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FUTURE IN TRENDS REGULATION

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It pleases me very much to be back in this part of the world again, and in this beautiful and historic city. I was in Russia a little over two years ago. I saw then the advances that are being made here in numerous fields, including basic material sciences. I saw research laboratories and technical talent of a high order, and I saw some of the work being done on advanced reactor designs. In those two years, there have been extraordinary changes, changes which would have been hard to foresee two years ago. There are no doubt many changes to come, and we may together hope that all those changes will contribute to the coming of an era of unprecedented peace, international cooperation, and prosperity.

I congratulate the members of this Nuclear Society on the convening of the Society's third annual meeting. The existence of this Nuclear Society helps assure that nuclear technology will make a contribution to the well-being of this great nation and the other nations of the former Soviet Union. I urge you to continue to strengthen your new Nuclear Society, and I am glad that your American and European counterparts are helping you.

I have been asked to talk this morning about the future of nuclear regulation. Now is a particularly good time for me to discuss this topic with you. I am happy to report that the United States Nuclear Regulatory Commission is embarking on a multi-million dollar program to help Russia and Ukraine strengthen their nuclear regulatory programs. The Chairmen of the Russian and Ukrainian regulatory authorities met at the NRC in Washington, D.C., in July to agree on priorities for use of the funds. I am encouraged by the goals and priorities which the Russian and Ukrainian authorities have set for themselves, particularly their emphasis on having the analytic capability to do good safety analyses (such analytic capability is one of my themes this morning). We at the U.S. NRC will do everything we can to assist these efforts. We are fresh from some reforms of our own, which

just the past few months have been affirmed by the judicial and legislative branches of our government. We are continually working to upgrade our capabilities and to help other regulatory bodies around the world to do the same, so that we are all strong enough to assure that nuclear safety will get its due.

I turn now to my main subject. Future trends in nuclear regulation are difficult to predict because, among other reasons, those trends depend in part on the future of nuclear power, and the future of nuclear power depends in part on the shifting balance between two opposing forces, one the need for electric power, and other the public's fear of major accidents.

I know in part from my discussions with utility executives in the U.S., and in part from my trips to Indonesia, Japan, and Taiwan over the past year, how critical these times are for the utilities, because they must make momentous decisions soon if they are going to be able to meet future energy needs. A sign of the times is that several new nuclear power plant designs are in the works. In fact, the NRC has before it 8 new designs in various stages of review. And, as reported yesterday by Prof. Mishima, General Electric's Advanced Boiling Water Reactor is being built in Japan.

But it is too soon to predict with confidence the future of nuclear power. Thus, to the extent that the future of nuclear regulation depends on the future of nuclear power, it is also too soon to speak with confidence of the future of nuclear regulation. Therefore, I shall avoid the fortuneteller's crystal ball and speak here only of that part of the future of nuclear regulation about which we can speak with some confidence right now, namely, what regulators should strive for. I shall therefore be talking as much about goals as about trends. As I discuss these goals, you will note that I often stress the importance of independent professional judgment, especially judgment based on technical capability. Without it, exercised where the public can see it, we will be unable to reap the benefits of nuclear technology, or to calm public fears.

I see six mutually-supporting trends in the regulation of nuclear technology. My list of six is, I believe, cross-cultural. Though the outward trappings of regulation may vary from country to country, the inner core is much the same, wherever regulation is truly effective.

The first trend is that the regulatory presence around the world probably will continue to grow. For one thing, regulation of the safety of nuclear power is politically necessary -- the public will demand it for safety reasons. For another, regulation of the safety of any large engineering project, whether by government or by private power, is economically necessary. Buyers want to know the worth of their purchase, owners the value of their assets and liabilities, and insurers their risks. These people will ask questions, set standards, and demand performance.

But more important, regulation satisfies a *technical* need. A concern for safety is at the very heart of large engineering projects like nuclear power plants, bridges, airplanes, and the like, because failure in the engineering of these projects can spell disaster for public safety. In these projects, regulators, whether governmental or private, can provide some of the independent judgment to which

any major technical effort needs to be subjected. Of course, a regulator can provide that independent judgment only if the regulator has the necessary scientific and engineering capabilities.

For this reason, we must be cautious about efforts to increase the regulatory authority of international bodies. International bodies have played, and continue to play, important roles. However, technical expertise in nuclear technology is in short supply, and an international regulatory regime, if not properly structured, could drain national authorities of some of the resources they need to accomplish their missions. Effective regulation requires effective national regulators.

Second, there is a trend toward giving the regulator greater independence. A capable regulator with no power is useless. No doubt there are many different structures which could give a regulator the necessary independence, but I would wager that they have a common element, namely, that the regulatory body has the freedom to act according to the dictates of well-informed technical judgment.

Whatever the structure of the regulatory body, its independence will always be threatened unless it has technical capabilities which command respect. And this is as it should be, because an independent regulator with no capability is dangerous. The danger is great where ignorance has the force of law.

