **Reason:** Editorial change and consistency with T-hot and T-cold	Motion: **Carried** • 12 – For • 2 – Against • 1 – Abstained

Reasons Against: Unnecessary change and leads to a lack of understanding for those unfamiliar with the standard.

Reason Abstained: Unnecessary change

7.5 Motion: Appendix B Steady State List Removal

2011 June 09 **Motion**: In Appendix B.2.1 replace the list of parameters with "Refer to Sections 4.1.3.1.3 and 4.1.3.1.4 for the set of parameters." In Appendix B.3.1 replace the list of parameters with "Refer to Sections 4.1.3.1.1 and 4.1.3.1.2 for the set of parameters." In Appendix B.1.1 replace the 2nd last sentence "The set of parameters to be monitored is identified in Secs B.2 and B.3." with ""The set of parameters to be monitored is identified in Sections 4.1.3.1.3 and 4.1.3.1.4 for BWR's and 4.1.3.1.1 and 4.1.3.1.2 for PWR's." **Reason:** To make Appendix B more consistent with the standard body regarding the Steady State parameters list. Response to public comment (MANTG, WESTRAIN) on the 2009 draft Standard. The WG agreed to consider their comments during the next revision. Two BWR parameters and five PWR parameters that are in Appendix B Steady State lists should be considered at a later time to inclusion into the standard body list. New AI-25	Motion: **Withdrawn**

BWR: • control rod drive hydraulic system flow and temperature • secondary plant heat balance data PWR: • containment pressure • boron concentration • pressurizer temperature • control rod positions • secondary plant heat balance data	

7.6 AI-25 Appendix B Steady State List parameter review (AI-8)

The following Appendix B Steady State parameters were considered in AI-8.

BWR

- control rod drive hydraulic system flow and temperature
- secondary plant heat balance data

PWR

- containment pressure
- boron concentration
- pressurizer temperature
- control rod positions
- secondary plant heat balance

These parameters should be reviewed for inclusion into the standard body Steady State parameter list.

7.7 Amended Motion (Not Carried): AI- 8 Appendix B Steady State List Removal

2011 June 09 **Amended Motion**: In Appendix B.2.1 replace the list of parameters with "Refer to Sections 4.1.3.1.3 and 4.1.3.1.4 for the set of parameters to be monitored." In Appendix B.3.1 replace the list of parameters with "Refer to Sections 4.1.3.1.1 and 4.1.3.1.2 for the set of parameters to be monitored." In Appendix B.1.1 delete the sentence "The set of parameters to be monitored is identified in Secs B.2 and B.3." **Reason:** To make Appendix B more consistent with the standard body regarding the Steady State parameters list. Response to public comment (MANTG, WESTRAIN) on the 2009 draft Standard. The WG agreed to consider their comments during the next revision. This Motion deletes two BWR parameters and five PWR parameters that are in Appendix B Steady State lists that will be considered at a later time for inclusion into the standard body list. New AI-25	Motion: **Not Carried** • 11 – For • 4 – Against • 0 – Abstained

BWR: • control rod drive hydraulic system flow and temperature • secondary plant heat balance data PWR: • containment pressure • boron concentration • pressurizer temperature • control rod positions • secondary plant heat balance data	

Reasons Against:

- Prefer to have matched list in Appendix B
- Current Appendix is sufficient
- Current structure is sufficient allowing user to use the standard

AI-8 is closed.

7.8 AI-5 Minimum Periodicity testing

Presentation below was given:

Action Item #5 – Minimum Testing Periodicity
Discussion

The existing and previous editions of the standard did not provide full testing periodicity guidance. This was emphasized by the request for clarification submitted by Ed Chrzanowski from Calvert Cliffs and addressed by the working group during our May 2006 Meeting at Dominion. The issue was further identified in the public comments to the proposed 2009 standard.

