

May 12, 2004

MEMORANDUM TO: Catherine Haney, Director
Policy and Rulemaking Program
Division of Regulatory Improvement Programs, NRR

FROM: Peter C. Wen, Project Manager /RA/
Policy and Rulemaking Program
Division of Regulatory Improvement Programs, NRR

SUBJECT: SUMMARY OF APRIL 7, 2004, MEETING WITH INDUSTRY FOCUS
GROUP REGARDING OPERATOR LICENSING ISSUES

On April 7, 2004, the NRC staff held a public meeting with the industry focus group (FG) on operator licensing to discuss Draft Revision 9 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and other operator licensing issues. Attachment 1 lists the attendees at the meeting.

This was the latest in a series of public meetings intended to promote the efficient, effective, and consistent preparation and administration of initial operator licensing examinations. The primary purpose of the meeting was to review the NRC staff's proposed response to public comments on Draft Revision 9 of NUREG-1021, which was issued in January 2003. The meeting also followed up on the status of outstanding issues that had been raised during prior meetings. Attachment 2 is the agenda for the meeting; the discussion topics are summarized in Attachment 3; Attachment 4 summarizes the results of the operator licensing examinations administered using Draft Revision 9 through March 2004; Attachment 5 summarizes a simulator testing presentation made by an industry representative; and Attachment 6 summarizes a staff post-meeting response to the industry's presentation.

Representatives of the NRC and the industry agreed that this meeting was useful for the exchange of information on this subject.

Project No. 689
Attachments: As stated
cc w/atts: See list

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Project No. 689

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List of Attendees - NRC / NEI Focus Group Meeting - April 7, 2004

Name	Organization
Bruce Boger	NRC / HQ
William Beckner	NRC / HQ
Dave Trimble	NRC / HQ
Fred Guenther	NRC / HQ
John Munro	NRC / HQ
Richard Conte*	NRC / RI
Lee Miller*	NRC / RII
Roger Lanksbury*	NRC / RIII
Tony Gody*	NRC / RIV
Fred Riedel	Arizona Public Service (Palo Verde)
Chuck Sizemore	NMC (Point Beach)
Gregg Ludlam	Progress Energy / CP&L
Charles Sawyer	Duke Power (McGuire)
Robert Evans	Nuclear Energy Institute
Scott Halverson	Callaway
Kerry Wright	Florida Power & Light (Seabrook)
Pat Wiley	Arizona Public Service (Palo Verde)
Dan Sealock	Cooper Nuclear Station
William Gilbert	Cooper Nuclear Station
Joe Waid*	Cooper Nuclear Station
Jerry Roberts*	Cooper Nuclear Station
Carey Fleming*	Winston and Strawn, LLP
* Participated via telephone bridge.	

AGENDA FOR PUBLIC MEETING WITH INDUSTRY FOCUS GROUP (FG)
ON OPERATOR LICENSING ISSUES

April 7, 2004; 9:00 a.m. - 12:00 noon
One White Flint North, Room 13B4
11555 Rockville Pike, Rockville, MD 20852

<u>TOPIC</u>	<u>LEAD</u>
● Introductions and Opening Remarks	NRC/FG
● Public Input	Public
● Results of Draft Revision 9 Examinations (see Attachment 4)	NRC
● Comments on Draft Revision 9 of NUREG-1021 - Most comments fully adopted - Selected comments partially adopted (Refer to Items 14, 42, 51, 103, and 105 in Meeting Notice Attachment ML040780610) - Some comments noted but not adopted (Refer to Items 9, 22, 41, 44, 59, 71, and 96 in Meeting Notice Attachment) - Additional changes and clarifications (Refer to Items 6, 10, 11, 82, 92, 94, 98 - 101, and 112 in Meeting Notice Attachment; instant SROs who pass overall but fail SRO-only)	NRC/FG
● Other Issues - Requalification inspection issues (Medical examinations; significance determination process; repeating items on the operating tests; proficiency and testing for SROs who normally work as ROs; reactivation hours in the control room; examination grading reviews; comprehensive exam timing) - Simulator testing - Knowledge and Ability (K/A) catalog project - Fatigue rule update	NRC
● Focus Group Issues	FG
● Public Questions and Answers	Public
● Summary / Conclusion / Action Item Review	NRC/FG

Operator Licensing Meeting With Industry Focus Group (FG) on April 7, 2004 Discussion Summary

Results of Draft Revision 9 Examinations

The NRC staff briefly reviewed the results (summarized on Attachment 4) of the 28 examinations completed, to date, using Draft Revision 9 of NUREG-1021, "Operator Licensing Examination Standards for Power Reactors." The FG did not voice any significant questions or concerns regarding the examination results.