Third, although it may seem paradoxical, along with increasingly independent regulation, there is also a trend toward greater self-management by the industry. An independent, capable regulator is not enough for excellence in the nuclear industry. The ultimate responsibility for safety rests with the operators of plants.

Some members of the public may be comforted by the thought of a regulator which tells the industry exactly what to do and how to do it, and cracks the whip to make sure it gets done. But we don't want an industry run by slaves. Safety *requires* that the men and women who design, build, or operate nuclear power plants be independent-minded and capable, especially capable of setting high goals, and of finding ways to meet those goals, with each other's help. The great improvement in the nuclear industry in the United States over the past 10 years is, in a very large part, the work of just such people, and there will be no further improvement without such people.

Fourth, there is a trend toward less process-oriented and more goal-oriented regulation. This is a consequence of the trend toward a more independent industry. Less process-oriented regulation is necessary if the industry is going to be left room to innovate and achieve excellence. Such regulation is hard to do, in part because the public will press the regulator to tell licensees in precise detail how to do everything. Even the industry will sometimes press for more detail on how to achieve goals; sometimes it's comforting to be able to say, "We did everything the way you told us to do it."

Goal-oriented, performance-based regulations are difficult to implement also because they cannot always be stated quantitatively and so leave room for disagreement about what performance is required. Quantitatively stated regulation can bind the regulator as much as the regulated and can

guard against a regulator's suddenly changing the way it interprets a regulation. However, arbitrary behavior by either the regulator or the regulated is unlikely where both are technically capable and conduct their business with each other at arm's length, with mutual respect, and on the public record.

I can think of no better example of non-prescriptive regulation than the NRC's upcoming rule on the training of nuclear power plant personnel. It is hard to think of a matter more important to the safety of nuclear power than the training of plant personnel, especially the operators. They must be consummate professionals, prepared for the daily humdrum and the rare emergency alike, and possessed of a sound knowledge of the plant and where their job fits into it. Those who do not understand the *safety* value of an independent, largely self-managed industry might be tempted to think that there would be no better subject for voluminous and detailed regulations than the training of nuclear power plant personnel. However, the NRC has resisted the temptation to lay down detailed law in this area and instead has encouraged the continuing development of industry programs, especially those initiated by the Institute for Nuclear Power Operations (INPO), which has played a major role in the improvement in nuclear safety in the United States over the past 10 years. INPO's international counterpart, the World Association of Nuclear Operators (WANO), is offering some of your plants valuable assistance right now.

I do not mean to say that non-prescriptive regulation is all that is necessary for the industry to achieve excellence. At the risk of sounding paradoxical, I would say that the excellence of training in the industry in the U.S. is partly due to, among many things, the NRC's intense prodding on the issue, and partly due to the NRC's stepping back and leaving the industry lots of room. The industry would not be where it is today on training had the NRC not threatened onerous regulation, but neither would the industry be where it is today on training had the NRC not stepped back once the industry became thoroughly engaged in the pursuit of excellence. In fact, the example of training nicely illustrates the first four trends I've discussed this morning: the increasing regulatory presence, the independent regulator, the independent industry, and non-prescriptive regulation.

Fifth, there are some indications that regulators may be converging on a quantitative risk goal which could be used in the regulation of a large number of activities, both nuclear and non-nuclear. A quantitative risk goal would not be used to the exclusion of the hallowed principles of defense-in-depth, mitigation of accidents, and the like. But a quantitative risk goal would be helpful in establishing non-prescriptive standards, and it is essential to the rational allocation of resources in achieving optimum safety for a whole society. We cannot afford to expend resources on reducing insignificant risks when greater needs go unmet. The NRC took a major step toward the articulation of such a goal with the publication some years back of its Safety Goals. We continue to work toward effective implementation of those goals, and we are now actively working with other U.S. regulators, such as the Environmental Protection Agency, to see if we can reach some government-wide consensus on how to use risk assessment more effectively in regulatory activities. Of course, such goals cannot be established or implemented without great technical capability.

Sixth and last, there is increasing recognition of the importance of stability in the regulator. Stability has been one of the most important goals of our efforts in the United States on standardization and licensing reform. All of a regulator's accomplishments -- be they technical capability, independence,

non-prescriptiveness, or a generally applicable risk goal -- can be squandered in a moment by an ill-conceived change in ends or means. Once again, technical capability is a guard against our taking the wrong path, because technical capability is in part based on the lessons of that great school the past, and is therefore more settled in its judgment.

In conclusion, let me say that there is much at stake in how we regulate. Whether we like it or not, there will be a continuing regulatory presence. It is a presence that should be optimized for the most good. We in the United States look forward to working with the regulators in many nations toward the common good of our peoples.

Again, it is a pleasure to be with you at this third meeting of the Nuclear Society. I and my colleagues at the U.S. Nuclear Regulatory Commission wish you well in your endeavors.