Specifically:

1. Malfunction testing periodicity was not defined by the standard as called out in MANTG Comment # 15, WESTRAIN #40.

2. The periodicity of Section 4.2.1.1. Scope of Panel Simulation, Section 4.2.1.2 Instrumentation, Controls, Markings, and Operator Aids, and Section 4.2.1.3 Control Room Environment comparisons are not defined by the standard as called out by comments Howell # 4, MANTG # 16A, WESTRAIN # 41A, MANTG # 17A, WESTRAIN # 42A, MANTG # 18A, WESTRAIN # 43A.

3. Instructor Station Capabilities testing periodicity was not defined in the standard as called out by WESTRAIN # 20C.

Further discussion and votes during the October 2008 standard public comments resolution meeting showed that several members of the working group felt that recommended testing periodicity should be provided for all standard requirements. By virtue of the voting during that timeframe, it was felt that the addition to the standard body would constitute a substantive change. While the addition of an appendix was considered, the motion was narrowly defeated.

Minimum Periodicity for Section 4. Testing Requirements

Section	Title	Periodicity Description
4.1.1	Real Time and Repeatability	Real Time and Repeatability tests shall be conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) whenever models are changed or modified in a way that potentially affects real time or repeatability;
4.1.2	Limits of Simulation	A Limits of Simulation test shall be conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) whenever models are changed or modified in a way that potentially affects Limits of Simulation; (3) whenever there are changes or modifications to Limits of Simulation software coding
4.1.3.1	Steady-State Operation	Steady-State Operation tests shall be conducted prior to the simulator's use in training and examination for the following

			situations: (1) completion of simulator initial construction; (2) once per reference unit fuel cycle .
	4.1.3.2	Normal Evolutions	Normal Evolutions tests shall be conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) once per reference unit fuel cycle
	4.1.4	Malfunctions	Malfunction tests shall be conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) upon initial implementation of a malfunction; (3) whenever there are changes or modifications to implemented malfunctions
	4.2.1	Physical Fidelity and Human Factors	Physical Fidelity and Human Factors comparisons shall be

			conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) completion of modification of panels, consoles or operating stations; (3) completion of modification of instrumentation, controls, markings or operator aids; (4) completion of modification of control room environment
	4.3	Simulator Instructor Station Capabilities	Demonstration of Instructor Station Capabilities shall be conducted prior to the simulator's use in training and examination for the following situations: (1) completion of simulator initial construction; (2) initial implementation of a simulator instructor station capability; (3) modification of an instructor station capability
	4.4.1	Simulator Verification Testing	It shall be demonstrated that simulator verification testing is performed as part of the initial

			structured software design and development process, and when changes or modifications are made to any of the following: • Computer platforms • Operating systems and run-time utilities • Interface systems • Instructor stations • Models	
	4.4.2	Simulator Validation Testing	Validation tests shall be conducted prior to the simulator's use in training and examination for the following situations: (1) Completion of simulator initial construction; (2) Whenever models are changed or modified in a way that potentially affects fidelity relative to the reference unit; and (3) Whenever there are changes that have the potential to affect simulator capabilities or repeatability, including changes to computer	

			platforms, operating systems and run-time utilities, interface systems, or instructor stations.
	4.4.3.1	Simulator Operability Testing	A simulator operability test shall be conducted once per reference unit fuel cycle by testing the following: (1) Simulator steady-state performance; and (2) Simulator transient performance for a benchmark set of transients
	3.4.3.2	Simulator Scenario-Based Testing	Scenario-based testing shall be conducted for (1) NRC Initial License Examination scenarios; (2) Licensed Operator Requalification annual examination scenarios; (3) scenarios used for reactivity control manipulation experience.
	4.4.3.3	Simulator reactor core performance testing	Simulator reactor core performance testing shall be

		conducted each reference unit fuel cycle.
4.4.3.4	Post-event simulator testing	Post-event simulator testing should be conducted when a reference unit event generates relevant data for evaluating simulator performance.