Comments on Draft Revision 9 of NUREG-1021

The NRC staff's primary goals for the meeting were to review its proposed responses to the public comments submitted in connection with Draft Revision 9 of NUREG-1021 and to apprise the FG of additional changes that were being considered based on internal comments collected during the trial period. To assist members of the public in preparing for this meeting, the NRC staff had summarized all of the comments and proposed responses in an attachment to the public meeting notice (ML040780610); the item numbers referenced on the agenda and in the following discussions correspond with those in the comment summary.

Before addressing the comments and proposed changes, the NRC staff briefly outlined the milestones for publishing Final Revision 9 of NUREG-1021 (including final comment resolution, management approval, and issuing a *Federal Register* notice (FRN)) and predicted that, barring any unforeseen delays, it could be available sometime in May. The staff noted that, consistent with past practice, Revision 9 would become effective for all examinations administered six or more months after the FRN announcing its publication and that licensees could continue to use Revision 8 for examinations administered prior to the effective date.

The NRC staff explained that it divided the public comments and recommendations into three categories: those that will likely be adopted in their entirety and require no further discussion; those that it expects to partially adopt by making a change that is somewhat different from what was recommended; and those that will likely be rejected. The staff then proceeded to review the partially-adopted items per the agenda (Attachment 2) and explained the bases for the staff's positions (per the attachment to the meeting notice). Only those items that generated feedback and questions from the FG are discussed below; the FG noted that it considered the resolutions for the remaining items to be acceptable.

- Item #42: The NRC staff explained that it had reconsidered its earlier position regarding the **need to evaluate instant senior reactor operator (SRO) applicants in the primary reactor operator (RO) position** during the simulator operating test and proposed, based on concerns related to public confidence, that every new license applicant (i.e., RO and instant SRO) should continue to be evaluated in the primary RO ("at the controls") position. The staff agreed to consider the FG's feedback that the balance of plant operating position is often more challenging than the primary RO and that allowing its use would reduce the burden on test developers and NRC examiners.
- Item #51: The NRC staff explained that, in order to **address the misperception that "non-critical" errors during the simulator operating test are unimportant**, Final Revision 9 would eliminate the qualifier and simply refer to errors and critical errors, all of which would be measured against the facility licensee's operating procedures and

requirements, all of which have a bearing on the applicants' competence, and all of which need to be considered in the grading process. The FG reiterated its position that any errors that do not result in adverse consequences during the scenario should simply be noted by the examiners and referred to the facility licensee for remedial action, similar to "green findings" under the reactor oversight process. The NRC staff reminded the FG that it had proposed alternative grading criteria for communications errors (the area that generated the most concern during past discussions) during the November 2003 meeting, and that the FG had subsequently declined the offer. The staff further noted, in an effort to mitigate the industry's concern that the applicant failure rate would increase based on inconsequential errors, that the pass-rates on the Draft Revision 9 operating tests have been consistent with past performance; moreover, the "safety valves" in the grading process that allow examiners to recommend passing an applicant, even if the nominal grading criteria dictate a failure, will help ensure that any failures are, indeed, justified. The staff advised the FG against revising their communications standards in an effort to keep them from being evaluated during the licensing examinations.

- Item #103: The NRC staff explained that it is appropriate to reduce the **walk-through operating test for SROs limited to fuel handling** from 15 to 10 job performance measures, but that it considered the FG proposal to test only 2 tasks related to the emergency and abnormal plant procedures (E&APEs) to be inadequate given that the draft revision eliminated the discussion scenarios, which previously focused on those activities. The FG responded that the staff's proposed distribution of 3 administrative, 4 systems, and 3 E&APE tasks would be acceptable; however, it requested the staff to reconsider the industry's recommended distribution during future NUREG revisions.
- Item #22: The NRC Region I representative questioned, on behalf of one of his facilities, when the 2-year "**shelf life**" on the **generic fundamentals examination (GFE)** would take effect; i.e., when would applicants who passed the GFE more than two years ago, and have not been in a licensed operator requalification program, have to begin retaking the GFE? The NRC staff responded that examinations given after the effective date of final Revision 9 (i.e., six months after the date of publication) would require the applicants to have passed a GFE within two years before the date of application, unless a waiver is granted pursuant to ES-204.
- Item #96: The NRC staff summarized its bases for retaining the option to administer **static written requalification examinations** if it determines that there is sufficient cause to conduct requalification examinations at a facility, noting that feedback from the Regional Offices suggests that only about 25 percent of all facilities still administer static written exams. The FG responded that most of those facilities do so only to mitigate the risk to their operators if the NRC should ever decide to conduct examinations at their facility, and it requested the NRC to consider following the facility's examination process if it complies with 10 CFR 55.59 and is not otherwise flawed.

