

Realism in the Assessment of Fissionable Material Operations Outside Reactors

Introduction

The Nuclear Criticality Safety Division (NCSD) urges and encourages the use of realistic models and assumptions in all studies of the risks, costs, benefits, and consequences related to establishing criticality safety in operations with fissionable material outside reactors.

Background

It is customary for scientists and engineers when modeling hypothetical abnormal conditions and failure mechanisms to make conservative assumptions and add safety margins. Analysis of these abnormal conditions should be limited to those that are credible. Thus, assumptions that are physically impossible are excluded. “Worst case scenarios” should not violate the laws of nature.¹

General Discussion

Fissionable material processes are sometimes mischaracterized as requiring controls so extensive and unprecedented as to outweigh the benefit (mission need). The NCSD encourages criticality safety practitioners to avoid extremes when developing controls. The absence of realism produces inaccurate results; undue alarm of the operators; and ultimately, lack of credibility with the operators.

Occasionally, unrealistic assumptions may be used for expediency. However, controls derived therefrom must allow reasonably convenient and flexible operation such that operators support them. Thus, the controls do not invite deviation.

Conclusion

Results of unrealistic assumptions are oftentimes not a cost effective means of doing business, and may result in a disservice to fissile material facility operations. To the extent practical, NCSD encourages existing criticality safety practitioners to foster increased realism in technical practices.

¹ American Nuclear Society, *Realism in the Assessment of Nuclear Technologies*, Position Statement 65, June 2004