Kewaunee Nuclear Power Plant

Simulator Certification Report

Appendix E - Exceptions

Revision A Dated July 16, 1991

Appendix E - EXCEPTIONS

This appendix contains a compilation of all exceptions to ANSI/ANS-3.5-1985 organized by submittal report section. For each exception, the ANSI standard requirement, the exception, the justification and the completion date (if applicable) are listed.

SECTION 1.0 SIMULATOR INFORMATION

There are no exceptions related to this section of the submittal.

SECTION 2.0 SIMULATOR DESIGN DATA

There are no exceptions related to this section of the submittal.

SECTION 3.0 SIMULATOR TESTING

SECTION 3.1 TESTING SCOPE, DEVELOPMENT, IMPLEMENTATION AND EVALUATION

Test Exceptions are identified in the following sub-sections of 3.1.

SECTION 3.1.1 COMPUTER REAL TIME TESTING

There are no exceptions related to this part of the submittal.

SECTION 3.1.2 NORMAL OPERATIONS TESTING

Section 3.1.1 of ANSI/ANS-3.5-1985 states in part:

"The minimum evolutions that the simulator shall be capable of performing, using only operator action normal to the reference plant, are as follows:

7) Startup, shutdown and power operations with less than full reactor coolant flow;
9) Core performance testing such as ..., determination of shutdown margin,...;
10) Operator conducted surveillance testing on safety-related equipment or systems."

The following four exceptions are taken to section 3.1.1 of ANSI/ANS-3.5-1985:

1) Kewaunee Nuclear Power Plant does not startup, shutdown or operate at power with less than full reactor coolant flow. An assumption in the Updated Safety Analysis Report analysis of the locked rotor accident assumes that both reactor coolant pumps are operating prior to the event. Therefore WPS has administrative and procedural restrictions

which prevent closing of the reactor trip breakers without both reactor coolant pumps operating.

2) Kewaunee Nuclear Power Plant Operators do not perform shutdown margin calculations. For each refueling cycle, the Reactor Engineering Department performs a shutdown margin calculation assuming that the most reactive rod is fully withdrawn. Using this calculation, the Operations department assumes shutdown margin is met with one rod fully withdrawn. Should more than one rod remain fully withdrawn after a reactor trip, it is assumed shutdown margin is not met and appropriate action taken in accordance with plant procedures.

3) Operations Surveillance Procedure (SP) 42-047 (Diesel Generator Combined Monthly Test) was not performed. It is stated in SP 42-047 that if SP 42-109 (Diesel Generator Manual Test) and SP 42-152 (Automatic Load Sequence Test) are run separately, then SP 42-047 need not be performed. Since SP 42-109 and SP 42-152 were run separately, SP 42-047 was not performed.

4) Operation Surveillance Procedure 87-274 (Biennial Validation of MOV Position Indication Operation) was not performed. SP 87-274 does not involve any simulator operations by the operator.

SECTION 3.1.3 CONTROL FUNCTION TESTING

Section 3.1.2 of ANSI/ANS-3.5-1985, states in part:

"The simulator shall be capable of simulating, in real time, abnormal and emergency events including malfunctions to demonstrate inherent plant response and automatic plant control functions. Each type of accident analyzed in the reference plant Safety Analysis Report that results in observable indication on control room instrumentation and for which the simulator is determined to be appropriate for training shall be simulated. ... The malfunctions listed below shall be included:

3) Loss or degraded electrical power to the station, including... loss of power to the individual instrumentation buses (AC as well as DC) that provide power to control room indication or plant control functions affecting the plant's response;
12) Control rod failure including stuck rod, uncoupled rods, drifting rods, ...;
25) Reactor pressure control system failure including turbine bypass failure (BWR)."

The following 13 exceptions are taken to section 3.1.2 of ANSI/ANS-3.5-1985:

1) Loss of power to D.C. Instrumentation buses was not performed. Kewaunee Nuclear Power Plant is in the process of completing a major modification to the DC electrical distribution system. This will be followed up with modification of the simulator DC electrical distribution system, at which time the modification performance test will be performed. This will be completed on the simulator by 12/31/91.

2) Control rod failure - "uncoupled rods" was not performed. The term "uncoupled rod(s)" is not applicable to Westinghouse PWRs such as the Kewaunee Nuclear Power Plant.

