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RESEARCH: THE VISION AND NEEDS OF REGULATORS

by

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at the

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I am pleased to participate today in this discussion of research. As it happens, this is an issue that has received very careful and recent attention in the U.S. The Nuclear Regulatory Commission (NRC) has recently received a thoughtful report on the research program by a panel chaired by former Commissioner Rogers and has benefitted by an analysis of NRC research activities by the Advisory Committee on Reactor Safeguards. This meeting is timely because we are considering these reports very carefully in the budget process that is now underway.

I will focus my comments on three questions: Why should a regulator support research? What types of research should be undertaken? And what is the role for international cooperation in research?

Why Support Research?

Some in this audience may wonder why this question should even be asked. As it happens, some licensees have raised questions about the need for NRC-sponsored research. This is a natural and appropriate question, in my view, because our licensees are required to pay most of the costs of NRC

activities through fees and they have a legitimate interest in assuring that funds are appropriately expended.

The fact that the question has been asked, however, reflects a failure by the agency to explain adequately the nature of and rationale for NRC-sponsored research. Some research sponsored by the Government is performed in order to answer fundamental scientific questions that have no immediately obvious practical application. NRC research is distinctly not of this kind. Rather, NRC-sponsored research is aimed at providing comprehensive knowledge or understanding to meet a recognized or anticipated need: application of the knowledge to a practical problem is the justification for the work. More specifically, the practical problems that are addressed by the NRC's research program relate to the need to develop and maintain a solid technical foundation for the NRC's regulatory policies.

The value of this work is perhaps best revealed by arraying the contributions from past NRC-sponsored research. As you may know, a major emphasis of the NRC in recent years has been the application of risk insights to improve our regulatory program. This effort holds the promise of both improving safety and reducing needless regulatory burden. The underpinnings for the effort is the tool of probabilistic risk assessment -- a tool that has had significant development as a research project by the NRC and its predecessor, the Atomic Energy Commission, and now provides the foundation for the analysis of reactor safety around the world. Other examples of important past research include the studies on nuclear plant aging, which have helped form the technical basis for the NRC's license renewal efforts; development of a new and more realistic source term, which is protective of public health and safety and also reduces regulatory burden; and the NRC's thermal-hydraulics research program, which has developed computer codes such as RELAP and TRAC that are widely used around the world for reactor safety analyses.

My fundamental point is that virtually every major new initiative that the agency has undertaken over the past few years -- license renewal, risk-informed regulation, design certification of advanced reactor designs, assessment of digital instrumentation and control systems, steam generator tube integrity programs, the new source term, and many other examples--has required technical guidance from our research program. And issues now upon the agency demonstrate the need for further related research. For example, research is needed to respond to industry interest in new types of reactors (such as the helium-cooled reactors), to handle applications for higher burnup of fuel and for power uprates, and to deal with materials issues associated with extended terms of reactor operation. In short, an active research program is a fundamental need for the agency.

What Types of Research Should Be Funded?

As I have already indicated, NRC research is launched in order to meet a known or anticipated regulatory need. There are two subcategories of research that require separate consideration: confirmatory research and anticipatory research. Confirmatory research enables the agency to respond to license applications that are now before the agency or that are anticipated to come before the agency in the future–usually the near future. This type of research supports the NRC's front-line regulatory activities and is usually conducted at the request of the offices that are directly responsible for regulatory oversight–our Offices of Nuclear Reactor Regulation and Nuclear Materials Safety and Safeguards. Criteria for conducting confirmatory research include, for example, the need for independent, confirmatory information on safety issues involving fundamental or crucial barriers, such as fuel or fuel cladding, the absence of independent, confirmatory information on new technology or new designs, and the degree of uncertainty in our knowledge.

The NRC also conducts research programs that are more in the distance, research related to evolving technologies or issues that may become important regulatory concerns in the future. Some of this work may also be confirmatory in nature, providing independent assessment of information developed by the nuclear industry, but much of it is what we refer to as "anticipatory" research. These types of programs may not have been requested by our regulatory offices. Rather, this work arises from the examination of industry trends and an effort to try to foresee where the NRC may need information to respond to future regulatory issues. If we wait until these potential issues become actual regulatory concerns, it may be too late to develop the technical information to respond to them in a timely fashion. Thus the need for forward-looking programs.

I should note that the usefulness of anticipatory research may not become apparent for many years after the initiation of the research. A case in point is the NRC's work on probabilistic risk assessment. Work in this area actually predated the NRC – it was initiated in the early 1970s by the old Atomic Energy Commission and was taken over by the NRC when the agency came into being in 1975. Although the NRC gradually increased its use of PRAs in its regulatory activities, it was not until the mid-1990s, more than 20 years after the initial research, that the NRC embarked on a comprehensive effort to risk-inform elements of our regulatory processes. A similar example is the agency's work on pressurized thermal shock, which was conducted long before the program offices were aware of the regulatory need. Although support for anticipatory research may occasionally lead to blind alleys, a thoughtful approach to research planning for the long term is likely to result in benefits that far outweigh the costs.

The challenge is to maintain an appropriate balance between confirmatory and anticipatory research. It is easy to allow anticipatory research to diminish, particularly in a time of declining budgets, because it is easier to justify the need for confirmatory research. But, as my examples have indicated, the failure of the research organization to look over the horizon to prepare for problems that are not yet apparent to the program offices is a critical need for a regulator.

I should add that the recent evaluation by the outside panel reached the conclusion that the allocation of funds for anticipatory research at the NRC has grown too small. This is an issue that we will need to examine in our ongoing budget review.

<u>What Is the Role for International Cooperation in Research?</u>

It is my view that the NRC must seek international cooperation in research for several reasons.

One reason arises from the harsh reality of budget stringency. The NRC's research budget has declined from over $200 million in the early 1980s to just $40 million in FY 2001, before adjustment for inflation. We are aware that other countries have suffered similar reductions on their programs. There thus is a continuing value in leveraging funds by collaboration on research programs in which there is bilateral or multilateral interest. All participants in such programs benefit from the pooling of resources and the realization of greater efficiencies. The value to each individual participant is much greater than that party's contribution.

Saving money is not the sole purpose for conducting international cooperative research. We recognize that many of our research partners have unique facilities. International collaboration provides broader access to such capabilities. One need only look at the international scope of the testing and analysis that was carried out on reactor thermal-hydraulics in facilities of different scales and capabilities throughout the world -- the Large Scale Test Facility in Japan, BETHSY in France, SPES

in Italy, and Semiscale and LOFT in the U.S. The computational tools that are available today for reactor safety analyses are based on data from these and other test facilities too numerous to list. And the diversity of these testing and analysis programs is also a significant advantage because it promotes both depth and breadth in the available research results.

Another benefit of international cooperation and collaboration is the magnification of intellectual firepower that comes from interactions among a broad set of researchers. The ability to learn from each other and to bring those new insights to bear on issues of reactor safety is invaluable. International cooperation thus improves our understanding of reactor safety issues and contributes to better reactor safety performance, thereby strengthening us all.

Conclusion

Let me conclude simply by noting that I view a strong research program as a central feature of a sound regulatory system. There are challenges in sustaining such activity, particularly in the need to maintain an appropriate balance between confirmatory and anticipatory research. The enhancement of international cooperation in research is essential.

Thank you.