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NEW DEVELOPMENTS IN INTERNATIONAL COOPERATION IN NUCLEAR REGULATION

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I am pleased to be able to join you today in discussing the international dimensions of the regulation of nuclear power. The subject is very appropriate so near to the 50th anniversary of the first controlled, self-sustaining, nuclear reaction, which took place only about four miles south of where we are meeting. 50 years ago this last Saturday, Enrico Fermi's team began laying down the graphite matrix which moderated the reaction, and only 18 days later, his team reached its historic goal. The reaction put out only about half a watt of power. Those present understood they were working toward a weapon, but some of the people present were already full of ideas for the commercial use of nuclear energy. The safety systems in Fermi's reactor were somewhat crude: There was no system for heat removal. There was no radiation shield. Three people stood on top of the graphite matrix with buckets of cadmium nitrate for use in an emergency. A striking sculpture by the great British sculptor Henry Moore now marks the site of this great event. Some believe that Moore's sculpture suggests more menace than promise in nuclear energy. The task of regulation is to help fulfill the promise, by helping to assure that the public is adequately protected.

The United States understood from the beginning that the use of nuclear materials, whether for war or for peace, was not just a national concern. Less than a year after World War II ended, then U.S. President Harry Truman instructed Bernard Baruch, the United States Representative to what was then called the United Nations Atomic Energy Commission, to negotiate toward the establishment of what Truman called the "Atomic Development Authority." This Authority was in conception far more radical than any suggestions we have heard over the past year for what an international nuclear safety convention should be. Truman's instructions to Baruch described the Atomic Development Authority as an international agency which would have "absolute dominion" over national nuclear authorities. It would control all supplies of uranium and thorium, conduct all weapons research, and assure that there were no stockpiles of nuclear weapons. Even in the civilian uses of nuclear materials, the Authority was to be supreme, leasing materials, allowing for the production of power

through licensing arrangements, and controlling the inspections conducted in connection with its licensing functions.

However, even Truman's radical instructions acknowledged that "it is necessary at all times to take advantage of the opportunity for promotion of *de*centralized ... national and private development and of avoiding unnecessary concentration of functions in the Authority." [Italics added.] We have ended up with far more national and private development than Truman and Baruch had wanted in 1946, but I for one am not persuaded that it was a bad thing that the Baruch plan was never implemented. The Atomic Development Authority might well have been too powerful for the common good.

Nonetheless, the United States has never ceased to believe that there is an international dimension to the regulation of the civilian uses of nuclear materials, particularly of nuclear power. Regulators cannot think in national terms alone. The effects of nuclear technology, particularly nuclear power, do not honor national boundaries. A major accident in one country can affect the health of citizens of other countries, and a poorly run plant anywhere lessens public confidence in nuclear plants everywhere. The design of nuclear power plants, the training of nuclear professionals, the buying and selling of nuclear technology, and the reporting of nuclear safety information all take place on an international scale. It is truly an international technology. For example, several nations, including Korea, Japan, Taiwan, France, Italy, and the Netherlands, have been working with the Electric Power Research Institute to compile the utilities' requirements for the new nuclear power plant designs, and our design certification procedures exclude no vendor on the grounds of nationality.

Nuclear professionals must exchange information and cooperate toward optimal solutions to the problems we face. The sponsors of the meetings in which we are participating have for many years been making significant contributions to this exchange. The IAEA and NEA have done an outstanding job of serving as excellent fora for this exchange. I am pleased to be able to say that we at the NRC are increasing our efforts in international cooperation. We are sending NRC staff in increasing numbers to many countries, and we will be establishing a semi-permanent presence abroad in some cases. This past year, we have embarked on important efforts to help Russia, Ukraine, the Czech and Slovak Federal Republic, Hungary, and Indonesia strengthen their regulatory bodies. Since the Nuclear Regulatory Commission was established in 1975, more than 200 citizens from 26 other nations have come to the agency for assignments lasting from two months to two years. There have been times this year when there have been as many as eleven individuals at one time at the agency on such assignments, and there may soon be even more. Efforts such as these will go a long way toward establishing an international consensus on nuclear safety, a consensus with a good deal of practical force, and one worthy of the public's confidence.

I would like to discuss briefly two elements I discern in what I believe is a growing international consensus on nuclear safety. Now that the expert working groups on an international nuclear safety convention are concluding their work and formal negotiations on the convention are about to begin, it would be well to take stock of what we are already achieving internationally. Doing so will help us see more clearly what we can hope to achieve by entering into such a convention. One of the two

elements of consensus I will discuss today has to do with the nature of the regulator, and the other has to do with the nature of the regulation.

