ANS Issues Clarification on ANSI/ANS-8.1-1983, "Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors."
(*Nuclear News*, January 2003)

Inquiry 1:

Does ANSI/ANS-8.1-1983 support the use of inherently unlikely events or changes in process condition in meeting the double contingency principle, or is an NCS control always required to support the unlikelihood of a particular event or change in process condition?

Response 1:

Yes, ANSI/ANS-8.1-1983 and the current 1998 revision support the use of inherently unlikely events. Certain inherent physicochemical properties of a fissile material process and any ancillary operations may, in fact, make certain process conditions not attainable. It makes no sense to require an NCS control on a property that nature will not change (e.g., maximum crystalline density of UF_4). It does make sense to acknowledge that credit is taken for an immutable physicochemical property in the safety analysis, but it may not make sense to specify an NCS control. If one cannot rely on the natural course of events, then certainly specific NCS controls on parameters need to be instituted (e.g., testing for an acquired process chemical when safety credit has been taken for its properties).

Inquiry 2:

Is there any generally accepted numerical probability associated with the term "unlikely," as it is used in the standard? If so, what is it?

Response 2:

No, the application of this term is left to the judgment of the user. The intent of the standard is to rely on the experience of a recognized expert in assessing the safety significance of specific situations.

Inquiry 3:

Can the words "natural or credible course of events" be applied to more than just physicochemical properties of materials? For example, could it be used to justify that the inherent unlikeliness of inadvertent sprinkler activation over a particular area (given normal industrial maintenance practices) provides one leg of the double contingency principle? We have a lot of past operating experience at Portsmouth and Paducah, and we have several good references, which give us numerical estimates of the probability of inadvertent sprinkler activation. These probabilities are low enough that we believe the event to be at least as unlikely as the probability of losing some of our administrative controls. As a result, we would not normally consider sprinkler activation to be a "normal" condition when developing double contingency arguments, but would of course evaluate it as an accident condition during the evaluation and show that a criticality would not occur.

Response 3:

No. The intent of the standard is to assume accidental actuation regardless of its low probability of occurrence. The phrase "natural or credible course of events" can be applied to justify that water sprinkler systems will activate with some degree of frequency. The concept of "natural or credible course of events" should not be extended to justify the "inherent unlikeliness" of such things as inadvertent sprinkler activation, regardless of the probability based on past experience. When dealing with probabilities, however low, they are still only probabilities, not certainties, such as the inherent properties of materials.