3) Control rod failure - "drifting rods" was not performed. The term "drifting rod(s)" is not applicable to Westinghouse PWRs such as the Kewaunee Nuclear Power Plant.

4) Reactor pressure control system failure including turbine bypass failure was not performed. This is not applicable to Westinghouse PWRs such as the Kewaunee Nuclear Power Plant.

5) USAR Accident Uncontrolled RCCA Withdrawal from a Subcritical Condition was not performed. Operator actions for this are the same as Normal Operations test run #20400001 (Reactor Startup) until the point when the continuous rod withdrawal malfunction would be inserted. At this point, operator action would be to manually trip the reactor, which was performed in several Control Function tests.

6) USAR Accident Chemical and Volume Control System Malfunction - Dilution During Refueling was not performed. Refueling operations (Reactor Vessel Head Removed) can not performed on the simulator.

7) USAR Accident Chemical and Volume Control System Malfunction - Dilution During Startup was not performed. Due to the nature of the event, in that it takes a long time to perform, the classroom is a more appropriate training setting for this accident.

8) USAR Accident Loss of Reactor Coolant Flow - Low Frequency, was not performed. This accident assumes a decrease in grid frequency at 5 Hz/sec until a reactor trip occurs at 54.5 Hz. This accident is enveloped by the simultaneous trip of both reactor coolant pumps. Operator actions are the same for simultaneous trip of both reactor coolant pumps (Control Function Test Run #34000001) as they are for loss of reactor coolant flow - low frequency.

9) USAR Fuel Handling Accidents were not performed. The classroom is a more appropriate training setting for these accidents.

10) USAR Accidental Release of Waste Liquid Event was not performed. Since the only indication in the control room of an accidental release of waste liquid is radiation monitoring indications and alarms (indications which can be controlled by the instructor) and there are no mitigating actions an operator can take from the control room, this event was not performed.

11) USAR Accidental Release of Waste Gases Event was not performed. Since the only indication in the control room of an accidental release of waste gas is radiation monitoring indications and alarms (indications which can be controlled by the instructor) and there are no mitigating actions an operator can take from the control room, this event was not performed.

12) USAR Accident Turbine missile damage to spent fuel pool was not performed. The classroom is a more appropriate training setting for this accident.

13) USAR Accident Charcoal Filter Ignition due to Iodine Absorption was not performed. The classroom is a more appropriate training setting for this accident.

SECTION 3.1.4 REMOTE FUNCTION TESTING

There are no exceptions related to this part of the submittal.

SECTION 3.1.5 STEADY STATE TESTING

There are no exceptions related to this part of the submittal.

SECTION 3.1.6 TRANSIENT TESTING

There are no exceptions related to this part of the submittal.

SECTION 3.2 TEST DEVELOPMENT AND IMPLEMENTATION

There are no exceptions related to this part of the submittal.

SECTION 3.3 REVIEW AND APPROVAL OF TEST RESULTS

There are no exceptions related to this part of the submittal.

SECTION 3.4 TEST ABSTRACT FORMAT

There are no exceptions related to this part of the submittal.

SECTION 3.5 TEST ABSTRACTS

Section 3.1 of ANSI/ANS-3.5-1985 states:

"The response of the simulator resulting from operator action, no operator action, improper operator action, automatic plant controls and inherent operating characteristics shall be realistic to the extent that within the limits of the performance criteria (Section 4, Performance Criteria) the operator shall not observe a difference between the response of the simulator control room instrumentation and the reference plant."

The following tests have exceptions to section 3.1 of the standard;

Test No.	Exception	Justification	Est. Comp.
42-152	During performance of operator conducted surveillance procedure 42-152, "Automatic Load Sequence Test", the time tolerance between Sequence of Events point N-245 and A-245 and between N-246 and A-246 could NOT be achieved.	The simulator does not have the ability to scan the same SER point within the time required to meet acceptance criteria of the Surveillance Procedure (<.5 seconds). This has no negative impact on testing or training and therefore, will not be corrected.	N/A
207	While conducting a normal operation test from hot standby to 100% power the timed opening of reheater steam inlet control valves had to be manipulated manually because of a broken cam within the controller.	In the simulator environment, resetting plant conditions exposes the cam to abuse that does not exist in the plant. After many attempts to keep the automatic cam drive operational a decision was made to allow manual manipulation of the cam. This mode of operation has minimal impact on operator training or testing.	N/A

Section 3.3.1 of ANSI/ANS-3.5-1985 states:

"The inclusion of systems of the reference plant and the degree of simulation shall be to the extent necessary to perform the reference plant evolutions described in 3.1.1 (Normal Plant Evolutions), and the malfunctions described in 3.1.2 (Plant Malfunctions). It shall be possible to perform these control manipulations and observe plant response as in the reference plant. This shall include system interactions with other simulated systems and shall provide total system integrated response."

