

ANS Issues Clarification on ANSI/ANS-8.3-1979, "Criticality Accident Alarm System"
(Nuclear News, January 1981)

Beginning on page 96 of the January, 1981, Issue of "Nuclear News" (Vol. 24, No. 1), an interpretation of ANSI/ANS-8.3-1979, Paragraph 5.1 is reported. The cited paragraph is identical to Paragraph 5.6 in ANSI/ANS-8.3-1986. The interpretation is quoted in its entirety below.

Inquiry:

A request has been made for an interpretation of paragraph 5.2 of ANSI/ANS-8.3-1979, American National Standard "Criticality Accident Alarm System."

Paragraph 5.2, titled "Detection Criteria [sic]," states: "Criticality alarm systems shall be designed to detect immediately the minimum accident of concern. For this purpose, in areas where material is handled or processed with only nominal shielding, the minimum accident may be assumed to deliver the equivalent of an absorbed dose in free air of 20 rad at a distance of 2 m from the reacting material within 60 s."

The question requiring interpretation is whether, for dose-integrating systems, the alarm is required as soon as the dose rate reaches the equivalent of 20 rad/min at 2 m; or if the alarm is required after the accumulation of a dose corresponding to 20 rad at 2 m, if this occurs in 1 minute or less.

Response:

The following interpretation was approved by ANS-8, Fissionable Materials Outside Reactors.

The scope of the standard includes the statement that: Details of this standard are directed principally toward gamma-radiation rate-sensing systems. Analogous considerations are applicable to integrating systems and to those detecting neutrons.

It is the intent of ANSI-ANS-8.3-1979 [sic] that criticality accident alarm systems respond promptly to accidents that produce a dose rate equivalent to 20 rad/min at 2 m from the reacting material. Well-designed dose-rate sensing systems will initiate alarms in less than one-half second.

A decision to install a dose integrating alarm system should not imply a significantly lesser degree of protection for personnel than if a dose-rate sensing instrument is used. If a delay of one minute is accepted in initiating an alarm for the minimum accident of concern, an operator two meters from the accident can expect an exposure slightly in excess of 20 rads; whereas if the accident is signaled promptly, the operator's exposure would be on the order of one rad. This is a significant difference and supports the position that a dose-integrating system should respond essentially as rapidly as and with sensitivity equivalent to a rate sensing instrument.