Listed below are proposed changes to the standard:

Section 4.1.1 Real Time and Repeatability

Real Time and Repeatability tests shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) whenever models are changed or modified in a way that potentially affects real time or repeatability;

Section 4.1.2 Limits of Simulation

A Limits of Simulation test shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) whenever models are changed or modified in a way that potentially affects Limits of Simulation;

(3) whenever there are changes or modifications to Limits of Simulation software coding

Section 4.1.3.1 Steady State Operation

Steady-State Operation tests shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) once per reference unit fuel cycle

Section 4.1.3.2 Normal Evolutions

Normal Evolutions tests shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) once per reference unit fuel cycle

Section 4.1.4 Malfunctions

Malfunction tests shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) upon initial implementation of a malfunction;

(3) whenever there are changes or modifications to implemented malfunctions

Section 4.2.1 Physical Fidelity and Human Factors

Physical Fidelity and Human Factors comparisons shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) completion of modification of panels, consoles or operating stations;

(3) completion of modification of instrumentation, controls, markings or operator aids;

(4) completion of modification of control room environment

Section 4.3 Simulator Instructor Station Capabilities

Demonstration of Instructor Station Capabilities shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) initial implementation of a simulator instructor station capability;

(3) modification of an instructor station capability

Potential Conflicts with proposed periodicity requirements:

Section 4.4.2 Simulator Validation Testing

It shall be demonstrated that simulator validation testing is performed by comparison of simulator model results to actual or predicted reference unit data as defined by Sec. 3, “General Requirements.” Sec. 4, “Testing Requirements,” provides the criteria to ensure these requirements are met. Simulator validation testing may be conducted in a fully integrated, partially integrated, or stand-alone mode of system operation. Each simulation support organization shall ensure that the validation test documentation is generated. The order of preference for data comparison shall be as stated in Sec. 5.1.1. A record of the conduct of this test, the test's results, and the test's evaluation shall be maintained.

Validation tests shall be conducted prior to the simulator's use in training and examination for the following situations:

(1) completion of simulator initial construction;

(2) whenever models are changed or modified in a way that potentially affects fidelity relative to the reference unit;

(3) whenever there are changes that have the potential to affect simulator capabilities or repeatability, including changes to computer platforms, operating systems and run-time utilities, interface systems, or instructor stations.

In Section 3.1.3.2 - Normal Evolutions, items 1 through 4 define Normal Evolutions

7.9 Motion: (McCullough) AI-5 Normal Evolutions

Name 2011 June09 **Motion**: As the lead in to section 4.1.3.2 insert the following paragraph: **Normal evolutions shall be conducted upon completion of simulator initial construction and once per reference unit fuel cycle.** The performance of procedures… **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Amended** • x – For • x – Against • x – Abstained

7.10 Amended Motion (Carried): (McCullough) AI-5 Normal Evolutions

Name 2011 June09 **Amended Motion**: As the lead in to section 4.1.3.2 insert the following paragraph: **Normal evolutions shall be conducted upon completion of simulator initial construction and once per reference unit fuel cycle.** The performance of procedures… **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Carried** • 14 – For • 1 – Against

Reasons Against: Periodicity cannot be assigned to a scope that is not well defined in regards to bullet 4 (surveillance testing) in Section 3.1.3.2

7.11 Motion: (McCullough) AI-5 malfunction testing periodicity

Name 2011 June 09 **Motion**: As the lead in to section 4.1.4 insert the following paragraph: **A malfunction test shall be conducted upon initial implementation or modification of a malfunction.** It shall be demonstrated that simulator… **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Amended**

7.12 Amended Motion (Carried): (McCullough) AI-5 malfunction testing periodicity

Name 2011 June 09 **Amended Motion**: As the lead in to section 4.1.4 insert the following paragraph: **A malfunction test shall be conducted:** **(1) upon initial implementation of a malfunction;** **(2) whenever there is a change or modification to a malfunction.** It shall be demonstrated that simulator… **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Carried** • 14 – For • 1 – Against

Reasons Against: Wording expands the scope and may introduce addition interpretations.

Bullet one does not require testing for already implemented malfunctions.

