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RECIP.NAME RECIPIENT AFFILIATION
MURLEY,T.E. Office of Nuclear Reactor Regulation, Director (Post 870411

SUBJECT: Forwards corrected simulator test performance abstracts, initially submitted via 910325 ltr.Deviations noted that exceeded 10% tolerance for noncritical parameters.

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Iowa Electric Light and Power Company

JOHN F. FRANZ, JR.
VICE PRESIDENT, NUCLEAR

June 30, 1992
NG-92-2736

Dr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Plant-Referenced Simulator Certification Report
Reference: Letter NG-91-0596, D. Mineck to T. Murley, March 25, 1991
File: A-205h, H-41e

Dear Dr. Murley:

In accordance with the Code of Federal Regulations, Title 10, Section 55.45(b), Iowa Electric Light and Power Company (IELP) submitted a completed NRC Form 474 in March, 1991 (see reference). Upon further review, we discovered that our position on ANSI/ANS-3.5-1985 Sections 4.1(3) and 4.1(4) was not included in that report. Additionally, we discovered that four simulator performance test abstracts which identified deviations that exceeded the 10% tolerance for non-critical parameters were incomplete. The deviations were documented, but justifications for allowing the deviations to continue without correction were not.

The Attachments to this letter describe our position in regard to the above ANSI/ANS Standard, and include an addendum to the simulator performance test abstracts with the appropriate justification.

If there are any questions concerning this matter, please contact Mr. Steve Swails, Manager, Nuclear Training, at (319) 851-7795.

Very truly yours,

John F. Franz, Jr.
Vice President, Nuclear

SLS/pdm/twp

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Attachments: 1) IELP Position on ANSI/ANS-3.5-1985 Sections 4.1(3) and 4.1(4)
2) Copies of Simulator Performance Test Abstracts for Tests 4.1.2, 4.1.3, 4.1.4, and 4.1.5
3) Addendum to Simulator Performance Test Abstracts for Tests 4.1.2, 4.1.3, 4.1.4, and 4.1.5

cc: S. Swails
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IELP Position on ANSI/ANS-3.5-1985 Sections 4.1(3) and 4.1(4)

ANSI/ANS-3.5-1985 Standard Sections 4.1(3) and 4.1(4) state in part:

"The simulator computed values for steady state, full power operation with the reference plant control system configuration shall be stable and not vary more than +/- 2% of the initial values over a 60-minute period."

"The simulator computed values of critical parameters shall agree within +/- 2% of the reference plant parameters and shall not detract from training."

"The calculated values of non-critical parameters pertinent to plant operation, that are included on the simulator control room panels, shall agree within +/- 10% of the reference plant parameters and shall not detract from training."

IELP Position:

The tolerances specified in ANSI/ANS-3.5-1985 are inconsistent when considered over the entire range of the measured parameter. If the measured parameter range is 0 to 100 inches, the +/- 2% tolerance at the top of the range, (as an example, say 100 inches), would allow a simulator calculated value between 98 and 102 inches. The same +/- 2% tolerance near the bottom of the range, (as an example, say 5 inches), would dictate the calculated value be between 4.9 and 5.1 inches. We do not believe that the range of calculated values at the lower end requires a higher accuracy, in absolute value, than that at the higher end to meet the intent of the Standard. This is particularly true when one considers that the instrumentation observed by the operator uses a typical meter accuracy of +/- 2% of full scale over the entire range of the instrument.

We based the 2% and 10% simulator accuracies on "percent of full scale" rather than "percent of the reference plant value", which is implied by ANSI/ANS-3.5-1985. This is justifiable because normal meter accuracies (typically 2% of full scale) mask the small differences associated with readings at the lower end of the meter scale. It is our position that the method for calculating differences based on normalizing scales is consistent and in accordance with the intent of the Standard. The basis for our position is as follows:

1. Parameters are observed and monitored by operators in the Duane Arnold Energy Center Simulator on meters, indicators, recorders and controllers. Parameters include items such as temperature, pressure, level, flow, power, speed, etc. The operator uses a mental "steady state band" for each parameter which represents the steady state condition for that parameter, based on his/her experience under similar steady state conditions in the reference plant. For steady state conditions, the operator will observe simulator conditions and potentially note any differences between the reference plant indication and the simulator indication. If the parameter value is different, then the operator will use his/her mental "steady state band" to determine if the simulator indicated value deviates significantly

from the reference plant indicated value. This variation is based on percent of scale difference from the reference value.

2. The meter accuracy is applicable over the full scale deflection of the meter. A typical meter has a guaranteed accuracy or allowed tolerance over the 0% to 100% range of meter movement. The meter is normally most accurate at mid scale and must demonstrate accuracy within the allowed specification at ten points over the range of the indicated parameter. If 2% accuracy is available on the meter, this is 2% of the 100% scale value. If 1% accuracy is available on the meter, this is 1% of the 100% scale value.

