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Make A Difference for Safety

Elmo E. Collins, US NRC Region IV Regional Administrator

Thank you for the invitation to address this Society. It a privilege for me to be here to provide some thoughts about what it means to be a professional reactor operator.

This society plays an important and significant role in establishing, emphasizing, and raising the level of professionalism of nuclear power plant control room operators. The commitment of the professional reactor operator society to public health and safety is the same commitment held by the Nuclear Regulatory Commission, so in this we share a fundamental commitment to nuclear power plant safety. It is from that common ground that I am addressing you today.

So, I'll be addressing the nature of the job of nuclear power plant control room operator and what it means to be ready for the unexpected. Along the way I'll touch on some of what the NRC is doing after the events in Japan. Then I'll be happy to entertain any questions you have.

I sometimes have the opportunity and the privilege to present licenses to control room operators. These occasions give me the chance to emphasize the importance of the job of being a reactor operator.

How important is that job? You don't have to look any further than the woman or man "on the street" to find the answer to this question. Just think about how they respond to you when you tell them that you operate a nuclear power plant for a living? Whether or not they are for or against nuclear power, they have an immediate grasp of the importance of the job of operating a nuclear power plant. Given the recent events in Japan, you can know for sure that there is a genuine, heartfelt, desire on their part that you do your job well when you hear them say, "Keep us safe."

Operating a nuclear power plant is not "just another job."

The nature of the job of operating a nuclear power plant is unique. At its most fundamental level, a nuclear reactor is driven, not by what you or I want it to be, but by the first principles of nature. It is the control of an enormous amount of energy, nuclear energy that, without exception, follows the first principles of physics and thermodynamics and chemistry and fluid dynamics. It is a complex and demanding technology. It will be an unforgiving technology if you operate it in a manner inconsistent with the principles of its nature.

The Three Mile Island accident is a vivid example where reactor operators who were well intentioned, took actions inconsistent with the nature of the technology. The technology did not forgive them.

The Three Mile Island accident also drove home to us in the United States the point that a nuclear reactor accident can happen. As a result, the rigor, and the comprehensiveness of control room operator training was improved dramatically. Those of you who are licensed reactor operators know the intensity, extent, and depth of the training that precedes licensing.

After the Three Mile Island accident, a change was also needed in the mind-set to what it means to operate a nuclear reactor safely. I frequently quote NRC's Roger Mattson, then the Director of the Division of Systems Safety. He said that there is a difference between believing that accidents can happen and not believing it ……That's the way I've been conducting myself ……. It was a mistake. It was wrong.[1]

There is a difference, and it makes a difference what you believe about the business of operating a nuclear power plant; what your fundamental assumptions are; and, ultimately the attitude and vigilance that you bring to the job.

Accordingly, after the TMI accident, NRC and the U.S. Nuclear industry approached the safety of nuclear power plants with the premise that an accident can happen, and with the resolve that nuclear power plant accidents can and must be prevented. Items that received little or no attention before the TMI accident were now at front and center. We've already talked about control room operator training. But other areas also received attention: emergency preparedness, protective action recommendations, public communication, symptom-based emergency operating procedures, and severe accident research and mitigation guidelines. In the years following the Three Mile Island accident, when areas of risk or vulnerability were identified, additional measures and equipment beyond the traditional 'design basis' of the facility were prescribed and have become key features of the "safety framework" that is aimed to "prevent the nuclear reactor accident." Areas included containment hydrogen control, anticipated transients without scram, station blackout, and measures to handle incidents of widespread site damage such as explosions and fire.

Indeed, the Nuclear Regulatory Commission's Strategic plan identifies under the goal of adequate protection of the public a strategic outcome to 'prevent the nuclear reactor accident.' [2]

I have frequently used Roger Mattson's quote when talking about safety lessons as a reminder to emphasize the importance of holding the premise that nuclear reactor accidents are possible.

How are we doing? The Three Mile Island Accident happened over 32 years ago and we've not had another in the United States.

