**BREAKOUT SESSION PLAN**
**OUTLINE**

Lead NRC Facilitator: Todd Fish
Backup NRC Facilitator: Peter Presby
MANTG Representative: John Taylor, Entergy Nuclear Vermont Yankee

Objective (Purpose):

Region I and MANTG representatives communicate on issues of importance related to simulator fidelity and testing performance in an atmosphere of professional respect.

Success Criteria (Potential Outcomes):

1. Participants obtain a new perspective or confirm past acceptable practices on the breakout session's topic with respect to regulatory requirements, standards, and NRC staff expectations.

2. Address questions as they occur or identify questions for further development or formal response by NRC staff.

Agenda (Process in order to Achieve Objective and Success Criteria):

- Session Nos. 1 and 4 (Tuesday and Wednesday Afternoon)
  MS3 Simulator and Plenary room
  - 00-60 MIN Industry SBT Demo: Run on MS 3 Simulator
    Split into 2 groups, ~25 min each
  - 60-120 MIN Plenary session for discussion of:
    1) MANTG/TTC deltas
    2) SBT Q's and General Q's - Attachment 1
    3) Open forum for questions

- Session Nos. 2 and 3 (Wednesday morning)
  Plenary room
  - 00-15 MIN Discuss Apparent Fidelity Issue Logic Chart (Attachment 2)
  - 15-30 MIN Focus Group Case Study Assignments (Attachment 3, 4 & 5)
  - 30-50 MIN Case Study Evaluations by Groups
  - 50-60 MIN Break
  - 60-110 MIN Group Presentations of Case Studies
  - 110-120 MIN Session Wrap/Top 3 Issues/Collect Qs and Potential A's

## ATTACHMENT 1

## DOMINION CONNECTICUT SBT DEMONSTRATION TEST

MANTG SBT demonstration modeled after TTC SBT, consisting of a SG Tube Leak/Rupture with additional malfunctions. TTC SBT documentation was previously sent by NRC to INPO.

Discussion topics in last hour of Demonstration Session:

1. If there are no SBTs for scenarios used in training, is it acceptable to rely on Yearly Steady State Tests and Transient Tests AND SBT for initial and requal annual operating tests in order to limit and define the scope of testing?

   NRC Considerations: On July 12, 2005, the industry focus group proposed to NRC staff that ONLY simulator scenarios for FUTURE initial and requalification operating tests be subjected to SBT, i.e., NOT all training scenarios. The industry expects NRC staff to effectively GRANDFATHER current and previous scenarios.

2. What needs to be done with Malfunction Cause and Effect (MC&E) Documentation to ensure that the scenario produced for any use is properly tested and validated, i.e., best estimate data?

   NRC Considerations: The industry focus group proposed to NRC staff to ATTACH to SBT each malfunction's associated MC&E document in lieu of anything else to the operating test scenario.

3. In the demonstration, did you see evidence that the facility: 1) determined best estimate data in advance of the SBT; 2) determined initial plant parameter trends prior to running the SBT; 3) has the ability to independently evaluate accumulated data against acceptance criteria?

4. To what extent (conditions for acceptance especially for tests done in 1980s) can past Verification and Validation testing be relied on for the development of the MC&E?

   NRC Considerations: Legacy test issues, such as inadequate V & V are known (or highly suspected) to be problematic. The root cause of most fidelity issues appears to be inadequate V&V, along with inadequate testing to detect "garbage-in-garbage-out" fidelity issues. To-date, such an approach has resulted in a "wait-until-the-problem-is-found-and-then-fix-it" attitude. MC&E documents which reflect poor "input" can not support good "output"; rather they only mask and compound fidelity issues until the licensed operator becomes conditioned that a problem is no longer apparent and may result in negative training.

5. What is the basis for acceptance of first vs second or third order responses predicted and seen in the test and how tight does the rate of change need to be on parameter changes?

   NRC Considerations: First order responses are based upon the fact that the primary/immediate effects should be addressed in the test procedure and that other secondary or tertiary effects need not be specifically identified in the test unless important to the test. Rate of change for certain parameters is important in terms of

control such as in the case of turbine valve positioning versus demand. For most cases, rate of change is not easily evaluated. Specific plant design data or actual data is needed to support the desired response. The idea is that the expected behavior should be the same/similar as the reference plant under identical conditions.

6. Is there a difference between scenario validation and scenario based testing; and on either initial or requal exams based on review comments, when does an SBT need to be redone?

   NRC Considerations: There is a difference. Scenario validation is closely related to ensuring that the scenario can support the operating test as preplanned. SBT is confirming that the simulator's performance is comparable to the referenced plant performance. SBT should be redone or retested whenever software changes affect previously-obtained test results. Another SBT is not required for changes to a scenario that training staff use as a test/evaluation for licensed operators.

