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TO RISK OR NOT TO RISK

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It is a great pleasure to be here this morning to address this distinguished gathering. At the outset, I would like to express my thanks to Commissioner Dicus, who graciously offered to exchange places with me, and allow me to take the mid-morning time slot in this morning's program and to catch my early flight. That was generous of her — and as such, completely in character. Therefore, I will leave her with the pleasant chore of answering your questions, as a token of my appreciation.

Last year, when I had the honor to address this group, I was still a relatively new kid on the block. I took the opportunity at that time to congratulate you, the leaders of the U.S. nuclear industry and the NRC staff, for the improving successful safety record of what is by any objective measure — and I stress objective — a safe and environmentally benign industry. Congratulations are again in order.

*(SLIDE # 1: Performance Indicators -- Annual Industry Averages 1997)*

I would also offer the sobering thought that while we are here, the nuclear plants, the nuclear medicine labs, all nuclear facilities, and the NRC operational corps are all at work -- and everything is fine. Therefore, I would also like to pay tribute to the men and women whose everyday work at their jobs in this country's nuclear industry and regulatory agencies -- not just the NRC, but also Agreement States -- makes these congratulations possible. They are among the brave and the free who make America strong, to paraphrase Francis Scott Key.

It would be wrong not to acknowledge here, today, the contribution of the hands-on

people of industry and NRC in what America's nuclear industry has achieved. When it comes to ensuring nuclear safety, the policies and decisions made in the board rooms of nuclear utilities and NRC offices are important, but they would count for little without the day-to-day efforts of many thousands of skilled working men and women in the control rooms, the maintenance shops, the engineering offices of this country's nuclear plants, and our own NRC colleagues in the front line. It is they who for decades have played an indispensable role in keeping the risk of nuclear plants and nuclear applications acceptably low. Without their diligence, dedication, and attention to detail, the safety decisions made at the top of organizations would not be translated into action. It is their quality in action and quality in depth that establishes the flexible and strong framework on which the nuclear technology and regulatory technology fabrics are woven.

Now, a "disclaimer". The opinions are my own except when I specifically state "the Commission."

This week you will participate in a conference with a systematic focus on nuclear technology regulation. I will focus my remarks on the pivotal issues that are faced by both the nuclear technologist and the regulatory technologists. I titled this talk "To Risk or Not to Risk" with some hesitation because you might think it is a question. It is not. The use of risk insights is a strategy that has profound implications for the regulation of the nuclear industry, and it needs an answer. Too much time and too much money has been spent on it without the NRC reaping the benefits of a more quantitative regulatory framework, without the industry reaping the benefits of more stable and consistent regulations that add to defense-in-depth and operational safety, and without the public reaping the benefits of a better defined set of safety boundaries for nuclear power. It is time to decide the role of risk insights and to define what its benefits are. For the complex nuclear power technology, which has an equally complex regulatory structure that is normally bound by overconservative processes, risk insights are the only available tool that can provide the definition needed for conservative and efficient decision-making, whether technological or regulatory.

I will not keep you in suspense any longer about my own views: I believe that we can make the NRC regulatory fabric risk-informed; that we should, and indeed, that we must. Though I approach this as a regulator, looking at what best serves the public interest, I firmly believe that the insertion of risk insights clearly serves industry's self-interest. In the real world, the shift to fully risk-informed regulation is already taking place, but it is not going to be timely or efficient if the industry and the NRC do not give it wholehearted support. Whatever reservations you may have about a fully risk-informed NRC, it can only be better than a non-risk-informed NRC.

It would be a serious mistake to think of risk-informed regulation as a new concept. The opposite is true. For some 25 years, we have been working on risk issues -- within the NRC, in the industry, in academia, and in little offices around the globe -- and we have already

accomplished a great deal. More than is sometimes realized, risk information has long been an ingredient -- sometimes explicitly, sometimes in a more or less covert way -- of the approach to nuclear safety. It's time to bring it out into the sunlight, and make explicit that this is an indispensable component, part of the warp and woof of the regulatory fabric. For there has also long been ambivalence about risk information, and that ambivalence also continues to the present day.

Last year, when I addressed this conference, I tried to make the point that the greatest challenge before the NRC and the regulated industry was not to acquire more information, but rather to apply the enormous base of knowledge we have already accumulated. The message I wanted to convey was that there were too many uncertainties in our regulations and their implementation, in part because of the piece-meal way that new requirements had been developed; that these uncertainties caused some unjustifiable regulatory burdens; and that only risk information, applied in a systematic way throughout our processes, could ensure that requirements were actually adding value in terms of enhanced safety. Let me reflect on a few key issues and their progress.

*(SLIDE # 2: "Reflections")*

- Value-Added to Society

As I was stating, there must be value-added to society both by the industry and the regulatory processes. These processes converge on the safety of operations, and the spinoff is better capacity factors and economics. I want to reaffirm my belief both in the need for this added value and in the strong compatibility between safety and key plant productivity factors.