After reviewing its proposed response to the public comments on Draft Revision 9, the NRC staff solicited feedback from the FG on additional changes (per the agenda and Attachment to the meeting notice) that are being considered in response to internal comments. Only those items that generated feedback and questions from the FG are discussed below; the FG noted that it considered the resolutions for the remaining items to be acceptable.

- Item #6: The NRC staff noted that **chief examiners have always had the option to make adjustments to the crew selections** but it has never been formally recognized in

the examination guidance. The FG acknowledged that this was their understanding, as well, and requested the staff to consider extending the restriction on further changes (absent applicant withdrawals) from no less than two to no less than four or six weeks before the scheduled examination date so that applicants would be tested in the same crew configurations during both the audit and licensing examinations.

- Item #10: The NRC staff noted that it has not changed its position regarding **chief reactor watch (CRW) experience** and that Final Revision 9 will no longer include the CRW as one of the military watch stations that is considered equivalent to a reactor operator because CRWs are not qualified to assume a watch station responsible for the reactor controls. The FG disagreed with the staff position on the basis that CRW experience should be at least as good as being a staff engineer, which does qualify as responsible nuclear power plant experience.
- Item #92: The NRC staff clarified that the final **policy for documenting quality problems in the examination report** would probably afford the NRC Regional Offices some flexibility to raise or lower the 20 percent thresholds provided they obtained concurrence from the operator licensing program office. This would allow the Regions to forego comments in situations where one common error resulted in multiple unsatisfactory questions or to make comments in particularly egregious situations, even though there were fewer than 20 unsatisfactory questions. The FG acknowledged the change without further comment.
- Item #94: The FG noted that the proposed change was somewhat vague and sought further clarification regarding the **facilities' involvement in the appeal process**. The NRC staff explained that, in addition to providing technical information, facility licensees that prepared the examination may be requested to confirm the validity of any test items that the appellant called into question (i.e., does the facility stand behind the question as written?).
- Item #100: The FG noted that the proposed clarification regarding **requalification examination participation for newly-licensed operators** had generated a lot of discussion among the FG members. The FG questioned whether an applicant who passed the initial operating test in June should have to take the regularly-scheduled annual operating test in November and if the same operator would be in compliance with the regulation if the next regularly-scheduled operating test was not until the following March (instead of November). The NRC staff stressed that the preferred approach would have the newly-licensed operator take the operating test in November with the same crew configuration that is used for operations and training, but it acknowledged that the annual test requirement could be considered satisfied even if the operator skipped the first test in November and took one the following year; given the fact that the initial operating test is comprehensive in scope, taking the next regularly-scheduled test in March of the following year would not be a problem. The NRC staff reiterated that newly-licensed operators who participate in a requalification training cycle (nominally about six weeks) would generally be expected to take any operating test or comprehensive written examinations given after that point. When questioned by the FG on the status of clarifying the regulations in this area, the NRC staff responded that it is still planning to clear up a number of items in Part 55 but noted that the project will likely be delayed by higher priority rulemakings and budgetary limitations.
- The NRC staff raised one new topic involving a **facility's request to obtain an RO license for an instant SRO applicant** who received an 80 percent on the written examination overall, but failed the SRO portion of the written examination, and passed the operating test. The staff indicated that such an individual would have to accept a

final denial of the SRO application and then reapply for an RO license; the NRC would evaluate the applicant's experience, training, and operating test performance to determine eligibility and the need for further testing. The staff noted that this issue would likely be addressed in Final Revision 9.

