

IEEE Guide for the Evaluation of Human-System Performance in Nuclear Power Generating Stations

Sponsor

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Abstract: Guidance for evaluating human-system performance related to systems, equipment, and facilities in nuclear power generating stations is provided. Specific evaluation techniques and rationale for their application within the integrated systems approach to plant design, operations, and maintenance described in IEEE Std 1023-1988 are summarized.

Keywords: design, human-system performance, integrated systems, maintenance, nuclear power generating stations, and operation

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Introduction

(This introduction is not part of IEEE Std 845-1999, IEEE Guide for the Evaluation of Human-System Performance in Nuclear Power Generating Stations.)

This introduction provides background on the rationale used to develop this guide. This information is meant to assist in the understanding and usage of this guide.

Human factors engineering has been a part of nuclear power plant design, construction, and operation from the industry's beginning, although not under that name. (For example, see H. L. Parris, "A Review of Human Factors R&D in the Nuclear Power Industry," and Leonard C. Pugh, Sr., "In the Rear-View Mirror: Human Factors in Nuclear Power," both in *American Nuclear Society Transactions*, 1986 Annual Meeting, Volume 52, TANSO 52 1-658, 1986.) The incident at Three Mile Island, however, brought increased prominence to the human factors field in the nuclear power industry. The U.S. Nuclear Regulatory Commission began to consider guidance and regulation concerning the human factors engineering aspects of nuclear power plant design, construction, and operation at that time. Part of the industry's response to this increasing emphasis on human factors engineering were proposals to create human factors guidelines as part of the industry standards efforts of the IEEE Nuclear Power Engineering Committee. This guide began as one of those efforts, initiated in 1980. These efforts were the subject of an IEEE-sponsored meeting held in Monterey, California, in June 1985, as documented in "1985 IEEE Third Conference on Human Factors and Power Plant," report #85CH2235-0.

This guide, IEEE Std 845-1999, was initially published in 1988. Subcommittee SC-7, Human Factors and Control Facilities, prepared this revision. The revision is intended to both update the content, and focus the purpose of the guide from the 1988 publication. Specifically, Working Group 7.4 of SC-7 has prepared this revision to make the principles and techniques contained in it more consistent with the integrated systems approach to engineering design as described in the top-level companion standard, IEEE Std 1023-1988 [B3]¹. This revision is also intended to improve the consideration of related factors to systems design, such as procedures, training, human-systems interactions, etc., in the evaluation of overall systems performance. SC-7 is also in the process of concurrently revising IEEE Std 1023-1988 [B3], which will reflect the improvements made to this standard.

This guide is intended to supply basic guidance for evaluating human-system performance related to systems, equipment, and facilities in nuclear power plants. It summarizes specific evaluation techniques and presents rationale for their application within the integrated approach to plant design, operations, and maintenance as described in IEEE Std 1023-1988 [B3]. This revision is intended for use by personnel who are familiar with the concepts of formal human factors analysis, but not necessarily human factors practitioners knowledgeable in the details of specific evaluation techniques.

In addition to preparing IEEE Std 845-1999 and revising IEEE Std 1023-1988 [B3], SC-7 has also developed the following human factors-related documents: IEEE Std 1082-1997 [B4] and IEEE Std 1289-1998 [B5].

¹The numbers in brackets correspond to those of the bibliography in Annex A.

Participants

During the initial revision of this guide, Raymond J. Christensen was chair of Working Group 7.4. At the time this guide was completed, Working Group 7.4 was chaired by James P. Bongarra, Jr. The following list represents the membership of SC-7 that attended the meetings and contributed to this document:

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