

1 CONSENSUS STANDARD REQUIREMENTS AND GUIDANCE¹

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1.1 Introduction to Consensus Standards⁴

1.1.1 Definition

A consensus standard documents minimum requirements and recommendations for a specific subject, such as CASs. Standards are developed by a work group under a consensus committee which in turn is under or part of a standards body such as ANS. A standard represents consensus from a wide range of interests including those of academic, private, government, and implementing organizations. Although work groups consider all of these interests, work groups must remain independent of each of these interested organizations. Any difficulties in obtaining consensus generally contribute to a standard in which every word and issue has been considered at length.

Compliance with a consensus standard is voluntary, intentionally left as a management or regulator prerogative. Work groups and standards bodies encourage compliance but do not have authority to require or judge compliance.

1.1.2 Nomenclature

Within the U. S. a specific nomenclature is used in standards certified by ANSI:

- a. **Shall** indicates a requirement. To comply with a standard one must comply with all applicable requirements of the standard.
- b. **Should** indicates a recommendation (specifically, minimum additional guidance). Usually a statement is designated a recommendation because:
 - the statement is highly recommended guidance for all cases,
 - the statement would normally be a requirement for some applications but it is not an appropriate requirement for other applications, or
 - compliance would be difficult to prove adequately because proof would be subjective.

One need not comply with recommendations of a standard but it is generally prudent to document justification for noncompliance.

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- c. **May** indicates permission, neither a requirement nor a recommendation. Permission statements generally provide:
- reminder(s) of issues or implementation methods users should consider, or
 - value(s) which satisfy the intent of a requirement or recommendation for most applications, assuming users do not always find it cost-effective to develop application-specific values.

One need not implement permissions of a standard.

1.1.3 Clarifications and Interpretations

Although standard writers make every effort to write concise, appropriately clear, and technically accurate criteria, users must ensure criteria are not misapplied or misinterpreted. Users can obtain assistance to resolve questions they have regarding a standard. In the case of ANS standards users should request a clarification or interpretation through the ANS Standards Steering Committee secretary. The request is referred to the appropriate consensus committee or subcommittee, which will take one of three actions, as approved by the steering committee:

- a. A **clarification** is an explanation of the original intent of the standard and does not provide new or changed requirements. There is no need to change the standard although the clarification may be incorporated in the next revision. Clarifications are published in *Nuclear News*.
- b. A **generic interpretation** requires that supplemental criteria be developed for inclusion in the standard. The fact that an interpretation is required will generally shorten the time until a work group revises the standard. Generic interpretations are published in *Nuclear News*.
- c. A **case interpretation** is one which, if made, would explain or permit or agree with application of the standard to a specific design, facility, or operation. Case interpretations are prohibited. They are mentioned here only because they are a common request. No official action is taken but a committee representative may unofficially contact the requester to explain this ANS policy.

1.1.4 Public Review and Comment

Draft standards which will be ANSI-certified are available for public review and comment for at least 60 days through ANSI, the appropriate standards body, or both at sometime during the approval process. In the case of ANS standards the consensus committee determines when the standard will be available (either concurrent with or after the consensus committee review and approval). Public review is conducted through ANSI, and announcements of ANS standards reviews, revisions, withdrawals, and approvals are published in *Nuclear News*. Individuals who wish to participate in the public review can obtain copies of the draft standard through ANS or ANSI for a nominal fee. The same provisions for public review and comment apply to draft revisions of standards.

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1.2 Key U. S. CAS Standard: ANSI/ANS-8.3^{b,c}

ANSI/ANS-8.3-1986 is the key U. S. consensus standard for CASs, specifying minimum criteria for an adequate CAS. The standard is maintained by work group ANS-8.3 at the direction of Subcommittee ANS-8 under ANS Consensus Committee N-16. The standard exists because accidents can occur in spite of best efforts to prevent them and because an adequate detection and alarm system is helpful in reducing personnel exposures in the event of a criticality accident.

1.2.1 Topics Addressed

ANSI/ANS-8.3-1986 addresses a variety of items. Those which are considered unique to or special for criticality accident detection and alarms are addressed in much more detail than items which might generally apply.

