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Incorporation of Risk Management Concepts in Regulatory Programs

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Incorporation of Risk Management Concepts in Regulatory Programs

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Name: Leo Bobek
Address:
1 University Avenue
Lowell, MA, 01854
Organization: University of Massachusetts Lowell

General Comment

Thank you for the opportunity to submit the attached comments on behalf of the National Organization of Test Research and Training Reactors.

Attachments

TRTR NRC2011-0269 Comments

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6 January, 2012

Chief, Rules, Announcements, and Directives Branch, Office of Administration
U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001

Re: NRC-2011-0269
Incorporation of Risk Management Concepts in Regulatory Programs

The following comments are submitted on behalf of the National Organization of Test, Research, and Training Reactors (TRTR). TRTR is a professional organization with members from over 40 research reactor facilities across the U.S. including government, national laboratories, industry, and universities. TRTR promotes science and engineering education, fundamental and applied research, the application of technology in areas of national concerns, and improving U.S. technological competitiveness around the world. TRTR Membership includes managers and directors of research reactors, administrators, educators, research scientists, and engineers.

General Comment

Nuclear non-power research reactors (NPRs) are designed for scientific and education purposes. NPRs licensed by the NRC operate at thermal power levels hundreds to thousands of times lower than nuclear power reactors – ranging from 20MW to a few watts of thermal power. Based on their design and utilization, NPRs pose from little to no risk to the public.

Since the 1950's, a graded approach in the safety analyses for research reactor design has ensured safe operation. Given their design, power level, and associated utilization, a graded approach to regulation should be applied to NPRs that is commensurate with the low potential hazard to the public. To illustrate, most NPRs operate with primary coolant (or pool water) temperatures and pressures at or near ambient levels. A typical NPR safety limit is the onset of nucleate boiling. For NPRs, the margin between normal operating parameters and their safety limits is sufficiently large to ensure credible design basis accidents (DBA) will not lead to fuel damage. Nonetheless, a maximum hypothetical accident (MHA) (similar to a *beyond design basis event*) also is used to evaluate the consequences of a hypothetical NPR fission product release. The MHA is considered non-credible, and for many NPRs there is no initiating event for the analysis. The purpose of the MHA is to demonstrate that even under non-credible hypothetical conditions "...the maximum consequences of operating the reactor at a specific site are within acceptable limits." (NUREG-1537 *Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors*)

Conservative deterministic methods have been used for NPR safety evaluations for over 50 years. The method typically employs a single conservative numerical value (with a probability of 1) in the analyses, leading to a conservative single value for the result. The deterministic safety analysis will use a defined set of rules for the event selection, the analytical methods employed, the parameter specifications for input, and acceptance criteria. Without the need to perform complex calculations, deterministic methods provide reasonable assurance that DBAs at NPRs do not lead to a fission product release. Computational models using a deterministic approach also are used by NPRs for evaluating the DBA transient and accident analysis. For the MHA, these methods and models tend to overestimate the amount of the radiological release and the consequence. Therefore, the results bound all the credible DBAs for the NPR.

Answers to Specific Questions

Do you believe there is a common understanding and usage of the terms risk-informed, performance-based, and defense-in-depth within the NRC, industry, and other stakeholders? Which terms are especially unclear?

While there may be an understanding of the terms, there is an apparent disproportionate application of regulation in relation to risk for NPRs. The deterministic approach applied in the regulation of NPRs has led to performance-based outcomes where there has been no significant event with a risk to public safety in over 50 years with NRC licensed NPRs.

What are the relevant lessons learned from the previous successful and unsuccessful risk-informed and performance-based initiatives?

The NRC has not devised sufficient metrics for the staff to use in the development of risk-informed guidance. Despite the performance-based outcomes for NPRs, staff guidance (e.g., for emergency planning, licensing, upgrades, technical specification development, etc.) has not employed a performance-based or risk-informed approach.

What are the relevant lessons learned from the previous successful and unsuccessful deterministic regulatory actions?

Again, where the NRC employs the same regulatory framework for NPRs as power reactors there is an apparent disparity in the application. As an example, an Unusual Event or Alert declaration by a power reactor invokes a significant reaction on the part of the licensee and the NRC in preparation of a possible escalation where the health and safety of the public may be in jeopardy. While NPRs are also required to use these emergency terms, the NRC recognizes (e.g., training of EOC personnel) that the declaration of an emergency event at an NPR does not require invoking the same response as for a power reactor. The reason is the recognition of the significantly lower potential risk or no risk to public health and safety. The same can be said for other specific reactor related notifications such as an Abnormal Occurrence.

What are the key characteristics for a holistic risk management regulatory structure for reactors, materials, waste, fuel cycle, and security?

Without placing the burden on the licensee, the NRC must undertake realistic analyses of the relative risk associated with each of these regulated entities. Regulation and guidance then must be developed proportionately for each entity based upon this relative risk assessment. Proportional regulation, based upon the relative risk, is fundamental for the NRC to achieve the obligations of the Atomic Energy Act to "*impose only such minimum amount of regulation of the licensee as the Commission finds will permit the Commission to fulfill its obligations under this Act to promote the common defense and security and to protect the health and safety of the public and will permit the conduct of widespread and diverse research and development.*"

It is vital not to impose the need for probabilistic risk assessments on the NPR licensee. Most NPR licensees do not have expertise or resources to accomplish such a task, nor does the specific equipment data exist to support meaningful probabilistic risk assessments.

What are the challenges in accomplishing the goal of a holistic risk management regulatory structure? How could these challenges be overcome?

The greatest problem will be the issue of overcoming risk perception (misconception) by the public, elected government officials, and even the NRC staff. Risk perception is a subjective human trait that typically has no basis in reality (e.g., driving a car *feels* safer than flying in airplane). As with all scientific and engineering principles, the results and conclusions must be supported by defensible and irrefutable analyses.

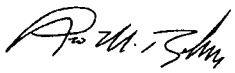
What is a reasonable time period for a transition to a risk management regulatory structure?

Five years is preferable. Ten years is practical.

From your perspective, what particular areas or issues might benefit the most by transitioning to a risk management regulatory approach?

Nuclear technology has yet to reach its fullest potential in aiding and improving the lives of humans. Much of this potential has been lost due to a regulatory burden that is disproportionate to the risk. A risk management approach may help ease the burden and encourage further development and use of nuclear technologies.

Respectfully,



Leo Bobek

Chairman, National Organization of Test, Research and Training Reactors