7.13 Recessed: 1805

8. **Friday 2011 June 10 (0800)**

8.1 Roll Call

Present:
Chang, SK
Colby, Butch
Florence, Jim
McCullough, George
Tarselli, Frank
Vick, Larry
Welchel, Keith
Felker, Bob
Robert Goldman Proxy – Gary Degraw (River Bend)
David Goodman
Jody Lawter
Mac McDade
Michael Petersen
Pablo Rey
James Sale

Absent:
Koutouzis, Dennis

8.2 Consensus Level

16 - Voting members
15 - Voting members Present
8 - Quorum (Majority Total Membership)
12 - Consensus (75% Membership Attendees)
10 – Super Majority (2/3 Membership Attendees)
8 – Majority (> 50% Membership Attendees)

8.3 Motion (Carried): (McCullough) AI-5 Physical fidelity and human factors periodicity

Physical fidelity and human factors discussion:

Name 2011 June 10 **Motion**: Add paragraph to section 4.2.1: 4.2.1 Physical fidelity and human factors **A comparison shall be conducted to identify noticeable differences:** **(1) upon completion of simulator initial construction;** **(2) once every four years** 4.2.1.1 Scope of panel simulation **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Carried** • 13 – For • 2 – Against

Reasons Against: Unnecessary and human factors periodicity does not apply. This is a new requirement and difference should be caught with other testing

8.4 Motion (Carried): (McCullough) AI-5 Instructor Station testing periodicity

Instructor Station testing discussion:

Name 2011 June 10 **Motion**: Add paragraph to section 4.3: 4.3 Simulator instructor station capabilities **An instructor station test shall be conducted:** **(1) upon initial implementation of a simulator instructor station capability;** **(2) whenever there is a change or modification of an instructor station capability** 4.3.1 Initial conditions **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Carried** • 13 – For • 2 – Against

Reasons Against: Unnecessary, instructor station periodicity does not apply. "Capability" should be added to the lead in sentence "An instructor station **capability** test shall be conducted"

8.5 Motion (Carried): (McCullough) AI-5 Limits of Simulation notification testing periodicity

Name 2011 June 10 **Motion**: As the lead in to section 4.1.2 insert the following paragraph: 4.1.2 Limits of simulation **A limits of simulation notification test shall be conducted:** **(1) upon initial implementation of limits of simulation;** **(2) whenever there is a change or modification to the limits of simulation** It shall be demonstrated that the limits of simulation **Reason:** Testing periodicity industry comment in the 2009 brought forward to this standard. Additionally this item was an identified item during the development of the 2009 standard.	Motion: **Carried** • 14 – For • 1 – Against

Reasons Against: Unnecessary, limits of simulation periodicity does not apply

8.6 AI-26 (New): Parliamentary Inquiry to reconsider Motion voting requirements

Review and recommend modifications to the Rule of the Chair related to **quorum in session.**

Interim Voting (Motions – Substantive Changes) shall be by Consensus (75% [rounded up] of **quorum in session**);

Rule of the Chair for the remainder of the meeting:

Interim Voting (Motions – Substantive Changes) shall be by Consensus (75% [rounded up] of voting membership present);

8.7 AI-27 (New): Define Substantive Change Motion Carried threshold

Define Substantive Change with regards to Motion "Carried" threshold.

Received from Pat Schroeder Friday during the meeting:

The definition of substantive change is defined by the American National Standards Institute in their Essential Requirements; the definition is found in Annex-A on page 24:

Substantive Change: A substantive change in a proposed American National Standard is one that directly and materially affects the use of the standard. Examples of substantive changes are below:

- "shall" to "should" or "should" to "shall";
- addition, deletion or revision of requirements, regardless of the number of changes;
- Addition of mandatory compliance with referenced standards.

8.8 AI-10 Motion (Tabled): (McCullough) Realtime and Repeatability tests periodicity

Discussions centered on measuring Realtime (how and when). Test once or when all tests are run.

The Realtime and Repeatability discussion was tabled.

8.9 AI-21 (McCullough) Device derived from the Simulation Load

AI-21 basis and discussion is that other devices are used in training programs.