- a. The standard indicates that the purpose of a CAS is to protect personnel by detecting a nuclear criticality accident and activating an audible alarm to signal immediate evacuation. ANSI/ANS-8.3 development indicates that a CAS is intended to protect personnel from a life-threatening or very severe radiation dose rather than to achieve a low-as-reasonably-achievable exposure goal. The specified 12 rad threshold is loosely based on one half the whole body dose at which temporary changes to whole blood cells were barely detectable using techniques available by the year 1971.^{4e} Improved technology and changes in recommendations do not invalidate this threshold because it is significantly less than exposures expected to cause severe radiation sickness in adults.
- b. ANSI/ANS-8.3 requires that the need for a CAS be evaluated for activities in which the quantity of fissionable material exceeds specified values. Criteria for determining the need for a CAS include a requirement to install a system where it is deemed the system will reduce total risk, a recommendation to consider the hazards which could be caused by false alarms, and permission to use 2×10^{19} total fissions in defining a maximum accident of concern outside nuclear reactors.
- c. The standard specifies requirements and recommendations for alarm signal characteristics and provides an appendix with additional information. The detailed criteria provide an overall emphasis on the immediacy and audibility of an alarm to signal personnel evacuation.
- d. ANSI/ANS-8.3-1986 specifies criteria to ensure system reliability and dependability. These criteria address tests, repairs, false alarms, activities and environments which can degrade systems, and designs and events which can lead to system failure.
- e. The standard includes requirements and recommendations for CAS response and detector sensitivity, intended to ensure that credible criticality accidents are detected and that alarms are activated. The criteria also include permissions to define a minimum accident of concern as:
 - delivering "the equivalent of an absorbed dose in free air of 20 rad at a distance of 2 m from the reacting material in 60 s," which corresponds approximately to a fission yield of 10^{15} neutrons in the first minute of the excursion, and^{b,f}

- having a "minimum duration of the radiation transient [of] 1 ms."^b

These definitions are key technical information often used in designing and qualifying CASs.

- f. ANSI/ANS-8.3-1986 addresses employee familiarization, including training and drill criteria.
- g. The standard includes appendices with additional information on characterizing the minimum accident of concern, one of many possible methods for determining a gamma-detector radius of coverage, and alarm signals and sounds. Appendices are not part of a standard although they are included with a standard. Appendix information can assist in understanding or applying a standard but the information does not include requirements, recommendations, or permissions.

1.2.2 Topics Not Addressed

The standard does not currently address several topics which are potentially related to criticality accidents or CASs for a variety of reasons.

- a. The standard does not address criticality accidents from which a person would receive less than 12 rad total exposure if the person did not evacuate. Although such criticality accidents are possible with well-shielded or remotely-operated facilities, personnel protection in such cases is considered a health physics function.
- b. By defining a maximum accident of concern, the standard does not address criticality accidents with greater fission yields. Although such criticality accidents are possible, they seem to be not credible for activities to which the standard is intended to apply, based on experience.^{2h}
- c. By defining a minimum criticality accident of concern, ANSI/ANS-8.3-1986 currently does not address criticality accidents with lower dose rates or shorter radiation transients. Although such accidents are theoretically possible and the transients can be experimentally produced, they were originally thought to be not credible for activities to which the standard is intended to apply, based on experience and informal surveys.^{ij,k} This definition is being re-evaluated for the next revision to the standard.
- d. ANSI/ANS-8.3-1986 does not address topics which are adequately addressed in other standards, outside the scope of the ANS-8.3 work group charter, or both, including:
 - criticality accident prevention,
 - criticality accident response, except for providing a detection and alarm system;^c
 - criticality accidents in nuclear reactors, including critical facilities, research reactors, and nuclear power plants;
 - general criteria for electrical, mechanical, computerized, or instrument systems;
 - general quality assurance criteria;
 - general radiation detection or protection methods; and
 - inappropriate application by management, regulators, or both.

1.2.3 Status of the Current Standard and Its Draft Revision¹

ANSI/ANS-8.3-1986 is the current, active U. S. standard for CASs. As of September 1, 1995, one clarification has been published and eight other clarifications are being reviewed for publication in late 1995 or early 1996. The standard and information about its clarifications are included in this notebook under Tab 7. To date, no interpretations of the standard have been necessary.