Other Issues

The NRC staff discussed the following issues related to the **licensed operator requalification training, examinations, and inspections**:

- The NRC staff informed the FG that, in the course of implementing IP 71111.11 (the "Licensed Operator Requalification Program" baseline inspection procedure) over the last year, NRC inspectors have identified a number of issues related to the **conduct of medical examinations and conformance with medical standards** for licensed operators. The staff noted that the last generic communication related to this topic was issued almost ten years ago and that it is planning to develop a regulatory issue summary (RIS) to remind facility licensees of the requirements in this area.
- The NRC staff noted three additional areas of concern identified since the last public meeting and advised the FG that these items may receive additional attention during future requalification inspections: (1) The staff cautioned the FG that the good testing practice of minimizing **test item repetition** should apply to all parts of the requalification examination, even though the recent revision to IP 71111.11, which requires examiners to look for evidence of grade inflation when more than half the questions are repeated, applies only to the written exam. The FG responded that the policy may not work well when reviewing scenario repetition because, if a second crew passes the one and only repeated scenario that a previous crew failed, it may trigger unnecessary alarm. The FG also noted that the recent revision to Appendix D of the IP is confusing because it jumps between "points" and "percent." The staff agreed to look into the matter and contact the FG member for further details. (2) The staff advised the FG that facility licensees need to **exercise good judgement when regrading written requalification examinations**; NRC inspectors will be looking for unreasonable question deletions and answer key changes made in an effort to pass more operators. (3) The staff reminded the FG that the **comprehensive written requalification examinations are to be given at or near the end of the 24-month cycle** (as discussed in RIS 2003-10). The staff noted that one facility had given its last examination in April 2003, even though its 24-month cycle did not end until following December; this caused the staff to question how the examination could have comprehensively evaluated the learning objectives covered during the entire training cycle, as required for a systems approach to training.
- The NRC staff informed the FG that it is **planning to clarify the Operator Requalification Human Performance Significance Determination Process (SDP) (IMC 0609, Appendix I)** to ensure that the block diagram matches the intent of the preamble and the terminology is consistent with the reactor oversight process; for example, Block 23 will likely be moved to Page 1.
- The NRC staff briefly reviewed two additional issues that were recently raised by the NRC Regional Offices with respect to **SRO watch-standing proficiency**; both issues will likely be addressed in Final Revision 9. The staff reminded the FG that, in addition to completing the SRO requalification training and testing program, SROs who normally stand watch as ROs would need to perform at least 40 hours under-direction as an SRO before they can resume official duties in that capacity. The staff further noted that the

40 hours spent under-direction do not all have to be in the control room, but wherever required by the duties of the watch and in the presence of an active SRO. The FG had no significant comment.

The NRC staff updated the FG on the status of the **simulator scenario-based testing (SBT)** issue, noting that there has been a lot of interest in the topic and that the staff has developed a position in this area. The staff suggested that the relatively high number of simulator fidelity issues recently identified indicates that the previous testing regime may not have been as good as we previously thought, so the staff wants ensure that the SBTs are sufficiently robust. The staff position calls for using the four criteria/questions outlined in Section 4.1.4 of the industry standard (ANSI/ANS-3.5-1998, "Nuclear Power Plant Simulators For Use In Operator Training and Examination") as part of the acceptance criteria during the scenario validation process to ensure that no negative training will occur; a simple cover sheet with an attached list of key parameters, alarms, and automatic actions that were checked should be sufficient to document the validation. The NRC recognizes that estimates of key parameter changes, alarms, and annunciators may not be practical in advance of conducting the scenario and, therefore, are not warranted. However, the NRC expects that it should at least be possible for subject matter experts (in the absence of actual event or best-estimate data) to review the results at the conclusion of a scenario-based test and confirm that observable changes in key parameters correspond in direction to the expected response, that the simulator did not fail to cause an expected alarm or automatic action, and that the simulator did not cause an unexpected alarm or automatic action. The FG responded that SBT is explained in Section 4.4.3.2 of the industry standard, which the NRC endorsed without exception, and that facility licensees are very sensitive to any additional workload that might be placed on the instructors who have to validate and document the simulator scenarios. The FG further noted that facility licensees will have little incentive to voluntarily switch to the 1998 standard if it significantly increases the data-gathering and documentation requirements and suggested that taking a more qualitative approach to SBT might prompt more licensees to adopt the new standard. The NRC staff assured the FG that it is not trying to create more work for facility licensees, but rather to limit the risk for negative training by facilitating the identification and correction of simulator fidelity problems. The industry representative from Callaway, which has already adopted the 1998 standard, summarized the points included in Attachment 5. All parties agreed to continue the dialog in this area. Pursuant to that goal, since the meeting, the NRC staff has prepared Attachment 6 to respond to the industry's presentation and better explain the basis for the NRC's position. The staff also encourages interested parties to review the questions and answers related to the operator licensing workshop with the MidAtlantic Nuclear Training Group in August 2003 for more information; the Qs&As are available in the NRC's Public Electronic Reading Room under ML040830603 (see questions Q1 and Q6 of Enclosure 1 for details regarding the NRC's position on SBT) and on the operator licensing web page.