The following test has an exception to section 3.3.1 of the standard;

Test No.	Exception	Justification	Est. Comp.
33-144	During performance of operator conducted surveillance procedure 33-144, "Accumulator Isolation and Check Valve Test", the accumulator check valve test could not be performed because the SI test lines are NOT modeled.	Modeling of the SI Test Lines is not necessary since there is no training or testing value, other than the performance of this S.P.	N/A

The exception related to Section 3.3.2 of ANSI/ANS 3.5-1985 has been resolved (associated Test No.: 05B-104)

Section 4.2.1 of ANSI/ANS-3.5-1985 states:

"Tests shall be conducted to prove the capability of the simulator to perform correctly during the limiting cases of those evolutions identified in 3.1.1 (Normal Plant Evolutions) and 3.1.2 (Plant Malfunctions) of this standard. Acceptance criteria for these tests shall:

(a) where applicable, be the same as plant startup test procedure acceptance criteria;

(b) require that the observable change in the parameters correspond in direction to those expected from a best estimate for the simulated transient and do not violate the physical laws of nature;

(c) require that the simulator shall not fail to cause an alarm or automatic action if the reference plant would have caused an alarm or automatic action, and conversely, the simulator shall not cause an alarm or automatic action if the reference plant would not cause an alarm or automatic action."

The exceptions associated with the following tests have been resolved: 155, 158, 33-191, 201, 301, 305, 307, 310, 312, 315, 317, 320, 321, 322, 326, 328, 330, 339, 340, 341, 343, 345, 349, 354, 358, 363, 364, 366, 376, 406, 407, and 436.

The following test is an exception to acceptance criteria (b) of section 4.2.1 of the standard;

NORMAL OPERATIONS EVOLUTIONS (From report section 3.5.2).

211	While conducting a normal operation test from 100% power to hot standby and cooldown to cold shutdown, RCS pressure decreased during the cooldown in an uncontrolled fashion and could NOT be recovered.	This malfunction occurs 40 minutes into the cool-down. Due to the limited simulator time available during training, the op-erators would initiate the cooldown and then once established, move on to the next initial cond-ition to achieve the maximum benefit from the time available.	12/31/91

The following test is an exception to acceptance criteria (c) of Section 4.2.1 for the standard;

REMOTE FUNCTION TESTS (From report section 3.5.4)

408	With breaker G-1 and the G-1 breaker disconnect closed simultaneously it was expected that auxiliary switch 52Z/301 would operate. It did NOT.	Impact on training is minimal since the in-structors are informed of this problem and would indicate to the trainees the proper operation of the relay.	12/31/91

Section B.2.2 of Appendix B, ANSI/ANS-3.5-1985, states:
"Transient Performance. Run the following set of transients from an initial condition of approximately 100% power, steady state xenon and decay heat with no operator follow up action (unless otherwise noted):

(1) Manual reactor trip.

(2) Simultaneous trip of all feedwater pumps.

(3) Simultaneous closure of all Main Steam Isolation Valves.

(4) Simultaneous trip of all reactor coolant pumps.

(5) Trip of any single reactor coolant pump.

(6) Main Turbine trip. (maximum power level which does not result in immediate reactor trip.)

(7) Maximum rate power ramp (100% down to approximately 75% and back up to 100%)

(8) Maximum size Reactor Coolant system rupture combined with loss of all offsite power.

(9) Maximum size unisolable main steam line rupture.