7. When does a plant reference simulator not meet the definition in the rule?

   NRC Considerations: By definition, a plant-referenced simulator means a simulator modeling the systems of the reference plant. Modeling of systems other than the reference plant may call into question whether or not the regulatory definition is met. Refer to the OLB program office website, "Operator Licensing Program Feedback" page, Question No. Sim.37, for additional insight on this topic.

8. Will the NRC accept the core performance tests done on the plant also done on the simulator for BWRs (PWRs are covered by ANS standard)?

   NRC Considerations: At the July 12, 2005, public meeting, the industry focus group proposed limiting the core testing approach for BWRs to: 1) Calculating the Shutdown Margin; and 2) Calculating the Estimated Critical Position while conducting a plant start-up. The NRC staff is aware of MANTG's White Paper on core testing and has stated that such an approach is reasonable. However, the industry has not reached agreement among itself in this area.

9. Does best estimate need further definition by way of examples in addition to the existing guidance of plant data or engineering evaluation? To what extent must engineering evaluations be done? Can approved P&IDs and procedures constitute an engineering evaluation based on their respective review processes?

   NRC Considerations: ANS-3.5-1998 defines 'Best-estimate" as: "Predicted reference unit performance data derived from engineering evaluation or operational assessment by subject matter experts for specific conditions." Engineering evaluations and operational assessments should be based upon sound and credible information. For example, using Piping & Instrument Diagrams that are controlled, maintained, and approved by engineers generally provide useful engineering data. While plant procedures may or may not be reviewed and approved by engineering personnel, they also provide data from which to draw assessments.

10. What are the best practices for handling major plant modifications, such as digital feedwater, in terms of timing the modification to the plant, to the simulator, to the training program for both licensed (requal) and initial trainees?

NRC Considerations: Refer to Question 5 above. In general, most plant modifications can be incorporated into the simulator with minimum impact. Planning is key to successfully implementing a modification. The standard provides sufficient direction with regard to handling plant modifications. NRC staff may question modifications on the simulator to ensure that negative training is not occurring.

**ATTACHMENT 2**

**APPARENT FIDELITY ISSUE LOGIC CHART**

PHASE 1 - INITIAL IDENTIFICATION OF SIMULATOR ISSUE

1 Is the issue an APPARENT FIDELITY issue? [an example of the simulator NOT demonstrating expected plant response to operator input and to normal, transient, or accident conditions to which simulator was designed to respond IAW 55.46(c)(1)]

1.1 If NO, Is the issue a testing or records issues related to meeting the applicable ANSI/ANS 3.5 version?

1.1.1 If YES go to step 6 —>

1.1.2 If NO, STOP - there is no performance deficiency.

1.2 If YES, continue

2 Does the APPARENT FIDELITY issue need further development?

2.1 If YES,

2.1.1 And if a true fidelity issue, Would it be a minor issue?

2.1.1.1 If YES, ensure issue is in licensee CAP, Do not document.
2.1.1.2 If NO, continue

2.1.2 Leave as an open issue or URI if report needs to be issued since the there is a need for additional licensee review and input to NRC. —>

2.2 If NO, because it is in the licensee's corrective action process (CAP):

NOTE: The current activity may be a followup to an URI established 6 months ago as a part of 2.1.2 and is occurring based on licensee further review and input to NRC staff.

2.2.1 Is the issue > 2yrs. Old?

2.2.1.1 If YES, Is there a reasonable explanation as to why not fixed?

2.2.1.1.1 If NO, Go to Step 12 —>

2.2.1.1.2 If YES, because of parts on order or other design review, Go to Step 5 Licensee Identified PD —>.

2.2.1.2 If NO, Go to Step 5 Licensee Identified PD —>

2.3 If NO, because the issue was fully developed once identified, continue

3 Could the FIDELITY issue have been found earlier within the scope of simulator operational testing or other methods such as operator input (they have known about it for some time and the issue was not documented).

3.1 If YES (because of other methods such as operator input), Go to Step 5 (proceed with performance deficiency analysis on a fidelity issue) —>

3.2 If YES (because of inadequate operational testing), proceed with performance deficiency analysis on a fidelity issue in priority over a testing issue

AND Did the licensee do an extent of conditions review related to testing?

NOTE: The question as to whether or not a fidelity issue should or would have been identified based on the a simulator testing or other forum by the licensee is speculative and should not be a factor in the determination of a performance deficiency. If the test was inadequate to identify the fidelity issue sooner, then the licensee is still responsible for the PD regardless of cause being testing related. If the fidelity issue is beyond the reasonable scope of testing then there is there may not be a performance deficiency due to external causes unless it was preventable by V&V testing with a modeling change. An example would be that the problem is manifested 2 hours after a malfunction test and it is unreasonable to run the test beyond a 1/2 hour.

