

# American Nuclear Society

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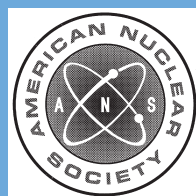
**ANSI/ANS-8.26-2007 (R2022)**

**criticality safety engineer training  
and qualification program**

## an American National Standard

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**American National Standard  
Criticality Safety Engineer Training  
and Qualification Program**

Secretariat  
**American Nuclear Society**

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## **American National Standard**

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## Foreword

(This Foreword is not a part of American National Standard, "Criticality Safety Engineer Training and Qualification Program," ANSI/ANS-8.26-2007.)

Appendix A of ANSI/ANS-8.1-1998 (R2007) reminds us that the few criticality accidents that occurred worldwide resulted from a failure to anticipate the unexpected in fissionable material handling and processing operations. To be a criticality safety engineer, one must not only be familiar with nuclear criticality and the factors that influence it but also recognize that criticality safety is only meaningful within the context of fissionable material operations. Minimizing the risk of a criticality accident to an acceptable level within the scope of operations is the basic function of every person who works in the field of criticality safety. This requires personnel who are thoroughly familiar with fissionable material processes and who work in close cooperation with operations personnel and management. The goal of the criticality safety engineer is to assist operating personnel in the conduct of safe and efficient operations while maintaining an acceptably low risk of a criticality accident.

The art and science of nuclear criticality safety are complex. In addition to nuclear physics, an effective criticality safety engineer develops a multidisciplinary understanding of electrical (software, hardware), chemical, mechanical (structural, heat transfer), material, industrial (procedural, ergonomic), human performance (behavioral), and economic issues related to fissionable material process control.

Key elements of an effective training program include an understanding of the impact of controlled parameters on the reactivity of a defined system and an ability to effectively predict the reactivity of a system or process. A careful review of lessons learned from previous criticality accidents and other site-specific nonconformances can also be considered.

Training to the program content elements in this standard can enable criticality safety engineers to become effective advocates to foster a nuclear safety-conscious workforce and sound nuclear safety practices in support of facility operations personnel. One key element of the training program is practical experience with the parameters that affect the neutron multiplication of fissionable material systems. This experience can be achieved through hands-on criticality safety courses, conduct of experiments in a research reactor environment, or participation in critical experiments.

This standard provides guidance for the *content* of training programs for nuclear criticality safety specialists who are responsible for developing the analyses, controls, and safety documentation required for the safe handling of fissionable materials. This standard presents a matrix of training and qualification criteria based on education and experience combined with individual job functions and provides for qualification of experienced staff by documentation. This standard stresses the necessity to integrate standard training subjects with operational experience in order to qualify as a criticality safety engineer.

This standard *does not specify how* to develop or execute these training and qualification programs; it provides only the elements that should be included in the programs. It is not intended that these programs lead to any professional engineer certification, only that they create a common basis for criticality safety engineer qualification across the diverse organizations that rely on these specialists. Standard criteria for establishing scopes, functions, and levels of competence for safety professionals are available in ASSE/ANSI Z590.2-2003 and ASSE/ANSI Z590.1-200X, published or in draft form by the American Society of Safety Engineers.

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