ANSI/ANS-8.3-199x is a draft revision to ANSI/ANS-8.3-1986, currently undergoing review and approval within the ANS Standards Committees structure. As of September 1, 1995, the draft incorporates the clarifications discussed above, incorporates some additional criteria from the international CAS standards, and includes a number of non-editorial changes:

- A recommendation regarding process equipment is moved from the scope to general principles section of the standard, to comply with ANSI guidelines and to improve visibility.
- The permitted definition for a maximum accident of concern is redefined as "a maximum fission yield integrated over the duration of the accident may be assumed not to exceed 2.0×10^{19} fissions."
- If an application-specific credible accident is less than the standard's indicated minimum accident of concern, a requirement to consider alternate detection methods is included.
- A documented basis is required for defining an application-specific maximum accident of concern less than indicated by the standard, and for defining an application-specific minimum accident of concern different than indicated by the standard.
- The alarm signal is required to be distinctive from other signals or alarms which require a different response from personnel.
- Use of portable instruments to augment installed CASs is permitted for a variety of situations if other specific requirements are satisfied.
- A reference to a publication regarding flux-to-dose conversion factors is included.
- Training and posting criteria are retained but users are referred to ANSI/ANS-8.19 for drill criteria.
- A new appendix to simplify placement of neutron-sensitive detectors is included.

We expect the draft will be available for public comment after, rather than concurrent with, the ANS N-16 Consensus Committee review and approval. Comments will be accepted until the draft is endorsed by ANSI or withdrawn.

1.3 International CAS Standards: ISO 7753 and IEC 860^{mn}

ISO 7753: 1987 and CEI IEC 860: 1987 are the key, active international standards for CASs. Together the standards specify criteria similar to the criteria of ANSI/ANS-8.3-1986. Some differences are editorial but some differences are quite significant, particularly the differences between IEC 860 and ANSI/ANS-8.3. Although it is possible for a CAS to comply with both the U. S and international standards, organizations which choose to obtain and maintain such CASs should consider the differences carefully.

These international standards use the same minimum accident of concern defined in ANSI/ANS-8.3 and, with the exception of the following, address the same subjects as the U. S. standard:

- employee familiarization in the workplace, and
- evacuation route postings.

1.3.1 ISO 7753 and Comparison with ANSI/ANS-8.3

International standard ISO 7753: 1987 addresses criteria dealing with the purpose of a CAS and the characteristics of a criticality accident. Most of the ISO 7753 criteria are very similar to the ANSI/ANS-8.3 criteria addressing the same subjects. The potentially significant differences include:

- an explicitly stated preference for concurrent response from two or more detector channels rather than use of a single highly reliable channel,
- explicit identification of two primary objectives, ensuring reliable activation of a criticality accident alarm and avoidance of false alarms, rather than one primary objective,
- requirement for an unique alarm signal,
- recommendation to provide indication of which detection channels have been tripped,
- requirement to notify management in advance of out-of-service periods, and
- inclusion of emergency planning information as an annex (or appendix).

1.3.2 IEC 860 and Differences with ANSI/ANS-8.3

International standard CEI IEC 860: 1987 is complementary to standard ISO 7753, providing criteria for instrument design, maintenance, qualification, testing, and documentation of testing. There are many differences between the criteria of IEC 860 and of ANSI/ANS-8.3 because the international criteria are much more detailed than similar U. S. criteria. Some of the limiting values specified in IEC 860 are "tighter" or more conservative than similar limits specified in ANSI/ANS-8.3. Users should also be aware that some of the criteria categorized as signal or design criteria in the U. S. standard are categorized as testing criteria in the international standard.

1.4 Other Consensus Standards of Possible Interest for CAS Programs

1.4.1 Other ANS-8 Standards

The following other ANSI/ANS-8 standards may be of interest to personnel who determine if CASs are needed or maintain programs which are affected by CASs:

- ANSI/ANS-8.1 which addresses criticality accident prevention and single parameter subcritical limits for commonly used fissionable isotopes,^o
- ANSI/ANS-8.15 which addresses limits for special actinide isotopes,^p
- ANSI/ANS-8.19 which addresses administrative practices including some criticality-accident emergency planning and preparedness criteria, and^a
- draft ANSI/ANS-8.23 which addresses technical criteria for criticality-accident emergency planning and preparedness.^f

1.4.2 Other U. S. Standards

Apparently no additional U. S. consensus standards apply uniquely or specifically to CASs. However, standard ANSI N323, "Radiation Protection Instrumentation Test and Calibration," may apply to a few specific CAS designs.^s The scope of ANSI N323-1978 states:

"This standard establishes calibration methods for *portable* radiation protection instruments used for detection and measurement of *levels* of ionizing radiation fields or levels of radioactive surface contamination. For purposes of this standard, portable radiation protection instruments are those which are carried by hand to a specific facility or location for use. Although this standard is specific to portable radiation protection instrumentation, the basic calibration principles may be applicable to radiation detection instruments in general."
(emphasis added)

During a 1989 survey, people indicated that ANSI N323 did not apply to their CASs because their CASs are *fixed* systems which detect *changes* in radiation levels. However, these people indicated that some of the ANSI N323 criteria were useful for CAS calibration programs.

Organizations may also wish to examine general electronic, alarm, maintenance, calibration, and quality assurance standards for general criteria which might apply.

1.4.3 Other International Standards

Based on ISO 7753 and IEC 860 references and on standards titles listed by ISO on the internet, the following international standards may also be of interest to personnel who determine if CASs are needed, maintain CASs or CAS programs, or maintain programs which are affected by CASs:

- IEC 293, which addresses nuclear instrumentation supply voltages,¹
- ISO 1709, which addresses criticality accident prevention, and²
- ISO 4037, which addresses gamma reference radiations for calibration.³

Organizations may also wish to examine general electronic, alarm, maintenance, calibration, and quality assurance standards for general criteria which might apply.

1.5 References

- a. "Procedures Manual For Standards Development," Rev. 1 (LaGrange Park, Illinois USA: American Nuclear Society, June 17, 1986).
- b. "Criticality Accident Alarm System, An American National Standard," ANSI/ANS-8.3-1986 (LaGrange Park, Illinois USA, American Nuclear Society, approved August 29, 1986).
- c. Standards, Standards Actions, "Clarification," *Nuclear News*, Vol. 35, No. 9 (July 1992): p. 76.
- d. "Basic Radiation Protection Criteria," NCRP Report No. 39 (Bethesda, Maryland USA: National Council on Radiation Protection and Measurements, issued January 15, 1971).
- e. David R. Smith, personal communication to ANS-8.3 work group, 1990.
- f. Davis A. Reed, "ANSI/ANS-8.3-1986: American National Standard Criticality Accident Alarm System," in *Transactions of the American Nuclear Society*, Vol. 64 (LaGrange Park, Illinois USA: American Nuclear Society, Nov. 1991), p. 325.
- g. William L. Ginkel, et. al., "Nuclear Incident at the Idaho Chemical Processing Plant," IDO-10035 (Idaho Falls, Idaho USA: Phillips Petroleum Company and the Atomic Energy Commission, February 15, 1960).
- h. William R. Stratton, "A Review of Criticality Accidents," revised by David R. Smith, DOE/NCT-04 (Livermore, California USA: Lawrence Livermore National Laboratory, March, 1989).
- i. Richard E. Malenfant, "A Criticism of ANSI/ANS-8.3-1986: Criticality Accident Alarm System," in *Transactions of the American Nuclear Society*, Vol. 64 (LaGrange Park, Illinois USA: American Nuclear Society, Nov. 1991), p. 327.