3. We must ensure the allowable deviation can be "seen" on the relevant instrumentation. A situation could arise on a particular instrument, where a very small change would be impossible to discern on an instrument that had a broad display range, and graduations much larger than the error tolerances themselves. If the initial reading was at the low end of the indication, close to zero, and a very small change is observed, a deviation of 10% to 1000% would not be unusual if the 2% and/or 10% deviation is based on the percent of the reference value vs. the percent of the indication range. Thus the IELP position is that the scale range of the meter must be used to determine the 2% or 10% value. This allows for the measurement of a known and consistent meter deflection from the reference value with a mental "steady state band" allowable.

Summary:

The ANSI/ANS-3.5 Writing Committee has studied the allowable tolerance error of critical parameters. EPRI NP-7081-L "Investigation of the Accuracy of Steady-State Critical Parameters Necessary for Operator Training", describes the methods used in the study. Final results have not yet been approved by the ANSI/ANS-3.5 Committee. However, the draft copies of revisions to the Standard indicate that the committee agrees with the IELP position. The final approval may resolve this in the future. Until that time, IELP considers that the above method is both accurate and meets the intent of the Standard.

SIMULATOR PERFORMANCE TEST ABSTRACT

Test # 4.1.2 Date of Test 12/26/90

Test Rev. # 0 Revision Date 07/06/89

DESCRIPTION OF TEST:

50% power for steady state operation, per ANSI/ANS-3.5-1985, section 4.1, 5.4.2, app. B. Beginning of life for core cycle.

Was this test performed to comply with ANSI/ANS 3.5, Section 3.1.2?

___ Yes _X_ No

If so, state applicable malfunction number(s) from section 3.1.2.

N/A

Initial Severity N/A

Final Severity N/A

Delay Time N/A

Trigger definition: N/A

Tested Option N/A

Initial Condition IC-13

Duration of Test 20 minutes

DESCRIPTION OF FINAL CONDITION:

Simulator stable at 50% power.

DESCRIPTION OF BASELINE DATA USED FOR FIDELITY COMPARISON:

Reference plant data, GE heat balance, power to flow map and plant heat balance data. 7584-M1-N12-(5-2, 4-1, 3-1, 2-1)

DEFICIENCIES NOTED:

Computer point B060 higher than design. (CRD pump discharge temp.) and points TO39/TO40, lower than design. (HP and LP condenser pressures).

CORRECTION ACTIONS PLANNED:

None

EXCEPTIONS TO ANSI/ANS-3.5-1988 TAKEN AS A RESULT OF THIS TEST (INCLUDE JUSTIFICATION):

Due to plant design changes, actual values obtained for B060 (CRD) is based on plant actual data not GE design. LP and HP condenser pressure is due to having installed four additional cooling tower cells.

Test Performed by	Date 12/26/90
CMS Update Made by	Date 2/15/91
Simulator Supervisor Review.	Date 2/15/91

SIMULATOR PERFORMANCE TEST ABSTRACT

Test # 4.1.3 Date of Test 12/26/90

Test Rev. # 0 Revision Date 07/06/89

DESCRIPTION OF TEST:

75% power for steady state operation, per ANSI/ANS-3.5-1985, section 4.1, 5.4.2, app. B. Beginning of life for core cycle.

Was this test performed to comply with ANSI/ANS 3.5, Section 3.1.2?

___ Yes X No

If so, state applicable malfunction number(s) from section 3.1.2.

N/A

Initial Severity N/A

Final Severity N/A

Delay Time N/A

Trigger definition: N/A

Tested Option N/A

Initial Condition IC-23

Duration of Test 20 minutes

DESCRIPTION OF FINAL CONDITION:

Simulator stable at 75% power.

DESCRIPTION OF BASELINE DATA USED FOR FIDELITY COMPARISON:

Reference plant data, GE heat balance, power to flow map and plant heat balance data. 7884-M1-N12-(5-2, 4-1, 3-1, 2-1)

DEFICIENCIES NOTED:

Computer point B060 higher than design. (CRD pump discharge temp. and points T039/T040, lower than design. (HP and LP condenser pressures).

CORRECTION ACTIONS PLANNED:

None

EXCEPTIONS TO ANSI/ANS-3.5-1988 TAKEN AS A RESULT OF THIS TEST (INCLUDE JUSTIFICATION):

Actual plant data for point B060 (CRD Disch temp) due to design change for normal suction path for CRD. LP/HP condenser pressure is due to design change that added four additional cooling tower cells.

Test Performed by — Date: 12/26/90

CMS Update Made by — Date: 2/15/91

Simulator Supervisor Review — Date: 2/15/91

SIMULATOR PERFORMANCE TEST ABSTRACT

Test # 4.1.4 Date of Test 12/26/90

Test Rev. # 0 Revision Date 07/06/89

DESCRIPTION OF TEST:

100% power for steady state operation, time = zero, per ANSI/ANS-3.5-1985, section 4.1, 5.42, appendix B. Beginning of life for core cycle.