The NRC staff updated the FG on the status of the **fatigue rule**, noting that the proposed rulemaking will likely be delayed because it is one of two pending rules (the other being fitness for duty) affecting the same part of the regulations. A decision whether to combine the two rulemakings, or delay the fatigue rule until after a fitness for duty rule is completed, is expected in the near future.

Industry Focus Group Issues

The FG updated the NRC staff on the industry proposal to review and **revise the generic section of NUREG-1122**, "Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors," to better reflect current licensed operator responsibilities. The FG indicated that it is considering the staff's concerns regarding the basis for undertaking the project and has taken the staff's suggestion to have a population of operators evaluate the K/A statements at the front end to determine if a revision is warranted.

The FG expressed an interest in learning the **results of the March 2004 generic fundamentals examination**, which was the first to be administered using the 50-question format. The NRC staff informed the FG that the mean scores on the subject examination were still high at about 90 percent, but about two percent lower than recent examinations. However, the median scores of about 92 percent suggested that this was not a difficult examination. The staff also noted that the mean scores were depressed by a somewhat higher number of failures, with several applicants scoring in the low seventies. The staff does not believe that the results can be attributed to the reduction in the length of the GFE and will continue to monitor performance during future examinations.

The FG briefed the NRC staff on its plans to **review future GFEs** prior to their administration, as was agreed to by the NRC during previous meetings. The NRC staff noted that the review criteria have been incorporated in Revision 9 of NUREG-1021 and encouraged the individual who will be reviewing the next examination to contact the NRC's GFE coordinator at the operator licensing program office to make the arrangements.

Public Questions and Answers

None.

**Summary of Results
For 28 Examinations Administered Through March 2004
Using Draft Revision 9 of NUREG-1021**

Written Examinations

	No. of Applicants	Average Grade	No. Failed	Pass Rate	No. Failed ¹	Pass Rate ¹
RO	88	87.1%	5	94.3%	1	98.9%
U-100 ²	34	90.2%	0	100%	0	100%
U-25 (All) ³	61	87.4%	8	86.9%	5	91.8%
U-25 (Only) ⁴	27	86.6%	7	74.1%	4	85.2%
I-100 ⁵	79	87.9%	3	96.2%	2	97.5%
I-25 ⁶	79	84.2%	4	94.9%	1	98.7%
SRO-25 Total ⁷	140	85.6%	12	91.4%	6	95.7%
SRO-100 Total ⁷	113	88.6%	3	97.4%	2	98.2%

Operating Tests

RO	88	n/a	1	98.9%	1	98.9%
SRO	137	n/a	2	98.5%	2	98.5%

Notes:

1. The results of one examination were particularly poor. The two right-hand columns reflect the overall results if that examination is entirely excluded.
2. "U-100" refers to the 34 SRO-upgrade applicants who took the 75-question RO examination in addition to the 25-question SRO exam. The average grade is based on all 100 questions. All but 3 of the applicants scored above 80% on the SRO-only questions and would have passed even if they had only taken the 25-question SRO exam. Only 1 applicant achieved an 80% overall but scored below 70% on the SRO-only questions.
3. "U-25 (All)" includes all 61 SRO-upgrade applicants' results on the 25-question SRO examination.
4. "U-25 (Only)" includes only those 27 SRO-upgrade applicants who did not take the 75-question RO examination. Only 1 of the failing applicants scored below a 70%; the other 6 would have passed if they had taken the 100-question examination (and performed at a comparable level).
5. "I-100" refers to the 79 SRO-instant applicants' overall results on the 100-question examination.
6. "I-25" refers to the 79 SRO-instant applicants' results on the 25-question SRO examination.
7. "SRO-25 Total" and "SRO-100 Total" combine the results for SRO-upgrade and instant applicants on the 25- and 100-question examinations. Scores on the SRO-only questions average about 3% below the overall scores. Upgrade applicants scored 2-3% higher overall and on the SRO-only questions.
8. A total of 4 applicants (1 upgrade and 3 instants) scored 80% or better overall, but failed because they scored below a 70% on the SRO-only questions.