3.2.1 If NO, why not.

3.2.2 If YES, do results indicate other test inadequacies?

3.2.2.1 If YES, Go to Step 5 (proceed with deviations from the standard with multiple examples)

3.2.2.2 If NO, continue

3.3 If NO, continue.

4 Was there a recent modeling or platform change in the last 2-5 years???

4.1 If YES, Could the FIDELITY ISSUE have been reasonably identified earlier by sound Verification and Validation testing program

4.1.1 If NO, test was adequate, there may not be a performance deficiency due to external causes (e.g., vendor input problem if beyond the reasonable control of facility licensee)..

4.1.2 If YES, V&V was inadequate or control problem noted with licensee organization, Go to Step 5 (proceed with performance deficiency analysis on a fidelity issue in priority over a testing issue

AND Did the licensee do an extent of conditions review related to testing?

4.1.2.1 If NO, why not.

4.1.2.2 If YES, do results indicate other test inadequacies?

4.1.2.2.1 If YES, Go to Step 5 (proceed with deviations from the standard with multiple examples)

4.1.2.2.2 If NO, continue

4.2 If NO, the issue is most likely an old design and V&V issue:

Give the facility licensee time to fix (along with an extent of condition review) per 10 CFR 55.46 (d) (2) which requires that all modeling and hardware deficiencies be corrected in addition to that found by testing. If a reasonable time frame has expired Go to Steps 5 or 12 with a performance deficiency against this rule.

The issue could be coupled with perhaps PIR sample based on the number and nature of issues identified or in the CA process for the inspection or exam that identified these issues.

PHASE 2 - PROCESSING FINDINGS

5 Was the more than minor FIDELITY OR TESTING ISSUE identified based on the a simulator testing or other forum by the licensee?

5.1 If YES, Process as a Licensee Identified Performance Deficiency IAW MC0612App.B

NOTE: Consider for follow-up on next requal inspection

Consider for PIR sample dependent on the number and nature of the deficiencies identified by the licensee.

Licensee identified Performance Deficiencies are treated in section 4OA... in the back of the report.

5.2 If NO, Was the fidelity issue identified based on current NRC activity on the simulator or as a result of licensee followup to an event?

5.2.1 If YES, the issue should be considered self revealing or NRC identified and, therefore, process the issue as a performance deficiency unless there are special circumstances for licensee identified.

Process a performance deficiency (violation) IAW applicable section of the simulator rule 10 CFR 55.46 OR

Process a performance deficiency (deviation) IAW the applicable section of ANSI/ANS 3.5 applicable date.

An example of a special circumstance for licensee identified is a licensee representative took the initiative to reveal the problem during an NRC exam validation week based on an indication of a problem without

prompting or questioning from NRC.

5.2.2 If NO, Analyze the issue for external causes (not a performance deficiency), traditional enforcement, more than minor IAW MC 0612 Appendix B and Attachment 1

PHASE 3 - SIMULATOR SIDE ISSUE INPUT
(PLANT REFERENCE, TESTING METHODOLOGY, RECORDS)

6 Is the plant using a Plant Referenced Simulator as defined in 10 CFR 55?

6.1 If YES, go to Step 1.

6.2 If NO - Is use of a simulator that is not Plant Referenced approved by the commission per 10 CFR 55.46(b)(1) and (2)?

6.2.1 If YES, Consult with IROB - Conduct special review per 55.46(b)(1)(i) through (iii) as approved by Commission IAW 55.46 (b)(2).

6.2.2 If NO, go to step 5 and process the performance deficiency —>

AND, consult with OL program office and give special consideration for a management meeting surrounding the processing of the applicable performance deficiency.

7 Does the scope of testing procedures match the specific list of test or evolutions of 55.46(c)(1)(i) or the applicable ANSI/ANS version?

7.1 If YES, go to step 8

7.2 If NO, Identify which tests are not covered by the licensee's testing program IAW 55.46(c)(i) and go to step 5 —>

NOTE: Some tests do not match those listed in the rule so the finding may not be a violation. Also this section of the rule refers to the simulator being of sufficient scope to allow the conduct of general operating test areas as listed in 55.45(a)(1) through (13). Simulators must be able to support these activities but it doesn't mean the test procedures need to cover all aspects of 55.45 to an excessive degree.

8 Is the issue related to the facility using the simulator to meet the control manipulation requirements of 55.31(a)(5) for initial exams?

8.1 If NO, go to 9

8.2 IF YES, Is core performance testing done consistent with in-plant core performance testing IAW 55.46(d)(1), (c)(1)(ii) (c)(2)(i&ii)

8.2.1 If YES, go to 9

8.2.2 If NO, identify discrepancy or discrepancies, consult with OL program

office, and go to step 5 —>

9 Are applicable or critical parameters identified in the test procedure IAW the applicable ANSI/ANS 3.5 or other accepted method?