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- j. David R. Smith, "The Function and Characteristics of Criticality Accident Alarm Systems," in *Transactions of the American Nuclear Society*, Vol. 39 (LaGrange Park, Illinois USA: American Nuclear Society, Nov. 1981), pp. 554-555.
- k. Davis A. Reed, private communication to ANS-8.3 work group, 1991.
- l. "American National Standard, Criticality Accident Alarm System," ANSI/ANS-8.3-199x draft (May 1995).
- m. "International Standard, Nuclear Energy - Performance and Testing Requirements for Criticality Detection and Alarm Systems," ISO 7753: 1987 (E) (Geneva Switzerland: International Organization for Standardization, August 1, 1987).
- n. "International Standard, Warning Equipment for Criticality Accidents," CEI IEC 860: 1987 (Geneva Switzerland: International Electrotechnical Commission, 1987).
- o. "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors, An American National Standard," ANSI/ANS-8.1-1983 (R1988) (LaGrange Park, Illinois USA: American Nuclear Society, approved October 7, 1983).
- p. "American National Standard, Nuclear Criticality Control of Special Actinide Elements," ANSI/ANS-8.15-1981 (R1987) (LaGrange Park, Illinois USA: American Nuclear Society, approved November 9, 1981).
- q. "Administrative Practices for Nuclear Criticality Safety, An American National Standard," ANSI/ANS-8.19-1984 (R1988) (LaGrange Park, Illinois USA: American Nuclear Society, approved October 1, 1984).
- r. "Nuclear Criticality Accident Emergency Planning and Response, An American National Standard," ANSI/ANS-8.23-199x draft (June 1995).
- s. Health Physics Society and Institute of Electrical and Electronics Engineers, Inc., "American National Standard, Radiation Protection Instrumentation Test and Calibration," ANSI N323-1978 (R1981) (Institute of Electrical and Electronics Engineers, Inc., approved September 13, 1977).
- t. "International Standard, Supply Voltages for Transistorized Nuclear Instruments," CEI IEC 293: 1968 (Geneva Switzerland: International Electrotechnical Commission, 1968).
- u. "International Standard, Principles of Criticality Safety in Handling and Processing," ISO 1709: 1975 (Geneva Switzerland: International Organization for Standardization, 1975).
- v. "International Standard, Nuclear Energy - X and Gamma Reference Radiations for Calibrating Dosimeters and Dose Ratemeters and for Determining their Response as a Function of Photon Energy," ISO 4037: 1979 (Geneva Switzerland: International Organization for Standardization, 1979).

1.6 Visual Aids from the Workshop Presentation

**CRITICALITY ACCIDENT ALARM SYSTEMS
REQUIREMENTS AND GUIDANCE -
CONSENSUS STANDARDS**

Prepared by Valerie L. Putman

Representing ANS-8.3 and -8.23 Work Groups

From Lockheed Idaho Technologies Company.

CONSENSUS STANDARDS IN GENERAL

Specifies a MINIMUM set of requirements and recommendations

Consensus is based on a wide range of interests

Subject to public review and comment

**Subject to periodic review and action
(reaffirmation, revision, or withdrawal)**

**Compliance is VOLUNTARY
(management or regulator prerogative)**

CONSENSUS STANDARD NOMENCLATURE

Within a standard

- **SHALL:** denotes a requirement
- **SHOULD:** denotes a recommendation
- **MAY:** denotes permission,
neither a requirement nor a recommendation

Standards actions

- **CLARIFICATION:** explains original intent
- **GENERIC INTERPRETATION:** requires
supplemental criteria be developed
- **CASE INTERPRETATION:** would judge application
or compliance; case interpretations are prohibited

U. S. CAS STANDARD: ANSI/ANS-8.3

**"American National Standard,
Criticality Accident Alarm System,"
ANSI/ANS-8.3-1986,
American Nuclear Society,
approved August 29, 1986.**

entire standard is included in the workshop notebook

U. S. CAS STANDARD: ANSI/ANS-8.3

ANSI/ANS-8.3-1986

- **is the key U.S. standard**
- **is intended to apply to facilities in which personnel evacuation in the event of a criticality accident would minimize severe overexposure to radiation**
- **does not apply to reactor and critical facilities designed to achieve a nuclear critical condition.**
- **specifies minimum requirements and recommendations for CASs**
- **depends on management or regulatory prerogative to require compliance**

U. S. CAS STANDARD: ANSI/ANS-8.3

Topics

- **CAS Purpose**
 - **avoid SEVERE overexposure**
 - **alarm is for immediate evacuation purposes only**
- **Is a CAS needed?**
 - **viewpoint different than a regulator's:**

"Is a CAS appropriate?" rather than, "Is an exemption to CAS requirements appropriate?"
 - **evaluate if exceed specific quantities of fissionable material**
 - **install if it will reduce overall risk**
 - **12 rad threshold**
 - **permission to define a max. accident of concern:**

2×10^{19} total fissions

U. S. CAS STANDARD: ANSI/ANS-8.3

Topics (continued)

- **Alarm (signal) characteristics**
 - **audibility throughout area to be evacuated**
 - **minimum and maximum decible levels**
 - **frequencies**
 - **automatic actuation required
(manual actuation also permitted)**
 - **alarm signal duration**
 - **supplemental signals**
- **Dependability, reliability, and durability**
 - **#1 objective: reliable actuation of alarm**
 - **power outages and portable instruments**
 - **avoid false alarms**
 - **protect from or avoid conditions which could cause
system or component failure**