(10) Slow Primary System depressurization to saturated condition using pressurizer relief or safety valve stuck open. (inhibit activation of high pressure Emergency Core Cooling Systems)

B2.2.1 For transients B2.2(1), B2.2(2), B2.2(3), B2.2(4), B2.2(6), and B2.2(7), record the following parameters simultaneously versus time with a resolution of 0.5 seconds or less:

. Neutron flux (%)
. Average temperature
. Pressurizer pressure
. Pressurizer level
. Pressurizer temperature
. Total steam flow (if available)
. Total feedwater flow (if available)
. Hot leg temperature (any single loop)
. Cold leg temperature (same loop as hot leg temperature)
. Steam generator secondary pressure (same loop as hot leg temperature)
. Steam generator level (same loop as hot leg temperature).

B2.2.2 For transient B2.2(5), record the following parameters simultaneously versus time with a resolution of 0.5 seconds or less:

. Neutron flux (%)
. For both affected and unaffected loops
. Hot leg temperature
. Cold leg temperature
. Steam generator secondary pressure

- Steam generator level
- Steam generator steam flow (if available)
- Steam generator feedwater flow.

B2.2.3 For transients B2.2(8) and B2.2(9), record the following parameters simultaneously versus time with a resolution of 0.5 seconds or less:

- Pressurizer pressure
- Narrow range pressurizer pressure
- Pressurizer level
- Containment pressure
- Containment temperature.

B2.2.4 For transient B2.2(10), record the following parameters simultaneously versus time with a resolution of 0.5 seconds or less:

- Relief valve flow (if available)
- Pressurizer pressure
- Pressurizer temperature
- Pressurizer level
- Loop flow rates
- Surge line temperature
- Hot leg temperature (surge line leg)
- Source range monitor output
- Reactor vessel level (if available)
- Saturation margin monitor output (if available)"

The following exceptions to Appendix B, section B2.2.1 of the standard were taken;

Test No.	Exception	Justification	Est. Comp.
151	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the individual flows.	N/A
151	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater flow is not available. Total Feedwater Flow was derived from the sum of the individual flows.	N/A

152	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the indiv- idual flows.	N/A
152	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater flow is not available. Total Feedwater Flow was derived from the sum of the indiv- idual flows.	N/A
153	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the indiv- idual flows.	N/A
153	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater Flow is not available. Total Feedwater Flow was derived from the sum of the indiv- idual flows.	N/A
154	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the indiv- idual flows.	N/A
154	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater Flow is not available. Total Feedwater Flow was derived from the sum of the indiv- idual flows.	N/A
156	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the indiv- idual flows.	N/A

156	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater Flow is not available. Total Feedwater Flow was derived from the sum of the individual flows.	N/A
157	Steam generator A and B steam flow was used in place of total steam flow.	Total Steam Flow is not available. Total Steam Flow was derived from the sum of the individual flows.	N/A
157	Steam generator A and B feedwater flow was used in place of total feedwater flow.	Total Feedwater flow is not available. Total Feedwater Flow was derived from the sum of the individual flows.	N/A

The following exception to Appendix B, section B2.2.2 of the standard was taken;

155	Steam generator A and B auxiliary feedwater flow was used instead of steam generator feedwater flow.	The trip of one RCP from 100% power causes a reactor trip followed shortly thereafter by a main FW isolation signal which reduces main FW flow to zero. Trending auxiliary FW flow allows for a more detailed analysis of the event.	N/A

The following exceptions to Appendix B, section B2.2.4 of the standard were taken;

Test No.	Exception	Justification	Est. Comp.
160	Relief valve flow was NOT monitored.	Relief valve flow is not available	N/A

160	Reactor vessel level was NOT monitored.	Reactor Vessel level was not available at the time the test was run. However, reactor vessel level is now available and will be included as a monitored parameter during the quadrennial requalification cycle.	Complete

SECTION 4 MISCELLANEOUS TESTS AND EVALUATIONS

There are no exceptions related to this section of the submittal.

SECTION 5.0 SIMULATOR DISCREPANCY RESOLUTION AND UPGRADING PROGRAMS

SECTION 5.1 SIMULATOR DISCREPANCY IDENTIFICATION

There are no exceptions related to this section of the submittal.

SECTION 5.2 SIMULATOR UPGRADING PROGRAM

There are no exceptions related to this section of the submittal.

SECTION 5.3 SIMULATOR WORK ORDER (SWO) PROCESS

There are no exceptions related to this section of the submittal.

SECTION 5.4 SCHEDULING OF WORK

There are no exceptions related to this section of the submittal. The exception associated with DCR 891 has been resolved.

