PRESENTATION
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Criticality Safety
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Of all the safety issues that the Defense Nuclear Facilities Safety Board has addressed in carrying out its statutory oversight function, none is more important or challenging than criticality safety. I welcome and appreciate the opportunity to meet with you today to convey the Board's concerns regarding this issue and its dedication to the pursuit of a zero-tolerance mentality in the conduct of any program in the Department of Energy where the possibility of a criticality accident exists.

Why the emphasis on criticality accidents? Obviously, a criticality accident would endanger the lives of facility workers as well as present a potential risk to the public through exposure to radiation from any radioactive release. Almost as important is the fact that a criticality accident constitutes, in the mind of the public, confirmation of the fears generated by critics who have attacked anything related to "nuclear."

A number of commendable criticality safety initiatives have been conducted by DOE, and have contributed directly to a continuing upgrade of criticality safety throughout the DOE complex. These initiates include implementation of the Board's Recommendation 97-2, the Secretary's requirement that criticality specialists spend more time on the floor where operations with fissile material are conducted, and the completion of individual self-assessments and associated improvements in sites' criticality safety programs. Later in the program, Dr. Burns of the Board's staff will discuss some additional initiatives that may be explored in the future.

Before discussing recent incidents or threats to criticality safety, I would like to note two of the Board's concerns that prompted the issuance of Recommendation 97-2. The first is the continuing threat to stable funding of criticality programs, while the second is the result of the movement within DOE to close experimental criticality facilities. I understand that commendable progress has been made by Dr. Crandall on ensuring stabilized funding in the future. On the second issue, I simply wish to reinforce the Board's position that any impact on or delay in the training of criticality engineers and experimental test programs that might be associated with the relocation of the Los Alamos criticality facilities should be identified and minimized. This is a difficult problem that the Board is following closely.

I would like to share with you additional thoughts that may be helpful in your commitment to criticality safety. Lest we forget, much of what we know today of criticality safety requirements is due to extensive experiments conducted in the early years at Los Alamos National Laboratory, sometimes with tragic results. Dr. Otto Frisch's early experiments with special nuclear material to confirm theoretical calculations were referred to as "tickling the Dragon's tail" in recognition of the danger involved.

One of the early experimenters, Dr. Harry Daughlian, died in August 1945, within 10 days of an accidental exposure from working on a critical assembly. Months later, Dr. Louis Slotin, who was one of the investigators assigned to look into that accident, was fatally involved in another criticality accident at Los Alamos.

As a young staffer on the Joint Committee on Atomic Energy in 1957, my very first visit to Los Alamos was to investigate a criticality accident that, while causing a great deal of property damage, fortunately, did not involve any personal injuries.

We must not forget what can occur if strict attention is not given to criticality safety. Three individuals died at the SL-1 reactor experiment in Idaho, a death occurred in Rhode Island at a processing plant, and, of course, there were two deaths associated with the recent Japanese criticality experience.

From a historical perspective, I recall that in the early stages of the Navy nuclear program, some 40 or more years ago, there were no formal requirements similar to 10 CFR 830, there were no consensus standards, there weren't even any computers or pertinent benchmarked criticality data. What was it that enabled the success of this program? A major contributor was the acceptance of personal responsibility for safety by the people involved in criticality safety programs, i.e., "a criticality safety culture." Ensuring this "criticality safety culture" in the DOE complex is a continuing challenge, especially given that the program is constantly being pressured by financial and schedule concerns. There are several other areas that are potential threats to "a criticality safety culture."

- The first potential threat is human errors associated with the implementation of complex criticality controls and laxity in the conduct of operations.

The Board is aware of several recent incidents involving Building 9212 at Y-12 and the removal of raschig rings in tanks at Rocky Flats. I would like to re-emphasize the importance of the proper development and execution of procedures, postings, and requirements involving the handling of fissile material. It is important that the criticality safety community work closely with the relevant line organizations to develop criticality controls that are concise and easily implemented. If a criticality accident should occur, I am convinced it will not be caused by an unanalyzed criticality situation. It will be due to an operator making a mistake in trying to follow a complex, confusing criticality safety control.

- The second potential threat is the proliferation of risk acceptance.

Where criticality issues are involved in a process, the objective should be prevention, not mitigation, of an accident. The extreme cost of failure, from both a safety and a public perception standpoint, is unacceptable. In the words of a noted expert in this area, Victor Stello, "In the mind of the public, risk is a clever way that the nukes have to package danger."

- A finally potential threat is retirement of experienced criticality specialists and the general demise of nuclear programs in the academic community.

- Attracting and retaining criticality safety experts is a significant problem that appears only to be getting worse.

As a final thought, keep in mind that *you* have responsibility for criticality safety. If a criticality incident occurs at your site, you will find yourself in the position of having to justify not having taken every possible step to avoid it.

The Board encourages DOE and its contractors to redouble their efforts in the development and implementation of clear criticality safety requirements and adherence to sound conduct-of-operations practices to ensure continued success in achieving their mission objectives. I know the challenge I am presenting—that of overcoming the obstacles to achieving the needed "criticality safety culture"—may be difficult to accept without losing a lot of sleep, but we must strive to meet it. In the words of Robert Browning, ". . .a man's reach should exceed his grasp, or what's a heaven for?"