U. S. CAS STANDARD: ANSI/ANS-8.3

Topics (continued)

- **Other design criteria**

- **response time**
- **sensitivity, specifically detect all accidents of concern**

permission to define min. accident of concern:

**20 rad at 2 m in 60 s
(roughly equivalent to 10^{15} fissions in 1st minute)**

permission to define min. duration of transient:

1 ms

- **Tests**

- **initial, after repairs, and periodic**
- **corrective actions**
- **records**

U. S. CAS STANDARD: ANSI/ANS-8.3

Topics (continued)

- **Emergency preparedness and planning**
 - emergency plan recommended (no details specified)
 - posting required
 - employee training required
 - evacuation drills required

- **Appendices (information, not part of standard)**
 - characterizing min. accident of concern
 - gamma detector areal coverage
 - signal characteristics and sound levels

U. S. CAS STANDARD: ANSI/ANS-8.3

Topics NOT covered

- **criticality accident prevention**
- **criticality accident detection for nuclear reactors**
 - **commercial power reactors**
 - **research reactors**
 - **experiment facilities where the experiment is intended to achieve nuclear criticality**
- **general radiation detection or protection**
- **emergency planning and response, including evacuation radius**
- **general criteria which might also apply including electrical, mechanical, instrument, alarm, calibration, maintenance, computerized or transistorized systems, quality assurance, etc.**

U. S. CAS STANDARD: ANSI/ANS-8.3

Status

- **ANSI/ANS-8.3-1986 is currently active revision**
- **1 clarification published**
- **8 clarifications being considered**
- **draft revision to standard in review process**

Changes included in current draft revision

- **above clarifications**
- **possibility of an application-specific min. accident of concern less than the standard's permitted definition**
- **use of portable instruments**
- **distinct alarm signal**
- **reference to ANSI/ANS-8.19 for training and drill criteria**
- **reference to an acceptable publication for flux-to-dose conversion**

INTERNATIONAL STANDARDS: ISO 7753 & IEC 860

ISO 7753

- **"International Standard, Nuclear Energy - Performance and Testing Requirements for Criticality Detection and Alarm Systems," ISO 7753: 1987, International Organization for Standardization, August 1, 1987.**
- **Very similar to ANSI/ANS-8.3-1986, including definitions and permissions for minimum accident of concern**
- **Differences from ANSI/ANS-8.3-1986**
 - **explicitly identify twin primary objectives:
reliable activation of criticality alarm, and
avoidance of false alarms**
 - **explicit preference for multiple detector channels,
with recommendation to provide indicator of which
channel(s) were tripped**
 - **unique alarm signal required but alarm
characteristics not addressed to same extent**
 - **most testing specifics in IEC 860**
 - **annexes include emergency planning information**

INTERNATIONAL STANDARDS: ISO 7753 & IEC 860

IEC 860

- **"International Standard, Warning Equipment for Criticality Accidents," CEI IEC 860: 1987, International Electrotechnical Commission, 1987.**
- **Comparitively detailed and more extensive CAS criteria:**
 - **design**
 - **testing**
 - **calibration**
 - **documentation**
- **Some criteria "tighter" than ANSI/ANS-8.3, including**
 - **recommendations for decible levels**
 - **mechanical stress tolerances (includes seismic tolerance)**
 - **specific test methods and associated tolerances**

OTHER STANDARDS OF POSSIBLE INTEREST

ANSI/ANS-8.1

ANSI/ANS-8.15

ANSI/ANS-8.19

draft ANSI/ANS-8.23

ANSI N323

IEC 293

ISO 1709

ISO 4037

general standards for related subjects (e.g. alarm systems, electronic systems, instrument systems, calibration, maintenance, testing, records, quality assurance)

DISCLAIMER

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SUMMARY

ANSI/ANS-8.3-1986

- **is the current key U.S. standard**
- **is intended to apply to facilities for which personnel evacuation in the event of a criticality accident would minimize severe overexposure to radiation**
- **does not apply to reactor and critical facilities designed to achieve a nuclear critical condition.**
- **specifies minimum requirements and recommendations for CASs**
- **depends on management or regulatory prerogative to require compliance**

Other standards might be applicable, particularly

- **ISO 7753: 1987**
- **IEC 860: 1987**