9.1 If YES, go to 10

9.2 If NO, Review and assess any deviation between the plant and the simulator IAW with step 1

NOTE: It may be necessary to perform an adequate test meeting the ANSI/ANS requirements and recommendations in order to conduct this assessment.

AND Process a Performance Deficiency in accordance with step 5 except the issue will be a finding with no violation.

10 Is best estimate data correlated to the plant data or engineering evaluation IAW the criteria established by the applicable section ANSI/ANS 3.5 or other accepted method?

10.1 IF YES go to 11

10.2 If NO, Review and assess any deviation between the plant and the simulator IAW with step 1

NOTE: It may be necessary to perform and adequate test meeting the ANSI/ANS requirements and recommendations in order to conduct this assessment.

AND Process a Performance Deficiency in accordance with step 5 except the issue will be a finding with no violation.

11 Are there meaningful comparisons being done to best estimate data IAW the criteria established by the applicable section ANSI/ANS 3.5 or other accepted method?

11.1 IF YES go to 12

11.2 If NO, Review and assess any deviation between the plant and the simulator IAW with step 1

NOTE: It may be necessary to perform and adequate test meeting the ANSI/ANS requirements and recommendations in order to conduct this assessment.

AND Process a Performance Deficiency in accordance with step 5 except the issue will be a finding with no violation.

12 Are substantial deviations identified, evaluated, and corrected appropriate to the circumstances IAW the criteria established by the applicable ANSI/ANS 3.5 or other accepted method?

NOTE: Substantial deviation is defined as data outside the test acceptance criteria of the test procedure, in some cases for certain test, percentage tolerances are given in the ANSI/ANS such as for steady state tests. In other cases it will be left to

engineering judgement, consult with the OL program office in such cases especially if no test acceptance criterion has been identified.

12.1 If NO, go to 13.

12.2 If YES, Is the substantial deviation being corrected in a reasonable length of time IAW 10CFR 55.46(d)(3).

NOTE: A reasonable length of time is not defined. However the uncorrected problem should not have the potential for or produce negative training or adversely impact operator safety actions. For example, if a substantial problem can not be corrected within a year due to lack of parts, it was identified by the licensee testing program, the problem is noted to the operators prior to simulator training sessions, then we should answer this question with “YES” unless there was a performance deficiency in the above noted actions that resulted in a plant event occurring.

12.2.1 If YES, go to 13

12.2.2 If NO, consult with OL program office

Review and assess any deviation between the plant and the simulator IAW with step 2

NOTE: It may be necessary for the licensee to perform an adequate test meeting the ANSI/ANS requirements and recommendations in order to conduct this assessment.

13 For any test/records selected for review, are [ ADDITIONAL KEY POINTS ON TESTING OR RECORDS AS NEEDED ] IAW the criteria established by the applicable section ANSI/ANS 3.5 or other accepted method?

13.1 IF YES go to 14

13.2 If NO, Review and assess any deviation between the plant and the simulator IAW with step 2

NOTE: It may be necessary to perform and adequate test meeting the ANSI/ANS requirements and recommendations in order to conduct this assessment.

AND Process a Performance Deficiency in accordance with step 5 except the issue will be a finding with no violation.

14 In reaching this point, there should be no more-than-minor performance deficiencies to be processed after carefully examining the questions above.

Each issue should be analyzed in steps 1 through 13 above.

Lack of Records or missing records for the most part are a violation of the rule10CFR 55.46(d)(1 or 3 as applicable) for performance testing but the applicable section of the

ANSI/ANS related to records should also be noted such as for validation testing.

**ATTACHMENT 3**

**FOCUS GROUP CASE STUDY ASSIGNMENT/INSTRUCTIONS**

For the selected case study identify the following:

1. Briefly state what is the performance deficiency

2. Identify the Violation (vs. rule/requirement) OR Finding (vs Standard) OR URI

3. Identify the category of significance (Red, Yellow, White, Green, OR Other)

4. Identify the Operational Impact: Direct, Would, Could, OR Minor Impact on operator performance.

For these case studies assume all are identified by NRC or are self revealing

**Gp I:** 1, 7 **Gp II:** 2, 9 **Gp III:** 3, 10 **Gp IV**: 4,11 **Gp V:** 6,12

Case Studies 5, 8, 13, 14, 15 and 16 available for discussion if time permits. Issues 5, 8 and 13 are similar.

Definitions:

1. Negative Training - fidelity issue directly impacts operator actions of omission and commission

2. Deviation: A licensee's failure to satisfy a written commitment, such as a commitment to conform to the provisions of applicable codes, standards, guides, or accepted industry practices when the commitment, code, standard, guide, or practice involved has not been made a requirement by the Commission.