**Written Summary of Simulator Testing Topic
Public Meeting with Industry Focus Group (FG) on
Operator Licensing Issues
Provided by Scott Halverson
AmerenUE, Callaway Plant Simulator**

Why are we conducting simulator scenario tests?

Lets look at the regulation first for the requirements

What is the BIG PICTURE? What are we trying to accomplish?

Reference: 10CFR55.46(C)(2)(ii)

"Simulator fidelity has been demonstrated so that significant control manipulations are completed without procedural exceptions, simulator performance exceptions, or deviation from the approved training scenario sequence."

Reference: Federal Registry Volume 66, No. 201 Page 52659

"NUREG-1021 essentially ensures that the simulator scenarios for examinations are completed without procedure exceptions or simulator performance exceptions."

Reference: Federal Register Volume 66, No. 201 Page 52664

"The intent of paragraph 55.45(b)(3)(i)(B) of the proposed rule was not to establish specific performance testing requirements but to ensure that the significant control manipulations that are performed on the simulator are completed without procedural exceptions, simulator performance exceptions, or deviation from the approved training scenario sequence."

Comment:

We want to ensure that the simulator software, hardware, network and facility support the simulator scenario training and examination needs of the licensed operator training program.

Have we changed anything? Is there an improved testing approach?

Reference: Federal Register Volume 66, No. 201 Page 52657

"Lastly, the final rule facilitates voluntary licensee transition to an improved approach to simulator testing as described in an American National Standards Institute/American Nuclear Society (ANSI/ANS) standard, ANSI/ANS-3.5-1998 ..."

Reference: Federal Registry Volume 66, No. 201 Page 52658

"Finally, the final rule facilitates voluntary licensee transition to an improved approach to simulator testing as described in industry standard ANSI/ANS-3.5-1998,..."

Reference: Federal Registry Volume 66, No. 201 Page 52659

"For facility licensees that adopt the 1998 revised national standard, the final rule revision allows for a change in the type of performance testing from a prescriptive simulator testing program in the context of initial simulator procurement to a scenario-based and operability performance testing program."

Reference: Federal Registry Volume 66, No. 201 Page 52659

"The final rule will allow facility licensees to adjust their performance test programs to their end user needs, as defined by their accredited systems-approach-to-training (SAT) programs..."

Reference: Federal Registry Volume 66, No. 201 Page 52664

"The commission believes that the rule will facilitate the voluntary implementation of ANSI/ANS-3.5-1998 because it deletes the prescriptive requirements for simulator test performance and scheduling that were implemented in connection with the industry standard that was in effect at the time of the 1987 rule change."

Comment:

We no longer want to do what we were doing before. It is clearly stated and restated that there is a voluntary new improved approach or transition from the old testing approach. We will be doing something different.

Have we also changed the testing philosophy?

Reference: Federal Register Volume 66 No. 201 Page 52658

"...which employs a scenario-based testing philosophy that is inconsistent with the testing assumptions and requirements of the current rule."

Comment:

A new philosophy or approach is being proposed that demonstrates an integrated approach vs. stand-alone approach to performance testing.

Why are we repeatedly referencing the standard as an acceptable approach?

Reference: Federal Register Volume 66 No. 201 Page 52666

Voluntary Consensus Standards

"The National Technology Transfer and Advancement Act of 1995, Pub. L. 104-113, requires that Federal agencies use technical standards developed or adopted by voluntary consensus standards bodies unless the use of such a standard is inconsistent with applicable law or otherwise impractical."

"The commission has determined that the industry consensus standard in this area, American National Standard Institute/American Nuclear Society (ANSI/ANS) 3.5, Nuclear Power Plant Simulator for Use in Operator Training and Examination" is one acceptable means for complying with specific parts of the requirements of the final rule."

"Accordingly, Regulatory Guide 1.149, Revision 3, endorses the ANSI/ANS-3.5-1998 as an acceptable method by which facility licensees might implement specific parts of this rule."

Reference: Federal Register Volume 66 No. 201 Page 52664

"As with most other NRC regulations, the linkage between 10 CFR Part 55 and ANSI/ANS-3.5, the industry consensus standard for nuclear power plant simulation facilities, is established by the associated regulatory guide, in this case RG 1.149."

