80-555
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Babcock & Wilcox

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February 6, 1980

To: Technical Experts and Subcommittee Members

Gentlemen:

This is to confirm that there will be a second simulator standard review meeting to solicitate comments and suggestions for the revised standard plus it appendixes will be held at Combustion Engineering February 20 and 21, 1980. There have been external reviews by members of NUPPSCO and a consensus response must be developed. Attached is the proposed Appendix A and B to the standard plus NUPPSCO comments. The meeting will be held at the Combustion Engineering Training Center (part of the CE main office), 1000 Prospect Hill Road, Windsor, Connecticut. Pete Walzer, Manager of Training Services for Combustion Engineering will be our host. His phone number is 203-688-1911.

Meeting Agenda

8:00 a.m. - February 20, 1980

Resolve NUPSCO Comments on Main Body of Standard

Review and Resolve Comments on the Proposed Appendix A & B

Invited Technical Experts are:

J.R. Hill
R.M. Rosser
Ian Hay
Jerry Holman
Dean Crawford
Jim Cox

Subcommittee Members are:

N.S. Elliott, Chairman
P.E. Walzer, Member
F.L. Kelly, Member
H.L. Abercrombie, Member

Sincerely,

N.S. Elliott, Manager
Training Services

NSE/ncv
cc: H.J. Green

AMERICAN NATIONAL STANDARD FOR NUCLEAR POWER PLANT SIMULATORS

FOR USE IN OPERATOR TRAINING ANSI/ANS-3.5-1979

APPENDIX A

Procedure for Reporting Simulator Performance

The purpose of this procedure is to provide ~~a~~ standard ~~report format~~ documentation for demonstration of a simulator's conformance to the requirements of ANS 3.5. It is intended that the ~~report~~ document provide sufficient detail ~~to allow an independent audit by an outside agency~~ and provide for operator & simulator purposes ~~comparative data among simulators~~.

The report format is organized in a way to allow independent training capability modification, data collection and testing.

This documentation shall be maintained at the simulator facility.

1. SIMULATOR INFORMATION

   1.1 General

   1.2 Control Room

   1.3 Instructor Interface

   1.4 Operating Procedures for Simulated Plant

   1.5 ~~Training Staff and Curriculum~~

   1.6 Changes Since Last Report

2. SIMULATOR DATA BASE

   2.1 System Descriptions

   2.2 Physics Data

   2.3 Steady State Operating Conditions

   2.4 Transient Operating Conditions

   2.5 Malfunction Operating Conditions

   2.6 Design Analysis Data

   2.7 Protective and Control Setpoints

   2.8 Interlock and Control Logic

3. SIMULATOR TESTS

   3.1 Normal Operations

   3.2 Abnormal Operations

   3.3 Personnel Conducting Tests

   3.4 Anticipated Upgrading

1. SIMULATOR INFORMATION

This section contains "name plate" data, control room information, instructor interface features, ~~and descriptions of training evolutions.~~ The intent is to provide familiarization with the specific simulator and its general applicability as an operator training vehicle. (Note: The symbol, §, denotes reference to ANSI/ANS 3.5)

1.1 General

Owner/Operator/Manufacturer - Initial Operating Date -

Reference Plant - Initial Operating Date -

Type of Report (Initial Operation, Initial Update,

Subsequent Update) -

~~Training Application -~~

1.2 Control Room

Physical arrangement of control room equipment.

Comparison to Reference Plant.

Equipment not in Simulator Control Room.

(e.g. Security system desk.)

Equipment included in simulator control room.

(e.g. Nuclear Instrument Racks, System Test Cabinets).

1.3 Instructor Interface

Location of instructor controls.

Simulator Initial Condition List (§ 3.4)

Control provided for systems operated/controlled from outside control room. (§ 3.3.2)

Malfunction ~~descriptions~~ list (§ 3.1.2)

1. Generic Accidents
2. Required abnormal and emergency conditions
3. Other malfunctions

Special instructor/training features for Simulated Plant (§ 3.1.1)

1.4 Operating Procedures for Simulated Plant

Indicate significant difference between simulator procedures and reference plant procedures.

Special procedures identified ~~used only~~ for simulator testing.

Normal operating procedures for simulated plant.

Abnormal operating procedures for simulated plant. (Include procedures as an appendix).

1.5 Training Evolutions

Description of the training evolutions performed in the simulator training programs.

1.6 Changes Since Last Report

List by category.

Put requirement for [illegible] in Sec 5. Reference data base

2. Simulator Data Base

This section contains details which are pertinent to the reference plant including design analysis data, plant parameters, plant system description, plant operations and testing data. The intent is to present the complete data base from which the simulator was designed, on which upgrading has been and may be based, and with which correlation will be shown.

2.1 System Descriptions

1. General system functional and component description for reference plant.
2. Volumes, masses, etc.
3. Characteristics of active components (Pump head curves, valve stroke times, etc.)
4. Tabulation of critical parameters for this system. (§2.)

2.2 Physics Data

1. Outline of reference plant physics test procedure.
2. Source of data (e.g. design data, reference plant and date).
3. List of values of physics parameters (modulator and Dopples coefficients, rod worth, etc.) for each fuel cycle.
4. List of values of related parameters (rod insertion time, flow coastdown time, etc.)
5. List of special instrumentation used to obtain these measurements.