SECTION 5.5 SIMULATOR REVIEW COMMITTEE

There are no exceptions related to this section of the submittal.

SECTION 5.6 SIMULATOR MAINTENANCE SUPPORT REQUESTS

There are no exceptions related to this section of the submittal.

SECTION 6.0 SCHEDULE FOR RECERTIFICATION AND CHANGES TO TESTING

There are no exceptions related to this section.

SECTION 7.0 MISCELLANEOUS

There are no exceptions related to this section.

APPENDIX A SIMULATOR ENVIRONMENT COMPARISON

SECTION A.1 SIMULATOR PHYSICAL CONFIGURATION

There are no exceptions related to this section.

SECTION A.2 SCOPE OF SIMULATION

See Section 3.0 of this appendix for exceptions related to the scope of simulation.

SECTION A.3 SIMULATOR CONTROL ROOM ENVIRONMENT

There are no exceptions related to this section.

APPENDIX B INSTRUCTOR INTERFACE

There are no exceptions related to this section.

APPENDIX C SAMPLE DESIGN DATABASE PRINTOUTS

There are no exceptions related to this section.

APPENDIX D QUADRENNIAL CERTIFICATION TEST SCHEDULE

There are no exceptions related to this section.

Kewaunee Nuclear Power Plant

Simulator Certification Report

Test Abstracts

Test Run No. 21900001

Test Run No. 22000001

TEST ABSTRACT

TYPE: Normal Operations

TEST RUN NO: 21900001

CONTROL FILE NO: 014

TEST RUN DATE: 02/11/91

TEST DURATION: 1 hour 35 min.

TITLE: Control Rod Worth Using Rod Swap

VARIABLE: N/A

INITIAL CONDITION: END OF TEST RUN #21800001

NATURE OF BASELINE DATA: Actual Plant Data

APPLICABLE SECTION OF ANSI 3.5: 3.1.1(9)

DESCRIPTION:

Control Bank B is inserted until a - .5 DPM SUR is obtained. Control Bank A (reference bank) is withdrawn to obtain a +.5 DPM SUR. These steps are repeated until control bank B is fully inserted. Control Bank B is then withdrawn until a +.5 DPM SUR is obtained. Control Bank A is inserted to obtain a -.5 DPM SUR. These steps are repeated until control Bank B is fully withdrawn. This process is then repeated for all remaining shutdown and control banks. When the process is completed for all remaining shutdown and control banks, a boration is initiated. During the boration, control Bank A is periodically withdrawn to maintain a 0 DPM SUR. The boration is stopped when control Bank A is nearly fully withdrawn.

RESULTS:

Test parameters trended in the expected direction. Expected automatic actions and alarms did occur. Test results are satisfactory.

FOLLOW UP ACTION:

None

Reviewed by Certification Review Board

[signature]
Certification Review Board Chairman

2-20-91
Date

91-11
Mtg. No.

TEST ABSTRACT

TYPE: Normal Operations

TEST RUN NO: 22000001

CONTROL FILE NO: 013

TEST RUN DATE: 11/12/90

TEST DURATION: 23 min.

TITLE: Isothermal Temperature Coefficient Measurement

VARIABLE: N/A

INITIAL CONDITION: HOT STANDBY, REACTOR CRITICAL AT E-8 AMPS, RCS TEMP 547 DEG F, RCS PRESS 2230 PSIG, BEGINNING OF CORE LIFE, RCS BORON 1170 PPM (IC# 6)

NATURE OF BASELINE DATA: Actual Plant Data

APPLICABLE SECTION OF ANSI 3.5: 3.1.1(9)

DESCRIPTION:

The isothermal temperature coefficient measurement was accomplished by performing the applicable steps of reactor test procedure "Isothermal Temperature Coefficient Measurement". The simulator is initialized with reactor power below the point of adding heat. The reactor coolant system is cooled down approximately 5 deg F, using steam dump to condenser. RCS temperature is stabilized. RCS is then heated up approximately 10 deg F, and stabilized.

RESULTS:

Test parameters trended in the expected direction. Expected automatic actions and alarms did occur. Test results are satisfactory.

FOLLOW UP ACTION:

None

Reviewed by Certification Review Board

Lee M. W. McA	2-12-91	91-10
Certification Review Board Chairman	Date	Mtg. No.