American Nuclear Society

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nuclear power plant simulators for use in operator training and examination

an American National Standard

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American National Standard
Nuclear Power Plant Simulators for Use in Operator Training and Examination

Secretariat
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American National Standard

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Foreword

(This Foreword is not a part of the American National Standard "Nuclear Power Plant Simulators for Use in Operator Training and Examination," ANSI/ANS-3.5-2009.)

The nuclear power industry is currently in a mature phase of operation with encouraging successes in operating license extensions. In addition to life extension activity, there is renewed interest in new construction of nuclear power plants. This fifth revision of the 1979 original standard continues in the philosophy of further addressing issues related to maintaining simulators throughout the life of commercial nuclear power plants. This revision of the standard does not preclude applying the functional requirements and criteria of this standard to next-generation reactors.

The first ANS-3.5 standard, published in January 1979, provided essential requirements for the acquisition of full-scope simulators to support operator training programs. The second ANS-3.5 standard, published in April 1981, further delineated specification requirements. Improvements in testing methods and overall consistency were subsequently included in the third ANS-3.5 standard, published in October 1985. The fourth ANS-3.5 standard, published in March 1993, introduced a new testing methodology and processes that effectively integrated training processes with simulator testing and configuration management processes. The fifth ANS-3.5 standard, published in April 1998, further refined the integration of the training scenario validation process with the simulator testing process.

As the industry matures and performance improves, plants routinely remain online throughout a fuel cycle. This provides fewer operational experience opportunities previously afforded to licensed operators. Excellent plant performance has also resulted in a more vital role for the simulator in providing operators with experience previously obtained in the actual plant. As a result, the importance of a thoroughly tested simulator in providing a high quality training tool cannot be overemphasized.

As industry performance continues to improve, accredited operator training programs become a valuable component of a comprehensive simulator test program. This standard recognizes the current synergy between the traditional simulator testing processes and training processes that may be used to complement an overall simulator test program. This revision also recognizes recent changes in U.S. Nuclear Regulatory Commission regulations that eliminated formal simulator certification submittal requirements and allows applicants for an operator license to meet experience eligibility requirements on the reference unit simulator. The advent of increased regulator and industry oversight group scrutiny of simulators also influences this revision. The working group provided formal input to the regulatory process to facilitate consistent perspectives.

In addition to enhanced readability accomplished by professional technical editors, users of this revision will find improvements and clarifications in the performance testing methodology, new sections addressing simulator core performance testing and post-event simulator testing, and other important guidance required to ensure accurate simulation for operator training.

When a simulator is used for operator training and examination, it is expected to meet the requirements set forth in this standard.

Acknowledgements:

This review and revision cycle was fortunate to receive substantial support from a diverse and dedicated group of nuclear simulator experienced professionals representing many utilities and interested parties. A wide range of utility, independent, and industry oversight organization participation, including individuals with

significant military and commercial reactor experience, was represented in this working group. Input to the development of the standard was received through various means, such as numerous surveys with >95% industry participation as well as feedback from training and simulator associations. Working group meetings were also attended and supported regularly by nonmember participants. All aspects of power reactor and simulator design, construction, and operation, in addition to extensive operator training and evaluation experience, were available throughout this review cycle. The average individual experience represented at each working group meeting was approximately 26 years of diverse nuclear industry experience, including 20 years of simulation related experience, and approximately 75 collective years of operator training experience. Working group continuity was preserved by members with a range of 2 to 24 years of working group participation experience. The significant experience available and dedicated participation were effectively used to prioritize and address each important issue.

This standard might reference documents and other standards that have been superseded or withdrawn at the time the standard is applied. A statement has been included in the references section that provides guidance on the use of references.

This standard does not incorporate the concepts of generating risk-informed insights or a graded approach to quality assurance. The user is advised that one or both of these techniques could enhance the application of this standard.

This standard was prepared by Working Group 3.5 of the Standards Committee of the American Nuclear Society, which had the following membership:

T. Dennis (Chair), *individual*
J. B. Florence (Vice Chair), *Nebraska Public Power District, Cooper*
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H. O. Paris, *GSE Systems, Inc.*
F. A. Tarselli, *PPL Corporation, Susquehanna, LLC*

Certain highly technically qualified individuals provided additional expert assistance and advice to the working group during the development of this standard. They were as follows:

T. R. Byron, *Institute of Nuclear Power Operations*
J. J. Cataudella (ANS-3.5 Past Chair), *Dominion, Millstone*
J. F. Collins, *U.S. Nuclear Regulatory Commission*
M. Fedele, *CAE, Inc., Aviation Simulation*
D. Noe, *GSE Systems, Inc.*
B. Panfil, *FirstEnergy, Perry*
D. C. Trimble, *U.S. Nuclear Regulatory Commission*
M. Wyatt, *Exelon*

Subcommittee ANS-21, Maintenance, Operations, Testing and Training, had the following membership during its review of this standard:

T. Dennis (Chair), *Individual*
C. H. Moseley, Jr. (Vice Chair), *BWXT/Y12*

N. W. Brown, *Lawrence Livermore National Laboratory*
C. L. Eldridge, *Pacific Gas and Electric Company*
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R. P. Kassawara, *Electric Power Research Institute*
J. D. Koutouzis, *Institute of Nuclear Power Operations*
L. E. Kreider, *Engineering Planning and Management, Inc.*
E. M. Lloyd, *Exitech Corporation*
C. A. Mazzola, *Shaw Environmental & Infrastructure, Inc.*
P. A. Milligan, *U.S. Nuclear Regulatory Commission*
D. K. Ostrom, *Individual*
J. W. Roe, *Nuclear Energy Institute*
W. J. Rudolph II, *FirstEnergy Corporation*
J. D. Stevenson, *Individual*

The Nuclear Facility Standards Committee had the following membership at the time of its approval of this standard:

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J. A. August, *CORE, Inc.*
W. H. Bell, *South Carolina Electric & Gas Company*
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D. J. Spellman, *Oak Ridge National Laboratory (NFSC Liaison to IEEE NPEC)*
S. L. Stamm, *Shaw Nuclear Services*
J. D. Stevenson, *Individual*
J. A. Werenberg, *Southern Company Services*
M. J. Wright, *Entergy Operations, Inc.*

NFSC Liaison:

G. Hutcherson, *Institute of Nuclear Power Operations*
S. Dua, *Canadian Standards Association*
J. C. Butler, *Nuclear Energy Institute*

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Mid Atlantic Nuclear Training Group, Simulator Subcommittee
F. A. Tarselli (Chair), *PPL Corporation, Susquehanna*
Utility Simulator Users Group
M. McDade (Chair), *Progress Energy, Harris*

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