Working group member's discussion generated list of other simulation device types and uses:

Types of other simulation devices:

- Classroom Simulator
- Part Task Trainers (PTT)
- EP Stand alone simulator for Scenario development
- Test-bed/ Training Device
- DCS validation/verification
- Simulator in the Control Room
- Process visualization Simulator
- Refueling Core Training Simulator
- Virtual Simulation

Uses of other simulation devices (Red - considered within the scope of the standard):

- LOR/ILT Training
- LOR/ILT Scenario Training Development
- NRC Exam development
- JPM training and development
- ILT Plant system familiarization
- Control room familiarization
- Control Room JIT
- Software development
- Stand-alone simulator testing
- EP Scenario Development
- DCS verification testing
- Engineering design modifications

- Plant modification
- Simulation assisted engineering
- PRA
- Procedure development and checkout
- NEO control familiarization
- Maintenance technical training
- Eng Support Programs
- Human Factors Engineering

The WG had a lengthy discussion of many of the other uses of the Full Scope Simulator SW and several observations and questions developed:

- Are standard changes needed to address the other uses of the simulator?
- Other devices derived from the full scope simulation software have little to no pedigree
- Do devices crafted from the full scope simulator need some level of pedigree dependent on the specific intended use
- Should Appendix D be brought into the standard body to address these "Other Devices"
- Devices today fall short of meeting US NRC regulatory requirements

AI-21 is Closed

8.10 AI-28 (New): (Felker) Review terms: If Available - As applicable Usage

Review and report to the WG the usage of the terms: **If available** versus **As applicable**.

Assignment: Felker, Chang, Sale

8.11 AI-29 (New): (Rey) Review and report Normal Evolution Surveillance testing applicability

Review the scope of testing in section 4.1.3.2 “Normal Evolutions” as applicable per scope defined in 3.1.3.2. It seems that the scope of “Normal Evolutions” defined in 3.1.3.2, is interpreted in different way by different simulator staff, especially regarding the surveillance tests. If the interpretation is done in the more extensive way, it makes no sense to test all the normal evolutions once per fuel cycle. It should be clarified what Normal Evolutions shall be tested with the frequency established in 4.1.3.2.Assignment: Rey, Tarselli

8.12 AI-30 (New): (Sale) Review Appendix B Steady State for possible deletion

Review Appendix B Steady State section for deletion.

Assignment: Sale

8.13 AI-31 (New): (Petersen) Review lists nomenclature for consistency

Review list nomenclature for consistency

Assignment: Petersen

8.14 Next Meeting

Date: 2011 Nov 14-18
Sponsor: Summer Nuclear Station
Location: Chapin, SC

8.15 Adjourned: 1400

9. Attachment 1 - Style Guide Review (SK Change)

201x Standard - Style Guide

1. **ANSI Style Guide-sheet – 2003**

   Available at http://www.ansi.org/

   A. General guide-lines
   - **Heavy emphasis on technical integrity (accurate, complete, consistent), a spelling error would only be a minor issue.**
   - **Consistency throughout the document: format, capitalization, etc..**

   B. Strong recommendations:
   - **No requirements in foreword, scope, background, definitions, footnotes.**
   - **Use of "shall" to indicate a requirement; use "should" to indicate a recommendation. Avoid use of "must".**
   - **References: full and complete. Annex is a preferred term to Appendix.**
   - **Number the footnotes sequentially.**

   C. Completeness and consistency of document:
   Pagination, indentation, punctuation, numbering of sections, footnotes, etc.: follow 2009 Standard.

2. **ANSI Style manual, 8th edition, version 1.0, 3/1/91. [historical]**

   http://www.new.ans.org/standards/resources/downloads/docs/ansi-stylemanual.pdf

This has been replaced by the 2003 guide, but ANS keeps it for reference.