Success? Not in the world of the safety of complex hazardous technologies.

James Reason reminds us that the safe operation of hazardous, complex technologies is war. It is a "safety war," and it is not won with one, final conclusive battle achieving victory. Rather it is guerilla warfare, a long struggle with no final conclusive victory. [3]

James Reason also emphasizes to us that a lengthy period without a serious accident can lead to the steady erosion of protection. It is easy to forget to fear things that rarely happen. It does not signal the "coming of peace in the safety war," it is rather a sign of "a period of heightened danger," and a time to "renew focus on and to strengthen safety defenses." [4]

What this means is that it is our obligation with respect to safety is to continually check ourselves and find ways to strengthen our defenses. And now, with the occurrence of the reactor accidents at Fukushima, that obligation is more important than ever.

Presently, the industry and the NRC are examining many of the items we have put in place in the 32 years since the TMI accident. NRC Temporary Instruction 183 provided inspection to verify provisions were in place for widespread site damage, station blackout, and corresponding procedures. Overall, NRC found a strong capability at nuclear power plants to respond to these unexpected significant events.

NRC has assembled a team to consider what steps are necessary for the agency to take in the near team. This team is scheduled to make its final report to the Commission on July 19. In the longer term, NRC plans to conduct a thorough, comprehensive assessment of the "safety framework" aimed to prevent accidents.

It is too early to tell the specifics and extent of what will change following Fukushima. But be assured, we will take steps to strengthen safety and reduce risk where appropriate. We do know that we have entered the next chapter of the safety war for commercial nuclear power plants.

How are nuclear power plant reactor operators doing while the post-Fukishima examinations are in progress? From my observations the level of professionalism is very high.

Recently NRC published it Policy Statement on Safety Culture. I can't think of a job in the nuclear industry that needs a strong safety culture more than that of the reactor operator. This policy statement refers to safety culture as "the necessary full attention to safety matters" and the "personal dedication and accountability of all individuals engaged in any activity which has a bearing on the safety of nuclear power plants. A strong safety culture is one that has a strong safety-first focus." [5]

I challenge this society, as a professional society, to continue to find ways to increase your professionalism, but specifically with a focus on safety culture. Professionalism as a reactor operator necessarily includes a grasp of and an internalization of the profession; that is, having a high degree of technical knowledge and understanding of the plant, and a high level of readiness for plant operations, off-normal or emergency. Together, these form the essence of operational safety. Safety culture, according to the NRC's policy statement is addressing problems commensurate with their importance to safety.

For the professional reactor operator, having a strong safety culture means understanding plant problems relative to their importance to safety, and it means having an understanding of the most basic assumptions, the fundamental beliefs about the business of operating a nuclear power plant. The basic assumptions and fundamental beliefs form the premises for how the job is approached and the in-depth technical understanding provides the foundation of good, safety-based operational decisions.

We've already talked one of the most basic assumptions, a fundamental belief about operating a nuclear power plant. It was indelibly imprinted in our nuclear DNA after the Three Mile Island accident: an accident can happen.

So, we were sober and riveted when in March this year we witnessed the reactor accidents at the Fukushima Daiichi Nuclear Power Plant on world-wide television. It was a powerful and vivid reminder, one that none of us wanted, of the words of Roger Mattson that an accident can happen. The accident at Fukushima compels all of us to give deeper reflection to understand what Roger Mattson meant when he said that there is a difference in believing whether or not an accident can happen; a self-reflection about how ones individual actions, behaviors, and decisions have reflected this premise. Ultimately, each of us needs to translate the belief that an accident can happen into actions to prevent the accident. To take actions that make a difference about how a nuclear power plant is operated.

Reactor operators are given both the privilege and responsibility to display the standards needed for operational safety. Station personnel look to the reactor operator to see how you approach your job. Reactor operators have the obligation to give station personnel the best example of 'deciding for safety.' It is a "safety war" and as control room reactor operators, you are on the front line, prominently engaged in the battle for safety. You are responsible for safe operation of the nuclear reactor and this responsibility cannot be abdicated or delegated.