Should explain [illegible] simulator.

Put data base requirements in section 5

2.3 Steady State Operating Conditions

1. Description of Steady State condition (e.g. hot shutdown, 20% load, etc.). including equipment lineups,
2. Source of data (e.g. design data, reference plant and date).
3. List of the values of all critical parameters ~~and all non-critical parameters~~ including system I.D. and source (e.g. meter tag no., computer printout, etc.)
4. Note operating procedure sequence being followed (and any abnormal conditions.)

2.4 Transient Operating Conditions

1. Description of transient (e.g. ~~increase in plant load from 40% to 85% at 2% per minute, high head injection surveillance test~~, etc.) including initial & end states, turbine trip, reactor trip
2. Source of data.
3. List of the values of pertinent critical parameters ~~and non-critical parameters~~ at reasonable frequency before, during and after transient.
4. Provide limits of applicable plant startup acceptance test criteria.
5. Note operating procedure sequence being followed and any abnormal conditions.

2.5 Malfunction Operating Conditions

1. Description of ~~malfunction initiation.~~
2. Source of data.
3. Values of critical parameters observed or calculated before, during and after the transient.
4. Note operating procedure being followed at the time of the malfunction, procedure used to control malfunction and indications that caused a change from normal to emergency procedures, if any.

2.6 Design Analysis Data

1. Supporting analytical data for the accident conditions simulated but not observed in an operating plant.
2. Indicate conservative factors included in the analysis.

2.7 Protective and Control Setpoints

List of setpoint values and source.

2.8 Interlock and Control Logic

List of documents showing current interlock and control logic.

3. Simulator Tests

This is the ~~main~~ testing ~~report~~. It demonstrates the functioning of the operational features listed in Section 1, and the correlation of the simulator performance with the data base in Section 2. The intent is to demonstrate compliance with the requirements of ANSI/ANS 3.5 1979.

3.1 Normal Operations

1. ~~Verify~~ control room equipment. List changes in reference plant and simulator since last report.
2. Demonstrate that the simulator initial conditions correspond to those listed in Section 1.3, ~~and indicate the step in the operating procedure sequence to which each initial condition corresponds~~.
3. Perform the plant evolutions required in § 3.1.1 of the standard, ~~using the operating procedures in Section 1.4~~. Indicate procedures used for regular training programs as opposed to those used for simulator testing (e.g. core physics tests). Verify that the instructor local plant controls and training evolution procedures produce a realistic operating environment for the plant operators.
4. Maneuver the simulated plant to the steady state operating conditions for which data are available in Section 2.3. At each condition perform mass and energy balances, and record the computed value and displayed value of all critical parameters, ~~and all noncritical parameters~~. Show that these values fall within the limits given in § 4.1 of the standard.

5. With the simulator operating at steady state, ~~full~~ power, ~~in automatic control~~ record all critical parameters computed values at ten minute intervals for a 60-minute period. Show that these values fall within the limits given in § 4.1 of the standard.

6. Maneuver the simulated plant through the transient operating conditions for which data are available in Section 2.4. Record the set of parameters for which data were obtained in a similar manner. Compare the performance of the simulated plant ~~to the~~ transient data, startup test criteria and other ~~criteria~~ specified in § 4.2 of the standard.

3.2 Abnormal Operations

1. Initiate the ~~malfunction condition~~ for which data are ~~available~~ in Section 2.5 from an operating plant. If this is not a standard simulated malfunction explain the method used to initiate the malfunction condition for the test. Compare the simulator and ~~observed~~ data and show that they ~~meet the criteria~~ specified in § 4.2 of the standard.

2. Initiate each of the malfunction conditions listed in Section 1.3. Indicate whether the malfunction is required or optional within the simulator training program. Record appropriate critical parameters and show that they ~~meet the criteria specified in~~ § 4.2 of the standard.

3.3 Personnel Conducting Tests

Summarize the background and experience of the personnel conducting these tests.

3.4 Anticipated Upgrading

Describe ~~Possibilities and~~ plans for upgrading the training simulator ~~should be discussed~~ when correlations do not comply with the performance criteria.

AMERICAN NATIONAL STANDARD FOR NUCLEAR POWER PLANT SIMULATIONS

FOR USE IN OPERATOR TRAINING ANSI/ANS-3.5-1979

APPENDIX B

IMPLEMENTATION SCHEDULE

The implementation of ANSI 3.5 of 1980 to existing simulators (those which are in use as training devices) concerns the requirements of Section 5 Simulator Update. The adoption of this standard and endorsement by the Nuclear Regulatory Commission will make the standard applicable to all simulators which are already being utilized in approved operator licensing preparation and requalification programs. The implementation of Section 5 of the standard shall be demonstrated through the completion of the Procedure for Reporting Documenting Simulator Performance; Appendix A. The minimum acceptable schedule is:

Section 1., Simulator Information and Section 2, Simulator Data Base, shall be complete within one year of NRC endorsement adoption of the standard.

Section 3, Simulator Tests, shall be conducted and initial report prepared documented within two years of NRC endorsement adoption of the standard. Deviation from the data base shall be corrected and the simulator shall be in full compliance within three years of NRC endorsement adoption.