3. ANS NFSC Policy and Procedures Manual

http://www.ans.org/standards/resources/downloads/docs/nfscpolicies.pdf
Section 7.3 Specifying Requirements in a Standard (Shall, Should, and May) (approved Jan 2010).
Directions given in the standard shall use "shall", "should", and "may":
Shall, to designate a mandatory action.
Should, to delineate a recommended action. "Should also indicates that the issue must be addressed and that either the recommended action shall be taken or an equivalent action shall be taken and a basis given for equivalency. "
May, to designate a permissive action.
Avoid "shall consider", "shall, if possible" and equivalent phrases
Note: Three occurrences of "shall consider" or equivalent are found in the 2009 Standard. These may deviate from NFSC rules.

Section 3.2.1.2, end of 1st paragraph: "The following items shall be considered:"

Section 3.2.1.3, end of 1st paragraph: "The following items shall be considered:"

Section 4.4.3.2, end of 4th paragraph: "Evaluation of the test data shall consider:"

Section 7.4 Use of units SI units shall be used either parenthetically with English units or SI units exclusively (approved Nov 2004).

It refers to the NBS publication concerning SI units:

NBS Special Publication 330, "The International System of Units (SI)," U.S. Department of Commerce, 1977.

The current version is "NIST Special Publication 330. 2008 Edition; U.S. Department of Commerce, National Institute of Standards and Technology" available at

http://physics.nist.gov/Pubs/SP330/sp330.pdf

The 2008 edition has no impact on the SI units used in Appendix C of the Standard:
MPa and °C

4. **Other References:**

Google dictionary: http://www.google.com/dictionary
Merriam-Webster: http://www.merriam-webster.com/

The Chicago Manual of Style. Chicago: University of Chicago.

Webster's New International Dictionary of the English Language (Unabridged). Springfield, MA: Merriam-Webster, Inc.

10. **Attachment 2 – (Jack Cross) DCS Presentation**

Jack Cross, Westinghouse
Manager
Simulator Upgrades

DCS Components
- Control Logic
- HMI
- Communication Busses
- DCS Platform

Implementation Strategies
- Stimulation
- Simulation
- Emulation
- Hybrid

Stimulation
- Makes used of identical or very similar equipment
- Requires plant DCS data
- DCS Vendor simulator support needed to be effective
- Large hardware footprint may limit deployment on other simulator instances
- Virtual stimulation is a variant

Simulation
- Decouples DCS functionality from plant implementation
- Typically a functional simulation relying on functional drawings
- Allows simulator functionality to be imposed

- Requires extensive testing to verify equivalency

Emulation

- DCS modeled with third party tools or translated via a code generator
- DCS components are individually modeled to improve accuracy of simulation and provide accurate, flexible malfunction capability
- Requires plant DCS data
- Allows simulator functionality to be imposed
- Requires extensive testing to verify equivalency

Hybrid

- Combination of Stimulation and Simulation/Emulation
- Allows “Best of Both Worlds” approach
- Requires plant DCS data
- Westinghouse approach: HMI Stimulated, Control Logic Emulated

Simulator System (cont.)

- Ovation Controllers will be simulated on the Model Computer
- Ovation Control Builder code will be created using Westinghouse’s translation tool. The generated code will be integrated into the Model Computer.
- Simulation software is layered on top of the Ovation applications to provide simulator functionality (Run/Freeze, IC/Backtrack, Time Control, Malfunctions, etc.)
- Sample Simulator System Architecture

DCS Simulation Issues

- Control room fidelity – ANSI/ANS 3.5 – Soft controls replace hard controls, simulator implementation needs to exactly match plant
- Modern DCS’s are complex to accommodate validation, redundancy, better control over larger operation range
- DCS makes use of inherent platform features – not always well documented on functional block

diagrams
- Operating Plant Upgrade Issues
- DCS technology exposes more plant data to the operator. Older simulator models may need to be updated to provide accurate data
- Need to integrate into existing simulator platform. All major platforms have proven capable of hosting DCS upgrades
- Some utilities deploy many instances of the simulator. Need a solution to address stimulated components
- Classroom Simulator
- Controller software will be simulated in the Model Computer
- Ovation graphics are emulated to allow for display and control in a non-Ovation environment