In this long struggle in the "safety war," while reactor operators find themselves doing the same thing many times, performing the same plant task repetitively, they can never let their job as a control room operator become repetitious. Reactor operators can't let their control room activities become habitual or routine.

I'm sure that you are aware that industry attention is being applied today to improve in the area of "engaged and thinking organizations."

I'll draw your attention to NRC Information Notice 2011-02 addressing reactivity management, and to two recent special inspections at Region I facilities involving reactivity. These events show that too frequently, the actions of reactor operators either do not reflect an in-depth, integrated understanding of what is going on in the plant or reflect a habitual or routine mentality in operating a nuclear reactor, or a combination of both. Let's be clear, reactivity and reactivity management lie at the very core of reactor safety. Controlling the reactivity of the reactor core is the business of the reactor operator. Reactivity changes can never be treated as routine. I submit to you that reactivity management is an area that requires attention in the U.S. industry and that this society can assist.

Not being habitual or repetitious is only half the battle. The other half rests in reactor operators being prepared for the unexpected.

Certainly, the accidents at Fukushima highlight the need to check our readiness to respond to extreme events in areas of equipment capability, emergency operating procedures, emergency preparedness, and severe accident guidelines. Industry and NRC are doing this.

But what about the readiness of the "mindset" of the individual and the culture of the organization to respond to extreme events or a combination of equipment failures that has never been experienced in real life or drilled in the simulator?

The reactor operators and organization who do this best "know that they have not experienced all the ways that their systems can fail. They know that they have not deduced all possible failure modes. They have a deep appreciation for the liabilities of overconfidence. This appreciation takes the form of ongoing mindfulness embedded in practices that enact alertness, broaden attention, reduce distractions, and forestall misleading simplifications."[6]

Even today, nuclear power plants in Nebraska are anticipating water levels in the Missouri River that have never been experienced. Ask the reactor operators at Robinson, potentially the first significant accident sequence precursor event since Davis-Besse, about response and actions to combinations of equipment failures never before experienced.

This preparedness is more difficult to assess, but that is the challenge that must be met. Find ways to enact alertness, eliminate distractions so you can stay focused on the business at hand, and avoid over simplification of the equipment anomalies you see.

The last challenge I leave you with today is to make a difference for safety. Every one of us can do that by conducting an honest, serious self-reflection about what we truly believe about the business of operating a nuclear power plant.

The antidote to a routine, habitual, or repetitious approach to operating a nuclear power plant is the same antidote to being unprepared for the unexpected: the mindset that is brought to the job. Today, as professional reactor operators, I challenge you to approach your jobs with:

1) A mind-set that understands and believes that nuclear power technology is demanding and unforgiving; believes that a reactor accident can happen.
2) A mind-set that has the resolve to act to prevent accidents.
3) A mind-set that knows that however well designed and built, equipment fails in unexpected ways, in unanticipated combinations, with surprising consequences.
4) A mind-set that sees through the repetition and tedium of control room actions, sees through the procedure that is being used and the switch that is being operated with an understanding of the underlying reality of what is happening in the plant.
5) A mind-set that knows that when it comes to nuclear power plant operational safety, nothing is routine.
6) A mind-set that knows that safety can never be taken for granted.

Make a difference for safety.

Notes

[1] Robert Pool, "Search for Safety", an excerpt from *Beyond Engineering: How Society Shapes Technology*, 1997

[2] NRC Strategic Plan: Fiscal Years 2008-2013 (NUREG-1614, Volume 4)

[3] James Reason, *Managing the Risks of Organizational Accidents*, 1997, p. 114

[4] Ibid. p. 6 and p. 114

[5] NRC Policy Statement on Safety Culture

[6] Karl E. Weick and Kathleen M. Sutcliffe, *Managing the Unexpected,* 2007.p. 3