Was this test performed to comply with ANSI/ANS 3.5, Section 3.1.2?

___ Yes _X_ No

If so, state applicable malfunction number(s) from section 3.1.2.

N/A

Initial Severity N/A

Final Severity N/A

Delay Time N/A

Trigger definition: N/A

Tested Option N/A

Initial Condition IC-14

Duration of Test 20 minutes

DESCRIPTION OF FINAL CONDITION:

Simulator stable at 100% power.

DESCRIPTION OF BASELINE DATA USED FOR FIDELITY COMPARISON:

Reference plant data, GE heat balance, power to flow map and plant heat balance data. 7884-M1-N12-(5-2, 4-1, 3-1, 2-1)

DEFICIENCIES NOTED:

Computer point B060 higher than design. (CRD pump discharge temp. and points TO39/TO40, lower than design. (HP and LP condenser pressures).

CORRECTION ACTIONS PLANNED:

None

EXCEPTIONS TO ANSI/ANS-3.5-1988 TAKEN AS A RESULT OF THIS TEST (INCLUDE JUSTIFICATION):

Simulator reflects actual plant data based upon plant modifications as original design specs. CRD suction path mods are cooling tower additions.

Test Performed by — Date: 12/26/90

CMS Update Made by — Date: 2/15/91

Simulator Supervisor Review — Date: 2/15/91

SIMULATOR PERFORMANCE TEST ABSTRACT

Test # 4.1.5 Date of Test 12/26/90

Test Rev. # 0 Revision Date 07/06/89

DESCRIPTION OF TEST:

100% power for steady state operation, one hour stability run, per ANSI/ANS-3.5-1985, section 4.1, 5.42, appendix B. Beginning of life for core cycle.

Was this test performed to comply with ANSI/ANS 3.5, Section 3.1.2?

___ Yes X No

If so, state applicable malfunction number(s) from section 3.1.2.

N/A

Initial Severity N/A

Final Severity N/A

Delay Time N/A

Trigger definition: N/A

Tested Option N/A

Initial Condition IC-14

Duration of Test 75 minutes

DESCRIPTION OF FINAL CONDITION:

Simulator stable at 100% power after one hour stability run.

DESCRIPTION OF BASELINE DATA USED FOR FIDELITY COMPARISON:

Reference plant data, GE heat balance, power to flow map and plant heat balance data. 7884-M1-N12-(5-2, 4-1, 3-1, 2-1)

DEFICIENCIES NOTED:

Computer point B060 higher than design. (CRD pump discharge temp. and points TO39/TO40, lower than design. (HP and LP condenser pressures).

CORRECTION ACTIONS PLANNED:

None

EXCEPTIONS TO ANSI/ANS-3.5-1988 TAKEN AS A RESULT OF THIS TEST (INCLUDE JUSTIFICATION):

Simulator reflects changes to reference plant. Simulator data is accurate with actual plant data. (Design vs actual). CRD disch temp is due to modification for the CRD pump suction and HP/LP condenser press is due to the additional four cooling tower cells added.

Test Performed by — Date: 12/26/90

CMS Update Made by — Date: 2/15/91

Simulator Supervisor Review — Date: 2/15/91

Addendum to Simulator Performance Test Abstracts for Tests 4.1.2, 4.1.3, 4.1.4, and 4.1.5

JUSTIFICATION FOR EXCEPTIONS TAKEN TO SIMULATOR PERFORMANCE TESTS 4.1.2, 4.1.3, 4.1.4 AND 4.1.5 TO CLARIFY/CORRECT PRIOR JUSTIFICATIONS

HP and LP condenser pressure was lower than design data available due to adding four cooling tower cells to both the reference plant and the simulator model. The best available reference data at the time of the certification test run, December 26, 1990, was G.E. heat balance data which was based on 20 cooling tower cells, whereas the simulator was modelled for 24 cooling tower cells to match the reference plant. Thus the lower temperature of the inlet circulating water resulted in HP and LP condenser pressures being lower than the GE design data used.

CRD pump discharge temperature was higher than the GE heat balance data used due to a design change installed in both the reference pant and the simulator. GE heat balance data is based on CRD suction only from the Condensate Storage Tanks (CSTs), which are at approximately 68°F under normal conditions. The plant and the simulator have been modified such that the CRD suction is taken from either the CSTs or the Condensate Pump Return Line, whichever is at a higher pressure. Normally, the Condensate Pump Return Line is the higher pressure source, and is also at a higher temperature, and thus the discharge temperature of the CRD pumps was higher as well.

As soon as reference plant heat balance data becomes available, it will be evaluated for use in simulator certification testing.