- Safety and Compliance

*(SLIDE # 2: "Safety and Compliance.")*

There is general agreement at the Commission with the principles embodied in the Commission's statement on Safety and Compliance, but there are still problems in putting this into practice. On the positive side, current regulatory enhancements are directing staff efforts away from issues of little significance and toward those with greater importance for protection of public health and safety. On the negative side, their implementation is not consistent across the board. Progress has been made in the last 6 months, yet we need to continue to reduce regulatory intrusiveness when there are no safety benefits. I would be remiss if I failed to acknowledge that we have witnessed an increase in escalated actions, and more than a

doubling of non-escalated Severity Level IV violations between FY1994 and FY 1997 (around 1400 in FY97). These increases should be a matter of concern to everyone here, and they

warrant our scrutiny.

It is sometimes said that the Commission has been allowing an overemphasis on compliance at the cost of the safety focus. I don't think it is so, now. Indeed, the Commission has just approved revisions to the Enforcement Policy that include the addition of a statement on the nexus between safety and compliance. The Commission also approved other actions that should promote greater clarity in NRC findings regarding the safety significance of violations. If we at the Commission level had wanted to emphasize compliance over safety, we would have declared that safety equals compliance and gone fishing.

- Final Regulatory Guidance on Risk-Informed Regulation

*(SLIDE # 2: Final Regulatory Guidance on Risk-Informed Regulation)*

Last year, I described what I saw as the different safety-risk domains that should be used for regulatory activities, and I depicted them as blobs, one inside the other.

*(SLIDE # 3: NRC Regulatory Oversight Domains and Utility Management Oversight)*

I didn't succeed in selling the NRC staff on my blobs, but the staff did propose, and the Commission approved, defined risk domains, as shown in the next slide.

*(SLIDE # 4, Mean Core Damage Frequency Acceptance Guidelines)*

The staff version shows a lack of artistic creativity for sure, but is quite workable and practical.

On March 19, the Commission issued an Staff Requirements Memorandum approving the staff's proposal "to allow very small increases in core damage frequency (CDF) and large early release frequency (LERF) independent of the baseline calculated LDF/LERF, provided that licensees track and the NRC staff monitor the cumulative effect of changes." The Commission also approved the staff's proposed definition of "very small": "changes less than  $10^{-6}$  per reactor year for CDF and less than  $10^{-7}$  per reactor year for LERF." From zero to very small is a **dramatic** change.

- Staff Requirements Memorandum on 50.59

*(SLIDE # 5: Staff Requirements Memorandum on 50.59)*

The de facto zero criterion is out of 50.59. "Minimal" is in. From zero to minimal is also a dramatic change. And to avoid misinterpretation, the Commission has bounded the value of "minimal" in the best traditional NRC language: "minimal" is larger than negligible, and

substantially less than “significant.” Neither of these departures from zero means **any** compromise of protection for public health and safety.

Let me briefly mention a few other topics:

- Integrated Review of the NRC Assessment Process for Operating Commercial Nuclear Reactors.

*(SLIDE # 6: Integrated Review of the NRC Assessment Process for Operating Commercial Nuclear Reactors)*

The staff just proposed, in response to Commission initiatives, a new integrated inspection and assessment process: no SALP, no SMM, but more accountability, transparency, and due process. I want to commend the staff for having responded with a sense of purpose to the Commission’s direction. Although still a concept and in need of better mechanics, I believe it can be made to achieve what is needed:

*(SLIDE #7: Integrated Review of Assessment Processes for Operating Commercial Nuclear Reactors)*

- Provide clear roles and responsibilities.
- Maintain data integrity so that the process does not distort the data.
- Include a decision model or criteria so that NRC actions are predictable.
- Be risk informed.
- Be simple, non-redundant, and efficient.

This new approach does not merely tinker with the status quo, it challenges and changes it. The integrated assessment encompasses the NRC’s know-how with state of the art developments in information processing and sampling, and with decision-making elements supported by quantitative assessment. At the same time, it must maintain the robust safety philosophy that must underlie all our regulatory activities. It should be less punitive and more leading to self-corrective actions.

- Public Information

*(SLIDE # 8: Public Information)*

The Commission has been emphasizing the importance of clear, consistent, transparent communication with the American public. The Commission directed the staff to recommend, via a task force called the Communication Coordinating Committee, across-the-board improvements in the way we handle public information. Independent of the final results of the Task Force effort, progress has already been made. You can see the change by

comparing the way the Zion control rod incident was treated with the handling of the Haddam Neck site. In the case of Haddam Neck, the region and headquarters made sure that the issues were placed in their proper safety perspective. I want to acknowledge publicly the progress made already in all regions. I eagerly await the results of the Task Force efforts.