3. Finding (FIN): An issue of concern that is related to a licensee performance deficiency. Findings may or may not be related to regulatory requirements and, therefore, may or may not be related to a violation.

4. Green Finding: A finding of very low safety significance.

5. Inspector-Identified: For the purpose of this Manual Chapter, inspector-identified findings are those findings found by NRC inspectors that the licensee had not previously documented in a corrective action program; had not been identified by a licensee-sponsored program, evaluation, or audit designed to identify deficiencies; and would not reasonably have been otherwise identified in the licensee's normal processes or reviews. Inspector-identified findings also include previously documented licensee findings to which the inspector has added new value .

6. Issue: A well-defined observation or collection of observations that is of concern and may or may not result in a finding.

7. Licensee-Identified: For the purpose of the Manual Chapter, "licensee-identified" findings are those findings identified through a licensee program or process that are

specifically intended to identify the problem. Some examples of licensee programs that likely result in such findings are post maintenance testing, surveillance testing, ASME Section XI testing, drills, critiques, event assessments, evaluations, or audits conducted by or for the licensee. Most green findings documented in the licensee's corrective action program are considered licensee-identified.

8. Minor Violation/Finding: A violation or finding that is less significant than a Severity Level IV violation or less significant than what the SDP characterizes as green and is of such low significance that documentation in an NRC inspection report is not normally warranted. Although minor violations must be corrected, they are not usually described in inspection reports.

9. Non-cited Violation (NCV): A method for dispositioning a Severity Level IV violation or a violation associated with a finding that is characterized as green (very low safety significance). Provided applicable criteria in the enforcement policy are met, such findings are documented as violations, but are not cited in notices of violation, which normally require written responses from licensees.

10. Noncompliance: A violation (regardless of whether it is cited or not), nonconformance, or deviation.

11. Nonconformance: A vendor's or certificate holder's failure to meet contract requirements related to NRC activities (e.g., 10 CFR Part 50, Appendix B, Part 71, or Part 72) where the NRC has not imposed requirements directly on the vendor or certificate holder.

12. Notice of Violation (NOV): A formal, written citation in accordance with 10 CFR 2.201 that sets forth one or more violations of a legally binding regulatory requirement.

13. Observation: A factual detail noted during an inspection. Observations are not generally documented in inspection reports but may be documented in conjunction with and to support a finding.

14. Performance Deficiency: An issue that is the result of a licensee not meeting a requirement or standard where the cause was reasonably within the licensee's ability to foresee and correct, and which should have been prevented. Issues related to cross-cutting areas are generally considered an underlying cause of a performance deficiency rather than an independent issue. Issues of problem identification and resolution, human performance, or establishment of a safety-conscious work environment, in and of themselves, do not provide the basis for a performance deficiency.

15. Potentially Generic Issue: An inspection finding that may have implications for other licensees, certificate holders, and vendors whose facilities or activities are of the same or similar manufacture or style.

16. Red Finding: A finding of high safety significance.

17. Self-Revealing: For the purpose of documentation in the ROP (versus enforcement), self-revealing findings are those findings that reveal themselves to either the NRC or licensee through a change in process, capability or functionality of equipment, operations, or programs during routine operation. For the purposes of determining significance and documenting in inspection reports, self-revealing findings are treated

the same as inspector-identified findings.

18. Significance: The quality of being important. As used in this inspection manual chapter (IMC), significance involves the consideration of (1) actual safety consequences; (2) potential safety consequences, including the consideration of risk information; (3) potential for impacting the NRC's ability to perform its regulatory function; and (4) any willful aspects of the violation.

19. Significant: Significance determined to be greater than green or a violation determined to be greater than Severity Level IV.

20. Unresolved Item (URI): An issue about which more information is required to determine if it is acceptable, if it is a finding, or if it constitutes a deviation or violation. Such a matter may require additional information from the licensee or cannot be resolved without additional guidance or clarification/interpretation of the existing guidance (e.g., performance indicator reporting guidance).

21. Violation (VIO): The failure to comply with a legally binding regulatory requirement, such as a statute, regulation, order, license condition, or technical specification.

22. White Finding: A finding of low to moderate safety significance.

23. Yellow Finding: A finding of substantial safety significance.

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## ATTACHMENT 4

## SIMULATOR FIDELITY AND PERFORMANCE TESTING CASE STUDIES

**Issue No. 1**

A licensee's methodology for simulator testing deviated from the accepted guidance in that the licensee compared current year transient test data to prior year test data rather than to "best estimate" data as specified in ANSI/ANS 3.5-1985. It was noted that the potential existed for deviations to be introduced between the plant's control room and the plant reference simulator. Deviations could cause negative training, which in turn could have an adverse effect on operator actions during plant operations.