Comment:

If the standard already exists in the industry then it is more efficient to endorse the existing standard than to rewrite it in different words.

We better look at the Regulatory Guide 1.149 Rev 3 next.

What changed between Regulatory Guide 1.149 Rev 2 and Regulatory Guide 1.149 Rev 3?

Reference: Regulatory Guide 1.149 Rev 2 Section C.1.5

"Performance and malfunction testing may be integrated with a facility license's approved or accredited training program that uses a systems approach to training if performance data are obtained during either scenario dry-runs or the training session and analyzed for compliance with the performance criteria listed in ANSI/ANS-3.5-1993."

Reference: Regulatory Guide 1.149 Rev 3 Section C.1.4

"In regard to Section 4.4.3.2, "Scenario-Based Testing," documentation and performance test results should be consistent with facility licensees' defined objectives of the accredited training program or approved operator licensing operating tests."

Reference: Regulatory Guide 1.149 Rev 3 Section C.1.5

"(i.e., verification and validation during software development in a controlled configuration control environment with ongoing scenario-based and recurring operability testing)"

Comment:

We traded malfunction testing for scenario-based testing and verification and validation testing. We recognized that instructors would be performing the scenario based testing.

We now finally have to look at the guidance in the standard.

What do we need to do to meet the performance test requirement?

Reference: ANSI/ANS-3.5-1998 Section 4.4.3

"A record of the conduct of these tests, and data comparison that the results meet reference unit data, shall be maintained"

Comment: Some sort of documentation is required to be recorded and maintained. A comparison must be made.

Reference: ANSI/ANS-3.5-1998 Section 4.4.3

"Simulator performance testing comprises operability and scenario-based testing."

Comment: Scenario-based testing is included in performance testing. Scenario-based testing is not an operability test.

Reference: ANSI/ANS-3.5-1998 Section 4.4.3.2

"Scenarios developed for the simulator, including the appropriate instructor interfaces and cueing, shall be tested before use for operator training or examination."

Comment: A dry-run of the simulator scenario before the students are exposed to the simulator scenario is always a good idea.

Reference: ANSI/ANS-3.5-1998 Section 4.4.3.2

"The simulator shall be capable of being used to satisfy predetermined learning or examination objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence."

Comment: The objectives are included in the simulator scenario. There is no need to duplicate this work by making a copy to attach as documentation. The simulator scenario, objectives and the plant procedures would be used to capture the desired response. Successful completion of the procedures would confirm that the simulator responded like the plant without significant performance discrepancies.

Reference: ANSI/ANS-3.5-1998 Section 4.4.3.2

"A record of the conduct of these tests, typically in the form of a completed scenario or lesson plan checklist, and the evaluation of the test results, shall be maintained."

Comment: Since the instructors would be conducting the testing we made every attempt to minimize the burden by implementing a simple all-inclusive checklist to document the simulator scenario testing. The checklist was to include the aspects of criteria and evaluation all on the same page. It was assumed that the simulator scenarios and procedures could be produced from existing plant records. They would not be copied just to provide volume to the testing documentation. This would save both manpower and time. The checklist would be retained as the four year record.

There is also one more piece to the puzzle. There is one more requirement.

The software development process is required to implement and validates changes or modifications made to the simulator.

Example: Changing the value from 4 to 5. The software engineer must first verify the plant value to be changed, make the change and then verify the change. He makes the determination that "5' now has the value of "5". A validation test now looks at the simulator in an integrated fashion and validates that "5" is the value and that this value matches the plant or best estimate value. When the simulator scenario is run the value will be 5. If for some reason the value is not 5 then feedback is provided and the value is corrected to be 5. This is an indication of a special logic condition or a potential problem with the verification and validation testing program. If the value is to be changed to six the Simulator configuration management process is followed.

Where is the feedback in the process?

The instructor reviews the simulator scenario and simulator performance while developing the training material.

The instructor can identify any deficiencies during this preview process.

The initial license training class or licensed operator continuing training class reviews the simulator scenario

You may have as many as sixty licensed operators that could challenge the operation of the simulator and identify deficiencies during the training process. If items are identified while conducting training they may have to be evaluated for negative training impact. This may require more corrective actions than simply making the software or hardware change to the simulator.

In our case we have a simulator performance review group review all testing documentation to determine if the simulator performance is meeting expectations. We include personnel from operations, engineering, operator training and simulator on the review group.