- Clarity, Consistency, and Accountability

*(SLIDE # 8: Clarity, Consistency and Accountability)*

Last but not least, in conjunction with clarity and consistency, I believe we need accountability. Too often it appears that the NRC enacts good rules, but somewhere between the establishment of requirements by the Commission and their actual implementation in the field, there is a disconnect. The Commission has been insistent that these problems must be corrected. For our part, we know that we have to put a lot of effort into making our rulings clear and consistent. But it is also essential that the staff be cognizant of the efforts needed to conduct implementation in a clear and consistent manner: clear to all stakeholders, and consistent with Commission direction. And accountability needs to be threaded **throughout the process**. Accountability cuts both ways. It means being able to give credit where credit is due. It also means, when deficiencies occur, being able to know where the responsibility lies.

The need for consistency starts where the NRC meets the licensees: in your facilities.

The inspection process is so important a component of our regulatory program that I have been trying to figure out a metaphor to describe it. Here's one. The inspection process must work like a tunable transducer, and never like a bistable. Let me translate that phrase: it means that information is collected and processed throughout the system without distortion or interruption. Let me tell you a story. There was once a round, white speck of paint....

*(SLIDE #9)*

This is an example of what inspection and assessment process should not be. Before I leave the subject of clarity, consistency, and accountability want to mention that I have criticized the staff in the past for using vague terms to fault a licensee's performance -- for example, the phrase "lack of a questioning attitude." Well, make no mistake, a questioning attitude is a good thing -- and this Commission has one. We question a lot. And we are going to question a lot more. To make informed decisions, we require reliable, proper, solid input from the staff and, as needed, from licensees and all other stakeholders. We don't want to find ourselves getting answers that don't fit the questions. So let me tell you one more story. There was once a Ph.D. candidate in zoology.

*(SLIDE #10)*

An therein lies a tough challenge to both the NRC and the industry, because the responsibility lies **with both**. In the past, sometimes there has been a tendency to set standards that are vague, and to allow a maximum of interpretability or flexibility when it comes to applying them. But present knowhow and present information availability require a higher level of definition. So, I would like to add to last year's theme. I titled it "Definition".

(SLIDE # 11: Definition)

And in definition are clarity, consistency, **resolution**, and accountability. This goes a bit farther than what I expressed last year: resolution is added, and resolution needs to be timely.

A generation ago, a Supreme Court Justice offered his own definition of obscenity: "I know it when I see it." I'm not about to offer an opinion on whether that is an appropriate way to judge questions of obscenity, but I *do* know that it is no way to decide questions of nuclear safety. It may be a convenient approach in the short run, but it does not serve the long-term interests of either the NRC or the industry, and most important, it does not serve the interests of the public. We owe the public objective and discernible standards, not *ad hoc* regulation that varies depending on the individuals involved, or that is driven by whatever recent event has drawn the attention of the media. In this regard, it is risk information that provides an objective mean of determining whether regulation is insufficient -- on the one hand -- or excessive on the other. Insufficient regulation deprives the public of adequate safety; excessive regulation translates into unnecessary costs to consumers.

Speaking of the media, parenthetically, it's often said that the media are not objective when it comes to nuclear issues. At least some of that criticism is fair. It is true that we can't expect others to be objective about nuclear safety if we ourselves do

not set an example of objectivity and clarity in the way we set and apply nuclear safety standards.

With that background, let me return to risk-insights because to me they imply definition and decision-making.

We have a decision from the Commission in Direction-Setting Issue # 12, that the regulatory processes should become risk-informed. The ultimate objective is to become both risk-informed and performance-based. But the Commission recognizes that the two concepts are separate, and do not have to proceed on the same schedule. The fact is that performance-based regulation is not always linked to risk-informed applications, but that does not mean that we have to delay incorporating risk insights -- which are available, now -- into our activities across the board. Nor do we have to pass up opportunities to establish performance-based regulations in place of prescriptive requirements. At present, risk-

informed and performance-based initiatives are more easily done independently, even though they could ultimately be linked in many applications. I advocate making 10 CFR 50 risk-informed, the sooner the better.

I'd like to conclude by declaring my optimism about this industry and its regulation. I think we are on the right track. We have learned from experience and we are applying what we have learned. A technologically mature industry calls for maturity in the way we approach regulation: not haphazardly, not by talking about risk in whispers, but by being objective, consistent, and open.

In the end, I believe it will be this industry -- hopefully with the assistance of a risk-informed regulatory fabric -- that will raise safety-related performance up to the point that it will be above the margins of safety that we would like to have, and far above what is required. And the only way that we will be able to tell the difference is with the support of quantitative risk information. Let us also remember that ultimately what we create has to be usable and used by the men and women who work every day at this country's nuclear installations.

To risk or not to risk is not a question. This is a good time to make a transition, where risk technology can add a quantitative framework to our regulatory fabric.

Who will gain the most? Not the industry, not the NRC, but the American people.  
Thank you.

**NOTE:** Slides will available and posted with this speech during the week of April 20.