**Issue No. 2**

Differences were identified between the simulator and the plant in response to a manual reactor scram from high power levels. This contributed to problems during recovery from an actual reactor scram in 2003. - The licensee had previously identified this simulator fidelity issue in 2000 after a scram from high power initiated by a turbine trip (e.g., the same event of 2003). Simulator vessel shrink & swell modeling was not accurate - so licensee implemented batch files (e.g., work around) in model to correct discrepancy for specific simulator training scenarios initiated by turbine trip. However, modeling error was not included in the regular briefing for licensed operators in their training cycle

**Issue No. 3**

A facility removed from service, and abandoned the Backup Seismic System (Terra Tech Instrument) in place in June 2000. However, as of August 31, 2004, the plant referenced simulator still provided an annunciator fed from the backup seismic system when an earthquake of sufficient magnitude was felt.

**Issue No. 4**

inspectors observed the suction valve from the condensate storage tank to the RCIC pump automatically closed and transferred pump suction to the suppression pool during a simulated station blackout. The associated reference plant’s design includes batteries to maintain power to control circuits for RCIC system valves for a limited time which would prevent automatic swaps such as this.

**Issue No. 5**

Inspectors noted (1) "best estimate" data for the simulator testing was not used; (2) a required annual simulator transient test was not performed, and; (3) simulator test documentation did not include an evaluation and validation of test results.

**Issue No. 6**

Primary Containment Isolation Signal (PCIS) isolation of the Primary Containment Instrument Gas (PCIG) system resulted in a reference plant’s MSIVs drifting closed in a matter of minutes. The associated plant-referenced simulator modeled a significantly greater time required before

the valves would drift closed.

**Issue No. 7**

Key plant parameters trended during a simulated loss of all reactor coolant pumps (steam generator pressure and cold leg temperature) did not match in magnitude or direction with reference plant data for the same event. Additionally, the plant decay heat was incorrectly modeled such that a cooldown did not occur during excessive post-trip auxiliary feed flow conditions.

**Issue No. 8**

Inspectors noted that (1) "best estimate" data for the simulator testing was not used; (2) all required key parameters during the simulator test were not recorded; and (3) simulator differences identified during testing were not documented and justified.

**Issue No. 9**

A facility, committed to the 1985 ANSI standard, last conducted normal evolutions - core performance testing on the simulator following the Core Cycle 7 reload. They were currently on their Core Cycle 25.

**Issue No. 10**

A licensee submitted license applications (NRC Form 398s) certifying that three applicants for operator licenses met all training requirements for holding an operator license in accordance with 10 CFR 55.31. Credit was taken on the applications for reactivity manipulations conducted on the simulator. However, simulator testing and maintenance was not adequate to take credit for reactivity manipulations on the simulator (as allowed by 10 CFR 55.46(c)) in lieu of the actual reference plant.

**Issue No. 11**

A simulator’s core behavior differed from the reference plant core during manual initiation of the emergency condenser in that the simulator did not mimic the neutron flux spike and flux tilting expected of the reference plant.

**Issue No. 12**

A simulator was modeled to prevent indication of greater than 2/3 core height during a LOCA regardless of reactor coolant mass

**Issue No. 13**

Inspectors noted (1) "best estimate" data for the simulator testing was not used; (2) some (4 of the 11 required) annual simulator transient tests were not performed and; (3) simulator test documentation did not include an evaluation and validation of test results.

**Issue No. 14**

Inspectors identified that multiple simulator parameters differed from the plant as documented

on steady-state comparison tests by greater than acceptance criteria limits. The parameters included electrical generator output, steam generator level, and feed flow rate. The licensee had not identified or addressed these differences.

**Issue No. 15**

Licensee's investigation into an actual rod drop event in the reference plant revealed contributors to the poor operator performance included unrealistic simulator training. The simulator individual rod position indication did not flash magenta on rod drops, and the plant feed-water regulating valves were over-responsive causing significant swings in feed-water flows.

**Issue No. 16**

The balance of plant operator misdiagnosed normal operation of atmospheric dump valves after a trip as a component malfunction. Subsequent investigation revealed that the plant systems operated properly but that the BOP operator did not expect the Steam Generator Atmospheric Relief Valves (ARV) to be open while the steam dumps were closed shortly following a plant trip. The licensee identified that the simulator had not accurately modeled steam generator atomospheric relief valves post-trip operation since initial licensing.

