

## **ANS Issues Clarification on ANSI/ANS-8.3-1986, "Criticality Accident Alarm System."**

(*Nuclear News*, March 1996)

### *Inquiry 1:*

"Section 5.5 of the standard states that the response time shall be less than 0.5 seconds, and result in the sounding of the alarm. Is the initial time (activation) when a radiation field is exposed to the detector, or is the initial time when the electronic circuit begins to change state to cause an alarm? The difference between these two initial times is the time it takes for the system to *process* the signal coming from the detector (the process circuit, averaging the signal, etc.), before beginning to change the state of the *alarm* circuit.

Section 5.5 states: "The system shall be designed to produce the desired signal within one-half second of activation by the minimum accident of concern."

### *Response 1:*

The intent of Section 5.5 is to specify the maximum time (0.5 sec) for the circuitry to engage and activate the signal generator (alarm) after the detector has experienced a radiation field associated with the minimum accident of concern. It is recognized that small but unavoidable delays will occur after the signal is sent and before the sound reaches the ears of individual(s) who is(are) expected to respond.

### *Inquiry 2:*

"Does Section 4.2.2 refer to the dose in free, dry air or does it refer to a biological dose?"

Section 4.2.2 states: "A criticality alarm system is not required by this standard in areas where the maximum foreseeable absorbed dose in free air will not exceed 12 rad. For the purpose of this evaluation a maximum yield may be assumed not to exceed  $2 \times 10^{19}$  fissions for events outside reactor cores."

### *Response 2:*

This is specified as the dose in free air because biological dose equivalents are dependent on many undefinable factors. For example, the quality factor is sensitive to the magnitude of the dose, the age of the recipient, the organ or portion of the body being irradiated, and other less significant considerations. The dose in free air is a physical quantity subject to unambiguous definition.