The mock NRC examination normally includes personnel from other plants. This provides the opportunity for external feedback on simulator performance.

The NRC also has the opportunity to review simulator performance during the examination process.

Conclusion

Using a checklist that captures criteria and evaluation is an acceptable approach to document simulator scenario performance, realizing that this is combined with operability testing and a formal configuration management process with validation and verification testing.

Feedback from the various instructors, students, external sites and the NRC will also confirm the overall simulator performance.

A review of the modifications made during the prior four-year time period can also be used to validate the presence of a healthy on-going configuration management program.

NRC Staff Response to Industry Presentation on Simulator Scenario-Based Testing

The industry's comments imply that the sole objective of the NRC rules related to the fidelity and testing of simulation facilities is encompassed in 10 CFR 55.46(c)(2)(ii), when, in fact, that is only a subset of a broader objective of the rule. That broader objective is found in 10 CFR 55.46(c)(1), which states that "[a] plant-referenced simulator ... must demonstrate expected plant response to operator input and to normal, transient, and accident conditions to which the simulator has been designed to respond. The plant-referenced simulator must be designed and implemented so that it:

- (i) Is sufficient in scope and fidelity to allow conduct of the evolutions listed in §§ 55.45(a)(1) through (13), and 55.59(c)(3)(i)(A) through (AA), as applicable to the design of the reference plant.
- (ii) Allows for the completion of control manipulations for operator license applicants."

To meet the objective of 10 CFR 55.46(c)(1), it is imperative that the simulator provides the annunciators, alarms, indications, and responses that would be expected in the referenced plant.

The NRC is not changing its regulatory position with respect to simulator testing. If properly implemented, the NRC continues to believe that ANSI-3.5-1998 ("Nuclear Power Plant Simulators For Use In Operator Training And Examinations") provides an acceptable approach to simulator testing when the performance testing (which includes scenario-based testing (SBT)), consistent with both the standard and the definition in 10 CFR 55.4, compares simulator performance to actual or predicted reference plant performance. SBT is required under Section 4.4.3.2 of the standard and it determines if the simulator is capable of being used to satisfy predetermined learning objectives without exceptions, significant performance discrepancies, or deviation from the approved scenario sequence. Since the standard requires an evaluation of SBT results, the question is: what acceptance criteria should be used when performing this evaluation? Clearly, the criteria must be meaningful, focused on the simulator's capability to meet the operators' training and testing needs, and, consistent with the definition of performance testing, must compare simulator performance to actual or predicted performance of the reference plant.

The NRC staff does not agree with the comment that successful completion of the procedures during SBT, in conjunction with validation and operability testing, would confirm that the simulator responded like the plant without significant performance discrepancies. Successful completion of a plant procedure, while certainly providing some value, depending on the quality and detail of the procedure, does not necessarily confirm proper simulator behavior and characteristics with respect to the plant. It may be possible for the procedure to be followed for the wrong reasons based on incorrect simulator fidelity. The fact that validation and operability testing, which compare simulator performance to actual or predicted plant performance, are also conducted does not waive the requirement of both the standard and the regulation for such comparison during scenario-based performance testing. The need for this comparison during SBT is driven by the fact that the simulator models are often being exercised in a manner different from that used in either validation or operability testing.

Precedent is set in the standard for using the acceptance criteria of Section 4.1.4 for SBTs when SBTs are credited under Section 4.4.3.1 for operability performance testing. Section 4.1.4 is also used for testing malfunctions, which often are combined to constitute the scenarios used for SBT. In fact, the NRC does not understand how a simulator could support training objectives if it does not minimally meet the acceptance criteria in Section 4.1.4, which provide a uniform and reasonable means for evaluating simulator performance under the SBTs of Section 4.4.3.2. The Section 4.1.4 criteria confirm that: “(1) [t]he simulator allows the use of applicable reference unit procedures; (2) [a]ny observable change in simulated parameters corresponds in direction to those expected from actual or best estimate response of the reference unit to the malfunction; (3) [t]he simulator [does] not fail to cause an alarm or automatic action if the reference unit would have caused an alarm or automatic action under identical circumstances; [and] (4) [t]he simulator [does] not cause an alarm or automatic action if the reference unit would not cause an alarm or automatic action under identical circumstances.” Use of these criteria provides assurance that proper focus and thought was applied, provides a more uniform threshold for evaluating simulator performance, and directly supports demonstration of compliance with 10 CFR 55.46(c)(1).