**ATTACHMENT 5**

**FINDING SUMMARY FROM PUBLIC WEB SITE**

**Beaver Valley**

[**Issue No. 1**]
Green. Finding, ACCEPTABILITY OF LICENSEE'S SIMULATOR TESTING METHODOLOGY
The inspectors identified a finding because the licensee's methodology for simulator testing deviated from the accepted guidance. Inspectors noted the potential existed for deviations to be introduced between the plant's control room and the plant reference simulators. Deviations could cause negative training, which in turn could have an adverse effect on operator actions during plant operations.

**Cooper**

[**Issue No. 2**]
Green. NCV SDP - 10 CFR 55.46 ( c), was identified regarding differences between the simulator and the plant in response to a manual reactor scram from high power levels. This resulted in negative training provided to licensed operators and contributed to problems during recovery from an actual reactor scram on May 26, 2003. - Licensee had previously identified this simulator fidelity issue in 2000 after a scram from high power initiated by a turbine trip (e.g., the same event of 5/26/03). Simulator vessel shrink & swell modeling was not accurate - so licensee implemented batch files (e.g., work around) in model to correct discrepancy for specific simulator training scenarios initiated by turbine trip - modeling error was not included in the regular briefing for licensed operators in their training cycle -

**Diablo Canyon**

[**Issue No. 3**]
Green. NCV NonCited Violation, Failure to Maintain Simulator with respect to Backup Seismic Alarm
A noncited violation of 10 CFR 55.46 was identified by the inspectors for the failure to maintain the plant referenced simulator to respond to normal, transient and accident conditions. Pacific Gas and Electric Company removed from service, and abandoned the Backup Seismic System (Terra Tech Instrument) in place in June 2000. However, as of August 31, 2004, the plant referenced simulator still provided an annunciator fed from the backup seismic system when an earthquake of sufficient magnitude was felt. This provided operators with negative training in that operators were trained that the backup seismic system would provide annunciation and indication.

**Hope Creek**

[**Issue No. 4**]
Green. NCV NonCited Violation, SIMULATOR INCORRECTLY REPLICATED PLANT DESIGN
The inspectors identified that the Hope Creek simulator did not replicate the plant design during a station blackout (SBO) condition because the reactor core isolation cooling (RCIC) pump suction swapped from the condensate storage tank (CST) to the suppression pool. The finding

was determined to be of very low safety significance and a non-cited violation of 10 CFR 55.46(c)(1), "Plant-Referenced Simulators."

[**Issue No. 5**]
Green. Finding, FAILURE TO CONDUCT HOPE CREEK SIMULATOR TESTING IN ACCORDANCE WITH ANSI/ANS 3.5-1993. The inspectors identified that simulator performance testing on the Hope Creek simulator did not meet the standards as specified in ANSI/ANS 3.5-1993 in that: (1) "best estimate" data for the simulator testing was not used; (2) a required annual simulator transient test was not performed, and; (3) simulator test documentation did not include an evaluation and validation of test results.

[**Issue No. 6**]
Green. NCV NonCited Violation, FAILURE OF THE HOPE CREEK SIMULATOR TO DEMONSTRATE EXPECTED PLANT RESPONSE TO TRANSIENT CONDITIONS
A self-revealing Green Non-Cited Violation (NCV) of 10CFR55.45(c)(1) was identified. It involved the failure of the Hope Creek simulator to correctly replicate the plant's response to a Primary Containment Isolation Signal (PCIS) isolation of the Primary Containment Instrument Gas (PCIG) system that results in MSIVs drifting closed.

**Indian Point 2**

[**Issue No. 7**]
Green. NCV NonCited Violation, FAILURE OF THE SIMULATOR TO DEMONSTRATE EXPECTED PLANT RESPONSE TO TRANSIENT CONDITIONS. The inspectors identified a non-cited violation of 10 CFR 55.46(c)(1), involving the failure of the simulator to correctly replicate key parameters such as steam generator pressure and cold leg temperature (Tcold) during a loss of all reactor coolant pumps. Additionally, the plant decay heat load was not correctly modeled which contributed to inappropriate operator actions during the August 3, 2003, plant trip.

[**Issue No. 8**]
Green. Finding, FAILURE TO CONDUCT SIMULATOR TESTING IN ACCORDANCE WITH ANSI/ANS 3.5-1985. The inspectors identified that simulator performance testing did not meet the standards as specified in ANSI/ANS 3.5-1985 in that: (1) "best estimate" data for the simulator testing was not used; (2) all required key parameters during the simulator test were not recorded; and (3) simulator differences identified during testing were not documented and justified.

**Kewaunee**

[**Issue No. 9**]
Green. FINDING - Self-revealing NCV SDP - 10 CFR 55.46 ( d), was identified regarding failure to adequately conduct simulator performance testing throughout the life of the simulator. In addition, the licensee failed to correct modeling and hardware discrepancies and discrepancies identified from scenario validation and from performance testing. In addition, the licensee was committed to follow ANSI/ANS-3.5-1985... the licensee failed to conduct perfromance testing, with regard to normal evolutions core performance tests for Cycle 25, the most recent core load in the actual reactor. The licensee could only provide Cycle 7 core test.