The first element I believe we are coming increasingly to agree on is that the regulator must be independent. A capable regulator with no power is useless. However, this independence is more a matter of knowledge than of law. The United States Atomic Energy Act declares that the Commissioners of the Nuclear Regulatory Commission shall serve for fixed terms rather than at the pleasure of the President, but this framework is neither necessary, nor even sufficient, for independence in a regulator. As the late U.S. Supreme Court Justice Felix Frankfurter said of the Interstate Commerce Commission, which is one of the oldest U.S. agencies headed by officers who do not serve at the pleasure of the President, "Independence must be asserted, it cannot be conferred, it cannot be granted."

Whatever the legal structure of the regulatory body, its independence will always be threatened unless it has capabilities which command respect. And this is as it should be, because an independent regulator with no capability is dangerous. The regulatory body must have the freedom to act according to the dictates of well-informed technical judgement, but one way the regulator can acquire the necessary freedom is to *exercise* well-informed technical judgement.

Independence and the sound technical judgment on which it rests encourage two other virtues which contribute to safety. One of these is stability. Sound technical judgment relies in part on the often harsh lessons of experience, especially the engineering failures which are part of that experience, and from which we often learn more than we do from our successes. A regulatory body which attends to the lessons of experience is often less likely to change policy radically. For instance, the independent regulator will insist that the industry not neglect the lessons of experience. The regulator will thus reduce the need for backfitting, which is a great source of instability.

Another virtue which independent technical judgement in a regulator encourages is respect for the knowledge and innovative power of the nuclear industry. Professionals respect the accomplishments and capabilities of their fellow professionals, but they also respect the limits of their own capabilities. Professionals in regulatory agencies are therefore likely to know that, although in carrying out their responsibilities they can make a great contribution to safety in design and operation, the greatest and most far-reaching innovations are likely to come from their colleagues in industry. Regulators must be ready to make room for innovations. If we have the necessary analytic capabilities, we are more likely to have the confidence to make an independent assessment of the value of innovations. If we insist on the old things because we don't know what to make of the new ones, we will cut off one source of increased safety.

Here then is one reason why we must be extremely cautious about any effort to increase the regulatory authority of international bodies. Consider a domestic analogy: One can imagine arguments for putting under one roof all federal agencies which regulate for the sake of health and safety or the environment. For example, such a superagency might be more likely to take a comparative risk approach and bring a greater sense of proportion and priorities to the safety regulation of a wide range of activities. However, in such a superagency, the safety of nuclear power

might suffer from lack of attention and resources. Similarly in the international context: Effective regulation of safety requires effective national regulators, but 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.

I want to discuss now a second element of what I believe is a growing international consensus on nuclear safety. There are some indications that regulators may be converging, seemingly unintentionally, on a quantitative risk goal which could be used in the regulation of a large number of activities, both nuclear and non-nuclear. For instance, just taking the NRC alone, I have calculated that our safety goals, reactor site criteria, low-level waste disposal criteria, ill-fated BRC criteria, and some of our radiation protection standards all imply an annual individual risk of cancer fatality somewhere in the range of 10E-5 to 10E-6, even though these various criteria were established at different times, for different purposes, by different people, using different terminologies. I found more evidence of convergence in reports last month that British regulators plan to require of new nuclear power plants that the annual individual risk of fatality from operations be no greater than 10E-5 annually.

A quantitative risk goal should 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 standards which leave the industry room for innovation. Just as important, risk goals are 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 quantitative risk goals 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 approach risk. Of course, such goals cannot be established or implemented without great technical capability. And so, once again, technical capability is at the foundation of the growing international consensus. Without such capability, regulators can be neither independent nor coherent.

What then can we hope for from an international nuclear safety convention? For instance, it is too soon to write a quantitative risk goal in stone. The discussions and airing of the many issues connected with risk assessment must proceed unhindered by premature law. Also, an international convention must not incorporate highly detailed deterministic standards, not if it is to last. Here we can learn from fundamental legal documents such as the United States Constitution. The language of any nuclear safety convention must be general enough to attract assent, and flexible enough to be useful in unforseen circumstances and not a discouragement to technical innovation. Also, a convention which would enable an international institution to shut down ailing plants probably would not be acceptable to many nations, and I am by no means sure that we should want to be able to draft such a convention. In these circumstances, given a choice between writing a convention which merely tells plants in trouble what they ought to be doing, or directing more expertise and money toward those plants, I would opt for the latter. To set down all the "oughts" without helping to provide the means for their realization would neither guarantee greater safety in plant operations nor inspire greater confidence on the part of the general public.

However, the convention which seems likely to emerge over the next year will, I believe, not merely say what ought to be done. We have reason to hope that the mechanisms the convention may establish will facilitate the present trend of increasing international coordination and consultation among persons and institutions, and that the convention will thereby increase the likelihood that skilled people will be in positions of national authority and will have the resources they need to accomplish their missions. This is what we should aim for, whether we are drafting a convention, or arranging a program of aid.

Thank you for providing me an opportunity to make these remarks. I look forward to the discussion.