[**Issue No. 10**]
Severity Level IV, NCV, 10 CFR 50.9, "Completeness and Accuracy of Information." The licensee provided inaccurate information to the NRC regarding the training requirements for reactivity manipulations using the simulator for three reactor operator license applicants. Specifically, the licensee submitted NRC Form 398's certifying that the three applicants for operator licenses met all training requirements for holding an operator license in accordance with 10 CFR 55.31. However, the licensee failed to adequately test and maintain the simulator in accordance with 10 CFR 55.46( c) to adequately take credit for reactivity manipulations on the simulator in lieu of the actual reactor.

**Nine Mile Point**

Green. Failure of the NMP Unit 1 and Unit 2 simulators to comply with 55.46(c)(1) – failure to correctly demonstrate the expected plant response to operator input and to transient conditions.

[**Issue No. 11**]
A) At **Unit 1**, simulator failed to properly demonstrate expected plant response to operators inducing a reactor cold water reactivity addition event from manual initiation of the Emergency Cooling System while conducting surveillance test procedure N1-ST-V19, "Emergency Cooling System – Heat Removal Capability Test At High Power," Revision 0. (simulator core behavior significantly different from reference core – unexpected high neutron flux, flux tilting, closure of bypass valves, etc.)

[**Issue No. 12**]
B) At **Unit 2**, simulator failed to correctly demonstrate the expected plant response to operators injecting water into the reactor vessel when mitigating accident conditions while conducting emergency operating procedures (EOP) following a loss of coolant accident (LOCA)

**Salem**

[**Issue No. 13**]
Green. Failure to conduct Salem simulator testing in accordance with ANSI/ANS 3.5-1993. The inspectors identified that simulator performance testing on the Salem simulator did not meet the standards as specified in ANSI/ANS 3.5-1993 in that: (1) "best estimate" data for the simulator testing was not used; (2) some (4 of the 11 required) annual simulator transient tests were not performed and; (3) simulator test documentation did not include an evaluation and validation of test results. This finding is more than minor because it affects the human performance (human error) attribute of the mitigating systems cornerstone. Improperly conducted simulator testing brings simulator fidelity into question.

**Three Mile Island 1**

[**Issue No. 14**]
Green. Simulator did not replicate expected plant response to steady state conditions. An NCV was identified for simulator modeling discrepancies that should have identified and corrected during required steady state performance testing as required by ANSI-ANS-3.5-1985 and 55.46. A performance deficiency existed in that licensee did not ensure that the simulator met test

acceptance criteria in replicating expected plant response to steady state conditions. (e.g. test not conducted in a manner such that out-of-tolerance parameters were identified and corrected)

**Watts Barr 1**

[**Issue No. 15**]
Actual Reference Plant Rod Drop Event of September 19, 2004 – NCV for failure to maintain adequate oversight during rod drop event. Although no simulator finding was written up in the report, it is important to note that: "… In addition, the licensee's investigation revealed additional contributors to the shift crew's poor response, including training on rod drop events in the simulator that was not realistic, the individual rod position indication in the simulator did not flash magenta on rod drops, and the plant feed-water regulating valves were over-responsive causing significant swings in feed-water flows…" Shift management became overly involved with stabilizing the secondary transient and did not maintain a broad perspective. This resulted in a 3½-minute delay in tripping the reactor due to multiple dropped control rods. ... Shift management's failure to maintain a broad perspective and becoming involved in the stabilization of the secondary system resulted in a delay in manually tripping the reactor, which could affect the fuel cladding barrier.

**Wolf Creek Generating Station**

[**Issue No. 16**]
Green: A self-revealing, NCV of CFR 55.46(1) was identified regarding simulator response to a transient condition. While completing immediate actions following a reactor trip that occurred on February 13, 2004, the Balance of plant Operator (BOP) observed what he understood to be a malfunction of the steam dump valves. Subsequent investigation revealed that the plant systems operated properly but that the BOP operator did not expect the Steam Generator Atmospheric Relief Valves (ARV) to be open while the steam dumps were closed shortly following a plant trip. The licensee identified that the simulator had not accurately modeled steam generator atomospheric relief valves post-trip operation since initial licensing. ...involved a simulator fidelity issue which impacted operator actions."

Failure to Promptly Identify a Simulator Fidelity Concern - The team determined problem identification related to the self-revealing issue was not timely because of the length of time the issue existed, prior to identification. From initial plant operation until February 9, 2004, the licensee failed to identify that the simulator response to a normal reactor trip differed from the actual plant response (Section 4OA2e)"